APPENDIX A
Supplemental Remedial Investigation Technical Memorandums

Annotated Table of Contents for Appendix A for the Everett Smelter Lowland Area Supplemental Remedial Investigation

The following is an annotated table of contents for technical memorandums prepared as part of the supplemental remedial investigation (SRI) of the Everett Smelter Lowland Area. The following summary identifies the investigation activities described in each memorandum that were used in the SRI. Each memorandum prepared as part of the SRI includes the laboratory analytical data report(s) for samples collected as part of the identified investigation activities and the results of a data quality review of analytical results.

May 7, 2012 - Groundwater Monitoring Technical Memorandum, Lowland Area – Benson Property

This technical memorandum summarizes investigation activities at the Everett Smelter Lowland Area Benson Subarea performed in December 2011 and January 2012. Investigation activities included the following:

- Installation of 20 groundwater monitoring well pairs (10 "shallow" wells and 10 "deep" wells) along the east side of the Benson Subarea (BP-01 S/D through BP-10 S/D).
- Soil sample collection from each deep well boring completed during the monitoring well installation.
- Soil sample analysis for metals.
- Monitoring well development.

July 25, 2012 - Groundwater Monitoring Technical Memorandum, Lowland Area – Benson Property

This technical memorandum summarizes investigation activities at the Everett Smelter Lowland Area Benson Subarea on June 4 and 11, 2012. Investigation activities included the following:

- Development of three existing groundwater monitoring wells (EV-20B, EV-22A and EV-22B).

May 15, 2013 - Monitoring Well Installation Technical Memorandum, Lowland Area

This memorandum summarizes investigation activities completed at the Everett Smelter Lowland Area in December 2012 and January 2013. Investigation activities included the following:

- Installation of 54 groundwater monitoring wells (23 "shallow" wells, 30 "deep" wells and one "deeper deep" well) throughout the Lowland Area including:
    - Forty-six monitoring wells were installed in shallow/deep well pairs at twenty three locations.
    - Seven wells were installed as deep wells, either adjacent to existing shallow wells or where shallow groundwater was not encountered.
    - One deeper, deep well (BP-05D2) was installed adjacent to an existing shallow/deep well pair (BP-05S/D) on the Benson Property.
- Installation of three soil borings.
- Soil sample collection during the monitoring well and soil boring installation.

- Soil sample analysis for metals.
- Monitoring well development.

June 25, 2013 - Snohomish River Sediment, Seep and Outfall Sampling Technical Memorandum, Lowland Area

This memorandum summarizes investigation activities completed at the Everett Smelter Lowland Area on April 26, 29 and 30, 2013. Investigation activities included the following:

- Collection of seep and outfall water and sediment samples from 10 locations on the Snohomish River shoreline in the Lowland Area.
- Analysis of the water and sediment samples for metals.

July 16, 2013 - Lowland Area Groundwater, Surface Water and Sediment Technical Memorandum (Quarter 1)

This memorandum summarizes investigation activities completed at the Everett Smelter Lowland Area in January through March 2013. Investigation activities included the following:

- Collection of groundwater samples from 87 monitoring wells.
- Groundwater sample analysis for metals.
- Collection of surface water and sediment samples from four locations in the Lowland Area.
- Surface water and sediment sample analysis for metals.
- Hydraulic conductivity testing.
- Tidal study.

June 27, 2013 - Lowland Area Surface Soil Sample Collection Technical Memorandum

This memorandum summarizes investigation activities completed at the Everett Smelter Lowland Area on May 24, 2013. Investigation activities included the following:

- Collection of six surface soil samples at the base of the slope adjacent to East Marine View Drive.
- Surface soil sample analyses for metals.

June 28, 2013 - Lowland Area Groundwater and Surface Water Technical Memorandum (Quarter 2)

This memorandum summarizes investigation activities completed at the Everett Smelter Lowland Area in April and May 2013. Investigation activities included the following:

- Collection of groundwater sample from 87 monitoring wells.
- Groundwater sample analysis for metals and arsenic speciation.
- Collection of surface water samples from four locations in the Lowland Area.

- Surface Water sample analysis for metals and arsenic speciation.

October 18, 2013 - August 2013 Monitoring Well Installation Memorandum

This memorandum summarizes investigation activities completed at the Everett Smelter Lowland Area in August 2013. Investigation activities included the following:

- Installation of four groundwater monitoring wells [two "deep" wells (LLMW-35D and LLMW-36D) and two "deeper deep" wells (BP-04D2 and BP-07D2)].
- Soil sample collection during monitoring well installation.
- Soil sample analysis for metals.

October 31, 2013 - August/September 2013 Groundwater Sampling Memorandum (Quarter 3)

This memorandum summarizes investigation activities completed at the Everett Smelter Lowland Area in August and September 2013. Investigation activities included the following:

- Monitoring well development.
- Collection of groundwater samples from 91 monitoring wells.
- Collection of surface water samples from two locations in the Lowland Area.
- Groundwater and surface water sample analysis for metals, arsenic speciation and conventionals.

January 15, 2014 – October/November 2013 Groundwater Sampling Memorandum (Quarter 4)

This memorandum summarizes investigation activities completed at the Everett Smelter Lowland Area in October through November 2013. Investigation activities included the following:

- Collection of groundwater samples from 91 monitoring wells.
- Collection of surface water samples from two locations in the Lowland Area.
- Groundwater and surface water sample analysis for metals, arsenic speciation and conventionals.
- Tidal study.

November 17, 2014 - 2014 Focused Source Area Investigation Results

This technical memorandum summarizes investigation activities at the Everett Smelter Lowland Area Benson Subarea performed in March and April 2014. Investigation activities included the following:

- Installation of 44 soil borings in the Marine View Drive Right-of-Way (LLSB-04 through LLSB-47).
- Soil sample collection from each boring.
- Soil sample analysis for metals.

- Synthetic Precipitation Leaching Procedure (SPLP) testing for arsenic.
- Column leaching tests for arsenic.
- Permeameter testing.

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Final
Groundwater Monitoring Technical Memorandum

Everett Smelter Cleanup Site
FSID 2744, ISIS Cleanup Site ID 4298

Lowland Area – Benson Property
Everett, Washington

for
Washington State Department of Ecology

May 7, 2012

GeoEngineers
Earth Science + Technology

GeoEngineers

Final
Groundwater Monitoring
Technical Memorandum

Everett Smelter Cleanup Site
FSID 2744, ISIS Cleanup Site ID 4298

Lowland Area – Benson Property
Everett, Washington

for
Washington State Department of Ecology

May 7, 2012

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Final
Groundwater Monitoring
Technical Memorandum

Everett Smelter Cleanup Site
FSID 2744, ISIS Cleanup Site ID 4298

Lowland Area – Benson Property
Everett, Washington

Project No. 0504-068-00

May 7, 2012

Prepared for:

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1.0 INTRODUCTION

This technical memorandum summarizes field investigation activities at the Everett Smelter Lowland Area – Benson Property Site generally located at 501 East Marine View Drive in Everett, Washington (Figure 1). The Benson Property includes three contiguous property parcels east of East Marine View Drive, North Broadway/Pacific Highway, and the Weyerhaeuser Bridge Road (Figure 2). The Benson Property Site includes the three property parcels in addition to the adjacent City of Everett and Washington State Department of Transportation rights-of-ways.

The Benson Property Site is located within the Everett Smelter Cleanup Site. The Everett Smelter Cleanup Site has been divided into an Upland Area and Lowland Area. The Benson Property Site is a sub-area of the Lowland Area. Slag resulting from former smelter activities in the Upland Area was historically deposited on the Benson Property Site. Additionally, contaminants from smelting activities have been or likely have been transported to the Benson Property Site via groundwater, air, soil, and possibly surface water transport pathways.

The current owner of the Benson Property Site is filling a portion of the Site in preparation for development of the property. The filling activities will cover the existing soil surface and slag previously identified at the Site. Fill materials are being placed over the existing surface to raise the elevations to match the adjacent East Marine View Drive. The fill thickness is expected to be approximately 34 feet. The thickness around the perimeter of the fill area will taper off to zero at the current elevations.

The purpose of the current study was to characterize metals concentrations in soil and groundwater on the eastern boundary of the Benson Property Site. Soil boring, soil sampling and analysis, monitoring well installation, and groundwater sampling and analysis were performed to characterize metals concentrations in soil and groundwater on the eastern boundary of the Site and east of the area to be filled. Supplemental soil analysis for total petroleum hydrocarbons and semivolatile organic compound (SVOC) analysis was completed in response to sheen observed in the field during well installation. The activities were performed in general accordance with the Sampling and Analysis Plan (SAP), Quality Assurance Project Plan (QAPP) and Health and Safety Plan (HASP) for the project dated October 26, 2011 (GeoEngineers, 2011).

1.1. Site History and Background

Historical activities within the Everett Smelter Cleanup Site included smelting and refinement of metal ores on a portion of the Site from the mid 1890s until plant demolition in 1912. The historic smelting operation, which included an arsenic extraction plant, resulted in the release of metals including arsenic and lead to the soil, groundwater, and air. Slag was historically poured down the bluff located on the east side of the Everett Smelter Site and onto the adjacent tideflats which is now the Benson Property Site.

Groundwater monitoring at the Benson Property Site during the 1990s identified metals at concentrations greater than screening levels as a result of smelting activities. The arsenic extraction plant and arsenic trioxide processing area location underwent environmental cleanup from 2004 to 2006 to remove soil contaminated by smelter operations. The cleanup area did not

generally include existing road rights-of-ways east of the former arsenic extraction plant. Groundwater sampling and analysis to characterize metals concentrations at the Benson Property Site had not been performed since cleanup of the former arsenic trioxide processing area.

2.0 FIELD INVESTIGATION

2.1. Soil Sampling and Monitoring Well Installation

Investigation activities included installation of 20 groundwater monitoring wells (10 "shallow" wells and 10 "deep" wells) along the east side of the Benson Property Site using a truck-mounted, hollow-stem auger (HSA) drill rig. The monitoring wells were installed in pairs at ten locations as shown on Figure 3. The shallow and deep wells in each pair are spaced approximately 4 feet to 5 feet apart. Soil samples were collected from each deep well boring completed during the monitoring well installation.

The investigation locations were chosen to characterize metals concentrations in soil and groundwater on the eastern boundary of the Benson Property and east of the area to be filled. Before drilling, a licensed surveyor marked the property line between the Benson Property and adjacent BNSF property and also marked the proposed investigation locations, which were all confirmed to be located approximately 5 feet west of the property line. The monitoring well installations were completed between December 27, 2011 and January 6, 2012. The horizontal coordinates of the well location and vertical elevation of each well were surveyed after well installation was completed. Four concrete Ecology blocks were placed around each well pair for protection from equipment and/or fill placement.

In general accordance with the objectives of the SAP, the shallow wells (BP-01S through BP-10S) were installed in what previous investigations of the Everett Smelter Area characterize as the "shallow aquifer." The top of the well screens were installed at approximately 3 feet below ground surface (bgs) and the bottom of the well screens were installed at between approximately 9 feet to 14 feet bgs. The bottom of the well screens for the shallow wells were installed approximately 1 foot above the historic native surface of the silt/channel deposits. A minimum 5-foot long well screen was desired for the shallow wells and the shallow well screens ranged from approximately 5.5 feet to 10 feet long.

Deep wells (BP-01D through BP-10D) were installed in what previous investigations of the Everett Smelter Area characterize as the "deep aquifer." The top of the well screens were installed at approximately 21 feet to 23 feet bgs and the bottom of the well screens were installed at between approximately 30 feet to 35 feet bgs. All deep well screens were ten feet long and the wells were installed with a 1-foot long "sump" at the bottom to provide for potential settling of sediments. The deep well screens were installed with a minimum 1-foot separation between the bottom of the silt/channel deposits and the top of the well screens.

All borings were logged by a professional geologist and the wells were installed by a licensed driller in general accordance with Washington Administrative Code (WAC) 173-160. Wells were constructed of 2-inch-diameter PVC with stick-up monuments. Monitoring well logs are provided in Appendix A. The survey data for the wells is included as Appendix B.

Continuous soil samples were collected from each boring advanced to install the deep wells using a split-spoon sampler (i.e., Standard Penetration Test sampler or "California spoon" sampler). Soil samples were not collected from the borings advanced to install the shallow wells since they were co-located with the deep wells. Decisions regarding well construction details for shallow wells were based on soil observed in the adjacent deep well. Field screening was generally completed as described in the SAP (GeoEngineers, 2011), and one soil sample was collected from each deep well in each of the following five soil horizons:

- Fill comprising the shallow aquifer;
- Historic native surface (i.e., the top of the native silt/channel deposits);
- From deeper within the native silt/channel deposits;
- Soil comprising the upper portion of the deep aquifer (alluvium); and
- Soil from deeper within the deep aquifer (alluvium) that was within the elevation where the well screen was installed.

A total of 55 soil samples (50 parent and five field duplicates) were collected, logged on a chain-of-custody form in general accordance with the QAPP and placed in laboratory-supplied jars and stored in coolers on ice for transport and delivery to the analytical laboratory. Samples were collected for total metals analyses including antimony, arsenic, cadmium, lead, mercury, and thallium by Environmental Protection Agency (EPA) Methods 6010, 200.8 (i.e., thallium), and 7470 (i.e., mercury).

During the soil sampling, petroleum sheens (slight sheens) and/or odors were identified in soil representative of the fill that comprises the shallow aquifer at BP-03D, BP-05D, BP-07D, and BP-09D. Therefore, in consultation to Ecology, additional samples representing the suspect fill from BP-03D, BP-05D, BP-07D, and BP-09D was submitted for analysis of diesel- and oil-range petroleum hydrocarbons by Northwest Total Petroleum Hydrocarbons Method NWTPH-Dx and SVOCs by EPA Method 8270.

All of the soil samples collected were submitted to Analytical Resources, Inc. (ARI) in Tukwila, Washington for chemical analysis.

2.2. Monitoring Well Development and Groundwater Monitoring

2.2.1. Monitoring Well Development

The monitoring wells were developed on January 11, 12, and 13, 2012. Well development was completed to remove water introduced into the well during drilling, stabilize the filter pack and formation materials surrounding the well screen and restore the hydraulic connection between the well screen and the surrounding soil. Each well screen interval was gently surged with a decontaminated bailer and groundwater in the well was removed using a dedicated, submersible pump and tubing. Approximately 20 gallons of water was removed from each well at a rate of approximately 20 gallons per hour. The initial turbidity readings of water removed from the wells during development were greater than 1,000 Nephelometric turbidity units (NTUs) and final turbidity readings ranged from 73.3 NTUs to 375 NTUs.

2.2.2. Groundwater Monitoring

Groundwater sample collection was completed on January 25, 26 and 27, 2012. Groundwater elevations were measured and recorded prior to sampling using an electronic water level indicator.

Groundwater purging and sample collection was completed using low-flow/low-turbidity sampling techniques to minimize the suspension of sediment in the samples. The wells were purged and groundwater samples were obtained from the wells using dedicated well pumps and polyethylene tubing. Groundwater was purged from the wells at a rate of approximately 0.5 liters per minute. A Horiba U-22 water quality measuring system with a flow-through cell was used to monitor water quality parameters during purging that included electrical conductivity, dissolved oxygen, pH, salinity, total dissolved solids, oxidation-reduction potential, and temperature. Turbidity was measured using a Hach turbidimeter. Samples were collected from the wells after the measured values for the water quality parameters varied by less than 10 percent on three consecutive measurements. The stabilized field measurements were documented on the field logs.

Following completion of well purging, the flow-through cell was disconnected and groundwater samples were collected in laboratory-prepared containers. A total of 21 groundwater samples (20 parent and one duplicate sample) were collected for total and dissolved metals analysis including antimony, arsenic, cadmium, lead, mercury, and thallium by EPA Methods 6010, 200.8 (i.e., thallium), and 7470 (i.e., mercury). Samples that were collected for dissolved metals analysis were filtered in the field using a 0.45-micron filter.

As a result of the observed sheen and odor at locations BP-03S, BP-05S, BP-07S, and BP-09S, groundwater samples were also submitted for analysis of diesel- and oil-range petroleum hydrocarbon analysis (i.e., Method NWTPH-Dx) and SVOCs. (i.e., EPA Method 8270).

Immediately following sample collection, the groundwater samples were logged on the chain-of-custody and placed in coolers on ice for transport and delivery to the analytical laboratory. The samples were submitted to ARI for analysis.

2.3. Decontamination

Drilling and non-disposable sampling equipment was decontaminated using the procedures specified in the QAPP (GeoEngineers, 2011).

2.4. Disposal of Investigation-Derived Materials

Soil cuttings from borings advanced for soil sampling and monitoring well installation were placed in labeled and sealed 55-gallon drums. Development and purge water removed from the monitoring wells and decontamination water generated during all sampling activities was also placed in labeled and sealed 55-gallon drums. All drummed investigation derived waste is stored on the Benson Property Site in the general vicinity of the investigation locations/monitoring well pairs awaiting future disposal. Incidental waste (i.e., gloves, paper towels, etc.) were disposed of off site as solid waste.

2.5. Deviations From The SAP

Field activities were performed in general accordance with the SAP, QAPP and HASP, with the exceptions listed below. All deviations were discussed with and approved by a representative of Ecology prior to implementation. Deviations included the following:

- Monitoring well pairs at BP-01S and BP-01D, BP-09S and BP-09D, and BP-10S and BP-10D were completed approximately 60 feet south of their proposed locations.
- Four supplemental soil samples were collected from the fill horizon and analyzed for petroleum hydrocarbons and SVOCs based on field screening that indicated the presence of sheen on the soil.
- Four supplemental groundwater samples were collected from the fill horizon from wells installed in the shallow aquifer and analyzed for petroleum hydrocarbons and SVOCs based on field screening that indicated the presence of sheen on soil from the fill horizon.
- The SAP indicated that bailers would be used to develop the groundwater monitoring wells. However, the monitoring wells were developed using groundwater pumps as well as bailers.

3.0 RESULTS

3.1. Observed Stratigraphy and Subsurface Conditions

In general, soils encountered were similar to what has been described in previous investigations of the Lowland Area. Approximately 10 feet to 15 feet of fill was observed at the surface of the Benson Property Site (i.e., 15 feet of fill was observed in BP-09D). Fill predominantly consisted of wet, soft/loose silty sands to silts with occasional wood and debris such as glass, metal debris, and concrete. Slag comprised a small percentage of the fill at BP-02D, BP-03D, BP-05D and BP-06D. Slag comprised the majority of fill present at BP-04D between approximately 1.5 to 9.5 feet bgs. Groundwater was encountered at less than 1 foot to approximately 2 feet bgs at the time of drilling.

The historic native surface of the silt deposits was identified beneath the fill and was typically evident as a layer of silt, silt with organics, and/or peat. However, channel deposits replacing the silt may have been encountered in BP-10D. The historic native surface comprised the top of what has been described as an organic-rich silt which forms a confining layer between the shallow aquifer and underlying deep aquifer, where present. The confining layer silt/channel deposits were generally observed to be between approximately 10 feet and 13 feet thick except at BP-09D where the silt was observed to be approximately 4 feet thick.

Wet, loose to medium dense sand was observed beneath the bottom of the confining layer silt and/or channel deposits to the full depth of the completed borings. The sand present beneath the confining layer is interpreted to represent the deep aquifer comprised of alluvium that has been described in previous investigations.

3.2. Data Validation

A data quality assessment was performed on all data in general conformance with an EPA "Stage-2B" validation. Data quality assessment reports for soil and groundwater are provided in

Appendix C. The laboratory analytical reports are provided in Appendix D. The data were deemed acceptable for use as qualified with several exceptions:

- The analytical data for the acid fraction compounds (i.e., phenols, benzoic acid, and benzyl alcohol) in one soil sample (BP-05-120103-6-7). The data for the acid fraction compounds in sample BP-05-120103-6-7 was rejected due to low surrogate recoveries as a result of matrix interference.
- The analytical data for 3,3'-dichlorobenzidiene in one groundwater sample (BP5S-120127-W). The data for 3,3'-dichlorobenzidiene in sample BP5S-120127-W was rejected due to low surrogate recoveries as a result of matrix interference.

3.3. Soil Analytical Results

Fifty-five soil samples collected from the borings advanced to install the ten deep monitoring wells were submitted for metals analysis (i.e., antimony, arsenic, cadmium, lead, mercury and thallium). Additionally, four samples were collected and submitted for analysis of diesel- and oil-range petroleum hydrocarbons and SVOCs.

Results for metals in soil are presented in Table 1. The results presented in Table 1 are compared to Model Toxics Control Act (MTCA) Method A, Method B or background for the purpose of screening the data relative to established Ecology benchmarks.

The following summarizes the results for soil samples:

- Antimony was detected in the soil sample collected from the shallow aquifer at BP-05D at a concentration of 110 milligrams per kilogram (mg/kg) which is greater than the MTCA Method B value of 32 mg/kg. Antimony was not detected in any other soil samples.
- Arsenic was detected in most samples at concentrations ranging from less than the MTCA Method A value (20 mg/kg) based on soil background concentrations in Washington State to 875 mg/kg. In general, the highest soil arsenic concentrations were located in the fill layer as well as at the historic native surface of the silt/channel deposits, particularly at BP-03D through BP-05D which are within the aerial extent of slag as shown on Figure 4. Arsenic concentrations in soil from beneath the silt/channel deposits were less than the MTCA Method A value except at BP-05D and BP-06D. The samples collected from the deep aquifer in BP-05D and BP-06D contained arsenic at concentrations ranging from approximately 41 mg/kg to 396 mg/kg. Arsenic concentrations were less than the MTCA Method A value in soil from the silt/channel deposits between the fill layer and the deep aquifer soil except in two locations (i.e., BP-08D - 23mg/kg and BP-10D - 30 mg/kg).
- Cadmium was detected in over half of the soil samples at concentrations ranging from less than the MTCA Method A value (2 mg/kg) to 8.4 mg/kg. Cadmium concentrations were higher in samples collected from the fill as well as the historic native surface of the silt/channel deposits and in samples with higher lead and/or arsenic concentrations. Soil with cadmium concentrations greater than the MTCA Method A value were detected in samples collected from the fill and historic native surface of the silt/channel deposits within the aerial extent of slag.

- Lead was detected in most samples at concentrations ranging from less than the MTCA Method A value (250 mg/kg) to 8,250 mg/kg. Lead concentrations that were greater than the MTCA Method A value were located in the fill as well as the historic native surface of the silt/channel deposits and predominantly in the aerial extent of slag in BP-03D through BP-05D as shown on Figure 5.
- Mercury was detected at concentrations less than the MTCA Method A value of 2 mg/kg in all of the samples analyzed.
- Thallium was not detected in any of the soil samples analyzed.

Results from the petroleum hydrocarbon and SVOC analyses are presented in Table 2 compared to MTCA Method A or B values for purpose of screening the data relative to established Ecology benchmarks:

- Diesel- and/or oil-range petroleum hydrocarbons were detected in the four samples, at concentrations ranging from less than the MTCA Method A value (2,000 mg/kg) to 7,600 mg/kg. Diesel and/or oil exceeded the MTCA value at BP-03D and BP-05D at depths up to 6 feet bgs.
- Multiple polycyclic aromatic hydrocarbons (PAHs) were detected in each sample. Benzo(a)pyrene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene and the total carcinogenic PAHs exceeded the MTCA Method A and B values in one more samples collected from BP-03D, BP-05D, BP-07D and BP-09D.
- Other SVOCs were either not detected or were detected at concentrations less than MTCA Method A and B values.

3.4. Groundwater

Twenty-one groundwater samples that were collected from 10 shallow aquifer and 10 deep aquifer monitoring wells were submitted for total and dissolved metals analysis (i.e., antimony, arsenic, cadmium, lead, mercury and thallium). Additionally, four samples were collected and submitted for analysis of diesel- and oil-range petroleum hydrocarbons and SVOCs.

Depth-to-groundwater and the water quality parameter values measured during groundwater sample collection are presented in Table 3. Groundwater was observed at depths of less than 1 foot and approximately 2 feet bgs in the shallow wells and between approximately 7 feet and 8 feet bgs in the deep wells upon initiation of groundwater sampling. The groundwater pH was identified to be generally neutral (i.e., around pH 7) except in groundwater from the shallow aquifer in BP-04S and BP-05S which was measured to be relatively more basic at between approximately pH 9 and 10.

The results for total and dissolved metals analyses on groundwater are presented in Tables 4, 4A and 4B. Table 4 presents groundwater total and dissolved metals analyses results for both the shallow aquifer and deep aquifer samples. Tables 4A and 4B provide the groundwater total and dissolved metals analyses results for shallow aquifer and deep aquifer groundwater samples separately. Results are compared to MTCA Method A or B values for purpose of screening the data relative to established Ecology benchmarks.

The following summarizes the results for the groundwater samples:

- Antimony was detected in at least one sample from each boring, typically less than the MTCA Method B value (6.4 micrograms per liter [µg/L]). The exception was groundwater from the shallow aquifer in BP-04S, where antimony was detected at concentrations of 8.7 µg/L (total) and 8.2 µg/L (dissolved) that were greater than the Method B value. Investigation location BP-04 is where slag comprised the majority of fill from between approximately 1.5 to 9.5 feet bgs.
- Arsenic was detected in all wells at concentrations ranging from less than the MTCA Method A value that is based on background concentrations in groundwater in Washington State (5 µg/L) to 14,900 µg/L in groundwater from the deep aquifer in BP-05D. In general, there was not a substantial difference between the total and dissolved arsenic concentrations. Dissolved arsenic concentrations in shallow groundwater are presented on Figure 6. Figure 6 was prepared by overlaying data collected during this investigation (2012 data) on top of previous (pre-2000) data. As can be seen in Figure 6, shallow aquifer arsenic concentrations in 2012 are generally similar to and lower as compared with pre-2000 concentrations. Of note, some of the lowest arsenic concentrations in the shallow aquifer in 2012 are observed where fill soil arsenic concentrations were highest.

  Dissolved arsenic concentrations in deep groundwater are shown on Figure 7. Figure 7 also shows the previous and 2012 groundwater data together. As can be seen in Figure 7, deep arsenic groundwater concentrations in 2012 are generally similar. Concentrations are slightly elevated and the plume is laterally wider when compared to pre-2000 concentrations.
- Cadmium was only detected in groundwater from the shallow aquifer at wells BP-04S and BP-10S and was detected at concentrations less than the MTCA Method A value (5 µg/L).
- Lead was detected in all but one of the total metals samples but was only greater than the MTCA Method A value (15 µg/L) in groundwater from the shallow aquifer at wells BP-02S and BP-04S. Lead was only detected in two dissolved metals samples at concentration less than the Method A value.
- Mercury and thallium were not detected in any groundwater samples.

Petroleum hydrocarbon and SVOC results for groundwater are presented in Table 5. The following summarizes the results for the groundwater samples:

- Diesel-range petroleum hydrocarbons were detected in the sample collected from BP-09S at 0.25 mg/L which is less than the MTCA Method A value (i.e., 0.5 mg/L). Diesel- and oil-range petroleum hydrocarbons were not detected in the remaining samples.
- 1-Methylnaphthalene was detected in the sample collected from BP-09S at a concentration of 24 µg/L which is greater than the MTCA Method B value (i.e., 1.51 µg/L). Other SVOCs were either not detected, or were detected at concentrations less than MTCA values. It should be noted that the reporting limits for several non-detected SVOCs were elevated above the MTCA values.

4.0 FINDINGS AND RECOMMENDATIONS FOR ADDITIONAL INVESTIGATION

4.1. Soil Findings

The findings from soil and groundwater sampling and analysis on the eastern boundary of the Benson Property performed as part of the current investigation include the following:

- The concentrations of metals including antimony, arsenic, cadmium, and lead are highest in the fill soil and at the historic native surface of the silt/channel deposits.
- The highest concentrations of soil metals are present in fill and at the historic native surface of the silt/channel deposits within the area where slag is present (i.e., BP-03D through BP-07D) (Table 1).
- The metals concentrations in the silt/channel deposits were less than MTCA Method A and B levels except for arsenic in two samples collected from BP-08D and BP-10D (i.e., 23 mg/kg and 30 mg/kg) which was slightly greater than the MTCA Method A level based on background concentrations in soil in Washington State (i.e., 20 mg/kg).
- The metals concentrations in deep aquifer soil were less than MTCA Method A and B levels except for arsenic in samples collected from BP-05D (i.e., 41.1 and 396 mg/kg) and BP-06D (i.e., 84 and 116 mg/kg) which are in the area where groundwater arsenic concentrations are the highest at the Site.

4.2. Groundwater Findings

- Shallow aquifer groundwater is present at or near the surface of the Site and likely discharges to surface water on the Site and on adjacent properties in locations where ponds or stormwater collection features are located.
- The total and dissolved arsenic concentrations in groundwater from the shallow aquifer are greater than the MTCA Method A level which is based on background concentration in Washington State (i.e., 5 µg/L) in all but one well (i.e., BP-10S) at the Site. Total and dissolved arsenic concentrations in shallow aquifer groundwater that were greater than the background concentration ranged from approximately 27 to 157 µg/L.
- The results from the current investigation for arsenic in shallow aquifer groundwater on the eastern boundary of the Benson Property are consistent with, to slightly lower than, previous sampling and analysis results and indicate that elevated arsenic concentrations are currently present on and adjacent to the Benson Property. The current extent of elevated arsenic concentrations in shallow aquifer groundwater beyond this boundary is not known.
- The highest antimony (dissolved and total) and lead (total) concentrations in groundwater from the shallow aquifer were from BP-04S where slag comprised the majority of fill from between approximately 1.5 to 9.5 feet bgs. In general, all other antimony and lead, as well as mercury and thallium, concentrations in groundwater from the shallow aquifer were less than the MTCA Method A and B values.
- The highest arsenic concentrations in groundwater from the shallow aquifer (i.e., BP-09S, BP-07S, and BP-01S) do not coincide with the highest measured arsenic concentrations in fill soil (i.e., BP-03S, BP-04S, and BP-05S). As a result, the source or sources of elevated arsenic in fill aquifer groundwater is not clearly evident.

- The total and dissolved arsenic concentrations in groundwater from the deep aquifer are greater than the MTCA Method A level which is based on background in Washington State concentration (i.e., 5 µg/L) in six of 10 wells (i.e., BP-04D through BP-07D, BP-09D, and BP-10D) at the Site. Total and dissolved arsenic concentrations in deep aquifer groundwater that were greater than the background concentration ranged from approximately 14 to 14,900 µg/L.
- The results from the current investigation for arsenic in deep aquifer groundwater on the eastern boundary of the Benson Property indicate that elevated arsenic concentrations are currently present on and adjacent to the Benson Property. The current extent of elevated arsenic concentrations in deep aquifer groundwater is not known.
- The results from the current investigation indicate that there is the potential that surface water arsenic concentrations may be effected by groundwater arsenic concentrations where elevated arsenic concentrations are present in shallow groundwater.

The findings summarized above were used to develop the recommendations presented in the following section.

4.3. Recommendations

The following sequence of recommendations is provided based on the findings from the current soil and groundwater sampling and analysis and the results of previous investigations at the Benson Property Site.

1. **Evaluate exposure pathways, points of compliance, and Preliminary Cleanup Levels for soil, groundwater, and surface water at the Benson Property Site.**

   A comprehensive evaluation of potential exposure pathways, points of compliance, and preliminary cleanup levels for the Benson Property Site has not been performed to date. Identification of the potential exposure pathways and points of compliance for soil and groundwater is necessary to determine preliminary cleanup levels for Benson Property and Lowland Area. The establishment of preliminary cleanup levels will allow the existing data to be screened with preliminary cleanup levels and data gaps to be identified. The identified data gaps would be used to determine the scope of additional site investigations, if necessary.

2. **Characterize arsenic concentrations in groundwater downgradient of Benson Property Site.**

   Additional characterization of arsenic in groundwater is recommended as exceedances of the groundwater cleanup levels have been identified at the eastern boundary of the Benson Property Site. The additional study of groundwater conditions in the Lowland Area is recommended to more fully characterize arsenic concentrations in shallow aquifer and deep aquifer groundwater east of the Benson Property extending to the Snohomish River. The information from further characterization of arsenic concentrations in groundwater will be used to evaluate groundwater compliance and the scope of any remedial actions to be performed on the Benson Property and Lowland Area.

3. **Characterize arsenic in surface water at and downgradient of the Benson Property Site.**

   Additional characterization of arsenic in surface water is recommended if exceedances in groundwater and/or surface water cleanup levels are identified at the Benson Property Site. The additional study of surface water conditions is recommended to more fully characterize arsenic concentrations in surface water present on and downgradient of the Benson Property. The information from further characterization of arsenic concentrations in surface water will be used to evaluate compliance and the scope of any remedial actions to be performed on the Benson Property and Lowland Area.

4. **Evaluate potential arsenic sources at and upgradient of the Benson Property Site.**

   Additional evaluation of potential arsenic source areas is recommended if groundwater or surface water is identified to not meet preliminary cleanup levels at the point(s) of compliance. Potential sources of arsenic may include residual groundwater residing at the site following the completion of remedial actions in the Upland Area in 2006; slag and fill materials present in the road rights-of-ways; and slag and fill materials present on the Benson Property. Additionally, arsenic present in groundwater from the Upland Area may also be adsorbing onto soil present on the Benson Property as indicated by arsenic concentrations in soil comprising alluvium at the Benson Property.

   If groundwater and/or surface water is identified to not be in compliance with preliminary cleanup levels, consideration of the following areas of investigation is recommended:

   - Soil, fill material, and groundwater arsenic concentrations upgradient of the Benson Property (e.g., within the Marine View Drive right-of-way); and
   - Soil, fill material, and groundwater within the western and central portions of the Benson Property.

   The information from further investigation of the potential sources of arsenic in groundwater and surface water will be used to inform the scope of any remedial actions to be performed on the Benson Property and Lowland Area.

5.0 LIMITATIONS

We have prepared this report for the exclusive use of Washington State Department of Ecology and their authorized agents.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the field of environmental investigation in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Please refer to Appendix E titled “Report Limitations and Guidelines for Use” for additional information pertaining to use of this report.

TABLE 1

CHEMICAL ANALYTICAL RESULTS FOR SOIL - METALS

BENSON PROPERTY

EVERETT, WASHINGTON

Location	Sample Number	Collection Date	Depth (ft bgs)	Stratigraphic Unit	Antimony (mg/kg)	Arsenic (mg/kg)	Cadmium (mg/kg)	Lead (mg/kg)	Mercury (mg/kg)	Thallium (mg/kg)
BP-01D	BP-01-120106-6.8-7	1/6/2012	6.8-7	Fill	6 U	**21.7 J**	**0.7**	**506**	**0.33 J**	0.2 U
	BP-01-120106-10.6-10.8	1/6/2012	10.6-10.8	Surface of Silt/Channel Deposits	10 U	**63 J**	**0.6**	**27**	**0.11 J**	0.4 U
	BP-01-120106-16.5-17.5	1/6/2012	16.5-17.5	Silt/Channel Deposits	7 U	**11.5 J**	**0.6**	**8**	**0.05 J**	0.3 U
	BP-01-120106-21-22	1/6/2012	21-22	Top of Alluvium	6 U	**3.3 J**	0.2 U	**3**	0.02 U	0.2 U
	BP-01-120106-27.5-28.5	1/6/2012	27.5-28.5	Alluvium	6 U	**5.1 J**	0.2 U	2 U	0.03 U	0.2 U
BP-02D	BP-02-120105-3-4	1/5/2012	3-4	Fill	6 U	**4.4 J**	**0.3**	**16**	**0.05**	0.2 U
	BP-02-120105-DUP-5				6 U	**5.4 J**	**0.3**	**21**	**0.06**	0.2 U
	BP-02-120105-11.3-11.5	1/5/2012	11.3-11.5	Surface of Silt/Channel Deposits	9 U	**320 J**	**2.5**	**126**	**0.28**	0.3 U
	BP-02-120105-15-16	1/5/2012	15-16	Silt/Channel Deposits	8 U	**11.3 J**	**0.4**	**7**	**0.07**	0.3 U
	BP-02-120105-23-24	1/5/2012	23-24	Top of Alluvium	6 U	**5.4 J**	0.2 U	**4**	0.02 U	0.2 U
	BP-02-120105-27.5-28.5	1/5/2012	27.5-28.5	Alluvium	7 U	**11.3 J**	**0.4**	**3**	0.03 U	0.3 U
BP-03D	BP-03-120104-6.7-6.9	1/4/2012	6.7-6.9	Fill	10 U	**875 J**	**6.9**	**2,260**	**1.28**	0.4 U
	BP-03-120104-10.1-10.3	1/4/2012	10.1-10.3	Surface of Silt/Channel Deposits	10 U	**56.3 J**	**0.8**	**29**	**0.08**	0.4 U
	BP-03-120104-14-15	1/4/2012	14-15	Silt/Channel Deposits	9 U	**14.7 J**	0.4 U	**10**	**0.05**	0.4 U
	BP-03-120104-20-21	1/4/2012	20-21	Top of Alluvium	7 U	**6.4 J**	0.3 U	**4**	**0.03**	0.3 U
	BP-03-120105-26-27	1/5/2012	26-27	Alluvium	6 U	**1.2 J**	0.3 U	3 U	0.02 U	0.2 U
BP-04D	BP-04-120104-6.5-7	1/4/2012	6.5-7	Fill	60 U	**368 J**	**7**	**8,520**	**0.08**	0.2 U
	BP-04-120104-10-10.2	1/4/2012	10-10.2	Surface of Silt/Channel Deposits	10 U	**721 J**	**8.4**	**985**	**0.71**	0.5 U
	BP-04-120104-14-15	1/4/2012	14-15	Silt/Channel Deposits	9 U	**13.1 J**	**0.5**	**14**	**0.14**	0.3 U
	BP-04-120104-21.5-22.5	1/4/2012	21.5-22.5	Top of Alluvium	7 U	**5.1 J**	0.3 U	**4**	0.02 U	0.3 U
	BP-04-120104-27-28	1/4/2012	27-28	Alluvium	6 U	**14.7 J**	0.2 U	**3**	0.02 U	0.2 U
BP-05D	BP-05-120103-2.5-3	1/3/2012	2.5-3	Fill	**110**	**507 J**	**4**	**6,950**	0.03 U	0.3 U
	BP-05-120103-10.7-10.9	1/3/2012	10.7-10.9	Surface of Silt/Channel Deposits	9 U	**362 J**	**5.7**	**239 J**	**0.2**	0.3 U
	BP-120103-DUP-4				9 U	**505 J**	**6.6**	**1,020 J**	**0.26**	0.4 U
	BP-05-120103-14-15	1/3/2012	14-15	Silt/Channel Deposits	8 U	**10.9 J**	**0.3**	**9**	**0.11**	0.3 U
	BP-05-120103-22-22.5	1/3/2012	22-22.5	Top of Alluvium	6 U	**41.1 J**	0.2 U	**2**	0.02 U	0.2 U
	BP-05-120103-30-31	1/3/2012	30-31	Alluvium	6 U	**396 J**	0.2 U	**2**	0.03 U	0.2 U
BP-06D	BP-06-111230-5.5-6	12/30/2011	5.5-6	Fill	7 U	**45**	**1.3**	**283**	**0.13**	0.3 U
	BP-06-111230-10.2-10.4	12/30/2011	10.2-10.4	Surface of Silt/Channel Deposits	9 U	**29**	**0.7**	**21**	**0.08**	0.3 U
	BP-06-111230-12-13	12/30/2011	12-13	Silt/Channel Deposits	10 U	**20**	**0.4**	**9**	**0.06**	0.4 U
	BP-06-111230-23-24	12/30/2011	23-24	Top of Alluvium	6 U	**7**	0.3 U	**4**	**0.04**	0.3 U
	BP-06-111230-29.5-30	12/30/2011	29.5-30	Alluvium	6 U	**84**	0.2 U	2 U	0.03 U	0.2 U
	BP-06-111230-DUP-3				6 U	**116**	0.2 U	2 U	0.02 U	0.2 U
BP-07D	BP-07-111229-5-6	12/29/2011	5-6	Fill	20 U	**56.4 J**	**1.9**	**727**	**0.27 J**	0.3 U
	BP-07-111229-12.6-12.8	12/29/2011	12.6-12.8	Surface of Silt/Channel Deposits	7 U	**14**	**0.4**	**32**	**0.06**	0.3 U
	BP-07-111229-15.5-16.5	12/29/2011	15.5-16.5	Silt/Channel Deposits	9 U	**15**	**0.4**	**8**	**0.08**	0.3 U
	BP-07-111229-24.5-25.5	12/29/2011	24.5-25.5	Top of Alluvium	6 U	**8**	**0.3**	**5**	**0.04**	0.3 U
	BP-07-111229-30.5-31.5	12/29/2011	30.5-31.5	Alluvium	6 U	6 U	0.2 U	2 U	0.03 U	0.2 U
BP-08D	BP-08-111229-6-6.2	12/29/2011	6-6.2	Fill	6 U	**9**	**0.9**	**44**	**0.37**	0.2 U
	BP-08-111229-10.2-10.4	12/29/2011	10.2-10.4	Surface of Silt/Channel Deposits	10 U	**150**	**4.4**	**376**	**0.3**	0.4 U
	BP-08-111229-12-13	12/29/2011	12-13	Silt/Channel Deposits	9 U	**23**	0.3 U	**7**	**0.07**	0.3 U
	BP-08-111229-20-21	12/29/2011	20-21	Top of Alluvium	6 U	**6**	0.3 U	**4**	**0.07**	0.3 U
	BP-08-111229-24.5-25.5	12/29/2011	24.5-25.5	Alluvium	6 U	**7**	0.2 U	2 U	0.03 U	0.2 U
BP-09D	BP-09-111228-8-9	12/28/2011	8-9	Fill	6 U	**28**	**0.3**	**17**	**1.44 J**	0.2 U
	BP-9-111228-DUP-2				6 U	**17**	**0.4**	**15**	**0.86 J**	0.2 U
	BP-09-111228-15.2-15.4	12/28/2011	15.2-15.4	Surface of Silt/Channel Deposits	7 U	**51**	**2.1**	**98**	**0.12**	0.3 U
	BP-09-111228-17-18	12/28/2011	17-18	Silt/Channel Deposits	6 U	**12**	**0.3**	**4**	**0.11**	0.3 U
	BP-09-111228-19-20	12/28/2011	19-20	Top of Alluvium	6 U	**10**	**0.2**	**4**	**0.04**	0.2 U
	BP-09-111228-27-28	12/28/2011	27-28	Alluvium	6 U	**6**	0.2 U	2 U	**0.04**	0.2 U
BP-10D	BP-10-111227-1.5-2	12/27/2011	1.5-2	Fill	6 U	**55**	**0.6**	**56**	**0.12**	0.3 U
	BP-10-111227-10.3-10.5	12/27/2011	10.3-10.5	Surface of Silt/Channel Deposits	9 U	**61**	**1.6**	**98**	**0.14**	0.4 U
	BP-10-111227-11.5-11.7	12/27/2011	11.5-11.7	Silt/Channel Deposits	10 U	**30**	0.5 U	**31**	**0.15**	0.5 U
	BP-10-111227-17.5-18	12/27/2011	17.5-18	Top of Alluvium	7 U	7 U	**0.3**	3 U	0.03 U	0.3 U
	BP-10-111227-21.5-22.5	12/27/2011	21.5-22.5	Alluvium	5 U	5 U	0.2 U	**2**	**0.02**	0.2 U
	BP-10-111227-DUP-1				5 U	5 U	0.2 U	2 U	**0.03**	0.2 U
MTCA Method A or B values[1]					**32[3]**	**20[2]**	**2[2]**	**250[2]**	**2[2]**	**NE**

Notes:

[1] MTCA Method A or B values are presented and compared to the analytical results for discussion purposes only.

[2] MTCA Method A value for unrestricted land use.

[3] MTCA Method B value for unrestricted land use.

mg/kg = milligram per kilogram

U = The analyte was not detected at a concentration greater than the identified reporting limit.

J = The analyte was detected and the detected concentration is considered an estimate.

NE = MTCA value has not been established.

bgs = Below ground surface

Bold indicates analyte was detected.

Yellow shading indicates concentrations greater than the MTCA value presented.

TABLE 2

CHEMICAL ANALYTICAL RESULTS FOR SOIL - PETROLEUM HYDROCARBONS AND SVOCs

BENSON PROPERTY

EVERETT, WASHINGTON

Analytes			Location	BP-03D	BP-05D	BP-07D	BP-09D
			Sample Number	BP-03-120104-3.5-4.5	BP-05-120103-6-7	BP-07-111229-5-6	BP-09-111228-3.5-4.5
			Date	1/4/2012	1/3/2012	12/29/2011	12/28/2011
			Depth	3.5-4.5 ft bgs	6-7 ft bgs	5-6 ft bgs	3.5-4.5 ft bgs
	Unit(s)	MTCA A[1,2]	MTCA B[1,3]				
Total Petroleum Hydrocarbons							
Diesel fuel	mg/kg	2,000	NA	1,200	1,100	2,300	610
Motor Oil	mg/kg	2,000	NA	7,600	1,500	3,900	1,500
SVOCs							
PAHs							
Acenaphthene	µg/kg	NA	4,800,000	230 U	170	2,000	150
Acenaphthylene	µg/kg	NA	NA	230 U	120	410	290
Anthracene	µg/kg	NA	24,000,000	130 J	2,000	3,600	480
Benzo(a)anthracene	µg/kg	NA	1,370	150 J	240	5,900	570
Benzo(a)pyrene	µg/kg	100	140	230 U	280	6,000	1,000
Benzo(ghi)perylene	µg/kg	NA	NA	150 J	120	2,200	860
Benzofluoranthenes (Sum)	µg/kg	NA	NA	320	430	9,300	1,300
Chrysene	µg/kg	NA	NA	320	890	7,700	1,000
Dibenzo(a,h)anthracene	µg/kg	NA	137	230 U	40 J	1,100	180
Fluoranthene	µg/kg	NA	3,200,000	480	600	16,000	1,700
Fluorene	µg/kg	NA	3,200,000	170 J	490	3,200	230
Indeno(1,2,3-cd)pyrene	µg/kg	NA	1,370	230 U	100	2,100	630
2-Methylnaphthalene	µg/kg	NA	320,000	330	450	3,500	690
Naphthalene	µg/kg	5,000	1,600,000	470	690	3,000	1,700
Phenanthrene	µg/kg	NA	NA	690	1,000	14,000	1,600
Pyrene	µg/kg	NA	2,400,000	550	590	17,000	1,800
cPAH TEC[4]	ug/kg	100	NA	188	370	7,917	1,278
Phenols							
2-Chlorophenol	µg/kg	NA	400,000	230 U	58 R	93 U	57 U
2,4,5-Trichlorophenol	µg/kg	NA	8,000,000	1,200 U	290 R	460 U	280 U
2,4,6-Trichlorophenol	µg/kg	NA	80,000	1,200 U	290 R	460 U	280 U
2,4-Dichlorophenol	µg/kg	NA	240,000	2,300 U	580 R	930 U	570 U
2,4-Dimethylphenol	µg/kg	NA	1,600,000	460 U	120 R	260	34 J
2,4-Dinitrophenol	µg/kg	NA	160,000	9,800 U	2,500 R	4,000 U	2,400 U
2-Nitrophenol	µg/kg	NA	NA	1,200 U	290 R	460 U	280 U
4,6-Dinitro-2-Methylphenol	µg/kg	NA	NA	2,300 U	580 R	930 U	570 U
4-Chloro-3-Methylphenol	µg/kg	NA	NA	1,200 U	290 R	460 U	280 U
4-Nitrophenol (p-Nitrophenol)	µg/kg	NA	NA	1,200 U	290 U	460 U	280 U
o-Cresol (2-methylphenol)	µg/kg	NA	4,000,000	230 U	58 U	260	57 U
p-Cresol (4-methylphenol)	µg/kg	NA	400,000	460 U	120 U	810	71 J
Pentachlorophenol	µg/kg	NA	2,500	2,300 U	580 R	930 U	570 U
Phenol	µg/kg	NA	24,000,000	230 U	58 R	300	28 J
Phthalates							
Bis(2-Ethylhexyl) Phthalate	µg/kg	NA	71,000	290	81	120 U	160
Butyl benzyl phthalate	µg/kg	NA	526,000	230 U	58 U	93 U	57 U
Dibutyl phthalate	µg/kg	NA	8,000,000	390	58 U	93 U	57 U
Diethyl phthalate	µg/kg	NA	64,000,000	580 U	140 U	230 U	140 U
Dimethyl phthalate	µg/kg	NA	NA	230 U	58 U	93 U	57 U
Di-N-Octyl Phthalate	µg/kg	NA	NA	230 U	58 U	93 U	57 U
Benzenes							
1,2,4-Trichlorobenzene	µg/kg	NA	34,500	230 U	58 U	93 U	57 U
1,2-Dichlorobenzene (o-Dichlorobenzene)	µg/kg	NA	7,200,000	230 U	58 U	93 U	57 U
1,3-Dichlorobenzene (m-Dichlorobenzene)	µg/kg	NA	NA	230 U	58 U	93 U	57 U
1,4-Dichlorobenzene (p-Dichlorobenzene)	µg/kg	NA	NA	230 U	58 U	93 U	57 U
Hexachlorobenzene	µg/kg	NA	630	230 U	58 U	93 U	57 U
Nitrobenzene	µg/kg	NA	160,000	230 U	58 U	93 U	57 U
Miscellaneous							
1-Methylnaphthalene	µg/kg	NA	34,500	160 J	300	1,500	390
2,2'-Oxybis[1-chloropropane]	µg/kg	NA	14,000	230 U	58 U	93 U	57 U
2,4-Dinitrotoluene	µg/kg	NA	160,000	1,200 U	290 U	460 U	280 U
2,6-Dinitrotoluene	µg/kg	NA	80,000	1,200 U	290 U	460 U	280 U
2-Chloronaphthalene	µg/kg	NA	6,400,000	230 U	58 U	93 U	57 U
2-Nitroaniline	µg/kg	NA	NA	1,200 U	290 U	460 U	280 U
3,3'-Dichlorobenzidine	µg/kg	NA	2,200	1,700 U	430 U	700 U	420 U
3-Nitroaniline	µg/kg	NA	NA	1,200 U	290 U	460 U	280 U
4-Bromophenyl phenyl ether	µg/kg	NA	NA	230 U	58 U	93 U	57 U
4-Chloroaniline	µg/kg	NA	5,000	3,100 U	780 U	1,200 U	760 U
4-Chlorophenyl-Phenylether	µg/kg	NA	NA	230 U	58 U	93 U	57 U
4-Nitroaniline	µg/kg	NA	NA	1,200 U	290 U	460 U	280 U
Benzoic Acid	µg/kg	NA	320,000,000	4,600 U	1,200 R	1,900 U	1,100 U
Benzyl Alcohol	µg/kg	NA	8,000,000	230 U	58 R	93 U	57 U
Bis(2-Chloroethoxy)Methane	µg/kg	NA	NA	230 U	58 U	93 U	57 U
Bis(2-Chloroethyl)Ether	µg/kg	NA	910	230 U	58 U	93 U	57 U
Carbazole	µg/kg	NA	NA	230 U	790	1,400	180
Dibenzofuran	µg/kg	NA	80,000	140 J	180	1,300	370
Hexachlorobutadiene	µg/kg	NA	13,000	1,200 U	290 U	460 U	280 U
Hexachlorocyclopentadiene	µg/kg	NA	480,000	4,600 U	1,200 U	1,900 U	1,100 U
Hexachloroethane	µg/kg	NA	71,000	230 U	58 U	93 U	57 U
Isophorone	µg/kg	NA	1,100,000	230 U	58 U	93 U	57 U
N-Nitrosodi-n-propylamine	µg/kg	NA	140	230 U	58 U	93 U	57 U
N-Nitrosodiphenylamine	µg/kg	NA	200,000	230 U	150	93 U	57 U

Notes:

[1] MTCA Method A or B values are presented and compared to the analytical results for discussion purposes only.

[2] MTCA Method A value for unrestricted land use.

[3] MTCA Method B value for unrestricted land use. Cleanup Level presented is the lowest of non-carcinogenic and carcinogenic values.

[4] Carcinogenic polycyclic aromatic hydrocarbon toxic equivalent concentration, calculated using Table 708-2 of WAC 173-340 (non-detects calculated as half the detection limit).

U = The analyte was not detected at a concentration greater than the identified reporting limit.

J = The analyte was detected and the detected concentration is considered an estimate.

R = Data was rejected by laboratory due to low surrogate recoveries. Low surrogate recoveries were the result of matrix interferences.

MTCA = Model Toxics Control Act

µg/kg = microgram per kilogram

mg/kg = milligram per kilogram

NA = MTCA value has not been established.

Bold indicates analyte was detected.

Yellow shading indicates concentrations greater than the MTCA value presented.

TABLE 3

DEPTH TO WATER AND GROUNDWATER QUALITY PARAMETERS[1]

BENSON PROPERTY

EVERETT, WASHINGTON

Location	Aquifer	Date	Depth to Water (ft bgs)	pH	Conductivity (mS/m)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (C)	Salinity (%)	TDS (g/L)	ORP (mV)
BP-01	Shallow Aquifer	1/26/2012	1.70	6.54	109	9.78	0.37	7.68	0.0	0.70	-108
	Deep Aquifer	1/26/2012	6.68	6.94	35.5	10.5	0.29	11.03	0.0	0.23	-38
BP-02	Shallow Aquifer	1/25/2012	1.64	7.15	58.1	27.7	0.23	9.32	0.0	0.38	-161
	Deep Aquifer	1/25/2012	7.58	6.47	53.5	11.4	0.22	11.42	0.0	0.34	-1
BP-03	Shallow Aquifer	1/25/2012	0.52	7.25	49.10	8.09	0.20	7.84	0.0	0.32	-136
	Deep Aquifer	1/25/2012	7.75	6.92	56.7	8.75	0.23	11.14	0.0	0.36	-77
BP-04	Shallow Aquifer	1/25/2012	1.06	10.14	37.5	15.1	1.74	5.36	0.0	0.24	-80
	Deep Aquifer	1/25/2012	8.10	6.69	50.1	7.30	0.33	11.18	0.0	0.32	-16
BP-05	Shallow Aquifer	1/27/2012	0.70	9.31	42.8	13.3	0.34	6.11	0.0	0.28	-349
	Deep Aquifer	1/27/2012	8.07	6.75	42.9	14.8	0.65	11.40	0.0	0.28	-19
BP-06	Shallow Aquifer	1/27/2012	1.20	6.71	58.7	14.9	0.27	8.08	0.0	0.38	-123
	Deep Aquifer	1/27/2012	7.63	6.45	47.6	11.1	0.41	11.44	0.0	0.31	4
BP-07	Shallow Aquifer	1/27/2012	0.45	6.98	151.0	8.80	0.28	9.20	0.1	1.00	138
	Deep Aquifer	1/27/2012	8.00	6.61	47.9	11.9	0.30	11.72	0.0	0.31	-37
BP-08	Shallow Aquifer	1/26/2012	5.90	6.63	158	15.1	0.30	8.11	0.1	1.0	-96
	Deep Aquifer	1/26/2012	7.55	6.63	194	9.69	0.40	11.49	0.1	1.2	-9
BP-09	Shallow Aquifer	1/26/2012	0.72	6.75	78.7	21.1	0.28	8.72	0.0	0.50	137
	Deep Aquifer	1/26/2012	8.47	6.53	95.5	9.86	0.35	11.22	0.0	0.61	-101
BP-10	Shallow Aquifer	1/26/2012	0	6.52	119	13.8	0.35	6.94	0.1	0.80	-110
	Deep Aquifer	1/26/2012	6.79	6.48	110	25.1	0.39	11.12	0.0	0.70	-1

Notes:

[1] Wells sampled using low-flow technique. Depth to water measured before purging; all other parameters shown were monitored for stabilization during purging and the indicated value is the value at the end of purging prior to sample collection.

ft bgs = feet below ground surface

mS/m = millisiemen per meter

NTU = Nephelometric turbidity unit

mg/L = milligram per liter

C = Celcius

TDS = Total dissolved solids

g/L = gram per liter

ORP = Oxidation/reduction potential

mV = millivolt

TABLE 4

CHEMICAL ANALYTICAL DATA FOR GROUNDWATER - METALS

BENSON PROPERTY

EVERETT, WASHINGTON

Location	Aquifer	Sample Number	Date	Antimony		Arsenic		Cadmium		Lead		Mercury		Thallium	
				Total (µg/L)	Dissolved (µg/L)	Total (µg/L)	Dissolved (µg/L)	Total (µg/L)	Dissolved (µg/L)	Total (µg/L)	Dissolved (µg/L)	Total (µg/L)	Dissolved (µg/L)	Total (µg/L)	Dissolved (µg/L)
BP-01	Shallow Aquifer	BP-01S-120126-W	1/26/2012	**0.8**	**0.4**	**125**	**116**	0.1 U	0.1 U	**8.8**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
	Deep Aquifer	BP-01D-120126-W	1/26/2012	0.2 U	0.2 U	**0.5**	**0.3**	0.1 U	0.1 U	**0.2**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
BP-02	Shallow Aquifer	BP2S-120125-W	1/25/2012	**0.8**	**0.3**	**96.6**	**97.9**	0.1 U	0.1 U	**22**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
	Deep Aquifer	BP2D-120125-W	1/25/2012	0.2 U	0.2 U	**0.5**	**0.4**	0.1 U	0.1 U	**0.2**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
BP-03	Shallow Aquifer	BP3S-120125-W	1/25/2012	**0.3**	0.2 U	**32.8**	**33.2**	0.1 U	0.1 U	**6.8**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
	Deep Aquifer	BP3D-120125-W	1/25/2012	0.2 U	0.2 U	**1**	**0.8**	0.1 U	0.1 U	**0.2**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
BP-04	Shallow Aquifer	BP4S-120125-W	1/25/2012	**8.7**	**8.2**	**68**	**58.2**	**0.2**	0.1 U	**78.5**	**1.2**	0.1 U	0.1 U	0.2 U	0.2 U
	Deep Aquifer	BP4D-120125-W	1/25/2012	0.2 U	0.2 U	**5,220**	**5,490**	0.1 U	0.1 U	**1**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
BP-05	Shallow Aquifer	BP5S-120127-W	1/27/2012	**1.8**	**1.5**	**31**	**27.1**	0.1 U	0.1 U	**0.7**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
	Deep Aquifer	BP5D-120127-W	1/27/2012	**0.8**	**0.8**	**14,900**	**14,500**	0.1 U	0.1 U	**1.6**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
BP-06	Shallow Aquifer	BP6S-120127-W	1/27/2012	**0.4**	0.2 U	**43.7**	**38.1**	0.1 U	0.1 U	**6.1**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
	Deep Aquifer	BP6D-120127-W	1/27/2012	**0.4**	**0.4**	**2,120**	**2,070**	0.1 U	0.1 U	**0.2**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
BP-07	Shallow Aquifer	BP7S-120127-W	1/27/2012	**0.3**	**0.3**	**114**	**127**	0.1 U	0.1 U	**1.9**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
		BPDUPE-120127-W		**0.2**	**0.3**	**124**	**120**	0.1 U	0.1 U	0.1 U	**2**	0.1 U	0.1 U	0.2 U	0.2 U
	Deep Aquifer	BP7D-120127-W	1/27/2012	**0.6**	**0.6**	**6,500**	**5,760**	0.1 U	0.1 U	**0.3**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
BP-08	Shallow Aquifer	BP8S-120126-W	1/26/2012	0.2 U	0.2 U	**63.1**	**55.5**	0.1 U	0.1 U	**0.3**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
	Deep Aquifer	BP8D-120126-W	1/26/2012	**0.3**	0.2 U	**1.7**	**1.3**	0.1 U	0.1 U	**0.3**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
BP-09	Shallow Aquifer	BP9S-120126-W	1/26/2012	**0.7**	**0.6**	**153**	**157**	0.1 U	0.1 U	**0.9**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
	Deep Aquifer	BP9D-120126-W	1/26/2012	0.2 U	**0.2**	**14.1**	**14**	0.1 U	0.1 U	**0.2**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
BP-10	Shallow Aquifer	BP10S-120126-W	1/26/2012	**0.3**	**0.3**	**1.8**	**1.6**	**0.2**	**0.1**	**0.3**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
	Deep Aquifer	BP10D-120126-W	1/26/2012	**0.6**	**0.5**	**150**	**136**	0.1 U	0.1 U	**1.8**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
MTCA Method A or B values[1]				**6.4[3]**		**5[2]**		**5[2]**		**15[2]**		**2[2]**		**NE**	

Notes:

[1] MTCA Method A or B Values are presented and compared to the analytical results for discussion purposes only.

[2] MTCA Method A value.

[3] MTCA Method B value.

U = The analyte was not detected at a concentration greater than the identified reporting limit.

µg/L = microgram per liter

NE = MTCA value has not been established.

Bold indicates analyte was detected.

Yellow Shading indicates concentrations greater than MTCA value presented.

TABLE 4A

CHEMICAL ANALYTICAL DATA FOR SHALLOW AQUIFER GROUNDWATER - METALS

BENSON PROPERTY

EVERETT, WASHINGTON

Location	Aquifer	Sample Number	Date	Antimony		Arsenic		Cadmium		Lead		Mercury		Thallium	
				Total (µg/L)	Dissolved (µg/L)	Total (µg/L)	Dissolved (µg/L)	Total (µg/L)	Dissolved (µg/L)	Total (µg/L)	Dissolved (µg/L)	Total (µg/L)	Dissolved (µg/L)	Total (µg/L)	Dissolved (µg/L)
BP-01	Shallow Aquifer	BP-01S-120126-W	1/26/2012	**0.8**	**0.4**	**125**	**116**	0.1 U	0.1 U	**8.8**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
BP-02	Shallow Aquifer	BP2S-120125-W	1/25/2012	**0.8**	**0.3**	**96.6**	**97.9**	0.1 U	0.1 U	**22**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
BP-03	Shallow Aquifer	BP3S-120125-W	1/25/2012	**0.3**	0.2 U	**32.8**	**33.2**	0.1 U	0.1 U	**6.8**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
BP-04	Shallow Aquifer	BP4S-120125-W	1/25/2012	**8.7**	**8.2**	**68**	**58.2**	**0.2**	0.1 U	**78.5**	**1.2**	0.1 U	0.1 U	0.2 U	0.2 U
BP-05	Shallow Aquifer	BP5S-120127-W	1/27/2012	**1.8**	**1.5**	**31**	**27.1**	0.1 U	0.1 U	**0.7**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
BP-06	Shallow Aquifer	BP6S-120127-W	1/27/2012	**0.4**	0.2 U	**43.7**	**38.1**	0.1 U	0.1 U	**6.1**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
BP-07	Shallow Aquifer	BP7S-120127-W	1/27/2012	**0.3**	**0.3**	**114**	**127**	0.1 U	0.1 U	**1.9 J**	0.1 UJ	0.1 U	0.1 U	0.2 U	0.2 U
		BPDUPE-120127-W		**0.2**	**0.3**	**124**	**120**	0.1 U	0.1 U	0.1 UJ	**2 J**	0.1 U	0.1 U	0.2 U	0.2 U
BP-08	Shallow Aquifer	BP8S-120126-W	1/26/2012	0.2 U	0.2 U	**63.1**	**55.5**	0.1 U	0.1 U	**0.3**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
BP-09	Shallow Aquifer	BP9S-120126-W	1/26/2012	**0.7**	**0.6**	**153**	**157**	0.1 U	0.1 U	**0.9**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
BP-10	Shallow Aquifer	BP10S-120126-W	1/26/2012	**0.3**	**0.3**	**1.8**	**1.6**	**0.2**	**0.1**	**0.3**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
MTCA Method A or B values[1]				6.4[3]		5[2]		5[2]		15[2]		2[2]		NE	

Notes:

[1] MTCA Method A or B Values are presented and compared to the analytical results for discussion purposes only.

[2] MTCA Method A value.

[3] MTCA Method B value.

U = The analyte was not detected at a concentration greater than the identified reporting limit.

µg/L = microgram per liter

NE = MTCA value has not been established.

Bold indicates analyte was detected.

Yellow Shading indicates concentrations greater than MTCA value presented.

TABLE 4B

CHEMICAL ANALYTICAL DATA FOR DEEP AQUIFER GROUNDWATER - METALS

BENSON PROPERTY

EVERETT, WASHINGTON

Location	Aquifer	Sample Number	Date	Antimony		Arsenic		Cadmium		Lead		Mercury		Thallium	
				Total (µg/L)	Dissolved (µg/L)	Total (µg/L)	Dissolved (µg/L)	Total (µg/L)	Dissolved (µg/L)	Total (µg/L)	Dissolved (µg/L)	Total (µg/L)	Dissolved (µg/L)	Total (µg/L)	Dissolved (µg/L)
BP-01		BP-01D-120126-W	1/26/2012	0.2 U	0.2 U	**0.5**	**0.3**	0.1 U	0.1 U	**0.2**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
BP-02	Deep Aquifer	BP2D-120125-W	1/25/2012	0.2 U	0.2 U	**0.5**	**0.4**	0.1 U	0.1 U	**0.2**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
BP-03	Deep Aquifer	BP3D-120125-W	1/25/2012	0.2 U	0.2 U	**1**	**0.8**	0.1 U	0.1 U	**0.2**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
BP-04	Deep Aquifer	BP4D-120125-W	1/25/2012	0.2 U	0.2 U	**5,220**	**5,490**	0.1 U	0.1 U	**1**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
BP-05	Deep Aquifer	BP5D-120127-W	1/27/2012	**0.8**	**0.8**	**14,900**	**14,500**	0.1 U	0.1 U	**1.6**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
BP-06	Deep Aquifer	BP6D-120127-W	1/27/2012	**0.4**	**0.4**	**2,120**	**2,070**	0.1 U	0.1 U	**0.2**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
BP-07	Deep Aquifer	BP7D-120127-W	1/27/2012	**0.6**	**0.6**	**6,500**	**5,760**	0.1 U	0.1 U	**0.3**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
BP-08	Deep Aquifer	BP8D-120126-W	1/26/2012	**0.3**	0.2 U	**1.7**	**1.3**	0.1 U	0.1 U	**0.3**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
BP-09	Deep Aquifer	BP9D-120126-W	1/26/2012	0.2 U	**0.2**	**14.1**	**14**	0.1 U	0.1 U	**0.2**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
BP-10	Deep Aquifer	BP10D-120126-W	1/26/2012	**0.6**	**0.5**	**150**	**136**	0.1 U	0.1 U	**1.8**	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U
MTCA Method A or B values[1]				**6.4[3]**		**5[2]**		**5[2]**		**15[2]**		**2[2]**		**NE**	

Notes:

[1] MTCA Method A or B Values are presented and compared to the analytical results for discussion purposes only.

[2] MTCA Method A value.

[3] MTCA Method B value.

U = The analyte was not detected at a concentration greater than the identified reporting limit.

µg/L = microgram per liter

NE = MTCA value has not been established.

Bold indicates analyte was detected.

Yellow Shading indicates concentrations greater than MTCA value presented.

TABLE 5

CHEMICAL ANALYTICAL RESULTS FOR GROUNDWATER - PETROLEUM HYDROCARBONS AND SVOCs

BENSON PROPERTY

EVERETT, WASHINGTON

Analytes			Location	BP-03S	BP-05S	BP-07S		BP-09S
			Sample Number	BP-03S-120125-W	BP-05S-120127-W	BP-07S-120127-W	BP-DUPE-120127-W	BP-09S-120126-W
			Date	1/25/2012	1/27/2012	1/27/2012	1/27/2012	1/26/2012
	Unit(s)	MTCA A[1,2]	MTCA B[1,3]					
Total Petroleum Hydrcarbons								
Diesel fuel	mg/L	0.5	NA	0.1 U	0.1 U	0.1 U	0.1 U	**0.25**
Motor Oil	mg/L	0.5	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
SVOCs								
PAHs								
Acenaphthene	µg/L	NA	960	1 U	1 U	**1.9**	**1.8**	**22**
Acenaphthylene	µg/L	NA	NA	1 U	1 U	1 U	1 U	1 U
Anthracene	µg/L	NA	4,800	1 U	1 U	1 U	1 U	**13**
Benzo(a)anthracene	µg/L	NA	0.12	1 U	1 U	1 U	1 U	1 U
Benzo(a)pyrene	µg/L	0.1	0.012	1 U	1 U	1 U	1 U	1 U
Benzo(ghi)perylene	µg/L	NA	NA	1 U	1 U	1 U	1 U	1 U
Benzofluoranthenes (Sum)	µg/L	NA	NA	1 U	1 U	1 U	1 U	1 U
Chrysene	µg/L	NA	12	1 U	1 U	1 U	1 U	**0.9**
Dibenzo(a,h)anthracene	µg/L	NA	0.012	1 U	1 U	1 U	1 U	1 U
Fluoranthene	µg/L	NA	640	1 U	1 U	**0.7**	**0.6**	**6.3**
Fluorene	µg/L	NA	640	1 U	1 U	**1.4**	**1.3**	**21**
Indeno(1,2,3-cd)pyrene	µg/L	NA	0.12	1 U	1 U	1 U	1 U	1 U
2-Methylnaphthalene	µg/L	NA	32	1 U	1 U	1 U	1 U	**32**
Naphthalene	µg/L	160	160	1 U	1 U	**1.6**	**1.5**	**36**
Phenanthrene	µg/L	NA	NA	1 U	1 U	**1.2**	**1.2**	**33**
Pyrene	µg/L	NA	480	1 U	1 U	1 U	1 U	**4.4**
Phenols								
2,4,5-Trichlorophenol	µg/L	NA	800	5 U	5 U	5 U	5 U	5 U
2,4,6-Trichlorophenol	µg/L	NA	8	5 U	5 U	5 U	5 U	5 U
2,4-Dichlorophenol	µg/L	NA	24	5 U	5 U	5 U	5 U	5 U
2,4-Dimethylphenol	µg/L	NA	160	1 U	1 U	1 U	1 U	1 U
2,4-Dinitrophenol	µg/L	NA	32	10 U	10 U	10 U	10 U	10 U
2-Chlorophenol	µg/L	NA	40	1 U	1 U	1 U	1 U	1 U
4,6-Dinitro-2-Methylphenol	µg/L	NA	NA	10 U	10 U	10 U	10 U	10 U
4-Chloro-3-Methylphenol	µg/L	NA	NA	5 U	5 U	5 U	5 U	5 U
4-Nitrophenol (p-Nitrophenol)	µg/L	NA	NA	5 U	5 U	5 U	5 U	5 U
o-Cresol (2-methylphenol)	µg/L	NA	400	1 U	1 U	1 U	1 U	1 U
p-Cresol (4-methylphenol)	µg/L	NA	40	1 U	1 U	1 U	1 U	1 U
Pentachlorophenol	µg/L	NA	0.219	5 U	5 U	5 U	5 U	5 U
Phenol	µg/L	NA	2,400	1 U	1 U	1 U	1 U	1 U
Phthalates								
Bis(2-Ethylhexyl) Phthalate	µg/L	NA	6.3	**0.6**	1 U	1 U	1 U	1 U
Butyl benzyl phthalate	µg/L	NA	3,200	1 U	1 U	1 U	1 U	1 U
Dibutyl phthalate	µg/L	NA	1,600	1 U	1 U	1 U	1 U	1 U
Diethyl phthalate	µg/L	NA	13,000	1 U	1 U	1 U	1 U	1 U
Dimethyl phthalate	µg/L	NA	NA	1 U	1 U	1 U	1 U	1 U
Di-N-Octyl Phthalate	µg/L	NA	NA	1 U	1 U	1 U	1 U	1 U
Benzenes								
1,2,4-Trichlorobenzene	µg/L	NA	1.51	1 U	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene (o-Dichlorobenzene)	µg/L	NA	720	1 U	1 U	1 U	1 U	1 U
1,3-Dichlorobenzene (m-Dichlorobenzene)	µg/L	NA	NA	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene (p-Dichlorobenzene)	µg/L	NA	NA	1 U	1 U	1 U	1 U	1 U
Hexachlorobenzene	µg/L	NA	0.055	1 U	1 U	1 U	1 U	1 U
Nitrobenzene	µg/L	NA	16	1 U	1 U	1 U	1 U	1 U
Other								
1-Methylnaphthalene	µg/L	NA	1.51	1 U	1 U	**1**	**0.9**	**24**
2,2'-Oxybis[1-chloropropane]	µg/L	NA	0.63	1 U	1 U	1 U	1 U	1 U
2,4-Dinitrotoluene	µg/L	NA	32	5 U	5 U	5 U	5 U	5 U
2,6-Dinitrotoluene	µg/L	NA	16	5 U	5 U	5 U	5 U	5 U
2-Chloronaphthalene	µg/L	NA	640	1 U	1 U	1 U	1 U	1 U
2-Nitroaniline	µg/L	NA	160	5 U	5 U	5 U	5 U	5 U
2-Nitrophenol	µg/L	NA	NA	5 U	5 U	5 U	5 U	5 U
3,3'-Dichlorobenzidine	µg/L	NA	0.19	5 U	5 R	5 U	5 U	5 U
3-Nitroaniline	µg/L	NA	NA	5 U	5 U	5 U	5 U	5 U
4-Bromophenyl phenyl ether	µg/L	NA	NA	1 U	1 U	1 U	1 U	1 U
4-Chloroaniline	µg/L	NA	32	5 U	5 U	5 U	5 U	5 U
4-Chlorophenyl-Phenylether	µg/L	NA	NA	1 U	1 U	1 U	1 U	1 U
4-Nitroaniline	µg/L	NA	NA	5 U	5 U	5 U	5 U	5 U
Benzoic Acid	µg/L	NA	64,000	10 U	10 U	10 U	10 U	10 U
Benzyl Alcohol	µg/L	NA	800	5 U	5 U	5 U	5 U	5 U
Bis(2-Chloroethoxy)Methane	µg/L	NA	NA	1 U	1 U	1 U	1 U	1 U
Bis(2-Chloroethyl)Ether	µg/L	NA	0.04	1 U	1 U	1 U	1 U	1 U
Carbazole	µg/L	NA	NA	1 U	1 U	**0.8**	**0.8**	**17**
Dibenzofuran	µg/L	NA	16	1 U	1 U	1 U	1 U	**10**
Hexachlorobutadiene	µg/L	NA	8	1 U	1 U	1 U	1 U	1 U
Hexachlorocyclopentadiene	µg/L	NA	48	5 U	5 U	5 U	5 U	5 U
Hexachloroethane	µg/L	NA	3.1	1 U	1 U	1 U	1 U	1 U
Isophorone	µg/L	NA	46	1 U	1 U	1 U	1 U	1 U
N-Nitrosodi-n-propylamine	µg/L	NA	NA	1 U	1 U	1 U	1 U	1 U
N-Nitrosodiphenylamine	µg/L	NA	NA	1 U	1 U	1 U	1 U	1 U

Notes:

[1] MTCA Method A or B values are presented and compared to the analytical results for discussion purposes only.

[2] MTCA Method A value for unrestricted land use.

[3] MTCA Method B value for unrestricted land use. Cleanup Level presented is the lowest of non-carcinogenic and carcinogenic values.

U = The analyte was not detected at a concentration greater than the identified reporting limit.

J = The analyte was detected and the detected concentration is considered an estimate.

R = Data was rejected by laboratory due to low surrogate recoveries. Low surrogate recoveries were the result of matrix interferences.

MTCA = Model Toxics Control Act

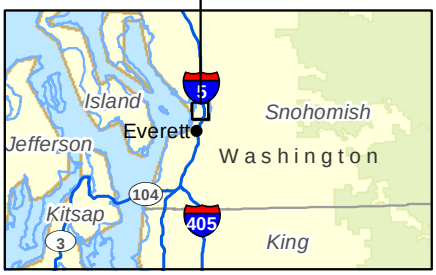
µg/L = microgram per liter

mg/L = milligram per liter

NA = MTCA value has not been established.

Bold indicates analyte was detected.

Yellow Shading indicates concentrations greater than MTCA value presented.



N
W E
S

2,000 0 2,000

Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: ESRI Data & Maps

Projection: NAD 1983 UTM Zone 10N

Vicinity Map

Everett Smelter - Benson Property

GeoEngineers

Figure 1

Path: \\sea\projects\0\0504068\GIS\0504068_VicinityMap.mxd Map Revised: 12 March 2012 amanza

Path: \\sea\projects\0\0504068\GIS\050406800_PropertyBoundaries.mxd Map Revised: 12 March 2012 amanza

Legend

- Benson Property Boundary
- Parcel Boundaries (2010)

N
W E
S

200 0 200
Feet

Data Source: Esri World Imagery; Aerials Express Seattle, 2009. City of Everett GIS. Washington Department of Ecology.

Projection: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

Notes:
1. The locations of all features shown are approximate.
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Benson Property Boundaries

Everett Smelter - Benson Property

GeoEngineers

Figure 2

Path: \\sea\projects\0\0504068\GIS\050406800_MWLocations_fixed.mxd Map Revised: 12 March 2012 amanza

Legend

- Actual Monitoring Well Location*
- Extent of Slag (Present Estimate)
- Extent of Slag (1913 Estimate)
- Benson Property Boundary
- Parcel Boundaries (2010)
- Approximate Location of PSE Natural Gas Pipeline

N
W E
S

200 0 200
Feet

* Represents location of shallow well. Deep well is located approximately 5ft to the south.

Data Source: Esri World Imagery; Aerials Express Seattle, 2009. City of Everett GIS. Washington Department of Ecology. Actual monitoring well locations provided by David Evans and Associates, 2011. PSE Pipeline approximated from David Evans and Associates drawings and PSE field located markings for the portion of the pipeline in the project area.

Projection: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

Notes:
1. The locations of all features shown are approximate.
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Boring/Monitoring Well Locations

Everett Smelter - Benson Property

GeoEngineers

Figure 3

Path: \\sea\projects\0\0504068\GIS\050406800_Soil_Arsenic.mxd Map Revised: 30 April 2012 amanza

Location	Depth (ft bgs)	Stratigraphic Unit	Arsenic (mg/kg)
BP-01	6.8-7	Fill	21.7 J
	10.6-10.8	Surface of Silt/Channel Deposits	63 J
	16.5-17.5	Silt/Channel Deposits	11.5 J
	21-22	Top of Alluvium	3.3 J
	27.5-28.5	Alluvium	5.1 J
BP-02	3-4	Fill	4.4 J
			5.4 J
	11.3-11.5	Surface of Silt/Channel Deposits	320 J
	15-16	Silt/Channel Deposits	11.3 J
	23-24	Top of Alluvium	5.4 J
	27.5-28.5	Alluvium	11.3 J
BP-03	6.7-6.9	Fill	875 J
	10.1-10.3	Surface of Silt/Channel Deposits	56.3 J
	14-15	Silt/Channel Deposits	14.7 J
	20-21	Top of Alluvium	6.4 J
	26-27	Alluvium	1.2 J
BP-04	6.5-7	Fill	368 J
	10-10.2	Surface of Silt/Channel Deposits	721 J
	14-15	Silt/Channel Deposits	13.1 J
	21.5-22.5	Top of Alluvium	5.1 J
	27-28	Alluvium	14.7 J
BP-05	2.5-3	Fill	507 J
	10.7-10.9	Surface of Silt/Channel Deposits	362 J
			505 J
	14-15	Silt/Channel Deposits	10.9 J
	22-22.5	Top of Alluvium	41.1 J
	30-31	Alluvium	396 J
BP-06	5.5-6	Fill	45
	10.2-10.4	Surface of Silt/Channel Deposits	29
	12-13	Silt/Channel Deposits	20
	23-24	Top of Alluvium	7
	29.5-30	Alluvium	84
			116
BP-07	5-6	Fill	56.4 J
	12.6-12.8	Surface of Silt/Channel Deposits	14
	15.5-16.5	Silt/Channel Deposits	15
	24.5-25.5	Top of Alluvium	8
	30.5-31.5	Alluvium	6 U
BP-08	6-6.2	Fill	9
	10.2-10.4	Surface of Silt/Channel Deposits	150
	12-13	Silt/Channel Deposits	23
	20-21	Top of Alluvium	6
	24.5-25.5	Alluvium	7
BP-09	8-9	Fill	28
			17
	15.2-15.4	Surface of Silt/Channel Deposits	51
	17-18	Silt/Channel Deposits	12
	19-20	Top of Alluvium	10
	27-28	Alluvium	6
BP-10	1.5-2	Fill	55
	10.3-10.5	Surface of Silt/Channel Deposits	61
	11.5-11.7	Silt/Channel Deposits	30
	17.5-18	Top of Alluvium	7 U
	21.5-22.5	Alluvium	5 U
			5 U
MTCA Method A or B values[1]			20[2]

Notes:

[1] MTCA Method A or B values are presented and compared to the analytical results for discussion purposes only.

[2] MTCA Method A value for unrestricted land use.

mg/kg = milligram per kilogram

U = The analyte was not detected at a concentration greater than the identified reporting limit.

J = The analyte was detected and the detected concentration is considered an estimate.

bgs = Below ground surface

Bold indicates analyte was detected.

Gray shading indicates concentrations greater than the MTCA value presented.

Legend

- Actual Monitoring Well Location*
- Extent of Slag (Present Estimate by Others)
- Extent of Slag (1913 Estimate by Others)
- Benson Property Boundary
- Parcel Boundaries (2010)
- Approximate Location of PSE Natural Gas Pipeline

N W E S

200 0 200

Feet

* Represents location of shallow well. Deep well is located approximately 5ft to the south.

Data Source: Esri World Imagery; Aerials Express Seattle, 2009. City of Everett GIS. Washington Department of Ecology. Actual monitoring well locations provided by David Evans and Associates, 2011. PSE Pipeline approximated from David Evans and Associates drawings and PSE field located markings for the portion of the pipeline in the project area.

Projection: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

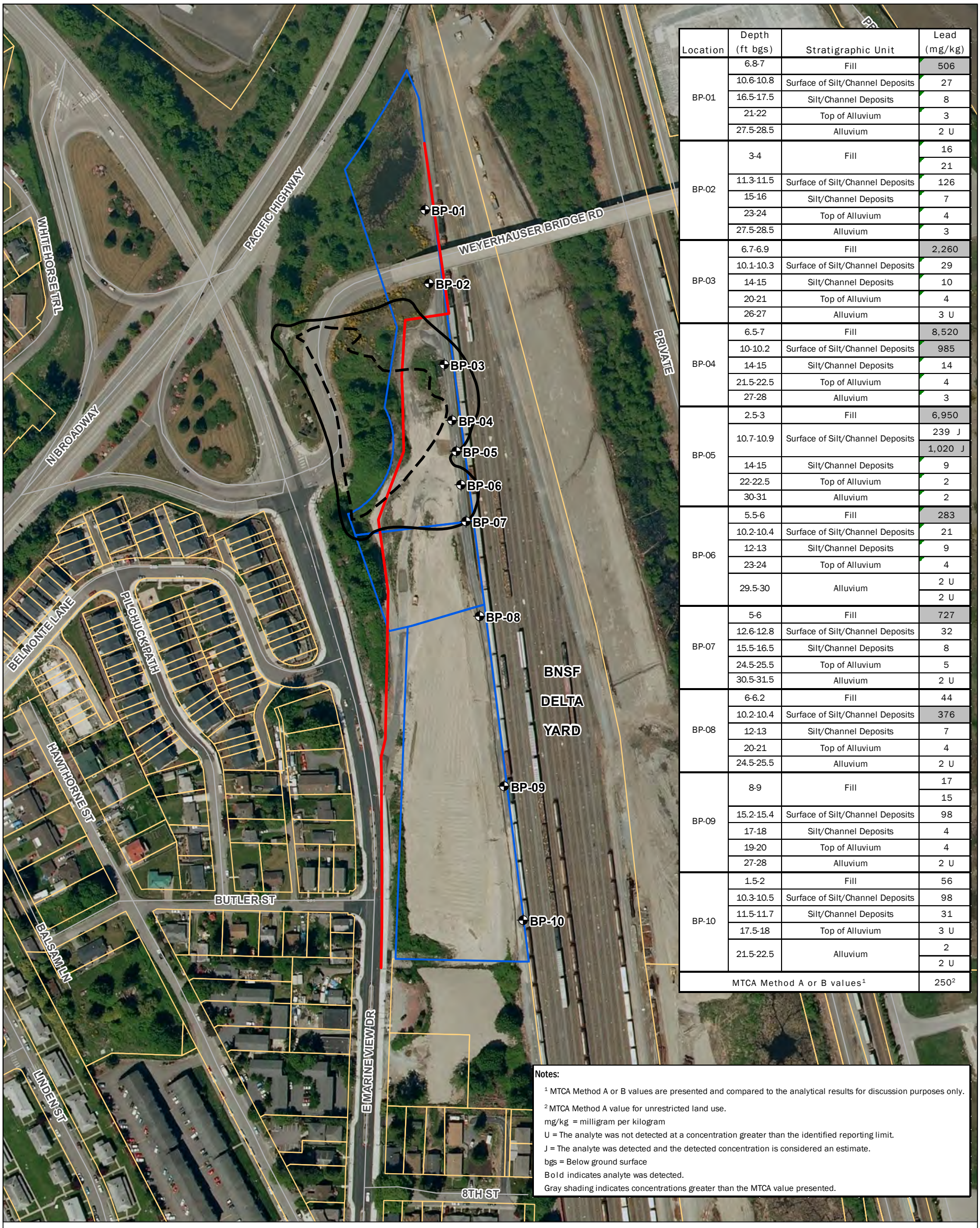
Boring/Monitoring Well Locations: Soil Results – Arsenic

Everett Smelter - Benson Property

GeoEngineers

Figure 4

Path: \\sea\projects\0\0504068\GIS\050406800_Soil_Lead.mxd Map Revised: 30 April 2012 amanza



Location	Depth (ft bgs)	Stratigraphic Unit	Lead (mg/kg)
BP-01	6.8-7	Fill	506
	10.6-10.8	Surface of Silt/Channel Deposits	27
	16.5-17.5	Silt/Channel Deposits	8
	21-22	Top of Alluvium	3
	27.5-28.5	Alluvium	2 U
BP-02	3-4	Fill	16
			21
	11.3-11.5	Surface of Silt/Channel Deposits	126
	15-16	Silt/Channel Deposits	7
	23-24	Top of Alluvium	4
	27.5-28.5	Alluvium	3
BP-03	6.7-6.9	Fill	2,260
	10.1-10.3	Surface of Silt/Channel Deposits	29
	14-15	Silt/Channel Deposits	10
	20-21	Top of Alluvium	4
	26-27	Alluvium	3 U
BP-04	6.5-7	Fill	8,520
	10-10.2	Surface of Silt/Channel Deposits	985
	14-15	Silt/Channel Deposits	14
	21.5-22.5	Top of Alluvium	4
	27-28	Alluvium	3
BP-05	2.5-3	Fill	6,950
	10.7-10.9	Surface of Silt/Channel Deposits	239 J
			1,020 J
	14-15	Silt/Channel Deposits	9
	22-22.5	Top of Alluvium	2
	30-31	Alluvium	2
BP-06	5.5-6	Fill	283
	10.2-10.4	Surface of Silt/Channel Deposits	21
	12-13	Silt/Channel Deposits	9
	23-24	Top of Alluvium	4
	29.5-30	Alluvium	2 U
			2 U
BP-07	5-6	Fill	727
	12.6-12.8	Surface of Silt/Channel Deposits	32
	15.5-16.5	Silt/Channel Deposits	8
	24.5-25.5	Top of Alluvium	5
	30.5-31.5	Alluvium	2 U
BP-08	6-6.2	Fill	44
	10.2-10.4	Surface of Silt/Channel Deposits	376
	12-13	Silt/Channel Deposits	7
	20-21	Top of Alluvium	4
	24.5-25.5	Alluvium	2 U
BP-09	8-9	Fill	17
			15
	15.2-15.4	Surface of Silt/Channel Deposits	98
	17-18	Silt/Channel Deposits	4
	19-20	Top of Alluvium	4
	27-28	Alluvium	2 U
BP-10	1.5-2	Fill	56
	10.3-10.5	Surface of Silt/Channel Deposits	98
	11.5-11.7	Silt/Channel Deposits	31
	17.5-18	Top of Alluvium	3 U
	21.5-22.5	Alluvium	2
			2 U
MTCA Method A or B values[1]			250[2]

Notes:

[1] MTCA Method A or B values are presented and compared to the analytical results for discussion purposes only.

[2] MTCA Method A value for unrestricted land use.

mg/kg = milligram per kilogram

U = The analyte was not detected at a concentration greater than the identified reporting limit.

J = The analyte was detected and the detected concentration is considered an estimate.

bgs = Below ground surface

Bold indicates analyte was detected.

Gray shading indicates concentrations greater than the MTCA value presented.

Legend

- Actual Monitoring Well Location*
- Extent of Slag (Present Estimate by Others)
- Extent of Slag (1913 Estimate by Others)
- Benson Property Boundary
- Parcel Boundaries (2010)
- Approximate Location of PSE Natural Gas Pipeline

N W E S

200 0 200

Feet

* Represents location of shallow well. Deep well is located approximately 5ft to the south.

Data Source: Esri World Imagery; Aerials Express Seattle, 2009. City of Everett GIS. Washington Department of Ecology. Actual monitoring well locations provided by David Evans and Associates, 2011. PSE Pipeline approximated from David Evans and Associates drawings and PSE field located markings for the portion of the pipeline in the project area.

Projection: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Boring/Monitoring Well Locations: Soil Results – Lead

Everett Smelter - Benson Property

GeoEngineers

Figure 5

Path: \\sea\projects\0\0504068\GIS\050406800_GW_Shallow_Arsenic.mxd Map Revised: 12 March 2012 amanza

Legend

- 85 — Historic Monitoring Well/Hydropunch and Dissolved Arsenic Concentration
- 116 — 2012 Monitoring Well and Dissolved Arsenic Concentration
- Benson Property Boundary
- 2012 Groundwater Data
- Parcel Boundaries (2010)

Dissolved Arsenic Concentration in Shallow Groundwater [µg/L]*

- > 10,000
- 1,000 - 10,000
- 100 - 1,000
- 10 - 100

* Shading for 2012 data shown inside box and shading for historic data shown outside box.

N W E S

200 0 200
Feet

Arsenic in Shallow Groundwater

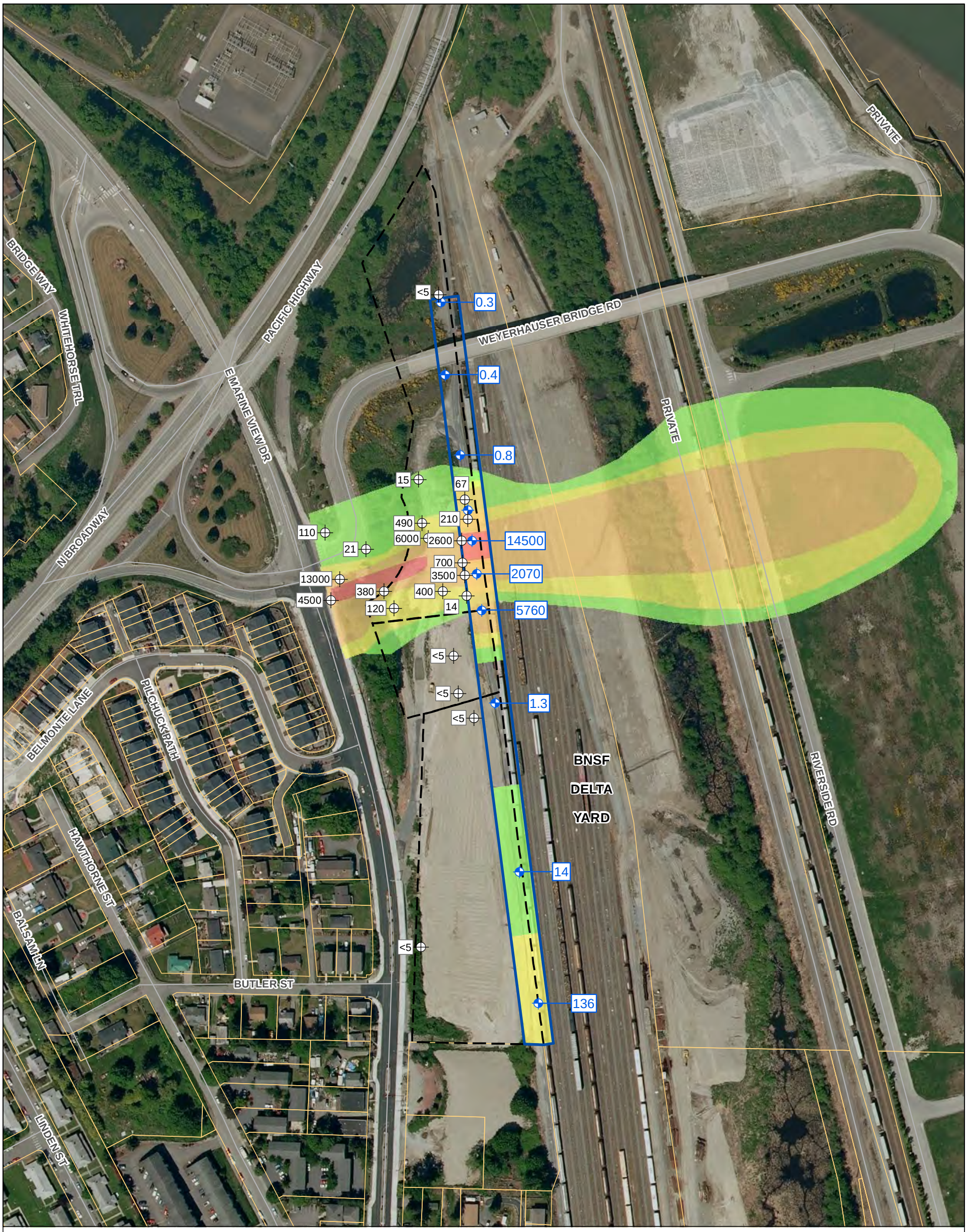
Everett Smelter - Benson Property

GeoEngineers

Figure 6

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Data Source: Esri World Imagery; Aerials Express Seattle, 2009. City of Everett GIS. Washington Department of Ecology.

Path: \\sea\projects\0\0504068\GIS\050406800_GW_Deep_Arsenic.mxd Map Revised: 12 March 2012 amanza



Legend

- 67 — Historic Monitoring Well/Hydropunch and Dissolved Arsenic Concentration
- 136 — 2012 Monitoring Well and Dissolved Arsenic Concentration
- Benson Property Boundary
- 2012 Groundwater Data
- Parcel Boundaries (2010)

Dissolved Arsenic Concentration in Deep Groundwater [µg/L]*

- > 10,000
- 1,000 - 10,000
- 100 - 1,000
- 10 - 100

* Shading for 2012 data shown inside box and shading for historic data shown outside box.

N W E S

200 0 200

Feet

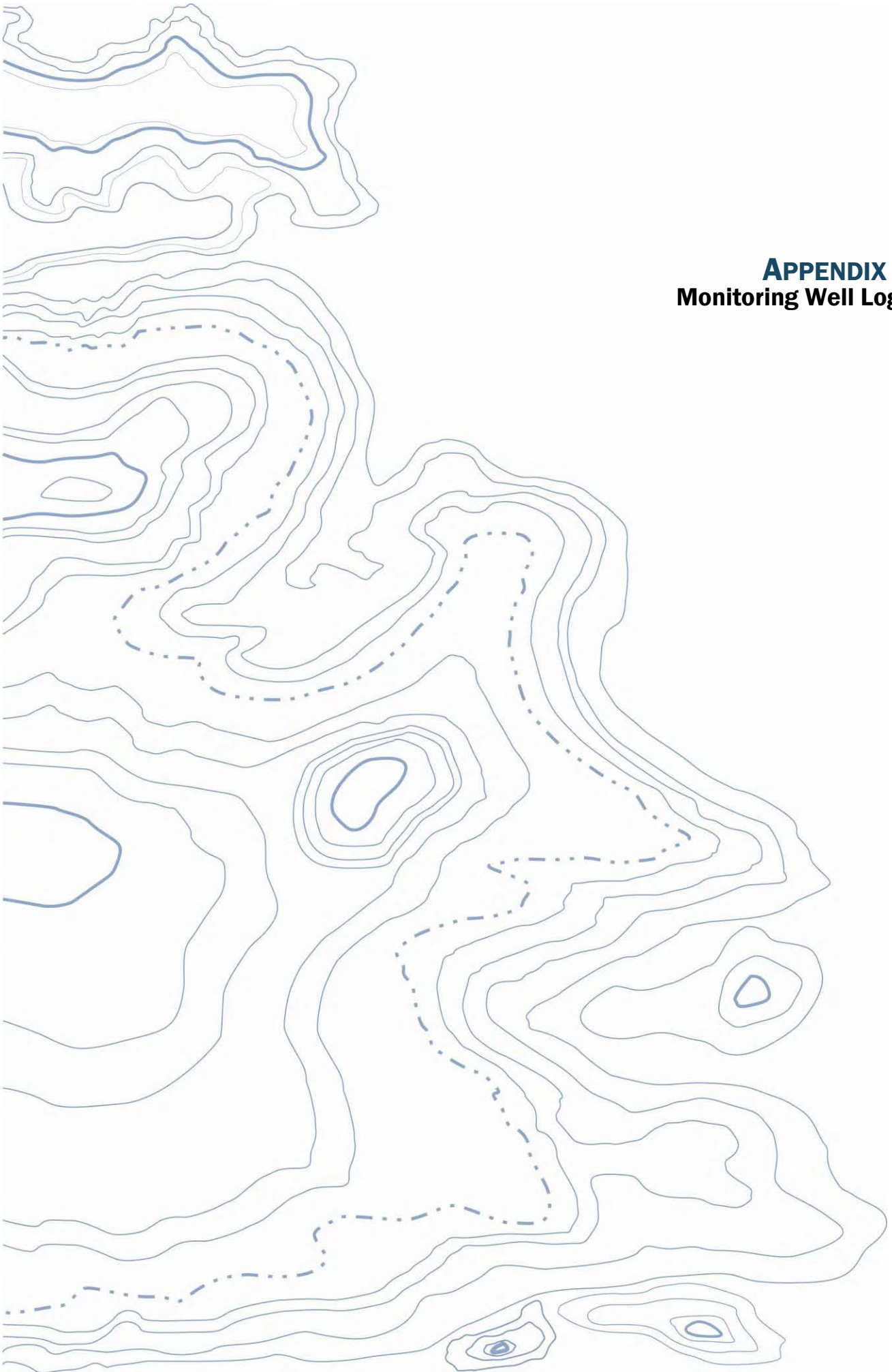
Arsenic in Deep Groundwater

Everett Smelter - Benson Property

GeoEngineers

Figure 7

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Data Source: Esri World Imagery; Aerials Express Seattle, 2009. City of Everett GIS. Washington Department of Ecology.



APPENDIX A
Monitoring Well Logs

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% RETAINED ON NO. 200 SIEVE	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS
				SP	POORLY-GRADED SANDS, GRAVELLY SAND
	MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
	CC	Cement Concrete
	AC	Asphalt Concrete
	CR	Crushed Rock/ Quarry Spalls
	TS	Topsoil/ Forest Duff/Sod

Measured groundwater level in exploration, well, or piezometer

Groundwater observed at time of exploration

Perched water observed at time of exploration

Measured free product in well or piezometer

Graphic Log Contact

Distinct contact between soil strata or geologic units

Approximate location of soil strata change within a geologic soil unit

Material Description Contact

Distinct contact between soil strata or geologic units

Approximate location of soil strata change within a geologic soil unit

Sampler Symbol Descriptions

2.4-inch I.D. split barrel

Standard Penetration Test (SPT)

Shelby tube

Piston

Sonic Core

Bulk or grab

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

A "P" indicates sampler pushed using the weight of the drill rig.

Laboratory / Field Tests

%F	Percent fines
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
OC	Organic content
PM	Permeability or hydraulic conductivity
PP	Pocket penetrometer
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen
NT	Not Tested

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

KEY TO EXPLORATION LOGS

GeoEngineers

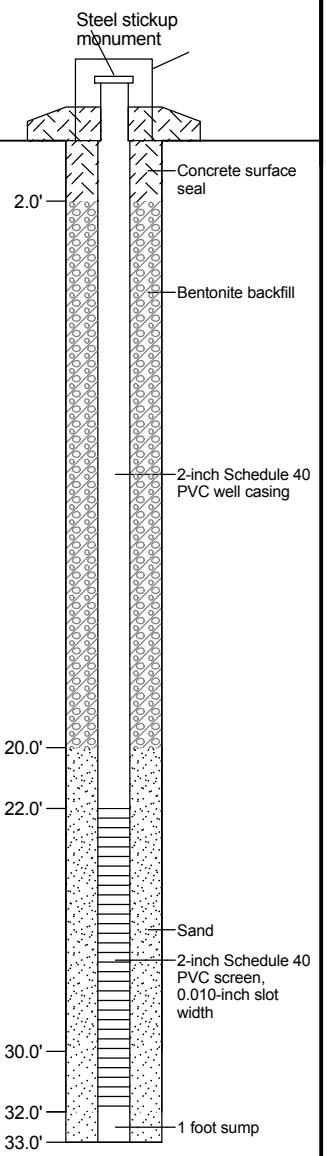
FIGURE A-1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
1/6/2012	1/6/2012	33	GRL/TSD / GRL	Holocene	HSA

Hammer Data	Drilling Equipment	
140 (lbs) / 30 (in) Drop	Mobile B-61 Truck Rig	A 2 (in) well was installed on 1/6/2012 to a depth of (ft). Well was developed on 1/6/2012.
Surface Elevation (ft) Vertical Datum: Undetermined	Top of Casing Elevation (ft)	Groundwater: Date Measured 1/6/2012; Depth to Water (ft) 4.0; Elevation (ft)
Easting (X) Northing (Y)	Horizontal Datum	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor
	0		18	29					GP	1-1/4-inch crushed gravel (medium dense, moist) (fill)		
									SP-SM			
			16	8					ML	Brown fine to coarse sand with silt, gravel, brick dust (medium dense, moist) (fill)		
			7	5		1				Gray silt with sand with some zones of gray silty fine sand (medium stiff, moist) (fill)		
	5		10	3						Grades to occasional gravel, trace organics, wet		
										Grades soft		
			10	2		2				One small root in shoe		
			8	5					SM	Dark brown silty fine sand, occasional gravel (very loose, wet) (fill)		
			0.5	1						Trace white material and glassy material 6.8 to 6.9 feet		
	10									Grades to fine to coarse, occasional wood debris		
			18	2		3			ML	Wood ~9 to 10.5 feet bgs A few wood splinters in barrel; shoe is empty		
			18	1						Brown silt with organics (very soft, moist) (native)		
			18	1						1-inch wood 1-inch wood		
										4 inches fibrous woody matter		
	15		18	0						1-inch sand, trace silt; grades to trace sand below 14 feet		
			18	0		4				Grades to trace organics		
										Grades to with sand below 17 feet		
			18	0								
										Grades to more sand less silt, no organics, moist to wet below 18.5 feet bgs		
	20		18	0					ML/SM	Gray sandy silt with silty fine sand (very soft/very loose, moist to wet)		
			18	10		5			SP	Gray fine to coarse sand, trace silt (very loose, wet)		
			18	13						Grades loose		
			18	8						Grades very loose		
	25		18	18								
										1/2-inch layer fine sand		
			14	21		6				1-inch layer fine sand, grades loose		
			18	40						1-inch layer fine sand		
	30		18	22						Grades medium dense		
										Grades loose		
			18	54						Grades medium dense		



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-01D

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-2
Sheet 1 of 1

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	1/6/2012	1/6/2012	9.5	GRL/TSD / GRL	Holocene	HSA

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-61 Truck Rig
Surface Elevation (ft) Vertical Datum	Undetermined	Top of Casing Elevation (ft)	
Easting (X) Northing (Y)		Horizontal Datum	

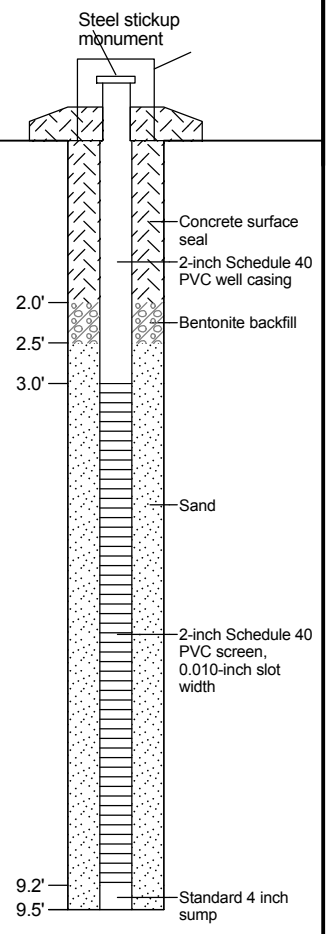
A 2 (in) well was installed on 1/6/2012 to a depth of (ft). Well was developed on 1/6/2012.

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor
	0							Soil information shown in BP-01D		
	5									

WELL LOG



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-01S

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-3
Sheet 1 of 1

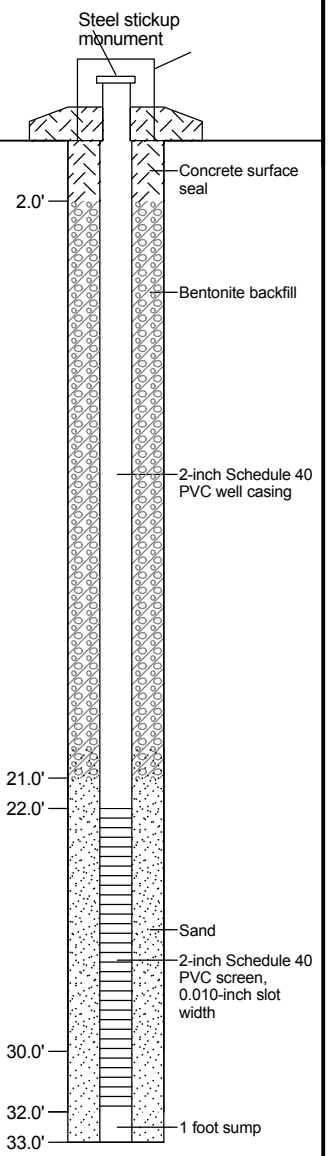
Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
1/5/2012	1/5/2012	34	GRL/TSD / GRL	Holocene	HSA

Hammer Data	Drilling Equipment	
140 (lbs) / 30 (in) Drop	Mobile B-61 Truck Rig	A 2 (in) well was installed on 1/5/2012 to a depth of (ft). Well was developed on 1/5/2012.
Surface Elevation (ft) Vertical Datum: Undetermined	Top of Casing Elevation (ft)	Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)
Easting (X) Northing (Y)	Horizontal Datum	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor
	0		18	22					SP-SM	Brown fine to coarse sand with silt, trace organics, gravel (loose, moist) (fill)		
			18	29					SP	Brown fine to medium sand, trace silt (loose, moist) (fill)		
			18	9		1				4-inch silty fine to medium sand layer		
									SM	4-inch layer silty fine to coarse sand with gravel, wood, topped with geotextile fabric		
	5		18	6					SP	Brown silty fine to coarse sand with gravel (very loose, moist) (fill)		
			18	7						Grades to trace wood		
			6	5					SM	Brown fine to medium sand, trace silt, trace organics (very loose, wet) (fill)		
			15	4						Black silty sand and metal debris (one nail), occasional gravel (very loose, wet) (fill)		
	10		18	3		2			ML	Slag in shoe (1 piece ~3/4-inch diameter)		
									SM	Gray silt with sand, trace organics (soft, wet) (fill)		
			18	0					PT	Grades with wood		
			18	0					ML	2 inches gray silty fine sand (very loose, moist) (fill)		
	15		18	0		3				2 inches peat (soft, moist) (native)		
										Gray silt, trace organics (soft, moist)		
			18	0						Grades to very soft		
			18	0						1-inch layer fine to medium sand		
										I-inch fine sand with silt in shoe		
	20		18	4						Grades to sand		
									SM	Silty fine sand, trace organics (loose, moist)		
			18	3						Grades moist to wet		
			18	34		4			SP	Gray fine sand, trace silt (very loose, wet)		
										Grades to medium dense		
			18	13						3-inch layer silty fine sand/sandy silt		
	25		18	34						4-inch layer silty fine sand/sandy silt		
									SP	Gray fine to medium sand, trace silt (dense, wet)		
			14	8		5			WD	Wood (dense, moist)		
									SP	Gray fine to coarse sand with wood, trace silt (loose, wet)		
			16	20						Grades to no wood, medium dense		
	30		18	15						1/2-inch layer wood		
			18	14						Wood in shoe		
										Grades to trace wood		

WELL LOG



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-02D

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-4
Sheet 1 of 1

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	1/5/2012	1/5/2012	9	GRL/TSD / GRL	Holocene	HSA

Hammer Data: 140 (lbs) / 30 (in) Drop	Drilling Equipment: Mobile B-61 Truck Rig	A 2 (in) well was installed on 1/5/2012 to a depth of (ft). Well was developed on 1/5/2012.
Surface Elevation (ft) Vertical Datum: Undetermined	Top of Casing Elevation (ft)	Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)
Easting (X) Northing (Y)	Horizontal Datum	

Notes:

FIELD DATA: Interval Recovered (in) | Blows/foot | Collected Sample / Sample Name | Water Level | Graphic Log | Group Classification | MATERIAL DESCRIPTION | Sheen | Headspace Vapor

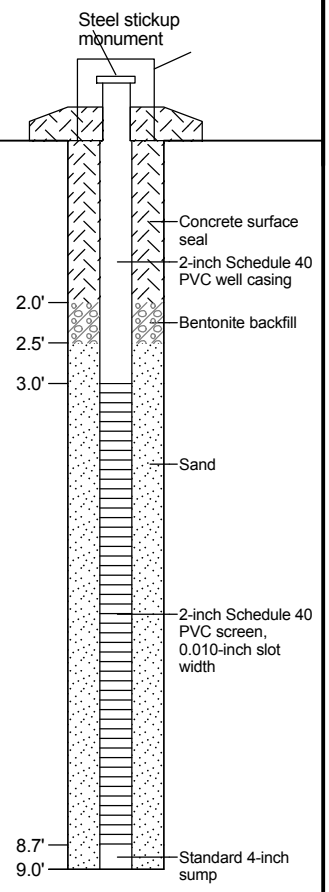
Elevation (feet) / Depth (feet)

0

Soil information shown in BP-02D

5

WELL LOG



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-02S

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-5
Sheet 1 of 1

Seattle Date:3/12/12 Path:P:\0\0504068\GINT\0504068800.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	1/4/2012	1/5/2012	32	GRL/TSD / GRL	Holocene	HSA

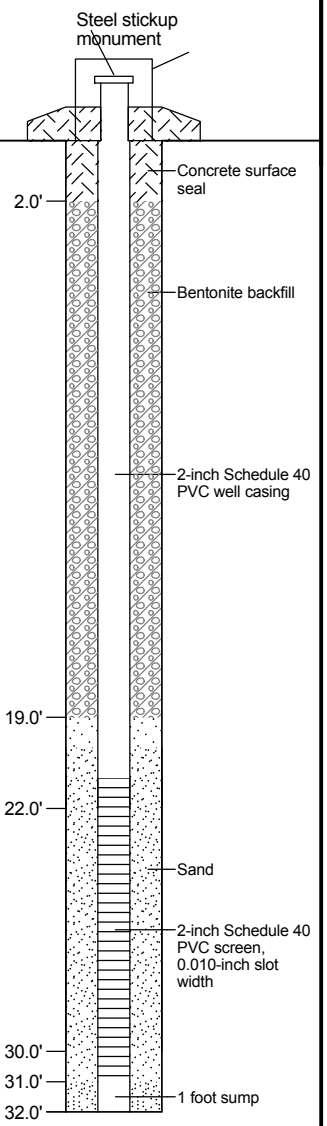
Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-61 Truck Rig
Surface Elevation (ft) Vertical Datum	Undetermined	Top of Casing Elevation (ft)	
Easting (X) Northing (Y)		Horizontal Datum	

A 2 (in) well was installed on 1/4/2012 to a depth of (ft). Well was developed on 1/4/2012.

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
1/4/2012	2.5	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor
	0		18	42					GP	1-1/4-inch crushed gravel (medium dense, moist) (fill)		
			15	40					GM	1-inch layer silty fine to coarse gravel with sand (medium dense, moist) (fill)		
			18	17		1			WD	2-inch layer burnt material (very stiff, moist) (fill)	MS	
	5		18	29					GM	1-inch layer silty fine to coarse gravel with sand (medium dense, moist) (fill)		
			18	2		2			GP	1-1/4-inch crushed gravel surface (medium dense, moist) (fill)		
			18	3		3			GP-GM	Dark brown fine to coarse gravel with sand, silt and slag, wood (some burnt) glass, metal debris and potential "rock wool" slag (medium dense, wet) (fill)		
			18	5		4			SM	Black soil or slag (size is "silty fine to coarse sand with gravel") (loose, wet) (fill) (Note: blocky organic sheen on sample; MS on water at top of sampler)		
	10		18	2					WD	Dark brown burnt wood and silt (very stiff, wet) (fill)		
			18	0					SP-SM	Gray silt with sand (very soft, moist) (fill)		
			18	0					PT	Dark brown peat (very soft, moist) (fill)		
			18	0		5			ML	Gray silt, trace sand, trace organics (very soft, moist) (fill)		
	15		18	0						Brown silt with organics (very soft, moist) (fill)		
			18	0					SP	Wood debris (soft, wet) (fill)		
			18	0					ML	Gray fine sand with silt (very loose, moist) (fill)		
			18	1		6				Brown peat with silt (soft, moist) (native)		
	20		18	5					SP	Brown and gray silt with organics (soft, moist)		
			18	20						Grades to very soft		
			18	20						Grades to trace organics		
			18	20		7				Gray fine to medium sand, trace silt (very loose, moist)		
	25		18	31						Gray silt, trace organics (very soft, moist)		
			18	36						Gray fine sand, trace silt (very loose, wet)		
			16	17						Stopped drilling 1/4/2012 at 21.5 feet; resumed drilling 1/5/2012		
	30									Grades to loose		
										1- to 2-inch pockets of silt with organics		
										Grading slightly more coarse; medium dense		
										~3 mm wood layer		
										Grades to dense		
										Grades to fine to coarse, medium dense		
										0.5-inch layer of wood		



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-03D

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-6
Sheet 1 of 1

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	1/4/2012	1/5/2012	9	GRL/TSD / GRL	Holocene	HSA

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-61 Truck Rig
Surface Elevation (ft) Vertical Datum	Undetermined	Top of Casing Elevation (ft)	
Easting (X) Northing (Y)		Horizontal Datum	

A 2 (in) well was installed on 1/5/2012 to a depth of (ft). Well was developed on 1/4/2012.

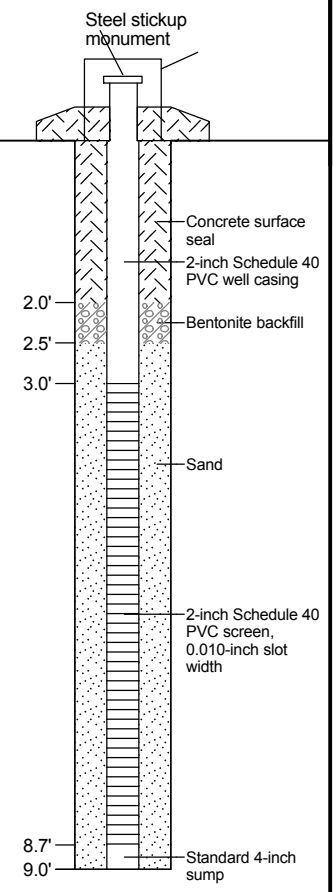
Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

FIELD DATA

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor
	0									Soil information shown in BP-03D		
	5											

WELL LOG



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-03S

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-7
Sheet 1 of 1

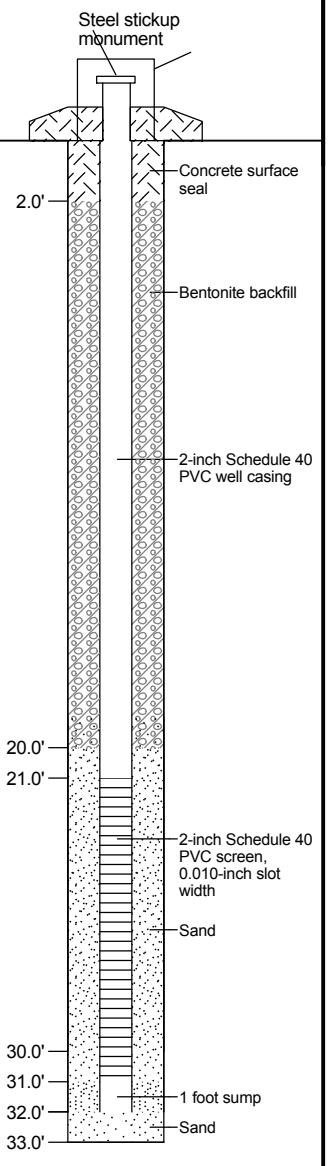
Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
1/4/2012	1/4/2012	33	GRL/TSD / GRL	Holocene	HSA

Hammer Data	Drilling Equipment	Groundwater
140 (lbs) / 30 (in) Drop	Mobile B-61 Truck Rig	Date Measured: 1/4/2012; Depth to Water (ft): 1.5; Elevation (ft):
Surface Elevation (ft) / Vertical Datum: Undetermined	Top of Casing Elevation (ft)	A 2 (in) well was installed on 1/4/2012 to a depth of (ft). Well was developed on 1/4/2012.
Easting (X) / Northing (Y)	Horizontal Datum	

Notes:

Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor
0		12	15					GP	1-1/4-inch crushed gravel surface (loose, moist) (fill)		
								ML			
		14	22		1			SLAG	Light brown sandy silt, occasional gravel with slag (stiff, moist) (fill)		
		15	45						Slag with sand, trace silt (loose, wet) (fill)		
									Note: Slag is medium sand to coarse gravel-sized		
5		18	55						Grades to dense		
		18	26		2						
		12	27						~6-inch layer contains medium to coarse sand-sized white material (only <5% by mass); flaky - coating the slag		
		13	4		3			ML	3 inches gray silt, trace sand, trace slag (soft, moist) (fill)		
10		18	2					PT	Dark brown peat (soft, moist to wet) (native)		
		18	1					0	Brown silt with organics (decomposing fibrous/woody material) (soft, moist)		
		18	1		4				Grades to very soft		
									5-inch layer of gray silt with organics		
15		18	1								
		18	0						Grades to gray, one 1 cm and two 5 mm layers of silty fine sand		
		18	0						Increasing number of silty sand layers (all <5 mm thick)		
20		18	2						Grades to silt with sand, trace organics to sandy silt, trace organics		
		18	6		5			SM	Gray silty fine sand, trace organics (very loose, moist)		
								SP			
		18	0						Gray fine sand, trace silt, trace organics (loose, wet)		
		18	14						Grades to fine to medium sand, trace silt, very loose		
25		18	12						Grades to medium dense		
		18	24		6						
		18	12						4 inches wood		
30		18	14						1/2-inch wood		
		18	15						Grades to fine to coarse 1-inch wood		
									1-inch wood in shoe		

WELL LOG



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-04D

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-8
Sheet 1 of 1

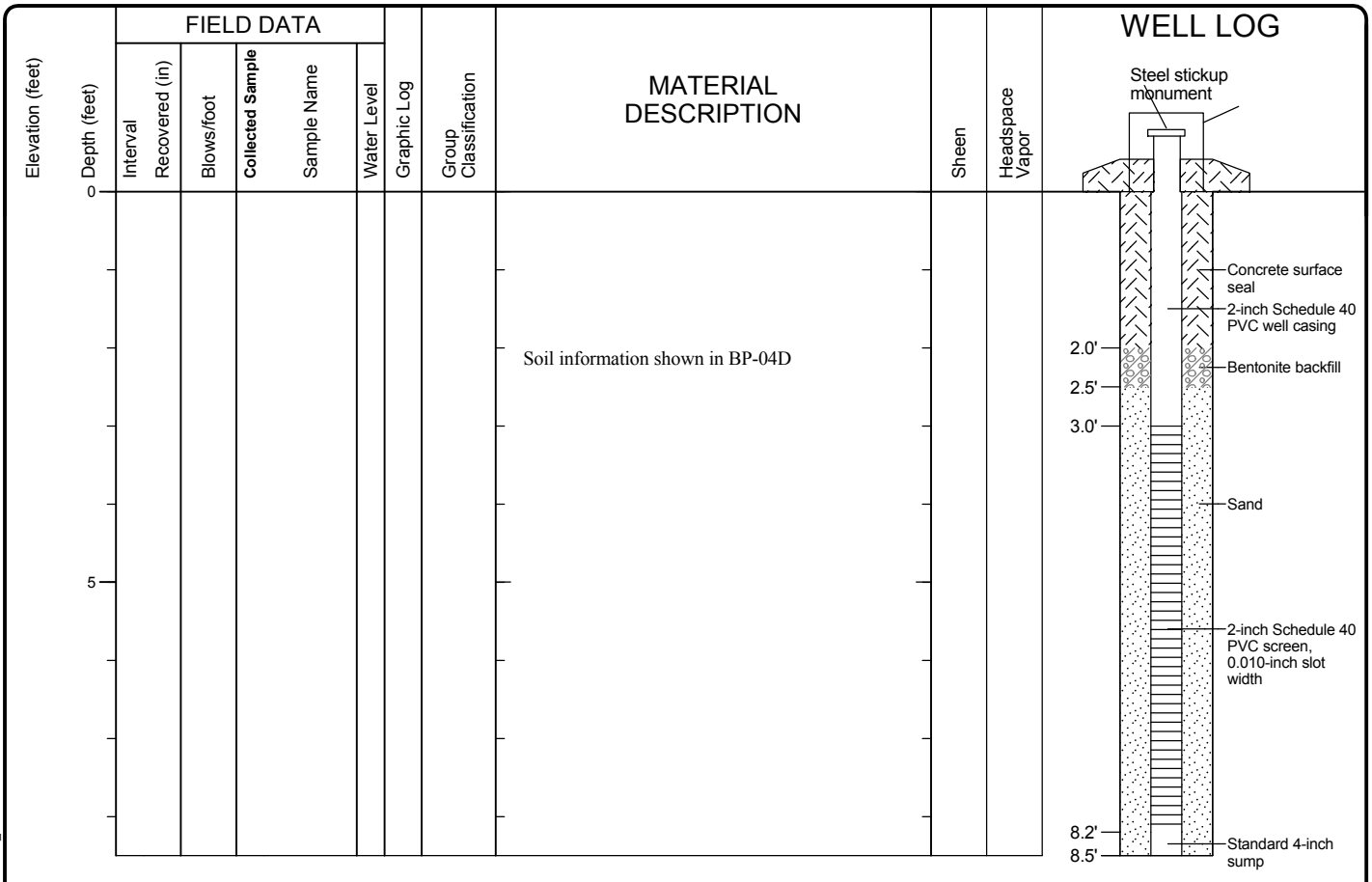
Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	1/4/2012	1/4/2012	8.5	GRL/TSD / GRL	Holocene	HSA

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-61 Truck Rig
Surface Elevation (ft) Vertical Datum	Undetermined	Top of Casing Elevation (ft)	
Easting (X) Northing (Y)		Horizontal Datum	

A 2 (in) well was installed on 1/4/2012 to a depth of (ft). Well was developed on 1/4/2012.

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-04S

GeoEngineers

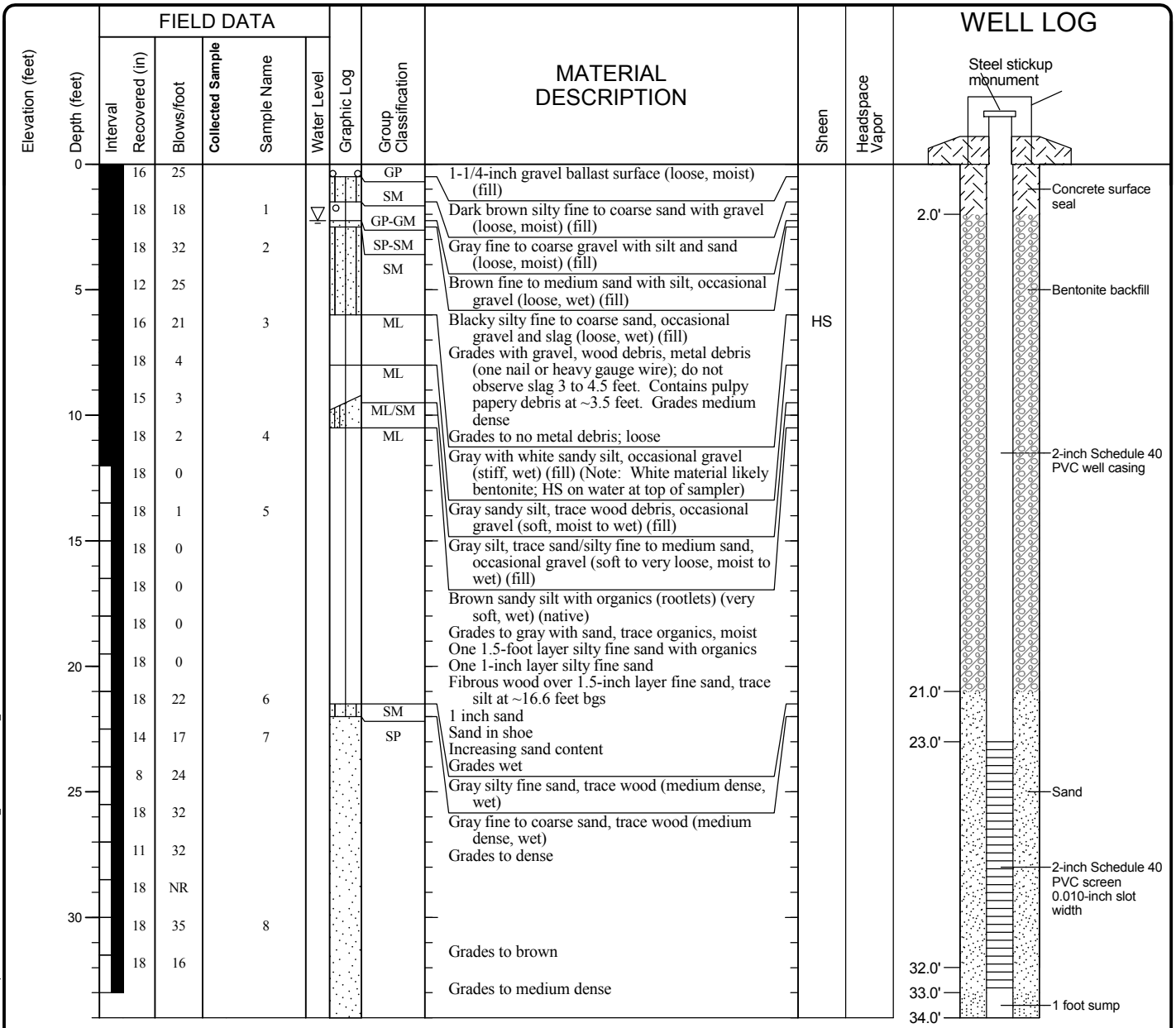
Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-9
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
1/3/2012	1/3/2012	34	GRL/TSD / GRL	Holocene	HSA

Hammer Data	Drilling Equipment	
140 (lbs) / 30 (in) Drop	Mobile B-61 Truck Rig	A 2 (in) well was installed on 1/3/2012 to a depth of (ft). Well was developed on 1/3/2012.
Surface Elevation (ft) Vertical Datum: Undetermined	Top of Casing Elevation (ft)	Groundwater: Date Measured 1/3/2012; Depth to Water (ft) 2.3; Elevation (ft)
Easting (X) Northing (Y)	Horizontal Datum	

Notes:



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-05D

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-10
Sheet 1 of 1

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	1/3/2012	1/3/2012	9.5	GRL/TSD / GRL	Holocene	HSA

Hammer Data: 140 (lbs) / 30 (in) Drop	Drilling Equipment: Mobile B-61 Truck Rig	A 2 (in) well was installed on 1/3/2012 to a depth of (ft). Well was developed on 1/3/2012.
Surface Elevation (ft) Vertical Datum: Undetermined	Top of Casing Elevation (ft)	Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)
Easting (X) Northing (Y)	Horizontal Datum	

Notes:

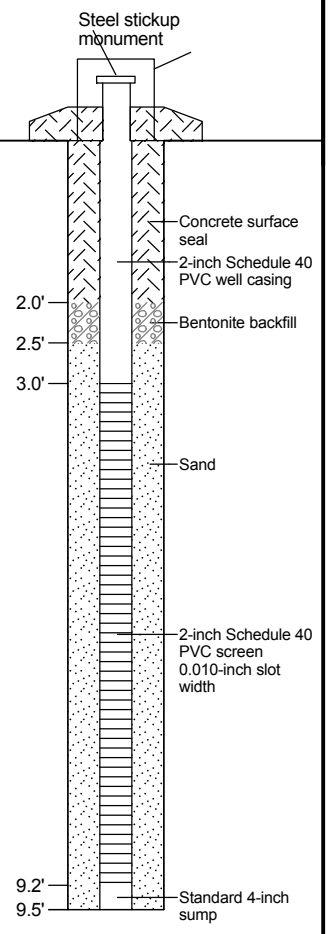
FIELD DATA: Interval Recovered (in) | Blows/foot | Collected Sample / Sample Name | Water Level | Graphic Log | Group Classification | MATERIAL DESCRIPTION | Sheen | Headspace Vapor | Elevation (feet) | Depth (feet)

Soil information shown in BP-05D

0

5

WELL LOG



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-05S

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-11
Sheet 1 of 1

Drilled Start 12/30/2011	End 12/30/2011	Total Depth (ft) 35	Logged By GRL/TSD Checked By GRL	Driller Holocene	Drilling Method HSA
Hammer Data 140 (lbs) / 30 (in) Drop			Drilling Equipment Mobile B-61 Truck Rig		
Surface Elevation (ft) Vertical Datum Undetermined			Top of Casing Elevation (ft)		
Easting (X) Northing (Y)			Horizontal Datum		

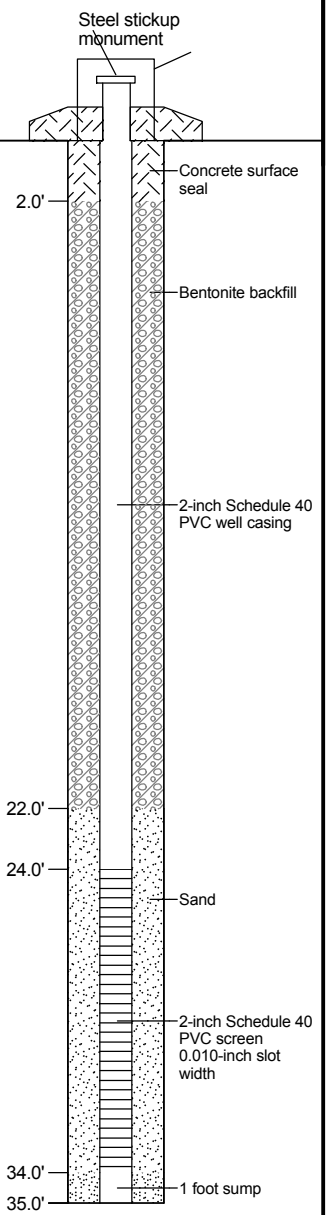
A 2 (in) well was installed on 12/30/2011 to a depth of (ft).
Well was developed on 12/30/2011.

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/30/2011	3.0	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor
	0		18	28					SP	1-1/4-inch crushed gravel surface (medium dense, moist) (fill)		
			16	24					ML	Dark brown silt with organics (very stiff, moist) (fill)		
			13	NR					GM	3-inch long piece of wood		
									WD	Gray silty gravel with sand (medium dense, moist) (fill)		
	5		12	2		1			ML	Dark brown burnt wood with gravel and sand (soft, wet) (fill)		
			14	21						Dark brown sandy silt with organics including burnt wood; slag (soft, wet) (fill) (Slag includes only one piece approximately 3 inches long)		
			18	8						Grades to stiff		
			15	5		2				Grades to medium stiff		
	10		18	4		3			ML	Grades to with gravel		
			18	1		4				Grades to gray silt, trace organics, medium stiff, moist (Note: Brick dust in shoe)		
			18	0						Grades to with sand, soft		
			18	1						Brown silt with organics (soft, moist) (native)		
	15		18	1						Grades to very soft		
			18	2						One 1-inch area fine sand		
			18	2						1-inch long piece of wood		
	20		18	0						1-inch layer fine sand		
			18	1		5			SM	Gray silty fine sand (very loose, wet)		
			18	9								
	25		18	12					SP	Gray fine to coarse sand, trace silt (medium dense, wet)		
			18	12						1-inch fine to medium sand		
			18	20		6						
	30		18	18						Grades to brown (looks oxidized)		
			18	24						Grades to gray with 1-inch zones of brown		
			18	52								
	35									Grades to very dense		

WELL LOG



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-06D

GeoEngineers

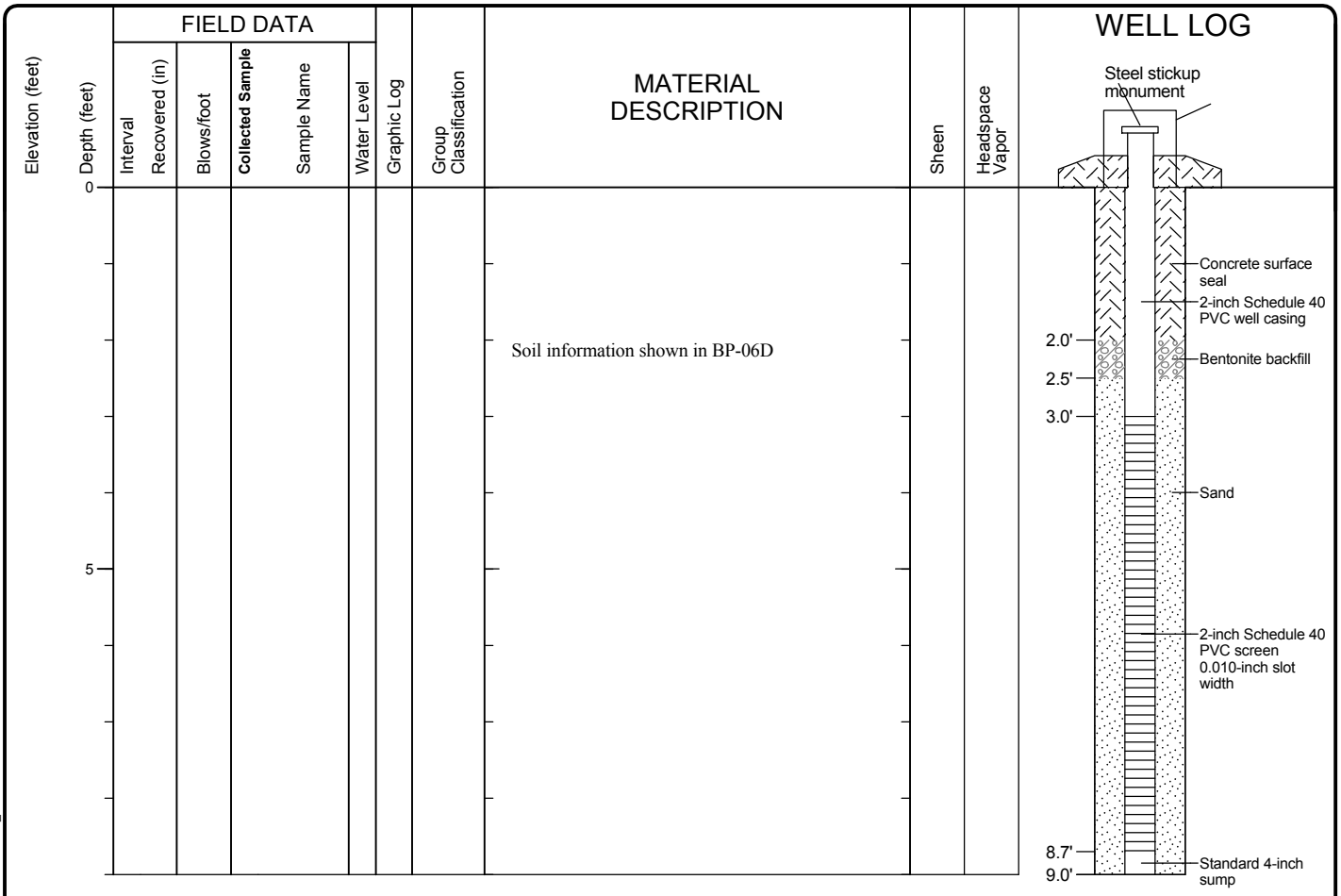
Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-12
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/30/2011	12/30/2011	9	GRL/TSD / GRL	Holocene	HSA

Hammer Data: 140 (lbs) / 30 (in) Drop	Drilling Equipment: Mobile B-61 Truck Rig	A 2 (in) well was installed on 12/30/2011 to a depth of (ft). Well was developed on 12/30/2011.
Surface Elevation (ft) Vertical Datum: Undetermined	Top of Casing Elevation (ft)	Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)
Easting (X) Northing (Y)	Horizontal Datum	

Notes:



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-06S

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-13
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/29/2011	12/29/2011	36.5	GRL/TSD / GRL	Holocene	HSA

Hammer Data: 140 (lbs) / 30 (in) Drop	Drilling Equipment: Mobile B-61 Truck Rig	A 2 (in) well was installed on 12/29/2011 to a depth of (ft). Well was developed on 12/29/2011.
Surface Elevation (ft) Vertical Datum: Undetermined	Top of Casing Elevation (ft)	Groundwater: Date Measured 12/29/2011; Depth to Water (ft) 3.0; Elevation (ft)
Easting (X) Northing (Y)	Horizontal Datum	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor
	0		11	NR					GP	1-1/4-inch crushed gravel surface (loose, moist) (fill)		
			11	9					ML	Dark brown sandy silt with organics (stiff, moist) (fill)		
			5	1/18"					WD	Burnt wood (stiff, moist to wet) (fill)		
			9	1/18"		1			SM	Brown silty fine to coarse sand, occasional gravel, trace organics (very loose, wet) (fill)	SS	
	5								WD	Dark brown decomposed possibly burnt wood/organics (very soft, wet) (fill)	HS	
			16	0					ML	Gray silt with sand, occasional gravel (very soft, wet) (fill)	SS	
			15	2								
			18	1								
	10		8	0							NS	
			12	2		2			ML	1-inch brown silt with organics (soft, moist) (native)		
			18	1					ML	Brown silt, trace sand, trace organics (soft, moist)		
	15		18	1		3				Grades to very soft		
			18	1						Grades to organic fibers		
			18	0						Grades to sandy silt		
			18	0						Grades to moist to wet		
	20		18	0		4						
			18	2					SM	Gray silty fine sand (very loose, wet)		
			18	2					ML	Gray sandy silt (soft, moist to wet)		
			18	2						Grades to silty fine sand/sandy silt in ~4-inch layers		
			18	2		5			SP-SM	Grades to wet		
	25		18	1/18"						Gray fine sand with silt (very loose, wet)		
			18	6						Two 1-inch layers sandy silt		
			18	19					SP	Gray fine to coarse sand, trace silt (loose, wet)		
			18	22		6				1-inch layer sandy silt		
	30		18	46						Grades to medium dense		
			18	58						Trace organics (1/2-inch layers)		
			12	17						Trace organics (1/2-inch layers)		
	35									Grades to dense		
										Grades to very dense		
										Grades to medium dense		

WELL LOG

Steel stickup monument
Concrete surface seal
2.0'
Bentonite backfill
2-inch Schedule 40 PVC well casing
23.5'
Sand
25.5'
2-inch Schedule 40 PVC screen 0.010-inch slot width
35.5'
1 foot sump
36.5'

Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-07D

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-14
Sheet 1 of 1

Seattle Date:3/12/12 Path:P:\0\0504068\GINT\0504068OO.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/29/2011	12/29/2011	12	GRL/TSD / GRL	Holocene	HSA

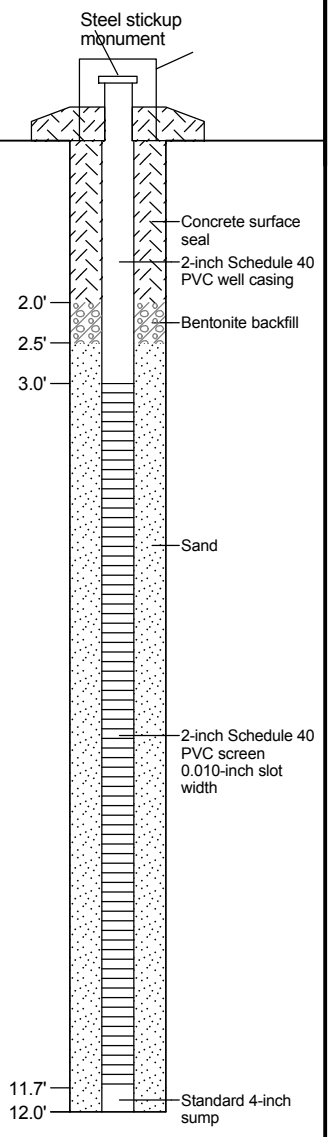
Hammer Data: 140 (lbs) / 30 (in) Drop	Drilling Equipment: Mobile B-61 Truck Rig	A 2 (in) well was installed on 12/29/2011 to a depth of (ft). Well was developed on 12/29/2011.
Surface Elevation (ft) Vertical Datum: Undetermined	Top of Casing Elevation (ft)	Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)
Easting (X) Northing (Y)	Horizontal Datum	

Notes:

FIELD DATA

Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor
	0								Soil information shown in BP-07D		
	5										
	10										

WELL LOG



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-07S

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-15
Sheet 1 of 1

Seattle Date:3/12/12 Path:P:\0\0504068\GINT\0504068800.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

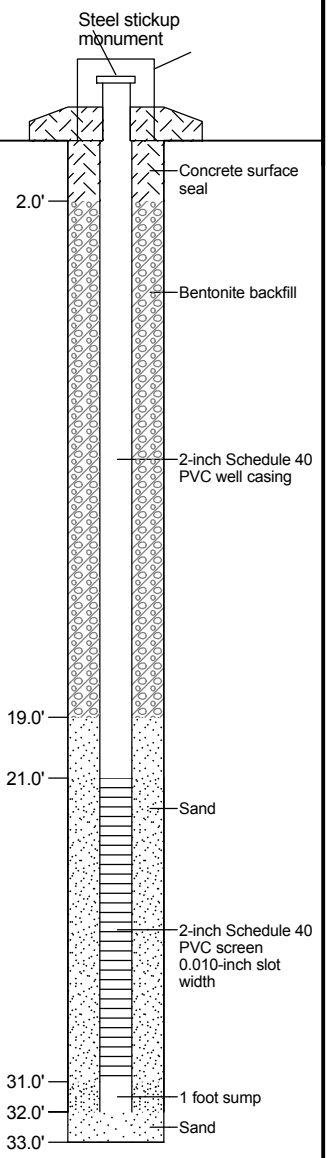
Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/28/2011	12/29/2011	33	GRL/TSD / GRL	Holocene	HSA

Hammer Data: 140 (lbs) / 30 (in) Drop	Drilling Equipment: Mobile B-61 Truck Rig	A 2 (in) well was installed on 12/29/2011 to a depth of (ft). Well was developed on 12/29/2011.
Surface Elevation (ft) Vertical Datum: Undetermined	Top of Casing Elevation (ft)	Groundwater: Date Measured 12/28/2011; Depth to Water (ft) 0.5; Elevation (ft)
Easting (X) Northing (Y)	Horizontal Datum	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor
	0		5	NR					GP	1-1/4-inch crushed rock surface (medium dense, moist to wet) (fill)		
			7	20					SM	Grades to wet Gray fine silty sand, occasional gravel (medium dense, wet) (fill)		
			18	13		1			ML	Brown silt with organics (stiff, moist to wet) (fill)		
	5		2	5						Grades to gray silt, trace organics, trace sand (stiff, moist) (fill)		
			18	3		2				Grades to medium stiff Grading between trace sand to with sand, occasional gravel, soft		
			18	2								
			18	3		3						
	10		5	1					ML	Dark brown silt with organics (very soft, moist) (native)		
			18	1		4			ML	Gray silt, trace sand, trace organics (very soft, moist)		
			18	2						Grades to no sand, soft		
	15		18	0						Small (1 inch) piece of wood Grades to sandy silt, very soft		
			18	0								
			18	1								
	20		18	0		5						
			18	2					SM	Gray silty fine sand (very loose, wet)		
			18	11					SP-SM	Gray sand with silt (medium dense, wet)		
			18	19		6			SP	Gray fine to coarse sand, trace silt (medium dense, wet)		
	25		18	28								
			18	24								
			18	22					WD	Chunk of wood (yellow in color) ~ 1/2 inch		
									SP	Gray fine to medium sand, trace silt (medium dense, wet)		
	30		18	12					WD			
									SP	Brown organic matter (decomposing wood) ~1 inch		
			5	9						Gray fine to coarse sand, trace silt (medium dense, wet) Grades to fine to medium sand, trace wood 3-inch wood, decomposing		

WELL LOG



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-08D

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-16
Sheet 1 of 1

Seattle Date:3/12/12 Path:P:\0\0504068\GINT\0504068OO.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start 12/28/2011	End 12/29/2011	Total Depth (ft) 9	Logged By GRL/TSD Checked By GRL	Driller Holocene	Drilling Method HSA

Hammer Data 140 (lbs) / 30 (in) Drop	Drilling Equipment Mobile B-61 Truck Rig	A 2 (in) well was installed on 12/29/2011 to a depth of (ft). Well was developed on 12/29/2011.
Surface Elevation (ft) Undetermined Vertical Datum	Top of Casing Elevation (ft)	Groundwater Date Measured / Depth to Water (ft) / Elevation (ft)
Easting (X) Northing (Y)	Horizontal Datum	

Notes:

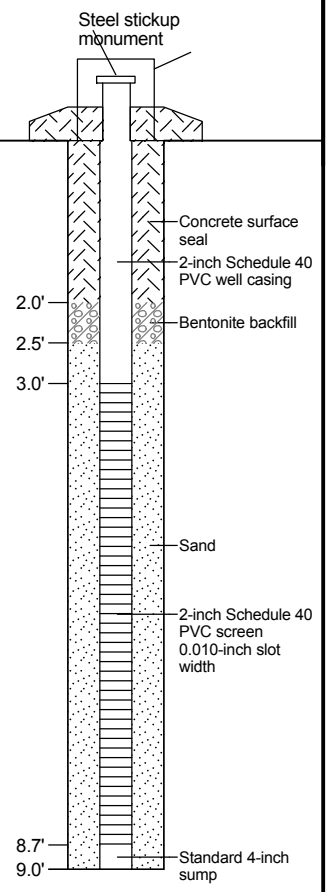
FIELD DATA: Elevation (feet); Depth (feet); Interval Recovered (in); Blows/foot; Collected Sample; Sample Name; Water Level; Graphic Log; Group Classification

MATERIAL DESCRIPTION

Soil information shown in BP-08D

Sheen; Headspace Vapor

WELL LOG



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-08S

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

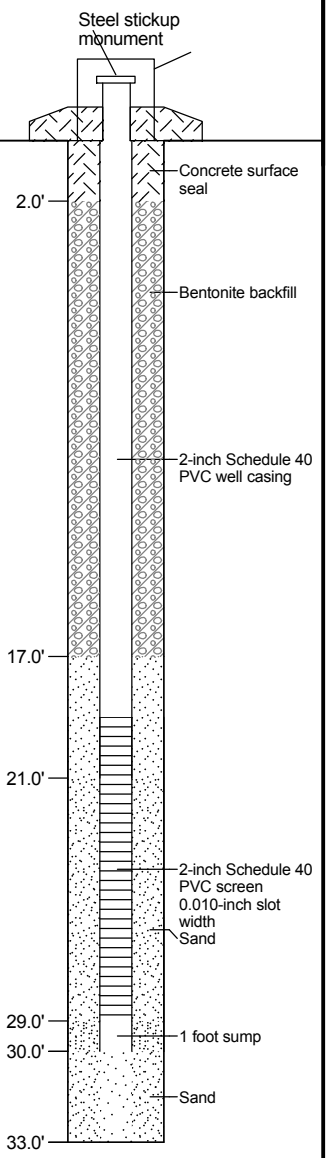
Figure A-17
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/28/2011	12/28/2011	31.5	GRL/TSD / GRL	Holocene	HSA

Hammer Data: 140 (lbs) / 30 (in) Drop	Drilling Equipment: Mobile B-61 Truck Rig	A 2 (in) well was installed on 12/28/2011 to a depth of (ft). Well was developed on 12/28/2011.
Surface Elevation (ft) Vertical Datum: Undetermined	Top of Casing Elevation (ft)	Groundwater: Date Measured 12/28/2011; Depth to Water (ft) 2.5; Elevation (ft)
Easting (X) Northing (Y)	Horizontal Datum	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor
	0		4	10					SM	Brown silty fine to coarse sand with gravel, occasional wood (medium dense, moist to wet) (fill)		
			6	2			▽			Grades to wet, very loose		
			12	4		1						
	5		13	6		2			ML	Grades to occasional wood debris (potentially treated; potential piece of RR tie?), loose (HS with color)	HS	
			1	2						Brown silt with organics (medium stiff, moist to wet) (fill)	SS	
			14	2		3				Grades to gray silt, trace organics, trace sand (medium stiff, moist) (fill)		
			15	2						Grades to soft		
	10		18	2		4			SP	SS Gray fine to coarse sand, trace silt (very loose, wet) (fill)		
			11	1						NS		
			18	9						Grades to loose		
	15		18	1/18"		5			PT	1-inch organics, rootlets, sand (native)		
			11	8		6			ML	Brown silt, trace sand with organics (very soft, moist)		
			12	17		7				1-inch layer of fine to coarse sand with silt Grades to medium stiff		
	20		18	13					SP-SM	Brown fine sand with silt (medium dense, wet)		
			17	19					SP	Brown to gray fine to medium sand, trace silt (medium dense, wet)		
			18	22						Grades to gray		
			13	11		8				Grading between fine sand to fine to medium sand, slight silt content changes every 3 to 4 inches		
	25		15	23						Grades to fine to coarse sand		
			18	17		9				Grades to brown fine to medium sand Grades fine		
			18	17					SM/ML	Grades to gray		
	30		18	20						Green to gray silty sand to sandy silt (medium dense to very stiff, moist)		
										3/4-inch fine to medium sand, trace silt		



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-09D

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

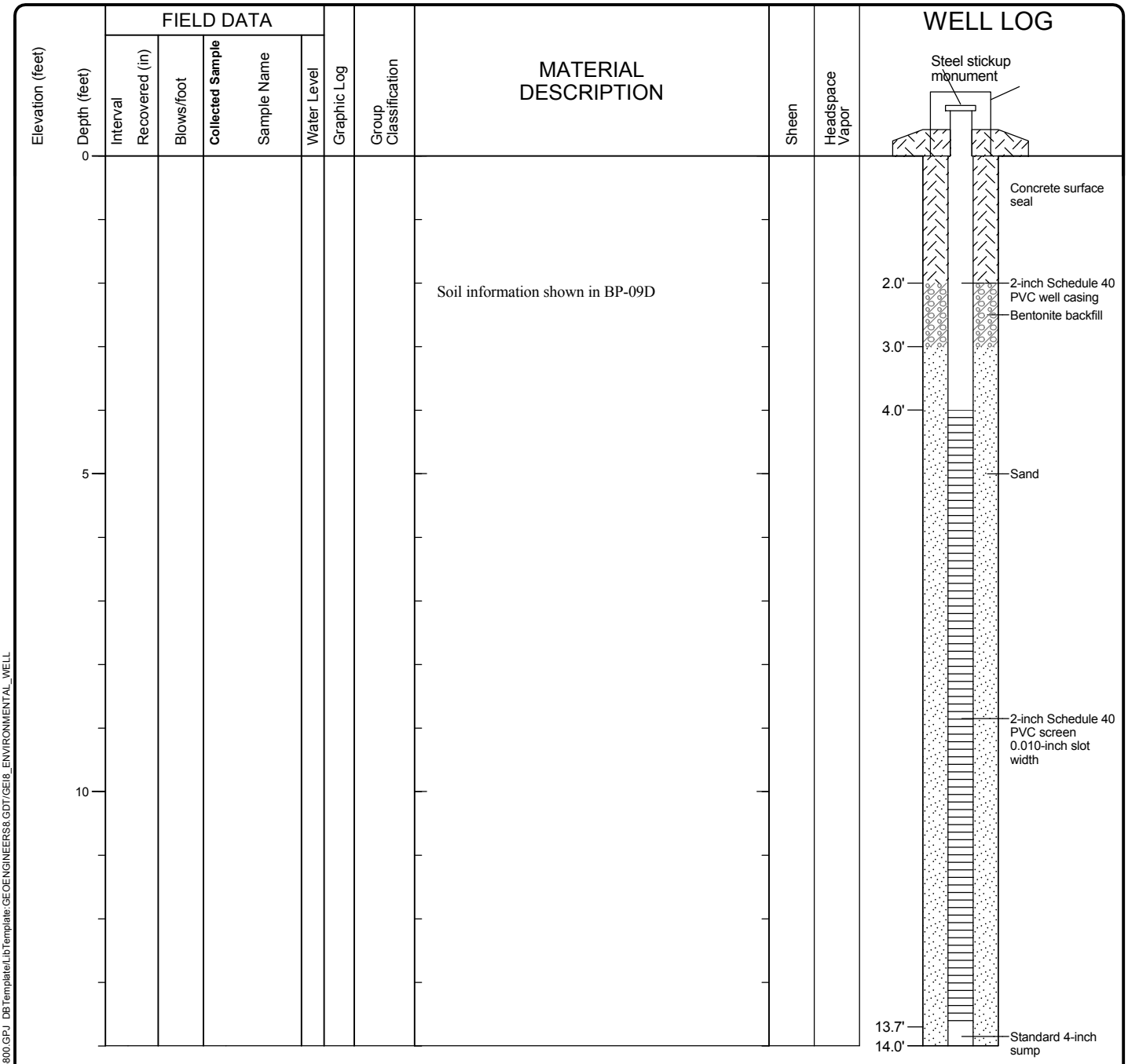
Figure A-18
Sheet 1 of 1

Seattle Date:3/12/12 Path:P:\0\0504068\GINT\0504068800.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start 12/28/2011	End 12/28/2011	Total Depth (ft) 14	Logged By GRL/TSD Checked By GRL	Driller Holocene	Drilling Method HSA

Hammer Data: 140 (lbs) / 30 (in) Drop	Drilling Equipment: Mobile B-61 Truck Rig	A 2 (in) well was installed on 12/28/2011 to a depth of (ft). Well was developed on 12/28/2011.
Surface Elevation (ft) Vertical Datum: Undetermined	Top of Casing Elevation (ft)	Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)
Easting (X) Northing (Y)	Horizontal Datum	

Notes:



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-09S

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

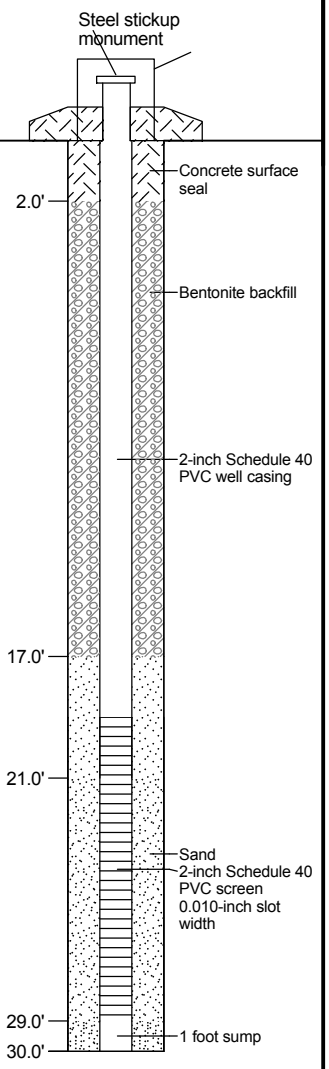
Figure A-19
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/27/2011	12/27/2011	30	GRL/TSD / GRL	Holocene	HSA

Hammer Data: 140 (lbs) / 30 (in) Drop	Drilling Equipment: Mobile B-61 Truck Rig	A 2 (in) well was installed on 12/27/2011 to a depth of (ft). Well was developed on 12/27/2011.
Surface Elevation (ft) Vertical Datum: Undetermined	Top of Casing Elevation (ft)	Groundwater: Date Measured 12/27/2011; Depth to Water (ft) 2.0; Elevation (ft)
Easting (X) Northing (Y)	Horizontal Datum	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor
	0		6	18					GP	1-1/4-inch crushed rock surface (medium dense, wet) (fill)		
			7	5		1	▽		ML	Brown sandy silt with wood (medium stiff, wet) (fill)		
			9	1/18"						Grades to occasional gravel, very soft		
	5		4	1/18"								
			11	4		2			GP	Dark brown fine to coarse gravel, trace wood (loose, wet) (fill)		
			16	3		3			ML	Gray silt with sand, trace organics, occasional gravel (soft, wet) (fill)		
			9	2		4			SP	Brown fine to medium sand (very loose, wet) (fill)		
	10		12	2		5			ML	Gray silt with sand and wood (soft, wet) (native)		
			9	3						Grades to gray/brown		
			10	5								
	15		0	1						Grades to medium stiff		
			12	8		6				Grades to very soft		
			13	25					SP-SM	Gray fine to coarse sand with silt, trace wood debris (medium dense, moist) (trace shell fragments 17.5 to 17.6 feet)		
	20		7	34						Grades to occasional gravel		
			16	67		7				Grades to no wood, dense		
			18	50/5"						Grades to brown		
			16	60/6"						Grades to very dense		
	25		18	29		8			GP	3-inch layer of gravel/coarse sand		
			18	40					SP	Brown fine to medium sand, trace silt (medium dense, moist)		
			18	37		9				Grades to dense		
	30											



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-10D

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-20
Sheet 1 of 1

Seattle Date:3/12/12 Path:P:\0\0504068\GINT\0504068800.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/27/2011	12/27/2011	9	GRL/TSD / GRL	Holocene	HSA

Hammer Data	Drilling Equipment	
140 (lbs) / 30 (in) Drop	Mobile B-61 Truck Rig	
Surface Elevation (ft) Vertical Datum: Undetermined	Top of Casing Elevation (ft)	
Easting (X) Northing (Y)	Horizontal Datum	

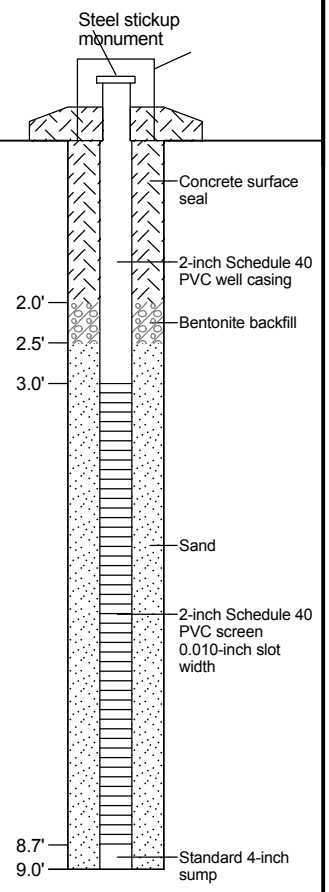
A 2 (in) well was installed on 12/27/2011 to a depth of (ft).
Well was developed on 12/27/2011.

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor
	0							Soil information shown in BP-10D		
	5									

WELL LOG



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-10S

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-21
Sheet 1 of 1

APPENDIX B
Well Survey Data

Benson Survey Information[1]

Point Number	Northing	Easting	Elevation	Descriptor
11434	371977.6217	1308726.824	17.7776	BP-01S-PVC NORTH
11435	371977.8594	1308726.82	17.9685	BP-01S-TOP CASE
11436	371977.9308	1308726.808	15.1621	BP-01S-GROUND
11437	371973.7536	1308727.1	17.9744	BP-01D-PVC NORTH
11438	371973.9435	1308727.133	18.1817	BP-01D-TOP CASE
11439	371973.9983	1308727.036	15.2581	BP-01D-GROUND
11380	371826.4767	1308735.183	18.8524	BP-02S-PVC NORTH
11381	371826.6229	1308735.171	19.0765	BP-02S-TOP CASE
11382	371826.709	1308735.188	16.2844	BP-02S-GROUND
11383	371822.5084	1308735.14	18.8833	BP-02D-PVC NORTH
11384	371822.651	1308735.18	19.086	BP-02D-TOP CASE
11385	371822.7801	1308735.157	16.2596	BP-02D-GROUND
11386	371659.4186	1308766.223	18.2597	BP-03S-PVC NORTH
11387	371659.6118	1308766.209	18.46	BP-03S-TOP CASE
11388	371659.7059	1308766.193	15.5448	BP-03S-GROUND
11389	371655.4975	1308766.43	18.3743	BP-03D-PVC NORTH
11390	371655.655	1308766.425	18.6676	BP-03D-TOP CASE
11391	371655.7025	1308766.279	15.6476	BP-03D-GROUND
11392	371545.1199	1308782.617	18.3645	BP-04S-PVC NORTH
11393	371545.2953	1308782.617	18.5324	BP-04S-TOP CASE
11394	371545.4459	1308782.652	15.6544	BP-04S-GROUND
11395	371541.1801	1308782.814	18.3263	BP-04D-PVC NORTH
11396	371541.3286	1308782.772	18.5042	BP-04D-TOP CASE
11397	371541.3792	1308782.714	15.7489	BP-04D-GROUND
11398	371481.4942	1308791.423	18.5623	BP-05S-PVC NORTH
11399	371481.6665	1308791.447	18.7109	BP-05S-TOP CASE
11400	371481.7366	1308791.449	15.7579	BP-05S-GROUND
11401	371477.1097	1308791.563	18.6539	BP-05D-PVC NORTH
11402	371477.267	1308791.557	18.7993	BP-05D-TOP CASE
11403	371477.3325	1308791.524	15.8271	BP-05D-GROUND
11404	371412.4909	1308800.711	18.4397	BP-06S-PVC NORTH
11405	371412.6532	1308800.702	18.64	BP-06S-TOP CASE
11406	371412.7549	1308800.648	15.9709	BP-06S-GROUND
11407	371407.1276	1308801.203	18.3941	BP-06D-PVC NORTH
11408	371407.2864	1308801.302	18.6131	BP-06D-TOP CASE
11409	371407.4074	1308801.252	15.8152	BP-06D-GROUND
11410	371337.2871	1308811.404	18.4126	BP-07S-PVC NORTH
11411	371337.4225	1308811.381	18.6106	BP-07S-TOP CASE
11412	371337.6234	1308811.452	15.6123	BP-07S-GROUND
11413	371332.8036	1308812.098	18.402	BP-07D-PVC NORTH
11414	371332.9558	1308812.046	18.5487	BP-07D-TOP CASE
11415	371332.9585	1308812.046	15.5399	BP-07D-GROUND
11416	371143.3462	1308839.017	18.7268	BP-08S-PVC NORTH
11417	371143.4882	1308839.031	19.4972	BP-08S-TOP CASE
11418	371143.6782	1308838.961	16.0317	BP-08S-GROUND
11419	371139.579	1308839.538	18.5903	BP-08D-PVC NORTH
11420	371139.7544	1308839.559	19.1342	BP-08D-TOP CASE
11421	371139.9184	1308839.716	15.8503	BP-08D-GROUND
11422	370793.3724	1308889.876	18.9128	BP-09S-PVC NORTH
11423	370793.4997	1308889.764	19.3633	BP-09S-TOP CASE
11424	370793.5486	1308889.628	16.4817	BP-09S-GROUND
11425	370788.6206	1308890.473	19.0316	BP-09D-PVC NORTH
11426	370788.7625	1308890.439	19.3319	BP-09D-TOP CASE
11427	370788.8464	1308890.222	16.2656	BP-09D-GROUND
11428	370519.5021	1308928.873	18.8297	BP-10S-PVC NORTH
11429	370519.4335	1308928.719	19.1937	BP-10S-PVC NORTH
11430	370519.5529	1308928.887	16.0855	BP-010S-GROUND
11431	370514.2451	1308929.084	18.8601	BP-10D-PVC NORTH
11432	370514.3683	1308929.002	19.089	BP-10D-TOP CASE
11433	370514.5133	1308929.03	16.0624	BP-10D-GROUND

Notes:

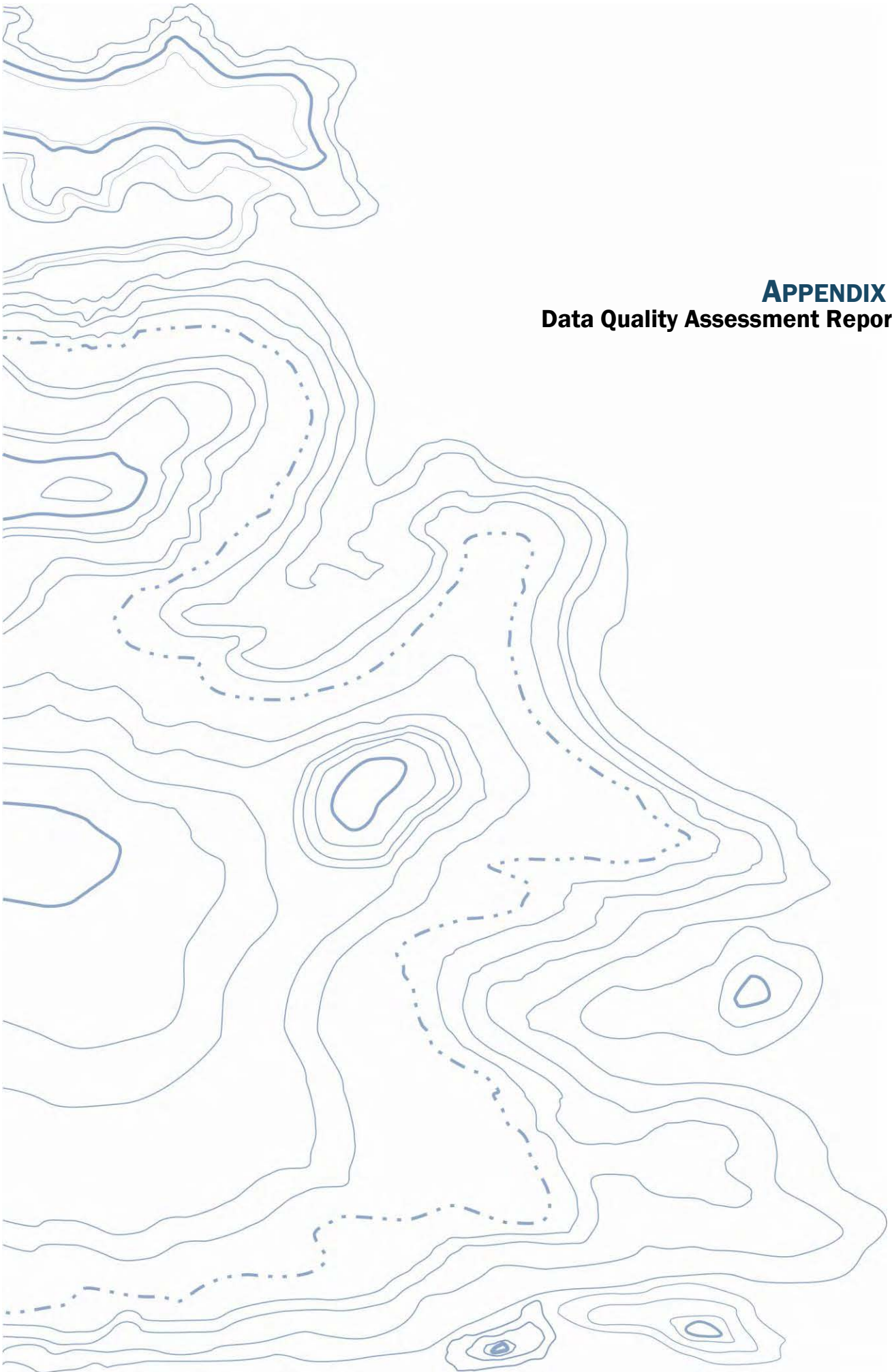
[1] Wells surveyed by David Evans and Associates.

The horizontal datum is Washington State Plane coordinate system 83/91. Vertical is NAVD 88 in US Survey feet.

"PVC North" indicates a point on the northern rim of the PVC well casing (well cap removed).

"Top Case" indicates a point on the northern rim of the steel stick-up monument (with the lid opened).

"Ground" indicates a point near the base of the stick-up monument on the north side of the well.



APPENDIX C
Data Quality Assessment Reports

GROUNDWATER DATA QUALITY ASSESSMENT SUMMARY

Metals (Sb, As, Cd, Pb, Hg, Tl) by EPA Methods 6020/7470A, Petroleum Hydrocarbons by Ecology Method NWTPH-Dx, and Semivolatiles by EPA Method SW8270

Laboratory Sample Delivery Groups (Analytical Resources, Inc. Sdg): ug14, UF95

Project: Everett Smelter Benson Property (GeoEngineers Project Number 0504-068-00)

This report presents the results of a United States Environmental Protection Agency (USEPA)-defined Stage 2B validation (USEPA Document 540-R-08-005) of analytical data from the analyses of groundwater samples obtained at the "Everett Benson Property - ASARCO Smelter" sampling event. The data validation included verification and validation checks of the following quality control (QC) elements:

- Chain of Custody
- Holding Times
- Surrogates
- Internal Standards
- Method Blanks
- Laboratory Control Samples
- Matrix Spikes/Matrix Spike Duplicates
- Laboratory Duplicates
- Field Duplicates
- Initial Calibrations
- Continuing Calibration
- Reporting Limits and Miscellaneous

Certain data were qualified as a result of this data quality assessment. The QC elements for which data were qualified, as well as the associated samples, are the following:

✓ **Matrix Spikes/Matrix Spike Duplicates**

- BP5S-120127-W
- Rejection of data was associated MS/MSD %R values being less than 10%. These data points should not be used for any purpose.

✓ **Field Duplicates**

- BP7S-120127-W/BPDUPE-120127-W

Objective

The objective of the data quality assessment was to review laboratory analytical procedures and quality control (QC) results to evaluate whether:

- The samples were analyzed using well-defined and acceptable methods that provide detection limits below applicable regulatory criteria;

- The precision and accuracy of the data are well defined and sufficient to provide defensible data; and
- The quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

Twenty-one (21) groundwater samples, including one (1) field duplicate, were analyzed by one or more of the analytical methods listed above.

Data Package Completeness

Analytical Resources, Incorporated (ARI), located in Tukwila, Washington, was the laboratory that analyzed the samples evaluated as part of this data validation review. The laboratory provided the proper documentation for the Stage 2B validation. The laboratory followed adequate corrective action processes and all identified anomalies were discussed in the case narratives.

Chain-of-Custody Documentation

Chain-of-custody (COC) forms were provided with the laboratory analytical reports. There were no anomalies noted on the COC forms. Proper COC protocols appear to have been followed during the January 2012 sampling event.

Holding Times

The holding time is defined as the time that elapses between sample collection and sample analysis. Maximum holding time criteria exist for each analysis to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times were met for all analyses.

Surrogate Recoveries

A surrogate compound is a compound that is chemically similar to the analytes of interest, but unlikely to be found in any environmental sample. Surrogates are used for organic analyses and are added to all samples, standards, and blanks to serve as an accuracy and specificity check of each analysis. The surrogates are added at a known concentration and percent recoveries are calculated following analysis. All surrogate recoveries for and groundwater samples were within the laboratory control limits.

Internal Standards

Like a surrogate, an internal standard is a compound that is chemically similar to the analytes of interest, but unlikely to be found in any environmental sample. Internal standards are used only for the mass spectrometry (MS) instrumentation and are usually added to the sample aliquot after extraction has taken place. The internal standard should be analyzed at the beginning of a 12 hour sample run and the control limits for internal standard recoveries are -50% to +100% of the calibration standard. All internal standard recoveries were within the control limits.

Method Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. Method blanks were analyzed with each batch of samples at a frequency of one per twenty samples. For all sample batches, method blanks for all

applicable methods were analyzed at the required frequency. None of the analytes of interest were detected above the reporting limits in any of the blanks.

Matrix Spikes/Matrix Spike Duplicates (MS/MSD)

Because the actual analyte concentration in environmental samples is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis. One aliquot of sample is analyzed in the normal manner, then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a percent recovery (%R) is calculated. Matrix spike duplicates (MSD) analyses are generally performed for organic analyses as a precision check. For some organic analytical methods, such as NWTPH-Dx, a laboratory control sample/laboratory control sample duplicate (LCS/LCSD) sample set is performed in lieu of a MS/MSD analysis.

For metals analyses, the matrix spike (referred to as a "spiked sample") is typically followed by a post-spike sample if any element recoveries were outside the control limits in the "spike sample". In these cases, only the post spiked sample recoveries are used for assessment.

Matrix spike analyses should be performed once per analytical batch or every twenty field samples, whichever is more frequent. The recovery criteria for matrix spikes and laboratory control samples are specified in the laboratory documents as are the relative percent difference values. The frequency requirements were met for all analyses and the % R/RPD values were within the proper control limits, with the following exceptions:

SDG UG14 *(SVOCs):* A matrix spike sample set was performed on sample BP5S-120127-W. The %R values for 3,3'-dichlorobenzidiene were less than 10%. There were no positive results for any target analytes in the native sample. For these reasons, the reporting limit for only 3,3'-dichlorobenzidiene in sample BP5S-120127-W was rejected (R) and should not be used for any purpose.

In the same MS/MSD sample set, the %R values for N-nitrosodiphenylamine were less than the control limits in the spiked samples. There were no positive results for any target analytes in the native sample. The %R values for N-nitrosodiphenylamine were greater than 10% in the spiked samples. Qualifiers are typically not applied to organic outliers based on matrix spike outliers alone as long as %R values are greater than 10%,

Laboratory Control Samples/Laboratory Control Sample Duplicates (LCS/LCSD)

A laboratory control sample is essentially a blank sample that is spiked with a known amount of analyte concentration and analyzed. It is to be treated much like a matrix spike, without the possibility for matrix interference. As there is no actual sample matrix in the analysis, the analytical expectations for accuracy and precision are usually more rigorous and qualification would apply to all samples in the batch, instead of the parent sample only.

Laboratory control sample analyses should be performed once per analytical batch or every twenty field samples, whichever is more frequent. The recovery criteria for laboratory control samples are specified in the laboratory documents as are the relative percent difference values. The frequency requirements were met for all analyses, and the %R/RPD values were within the proper control limits.

Laboratory Duplicates

1. Internal laboratory duplicate analyses are performed to monitor the precision of the analyses. Two separate aliquots of a sample are analyzed as distinct samples in the laboratory, and the RPD between the two results is calculated. Duplicate analyses should be performed once per analytical batch. If one or more of the samples used has a concentration greater than five times the reporting limit for that sample, the absolute difference is used instead of the RPD.
2. Laboratory duplicates were analyzed at the proper frequency and the specified acceptance criteria were met in all cases.

Field Replicates/Duplicates

3. Field duplicate samples were collected and analyzed along with the reviewed sample batches. The duplicate samples were analyzed for the same parameters as the associated parent samples. As indicated above for the laboratory duplicates the RPD is used as the criteria for assessing precision, unless one or more of the samples used has a concentration greater than five times the reporting limit for that sample, the absolute difference is used instead of the RPD.
4. The RPD control limits for soil samples is 50%, while the RPD control limits for water samples is 35%. The absolute difference control limits for soil samples is twice the PQL value, while the absolute difference control limits for water samples is the same as the PQL value.
5. In cases where any of the cPAH compounds were qualified for precision, the resulting TEC value was also qualified as estimated (J) in that sample.

SDG UG14: One set of field duplicates, samples BP7S-120127-W/BPDUPE-120127-W, were submitted to the laboratory. The absolute difference values for dissolved and total lead exceeded the control limits above. The positive results/reporting limits for dissolved and total lead were qualified as estimated (J/UJ) in both samples.

Initial Calibrations (ICALs)

All initial calibrations were conducted according to the laboratory methods, and consisted of the appropriate number of standards. For the organics analyses, all percent relative standard deviation (%RSD) values were less than +/- 30% and all relative response factors (RRF) were greater than 0.05.

Continuing Calibration (CCALs)

All continuing calibrations were conducted according to the laboratory methods, and consisted of the appropriate number of standards. For the organics analyses, all percent difference (%D) values were less than +/- 25% and all relative response factors (RRF) were greater than 0.05, with the exception below:

SDG UG14 and UF95 (Semivolatiles): The percent difference (%D) value for benzoic acid was greater than the control limits of ±25% in the continuing calibration (CCAL) standard analyzed on February 2, 2012. There were no positive results for benzoic acid in the associated samples, no qualifiers were required.

Overall Assessment

As was determined by this evaluation, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the surrogate, LCS/LCSD, and MS/MSD %R values, with the

exceptions indicated above. Precision was acceptable, as demonstrated by the field duplicate, laboratory duplicate, LCS/LCSD and MS/MSD RPD and absolute difference values, with the exceptions indicated above.

Selected data were qualified as estimated because of field duplicate precision outliers.

Data was rejected because of MS/MSD %R values being less than 10%.

All other data points are acceptable for use as qualified.

References

USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (USEPA 2002)

USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (USEPA 1999)

SOIL DATA QUALITY ASSESSMENT SUMMARY

Metals (Sb, As, Cd, Pb, Hg, Tl) by EPA Methods 6010/200.8(Tl)/7471, Petroleum Hydrocarbons by Ecology Method NWTPH-Dx, and Semivolatiles by EPA Method SW8270

Laboratory Sample Delivery Groups (Analytical Resources, Inc. Sdg): uc89, ud05, ud52, ud64, ud65, ud72, and ud74

Project: Everett Smelter Benson Property (GeoEngineers Project Number 0504-068-00)

This report presents the results of a United States Environmental Protection Agency (USEPA)-defined Stage 2B validation (USEPA Document 540-R-08-005) of analytical data from the analyses of soil samples obtained at the "Everett Smelter Benson Property" sampling event. The data validation included verification and validation checks of the following quality control (QC) elements:

- Chain of Custody
- Holding Times
- Internal Standards
- Method Blanks
- Laboratory Control Samples
- Matrix Spikes/Matrix Spike Duplicates
- Laboratory Duplicates
- Field Duplicates
- Reporting Limits

Data were qualified as a result of this data quality assessment. The QC elements for which data were qualified and the associated samples are the following:

✓ **Surrogates:**

- BP-05-120103-6-7
- Rejection of data was associated with surrogate %R values being less than 10%. These data points should not be used for any purpose.

✓ **Laboratory Duplicates**:

- BP-02-120105-3-4, BP-02-120105-11.3-11.5, BP-02-120105-15-16, BP-02-120105-DUP-5, BP-03-120104-6.7-6.9, BP-03-120104-10.1-10.3, BP-03-120104-14-15, BP-03-120104-20-21, BP-03-120105-26-27, BP-04-120104-6.5-7, BP-04-120104-10-10.2, BP-04-120104-14-15, BP-04-120104-21.5-22.5, BP-04-120104-27-28, BP-05-120103-2.5-3, BP-05-120103-10.7-10.9, BP-05-120103-14-15, BP-05-120103-22-22.5, BP-05-120103-30-31, BP-120103-DUP-4, BP-07-111229-5-6, BP-02-120105-23-24, BP-02-120105-27.5-28.5, BP-01-120106-6.8-7, BP-01-120106-10.6-10.8, BP-01-120106-16.5-17.5, BP-01-120106-21-22, and BP-01-120106-27.5-28.5

✓ **Field Duplicates:**

- BP-09-111228-8-9/BP-111228-DUP-2

Objective

The objective of the data quality assessment was to review laboratory analytical procedures and quality control (QC) results to evaluate whether:

- The samples were analyzed using well-defined and acceptable methods that provide detection limits below applicable regulatory criteria;
- The precision and accuracy of the data are well defined and sufficient to provide defensible data; and
- The quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

Fifty-eight (58) soil samples, including five (5) field duplicates, were analyzed by one or more of the analytical methods listed above.

Data Package Completeness

Analytical Resources, Incorporated (ARI), located in Tukwila, Washington, was the laboratory that analyzed the samples evaluated as part of this data validation review. The laboratory provided Forms I, II and III for the Stage 2B validation. The laboratory followed adequate corrective action processes and all identified anomalies were discussed in the case narratives.

Chain-of-Custody Documentation

Chain-of-custody (COC) forms were provided with the laboratory analytical reports. There were no anomalies noted on the COC forms. Proper COC protocols appear to have been followed during the December 2011/January 2012 sampling event.

Holding Times

The holding time is defined as the time that elapses between sample collection and sample analysis. Maximum holding time criteria exist for each analysis to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times were met for all analyses.

Surrogate Recoveries

A surrogate compound is a compound that is chemically similar to the analytes of interest, but unlikely to be found in any environmental sample. Surrogates are used for organic analyses and are added to all samples, standards, and blanks to serve as an accuracy and specificity check of each analysis. The surrogates are added at a known concentration and percent recoveries are calculated following analysis. All surrogate recoveries for solid samples were within the laboratory control limits, with the following exceptions:

SDG UD72 and UD74 (NWTPH-Dx): The %R values for the surrogate o-terphenyl were not reported in samples BP-03-120104-3.5-4.5 and BP-07-111229-5-6 because these samples were diluted ten-fold or more. The concentration of the surrogate spiked solution was diluted below the calibration range. No qualifiers were required.

SDG UD72 and UD74 (SVOC): The %R values for the four acidic surrogates were less than the control limit in sample BP-05-120103-6-7, with two being less than 10%. There were no positive results for any of the acidic fraction compounds in this sample. For this reason, the reporting limits for acidic fraction compounds were rejected (R) in this sample.

Internal Standards

Like a surrogate, an internal standard is a compound that is chemically similar to the analytes of interest, but unlikely to be found in any environmental sample. Internal standards are used only for the mass spectrometry (MS) instrumentation and are usually added to the sample aliquot after extraction has taken place. The internal standard should be analyzed at the beginning of a 12 hour sample run and the control limits for internal standard recoveries are -50% to +100% of the calibration standard. All internal standard recoveries were within the control limits.

Method Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. Method blanks were analyzed with each batch of samples at a frequency of one per twenty samples. For all sample batches, method blanks for all applicable methods were analyzed at the required frequency. None of the analytes of interest were detected above the reporting limits in any of the blanks.

Matrix Spikes/Matrix Spike Duplicates (MS/MSD)

Because the actual analyte concentration in environmental samples is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis. One aliquot of sample is analyzed in the normal manner, then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a percent recovery (%R) is calculated. Matrix spike duplicates (MSD) analyses are generally performed for organic analyses as a precision check. For some organic analytical methods, such as NWTPH-Dx, a laboratory control sample/laboratory control sample duplicate (LCS/LCSD) sample set is performed in lieu of a MS/MSD analysis.

For metals analyses, the matrix spike (referred to as a "spiked sample") is typically followed by a post-spike sample if any element recoveries were outside the control limits in the "spike sample". In these cases, only the post spiked sample recoveries are used for assessment.

Matrix spike analyses should be performed once per analytical batch or every twenty field samples, whichever is more frequent. The recovery criteria for matrix spikes and laboratory control samples are specified in the laboratory documents as are the relative percent difference values. The frequency requirements were met for all analyses and the %R/RPD values were within the proper control limits, with the following exception:

SDG UD52 *(Metals):* A matrix spike sample set was performed on sample BP-05-120103-2.5-3. The %R values for antimony, arsenic, and lead were outside of the control limits in the spiked sample. The %R value for antimony was within the control limits in the post digest spike sample. Also, the parent sample concentrations for arsenic and lead were greater than four times the amount spiked into the sample. According to the National Functional Guidelines, no further action is required.

Laboratory Control Samples/Laboratory Control Sample Duplicates (LCS/LCSD)

A laboratory control sample is essentially a blank sample that is spiked with a known amount of analyte concentration and analyzed. It is to be treated much like a matrix spike, without the possibility for matrix interference. As there is no actual sample matrix in the analysis, the analytical expectations for accuracy and precision are usually more rigorous and qualification would apply to all samples in the batch, instead of the parent sample only.

Laboratory control sample analyses should be performed once per analytical batch or every twenty field samples, whichever is more frequent. The recovery criteria for laboratory control samples are specified in the laboratory documents as are the relative percent difference values. The frequency requirements were met for all analyses and the %R/RPD values were within the proper control limits.

Laboratory Duplicates

1. Internal laboratory duplicate analyses are performed to monitor the precision of the analyses. Two separate aliquots of a sample are analyzed as distinct samples in the laboratory and the RPD between the two results is calculated. Duplicate analyses should be performed once per analytical batch. If one or more of the samples used has a concentration greater than five times the reporting limit for that sample, the absolute difference is used instead of the RPD.
2. Laboratory duplicates were analyzed at the proper frequency and the specified acceptance criteria were met in all cases, with the exceptions below:

SDG UD52 *(Metals):* A laboratory duplicate was performed on sample BP-05-120103-2.5-3. The RPD value for arsenic was greater than the control limit of 20%. The positive results for arsenic were qualified as estimated (J) in the laboratory associated batched samples.

SDG UD72, UD74 *(Metals):* A laboratory duplicate was performed on sample BP-07-111229-5-6. The RPD values for arsenic and mercury were greater than the control limit of 20%. The positive results for arsenic and mercury were qualified as estimated (J) in the laboratory associated batched samples BP-07-111229-5-6, BP-02-120105-23-24, BP-02-120105-27.5-28.5, BP-01-120106-6.8-7, BP-01-120106-10.6-10.8, BP-01-120106-16.5-17.5, BP-01-120106-21-22, and BP-01-120106-27.5-28.5.

Field Replicates/Duplicates

1. Field duplicate samples were collected and analyzed along with the reviewed sample batches. The duplicate samples were analyzed for the same parameters as the associated parent samples. As indicated above for the laboratory duplicates, the RPD is used as the criteria for assessing precision, unless one or more of the samples used has a concentration greater than five times the reporting limit for that sample, the absolute difference is used instead of the RPD.
2. The RPD control limits for soil samples is 50%, while the RPD control limits for water samples is 35%. The absolute difference control limits for soil samples is twice the PQL value, while the absolute difference control limits for water samples is the same as the PQL value.
3. In cases where any of the cPAH compounds were qualified for precision, the resulting TEC value was also qualified as estimated (J) in that sample.

SDG UC89, UD64 (Metals): Two sets of field duplicates, samples BP-10-111227-21.5-22.5/BP-111227-DUP-1 and BP-09-111228-8-9/BP-111228-DUP-2, were submitted to the laboratory. In the second sample pair, the RPD value for mercury exceeded the RPD control limits described above.

The positive results for mercury were qualified as estimated (J) in samples BP-09-111228-8-9 and BP-111228-DUP-2.

SDG UD05, UD65 (Metals): One set of field duplicates, samples BP-06-111230-29.5-30/BP-06-111230-DUP-3, were submitted to the laboratory. The precision criteria described above were met for all target analytes.

SDG UD52 (Metals): Two sets of field duplicates, samples BP-05-120103-10.7-10.9/BP-120103-DUP-4 and BP-02-120105-3-4/BP-02-120105-DUP-5, were submitted to the laboratory. The precision criteria described above were met for all target analytes.

Reporting Limits

SDG UC89, UD72, UD74 *(Metals):* The laboratory initially included thallium with the list of five other metals analyzed by method SW6010B. In order to achieve project reporting limits of 0.2 mg/kg, thallium was re-digested and analyzed by method SW200.8. Both sets of data were reported by the laboratory. In order to avoid reporting both sets of thallium results, the original set of results were qualified with Do-Not-Report (DNR) in the GeoEngineers' database. Only the second set of data should be used for decision making.

SDG UD72, UD74 *(Semivolatiles):* The compounds phenanthrene, fluoranthene, and pyrene exceeded the linear range of the instrument in sample BP-07-111229-5-6. For this reason, this sample was diluted by the laboratory and re-analyzed. Both sets of data were reported. For this sample, the initial reported results for phenanthrene, fluoranthene, and pyrene were labeled as DNR in the database. Also in each sample, the diluted reporting limits for all target analytes except phenanthrene, fluoranthene, and pyrene were labeled as DNR in the database.

Overall Assessment

As was determined by this evaluation, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the surrogate, LCS/LCSD, and MS/MSD %R values, with the exceptions indicated above. Precision was acceptable, as demonstrated by the field duplicate, laboratory duplicate, LCS/LCSD and MS/MSD RPD and absolute difference values, with the exceptions indicated above.

Selected data were qualified as estimated because of field duplicate and laboratory duplicate precision outliers.

Data were rejected because of surrogate %R values being less than 10%.

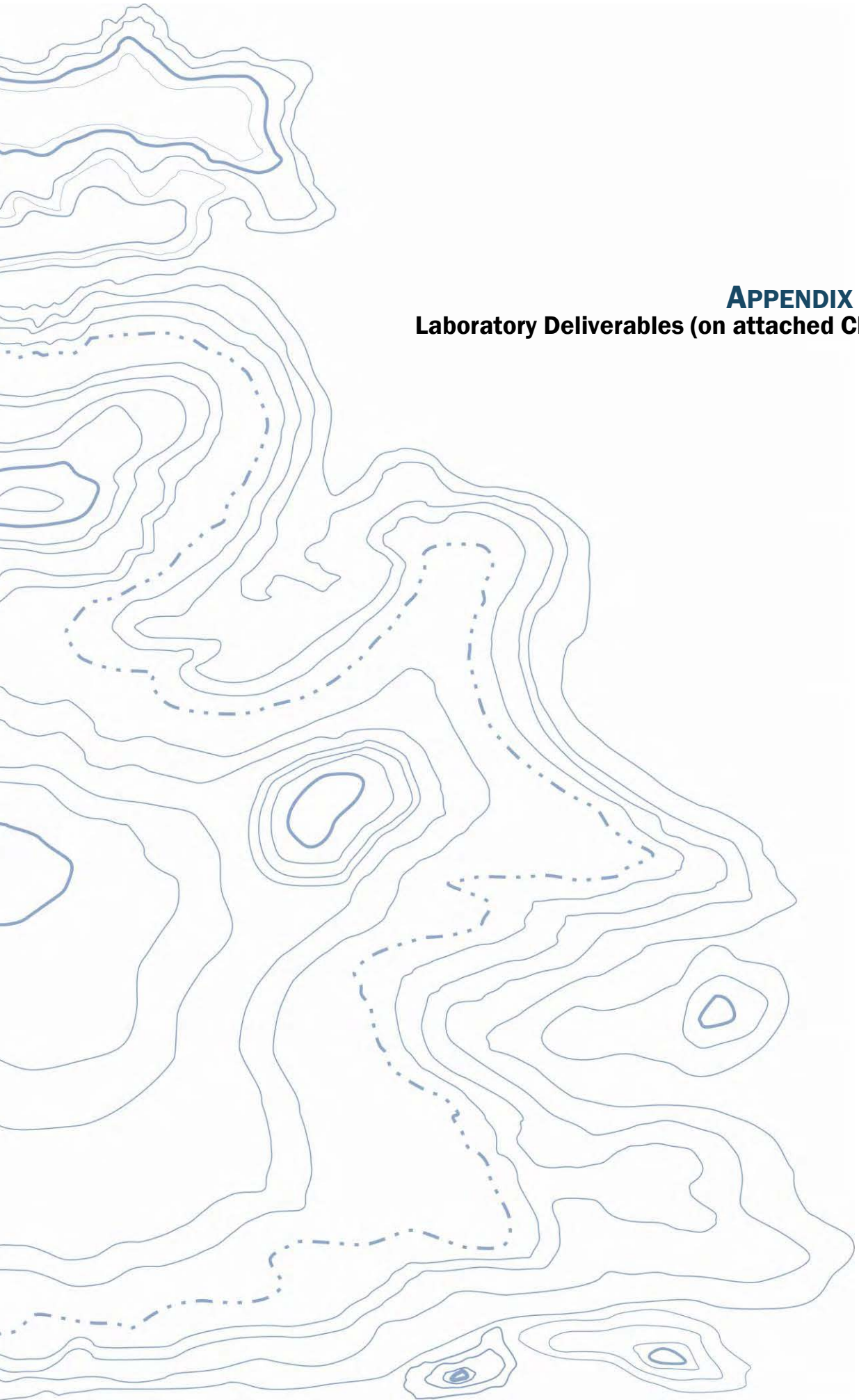
Data were labeled as DNR in order to avoid certain target analytes being reported twice.

All data are acceptable for use as qualified.

References

USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (USEPA 2002)

USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (USEPA 1999)



APPENDIX D
Laboratory Deliverables (on attached CD)

APPENDIX E
Report Limitations and Guidelines for Use

APPENDIX E
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report.

ENVIRONMENTAL SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES, PERSONS AND PROJECTS

GeoEngineers has performed this investigation of the Everett Smelter – Benson Property in general accordance with the scope and limitations of our proposal, dated September 17, 2011. This report has been prepared for the exclusive use of Washington State Department of Ecology, and their authorized agents. This report is not intended for use by others, and the information contained herein is not applicable to other properties.

GeoEngineers structures our services to meet the specific needs of our clients. For example, an ESA study conducted for a property owner may not fulfill the needs of a prospective purchaser of the same property. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and property. No one except Washington State Department of Ecology should rely on this environmental report without first conferring with GeoEngineers. Use of this report is not recommended for any purpose or project except the one originally contemplated.

THIS ENVIRONMENTAL REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS

This report has been prepared for the Everett Smelter – Benson Property. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, it is important not to rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

If important changes are made to the project or property after the date of this report, we recommend that GeoEngineers be given the opportunity to review our interpretations and recommendations. Based on that review, we can provide written modifications or confirmation, as appropriate.

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1 Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

RELIANCE CONDITIONS FOR THIRD PARTIES

Our report was prepared for the exclusive use of our Client. No other party may rely on the product of our services unless we agree to such reliance in advance and in writing. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions. Within the limitations of scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and generally accepted environmental practices in this area at the time this report was prepared.

ENVIRONMENTAL REGULATIONS ARE ALWAYS EVOLVING

Some substances may be present in the vicinity of the subject property in quantities or under conditions that may have led, or may lead, to contamination of the subject property, but are not included in current local, state or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards for appropriate inquiry, or regulatory definitions of hazardous substances, change or if more stringent environmental standards are developed in the future.

CONDITIONS CAN CHANGE

This environmental report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by man-made events such as construction on or adjacent to the subject property, by new releases of hazardous substances, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Please contact GeoEngineers before applying this report for its intended purpose so that GeoEngineers may evaluate whether changed conditions affect the continued applicability of the report.

MOST ENVIRONMENTAL FINDINGS ARE PROFESSIONAL OPINIONS

Our interpretations of site conditions are based on field observations and analytical data from widely spaced sampling locations at the subject property. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an informed opinion about subsurface conditions throughout the property. Actual subsurface conditions may differ, sometimes significantly, from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

READ THESE PROVISIONS CLOSELY

It is important to recognize that the geoscience practices (geotechnical engineering, geology and environmental science) are less exact than other engineering and natural science disciplines. Without this understanding, there may be expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory “limitations” provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you need to know more about how these “Report Limitations and Guidelines for Use” apply to your project or property.

Draft
Groundwater Monitoring
Technical Memorandum

Everett Smelter Cleanup Site
FSID 2744, ISIS Cleanup Site ID 4298

Lowland Area – Benson Property
Everett, Washington

for
Washington State Department of Ecology

July 25, 2012

GeoEngineers

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GeoEngineers

Draft
Groundwater Monitoring
Technical Memorandum

Everett Smelter Cleanup Site
FSID 2744, ISIS Cleanup Site ID 4298

Lowland Area – Benson Property
Everett, Washington

Project No. 0504-068-00

July 25, 2012

Prepared for:

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APPENDICES

1.0 INTRODUCTION

This technical memorandum summarizes groundwater monitoring activities at the Benson Property Site (Site) located within the Lowland Area of the Everett Smelter Cleanup. The Benson Property Site is generally located at 501 East Marine View Drive in Everett, Washington (Figure 1).

The Everett Smelter Cleanup is divided into an Upland Area and Lowland Area and the Benson Property Site is located within the Lowland Area. The Benson Property Site includes three contiguous property parcels east of East Marine View Drive, North Broadway/Pacific Highway, and the Weyerhaeuser Bridge Road and parts of the adjacent City of Everett and Washington State Department of Transportation rights-of-ways (Figure 2).

Slag resulting from former smelter activities in the Upland Area was historically deposited on the Benson Property Site. Additionally, contaminants from smelting activities have been or are likely to have been transported to the Benson Property Site via groundwater, air, soil, and possibly surface water transport pathways.

GeoEngineers previously completed installation and sampling of 10 monitoring well pairs (BP-01S/D through BP-10S/D) along the eastern (downgradient) area of the Site to evaluate shallow and deep groundwater quality downgradient of the Site. Field activities included well installation, soil sampling, well development and one round of groundwater sampling. The groundwater samples were collected in January 2012. Results of the investigation were presented in the May 7, 2012 Final Groundwater Monitoring Technical Memorandum, prepared by GeoEngineers.

The purpose of the sampling and analysis described in this Technical Memorandum was to characterize metals concentrations in groundwater on the western (upgradient) boundary of the Site. Three existing groundwater monitoring wells (EV-20B, EV-22A and EV-22B) were developed and sampled. The wells were installed by Hydrometrics in 1998 as part of the Comprehensive Lowland Area Remedial Investigation (RI). Note that well EV-20B is identified in the Comprehensive Lowland Area RI as EV-20 in some places and EV-20B in others; since it is a well screened in the deep aquifer, the well is referred to as EV-20B in this report. The current study was performed in general accordance with the Sampling and Analysis Plan (SAP), Quality Assurance Project Plan (QAPP) and Health and Safety Plan (HASP) prepared by GeoEngineers for the Site dated October 26, 2011.

1.1. Site History and Background

Historical activities within the Everett Smelter Cleanup Site included smelting and refinement of metal ores on a portion of the Site from the mid 1890s until plant demolition in 1912. The historic smelting operation, which included an arsenic extraction plant, resulted in the release of metals including arsenic and lead to the soil, groundwater, and air. Slag was reported to have been historically poured down the bluff located on the east side of the Everett Smelter Site and onto the adjacent tideflats which is now the Benson Property Site.

Groundwater monitoring at the Benson Property Site during the 1990s identified metals at concentrations greater than screening levels. The arsenic extraction plant and arsenic trioxide processing area location underwent environmental cleanup from 2004 to 2006 to remove soil contaminated by smelter operations. The cleanup area did not generally include existing road rights-of-ways east of the former arsenic extraction plant.

2.0 FIELD INVESTIGATION

2.1. Monitoring Well Development and Groundwater Monitoring

2.1.1. Monitoring Well Development

Monitoring wells EV-20B, EV-22A and EV-22B were developed on June 4, 2012. Well development was completed to remove settled solids that may have accumulated in the wells since they were last sampled in the late 1990s. Each well screen interval was gently surged with a decontaminated bailer and groundwater in the well was removed using either a bailer or a dedicated, submersible pump and tubing. Approximately 3.5 to 10 gallons of water was removed from each well. Note that EV-22B ran dry during development. The initial turbidity readings of the water removed from the wells during development were greater than 1,000 Nephelometric turbidity units (NTUs) and final turbidity readings during development ranged from approximately 8 to 30 NTUs.

2.1.2. Groundwater Monitoring

Groundwater sample collection was completed on June 11, 2012. Groundwater elevations were measured and recorded prior to sampling using an electronic water level indicator. Groundwater purging and sample collection was completed using low-flow/low-turbidity sampling techniques to minimize the suspension of sediment in the wells and turbidity in the groundwater samples.

Wells EV-20B and EV-22A were purged and groundwater samples were obtained from the wells using dedicated well pumps and polyethylene tubing. Groundwater was purged from the wells at a rate of approximately 0.5 liters per minute. A Horiba U-22 water quality measuring device with a flow-through cell was used to monitor water quality parameters during purging that included electrical conductivity, dissolved oxygen, pH, salinity, total dissolved solids, oxidation-reduction potential, and temperature. Turbidity was measured using a Hach turbidimeter. Samples were collected from the wells after the measured values for the water quality parameters varied by less than 10 percent on three consecutive measurements. The final field measurements were documented on the field logs.

Well EV-22B was also purged and a groundwater sample was obtained from the well using a dedicated well pump and polyethylene tubing. However, well EV-22B ran dry during purging. A sample was collected from the well after the well was allowed to recharge and additional purging was performed. Similar to EV-20B and EV-22A, groundwater was purged from the well at a rate of approximately 0.5 liters per minute and a Horiba U-22 water quality measuring device with a flow-through cell was used to monitor water quality parameters during purging that included electrical conductivity, dissolved oxygen, pH, salinity, total dissolved solids, oxidation-reduction potential, and temperature. Additionally, the turbidity was measured using a Hach turbidimeter. The measured values for the water quality parameters varied by less than 10 percent on two

consecutive measurements prior to sampling, except for dissolved oxygen. The final field measurements were documented on the field log.

Following completion of well purging, the flow-through cell was disconnected and groundwater samples were collected into laboratory-prepared containers. A total of four groundwater samples (three parent and one duplicate sample) were collected for total and dissolved metals analysis including antimony, arsenic, cadmium, lead, mercury, and thallium by U.S. Environmental Protection Agency (EPA) Methods 6010, 200.8 (i.e., thallium), and 7470 (i.e., mercury). Samples that were collected for dissolved metals analysis were filtered in the field using a 0.45-micron filter.

Immediately following sample collection, the groundwater samples were logged on the chain-of-custody and placed in coolers on ice for transport and delivery to the analytical laboratory. The samples were submitted to Analytical Resources, Inc. (ARI) for analysis.

2.2. Decontamination

Non-disposable sampling equipment was decontaminated using the procedures specified in the QAPP (GeoEngineers, 2011).

2.3. Disposal of Investigation-Derived Materials

Development and purge water removed from the monitoring wells and decontamination water generated during the sampling activities was placed in labeled and sealed 55-gallon drums. The drums are stored at a centralized location at the Benson Property Site. Incidental waste (i.e., gloves, paper towels, etc.) were disposed of off site as solid waste.

2.4. Deviations From The SAP

Field activities were performed in general accordance with the SAP, QAPP and HASP, with the following exceptions:

- The SAP indicated five well volumes of water would be removed during development. However, only a little more than one well volume was removed from EV-22B due to the well going dry during development.
- The SAP indicated groundwater samples would be collected after the groundwater quality parameters varied by less than 10 percent on three consecutive measurements. However, a sample was collected from EV-22B after most parameters (other than dissolved oxygen) varied by less than 10 percent on two consecutive measurements due to the well going dry during purging/sampling.

3.0 RESULTS

3.1. Data Validation

A data quality assessment was performed on the data in general conformance with an EPA "Stage-2B" validation. The data quality assessment report describing data validation criteria and results, is provided in Appendix B. The laboratory analytical reports used in the data quality assessment are provided in Appendix C. The data were deemed acceptable for use as qualified.

3.2. Groundwater

The four groundwater samples (three parent and one duplicate sample) that were collected from one shallow aquifer and two deep aquifer monitoring wells were submitted for total and dissolved metals analysis (i.e., antimony, arsenic, cadmium, lead, mercury and thallium).

The depth-to-groundwater and the water quality parameter values measured during groundwater sample collection are presented in Table 1. The results for total and dissolved metals analyses on the groundwater samples are presented in Table 2. The results of groundwater analyses are compared to Model Toxics Control Act (MTCA) Method A or B values for purpose of screening the data relative to established Ecology benchmarks.

The following summarizes the results for the groundwater samples:

- Antimony was detected in all of the samples collected at concentrations less than the MTCA Method B value (6.4 micrograms per liter [µg/L]).
- Arsenic was detected in all of the samples collected and in general, arsenic concentrations in both shallow and deep aquifer groundwater were similar to or greater than concentrations observed during the groundwater monitoring performed in June 1999. Results for dissolved arsenic analyses are shown on Figures 2 and 3. Figure 2 presents the results for samples collected from the shallow aquifer and Figure 3 presents the results for groundwater samples collected from the deep aquifer. Figures 2 and 3 are updates to figures that were previously included in the GeoEngineers report titled "Final Groundwater Monitoring Technical Memorandum", dated May 7, 2012. The figures were prepared by overlaying data collected during GeoEngineers' recent investigations (i.e., data collected from wells BP-01S/D through BP-10S/D sampled in January 2012 and data collected from EV-20B and EV-22A/B collected June 2012) on top of previous (pre-2000) data.
    - The dissolved arsenic concentration of approximately 4 µg/L in shallow aquifer well EV-22A was less than the MTCA Method A value (5 µg/L). The total arsenic concentration of approximately 9 µg/L was greater than the MTCA Method A value.
    - The dissolved arsenic concentration of 3.3 µg/L in the deep aquifer well EV-22B was less than the MTCA Method A value. The total arsenic concentration of 17.6 µg/L was greater than the MTCA Method A value.
    - The total and dissolved arsenic concentrations in groundwater from the deep aquifer well EV-20B (15,500 and 14,500 µg/L) are greater than the MTCA Method A value. The arsenic is primarily in the dissolved form.
- Total cadmium was detected in three out of four samples either at or slightly above the reporting limit (0.1 µg/L) but lower than the MTCA Method A screening value of 5 µg/L. Dissolved cadmium was not detected in any of the samples.
- Total lead was detected in all samples at concentrations ranging from 1.4 to 5.3 µg/L, which is lower than the MTCA Method A screening value of 15 µg/L. Dissolved lead was detected in the samples from EV-22A and EV-22B at concentrations slightly higher than the reporting limit but less than the MTCA Method A screening value.
- Mercury and thallium were not detected in any of the samples.

4.0 LIMITATIONS

We have prepared this report for the exclusive use of Washington State Department of Ecology and their authorized agents.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the field of environmental investigation in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Please refer to Appendix D titled "Report Limitations and Guidelines for Use" for additional information pertaining to use of this report.

TABLE 1

DEPTH TO WATER AND GROUNDWATER QUALITY PARAMETERS[1]

BENSON PROPERTY
EVERETT, WASHINGTON

Location	Aquifer	Date	Depth to Water (ft bgs)[2]	pH	Conductivity (mS/m)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (C)	Salinity (%)	TDS (g/L)	ORP (mV)
EV-20B	Deep Aquifer	6/11/2012	47.3	6.12	34.2	58.1	3.59	16.91	0.0	0.22	133
EV-22A	Shallow Aquifer	6/11/2012	11.4	6.50	170	4.32	0.14	10.45	0.1	1.1	-214
EV-22B	Deep Aquifer	6/11/2012	16.7	6.65	438	10.1	0.18	13.00	0.2	2.8	-101

Notes:

[1] Wells sampled using low-flow technique. Depth to water measured before purging; all other parameters shown were monitored for stabilization during purging and the indicated value is the value at the end of purging prior to sample collection.

[2] Wells have not been surveyed. Therefore the depth to water values shown should be considered approximate. Depths were approximated by subtracting 3 feet (approximate casing stickup height) from the top-of-casing depth measurement.

ft bgs = feet below ground surface

mS/m = millisiemen per meter

NTU = Nephelometric turbidity unit

mg/L = milligram per liter

C = Celsius

TDS = Total dissolved solids

g/L = gram per liter

ORP = Oxidation/reduction potential

mV = millivolt

TABLE 2

CHEMICAL ANALYTICAL RESULTS FOR GROUNDWATER

BENSON PROPERTY

EVERETT, WASHINGTON

Location	Aquifer	Sample Number	Date	Antimony		Arsenic		Cadmium		Lead		Mercury		Thallium	
				Total (µg/L)	Dissolved (µg/L)	Total (µg/L)	Dissolved (µg/L)	Total (µg/L)	Dissolved (µg/L)	Total (µg/L)	Dissolved (µg/L)	Total (µg/L)	Dissolved (µg/L)	Total (µg/L)	Dissolved (µg/L)
EV-20B	Deep Aquifer	EV20-120611-W	6/11/2012	**0.6**	**0.6**	**15,500**	**14,500**	**0.1**	0.1 U	**1.4**	0.1 UJ	0.1 U	0.1 U	0.2 U	0.2 U
EV-22A	Shallow Aquifer	EV22A-120611-W	6/11/2012	**0.7**	**0.3**	**8.9**	**3.5**	**0.1**	0.1 U	**5.3**	0.1 UJ	0.1 U	0.1 U	0.2 U	0.2 U
		Dup-120611-W[1]	6/11/2012	**0.6**	**0.3**	**9.1**	**4.3**	0.1 U	0.1 U	**5.1**	**0.4 J**	0.1 U	0.1 U	0.2 U	0.2 U
EV-22B	Deep Aquifer	EV22B-120611-W	6/11/2012	**1.7**	**0.8**	**17.6**	**3.3**	**0.3**	0.1 U	**3.4**	**0.2 J**	0.1 U	0.1 U	0.2 U	0.2 U
MTCA Method A or B Values [2]				**6.4[3]**		**5[2]**		**5[2]**		**15[2]**		**2[2]**		**NE**	

Notes:

[1] Sample Dup-120611-W is a field duplicate sample of sample EV-22A-120611-W.

[2] MTCA Method A or B Values are presented and compared to the analytical results for discussion purposes only.

[3] MTCA Method A value.

[4] MTCA Method B value.

U = The analyte was not detected at a concentration greater than the identified reporting limit.

UJ = The analyte was not detected; however, the value is an estimated reporting limit.

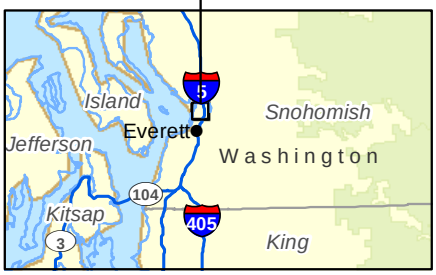
J = The analyte was detected; however, the value is an estimated concentration.

µg/L = microgram per liter

NE = MTCA value has not been established.

Bold indicates analyte was detected.

Yellow Shading indicates concentrations greater than MTCA value presented.



N
W E
S

2,000 0 2,000

Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: ESRI Data & Maps

Projection: NAD 1983 UTM Zone 10N

Vicinity Map

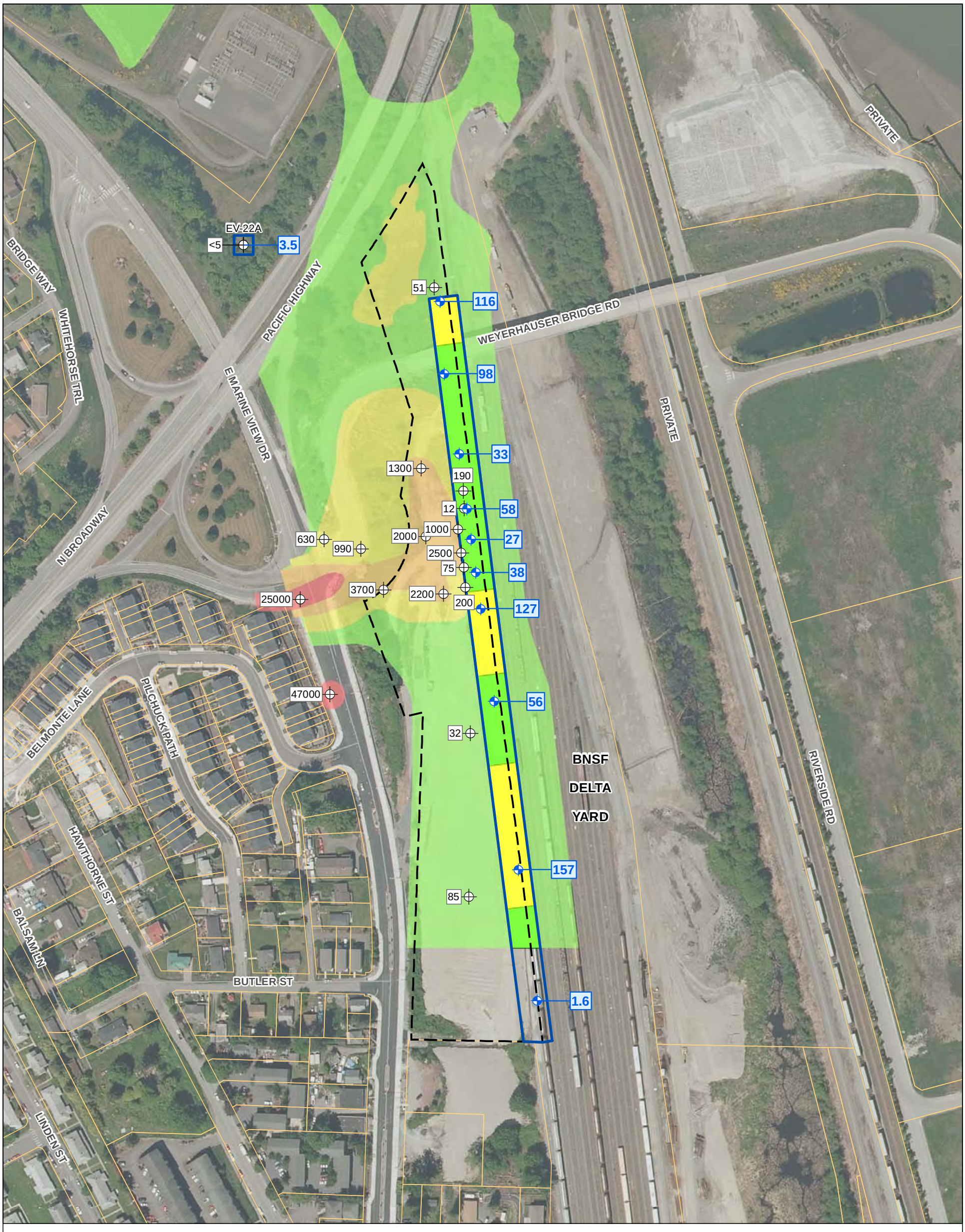
Everett Smelter - Benson Property

GeoEngineers

Figure 1

Path: \\sea\projects\0\0504068\GIS\0504068_VicinityMap.mxd Map Revised: 12 March 2012 amanza

Path: \\sea\projects\0\0504068\GIS\050406800_GWTechMemo_Shallow.mxd Map Revised: 25 July 2012 amanza



Legend

- Historic Monitoring Well/Hydropunch Location
- Monitoring Well Installed in 2012
- 67 — Historic Dissolved Arsenic Concentration
- 136 — 2012 Dissolved Arsenic Concentration
- Benson Property Boundary
- Parcel Boundaries (2012)

Dissolved Arsenic Concentration in Shallow Groundwater [µg/L]

Historic Results	2012 Results
> 10,000	> 10,000
1,000 - 10,000	1,000 - 10,000
100 - 1,000	100 - 1,000
10 - 100	10 - 100

N W E S

200 0 200
Feet

Arsenic in Shallow Groundwater

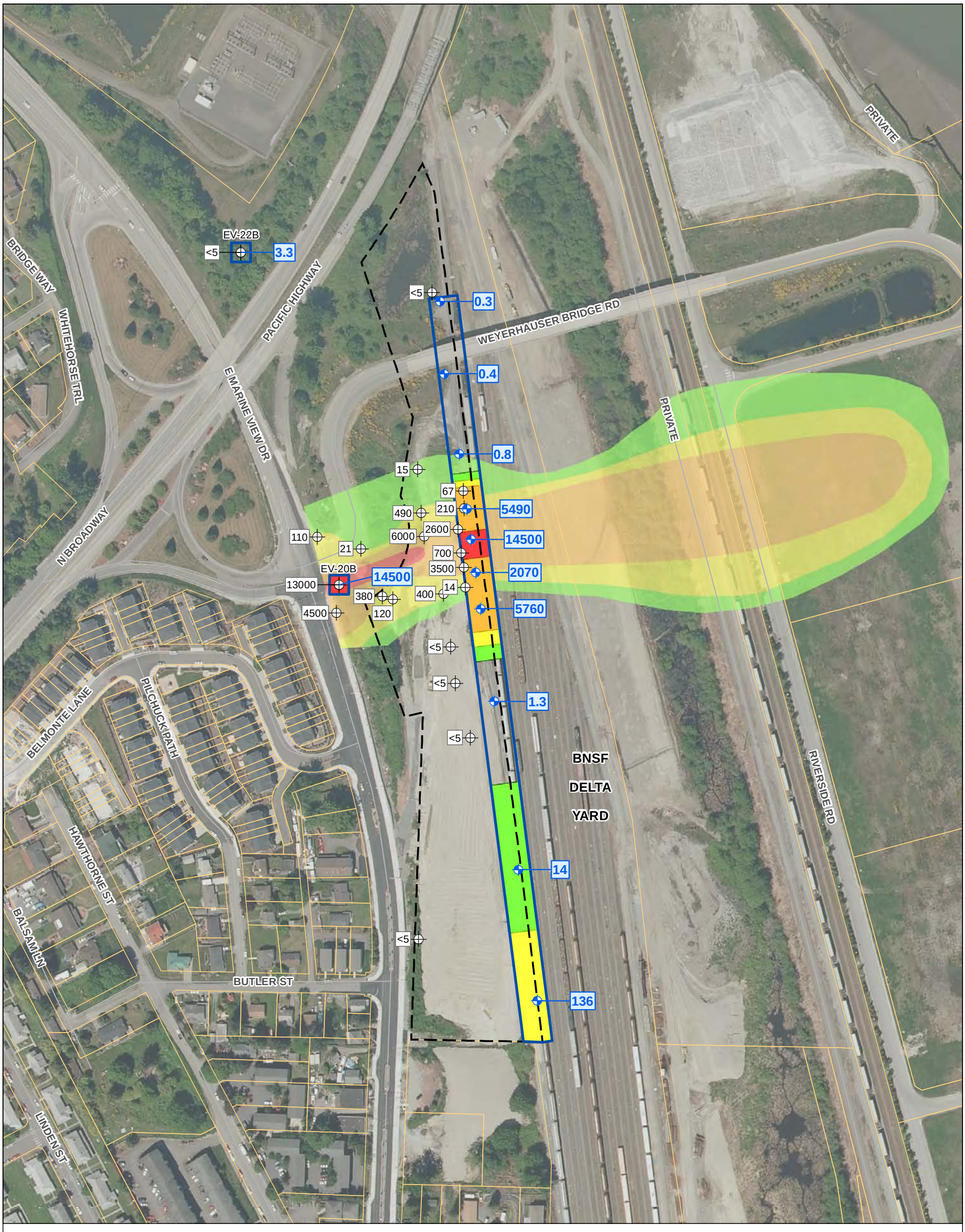
Everett Smelter - Benson Property

GeoEngineers

Figure 2

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Data Source: Aerials Express Seattle, 2009. City of Everett GIS. Snohomish County GIS. Washington Department of Ecology.

Path: \\sea\projects\0\0504068\GIS\050406800_GWTechMemo_Deep.mxd Map Revised: 25 July 2012 amanza



Legend

- Historic Monitoring Well/Hydropunch Location
- Monitoring Well Installed in 2012
- 67 — Historic Dissolved Arsenic Concentration
- 136 — 2012 Dissolved Arsenic Concentration
- Benson Property Boundary
- Parcel Boundaries (2012)

Dissolved Arsenic Concentration in Deep Groundwater [µg/L]

Historic Results	2012 Results
> 10,000	> 10,000
1,000 - 10,000	1,000 - 10,000
100 - 1,000	100 - 1,000
10 - 100	10 - 100

N W E S

200 0 200
Feet

Arsenic in Deep Groundwater

Everett Smelter - Benson Property

GeoEngineers

Figure 3

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Data Source: Aerials Express Seattle, 2009. City of Everett GIS. Snohomish County GIS. Washington Department of Ecology.

APPENDIX A
Monitoring Well Logs
(from Comprehensive Lowland Report)

HYDROMETRICS INC.
Consulting Scientists and Engineers
Tacoma, Washington

Monitor Well Log

Hole Name: EV-20

Date Hole Started: 9/28/98 Date Hole Finished: 9/28/98

Client: Asarco
Project: Everett Lowland Investigation
County: Snohomish State: Washington
Property Owner: City of Everett
Legal Description: Everett Right of Way
Descriptive Location: 2' off Sidwalk on SE corner Mar. view. Dr.

Recorded By: JS
Drilling Company: Hydrometrics (Mobile B-61)
Driller: Jim Niederkorn
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Install Monitor Well
Target Aquifer: Alluvial
Hole Diameter (in): 8
Total Depth Drilled (ft): 55

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	Y	2-inch, flush threaded, Sch 40, PVC	+2.07'-55.0'
Surface Casing Used?	Y	Steel Monument	+2.47-2.53
Screen/Perforations?	Y	Prepack 0.010-inch slot, Sch 40 PVC	50'-55'
Sand Pack?	Y	10/20 Silica Sand	45'-55'
Annular Seal?	Y	Bentonite Grout	1'-45'
Surface Seal?	Y	Concrete	0-1'
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	XRF Analysis	0-0.5', 2-3.5', 5' intervals ther

Static Water Level Below MP: 50.81
Date: 9/30/98
MP Description: Top of PVC
MP Height Above or Below Ground (ft): 2.07

Surface Casing Height (ft): 2.47
Riser Height (ft): 2.07
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Sampled with a 3" (ID) split spoon under a 30-inch drop, winch release, 300-pound, safety hammer under "N" rod. Cuttings placed in a 55-gallon drum and labeled for disposal. Sampled to 50-feet; drilled to 55-feet, did not sample to help prevent heaving sands.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9809-140	GRAB			0.0 - 0.5'
		SS	32/50-1	0.00	2.0 - 4.0' No recovery
5	EVT-9809-141	SS	10/10/9	0.10	5.0 - 6.5'
10	EVT-9809-142	SS	2/2/2	1.00	10.0 - 11.5'
15	EVT-9809-143	SS	4/2/2	1.00	15.0 - 16.5' Duplicate sample @ 11:12 EVT-9809-144
20	EVT-9809-145	SS	6/14/42	1.00	20.0 - 21.5'
25					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 4.0'
Silty LOAM
Brown, dry, abundant vegetation, loose, trace rounded gravel 1/4" and under.
[Fill]

4.0 - 8.0'
Silty SAND
Brown dry, fine grained, trace 1/4" rounded gravel.
[Fill]

8.0 - 13.0'
SAND
Dark brown, fined grained, loose, slighlty moist to dry, trace organics.
[Till/Fill]

13.0 - 18.0'
Sandy SILT
Red to yellowish brown with some black staining, some oxidation, slightly moist, soft, some 1" subrounded gravels.
[Till/Fill]

18.0 - 22.0'
SAND
Light brown to gray, slightly moist, sorted, fine grained, medium dense to dense, some 1" subrounded gravels.
[Till/Fill]

22.0 - 55.0'
SAND
Gray, dry to 49', medium to fine grained, medium dense to dense, well sorted.
[Alluvium]

Continued Next Page

GEOTECH 0030.GPJ HYD-TUC.GDT 3/16/99

HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Monitor Well Log

Hole Name: EV-20

Date Hole Started: 9/28/98 Date Hole Finished: 9/28/98

(Continued)

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	EVT-9809-146	SS	12/24/25	1.50	25.0 - 26.5'		
30	EVT-9809-147	SS	8/14/17	1.50	30.0 - 31.5'		
35	EVT-9809-148	SS	4/14/12	1.50	35.0 - 36.5'		
40	EVT-9809-149	SS	10/24/28	1.50	40.0 - 41.5'		
45	EVT-9809-150	SS	10/28/37	1.50	45.0 - 46.5' Water at 49' at time of drilling		
50	EVT-9809-151	SS	14/26/38	1.50	50.0 - 51.5'		
55							
60							
65							

GEOTECH 0030.GPJ HYD-TUC.GDT 3/16/99

HYDROMETRICS INC.

Consulting Scientists and Engineers
Helena, Montana

Monitor Well Log

Hole Name: EV-22A

Date Hole Started: 9/22/98 Date Hole Finished: 9/22/98

Client: ASARCO
Project: Everett Lowland Investigation
County: Snohomish State: Washington
Property Owner: City of Everett
Legal Description:
Descriptive Location: southwest of PUD substation

Recorded By: BT
Drilling Company: Hydrometrics
Driller: Jim Neiderkorn
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Install Monitor Well
Target Aquifer: First Water
Hole Diameter (in): 8-inch
Total Depth Drilled (ft): 20

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	Y	2-inch, flush threaded, Sch 40, PVC	+2.15-20
Surface Casing Used?	Y	steel	+2.35-2.65
Screen/Perforations?	Y	0.010-inch slot, Sch 40, PVC	15-20
Sand Pack?	Y	10-20 silica sand	12.5-20
Annular Seal?	Y	Bentonite Chips	1-12.5
Surface Seal?	Y	Concrete	0-0.5
DEVELOPMENT/SAMPLING			
Well Developed?	Y	pumping	
Water Samples Taken?	Y	common ions and metals	
Boring Samples Taken?	Y	split spoon soil samples submitted for XRF metals analysis	

Static Water Level Below MP: 18.89
Date: 9/24/98
MP Description: top of PVC casing
MP Height Above or Below Ground (ft): 2.15

Surface Casing Height (ft): 2.35
Riser Height (ft): 2.15
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: well was completed with Timco instapack well screen containing 20-40 silica sand

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9809100	GRAB			0.0 - 0.5'
	EVT-9809101	SS	8,13,14		2.0 - 3.5' 3" O.D. split spoon with 300 lb hammer
5	EVT-9809102	SS	6,4,3		5.0 - 6.5'
10	EVT-9809103	SS	1,1,1		10.0 - 11.5'
15	EVT-9809104	SS	2,4,4		15.0 - 16.5'
20	EVT-9809105	SS	1,1,5		20.0 - 21.5'
25					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 2.0'
Sand and Silt
light brown, trace gravel, gravel is subrounded up to 1.5 inches in diameter, dry.

2.0 - 5.0'
Silty Sand
dark brown, more gravel than above, trace of wood and roots, dry.

5.0 - 8.0'
Silty Sand
medium to dark brown, trace gravel.

8.0 - 15.0'
Sand
black and white (salt and pepper), medium to dark brown at 8 feet, medium to fine grained, well sorted, trace fine gravel, moist.

15.0 - 17.0'
Sand
grey, fine grain, well sorted, trace of woody organics, wet.

17.0 - 20.0'
Silt
grey, damp.

GEOTECH 0030.GPJ D-TUC.GDT 4/8/99

HYDROMETRICS INC.

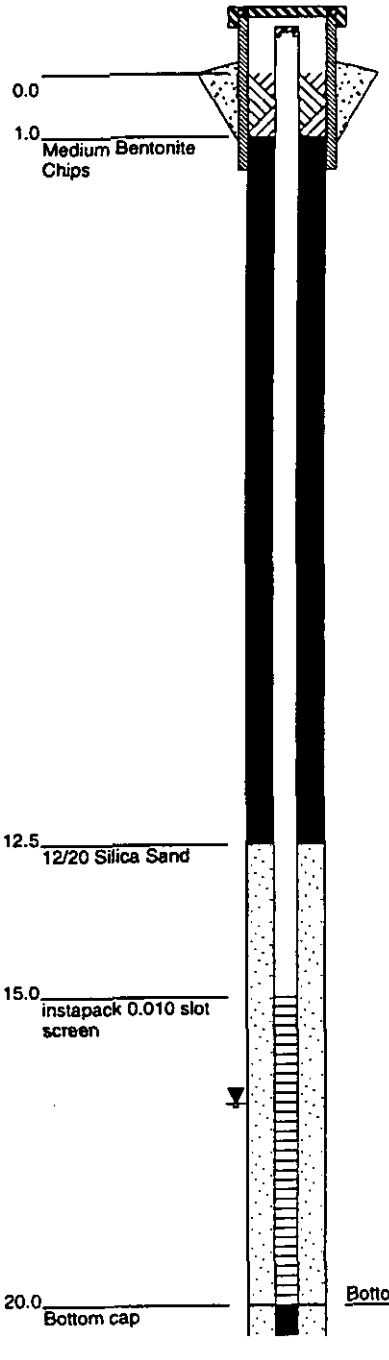
Consulting Scientists and Engineers
Helena, Montana

Monitor Well Log

Hole Name: EV-22A

Date Hole Started: 9/22/98 Date Hole Finished: 9/22/98

Well Construction Diagram



Geological Description

0.0 - 2.0'
Sand and Silt
light brown, trace gravel, gravel is subrounded up to 1.5 inches in diameter, dry.

2.0 - 5.0'
Silty Sand
dark brown, more gravel than above, trace of wood and roots, dry.

5.0 - 8.0'
Silty Sand
medium to dark brown, trace gravel.

8.0 - 15.0'
Sand
black and white (salt and pepper), medium to dark brown at 8 feet, medium to fine grained, well sorted, trace fine gravel, moist.

15.0 - 17.0'
Sand
grey, fine grain, well sorted, trace of woody organics, wet.

17.0 - 20.0'
Silt
grey, damp.

Bottom of Hole 20.0

WELL_DIAGRAM C:\2J HYD-TUC.GDT 4/8/99

HYDROMETRICS INC.
Consulting Scientists and Engineers
Helena, Montana

Monitor Well Log

Hole Name: EV-22B

Date Hole Started: 9/22/98 Date Hole Finished: 9/22/98

Client: ASARCO

Project: Everett Lowland Investigation

County: Snohomish State: Washington

Property Owner: City of Everett

Legal Description:

Descriptive Location: southwest of PUD substation

Recorded By: BT

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: Hollow Stem Auger

Drilling Fluids Used: None

Purpose of Hole: Install Monitor Well

Target Aquifer: Deep Alluvial

Hole Diameter (in): 8-inch

Total Depth Drilled (ft): 35

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	Y	2-inch, flush threaded, Sch 40, PVC	+2.5-35
Surface Casing Used?	Y	steel	+2.85-2.15
Screen/Perforations?	Y	0.010-inch slot, Sch 40, PVC	30-35
Sand Pack?	Y	10-20 silica sand	27-35
Annular Seal?	Y	Bentonite Grout	1-27
Surface Seal?	Y	Concrete	0-1
DEVELOPMENT/SAMPLING			
Well Developed?	Y	pumping	
Water Samples Taken?	Y	common ions and metals	
Boring Samples Taken?	Y	split spoon soil samples submitted for XRF metals analysis	

Static Water Level Below MP: 20.02

Date: 9/24/98

MP Description: top of PVC casing

MP Height Above or Below Ground (ft): 2.5

Surface Casing Height (ft): 2.85

Riser Height (ft): 2.5

Ground Surface Elevation (ft):

MP Elevation (ft):

Remarks: well was completed with Timco instapack well screen containing 20-40 silica sand

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
25	EVT-9809106	SS	2,2,2		25.0 - 26.5' Split spoon samples were previously collected at well EV-22A to 21 feet.
30	EVT-9809107	SS	7,5,5		30.0 - 31.5'

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 2.0'
Sand and Silt
light brown, trace gravel, gravel is subrounded up to 1.5 inches in diameter, dry.

2.0 - 5.0'
Silty Sand
dark brown, more gravel than above, trace of wood and roots, dry.

5.0 - 8.0'
Silty Sand
medium to dark brown, trace gravel.

8.0 - 15.0'
Sand
black and white (salt and pepper), medium to dark brown at 8 feet, medium to fine grained, well sorted, trace fine gravel, moist.

15.0 - 17.0'
Sand
grey, fine grain, well sorted, trace of woody organics, wet.

17.0 - 27.0'
Silt
grey, with wood fragments, damp.

27.0 - 35.0'
Sand
grey, fine grain, trace gravel, wet.

GEOTECH 0030.GD-TUC.GDT 4/8/99

HYDROMETRICS INC.

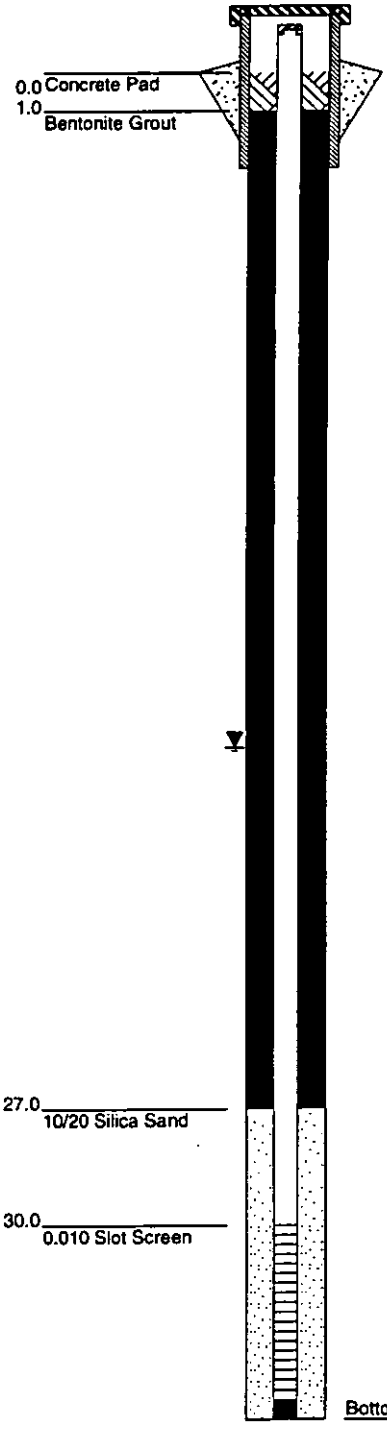
Consulting Scientists and Engineers
Helena, Montana

Monitor Well Log

Hole Name: EV-22B

Date Hole Started: 9/22/98 Date Hole Finished: 9/22/98

Well Construction Diagram



Geological Description

0.0 - 2.0'
Sand and Silt
light brown, trace gravel, gravel is subrounded up to 1.5 inches in diameter, dry.

2.0 - 5.0'
Silty Sand
dark brown, more gravel than above, trace of wood and roots, dry.

5.0 - 8.0'
Silty Sand
medium to dark brown, trace gravel.

8.0 - 15.0'
Sand
black and white (salt and pepper), medium to dark brown at 8 feet, medium to fine grained, well sorted, trace fine gravel, moist.

15.0 - 17.0'
Sand
grey, fine grain, well sorted, trace of woody organics, wet.

17.0 - 27.0'
Silt
grey, with wood fragments, damp.

27.0 - 35.0'
Sand
grey, fine grain, trace gravel, wet.

WELL_DIAGRAM 00J HYD-TUC.GDT 4/8/99

APPENDIX B
Data Quality Assessment Report

DATA QUALITY ASSESSMENT SUMMARY

METALS (SB, AS, CD, PB, HG, TL) BY EPA METHODS 6020/7470A

LABORATORY SAMPLE DELIVERY GROUPS (ANALYTICAL RESOURCES, INC. SDG):
UY16
PROJECT: EVERETT SMELTER BENSON PROPERTY (GEOENGINEERS PROJECT NUMBER 0504-068-00)

This report presents the results of a United States Environmental Protection Agency (EPA)-defined Stage 2B validation (USEPA Document 540-R-08-005) of analytical data from the analyses of groundwater samples obtained at the "Everett Benson Property – ASARCO Smelter" sampling event. The data validation included verification and validation checks of the following quality control (QC) elements:

- Chain of Custody
- Holding Times
- Surrogates
- Internal Standards
- Method Blanks
- Laboratory Control Samples
- Matrix Spikes/Matrix Spike Duplicates
- Laboratory Duplicates
- Field Duplicates
- Initial/Continuing Calibrations
- Reporting Limits and Miscellaneous

Certain data were qualified as a result of this data quality assessment. The QC elements for which data were qualified, as well as the associated samples, are shown below:

- ✓ **Field Duplicates**

  EV22A-120611-W & DUP-120611-W

Objective

The objective of the data quality assessment was to review laboratory analytical procedures and quality control (QC) results to evaluate whether:

- The samples were analyzed using well-defined and acceptable methods that provide detection limits below applicable regulatory criteria;
- The precision and accuracy of the data are well defined and sufficient to provide defensible data; and
- The quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

Four (4) groundwater samples, including one (1) one duplicate, were analyzed by one or more of the analytical methods listed above.

Data Package Completeness

Analytical Resources, Incorporated (ARI), located in Tukwila, Washington, was the laboratory that analyzed the samples evaluated as part of this data validation review. The laboratory provided the proper documentation for the Stage 2B validation. The laboratory followed adequate corrective action processes and all identified anomalies were discussed in the case narratives.

Chain-of-Custody Documentation

Chain-of-custody (COC) forms were provided with the laboratory analytical reports. There were no anomalies noted on the COC forms; proper COC protocols appear to have been followed during the June 2012 sampling events.

Holding Times

The holding time is defined as the time that elapses between sample collection and sample analysis. Maximum holding time criteria exist for each analysis to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times were met for all analyses.

Surrogate Recoveries

A surrogate compound is a compound that is chemically similar to the analytes of interest, but unlikely to be found in any environmental sample. Surrogates are used for organic analyses and are added to all samples, standards, and blanks to serve as an accuracy and specificity check of each analysis. The surrogates are added at a known concentration and percent recoveries are calculated following analysis. All surrogate recoveries for and groundwater samples were within the laboratory control limits.

Internal Standards

Like a surrogate, an internal standard is a compound that is chemically similar to the analytes of interest, but unlikely to be found in any environmental sample. Internal standards are used only for the mass spectrometry (MS) instrumentation and are usually added to the sample aliquot after extraction has taken place. The internal standard should be analyzed at the beginning of a 12 hour sample run and the control limits for internal standard recoveries are -50% to +100% of the calibration standard. All internal standard recoveries were within the control limits.

Method Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. Method blanks were analyzed with each batch of samples at a frequency of one per twenty samples. For all sample batches, method blanks for all applicable methods were analyzed at the required frequency. None of the analytes of interest were detected above the reporting limits in any of the blanks.

Matrix Spikes/Matrix Spike Duplicates (MS/MSD)

Because the actual analyte concentration in environmental samples is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis. One aliquot of sample is analyzed in the normal manner, then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a percent recovery (%R) is calculated.

For metals analyses, the matrix spike (referred to as a "spiked sample") is typically followed by a post-spike sample if any element recoveries were outside the control limits in the "spike sample". In these cases, only the post spiked sample recoveries are used for assessment.

Matrix spike analyses should be performed once per analytical batch or every twenty field samples, whichever is more frequent. The recovery criteria for matrix spikes and laboratory control samples are specified in the laboratory documents as are the relative percent difference values. The frequency requirements were met for all analyses, and the %R/RPD values were within the proper control limits.

Laboratory Control Samples/Laboratory Control Sample Duplicates (LCS/LCSD)

A laboratory control sample is essentially a blank sample that is spiked with a known amount of analyte concentration and analyzed. It is to be treated much like a matrix spike, without the possibility for matrix interference. As there is no actual sample matrix in the analysis, the analytical expectations for accuracy and precision are usually more rigorous and qualification would apply to all samples in the batch, instead of the parent sample only.

Laboratory control sample analyses should be performed once per analytical batch or every twenty field samples, whichever is more frequent. The recovery criteria for laboratory control samples are specified in the laboratory documents as are the relative percent difference values. The frequency requirements were met for all analyses, and the %R/RPD values were within the proper control limits.

Laboratory Duplicates

1. Internal laboratory duplicate analyses are performed to monitor the precision of the analyses. Two separate aliquots of a sample are analyzed as distinct samples in the laboratory, and the RPD between the two results is calculated. Duplicate analyses should be performed once per analytical batch. If one or more of the samples used has a concentration greater than five times the reporting limit for that sample, the absolute difference is used instead of the RPD.
2. Laboratory duplicates were analyzed at the proper frequency and the specified acceptance criteria were met in all cases.

Field Replicates/Duplicates

1. Field duplicate samples were collected and analyzed along with the reviewed sample batches. The duplicate samples were analyzed for the same parameters as the associated parent samples. As indicated above for the laboratory duplicates the RPD is used as the criteria for assessing precision, unless one or more of the samples used has a concentration greater than five times the reporting limit for that sample, the absolute difference is used instead of the RPD.
2. The RPD control limits for soil samples is 50%, while the RPD control limits for water samples is 35%. The absolute difference control limits for soil samples is twice the PQL value, while the absolute difference control limits for water samples is the same as the PQL value.

SDG UY16: One set of field duplicates, Samples EV22A-120611-W/DUP-120611-W, were submitted to the laboratory. The absolute difference value for dissolved lead exceeded the control limits above. The positive results/reporting limits for dissolved lead were qualified as estimated (J/UJ) in both samples.

Overall Assessment

As was determined by this evaluation, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the surrogate, LCS/LCSD, and MS/MSD %R values, with the exceptions indicated above. Precision was acceptable, as demonstrated by the field duplicate, laboratory duplicate, LCS/LCSD and MS/MSD RPD and absolute difference values, with the one exception indicated above.

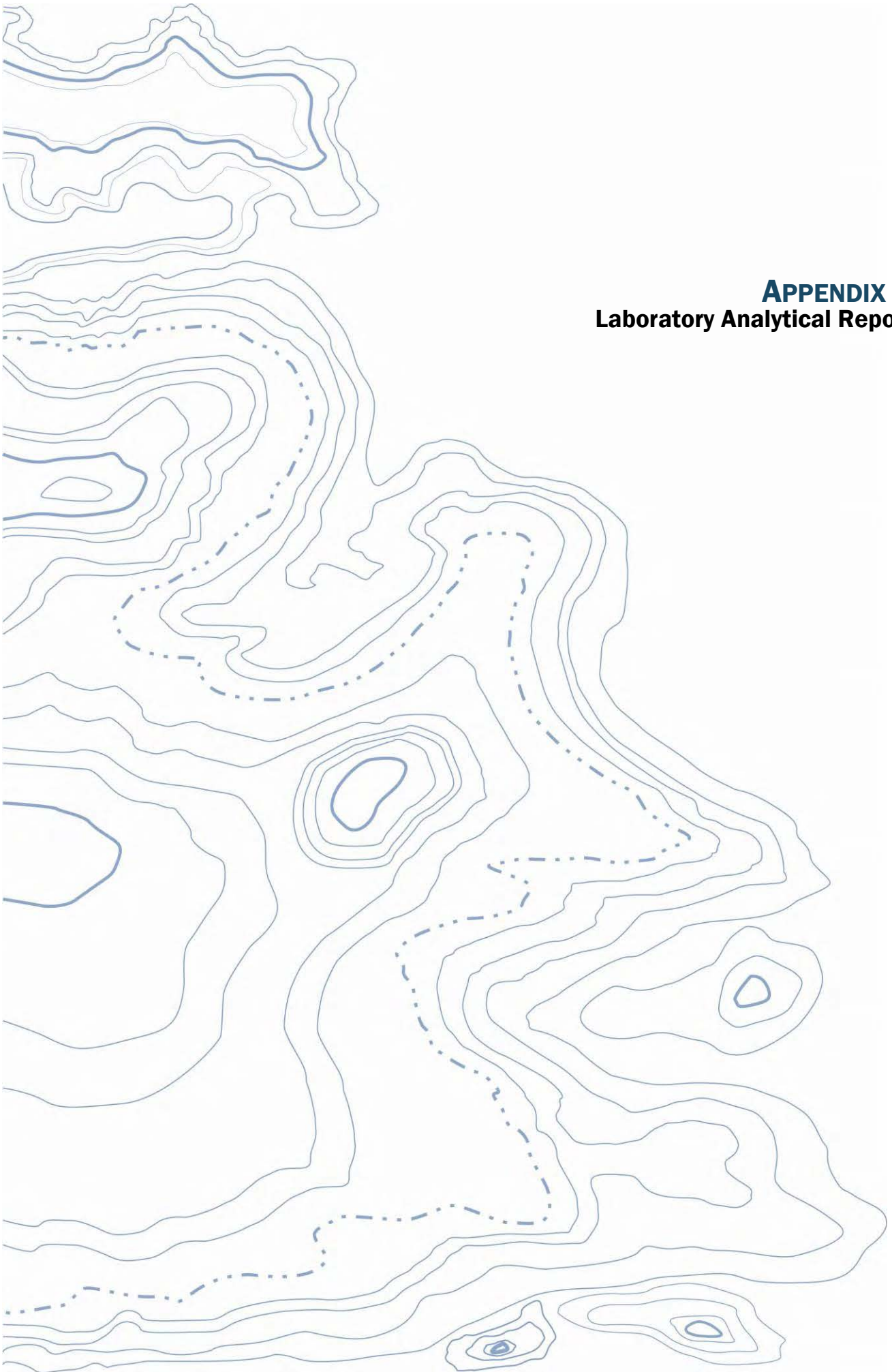
Selected data were qualified as estimated because of field duplicate precision outliers.

All other data points are acceptable for use as qualified.

References

USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (USEPA, 2002)

USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (USEPA, 1999)



APPENDIX C
Laboratory Analytical Report

APPENDIX D
Report Limitations and Guidelines for Use

APPENDIX D
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report.

Environmental Services are Performed for Specific Purposes, Persons and Projects

GeoEngineers has performed this investigation of the Everett Smelter – Benson Property in general accordance with the scope and limitations of our proposal, dated September 17, 2011. This report has been prepared for the exclusive use of Washington State Department of Ecology, and their authorized agents. This report is not intended for use by others, and the information contained herein is not applicable to other properties.

GeoEngineers structures our services to meet the specific needs of our clients. For example, an ESA study conducted for a property owner may not fulfill the needs of a prospective purchaser of the same property. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and property. No one except Washington State Department of Ecology should rely on this environmental report without first conferring with GeoEngineers. Use of this report is not recommended for any purpose or project except the one originally contemplated.

This Environmental Report is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the Everett Smelter – Benson Property. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, it is important not to rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

If important changes are made to the project or property after the date of this report, we recommend that GeoEngineers be given the opportunity to review our interpretations and recommendations. Based on that review, we can provide written modifications or confirmation, as appropriate.

[1] Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

Reliance Conditions for Third Parties

Our report was prepared for the exclusive use of our Client. No other party may rely on the product of our services unless we agree to such reliance in advance and in writing. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions. Within the limitations of scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and generally accepted environmental practices in this area at the time this report was prepared.

Environmental Regulations are Always Evolving

Some substances may be present in the vicinity of the subject property in quantities or under conditions that may have led, or may lead, to contamination of the subject property, but are not included in current local, state or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards for appropriate inquiry, or regulatory definitions of hazardous substances, change or if more stringent environmental standards are developed in the future.

Conditions Can Change

This environmental report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by man-made events such as construction on or adjacent to the subject property, by new releases of hazardous substances, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Please contact GeoEngineers before applying this report for its intended purpose so that GeoEngineers may evaluate whether changed conditions affect the continued applicability of the report.

Most Environmental Findings are Professional Opinions

Our interpretations of site conditions are based on field observations and analytical data from widely spaced sampling locations at the subject property. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an informed opinion about subsurface conditions throughout the property. Actual subsurface conditions may differ, sometimes significantly, from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Read These Provisions Closely

It is important to recognize that the geoscience practices (geotechnical engineering, geology and environmental science) are less exact than other engineering and natural science disciplines. Without this understanding, there may be expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory “limitations” provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you need to know more about how these “Report Limitations and Guidelines for Use” apply to your project or property.

Monitoring Well Installation Technical Memorandum

Everett Smelter Cleanup Site
FSID 2744, ISIS Cleanup Site ID 4298

Lowland Area
Everett, Washington

for
Washington State Department of Ecology

May 15, 2013

GeoEngineers
Earth Science + Technology

Monitoring Well Installation Technical Memorandum

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Technical Memorandum

Everett Smelter Cleanup Site
FSID 2744, ISIS Cleanup Site ID 4298

Lowland Area
Everett, Washington

Project No. 0504-068-00

May 15, 2013

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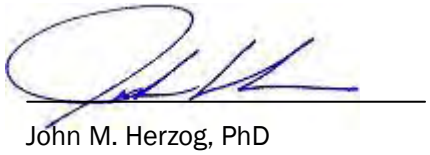

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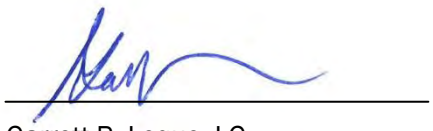

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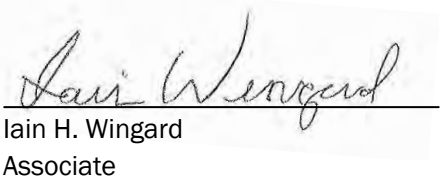

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1.0 INTRODUCTION

This memorandum summarizes field investigation activities completed at the Everett Smelter Lowland Area. The Lowland Area is a part of the Everett Smelter Cleanup Site and generally located in northeast Everett, Washington (Figure 1). The Lowland Area includes multiple parcels and the rights-of-way adjacent to the parcels as shown in Figure 2.

The purpose of the Lowland Area study is to characterize metals concentrations in soil and groundwater within and near the Lowland Area in order to evaluate potential environmental impacts from the historical smelter activities. Soil boring, soil sampling and analysis and monitoring well installation were performed in December 2012 and January 2013. A total of 54 monitoring wells and three soil borings were installed to characterize metals concentrations in soil throughout the Lowland Area. The activities were completed in general accordance with the Washington State Department of Ecology (Ecology)-approved Final Sampling and Analysis Plan (SAP), Quality Assurance Project Plan (QAPP) and Health and Safety Plan (HASP) for the project dated August 31, 2012.

The purpose of this technical memorandum is to describe field activities completed as part of the investigation of the Lowland Area and summarize the resulting data. The results of this and future field activities will be used to develop a preliminary Feasibility Study so that a Cleanup Action Plan can be developed for the Lowland Area that is protective of human health and the environment.

1.1. Site History and Background

The Everett Smelter Lowland Area is part of the Everett Smelter Cleanup Site. The Everett Smelter Cleanup Site has been divided into an Upland Area and Lowland Area. Historically, a smelter was located in the Upland Area, west of the Lowland Area. Beginning in the 1890s, the smelter produced lead, copper, gold and silver from ore. An arsenic extraction plant was added in 1901. The entire smelter was shut down by 1912 and dismantled by 1915.

The historic smelting activities resulted in the release of metals including arsenic and lead to the soil, groundwater and air. The arsenic extraction plant where arsenic trioxide was produced was demolished. However, arsenic trioxide remained on site in the former plant area. This portion of the Everett Smelter Cleanup Site has been referred to as the former arsenic trioxide processing area and as the fenced area.[1] This area underwent environmental cleanup in approximately 2004 through 2006 to remove and consolidate soil that had been contaminated by smelter operations.

Historically, slag waste from former smelter activities was poured down the bluff located on the east side of the Upland portion of the Everett Smelter Site and onto an adjacent property, currently known as the Benson Property. Slag present on the Benson Property was historically used for the manufacture of “rock wool”. Additionally, slag was excavated from the Benson Property and

[1] The former arsenic trioxide processing area has sufficiently high contamination that it was purchased by Asarco soon after the Site was rediscovered, the homes vacated, and the area fenced off.

transported for use on and off site. Although slag was historically reused, not all of it was removed. Slag still remains on the Benson Property and potentially in other parts of the Lowland Area.

Air emissions from the former smelter stacks are likely to have deposited of particulates containing metals onto the historic land surface surrounding the Smelter Site. The extent of contamination from the smelter has been characterized in the Upland portion of the Everett Smelter Cleanup Site and is currently under remedial action. The extent of contamination in the Lowland portion of the Site is being investigated to evaluate potential environmental impacts from historical smelter activities.

Multiple soil and groundwater investigations have been performed in the Lowland Area since the 1990s related to the Everett Smelter contamination. Groundwater monitoring in the late 1990s identified metals-contaminated groundwater east of the former smelter in the Lowland Area. In 2011 and 2012, GeoEngineers installed 20 wells (in ten well pairs - "shallow" and "deep" wells BP-01S/D through BP-10S/D) along the eastern portion of the Benson Property and collected soil and groundwater samples from the borings/wells. Additionally, GeoEngineers collected groundwater samples from three existing wells (EV-20B and EV-22A/B). Soil and groundwater samples were analyzed for arsenic, lead, cadmium, mercury, antimony and thallium. Results indicated soil and groundwater contain elevated metals concentrations (predominantly arsenic and lead). Of note, the metals concentrations in groundwater identified in the late 1990s were similar to the metals concentrations detected in 2012.

2.0 FIELD INVESTIGATION

2.1. Monitoring Well and Soil Boring Installation

Investigation activities included installation of 54 groundwater monitoring wells (23 "shallow" wells, 30 "deep" wells and one "deeper deep" well) throughout the Lowland Area using hollow-stem auger (HSA) drill rigs. Forty six of the monitoring wells were installed in shallow/deep well pairs at twenty three locations as shown on Figure 3. Seven of the wells were installed as deep wells, either adjacent to existing shallow wells or where shallow groundwater was not encountered. One deeper, deep well (BP-05D2) was installed adjacent to an existing shallow/deep well pair (BP-05S/D) on the Benson Property to further characterize the vertical extent of metals in soil and groundwater. The shallow and deep wells in each pair are spaced approximately 4 to 5 feet apart. Soil samples were collected from each deep well boring completed during the monitoring well installation activities.

The investigation locations were selected to characterize metals concentrations in soil and groundwater throughout the Lowland Area. The monitoring well installations were completed between December 4, 2012 and January 24, 2013. The horizontal coordinates and vertical elevations of each well were surveyed after well installation was completed.

In general accordance with the objectives of the SAP, shallow wells were installed in what previous investigations of the Everett Smelter Area characterize as the "shallow aquifer." The top of the well screens were installed at depths ranging from 3.5 feet to 8 feet below ground surface (bgs) and the bottom of the well screens were installed at depths ranging from 6 to 18 feet bgs. The only exception to this is well LLMW-23S, which was installed on top of a dike along the Snohomish River

at a higher surface elevation than the surrounding Lowland Area and was screened from 14 to 24 feet bgs. The bottom of the shallow well screens within the Lowland Area were installed approximately 1 foot above the historic native surface of the silt/channel deposits, where encountered. Shallow wells installed within the Upland Area along Marine View Drive were typically installed at or just above the top of the Vashon Till unit (described below in Section 3.0) with the exception of LLMW-27S, which was installed between 31 and 36 feet bgs at a potential water bearing zone within the Vashon Till unit. Shallow wells were installed with screen lengths ranging from 2.5 to 10 feet.

Deep wells were installed in what previous investigations of the Everett Smelter Area characterize as the "deep aquifer." The top of the well screens within the Lowland Area were installed at depths ranging from 11 to 30 feet bgs and the bottom of the well screens were installed at depths ranging from 21 feet to 40 feet bgs. The deep wells installed in the Upland Area had top of screen depths ranging from 35 to 63.5 feet bgs and the bottom of the screens were installed between approximately 45 to 73.5 feet bgs. All of the deep well screens were ten feet in length. The deep well screens were installed with a minimum 1-foot separation between the bottom of the silt/channel deposits or Vashon Till unit and the top of the well screens.

The deeper deep well BP-05D2 was installed with a 5-foot-long screen set from 67 feet to 72 feet bgs.

Three soil borings were completed using direct-push technologies at the locations shown on Figure 3. These borings were each completed to 20 feet bgs on January 7, 2013.

All borings were logged by qualified geologists and the wells were installed by licensed drillers in general accordance with Washington Administrative Code (WAC) 173-160. Wells were constructed of 2-inch-diameter PVC with either flush mount or stick-up monuments. Wells with stick-up monuments have steel bollards set in concrete around the wells for protection. Boring and monitoring well construction logs are provided in Appendix A. Each monitoring well and boring location was surveyed by a certified land survey company, David Evans and Associates. A summary of monitoring well and soil boring construction information is provided in Table 1. The survey data and surveyor's field notes are provided in Appendix B.

Continuous soil samples were collected from each boring advanced to install the deep wells using a split-spoon sampler (i.e., Standard Penetration Test sampler or "California spoon" sampler). Soil samples were only collected from the deep well borings at locations where the deep well borings were co-located with a shallow well boring. Well construction details for the shallow wells were based on observations of soil in the adjacent deep well. Field screening was completed as described in the Ecology-approved SAP (GeoEngineers, 2012), and at least one soil sample was collected from each deep well in each of the following four soil horizons:

- Fill comprising the shallow aquifer;
- Historic native surface (i.e., the top of the native silt deposits or till);
- From deeper within the native deposits; and

- Soil from within the deep aquifer (alluvium or advance outwash) that was within the elevation where the well screen was installed.

Soil samples were collected, logged on a chain-of-custody form in general accordance with the QAPP, placed in laboratory-supplied jars and stored in coolers on ice for transport and delivery to the analytical laboratory. A total of 151 samples were analyzed for metals including antimony, arsenic, cadmium, lead, mercury, and thallium by Environmental Protection Agency (EPA) Methods 6010/200.8/7470.

Chemical analysis of the soil samples was completed by Analytical Resources, Inc. (ARI) in Tukwila, Washington.

2.2. Monitoring Well Development

The monitoring wells were developed in December 2012 and January 2013. Well development was completed to remove water that may have been introduced into the well during drilling, stabilize the filter pack and formation materials surrounding the well screen and restore the hydraulic connection between the well screen and the surrounding soil. Each well screen interval was gently surged with a decontaminated stainless steel bailer and groundwater in the well was removed using a decontaminated, submersible pump and tubing. Approximately 20 to 50 gallons of water was removed from each well at a rate of approximately 20 gallons per hour. The initial turbidity readings of water removed from the wells during development were greater than 1,000 Nephelometric turbidity units (NTUs) and final turbidity readings were less than 500 NTUs in all but six wells. The soil within the well screen intervals of the six wells with higher turbidities generally included a higher fines content and/or organics/wood which may have contributed to the higher turbidities.

2.3. Decontamination

Drilling and non-disposable sampling equipment was decontaminated using the procedures specified in the QAPP.

2.4. Disposal of Investigation-Derived Materials

Soil cuttings from borings advanced for soil sampling and monitoring well installation were placed in labeled and sealed 55-gallon drums pending characterization for disposal. Approximately 3,500 gallons of development and purge water removed from the monitoring wells and decontamination water generated during all Lowland activities was placed in one 6,500 gallon upright aboveground polyethylene storage tank pending characterization for disposal. Both the soil drums and aboveground storage tank were stored within a fenced staging area on a property owned by the Port of Everett and made available for the investigation. The soil was disposed of at Republic Services Landfill in Roosevelt, Washington and water was disposed of at Emerald Services Airport Way Facility in Seattle, Washington based on the results of the characterization for disposal and approval by the disposal facilities. Incidental waste (i.e., gloves, paper towels, etc.) were disposed of off site as solid waste.

2.5. Deviations From the SAP

Field activities were performed in general accordance with the SAP, QAPP and HASP created for this project, with the exceptions listed below. All deviations were discussed with and approved by a representative of Ecology prior to implementation. Deviations included the following:

- Monitoring wells LLMW-24D, LLMW-25D, LLMW-31D were installed as deep wells only due to the absence of shallow groundwater at those locations.
- The actual location for monitoring well pair LLMW-17S/D was moved approximately 100 feet east-northeast from the planned location based on a request by Ecology. Pentachlorophenol (PCP) was previously observed at an investigation location west of the actual location of LLMW-17S/D. These wells were sampled for PCP in groundwater independent of the original scope of the Lowland (i.e., metals) investigation. The groundwater samples for PCP analysis were collected as "splits" and provided to Weyerhaeuser and Ecology.
- The actual location for monitoring well pair LLMW-21S/D is approximately 150 feet northeast of the planned location due to a request by the property owner for access reasons.
- The actual location for monitoring well LLMW-31D was on the east side of East Marine View Drive due to underground and overhead utility conflicts at the planned location.
- The actual locations for monitoring well pairs LLMW-12S/D, LLMW-14S/D and LLMW-15S/D were adjusted slightly (each less than approximately 100 feet from the planned locations) based on a request by the property owner for access reasons.

3.0 RESULTS

3.1. Observed Stratigraphy and Subsurface Conditions

In general, soils encountered during this investigation were similar to what has been described in previous investigations of the Lowland Area. The following is a description of four soil units observed in the Lowland Area:

- Fill: In general, approximately 7 feet to feet of fill was observed at the surface of the Lowland Area. However, up to 19 feet of fill was observed in LLMW-13D and LLMW-23D. Fill predominantly consisted of soft/loose silty sands to silts with occasional wood and debris such as glass, metal and concrete. Groundwater within the fill unit was measured at depths ranging from approximately 3 to approximately 12 feet bgs during groundwater investigation activities. Results of groundwater investigation activities will be provided in a separate groundwater monitoring technical memorandum.
- Silt: Silt deposits were identified beneath the fill, typically as a layer of silt, silt with organics, and/or peat. The top of the silt is likely the historic native surface present during the time of smelter operations. The silt deposits have been described as forming a somewhat leaky confining layer between the shallow, unconfined aquifer and underlying deep aquifer. Where present, the silt deposits were generally observed to be between approximately 1.5 and 13 feet thick. The silt deposits were generally observed to be thicker in monitoring wells in the western portion of the Lowland Area, and thinner toward the east (i.e., towards the Snohomish River). A silt layer was not observed to be present at wells LLMW-01 or LLMW-02 at an

elevation consistent with the elevation of the silt layer in other Lowland Area investigation locations. However, a thin silt layer was observed at LLMW-01 and LLMW-02 at an elevation substantially lower than observed in the remainder of the Lowland Area. It is likely the silt observed in LLMW-01 and LLMW-02 may represent a thin interbed within the alluvium unit (described below).

- Alluvium: Wet, loose to medium dense sand was observed beneath the silt confining layer. The sand present beneath the confining layer is interpreted to be comprised of alluvium that has been described in previous investigations.
- Lower Silt: A lower silt unit with sand interbeds was observed beneath the deep aquifer sand unit at the deeper deep location of BP-05D2. This silt was observed from approximately 46 feet to the total depth of the boring at 72 feet bgs. A five-foot well screen was set across the thickest sand interbed observed in the boring. The sand was observed at a depth of 68 to 71 feet bgs and the well screen was set at a depth of 67 to 72 feet bgs.

Soils encountered along the boundary between the Upland and Lowland Areas (LLMW-24D, LLMW-25D, LLMW-27D, LLMW-29D, LLMW-31D, LLMW-33D, and LLMW-34D) consisted of four principal geologic units:

- Fill/colluvium deposits: Approximately 1.5 to 6 feet of fill/colluvium deposits were observed at the surface in the borings performed along the boundary between the Upland and Lowland Areas. The soil was generally comprised of silt to cobble size material and occasionally contained organic matter, charred wood and other debris typically associated with fill.
- Weathered glacial till: Approximately 1.5 to 10 feet of weathered glacial till was observed underlying the surface fill/colluviums. The soil was generally comprised of silt to cobble size material. The soil was similar in appearance to the glacial till described below. However, the color of the weathered glacial till was generally brown and the density was lower than glacial till.
- Glacial till: Approximately 15 to 30 feet of glacial till was observed underlying the weathered glacial till. The soil was generally comprised of a dense mixture of silt to cobble sized material. Our interpretation of this soil is that it is Vashon till.
- Advance outwash sand: Advance outwash sand was observed underlying the glacial till to the full depth of the explorations. Soil consisted of fine to medium sand with trace amounts of silt. Our interpretation of this soil is that it is Vashon Advance Outwash Sand.

3.2. Data Validation

A data quality assessment was performed on all data in general conformance with an EPA "Stage-2B" validation. The data quality assessment report is provided in Appendix C. The laboratory analytical reports are provided in Appendix D. The data were deemed acceptable for use as qualified.

3.3. Soil Analytical Results

One hundred and fifty one soil samples from 31 deep borings were analyzed. Soil samples were only collected as part of the deep well installation and not from the co-located shallow monitoring well installations due to the close proximity (i.e., within 4 or 5 feet) of the well pairs. The soil

samples collected were submitted for metals analysis including antimony, arsenic, cadmium, lead, mercury and thallium. Selected soil samples were also submitted for analysis of grain size and total organic carbon (TOC).

The results for metals in soil are presented in Table 2 and Figures 4 and 5 present the arsenic and lead soil results, respectively.

The following summarizes the results for soil samples:

- Antimony was detected in one soil sample collected from the fill layer at LLMW-17 at a concentration of 19 milligrams per kilogram (mg/kg). Antimony was not detected in any other soil samples.
- Arsenic was detected in all samples at concentrations ranging from 1.7 mg/kg up to 1,330 mg/kg (LLMW-27 from 3.5 to 4.5 feet bgs). In general, the highest soil arsenic concentrations were observed in samples collected from the historic native surface of the silt deposits, followed by samples collected from the fill layer above the silt deposits.
- Cadmium was detected in all but 12 of the soil samples at concentrations ranging from 0.2 mg/kg to 4.5 mg/kg. Cadmium concentrations were higher in samples collected from the fill as well as the historic native surface of the silt. Cadmium concentrations also tended to be higher in samples with higher lead and/or arsenic concentrations.
- Lead was detected in the majority of samples at concentrations ranging from 2 mg/kg to 395 mg/kg. Lead concentrations tended to be higher in samples collected from the fill as well as the historic native surface of the silt.
- Mercury was detected in approximately half the samples at concentrations ranging from 0.02 mg/kg to 0.81 mg/kg.
- Thallium was not detected in any of the soil samples analyzed.

Soil total organic carbon results are presented in Table 3. The samples selected for grain size analysis are shown in Table 4 and the results are contained in Appendix E.

4.0 LIMITATIONS

We have prepared this report for the exclusive use of Washington State Department of Ecology and their authorized agents.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the field of environmental investigation in this area at the time this report was prepared. No warranty or other conditions express or implied should be understood.

Please refer to Appendix F titled “Report Limitations and Guidelines for Use” for additional information pertaining to use of this report.

Table 1

Summary of Monitoring Well and Soil Boring Construction Information

Everett Lowland

Everett, Washington

Location ID	Ecology Well Tag	Location Coordinates[1]		Elevations[2]		Flush / Stickup	Screened Interval Depth (feet bgs)
		Northing (Y)	Easting (X)	Ground Surface Elevation (feet)	Top of Casing Elevation (feet)		
Monitoring Well							
BP-05D2	BHR-977	371472.5693	1308791.7070	15.83	19.26	Stickup	67-72
LLMW-01D	BHU-093	373911.1708	1307952.9290	16.08	15.74	Flush	27.5-37.5
LLMW-02D	BHU-027	372887.0090	1307921.3900	15.38	15.15	Flush	22-32
LLMW-03S	BHU-088	372968.4709	1308355.5780	14.52	17.45	Stickup	3.5-8.5
LLMW-03D	BHU-087	372965.5718	1308351.5110	14.43	17.45	Stickup	21-31
LLMW-04S	BHU-090	372644.2517	1308249.7640	18.61	21.91	Stickup	4-14
LLMW-04D	BHU-089	372642.8382	1308246.2520	18.89	21.98	Stickup	22-32
LLMW-05S	BHU-011	372938.3312	1309085.1330	14.42	14.05	Flush	4-9
LLMW-05D	BHU-010	372934.1281	1309088.2700	14.39	13.92	Flush	15-25
LLMW-06S	BHU-091	372477.6634	1309132.4260	12.73	12.49	Flush	4-7
LLMW-06D	BHU-092	372472.7325	1309133.8720	12.71	12.29	Flush	18-28
LLMW-07S	BHU-008	372578.2673	1309467.0870	14.06	13.82	Flush	4-9
LLMW-07D	BHU-009	372580.8285	1309464.7630	14.09	13.81	Flush	15-25
LLMW-08S	BHU-013	372213.2542	1309788.2490	13.21	16.21	Stickup	5-10
LLMW-08D	BHU-012	372209.3701	1309788.5690	13.45	16.26	Stickup	15-25
LLMW-09S	BHU-007	371929.4722	1309290.9450	13.15	12.57	Flush	3.5-6
LLMW-09D	BHU-006	371933.0232	1309291.5300	13.18	12.79	Flush	17-27
LLMW-10S	BHU-015	371722.2934	1309357.7910	13.18	15.91	Stickup	4-6.5
LLMW-10D	BHU-014	371725.4255	1309359.4070	13.14	15.97	Stickup	21-31
LLMW-11S	BHU-041	371826.1136	1310349.2310	16.00	19.76	Stickup	3.5-9.5
LLMW-11D	BHU-040	371822.9079	1310350.2610	16.03	19.71	Stickup	12-22
LLMW-12S	BHU-017	371520.5241	1309412.4360	13.84	15.61	Stickup	3-7
LLMW-12D	BHU-016	371523.5091	1309414.2800	13.63	15.71	Stickup	17-27
LLMW-13S	BHU-044	371682.6131	1309796.9300	18.43	21.49	Stickup	8-18
LLMW-13D	BHU-045	371682.4624	1309793.1490	18.48	21.24	Stickup	25-35
LLMW-14S	BHU-019	371374.1753	1309446.9460	12.49	14.74	Stickup	3.5-6
LLMW-14D	BHU-018	371375.9911	1309449.1600	12.49	14.80	Stickup	20-30
LLMW-15S	BHU-021	371051.1506	1309535.4190	13.21	15.94	Stickup	3.5-9.5
LLMW-15D	BHU-020	371053.2175	1309536.6120	13.10	16.07	Stickup	24-34
LLMW-16S	BHU-043	371159.2967	1310164.4520	17.19	20.02	Stickup	4-12
LLMW-16D	BHU-042	371158.1660	1310160.4370	17.14	20.14	Stickup	24-34
LLMW-17S	BHU-039	371320.3207	1310602.2830	15.32	18.27	Stickup	4-11
LLMW-17D	BHU-038	371317.6575	1310603.0720	15.27	18.29	Stickup	15-25
LLMW-18S	BHU-023	370389.0772	1309715.2920	13.27	15.70	Stickup	3.5-7.5
LLMW-18D	BHU-022	370391.7580	1309718.7140	13.11	15.91	Stickup	20-30
LLMW-19D	BHU-005	370189.3895	1310224.8460	11.64	14.22	Stickup	17-27
LLMW-20D	BHU-037	370542.4429	1310748.1780	11.32	14.92	Stickup	11-21
LLMW-21S	BHU-026	370010.9467	1309885.4530	13.62	16.04	Stickup	3.5-7
LLMW-21D	BHU-025	370011.1759	1309881.2800	13.29	16.03	Stickup	23-33
LLMW-22S	BHU-004	369173.0090	1310445.6340	13.18	12.87	Flush	3.5-7
LLMW-22D	BHU-003	369167.8357	1310446.0910	13.14	12.80	Flush	17-27
LLMW-23S	BHU-002	368222.1107	1310277.4480	25.95	25.54	Flush	14-24
LLMW-23D	BHU-001	368226.9076	1310278.8900	25.91	25.30	Flush	30-40
LLMW-24D	BHU-030	371665.5506	1308321.7200	54.66	54.28	Flush	43.5-53.5
LLMW-25D	BHU-024	371489.9394	1308367.7590	61.98	61.76	Flush	55-65
LLMW-27S	BHU-032	371254.3715	1308467.3450	61.87	61.46	Flush	31-36
LLMW-27D	BHU-031	371259.2652	1308465.4350	61.93	61.71	Flush	50-60
LLMW-29S	BHU-029	370978.6854	1308557.0080	55.91	55.66	Flush	5-15
LLMW-29D	BHU-028	370982.4647	1308556.2150	56.04	55.62	Flush	50-60
LLMW-31D	BHR-886	370452.8170	1308669.7760	59.00	58.41	Flush	54-64
LLMW-33S	BHU-095	369957.8312	1308912.9560	37.73	37.42	Flush	3.5-10.5
LLMW-33D	BHU-094	369961.9490	1308914.5250	37.57	37.24	Flush	35-45
LLMW-34S	BHU-047	368693.8425	1308931.7710	53.22	52.71	Flush	4-12
LLMW-34D	BHU-046	368696.1556	1308930.6690	53.30	53.03	Flush	63.5-73.5
Soil Boring							
LLSB-1	Not Applicable	373990.7175	1306949.75	12.6436	Not Applicable	Not Applicable	Not Applicable
LLSB-2	Not Applicable	373634.9832	1307691.419	14.7497	Not Applicable	Not Applicable	Not Applicable
LLSB-3	Not Applicable	373543.2766	1308050.649	15.0686	Not Applicable	Not Applicable	Not Applicable

Notes

BP = Benson Property

LLMW = Lowland Monitoring Well

[1] Northing (Y) and Easting(X) are in Wasington State Plane North Coordinate System, 83/91 grid values

[2] Vertical datum is NAVD88, US survey feet

Survey performed by David Evans and Associates, Everett, Washington

Table 2

Chemical Analtyical Result - Soil[1]

Everett Lowland

Everett, Washington

Location ID	Sample ID	Analyte	Antimony	Arsenic	Cadmium	Lead	Mercury	Thallium
		Units	*mg/Kg*	*mg/Kg*	*mg/Kg*	*mg/Kg*	*mg/Kg*	*mg/Kg*
		Stratigraphic Unit						
LLMW01	LLMW01-3-4	Fill	5 U	**5.6**	**0.2**	**2**	0.02 U	0.2 U
	LLMW01-25-25.2	Native Surface	8 U	**16.4**	**0.6**	**14**	**0.18**	0.3 U
	LLMW01-26-26.5	Silt Deposits	8 U	**13.3**	**0.6**	**12**	**0.16**	0.3 U
	LLMW01-32.5-33.5	Alluvium	6 U	**2.7**	0.2 U	2 U	0.03 U	0.2 U
LLMW02	LLMW02-6-7	Fill	6 U	**5.3**	**0.3**	**3**	0.02 U	0.2 U
	LLMW02-17.4-17.6	Native Surface	8 U	**64.6**	**1.9**	**50**	**0.21**	0.3 U
	LLMW02-20-21	Silt Deposits	6 U	**7.5**	**0.3**	**3**	0.03 U	0.2 U
	LLMW02-27-28	Alluvium	6 U	**5.3**	**0.3**	**3**	0.02 U	0.2 U
LLMW03	LLMW03-9-10	Fill	6 U	**6.4**	**0.3**	**5**	0.02 U	0.2 U
	LLMW03-10.5-10.6	Native Surface	8 U	**20.9**	**0.6**	**21**	**0.09 J**	0.3 U
	LLMW03-13.5-14.5	Silt Deposits	8 U	**12.6**	**0.7**	**7**	**0.09 J**	0.3 U
	LLMW03-28-29	Alluvium	6 U	**3.2**	**0.3**	2 U	0.03 U	0.2 U
LLMW04	LLMW04-2-3	Fill	5 U	**7.3**	**0.5**	**11**	**0.05**	0.2 U
	LLMW04-2-3D	Duplicate	5 U	**6.7**	**0.5**	**10**	**0.05**	0.2 U
	LLMW04-14.3-14.5	Native Surface	7 U	**24.9**	**0.6**	**11**	**0.08**	0.3 U
	LLMW04-18-19	Silt Deposits	8 U	**15.7**	**0.7**	**6**	**0.09**	0.3 U
	LLMW04-30-31	Alluvium	5 U	**4.4**	**0.3**	2 U	0.02 U	0.2 U
LLMW05	LLMW05-6-7	Fill	6 U	**9.8**	**0.3**	**4**	0.02 U	0.2 U
	LLMW05-10-10.2	Native Surface	8 U	**49.8**	**0.8**	**53**	**0.1**	0.3 U
	LLMW05-12-13	Silt Deposits	7 U	**9.8**	**0.5**	**6**	**0.06**	0.3 U
	LLMW05-12-13-D	Duplicate	7 U	**9.8**	**0.5**	**5**	**0.06**	0.3 U
	LLMW05-20-21	Alluvium	6 U	**4.4**	**0.3**	**3**	0.03 U	0.2 U
LLMW06	LLMW06-6.5-7.5	Fill	6 U	**59.5**	**0.3**	**3**	0.02 U	0.2 U
	LLMW06-8-8.2	Native Surface	9 U	**28**	**0.8**	**15**	**0.08**	0.3 U
	LLMW06-11-12	Silt Deposits	7 U	**13.7**	**0.6**	**6**	**0.09**	0.3 U
	LLMW06-23-24	Alluvium	6 U	**5.3**	**0.3**	2 U	**0.03**	0.3 U
LLMW07	LLMW07-3-4	Fill	6 U	**5.7**	**0.5**	**16**	0.02 U	0.2 U
	LLMW07-10-10.2	Native Surface	8 U	**12.9**	**0.3**	**4**	**0.05**	0.3 U
	LLMW07-10.5-11	Silt Deposits	7 U	**13.5**	**0.4**	**5**	**0.06**	0.3 U
	LLMW07-18-19	Alluvium	6 U	**2.6**	0.2 U	2 U	0.02 U	0.2 U
LLMW08	LLMW08-3-4	Fill	10 U	**26.8**	**0.8**	**81**	**0.06**	0.2 U
	LLMW08-12-13	Native Surface	20 U	**29.2**	**1.1**	**386**	**0.07**	0.3 U
	LLMW08-20-21	Alluvium	6 U	**5.4**	**0.3**	4	0.02 U	0.2 U
LLMW09	LLMW09-4.5-5.5	Fill	6 U	**15.1**	**0.3**	**4**	0.02 U	0.2 U
	LLMW09-8.3-8.5	Native Surface	10 U	**103**	**1.7**	**169**	**0.26**	0.4 U
	LLMW09-10.5-11	Silt Deposits	8 U	**16.5**	**0.5**	8	**0.08**	0.3 U
	LLMW09-18-19	Alluvium	6 U	**5.9**	0.2 U	2 U	0.02 U	0.2 U
LLMW10	LLMW10-6-7	Fill	6 U	**2.8**	**0.3**	**3**	0.03 U	0.2 U
	LLMW10-7.5-7.7	Native Surface	7 U	**22.3**	**2.5**	**37**	**0.1**	0.3 U
	LLMW10-12-13	Silt Deposits	8 U	**15.4**	**0.6**	**8**	**0.09**	0.3 U
	LLMW10-27-28	Alluvium	6 U	**3.4**	**0.2**	2 U	0.03 U	0.2 U
LLMW11	LLMW11-5-6	Fill	10 U	**26**	0.6 U	**15**	**0.05**	0.2 U
	LLMW11-10.5-10.7	Native Surface	7 U	**13.9**	**0.4**	**12**	**0.05**	0.3 U
	LLMW11-11-11.5	Silt Deposits	6 U	**10.8**	**0.5**	**6**	**0.06**	0.3 U
	LLMW11-19.5-20.5	Alluvium	6 U	**28.9**	**0.3**	**3**	0.03 U	0.3 U
LLMW12	LLMW12-5-5.5	Fill	6 U	**3.8**	**0.3**	**3**	0.02 U	0.2 U
	LLMW12-8.5-8.7	Native Surface	8 U	**32.1**	**0.8**	**12**	**0.07**	0.3 U
	LLMW12-10-10.5	Silt Deposits	8 U	**12.6**	**0.5**	**8**	**0.09**	0.3 U
	LLMW12-21-22	Alluvium	6 U	**9.4**	**0.3**	**3**	0.02 U	0.2 U
LLMW13	LLMW13-10.5-11.5	Fill	7 U	**47.2**	**0.3**	**49**	0.03 U	0.3 U
	LLMW13-18.7-19	Native Surface	7 U	**15.7**	**0.5**	**12**	**0.09**	0.3 U
	LLMW13-23-24	Silt Deposits	6 U	**6.7**	**0.4**	**5**	0.02 U	0.2 U
	LLMW13-32-33	Alluvium	6 U	**4.2**	**0.3**	**3**	0.02 U	0.2 U
LLMW14	LLMW14-5.5-6	Fill	6 U	**8.4**	**0.4**	**16**	**0.03**	0.2 U
	LLMW14-7-7.2	Native Surface	10 U	**203**	**4.5**	**395**	**0.23**	0.4 U
	LLMW14-13.5-14.5	Silt Deposits	7 U	**12.9**	**0.6**	**7**	**0.07**	0.3 U
	LLMW14-29-30	Alluvium	6 U	**2.8**	**0.3**	2 U	0.03 U	0.2 U
LLMW15	LLMW15-2-3	Fill	6 U	**2.6**	**0.3**	**4**	**0.02**	0.2 U
	LLMW15-2-3 DUP	Duplicate	6 U	**2.5**	**0.3**	**3**	0.03 U	0.2 U
	LLMW15-11.5-11.7	Native Surface	10 U	**63.8**	**1.5**	**105**	**0.2**	0.4 U
	LLMW15-14-15	Silt Deposits	8 U	**12.9**	**0.6**	**7**	**0.1**	0.3 U
	LLMW15-30.5-31.5	Alluvium	6 U	**5.1**	**0.2**	2 U	0.03 U	0.2 U
LLMW16	LLMW16-13-13.5	Fill	6 U	**15**	**0.3**	**6**	**0.03**	0.2 U
	LLMW16-13.5-13.7	Native Surface	7 U	**21**	**0.5**	**8**	**0.06**	0.3 U
	LLMW16-15-16	Silt Deposits	7 U	**10.5**	**0.5**	**6**	**0.07**	0.3 U
	LLMW16-29.5-30.5	Alluvium	5 U	**4**	**0.3**	**3**	0.02 U	0.2 U
LLMW17	LLMW17-5-6	Fill	**19**	**43.7**	**0.4**	**47**	**0.04**	0.2 U
	LLMW17-12-12.2	Native Surface	6 U	**10.8**	**0.4**	**5**	**0.05**	0.3 U
	LLMW17-12.5-13	Silt Deposits	6 U	**12.2**	**0.4**	**5**	**0.05**	0.3 U
	LLMW17-21-22	Alluvium	6 U	**3.7**	**0.3**	**2**	0.03 U	0.2 U
LLMW18	LLMW18-6-7	Fill	6 U	**3.9**	**0.2**	**3**	0.03 U	0.2 U
	LLMW18-8.5-8.7	Native Surface	10 U	**313**	**3.1**	**212**	**0.54**	0.4 U
	LLMW18-11-12	Silt Deposits	9 U	**18.8**	**0.5**	**9**	**0.08**	0.4 U
	LLMW18-21-22	Alluvium	6 U	**3.4**	0.3 U	3 U	0.03 U	0.3 U
LLMW19	LLMW19-3-4	Fill	6 U	**142**	**0.4**	**86**	**0.04**	0.2 U
	LLMW19-7.8-8	Native Surface	8 U	**31.2**	**0.5**	**131**	**0.09**	0.3 U
	LLMW19-9-10	Silt Deposits	8 U	**19.8**	**0.5**	13	**0.08**	0.3 U
	LLMW19-25-26	Alluvium	6 U	**2.7**	0.2 U	2 U	0.03 U	0.2 U

Location ID	Sample ID	Analyte	Antimony	Arsenic	Cadmium	Lead	Mercury	Thallium
		Units	*mg/Kg*	*mg/Kg*	*mg/Kg*	*mg/Kg*	*mg/Kg*	*mg/Kg*
		Stratigraphic Unit						
LLMW20	LLMW20-4.5-5.5	Fill	5 U	**30.2**	**0.3**	**12**	**0.03**	0.2 U
	LLMW20-7.2-7.4	Native Surface	7 U	**64.6**	**0.5**	**9**	**0.06**	0.3 U
	LLMW20-9-9.5	Silt Deposits	6 U	**19.4**	**0.4**	**5**	**0.03**	0.2 U
	LLMW20-13.5-14.5	Alluvium	6 U	**22.9**	**0.3**	**19**	0.03 U	0.3 U
LLMW21	LLMW21-6-7	Fill	6 U	**15.4**	**0.3**	**5**	0.02 U	0.2 U
	LLMW21-7.7-7.9*	Native Surface	10 U	**121**	**2**	**96**	**0.22**	0.4 U
	LLMW21-12-13	Silt Deposits	8 U	**21.3**	**0.6**	**9**	**0.07**	0.3 U
	LLMW21-15-16	Silt Deposits	10 U	**17**	**0.6**	**10**	**0.07**	0.4 U
	LLMW21-24-25	Alluvium	6 U	**5.1**	**0.3**	3 U	0.02 U	0.2 U
LLMW22	LLMW22-3-4	Fill	6 U	**6.1**	0.2 U	2 U	0.02 U	0.2 U
	LLMW22-8-8.2	Native Surface	9 U	**24.6**	**0.4**	**8**	**0.1**	0.3 U
	LLMW22-10.5-11.5	Silt Deposits	8 U	**16.9**	**0.4**	**9**	**0.09**	0.3 U
	LLMW22-20-21	Alluvium	6 U	**2.6**	**0.2**	2 U	0.03 U	0.2 U
LLMW23	LLMW23-17-18	Fill	6 U	**5.6**	0.2 U	**4**	0.02 U	0.2 U
	LLMW23-20-21	Fill	6 U	**5.7**	0.2 U	**5**	0.03 U	0.2 U
	LLMW23-22.9-23.1	Native Surface	7 U	**11.2**	**0.3**	**7**	**0.04**	0.3 U
	LLMW23-26-26.5	Silt Deposits	8 U	**16.3**	**0.4**	**6**	**0.1**	0.3 U
	LLMW23-35-36	Alluvium	6 U	**2.3**	0.2 U	2 U	0.02 U	0.2 U
LLMW24	LLMW24-1.3-1.5	Native Surface	6 U	**14.6 J**	**1.1**	**69**	**0.07**	0.2 U
	LLMW24-6-6.5	Till	6 U	**3.2 J**	**0.5**	**4**	**0.04**	0.2 U
	LLMW24-30-31	Outwash	5 U	**2.1 J**	**0.4**	**2**	0.03 U	0.2 U
	LLMW24-45-46	Outwash	5 U	**2.5 J**	**0.3**	2 U	**0.02**	0.2 U
LLMW25	LLMW25-3-4	Fill	5 U	**2.7**	**0.6**	**5**	**0.04**	0.2 U
	LLMW25-8-8.2	Native Surface	5 U	**2.1**	**0.3**	2 U	0.02 U	0.2 U
	LLMW25-10.5-11	Till	5 U	**2**	**0.3**	**2**	0.03 U	0.2 U
	LLMW25-55-56	Outwash	6 U	**2.2**	**0.3**	2 U	0.03 U	0.2 U
LLMW27	LLMW27-3.5-4.5	Fill	6 U	**1,330**	0.2 U	2 U	**0.08**	0.2 U
	LLMW27-4.5-5.5	Native Surface	5 U	**274**	**0.7**	2 U	0.02 U	0.2 U
	LLMW27-8-9	Weathered Till	6 U	**84.2**	**0.8**	2 U	0.02 U	0.2 U
	LLMW27-15.5-16	Weathered Till	6 U	**2.4**	**0.3**	2 U	0.02 U	0.2 U
	LLMW27-25-26	Till	5 U	**3.1**	**0.4**	**2**	0.02 U	0.2 U
	LLMW27-30-31	Outwash	5 U	**2.3**	**0.4**	2 U	0.02 U	0.2 U
	LLMW27-37-37.5	Outwash	6 U	**58.7**	**0.7**	**19**	**0.08**	0.2 U
	LLMW27-40-41	Outwash	5 U	**2.3**	**0.3**	2 U	0.02 U	0.2 U
	LLMW27-50-51	Outwash	6 U	**28.8**	**0.4**	2 U	0.03 U	0.2 U
	LLMW27-60-61	Outwash	5 U	**38.9**	**0.3**	2 U	0.03 U	0.2 U
LLMW29	LLMW29-6-7	Fill	10 U	**6.9**	0.5 U	5 U	0.05	0.2 U
	LLMW29-12.5-13.5	Native Surface	5 U	**85.7**	**0.4**	**2**	**0.02**	0.2 U
	LLMW29-20-21	Till	5 U	**52.6**	**0.3**	**2**	**0.02**	0.2 U
	LLMW29-30-31	Outwash	5 U	**30.1**	**0.3**	2 U	0.02 U	0.2 U
	LLMW29-55-56	Outwash	6 U	**6.7**	**0.3**	2 U	0.03 U	0.2 U
LLMW31	LLMW31-3-4	Fill	5 U	**58.8**	**0.8**	**271**	**0.13**	0.2 U
	LLMW31-9.1-9.3	Native Surface	5 U	**12.7**	**0.4**	**34**	**0.07**	0.2 U
	LLMW31-25-25.5	Till	5 U	**4.3**	**0.4**	**3**	0.02 U	0.2 U
	LLMW31-45-46	Outwash	5 U	**2.2**	**0.4**	**3**	**0.03**	0.2 U
	LLMW31-55-56	Outwash	6 U	**2.1**	**0.4**	2 U	0.02 U	0.2 U
LLMW33	LLMW33-3-4	Fill	6 U	**121**	**1**	**301**	**0.81**	0.2 U
	LLMW33-4.5-4.7	Native Surface	6 U	**10.9**	**0.5**	**18**	**0.17**	0.2 U
	LLMW33-10.5-11.5	Weathered Till	6 U	**2.6**	**0.3**	2 U	0.03 U	0.2 U
	LLMW33-39-40	Outwash	6 U	**1.7**	**0.3**	2 U	0.02 U	0.2 U
LLMW34	LLMW34-4.5-5.5	Fill	6 U	**5.7 J**	**0.4**	**7**	**0.05**	0.2 U
	LLMW34-6-6.2	Native Surface	6 U	**4.6 J**	**0.3**	**6**	**0.06**	0.2 U
	LLMW34-11.5-11.7	Weathered Till	6 U	**2.7 J**	**0.3**	2 U	0.02 U	0.2 U
	LLMW34-70-70.5	Outwash	5 U	**2.2 J**	**0.4**	2 U	0.02 U	0.2 U
LLSB01	LLSB01-6-7	Fill	8 U	**11.3**	**0.5**	**26 J**	**0.06**	0.3 U
	LLSB01-10.8-11	Native Surface	9 U	**13.4**	**1.2**	**50 J**	**0.4**	0.4 U
	LLSB01-13-14	Silt Deposits	8 U	**14.9**	**0.6**	**12 J**	**0.15**	0.3 U
	LLSB01-19-20	Alluvium	6 U	**3.9**	**0.3**	**3 J**	0.03 U	0.2 U
LLSB02	LLSB02-3-4	Fill	5 U	**9.8**	**0.4**	**37**	**0.02**	0.2 U
	LLSB02-10-10.2	Native Surface	9 U	**36.4**	**1**	**133**	**0.1**	0.3 U
	LLSB02-10.6-10.8	Silt Deposits	8 U	**14.7**	**0.6**	**7**	**0.07**	0.3 U
	LLSB02-12-13	Silt Deposits	7 U	**15**	**0.7**	**7**	**0.09**	0.3 U
	LLSB02-15-16	Alluvium	6 U	**9.4**	**0.4**	**4**	**0.04**	0.2 U
LLSB03	LLSB03-3-4	Fill	5 U	**6.9**	**0.3**	**3**	0.02 U	0.2 U
	LLSB03-11-11.2	Native Surface	8 U	**31.1**	**0.7**	**14**	**0.12**	0.3 U
	LLSB03-13-14	Silt Deposits	7 U	**18.3**	**0.6**	**7**	**0.07**	0.3 U
	LLSB03-19-20	Alluvium	6 U	**6.9**	**0.3**	**3**	0.03 U	0.2 U
	LLSB-DUP	Duplicate	5 U	**5.4**	**0.3**	**3 J**	0.02 U	0.2 U
BP05D2	BP05D2-40-41	Alluvium	6 U	**10.7**	**0.3**	**6**	0.03 U	0.2 U
	BP05D2-50-51	Silt Deposits	6 U	**8.2**	**0.5**	**4**	**0.03**	0.2 U
	BP05D2-62-62.5	Silt Deposits	7 U	**11.9**	**0.7**	**5**	**0.04**	0.3 U
	BP05D2-65-66	Silt Deposits	6 U	**12.3**	**0.6**	**3**	0.03 U	0.3 U
	BP05D2-70.5-71	Alluvium	6 U	**6.4**	**0.3**	2 U	0.02 U	0.2 U

Notes

[1] Chemical analysis performed by Analytical Resources, Inc., of Tukwila, Washington.

mg/Kg = milligram per Kilogram

U = Analyte was not detected at or greater than the listed reporting limit.

J = The indicated result is an estimate.

A "D" or "Dup" at the end of the sample ID indicates a field duplicate sample.

Bold type indicates the analyte was detected.

* = Sample LLMW21-7.7-7.9 was mislabeled in the field and reported as LLMW21-7.7-9. The correct sample ID (LLMW21-7.7-7.9) is displayed in this table.

Table 3

Soil Total Organic Carbon

Everett Lowland

Everett, Washington

Sample ID	Analyte	Total Solids	Total Organic Carbon
	Units	Percent	Percent
	Stratigraphic Unit		
LLMW03-5-5.2	Native Surface	67.3	2.93
LLMW04-30-31	Alluvium	88.3	0.264
LLMW05-6-7	Fill	84.2	0.247
LLMW06-6.5-7.5	Fill	87.8	0.368
LLMW07-18-19	Alluvium	82.2	0.222
LLMW08-20-21	Alluvium	82.6	0.741
LLMW10-6-7	Fill	83	0.296
LLMW11-19.5-20.5	Alluvium	84.6	3.06
LLMW12-21-22	Alluvium	83.8	0.765
LLMW13-10.5-11.5	Fill	65.7	28.2
LLMW14-5.5-6	Fill	82.8	3.36
LLMW16-29.5-30.5	Alluvium	87.5	0.549
LLMW17-5-6	Fill	88	11.6
LLMW18-6-7	Fill	83.2	0.433
LLMW18-21-22	Alluvium	78.30	1.29
LLMW20-4.5-5.5	Fill	88.6	3.42
LLMW27-50-51	Outwash	79.8	0.129
LLMW29-55-56	Outwash	78.9	0.538

Table 4

Samples Submitted for Grain Size Analysis

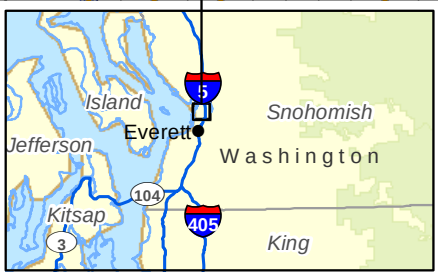
Everett Lowland

Everett, Washington

Sample ID
LLMW03-5-5.2
LLMW03-28-29
LLMW06-6.5-7.5
LLMW06-23-24
LLMW07-18-19
LLMW08-20-21
LLMW11-3.5-4.5
LLMW11-19.5-20.5
LLMW12-5-5.5
LLMW12-21-22
LLMW13-10.5-11.5
LLMW13-32-33
LLMW18-6-7
LLMW18-21-22

Note:

See Appendix E for results of grain size analyses.



N
W
E
S

2,000 0 2,000

Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: ESRI Data & Maps

Projection: NAD 1983 UTM Zone 10N

Vicinity Map

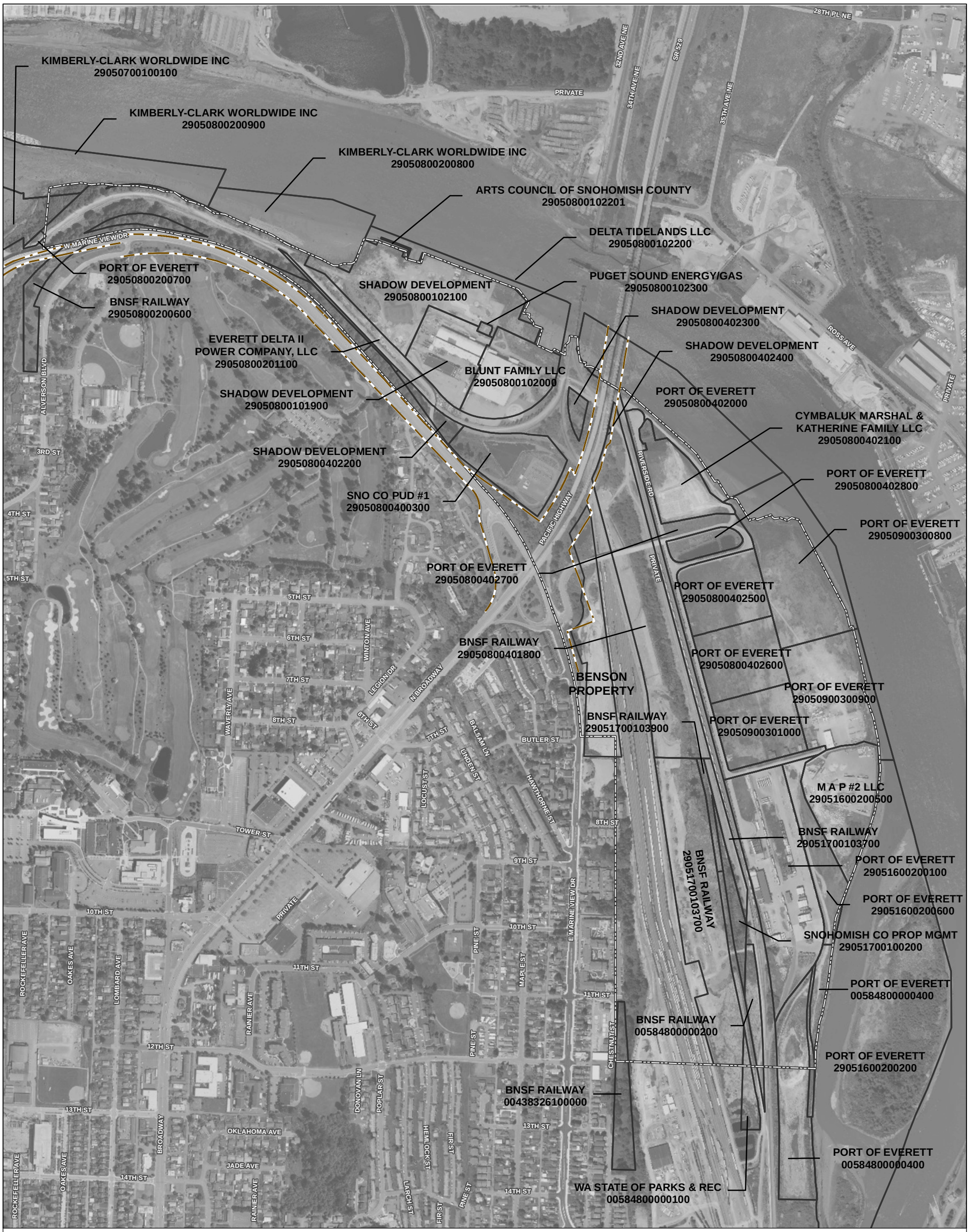
Everett Smelter - Lowland Area

GeoEngineers

Figure 1

Path: \\seal\projects\0105040681GIS\0504068_VicinityMap_Lowland.mxd Map Revised: 07 February 2013 amanza

Path: P:\0\0504068\GIS\050406800_T700_LowlandStudyArea_ed.mxd Map Revised: 15 May 2013 bmagdasy



Legend

- Lowland Area
- Snohomish County Parcel Boundary
- Approximate WSDOT Right of Way

N
W E
S

700 0 700

Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerials Express Seattle, 2009. Snohomish County GIS, 2012.

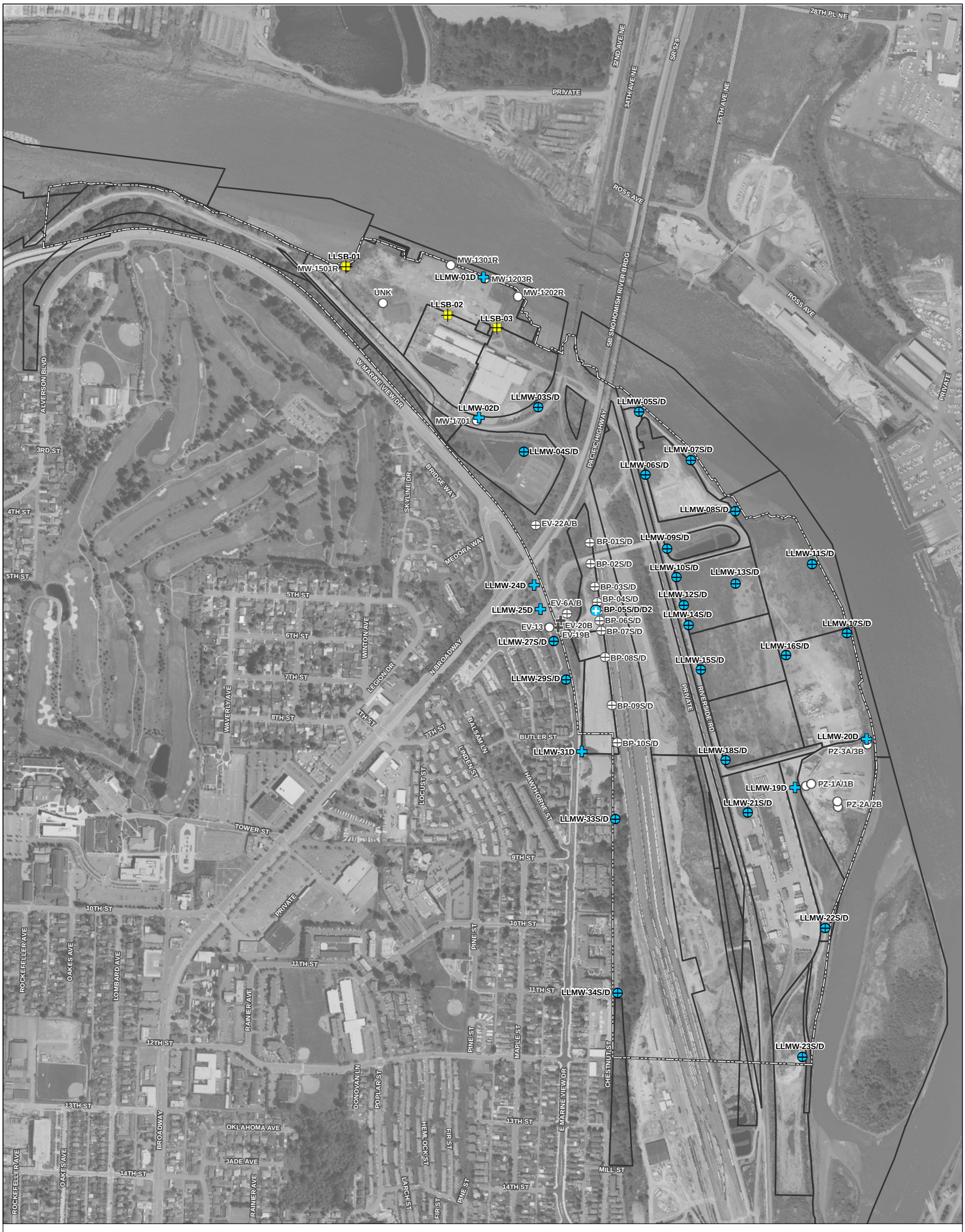
Lowland Area

Everett Smelter - Lowland Area

GeoEngineers

Figure 2

Path: W:\Seattle\Projects\0\0504068\GIS\050406800_T700_LowlandInvestigations_2012_2013.mxd Map Revised: 01 May 2013 bmagdasy



Legend

- Lowland Area
- Snohomish County Parcel Boundary
- Existing Shallow Aquifer Monitoring Well
- Existing Deep Aquifer Monitoring Well
- Existing Shallow and Deep Aquifer Monitoring Well Pair

Investigation Locations (2012-2013)

- Shallow and Deep Aquifer Monitoring Well Pair
- Deep Aquifer Monitoring Well
- Deeper Deep Aquifer Monitoring Well (to determine vertical extent)
- Soil Boring

N W E S

700 0 700

Feet

Lowland Area Investigation Locations

Everett Smelter - Lowland Area

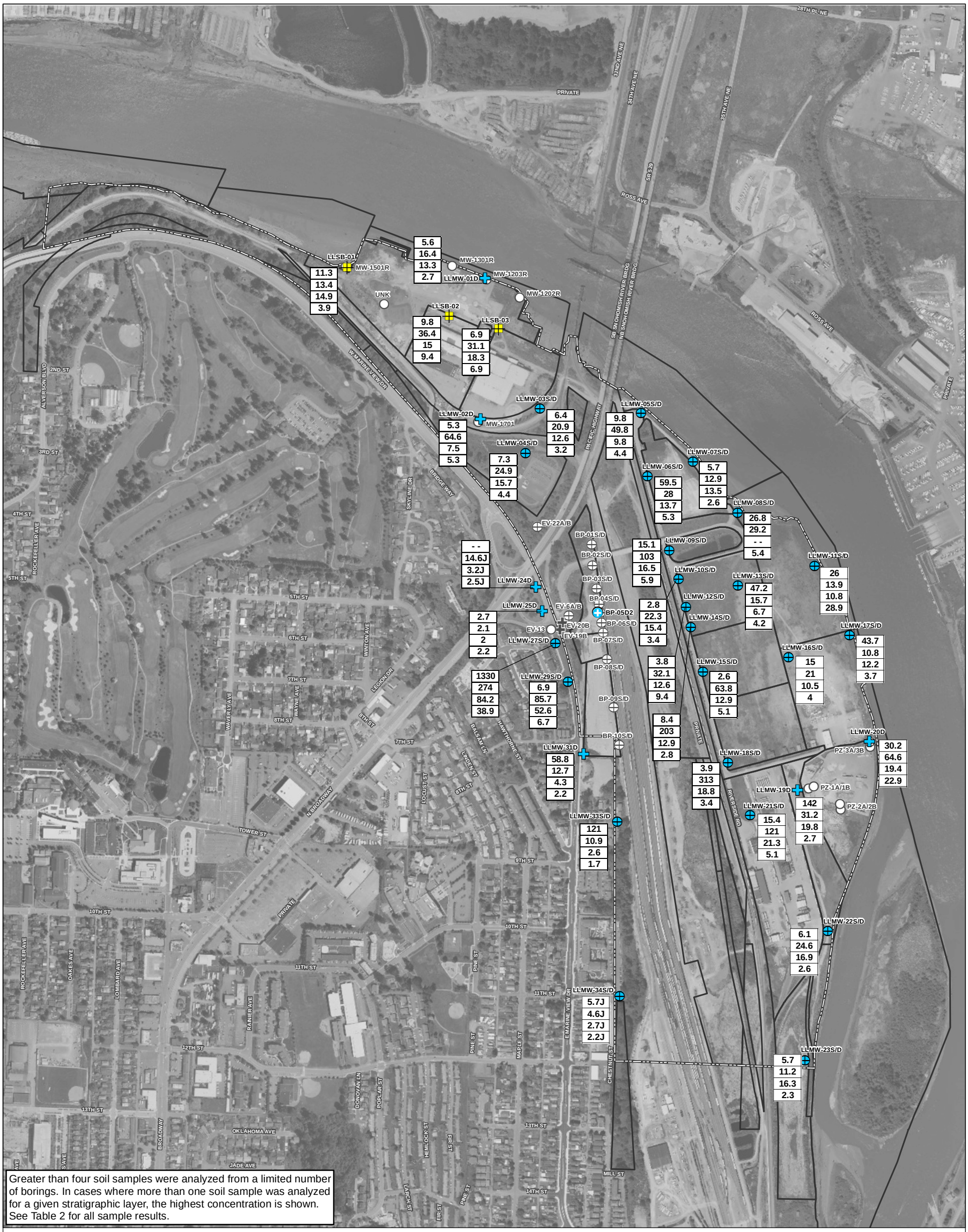
GeoEngineers

Figure 3

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerials Express Seattle, 2009. Snohomish County GIS, 2012.

Path: W:\Seattle\Projects\0\0504068\GIS\050406800_T700_Soil_Arsenic.mxd Map Revised: 01 May 2013 bmagdasy



Greater than four soil samples were analyzed from a limited number of borings. In cases where more than one soil sample was analyzed for a given stratigraphic layer, the highest concentration is shown. See Table 2 for all sample results.

Legend

- Lowland Area
- Snohomish County Parcel Boundary
- Existing Shallow Aquifer Monitoring Well
- Existing Deep Aquifer Monitoring Well
- Existing Shallow and Deep Aquifer Monitoring Well Pair

Investigation Locations (2012-2013)

- Shallow and Deep Aquifer Monitoring Well Pair
- Deep Aquifer Monitoring Well
- Deeper Deep Aquifer Monitoring Well (to determine vertical extent)
- Soil Boring

Key to Soil Results

- Fill (Shallow Aquifer)
- Native Surface
- Silt/Till
- Alluvium/Outwash (Deep Aquifer)
- 5.7J — Arsenic Concentration in mg/kg ("J" indicates estimate)
- - - — Sample Not Obtained

N W E S

700 0 700

Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerials Express Seattle, 2009. Snohomish County GIS, 2012.

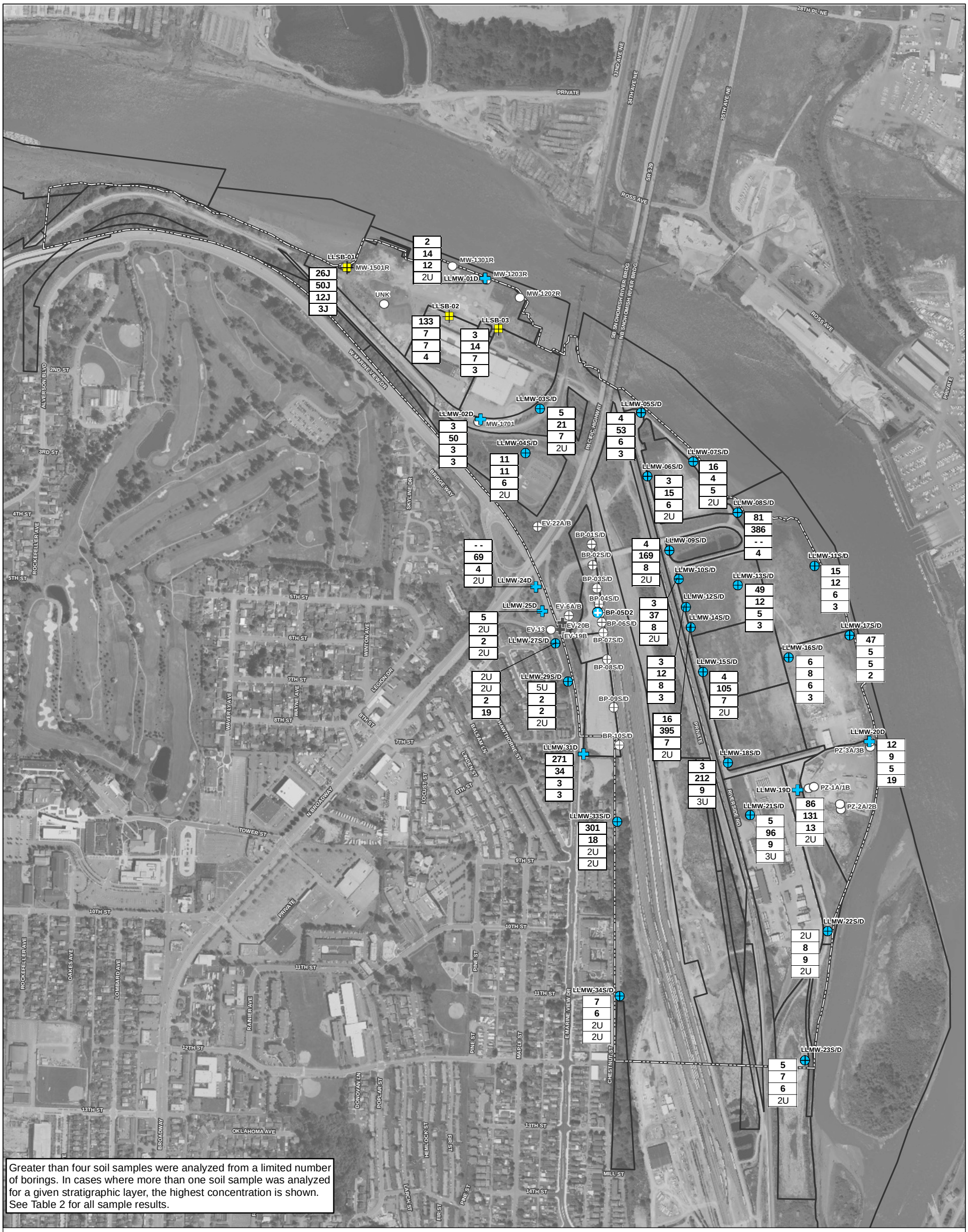
Boring/Monitoring Well Locations: Soil Results - Arsenic

Everett Smelter - Lowland Area

GeoEngineers

Figure 4

Path: W:\Seattle\Projects\0\0504068\GIS\050406800_T700_Soil_Lead.mxd Map Revised: 03 May 2013 bmagdasy



Legend

- Lowland Area
- Snohomish County Parcel Boundary
- Existing Shallow Aquifer Monitoring Well
- Existing Deep Aquifer Monitoring Well
- Existing Shallow and Deep Aquifer Monitoring Well Pair

Investigation Locations (2012-2013)

- Shallow and Deep Aquifer Monitoring Well Pair
- Deep Aquifer Monitoring Well
- Deeper Deep Aquifer Monitoring Well (to determine vertical extent)
- Soil Boring

Key to Soil Results

- Fill (Shallow Aquifer)
- Native Surface
- Silt/Till
- Alluvium/Outwash (Deep Aquifer)

5.7J — Arsenic Concentration in mg/kg ("U" indicates not detected, "J" indicates estimate)

- - — Sample Not Obtained

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerials Express Seattle, 2009. Snohomish County GIS, 2012.

N W E S

700 0 700

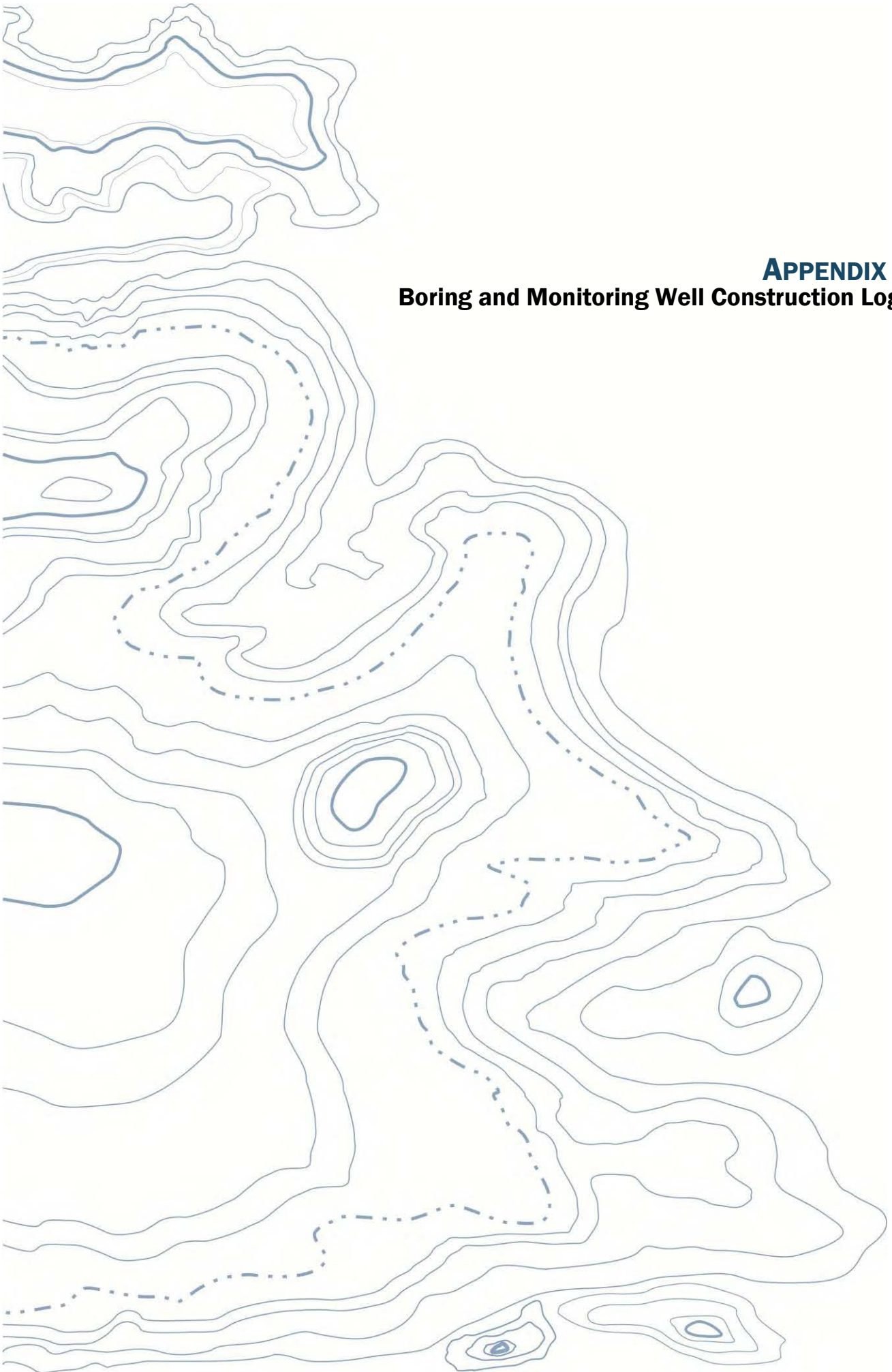
Feet

Boring/Monitoring Well Locations: Soil Results - Lead

Everett Smelter - Lowland Area

GeoEngineers

Figure 5



APPENDIX A
Boring and Monitoring Well Construction Logs

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% RETAINED ON NO. 200 SIEVE	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS
				SP	POORLY-GRADED SANDS, GRAVELLY SAND
	MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
	AC	Asphalt Concrete
	CC	Cement Concrete
	CR	Crushed Rock/ Quarry Spalls
	TS	Topsoil/ Forest Duff/Sod

Groundwater Contact

- **Measured groundwater level in exploration, well, or piezometer**
- **Groundwater observed at time of exploration**
- **Perched water observed at time of exploration**
- **Measured free product in well or piezometer**

Graphic Log Contact

- **Distinct contact between soil strata or geologic units**
- **Approximate location of soil strata change within a geologic soil unit**

Material Description Contact

- **Distinct contact between soil strata or geologic units**
- **Approximate location of soil strata change within a geologic soil unit**

Sampler Symbol Descriptions

- **2.4-inch I.D. split barrel**
- **Standard Penetration Test (SPT)**
- **Shelby tube**
- **Piston**
- **Direct-Push**
- **Bulk or grab**

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

A "P" indicates sampler pushed using the weight of the drill rig.

Laboratory / Field Tests

%F	Percent fines
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
OC	Organic content
PM	Permeability or hydraulic conductivity
PI	Plasticity index
PP	Pocket penetrometer
PPM	Parts per million
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen
NT	Not Tested

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

KEY TO EXPLORATION LOGS

GeoEngineers

FIGURE A-1

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	1/8/2013	1/8/2013	72	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft) / Vertical Datum	16.46 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371367.4523 1308612.59	Horizontal Datum	WA State Plane North 83/91

A 2 (in) well was installed on 1/8/2013 to a depth of 72 (ft).

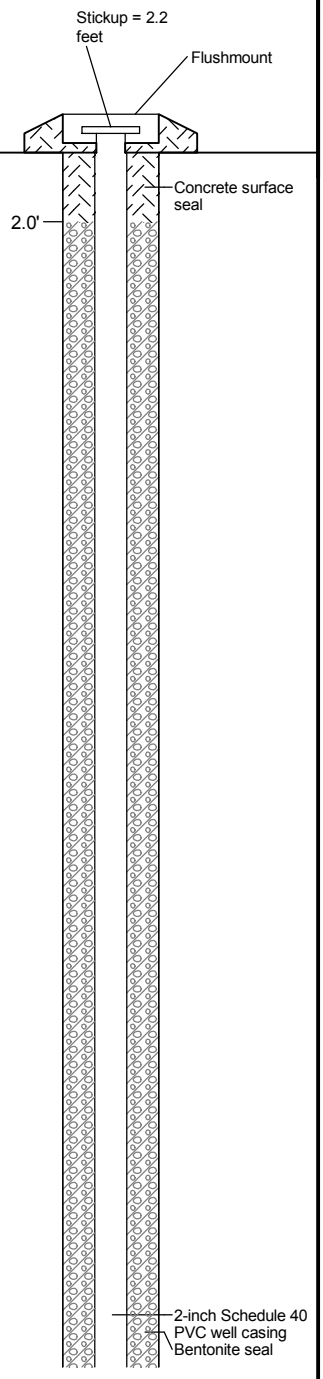
Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

FIELD DATA

Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0								See boring log BP-05D for sampling and material description from 0 to 33 feet bgs.		
15											
	5										
10											
	10										
5											
	15										
0											
	20										
-5											
	25										
-10											
	30										
-15											
	35										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

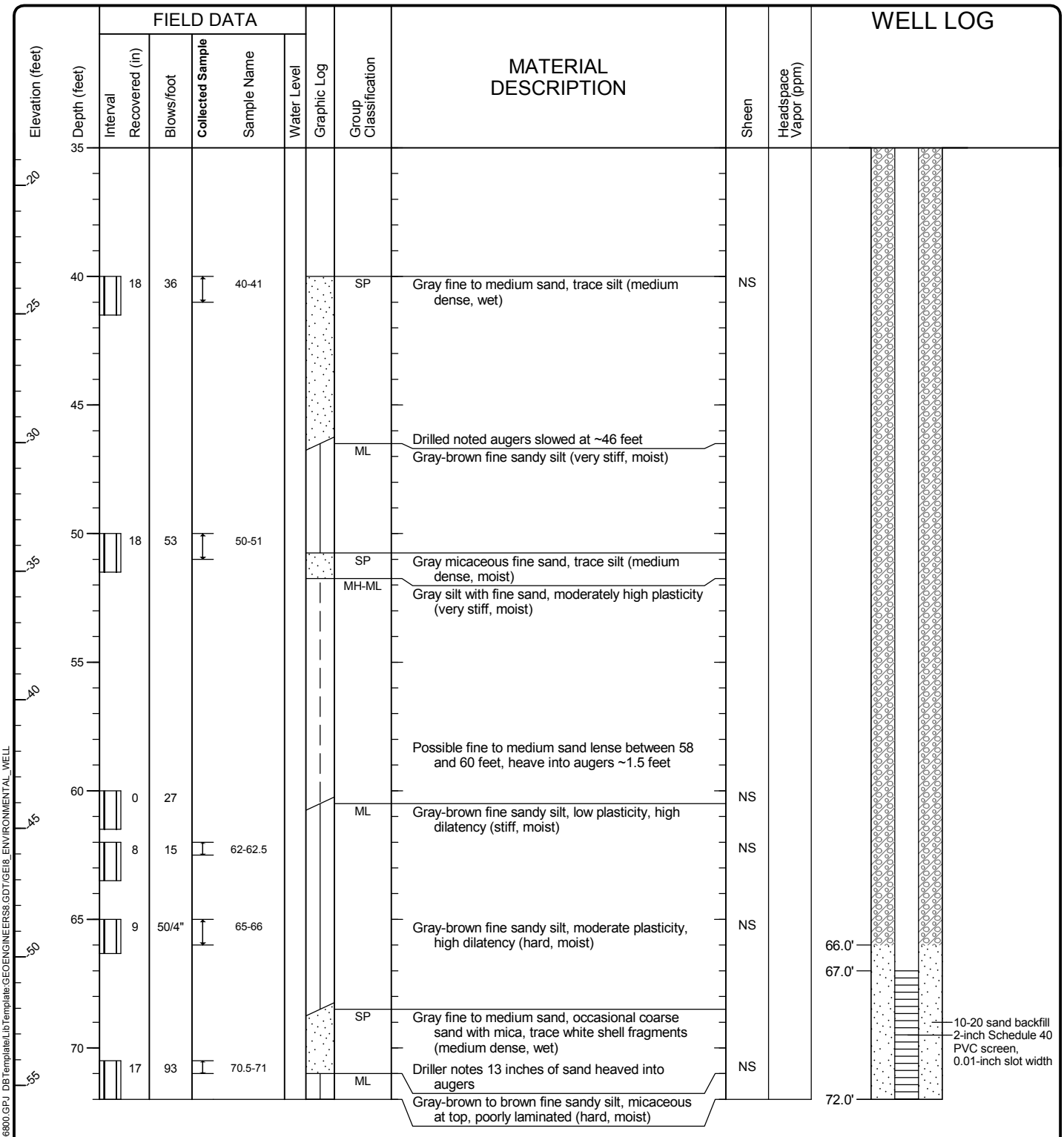
Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Log of Boring BP-05D2

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-2
Sheet 1 of 2



Note: Please see Figure A-1 for explanation of symbols

Log of Boring BP-05D2 (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-2
Sheet 2 of 2

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	1/2/2013	1/2/2013	38	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-59 Track Rig
Surface Elevation (ft)	16.0827	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	373911.1708	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1307952.929		

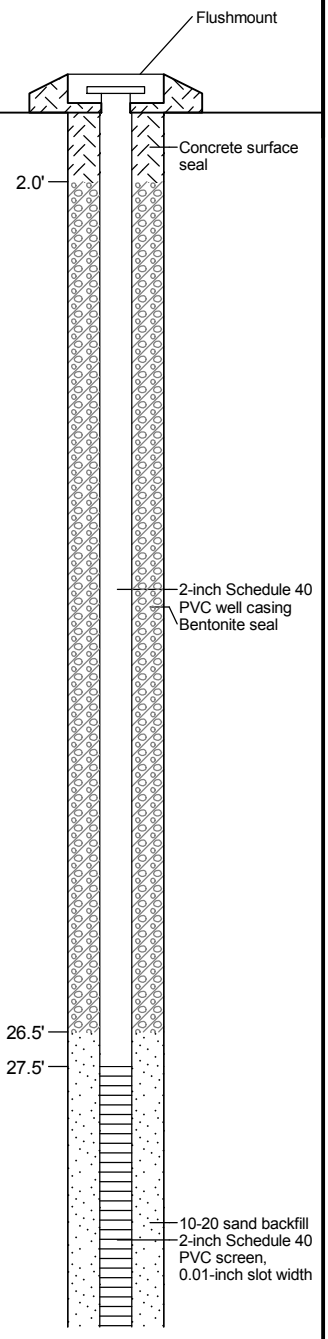
DOE Well I.D.: BHU-093
A 2 (in) well was installed on 1/2/2013 to a depth of 38 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
1/2/2013	7.5	8.6

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0								AC	20 inches asphalt		
			15	62					GP-GM	Light brown fine to coarse gravel with sand, with silt (medium dense, moist) (fill)	SS	
			13	38		3-4			SP	Light brown fine to coarse sand, occasional gravel, trace silt (medium dense, moist) (fill)	SS	
	5		17	17							SS	
			10	11						Light brown fine to coarse sand, occasional gravel, trace silt (loose, moist) (fill)	NS	
			11	4			▽			Light brown fine to coarse sand, trace silt, trace wood fragments (very loose, wet) (fill)	NS	
			12	7							NS	
	10									Becomes gray		
			10	14						Gray fine to coarse sand, trace silt (loose, wet) (fill)	NS	
			12	8		12.5-13				Gray fine to coarse sand, trace silt (very loose, wet) (fill)	NS	
									Wood	Wood (fill)		
			8	7					SP	Gray fine to medium sand with organic matter, trace silt (very loose, wet) (fill)	NS	
	15		10	3		15-16			Wood	Brown silty sawdust with wood fragments (soft, wet) (fill)		
			4	5						Sawdust with wood fragments (loose, wet) (fill)		
			4	6						Sawdust with bark and wood fragments (very loose, wet) (fill)		
	20		11	50/5"						Wood (log)		
			0	19					SP	Sand in shoe (fill)		
	25		18	6		25-25.2			ML	Dark gray-brown fine sandy silt with organic matter (~1%) (medium stiff, wet) (native)	NS	
						26-26.5						
			15	3					SP	Gray fine to coarse sand, trace silt, with mica (very loose, wet)	NS	
			8	14						Driller noted heaving sands	NS	
	30		13	29						Dark gray fine to coarse sand, occasional gravel, trace silt, with mica, trace organic matter (~1%) (medium dense, wet)	NS	
			12	38		32.5-33.5						
	35											

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-01D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-3
Sheet 1 of 2

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	WELL LOG
-20	35		4	33						Dark gray fine to coarse sand with mica, trace silt, occasional gravel, trace organic matter (~1%) (medium dense, wet)			37.5' 38.0'

Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-01D (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-3
Sheet 2 of 2

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/21/2012	12/21/2012	32	GRL	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-59 Track Rig
Surface Elevation (ft)	15.384	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	372887.009	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1307921.39		

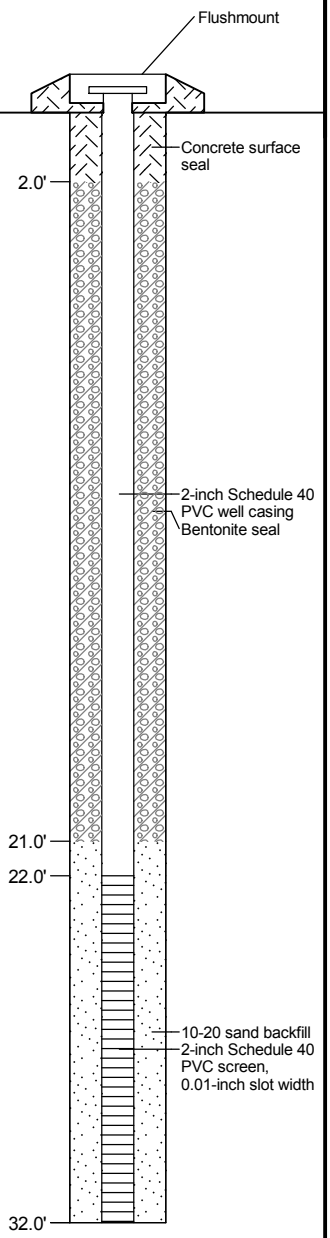
DOE Well I.D.: BHU-027
A 2 (in) well was installed on 12/21/2012 to a depth of 32 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/21/2012	3.3	12.1

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
15	0		18	29					SP	Gray fine to coarse sand with gravel, trace silt, occasional cobbles (medium dense, moist) (fill)		
			16	15		2-3			SP	Brown fine to coarse sand, trace silt, occasional gravel (loose, moist) (fill)		
			11	14						Brown fine to coarse sand, trace silt (loose, wet) (fill)		
10	5		16	8						2mm silt layer at 3.5 feet Grades to gray and becomes very loose		
			12	9		6-7						
			18	14						Becomes loose		
5	10		24	14						Grades with gravel		
			17	10								
0			16	4		12-13				Brown fine to coarse sand (very loose, wet) (fill)		
			18	8								
-5	15		18	24						Becomes loose		
			18	11								
						17.4-17.6			ML	Gray silt with organics (native)		
			18	14					SP	Grades to black, trace wood material (loose, wet) Gray fine to coarse sand, trace wood (loose, wet)		
-10	20		16	17		20-21				Gray fine to coarse sand with 3 silt/wood layers from 19.8 to 21 feet (stiff, wet)		
			14	13						Gray fine to coarse sand, trace wood at 22.5 feet (loose, wet)		
			16	13						Gray fine to coarse sand, trace wood and silt (medium dense, wet)		
-15	25		17	8						(loose, wet)		
			18	12						Grading coarser (loose, wet)		
			18	14		27-28				One wood piece (3") at 28 feet (loose, wet)		
	30											

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-02D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-4
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/26/2012	12/26/2012	31	GRL	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Turbo Track Rig
Surface Elevation (ft)	14.4339	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	372965.5718	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1308351.511		

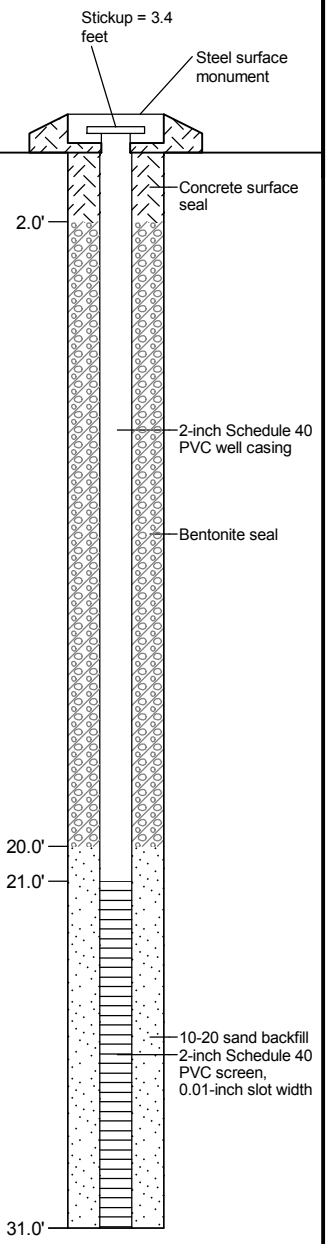
DOE Well I.D.: BHU-087
A 2 (in) well was installed on 12/26/2012 to a depth of 31 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/26/2012	3.0	11.4

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		18	18					ML	Dark brown sandy silt with abundant organic matter (fill)	SS	
			16	12		1.75-2			SP-SM	Gray-brown to brown fine to coarse sand with silt and gravel, trace organic matter (~1% rootlets) (loose, moist) (fill)	SS	
			10	6					SP	Light brown fine to coarse sand, occasional gravel, trace silt (black band from 1.75 to 2 feet) (very loose, moist) (fill)	SS	
	5		10	6		5-5.2			SP		NS	
			13	26					SM-ML	Light brown fine to coarse sand, occasional gravel, trace silt (very loose, wet) (fill)	NS	
			14	21					SP	Light brown fine to coarse sand , trace silt, occasional gravel, trace wood (~5%) (fill)	NS	
			13	13		9-10				Gray silty fine sand to fine sandy silt, with mica (medium stiff, wet) (fill)	NS	
	10		1	12		10.5-10.6			ML	Gray fine to coarse sand, trace silt (very loose, wet) (fill)	NS	
			3	5						Gray-brown medium to coarse sand, trace fine sand, trace silt, trace fine gravel, trace mica (medium dense, wet) (fill)	NS	
			11	2		13.5-14				Gray fine to coarse sand, trace silt, occasional gravel (loose, wet) (fill)	NS	
	15		14	5						Gray-brown fine to coarse sand, trace silt, trace organics (~1% wood fragments) (loose, wet) (fill)	NS	
			9	2						Brown fine sandy silt with organic matter (soft, wet) (native)	NS	
			18	6						Gray-brown fine sandy silt with organic matter (fibrous reeds/wood) (very soft, wet)	NS	
										Gray-brown fine sandy silt with organci matter (very soft, wet)	NS	
										Gray brown fine sandy silt with organic matter (soft, wet)	NS	
	20		17	24		20-21			SM	Gray silty fine sand with mica, trace organic matter (~1%) (very loose, wet)	NS	
			13	27					SP to SP-SM	Gray silty fine sand grading to fine sand with silt, moderately laminated (loose, wet)	NS	
			13	23					SP	Gray fine sand, trace silt (loose, wet)	NS	
			10	32						Gray fine to medium sand, trace silt (medium dense, wet)	NS	
	25									Gray fine to medium sand, trace silt, trace organics with mica (~1%) (loose, wet)	NS	
										Gray fine to coarse sand, trace silt with mica (medium dense, wet)		
			18	41		28-29				Gray fine to coarse sand, trace silt with mica (medium dense, wet)	NS	
	30											

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-03D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-5
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068800.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/26/2012	12/26/2012	8.5	GRL	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Turbo Track Rig
Surface Elevation (ft) / Vertical Datum	14.5247 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	372968.4709 / 1308355.578	Horizontal Datum	WA State Plane North 83/91

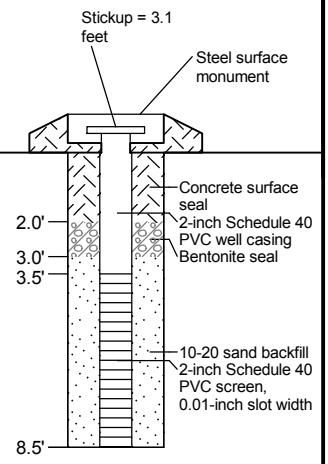
DOE Well I.D.: BHU-088
A 2 (in) well was installed on 12/26/2012 to a depth of 31 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
10	0								See LLMW-03D for sampling and material description		
	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-03S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-6
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/28/2012	12/28/2012	33	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Turbo Track Rig
Surface Elevation (ft) / Vertical Datum	18.8925 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	372642.8382 / 1308246.252	Horizontal Datum	WA State Plane North 83/91

DOE Well I.D.: BHU-089
A 2 (in) well was installed on 12/28/2012 to a depth of 33 (ft).

Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		18	12					SP-SM	Brown fine to coarse sand with silt, with gravel, rootlets (loose, moist) (fill)	NS	
			18	23		2-3			SP	Brown fine to coarse sand, trace silt, occasional gravel (loose, moist) (fill)	NS	
			2	20					SM	Orange-brown silty fine to coarse sand with gravel, trace organics (loose, moist) (fill)	NS	
	5		1	15							NS	
			8	4					ML	Brown to gray-brown sandy silt with gravel (soft, moist) (fill)	NS	
			12	2					SM	Gray silty fine to coarse sand with gravel, trace wood (~5%) (very loose, wet) (fill)	NS	
			18	5						Gray silty fine to coarse sand with gravel, trace wood (~1%) (loose, wet) (fill)	NS	
	10		13	13							NS	
			12	22					SP	Black to dark gray fine to coarse sand, trace organic matter (loose, wet) (fill)	NS	
			13	9						Gray fine to medium sand, occasional coarse sand, trace silt (loose, wet) (fill) Gray fine to medium sand, trace silt (loose, wet) (fill)	NS	
						14.3-14.5			SM			
	15		17	5					ML	Becomes dark gray to black with wood fragments (very loose, wet) (fill)		
			5	8						Black silty sand, trace wood fragments (very loose, wet) (native)		
			15	7		18-19				Gray-brown fine sandy silt with organic matter (~1%) (soft, moist) Becomes ~5% to 30% organic matter at shoe		
	20		11	5					ML to SM	Gray-brown fine sandy silt with organic matter (medium dense, wet)	NS	
										Gray fine sandy silt iwth interbeds of silty fine sand (soft, wet)		
			11	20					SP	Gray fine to coarse sand, trace silt with mica (loose, wet)	NS	
			13	16						Gray fine to coarse sand, trace silt with wood fragments with mica (loose, wet)	NS	
	25		12	33						Gray fine to coarse sand, trace silt with mica (medium dense, wet)	NS	
	30		15	57		30-31				Gray fine to coarse sand, trace silt with mica (medium dense, wet)	NS	
			5	35					Wood	Wood	NS	
									SP	Gray fine to coarse sand, trace silt with mica (medium dense, wet)		

WELL LOG

Stickup = 3.7 feet
Steel surface monument
Concrete surface seal
2.0'
2-inch Schedule 40 PVC well casing
Bentonite seal
21.0'
22.0'
10-20 sand backfill
2-inch Schedule 40 PVC screen, 0.01-inch slot width
32.0'
33.0'

Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-04D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-7
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/28/2012	12/28/2012	14	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Turbo Track Rig
Surface Elevation (ft)	18.6052	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	372644.2517	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1308249.764		

DOE Well I.D.: BHU-090
A 2 (in) well was installed on 12/28/2012 to a depth of 33 (ft).

Groundwater

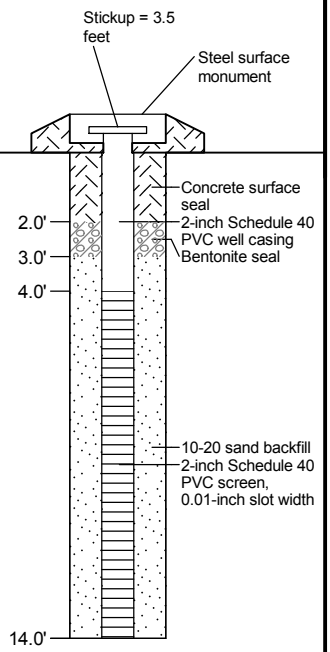
Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

FIELD DATA

Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0								See LLMW-04D for sampling and material description		
15											
	5										
10											
	10										
5											

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-04S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-8
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/10/2012	12/10/2012	25	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Turbo Track Rig
Surface Elevation (ft)	14.3948	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	372934.1281	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1309088.27		

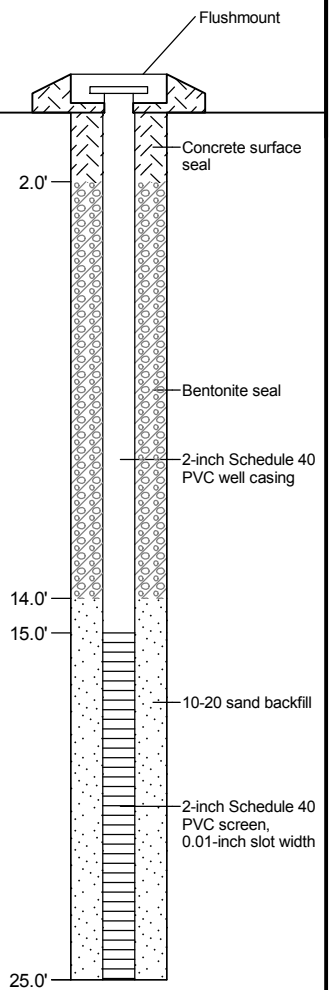
DOE Well I.D.: BHU-010
A 2 (in) well was installed on 12/10/2012 to a depth of 25 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/10/2012	5.0	9.4

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		18	17					OL	Brown organic silt with organic matter (roots) (fill)	NS	
									SP	Light brown fine to medium sand, trace silt (loose, moist) (fill)		
			10	12					ML	Brown to gray sandy silt with gravel and black charred wood (stiff, moist) (fill)	SS	
									SP			
			12	7						Light brown fine to coarse sand and trace silt, occasional gravel (loose, moist) (fill)	NS	
	5		12	7						Light brown fine to coarse sand, trace silt (loose, moist) (fill)	NS	
			18	8		6-7				Light brown fine to coarse sand, trace silt (loose, wet) (fill)	NS	
			16	16						Light brown fine to coarse sand, trace silt, thin dark brown sand layer at 6.5 feet, rootlets ~1 inch thick (very loose, wet) (fill)	NS	
			18	7						Gray fine to coarse sand, trace silt (loose, wet) (fill)	NS	
	10		0	7		10-10.2			ML	Gray fine to coarse sand, trace silt (loose to very loose, wet) (fill)	NS	
										Gray-brown fine sandy silt with organic matter (~15% rootlets) (medium stiff, wet) (native)		
			10	10		12-13					NS	
			18	9					SP	Gray fine to coarse sand, trace silt with mica (very loose, wet)	NS	
	15		14	5						Gray fine to medium sand with coarse sand, trace silt, micaceous (very loose, wet)	NS	
			15	14					SM	Gray fine to coarse sand, trace silt with mica (loose, wet)	NS	
			18	18					SP	Gray silty fine sand with mica (loose, wet)	NS	
										Gray fine to coarse sand, trace silt with mica (loose, wet)		
	20		18	22		20-21					NS	
			12	31							NS	
			18	21						Gray fine to coarse sand, trace silt with mica (dense, wet)		
	25											

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-05D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-9
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/10/2012	12/10/2012	9	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Turbo Track Rig
Surface Elevation (ft)	14.4241	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	372938.3312	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1309085.133		

DOE Well I.D.: BHU-011
A 2 (in) well was installed on 12/10/2012 to a depth of 25 (ft).

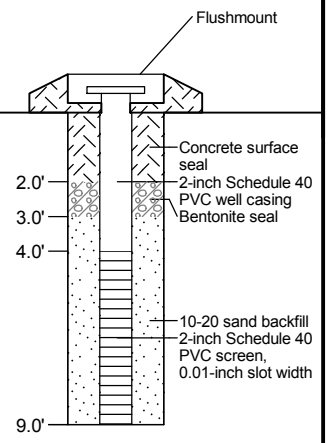
Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0								See LLMW-05D for sampling and material description		
10	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-05S

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-10
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/27/2012	12/27/2012	28.5	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft)	12.7123	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	372472.7325	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1309133.872		

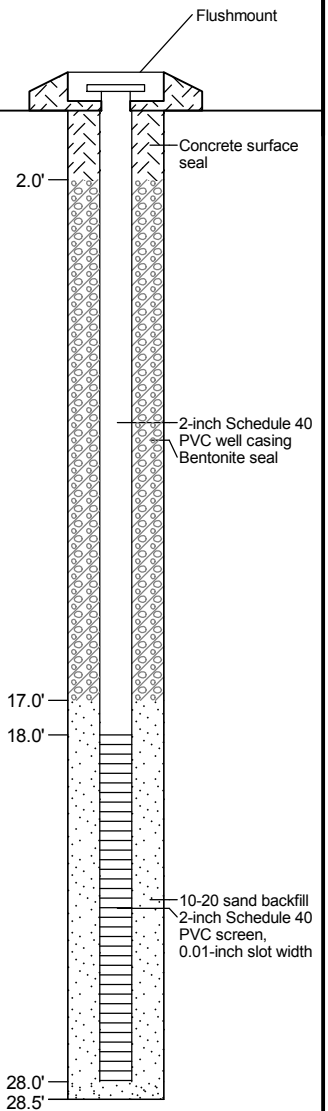
DOE Well I.D.: BHU-092
A 2 (in) well was installed on 12/27/2012 to a depth of 28.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0								CC	Concrete		
									Unknown	Unknown: cleared with vactor truck due to potential utilities		
	5		15	2							NS	
			15	3		6.5-7.5			SP	Gray-brown fine to coarse sand, with gravel, trace silt (very loose, wet) (fill)	NS	
			6	2		8-8.2			ML	Gray-brown fine sandy silt with organic matter (~15 to 20%) (very soft, wet) (native)	NS	
	10		13	0							NS	
			12	2		11-12				Gray-brown fine sandy silt with organic matter (~15%) (very soft, wet)	NS	
			6	11					Wood	Wood	NS	
	15		12	9					ML	Gray-brown fine sandy silt, trace organic matter (~5%) (medium stiff, wet)	NS	
			18	9					SP/ML	Gray fine to medium sand, trace silt with mica (very loose, wet)	NS	
			7	15						Gray fine to medium sand, trace silt (very loose, wet) Interbedded with gray-brown fine sandy silt with mica (medium stiff, wet)	NS	
	20		18	14					SP	Gray fine to coarse sand, trace silt with mica (loose, wet)	NS	
			9	2					SP-SM	Becomes fine sand with silt and wood with mica (loose, wet)		
			12	1		23-24			SP	Gray fine to medium sand, trace silt, trace wood (~1%) (very loose, wet) Gray fine to medium sand, trace silt (very loose, wet)		
	25		12	16					Wood	Gray fine to medium sand, trace silt (loose, wet) Brown wood zone		
									SP	Gray fine to coarse sand, trace silt (loose, wet)		

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-06D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-11
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/27/2012	12/27/2012	7	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft)	12.7338	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	372477.6634	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1309132.426		

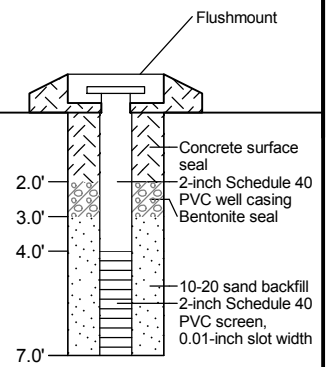
DOE Well I.D.: BHU-091
A 2 (in) well was installed on 12/27/2012 to a depth of 28.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
10	0								See LLMW-06D for sampling and material description		
	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-06S

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-12
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/7/2012	12/7/2012	25	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Turbo Track Rig
Surface Elevation (ft) / Vertical Datum	14.088 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	372580.8285 / 1309464.763	Horizontal Datum	WA State Plane North 83/91

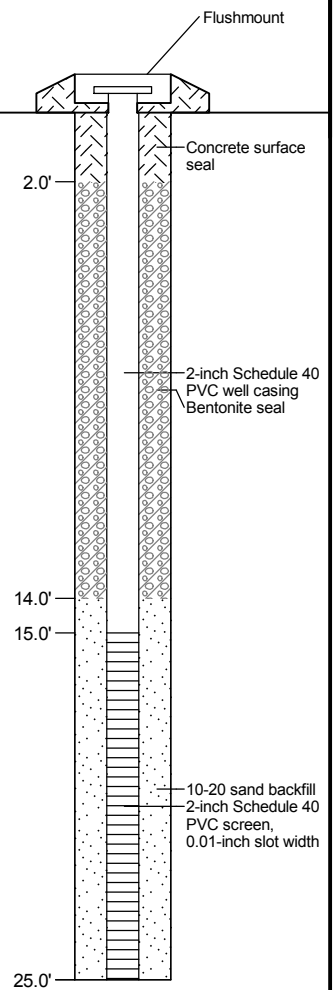
DOE Well I.D.: BHU-009
A 2 (in) well was installed on 12/7/2012 to a depth of 25 (ft).

Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		18	26					AC	Asphalt	SS	
									SP	Light brown fine to medium sand, trace silt, organic matter (loose, moist) (fill)		
			11	30					SP	Dark brown to brown fine to coarse sand with gravel and brick fragments, occasional charred wood, trace silt (medium dense, moist) (fill)	NS	
			18	13		3-4					NS	
			11	11					SP	Light brown fine to coarse sand, trace silt, occasional gravel (loose, moist) (fill)	NS	
	5		15	7						Orange-brown to light brown fine to coarse sand, trace silt , occasional gravel (loose, wet) (fill)	NS	
			8	6						Light brown fine to coarse sand, trace silt, occasional gravel (loose, wet) (fill)	NS	
			18	4						Dark brown fine to coarse sand, trace silt, occasional gravel, wood fragments (loose, wet) (fill)	NS	
	10					10-10.2				Gray fine to coarse sand, trace silt, occasional gravel (very loose, wet) (fill)		
			0	0		10.5-11			ML	Gray-brown fine sandy silt with organic matter and rootlets (~25%) (soft, wet) (native)		
			9	5						Gray-brown fine sandy silt with thin lenses of silty sand, trace organic matter and rootlets (~1%) (soft, wet)	NS	
			18	14					SP	Gray fine to medium sand, occasional coarse sand with alternating gradation of sand, trace organic matter and lenses of silty sand, micaceous (wet)	NS	
	15		15	13						Gray fine to coarse sand, trace silt, micaceous (loose, wet)	NS	
			18	4						Gray fine to coarse sand, trace silt, micaceous (loose, wet)	NS	
			18	19		18-19				Gray fine to coarse sand, trace silt, micaceous (medium dense, wet)	NS	
	20		18	24						Gray fine to coarse sand, trace silt, micaceous (loose, wet)	NS	
			18	28						Gray fine to coarse sand, trace silt, occasional gravel, micaceous (medium dense, wet)	NS	
			18	22						Gray fine to coarse sand, trace silt, micaceous (loose, wet)	NS	
	25											



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-07D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-13
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/7/2012	12/7/2012	9	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Turbo Track Rig
Surface Elevation (ft)	14.057	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	372578.2673	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1309467.087		

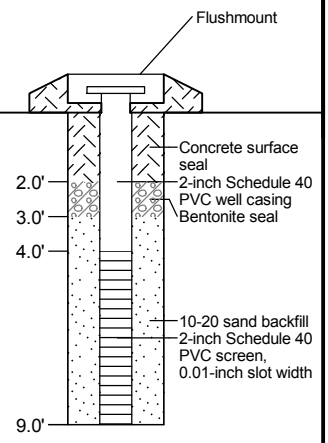
DOE Well I.D.: BHU-008
A 2 (in) well was installed on 12/7/2012 to a depth of 25 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0								See LLMW-07D for sampling and material description		
10											
	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-07S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-14
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/10/2012	12/11/2012	25.5	AMW	Holocene Drilling	Hollow-stem Auger

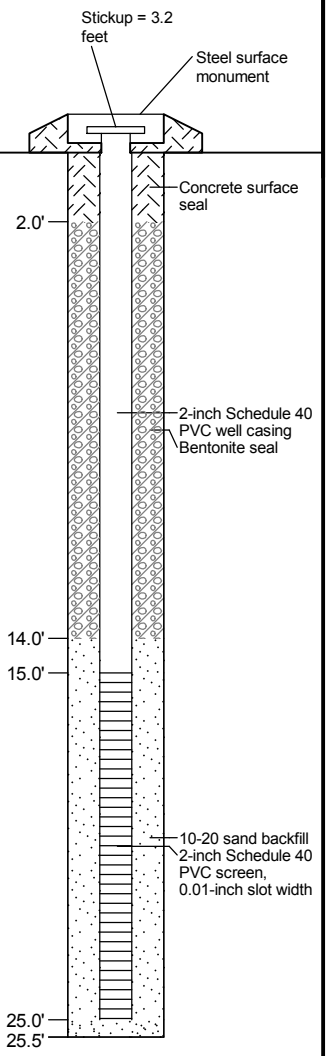
Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft)	13.4459	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	372209.3701	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1309788.569		

DOE Well I.D.: BHU-012
A 2 (in) well was installed on 12/10/2012 to a depth of 25.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/10/2012	5.5	7.9

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		12	25					SP	Brown fine to medium sand with coarse sand, occasional gravel, trace silt (loose, moist) (fill)	NS	
									GP	Brown coarse gravel, trace silt (loose, moist) (fill)		
			18	15					SP	Brown coarse gravel with sand, with silt (loose, moist) (fill)	NS	
									ML	Light brown fine to medium sand, trace silt, trace organic matter (~5%) (loose, moist) (fill)	NS	
10			12	6		3-4			SP-SM	Brown fine sandy silt with brick fragments and charred wood, occasional gravel (medium stiff, moist) (fill)	NS	
	5		15	0			▽			Brown to gray to orange fine to coarse sand with gravel, with silt (loose, moist) (fill)	NS	
			8	4						Dark brown to light brown fine to coarse sand with silt, occasional gravel (very loose, wet) (fill)	NS	
5			6	0					SP	Brown fine to coarse sand with silt, occasional gravel, trace rootlets (~1%) (loose, wet) (native)	NS	
			12	0						Gray brown to gray fine to coarse sand, trace silt (very loose, wet)	NS	
	10		4	0						Dark gray to black fine to coarse sand, trace silt (very loose, wet)	NS	
			12	0		12-13			ML	Gray fine to coarse sand, occasional gravel, trace silt (very loose, wet)	NS	
0			12	10					SP-SM	Dark gray-brown fine sandy silt with wood fragments (very soft, wet)	SS	
	15		14	21					SP	Dark gray-brown fine to coarse sand with silt, occasional gravel, trace wood (~5%) (very loose, wet)	NS	
			6	3					Wood	Dark gray-brown fine to coarse sand, occasional gravel, trace silt (loose, wet)	NS	
5			4	0					SP	Wood	NS	
			18	3		20-21				Gray fine to coarse sand, trace silt, wood fragments (~25%) (very loose, wet)	NS	
	20		18	25						Gray fine to coarse sand, trace silt with mica (very loose, wet)	NS	
10			18	28						Gray fine to coarse sand, trace silt, trace wood with mica (~5%) (very loose, wet)	NS	
			0							Gray fine to coarse sand, trace silt, micaceous (loose, wet)		
	25									Gray fine to coarse sand, trace silt, occasional fine gravel, micaceous (loose, wet)		



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-08D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-15
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\050406800.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/10/2012	12/11/2012	10	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft)	13.2146	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	372213.2542	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1309788.249		

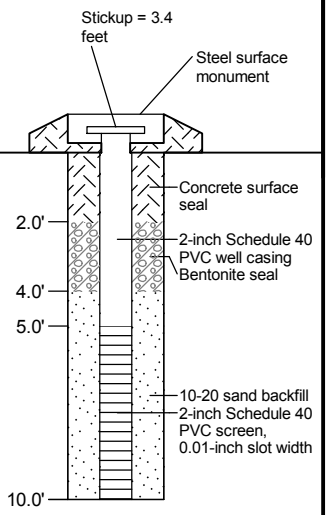
DOE Well I.D.: BHU-013
A 2 (in) well was installed on 12/10/2012 to a depth of 25.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0								See LLMW-08D for sampling and material description		
10											
	5										
5											
	10										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-08S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-16
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\050406800.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/6/2012	12/6/2012	27	AMW	Holocene Drilling	Hollow-stem Auger

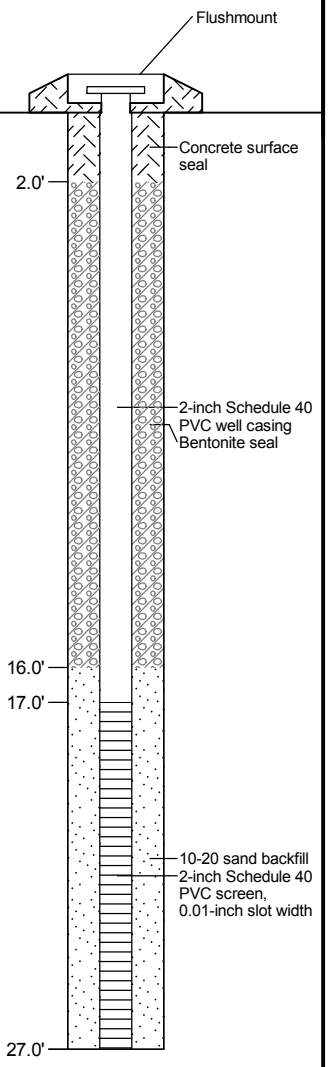
Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft)	13.1786	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	371933.0232	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1309291.53		

DOE Well I.D.: BHU-006
A 2 (in) well was installed on 12/6/2012 to a depth of 27 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0								GP	3 inch minus crushed rock (fill)		
			15	22					SP-SM	Brown fine to coarse sand with silt, occasional gravel (loose, moist) (fill)	NS	
									SP	Gray-brown fine to coarse sand, trace silt (loose, wet) (fill)		
			14	22							NS	
	5		18	20		4.5-5				Gray-brown fine to coarse sand, trace silt (loose, wet) (fill)	SS/MS	
			18	3							NS	
			12	3		7.3-7.5			ML	Gray-brown fine to coarse sand, trace silt (loose, wet) (fill)	NS	
										Gray-brown fine sandy silt with trace organic matter (~1%) (soft, moist) (native)		
			12	3						Gray-brown fine sandy silt with trace organic matter (~1%) (soft, moist)	NS	
	10		6	0		10.5-11				Gray-brown fine sandy silt with trace organic matter (~1%) (soft, moist)	NS	
										Gray-brown fine sandy silt with organic matter and rootlets (~15%) (very soft, moist)		
			12	4						Gray-brown fine sandy silt with organic matter and rootlets (>15%) (soft, moist)	NS	
			8	2					SM	Gray-brown fine sandy silt with organic matter and rootlets (~15%) (very soft, wet)	NS	
									ML	Gray silty fine sand (loose, wet)		
	15		18	6						Gray-brown fine sandy silt, trace organic matter	NS	
										Gray-brown fine sandy silt with silty fine sand interbeds, trace organic matter (~1%)		
			6	14					SP	Gray fine to coarse sand, trace silt (very loose, wet)	NS	
			12	16		18-19				Gray fine to coarse sand, trace silt (medium dense, wet)	NS	
	20		6	16						Gray fine to coarse sand, trace silt (medium dense, wet)	NS	
			6	15						Gray fine to coarse sand, trace silt (medium dense, wet)	NS	
			18	26						Occasional silt ripup clasts	NS	
										Gray fine to coarse sand, trace silt (medium dense, wet)		
	25		18	24						Gray fine to coarse sand, trace silt (medium dense, wet)	NS	
										Occasional brown silt ripup clasts		



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-09D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-17
Sheet 1 of 1

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/6/2012	12/6/2012	6	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	13.1484 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371929.4722 / 1309290.945	Horizontal Datum	WA State Plane North 83/91

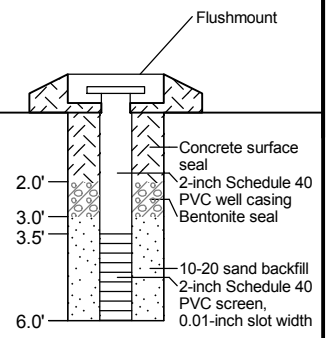
DOE Well I.D.: BHU-007
A 2 (in) well was installed on 12/6/2012 to a depth of 27 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
0	0								See LLMW-09D for sampling and material description		
	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-09S

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-18
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/11/2012	12/11/2012	31.5	AMW	Holocene Drilling	Hollow-stem Auger

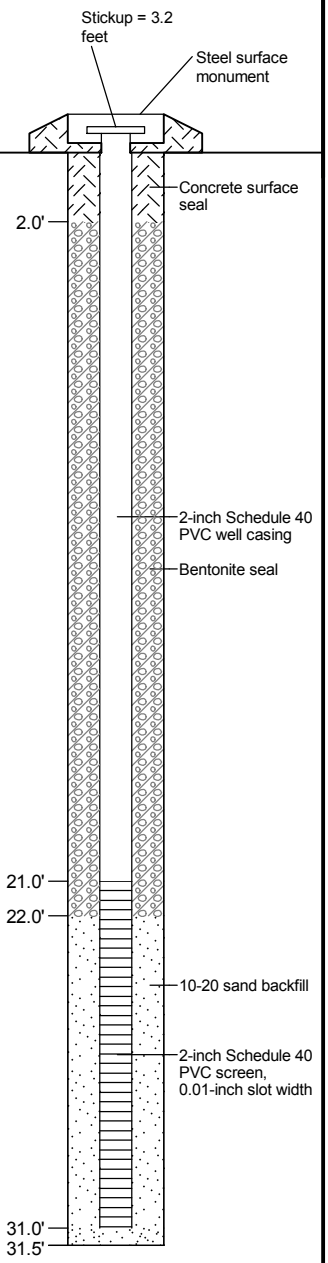
Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft)	13.1425	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	371725.4255	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1309359.407		

DOE Well I.D.: BHU-014
A 2 (in) well was installed on 12/11/2012 to a depth of 31.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/11/2012	24.0	-10.9

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		18	11					ML	Brown silt with organics/roots with fine sand (moist) (fill)	SS	
			18	32					SP-SM	Brown fine to coarse sand with silt, occasional gravel, trace organics (~1%) (loose, moist) (fill)	NS	
10			9	16					SP-SM	Brown fine to coarse sand, trace silt, occasional gravel, trace organics (~1%) (loose, moist) (fill)	NS	
	5		14	33							NS	
			12	15		6-7			AC	Dark brown fine to coarse sand with silt, with gravel (medium dense, moist) (fill)		
5									SP	Dark brown fine to coarse sand with silt (medium dense, wet) (fill)	NS	
			18	4		7.5-7.8			ML	Weathered asphalt	NS	
			16	0					OL	Gray fine to coarse sand , trace silt (loose, wet) (fill)	NS	
	10		9	0						Gray fine to medium sandy silt with organic matter (~15%) (soft, moist) (native)	NS	
0			18	3		12-13			ML	Brown organic silt with fine sand (very soft, wet) Brown organic silt with fine sand (very soft, wet) Brown organic silt with fine sand (very soft, wet)	NS	
			18	5						Gray-brown fine sandy silt with organic matter (~15%) (soft, wet)	NS	
	15		18	8					SM-ML	Gray interbedded fine silty sand and sandy silt zone (soft, wet)	NS	
									ML			
			16	15					SM-ML	Gray-brown fine sandy silt with organic matter (~15%) (medium stiff, wet)	NS	
-5			10	18					SM	Gray interbedded fine silty sand and sandy silt zone (soft, wet)	NS	
									SP	Gray fine silty sand (loose, wet)		
									SM	Gray fine to coarse sand, trace silt (loose, wet)		
	20		12	25					SP-SM	Brown-gray fine silty sand (loose, wet)	NS	
									ML	Gray fine to coarse sand with silt interbeds		
			10	18					SP	Gray-brown fine sandy silt (medium stiff, wet)	NS	
-10			18	31						Gray fine to coarse sand, trace silt, wood fragments (loose, wet)	NS	
										Gray fine to coarse sand, trace silt, with mica (loose, wet)		
			18	30			▽			Gray fine to coarse sand, trace silt (medium dense, wet)	NS	
	25		16	28					SP-SM	Brown silt ripup clasts Gray fine to coarse sand, trace silt, with mica (medium dense, wet)	NS	
-15			18	23		27-28			SP	Gray fine to coarse sand with silt (medium dense, wet)		
			18	23						Gray fine to coarse sand, trace silt (loose, wet) With gravel	NS	
	30		18	23						Gray fine to coarse sand, occasional gravel, trace silt with mica (medium dense, wet)	NS	
										Gray fine to coarse sand, trace silt with mica (medium dense, wet)		



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-10D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-19
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/11/2012	12/11/2012	6.5	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	13.183 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371722.2934 / 1309357.791	Horizontal Datum	WA State Plane North 83/91

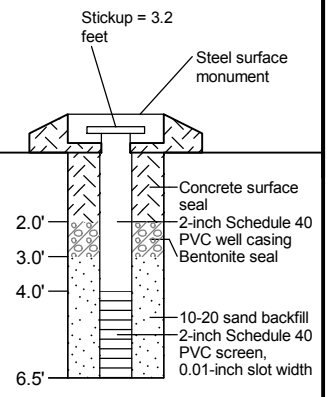
DOE Well I.D.: BHU-015
A 2 (in) well was installed on 12/11/2012 to a depth of 31.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
10	0								See LLMW-10D for sampling and material description		
	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-10S

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-20
Sheet 1 of 1

Drilled Start 12/13/2012	End 12/13/2012	Total Depth (ft) 22.5	Logged By AMW / Checked By	Driller Holocene Drilling	Drilling Method Hollow-stem Auger

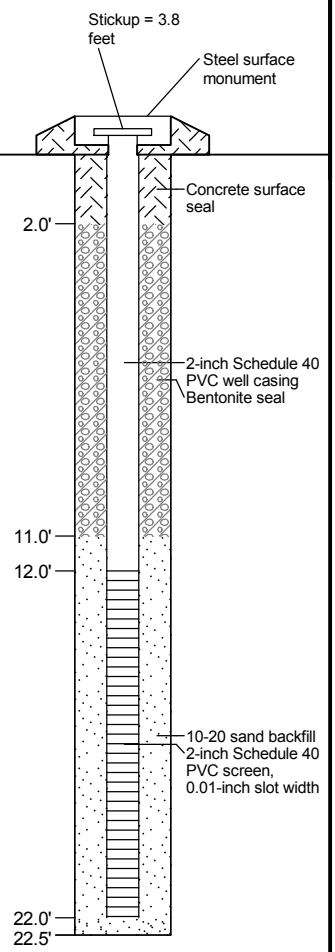
Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft) / Vertical Datum	16.0257 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371822.9079 1310350.261	Horizontal Datum	WA State Plane North 83/91

DOE Well I.D.: BHU-040
A 2 (in) well was installed on 12/13/2012 to a depth of 22.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
1/2/2013	4.5	11.5

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
15	0		14	5					SP	Brown fine to coarse sand, trace silt with rootlets, occasional gravel (moist) (fill)	NS	
			16	31						Brown fine to coarse sand, trace silt with roots (fill)	NS	
			18	23					SM	Brown silty sand with gravel, with rootlets (loose, moist) (fill)	SS	
						3.5-4.5			SP			
			15	47					SP-SM	Light brown fine to medium sand, trace silt (loose, moist) (fill)	SS	
10	5					5-6			SP	Dark brown fine to coarse sand, with silt, occasional gravel (medium dense, moist) (fill)	SS	
			10	23						Orange-brown fine to coarse sand, trace silt, occasional gravel (loose, moist) (fill)	SS	
			12	31						Orange-brown fine to coarse sand, trace silt (loose, moist to wet) (fill)	SS	
			11	10						Becomes gray-brown (medium dense) (fill)	NS	
5	10		12	9		10.5-10.7			ML	Gray-brown with orange mottling fine to coarse sand, trace silt (very loose, wet) (fill)	NS	
						11-11.5				Becomes gray with rotten wood (fill)		
			12	27					SP	Gray fine sandy silt (stiff, wet) (native)	NS	
										Gray-brown fine to medium sand, trace silt, micaceous (medium dense, wet)		
			9	27						Gray fine to coarse sand, trace silt, occasional gravel, trace organic layer with mica (<1%) (medium dense, wet)	NS	
0	15		6	25						Gray fine to coarse sand, trace silt, occasional gravel, trace organic layer with mica (~5%) (loose, wet)	NS	
			13	41							NS	
			12	30						Gray fine to coarse sand, trace silt, occasional gravel, with mica (medium dense, wet)	NS	
-5	20		12	32		19.5-20.5				Gray fine to coarse sand, trace silt, occasional gravel, trace wood fragments with mica (twigs and bark) (medium dense, wet)	NS	
				36								



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-11D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-21
Sheet 1 of 1

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/13/2012	12/13/2012	9.5	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft) / Vertical Datum	15.999 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371826.1136 1310349.231	Horizontal Datum	WA State Plane North 83/91

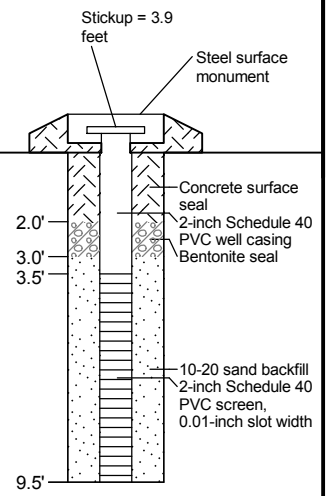
DOE Well I.D.: BHU-041
A 2 (in) well was installed on 12/13/2012 to a depth of 22.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
15	0								See LLMW-11D for sampling and material description		
10	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-11S

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-22
Sheet 1 of 1

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/12/2012	12/12/2012	27.5	PDR	Holocene Drilling	Hollow-stem Auger

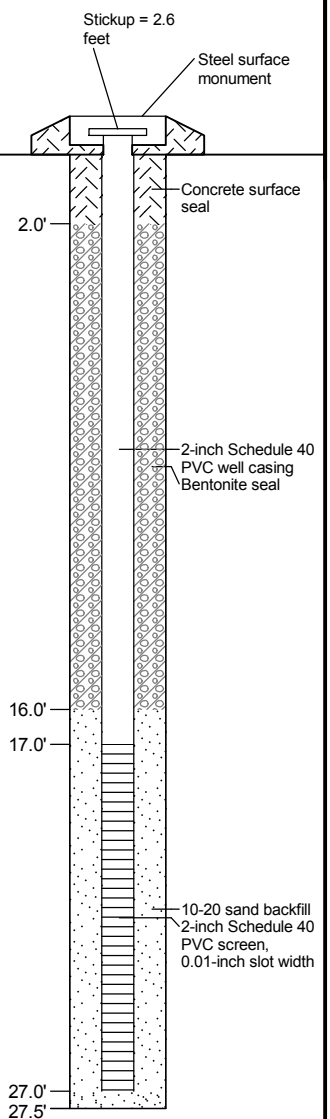
Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft)	13.6305	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	371523.5091	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1309414.28		

DOE Well I.D.: BHU-016
A 2 (in) well was installed on 12/12/2012 to a depth of 27.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/12/2012	4.5	9.1

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		17	6					SM	Brown silty fine to medium sand, trace organics (fill)	NS	
			18	8						Brown silty fine sand, occasional wood debris (loose, moist)	NS	
			15	14					SP-SM	Gray fine to medium sand, trace silt	NS	
	5		16	11		5-5.5				Gray fine to medium sand, trace silt, occasional fine gravel	NS	
			15	17						Grades to coarse sand	NS	
			18	3						Gray fine to coarse sand with trace silt, occasional fine gravel (medium dense, wet)	NS	
			8	0/18"		8.5-8.7			ML	Brown silt with organics	NS	
	10		18	0/18"		10-10.5				Gray silt with organics (soft, moist)	NS	
			18	2						Gray/brown silt with increasing organics and occasional 1 cm layer of fine sandy silt (soft, moist)	NS	
			14	3					SP	Gray silt	NS	
									ML	Gray fine to medium sand interbed		
									SP	Gray silt, occasional organics (soft, moist)		
	15		14	7					ML	Gray fine sand interbed	NS	
			18	6					SM	Gray silt, occasional organics (soft, moist)	NS	
			18	13					SP	Gray silty fine to medium sand with occasional wood debris	NS	
	20		18	16						Gray fine to coarse sand, trace silt (dense, wet)	NS	
			11	25		21-22					NS	
			18	23							NS	
			18	25							NS	
	25		16	24							NS	
										Gray fine to coarse sand, trace silt, occasional fine gravel (dense, wet)		



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-12D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-23
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\050406800.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/12/2012	12/12/2012	7	PDR	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft)	13.8405	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	371520.5241	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1309412.436		

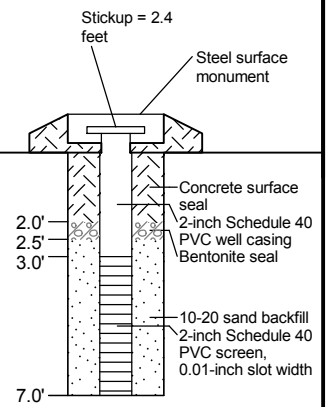
DOE Well I.D.: BHU-017
A 2 (in) well was installed on 12/12/2012 to a depth of 27.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
10	0								See LLMW-12D for sampling and material description		
	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-12S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-24
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/17/2012	12/17/2012	37	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft) / Vertical Datum	18.4782 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371682.4624 1309793.149	Horizontal Datum	WA State Plane North 83/91

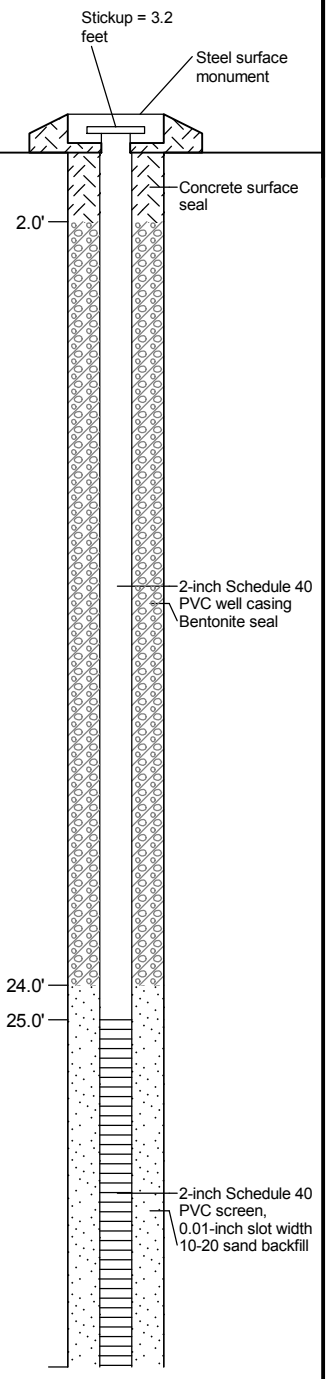
DOE Well I.D.: BHU-045
A 2 (in) well was installed on 12/17/2012 to a depth of 37 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
0								SP-SM	Light brown fine to coarse sand with gravel/cobbles, with silt (wet at surface, then moist below 6 inches) (fill)		
5		8	50/5"					SM	Brown fine to coarse silty sand with gravel (very dense, moist) (fill)	NS	
		0	50/2"							NS	
		11	50/5"					SP	Gray fine to coarse sand, trace silt (very dense, moist) (fill)		
10		8	21							NS	
		14	15		10.5-11.5			SP-SM	Gray fine to coarse sand, trace silt, with gravel (very dense, moist) (fill)	NS	
		12	17					SP	Black fine to coarse sand with silt, with charred wood (loose, moist) (fill)	NS	
		10	40					SM	Black fine to coarse sand with silt, with gravel, with charred wood (loose, moist to wet) (fill)	NS	
15		8	9					SP	Gray fine to coarse sand, trace silt (loose, wet) (fill)	NS	
		8	10						Dark gray fine to coarse sand, trace silt (loose, wet) (fill)	NS	
		12	9		18.7-19				Gray fine silty sand, laminated (loose, wet) (fill)	NS	
20		14	8					ML	Gray fine to coarse sand, trace silt, wood in shoe (medium dense, wet) (fill)	NS	
		14	18					SM	Gray fine to coarse sand, trace silt, with mica (very loose, wet) (fill)	NS	
		18	10		23-24			SM	Gray fine to coarse sand, with gravel, trace silt (very loose, wet) (fill)	NS	
25		18	15						Gray fine sandy silt, trace organic matter, low plasticity (~1%) (medium stiff, wet) (native)	NS	
		7	16					SP-SM	Gray fine to coarse silty sand (very loose, wet)	NS	
		13	45					SP	Gray-brown fine to coarse sand, trace organic matter (~1%) (loose, wet)	NS	
		5	25						Gray-brown silty fine to coarse sand, trace wood (loose, wet)	NS	
30		12	46						Gray-brown silty fine to coarse sand with wood, occasional gravel (loose, wet)	NS	
		15	51		32-33				Gray-brown fine to coarse sand with gravel, with silty, trace wood (loose, wet)	NS	
		12	50/6"						Gray-brown fine to coarse sand, trace wood (<1%) (medium dense, wet)	NS	
35									Gray fine sand with silt lense	NS	
									Gray fine to coarse sand, trace silt (wet)	NS	
								SP-SM	Gray fine to coarse sand with silt (wet)	NS	
								SP	Gray fine to coarse sand, occasional fien gravel, trace silt (medium dense, wet)	NS	

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-13D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-25
Sheet 1 of 2

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\050406800.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	WELL LOG
	35		17	61							NS		35.0'
													37.0'

Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-13D (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-25
Sheet 2 of 2

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/17/2012	12/17/2012	18	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft) / Vertical Datum	18.4337 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371682.6131 / 1309796.93	Horizontal Datum	WA State Plane North 83/91

DOE Well I.D.: BHU-044
A 2 (in) well was installed on 12/17/2012 to a depth of 37 (ft).

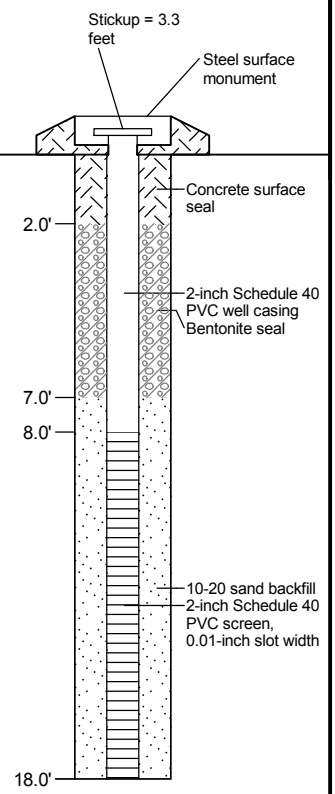
Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

FIELD DATA

Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0								See LLMW-13D for sampling and material description		
15											
	5										
10											
	10										
5											
	15										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-13S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-26
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\050406800.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/12/2012	12/12/2012	31	PDR	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	12.4895 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371375.9911 1309449.16	Horizontal Datum	WA State Plane North 83/91

DOE Well I.D.: BHU-018
A 2 (in) well was installed on 12/12/2012 to a depth of 31 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/12/2012	4.5	8.0

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		18	5					TS	2 inches topsoil (fill)	NS	
									SM	Brown silty fine to medium sand with organics ((loose, moist) (fill)	NS	
			16	7					SP	Brown fine to medium sand with trace silt (loose, moist) (fill)	NS	
			7	5						Brown fine to coarse sand with trace silt (loose, moist) (fill)	NS	
	5		10	5			▽			Gray fine to coarse sand with trace silt (loose, wet) (fill)	NS	
			10	3		5.5-6					NS	
						7-7.2			ML	Brown silt with organics (soft, wet) (native)		
			18	0		8-9				Brown silt (soft, wet)	NS	
	10		16	0							NS	
			8	0							NS	
			18	0/18"					ML	Gray silt with trace organics and some fine sand (soft, moist)	NS	
										With organics		
			18	5		13.5-14				Wood debris	NS	
	15								SM	Gray fine to medium silty sand (loose, wet)		
			15	4					SP-SM	Gray fine to coarse sand with silt (loose, wet)	NS	
			15	14							NS	
									ML	Brown silty interbed		
			18	6					SP	Gray fine to coarse sand with trace silt (dense, wet)		
									ML	Gray silt with fine sand (soft, wet)		
	20		16	24					Wood	Wood debris	NS	
			18	24					SP	Gray fine to coarse sand with trace silt (medium dense, wet)	NS	
			18	10						Gray fine to coarse sand with trace silt (dense, wet)	NS	
									Wood	Wood debris		
			18	21					SP	Gray fine to coarse sand with trace silt (dense, wet)	NS	
	25		18	17						Gray fine to coarse sand with trace silt (medium dense, wet)	NS	
			18	25						Gray fine to coarse sand with trace silt (medium dense, wet)	NS	
			18	22		29-30				Gray fine to coarse sand with trace silt (dense, wet)	NS	
	30											

WELL LOG

Stickup = 2.8 feet
Steel surface monument
Concrete surface seal
2.0'
2-inch Schedule 40 PVC well casing
Bentonite seal
19.0'
20.0'
10-20 sand backfill
2-inch Schedule 40 PVC screen, 0.01-inch slot width
30.0'
31.0'

Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-14D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-27
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/12/2012	12/12/2012	6	PDR	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	12.4877 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371374.1753 1309446.946	Horizontal Datum	WA State Plane North 83/91

DOE Well I.D.: BHU-019
A 2 (in) well was installed on 12/12/2012 to a depth of 31 (ft).

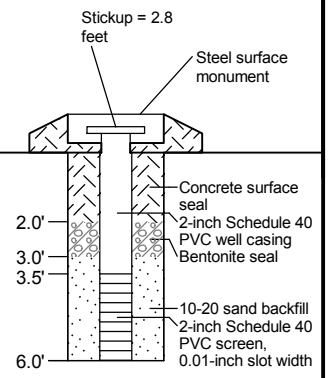
Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

FIELD DATA

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
10	0									See LLMW-14D for sampling and material description		
	5											

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-14S

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-28
Sheet 1 of 1

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/13/2012	12/13/2012	34	PDR	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	13.0987 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371053.2175 / 1309536.612	Horizontal Datum	WA State Plane North 83/91

DOE Well I.D.: BHU-020
A 2 (in) well was installed on 12/13/2012 to a depth of 34 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/13/2012	6.0	7.1

Notes:

Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
0		18	10					TS	3 inches topsoil (fill)	NS	
		18	39		2-3			SP-SM	Brown fine to medium sand with silt (medium dense, moist) (fill)	NS	
		10	22					GP-GM	Brown fine to coarse sand with silt (medium dense, moist) (fill)	NS	
		10	15		4-4.5			SP	Brown fine to coarse gravel with fine sand and silt (dense, moist) (fill)	NS	
5		18	15					ML	Dark gray fine to coarse sand with trace silt; black staining (dense, moist) (fill)	NS	
		7	14			▽		SP	Black silt with fine sand and organics (medium dense, moist) (fill)	NS	
		9	10						Brown fine to coarse sand with trace silt (loose, wet) (fill)	NS	
10		12	1					Wood	Gray fine to coarse sand with trace silt (loose, wet) (fill)		
		7	4		11.5-12			SP	Wood (fill)		
		18	1		14-15			ML	Brown silt with occasional fine sand and organics (medium dense, moist) (native)		
15		15	4								
		14	3								
		17	8								
20		15	6					Wood	Wood/gravel		
		18	6					ML	Gray silt with trace fine sand (soft, wet)	NS	
		16	23					SM	Gray silty fine sand (loose, wet)	NS	
		14	62					SP	Gray fine to coarse sand with trace silt (dense, wet)	NS	
25		17	20							NS	
		6	8					Wood	Wood in shoe	NS	
		5	26					Wood/SM	Brown wood with fine sand, trace silt		
30		12	33		30.5-31.5			SP-SM	Gray fine to coarse sand with silt (dense, wet)	NS	
		6	14					SP	Gray fine to coarse sand with trace silt (dense, wet)	NS	
								Unknown	No sample this interval		

WELL LOG

Stickup = 3.2 feet
Steel surface monument
Concrete surface seal
2.0'
2-inch Schedule 40 PVC well casing
Bentonite seal
23.0'
24.0'
10-20 sand backfill
2-inch Schedule 40 PVC screen, 0.01-inch slot width
34.0'

Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-15D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-29
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/13/2012	12/13/2012	9.5	PDR	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	13.2143 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371051.1506 1309535.419	Horizontal Datum	WA State Plane North 83/91

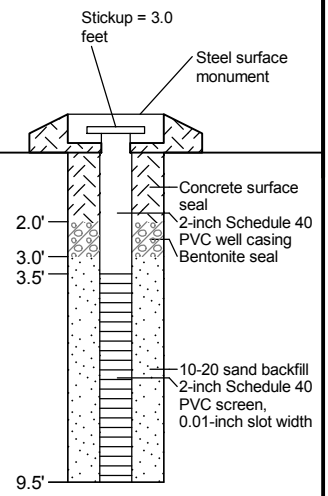
DOE Well I.D.: BHU-021
A 2 (in) well was installed on 12/13/2012 to a depth of 34 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
10	0								See LLMW-15D for sampling and material description		
5	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-15S

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-30
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/14/2012	12/14/2012	34	PDR	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft) / Vertical Datum	17.1441 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371158.166 / 1310160.437	Horizontal Datum	WA State Plane North 83/91

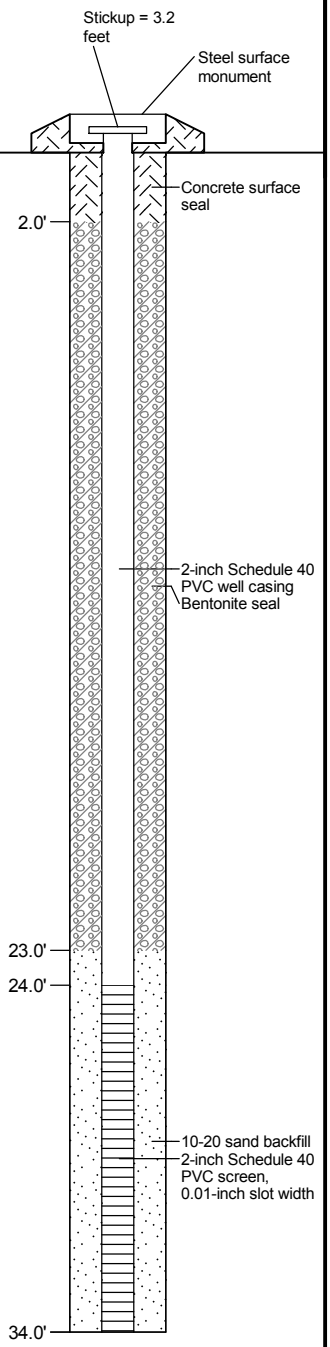
DOE Well I.D.: BHU-042
A 2 (in) well was installed on 12/14/2012 to a depth of 34 (ft).

Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		13	21					SM	Light brown silty sand with gravel, with organic matter (charred wood) (loose, wet) (fill)	NS	
15			12	17							NS	
			18	32							NS	
	5		8	50/2"					SP	Light brown fine to medium sand, occasional coarse sand and gravel, trace silt (very dense, moist) (fill)	NS	
10			6	50/3"					SM	Becomes moist	NS	
										Light brown silty sand with gravel (very dense, moist) (fill)		
	10		6	4					SP-SM	Black and brown fine to coarse sand with silt, with gravel and brick fragments (very loose, moist) (fill)	NS	
5			0	0								
			12	2		12.5-12.7 13-13.5					NS	
									ML/OL	Gray-brown fine sandy silty to organic silt (very soft, wet) (native)		
	15		18	0					ML	Gray-brown fine sandy silt with organic matter (~15%) (very soft, wet)	NS	
0			12	0		15-16				Becomes very stiff	NS	
			15	4						Becomes soft	NS	
			18	5						Gray-brown fine sandy silt with wood/organic matter (~12%) (soft, wet) moderate dilatency, moderate plasticity	NS	
-5	20		18	5							NS	
			18	13						Gray-brown fine sandy silt with wood/organic matter (soft, wet) high dilatency, high plasticity	NS	
			9	14					SP	Gray fine to coarse sand with trace silt (loose, wet)	NS	
-10	25		8	11						Gray fine to coarse sand with wood, trace silt, with mica (loose, wet)	NS	
			10	15						Gray fine to coarse sand with wood, trace silt, with mica (loose, wet)	NS	
									SP-SM	Gray fine to coarse sand with wood, with silt (loose, wet)		
			9	21							NS	
-15	30		14	61		29.5-30.5			SP	Gray fine to coarse sand, trace silt, with mica (loose, wet)	NS	
			18	56						Gray fine to coarse sand, occasional fine gravel, trace silt, with mica (loose, wet) occasional brown silt ripup clasts	NS	
			8	54						Gray fine to coarse sand with gravel, trace silt, with mica (medium dense, wet)		



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-16D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-31
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068800.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/14/2012	12/14/2012	12	PDR	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft)	17.1917	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	371159.2967	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1310164.452		

DOE Well I.D.: BHU-043
A 2 (in) well was installed on 12/14/2012 to a depth of 34 (ft).

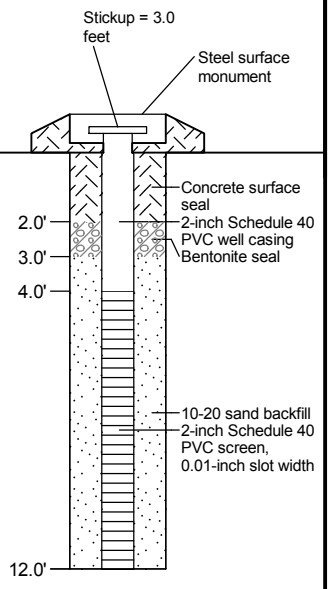
Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

FIELD DATA

Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
0	0								See LLMW-16D for sampling and material description		
-5	5										
-10	10										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-16S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-32
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/12/2012	12/13/2012	25.5	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft)	15.2671	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	371317.6575	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1310603.072		

DOE Well I.D.: BHU-038
A 2 (in) well was installed on 12/12/2012 to a depth of 25.5 (ft).

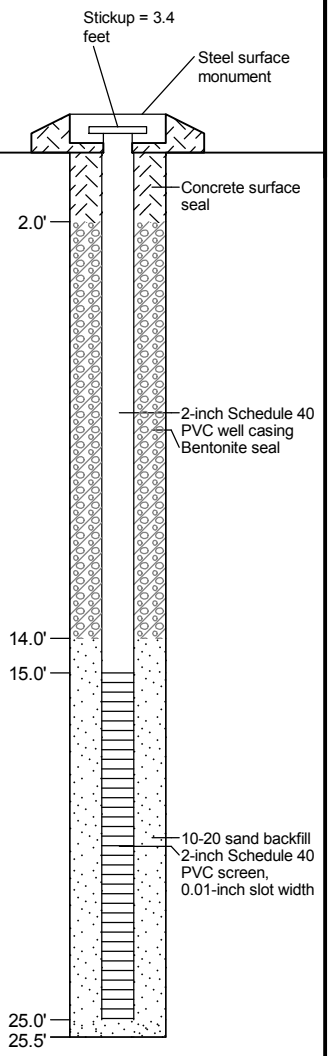
Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
5	0		12	6					SP	Brown fine to medium sand, occasional coarse sand and gravel, trace silt, wood fragments and rootlets (loose, moist) (fill)	NS	
			12	17						Brown fine to coarse sand, occasional gravel, trace silt, occasional rootlets (loose, moist) (fill)	NS	
			16	20						Brown fine to coarse sand with gravel, trace silt, occasional rootlets (~1%) (loose, moist) (fill)	SS	
10	5		18	10		5-6				Dark brown fine to coarse sand, occasional gravel, trace silt (very loose, moist) (fill)	SS	
			14	12						Light brown fine to coarse sand, trace silt (loose, moist)	SS	
			13	14							NS	
5	10		15	19						Gray-brown fine to coarse sand, occasional fine gravel, trace silt (loose, wet)	NS	
			12	11						Gray-brown fine to coarse sand, occasional fine gravel, trace silt (loose, wet)	NS	
			10	8		12-12.2 12.5-13			ML	Gray fine to medium sand, trace organic matter, with mica (~5%) (very loose, wet) (fill)	NS	
0	15		8	12					SP	Gray fine sandy silt , trace organics, 1 inch piece of wood, with mica (medium stiff, wet) (native)	NS	
			12	16						Gray fine to medium sand with coarse sand, trace silt, occasional wood (~1%), with mica (loose, wet)	NS	
			14	29						Gray fine to coarse sand, trace silt, with wood (loose, wet)	NS	
			0	25						Gray fine to coarse sand, trace silt, occasional wood (medium dense, wet) (native)		
-5	20		9	40						Gray fine to coarse sand with gravel, trace silt, with mica (medium dense, wet)	NS	
			12	40		21-22				Gray fine to coarse sand with gravel, trace silt (medium dense, wet)	NS	
			12	49						Gray fine to coarse sand with gravel, trace silt (medium dense, wet)	NS	
-10	25		9	41						Gray fine to coarse sand with gravel, trace silt (medium dense, wet)	NS	

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-17D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-33
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\050406800.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/12/2012	12/13/2012	11	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft) / Vertical Datum	15.3209 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371320.3207 / 1310602.283	Horizontal Datum	WA State Plane North 83/91

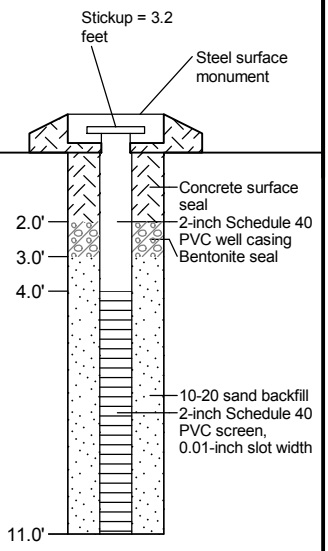
DOE Well I.D.: BHU-039
A 2 (in) well was installed on 12/12/2012 to a depth of 25.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
5	0									See LLMW-17D for sampling and material description		
0												
-5	5											
-10	10											

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-17S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-34
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/13/2012	12/13/2012	30	PDR	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	13.1053 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	370391.758 / 1309718.714	Horizontal Datum	WA State Plane North 83/91

DOE Well I.D.: BHU-022
A 2 (in) well was installed on 12/13/2012 to a depth of 30 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/13/2012	4.0	9.1

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		18	13					SOD	2 inched grass/topsoil (fill)	NS	
									GM	Brown silty fine to coarse gravel with fine to medium sand (dense, moist) (fill)	NS	
			8	50/3"						Becomes gray		
			3	42					CC	Rock in shoe	NS	
										Concrete debris (fill)		
	5		18	28					SP-SM	Brown fine to coarse sand with silt (dense, wet) (fill)	NS	
									SP	Gray fine to coarse sand with occasional fine to coarse gravel (dense, wet) (fill)		
			18	10		6-7			Wood		NS	
									SP	Wood in shoe (fill)		
			14						ML	Gray fine to coare sand (dense, wet) (fill)	NS	
						8.5-8.7			SP-SM	Dark gray silt with fine sand and organics (stiff, wet) (fill)		
			16	18					ML	Gray fine to coarse sand with silt (very loose, wet) (fill)	NS	
	10		18	0		11-12				Dark gray silt with fine sand and organics (soft, wet) (native)	NS	
			16	0						Grades to brown	NS	
										Brown silt with organics, occasional fine sand (soft, wet)		
			18	0						Brown silt with organics (soft, wet)	NS	
	15		12	0								
			18	2						Increasing organics	NS	
			18	9						Grades to gray		
									ML	Gray silt with fine to medium sand interbeds		
	20		18	22					SP	Gray fine to medium sand with trace silt, with trace organics		
			18	17		21-22				Gray fine to medium sand with trace silt (dense, wet)		
										Gray fine to medium sand, trace wood debris		
			10	22						Gray fine to coarse sand with occasional gravel, trace silt (medium dense, wet)	NS	
			18	25							NS	
	25		18	28						Gray fine to coarse sand, trace silt (dense, wet)	NS	
			13	32							NS	
	30		13	28							NS	

WELL LOG

Stickup = 3.1 feet
Steel surface monument
Concrete surface seal
2.0'
2-inch Schedule 40 PVC well casing
Bentonite seal
19.0'
20.0'
10-20 sand backfill
2-inch Schedule 40 PVC screen, 0.01-inch slot width
30.0'

Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-18D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-35
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/13/2012	12/13/2012	7.5	PDR	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	13.2735 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	370389.0772 / 1309715.292	Horizontal Datum	WA State Plane North 83/91

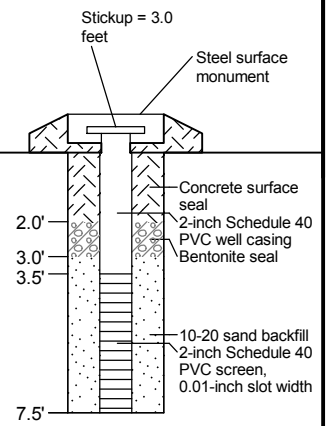
DOE Well I.D.: BHU-023
A 2 (in) well was installed on 12/13/2012 to a depth of 30 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
10	0								See LLMW-18D for sampling and material description		
	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-18S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-36
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/6/2012	12/6/2012	27	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft)	11.642	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	370189.3895	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1310224.846		

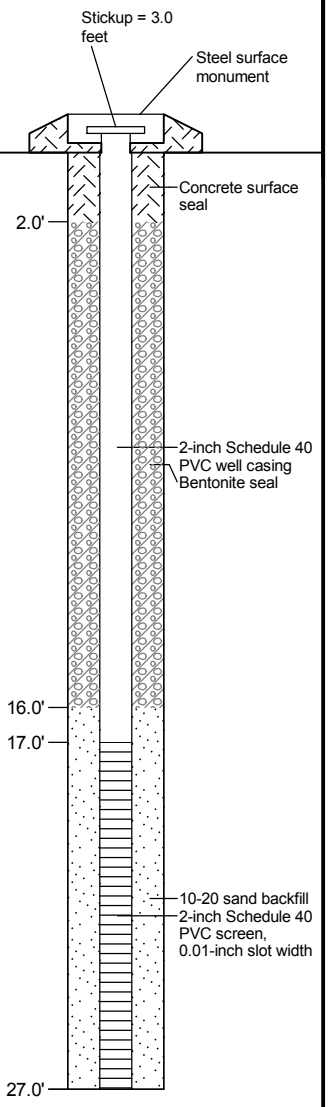
DOE Well I.D.: BHU-005
A 2 (in) well was installed on 12/6/2012 to a depth of 27 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		15	50/4"					SP-SM	Brown fine to coarse sand, concrete rubble (very dense, moist) (fill)	SS	
			18	80					Rock	Rock (fill)	NS	
			13	54		3-4			SP	Orange-brown fine to coarse sand with gravel (moist) (fill)	NS	
									ML	Olive brown fine sandy silt with gravel and brick fragments (hard, moist) (fill)	NS	
	5		18	24					SP	Dark gray fine to coarse sand, occasional gravel, trace silt (medium dense, wet) (fill)	NS	
			10	7						Brown silt lense at 3.75 feet	NS	
										Dark gray fine to coarse sand, trace silt (loose, wet) (fill)	NS	
			14	4		7.8-8			ML	Gray fine to coarse sand, occasional fine gravel, trace silt (very loose, wet) (fill)	NS	
			9	4		9-10					NS	
	10		10	3						Dark gray grades to gray-brown fine sandy silt with organic matter and rootlets (~15%) (soft, moist) (native)	NS	
			17	5						Gray-brown fine sandy silt with organic matter and rootlets (soft, moist)	NS	
			18	5						1 inch lense of gray silty sand, occasional carbonized wood, micaceous (very loose, moist)	NS	
										1 inch lense of gray silty sand, occasional carbonized wood, micaceous (very loose, moist)	NS	
	15		18	11					SP-SM		NS	
			18	17					ML	Gray fine to coarse sand with silt (very loose, wet)		
									SP-SM	Gray-brown fine sandy silt (very soft, wet)		
			18	21					SP	Gray fine to coarse sand with silt (very loose, wet)		
										Gray fine to coarse sand, trace silt, occasional brown silt ripup clasts (loose, wet)	NS	
	20		18	11								
			0	44								
	25		14	22		25-26				Gray fine to coarse sand, trace silt, with mica (loose, wet)	NS	

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-19D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-37
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

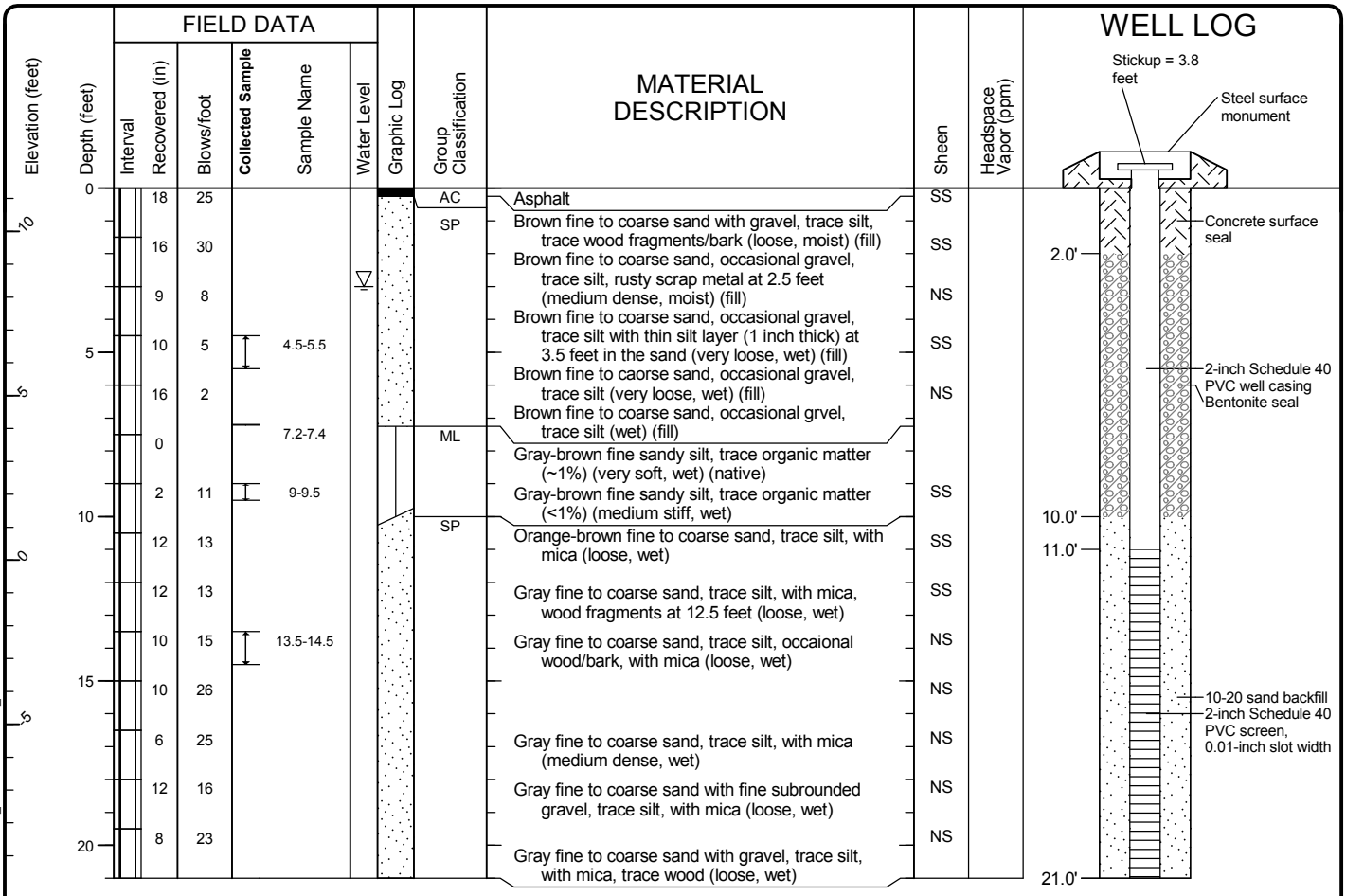
Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/12/2012	12/12/2012	21	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft)	11.3205	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	370542.4429	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1310748.178		

DOE Well I.D.: BHU-037
A 2 (in) well was installed on 12/12/2012 to a depth of 21 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/12/2012	3.0	8.3

Notes:



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-20D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-38
Sheet 1 of 1

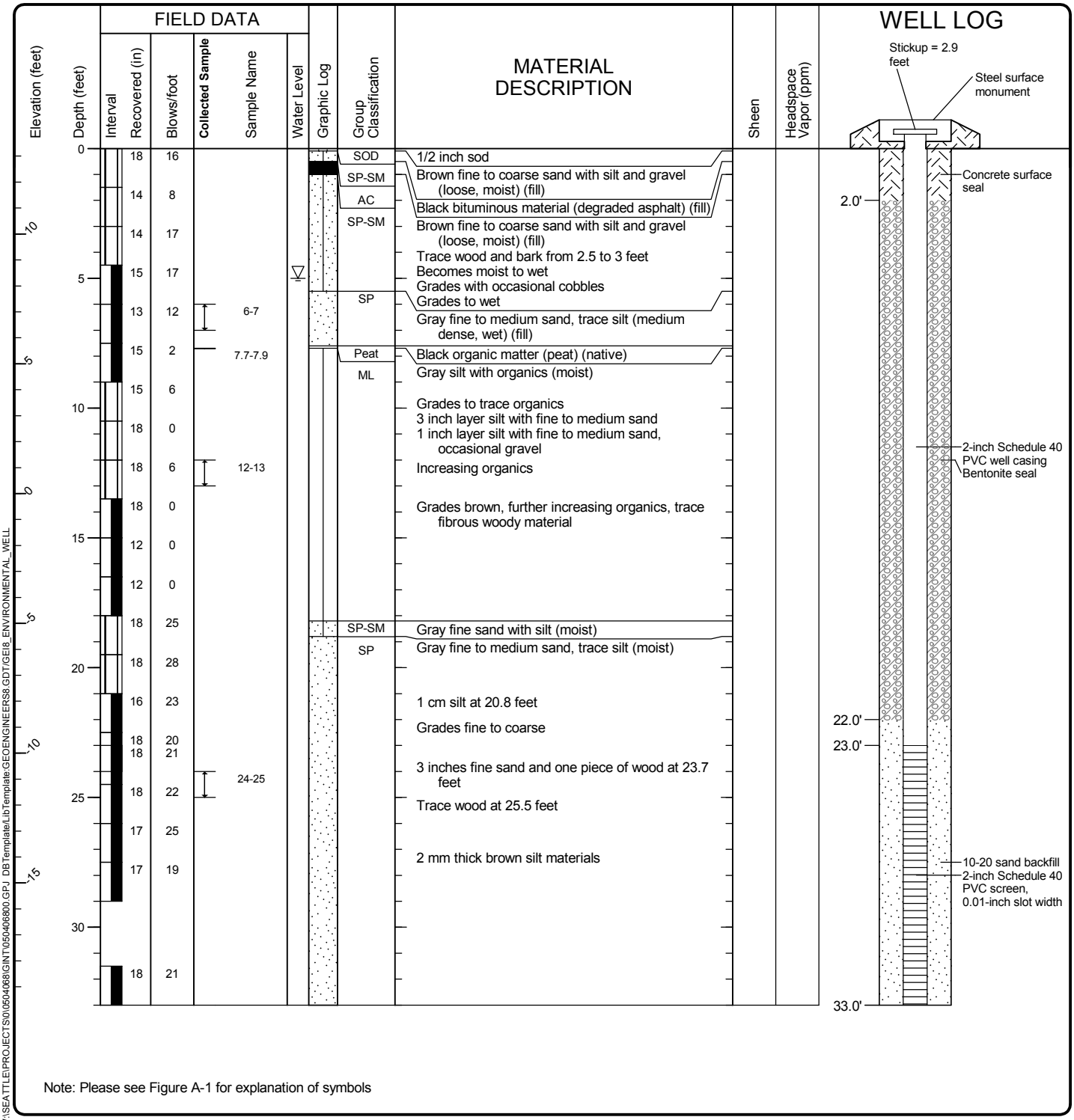
Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/20/2012	12/20/2012	33	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	13.2943 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	370011.1759 / 1309881.28	Horizontal Datum	WA State Plane North 83/91

DOE Well I.D.: BHU-025
A 2 (in) well was installed on 12/20/2012 to a depth of 33 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/20/2012	5.0	8.3

Notes:



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-21D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-39
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/20/2012	12/20/2012	7	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft)	13.6214	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	370010.9467	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1309885.453		

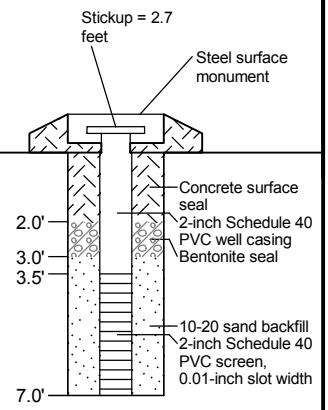
A 2 (in) well was installed on 12/20/2012 to a depth of 33 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
10	0								See LLMW-21D for sampling and material description		
	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-21S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-40
Sheet 1 of 1

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/5/2012	12/5/2012	27	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	13.1426 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	369167.8357 / 1310446.091	Horizontal Datum	WA State Plane North 83/91

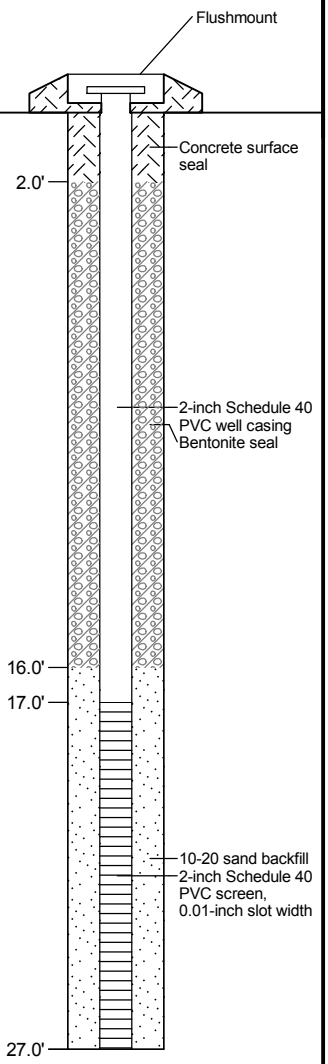
DOE Well I.D.: BHU-003
A 2 (in) well was installed on 12/5/2012 to a depth of 27 (ft).

Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		14	50/4"					SP	Brown fine to coarse sand with gravel (fill)	NS	
									CC	Concrete (fill)		
			8	50/2"					SP	Brown fine to coarse sand with gravel, trace silt (very dense, moist) (fill)	SS	
									CC	Concrete with brick fragments (fill)		
			18	31		3-4			SM	Brown silty sand with wood, brick fragments (fill)	NS	
	5		15	26					SP	Gray-brown with orange mottling fine to coarse sand, trace silt (medium dense, moist) (fill)	NS	
			12	9						Gray-brown fine to coarse sand, trace silt (medium dense, wet) (fill)	NS	
			12	6		8-8.2			ML	Gray fine to coarse sand, occasional gravel, trace silt (very loose, wet) (fill)	NS	
			17	5						Dark gray fine to coarse sand, occasional gravel, trace silt (very loose, wet) (fill)	NS	
	10		14	3		10.5-11.5				Brown fine sandy silt, trace rootlets (~1%) (medium stiff, moist) (native)	NS	
			18	6						Gray-brown fine sandy silt with organic matter and rootlets (~5%) (soft, moist)	NS	
			16	5					Wood	Gray-brown fine sandy silt with organic matter and wood fragments (soft, moist)	NS	
									ML	Gray-brown fine sandy silt with organic matter and wood fragments (soft, moist)		
	15		12	12					SM/ML	Piece of wood undergraded	NS	
			7	32					SM	Gray-brown fine sandy silt with organic matter (medium stiff, moist)	NS	
			18	32					SP	Gray-brown fine interbedded silty sand and sandy silt, trace organic matter (soft, wet)	NS	
	20		18	42		20-21				Gray fine silt sand with organic matter and rootlets (~15%) (loose, wet)	NS	
			18	34						Gray fine to coarse sand with gravel, trace silt, trace mica (medium dense, wet)	NS	
			18	47						Gray fine to coarse sand, trace silt (medium dense, wet)	NS	
	25		18	46						Gray fine to coarse sand, occasional rounded gravel, trace silt, trace mica (medium dense, wet)	NS	
			12	41						Gray fine to coarse sand, occasional fine gravel, trace silt, micaceous (medium dense, wet)	NS	
										Gray fine to coarse sand with fine gravel, trace silt, micaceous (medium dense, wet)	NS	
										Gray fine to coarse sand with fine gravel, trace silt, micaceous (medium dense, wet)	NS	
										Gray fine to coarse sand, trace silt, micaceous (medium dense, wet)	NS	



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-22D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-41
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\050406800.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/5/2012	12/5/2012	7	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	13.1787 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	369173.009 / 1310445.634	Horizontal Datum	WA State Plane North 83/91

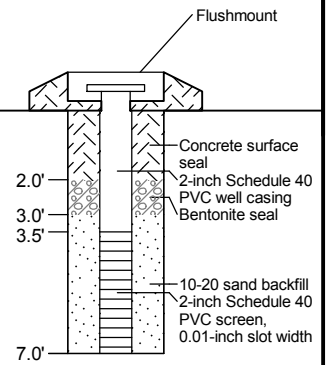
DOE Well I.D.: BHU-004
A 2 (in) well was installed on 12/5/2012 to a depth of 27 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
10	0								See LLMW-22D for sampling and material description		
	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-22S

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-42
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/4/2012	12/5/2012	40	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	25.9105 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	368226.9076 1310278.89	Horizontal Datum	WA State Plane North 83/91

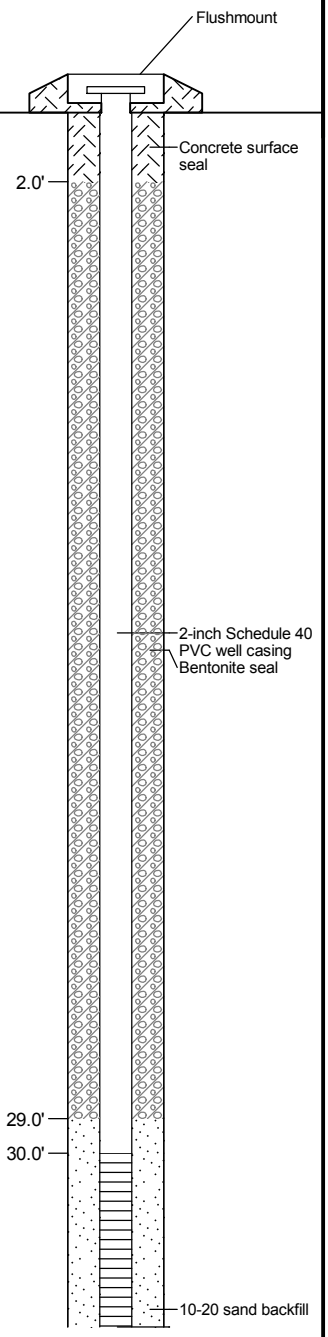
DOE Well I.D.: BHU-001
A 2 (in) well was installed on 12/4/2012 to a depth of 40 (ft).

Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Depth (feet)	Elevation (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
0	25								SP	Gray-brown fine to medium sand, trace silt (medium dense, moist) (fill)		
5	20		15	11							NS	
			15	31		8-9				Gray-brown fine to medium sand, trace silt (medium dense, moist) (fill)		
10	15		15	18						Gray-brown fine to coarse sand, occasional gravel, trace silt (medium dense, moist) (fill)	NS	
15	10		5	5						Gray-brown fine to coarse sand, occasional gravel, trace silt (medium dense, moist) (fill)	NS	
			15	19		17-18				Gray-brown fine to medium sand, trace wood fragments (~1%), yellow brick fragments at 16.5 feet (medium dense, moist) (fill)	NS	
			13	0						Gray-brown fine to medium sand, trace wood chips (~1%) (medium dense, moist) (fill)		
20	5		11	15		20-21				Gray-brown fine to coarse sandl, trace silt (medium dense, wet) (fill)	NS	
			10	14					Wood / SP	Dark brown wood fibers/bark (bogfuel) (wet) (fill)	NS	
			7	4		22.9-23.1			SM / SP	Gray-brown fine to coarse sand, occasional gravel, trace silt, trace wood (~1%) (medium dense, wet) (fill)	NS	
			9							Gray-brown fine to medium sand, trace silt (loose, wet) (fill)		
25	0		5	4		26-26.5			ML	Gray-brown silty fine to medium sand, trace wood (~5%) (loose, wet) (native)	NS	
			12	6						Gray-brown fine to coarse sand, trace silt, occasional rootlets (loose, wet)	NS	
			18	20					SP	Gray-brown sandy silt with rootlets (~15%) (medium stiff, wet)	NS	
30	-5		15	18						Gray-brown sandy silt with rootlets (~5%) (medium stiff, moist)	NS	
			18	19						Gray fine to medium sand, trace to no silt, trace rootlets (~1%), micaceous (loose, wet)	NS	
			18	38						Gray fine to medium sand, trace silt, trace rootlets (~1%), micaceous	NS	
35			18	37						Gray fine to medium sand, occasional coarse sand, occasional fine gravel, trace silt, micaceous, small silt ripups in matrix (medium dense, wet)	NS	



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-23D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-43
Sheet 1 of 2

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	WELL LOG
10	35					35-36				Gray fine to medium sand, occasional coarse sand, trace silt, micaceous (medium dense, wet) (native)	NS		2-inch Schedule 40 PVC screen, 0.01-inch slot width
			18	31						Gray fine to medium sand, occasional coarse sand, trace silt, micaceous (medium dense, wet)	NS		
			12	37						Gray fine to coarse sand, trace silt, micaceous (medium dense, wet)			
	40												40.0'

Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-23D (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-43
Sheet 2 of 2

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/4/2012	12/5/2012	24	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft)	25.9515	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	368222.1107	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1310277.448		

DOE Well I.D.: BHU-002
A 2 (in) well was installed on 12/4/2012 to a depth of 40 (ft).

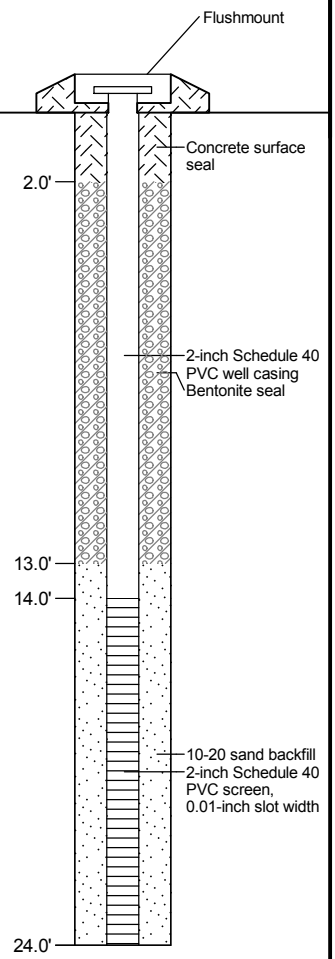
Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

FIELD DATA

Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
25	0								See LLMW-23D for sampling and material description		
20	5										
15	10										
10	15										
5	20										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-23S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-44
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/20/2012	12/20/2012	56.5	AMW	Holocene Drilling	Hollow-stem Auger

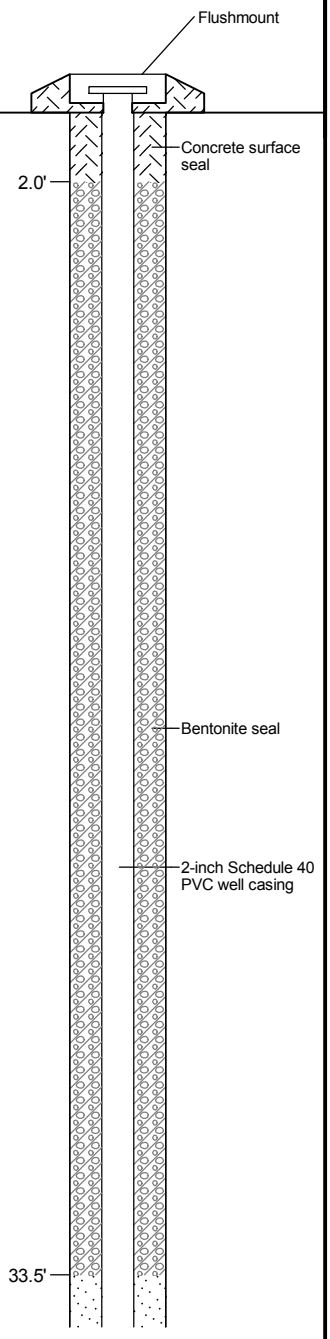
Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft) / Vertical Datum	54.6587 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371665.5506 1308321.72	Horizontal Datum	WA State Plane North 83/91

A 2 (in) well was installed on 12/21/2012 to a depth of 56.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/20/2012	45.0	9.7

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
50	0		18	4					SM	Brown silty fine to coarse sand, occasional gravel, abundant rootlets/sod in upper 6 inches (very loose, moist) (fill/topsoil)	NS	
			16	42		1.3-1.5			SP-SM	Gray-brown fine to coarse sand with silt and gravel (medium dense, moist) (weathered till)	NS	
			8	50/5"						Gray-brown fine to coarse sand with silt, occasional gravel (very dense, moist) (till)	NS	
45	5		3	50/3"							NS	
			8	50/2"		6-6.5			SM	Gray-brown silty fine to coarse sand with gravel (very dense, moist) (till)	NS	
			1	50/3"							NS	
40	10		2	50/4"						Gray-brown silty fine to coarse sand with gravel (very dense, moist) (till)	NS	
	15		0	50/5"								
35	20		0									
30	25											
25	30		15	70		30-31			SP	Light brown fine to medium sand, trace silt (very dense, moist) (outwash)	NS	
20	35											



Note: Please see Figure A-1 for explanation of symbols

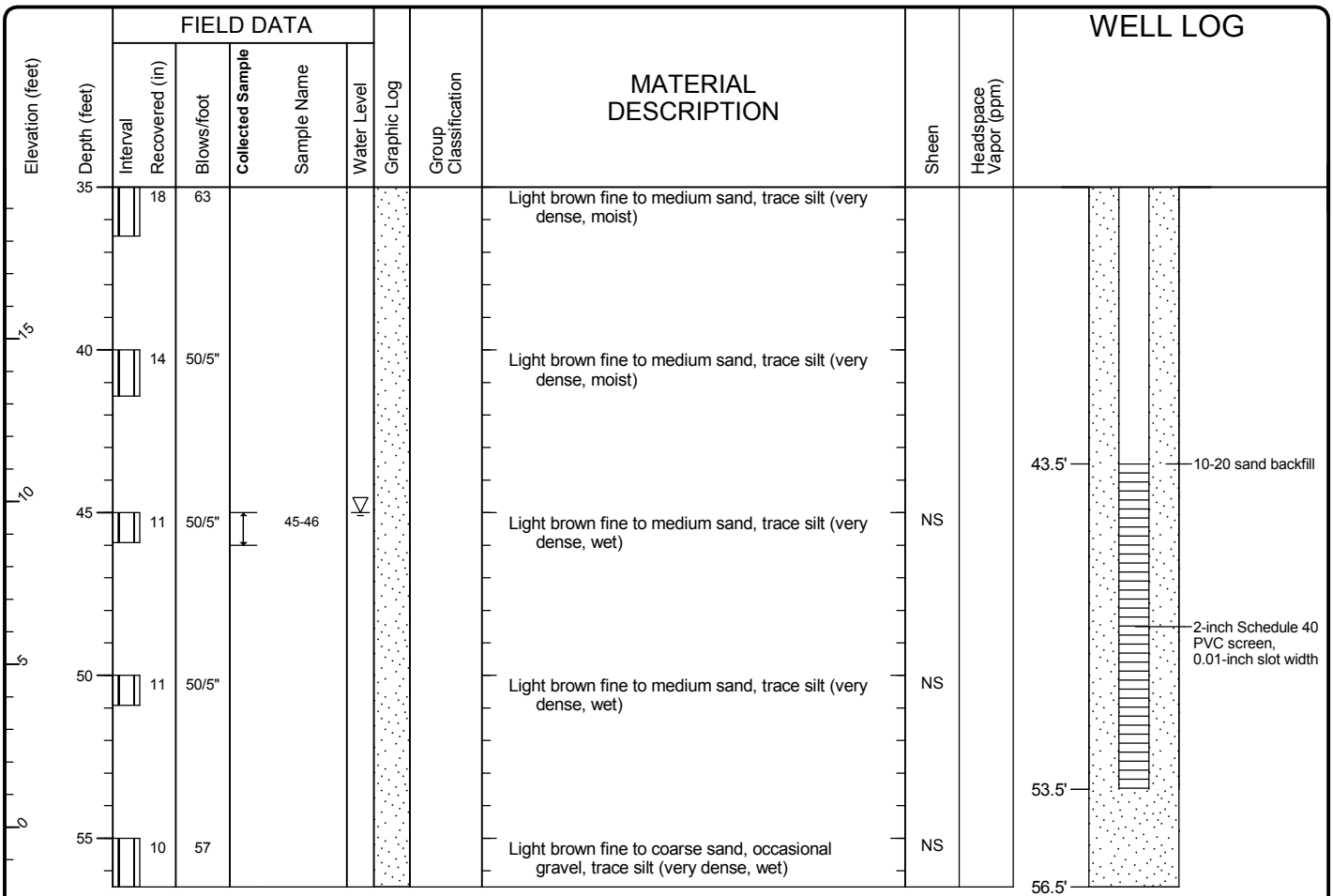
Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Log of Boring LLMW-24D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-45
Sheet 1 of 2



Note: Please see Figure A-1 for explanation of symbols

Log of Boring LLMW-24D (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-45
Sheet 2 of 2

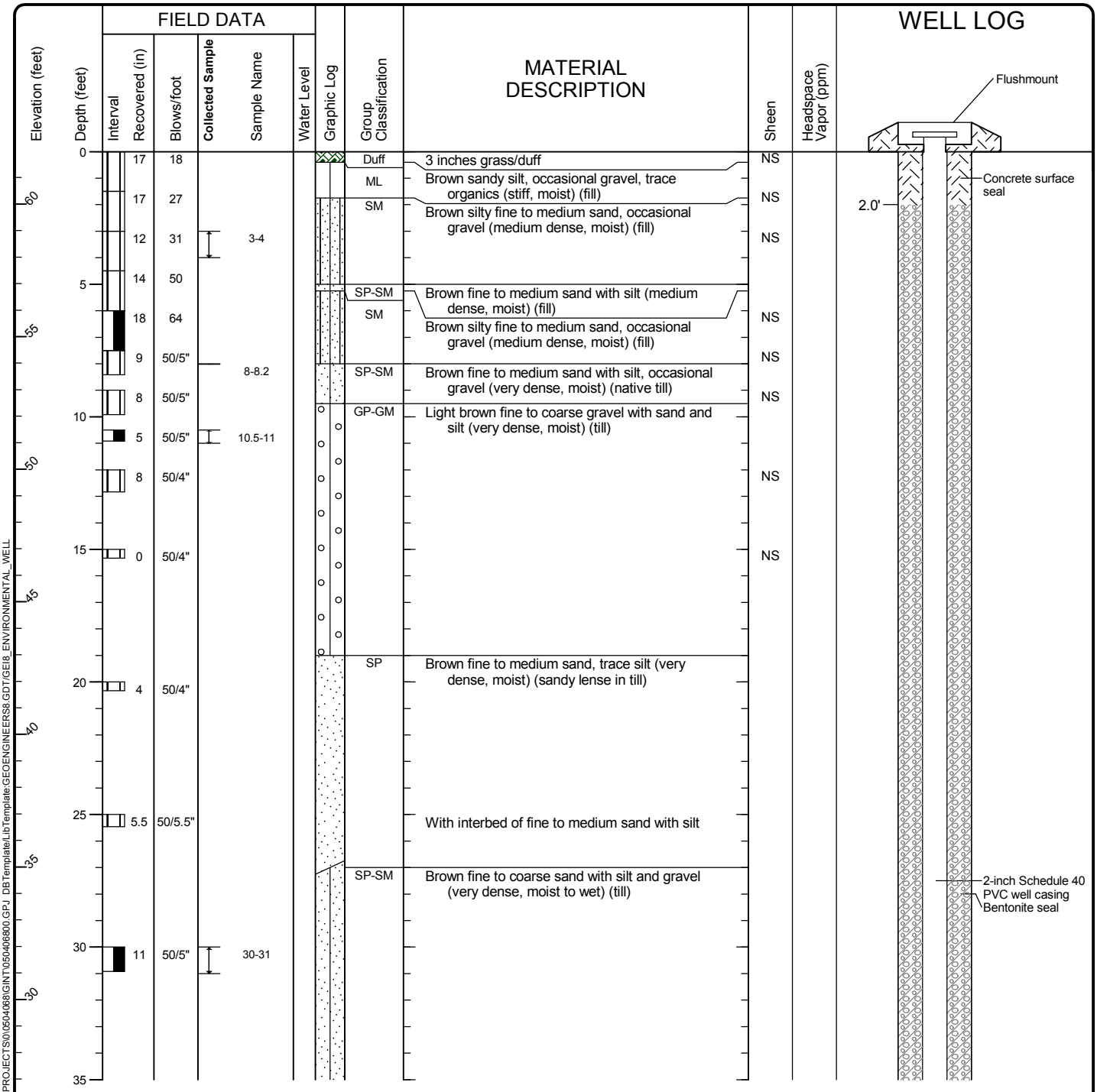
Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/19/2012	12/19/2012	65	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft) / Vertical Datum	61.9771 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371489.9394 1308367.759	Horizontal Datum	WA State Plane North 83/91

A 2 (in) well was installed on 12/19/2012 to a depth of 65 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/19/2012	55.0	7.0

Notes:



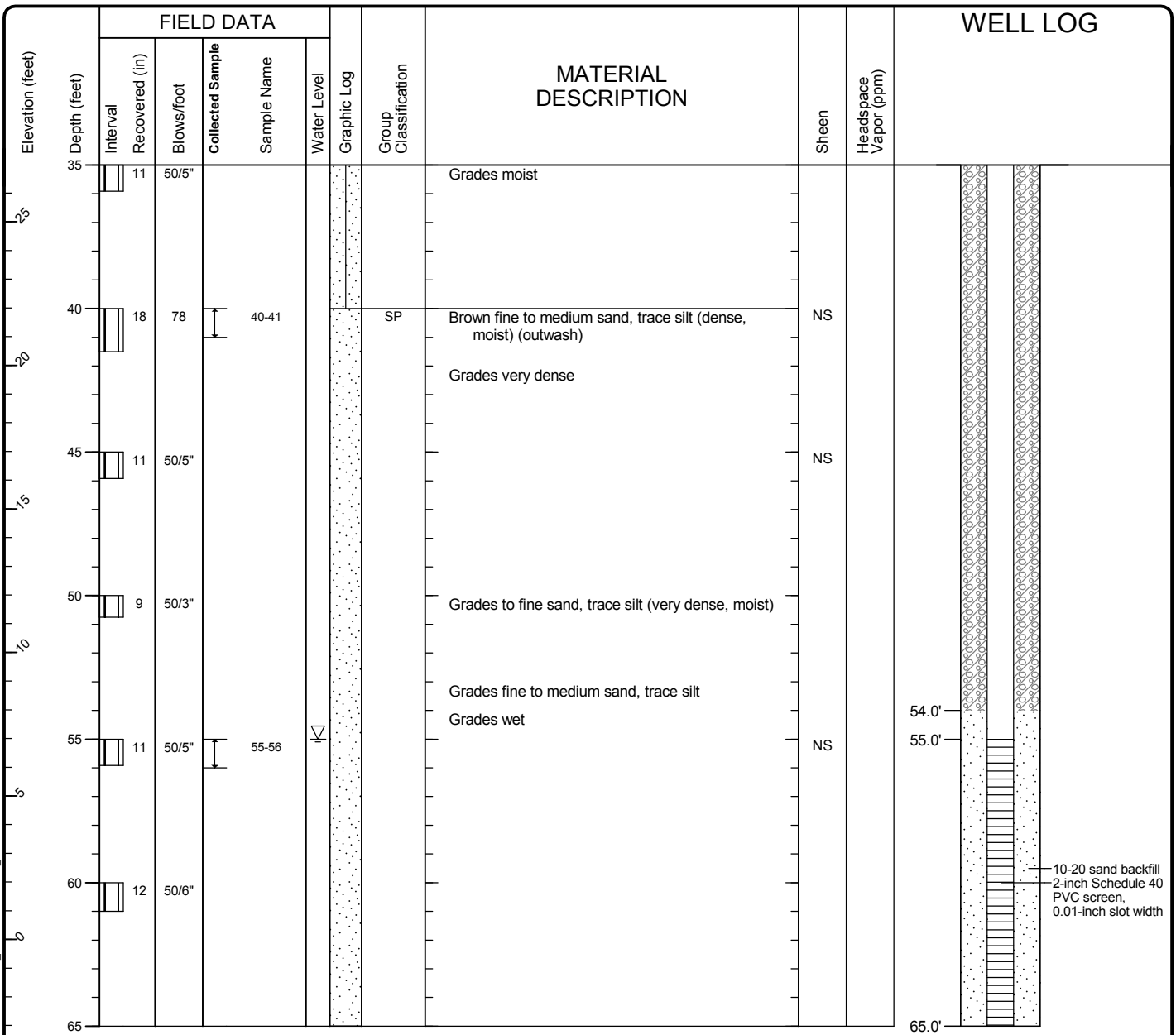
Note: Please see Figure A-1 for explanation of symbols

Log of Boring LLMW-25D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-46
Sheet 1 of 2



Note: Please see Figure A-1 for explanation of symbols

Log of Boring LLMW-25D (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-46
Sheet 2 of 2

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	1/9/2013	1/9/2013	61.5	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-59 Track Rig
Surface Elevation (ft)	61.9264	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	371259.2652	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1308465.435		

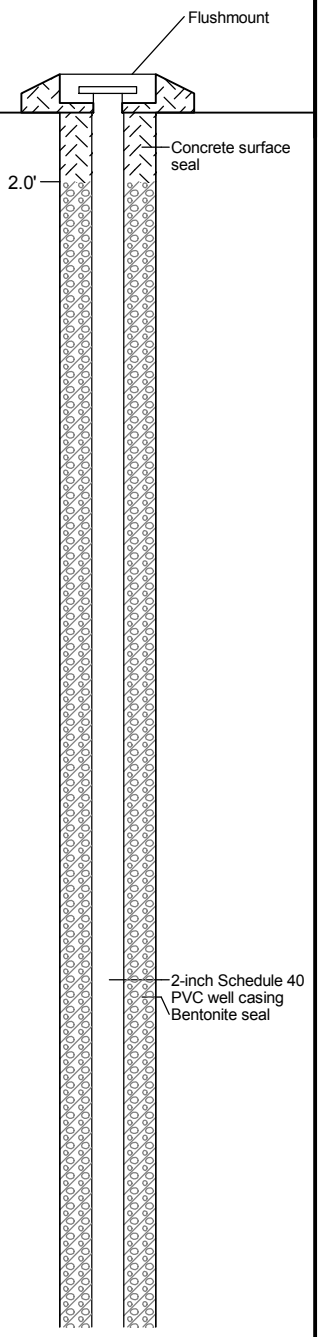
DOE Well I.D.: BHU-031
A 2 (in) well was installed on 1/10/2013 to a depth of 61.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Depth (feet)	Elevation (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
0	60		18	20					CC	4 inches concrete sidewalk	NS	
									GP-GM	Brown fine gravel with sand and silt (loose, moist) (base course, fill)		
			18	14					SM	Brown silty fine to medium sand, occasional gravel (loose, moist) (fill)	NS	
			16	25						Grades reddish-brown	NS	
5	55								SP-SM	Reddish-brown fine to medium sand with silt, occasional gravel (loose, moist) (fill)		
			15	20					SP	Brown fine to medium sand, trace silt (loose, moist) (fill)	NS	
									SM	Brown silty fine to coarse sand with gravel (loose, moist)		
			18	51						Grades with no gravel, orange-brown mottling		
			14	63						Grades brown, occasional gravel (medium dense, moist)		
10	50		15	93					SP-SM	Brown fine to coarse sand with silt, occasional gravel (very dense, moist) (native)		
			3	50/3"								
			9	50/3"								
15	45		3.5	50/3.5"								
			9	50/5"		15.5-16						
			3.5	50/3.5"								
20	40		5.5	50/5.5"						Grades with gravel		
25	35		18	45		25-26				Light brown fine to medium sand with silt (medium dense, moist)	NS	
									SP	Light brown fine to medium sand, trace silt (dense, moist)		
30	30		18	81		30-31					NS	
35												

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

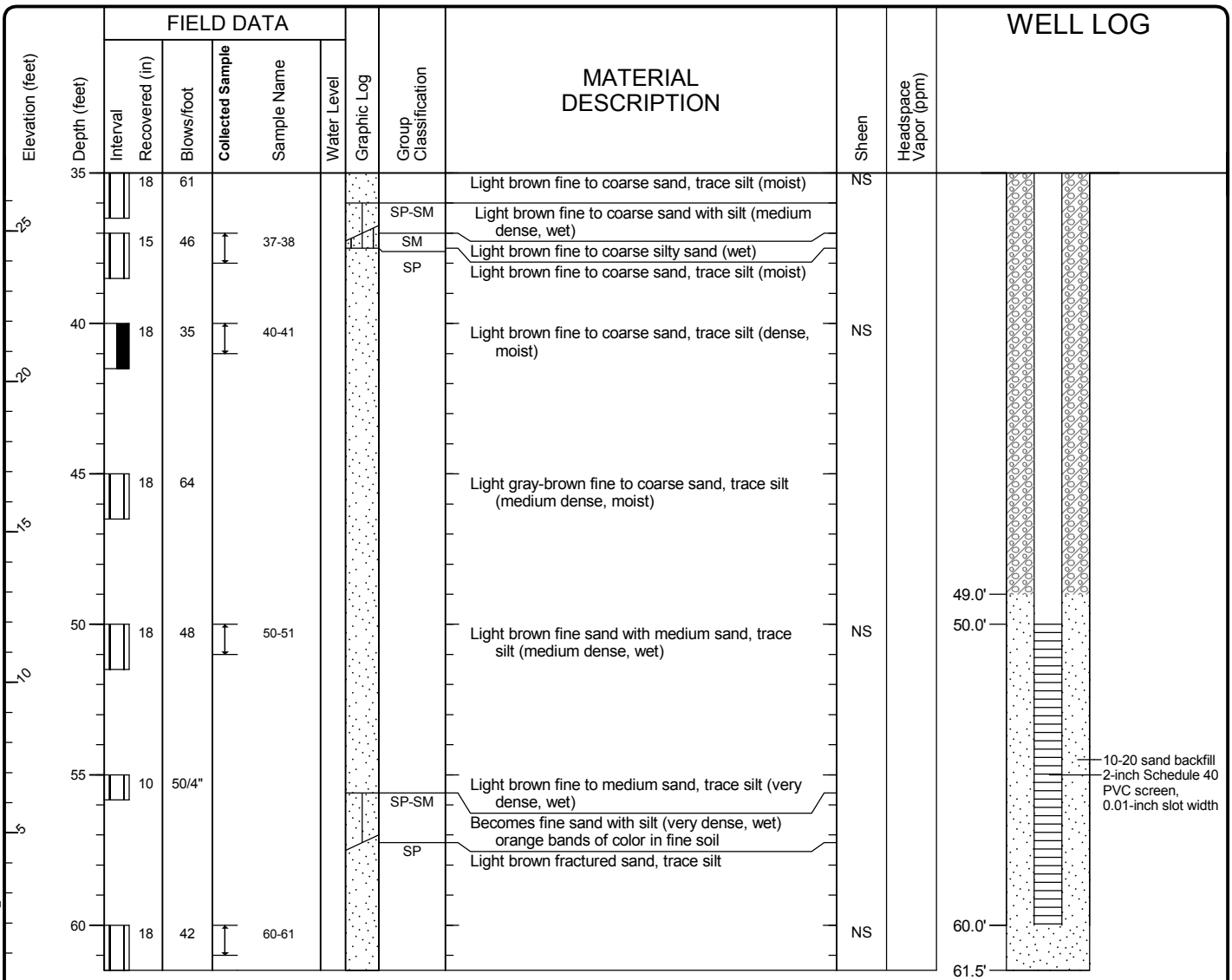
Log of Monitoring Well LLMW-27D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-47
Sheet 1 of 2

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-27D (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-47
Sheet 2 of 2

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	1/9/2013	1/9/2013	36	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-59 Track Rig
Surface Elevation (ft)	61.8712	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	371254.3715	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1308467.345		

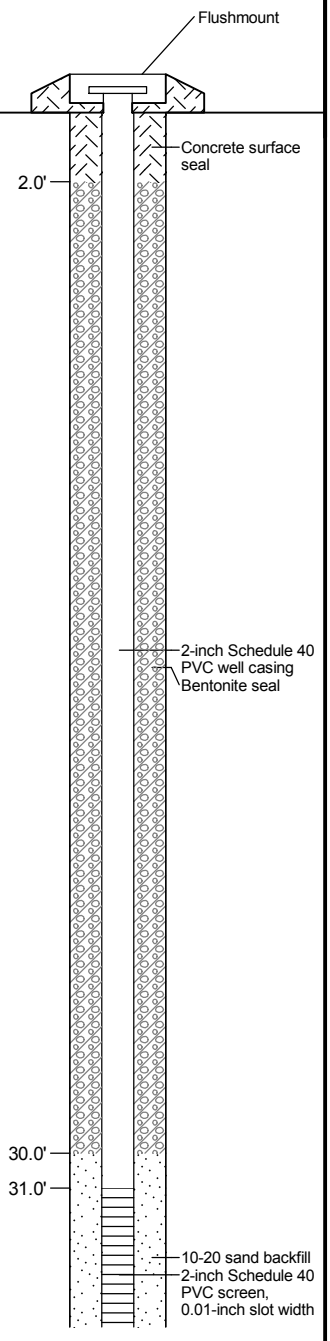
DOE Well I.D.: BHU-032
A 2 (in) well was installed on 1/9/2013 to a depth of 61.5 (ft).

Groundwater		
Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
60	0								See LLMW-27D for sampling and material description		
55	5										
50	10										
45	15										
40	20										
35	25										
30	30										
	35										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-27S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-48
Sheet 1 of 2

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample	FIELD DATA: Sample Name	FIELD DATA: Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	WELL LOG
	35											36.0'

Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-27S (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-48
Sheet 2 of 2

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	1/8/2013	1/8/2013	61.5	GRL	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-59 Track Rig
Surface Elevation (ft)	56.0371	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	370982.4647	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1308556.215		

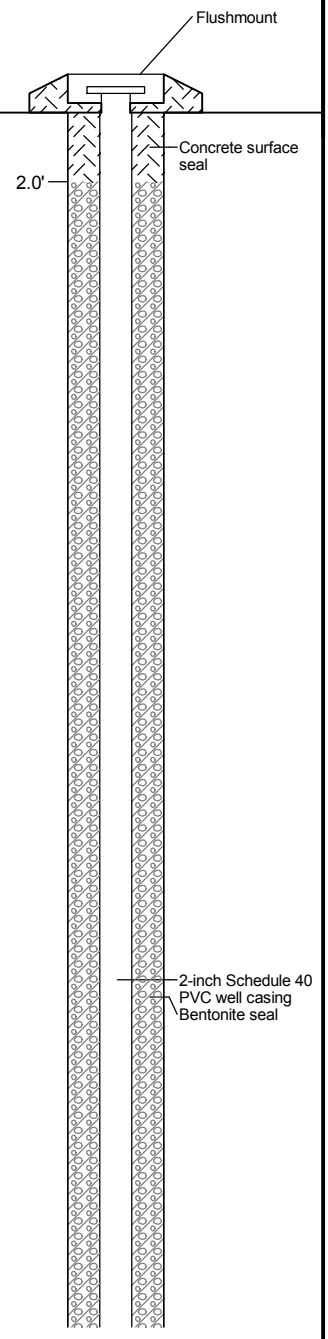
DOE Well I.D.: BHU-028
A 2 (in) well was installed on 1/8/2013 to a depth of 61.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
1/8/2013	44.1	11.9

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
55	0		15	41					AC	Asphalt concrete	NS	
									SM	Brown silty fine to coarse sand with gravel (medium dense, moist) (fill)		
			16	35		2-3				Grades dense	NS	
										Grades very dense		
			4	50/6"							NS	
50	5		1	50/5"							NS	
			15	22		6-7				Increased gravel content, grades medium dense	NS	
			12	36							NS	
			15	17							NS	
45	10									Grades loose		
			15	16						Grades medium dense	NS	
			16.5	56		12.5-13.5					NS	
									SP-SM	Brown fine to coarse sand with silt, occasional gravel (medium dense, moist) (native)		
			18	69						Grades very dense	NS	
40	15		12	76							NS	
										Grades dense		
			10	78/11"							NS	
										Grades very dense		
			18	48							NS	
										Grades to dense, lacks gravel		
35	20		15	65		20-21			SM	Brown silty fine to coarse sand, occasional gravel (medium dense, moist) (till)	NS	
			18	49							NS	
30	25		12	76/9"						Grades to very dense	NS	
									SP-SM	Brown fine to coarse sand with silt (very dense, moist) (outwash)		
25	30		15	78/9"		30-31					NS	
	35											

WELL LOG



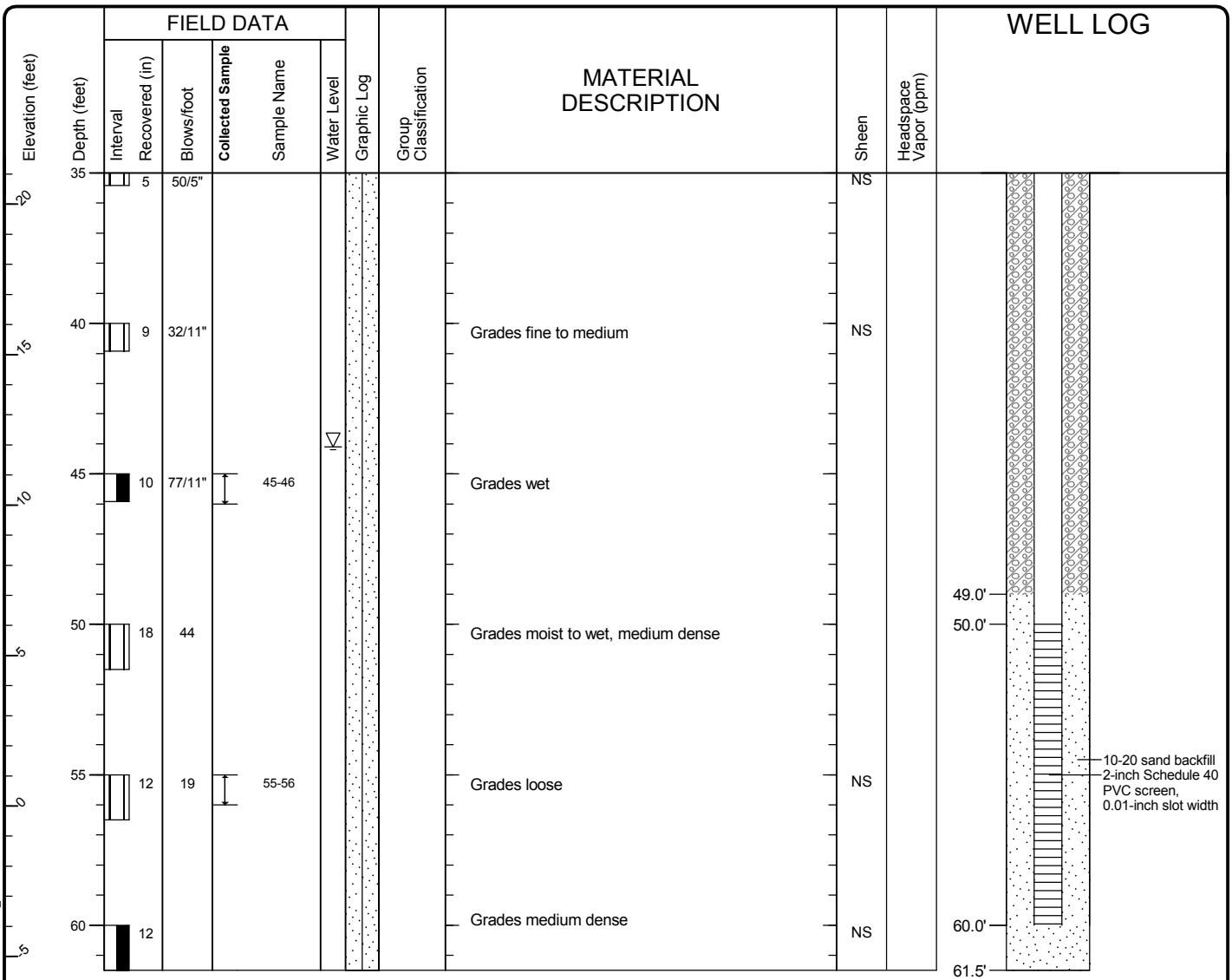
Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-29D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-49
Sheet 1 of 2



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-29D (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-49
Sheet 2 of 2

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	1/8/2013	1/8/2013	10	GRL	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-59 Track Rig
Surface Elevation (ft) / Vertical Datum	55.9093 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	370978.6854 1308557.008	Horizontal Datum	WA State Plane North 83/91

DOE Well I.D.: BHU-029
A 2 (in) well was installed on 1/8/2013 to a depth of 61.5 (ft).

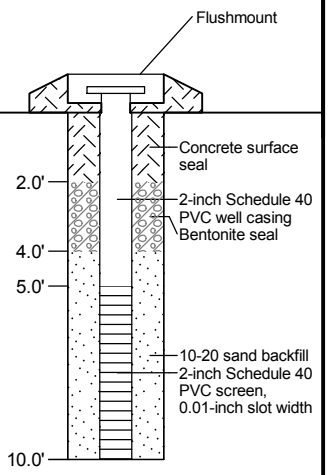
Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
55	0										
50	5										
	10										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-29S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-50
Sheet 1 of 1

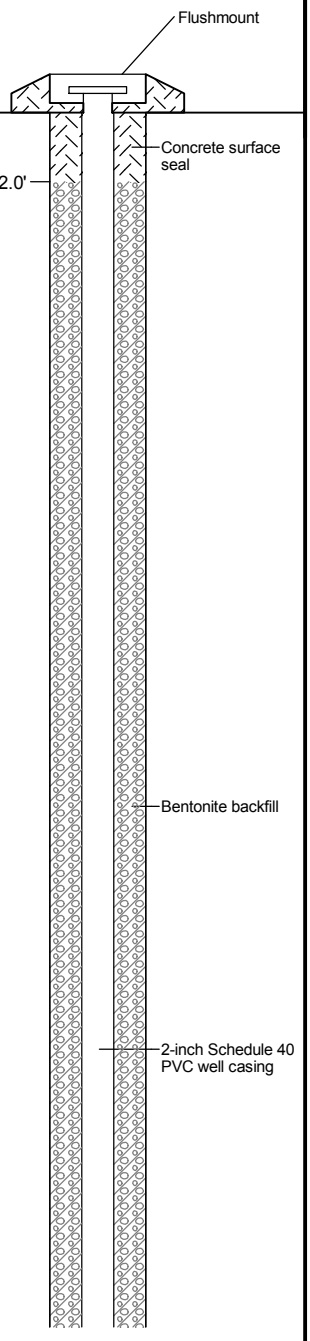
Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	1/23/2013	1/23/2013	64	GRL	Holocene	Hollow-stem Auger

Hammer Data	Drilling Equipment	
140 (lbs) / 30 (in) Drop	CME 850	A 2 (in) well was installed on 1/23/2013 to a depth of 64 (ft).
Surface Elevation (ft) Vertical Datum: 59	Top of Casing Elevation (ft)	Groundwater: Date Measured 1/23/2013; Depth to Water (ft) 46.0; Elevation (ft) 13.0
Easting (X) Northing (Y)	Horizontal Datum	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
55	0		12	30					SP-SM	Brown fine to coarse sand with silt, occasional gravel, and trace organic matter (medium dense, moist) (fill)	NS	
			18	44						Grades to darker brown with gravel		
									SM	Brown silty fine sand with gravel (medium dense, moist) (fill)		
			13	14		3-4				Grades fine to coarse, occasional gravel		
50	5		15	4						Grades gray-brown, fine, loose		
			1	3								
			12	7						Grades to very loose		
										2 inch oxidized iron stained layer, contains ~5% black pieces of decomposing wood		
45	10		17	50		9.1-9.3			SM	Light brown silty fine to coarse sand with occasional gravel (medium dense, moist) (native) (weathered till)		
			18	41						Grades very dense		
			11	50/5"		12-13				Rig chatter at 12 feet Grades to no gravel (till)		
40	15		18	32						Grades fine, dense		
			16	50/4"								
			11	50/5"						Grades occasional gravel, very dense		
			9	50/3"						Grades brown, fine to coarse		
35	20		5	50/5"		20-20.5						
										Less chatter		
30	25		5	50/5"		25-25.5			SP-SM	Brown fine to coarse sand with silt and occasional gravel (very dense, moist) (till)		
									SM	Brown silty fine to coarse sand with occasional gravel (very dense, moist) (till)		
25	30		5	50/5"								
	35											

WELL LOG



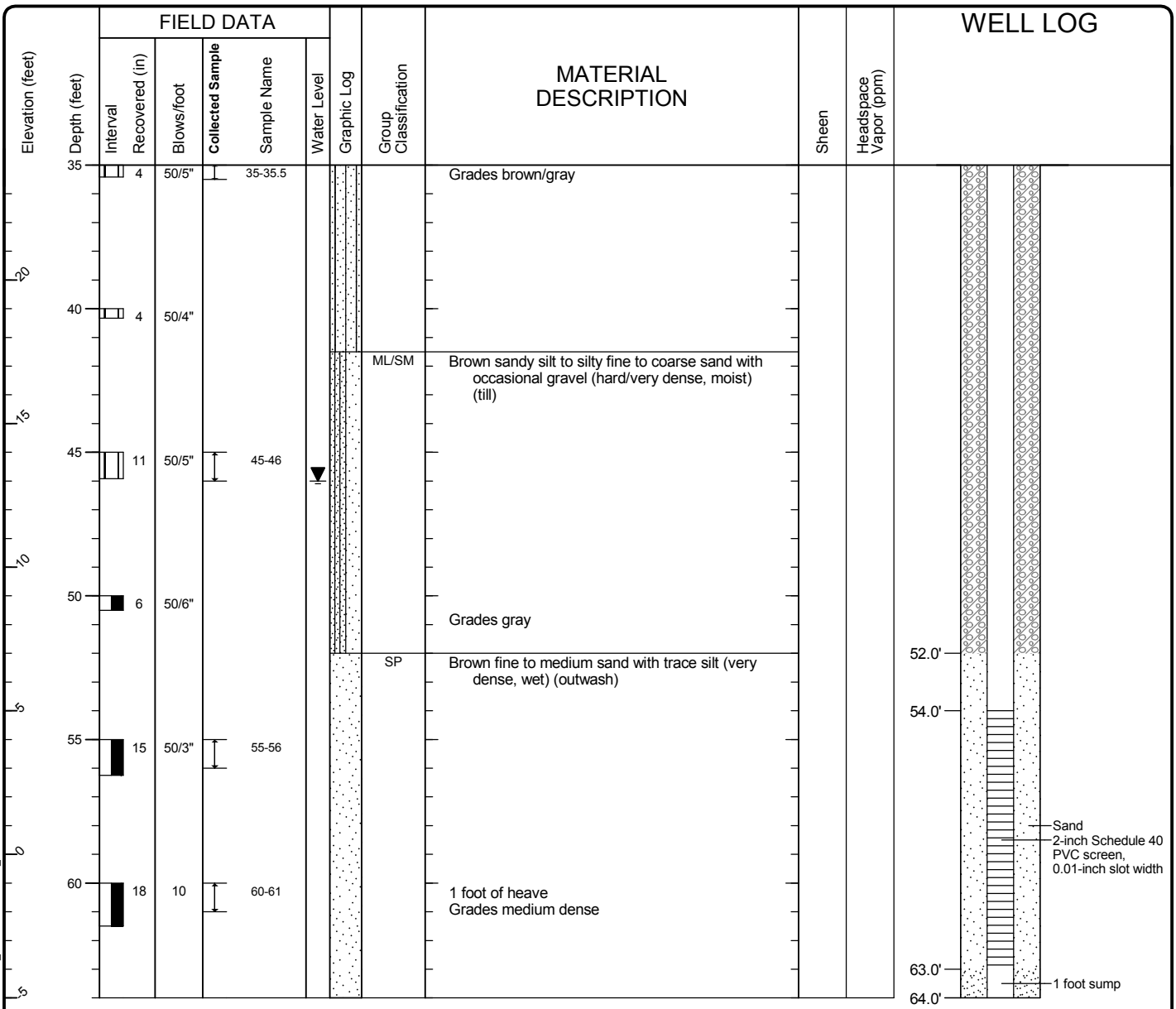
Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-31D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-51
Sheet 1 of 2



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-31D (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-51
Sheet 2 of 2

Drilled	Start	End	Total Depth (ft)	Logged By	Driller	Drilling Method
	1/3/2013	1/7/2013	45.5	AMW	Holocene Drilling	Hollow-stem Auger

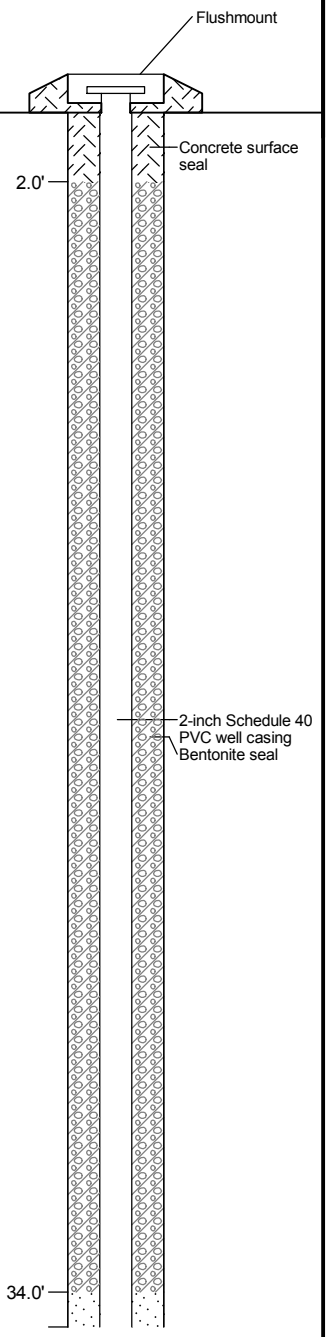
Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-59 Track Rig
Surface Elevation (ft)	37.5673	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	369961.949	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1308914.525		

DOE Well I.D.: BHU-094
A 2 (in) well was installed on 1/7/2013 to a depth of 45.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		18	49					AC	7 inches asphalt concrete	NS	
			18	34					SP-SM	Light brown fine to coarse sand with gravel, with silt (medium dense, moist) (fill)	NS	
35			14	14		3-4					NS	
			14	10		4.5-4.7			SM	Brown to orange-brown fine to coarse silty sand with gravel, occasional brick fragments (loose, moist) (fill)	NS	
	5		11	50/6"					GM	Light orange-brown silty fine to coarse sand with gravel (very loose, moist) (fill/colluvium)	NS	
30			17	40					SM	Gray-brown silty fine to coarse gravel with sand (very dense, moist) (weathered till)	NS	
			18	28						Orange-brown mottled to gray-brown silty fine to coarse sand with gravel (medium dense, wet) (weathered till)	NS	
	10		11	23		10.5-11.5				Gray-light brown mottled orange silty fine to coarse sand with gravel (medium dense, wet) (till)	NS	
25			7	50/3"					SM	Light brown silty fine to coarse sand with gravel (loose, wet) (till)	NS	
			10	50/4"						Gray-brown silty fine to coarse sand with gravel (very dense, moist) (till)	NS	
			11	50/4"						Gray silty fine to coarse sand with gravel (very dense, moist) (till)	NS	
	15		9	50/3"						Gray silty fine to coarse sand with gravel (very dense, moist) (till)	NS	
20										Becomes light brown		
										Light brown silty fine to coarse sand with gravel (<3") (very dense, moist) (till)		
	20		11	50/5"						Light brown silty fine to coarse sand with gravel (very dense, moist) (till)	NS	
15												
	25		6	50/6"		24-24.5				Gray silty fine to coarse sand, occasional gravel (very dense, moist) (till)	NS	
									SP-SM	Light brown fine sand with silt (very dense, moist)		
10			12	50/5"							NS	
	30		18	100					SP	Light brown fine sand, trace silt (very dense, moist) moderately laminated	NS	
									SM	Light brown fine silty sand with a clay filled verticle fracture 4" long		
5									ML	Light tan poorly laminated silt with sand (hard, moist)		
									ML	Light brown fine sandy silt (very stiff, moist) moderately laminated		
	35		14	50/4"					SP	Light brown fine to medium sand, trace silt (very	NS	



Note: Please see Figure A-1 for explanation of symbols

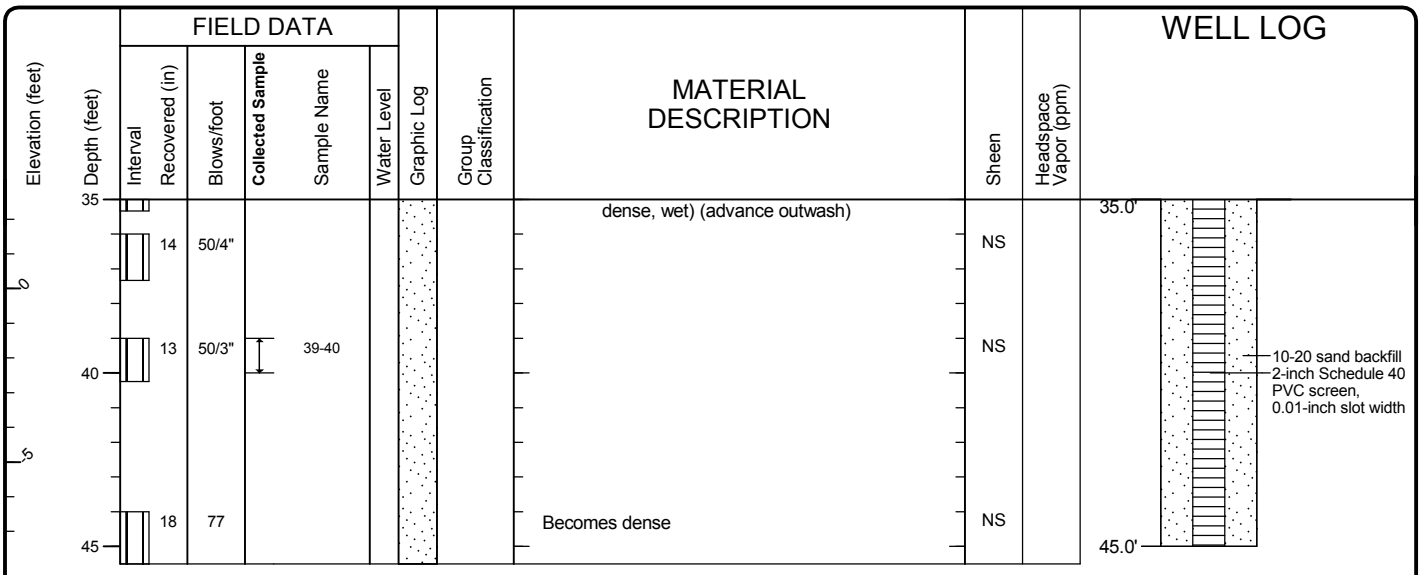
Log of Monitoring Well LLMW-33D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-52
Sheet 1 of 2

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-33D (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-52
Sheet 2 of 2

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	1/3/2013	1/7/2013	10.5	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-59 Track Rig
Surface Elevation (ft) / Vertical Datum	37.7314 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	369957.8312 / 1308912.956	Horizontal Datum	WA State Plane North 83/91

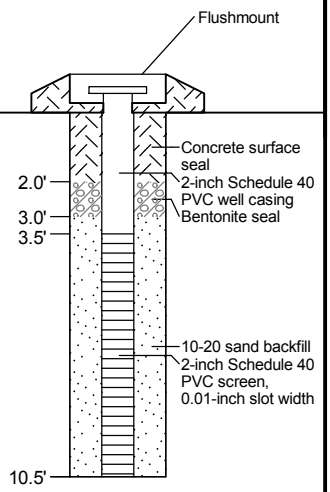
DOE Well I.D.: BHU-095
A 2 (in) well was installed on 1/7/2013 to a depth of 45.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0							See LLMW-33D for sampling and material description		
-35										
	5									
-30										
	10									

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-33S

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-53
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/20/2012	12/20/2012	75.3	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft) / Vertical Datum	53.2995 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	368696.1556 1308930.669	Horizontal Datum	WA State Plane North 83/91

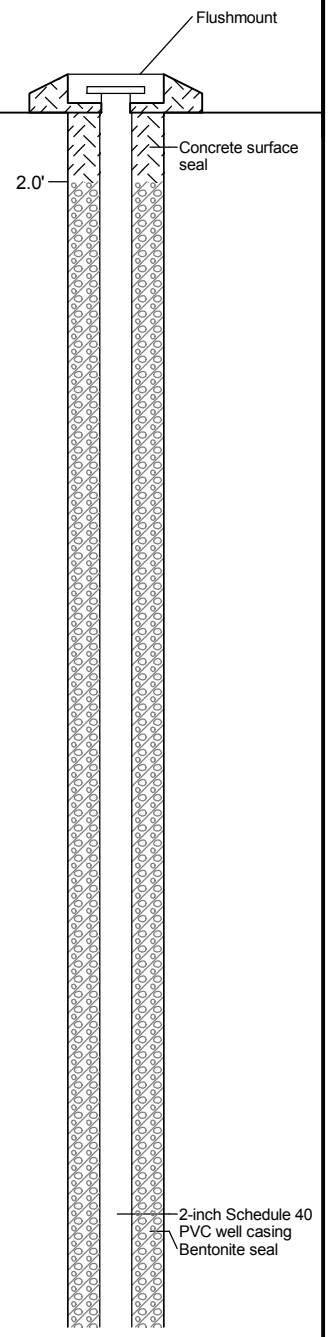
DOE Well I.D.: BHU-046
A 2 (in) well was installed on 12/19/2012 to a depth of 75.3 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/19/2012	70.0	-16.7

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0								AC	Asphalt concrete		
									SM	Brown silty fine to coarse sand with gravel (moist)		
			8	20						Light brown silty fine sand with medium to coarse sand, occasional gravel (loose, moist)	NS	
50			2	23							NS	
	5		14	10		4.5-5.5				Light brown silty fine sand with medium to coarse sand, with gravel (very loose, moist)	NS	
			13	5		6-6.2				Becomes orange-brown	NS	
										Orange-brown silty fine to coarse sand with gravel, trace carbonized wood (very loose, moist to wet)	NS	
45			18	26						Orange-brown to light brown mottled silty fine to coarse sand, occasional gravel (medium dense, moist to wet)	NS	
			14	16					SP-SM		NS	
	10									Gray-light brown with orange mottling fine to coarse sand with silt (loose, moist)		
			15	14							NS	
						11.5-11.7			SP	Light gray-brown slight orange mottling fine to coarse sand with silt, occasional gravel (loose, wet)	NS	
40			17	50/5"					SM		NS	
			10	50/4"						Light brown fine to medium sand, trace silt (loose, wet)	NS	
	15									Light brown silty fine sand, occasional medium to coarse sand, occasional gravel (very dense, wet) (native)		
			2	50/2"							NS	
										Light brown silty fine to medium sand, with gravel (very dense, moist to wet)		
35										Light brown silty fine to medium sand, with gravel and coarse sand (very dense, wet)		
	20		0	50/5"						3 inch rock in shoe	NS	
30												
	25		10	50/5"						Light brown silty fine to coarse sand, occasional gravel (very dense, moist)	NS	
25									SP-SM	Light brown fine to coarse sand with silt, with gravel (very dense, moist)		
	30		5	50/5"							NS	
20									SM	Gray silty fine to medium sand, occasional coarse sand and gravel (very dense, moist)		
	35											

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

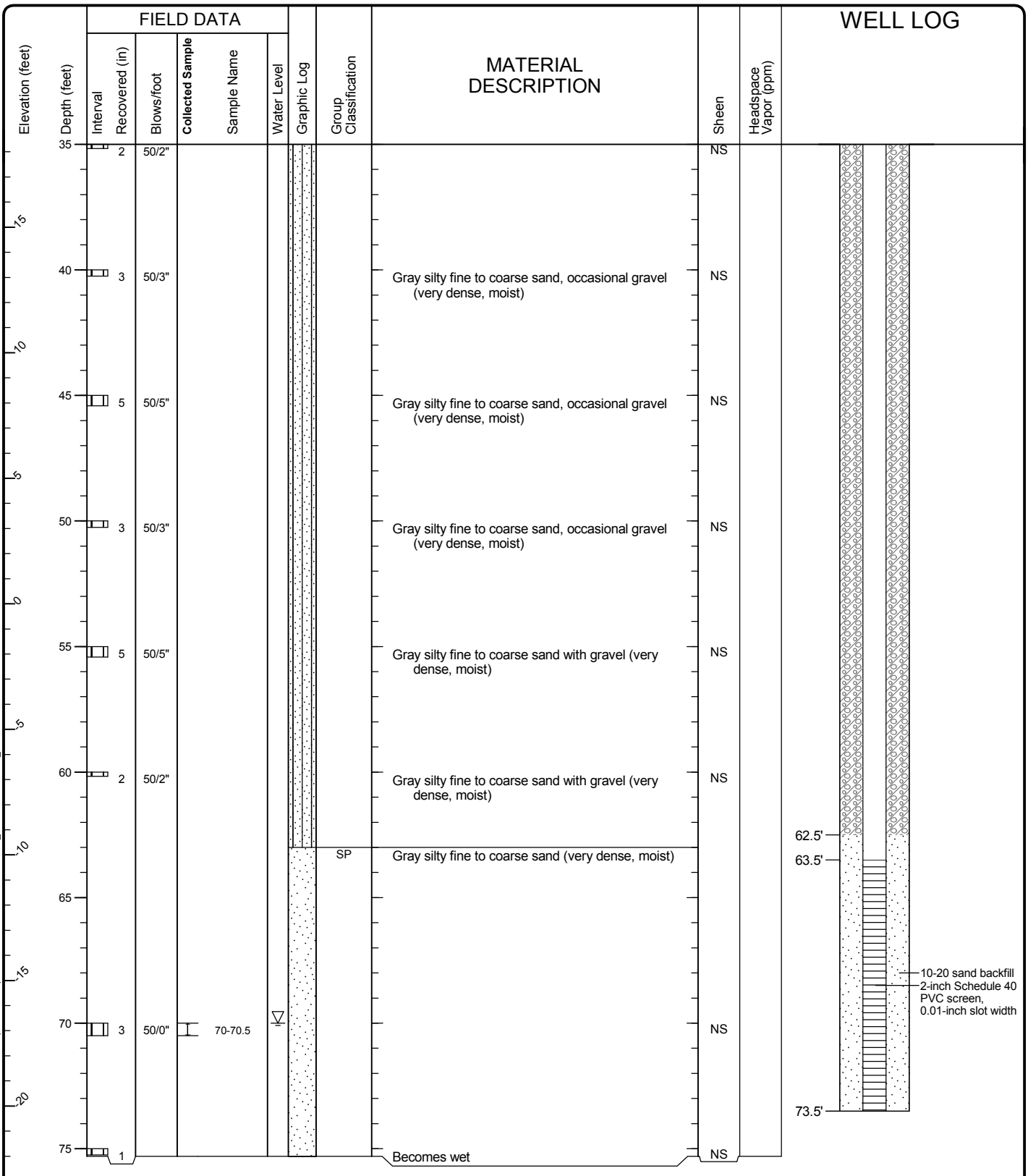
Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Log of Monitoring Well LLMW-34D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-54
Sheet 1 of 2



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-34D (continued)

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-54
Sheet 2 of 2

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/20/2012	12/20/2012	12	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft)	53.2239	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	368693.8425	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1308931.771		

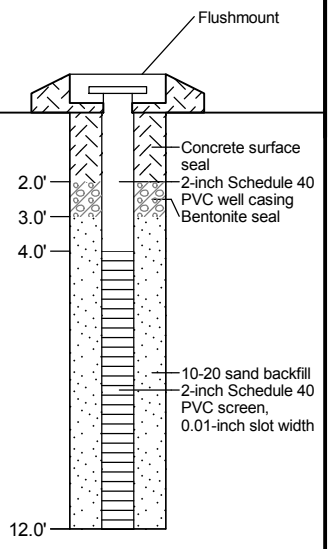
DOE Well I.D.: BHU-047
A 2 (in) well was installed on 12/20/2012 to a depth of 75.3 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0								See LLMW-34D for sampling and material description		
50											
	5										
45											
	10										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-34S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-55
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
1/7/2013	1/7/2013	20	GRL	Holocene Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
12.6436 NAVD88	Pneumatic	AMS Powerprobe 9500 D

Easting (X) / Northing (Y)	System Datum	Groundwater: Date Measured	Depth to Water (ft)	Elevation (ft)
373990.7175 / 1306949.75	WA State Plane North 83/91			

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
10	0		36						GP	Gray fine to coarse gravel with sand, trace silt (moist) (fill)	NS		
									Wood	Brown wood debris			
	5		40			4-5			SP-SM	Brown fine to coarse sand with silt and gravel, trace wood debris (moist) (fill)	NS		
										Grades to wet at 5 feet			
5						6-7			Wood	Brown wood debris with brown fine to medium sand with silt, occasional gravel (wet) (fill)	NS		
			40								NS		
									SP-SM	Brown fine to coarse sand with silt and gravel, trace wood debris (wet) (fill)			
0	10					10.8-11			ML	Brown silt, trace organics (wet) (native)	NS		
											NS		
						13-14				Grades with 1 inch sand interbeds	NS		
	15									Grades with wood, trace sand			
-5			48						SP	Gray fine to medium sand, trace silt, trace wood (wet)	NS		
	20					19-20					NS		

Note: Please see Figure A-1 for explanation of symbols

Log of Boring LLSB-01

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-56
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_STANDARD

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
1/7/2013	1/7/2013	20	GRL	Holocene Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
14.7497 NAVD88	Pneumatic	AMS Powerprobe 9500 D

Easting (X) / Northing (Y)	System Datum	Groundwater: Date Measured	Depth to Water (ft)	Elevation (ft)
373634.9832 / 1307691.419	WA State Plane North 83/91			

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
10	0		30						SP	Dark brown fine to coarse sand, trace silt, occasional gravel (moist) (fill)			
									SP	Brown-orange fine to medium sand (moist) (fill)			
						3-4				Gravel			
	5		48							Grades to brown Grades to wet Grades to medium to coarse sand			
5			48										
	10					10-10.2			ML	Gray silt, trace organics (wet) (native)			
						10.6-10.8			Wood	Wood (wet)			
			0			12-13			ML	Gray silt, trace organics, trace sand (wet) Grades sandy silt			
0									SP	Gray fine sand, trace silt, trace wood (wet)			
	15					15-16				Grades fine to medium Lacks wood			
			40							Grades <1cm layers of wood			
-5						19-20							
	20												

Note: Please see Figure A-1 for explanation of symbols

Log of Boring LLSB-02

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-57
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
1/7/2013	1/7/2013	20	GRL	Holocene Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
15.0686 NAVD88	Pneumatic	AMS Powerprobe 9500 D

Easting (X) / Northing (Y)	System Datum	Groundwater: Date Measured	Depth to Water (ft)	Elevation (ft)
373543.2766 / 1308050.649	WA State Plane North 83/91			

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		44						SP	Brown fine to medium sand (moist) (fill)			
						2-3					NS		
						3-4					NS		
			46							Grades to brown-orange			
10	5										NS		
			48						Wood	Wood debris (wet) (fill)			
	10					9.5-10.5			SP	Gray fine to coarse sand trace silt (wet) (fill)	NS		
5						11-11.2			ML	Gray silt, trace organics (wet) (native)	NS		
			40										
						13-14					NS		
0	15								SP	Gray fine to medium sand, trace silt (wet)	NS		
			44										
											NS		
						19-20					NS		
	20									Refusal due to heaving sands (wet)			

Note: Please see Figure A-1 for explanation of symbols

Log of Boring LLSB-03

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-58
Sheet 1 of 1

APPENDIX B
Survey Data

Garrett R. Leque

From: Garrett R. Leque
Sent: Monday, February 11, 2013 9:05 AM
To: Aaron M. Waggoner
Subject: FW: Monitor Wells-Everett Smelter
Attachments: GEOE0020-FIELD NOTES.pdf

From: Gil Laas [mailto:GJLA@deainc.com]
Sent: Wednesday, January 23, 2013 12:34 PM
To: Garrett R. Leque
Subject: Monitor Wells-Everett Smelter

Garrett,

Attached is a spread sheet with all the wells we located over the last few days. The format is as such: Point number, Northing, Easting, Elevation, and description. The descriptions are as follows: TOP CASE= top of metal lid to well. PVC NORTH=north edge of pvc pipe inside the well. GROUND= a ground shot elevation adjacent to well in areas in which the well case is NOT flush with the ground. In areas in which the lid was flush with the ground we did not measure a separate ground elevation.

Wells LLMW-31S and LLMW-31D were not set at the time of this survey.

I also included a copy of the surveyor's field notes for your reference.

The coordinate system is Washington State Plane North coordinate system 83/91 in grid values. Vertical datum is NAVD88. US survey feet.

Please call with any comments or questions.

Thanks

LLMW-31D was surveyed January 28, 2013 and has been included in the table below. LLMW-31S was not installed.

Gil Laas, P.L.S., C.Fed.S,
Project Surveyor | Associate
David Evans and Associates, Inc. | Surveying and Geomatics
1620 W. Marine View Dr. Suite 200 | Everett, WA 98201 | www.deainc.com
d: 425.405.1513 | c: 360.739.9853 | gjla@deainc.com

Carly Nadasky

From: Garrett R. Leque
Sent: Monday, February 11, 2013 9:04 AM
To: Aaron M. Waggoner
Subject: FW: Monitor Wells-Everett Smelter
Attachments: GRID-GEOE0118-0121CAG-WITH DESCRIPTION.csv

From: Gil Laas [mailto:GJLA@deainc.com]
Sent: Monday, January 28, 2013 10:43 AM
To: Garrett R. Leque
Subject: RE: Monitor Wells-Everett Smelter

Garrett,

Here is the updated spreadsheet with the last well.

Stop by anytime for the keys.

Gil

From: Garrett R. Leque [mailto:gleque@geoengineers.com]
Sent: Monday, January 28, 2013 9:35 AM
To: Gil Laas
Subject: RE: Monitor Wells-Everett Smelter

ok sounds good. There is one well; LLMW31D, and it is located across the street (east of) from the location shown on the Figure I sent you. It is located just north of the little City park that overlooks the industrial area. It is a flush well with one stickup bollard...

Thanks,
G

From: Gil Laas [mailto:GJLA@deainc.com]
Sent: Monday, January 28, 2013 9:33 AM
To: Garrett R. Leque
Subject: RE: Monitor Wells-Everett Smelter

Garrett,

We will shoot the two new wells this morning. I will send you the updated info by the end of the day. No worries about budget.

You can have someone pick up the keys this afternoon or tomorrow.

Thanks

Gil

From: Garrett R. Leque [mailto:gleque@geoengineers.com]
Sent: Monday, January 28, 2013 9:12 AM
To: Gil Laas
Subject: RE: Monitor Wells-Everett Smelter

Thanks!
After DEA did the work we installed one more well; LLMW31. Do you think it would be possible to get that included within the budget?

Thanks,
G

From: Gil Laas [mailto:GJLA@deainc.com]
Sent: Wednesday, January 23, 2013 12:34 PM
To: Garrett R. Leque
Subject: Monitor Wells-Everett Smelter

Garrett,

Attached is a spread sheet with all the wells we located over the last few days. The format is as such: Point number, Northing, Easting, Elevation, and description. The descriptions are as follows: TOP CASE= top of metal lid to well. PVC NORTH=north edge of pvc pipe inside the well. GROUND= a ground shot elevation adjacent to well in areas in which the well case is NOT flush with the ground. In areas in which the lid was flush with the ground we did not measure a separate ground elevation.

Wells LLMW-31S and LLMW-31D were not set at the time of this survey.

I also included a copy of the surveyor's field notes for your reference.

The coordinate system is Washington State Plane North coordinate system 83/91 in grid values. Vertical datum is NAVD88. US survey feet.

Please call with any comments or questions.

Thanks

Gil Laas, P.L.S., C.Fed.S,
Project Surveyor | Associate
David Evans and Associates, Inc. | Surveying and Geomatics
1620 W. Marine View Dr. Suite 200 | Everett, WA 98201 | www.deainc.com
d: 425.405.1513 | c: 360.739.9853 | gjla@deainc.com

Appendix B

Survey Data

Point Number	Northing	Easting	Elevation	Description
10000	373999.5776	1306940.8470	12.46	1501R-TOP CASE
10001	373999.2866	1306940.8230	11.94	1501R PVC NORTH
10002	373990.7175	1306949.7500	12.64	LLSB-1
10003	373634.9832	1307691.4190	14.75	LLSB-2
10004	373543.2766	1308050.6490	15.07	LLSB-3
10005	373911.1708	1307952.9290	16.08	01D-TOP CASE
10006	373910.9344	1307952.7240	15.74	01D-PVC NORTH
10007	373726.9180	1307221.6340	20.54	MW-UNK-TOP CASE
10008	373726.7456	1307221.4940	20.05	MW-UNK-PVC NORTH
10009	373729.7908	1307217.3640	15.98	MW-UNK-GROUND
10010	373617.7071	1307454.3610	17.19	MW-UNK-2-TOP BASE AT GROUND-BENT
10011	372887.0090	1307921.3900	15.38	02D-TOP CASE
10012	372886.6753	1307921.1850	15.15	02D PVC NORTH
10013	372968.6297	1308356.2020	17.64	03S-TOP CASE
10014	372968.3797	1308356.3800	17.45	03S-PVC NORTH
10015	372968.4709	1308355.5780	14.52	03S-GROUND
10016	372965.2847	1308351.9080	17.79	03D-TOP CASE
10017	372965.2972	1308351.7320	17.45	03D-PVC NORTH
10018	372965.5718	1308351.5110	14.43	03D-GROUND
10019	372938.3312	1309085.1330	14.42	05S-TOP CASE
10020	372938.0230	1309084.8030	14.05	05S-PVC NORTH
10021	372934.1281	1309088.2700	14.39	05D-TOP CASE
10022	372933.9143	1309087.9300	13.92	05D-PVC NORTH
10023	372578.2673	1309467.0870	14.06	07S-TOP CASE
10024	372578.1202	1309467.2720	13.82	07S-PVC NORTH
10025	372580.8285	1309464.7630	14.09	07D-TOP CASE
10026	372580.6617	1309464.9380	13.81	07D-PVC NORTH
10027	372477.6634	1309132.4260	12.73	06S-TOP CASE
10028	372477.2658	1309132.4950	12.49	06S-PVC NORTH
10029	372472.7325	1309133.8720	12.71	06D-TOP CASE
10030	372472.4759	1309133.8230	12.29	06D-PVC NORTH
10031	371929.4722	1309290.9450	13.15	09S-TOP CASE
10032	371929.1754	1309290.9440	12.57	09S-PVC NORTH
10033	371933.0232	1309291.5300	13.18	09D-TOP CASE
10034	371932.7400	1309291.5290	12.79	09D-PVC NORTH
10035	372212.5643	1309788.4460	16.65	08S-TOP CASE
10036	372212.3650	1309788.4670	16.21	08S-PVC NORTH
10037	372213.2542	1309788.2490	13.21	08S-GROUND
10038	372208.8338	1309788.8870	16.62	08D-TOP CASE
10039	372208.7778	1309789.0540	16.26	08D-PVC NORTH
10040	372209.3701	1309788.5690	13.45	08D-GROUND
10041	371825.3721	1310349.5720	19.88	11S-TOP CASE
10042	371825.3634	1310349.5860	19.76	11S-PVC NORTH
10043	371826.1136	1310349.2310	16.00	11S-GROUND
10044	371822.0995	1310350.8190	19.86	11D-TOP CASE
10045	371821.8957	1310350.7800	19.71	11D-PVC NORTH
10046	371822.9079	1310350.2610	16.03	11D-GROUND
10050	371319.7638	1310602.2140	18.53	17S-TOP CASE
10051	371319.6439	1310602.2280	18.27	17S-PVC NORTH
10052	371320.3207	1310602.2830	15.32	17S-GROUND
10053	371317.1396	1310602.9420	18.63	17D-TOP CASE
10054	371317.0587	1310602.9620	18.29	17D-PVC NORTH
10055	371317.6575	1310603.0720	15.27	17D-GROUND
10056	370542.1375	1310748.1650	15.11	20D-TOP CASE
10057	370541.8637	1310748.3440	14.92	20D-PVC NORTH
10058	370542.4429	1310748.1780	11.32	20D-GROUND

Point Number	Northing	Easting	Elevation	Description
10059	370543.0710	1310753.2670	11.23	PZ-3B-PVC NORTH
10060	370542.7696	1310753.2970	11.75	PZ-3B-TOP CASE
10061	370504.9847	1310755.1880	14.16	PZ-3A-PVC NORTH
10062	370504.7144	1310755.0800	14.74	PZ-3A-TOP CASE
10063	370188.7720	1310224.8770	14.60	19D-TOP CASE
10064	370188.5613	1310224.9320	14.22	19D-PVC NORTH
10065	370189.3895	1310224.8460	11.64	19D-GROUND
10066	370205.8714	1310306.7650	11.34	PZ-1B-PVC NORTH
10067	370205.6506	1310306.9870	13.74	PZ-1B-TOP CASE
10068	370216.1134	1310344.1870	13.33	PZ-1A-PVC NORTH
10069	370089.9137	1310537.2860	12.99	PZ-2A-PVC NORTH
10070	370089.9303	1310537.3100	13.50	PZ-2A-TOP CASE
10071	370050.4818	1310539.9430	12.02	PZ-2B-PVC NORTH
10072	370050.6105	1310539.6630	12.87	PZ-2B-TOP CASE
10073	370215.8348	1310344.3790	14.47	PZ-1A-TOP CASE
10074	369172.9406	1310445.5870	12.87	22S-PVC NORTH
10075	369173.0090	1310445.6340	13.18	22S-TOP CASE
10076	369167.8989	1310446.1630	12.80	22D-PVC NORTH
10077	369167.8357	1310446.0910	13.14	22D-TOP CASE
10078	368222.2067	1310277.6010	25.54	23S-PVC NORTH
10079	368222.1107	1310277.4480	25.95	23S-TOP CASE
10080	368226.9611	1310279.1070	25.30	23D-PVC NORTH
10081	368226.9076	1310278.8900	25.91	23D-TOP CASE
10082	370010.9723	1309884.8390	16.36	21S-TOP CASE
10083	370010.7034	1309884.8900	16.04	21S-PVC NORTH
10084	370010.9467	1309885.4530	13.62	21S-GROUND
10085	370011.2226	1309881.9670	16.15	21D-TOP CASE
10086	370011.1111	1309881.9240	16.03	21D-PVC NORTH
10087	370011.1759	1309881.2800	13.29	21D-GROUND
10088	370388.7121	1309715.0820	16.26	18S-TOP CASE
10089	370388.7626	1309715.2030	15.70	18S-PVC NORTH
10090	370389.0772	1309715.2920	13.27	18S-GROUND
10091	370391.6628	1309718.2390	16.22	18D-TOP CASE
10092	370391.6398	1309718.1620	15.91	18D-PVC NORTH
10093	370391.7580	1309718.7140	13.11	18D-GROUND
10094	371050.7465	1309535.3570	16.22	15S-TOP CASE
10095	371050.5776	1309535.3370	15.94	15S-PVC NORTH
10096	371051.1506	1309535.4190	13.21	15S-GROUND
10097	371052.7439	1309536.7510	16.25	15D-TOP CASE
10098	371052.5926	1309536.6760	16.07	15D-PVC NORTH
10099	371053.2175	1309536.6120	13.10	15D-GROUND
10100	371373.4417	1309447.0550	15.31	14S-TOP CASE
10101	371373.4769	1309447.0670	14.74	14S-PVC NORTH
10102	371374.1753	1309446.9460	12.49	14S-GROUND
10103	371375.7095	1309449.0750	15.29	14D-TOP CASE
10104	371375.6023	1309449.1470	14.80	14D-PVC TOP
10105	371375.9911	1309449.1600	12.49	14D-GROUND
10106	371520.1755	1309412.6120	16.19	12S-TOP CASE
10107	371520.0860	1309412.6630	15.61	12S-PVC NORTH
10108	371520.5241	1309412.4360	13.84	12S-GROUND
10109	371522.9645	1309414.2950	16.23	12D-TOP CASE
10110	371523.0150	1309414.2620	15.71	12D-PVC NORTH
10111	371523.5091	1309414.2800	13.63	12D-GROUND
10112	371721.7620	1309357.6080	16.40	10S-TOP CASE
10113	371721.7809	1309357.9690	15.91	10S-PVC NORTH
10114	371722.2934	1309357.7910	13.18	10S-GROUND
10115	371725.0606	1309359.3290	16.34	10D-TOP CASE
10116	371724.8375	1309359.5870	15.97	10D-PVC NORTH
10117	371725.4255	1309359.4070	13.14	10D-GROUND
10118	371682.0940	1309796.8330	21.74	13S-TOP CASE

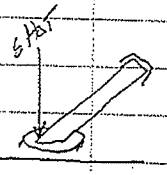
Point Number	Northing	Easting	Elevation	Description
10119	371682.0263	1309796.7690	21.49	13S-PVC NORTH
10120	371682.6131	1309796.9300	18.43	13S-GROUND
10121	371682.0029	1309793.1160	21.67	13D-TOP CASE
10122	371681.8513	1309793.0410	21.24	13D-PVC NORTH
10123	371682.4624	1309793.1490	18.48	13D-GROUND
10124	371159.1791	1310165.4720	20.23	16S-TOP CASE
10125	371158.9693	1310165.5270	20.02	16S-PVC NORTH
10126	371159.2967	1310164.4520	17.19	16S-GROUND
10127	371157.7625	1310161.3970	20.35	16D-TOP CASE
10128	371157.6532	1310161.3680	20.14	16D-PVC NORTH
10129	371158.1660	1310160.4370	17.14	16D-GROUND
10130	372644.2048	1308250.2640	22.14	04S-TOP CASE
10131	372644.1374	1308250.3910	21.91	04S-PVC NORTH
10132	372644.2517	1308249.7640	18.61	04S-GROUND
10133	372642.4795	1308246.2400	22.62	04D-TOP CASE
10134	372642.3485	1308246.3590	21.98	04D-PVC NORTH
10135	372642.8382	1308246.2520	18.89	04D-GROUND
10136	372106.4788	1308333.6660	28.82	EV-22A-TOP CASE
10137	372106.2793	1308333.5780	28.59	EV-22A-PVC NORTH
10138	372106.9332	1308333.6120	26.33	EV-22A-GROUND
10139	372111.6804	1308337.1410	29.41	EV-22B-TOP CASE
10140	372111.4369	1308337.1550	29.02	EV-22B-PVC NORTH
10141	372112.0293	1308337.8310	26.35	EV-22B-GROUND
10142	371460.1320	1308563.1640	60.96	EV-6A-PVC NORTH-SOUTHERLY
10143	371460.1068	1308563.2560	61.56	EV-6A-TOP CASE-SOUTHERLY
10144	371466.2733	1308565.2580	60.91	EV-6B-PVC NORTH-NORTHERLY
10145	371466.2012	1308565.2320	61.44	EV-6B-TOP CASE-NORTHERLY
10146	371451.3097	1308568.5600	61.65	PIEZ-PVC NORTH
10147	371451.1763	1308568.6050	61.76	PIEZ-TOP CASE
10148	371406.8325	1308516.4780	64.67	EV-20-TOP CASE
10149	371406.5816	1308516.5360	64.28	EV-20-PVC NORTH
10150	371407.2479	1308516.1020	62.05	EV-20-GROUND
10151	371355.0783	1308496.2820	61.46	EV-19B-PVC NORTH
10152	371355.0687	1308496.3590	62.02	EV-19B-TOP CASE
10153	371254.5214	1308467.3680	61.46	27S-PVC NORTH
10154	371254.3715	1308467.3450	61.87	27S-TOP CASE
10155	371259.3534	1308465.4100	61.71	27D-PVC NORTH
10156	371259.2652	1308465.4350	61.93	27D-TOP CASE
10157	371490.1217	1308367.6460	61.76	25D-PVC NORTH
10158	371489.9394	1308367.7590	61.98	25D-TOP CASE
10159	371665.5296	1308321.6810	54.28	24D-PVC NORTH
10160	371665.5506	1308321.7200	54.66	24D-TOP CASE
10161	371472.5693	1308791.7070	19.41	BP-05D2-TOP CASE
10162	371472.4120	1308791.7130	19.26	BP-05D2-PVC NORTH
10163	371472.6348	1308791.6740	15.82	BP-05D2-GROUND
10164	368693.8487	1308931.6630	52.71	34S-PVC NORTH
10165	368693.8425	1308931.7710	53.22	34S-TOP CASE
10166	368696.1675	1308930.6570	53.03	34D-PVC NORTH
10167	368696.1556	1308930.6690	53.30	34D-TOP CASE
10168	369957.9657	1308912.9620	37.42	33S-PVC NORTH
10169	369957.8312	1308912.9560	37.73	33S-TOP CASE
10170	369962.0849	1308914.4660	37.24	33D-PVC NORTH
10171	369961.9490	1308914.5250	37.57	33D-TOP CASE
10172	370978.8889	1308556.9360	55.66	29S-PVC NORTH
10173	370978.6854	1308557.0080	55.91	29S-TOP CASE
10174	370982.4785	1308556.1280	55.62	29D-PVC NORTH
10175	370982.4647	1308556.2150	56.04	29D-TOP CASE
10180	370453.0750	1308669.7880	58.41	31D-PVC NORTH
10181	370452.8170	1308669.7760	59.00	31D-TOP CASE

GEOE 118CAG

NR		DESC
10,000	MW-150 IR	NORTH Rim FLUSH
10 001	"	TOP N. Rim PVC - .02 TO PVC
10 002	Soil Log	LLSB-1
10003	"	LLSB-2
10004	"	LLSB-3
8	EOD8 COE	MON W/ SHOT
10,005	LLMW-01D	NORTH Rim LID
10,006	"	" " PVC
10,007	MONITOR WELL	UNK N. Rim LID
10,008	" "	" N. Rim PVC
10,009	" "	Ground
10,010	" "	UNK-2 SHOT @ BASE OF
"	STEEL @ TOP OF CONC. PIPE BENT 45° N.	
10,011	MONITOR WELL	LLMW2D N. Rim LID
10,012	" "	" N. Rim PVC
10,013	" "	LLMW03S N. Rim LID
10014	" "	" N. Rim PVC
100 15	" "	Ground
100 16	" "	LLMW03D N. Rim LID
100 17	" "	" N. Rim PVC
100 18	" "	Ground

1-18-13 CAT JRG

Rod	Code
w/ Grnd	6562 564
	" "
	" 286
	" "
	" "
	" 113
Flush w/ Ground	" 564
	" "
	" "
	" "
	" 270
	" 564
	" "
Flush w/ Ground	" "
	" "
	" "
	" "
	270
	564
	"
	270



Rite in the Rain

GEOE 118 CAG

NIL	DESL.			
10.019	LLMW-55	N. Rim	LID	
16,020	〃	N. Rim	PVC	
10,021	〃 50	N. Rim	LID	
10,022	〃	N. Rim	PVC	
10,023	LLMW-075	N. Rim	LID	
10,024	〃	N. Rim	PVC	
10025	〃 -075	N. Rim	LID	
10026	〃 -075	N. Rim	PVC	
10027	LLMW-065	N. Rim	LID	
10028	〃	N Rim	PVC	
10029	〃 060	N. Rim	LID	
10030	〃	N Rim	PVC	
10031	LLMW-095	N. Rim	LID	(NO LOCK)
10032	〃	N. Rim	PVC	
10033	〃 090	N. Rim	LID	(NO LOCK)
10034	〃	N. Rim	PVC	

1-18-13 CPB JRG

	Rod	Code
FLUSH w/ Grnd	6.562	564
	〃	〃
	〃	〃
	〃	〃
FLUSH w/ Grnd	〃	〃
	〃	〃
	〃	〃
	〃	〃
FLUSH w/ GRND	〃	〃
	〃	〃
	〃	〃
	〃	〃
FLUSH w/ Grnd	〃	〃
	〃	〃
	〃	〃
	〃	〃

10035	LLMW-08S	N. Rim	Casing	6562	564
10036	"	N. Rim	PVC	"	"
10037	"	Ground		"	270
10038	" -08D	N. Rim	Casing	"	564
10039	" "	N. Rim	PVC	"	"
10040	" "	Ground		"	270
10041	LLMW-11S	N. Rim	Casing	"	564
10042	" "	N. Rim	PVC	"	"
10043	" "	Ground		1	270
10044	" 11D	N. Rim	Casing	"	564
10045	" "	N. Rim	PVC	"	"
10046	" "	Ground		"	270

Rite in the Rain

GEOLOGICAL

NAD 83

8 CEDE-08

10050	LLMW-17S	Lid N. Rim	6.562	564
10051	"	PVC N. Rim	"	"
10052	"	Ground	"	270
10053	LLMW-17D	Lid N. Rim	"	564
10054	"	PVC N. Rim	"	"
10055	"	Ground	"	270
10056	LLMW-20D	Lid N. Rim	"	564
10057	"	PVC N. Rim	"	"
10058	"	Ground	"	270
10059	PZ3B	N. Top PVC	"	564
10060	"	& ext Square Lid	"	"
10061	PZ3A	N. Top PVC	"	"
10062	"	& ext Lid	"	"

10° AS 1-21-13 CDA JEG

Rite in the Rain

12/13

10063	LMW19-D	N. LID Rim	6.562	564
10064	"	N. PVC Rim	"	"
10065	"	Ground	"	270
10066	PZ1B	N. Rim PVC	"	564
10067	"	& LID	"	"
10068	PZ1A	N. Rim PVC	"	"
10073	"	& LID	"	"
10069	PZ2A	N. Rim PVC	"	"
10070	"	& LID	"	"
10071	PZ2B	N. Rim PVC	"	"
10072	"	& LID	"	"
10074	LMW22 S	N. Rim PVC	"	"
10075	" "	& LID @ Ground	"	"
10076	" D	N. Rim PVC	"	"
10077	" "	& LID @ Ground	"	"

Rite in the Rain

1-21-13

10078	LLMW-23	S	N. Rim PVC	6.562 564
10079	〃	〃	& Lid @ Ground	〃 〃
10080	〃	〃	D N. Rim PVC	〃 〃
10081	〃	〃	〃 & Lid @ Ground	〃 〃
10082	LLMW-21	S	N. Rim CASE	〃 〃
10083	〃	〃	〃 〃 PVC	〃 〃
10084	〃	〃	〃 Ground	〃 270
10085	LLMW-21	D	N. Rim CASE	〃 564
10086	〃	〃	〃 〃 PVC	〃 〃
10087	〃	〃	〃 Ground	〃 270
10088	LLMW-18	S	N. Rim CASE	〃 564
10089	〃	〃	〃 〃 PVC	〃 〃
10090	〃	〃	〃 Ground	〃 270
10091	LLMW-18	D	N. Rim CASE	〃 564
10092	〃	〃	〃 〃 PVC	〃 〃
10093	〃	〃	〃 Ground	〃 270

Rite in the Rain

1-21-13

10094	LLMW 15 S	N. Rim	Case	6.562 564
10095	" "	" "	PVC	" "
10096	" "	Ground		" 270
10097	LLMW 15 D	N. Rim	Case	" 564
10098	" "	" "	PVC	" "
10099	" "	Ground		" 270
10100	LLMW 14 S	N. Rim	Case	" 564
10101	" "	" "	PVC	" "
10102	" "	Ground		" 270
10103	LLMW 14 D	N. Rim	Case	" 564
10104	" "	" "	PVC	" "
10105	" "	Ground		" 270
10106	LLMW 12 S	N. Rim	Case	" 564
10107	" "	" "	PVC	" "
10108	" "	Ground		" 270
10109	LLMW 12 D	N. Rim	Case	" 564
10110	" "	" "	PVC	" "
10111	" "	Ground		" 270

1-21-13

10112	LLMW	10S	N. Rim	Case	6.562 564
10113	"	"	"	PVC	" "
10114	"	"	Ground		" 270
10115	LLMW	10D	N. Rim	Case	" 564
10116	"	"	"	PVC	" "
10117	"	"	Ground		" 270
10118	LLMW	13S	N. Rim	Case	" 564
10119	"	"	"	PVC	" "
10120	"	"	Ground		" 270
10121	LLMW	13D	N. Rim	Case	" 564
10122	"	"	"	PVC	" "
10123	"	"	Ground		" 270
10124	LLMW	16S	N. Rim	Case	" 564
10125	"	"	"	PVC	" "
10126	"	"	Ground		" 270
10127	LLMW	16D	N. Rim	Case	" 564
10128	"	"	"	PVC	" "
10129	"	"	Ground		" 270

Rite in the Rain

1-21-13

10130	LLMW04S	N. Rim CASE	6:56Z	564
10131	〃 〃	〃 〃 PVC	〃	〃
10132	〃 〃	Ground	〃	270
10133	LLMW04D	N. Rim CASE	〃	564
10134	〃 〃	〃 〃 PVC	〃	〃
10135	〃 〃	Ground	〃	270
10136	EV 22 A	N. Rim CASE	〃	564
10137	〃	〃 〃 PVC	〃	〃
10138	〃	Ground	〃	270
10139	EV 22 B	N. Rim CASE	〃	564
10140	〃	〃 〃 PVC	〃	〃
10141	〃	Ground	〃	270
	1-22-13			
10142	EV 6A	N. Rim PVC	STHELY OF 2	〃 564
10143	〃	℄ CASE TOP FLUSH	6A/6B	〃 〃
10144	EV 6B	N. Rim PVC	NTHELY OF 2	〃 〃
10145	〃	℄ CASE TOP 〃	6A/6B	〃 〃
10146	DIESO	N. Rim PVC	〃	〃
10147	〃	℄ CASE TOP 〃	〃	〃

Rite in the Rain

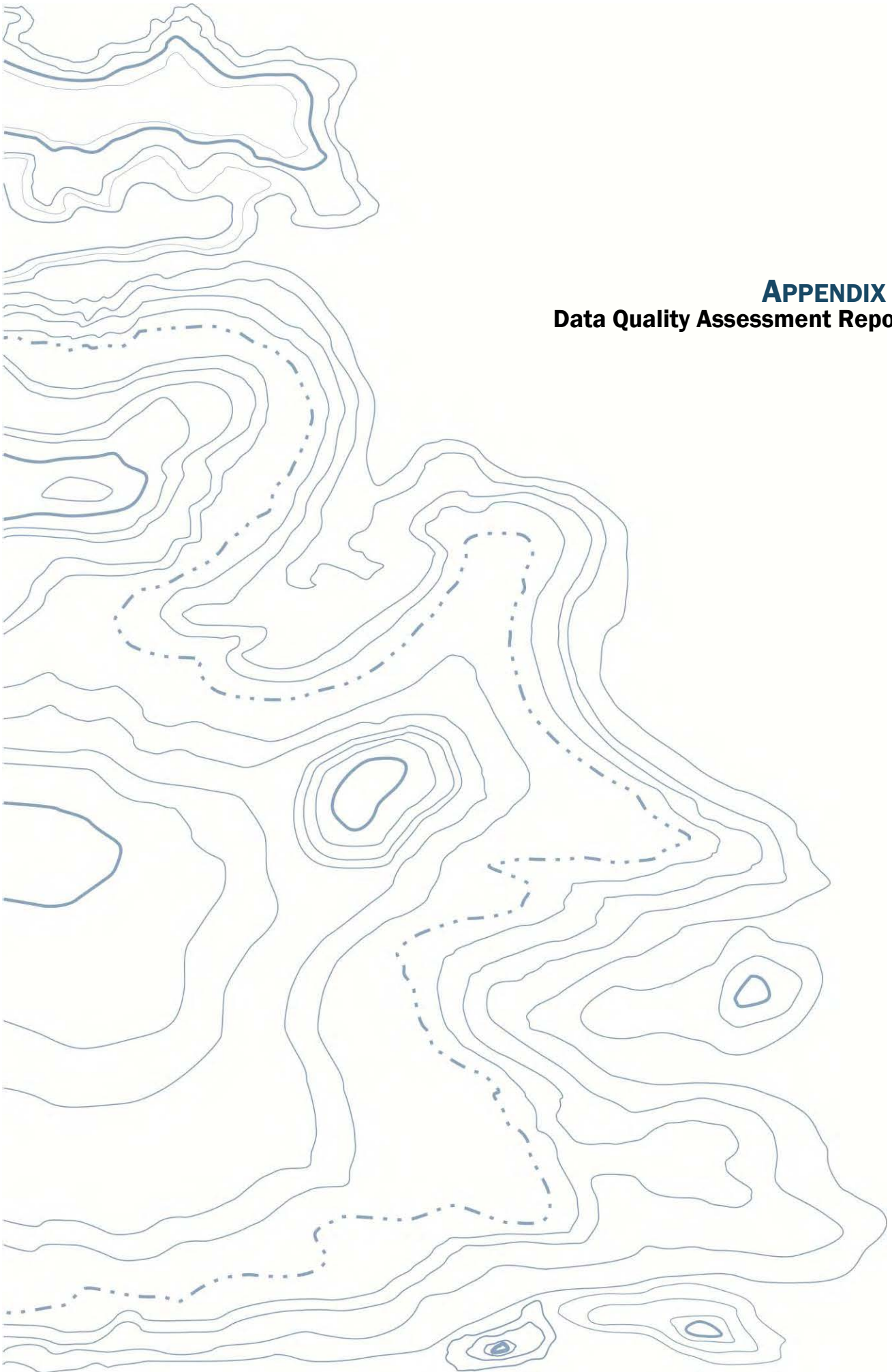
			1-22-13	
10148	EV 20B	N. Rim TOP CASE	6.562	564
10149	〃	N. Rim PVC	〃	〃
10150	〃	Ground	〃	270
10151	EV 19B	N. Rim PVC	〃	564
10152	〃	& LID FLUSH	〃	〃
10153	LMW 27 S	N. Rim PVC	〃	〃
10154	〃 〃	& LID FLUSH	〃	〃
10155	LMW 27 D	N. Rim PVC	〃	〃
10156	〃 〃	& LID FLUSH	〃	〃
10157	LMW 25 D	N. Rim PVC	〃	〃
10158	〃 〃	& LID FLUSH	〃	〃
10159	LMW 24 D	N. Rim PVC	〃	〃
10160	〃 〃	& LID FLUSH	〃	〃
10161	BP05D2	N. Rim CASE	〃	564
10162	〃	N. Rim PVC	〃	〃
10163	〃	Ground	〃	270

Rite in the Rain

1-22-13 UPSTRG

10164	LLMW34S	N. Rim PVC	6.562	564
10165	〃	〃 & LID FLUSH	〃	〃
10166	LLMW34D	N. Rim PVC	〃	〃
10167	〃	〃 & LID FLUSH	〃	〃
10168	LLMW33S	N. Rim PVC	〃	〃
10169	〃	〃 & LID FLUSH	〃	〃
10170	LLMW33D	N. Rim PVC	〃	〃
10171	〃	〃 & LID FLUSH	〃	〃
10172	LLMW29S	N. Rim PVC	〃	〃
10173	〃	〃 & LID FLUSH	〃	〃
10174	LLMW29D	N. Rim PVC	〃	〃
10175	〃	〃 & LID FLUSH	〃	〃
8	CEGE-08	MON	〃	113

Rite in the Rain



APPENDIX C
Data Quality Assessment Report

DATA QUALITY ASSESSMENT REPORT
METALS BY METHODS SW6010C/ SW7471A/SW200.8

ARI Laboratory SDG	Samples Validated (Bold indicates the sample was qualified)
VW17 (VY27 by SW200.8)	LLMW05-6-7, LLMW05-10-10.2, LLMW05-12-13, LLMW05-20-21, LLMW08-3-4, LLMW08-12-13, LLMW08-20-21, LLMW10-6-7, LLMW10-7.5-7.7, LLMW10-12-13, LLMW10-27-28, LLMW12-5-5.5, LLMW12-8.5-8.7, LLMW12-10-10.5, LLMW12-21-22, LLMW20-4.5-5.5, LLMW20-7.2-7.4, LLMW20-9-9.5, LLMW20-13.5-14.5
VV08 (VY30 by SW200.8)	LLMW22-3-4, LLMW22-8-8.2, LLMW22-10.5-11.5, LLMW22-20-21, LLMW23-17-18, LLMW23-20-21, LLMW23-22.9-23.1, LLMW23-26-26.5, LLMW23-35-36
VW18 (VY32 by SW200.8)	LLMW07-3-4, LLMW07-10-10.2, LLMW07-10.5-11, LLMW07-18-19, LLMW09-4.5-5.5, LLMW09-8.3-8.5, LLMW09-10.5-11, LLMW09-18-19, LLMW19-3-4, LLMW19-7.8-8, LLMW19-9-10, LLMW19-25-26
VX00 (VY33 by SW200.8)	LLMW14-5.5-6, LLMW14-7-7.2, LLMW14-13.5-14.5, LLMW14-29-30, LLMW15-2-3, LLMW15-11.5-11.7, LLMW15-14-15, LLMW15-30.5-31.5, LLMW17-5-6, LLMW17-12-12.2, LLMW17-12.5-13, LLMW17-21-22, LLMW18-6-7, LLMW18-8.5-8.7, LLMW18-11-12, LLMW18-21-22
VX01 (VY34 by SW200.8)	**LLMW11-5-6, LLMW11-10.5-10.7, LLMW11-11-11.5, LLMW11-19.5-20.5,** LLMW13-10.5-11.5, LLMW13-18.7-19, LLMW13-23-24, LLMW13-32-33, LLMW16-13-13.5, LLMW16-13.5-13.7, LLMW16-15-16, LLMW16-29.5-30.5
VX78 (VY35 by SW200.8)	LLMW02-6-7, LLMW02-17.4-17.6, LLMW02-20-21, LLMW02-27-28, LLMW21-6-7, LLMW21-7.7-9, LLMW21-12-13, LLMW21-15-16, LLMW21-24-25, LLMW25-3-4, LLMW25-8-8.2, LLMW25-10.5-11, LLMW25-55-56
VX79 (VY36 by SW200.8)	LLMW24-1.3-1.5, LLMW24-6-6.5, LLMW24-30-31, LLMW24-45-46 LLMW34-4.5-5.5, LLMW34-6-6.2, LLMW34-11.5-11.7, LLMW34-70-70.5
VZ01	LLMW29-6-7, LLMW29-12.5-13.5, LLMW29-20-21, LLMW29-30-31, LLMW29-55-56, **LLSB01-6-7, LLSB01-10.8-11, LLSB01-13-14, LLSB01-19-20, LLSB-DUP** LLSB02-3-4, LLSB02-10-10.2, LLSB02-10.6-10.8, LLSB02-12-13, LLSB02-15-16, LLSB03-3-4, LLSB03-11-11.2, LLSB03-13-14, LLSB03-19-20
VZ07	LLMW01-3-4, LLMW01-25-25.2, LLMW03-9-10, **LLMW03-10.5-10.6, LLMW03-13.5-14.5,** LLMW03-28-29, LLMW04-2-3, LLMW04-2-3D, LLMW04-14.3-14.5, LLMW04-18-19, LLMW04-30-31, LLMW06-6.5-7.5, LLMW06-8-8.2, LLMW06-11-12, LLMW06-23-24
VZ08	LLMW01-26-26.5, LLMW01-32.5-33.5, LLMW33-3-4, LLMW33-4.5-4.7, LLMW33-10.5-11.5, LLMW33-39-40 BP05D2-40-41, BP05D2-50-51, BP05D2-62-62.5, BP05D2-65-66, BP05D2-70.5-71
VZ68	LLMW27-3.5-4.5, LLMW27-4.5-5.5, LLMW27-8-9, LLMW27-15.5-16, LLMW27-25-26, LLMW27-30-31, LLMW27-37-37.5, LLMW27-40-41, LLMW27-50-51, LLMW27-60-61
WA93	LLMW31-3-4, LLMW31-9.1-9.3, LLMW31-25-25.5, LLMW31-45-46, LLMW31-55-56

PROJECT: LOWLAND AREA (0504-068-00)

This report documents the results of an Environmental Protection Agency (EPA) level 2b data validation of analytical data from the analyses of soil boring samples and the associated laboratory and field quality control (QC) samples. The review included the following:

- Chain of Custody
- Holding Times and Sample Preservation
- Instrument Calibration
- ICP Interference Check Sample
- Method and Calibration Blanks
- Laboratory Control Samples
- Matrix Spikes
- Laboratory Duplicates
- Field Duplicates
- Internal Standards/Tunes

OBJECTIVE

The objective of the data validation was to review laboratory analytical procedures and quality control (QC) results to evaluate whether:

- The samples were analyzed using well-defined and acceptable methods that provide detection limits below applicable regulatory criteria;
- The precision and accuracy of the data are well defined and sufficient to provide defensible data; and
- The quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

One hundred and fifty-one (151) soil samples were analyzed by one or more of the analytical methods listed in the title of this appendix.

DATA PACKAGE COMPLETENESS

Analytical Resources Incorporated (ARI), located in Tukwila, Washington, analyzed the soil samples evaluated as part of this data quality assessment. The laboratory provided all required deliverables for the assessment according to the National Functional Guidelines. The laboratory followed adequate corrective action processes and all identified anomalies were discussed in the case narrative.

DATA QUALITY ASSESSMENT SUMMARY

The results for each of the QC elements are summarized below. The data assessment was performed using guidance in the USEPA Contract Laboratory Program *National Functional Guidelines for Inorganic Data Review* (USEPA, 2010).

Chain-of-Custody Documentation

Chain-of-custody (COC) forms were provided with the laboratory analytical reports. There were no anomalies noted on the COC forms; proper COC protocols appear to have been followed for this sampling event.

Holding Times and Sample Preservation

The holding time is defined as the time that elapses between sample collection and sample analysis. The maximum holding time criteria of 6 months is prescribed for the two metals analytical methods to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times of 6 months were met for all analyses.

Instrument Calibration

The laboratory followed the method requirements for satisfactory instrument calibration. Instrument calibration is necessary in order to ensure that the instrument is capable of producing acceptable quantitative data for the metals on the target analyte list in the QAPP. Initial Calibration Verification (ICV) demonstrates that the instrument is capable of acceptable performance at the beginning of the analytical run. The Continuing Calibration Verification (CCV) demonstrates that the initial calibration is still valid by checking the performance of the instrument on any given day that samples are being analyzed.

Each calibration curve was made up of a blank and at least five calibration standards with all measurements being within the working range of the instrument. The calibration curves were fitted using linear regression and each curve had a correlation coefficient of ≥ 0.995.

The ICV/CCV standards were within 90% to 110% of the true value in all cases.

ICP Interference Check Sample

The Interference Check Sample verifies the analytical instrument's ability to overcome isobaric interferences typical of those found in samples. The laboratory analyzed this QC sample at the proper frequency and location of the analytical run. All solution mixtures were within the control limit of 20% of the true value.

Method Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. Method blanks were analyzed with each batch of samples, at a frequency of 1 per 20 samples. For all sample batches, method blanks were analyzed at the required frequency. None of the analytes of interest were detected above the reporting limits in any of the method blanks.

Matrix Spikes

Because the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis. One aliquot of sample is

analyzed in the normal manner, and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a percent recovery (%R) is calculated. In the event that a particular element is out of the recovery value control limits in the matrix spiked sample, the laboratory is required to analyze a "post-spiked" sample in order to further isolate any potential quality control issues with the given element.

Matrix spike analyses should be performed once per analytical batch or every 20 field samples, whichever is more frequent. The recovery criteria for matrix spikes are 75% to 125% for all of the elements in this report.

The frequency requirements were met for all analyses, with the following exceptions:

All SDGs: In all of the matrix spike samples, the %R value for antimony was less than the control limit of 80%. Appropriately, in each case the laboratory properly conducted a post-spiked sample. These post-spiked samples were spiked with a higher concentration of element solution as the matrix spike, however, they do not interact with acid and are never heated in the digestion process. The %R values for each of the post spike samples were within the 75% to 125% control limits.

In the process of determining the appropriate action for these potential outliers, it was also noted that there were no positive detections for antimony in the associated field samples in this sampling event. The reporting limits for antimony, even though biased low, were consistently three to five times less than the screening level and target reporting limit prescribed in the project QAPP. Based on professional judgment, the antimony reporting limits were not qualified, as there is no effect on the usefulness of the antimony data for this project.

SDG VZ07: The laboratory performed a matrix spike on Sample LLMW03-9-10. The %R value for mercury was greater than the control limit. The positive results for mercury were qualified as estimated (J) in the following samples from this geological boring: LLMW03-10.5-10.6, and LLMW03-13.5-14.5.

SDG VZ68: The laboratory performed a matrix spike on Sample LLMW27-3.5-4.5. The %R value for arsenic was less than the control limit. However, in this case the parent sample concentration was greater than four times the amount spiked into the matrix spike. For this reason, no qualification was necessary.

Laboratory Control Samples (LCS)

A laboratory control sample is essentially a blank sample that is spiked with a known amount of analyte concentration and analyzed. It is to be treated much like a matrix spike, without the possibility for matrix interference. As there is no actual sample matrix in the analysis, the analytical expectations for accuracy and precision are usually more rigorous and qualification would apply to all samples in the batch, instead of the parent sample only.

Laboratory control sample analyses should be performed once per analytical batch or every 20 field samples, whichever is more frequent. The recovery criteria for laboratory control samples are specified in the laboratory documents as are the relative percent difference values. The frequency requirements were met for all analyses, and the %R/RPD values were within the proper control limits.

Laboratory Duplicates

Internal laboratory duplicate analyses are performed to monitor the precision of the analyses. Two separate aliquots of a sample are analyzed as distinct samples in the laboratory, and the RPD between

the two results is calculated. Duplicate analyses should be performed once per analytical batch. If one or more of the samples used has a concentration greater than five times the reporting limit for that sample, the absolute difference is used instead of the RPD.

Laboratory duplicates were analyzed at the proper frequency and the specified acceptance criteria were met in all cases, with the following exceptions:

SDG VX01: The laboratory performed an internal duplicate on Sample LLMW11-5-6. The absolute difference value for antimony was greater than the control limit. There were no positive results for antimony in any of the field samples from the LLMW11 boring. The antimony reporting limits were qualified as estimated (UJ) in all samples from this geological boring: LLMW11-5-6, LLMW11-10.5-10.7, LLMW11-11-11.5, and LLMW11-19.5-20.5.

SDG VZ01: The laboratory performed an internal duplicate on Sample LLSB01-13-14. The absolute difference value for lead was greater than the control limit. The positive results for lead were qualified as estimated (J) in all samples from this geological boring: LLSB01-6-7, LLSB01-10.8-11, LLSB01-13-14, LLSB01-19-20, and LLSB-DUP.

Field Duplicates

Field duplicate samples were collected and analyzed along with the reviewed sample batches. The duplicate samples were analyzed for the same parameters as the associated parent samples. As mentioned above for the laboratory duplicates the RPD is used as the criteria for assessing precision, unless one or more of the samples used has a concentration greater than five times the reporting limit for that sample, the absolute difference is used instead of the RPD.

The RPD control limits for soil samples is 50%, while the RPD control limits for water samples is 35%. The absolute difference control limits for soil samples is twice the PQL value, while the absolute difference control limits for water samples is the same as the PQL value.

SDG VW17: One set of field duplicates, Samples LLMW05-12-13 & LLMW05-12-13D, was submitted to the laboratory. The precision criteria were met for all target analytes.

SDG VX00: One set of field duplicates, Samples LLMW15-2-3 & LLMW15-2-3 DUP, was submitted to the laboratory. The precision criteria were met for all target analytes.

SDG VZ01: One set of field duplicates, Samples LLSB01-19-20 & LLSB-DUP, was submitted to the laboratory. The precision criteria were met for all target analytes.

SDG VZ07: One set of field duplicates, Samples LLMW04-2-3 & LLMW04-2-3DUP, was submitted to the laboratory. The precision criteria were met for all target analytes.

Reporting Limits and Miscellaneous

SDG VW17, VV08, VW18, VX00, VX01, VX78, VX79: The reporting limits of arsenic and thallium in certain samples exceeded the screening levels and/or target reporting limits prescribed in the QAPP when originally analyzed by method SW6010C. The samples in these SDGs were all re-analyzed by method SW200.8 in order to achieve the target reporting limits.

Internal Standards/Tunes

The laboratory appropriately added an internal standard into each sample, with the exception of the instrument tune. The intensity of the internal standard response in each sample was monitored and

compared to the intensity of the response for that internal standard in the calibration blank. The percent relative intensity (%RI) in the samples were within 60-125% of the response in the calibration blank for the appropriate analytical run.

OVERALL ASSESSMENT

As was determined by this data quality assessement, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the LCS and MS %R values, with the exceptions mentioned above. Precision was acceptable, as demonstrated by the laboratory duplicate and field duplicate RPD values, with the exceptions noted above.

Data were qualified as estimated because of laboratory duplicate precision outliers.

The data are acceptable for use.

APPENDIX D
Laboratory Deliverables (on attached CD)

APPENDIX E
Results of Grain Size Analyses

GeoEngineers
0504-068-00
Lowland

Percent Finer (Passing) Than the Indicated Size

Sieve Size (microns)	3"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4 (4750)	#10 (2000)	#20 (850)	#40 (425)	#60 (250)	#100 (150)	#200 (75)	32	22	13	9	7	3.2	1 3
LLMW06-23-24	100 0	100.0	100 0	100.0	100.0	100.0	100 0	99 9	99.8	97 3	81 1	57.6	31 4	14 8	9 0	6.0	5 0	4 5	4 0	2 5	1.5
	100 0	100 0	100 0	100.0	100.0	100.0	100.0	100 0	99.6	97 1	80 4	56.9	31 6	14 9	9 0	6.0	5 0	4 5	4 0	2 5	1.5
	100 0	100 0	100 0	100.0	100 0	100 0	100 0	99 6	99.2	96 4	79 2	55.3	29 5	13.5	9 0	6 0	5 0	4.5	4.0	2.5	1 5
LLMW03-5-5 2	100 0	100.0	100 0	100 0	100.0	99.1	99 0	98.3	97 1	94 8	91 3	84.7	73 9	60 7	42.8	32.5	24 0	20 1	14.9	9.1	5 2
LLMW03-28-29	100 0	100 0	100.0	100 0	100 0	100 0	100.0	99 2	92 8	76.5	48.1	29 9	16 6	7 3	5 7	4.1	3.1	2.6	1 6	0.5	0 5
LLMW06-6.5-7.5	100.0	100.0	100 0	100 0	100 0	97.7	93 0	83.0	67.9	38.7	9 1	2 8	1 9	1 5	1 4	1 0	0 7	0.3	0.3	0.0	0 0
LLMW07-18-19	100.0	100.0	100 0	100 0	100.0	100.0	100.0	99.9	98.5	74.8	14 2	6 4	3 4	2.0	1 5	1 5	1 0	0.5	0 0	0.0	0 0
LLMW08-20-21	100 0	100 0	100 0	100 0	100 0	100 0	100.0	98 2	96.2	75.3	23 5	14 7	11 6	7.4	5 3	3 9	2.9	2.4	1 9	0.5	0 5
LLMW11-3 5-4 5	100 0	100.0	100 0	100 0	100 0	100 0	100 0	99 3	98 1	93.0	65 0	26.2	12 0	6 8	5 9	5 0	4 0	3 5	2.5	1 5	0 5
LLMW11-19 5-20 5	100 0	100 0	100 0	100 0	100.0	100 0	99.4	94.9	85 9	73.8	48 0	16 1	9.0	5 4	5 2	3 9	2 6	2 2	1.3	0 4	0.0
LLMW12-5-5 5	100 0	100.0	100 0	100.0	100.0	100 0	98 9	97.1	92.5	68.9	29 4	8 1	3.8	2 6	2 3	1 8	1.4	1 4	0 9	0.5	0.5
LLMW12-21-22	100 0	100 0	100.0	100.0	100 0	100 0	100.0	99 0	89 9	51.4	18 0	12.0	8 6	6 0	4 5	3 6	2.7	2.3	2.3	0 9	0.5
LLMW13-10.5-11 5	100.0	100 0	100 0	100.0	100 0	90.2	85 2	78 5	69 7	54.8	31 5	18 0	13 2	9.8	9.6	7 5	5.9	4 8	3 7	1 6	0.5
LLMW13-32-33	100.0	100 0	100.0	100.0	100.0	100 0	98 5	94 5	84 8	52 4	15 8	7.5	4.5	2 8	2 6	2 1	1.3	0.9	0 4	0 0	0 0
LLMW18-6-7	100.0	100 0	100.0	100.0	100 0	98.2	98 2	97.0	91 4	72.9	34 7	10 8	5.4	3 0	2 8	2 3	1.4	1 4	0 9	0 5	0 5
LLMW18-21-22	100.0	100.0	100.0	100.0	100.0	100 0	100 0	99.2	98.6	87 9	57 0	17 2	8.8	6.0	5 0	4 5	3.0	2 5	1 5	0.5	0.0

Testing performed according to ASTM D421/D422

VZ67

GeoEngineers
0504-068-00
Lowland

Percent Retained in Each Size Fraction

Description	% Coarse Gravel				% Gravel			% Coarse Sand	% Medium Sand		% Fine Sand			% Very Coarse Silt	% Coarse Silt	% Medium Silt	% Fine Silt	% Fine Silt	% Very Fine Silt	% Clay	
Particle Size (microns)	3-2"	2-1 1/2"	1 1/2"-1"	1-3/4"	3/4-1/2"	1/2-3/8"	3/8"-4750	4750-2000	2000-850	850-425	425-250	250-150	150-75	75-32	32-22	22-13	13-9	9-7	7-3 2	3 2-1.3	<1 3
LLMW06-23-24	0 0	0 0	0 0	0 0	0.0	0.0	0 1	0 1	2 4	16.3	23 5	26.2	16 6	5 8	3 0	1 0	0 5	0 5	1 5	1.0	1 5
	0 0	0 0	0.0	0 0	0 0	0 0	0 0	0 4	2 5	16 7	23 4	25.4	16.6	5.9	3 0	1 0	0.5	0.5	1 5	1 0	1.5
	0 0	0 0	0 0	0 0	0.0	0 0	0 4	0 5	2 8	17 2	23 9	25.8	15 9	4 6	3.0	1.0	0.5	0.5	1 5	1.0	1 5
LLMW03-5-5 2	0.0	0 0	0 0	0 0	0 9	0.1	0 7	1 2	2.2	3 5	6 7	10.8	13 1	17.9	10 4	8 4	3.9	5 2	5 8	3 9	5 2
LLMW03-28-29	0 0	0.0	0 0	0 0	0.0	0 0	0 8	6.4	16.3	28.4	18 2	13.3	9 3	1 6	1 6	1.0	0.5	1 0	1 0	0 0	0 5
LLMW06-6 5-7 5	0 0	0.0	0 0	0 0	2.3	4.7	10 0	15 1	29.2	29.6	6 2	0.9	0 4	0 1	0 3	0 3	0 3	0.0	0 3	0 0	0 0
LLMW07-18-19	0.0	0 0	0 0	0 0	0.0	0.0	0 1	1.4	23.7	60.7	7 8	3.0	1 4	0.5	0 0	0.5	0.5	0 5	0.0	0.0	0 0
LLMW08-20-21	0 0	0 0	0 0	0 0	0.0	0 0	1 8	2.0	20.9	51.8	8.9	3.0	4 2	2.1	1.5	1 0	0.5	0 5	1 5	0 0	0 5
LLMW11-3.5-4.5	0.0	0.0	0.0	0 0	0 0	0.0	0 7	1 3	5.0	28 0	38 8	14 2	5 2	0.9	1.0	1.0	0.5	1 0	1.0	1 0	0 5
LLMW11-19 5-20 5	0 0	0.0	0 0	0 0	0 0	0 6	4 6	9.0	12 1	25.8	31 9	7 1	3.6	0.2	1 3	1 3	0.4	0 9	0 9	0.4	0 0
LLMW12-5-5 5	0.0	0 0	0 0	0 0	0 0	1 1	1.9	4.6	23 6	39.5	21 3	4.3	1 3	0 3	0 5	0.5	0 0	0 5	0 5	0 0	0.5
LLMW12-21-22	0.0	0.0	0 0	0 0	0 0	0 0	1.0	9 0	38 5	33.5	6 0	3.4	2 6	1.4	0.9	0.9	0.5	0.0	1 4	0 5	0.5
LLMW13-10.5-11.5	0 0	0.0	0 0	0.0	9.8	5 0	6 8	8 7	14 9	23 4	13.5	4 7	3 4	0 2	2.1	1.6	1 1	1 1	2 1	1 1	0.5
LLMW13-32-33	0 0	0.0	0.0	0 0	0 0	1.5	3 9	9 7	32.4	36 6	8 3	3 0	1.7	0 3	0 4	0 9	0 4	0 4	0 4	0 0	0.0
LLMW18-6-7	0 0	0.0	0 0	0 0	1.8	0.0	1 2	5.6	18 5	38 2	23 9	5 3	2.4	0.2	0 5	0.9	0 0	0 5	0 5	0 0	0 5
LLMW18-21-22	0.0	0.0	0.0	0 0	0 0	0.0	0 8	0 6	10 8	30 9	39 8	8 4	2 8	1 0	0 5	1 5	0 5	1 0	1 0	0.5	0 0

VZ67

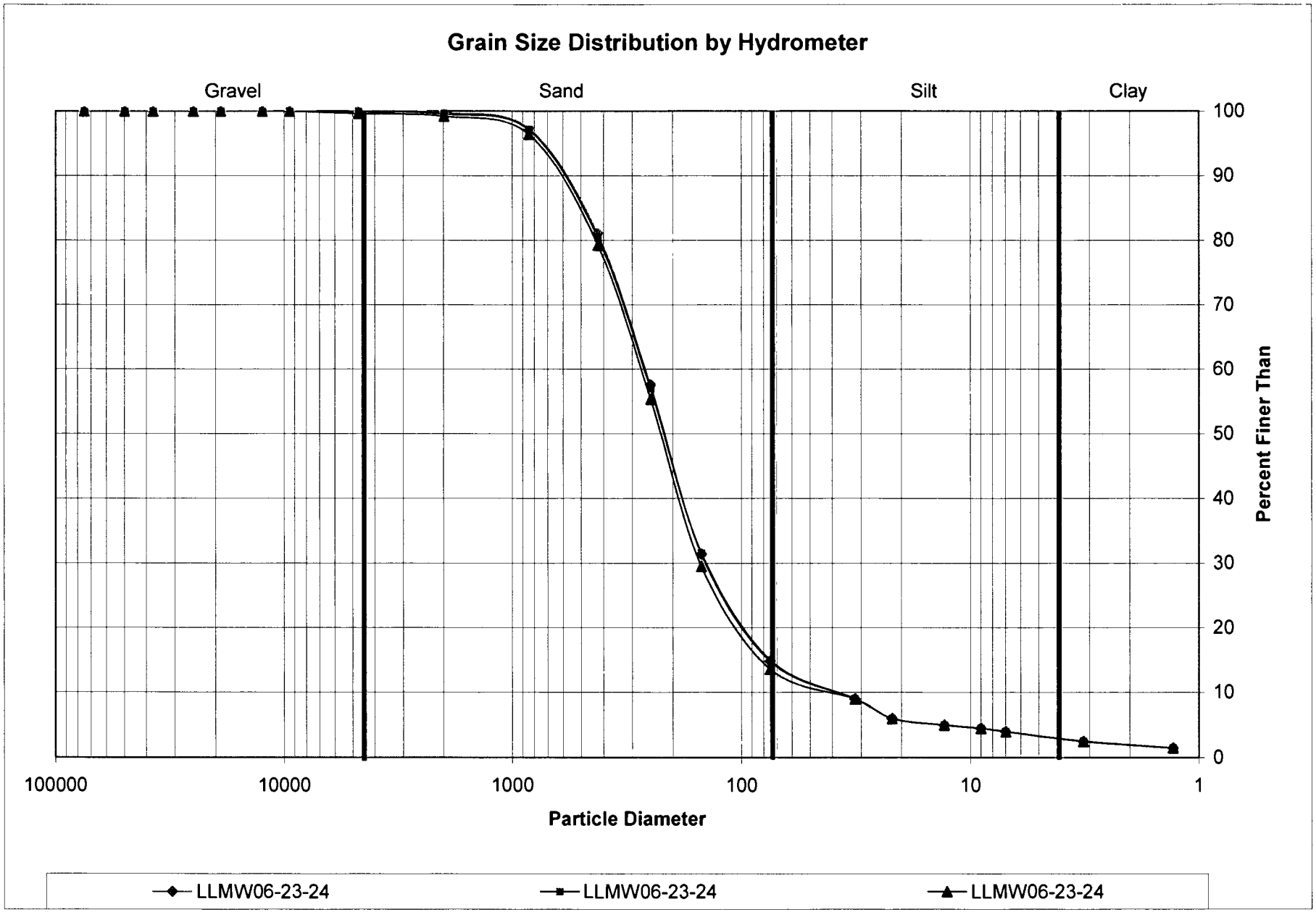
Client	GeoEngineers	Project No	0504-068-00
		Project	Lowland
ARI Triplicate Sample ID	VZ67F	Batch No	VZ67-01
Client Triplicate Sample ID	LLMW06-23-24	Page	1 of 1

Relative Standard Deviation, By Size

Sample ID	75000	50000	37500	25000	19000	12500	9500	4750	2000	850	425	250	150	75	32	22	13	9	7	3 2	1 3
LLMW06-23-24	100 0	100 0	100 0	100 0	100 0	100 0	100 0	99 9	99 8	97 3	81 1	57 6	31 4	14 8	9 0	6 0	5 0	4 5	4 0	2 5	1 5
LLMW06-23-24	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	99 6	97 1	80 4	56 9	31 6	14 9	9 0	6 0	5 0	4 5	4 0	2 5	1 5
LLMW06-23-24	100 0	100 0	100 0	100 0	100 0	100 0	100 0	99 6	99 2	96 4	79 2	55 3	29 5	13 5	9 0	6 0	5 0	4 5	4 0	2 5	1 5
AVE	100 00	100 00	100 00	100 00	100 00	100 00	100 00	99 85	99 52	96 94	80 23	56 60	30 81	14 43	9 01	6 00	5 00	4 50	4 00	2 50	1 50
STDEV	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 19	0 30	0 50	0 93	1 17	1 15	0 77	0 03	0 02	0 02	0 01	0 01	0 01	0 00
%RSD	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 19	0 30	0 51	1 16	2 07	3 74	5 32	0 32	0 32	0 32	0 32	0 32	0 32	0 32

This Triplicate applies to the Batch Containing the Following Samples

Sample ID	Date Sampled	Date Set up	Date Started	Date Complete	Data Qualifiers
LLMW06-23-24	12/27/2012	1/15/2013	1/21/2013	1/23/2013	
	12/27/2012	1/15/2013	1/21/2013	1/23/2013	
	12/27/2012	1/15/2013	1/21/2013	1/23/2013	
LLMW03-5-5 2	12/26/2012	1/15/2013	1/21/2013	1/23/2013	
LLMW03-28-29	12/26/2012	1/15/2013	1/21/2013	1/23/2013	
LLMW06-6 5-7 5	12/27/2012	1/15/2013	1/21/2013	1/23/2013	
LLMW07-18-19	12/7/2012	1/15/2013	1/21/2013	1/23/2013	
LLMW08-20-21	12/10/2012	1/15/2013	1/21/2013	1/23/2013	
LLMW11-3 5-4 5	12/13/2012	1/15/2013	1/21/2013	1/23/2013	
LLMW11-19 5-20 5	12/13/2012	1/15/2013	1/21/2013	1/23/2013	
LLMW12-5-5 5	12/12/2012	1/15/2013	1/21/2013	1/23/2013	
LLMW12-21-22	12/12/2012	1/15/2013	1/21/2013	1/23/2013	
LLMW13-10 5-11 5	12/17/2012	1/15/2013	1/21/2013	1/23/2013	
LLMW13-32-33	12/17/2012	1/15/2013	1/21/2013	1/23/2013	
LLMW18-6-7	12/13/2012	1/15/2013	1/21/2013	1/23/2013	
LLMW18-21-22	12/13/2012	1/15/2013	1/21/2013	1/23/2013	


Grain Size Distribution by Hydrometer
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Sand
Silt
Clay
100
90
80
70
60
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40
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20
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10000
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Particle Diameter
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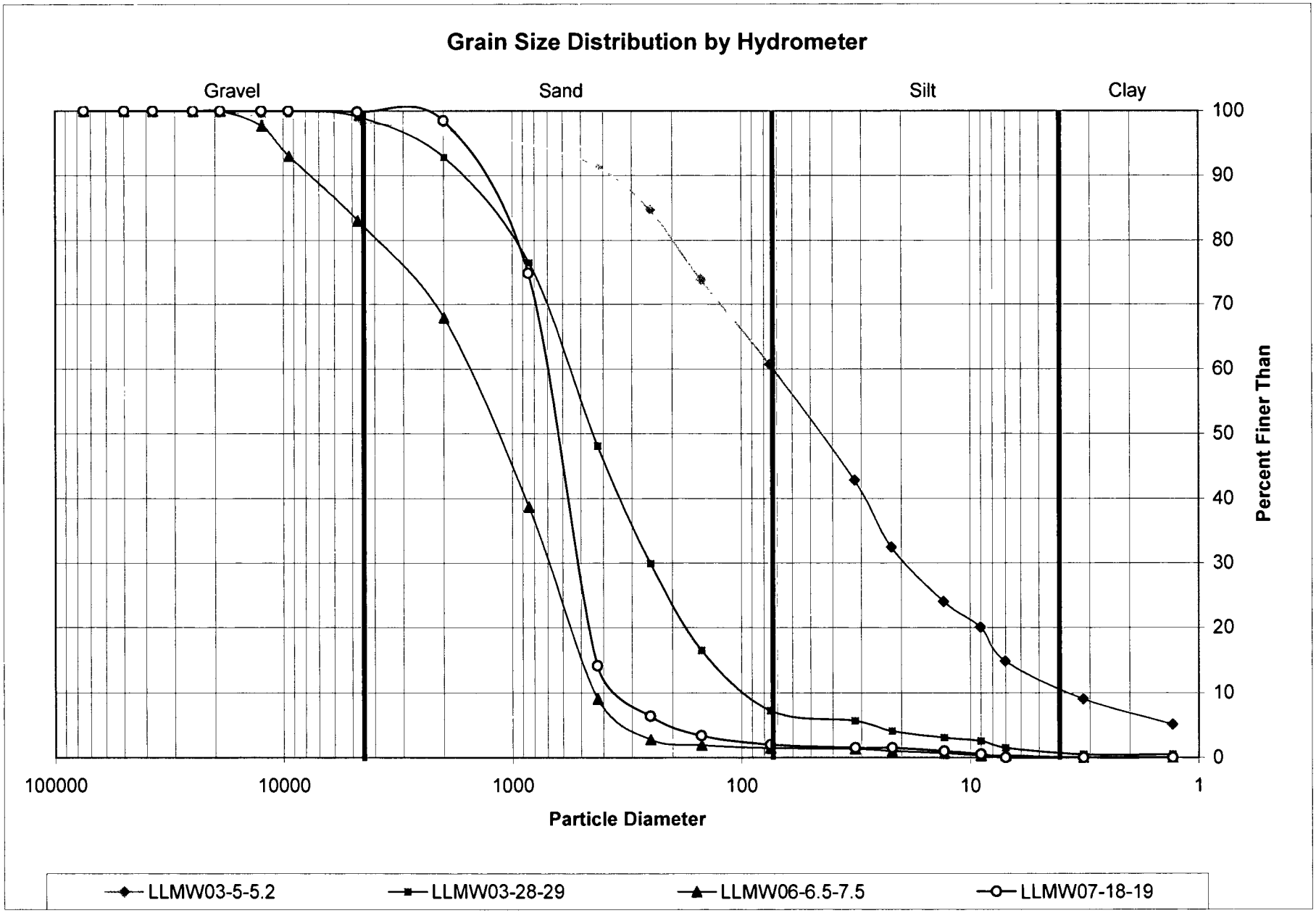
LLMW06-23-24
LLMW06-23-24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Sand
Silt
Clay
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Percent Finer Than
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LLMW03-28-29
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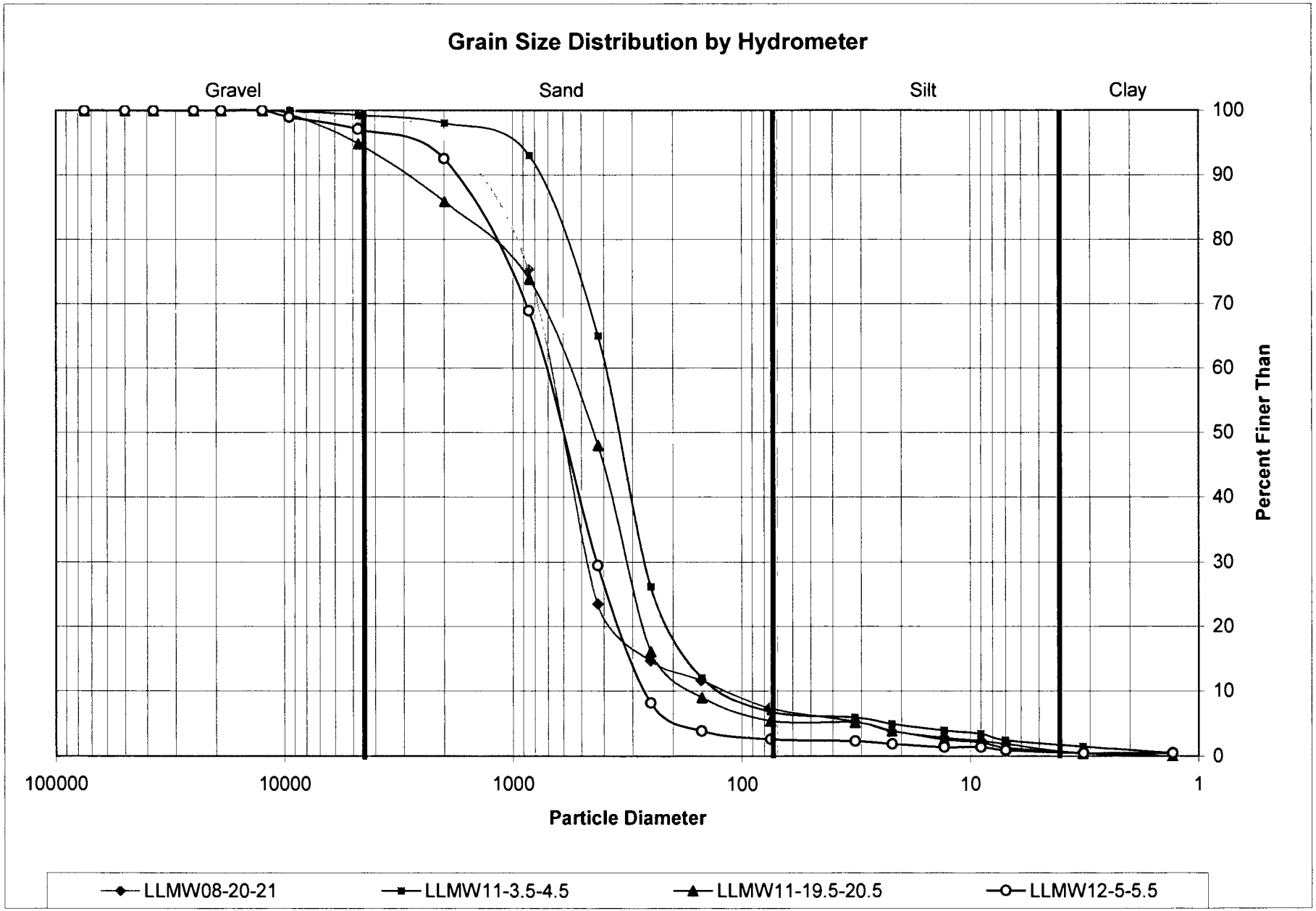
LLMW07-18-19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Silt
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Percent Finer Than
100000
10000
1000
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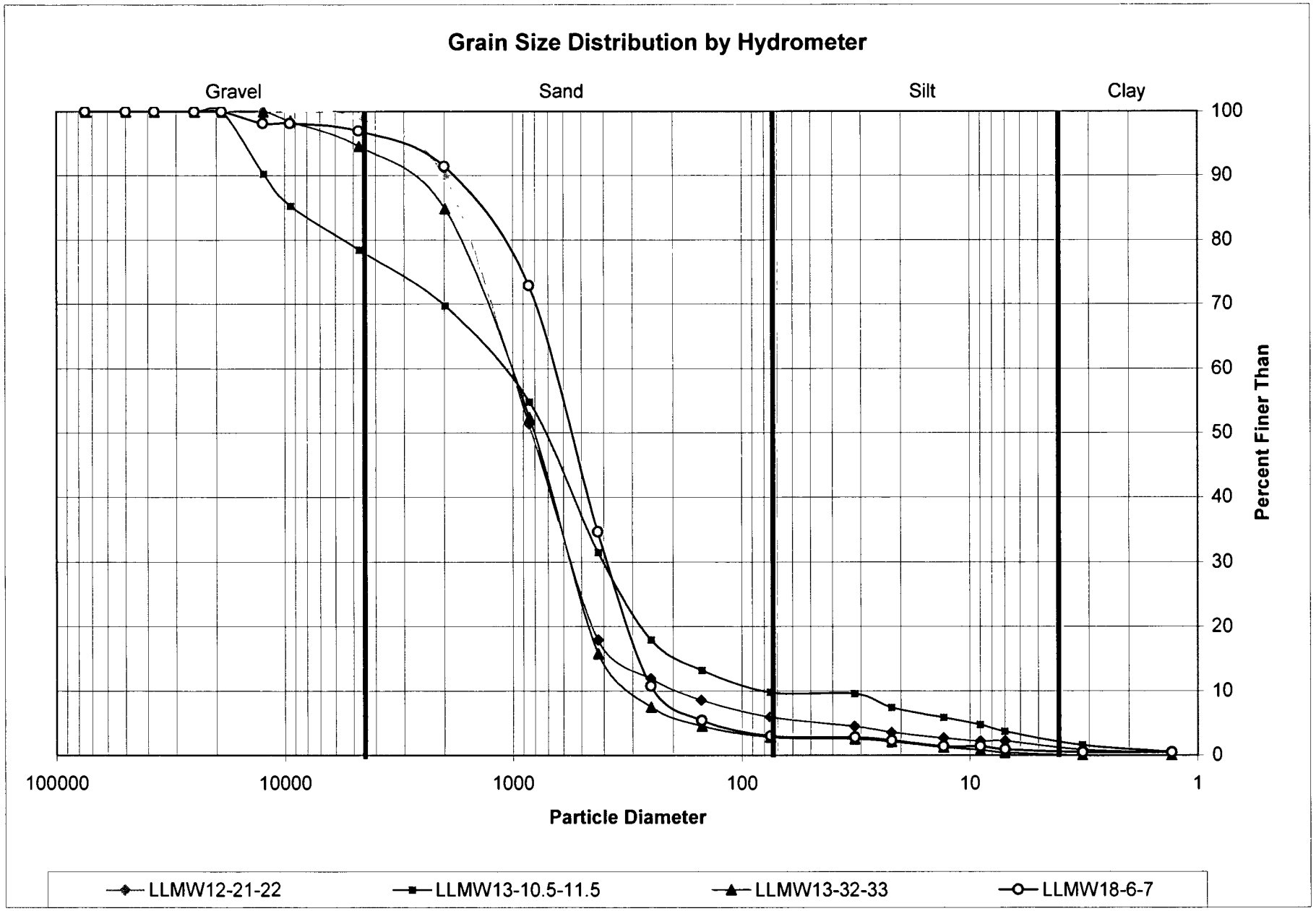
LLMW11-19.5-20.5
LLMW12-5-5.5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Sand
Silt
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Percent Finer Than
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Particle Diameter
LLMW12-21-22
LLMW13-10.5-11.5
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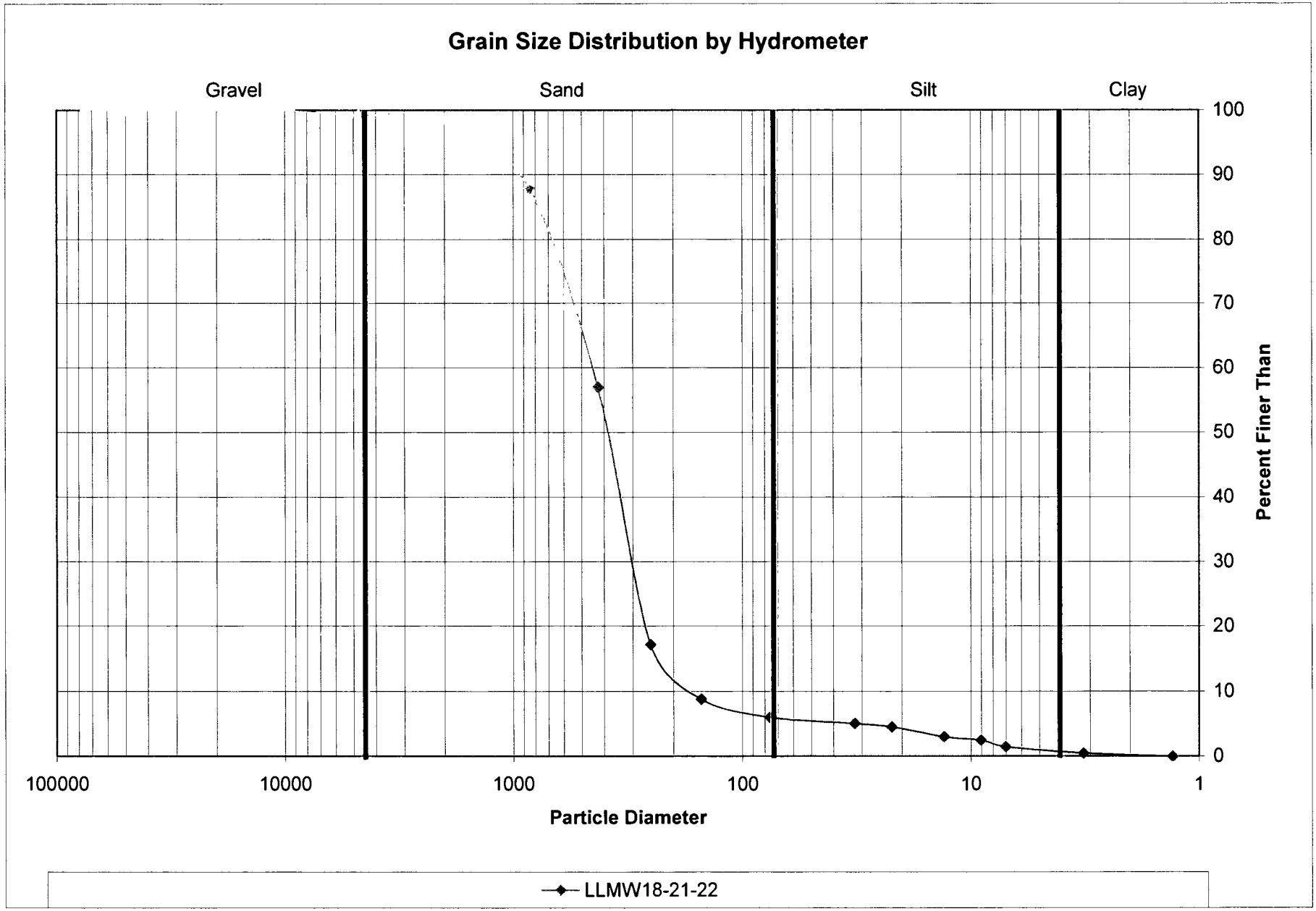
LLMW18-6-7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Silt
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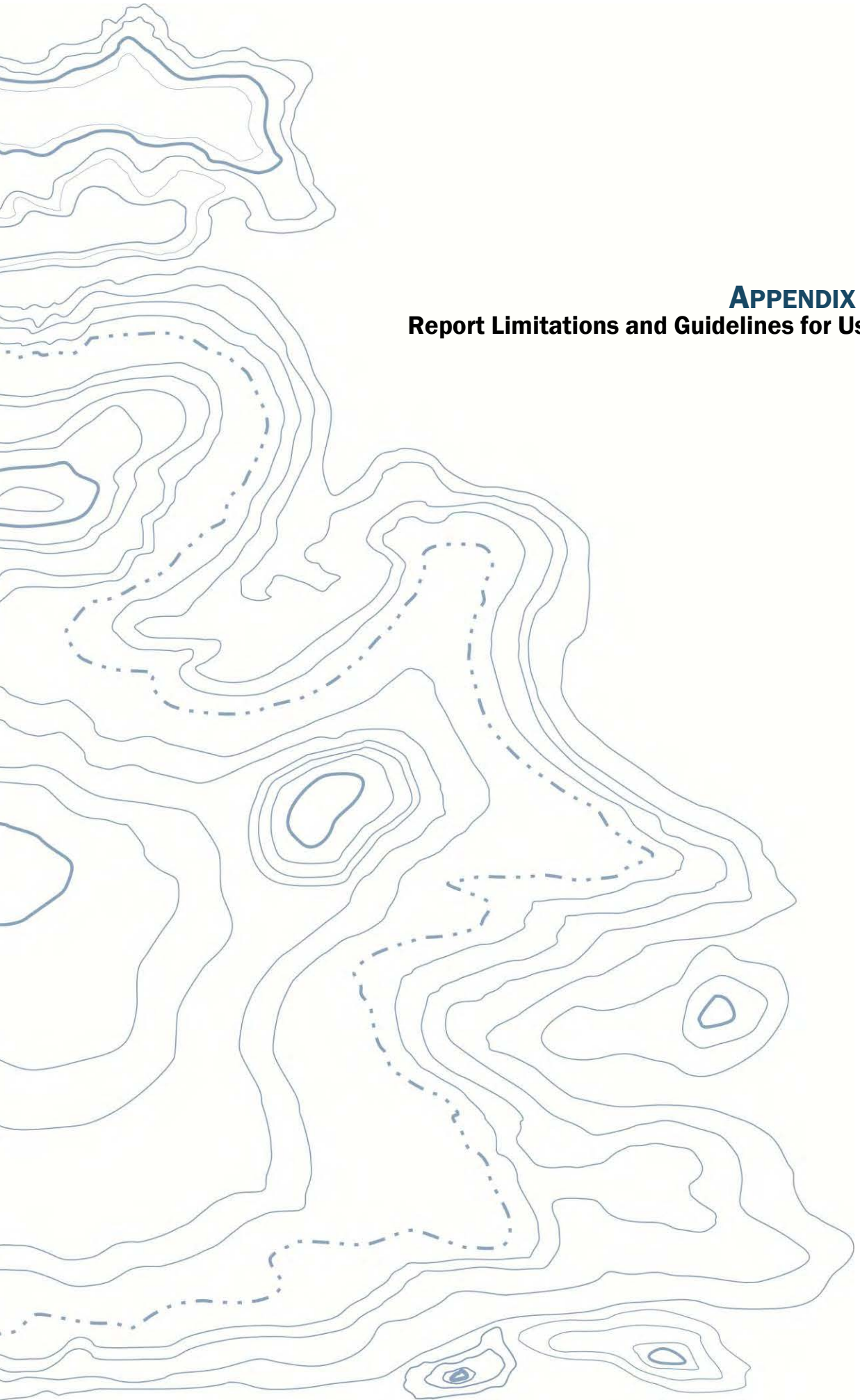
LLMW18-21-22



APPENDIX F
Report Limitations and Guidelines for Use

APPENDIX F
REPORT LIMITATIONS AND GUIDELINES FOR USE[2]

This appendix provides information to help you manage your risks with respect to the use of this report.

Environmental Services are Performed for Specific Purposes, Persons and Projects

GeoEngineers has performed this investigation of the Everett Smelter – Lowland Area in general accordance with the scope and limitations of our proposal, dated July 3, 2012. This report has been prepared for the exclusive use of Washington State Department of Ecology, and their authorized agents. This report is not intended for use by others, and the information contained herein is not applicable to other properties.

GeoEngineers structures our services to meet the specific needs of our clients. For example, an ESA study conducted for a property owner may not fulfill the needs of a prospective purchaser of the same property. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and property. No one except Washington State Department of Ecology should rely on this environmental report without first conferring with GeoEngineers. Use of this report is not recommended for any purpose or project except the one originally contemplated.

This Environmental Report is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the Everett Smelter – Lowland Area. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, it is important not to rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

If important changes are made to the project or property after the date of this report, we recommend that GeoEngineers be given the opportunity to review our interpretations and recommendations. Based on that review, we can provide written modifications or confirmation, as appropriate.

2 Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

Reliance Conditions for Third Parties

Our report was prepared for the exclusive use of our Client. No other party may rely on the product of our services unless we agree to such reliance in advance and in writing. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions. Within the limitations of scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and generally accepted environmental practices in this area at the time this report was prepared.

Environmental Regulations are Always Evolving

Some substances may be present in the vicinity of the subject property in quantities or under conditions that may have led, or may lead, to contamination of the subject property, but are not included in current local, state or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards for appropriate inquiry, or regulatory definitions of hazardous substances, change or if more stringent environmental standards are developed in the future.

Conditions Can Change

This environmental report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by man-made events such as construction on or adjacent to the subject property, by new releases of hazardous substances, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Please contact GeoEngineers before applying this report for its intended purpose so that GeoEngineers may evaluate whether changed conditions affect the continued applicability of the report.

Most Environmental Findings are Professional Opinions

Our interpretations of site conditions are based on field observations and analytical data from widely spaced sampling locations at the subject property. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an informed opinion about subsurface conditions throughout the property. Actual subsurface conditions may differ, sometimes significantly, from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Read These Provisions Closely

It is important to recognize that the geoscience practices (geotechnical engineering, geology and environmental science) are less exact than other engineering and natural science disciplines. Without this understanding, there may be expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory “limitations” provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you need to know more about how these “Report Limitations and Guidelines for Use” apply to your project or property.

Snohomish River Sediment, Seep and Outfall Sampling Technical Memorandum

Everett Smelter Cleanup Site
Lowland Area
FSID 2744, ISIS Cleanup Site ID 4298
Everett, Washington

for
Washington State Department of Ecology

June 25, 2013

GeoEngineers
Earth Science + Technology

Snohomish River Sediment, Seep and Outfall Sampling Technical Memorandum

Everett Smelter Cleanup Site
Lowland Area
FSID 2744, ISIS Cleanup Site ID 4298
Everett, Washington

for
Washington State Department of Ecology

June 25, 2013

GeoEngineers

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206.728.2674

Snohomish River Sediment, Seep and Outfall Sampling Technical Memorandum

Everett Smelter Cleanup Site
Lowland Area
FSID 2744, ISIS Cleanup Site ID 4298
Everett, Washington

Project No. 0504-068-00

June 25, 2013

Prepared for:

Washington State Department of Ecology
Toxics Cleanup Program
3190 160th Avenue SE
Bellevue, Washington 98008-5452

Attention: Sandra Matthews

Prepared by:

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Seattle, Washington 98101
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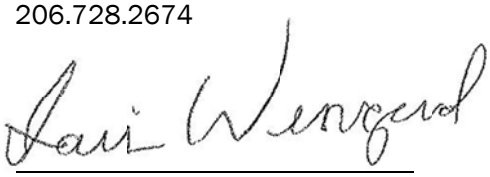

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Geologist

John M. Herzog, PhD
Principal

GRL:IHW:JMH:tt

Table of Contents

1.0 INTRODUCTION

This memorandum summarizes the results of the Snohomish River west riverbank sediment, seep and outfall investigation activities completed at the Everett Smelter Lowland Area. The Lowland Area is a part of the Everett Smelter Cleanup Site and is generally located in northeast Everett, Washington (Figure 1). The Lowland Area includes multiple parcels and the rights-of-way adjacent to the parcels as shown in Figure 2.

The purpose of the Lowland Area study is to characterize metals concentrations in various environmental media within and near the Lowland Area in order to evaluate potential environmental impacts from the historical smelter activities.

Seep and outfall water samples, along with collocated sediment samples, were obtained along the shoreline of the Snohomish River approximately down gradient of the historical smelter facility in April 2013. The collected samples were analyzed for select metals including antimony, arsenic, cadmium, lead, mercury, and thallium. The sample collection and analysis activities were completed in general accordance with the Washington State Department of Ecology (Ecology)-approved Final Sampling and Analysis Plan (SAP), Quality Assurance Project Plan (QAPP) and Health and Safety Plan (HASP) for the project dated August 31, 2012.

The purpose of this technical memorandum is to describe field activities completed as part of the sediment, seep and outfall investigation of the Lowland Area and to summarize the data resulting from analysis of the samples collected. The results of this and future field activities will be used to develop a preliminary Feasibility Study so that a Remedial Investigation and Cleanup Action Plan can be developed for the Lowland Area that is protective of human health and the environment.

2.0 FIELD INVESTIGATION

Fourteen potential sampling locations (seeps and outfalls) were identified during a reconnaissance of the shoreline of the Snohomish River completed by staff from both Ecology and GeoEngineers on August 16, 2012. The SAP provided criteria for triggering sampling and analysis at each of the 14 locations. Specifically, the SAP indicated that the sediment, seep and outfall locations to be sampled would be based upon results of monitoring well sampling and analysis completed adjacent to and in a presumed upgradient location from the identified seeps and/or outfall locations. The sampling and analysis results from the Lowland Area well monitoring completed in January and February 2013 triggered sampling criteria for 10 of the 14 seep and/or outfall locations identified. SAP Table 3 is summarized as Table 1 in this memorandum, with the rationale for sampling.

Seep, outfall water and sediment sample locations were approached on foot where readily accessible or were reached by using a boat operated by Research Support Services (RSS) of Bainbridge Island, Washington. The general approach for sampling seep/sediment locations and outfall/sediment locations was as follows:

- At each seep/sediment sampling locations (four locations), sediment was typically collected at the highest elevation where seeps were observed to be emerging from the shoreline on the day the sampling was performed. Where accessible on foot, sediment samples were collected first, and seep water was collected from the depression created by the sediment sampling. Samples were collected for total and dissolved metals (see Section 2.2, below).
- At each outfall/sediment sampling location, sediment was collected from the location directly below the outfall discharge point where outfall water was observed coming into contact with sediment on the day of sampling. Outfall water was collected directly into containers from the end of the pipe.

Sections 2.1 and 2.2 describe the sediment and water sampling activities.

2.1. River Sediment Sampling

River sediment sampling occurred on April 26, 29 and 30, 2013 at 10 locations along the west bank of the Snohomish River (Figure 2). Samples were obtained using either hand sampling or mechanical sampling equipment. Hand sampling equipment was used where sediment sampling locations were exposed at low tide and accessible by foot at the time of sampling. These techniques generally included collecting sediment using a stainless steel (SS) "cookie cutter," a SS spoon or hand auger. The mechanical sampling equipment included a modified Van Veen "power grab" deployed from a boat operated by RSS. This technique was used at locations where sediment was below tide levels at the time of sampling.

Sediment characteristics were recorded by a professional geologist at each sample location. The surface sediment sample collection forms are provided in Appendix A. At each location, the upper 10 centimeters (cm) of sediment was transferred from the sample collection equipment to an SS bowl, homogenized, and distributed to laboratory-prepared containers, as specified in the SAP. Field screening was completed as described in the SAP. Sediment samples were logged on a chain-of-custody form and stored in coolers on ice for transport and delivery to the analytical laboratory. Chemical analysis of the sediment samples was completed by Analytical Resources, Inc. (ARI) in Tukwila, Washington. A total of 10 samples with two duplicate samples were analyzed for metals including antimony, arsenic, cadmium, lead, mercury, and thallium by Environmental Protection Agency (EPA) Methods 6000/7000 series.

The horizontal coordinates of each sediment sample location was recorded with a handheld GPS device immediately following sample collection.

2.2. Riverbank Seep and Outfall Water Sampling

Riverbank seep and outfall water sampling occurred on April 26, 29 and 30, 2013 at the 10 locations (four seeps and six outfalls) along the west bank of the Snohomish River (Figure 2).

Two 500-milliliter (ml) polyethylene bottles with nitric acid preservative were filled with water from each sample location. One bottle was filled with water directly from the flowing seep or outfall for the total metals sample. For the dissolved metals sample, a decontaminated glass jar was filled with water directly from the flowing seep or outfall, and the water was transferred to the polyethylene bottle using a peristaltic pump and a disposable 0.45 micron water filter. Water quality parameters were measured using a YSI Model 556 multi-parameter meter and recorded on

the surface sediment sample collection forms (Appendix A). The horizontal coordinates of each water sample location were recorded using a handheld GPS device immediately following sample collection.

Seep and outfall samples were collected, logged on a chain-of-custody form in general accordance with the QAPP, placed in laboratory-supplied bottleware and stored in coolers on ice for transport and delivery to the analytical laboratory. Chemical analysis of the water samples was completed by ARI. A total of 10 samples with two duplicate samples were analyzed for total and dissolved metals including antimony, arsenic, cadmium, lead, mercury, and thallium by EPA Methods 6000/7000 series.

2.3. Decontamination

Sediment and water sampling equipment was decontaminated using the procedures specified in the QAPP.

2.4. Disposal of Investigation-Derived Materials

Incidental waste (i.e., disposable gloves, disposable tubing, paper towels, etc.) were disposed of off site as solid waste. Excess sediment was returned to the sampling location following sampling at each location.

2.5. Deviations From the SAP

Field activities were performed in general accordance with the Ecology-approved SAP, QAPP and HASP with the following exceptions:

- Location LLSP-07 was identified as a seep during the reconnaissance by Ecology and GeoEngineers on August 16, 2012. On the day of sampling (April 30, 2013), sampling personnel observed that the source of the water was actually an 18-inch diameter outfall. The location was therefore, renamed LLO-07.
- The SAP indicated that total and ferrous iron would be measured in seeps and outfalls, but due to the sampling methodology and the time limitations within the available tidal window, total and ferrous iron were not measured.
- The SAP indicated that turbidity would be measured in seeps and outfalls; however, due to the time constraints of the tidal window turbidity was not measured. Based on visual observations, turbidity is estimated to have likely exceeded the range of the instrument at the majority of seep and outfall locations.

3.0 RESULTS

3.1. Field Observations

Characteristics of selected sampling locations are briefly summarized below. The following locations were selected for discussion based on noteworthy field observations.

- Outfall LLO-02 consists of an approximately 24-inch-diameter pipe with a rubber tide gate attached to the end. At the time of sampling, the tide gate was partially buried in the mud

preventing it from closing completely. Water from the outfall was pooling in a depression at the mouth of the outfall. Sediment sample LLSD-13 was collected from within the area where the water was observed to pool.

- Outfall LLO-03 discharges within a box constructed of wooden timber bulkheads on three sides and a wooden screen on the fourth side that is apparently designed to prevent river debris from obstructing the outfall tide gate. Both the outfall and sediment sample locations were inaccessible by foot or by boat and therefore, were collected using sampling equipment with extendable handles to reach the target sampling locations.
- Water was observed draining out of the outfall LLO-07 18-inch pipe at approximately 5 gallons per minute with an orange filamentous bacterial growth inside and protruding from the end of the pipe down to the shoreline surface. The sediment on the shoreline surface within the flow path of the water from this pipe also had orange bacterial coatings.

3.2. Riverbank Seep and Outfall Water Quality Parameters

Water quality parameters including pH, conductivity, temperature, dissolved oxygen and oxidation-reduction potential were measured at all seep and outfall locations prior to sampling. Water quality parameter values measured during sample collection are presented in Table 2. The following summarizes the results for the water quality parameter measurements in seep and outfall water samples:

- pH ranged from approximately 6.36 to 7.19.
- Conductivity in the majority of samples ranged from 0.382 to 0.914 millisiemens per centimeter (mS/cm). Conductivity of LLO-05 was 0.060 mS/cm, and conductivity at LLSP-03 was 4.662 mS/cm.
- Temperature ranged from 9.23 to 14.83 degrees Celsius.
- Dissolved oxygen concentrations ranged from 3.33 to 11.12 milligrams per liter (mg/L) in the seep and outfall water samples.
- Oxidation-reduction potential measurements indicate the seep and outfall water is generally reducing or slightly oxidizing in the majority of locations (i.e., approximately -295.5 to 3.5 mV).

3.3. Chemical Analytical Results for River Sediment

Ten sediment samples with two duplicates were analyzed from the 10 sediment sample locations. The sediment samples were submitted for metals analysis including antimony, arsenic, cadmium, lead, mercury and thallium. The results for metals in sediment are presented in Table 3. Figure 3 presents the results of arsenic in sediment.

The following summarizes the results for the sediment samples:

- Antimony was not detected in any of the sediment samples.
- Arsenic was detected in all samples, with the majority of concentrations ranging from 7.7 to 48.9 milligrams per kilogram (mg/kg). One exception was location LLSD-19, where the arsenic concentration was 837 mg/kg. In general, arsenic levels were higher in the sediment samples

that were co-located with outfalls versus the sediment samples that were co-located with seeps.

- Cadmium was detected in all but one of the sediment samples (LLSD-19) at concentrations ranging from 0.5 to 1.1 mg/kg.
- Lead was detected in all but one of the sediment samples (LLSD-19) at concentrations ranging from 3 to 22 mg/kg. Lead concentrations tended to be higher in samples collected in the northern end of sampling area.
- Mercury was detected in all but two of the sediment samples (LLSD-14 and LLSD-17S) at concentrations ranging from 0.04 to 0.16 mg/kg.
- Thallium was not detected in any of the sediment samples analyzed.

The analytical laboratory deliverable is contained in Appendix C.

3.4. Chemical Analytical Results for Seep and Outfall Water

Ten water samples (i.e., four seeps and six outfalls) along with two duplicates were collected and submitted for dissolved and total metals analysis including antimony, arsenic, cadmium, lead, mercury and thallium. The results for dissolved and total metals in the seep and outfall water are presented in Table 4. Figure 3 presents the results of arsenic in water.

The following summarizes the results for the seep and outfall water samples:

- Dissolved antimony was detected in eight of the water samples collected at concentrations ranging from 0.2 to 0.6 micrograms per liter (µg/L). Total antimony was detected in six of the water samples at concentrations ranging from 0.2 to 0.7 µg/L.
- Dissolved and total arsenic was detected in all of the samples analyzed. The majority of the detected arsenic concentrations ranged from 0.8 to 44.7 µg/L. One exception was the outfall sample location LLO-07, where arsenic concentrations were 542 µg/L (dissolved) and 636 µg/L (total). In general, arsenic concentrations were lower in seeps (1.6 to 6.7 µg/L) compared to outfalls 0.8 to 636 µg/L (LLO-07).
- There were no detections of dissolved cadmium in the seep or outfall samples. Total cadmium was detected in one seep water sample at a concentration 0.1 µg/L (LLSP-08).
- Dissolved lead was detected in two outfall samples and three seep samples at concentrations ranging from 0.1 to 0.6 µg/L. Total lead was detected in four outfall samples and four seep samples at concentrations ranging from 0.1 to 4.5 µg/L.
- Dissolved mercury was detected at one seep sample (LLS-05) at a concentration of 0.0217 µg/L. Total mercury was detected in two seep samples at concentrations of 0.0278 µg/L (LLSP-05) and 0.0344 µg/L (LLSP-08).
- Thallium was not detected in any of the seep or outfall samples analyzed.

The analytical laboratory deliverable is contained in Appendix C.

3.5. Data Validation

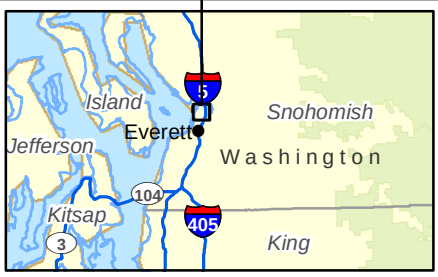
A data quality assessment was performed on all data in general conformance with an EPA "Stage-2B" validation. The data validation confirmed that the sample analytical results as qualified are acceptable for their intended use. The data quality assessment report is provided in Appendix B. The laboratory analytical reports are provided in Appendix C. The data were deemed acceptable for use as qualified.

4.0 LIMITATIONS

We have prepared this technical memorandum for the exclusive use of Washington State Department of Ecology and their authorized agents.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the field of environmental investigation in this area at the time this report was prepared. No warranty or other conditions express or implied should be understood.

Please refer to Appendix D titled "Report Limitations and Guidelines for Use" for additional information pertaining to use of this report.



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Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
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Data Sources: ESRI Data & Maps

Projection: NAD 1983 UTM Zone 10N

Vicinity Map

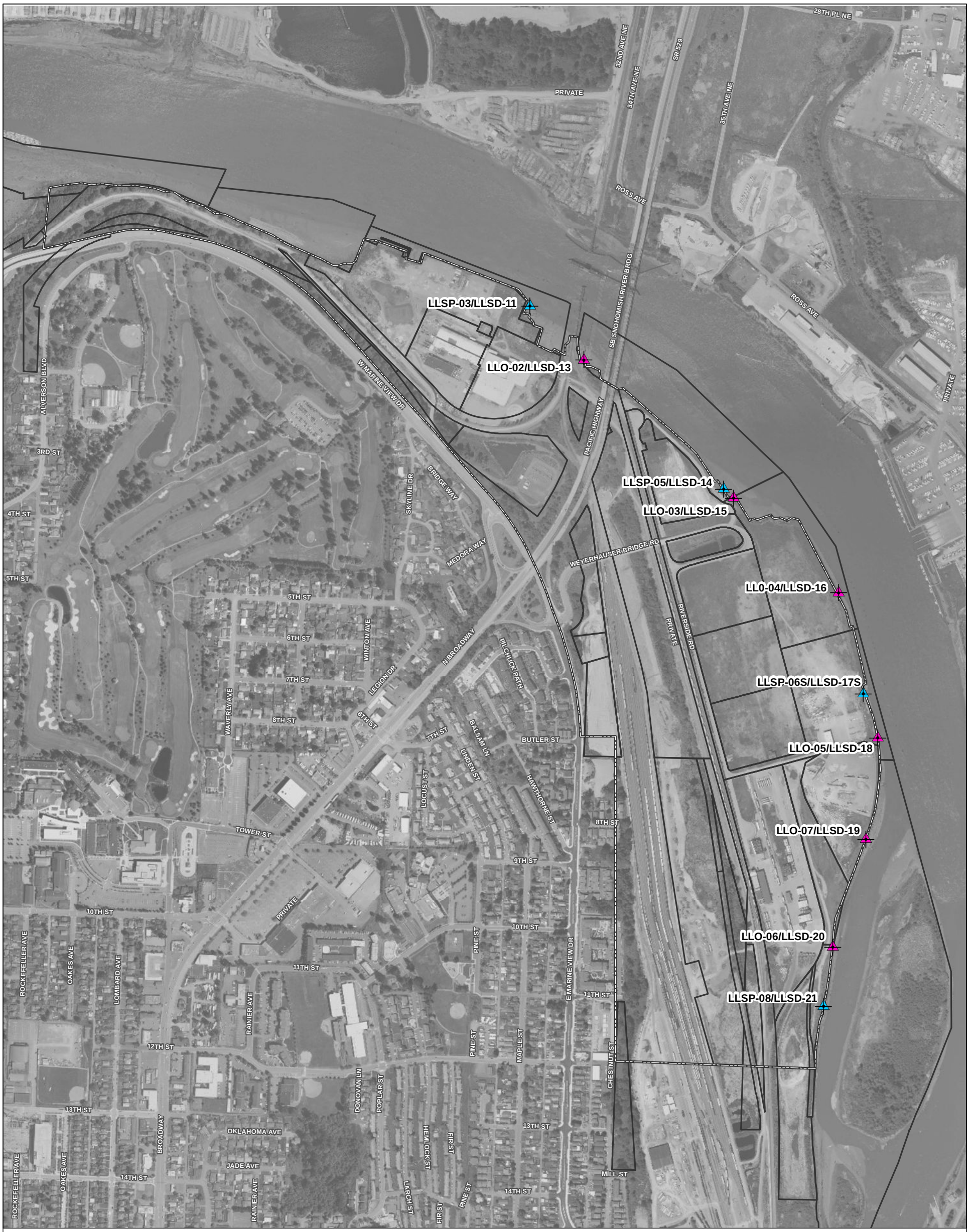
Everett Smelter - Lowland Area

GeoEngineers

Figure 1

Path: \\seal\projects\0050406\GIS\0504068_T1000_VicinityMap_Lowland.mxd Map Revised: 28 May 2013 tward

Path: \\sea\projects\0\0504068\GIS\050406800_T1000_LowlandInvestigationLocations.mxd Map Revised: 11 June 2013 bmagdasy



Legend

- Lowland Area
- Snohomish County Parcel Boundary

Investigation Locations

- Seep Water and Sediment Sample
- Outfall Water and Sediment Sample

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Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerials Express Seattle, 2009. Snohomish County GIS, 2012.

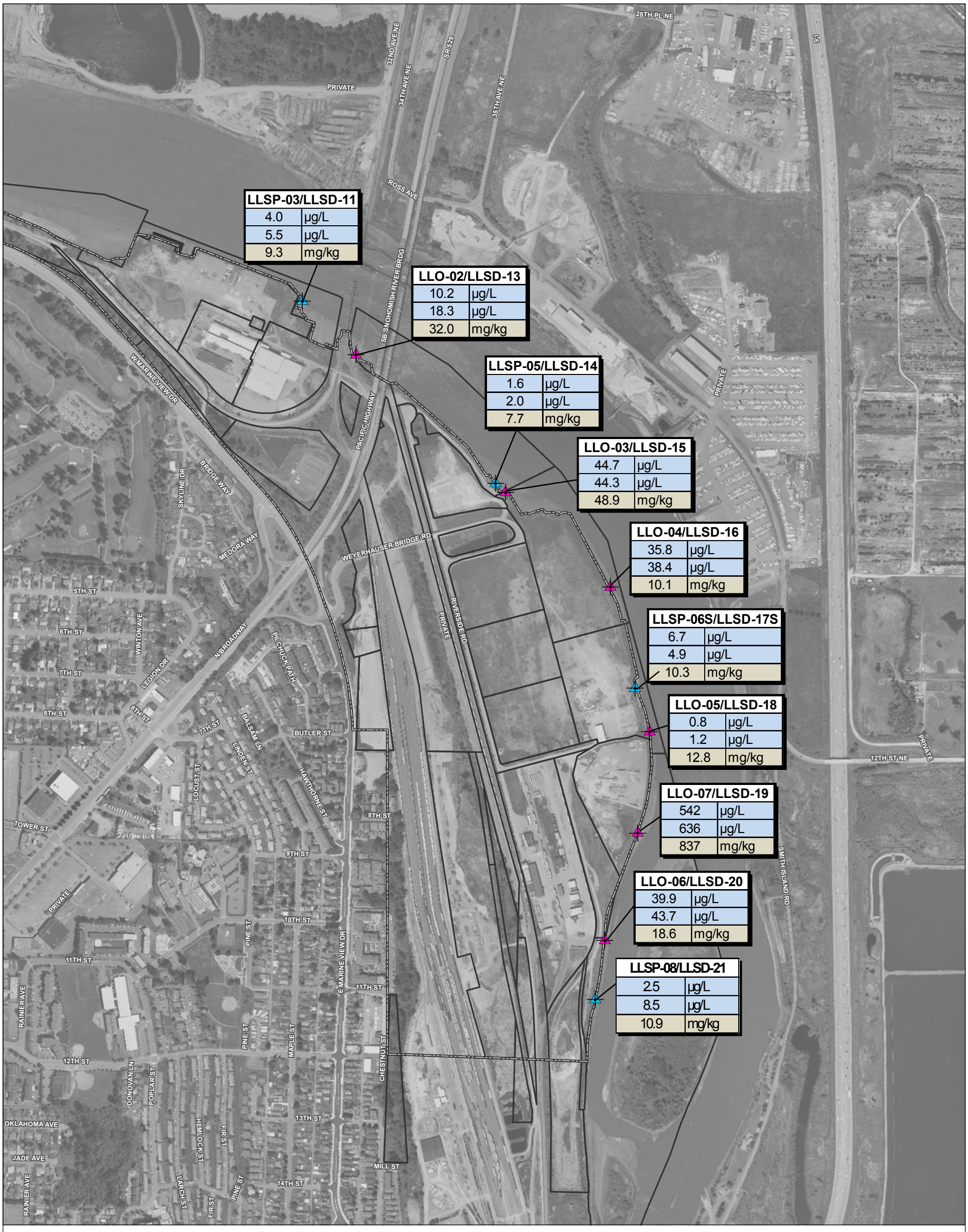
Lowland Investigation Locations

Everett Smelter - Lowland Area

GeoEngineers

Figure 2

Path: \\sea\projects\0\0504068\GIS\050406800_T1000_Water_and_Sed_Results.mxd Map Revised: 11 June 2013 bmagdasy



LLSP-03/LLSD-11	
4.0	µg/L
5.5	µg/L
9.3	mg/kg

LLO-02/LLSD-13	
10.2	µg/L
18.3	µg/L
32.0	mg/kg

LLSP-05/LLSD-14	
1.6	µg/L
2.0	µg/L
7.7	mg/kg

LLO-03/LLSD-15	
44.7	µg/L
44.3	µg/L
48.9	mg/kg

LLO-04/LLSD-16	
35.8	µg/L
38.4	µg/L
10.1	mg/kg

LLSP-06S/LLSD-17S	
6.7	µg/L
4.9	µg/L
10.3	mg/kg

LLO-05/LLSD-18	
0.8	µg/L
1.2	µg/L
12.8	mg/kg

LLO-07/LLSD-19	
542	µg/L
636	µg/L
837	mg/kg

LLO-06/LLSD-20	
39.9	µg/L
43.7	µg/L
18.6	mg/kg

LLSP-08/LLSD-21	
2.5	µg/L
8.5	µg/L
10.9	mg/kg

Legend

- Lowland Area
- Snohomish County Parcel Boundary

Investigation Locations

- Seep Water and Sediment Sample
- Outfall Water and Sediment Sample

Sample ID
Dissolved Arsenic in Water
Total Arsenic in Water
Arsenic in Sediment

N W E S

700 0 700

Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerials Express Seattle, 2009. Snohomish County GIS, 2012.

Water and Sediment Results – Arsenic

Everett Smelter - Lowland Area

GeoEngineers

Figure 3

Table 1

Rationale for Riverbank Seep, Outfall and Sediment Sample Locations

Everett Lowland

Everett, Washington

Investigation Location Designation	Adjacent Well(s)	Metals Concentrations in Adjacent Well(s) Greater Than PASL [1]?	Collect Seep/Outfall/Sediment Sample? [2]
LLSP-01/LLSD-08	MW-1501R	No	No
LLO-01/LLSD-09	MW-1501R	No	No
LLSP-02/LLSD-10	MW-1301R	No	No
LLSP-03/LLSD-11	MW-1202R	Yes	Yes
LLSP-04/LLSD-12	LLMW-03S/D	No	No
LLO-02/LLSD-13	LLMW-05S/D	Yes	Yes
LLSP-05/LLSD-14	LLMW-08S/D, LLMW-07S/D, LLMW-05S/D	Yes	Yes
LLO-03/LLSD-15	LLMW-08S LLMW-07S LLMW-05S	Yes	Yes
LLO-04/LLSD-16	LLMW-11S/D, LLMW-17S/D	Yes	Yes
LLSP-06/LLSD-17S	PZ-3B	Yes	Yes
LLO-05/LLSD-18	PZ-3B	Yes	Yes
LLO-06/LLSD-20	LLMW-22S/D	Yes	Yes
LLSP-07[3]/LLSD-19	PZ-2B	Yes	Yes
LLSP-08/LLSD-21	LLMW-23S/D	Yes	Yes

Notes:

[1] "PASL" = "Potentially applicable screening level." Although screening levels are to be developed in a supplemental remedial investigation report in the future, metals concentrations were screened against preliminary (potentially applicable) screening levels. The PASLs are: Antimony - 32 µg/L, Arsenic - 5 µg/L, Cadmium - 2 µg/L, Lead - 15 µg/L, Mercury - 2 µg/L and Thallium - no developed screening level.

[2] The SAP indicates to collect the seep/outfall/sediment sample if metals concentrations in the identified adjacent well are greater than screening levels.

[3] The source of what was identified as seep sample LLSP-07 was identified to actually be an outfall on the day of sampling. Therefore, LLSP-07 was renamed outfall sample LLO-07.

Table 2

Water Quality Parameters for Riverbank Seeps and Outfalls

Everett Lowland

Everett, Washington

Location Designation	pH	Conductivity (mS/cm)	Temperature (C)	Dissolved Oxygen (mg/L)	Oxidization Reduction Potential (mV)
Outfalls					
LLO-02	7.19	0.778	12.73	7.97	3.5
LLO-03	6.70	0.914	12.06	6.46	-50.5
LLO-04	6.45	0.460	10.63	5.86	-51.1
LLO-05	7.15	0.060	9.23	11.12	65.7
LLO-06	6.79	0.472	11.77	5.43	-40.0
LLO-07	6.36	0.604	11.57	6.35	-2.8
Seeps					
LLSP-03	6.95	4.662	14.75	3.33	-295.5
LLSP-05	6.88	0.382	12.74	6.33	-47.2
LLSP-06S	6.74	0.471	14.83	6.26	-37.1
LLSP-08	6.98	0.759	14.10	6.28	-89.2

Notes:

mS/cm - millisiemens per centimeter

C = degrees Celsius

mg/L = milligrams per liter

mV = millivolts

Table 3

Chemical Analytical Data – Sediment

Everett Lowland

Everett, Washington

Location Designation	Analyte	Antimony	Arsenic	Cadmium	Lead	Mercury	Thallium
	Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
	Sample ID						
LLSD-11	LLSD11-130429	10 U	**9.3**	**0.8**	**10**	**0.07**	0.4 U
	LLSD11-130429-DUP	10 U	**11.0**	**0.8**	**11**	**0.08**	0.4 U
LLSD-13	LLSD13-130429	10 U	**32.0**	**0.7**	**22**	**0.10**	0.4 U
LLSD-14	LLSD14-130426	7 U	**7.7**	**0.5**	**9**	0.03 U	0.3 U
LLSD-15	LLSD15-130426	8 U	**48.9**	**0.7**	**14**	**0.04**	0.3 U
LLSD-16	LLSD16-130429	8 U	**10.1**	**0.7**	**8**	**0.08**	0.3 U
LLSD-17S	LLSD17S-130429	6 U	**10.3**	**1.1**	**3**	0.03 U	0.2 U
LLSD-18	LLSD18-130429	8 U	**12.8**	**0.7**	**7**	**0.07**	0.3 U
	LLSD18-130429-DUP	9 U	**12.4**	**0.7**	**7**	**0.07**	0.3 U
LLSD-19	LLSD19-130430	20 U	**837**	0.9 U	9 U	**0.16**	0.4 U
LLSD-20	LLSD20-130429	7 U	**18.6**	**0.6**	**6**	**0.04**	0.3 U
LLSD-21	LLSD21-130426	10 U	**10.9**	**0.9**	**9**	**0.08**	0.4 U

Notes:

U = The analyte was not detected at the indicated reporting limit

Bold text indicates the analyte was detected.

mg/kg = milligram per kilogram

"DUP" = Field duplicate

Table 4

Chemical Analytical Data for Riverbank Seeps and Outfalls – Water

Everett Lowland

Everett, Washington

Location Designation	Analyte	Antimony		Arsenic		Cadmium		Lead		Mercury		Thallium	
	Unit	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total
	Sample ID												
Outfalls													
LLO-02	LL002-130429	**0.6**	**0.7**	**10.2**	**18.3**	0.1 U	0.1 U	**0.5**	**1.5**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLO-03	LL003-130426	**0.3**	**0.2**	**44.7**	**44.3**	0.1 U	0.1 U	0.1 U	0.1 U	0.0200 U	0.0200 U	0.2 U	0.2 U
LLO-04	LL004-130429	0.2 U	0.2 U	**35.8**	**38.4**	0.1 U	0.1 U	0.1 U	**0.2**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLO-05	LL005-130429	0.2 U	0.2 U	**0.8**	**1.2**	0.1 U	0.1 U	0.1 U	**0.1**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLO-06	LL006-130429	**0.4**	**0.3**	**39.9**	**43.7**	0.1 U	0.1 U	**0.2**	**0.4**	0.0200 U	0.0200 U	0.2 U	0.2 U
	LL006-130429-DUP	**0.4**	**0.4**	**40.5**	**43.9**	0.1 U	0.1 U	**0.2**	**0.5**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLO-07	LL007-130429	**0.2**	0.2 U	**542**	**636**	0.1 U	0.1 U	0.1 U	0.1 U	0.0200 U	0.0200 U	0.2 U	0.2 U
Seeps													
LLSP-03	LLSP03-130429	**0.2**	0.2 U	**4.0**	**5.5**	0.1 U	0.1 U	**0.1**	**1.7**	0.0200 U	0.0200 U	0.2 U	0.2 U
	LLSP03-130429-DUP	0.2 U	0.2 U	**3.0**	**5.0**	0.1 U	0.1 U	**0.1**	**2.2**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLSP-05	LLSP05-130426	**0.3**	**0.3**	**1.6**	**2.0**	0.1 U	0.1 U	**0.6**	**1.1**	**0.0217**	**0.0278**	0.2 U	0.2 U
LLSP-06S	LLSP06S-130429	**0.6**	**0.5**	**6.7**	**4.9**	0.1 U	0.1 U	**0.2**	**1.4**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLSP-08	LLSP08-130429	**0.6**	**0.2**	**2.5**	**8.5**	0.1 U	**0.1**	0.1 U	**4.5**	0.0200 U	**0.0344**	0.2 U	0.2 U

Notes:

U = The analyte was not detected at the indicated reporting limit

Bold text indicates the analyte was detected

µg/L = microgram per liter

DUP = Field duplicate sample

APPENDIX A
Surface Sediment Sample Collection Forms

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Project: Everett Lowland | Job No. 0504-068-00 | Sample Name: LLSP-03/LLSD-11

Date: 4/29/13 | Weather: sunny, light breeze, 50's

Field Personnel: Aaron Waggoner and Hannah McDonough

Subcontractor: RSS

Sample Method: (Hand Collection) Diver Van Veen Surface Grab

Target Sample Interval: 0-10 cm

Datum (Horizontal/Vertical): N/A

Leadline Water Depth: — Sampled from Exposed Mudflat

Tide Elevation: — L(-2.41' @ 14:18)

Mudline Elevation: —

water sample time = 1350

Run # or Comosite Pt	Time	Latitude (Northing)	Longitude (Easting)	Sample Criteria 1	2	3	4	5	Penetration Depth	Sample Depth
1	1350	48.016488	-122.19051	NA	NA	NA	NA	NA	10 cm	0-10cm

Acceptance critiera: 1 Overlying water is present; 2 Water has low turbidity; 3 Sampler is not overfilled; 4 Sample surface is flat; 5 Desired sample depth is reached.

Laboratory Analysis: metals

SEDIMENT SAMPLE DESCRIPTION

Predominant Sediment Type: Cobble Gravel (Sand) Coarse Medium (Fine) (Silt) Clay Shell Wood — fine sandy silt

Sediment Color: Gray Olive Drab Olive Light Brown Dark Brown (Black) Other — lt brn in upper 2-cm, black for 2-7cm, grey for 7-10cm

Sediment Odor: None (H2S) Petroleum Other ↓odor Slight Moderate (Strong)

Redox Thickness: | Visible Horizons: brown to black to grey

Organisms: Bladder wrack | Biological Structures: none

Wood: (None) <25% 25-50% >50% Describe:

Debris: Yes (No) Describe:

Petroleum: (None) SS MS HS Product Describe:

T = 14.75°C ORP = 295.5

C = 4.662 mS/cm Water Quality Parameters from LLSP-03

DO = 3.33 mg/L Seep water

pH = 6.95 Duplicate Samples from Seep water and Sediment

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SURFACE SEDIMENT SAMPLE COLLECTION FORM

Project Everett Lowland | Job No. 0504-068-00 | Sample Name LLO-02 / LLSD-13

Date 4/29/13 | Weather sunny, light breeze, 50's

Field Personnel Aaron Wagoner and Hannah Mathews

Subcontractor RSS

Sample Method: Hand Collection | Diver | Van Veen | Surface Grab

Target Sample Interval 0-10 cm

Datum (Horizontal/Vertical) ~~N/A~~

Leadline Water Depth 1 Pt. collected at low tide from tideflat w/ outfall pool (1320 water sample time)

Tide Elevation ~ L(-2.41' @ 14:18)

Mudline Elevation –

Run # or Comosite Pt	Time	Latitude (Northing)	Longitude (Easting)	Sample Criteria 1	2	3	4	5	Penetration Depth	Sample Depth
1	1315	48.01543	-122.18888	NA	~~NA~~	NA	NA	NA	10 cm	0-10 cm

Acceptance critiera: 1 Overlying water is present; 2 Water has low turbidity; 3 Sampler is not overfilled; 4 Sample surface is flat; 5 Desired sample depth is reached.

Laboratory Analysis: metals

SEDIMENT SAMPLE DESCRIPTION

Predominant Sediment Type: Cobble | Gravel | (Sand) Coarse Medium Fine | (Silt) Clay | Shell | Wood — Sandy ~~SILT~~ silt w/ organics (~1/5%)

Sediment Color: Gray | Olive | Drab Olive | (Light Brown) to 2cm | Dark Brown | Black | Other dark grey 2-10 cm

Sediment Odor: None | H_2S | Petroleum | (Other) marine | Slight | Moderate | Strong

Redox Thickness: 0-2cm of brown 2-10cm of Gray | Visible Horizons: light brn to gray

Organisms: none | Biological Structures: organic material in upper 2 cm

Wood: (None) | <25% | 25-50% | >50% | Describe

Debris: Yes | (No) | Describe

Petroleum: (None) | SS | MS | HS | Product | Describe

T = 12.73°C ORP = 3.5

C = 0.778 mS/cm Water Quality Parameters from LLO-02

DO = 7.97 mg/L Outfall water

pH = 7.19

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Project: Everett Lowland ECY | Job No. 0504-068-00 | Sample Name: LLSP-05 / LLSD-14 - 130426

Date: 4/26/13 | Weather: partly cloudy, upper 50's

Field Personnel: Aaron Waggoner and Hannah McDonough

Subcontractor: N/A

Sample Method: Hand Collection | Diver | Van Veen | Surface Grab | sample time: 1330

Target Sample Interval: 0-10 cm

Datum (Horizontal/Vertical): N/A

Leadline Water Depth: unsubmerged tideflat Sample at low tide

Tide Elevation: 12 pm = low tide L(-2.39'@1200)

Mudline Elevation: —

Run # or Comosite Pt	Time	Latitude (Northing)	Longitude (Easting)	Sample Criteria 1	2	3	4	5	Penetration Depth	Sample Depth
1	1305	48.01291	-122.18467	NA	NA	NA	NA	NA	10cm	10cm

Acceptance critiera: 1 Overlying water is present; 2 Water has low turbidity; 3 Sampler is not overfilled; 4 Sample surface is flat; 5 Desired sample depth is reached.

Laboratory Analysis: Metals

SEDIMENT SAMPLE DESCRIPTION

Predominant Sediment Type: Cobble | Gravel | f-c Sand | Coarse | Medium | Fine | w/ Silt | Clay | Shell | Wood — Fine to coarse SAND w/ silt

Sediment Color: Gray | Olive | Drab Olive | Light Brown | Dark Brown | Black | Other: upper grey brown medium grey w/ orange

Sediment Odor: None | H_2S | Petroleum | (Other: marine) | (Slight) | Moderate | Strong

Redox Thickness: 8 cm of grey | Visible Horizons: vertical pockets of iron staining

Organisms: worm | Biological Structures: vertical burrows

Wood: None | <25% | 25-50% | >50% | Describe: trace organics (<5%) (twigs, reeds).

Debris: Yes | (No) | Describe:

Petroleum: (None) | SS | MS | HS | Product | Describe:

T = 12.74°C ORP = -47.2

C = 0.382 mS/cm Water Quality Parameters of LLSP-05

DO = 6.33 mg/l Seep water

pH = 6.88

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Project: Everett Lowland | Job No. 0504-068-00 | Sample Name: LLO-03 LLSD15 - 130426

Date: 4/26/13 | Weather: cloudy

Field Personnel: Aaron Waggoner and Hannah McDonough

Subcontractor: N/A

Sample Method: Hand Collection (Hand auger) Diver Van Veen Surface Grab

Target Sample Interval: 0 - 10 cm

Datum (Horizontal/Vertical): N/A

Leadline Water Depth: — Collected at low tide from mudflat

Tide Elevation: — L(-2.39' @ 1200)

Mudline Elevation: —

sample time: 1430

Run # or Comosite Pt	Time	Latitude (Northing)	Longitude (Easting)	Sample Criteria 1	2	3	4	5	Penetration Depth	Sample Depth
1	1430	48.01273	-122.18437	~~Yes~~ NA	~~Yes~~ NA	~~Yes~~ NA	~~Yes~~ NA	~~Yes~~ NA	10cm	10cm

Acceptance critiera: 1 Overlying water is present; 2 Water has low turbidity; 3 Sampler is not overfilled; 4 Sample surface is flat; 5 Desired sample depth is reached.

Laboratory Analysis: Metals

SEDIMENT SAMPLE DESCRIPTION

Predominant Sediment Type: Cobble | Gravel | (silty) Sand | Coarse | Medium | Fine | Silt | Clay | Shell | Wood — Silty SAND

Sediment Color: Gray | Olive | Drab Olive | Light Brown | (Dark Brown) | Black | Other — dark grey w/ fragments of brick.

Sediment Odor: None | H_2S | Petroleum | (Other) marine | (Slight) | Moderate | Strong

Redox Thickness: ~~grey~~ — | Visible Horizons: —

Organisms: — | Biological Structures: none

Wood: (None) | <25% | 25-50% | >50% | Describe:

Debris: (Yes) | No | Describe: large pieces of wood and piping in channel (Timbers/Driftwood)

Petroleum: (None) | SS | MS | HS | Product | Describe:

T = 12.06°C | ORP = -50.5

Cond = 0.914 mS/cm | turbidity = 4.72

DO = 6.46 | Water quality parameters from LLO-03 outfall water

pH = 6.70

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SURFACE SEDIMENT SAMPLE COLLECTION FORM

Project Everett Lowland Job No. 0504-068-00 Sample Name LLO-04/LLSD-16

Date 4/29/13 Weather Windy, sunny, 50°F

Field Personnel Aaron Weygoner

Subcontractor RSS

Sample Method: Hand Collection Diver Van Veen Surface Grab Power Grab Outfall sample at 1155

Target Sample Interval 0-10ft

Datum (Horizontal/Vertical) N/A

Leadline Water Depth 4 ft

Tide Elevation – H(11.48@7:24) L(-2.41@14:18)

Mudline Elevation –

Run # or Comosite Pt	Time	Latitude (Northing)	Longitude (Easting)	Sample Criteria 1	2	3	4	5	Penetration Depth	Sample Depth
1	1220	48.01088	-122.18121	Y	Y	Y	Y	Y	0.7ft (21.3cm)	0 to 10cm

Acceptance critiera: 1 Overlying water is present; 2 Water has low turbidity; 3 Sampler is not overfilled; 4 Sample surface is flat; 5 Desired sample depth is reached.

Laboratory Analysis: metals

SEDIMENT SAMPLE DESCRIPTION

Predominant Sediment Type: Cobble, Gravel, (Sand), Coarse, Medium, (Fine), Silt, Clay — Shell, Wood — light brown sand 0-2cm fine sand/silt 2-10cm

Sediment Color: Gray, Olive, Drab Olive, (Light Brown), Dark Brown, Black, Other — grey

Sediment Odor: None, H_2S, Petroleum, (Other) (marine), Slight, Moderate, Strong

Redox Thickness: 2cm brown upper, Gray 2cm to 10cm Visible Horizons: brown – grey

Organisms: none Biological Structures: vertical burrows surface organics

Wood: None, (<25%), 25-50%, >50% Describe:

Debris: Yes, (No) Describe:

Petroleum: (None), SS, MS, HS, Product Describe:

T = 10.03°C ORP = -51.1

SC = 0.216 mS/cm Water Quality Parameters from LLO-04

DO = 5.86 mg/L Outfall water

pH = 6.45

Anchor got stuck on bottom after Sampling

GeoEngineers

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Project Everett Lowland Job No. 0504-068-00 Sample Name LLO-05 / LLSD-18

Date 4/29/13 Weather sunny, breezy, 50's

Field Personnel Aaron Waggoner and Hannah McDonough

Subcontractor RSS

Sample Method: Hand Collection Diver Van Veen Surface Grab Boat ~~Power~~ Grab

Target Sample Interval 0-10 cm

Datum (Horizontal/Vertical) N/A

Leadline Water Depth ~10ft

Tide Elevation H(11.48 @ 7:24) L(-2.41 @ 14:18)

Mudline Elevation –

Run # or Comosite Pt	Time	Latitude (Northing)	Longitude (Easting)	Sample Criteria 1	2	3	4	5	Penetration Depth	Sample Depth
1	1004	48.00800	-122.17997	Yes	Yes	Yes	yes	Yes	0.65' (16.6cm	10 cm

Acceptance critiera: 1 Overlying water is present; 2 Water has low turbidity; 3 Sampler is not overfilled; 4 Sample surface is flat; 5 Desired sample depth is reached.

Laboratory Analysis: Metals

SEDIMENT SAMPLE DESCRIPTION

Predominant Sediment Type: Cobble Gravel (Sand) Coarse Medium Fine (Silt) Clay Shell Wood — Lt. br fine Sandy Silt

Sediment Color: Gray Olive Drab Olive (Light Brown) Dark Brown Black Other

Sediment Odor: None H_2S Petroleum (Other) marine (Slight) Moderate Strong

Redox Thickness: 0.3 - 0.65 = grey redox Visible Horizons: gray silt ~ 4 inches depth

Organisms: marine plants upper layer Biological Structures: –

Wood: None (<25%) 25-50% >50% Describe: sticks, bark dust

Debris: Yes (No) Describe

Petroleum: (None) SS MS HS Product Describe

T = 9.23 °C

C = 0.060 mS/cm ORP = 65.7

DO = 11.12 mg/L Water Quality Parameters from LLO-05

pH = 7.15 outfall water Duplicate of LLSD-18 Sediment only

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Project Everett, Lowland Job No. 050-4068-00 Sample Name LLSP-06/LLSD-17 (S&D)

Date 4/29/13 Weather Sunny, 60's

Field Personnel Aaron Waggoner and Hannah McDonough

Subcontractor RSI

Sample Method: Hand Collection Diver Van Veen Surface Grab

Target Sample Interval 0-10 cm

Datum (Horizontal/Vertical) —

Leadline Water Depth ~~0ft~~ Sampled from exposed shoreline

Tide Elevation — 4 (-2.41' @ 14:18) at low tide

Mudline Elevation —

grand water sample above time = 1240
grand water sample below time = 1250
LLSP-05S from above silt layer
LLSP-05D from below silt layer

Run # or Comosite Pt	Time	Latitude (Northing)	Longitude (Easting)	Sample Criteria 1	2	3	4	5	Penetration Depth	Sample Depth
1	1235	48.00887	-122.18042	NA	NA	NA	NA	NA	10cm	0-10cm
2	1250	48.00888	-122.18035	NA	NA	NA	NA	NA	10cm	0-10cm

Acceptance critiera: 1 Overlying water is present; 2 Water has low turbidity; 3 Sampler is not overfilled; 4 Sample surface is flat; 5 Desired sample depth is reached.

Laboratory Analysis: metals

SEDIMENT SAMPLE DESCRIPTION

Predominant Sediment Type: Cobble Gravel (Sand) Coarse (Medium) Fine Silt Clay Shell Wood — ~~med SAND, trace silt~~

Sediment Color: (Gray) Olive Drab Olive Light Brown Dark Brown Black Other gray f-c SAND w/ mica

Sediment Odor: (None) H_2S Petroleum Other _____ Slight Moderate Strong

Redox Thickness 0 Visible Horizons lt brown

Organisms _____ Biological Structures none

Wood: (None) <25% 25-50% >50% Describe LLSP-05D description 0-7cm of fine to coarse sand lt. brown for 2cm then gray 2cm to 7cm, fine silty SAND gray 7cm to 10cm

Debris: Yes (No) Describe _____

Petroleum: Sheen (None) SS MS HS Product Describe _____

T = 14.83 ORP = -57.1 T 12.01 ORP -16.1
C = 0.471 mS/cm Water Quality parameters C 0.345
DO = 6.26 mg/L from both Seep locations DO 9.74(7)
pH = 6.74 LLSP-06S&D pH 7.89

GeoEngineers

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Project: Ecology Everett Lowland | Job No.: 0504-068-00 | Sample Name: ~~LLSP-07~~ LLSD-19 / LLØ7

Date: 4/30/13 | Weather: Sunny Breezy 50°F

Field Personnel: Aaron Waggoner / Hannah McDonough

Subcontractor: N/A

Sample Method: Hand Collection | Diver | Van Veen | Surface Grab

Target Sample Interval: 0 to 10cm

Datum (Horizontal/Vertical): —

Leadline Water Depth: N/A collected at low tide

Tide Elevation: -1.(-2.38' @ 15:06)

Mudline Elevation: —

LLØ7 ~~LLSP07~~ Parameters

Temp 11.57 | Cond 0.604 mS/cm | DO 6.35 | pH 6.36 | ORP -2.8

Lt. orange w/ H_2S odor, mud / Turbidity ~200 NTU

"Outfall not seep"

Run # or Comosite Pt	Time	Latitude (Northing)	Longitude (Easting)	Sample Criteria 1	2	3	4	5	Penetration Depth	Sample Depth
1	1750	48.00597	-122.18026	NA	NA	NA	NA	NA	10cm	0 to 10cm

Acceptance critiera: 1 Overlying water is present; 2 Water has low turbidity; 3 Sampler is not overfilled; 4 Sample surface is flat; 5 Desired sample depth is reached.

Laboratory Analysis: Metals

SEDIMENT SAMPLE DESCRIPTION

Predominant Sediment Type: Cobble | Gravel | (Sand) | Coarse | Medium | Fine | Silt | Clay | Shell | Wood

Sediment Color: Gray | Olive | Drab Olive | Light Brown | (Dark Brown) | Black | Other

Sediment Odor: None | (H_2S) | Petroleum | Other | Slight | Moderate | (Strong)

Redox Thickness: 6cm | Visible Horizons: 0-4cm Gravel in Matrix

Organisms: N/A | Biological Structures: N/A

Wood: (None) | <25% | 25-50% | >50% | Describe

Debris: Yes | (No) | Describe

Petroleum: (None) | SS | MS | HS | Product | Describe

Changed to LLØ7 from LLSPØ7 after discovering that there was an 18" steel outfall. Coarse crushed Gravel on surface of mud flat that has weathered from the bulkhead. Dark brown silty SAND occasional Gravel to 4cm then last Dark Gray silty sand to 10 cm.

GeoEngineers

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Project: Everett Lowland | Job No.: 0501-068-00 | Sample Name: LLSD-20/LLO-06

Date: 4/29/13 | Weather: Sunny, slight breeze, upper 50's

Field Personnel: Aaron Waggoner and Hannah McDonough

Subcontractor: RSS

Sample Method: Hand Collection | Diver | Van Veen | Surface Grab | (Boat Power Grab)

Target Sample Interval: 0-10cm

Datum (Horizontal/Vertical): N/A — outfall sample 1130

Leadline Water Depth: 5ft

Tide Elevation: -H(11.48@7:24) L(-2.41@14:18)

Mudline Elevation: -

Run # or Comosite Pt	Time	Latitude (Northing)	Longitude (Easting)	Sample Criteria 1	2	3	4	5	Penetration Depth	Sample Depth
1	1110	48.00382	-122.18119	Y	N	Y	Y	N		
2	1111			-	-	-	-	-		
3	1119			Y	Y	Y	Y	Y	0.6ft (18.3cm)	~~0-6ft~~ 0 to 6cm

Acceptance critiera: 1 Overlying water is present; 2 Water has low turbidity; 3 Sampler is not overfilled; 4 Sample surface is flat; 5 Desired sample depth is reached.

Laboratory Analysis:

SEDIMENT SAMPLE DESCRIPTION

Predominant Sediment Type: Cobble | w/ Gravel | Sand | Coarse | Medium | Fine | Silt | Clay | Shell | Wood

Sediment Color: Gray | Olive | Drab Olive | Light Brown | Dark Brown | Black | Other — light brn f SA w/ silt 0-4cm; light grey SA ~~w/ gravel~~ 4-7cm; grey SA w/ gravel 7-10cm

Sediment Odor: None | H_2S | Petroleum | Other marine | Slight | Moderate | Strong

Redox Thickness: 4cm of brown oxidized | Visible Horizons:

Organisms: | Biological Structures: vertical burrows 0-1.5cm

Wood: None | <25% | 25-50% | >50% | Describe: Sticks > 1" diam in Power Grab.

Debris: Yes | No | Describe:

Petroleum: None | SS | MS | HS | Product | Describe:

T= 11.77°C ORP= -40.0

C= 0.472 mS/cm Water Quality Parameter from LLO-06.

DO= 5.43 mg/L Outfall water

pH= 6.79 Duplicate of LLSD-20 Sediment only

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Project: Ecy - Everett Lowland | Job No. 0504-068-00 | Sample Name: LLSP-08/LLSD-21

Date: 4/26/13 | Weather: Sunny, Lt. breeze, 50°F

Field Personnel: Aaron Waggoner / Hannah McDonough

Subcontractor: N/A

Sample Method: Hand Collection | Diver | Van Veen | Surface Grab | Cookie Cutter

Target Sample Interval: 0 to 10 cm | sample time: 1130

Datum (Horizontal/Vertical): N/A

Leadline Water Depth: Unsubmerged Collected at low tide mud flat

Tide Elevation: Low Tide ~ 12PM -1.5' L (-2.39 @ 12:00)

Mudline Elevation: +

Run # or Comosite Pt	Time	Latitude (Northing)	Longitude (Easting)	Sample Criteria 1	2	3	4	5	Penetration Depth	Sample Depth
1	1120	48.00264	-122.18144	NA	NA	NA	NA	NA	10 cm	10 cm

Acceptance critiera: 1 Overlying water is present; 2 Water has low turbidity; 3 Sampler is not overfilled; 4 Sample surface is flat; 5 Desired sample depth is reached. * gradual sloping bank

Laboratory Analysis: Metals

SEDIMENT SAMPLE DESCRIPTION

Predominant Sediment Type: Cobble | Gravel | Sand | Coarse | Medium | Fine | (Silt) | Clay | Shell | Wood

Sediment Color: Gray | Olive | Drab Olive | Light Brown | Dark Brown | Black | Other: top 1cm = brown, remainder = dark grey

Sediment Odor: None | (H_2S) | Petroleum | Other ____ | Slight | (Moderate) | Strong

Redox Thickness: 9cm | Visible Horizons: No

Organisms: No | Biological Structures: No

Wood: None | (<25%) | 25-50% | >50% | Describe: woody debris, reeds

Debris: (Yes) | No | Describe: old cable, sediment cloth, other, see photo

Petroleum: None | SS | MS | HS | Product | Describe: Yes, sheen, organic platy sheen

pH 6.98 | ORP: -89.2

DO 6.28 mg/L | Water Quality Parameters from LLSP-08

Cond 0.759 mS/cm | Seep Water

T 14.10°C

APPENDIX B
Data Quality Assessment Report

DATA VALIDATION REPORT

TOTAL/DISSOLVED METALS IN WATER BY METHODS EPA200.8/SW7470A
METALS IN SEDIMENT BY METHODS SW6010C/200.8/7471A

Primary Laboratory SDG	Samples Validated (Bold indicates the sample was qualified)
W045/ W046	LL002-130429, LL003-130426, LL004-130429, LL005-130429, LL006-130429, LL006-130429-DUP, LL007-130430, LLSP03-130429, LLSP03-130429-DUP, LLSP05-130426, LLSP06-130429, LLSP08-130426
W057	LLSD11-130429, LLSD11-130429-DUP, LLSD13-130429, LLSD14-130426, LLSD15-130426, LLSD16-130429, LLSD17-130429, LLSD18-130429, LLSD18-130429-DUP, LLSD19-130430, LLSD20-130429, LLSD21-130426

PROJECT: LOWLAND AREA (0504-068-00)

This report documents the results of an Environmental Protection Agency (EPA) level 2b data validation of analytical data from the analyses of water and sediment samples and the associated laboratory and field quality control (QC) samples. The review included the following:

- Chain of Custody
- Holding Times and Sample Preservation
- Instrument Calibration
- ICP Interference Check Sample
- Method and Calibration Blanks
- Laboratory Control Samples
- Matrix Spikes
- Laboratory Duplicates
- Field Duplicates

OBJECTIVE

The objective of the data validation was to review laboratory analytical procedures and quality control (QC) results to evaluate whether:

- The samples were analyzed using well-defined and acceptable methods that provide detection limits below applicable regulatory criteria;
- The precision and accuracy of the data are well defined and sufficient to provide defensible data; and
- The quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

Seven (7) stormwater outfall samples, twelve (12) sediment samples, and five (5) seep samples, including field duplicates, were analyzed by one or more of the analytical methods listed in the title of this appendix.

DATA PACKAGE COMPLETENESS

Analytical Resources Incorporated (ARI), located in Tukwila, Washington, analyzed the water samples evaluated as part of this data quality assessment. The laboratory provided all required deliverables for the assessment according to the National Functional Guidelines. The laboratory followed adequate corrective action processes and all identified anomalies were discussed in the case narratives.

DATA QUALITY ASSESSMENT SUMMARY

The results for each of the QC elements are summarized below. The data assessment was performed using guidance in the USEPA Contract Laboratory Program *National Functional Guidelines for Inorganic Data Review* (USEPA, 2010).

Chain-of-Custody Documentation

Chain-of-custody (COC) forms were provided with the laboratory analytical reports. There were no anomalies noted on the COC forms; proper COC protocols appear to have been followed for this sampling event.

Holding Times and Sample Preservation

The holding time is defined as the time that elapses between sample collection and sample analysis. The maximum holding time criteria of 6 months (28 days for mercury) is prescribed for the two metals analytical methods to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times of 6 months (28 days for mercury) were met for all analyses.

Instrument Calibration

The laboratory followed the method requirements for satisfactory instrument calibration. Instrument calibration is necessary in order to ensure that the instrument is capable of producing acceptable quantitative data for the metals on the target analyte list in the QAPP. Initial Calibration Verification (ICV) demonstrates that the instrument is capable of acceptable performance at the beginning of the analytical run. The Continuing Calibration Verification (CCV) demonstrates that the initial calibration is still valid by checking the performance of the instrument on any given day that samples are being analyzed.

Each calibration curve was made up of a blank and at least five calibration standards with all measurements being within the working range of the instrument. The calibration curves were fitted using linear regression and each curve had a correlation coefficient of ≥ 0.995.

The ICV/CCV standards were within 90% to 110% of the true value in all cases.

ICP Interference Check Sample

The Interference Check Sample verifies the analytical instrument's ability to overcome isobaric interferences typical of those found in samples. The laboratory analyzed this QC sample at the

proper frequency and location of the analytical run. All solution mixtures were within the control limit of 20% of the true value.

Method Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. Method blanks were analyzed with each batch of samples, at a frequency of 1 per 20 samples. For all sample batches, method blanks were analyzed at the required frequency. None of the analytes of interest were detected above the reporting limits in any of the method blanks.

Matrix Spikes

Because the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis. One aliquot of sample is analyzed in the normal manner, and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a percent recovery (%R) is calculated. In the event that a particular element is out of the recovery value control limits in the matrix spiked sample, the laboratory is required to analyze a "post-spiked" sample in order to further isolate any potential quality control issues with the given element.

Matrix spike analyses should be performed once per analytical batch or every 20 field samples, whichever is more frequent. The recovery criteria for matrix spikes are 75% to 125% for all of the elements in this report.

The frequency requirements were met for all analyses, with the following exceptions:

All SDGs: The %R value for total antimony was less than the control limit of 80%. Appropriately, in each case the laboratory properly conducted a post-spiked sample. These post-spiked samples were spiked with a higher concentration of element solution as the matrix spike, however, they do not interact with acid and are never heated in the digestion process. The %R values for each of the post spike samples were within the 75% to 125% control limits.

In the process of determining the appropriate action for this potential outlier, it was also noted that the associated positive field results for total antimony were all far less than the specified screening level for this compound. Based on professional judgment, the total antimony reporting limits were not qualified, as there is no effect on the usefulness of the antimony data for this project.

Laboratory Control Samples (LCS)

A laboratory control sample is essentially a blank sample that is spiked with a known amount of analyte concentration and analyzed. It is to be treated much like a matrix spike, without the possibility for matrix interference. As there is no actual sample matrix in the analysis, the analytical expectations for accuracy and precision are usually more rigorous and qualification would apply to all samples in the batch, instead of the parent sample only.

Laboratory control sample analyses should be performed once per analytical batch or every 20 field samples, whichever is more frequent. The recovery criteria for laboratory control samples are specified in the laboratory documents as are the relative percent difference values. The frequency requirements were met for all analyses, and the %R/RPD values were within the proper control limits.

Laboratory Duplicates

Internal laboratory duplicate analyses are performed to monitor the precision of the analyses. Two separate aliquots of a sample are analyzed as distinct samples in the laboratory, and the RPD between the two results is calculated. Duplicate analyses should be performed once per analytical batch. If one or more of the samples used has a concentration greater than five times the reporting limit for that sample, the absolute difference is used instead of the RPD.

Laboratory duplicates were analyzed at the proper frequency and the specified acceptance criteria were met for all analyses.

Field Duplicates

Field duplicate samples were collected and analyzed along with the reviewed sample batches. The duplicate samples were analyzed for the same parameters as the associated parent samples. As mentioned above for the laboratory duplicates the RPD is used as the criteria for assessing precision, unless one or more of the samples used has a concentration greater than five times the reporting limit for that sample, the absolute difference is used instead of the RPD.

The RPD control limits for water samples is 50%, while the RPD control limits for water samples is 35%. The absolute difference control limits for soil samples is twice the PQL value, while the absolute difference control limits for water samples is the same as the PQL value. There were four sets of field duplicates shown below for this phase of the sampling event:

- LLO06-130429 & LLO06-130429-DUP
- LLSP03-130429 & LLSP03-130429-DUP
- LLSD11-130429 & LLSD11-130429-DUP
- LLSD18-130429 & LLSD18-130429-DUP

The precision criteria for all target analytes were met for all sample pairs.

OVERALL ASSESSMENT

As was determined by this data quality assessment, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the LCS and MS %R values. Precision was acceptable, as demonstrated by the laboratory duplicate and field duplicate RPD values.

All data, as reported, are acceptable for use.

APPENDIX C
Laboratory Deliverables (on attached CD)

APPENDIX D
Report Limitations and Guidelines for Use

APPENDIX D
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report.

Environmental Services are Performed for Specific Purposes, Persons and Projects

GeoEngineers has performed this investigation of the Everett Smelter – Lowland Area in general accordance with the scope and limitations of our proposal, dated July 3, 2012. This report has been prepared for the exclusive use of Washington State Department of Ecology, and their authorized agents. This report is not intended for use by others, and the information contained herein is not applicable to other properties.

GeoEngineers structures our services to meet the specific needs of our clients. For example, an ESA study conducted for a property owner may not fulfill the needs of a prospective purchaser of the same property. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and property. No one except Washington State Department of Ecology should rely on this environmental report without first conferring with GeoEngineers. Use of this report is not recommended for any purpose or project except the one originally contemplated.

This Environmental Report is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the Everett Smelter – Lowland Area. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, it is important not to rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

If important changes are made to the project or property after the date of this report, we recommend that GeoEngineers be given the opportunity to review our interpretations and recommendations. Based on that review, we can provide written modifications or confirmation, as appropriate.

Reliance Conditions for Third Parties

Our report was prepared for the exclusive use of our Client. No other party may rely on the product of our services unless we agree to such reliance in advance and in writing. This is to provide our

1 Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions. Within the limitations of scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and generally accepted environmental practices in this area at the time this report was prepared.

Environmental Regulations are Always Evolving

Some substances may be present in the vicinity of the subject property in quantities or under conditions that may have led, or may lead, to contamination of the subject property, but are not included in current local, state or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards for appropriate inquiry, or regulatory definitions of hazardous substances, change or if more stringent environmental standards are developed in the future.

Conditions Can Change

This environmental report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by man-made events such as construction on or adjacent to the subject property, by new releases of hazardous substances, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Please contact GeoEngineers before applying this report for its intended purpose so that GeoEngineers may evaluate whether changed conditions affect the continued applicability of the report.

Most Environmental Findings are Professional Opinions

Our interpretations of site conditions are based on field observations and analytical data from widely spaced sampling locations at the subject property. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an informed opinion about subsurface conditions throughout the property. Actual subsurface conditions may differ, sometimes significantly, from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Read These Provisions Closely

It is important to recognize that the geoscience practices (geotechnical engineering, geology and environmental science) are less exact than other engineering and natural science disciplines. Without this understanding, there may be expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory “limitations” provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you need to know more about how these “Report Limitations and Guidelines for Use” apply to your project or property.

Draft
Lowland Area Surface Soil Sample Collection Technical Memorandum

Everett Smelter Cleanup Site
FSID 2744, ISIS Cleanup Site ID 4298

Lowland Area
Everett, Washington

for
Washington State Department of Ecology

June 27, 2013

GeoEngineers

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Draft
Lowland Area Surface Soil Sample Collection Technical Memorandum

Everett Smelter Cleanup Site
FSID 2744, ISIS Cleanup Site ID 4298
Lowland Area
Everett, Washington

Project No. 0504-068-00

June 27, 2013

Prepared for:

Washington State Department of Ecology
Toxics Cleanup Program
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APPENDICES

1.0 INTRODUCTION

This memorandum summarizes field investigation activities completed at the Everett Smelter Lowland Area. The Lowland Area is a part of the Everett Smelter Cleanup Site and is generally located in northeast Everett, Washington (Figure 1). The Lowland Area includes multiple parcels and the right-of-ways that are located adjacent to the parcels as shown in Figure 2.

The purpose of the Lowland Area study is to characterize metals concentrations in soil, groundwater, surface water, and sediment within and near the Lowland Area in order to evaluate potential environmental impacts from the historical smelter activities. For this study, shallow excavations were advanced in the northern portion of the Lowland Area on May 24, 2013. A portable X-ray fluorescence (XRF) spectrometer was used in the field to estimate in-situ soil arsenic and lead concentrations. Soil samples were also collected for laboratory analysis of antimony, arsenic, cadmium, lead, mercury and thallium. The results of the soil sampling activities, as well as other activities being performed in the Lowlands, will be used to develop a preliminary Feasibility Study so that a Cleanup Action Plan can be identified for the Lowland Area that is protective of human health and the environment.

The investigation activities were completed in general accordance with the Washington State Department of Ecology (Ecology)-approved Final Sampling and Analysis Plan (SAP), Quality Assurance Project Plan (QAPP) and Health and Safety Plan (HASP) for the project dated August 31, 2012.

1.1. Site History and Background

The Everett Smelter Lowland Area is part of the Everett Smelter Cleanup Site. The Everett Smelter Cleanup Site has been divided into an Upland Area and Lowland Area. Historic smelting activities in the Upland resulted in the release of metals including arsenic and lead to the soil, groundwater and air in the Upland and Lowland Areas.

Air emissions in particular, from the former smelter stacks, are likely to have deposited particulates containing metals onto the historic land surface surrounding the Smelter Site. The extent of contamination from the smelter has been characterized in the Upland portion of the Everett Smelter Cleanup Site and is currently under remedial action. The extent of contamination in the Lowland portion of the Site is being investigated to evaluate potential environmental impacts from historical smelter activities.

The sampling and analysis results presented in this memorandum evaluate potential impacts from historical air emissions on land surfaces that are likely unaltered since the closure of the mill operations.

2.0 FIELD INVESTIGATION

Field investigation activities were completed on May 24, 2013. Shallow soil excavations were completed near the base of steep slopes in the northern portion of the Lowland Area and samples

were collected from the excavations at target depths. Sample locations were selected for because these areas were identified as likely to represent areas of minimal soil disturbance since the time of the historical air fallout from the smelter ceased. Activities included excavating the holes, performing in-situ XRF analysis of soil, and collection of soil samples for analysis at an analytical laboratory. The field investigation activities are summarized in the following sections.

2.1. Collection of Surface Soil Samples from Steep Slopes

Six surface soil sampling locations were established at the base of steep slopes along the northeast-facing slope northwest of East Marine View Drive. The purpose of the sampling was to characterize metals concentrations in soil suspected to have experienced little or no alteration since the time when smelter air emissions may have impacted surface soils. Surface soil (generally 0-to-12 inches below ground surface) was investigated using decontaminated hand tools.

The general activities completed at each sampling location include the following:

1. Sampling personnel mobilized to the general area of the investigation location identified in the SAP. Upon arrival, personnel looked for evidence of land modification and selected the specific location to be sampled. In general, an attempt was made to select locations that were near the base of steep slopes, but far enough away from obvious land modification activities. Note that more than 100 years has passed between the time of smelter operation and sampling activities, and it is likely that not all land-disturbing activities that have occurred during that time were observable at the time of sampling.
2. After selecting the specific location to be investigated, the “duff” layer was removed (i.e., the layer that consisted of greater than 50 percent organic matter) and the thickness of the duff layer was recorded. Note that all depths referred to in this memorandum refer to soil depths (i.e., the duff layer is not included).
3. A decontaminated shovel was used to excavate a hole at least 12 inches deep.
4. A portable XRF analyzer was used to measure arsenic and lead concentrations at various depths in the sidewall of the excavation.
5. A decontaminated spoon was used to collect soil from an interval of the sidewall of the excavation into a disposable plastic bag. The soil was homogenized and placed in clean soil jars provided by the analytical laboratory. The “default” interval that was collected was 0 to 1 foot, as per the SAP; however shorter intervals were selected where the XRF results indicated elevated arsenic concentrations in shorter intervals, or if different lithologies were encountered in the excavation. Table 1 summarizes the field activities performed at each sampling location, including the sample intervals collected.
6. Samples were placed in a soft cooler with “blue ice,” and logged on the chain-of-custody form.
7. The GPS location of the sample was recorded. Note that due to forest canopy cover, GPS locations should be considered approximate (i.e., plus or minus 30 feet).
8. The location was photographed, including a close-up of the excavation.
9. The excavation was backfilled with the remaining excavated material.

10. Samples were submitted to the analytical laboratory (Analytical Resources, Inc., (ARI) in Tukwila, Washington).

2.2. Deviations From the SAP

Field activities were performed in general accordance with the SAP, QAPP and HASP created for this project, with the exceptions listed below. Deviations included the following:

- Steep slope sample LLS-01 was relocated from the planned location shown in the SAP due to the presence of fill material observed at the originally planned location of LLS-01.
- The SAP listed eight collection locations (LLS-01 through LLS-08). Locations LLS-03 and LLS-04 were not investigated at this time due to property access restrictions. These locations will likely be sampled in the future when property access is granted.
- The SAP indicated sample homogenization was to be performed in a decontaminated stainless steel bowl; however soil was homogenized in disposable plastic bags. This methodology was selected to reduce the volume of decontamination water necessary to perform the activities, as the investigation locations were relatively remote locations accessed on foot. The selected method for homogenization would not be expected to affect the analytical results.
- The SAP indicated the investigation locations would be surveyed by a licensed surveyor; however it was decided this was not necessary. Locations were recorded using a handheld GPS unit.

3.0 RESULTS

Table 1 summarizes investigation activities and the chemical analytical results are shown in Table 2. Arsenic results are shown on Figure 2. The results are summarized as follows:

- Neither antimony nor thallium were detected in soil.
- Arsenic was detected at all locations at concentrations ranging between 5.9 and 82.2 milligrams per kilogram (mg/kg).
- Cadmium was detected at all locations at concentrations ranging between 0.2 and 1.9 mg/kg.
- Lead was detected at all locations at concentrations ranging between 5 and 194 mg/kg.
- Mercury was detected at all locations at concentrations ranging between 0.02 and 0.16 mg/kg.
- In general, metals concentrations, where detected, decreased with increasing distance from the former smelter.

A data validation report is provided in Appendix A and the laboratory deliverable is provided in Appendix B. All data were deemed acceptable for use.

4.0 LIMITATIONS

We have prepared this report for the exclusive use of Washington State Department of Ecology and their authorized agents.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the field of environmental investigation in this area at the time this report was prepared. No warranty or other conditions express or implied should be understood.

Please refer to Appendix C titled "Report Limitations and Guidelines for Use" for additional information pertaining to use of this report.

Table 1

Summary of Investigation Activities

Everett Lowland

Everett, Washington

Location ID	Location Coordinates [1]		Total Depth of Excavation (Inches)	Soil Description [2]	Depth Interval Collected for Analysis at Analytical Laboratory [3] (Inches)
	Northing	Easting			
LLS-01	374380.169097	1304783.76050	12	Brown medium to coarse sand occasional gravel (moist, very loose) (native).	0 to 12
LLS-02	374528.768696	1304954.49941	12	Brown silty fine sand with organics (moist, loose) (native).	0 to 12
LLS-03[4]	--	--	--	--	--
LLS-04[4]	--	--	--	--	--
LLS-05	373899.8205	1306612.942	12	0" to 8": Brown silty fine to medium sand, trace live roots (loose, moist) (native) 8" to 12": Light brown silty fine to medium sand, trace live roots (loose, moist) (native)	0 to 6 and 10 to 12
LLS-06	373345.826	1307167.366	12	8" to 12": Brown fine to medium sand trace silt, trace live roots (moist, loose) (native).	0 to 12
LLS-07	372871.426	1307632.42	20	0" to 14": Brown fine to medium sand with silt, trace live roots (moist, very loose) (native). 14" to 20": Light brown fine to medium sand with silt, trace live roots (moist, loose) (native).	0 to 12
LLS-08	372297.2247	1308129.237	14	Brown silty fine to coarse sand occasional gravel, trace live roots (moist, loose) (native).	0 to 12

Notes:

Investigation activities were performed on May 24, 2013.

[1] Locations were recorded using a hand-held gps unit. Horizontal Datum is NAVD88, US Feet.

[2] Visual classification by a professional geologist. Descriptions are based on the Unified Soil Classification System .

[3] Soil samples were analyzed by Analytical Resources, Inc. (ARI) of Tukwila, Washington.

[4] The location was planned to be sampled as per the Sampling and Analysis Plan (SAP); however, property access restrictions prevented sample collection.

-- = The investigation activities were not performed at the investigation location proposed in the SAP.

Table 2

Chemical Analytical Results

Everett Lowland

Everett, Washington

Location ID	Analyte	Antimony	Arsenic	Cadmium	Lead	Mercury	Thallium
	Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
	Sample ID						
LLS-01	LLS-01-0-1	5 U	**6.5**	**0.2**	**5**	**0.02**	0.2 U
LLS-02	LLS02-0-1	8 U	**5.9**	**0.5**	**30**	**0.07**	0.3 U
LLS-03[1]	Not Collected	--	--	--	--	--	--
LLS-04[1]	Not Collected	--	--	--	--	--	--
LLS-05	LLS-05-0-0.5	6 U	**16.2**	**0.5**	**25**	**0.07**	0.2 U
	LLS-05-0.8-1	6 U	**27.1**	**0.5**	**18**	**0.07**	1.5
LLS-06	LLS06-0-1	6 U	**29.5**	**0.9**	**74**	**0.08**	0.2 U
LLS-07	LLS07-0-1	6 U	**82.2**	**1.9**	**194**	**0.16**	0.2 U
LLS-08	LLS-08-0.5-1	6 U	**30.0**	**1.1**	**113**	**0.23**	0.2 U

Notes:

[1] The location was planned to be sampled as per the Sampling and Analysis Plan (SAP); however, property access restrictions prevented sample collection.

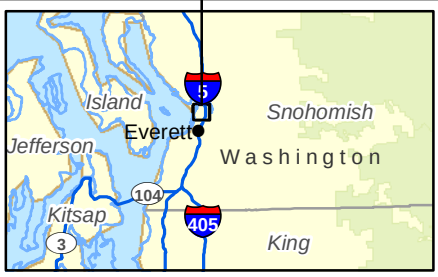
Chemical analysis performed by Analytical Resources, Inc., of Tukwila, Washington.

mg/Kg = milligram per kilogram

U = Analyte was not detected at or greater than the liste J = The indicated result is an estimate.

Bold type indicates the analyte was detected.

-- = The analysis was not performed because no sample was collected.



N
W
E
S

2,000 0 2,000

Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: ESRI Data & Maps

Projection: NAD 1983 UTM Zone 10N

Vicinity Map

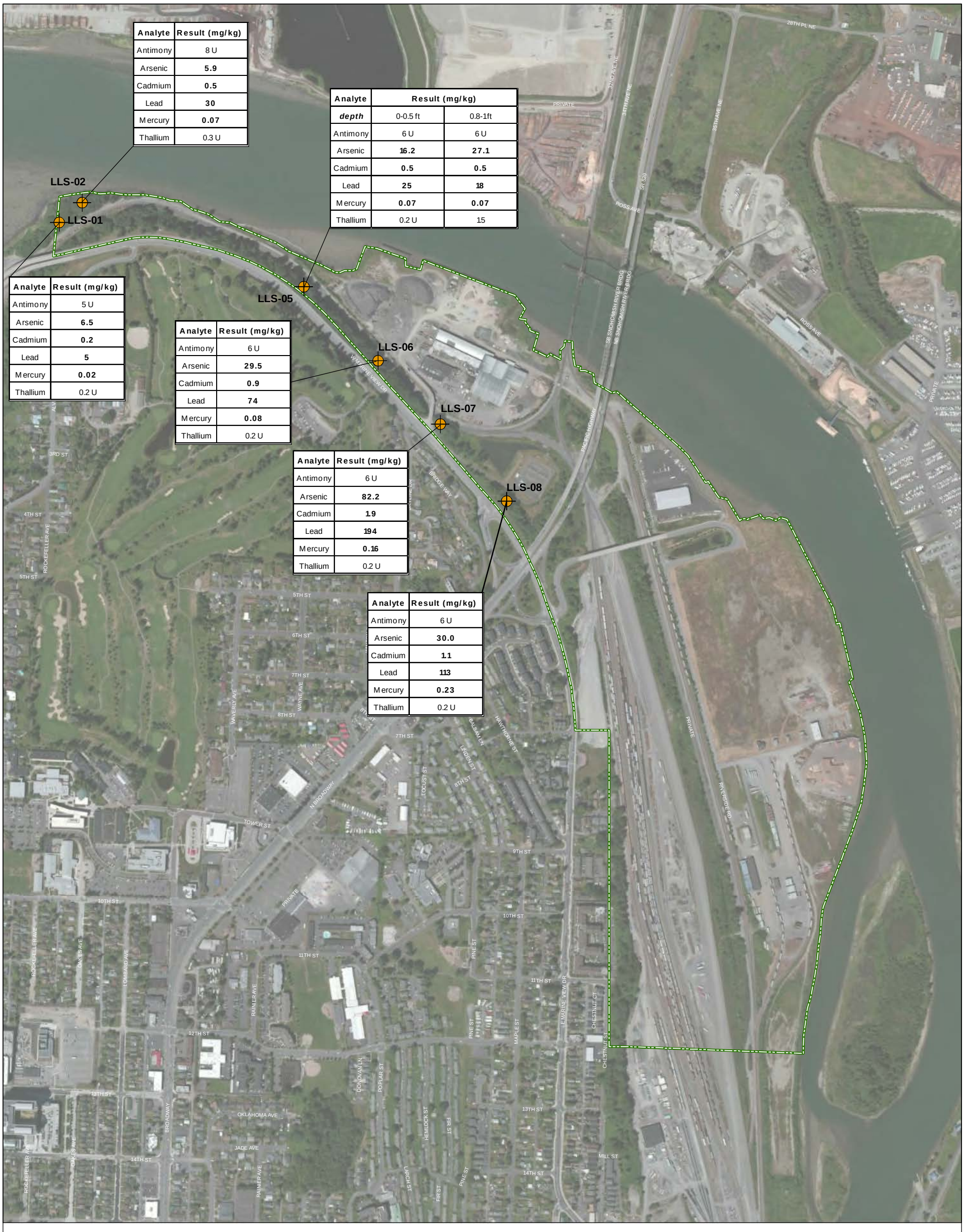
Everett Smelter - Lowland Area

GeoEngineers

Figure 1

Path: \\seal\projects\0050406\GIS\0050406800_T1000_VicinityMap_Lowland.mxd Map Revised: 28 May 2013 tward

Path: P:\0\0504068\GIS\050406800_T800_Soils_Metals.mxd Map Revised: 27 June 2013 ccabrera



Legend

Lowland Area

LLS-01

Lowland Soil Sample Location

N
W E
S

700 0 700

Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

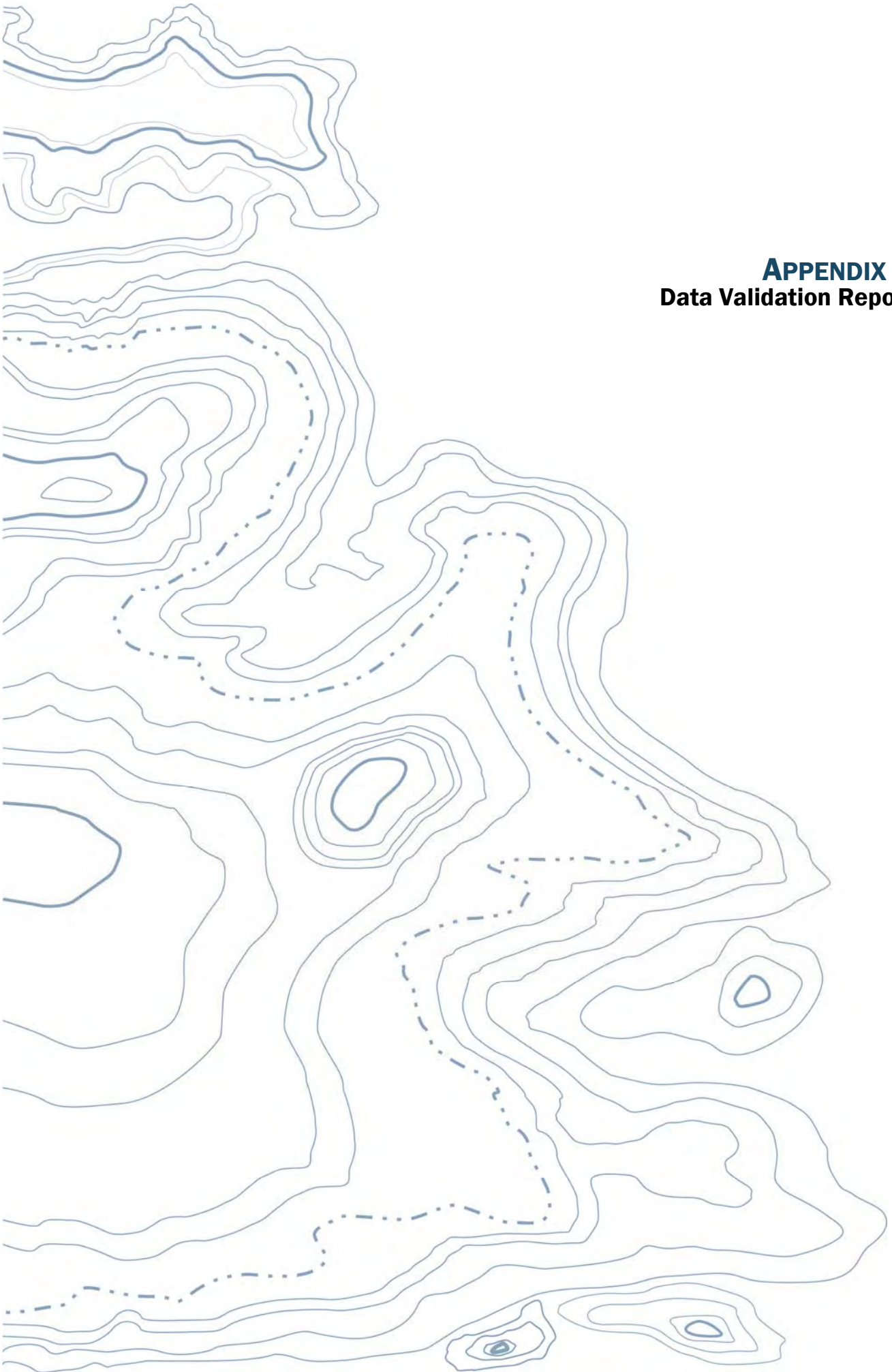
Data Source: Aerial Image from Microsoft, 2010. Snohomish County GIS, 2012.

Metals Concentrations in Soil
May 24, 2013

Everett Smelter - Lowland Area

GeoEngineers

Figure 2



APPENDIX A
Data Validation Report

APPENDIX B
Laboratory Deliverable

APPENDIX C
Report Limitations and Guidelines for Use

APPENDIX C
REPORT LIMITATIONS AND GUIDELINES FOR USE[2]

This appendix provides information to help you manage your risks with respect to the use of this report.

Environmental Services are Performed for Specific Purposes, Persons and Projects

GeoEngineers has performed this investigation of the Everett Smelter – Lowland Area in general accordance with the scope and limitations of our proposal, dated July 3, 2012. This report has been prepared for the exclusive use of Washington State Department of Ecology, and their authorized agents. This report is not intended for use by others, and the information contained herein is not applicable to other properties.

GeoEngineers structures our services to meet the specific needs of our clients. For example, an ESA study conducted for a property owner may not fulfill the needs of a prospective purchaser of the same property. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and property. No one except Washington State Department of Ecology should rely on this environmental report without first conferring with GeoEngineers. Use of this report is not recommended for any purpose or project except the one originally contemplated.

This Environmental Report is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the Everett Smelter – Lowland Area. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, it is important not to rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

If important changes are made to the project or property after the date of this report, we recommend that GeoEngineers be given the opportunity to review our interpretations and recommendations. Based on that review, we can provide written modifications or confirmation, as appropriate.

2 Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

Reliance Conditions for Third Parties

Our report was prepared for the exclusive use of our Client. No other party may rely on the product of our services unless we agree to such reliance in advance and in writing. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions. Within the limitations of scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and generally accepted environmental practices in this area at the time this report was prepared.

Environmental Regulations are Always Evolving

Some substances may be present in the vicinity of the subject property in quantities or under conditions that may have led, or may lead, to contamination of the subject property, but are not included in current local, state or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards for appropriate inquiry, or regulatory definitions of hazardous substances, change or if more stringent environmental standards are developed in the future.

Conditions Can Change

This environmental report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by man-made events such as construction on or adjacent to the subject property, by new releases of hazardous substances, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Please contact GeoEngineers before applying this report for its intended purpose so that GeoEngineers may evaluate whether changed conditions affect the continued applicability of the report.

Most Environmental Findings are Professional Opinions

Our interpretations of site conditions are based on field observations and analytical data from widely spaced sampling locations at the subject property. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an informed opinion about subsurface conditions throughout the property. Actual subsurface conditions may differ, sometimes significantly, from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Read These Provisions Closely

It is important to recognize that the geoscience practices (geotechnical engineering, geology and environmental science) are less exact than other engineering and natural science disciplines. Without this understanding, there may be expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory “limitations” provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you need to know more about how these “Report Limitations and Guidelines for Use” apply to your project or property.

Lowland Area Groundwater and Surface Water Technical Memorandum

Everett Smelter Cleanup Site
FSID 2744, ISIS Cleanup Site ID 4298

Lowland Area
Everett, Washington

for
Washington State Department of Ecology

June 28, 2013

GeoEngineers

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Lowland Area Groundwater and Surface Water Technical Memorandum

Everett Smelter Cleanup Site
FSID 2744, ISIS Cleanup Site ID 4298
Lowland Area
Everett, Washington

Project No. 0504-068-00

June 28, 2013

Prepared for:

Washington State Department of Ecology
Toxics Cleanup Program
3190 160th Avenue SE
Bellevue, Washington 98008-5452

Attention: Sandra Matthews

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JML:GRL:IHW:JMH:cn:cje

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APPENDICES

1.0 INTRODUCTION

This memorandum summarizes field investigation activities completed at the Everett Smelter Lowland Area. The Lowland Area is a part of the Everett Smelter Cleanup Site and is generally located in northeast Everett, Washington (Figure 1). The Lowland Area includes multiple parcels and the right-of-ways that are located adjacent to the parcels as shown in Figure 2. GeoEngineers performed an additional groundwater sampling event (the subject of this memorandum), including sampling of surface water from selected ponds present in the Lowland area, as part of the Lowland Area study between April 22 and May 15, 2013. The investigation activities were completed in general accordance with the Washington State Department of Ecology (Ecology)-approved Final Sampling and Analysis Plan (SAP), Quality Assurance Project Plan (QAPP) and Health and Safety Plan (HASP) for the project dated September 27, 2012.

The results of this and future field activities will be used to develop a preliminary Feasibility Study so that a Cleanup Action Plan can be developed for the Lowland Area that is protective of human health and the environment.

1.1. Site History and Background

The Everett Smelter Cleanup Site has been divided into an Upland Area and Lowland Area. Historic smelting activities resulted in the release of metals including arsenic and lead to the soil, groundwater and air. The extent of contamination from the smelter has been characterized in the Upland portion of the Everett Smelter Cleanup Site and is currently under remedial action. The extent of contamination in the Lowland portion of the Site is being investigated to evaluate potential environmental impacts from historical smelter activities.

Multiple soil and groundwater investigations have been performed in the Lowland Area since the 1990s related to the Everett Smelter contamination. Groundwater monitoring in the late 1990s identified metals-contaminated groundwater east of the former smelter in the Lowland Area. Previous investigations at the Lowland Area identified two aquifers, identified as the shallow and deep aquifers, which were noted to have similar flow directions toward the river and appear to be hydraulically separated by a silt aquitard across much of the area. Since 2011, GeoEngineers has installed multiple monitoring wells in the Lowland Area and collected soil and groundwater samples at these locations to evaluate soil and groundwater quality in the two aquifers. The results of these studies indicate that soil and groundwater contain elevated metals concentrations (predominantly arsenic and lead). Of note, the metals concentrations in groundwater identified in the late 1990s were similar to the metals concentrations detected in 2012.

This memorandum presents the findings of an additional groundwater sampling event, including sampling of surface water from selected ponds present in the Lowland area, as part of the Lowland Area study between April 22 and May 15, 2013.

2.0 FIELD INVESTIGATION

Field investigation activities reported in this memorandum were completed between April 22 and May 15, 2013 included the following:

- Groundwater sampling and analysis

- Surface water sampling and analysis

The field investigation activities are summarized in the following sections.

2.1. Groundwater Sampling

Field investigation activities included collecting groundwater samples from 87 new and existing groundwater monitoring wells located in and adjacent to the Lowland Area. The groundwater sample collection activities were completed between April 22 and May 15, 2013. Forty (40) of the monitoring wells that were sampled are "shallow" wells, installed in the shallow aquifer and 47 of the wells are "deep" wells, installed in the deep aquifer (Table 1). The groundwater monitoring wells that were sampled are shown in Figure 2. The well naming convention (i.e., well name prefixes), general investigation name and installation period are summarized in the table below.

Monitoring Well Name	Number of Wells	Investigation Name and Installation Period
"BP" wells	21	Benson Property / Lowland Area Investigations - 2011 through 2013
"EV" wells	7	Lowland Area Remedial Investigations - Mid to late 1990s
"LLMW" wells	53	Lowland Area Investigation – 2012 and 2013
"MW" wells	5	Weyerhaeuser West Investigation - Mid 1990s and 2011[1]
"PZ" wells	3	Weyerhaeuser Mill E Investigation - Mid 1990s
"UNK" well	1	Unknown
Total	**90[2]**	

Notes:

[1] Five MW wells were installed in the mid 1990s; four were abandoned in 2011 and new wells were installed.

[2] Three wells were dry and therefore 87 groundwater samples were collected.

The deep aquifer is known to be tidally influenced, as discussed in the memorandum titled "Draft Monitoring Well Installation Technical Memorandum," dated February 19, 2013. The tidal influence is most pronounced at wells located nearest the shoreline of the Snohomish River; however, wells as distant as the "BP" wells (see Figure 2) are also tidally influenced. Wells that were located along the Shoreline of the Snohomish River (i.e., within 100 feet of ordinary high water) were sampled on outgoing tides. LLMW-13S/D and LLMW-16S/D were also sampled on outgoing tides. Attempts were not made to sample other wells on outgoing tides in order to complete the groundwater sampling activities in a timely manner.

Groundwater elevations were measured and recorded prior to sampling each well using an electronic water level indicator. In addition, groundwater elevations were measured at 24 shallow aquifer and 27 deep aquifer monitoring wells within a two-hour period on May 9, 2013 to provide a "snap-shot" of groundwater levels/elevations and gradients in the Lowland Area (Table 1).

Groundwater purging and sample collection was completed using low-flow/low-turbidity sampling techniques to minimize the suspension of sediment in the groundwater samples. The wells were purged and groundwater samples were obtained from the wells using dedicated polyethylene tubing and either peristaltic pumps (75 wells) or submersible well pumps (12 wells). Submersible pumps were used when groundwater depths were greater than the peristaltic pump lift capacity

(depths greater than approximately 30 feet). Groundwater was purged from the wells at a rate of up to 0.5 liters per minute.

A water quality measuring system (Horiba U-22 or YSI 556) with a flow-through cell was used to monitor water quality parameters during purging. Water quality parameters that were measured include pH, electrical conductivity, dissolved oxygen, temperature, and oxidation-reduction potential. Turbidity was measured using a LaMotte turbidimeter. Samples were collected from the wells after the measured values for the water quality parameters varied by less than 10 percent on three consecutive measurements. The field measurements were documented on field logs.

Following completion of well purging, the flow through cell was disconnected and ferrous and total iron were measured using Hach color-disk field test kits and groundwater samples were collected in laboratory-prepared containers. All wells and surface water locations were sampled for total and dissolved metals, with the dissolved samples being filtered in the field through disposable 0.45 um filters. Selected wells and surface water locations were also sampled for analysis of dissolved arsenic species. Samples collected for arsenic speciation were collected in general accordance with GeoEngineers' document titled "Field Sample Collection Method for Arsenic Speciation in Water" (Appendix A).

Samples were logged on the chain-of-custody, placed in a cooler with ice, and delivered to Analytical Resources, Inc., in Tukwila, Washington for analysis.

Analysis included total and dissolved metals (i.e., antimony, arsenic, cadmium, lead, mercury, and thallium) by EPA Methods 200.8 and SW7470A. Dissolved arsenic species included As(III), As(V), as well as the methylated arsenics monomethylarsonic acid (MMA) and dimethylarsenic acid (DMA). The samples that were collected for dissolved metals analysis were filtered in the field using disposable 0.45-micron filters. The laboratory analytical reports for metals analyses on groundwater are provided in Appendix B. A data quality review was performed on the analytical data resulting from laboratory analysis of water samples. The data quality assessment report is provided in Appendix C.

2.2. Surface Water Sampling

Surface water samples were collected on April 30, 2013, at four locations within three ponds that are in the Lowland Area. The surface water sampling locations are shown on Figure 2. Samples were collected in approximately the same locations that were sampled on February 4 and 5, as reported in our separate memorandum titled "Draft Lowland Area Groundwater, Surface Water and Sediment Technical Memorandum," dated March 26, 2013.

Water samples were collected using disposable polyethylene tubing and a peristaltic pump. The tubing inlet was placed approximately 6 to 8 inches beneath the water surface. Water was purged at approximately 0.5 liters per minute.

A YSI 556 water quality measuring system with a flow-through cell was used to monitor water quality parameters during purging that included pH, electrical conductivity, dissolved oxygen, temperature, and oxidation-reduction potential. The water flowing through the cell was discharged

on land adjacent to the pond so as not to disturb the water or cause elevated turbidity. Turbidity was measured using a Hach turbidimeter. The field measurements were documented on field logs.

Following completion of purging, the flow-through cell was disconnected and water samples were collected in laboratory-prepared containers. Samples were logged on the chain-of-custody, placed in a cooler with ice, and delivered to Analytical Resources, Inc., in Tukwila, Washington for analysis.

Laboratory analyses included total and dissolved metals (i.e., antimony, arsenic, cadmium, lead, mercury, and thallium) by EPA Method 200.8 and SW7470A. Samples that were collected for dissolved metals analysis were filtered in the field using disposable 0.45-micron filters. All four surface water locations were sampled for analysis of arsenic speciation. Samples collected for arsenic speciation were collected in general accordance with GeoEngineers' document titled "Field Sample Collection Method for Arsenic Speciation in Water," with the exception that the sampling syringe was filled under the surface of the pond to avoid contact with air. The laboratory analytical reports for metals analyses on surface water are provided in Appendix B. A data quality review was performed on the analytical data resulting from laboratory analysis of water samples. The data quality assessment report is provided in Appendix C.

2.3. Decontamination

Non-disposable sampling equipment was decontaminated using the procedures specified in the QAPP.

2.4. Disposal of Investigation-Derived Materials

Groundwater was removed from the monitoring wells during monitoring well purging and sampling. Groundwater and decontamination water generated during all investigation activities was placed in seven 55 gallon drums pending profiling for disposal. The drums were located within a fenced staging area on property owned by the Port of Everett and made available for the investigation. Drums were profiled and then disposed of by Emerald Services on June 12, 2013. Incidental waste (i.e., gloves, disposable polyethylene tubing, paper towels, etc.) were disposed of off site as solid waste.

2.5. Deviations From the SAP

Field activities were performed in general accordance with the SAP, QAPP and HASP created for this project, with the exceptions listed below.

- Total and ferrous iron measurements were omitted from the field form for wells LLMW-27D and LLMW-33D. Total and ferrous iron and were not measured in the four surface water samples (LLSW-01, LLSW-02, LLSW-04, LLSW-05). Total and ferrous iron were not measured in four samples collected by Floyd Snider from which we collected splits (MW1201R, MW1301R, MW1303R, and MW1503R).
- The pH value was not measured for well LLMW-03S due to a non-operational pH sensor on the Horiba U-22 meter. An Oakton PC Testr 35 pH meter was used to measure the pH on wells sampled for the remainder of that day (April 22, 2013; wells LLMW-03D and LLMW06D). The pH of all wells sampled after April 22, 2013 was measured using a YSI 556 MPS meter.

3.0 RESULTS

3.1. Groundwater Elevations and Gradients

Groundwater elevations and gradients in the Lowland Area were evaluated using the results from snapshot groundwater level measurements. Groundwater level measurements were measured from the top of the well casing at 24 shallow aquifer and 27 deep aquifer monitoring wells within a two-hour period on May 9, 2013 (Table 2). The measurements are provided in Table 3. Survey information identifying the elevation of the top of the casing at each of the wells was used to calculate the groundwater elevation. The groundwater elevations were used to provide a snapshot of the groundwater gradients in the shallow and deep aquifers as shown on Figures 3 and 4, respectively.

The groundwater gradients observed in the shallow and deep aquifers in the Lowland Area were generally to the east-northeast (Figures 3 and 4). It should be noted that groundwater levels/elevations in the deep aquifer have been observed to be affected by tidal fluctuations. Additional information concerning the response of groundwater in the deep aquifer as a result of tidal fluctuations is presented in our memorandum titled "Lowland Area Groundwater, Surface Water and Sediment Technical Memorandum," dated June 30, 2013.

3.2. Water Quality Parameters

Water quality parameters including pH, temperature, conductivity, dissolved oxygen, oxidation-reduction potential, total and ferrous iron, and turbidity were measured at monitoring wells and surface water locations prior to sampling. Water quality parameter values measured during sample collection are presented in Table 2. The following summarizes the results for the water quality parameter measurements in groundwater and surface water samples:

- pH at the majority of the samples ranged from approximately 5.8 to 7, except at monitoring wells BP-04S, BP-05S, BP-05D2, EV-6B, LLMW-03S, LLMW-08S, LLMW-34D, LLSW-01 and MW-"UNK," where the pH ranged from approximately 7.3 to 9.2.
- Conductivity in the majority of samples ranged from 0.012 to 0.172 Siemens per meter (S/m), except at LLMW-08D, LLMW-22S and EV-22B, where conductivity ranged from 0.23 to 0.33 S/m.
- Turbidity in the groundwater monitoring wells ranged from 0 to 62 Nephelometric Turbidity Units (NTU) with approximately 90 percent of the samples having turbidities less than 10 NTU. Elevated turbidity (22 NTU to 62 NTU) was observed at wells EV-22A, EV-22B, EV-6A, LLMW-07D, LLMW-27D, LLMW-29D, LLMW-33S, LLMW-34S and in surface water sample LLSW-04.
- Dissolved oxygen concentrations ranged from 0.1 to 3 milligrams per liter (mg/L) in the majority of groundwater monitoring wells. Dissolved oxygen was relatively high (approximately 3.1 to 7.7 mg/L) in groundwater from BP-01S, LLMW-14S, LLMW-17S, LLMW-33S, EV-19B, EV-20B, LLMW-25D, LLMW-27D, LLMW-29D and LLMW-33D. Dissolved oxygen concentrations ranged from approximately 4.5 to 10.0 mg/L in the surface water samples.
- Temperature ranged from approximately 7 to 14 degrees Celsius in the groundwater samples, and 11 to 16 degrees Celsius in the surface water samples.

- Oxidation-reduction potential measurements indicate groundwater is generally reducing or slightly oxidizing in the majority of wells (i.e., approximately -358 to 124 millivolts [mV]).
- Total iron was measured at concentrations ranging from 0 to greater than 14 mg/L, and ferrous (reduced) iron was measured at concentrations ranging from 0 to 5.5 mg/L in the groundwater monitoring well samples.

3.3. Chemical Analytical results for Groundwater and Surface Water

Eighty seven groundwater samples and four surface water samples, not including field duplicates, were submitted for total and dissolved metals analyses (i.e., antimony, arsenic, cadmium, lead, mercury and thallium). Thirty four of the samples (not including field duplicates) were also analyzed for arsenic species (arsenate, arsenite, MMA and DMA). The results for groundwater and surface water sample analyses are presented in Tables 4 through 6. Table 4 presents the metals results for shallow aquifer groundwater and surface water. Table 5 presents the metals results for deep aquifer groundwater. Table 6 presents the dissolved arsenic concentrations in shallow groundwater and surface water are shown on Figure 5, and dissolved arsenic concentrations in deep groundwater are shown on Figure 6. The laboratory analytical reports are provided in Appendix B.

A data quality review was performed on the analytical data resulting from laboratory analysis of groundwater and surface water samples. The data quality review was performed in general conformance with an EPA "Stage-2B" validation. The data were deemed acceptable for use as qualified. The data quality assessment report is provided in Appendix C.

The following summarizes the results for the metals analyses on groundwater and surface water samples:

- Antimony was detected in approximately one-half of the groundwater and surface water samples collected from the Lowland Area. Where detected, antimony concentrations ranged from near the detection limit of 0.2 micrograms per liter (µg/L) to 15.6 µg/L. The highest antimony concentrations were detected in groundwater from monitoring well EV-6A. Dissolved antimony results were typically equal to or slightly less than the total antimony results indicating that antimony is largely present in the dissolved phase.
- Arsenic was detected in all wells and surface water samples at concentrations ranging from 0.2 µg/L to approximately 17,000 µg/L. As during a previous sampling round conducted in January 2013, the highest arsenic concentration was detected in groundwater from BP-05D (dissolved arsenic was 17,100 µg/L in the parent sample and 17,200 µg/L in a field duplicate sample). Dissolved arsenic concentrations were typically equal to or slightly less than the total concentrations indicating that arsenic is largely present in the dissolved phase.
- The highest arsenic concentrations in shallow groundwater and surface water were generally detected on and in the vicinity of the Benson Property (Figure 5). Arsenic concentrations in shallow groundwater were also higher in monitoring wells LLMW-08S, LLMW09S, LLMW-16S, PZ-1B and UNK in relationship to adjacent monitoring locations.

- An area of higher arsenic concentrations was detected in deep groundwater present in monitoring wells LLMW-27D, EV-19B, EV-20B, BP-04D, BP-5D, BP-06D, BP-07D, LLMW-12D, LLMW-13D and LLMW-14D (Figure 6). Arsenic concentrations in deep groundwater were also higher in monitoring wells LLMW-01D, LLMW-20D and BP-09D relative to adjacent monitoring locations.
- Arsenic concentrations were frequently one to two orders of magnitude different between shallow and deep groundwater at the majority of well pair locations indicating that the silt aquitard separates the shallow and deep aquifers at these locations.
- Methylated arsenics (MMA and DMA) were either not detected, or were detected at relatively low concentrations compared to the total amount of dissolved arsenic detected in each sample where speciation analysis was performed (Table 6). Where detected, methylated arsenics were detected at concentrations ranging from approximately 0.38 to 77 µg/L. These concentrations represent less than 0.5 percent of the dissolved arsenic present in each sample where MMA and/or DMA were detected. The sample that contained the highest fraction of methylated arsenics was surface water sample LLSW-02. In that sample, DMA was detected at an estimated concentration of 0.279 µg/L, which represents about 5.7 percent of the total (dissolved) arsenic in the sample (4.9 µg/L).
- Arsenate was the predominant form of arsenic in the deep aquifer, while arsenite was the predominant form of arsenic in the shallow aquifer. Table 6 presents all arsenic results for samples where arsenic speciation was performed. A calculated arsenate ratio is also shown in Table 6. Arsenate ratio was calculated as arsenate concentration divided by the sum of arsenate and arsenite.
- Cadmium was detected in approximately one-half of the groundwater samples and was not detected in surface water samples. Where detected, total cadmium was frequently detected but dissolved cadmium was not detected indicating that the cadmium may be sorbed to solids that are filtered out by the 0.45-micrometer field filter. Cadmium concentrations in the majority of samples ranged from non-detect to 4.3 µg/L, with one sample (EV-6A) having a relatively high cadmium concentration of 17.9 µg/L.
- Total lead was detected in the majority of well and surface water samples with concentrations ranging from 0.1 µg/L to 51.4 µg/L. The highest lead concentrations were detected in groundwater from EV-6A. Dissolved lead was not detected in the majority of wells indicating lead may be sorbed to solids that are filtered out by the 0.45 micrometer field filter. While median lead values in the shallow and deep aquifers were somewhat similar, lead concentrations in selected wells in the shallow aquifer were relatively elevated compared to the deep aquifer.
- Mercury was detected relatively infrequently in groundwater (i.e., eight samples) and was not detected in surface water samples. Where detected, mercury concentrations ranged from near the reporting limit of 0.02 µg/L to approximately 0.07 µg/L. The highest mercury concentrations were detected in groundwater from monitoring well PZ-3B.
- Thallium was only detected in two well samples, EV-6A and LLMW-33S, at total and dissolved thallium concentrations of approximately 0.3 µg/L to 0.4 µg/L.

In general, metals concentrations were similar to those measured during the previous groundwater sampling round performed in January 2013.

4.0 LIMITATIONS

We have prepared this report for the exclusive use of Washington State Department of Ecology and their authorized agents.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the field of environmental investigation in this area at the time this report was prepared. No warranty or other conditions express or implied should be understood.

Please refer to Appendix D titled "Report Limitations and Guidelines for Use" for additional information pertaining to use of this report.

Table 1

Summary of Lowland Groundwater and Surface Water Investigation Activities

Everett Lowland

Everett, Washington

Location Designation	Groundwater Aquifer	Depth to Groundwater "Snapshot" [1]	Sampling	
			Total and Dissolved Metals [2]	Arsenic Speciation [3]
Monitoring Wells				
BP-01S	Shallow	--	X	X
BP-01D	Deep	--	X	X
BP-02S	Shallow	X	X	--
BP-02D	Deep	X	X	--
BP-03S	Shallow	X	X	--
BP-03D	Deep	X	X	--
BP-04S	Shallow	X	X	X
BP-04D	Deep	X	X	X
BP-05S	Shallow	X	X	X
BP-05D	Deep	X	X	X
BP-05D2	Deep	X	X	X
BP-06S	Shallow	--	X	--
BP-06D	Deep	--	X	--
BP-07S	Shallow	--	X	X
BP-07D	Deep	--	X	X
BP-08S	Shallow	X	X	--
BP-08D	Deep	X	X	--
BP-09S	Shallow	--	X	--
BP-09D	Deep	--	X	--
BP-10S	Shallow	--	X	--
BP-10D	Deep	--	X	--
EV-6A	Shallow	--	X	X
EV-6B	Deep	--	X	X
EV-13[4]	Shallow	--	--	--
EV-19B	Deep	--	X	X
EV-20B	Deep	--	X	X
EV-22A	Deep	X	X	--
EV-22B	Deep	X	X	--
LLMW-01D	Deep	X	X	--
LLMW-02D	Deep	X	X	--
LLMW-03S	Shallow	X	X	--
LLMW-03D	Deep	X	X	--
LLMW-04S	Shallow	X	X	X
LLMW-04D	Deep	X	X	X
LLMW-05S	Shallow	X	X	X
LLMW-05D	Deep	X	X	X
LLMW-06S	Shallow	X	X	X
LLMW-06D	Deep	X	X	X
LLMW-07S	Shallow	X	X	--
LLMW-07D	Deep	X	X	--
LLMW-08S	Shallow	X	X	X
LLMW-08D	Deep	X	X	X
LLMW-09S	Shallow	--	X	--
LLMW-09D	Deep	--	X	--
LLMW-10S	Shallow	X	X	--
LLMW-10D	Deep	X	X	--
LLMW-11S	Shallow	X	X	X
LLMW-11D	Deep	X	X	X
LLMW-12S	Shallow	X	X	X
LLMW-12D	Deep	X	X	X
LLMW-13S	Shallow	X	X	X
LLMW-13D	Deep	X	X	X
LLMW-14S	Shallow	X	X	--
LLMW14D	Deep	X	X	--
LLMW-15S	Shallow	X	X	--
LLMW-15D	Deep	X	X	--
LLMW-16S	Shallow	X	X	X
LLMW-16D	Deep	X	X	X
LLMW-17S	Shallow	X	X	--
LLMW-17D	Deep	X	X	--
LLMW-18S	Shallow	--	X	--
LLMW-18D	Deep	--	X	--
LLMW-19D	Deep	--	X	--
LLMW-20D	Deep	--	X	--
LLMW-21S	Shallow	X	X	--
LLMW-21D	Deep	X	X	--
LLMW-22S	Shallow	X	X	--
LLMW-22D	Deep	X	X	--
LLMW-23S	Shallow	--	X	--
LLMW-23D	Deep	--	X	--
LLMW-24D	Deep	--	X	--
LLMW-25D	Deep	--	X	--
LLMW-27S[4]	Shallow	--	--	--
LLMW-27D	Deep	X	X	X

Location Designation	Groundwater Aquifer	Depth to Groundwater "Snapshot" [1]	Sampling	
			Total and Dissolved Metals [2]	Arsenic Speciation [3]
Monitoring Wells				
LLMW-29S[4]	Shallow	--	--	--
LLMW-29D	Deep	X	X	--
LLMW-31D	Deep	--	X	--
LLMW-33S	Shallow	--	X	--
LLMW-33D	Deep	--	X	--
LLMW-34S	Shallow	--	X	--
LLMW-34D	Deep	--	X	--
MW1202R	Shallow	--	X	--
MW1203R	Shallow	X	X	--
MW1301R	Shallow	--	X	--
MW1501R	Shallow	--	X	--
MW1701	Shallow	X	X	--
PZ-1B	Shallow	--	X	--
PZ-2B	Shallow	--	X	--
PZ-3B	Shallow	--	X	--
UNK	Shallow	--	X	--
Surface Water Samples				
LLSW-01	Not applicable	Not applicable	X	X
LLSW-02	Not applicable	Not applicable	X	X
LLSW-04	Not applicable	Not applicable	X	X
LLSW-05	Not applicable	Not applicable	X	X

Notes:

[1] Depth-to-water was measured within a two-hour window on May 9, 2013.

[2] Total and dissolved metals included antimony, arsenic, cadmium, lead, mercury and thallium.

[3] Dissolved arsenic included As(III), As(V), monomethylarsonic acid (MMA[V]), and dimethylarsenic acid (DMA[V]).

[4] The monitoring well was dry and therefore could not be sampled.

X The investigation activity was performed at the identified location.

-- The investigation activity was not performed at the identified location.

Table 2

Water Quality Parameters for Groundwater and Surface Water - April 2013

Everett Lowland

Everett, Washington

Location Designation	pH	Temperature (C)	Conductivity (S/m)	Dissolved Oxygen (mg/L)	Oxidization Reduction Potential (mV)	Total Iron (mg/L)	Ferrous Iron (mg/L)	Turbidity (NTU)	Depth to Water[1] (feet)
Monitoring Wells									
BP-01S	5.91	10.96	0.0679	5.62	-99.6	5	3.5	7.61	5.03
BP-01D	6.45	12.42	0.0306	1.25	-80.7	0.5	0.5	0.74	10.11
BP-02S	6.92	10.95	0.0398	0.17	-141.8	9	5	5.35	4.95
BP-02D	6.28	12.29	0.0364	0.31	-24.4	0	0	3.45	11.62
BP-03S	6.97	12.56	0.0266	0.43	-93.9	5	2	3.84	4.07
BP-03D	6.58	12.66	0.0334	0.37	-100.8	0.5	0	2.77	11.95
BP-04S	7.48	11.56	0.0252	0.63	-24.7	0.5	0	2.99	3.94
BP-04D	6.56	11.52	0.0345	0.36	-76.2	0.5	0.5	2.21	10.73
BP-05D	6.33	12.22	0.0323	0.77	-29.6	0	0	4.79	11.49
BP-05S	7.72	11.82	0.0258	0.27	-139.9	3	1	1.65	3.71
BP-05D2	7.34	12.58	0.0238	0.35	-104.2	1	1	4.21	7.01
BP-06S	6.49	12.76	0.0345	0.13	-95.2	8	1.5	4.31	3.91
BP-06D	6.34	13.88	0.0375	0.24	-11.8	1	0.5	3.77	11.33
BP-07S	6.92	11.3	0.154	2.1	-265	2	0.5	3.53	3.37
BP-07D	6.38	12.8	0.042	2.2	-116	0.5	0.5	4.68	11.61
BP-08S	6.42	10.7	0.155	1.9	-172	9	1	4.54	3.37
BP-08D	6.46	12.1	0.162	1.9	-62	1.5	0.5	3.61	11.46
BP-09S	6.56	11.2	0.078	2.2	-172	10	3	3.06	3.21
BP-09D	6.37	11.9	0.083	2.1	-129	11	1.5	4.88	12.17
BP-10S	6.23	10.8	0.075	2.6	-130	13	3	4.27	3.01
BP-10D	6.21	12.4	0.117	2.1	-93	>14 [2]	2.5	4.98	9.73
EV-6A	6.45	14.36	0.039	2.48	-1.2	1.5	0.5	24.1	46.73
EV-6B	7.9	14.08	0.05	0.68	-358.9	0	0	7.05	50.99
EV-13[3]	--	--	--	--	--	--	--	--	--
EV-19B	6.47	13	0.049	6.5	109	1.5	0	2.92	47.14
EV-20B	6.23	12.9	0.028	7.7	111	0.5	0	2.79	49.85
EV-22A	6.44	10.86	0.125	2.07	-84.5	12	1.5	30.2	14.17
EV-22B	6.63	11.96	0.33	0.36	-61	3.5	2	32	19.58
LLMW-01D	6.83	13.42	0.0398	2.45	-113.5	3.5	3	2.45	10.23
LLMW-02D	6.61	14	0.094	1.3	-156	>14 [2]	5.5	3.79	9.91
LLMW-03S	--[4]	10.04	0.0265	0.4	-119	7.5	5	1.24	5.41
LLMW-03D	6.8	10.49	0.000648	0.8	-164	0	0	0.87	11.84
LLMW-04S	6.75	10.4	0.1157	0.11	-136.2	3.5	3.5	7.97	8.34
LLMW-04D	6.98	12.25	0.0514	0.39	-197.7	0.5	0.5	4.78	16.84
LLMW-05S	5.98	12.94	0.0269	2.29	4.3	3	2.5	1.97	5.59
LLMW-05D	6.55	12.7	0.078	2.1	-113	4.5	1.5	1.12	10.3
LLMW-06S	6.28	11.11	0.0418	0.48	-119.6	4.5	2	2.77	4.28
LLMW-06D	7.1	10.59	0.0793	1	-161	3.5	2	6.95	5.99
LLMW-07S	6.74	11.12	0.0768	0.85	-21.1	0.5	0	2.83	5.59
LLMW-07D	6.76	12.4	0.0545	2.38	-120.6	5.5	4.5	25	9.57
LLMW-08S	7.91	10.15	0.1713	0.43	-122.5	3	1.5	3.47	10.11
LLMW-08D	6.82	10.61	0.2251	0.36	-110	6.5	1	1.05	12.91
LLMW-09S	6.41	11.2	0.048	1.3	-99	6	1	3.37	4.06
LLMW-09D	6.43	12.3	0.057	2	-41	0.5	0.5	5.62	7.38
LLMW-10S	6.46	11.29	0.0476	0.3	-63.5	5.5	1.5	2.59	7.76
LLMW-10D	6.65	12.45	0.0292	0.29	-62.9	3.5	2.5	5.39	10.08
LLMW-11S	5.84	10.47	0.027	3.03	40.6	4	1.5	1.51	12.2
LLMW-11D	6.38	10.86	0.0377	0.64	21.3	1	0.5	4.28	13.78
LLMW-12S	6.47	10.8	0.0235	0.35	-63.9	3.5	3	1.35	7.16
LLMW-12D	6.48	12.39	0.0412	0.17	-47.2	3	1	4.64	10.73
LLMW-13S	6.48	10.8	0.143	1.5	-150	11	4	2.74	12.48
LLMW-13D	6.63	11.6	0.056	1.5	-121	3	1.5	4.97	15.66
LLMW-14S	6.74	12.36	0.019	7.68	22.7	2	1.5	4.29	6.3
LLMW14D	6.57	12.64	0.0431	0.35	-187.2	0	0	4.67	11.12
LLMW-15S	6.49	11.44	0.0305	0.46	-57.9	5	1.5	2.84	7.34
LLMW-15D	6.84	12.87	0.068	0.68	-284.4	0	0	1.29	10.95
LLMW-16S	6.56	10.4	0.136	1.5	-174	7	5.5	4.63	11.38
LLMW-16D	6.47	12.5	0.121	1.4	-80	1	0.5	4.58	16.27
LLMW-17S	6.57	10.4	0.043	6.6	67	0	0	2.78	11.93
LLMW-17D	6.41	10.5	0.041	2	-103	3.5	1	1.37	15.82
LLMW-18S	5.88	11.1	0.031	2	-24	13	4	1.54	7.16
LLMW-18D	6.52	13.1	0.135	1.7	-354	0.5	0.5	3.82	11.24
LLMW-19D	6.39	12.08	0.0411	0.21	-181.7	3	2	6.32	8.79
LLMW-20D	6.18	10.4	0.061	1.9	46	0.5	0	1.27	12.28
LLMW-21S	6.17	11.3	0.0197	0.85	-100.2	2	1.5	0.98	7.25
LLMW-21D	6.52	12.99	0.0604	0.23	-307.8	1	0.5	5.01	12.56
LLMW-22S	6.22	11.4	0.257	3	-126	4.5	0.5	2.15	4.6
LLMW-22D	6.32	13.3	0.172	1.9	-112	11	0.5	2.36	6.83
LLMW-23S	6.1	12.41	0.089	0.16	-79.1	5.5	1.5	5.2	11.47
LLMW-23D	6.41	13.51	0.1579	1.31	-193.5	1	1	2.72	20.4

Location Designation	pH	Temperature (C)	Conductivity (S/m)	Dissolved Oxygen (mg/L)	Oxidization Reduction Potential (mV)	Total Iron (mg/L)	Ferrous Iron (mg/L)	Turbidity (NTU)	Depth to Water[1] (feet)
LLMW-24D	6.47	13.8	0.027	1.6	69	0	0	16.6	44.45
LLMW-25D	6.18	13.1	0.032	4.4	91	0	0	8.5	51.91
LLMW-27S[3]	--	--	--	--	--	--	--	--	--
LLMW-27D	6.41	13.3	0.036	5.9	110	NR	NR	22.2	47.36
LLMW-29S[3]	--	--	--	--	--	--	--	--	--
LLMW-29D	6.74	13.6	0.033	3.6	104	9	0	47.2	41.11
LLMW-31D	6.4	13.6	0.059	2.8	117	0.5	0	9.54	43.79
LLMW-33S	5.78	25.9	0.024	4.4	97	0	0	61.8	9.3
LLMW-33D	6.38	13	0.03	3.3	124	0.5	NR	4.42	26.9
LLMW-34S	5.94	12.2	0.033	2.3	134	1.5	0	29.2	7.18
LLMW-34D	7.37	13.7	0.032	2.1	-125	2.5	0	4.18	31.8
MW1202R	6.13	12.33	0.119	2.29	-98	--[5]	--[5]	1.7	7.01
MW1203R	6.1	12.24	0.104	2.89	48	--[5]	--[5]	0	9.57
MW1301R	6.52	10.69	0.0675	2.75	88	--[5]	--[5]	0	6.9
MW1501R	6.25	11.49	0.146	2.34	-71	--[5]	--[5]	4.1	3.8
MW1701	6.96	11.2	0.058	1.3	-168	6.5	5	4.3	2.84
PZ-1B	6.1	11.3	0.068	1.8	-132	13	3	1.44	2.4
PZ-2B	6.19	10.3	0.036	1.8	26	0	0	0.81	2.82
PZ-3B	6.59	10.6	0.04	3	27	1.5	0	2.71	4.46
UNK	9.22	10.7	0.068	1.2	-265	0	0	4.55	9.31
Surface Water									
LLSW-01	6.55	6.98	0.0199	11.01	164	0	0	5.65	NA
LLSW-02	6.12	8.7	0.0355	6.75	142	1	0	4.17	NA
LLSW-03	5.59	7.44	0.0104	8.13	162	0	0	2.49	NA
LLSW-04	6.32	8.02	0.0334	3.6	131	1	0	30.1	NA
LLSW-05	6.62	8.96	0.0281	9.48	126	0.5	0	7.27	NA
LLSW-06	6.1	7.18	0.0389	3.50	46	1	0	12.4	NA
LLSW-07	6.29	7.45	0.0264	14.24	128	0	0	27.1	NA

Notes:

[1] Depth to water measured in feet below top of casing at time of sampling.

[2] The maximum scale for the iron test kit is 7 mg/L. Values listed as >14 mg/L were above the scale after one dilution.

[3] The monitoring well was dry and therefore could not be sampled.

[4] The pH meter was not operating correctly. No pH measurement was recorded for this well. Note however the pH during the previous groundwater monitoring event in January 2013 was 5.1. The pH meter was replaced with an operating and calibrated pH meter after sampling this well.

[5] Samples collected by Floyd Snyder; GeoEngineers collected sample split. Floyd Snyder did not measure total or ferrous iron.

NR = Not recorded

S/m - Siemens per meter

NTU = Nephelometric turbidity units

mg/L = milligrams per liter

mV = Millivolts

-- The investigation activity was not performed at the identified location.

Table 3

Groundwater Level Measurements on May 9, 2013

Everett Lowland

Everett, Washington

Location Designation	Time	Northing (Y)[1]	Easting (X)[1]	TOC Elevation[2] (ft)	DTW TOC (ft)	GW Elevation[2] (ft)
EV-22A	10:34	372106.2793	1308333.578	28.59	14.2	14.39
BP-02S	9:14	371826.4767	1308735.183	18.85	5.46	13.39
BP-03S	9:16	371659.4186	1308766.223	18.26	4.29	13.97
BP-04S	9:22	371545.1199	1308782.617	18.36	4.24	14.12
BP-05S	9:24	371481.4942	1308791.423	18.56	4.31	14.25
BP-08S	9:17	371143.3462	1308839.017	18.73	3.5	15.23
LLMW-03S	10:00	372968.3797	1308356.380	17.45	6.05	11.40
LLMW-04S	10:42	372644.1374	1308250.391	21.91	8.54	13.37
LLMW-05S	9:52	372938.0230	1309084.803	14.05	5.59	8.46
LLMW-06S	10:58	372477.6634	1309132.426	12.49	4.73	7.76
LLMW-07S	10:06	372578.1202	1309467.272	13.82	5.77	8.05
LLMW-08S	10:08	372213.2542	1309788.249	16.21	10.56	5.65
LLMW-10S	10:58	371722.2934	1309357.791	15.91	7.85	8.06
LLMW-11S	10:20	371825.3634	1310349.586	19.76	12.43	7.33
LLMW-12S	10:57	371520.0860	1309412.663	15.61	7.31	8.30
LLMW-13S	10:25	371682.6131	1309796.930	21.49	12.72	8.77
LLMW-14S	10:57	371373.4769	1309447.067	14.74	6.56	8.18
LLMW-15S	10:53	371051.1506	1309535.419	15.94	7.67	8.27
LLMW-16S	10:25	371159.2967	1310164.452	20.02	11.69	8.33
LLMW-17S	10:32	371320.3207	1310602.283	18.27	12.24	6.03
LLMW-21S	10:44	370010.9467	1309885.453	16.04	7.67	8.37
LLMW-22S	10:42	369173.0090	1310445.634	12.87	4.96	7.91
MW-1203R	9:18	373910.1500	1307960.380	15.7	9.67	6.03
EV-22B	10:32	372111.4369	1308337.155	29.02	19.51	9.51
BP-02D	9:15	372886.6753	1307921.185	18.88	11.13	7.75
BP-03D	9:18	371655.4975	1308766.43	18.37	10.48	7.89
BP-04D	9:21	371541.1801	1308782.814	18.33	10.36	7.97
BP-05D	9:26	371477.267	1308791.557	18.65	10.68	7.97
BP-05D2	9:25	371472.412	1308791.713	19.26	6.83	12.43
BP-08D	9:19	371139.579	1308839.538	18.59	11	7.59
LLMW-01D	9:16	373911.1708	1307952.929	15.74	12.41	3.33
LLMW-02D	10:16	372887.009	1307921.39	15.15	6.24	8.91
LLMW-03D	10:02	372965.5718	1308351.511	17.45	12.15	5.30
LLMW-04D	10:40	372642.8382	1308246.252	21.98	16.12	5.86
LLMW-05D	9:53	372933.914	1309087.930	13.92	11.42	2.50
LLMW-06D	9:59	372472.7325	1309133.872	12.29	7.35	4.94
LLMW-07D	10:07	372580.662	1309464.938	13.81	10.96	2.85
LLMW-08D	10:06	372209.3701	1309788.569	16.26	12.29	3.97
LLMW-10D	11:00	371725.4255	1309359.407	15.97	10.73	5.24
LLMW-11D	10:19	371821.896	1310350.780	19.71	17.45	2.26
LLMW-12D	10:58	371523.015	1309414.262	15.71	10.42	5.29
LLMW-13D	10:27	371682.4624	1309793.149	21.24	16.82	4.42
LLMW-14D	10:56	371375.602	1309449.147	14.80	9.48	5.32
LLMW-15D	10:52	371053.2175	1309536.612	16.07	10.57	5.50
LLMW-16D	10:27	371158.166	1310160.437	20.14	15.98	4.16
LLMW-17D	10:34	371317.6575	1310603.072	18.29	15.73	2.56
LLMW-21D	10:45	370011.1759	1309881.28	16.03	10.62	5.41
LLMW-22D	10:50	369167.8357	1310446.091	12.80	10.24	2.56
LLMW-27D	9:42	371259.2652	1308465.435	61.71	47.41	14.30
LLMW-29D	9:37	370982.4647	1308556.215	55.62	41.23	14.39

Notes:

[1] Northing (Y) and Easting(X) are in Washington State Plane North Coordinate System, 83/91 grid values.

[2] Vertical datum is NAVD88, US survey feet.

DTW TOC = Depth to water below top of PVC well casing.

GW = Groundwater

Table 4

Chemical Analytical Data for Shallow Groundwater and Surface Water

Everett Lowland

Everett, Washington

Location Designation	Analyte	Arsenic						Antimony		Cadmium		Lead		Mercury		Thallium	
		Arsenic		Arsenate	Arsenite	MMA(V)	DMA(V)										
	Total/Disolved [1]	Total	Dissolved	Dissolved	Dissolved	Dissolved	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
	Sample ID																
Monitoring Well (µg/L)																	
BP-01	BP01S-130515-W	**94**	**91.8**	**1.42**	**7.43**	0.069 U	0.041 U	**0.3**	0.2 U	0.1 U	**0.2**	**5.6**	**0.2**	0.02 U	0.02 U	0.2 U	0.2 U
BP-02	BP02S-130502-W	**104**	**101**	–	–	–	–	0.2 U	0.2 U	0.1 U	0.1 U	**1.8**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
BP-03	BP03S-130506-W	**46.4**	**44.4**	–	–	–	–	0.2 U	0.2 U	0.1 U	0.1 U	**1.3**	**0.3**	0.02 U	0.02 U	0.2 U	0.2 U
BP-04	BP04S-130501-W	**55.4**	**47.8**	**21.2**	**26.8**	0.12 U	0.093 U	**4.2**	**4.1**	**0.3**	**0.2**	**41.1**	**2**	0.02 U	0.02 U	0.2 U	0.2 U
BP-05	BP05S-130501-W	**37.8**	**35.2**	**8.39**	**26.4**	0.062 U	0.046 U	**0.6**	**0.6**	0.1 U	0.1 U	**1.3**	**0.8**	0.02 U	0.02 U	0.2 U	0.2 U
BP-06	BP06S-130506-W	**50.7**	**54**	–	–	–	–	0.2 U	0.2 U	0.1 U	0.1 U	**1**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
BP-07	BP07S-130501-W	**326**	**316**	**23.8**	**114**	0.5 U	0.37 U	**0.3**	**0.3**	0.1 U	0.1 U	**0.3**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
BP-08	BP08S-130501-W	**85.2**	**80.7**	–	–	–	–	0.2 U	0.2 U	**0.6**	0.1 U	**0.1**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
BP-09	BP09S-130502-W	**164**	**160**	–	–	–	–	**0.5**	**0.4**	**0.1**	0.1 U	**0.4**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
BP-10	BP10S-130502-W	**123**	**116**	–	–	–	–	**0.4**	**0.3**	0.1 U	0.1 U	**1.4**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
EV-22A	EV22A-130508-W	**10.2**	**10.2**	–	–	–	–	**0.6**	**0.6**	0.3	0.1 U	**6.1**	**4.6**	**0.0213**	0.02 U	0.2 U	0.2 U
EV-6A	EV6A-130508-W	**210**	**195**	**11.4**	**49.4**	0.14 U	0.081 U	**15.4**	**15.6**	**17.7**	**17.9**	**51.4**	**38.7**	**0.0478**	**0.0343**	**0.3**	**0.4**
LLMW-03	LLMW03S-130422W	**1.4**	**1.3**	–	–	–	–	0.2 U	0.2 U	0.1 U	0.1 U	0.1 U	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-04	LLMW04S-130423W	**7.2**	**7.2**	**1.24**	**2.88**	0.13 U	**0.154 J**	0.2 U	0.2 U	0.1 U	0.1 U	**0.4**	**0.1**	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-05	LLMW05S-130510-W	**9.5**	**8.3**	**1.94**	**3.48**	0.069 U	0.041 U	0.2 U	**0.2**	0.1 U	0.1 U	0.1 U	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-06	LLMW06S-130423W	**9.1**	**10.1**	**1.06**	**2.42**	0.13 U	0.093 U	**0.3**	**0.3**	0.1 U	0.1 U	0.1 U	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-07	LLMW07S-130507-W	**24.5**	**24.4**	–	–	–	–	**0.2**	**0.3**	0.1 U	0.1 U	0.1 U	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-08	LLMW08S-130430-W	**142**	**140**	**42.3**	**75.6**	0.12 U	0.093 U	**0.3**	**0.2**	0.1 U	0.1 U	**7**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-09	LLMW09S-130422-W	**62**	**60.2**	–	–	–	–	**0.3**	**0.3**	0.1 U	0.1 U	**0.4**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-10	LLMW10S-130503-W	**6.3**	**7.1**	–	–	–	–	**0.2**	**0.2**	0.1 U	0.1 U	**0.4**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-11	LLMW11S-130430-W	**1.2**	**1.5 J**	**1.29**	**0.454 J**	0.12 U	0.093 U	0.2 U	0.2 U	0.1 U	0.1 U	0.1 U	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-12	LLMW12S-130503-W	**36.8**	**32.6**	**11**	**16.3**	0.069 U	0.041 U	0.2 U	0.2 U	0.1 U	0.1 U	0.1 U	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-13	LLMW13S-130424-W	**22.6**	**22.8**	**0.79**	**2.6**	0.13 U	0.093 U	0.2 U	0.2 U	**0.4**	0.1 U	**0.1**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-14	LLMW14S-130425W	**8.2**	**8.1**	–	–	–	–	**0.7**	**0.7**	0.1 U	**0.1**	**0.6**	**0.3**	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-15	LLMW15S-130424W	**4**	**3.8**	–	–	–	–	0.2 U	0.2 U	0.1 U	0.1 U	0.1 U	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-16	LLMW16S-130423-W	**2,110**	**2,070**	**746**	**1,280**	0.51 U	3.7 U	0.2 U	0.2 U	0.1 U	0.1 U	**0.3**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-17	LLMW17S-130429-W	**3.8**	**3.6**	–	–	–	–	**1.6**	**1.6**	**0.3**	0.1 U	0.1 U	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-18	LLMW18S-130424W	**6**	**6.8**	–	–	–	–	0.2 U	0.2 U	0.1 U	0.1 U	**0.2**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-21	LLMW21S-130424W	**35.4**	**33.9**	–	–	–	–	**0.3**	**0.3**	0.1 U	0.1 U	0.1 U	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-22	LLMW22S-130429-W	**3**	**3**	–	–	–	–	**0.4**	**0.5**	0.1 U	0.1 U	0.1 U	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-23	LLMW23S-130424W	**9.8**	**10**	–	–	–	–	0.2 U	0.2 U	**0.1**	0.1 U	**0.3**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-33	LLMW33S-130506-W	**24.4**	**0.3**	–	–	–	–	**0.3**	**0.2**	**4.3**	0.1 U	**28.1**	0.1 U	**0.229**	0.02 U	**0.3**	0.2 U
LLMW-34	LLMW34S-130506-W	**0.8**	**0.7**	–	–	–	–	0.2 U	0.2 U	0.1 U	0.1 U	**0.2**	0.1 U	**0.0321**	0.02 U	0.2 U	0.2 U
MW1202R	MW1202R-130426W	**1.5**	**1.4**	–	–	–	–	0.2 U	0.2 U	0.1 U	0.1 U	0.1 U	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
MW1303R	MW1203R-130426W	**0.8**	**0.7**	–	–	–	–	0.2 U	0.2 U	0.1 U	0.1 U	0.1 U	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
MW1301R	MW1301R-130426W	**0.9**	**0.9**	–	–	–	–	**1**	**1**	0.1 U	0.1 U	0.1 U	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
MW1501R	MW1501R-130426W	**1.7**	**1.2**	–	–	–	–	**2.2**	**1.9**	0.1 U	0.1 U	**2**	**0.7**	0.02 U	0.02 U	0.2 U	0.2 U
MW1701	MW-1701-130422-W	**2.9**	**2.5**	–	–	–	–	0.2 U	0.2 U	0.1 U	0.1 U	**0.2**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
PZ-1B	PZ-1B-042513-W	**176**	**163**	–	–	–	–	0.2 U	**0.2**	0.1 U	0.1 U	**0.2**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
PZ-2B	PZ-2B-042513-W	**17.9**	**18.8**	–	–	–	–	0.2 U	0.2 U	**0.2**	0.1 U	**0.2**	**0.1**	0.02 U	0.02 U	0.2 U	0.2 U
PZ-3B	PZ-3B-042513-W	**29.7**	**31**	–	–	–	–	**3.3**	**3.6**	0.1 U	0.1 U	**1.9**	**1.7**	**0.0712**	**0.0652**	0.2 U	0.2 U
UNK	UNK-130422-W	**84.8 J**	**78.9 J**	–	–	–	–	**5.4**	**3.5**	**0.1**	0.1 U	**3.7**	**3.2**	**0.0401**	**0.0285**	0.2 U	0.2 U

Location Designation	Analyte	Arsenic						Antimony		Cadmium		Lead		Mercury		Thallium	
		Arsenic		Arsenate	Arsenite	MMA(V)	DMA(V)										
	Total/Disolved [1]	Total	Dissolved	Dissolved	Dissolved	Dissolved	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
	Sample ID																
Surface Water (µg/L)																	
LLSW-01	LLSW01-130430	**3.7**	**3.1**	**0.65**	**0.66**	**0.13 J**	**1.31**	**0.4**	**0.4**	0.1 U	0.1 U	**0.3**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLSW-02	LLSW02-130430	**3.5**	**4.9**	**1.1**	**0.95**	0.13 U	**0.279 J**	**0.6**	**0.5**	0.1 U	0.1 U	0.1 U	**0.1**	0.02 U	0.02 U	0.2 U	0.2 U
LLSW-04	LLSW04-130430	**656**	**486**	**356**	**111**	2.5 U	1.9 U	**0.7**	**0.7**	0.1 U	0.1 U	**0.4**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLSW-05	LLSW05-130430	**197**	**64.1**	**59.6**	**1.87**	0.25 U	**0.38 J**	**2.6**	**2.3**	0.1 U	0.1 U	**6.3**	**0.4**	0.02 U	0.02 U	0.2 U	0.2 U
	LLSW05-130430-DUP	**199**	**69.8**	**60.1**	**1.38**	0.25 U	**0.47 J**	**2.6**	**2.4**	0.1 U	0.1 U	**5.9**	**0.5**	0.02 U	0.02 U	0.2 U	0.2 U

Notes:

[1] Dissolved samples were field filtered through disposable 0.45 um filters

-- = The investigation activity was not performed at the identified location.

µg/L = micrograms per liter

MMA = Monomethylarsonic acid

DMA = Dimethylarsenic acid

"DUP" = Field duplicate sample

U = The analyte was not detected at a concentration greater than the identified reporting limit.

J = The analyte was detected and the detected concentration is considered an estimate.

Bold font type indicates analyte was detected.

Table 5

Chemical Analytical Data for Deep Groundwater

Everett Lowland

Everett, Washington

Location Designation	Analyte	Arsenic						Antimony		Cadmium		Lead		Mercury		Thallium	
		Arsenic		Arsenate	Arsenite	MMA(V)	DMA(V)										
	Total/Dissolved [1]	Total	Dissolved	Dissolved	Dissolved	Dissolved	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
	Sample ID																
Monitoring Well (µg/L)																	
BP-01	BP01D-130515-W	**0.2**	**0.2**	**0.283 J**	0.081 U	0.069 U	0.041 U	0.2 U	0.2 U	0.1 U	0.1 U	0.1 U	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
BP-02	BP02D-130502-W	**0.6**	**0.6**	–	–	–	–	0.2 U	0.2 U	0.1 U	0.1 U	0.1 U	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
BP-03	BP03D-130506-W	**0.2**	**0.2**	–	–	–	–	0.2 U	0.2 U	0.1 U	0.1 U	**0.1**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
BP-04	BP04D-130501-W	**3,470**	**3,820**	**537**	**3,000**	2.5 U	1.9 U	0.2 U	0.2 U	0.1 U	0.1 U	**0.4**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
BP-05	BP05D-130501-W	**15,500**	**17,100**	**14,800**	**288**	25 U	19 U	**0.6**	**0.6**	0.1 U	0.1 U	**0.2**	**0.2**	0.02 U	0.02 U	0.2 U	0.2 U
	DUP-03-130501-W	**15,400**	**17,200**	**15,200**	**268**	25 U	19 U	**0.6**	**0.6**	0.1 U	0.1 U	**0.3**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
BP-05	BP05D2-130502-W	**9.3**	**5.4**	**6.89**	**3.08**	0.062 U	0.046 U	**0.7**	**0.3**	**0.2**	0.1 U	**1.9**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
BP-06	BP06D-130506-W	**1,820**	**1,850**	–	–	–	–	**0.4**	**0.4**	0.1 U	0.1 U	**0.1**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
BO-07	BP07D-130501-W	**5,140**	**4,150**	**3630**	**362**	**17.4 J**	1.9 U	**0.5**	**0.4**	0.1 U	0.1 U	**0.1**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
BP-08	BP08D-130501-W	**0.5**	**1.1**	–	–	–	–	0.2 U	0.2 U	**1**	0.1 U	**0.2**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
BP-09	BP09D-130502-W	**27**	**26.1**	–	–	–	–	**0.2**	0.2 U	**0.2**	0.1 U	**0.2**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
BP-10	BP10D-130502-W	**8**	**7.7**	–	–	–	–	**0.2**	**0.2**	**0.2**	0.1 U	**0.7**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
EV-19	EV19B-130508-W	**3,950**	**3,720**	**3,840**	3.2 U	**15.6 J**	1.6 U	**0.3**	**0.3**	**0.2**	**0.3**	**2.1**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
EV-20	EV20-130508-W	**14,300**	**14,300**	**15,800**	32 U	**77 J**	16 U	**0.2**	**0.2**	0.1 U	0.1 U	**1.7**	**0.1**	0.02 U	0.02 U	0.2 U	0.2 U
EV-22	EV22B-130508-W	**1.3**	**1.4**	–	–	–	–	**0.2**	0.2 U	0.2 U	**0.1**	**0.3**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
EV-6	EV6B-130507-W	**20.4**	**16.9**	**3.05**	**1.21**	0.069 U	0.041 U	**1.2**	**1.6**	0.1 U	0.1 U	**1.1**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-01	LLMW01D-130510-W	**22**	**21.2**	–	–	–	–	0.2 U	0.2 U	0.1 U	0.1 U	**0.1**	**0.3**	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-02	LLMW02D-130422-W	**1.5**	**1.5**	–	–	–	–	0.2 U	0.2 U	**0.2**	0.1 U	0.1 U	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-03	LLMW03D-130422W	**0.4**	**0.3**	–	–	–	–	0.2 U	0.2 U	0.1 U	0.1 U	0.1 U	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-04	LLMW04D-130423W	**4.7**	**5**	**1.03**	**1.44**	**0.23 J**	0.093 U	0.2 U	0.2 U	0.1 U	0.1 U	**0.2**	**0.1**	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-05	LLMW05D-130510-W	**1.7**	**1.2**	**2.53**	**0.368 J**	0.069 U	0.041 U	0.2 U	0.2 U	**0.5**	0.1 U	**0.3**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-06	LLMW06D-130422W	**2.8**	**2**	**0.58**	**1**	0.13 U	0.093 U	0.2 U	0.2 U	**0.3**	0.1 U	**0.3**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-07	LLMW07D-130508-W	**9**	**9.9**	–	–	–	–	0.2 U	0.2 U	0.1 U	0.1 U	0.1 U	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-08	LLMW08D-130430-W	**3.7**	**3.8**	**1.05**	**0.774**	0.062 U	0.046 U	0.2 U	0.2 U	0.1 U	0.1 U	0.1 U	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-09	LLMW09D-130423-W	**1.2**	**0.9**	–	–	–	–	0.2 U	0.2 U	0.1 U	0.1 U	**0.4**	**0.1**	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-10	LLMW10D-130503-W	**2.6**	**3.2**	–	–	–	–	0.2 U	0.2 U	0.1 U	0.1 U	**0.2**	**0.2**	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-11	LLMW11D-130430-W	**1.4**	**1.2 J**	**1.16**	**0.257 J**	0.062 U	0.046 U	**0.2**	**0.3**	0.1 U	0.1 U	0.1 U	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-12	LLMW12D-130503-W	**2,020**	**2,040**	**445**	**1,170**	2.8 U	1.6 U	0.2 U	0.2 U	0.1 U	0.1 U	0.1 U	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
	DUP-04-130503-W	**2,030**	**2,040**	**476**	**1,230**	2.8 U	1.6 U	**0.2**	0.2 U	0.1 U	0.1 U	**0.2**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-13	LLMW13D-130424-W	**68**	**79.8**	**46.2**	**103**	0.51 U	0.37 U	0.2 U	0.2 U	**0.1**	0.1 U	**0.3**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
	DUP-01-130424-W	**73.6**	**85.3**	**42**	**103**	0.37 U	0.51 U	0.2 U	0.2 U	0.1 U	0.1 U	**0.3**	**0.1**	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-14	LLMW14D-130425W	**234**	**246**	–	–	–	–	0.2 U	0.2 U	0.1 U	0.1 U	**0.2**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
	DUP-2-130425W	**293**	**228**	–	–	–	–	0.2 U	0.2 U	0.1 U	0.1 U	**0.2**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-15	LLMW15D-130425W	**0.5**	**0.5**	–	–	–	–	0.2 U	0.2 U	0.1 U	0.1 U	0.1 U	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-16	LLMW16D-130423-W	**1**	**0.5**	**0.22 J**	0.13 U	0.13 U	0.093 U	0.2 U	0.2 U	**0.2**	0.1 U	**0.3**	**0.2**	0.025	0.02 U	0.2 U	0.2 U
LLMW-17	LLMW17D-130429-W	**6.8**	**6.4**	–	–	–	–	0.2 U	0.2 U	**0.4**	0.1 U	0.1 U	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-18	LLMW18D-130424W	**0.8**	0.5 U	–	–	–	–	0.2 U	0.2 U	0.1 U	0.1 U	**0.2**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-19	LLMW19D-130423W	**17.9**	**16.2**	–	–	–	–	**0.2**	0.2 U	0.1 U	0.1 U	**0.2**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-20	LLMW20D-130425W	**20.7**	**20.7**	–	–	–	–	**1.3**	**1.4**	0.1 U	0.1 U	**0.7**	**0.6**	**0.0277**	**0.0262**	0.2 U	0.2 U
LLMW-21	LLMW21D-130424W	**0.7**	**0.3**	–	–	–	–	0.2 U	0.2 U	0.1 U	0.1 U	**0.2**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-22	LLMW22D-130429-W	**0.5 U**	0.5 U	–	–	–	–	0.2 U	0.2 U	**0.3**	0.1 U	0.1 U	0.1 U	**0.0229**	0.02 U	0.2 U	0.2 U
LLMW-23	LLMW23D-130425W	**0.5 U**	0.5 U	–	–	–	–	0.2 U	0.2 U	0.1 U	0.1 U	0.1 U	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-24	LLMW24D-130423-W	**1**	**0.8**	–	–	–	–	**0.3**	**0.3**	**0.3**	**0.3**	**0.5**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-25	LLMW25D-130423-W	**1.6**	**1.5**	–	–	–	–	**0.5**	**0.5**	**0.4**	**0.3**	**0.2**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U

Location Designation	Analyte	Arsenic						Antimony		Cadmium		Lead		Mercury		Thallium	
		Arsenic		Arsenate	Arsenite	MMA(V)	DMA(V)										
	Total/Dissolved [1]	Total	Dissolved	Dissolved	Dissolved	Dissolved	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
	Sample ID																
Monitoring Well (µg/L)																	
LLMW-27	LLMW27D-130508-W	**4,380**	**4,460**	**4,440**	3.2 U	**20.6**	1.6 U	**0.3**	**0.3**	**0.1**	0.1 U	**1.1**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
	DUPE-05-130508-W	**4,340**	**4,380**	**4,400**	3.2 U	**27.3**	1.6 U	**0.4**	**0.3**	**0.1**	0.1 U	**1.3**	**0.1**	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-29	LLMW29D-130507-W	**8.4**	**6.5**	–	–	–	–	**0.2**	**0.2**	**0.2**	0.1 U	**0.7**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-31	LLMW31D-130507-W	**0.9**	**0.8**	–	–	–	–	**0.2**	**0.2**	**0.1**	**0.1**	**0.2**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-33	LLMW33D-130507-W	**1.3**	**1.2**	–	–	–	–	**0.2**	**0.2**	0.1 U	0.1 U	**0.2**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U
LLMW-34	LLMW34D-130506-W	**1.6**	**1.5**	–	–	–	–	**1.2**	**0.9**	**0.2**	0.1 U	**5.6**	0.1 U	0.02 U	0.02 U	0.2 U	0.2 U

Notes:

[1] Dissolved samples were field filtered through disposable 0.45 um filters

-- = The investigation activity was not performed at the identified location.

MMA = Monomethylarsonic acid

DMA = Dimethylarsenic acid

"DUP" or "DUPE" = Field duplicate sample.

µg/L = micrograms per liter

U = The analyte was not detected at a concentration greater than the identified reporting limit.

J = The analyte was detected and the detected concentration is considered an estimate.

Bold font type indicates analyte was detected.

Table 6

Chemical Analytical Data - Arsenic in Water

Everett Lowland

Everett, Washington

Location Designation	Analyte	Arsenic		Arsenate	Arsenite	MMA(V)	DMA(V)	Arsenate Ratio[2]
	Total/Dissolved[1]	Total	Dissolved	Dissolved	Dissolved	Dissolved	Dissolved	
	Sample ID							
Shallow Wells (µg/L)								
BP-01	BP01S-130515-W	94	91.8	1.42	7.43	0.069 U	0.041 U	16%
BP-04	BP04S-130501-W	55.4	47.8	21.2	26.8	0.12 U	0.093 U	44%
BP-05	BP05S-130501-W	37.8	35.2	8.39	26.4	0.062 U	0.046 U	24%
BP-07	BP07S-130501-W	326	316	23.8	114	0.5 U	0.37 U	17%
EV-6	EV6A-130508-W	210	195	11.4	49.4	0.14 U	0.081 U	19%
LLMW-04	LLMW04S-130423W	7.2	7.2	1.24	2.88	0.13 U	0.154 J	30%
LLMW-05	LLMW05S-130510-W	9.5	8.3	1.94	3.48	0.069 U	0.041 U	36%
LLMW-06	LLMW06S-130423W	9.1	10.1	1.06	2.42	0.13 U	0.093 U	30%
LLMW-08	LLMW08S-130430-W	142	140	42.3	75.6	0.12 U	0.093 U	36%
LLMW11	LLMW11S-130430-W	1.2	1.5 J	1.29	0.454 J	0.12 U	0.093 U	74%
LLMW12	LLMW12S-130503-W	36.8	32.6	11	16.3	0.069 U	0.041 U	40%
LLMW13	LLMW13S-130424-W	22.6	22.8	0.79	2.6	0.13 U	0.093 U	23%
LLMW-16	LLMW16S-130423-W	2,110	2,070	746	1,280	0.51 U	3.7 U	37%
Surface Water (µg/L)								
LLSW-01	LLSW01-130430	3.7	3.1	0.65	0.66	0.13 J	1.31	50%
LLSW02	LLSW02-130430	3.5	4.9	1.1	0.95	0.13 U	0.279 J	54%
LLSW-04	LLSW04-130430	656	486	356	111	2.5 U	1.9 U	76%
LLSW-05	LLSW05-130430	197	64.1	59.6	1.87	0.25 U	0.38 J	97%
	LLSW05-130430-DUP	199	69.8	60.1	1.38	0.25 U	0.47 J	98%
Deep Wells (µg/L)								
BP-01	BP01D-130515-W	0.2	0.2	0.283 J	0.081 U	0.069 U	0.041 U	87%
BP-04	BP04D-130501-W	3,470	3,820	537	3,000	2.5 U	1.9 U	15%
BP-05	BP05D-130501-W	15,500	17,100	14,800	288	25 U	19 U	98%
	DUP-03-130501-W	15,400	17,200	15,200	268	25 U	19 U	98%
BP-05	BP05D2-130502-W	9.3	5.4	6.89	3.08	0.062 U	0.046 U	69%
BP-07	BP07D-130501-W	5,140	4,150	3,630	362	17.4 J	1.9 U	91%
EV-19	EV19B-130508-W	3,950	3,720	3,840	3.2 U	15.6 J	1.6 U	100%
EV-20	EV20-130508-W	14,300	14,300	15,800	32 U	77 J	16 U	100%
EV-6	EV6B-130507-W	20.4	16.9	3.05	1.21	0.069 U	0.041 U	72%
LLMW-04	LLMW04D-130423W	4.7	5	1.03	1.44	0.23 J	0.093 U	42%

Location Designation	Analyte	Arsenic		Arsenate	Arsenite	MMA(V)	DMA(V)	Arsenate Ratio[2]
	Total/Dissolved[1]	Total	Dissolved	Dissolved	Dissolved	Dissolved	Dissolved	
	Sample ID							
LLMW-05	LLMW05D-130510-W	**1.7**	**1.2**	**2.53**	**0.368 J**	0.069 U	0.041 U	**87%**
LLMW-06	LLMW06D-130422W	**2.8**	**2**	**0.58**	**1**	0.13 U	0.093 U	**37%**
LLMW-08	LLMW08D-130430-W	**3.7**	**3.8**	**1.05**	**0.774**	0.062 U	0.046 U	**58%**
LLMW-11	LLMW11D-130430-W	**1.4**	**1.2 J**	**1.16**	**0.257 J**	0.062 U	0.046 U	**82%**
LLMW-12	LLMW12D-130503-W	**2,020**	**2,040**	**445**	**1,170**	2.8 U	1.6 U	**28%**
	DUP-04-130503-W	**2,030**	**2,040**	**476**	**1,230**	2.8 U	1.6 U	**28%**
LLMW-13	LLMW13D-130424-W	**68**	**79.8**	**46.2**	**103**	0.51 U	0.37 U	**31%**
	DUP-01-130424-W	**73.6**	**85.3**	**42**	**103**	0.37 U	0.51 U	**29%**
LLMW-16	LLMW16D-130423-W	**1**	**0.5**	**0.22 J**	0.13 U	0.13 U	0.093 U	**99%**
LLMW-27	LLMW27D-130508-W	**4,380**	**4,60**	**4,440**	3.2 U	**20.6**	1.6 U	**100%**
	DUPE-05-130508-W	**4,340**	**4,380**	**4,400**	3.2 U	**27.3**	1.6 U	**100%**

Notes:

[1] Dissolved samples were field filtered through disposable 0.45 um filters.

[2] Arsenate ratio calculated as arsenate divided by (arsenate + arsenite). Non-detects treated as 1/2 the reporting limit.

MMA = Monomethylarsonic acid

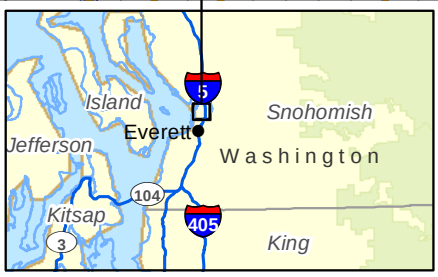
DMA = Dimethylarsenic acid

µg/L = micrograms per liter

U = The analyte was not detected at a concentration greater than the identified reporting limit.

J = The analyte was detected and the detected concentration is considered an estimate.

Bold font type indicates analyte was detected.



N
W
E
S

2,000 0 2,000

Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: ESRI Data & Maps

Projection: NAD 1983 UTM Zone 10N

Vicinity Map

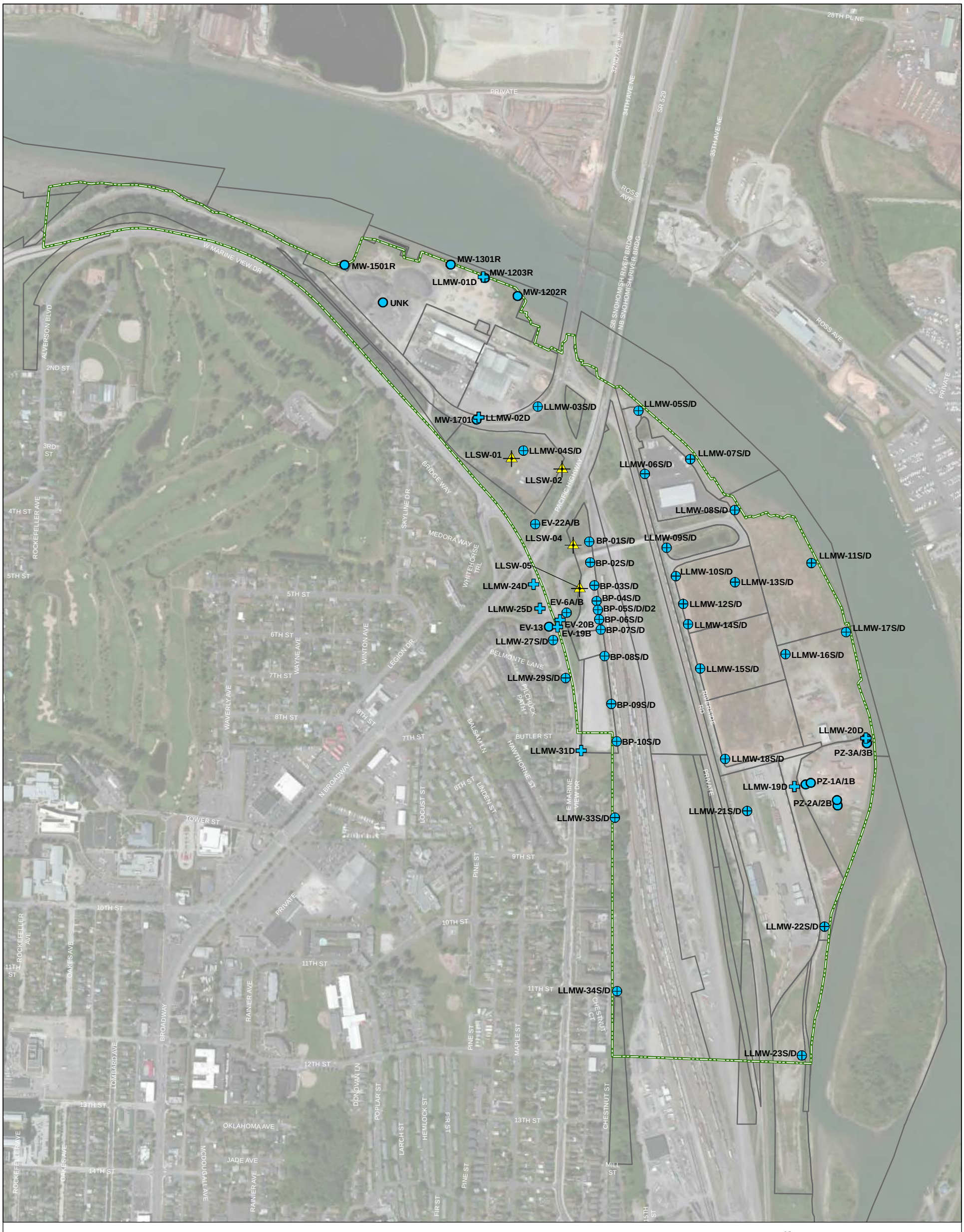
Everett Smelter - Lowland Area

GeoEngineers

Figure 1

Path: \\seal\projects\0105040681GIS\0504068_VicinityMap_Lowland.mxd Map Revised: 07 February 2013 amanza

Path: P:\0\0504068\GIS\050406800_T800_SitePlan_Rd2.mxd Map Revised: 28 June 2013 ccabrera



Legend

- Lowland Area
- Snohomish County Parcel Boundary

Investigation Locations

- Shallow Aquifer Monitoring Well
- Shallow and Deep Aquifer Monitoring Well Pair
- Deep Aquifer Monitoring Well
- Surface Water Sample Location

Notes:
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Data Source: Aerial Image from Microsoft, 2010. Snohomish County GIS, 2012.

N W E S

700 0 700

Feet

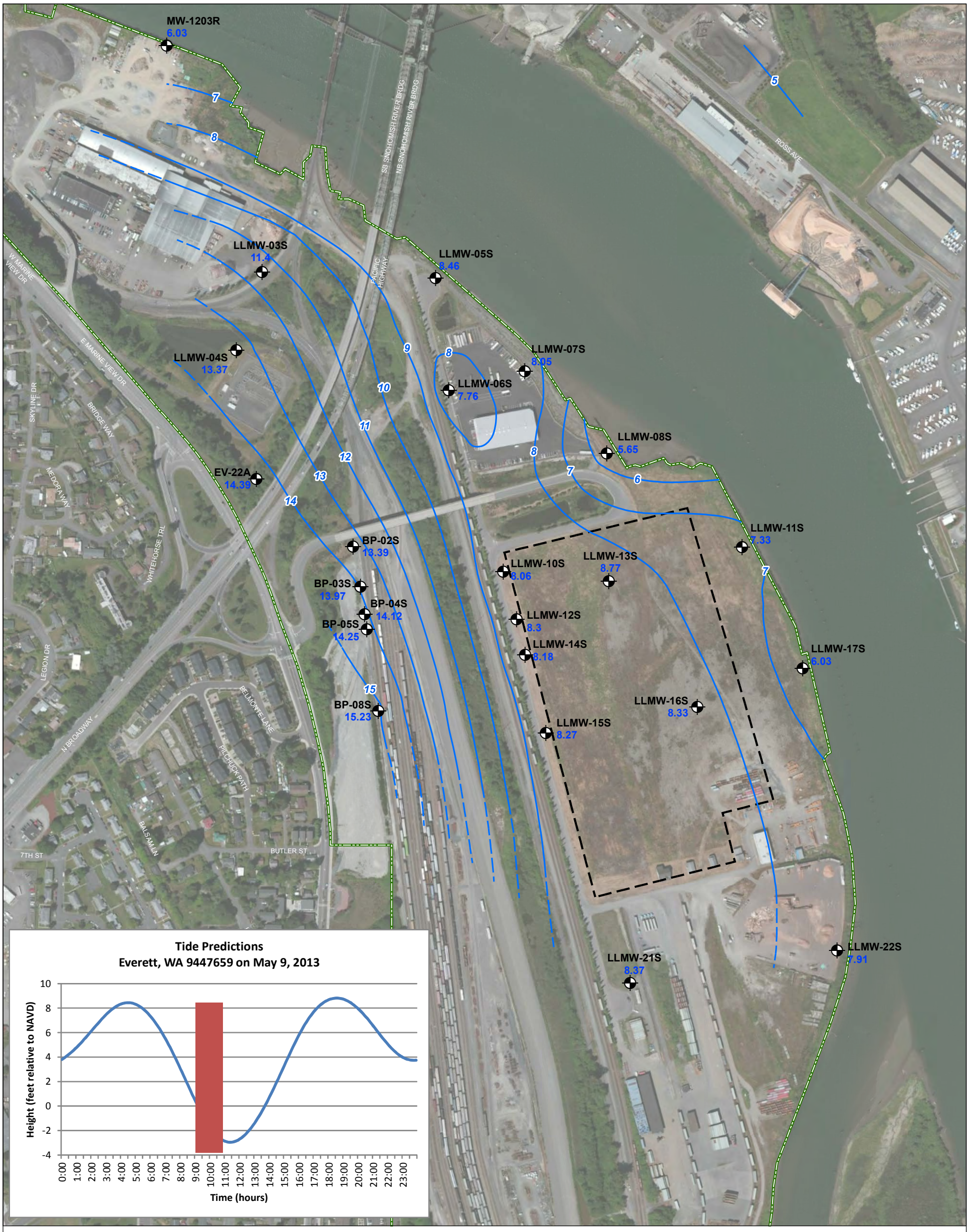
Lowland Area Investigation Locations

Everett Smelter - Lowland Area

GeoEngineers

Figure 2

Path: P:\0\0504068\GIS\050406800_T800_GWElev_Shallow_May9.mxd Map Revised: 28 June 2013 ccabrera



Legend

- Lowland Area
- **LLMW-10S** / **8.06** — Monitoring well designation and groundwater elevation (NAVD88) on May 9, 2013.
- Estimated Groundwater Elevation Contour, ft (dashed where inferred)
- Extent of Recent Filling (2011 to present)

N
W E
S

400 0 400
Feet

1. The locations of all features shown are approximate.
2. Inset tidal prediction chart generated using National Oceanic and Atmospheric Administration (NOAA) tidal prediction data for May 9, 2013. http://tidesandcurrents.noaa.gov/
3. Red overlay box on tidal prediction chart represents the time period for groundwater measurements on May 5, 2013.
4. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerial Image from Microsoft, 2010. Snohomish County GIS, 2012.

Groundwater Elevations
May 9, 2013 – Shallow Aquifer

Everett Smelter - Lowland Area

GeoEngineers

Figure 3

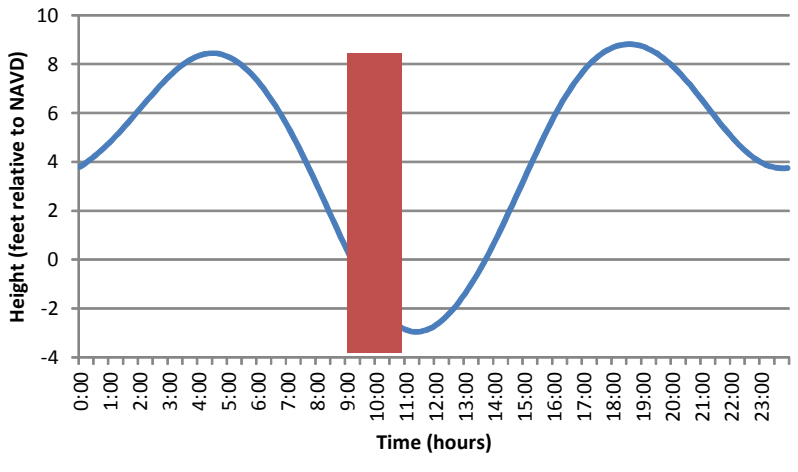
Path: P:\0\0504068\GIS\050406800_T800_GWElev_Deep_May9.mxd Map Revised: 28 June 2013 ccabrera

LLMW-01D 3.33
LLMW-03D 5.3
LLMW-02D 8.91
LLMW-04D 5.86
LLMW-05D 2.5
LLMW-07D 2.85
LLMW-06D 4.94
LLMW-08D 3.96
EV-22B 9.51
BP-02D 7.75
BP-03D 7.89
BP-04D 7.97
BP-05D 7.97
LLMW-11D 2.26
LLMW-13D 4.42
LLMW-10D 5.24
LLMW-12D 5.29
LLMW-14D 5.32
LLMW-17D 2.56
LLMW-16D 4.16
LLMW-15D 5.5
LLMW-27D 14.3
BP-08D 7.59
LLMW-29D 14.39
LLMW-21D 5.37
LLMW-22D 2.56

3 4 5 6 7 8 9 10 11 12 13 14

SB SNOHOMISH RIVER BRDG
NB SNOHOMISH RIVER BRDG
PACIFIC HIGHWAY
ROSS AVE
W MARINE VIEW DR
E MARINE VIEW DR
SKYLINE DR
BRIDGE WAY
MEDORA WAY
WHITEHORSE TRL
LEGION DR
N BROADWAY
BELMONTE LANE
PILCHUCK PATH
BALSAM LN
7TH ST
BUTLER ST

Tide Predictions
Everett, WA 9447659 on May 9, 2013



Lowland Area

LLMW-10D 5.24 Monitoring well designation and groundwater elevation (NAVD88) on May 9, 2013.

Estimated Groundwater Elevation Contour, ft (dashed where inferred)

Extent of Recent Filling (2011 to present)

N W E S

400 0 400
Feet

Notes:
1. The locations of all features shown are approximate.
2. Inset tidal prediction chart generated using National Oceanic and Atmospheric Administration (NOAA) tidal prediction data for May 9, 2013. http://tidesandcurrents.noaa.gov/
3. Red overlay box on tidal prediction chart represents the time period for groundwater measurements on May 5, 2013.
4. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerial Image from Microsoft, 2010. Snohomish County GIS, 2012.

Groundwater Elevations
May 9, 2013 – Deep Aquifer

Everett Smelter - Lowland Area

GeoEngineers

Figure 4

Path: P:\0\0504068\GIS\050406800_T800_GW_Arsenic_Shallow_S2.mxd Map Revised: 27 June 2013 ccabrera

Legend

Lowland Area

Investigation Locations

- Shallow Aquifer Monitoring Well
- Shallow and Deep Aquifer Monitoring Well Pair
- Surface Water — Sample Location

LLMW-10S → Monitoring Well Designation
4.4 → Dissolved Arsenic Concentration in ug/L

J = Result is an estimate
DRY = Well was dry and therefore no sample could be obtained

N W E S

700 0 700
Feet

Dissolved Arsenic Concentrations in Shallow Aquifer Groundwater and Surface Water April/May 2013

Everett Smelter - Lowland Area

GeoEngineers

Figure 5

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerial Image from Microsoft, 2010. Snohomish County GIS, 2012.

Path: P:\0\0504068\GIS\050406800_T800_GW_Arsenic_Deep_S2.mxd Map Revised: 27 June 2013 ccabrera

Legend

Lowland Area

Investigation Locations

Shallow and Deep Aquifer Monitoring Well Pair

Deep Aquifer Monitoring Well

LLMW-10D → Monitoring Well Designation
2.4 → Dissolved Arsenic Concentration in ug/L

U = The analyte was not detected at the indicated reporting limit

N W E S

700 0 700
Feet

Dissolved Arsenic Concentrations in Deep Aquifer Groundwater April/May 2013

Everett Smelter - Lowland Area

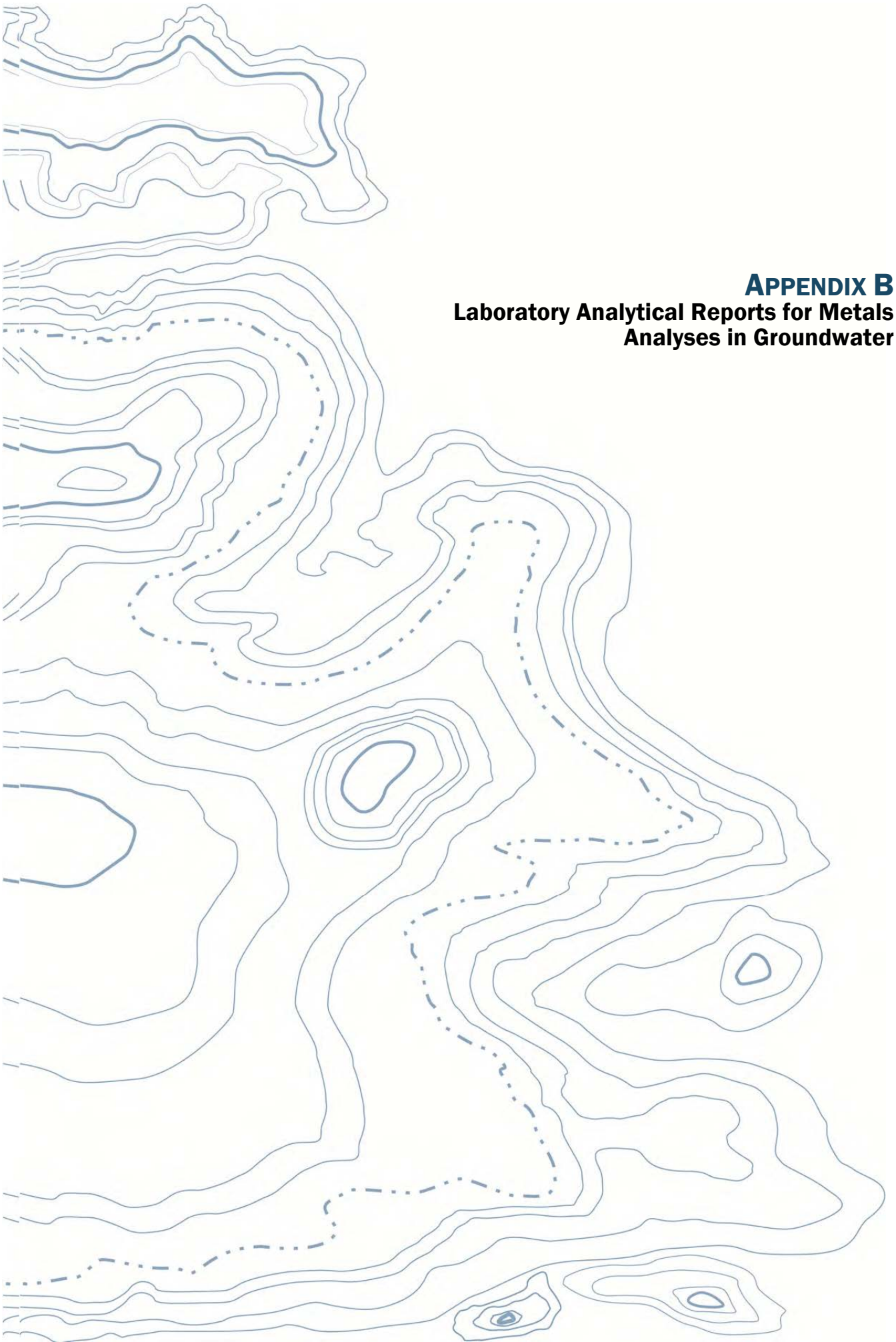
GeoEngineers

Figure 6

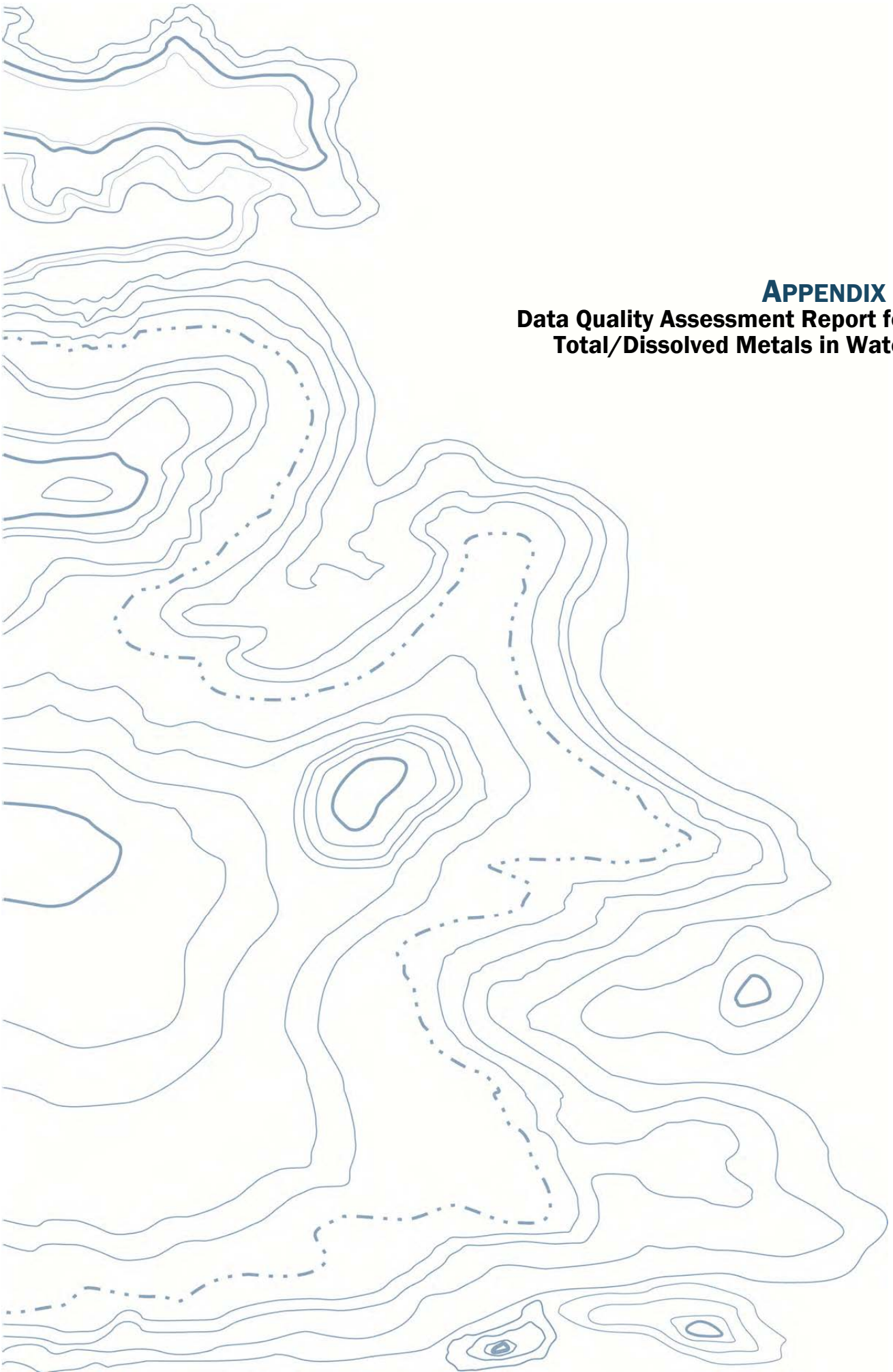
Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerial Image from Microsoft, 2010. Snohomish County GIS, 2012.

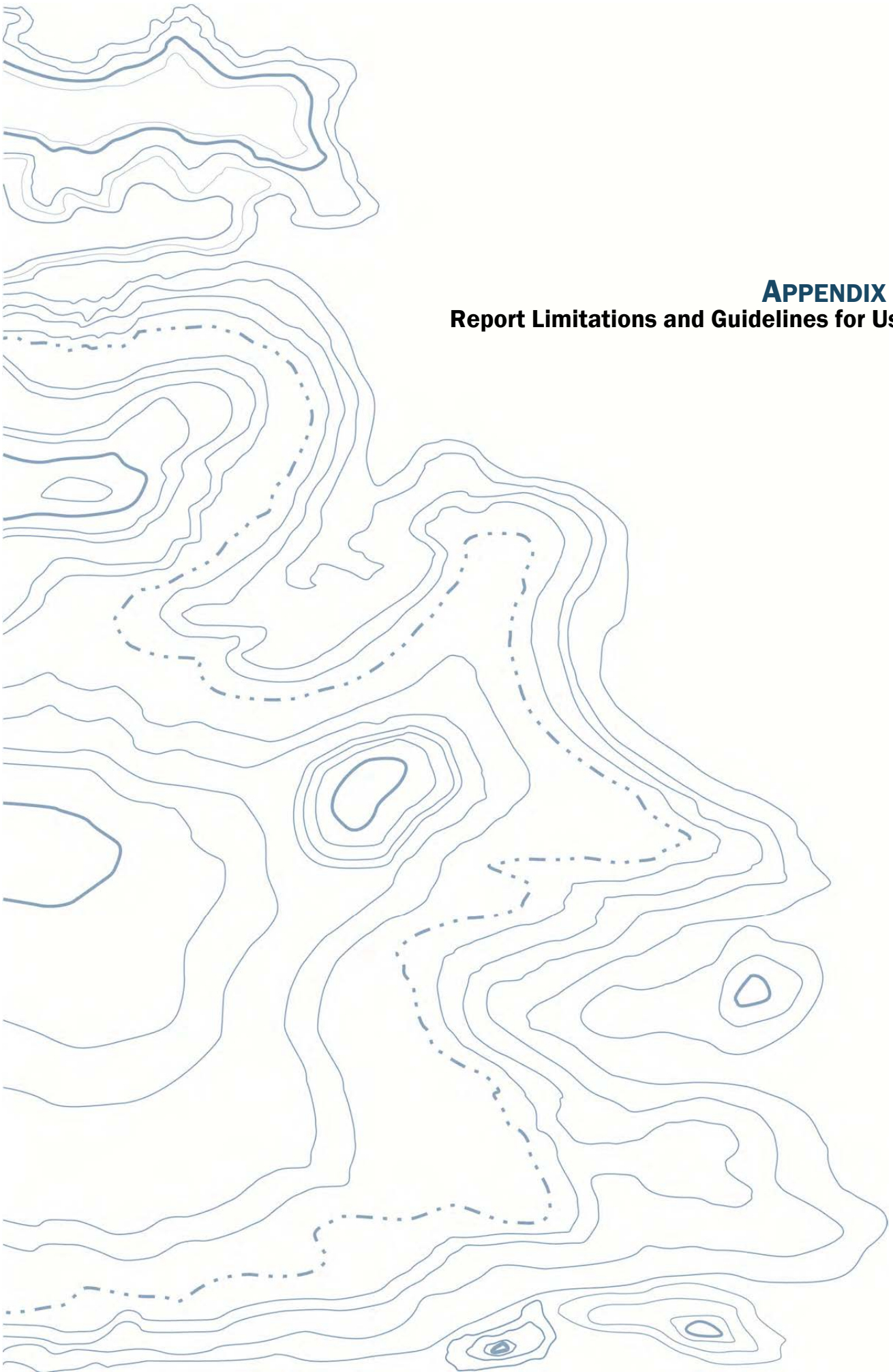
APPENDIX A
Field Sample Collection Method for Arsenic Speciation in Water



APPENDIX B
Laboratory Analytical Reports for Metals Analyses in Groundwater



APPENDIX C
Data Quality Assessment Report for Total/Dissolved Metals in Water



APPENDIX D
Report Limitations and Guidelines for Use

APPENDIX D
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report.

Environmental Services are Performed for Specific Purposes, Persons and Projects

GeoEngineers has performed this investigation of the Everett Smelter – Lowland Area in general accordance with the scope and limitations of our proposal, dated July 3, 2012. This report has been prepared for the exclusive use of Washington State Department of Ecology, and their authorized agents. This report is not intended for use by others, and the information contained herein is not applicable to other properties.

GeoEngineers structures our services to meet the specific needs of our clients. For example, an ESA study conducted for a property owner may not fulfill the needs of a prospective purchaser of the same property. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and property. No one except Washington State Department of Ecology should rely on this environmental report without first conferring with GeoEngineers. Use of this report is not recommended for any purpose or project except the one originally contemplated.

This Environmental Report is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the Everett Smelter – Lowland Area. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, it is important not to rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

If important changes are made to the project or property after the date of this report, we recommend that GeoEngineers be given the opportunity to review our interpretations and recommendations. Based on that review, we can provide written modifications or confirmation, as appropriate.

Reliance Conditions for Third Parties

Our report was prepared for the exclusive use of our Client. No other party may rely on the product of our services unless we agree to such reliance in advance and in writing. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there

1 Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

would otherwise be no contractual limits to their actions. Within the limitations of scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and generally accepted environmental practices in this area at the time this report was prepared.

Environmental Regulations are Always Evolving

Some substances may be present in the vicinity of the subject property in quantities or under conditions that may have led, or may lead, to contamination of the subject property, but are not included in current local, state or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards for appropriate inquiry, or regulatory definitions of hazardous substances, change or if more stringent environmental standards are developed in the future.

Conditions Can Change

This environmental report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by man-made events such as construction on or adjacent to the subject property, by new releases of hazardous substances, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Please contact GeoEngineers before applying this report for its intended purpose so that GeoEngineers may evaluate whether changed conditions affect the continued applicability of the report.

Most Environmental Findings are Professional Opinions

Our interpretations of site conditions are based on field observations and analytical data from widely spaced sampling locations at the subject property. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an informed opinion about subsurface conditions throughout the property. Actual subsurface conditions may differ, sometimes significantly, from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Read These Provisions Closely

It is important to recognize that the geoscience practices (geotechnical engineering, geology and environmental science) are less exact than other engineering and natural science disciplines. Without this understanding, there may be expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory “limitations” provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you need to know more about how these “Report Limitations and Guidelines for Use” apply to your project or property.

Lowland Area Groundwater, Surface Water and Sediment Technical Memorandum

Everett Smelter Cleanup Site
FSID 2744, ISIS Cleanup Site ID 4298

Lowland Area
Everett, Washington

for
Washington State Department of Ecology

July 16, 2013

GeoEngineers
Earth Science + Technology

Lowland Area Groundwater, Surface Water and Sediment Technical Memorandum

Everett Smelter Cleanup Site
FSID 2744, ISIS Cleanup Site ID 4298

Lowland Area
Everett, Washington

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Project No. 0504-068-00

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1.0 INTRODUCTION

This memorandum summarizes field investigation activities completed at the Everett Smelter Lowland Area. The Lowland Area is a part of the Everett Smelter Cleanup Site and is generally located in northeast Everett, Washington (Figure 1). The Lowland Area includes multiple parcels and the right-of-ways that are located adjacent to the parcels as shown in Figure 2.

The purpose of the Lowland Area study is to characterize metals concentrations in soil, groundwater, surface water, and sediment within and near the Lowland Area in order to evaluate potential environmental impacts from the historical smelter activities. For this study, 57 soil borings were advanced in and adjacent to the Lowland Area between December 4, 2012 and January 24, 2013. Soil sampling and analysis was completed as part of soil boring work and 54 of the borings were completed as groundwater monitoring wells. The groundwater monitoring wells were installed in the shallow and deep aquifers (23 "shallow" wells, 30 "deep" wells and one "deeper deep" well) identified in the Lowland Area. The results of the soil sampling activities completed as part of soil boring advancement and monitoring well installation and development were presented in a separate memorandum titled "Draft Monitoring Well Installation Technical Memorandum," dated February 19, 2013.

Groundwater sampling, and sampling of surface water and sediment from ponds present in the Lowland Area, hydraulic conductivity testing, and a tidal study were performed as part of the Lowland Area study between January 1 and March 8 2013. Water samples were collected and analyzed from a total of 87 new and existing monitoring wells and five surface water ponds to characterize metals concentrations in groundwater and surface water throughout the Lowland Area. Hydraulic conductivity testing and a tidal study were performed on a subset of the groundwater monitoring wells to measure aquifer characteristics. Sediment from the surface water ponds was also collected and analyzed. The investigation activities were completed in general accordance with the Washington State Department of Ecology (Ecology)-approved Final Sampling and Analysis Plan (SAP), Quality Assurance Project Plan (QAPP) and Health and Safety Plan (HASP) for the project dated August 31, 2012.

The purpose of this technical memorandum is to describe field activities completed as part of the investigation of groundwater, pond surface water and sediment, hydraulic testing, and the tidal study performed in the Lowland Area and to summarize the investigation results. The results of this and future field activities will be used to develop a preliminary Feasibility Study so that a Cleanup Action Plan can be developed for the Lowland Area that is protective of human health and the environment. The results of groundwater and pond surface water and sediment sampling and analysis, hydraulic testing and the tidal study are presented in the following sections.

1.1. Site History and Background

The Everett Smelter Lowland Area is part of the Everett Smelter Cleanup Site. The Everett Smelter Cleanup Site has been divided into an Upland Area and Lowland Area. The Benson Property Site is a sub-area of the Lowland Area. Historically, a smelter was located in the Upland Area, west of the Lowland Area. Beginning in the 1890s, the smelter produced lead, copper, gold and silver from

ore. An arsenic extraction plant was added in 1901. The entire smelter was shut down by 1912 and dismantled by 1915.

The historic smelting activities resulted in the release of metals including arsenic and lead to the soil, groundwater and air. The arsenic extraction plant where arsenic trioxide was produced was demolished. However, arsenic trioxide remained on site in the former plant area. This portion of the Everett Smelter Cleanup Site has been referred to as the former arsenic trioxide processing area and as the fenced area[1]. This area underwent environmental cleanup in approximately 2004 through 2006 to remove or consolidate soil that had been contaminated by smelter operations including the arsenic extraction plant.

Historically, slag waste from former smelter activities was poured down the bluff located on the east side of the Upland portion of the Everett Smelter Site and onto an adjacent property, currently known as the Benson Property. Slag present on the Benson Property was historically used for the manufacture of "rock wool". Additionally, slag was excavated from the Benson Property and transported for use on and off site. Although slag was historically reused, not all of it was removed. Slag still remains on the Benson Property and potentially in other parts of the Lowland Area.

Air emissions from the former smelter stacks are likely to have deposited particulates containing metals onto the historic land surface surrounding the Smelter Site. The extent of contamination from the smelter has been characterized in the Upland portion of the Everett Smelter Cleanup Site and is currently under remedial action. The extent of contamination in the Lowland portion of the Site is being investigated to evaluate potential environmental impacts from historical smelter activities.

Multiple soil and groundwater investigations have been performed in the Lowland Area since the 1990s related to the Everett Smelter contamination. Groundwater monitoring in the late 1990s identified metals-contaminated groundwater east of the former smelter in the Lowland Area. Previous investigations at the Lowland Area identified two aquifers, identified as the shallow and deep aquifers, which were noted to have similar flow directions toward the river and appear to be hydraulically separated by a silt aquitard across much of the area. In 2011 and 2012, GeoEngineers installed 20 monitoring wells (in ten well pairs - "shallow" and "deep" wells BP-01S/D through BP-10S/D) along the eastern portion of the Benson Property and collected soil and groundwater samples at these locations to evaluate soil and groundwater quality in the two aquifers. Additionally, GeoEngineers collected groundwater samples from three existing wells (EV-20B and EV-22A/B). Soil and groundwater samples were analyzed for arsenic, lead, cadmium, mercury, antimony and thallium. The results indicated that soil and groundwater contain elevated metals concentrations (predominantly arsenic and lead) on and adjacent to the Benson Property. Of note, the metals concentrations in groundwater identified in the late 1990s were similar to the metals concentrations detected in 2012. The results of the soil and groundwater sampling activities performed as part of soil boring advancement and monitoring well installation on the

[1] The former arsenic trioxide processing area has sufficiently high contamination that it was purchased by Asarco soon after the Site was rediscovered, the homes vacated, and the area fenced off.

Benson Property were presented in the memorandum titled "Final Groundwater Monitoring Technical Memorandum Lowland Area – Benson Property," dated May 7, 2012.

2.0 FIELD INVESTIGATION

Field investigation activities performed as part of the Lowland Area study between January 1 and March 8, 2013 included the following:

- Groundwater sampling and analysis;
- Surface water and sediment sampling and analysis;
- Hydraulic conductivity testing; and a
- Tidal study.

The field investigation activities are summarized in the following sections.

2.1. Groundwater Sampling

Field investigation activities included collecting groundwater samples from 87 new and existing groundwater monitoring wells located in and adjacent to the Lowland Area. Forty two (42) of the monitoring wells that were sampled are "shallow" wells, installed in the shallow aquifer and 45 of the wells are "deep" wells, installed in the deep aquifer (Table 1). The groundwater monitoring wells that were sampled are shown in Figure 2. The well naming convention (i.e., well name prefixes), general investigation name and installation period are summarized in the table below.

Monitoring Well Name	Number of Wells	Investigation Name and Installation Period
"BP" wells	21	Benson Property/Lowland Area Investigations – 2011 through 2013
"EV" wells	7	Lowland Area Remedial Investigations – Mid to late 1990s
"LLMW" wells	53	Lowland Area Investigation – 2012 and 2013
"MW" wells	5	Weyerhaeuser West Investigation – Mid 1990s and 2011[1]
"PZ" wells	3	Weyerhaeuser Mill E Investigation – Mid 1990s
"UNK" well	1	Unknown
Total	**90[2]**	

Notes:

[1] Five MW wells were installed in the mid 1990s; four were abandoned in 2011 and new wells were installed.

[2] Three wells were dry and therefore 87 groundwater samples were collected.

Groundwater sample collection was completed between January 7 and February 1, 2013.

Groundwater elevations were measured and recorded prior to sampling each well using an electronic water level indicator. In addition, groundwater elevations were measured at 15 shallow aquifer and 18 deep aquifer monitoring wells within a three-hour period on January 21, 2013 to provide a "snapshot" of groundwater levels/elevations and gradients in the Lowland Area (Table 1).

Groundwater purging and sample collection was completed using low-flow/low-turbidity sampling techniques to minimize the suspension of sediment in the groundwater samples. The wells were purged and groundwater samples were obtained from the wells using dedicated polyethylene tubing and either peristaltic pumps (77 wells) or submersible well pumps (10 wells). Submersible pumps, were used when groundwater depths were greater than the peristaltic pump lift capacity (depths greater than approximately 30 feet). Groundwater was purged from the wells at a rate of up to 0.5 liters per minute.

A Horiba U-22 water quality measuring system with a flow-through cell was used to monitor water quality parameters during purging. Water quality parameters that were measured include pH, electrical conductivity, dissolved oxygen, temperature, and oxidation-reduction potential. Turbidity was measured using a LaMotte turbidimeter. Samples were collected from the wells after the measured values for the water quality parameters varied by less than 10 percent on three consecutive measurements. The field measurements were documented on field logs.

Following completion of well purging, the flow through cell was disconnected and ferrous and total iron were measured using Hach color disk field test kits and groundwater samples were collected in laboratory-prepared containers. Samples were logged on the chain-of-custody, placed in a cooler with ice, and delivered to Analytical Resources, Inc., in Tukwila, Washington for analysis. Analysis included total and dissolved metals (i.e., antimony, arsenic, cadmium, lead, mercury, and thallium) by EPA Methods 200.8 and SW7470A. The samples that were collected for dissolved metals analysis were filtered in the field using disposable 0.45-micron filters. The laboratory analytical reports for metals analyses on groundwater are provided in Appendix A. Additionally, a data quality review was performed on the analytical data resulting from laboratory analysis of water samples. The data quality assessment report is provided in Appendix B.

2.2. Surface Water and Sediment Sampling

Surface water and sediment samples were collected on February 4 and 5, 2013, at seven locations within five ponds that are in the Lowland Area. The surface water and sediment sampling locations are shown on Figure 2. Sample locations were selected based on several criteria:

- Where samples had been previously collected by others, an attempt was made to sample near the previous sampling locations.
- Where one sample was collected per pond, the sample location was selected to be on the presumed upgradient (inlet) side of the pond. Where two samples were collected, a sample near the presumed outlet was also sampled.
- Locations needed to be safe and accessible.

Water samples were collected using disposable polyethylene tubing and a peristaltic pump. The tubing inlet was placed approximately 6 to 8 inches beneath the water surface. Water was purged at approximately 0.5 liters per minute.

A Horiba U-22 water quality measuring system with a flow-through cell was used to monitor water quality parameters during purging that included pH, electrical conductivity, dissolved oxygen, temperature, and oxidation-reduction potential. The water flowing through the cell was discharged

on land adjacent to the pond so as not to disturb the water or cause elevated turbidity. Turbidity was measured using a Hach turbidimeter. Samples were collected after the measured values for the water quality parameters varied by less than 10 percent on three consecutive measurements. The field measurements were documented on field logs.

Following completion of purging, the flow-through cell was disconnected and ferrous and total iron were measured using Hach color disk field test kits and surface water samples were collected in laboratory-prepared containers. Samples were logged on the chain-of-custody, placed in a cooler with ice, and delivered to Analytical Resources, Inc., in Tukwila, Washington for analysis. Analyses included total and dissolved metals (i.e., antimony, arsenic, cadmium, lead, mercury, and thallium) by EPA Method 200.8 and SW7470A. Samples that were collected for dissolved metals analysis were filtered in the field using disposable 0.45-micron filters. The laboratory analytical reports for metals analyses on surface water are provided in Appendix A. Additionally, a data quality review was performed on the analytical data resulting from laboratory analysis of water samples. The data quality assessment report is provided in Appendix B.

Sediment sampling was performed at each location following collection of surface water samples. Sediment samples were collected from the sediment directly beneath the location from where surface water samples were collected. Samples were collected of the top 10 cm (i.e., from the surface to a depth of 10 cm) of sediment using a decontaminated hand auger. Sediment observations were recorded on field forms.

The sediment was placed in a stainless steel bowl and thoroughly mixed before distributing the sediment to laboratory-prepared containers. Samples were logged on the chain-of-custody, placed in a cooler with ice, and delivered to Analytical Resources, Inc., in Tukwila, Washington for analysis of metals (i.e., antimony, arsenic, cadmium, lead, mercury, and thallium) by EPA Methods SW6010, 200.8, and SW7470A. The laboratory analytical reports for metals analyses on sediment are provided in Appendix C. Additionally, a data quality review was performed on the analytical data resulting from laboratory analysis of sediment samples. The data quality assessment report is provided in Appendix D.

2.3. Hydraulic Conductivity Testing

Hydraulic conductivity testing included performing slug tests and drawdown testing on selected groundwater monitoring wells in the Lowland Area. The following sections discuss the field activities and data analysis for slug and drawdown tests.

2.3.1. Slug Testing

Slug tests were performed on multiple well pairs at the Site between January 29 and February 1, 2013 to evaluate the hydraulic conductivity (*K*) within the shallow and deep aquifers (Table 1). Slug tests were performed on well pairs LLMW-03S/D, LLMW-11S/D, LLMW-12S/D, LLMW-16S/D, LLMW-22S/D, LLMW-27D, EV22A/B, BP05S/D and BP05D2, and BP08S/D. These wells were selected for slug testing because they are generally located downgradient of the former smelter location between the former smelter and the Snohomish River and are generally evenly distributed within the Lowland Area.

Prior to conducting the slug test in each well, a decontaminated electronic water-level sensor consisting of a pressure transducer and automated datalogger (INW Model PT2X vented transducer with a 15-psi range) was installed in the well and depth to groundwater was measured manually using a decontaminated electronic water level indicator. The depth to groundwater was measured to document the static groundwater level prior to initiating the slug tests. Then a falling head slug test and rising head slug test were performed.

The falling head slug test was performed by rapidly lowering a decontaminated slug constructed of a sealed and weighted 5-foot-long section of polyvinyl chloride (PVC) pipe of known volume into the well causing the water level to rise rapidly above the initial, static water level. The groundwater level was then monitored until it returned (fell) to the approximate initial water level. A rising head slug test was then conducted by rapidly removing the slug from the well causing the water level to fall rapidly below the initial level. The groundwater level was monitored until it returned (rose) to the approximate initial water level. The hydraulic response was measured by pressure transducer which was programmed to record the hydraulic pressure at 1-second intervals as well as with manual electronic water level indicator measurements before, during, and after each slug test.

Data from the falling head and/or rising head tests were used to estimate hydraulic conductivity at each well using the Bouwer-Rice (1976) method. The falling head data was not analyzed in wells LLMW-11S, LLMW-12S and LLMW-22S because the water level in these wells was below the top of the well screen at the time of the test. The Bouwer-Rice method for calculating the hydraulic conductivity requires that the well screen be entirely submerged and therefore, the results of the falling head tests could not be used and the results from the rising head test were used to evaluate the hydraulic conductivity in these wells. Note that while it is preferred to have falling and rising head data, the rising head data at LLMW-11S, LLMW-12S, LLMW-16S and LLMW-22S was sufficient to estimate hydraulic conductivity. Graphs showing the slug test data used for the hydraulic conductivity calculations are shown in Appendix E.

2.3.2. Drawdown Testing

Short-duration drawdown testing was performed on wells LLMW-11S/D, LLMW-16D, and BP05S/D/D2 on January 29 and February 1, 2013 to provide additional hydraulic conductivity data for the shallow and deep aquifers in the Lowland Area (Table 1). Wells were pumped for 30 minutes using decontaminated submersible pumps to allow a cone of depression in the groundwater aquifer to propagate beyond the radius of influence achieved during slug tests to observe the aquifer response over a larger area. The aquifer response to the removal of water by the pumping, as well as the recovery of the groundwater in the aquifer following the end of pumping, provided additional hydraulic characterization of the soil around each tested well.

Prior to conducting the drawdown test in each well, a decontaminated pressure transducer was installed in the well and depth to groundwater was measured manually using a decontaminated electronic water level indicator to document the initial static groundwater level. Then the groundwater was pumped from the well using a submersible pump and discharged into a 55-gallon drum. The water generated by the drawdown tests was subsequently transferred into a 6,000-gallon polyethylene holding tank located at the Site.

The groundwater level was monitored throughout the pumping and recovery phases of each drawdown test until the water level returned to the static pre-test level. A pressure transducer was installed in the Snohomish River near monitoring wells LLMW-08S/D to monitor and record the river stage and tidal elevations during each test so that the effects of changes in the tidal elevation could be identified and a tidal correction applied to water levels for the analysis of the drawdown and recovery phases.

Drawdown data was initially analyzed using the Cooper-Jacob (1946) analytical method for data collected during the pumping phase and using the Theis Recovery Method (1935) for the data collected during the recovery phase. Graphs showing the data used for the calculations are provided in Appendix E. Data collected from wells that were tidally influenced required correction to compensate for the groundwater level changes due to tidal influences described below over the duration of the test.

2.4. Tidal Study

A tidal study was conducted on a subset of the Lowland Area monitoring wells between February 5 and February 13, 2013 (Table 1). The tidal study was completed to evaluate the influence of changes in the level of surface water due to tidal variations in the Snohomish River on shallow and deep groundwater levels. Monitoring well pairs at varying distances from the Snohomish River shoreline were selected for the tidal study to evaluate the lateral and vertical influences of tidal action on groundwater. The tidal study included monitoring of groundwater levels in 12 monitoring wells (BP-05S/D, BP-08S/D, LLMW-06S/D, LLMW-11S/D, LLMW-12S/D and LLMW-13S/D) to record groundwater level response to tidal fluctuations using pressure transducers that were programmed to record the hydraulic pressure in the monitoring wells at 1-minute intervals for the duration of the study. Additionally, a pressure transducer was installed in the Snohomish River near monitoring wells LLMW-08S/D to directly monitor and record the surface water level in the Snohomish River for comparison to water levels recorded in monitoring wells in the Lowland Area (Figure 2). The water-level sensors were removed from the monitoring wells after completion of the data collection and the data was later downloaded for analysis.

The 72-hour period selected for analysis was between February 5, at 15:00 and February 8 at 14:59. This 72-hour period was selected because it captured the largest tidal range (i.e., an estimated 12-foot change in elevation) of the surface water in the Snohomish River adjacent to the Lowland Area resulting from tidal fluctuations during the period of February 5 to February 13. The tidal range of 12 feet is considered an estimate because the transducer in the river was dry during the lowest stages of the tide; although a 9-foot change was observed, extrapolation of the observed tidal curves yielded an estimate of 12 feet of total tidal fluctuation during the 72-hour tidal period.

The data generated as part of the tidal study were analyzed using the Serfes (1987) method to identify the mean groundwater elevations and flow direction for the shallow and deep aquifers and the Ferris (1951) method to identify the hydraulic diffusivity of the deep aquifer. Additional information, and the results from the tidal study for each well presented on graphs, are provided in Appendix F.

2.5. Decontamination

Non-disposable sampling equipment was decontaminated using the procedures specified in the QAPP.

2.6. Disposal of Investigation-Derived Materials

Groundwater was removed from the monitoring wells during monitoring well purging, sampling, and drawdown testing. Groundwater and decontamination water generated during all investigation activities was placed in one 6,000 gallon upright aboveground polyethylene storage tank pending analysis for disposal. The water storage tank was located within a fenced staging area on property owned by the Port of Everett and made available for the investigation. After analysis and waste profiling, the water was disposed of at Emerald Services Airport Way Facility in Seattle, Washington on May 1, 2013. Incidental waste (i.e., gloves, disposable polyethylene tubing, paper towels, etc.) were disposed of off site as solid waste.

2.7. Deviations from the SAP

Field activities were performed in general accordance with the SAP, QAPP and HASP created for this project, with the exceptions listed below. Deviations included the following:

- Hydraulic testing was completed on monitoring wells LLMW-16S/D rather than wells LLMW-13S/D. Wells LLMW-16S/D are located approximately 600 feet south-southeast of wells LLMW-13S/D and are generally downgradient of the former smelter location. It is our opinion that this deviation does not significantly affect the analysis of aquifer conditions and provides representative hydraulic data for shallow and deep groundwater in the south-central portion of the Site.
- Hydraulic testing was not conducted on well LLMW-27S because it was dry at the time of testing.
- Total and ferrous iron were omitted from the field form for wells EV-6A/6B.
- The SAP indicated that drawdown test data would be analyzed by Bower & Rice. Due to high K response, additional methods were used to analyze the data.

3.0 RESULTS

3.1. Groundwater Elevations and Gradients

Groundwater elevations and gradients in the Lowland Area were evaluated using the results from snapshot groundwater level measurements and the tidal study.

Snapshot groundwater level measurements were collected from the top of the well casing at 15 shallow aquifer and 18 deep aquifer monitoring wells within a three-hour period on January 21, 2013 (Table 1). The depth to water measurements are provided in Table 3. Survey information identifying the elevation of the top of the casing at each of the wells was used to estimate the groundwater elevation. The groundwater elevations were used to provide a snapshot of the groundwater gradients in the shallow and deep aquifers as shown in Figures 3 and 4, respectively.

The groundwater gradient observed in the shallow aquifer in the Lowland Area, based on the snapshot groundwater level measurements, was generally to the east-northeast (Figure 3). It should be noted that the water level measurements indicated a groundwater high in the Lowland Area, in an area in which recent filling has occurred. Snapshot groundwater levels/elevations measured at monitoring wells LLMW-13S and LLMW-16S were higher than levels/elevations observed in adjacent wells (Figure 3).

The groundwater gradient observed in the deep aquifer in the Lowland Area, based on the snapshot groundwater level measurements, was also generally to the east-northeast (Figure 4). It should be noted that groundwater levels/elevations in the deep aquifer were observed to be directly affected by tidal fluctuations. Additional information concerning the response of groundwater in the deep aquifer as a result of tidal fluctuations is presented in Section 3.2.

As part of the tidal study, groundwater levels were recorded at one-minute intervals by pressure transducers installed in six shallow and six deep aquifer monitoring wells between February 5 and February 8, 2013 (Table 1). The groundwater level data from the tidal study was used to estimate the mean groundwater elevation for each well completed in the shallow and deep aquifers. Graphs showing the results of the tidal study for groundwater in the wells that were monitored are presented in Appendix F. The groundwater elevations from the tidal study were used to identify the mean groundwater gradients in the shallow and deep aquifers as shown in Figures 5 and 6, respectively.

The mean groundwater gradients in the shallow and deep aquifers, based on the tidal study, were generally to the east-northeast (Figures 5 and 6). Similar to the results of the snapshot groundwater level measurements, the water levels for the shallow aquifer measured as part of the tidal study indicated a groundwater high in the Lowland Area in an area of recent filling. The groundwater levels/elevations measured at monitoring well LLMW-13S was higher than levels/elevations observed in adjacent wells (Figure 5).

3.2. Water Quality Parameters

Water quality parameters including pH, temperature, conductivity, dissolved oxygen, oxidation-reduction potential, total and ferrous iron, and turbidity were measured at all monitoring wells and surface water locations prior to sampling. Water quality parameter values measured during sample collection are presented in Table 2. The following summarizes the results for the water quality parameter measurements in groundwater and surface water samples:

- pH ranged from approximately 5 to 7, except at monitoring wells BP-04S, BP-05S, EV-6B, LLMW-24D and "UNK," where the pH in ranged from approximately 7 to 8.
- Conductivity in the majority of samples ranged from 0.000147 to 0.2 Siemens per meter (S/m) with relatively higher conductivity in the range of 0.2 to 0.72 S/m measured in groundwater from 10 wells located throughout the Lowland Area.
- Turbidity ranged from 0 to 95 Nephelometric Turbidity Units (NTU) with approximately 80 percent of the samples having turbidities less than 20 NTU.
- Dissolved oxygen concentrations ranged from 0 to 2 mg/L in the majority of groundwater monitoring wells. Dissolved oxygen was relatively high (approximately 3 to 9 mg/L) in

groundwater from LLMW-25D, LLMW-27D, LLMW-29D, EV-19B and EV-20B. Dissolved oxygen concentrations ranged from approximately 3 to 14 mg/L in the surface water samples.

- Temperature ranged from approximately 6 to 16 degrees Celsius.
- Oxidation-reduction potential measurements indicate groundwater is generally reducing or slightly oxidizing in the majority of wells (i.e., approximately -350 to 50 mV). Oxidation-reduction potential measurements of the surface water ranged from 46 to 164 mV.
- Total iron was measured at concentrations ranging from 0 to 7 mg/L and ferrous (reduced) iron was measured at concentrations ranging from 0 to 4 mg/L in the groundwater monitoring well samples. Total iron was measured at concentrations ranging between 0 and 1 mg/L in surface water samples; no ferrous iron was present in surface water samples.

3.3. Chemical Analytical Results for Groundwater and Surface Water

Ninety-one groundwater samples and seven surface water samples were submitted for total and dissolved metals analyses (i.e., antimony, arsenic, cadmium, lead, mercury and thallium). The results for groundwater and surface water sample analyses are presented in Table 4. Table 5 presents the results for total and dissolved metals analyses for deep aquifer groundwater. The results for dissolved arsenic concentrations in shallow groundwater and surface water are shown on Figure 7 and the results for dissolved arsenic concentrations in deep groundwater are shown on Figure 8. The laboratory analytical reports for metals analyses on water are provided in Appendix A.

A data quality review was performed on the analytical data resulting from laboratory analysis of groundwater and surface water samples. The data quality review was performed in general conformance with an EPA "Stage-2B" validation. The data were deemed acceptable for use as qualified. The data quality assessment report is provided in Appendix B.

The following summarizes the results for the metals analyses on groundwater and surface water samples:

- Antimony was detected in approximately one-half of the groundwater and surface water samples collected from the Lowland Area. Where detected, antimony concentrations ranged from near the detection limit of 0.2 micrograms per liter (µg/L) to 15.6 µg/L. The highest antimony concentrations were detected in groundwater from monitoring well EV-6A. Dissolved antimony results were typically equal to or slightly less than the total antimony results indicating that antimony is largely present in the dissolved phase.
- Arsenic was detected in all wells and surface water samples at concentrations ranging from 0.3 µg/L to 16,400 µg/L. The highest arsenic concentrations were detected in groundwater from BP-05D. Dissolved arsenic concentrations were typically equal to or slightly less than the total concentrations indicating that arsenic is largely present in the dissolved phase.
- The highest arsenic concentrations in shallow groundwater and surface water were generally detected on the Benson Property (Figure 7). Arsenic concentrations in shallow groundwater were also higher in monitoring wells LLMW-08S, LLMW09S, LLMW-16S, PZ-1B and UNK in relationship to adjacent monitoring locations.
- An area of higher arsenic concentrations was detected in deep groundwater present in monitoring wells LLMW-27D, EV-19B, EV-20B, BP-04D through BP-07D, LLMW-12D, and

LLMW-13D (Figure 8). Arsenic concentrations in deep groundwater were also higher in monitoring wells LLMW-01D, LLMW-17D, and BP-09D relative to adjacent monitoring locations.

- Arsenic concentrations are typically one to two orders of magnitude different between shallow and deep groundwater at the majority of well pair locations, suggesting that the silt aquitard separates the shallow and deep aquifers at these locations.
- Cadmium was detected in approximately one-half of the groundwater samples and in only one surface water sample. Where detected, total cadmium was frequently detected but dissolved cadmium was not detected indicating that the cadmium may be sorbed to solids that are filtered out by the 0.45 micrometer field filter. Cadmium concentrations ranged from non-detect to 27.4 µg/L. The highest cadmium concentrations were detected in groundwater from EV-6A.
- Total lead was detected in almost all wells and surface water samples with concentrations ranging from 0.1 µg/L to 291 µg/L. The highest lead concentrations were detected in groundwater from EV-6A. Dissolved lead was not detected in the majority of wells indicating lead may be sorbed to solids that are filtered out by the 0.45 micrometer field filter. While median lead values in the shallow and deep aquifers were approximately equal (approximately 0.6 µg/L), lead concentrations in selected wells in the shallow aquifer were relatively elevated compared to the deep aquifer.
- Mercury was detected relatively infrequently in groundwater (i.e., 11 samples) and surface water samples (three samples). Where detected, mercury concentrations ranged from near the reporting limit of 0.02 µg/L to approximately 0.06 µg/L. The highest mercury concentrations were detected in groundwater from the monitoring well designated UNK (i.e., unknown well designation).
- Thallium was only detected in one well sample, EV-6A at total and dissolved thallium concentrations of 0.3 µg/L.

3.4. Chemical Analytical Results For Sediment

Seven sediment samples were submitted for metals analysis (i.e., antimony, arsenic, cadmium, lead, mercury and thallium). The results for sediment sample analyses are presented in Table 6.

Neither antimony nor thallium were detected in the sediment samples. Arsenic, cadmium, and lead were detected in all of the sediment samples and mercury was detected in five sediment samples.

Arsenic was detected at concentrations ranging from 11.5 mg/kg to 219 mg/kg. The highest arsenic concentrations were detected in sediment samples collected from the pond located on the Benson property (i.e., LLSD-04 and LLSD-05). Cadmium was detected at concentrations ranging from 0.5 to 2.7 mg/kg and lead was detected at concentrations ranging from 10 to 532 mg/kg. The highest concentrations of cadmium, lead, and mercury were also detected in sediment collected from the pond located on the Benson property LLSD-05.

3.5 Hydraulic Conditions in the Shallow and Deep Aquifers

The hydraulic conditions in the shallow and deep aquifers were evaluated using slug tests performed on 18 well pairs, short-duration drawdown testing performed on three well pairs, and a tidal study utilizing data collected from six well pairs located in the Lowland Area (Table 1). The hydraulic conditions identified in the Lowland Area based on the slug and drawdown tests and tidal study include the following:

- Hydraulic conductivity values (*K*) estimated from slug and drawdown test data for the shallow aquifer ranged from approximately 2 ft/day to 250 ft/day and averaged 61 ft/day; the hydraulic conductivity values for the deep aquifer ranged from approximately 2 ft/day to 173 ft/day and averaged 49 ft/day. The hydraulic conductivity values for the monitoring wells tested in the shallow and deep aquifers are presented in Table 7. The hydraulic conductivity values that were observed for the shallow and deep aquifers based on the slug and drawdown tests are consistent with conductivity values for unconsolidated sand deposits.
- Hydraulic conductivity values were also estimated from the tidal study data for the deep aquifer using aquifer diffusivity values estimated from both time lag and tidal stage ratio. Based on the observed tidal responses in the deep aquifer, hydraulic conductivity values were between 21 and 26 ft/day, which are slightly lower than the average values estimated from slug and drawdown test data for the deep aquifer.
- Estimated horizontal groundwater velocities were calculated at selected wells completed in the shallow and deep aquifers using hydraulic conductivity values derived from slug and drawdown testing data, effective porosity values from available literature, and the average groundwater gradient at each well. The effective porosity values used are from available literature and are based on soil types observed when the wells were installed. The average groundwater gradient that was used for each well was calculated using the groundwater elevations in adjacent upgradient and/or downgradient test wells. The estimated groundwater velocities for the four wells that were evaluated (i.e., LLMW-11S/D and LLMW-12S/D) ranged from 0.04 to 6.30 ft/day. The estimated horizontal groundwater velocities are presented in Table 8. The horizontal groundwater velocities are estimated as they are based on effective porosity values for a soil type.
- The results of the tidal study indicate that wells completed in the deep aquifer show a direct hydraulic response to tidal fluctuations in the Snohomish River. The graphs presenting the data from the tidal study for wells completed in the deep aquifer that show the hydraulic response of groundwater from tidal fluctuation in the Snohomish River are provided in Appendix F.
- The results of the tidal study indicate that there is no appreciable effect on wells completed in the shallow aquifer in response to tidal fluctuations in the Snohomish River during the time the study was performed (see graphs in Appendix F). Therefore, groundwater in the shallow aquifer, based on the tidal study, appeared to be hydraulically distinct from surface water in the Snohomish River as well as groundwater in the deep aquifer during the time the study was performed.

- A tidal effect was observed in groundwater within the deep aquifer at a distance of approximately 1,700 feet from the shoreline of the Snohomish River in monitoring well BP-08D indicating that the deep aquifer behaves as a confined system.
- A reversal of the deep groundwater gradient direction (i.e., when deep groundwater briefly reversed flow direction inland away from the Snohomish River) was observed at the high tides during the tidal study. The tidally-influenced reversal of the groundwater gradient was observed to a distance of approximately 1,000 feet from the shoreline of the Snohomish River at monitoring well LLMW-12D during the highest tide of the study.
- As previously discussed in Section 3.1, the results of the tidal study indicate that the mean groundwater flow direction for groundwater in the shallow and deep aquifers is to the east-northeast toward the Snohomish River (Figures 5 and 6).

Based on the observed hydraulic responses to tidal fluctuations and the results of hydraulic testing in both the shallow and deep aquifers, the two aquifers appear to be hydraulically distinct, with the deep aquifer in hydraulic continuity with surface water in the Snohomish River.

4.0 LIMITATIONS

We have prepared this report for the exclusive use of Washington State Department of Ecology and their authorized agents.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the field of environmental investigation in this area at the time this report was prepared. No warranty or other conditions express or implied should be understood.

Please refer to Appendix G titled "Report Limitations and Guidelines for Use" for additional information pertaining to use of this report.

5.0 REFERENCES

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Table 1

Summary of Lowland Groundwater Investigation Activities

Everett Smelter - Lowland Area

Everett, Washington

Location Designation	Groundwater Aquifer	Groundwater Sampling	Depth to Groundwater "Snapshot" [1]	Hydraulic Conductivity Testing		Tidal Study
				Slug Testing	Drawdown Testing	
Monitoring Wells						
BP-01S	Shallow	X	--	--	--	--
BP-01D	Deep	X	--	--	--	--
BP-02S	Shallow	X	--	--	--	--
BP-02D	Deep	X	--	--	--	--
BP-03S	Shallow	X	--	--	--	--
BP-03D	Deep	X	--	--	--	--
BP-04S	Shallow	X	--	--	--	--
BP-04D	Deep	X	--	--	--	--
BP-05S	Shallow	X	X	X		X
BP-05D	Deep	X	--	X	X	X
BP-05D2	Deep	X	--	X	X	--
BP-06S	Shallow	X	--	--	--	--
BP-06D	Deep	X	--	--	--	--
BP-07S	Shallow	X	--	--	--	--
BP-07D	Deep	X	--	--	--	--
BP-08S	Shallow	X	X	X	--	X
BP-08D	Deep	X	--	X	--	X
BP-09S	Shallow	X	--	--	--	--
BP-09D	Deep	X	--	--	--	--
BP-10S	Shallow	X	--	--	--	--
BP-10D	Deep	X	--	--	--	--
EV-6A	Shallow	X	--	--	--	--
EV-6B	Deep	X	--	--	--	--
EV-13 [2]	Shallow	--	--	--	--	--
EV-19B	Deep	X	--	--	--	--
EV-20B	Deep	X	--	--	--	--
EV-22A	Deep	X	X	X	--	--
EV-22B	Deep	X	X	X	--	--
LLMW-01D	Deep	X	X	--	--	--
LLMW-02D	Deep	X	X	--	--	--
LLMW-03S	Shallow	X	X	X	--	--
LLMW-03D	Deep	X	X	X	--	--
LLMW-04S	Shallow	X	X	--	--	--
LLMW-04D	Deep	X	X	--	--	--
LLMW-05S	Shallow	X		--	--	--
LLMW-05D	Deep	X	X	--	--	--
LLMW-06S	Shallow	X	X	--	--	X
LLMW-06D	Deep	X	X	--	--	X
LLMW-07S	Shallow	X	--	--	--	--
LLMW-07D	Deep	X	--	--	--	--
LLMW-08S	Shallow	X	X	--	--	--
LLMW-08D	Deep	X	X	--	--	--
LLMW-09S	Shallow	X	--	--	--	--
LLMW-09D	Deep	X	--	--	--	--
LLMW-10S	Shallow	X	X	--	--	--
LLMW-10D	Deep	X	X	--	--	--
LLMW-11S	Shallow	X	--	X	X	X
LLMW-11D	Deep	X	--	X	X	X
LLMW-12S	Shallow	X	--	X	--	X
LLMW-12D	Deep	X	--	X	--	X
LLMW-13S	Shallow	X	X	--	--	X
LLMW-13D	Deep	X	X	--	--	X
LLMW-14S	Shallow	X	--	--	--	--
LLMW14D	Deep	X	--	--	--	--
LLMW-15S	Shallow	X	X	--	--	--
LLMW-15D	Deep	X	X	--	--	--
LLMW-16S	Shallow	X	X	X	--	--
LLMW-16D	Deep	X	X	X	X	--
LLMW-17S	Shallow	X	X	--	--	--
LLMW-17D	Deep	X	X	--	--	--
LLMW-18S	Shallow	X	--	--	--	--
LLMW-18D	Deep	X	--	--	--	--
LLMW-19D	Deep	X	--	--	--	--
LLMW-20D	Deep	X	--	--	--	--
LLMW-21S	Shallow	X	X	--	--	--
LLMW-21D	Deep	X	X	--	--	--
LLMW-22S	Shallow	X	X	X	--	--
LLMW-22D	Deep	X	X	X	--	--
LLMW-23S	Shallow	X	--	--	--	--
LLMW-23D	Deep	X	--	--	--	--
LLMW-24D	Deep	X	--	--	--	--
LLMW-25D	Deep	X	--	--	--	--
LLMW-27S [2]	Shallow	--	--	--	--	--
LLMW-27D	Deep	X	X	X	--	--

Location Designation	Groundwater Aquifer	Groundwater Sampling	Depth to Groundwater "Snapshot" [1]	Hydraulic Conductivity Testing		Tidal Study
				Slug Testing	Drawdown Testing	
Monitoring Wells						
LLMW-29S[2]	Shallow	--	--	--	--	--
LLMW-29D	Deep	X	X	--	--	--
LLMW-31D	Deep	X	--	--	--	--
LLMW-33S	Shallow	X	--	--	--	--
LLMW-33D	Deep	X	--	--	--	--
LLMW-34S	Shallow	X	--	--	--	--
LLMW-34D	Deep	X	--	--	--	--
MW1202R	Shallow	X	--	--	--	--
MW1203R	Shallow	X	X	--	--	--
MW1301R	Shallow	X	--	--	--	--
MW1501R	Shallow	X	--	--	--	--
MW1701	Shallow	X	--	--	--	--
PZ-1B	Shallow	X	--	--	--	--
PZ-2B	Shallow	X	--	--	--	--
PZ-3B	Shallow	X	--	--	--	--
UNK	Shallow	X	--	--	--	--

Notes:

[1] Depth-to-water was measured within a three-hour window on January 21, 2013.

[2] The monitoring well was dry and therefore could not be sampled.

-- The investigation activity was not performed at the identified location.

Table 2

Water Quality Parameters for Groundwater and Surface Water - January 2013

Everett Smelter - Lowland Area

Everett, Washington

Location Designation	pH	Temperature (C)	Conductivity (mS/m)	Dissolved Oxygen (mg/L)	Oxidization Reduction Potential (mV)	Total Iron (mg/L)	Ferrous Iron (mg/L)	Turbidity (NTU)	Depth to Water[1] (feet)
Monitoring Wells									
BP-01S	5.98	7.46	102	0.49	-111	5	1.2	11	4.2
BP-01D	6.1	10.17	56.5	0.8	-70	0	0	16.8	6.79
BP-02S	6.7	8.32	52.3	0.39	-151	5.5	0.5	25	4.3
BP-02D	6.14	10.62	45.6	0.52	-14	0	0	19	11.68
BP-03S	6.76	7.95	40.4	0.61	-143	5.5	2	3.4	3.3
BP-03D	6.32	9.8	49.8	0.87	-104	0.5	0	6.5	10.44
BP-04S	7.1	5.99	32.1	1.17	-56	0	0	15	3.64
BP-04D	6.3	16.65	59.9	0.82	-59	0.5	0.1	49	10.7
BP-05D	6	11.35	39.5	1.98	53	0	0	18	10.18
BP-05S	7.5	7.99	31	0.53	-171	0.5	0	6	3.61
BP-05D2	6.92	10.5	30.1	0.94	-46	0	0	13	6.8
BP-06S	6.41	7.4	51	0.8	-140	7	1	5.1	3.53
BP-06D	6.23	10.7	47	0.6	-54	1	0.5	6.3	10.93
BP-07S	6.76	9.2	134	0.7	-258	3	2	8.7	3.22
BP-07D	6.43	11	49	0.7	-156	0.5	0.5	5.5	10.55
BP-08S	6.41	6.8	166	0.7	-147	7	2	6.3	3.2
BP-08D	6.46	10	171	0.6	-68	1.5	0.5	8.6	10.97
BP-09S	6.3	8.43	80.1	0.64	-135	5.5	1	69	3.13
BP-09D	6.18	9.84	87.7	0.66	-101	6.25	1	19	10.84
BP-10S	6.26	6.6	72	0.5	-133	7	2	7.6	2.61
BP-10D	6.23	10.3	122	0.4	-95	7	4	12.9	9.19
EV-6A	5.99	10	34.4	1.99	170	0	0	1.2	46.29
EV-6B	7.76	10.92	61	0.48	-345	NR	NR	33	50.95
EV-13[2]	--	--	--	--	--	--	--	--	--
EV-19B	6.12	12.5	53	6.5	63	0.5	0	5	47.3
EV-20B	6.22	12.2	29	9.6	52	4	0	5.3	50.01
EV-22A	6.3	9.85	0.147	0.54	0.104	5	2.5	4.4	13.07
EV-22B	6.57	9.16	411	0.63	-119	4.7	1.5	10.5	19.61
LLMW-01D	5.72	12.13	59.8	0.87	-101	4.5	2.4	95	6.72
LLMW-02D	5.5	12.5	118	0.6	-94	5.1	1.75	14.8	7.16
LLMW-03S	5.1	9.61	26500	0.71	-40	5.1	1.5	24	5.34
LLMW-03D	5.34	11.96	55.8	0.72	-57	0.6	0.6	15	7.96
LLMW-04S	6.37	9.65	162	0.59	-136	5.6	2	25	7.42
LLMW-04D	6.82	11	229	0.58	-174	0.5	0	19	12.65
LLMW-05S	5.1	10.99	99	1.21	-34	6.8	1.3	3.1	4.78
LLMW-05D	5.59	11.92	129	0.49	-72	5.8	1.7	9.1	6.03
LLMW-06S	6.07	7.8	70	0.6	-76	7	2	7.2	3.23
LLMW-06D	6.71	11.5	640	1.5	-77	1.5	0.5	12.3	4.68
LLMW-07S	6.06	8.5	187	1.73	-3	0.5	0.2	0.95	8.75
LLMW-07D	5.94	10.1	133	1.35	-88	5	2.6	45	4.05
LLMW-08S	6.3	10.11	370	0.8	-111	5.8	1.4	35	6.02
LLMW-08D	6.56	11.6	520	0.82	-147	6	2	6	7.7
LLMW-09S	6.18	7.7	36	0.3	-64	7	1	8.3	3.48
LLMW-09D	6.5	14.18	55	0.5	-52	1.5	1	10.8	5.14
LLMW-10S	6.44	8.2	69	0.8	-54	5	1	4.3	7.25
LLMW-10D	6.58	11.4	41	0.6	-101	6	1	8.9	8.94
LLMW-11S	5.67	9.3	58	1.1	59	0.5	0.5	8.7	11.41
LLMW-11D	5.97	10.6	65	7	-27	4.5	1	8.3	11.15
LLMW-12S	6.29	8.5	35	0.6	-13	6.5	3	10.3	6.6
LLMW-12D	6.51	11.6	44	1	-89	1.5	0.5	5.6	9.82
LLMW-13S	6.2	10.5	120	0.5	-134	7	4	7.2	11.86
LLMW-13D	6.43	11.1	80	0.4	-94	3	2.5	25.6	13.63
LLMW-14S	6.44	6.3	4	0.8	42	0.5	0	7.7	5.32
LLMW14D	6.57	11.3	53	1.3	-262	0.5	0.5	5.4	7.71
LLMW-15S	6.54	9.4	52	0.8	-243	7	1.5	1.4	6.46
LLMW-15D	6.49	11.2	85	1.1	-333	0	0	6.1	8.32
LLMW-16S	6.57	10.14	109	0.65	-149	4.5	2.4	16	10.1
LLMW-16D	6.48	11.63	127	0.53	-84	1.3	0	79	13.73
LLMW-17S	6.65	8.8	41	1.7	-32	0	0	5.4	11.36
LLMW-17D	6.72	10.3	40	0.7	-187	2.5	1.5	33.2	11.1
LLMW-18S	6.26	8.3	43	1.1	-89	4	1.5	8.2	6.78
LLMW-18D	6.48	10.7	123	0.6	-347	0.5	0	23.4	8.06
LLMW-19D	5.85	11.35	61.8	0.76	-107	1.4	1	30	7.03
LLMW-20D	5.5	7.03	381	0.84	1.09	0.2	0.2	0	8.23
LLMW-21S	6.37	9.6	34	1	-5	0.5	0.5	8.3	6.62
LLMW-21D	6.57	11.8	79	0.8	-320	0.2	0.2	12.2	8.12
LLMW-22S	6.17	9	720	1.4	-64	4	2.6	4.6	4.26
LLMW-22D	6.31	12	138	1	-48	0.6	0.6	4.7	5.89
LLMW-23S	5.26	13.57	78800	0.95	-92	5.2	1.5	11	10.21
LLMW-23D	5.71	12.81	0.204	0.47	-110	1.8	1.5	33	18.16
LLMW-24D	6.15	10.49	31.4	0.69	65	0.05	0	71	44.28
LLMW-25D	5.77	11	32.5	3.49	88	0	0	43	51.72
LLMW-27S[2]	--	--	--	--	--	--	--	--	--
LLMW-27D	6.36	12.3	41	3.4	61	0.5	0	9.5	47.51

Location Designation	pH	Temperature (C)	Conductivity (mS/m)	Dissolved Oxygen (mg/L)	Oxidization Reduction Potential (mV)	Total Iron (mg/L)	Ferrous Iron (mg/L)	Turbidity (NTU)	Depth to Water[1] (feet)
Monitoring Wells									
LLMW-29S[2]	--	--	--	--	--	--	--	--	--
LLMW-29D	6.38	9.55	32.9	2.85	29	0	0	59	41.36
LLMW-31D	6.59	12.8	50	1.9	39	0.5	0	2	44
LLMW-33S	5.58	9.81	30.7	7	171	0.7	0	OR	8.38
LLMW-33D	5.94	10.9	29.1	2.04	151	1	0	3.2	26.32
LLMW-34S	5.43	11.03	34.3	1.1	155	0	0	8.4	6.72
LLMW-34D	8.04	10.23	33	0.7	-125	0	0	11	31.25
MW1202R	6.3	9.53	217	0.91	-48	0.7	0.6	2.5	5.91
MW1203R	5.79	9.96	122	0.78	-11	2	0.6	2.4	8.62
MW1301R	6.06	8.56	79	0.41	-14	0.5	0	2	5.48
MW1501R	6.24	7.29	344	1.79	10	1.5	0.5	5	3.24
MW1701	6.41	9.48	68.7	0.4	-124	7	1.5	7	2.22
PZ-1B	6.09	8.2	76	0.5	-95	7	2.5	7.3	2.13
PZ-2B	6.28	5.9	33	0.5	44	0.5	0	5.2	2.63
PZ-3B	6.26	6.4	273	0.6	96	0	0	3.2	3.63
UNK	8.05	9.6	74	1.6	-250	2.5	0	10.3	8.86
Surface Water									
LLSW-01	6.55	6.98	19.9	11.01	164	0	0	5.65	NA
LLSW-02	6.12	8.7	35.5	6.75	142	1	0	4.17	NA
LLSW-03	5.59	7.44	10.4	8.13	162	0	0	2.49	NA
LLSW-04	6.32	8.02	33.4	3.6	131	1	0	30.1	NA
LLSW-05	6.62	8.96	28.1	9.48	126	0.5	0	7.27	NA
LLSW-06	6.1	7.18	38.9	3.50	46	1	0	12.4	NA
LLSW-07	6.29	7.45	26.4	14.24	128	0	0	27.1	NA

Notes:

[1] Depth to water measured in feet below top of casing at time of sampling.

[2] The monitoring well was dry and therefore could not be sampled.

OR = Over-reading

NR = Not recorded

S/m - Siemens per meter

NTU = Nephelometric turbidity units

mg/L = milligrams per liter

mV = Millivolts

-- The investigation activity was not performed at the identified location.

Table 3

Groundwater Level Measurements on January 21, 2013

Everett Smelter - Lowland Area

Everett, Washington

Shallow Aquifer Monitoring Wells						
Location Designation	Time	Northing (Y) [1]	Easting (X) [1]	TOC Elevation [2]	DTW TOC (ft)	GW Elevation [2] (ft)
EV-22A	13:26	372106.2793	1308333.578	28.59	13.43	15.16
BP-05S	13:53	371481.4942	1308791.423	18.56	3.75	14.81
BP-08S	13:46	371143.3462	1308839.017	18.73	3.31	15.42
LLMW-03S	13:03	372968.3797	1308356.38	17.45	5.67	11.78
LLMW-04S	13:19	372644.1374	1308250.391	21.91	7.75	14.16
LLMW-06S	13:49	372477.6634	1309132.426	12.49	3.86	8.63
LLMW-08S	14:05	372213.2542	1309788.249	16.21	9.57	6.64
LLMW-10S	13:43	371722.2934	1309357.791	15.91	7.64	8.27
LLMW-13S	14:17	371682.6131	1309796.93	21.49	11.86	9.63
LLMW-15S	13:36	371051.1506	1309535.419	15.94	7.28	8.66
LLMW-16S	14:35	371159.2967	1310164.452	20.02	10.82	9.20
LLMW-17S	12:52	371320.3207	1310602.283	18.27	11.85	6.42
LLMW-21S	13:28	370010.9467	1309885.453	16.04	7.39	8.65
LLMW-22S	13:15	369173.009	1310445.634	12.87	4.63	8.24
MW-1203R	12:40	373910.15	1307960.38	15.7	8.51	7.19

Deep Aquifer Monitoring Wells						
Location Designation	Time	Northing (Y) [1]	Easting (X) [1]	TOC Elevation [2]	DTW TOC (ft)	GW Elevation [2] (ft)
EV-22B	13:27	372111.4369	1308337.155	29.02	19.99	9.03
BP-05D	13:54	371477.267	1308791.557	18.65	10.23	8.42
BP-08D	13:47	371139.579	1308839.538	18.59	10.71	7.88
LLMW-01D	12:40	373911.1708	1307952.929	15.74	8.03	7.71
LLMW-02D	12:52	372887.009	1307921.39	15.15	7.18	7.97
LLMW-03D	13:04	372965.5718	1308351.511	17.45	9.42	8.03
LLMW-04D	13:20	372642.8382	1308246.252	21.98	13.88	8.10
LLMW-06D	13:52	372472.7325	1309133.872	12.29	4.92	7.37
LLMW-08D	14:07	372209.3701	1309788.569	16.26	9.02	7.24
LLMW-10D	13:44	371725.4255	1309359.407	15.97	8.34	7.63
LLMW-13D	14:15	371682.4624	1309793.149	21.24	13.94	7.30
LLMW-15D	13:35	371053.2175	1309536.612	16.07	8.68	7.39
LLMW-16D	14:34	371158.166	1310160.437	20.14	13.15	6.99
LLMW-17D	13:00	371317.6575	1310603.072	18.29	11.01	7.28
LLMW-21D	13:26	370011.1759	1309881.28	16.03	8.87	7.16
LLMW-22D	13:18	369167.8357	1310446.091	12.80	5.47	7.33
LLMW-27D	14:08	371259.2652	1308465.435	61.71	47.48	14.23
LLMW-29D	14:13	370982.4647	1308556.215	55.62	41.31	14.31

Notes:

[1] Northing (Y) and Easting (X) are in Washington State Plane North Coordinate System, 83/91 grid values

[2] Vertical datum is NAVD88, US survey feet

TOC = Top of PVC well casing

DTW = Depth to water below top of casing as measured from the north rim of the casing

GW = Groundwater

Table 4

Chemical Analytical Data for Shallow Groundwater and Surface Water

Everett Smelter - Lowland Area

Everett, Washington

Location Designation	Analyte	Antimony		Arsenic		Cadmium		Lead		Mercury		Thallium	
	Unit	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total
	Sample ID												
Monitoring Wells													
	BP01S-130114-W	0.2 U	**0.7**	**83.8 J**	**88.4 J**	0.1 U	**0.2**	0.1 U	**11.9 J**	0.0200 U	0.0200 U	0.2 U	0.2 U
BP01S	DUP02-130114-W	0.2 U	**0.7**	**84.8 J**	**90.9 J**	0.1 U	**0.2**	0.1 U	**12.1 J**	0.0200 U	0.0200 U	0.2 U	0.2 U
BP02S	BP02S-130114-W	0.2 U	**0.4**	**94.5**	**132**	0.1 U	**0.1**	0.1 U	**10.1**	0.0200 U	0.0200 U	0.2 U	0.2 U
BP03S	BP03S-130114-W	**0.4**	0.2 U	**36.8**	**34.4**	**0.2**	0.1 U	**9.6**	**0.2**	0.0200 U	0.0200 U	0.2 U	0.2 U
BP04S	BP04S-130115-W	**3.3**	**3.8**	**24.3**	**30.5**	**0.2**	**0.6**	**2.2**	**35.5**	0.0200 U	0.0200 U	0.2 U	0.2 U
BP05S	BP05S-130115-W	**1.1**	**1.3**	**26.2**	**29.9**	0.1 U	**7.9**	**0.3**	**1.4**	0.0200 U	0.0200 U	0.2 U	0.2 U
BP06S	BP06S-130114-W	0.2 U	0.2 U	**52.3**	**59**	0.1 U	**0.3**	0.1 U	**1.1**	0.0200 U	0.0200 U	0.2 U	0.2 U
BP07S	BP07S-130114-W	**0.2**	**0.3**	**277**	**274**	0.1 U	0.1 U	0.1 U	**0.8**	0.0200 U	0.0200 U	0.2 U	0.2 U
BP08S	BP08S-130114-W	0.2 U	0.2 U	**57.5**	**71.7**	0.1 U	0.1 U	0.1 U	**0.1**	0.0200 U	0.0200 U	0.2 U	0.2 U
BP09S	BP09S-130114-W	**0.5**	**1.1**	**164**	**279**	0.1 U	**5.6**	0.1 U	**0.9**	0.0200 U	**0.0394**	0.2 U	0.2 U
BP10S	BP10S-130114-W	**0.4**	**0.4**	**94.8**	**115**	0.1 U	**0.2**	0.1 U	**0.5**	0.0200 U	0.0200 U	0.2 U	0.2 U
EV6A	EV6A-130117-W	**14.9**	**15.6**	**28.4**	**136**	**27.1**	**27.4**	**67.8**	**291**	0.0200 U	**0.0404**	**0.3**	**0.3**
EV22A	EV22A-130116-W	**0.6**	**0.6**	**11.8**	**11.9**	0.1 U	**0.1**	**5.2**	**6.5**	0.0200 U	**0.0366**	0.2 U	0.2 U
LLMW03S	LLMW03S-130107-W	0.2 U	0.2 U	**1.8**	**2.4**	0.1 U	**0.2**	0.1 U	**1.5**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW04S	LLMW04S-130110-W	**0.2**	0.5 U	**8.3**	**9.1**	0.1 U	0.2 U	0.1 U	**1.3**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW05S	LLMW05S-130109-W	**0.2**	**0.2**	**8.4**	**8**	0.1 U	0.1 U	0.1 U	**0.2**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW06S	LLMW06S-130109-W	**0.3**	**0.4**	**12.4**	**13.7**	0.1 U	**0.2**	0.1 U	**0.3**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW07S	LLMW07S-130109-W	**1.3**	**1.5**	**15.6**	**17.2**	**0.1**	**0.6**	0.1 U	**0.3**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW08S	LLMW08S-130108-W	**0.9**	**1.2**	**192**	**206**	**0.3**	**0.4**	**30.5**	**43.4**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW09S	LLMW09S-130116-W	**0.3**	**0.3**	**59**	**61.5**	0.1 U	**2.2**	0.1 U	**0.6**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW10S	LLMW10S-130116-W	**0.5**	**0.5**	**4.4**	**4.5**	0.1 U	**0.3**	**0.1**	**0.7**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW11S	LLMW11S-130109-W	**0.2**	**0.2**	**1.1**	**1.1**	0.1 U	**0.2**	0.1 U	**0.3**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW12S	LLMW12S-130116-W	0.2 U	0.2 U	**16.6**	**20**	0.1 U	**5.5**	0.1 U	**0.2**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW13S	LLMW13S-130116-W	0.2 U	0.2 U	**25.5**	**27.1**	0.1 U	0.1 U	0.1 U	**0.4**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW14S	LLMW14S-130111-W	**1.3**	**1.2**	**2.7**	**2.8**	**0.1**	**0.3**	**2.3**	**2.3**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW15S	LLMW15S-130111-W	0.2 U	0.5 U	**4.6**	**4.5**	0.1 U	0.2 U	0.1 U	**0.3**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW16S	LLMW16S-130111-W	0.2 U	0.2 U	**1,700**	**1,700**	0.1 U	**0.1**	0.1 U	**0.8**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW17S	LLMW17S-130109-W	**1.9**	**1.8**	**2.6**	**2.8**	0.1 U	0.2 U	0.1 U	**0.2**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW18S	LLMW18S-130108-W	**0.4**	**0.4**	**4.9**	**4.7**	**0.2**	**0.2**	0.1 U	**0.3**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW21S	LLMW21S-030108-W	**0.4**	**0.4**	**28.9**	**31.1**	0.1 U	0.1 U	0.1 U	**0.3**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW22S	LLMW22S-130108-W	2 U	5 U	**6**	**8**	1 U	**3**	1 U	**3**	0.0200 U	**0.0351**	2 U	5 U
LLMW23S	LLMW23S-130108-W	0.2 U	0.2 U	**15**	**15.4**	0.1 U	0.1 U	**0.7**	**1.8**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW33S	LLMW33S-130117-W	**0.4**	**0.4**	**0.3**	**3.1**	0.1 U	**0.4**	0.1 U	**3.5**	0.0200 U	**0.0328**	0.2 U	0.2 U
LLMW34S	LLMW34S-130116-W	0.2 U	0.2 U	**0.5**	**0.5**	0.1 U	**0.2**	0.1 U	**0.2**	**0.0222**	**0.0275**	0.2 U	0.2 U
MW1202R	MW1202R-130129-W	**1.2**	**1.2**	**2.9**	**3**	0.1 U	0.1 U	**0.1**	**0.2**	0.0200 U	**0.0238**	0.2 U	0.2 U
MW1203R	MW1203R-130129-W	0.2 U	0.2 U	**1.2**	**1.2**	0.1 U	**0.1**	0.1 U	0.1 U	0.0200 U	0.0200 U	0.2 U	0.2 U
MW1301R	MW1301R-130129-W	**1**	**1**	**1.5**	**1.5**	0.1 U	0.1 U	0.1 U	0.1 U	0.0200 U	0.0200 U	0.2 U	0.2 U
MW1501R	MW1501R-130129-W	**2.9**	**2.9**	**1.7**	**1.8**	0.1 U	0.1 U	**0.7**	**1**	0.0200 U	0.0200 U	0.2 U	0.2 U
MW1701	MW1701-130129-W	0.2 U	0.2 U	**2.2**	**2.8**	0.1 U	**0.2**	0.1 U	**0.2**	0.0200 U	0.0200 U	0.2 U	0.2 U
PZ1B	PZ1B-130117-W	**0.2**	**0.2**	**131**	**122**	0.1 U	**0.1**	0.1 U	**0.3**	0.0200 U	0.0200 U	0.2 U	0.2 U
PZ2B	PZ2B-130117-W	**0.4**	**0.4**	**22.9**	**21**	**0.1**	**0.4**	**0.2**	**0.3**	0.0200 U	0.0200 U	0.2 U	0.2 U
PZ3B	PZ3B-130117-W	**1.2**	**1.2**	**5.8**	**6.6**	0.1 U	0.1 U	**0.1**	**0.8**	0.0200 U	0.0200 U	0.2 U	0.2 U
UNK	UNK-130121-W	**7**	**11.6**	**71.6**	**86.9**	0.1 U	**0.2**	**3.1**	**4.2**	**0.044**	**0.0599**	0.2 U	0.2 U
Surface Water													
LLSW01	LLSW01-130205	**0.6**	**0.5**	**2.5**	**4**	0.1 U	0.1 U	**0.1**	**0.6**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLSW02	LLSW02-130204	**0.7**	**0.6**	**5**	**6.7**	0.1 U	0.1 U	**0.3**	**0.9**	0.0200 U	**0.0217**	0.2 U	0.2 U
LLSW03	LLSW03-130204	**0.3**	**0.2**	**0.7**	**1.2**	0.1 U	0.1 U	0.1 U	**0.4**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLSW04	LLSW04-130205	**1.5**	**1.3**	**263**	**378**	0.1 U	0.1 U	**0.3**	**1.9**	0.0200 U	**0.0234**	0.2 U	0.2 U
LLSW05	LLSW05-130205	**9.1**	**9.1**	**233**	**347**	0.1 U	**0.2**	**2.3**	**6.2**	**0.0291**	**0.0413**	0.2 U	0.2 U
LLSW06	LLSW06-130204	**0.3**	**0.3**	**2.1**	**3.5**	0.1 U	0.1 U	0.1 U	**0.3**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLSW07	LLSW07-130204	**0.4**	**0.3**	**0.8**	**1.4**	0.1 U	0.1 U	0.1 U	**0.3**	0.0200 U	0.0200 U	0.2 U	0.2 U

Notes:

U = The analyte was not detected at the indicated reporting limit

J = The result is an estimate

Bold text indicates the analyte was detected.

Table 5

Chemical Analytical Data for Deep Groundwater

Everett Smelter - Lowland Area

Everett, Washington

Location Designation	Analyte	Antimony		Arsenic		Cadmium		Lead		Mercury		Thallium	
	Unit	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total
	Sample ID												
Monitoring Wells													
BP01D	BP01D-130114-W	0.2 U	0.2 U	**0.3**	**0.5 J**	0.1 U	**0.5**	0.1 U	**0.4**	0.0200 U	0.0200 U	0.2 U	0.2 U
BP02D	BP02D-130114-W	0.2 U	0.2 U	**0.3**	**1**	0.1 U	**0.1**	0.1 U	**0.5**	0.0200 U	0.0200 U	0.2 U	0.2 U
BP03D	BP03D-130114-W	0.2 U	0.2 U	**0.3**	**0.9**	0.1 U	**0.7**	0.1 U	**0.6**	0.0200 U	0.0200 U	0.2 U	0.2 U
BP04D	BP04D-130115-W	0.2 U	0.2 U	**3,620**	**3,740**	0.1 U	**0.5**	0.1 U	**3.8**	0.0200 U	0.0200 U	0.2 U	0.2 U
BP05D	BP05D-130115-W	**0.5**	**0.6**	**14,800**	**16,400**	0.1 U	**0.3**	0.1 U	**0.6**	0.0200 U	0.0200 U	0.2 U	0.2 U
	DUP03-130115-W	**0.6**	**0.6**	**16,100**	**16,500**	**0.2**	**0.2**	0.1 U	**0.8**	0.0200 U	0.0200 U	0.2 U	0.2 U
BP05D	BP05D2-130115-W	**0.6**	**0.7**	**25.6**	**25.3**	0.1 U	**0.6**	0.1 U	**1.2**	0.0200 U	0.0200 U	0.2 U	0.2 U
BP06D	BP06D-130114-W	**0.4**	**0.4**	**1,780**	**1,820**	0.1 U	**0.2**	0.1 U	**0.4**	0.0200 U	0.0200 U	0.2 U	0.2 U
BP07D	BP07D-130114-W	**0.4**	**0.4**	**5,020**	**4,940**	0.1 U	0.1 U	0.1 U	**0.3**	0.0200 U	0.0200 U	0.2 U	0.2 U
BP08D	BP08D-130114-W	0.2 U	0.2 U	**0.8**	**0.9**	0.1 U	0.1 U	0.1 U	**0.2**	0.0200 U	0.0200 U	0.2 U	0.2 U
BP09D	BP09D-130114-W	0.2 U	0.2 U	**22.4**	**23**	0.1 U	**0.7**	0.1 U	**0.5**	0.0200 U	0.0200 U	0.2 U	0.2 U
BP10D	BP10D-130114-W	**0.3**	**0.3**	**8.3**	**8.1**	0.1 U	**0.1**	**0.1**	**0.7**	0.0200 U	**0.0239**	0.2 U	0.2 U
EV6B	EV6B-130117-W	**0.3**	**0.4**	**12.6**	**10.2**	0.1 U	0.1 U	**0.1**	**1.2**	0.0200 U	0.0200 U	0.2 U	0.2 U
EV19B	EV19B-130118-W	**0.2**	**0.2**	**3,970**	**4,050**	**0.1**	**0.3**	0.1 U	0.1 U	0.0200 U	0.0200 U	0.2 U	0.2 U
EV20B	EV20B-130118-W	**0.3**	**0.7**	**14,000**	**13,900**	0.1 U	**0.1**	0.1 U	**0.2**	0.0200 U	0.0200 U	0.2 U	0.2 U
EV22B	EV22B-130116-W	**0.4**	**0.6**	**3.3**	**3.4**	0.1 U	0.2 U	0.1 U	**0.6**	**0.0371**	**0.0518**	0.2 U	0.2 U
LLMW01D	LLMW01D-130108-W	**0.2**	**0.3**	**23.8**	**24.5**	0.1 U	0.1 U	**0.1**	**2.1**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW02D	LLMW02D-130107-W	0.2 U	0.2 U	**2.4**	**2.6**	0.1 U	0.1 U	0.1 U	**0.2**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW03D	LLMW03D-130107-W	0.2 U	0.2 U	**0.6**	**1.1**	0.1 U	0.1 U	0.1 U	**0.6**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW04D	LLMW04D-130110-W	**0.3**	**0.3**	**31.1**	**35**	0.1 U	0.1 U	**0.6**	**1.2**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW05D	LLMW05D-130109-W	0.2 U	0.2 U	**1.7**	**1.4**	0.1 U	0.1 U	0.1 U	**0.3**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW06D	LLMW06D-130201-W	0.2 U	0.2 U	**5.5**	**7**	0.1 U	0.1 U	**0.3**	**1**	0.0200 U	**0.0232**	0.2 U	0.2 U
LLMW07D	LLMW07D-130109-W	0.5 U	0.2 U	**5.9**	**6.9**	0.2 U	0.1 U	0.2 U	**1.5**	0.0200 U	0.0200 U	0.5 U	0.2 U
LLMW08D	LLMW08D-130108-W	0.2 U	0.2 U	**2**	**2**	0.1 U	0.1 U	0.1 U	**0.1**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW09D	LLMW09D-130116-W	0.2 U	0.2 U	**0.9**	**1.7**	0.1 U	**2**	**0.3**	**0.9**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW10D	LLMW10D-130116-W	0.2 U	0.2 U	**2.4**	**3**	0.1 U	0.1 U	0.1 U	**1.7**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW11D	LLMW11D-130109-W	0.2 U	0.2 U	**1.7**	**1.7**	0.1 U	**0.5**	0.1 U	**0.3**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW12D	LLMW12D-130116-W	0.2 U	0.2 U	**1,980**	**1,880**	0.1 U	**0.4**	0.1 U	**0.4**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW13D	LLMW13D-130116-W	0.2 U	0.2 U	**22.4**	**25.4**	0.1 U	0.1 U	0.1 U	**0.6**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW14D	LLMW14D-130111-W	0.2 U	0.2 U	**313**	**274**	0.1 U	**0.4**	**0.2**	**0.6**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW15D	LLMW15D-130111-W	0.2 U	0.5 U	**0.5**	**0.9**	0.1 U	0.2 U	0.1 U	**0.2**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW16D	LLMW16D-130111-W	0.2 U	**0.2**	0.5 U	**1.8**	0.1 U	0.1 U	**0.2**	**1.2**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW17D	LLMW17D-130109-W	0.2 U	0.5 U	**14.9**	**15.8**	0.1 U	0.2 U	0.1 U	**0.5**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW18D	LLMW18D-130109-W	0.2 U	0.2 U	**0.7**	**1.4**	0.1 U	0.1 U	0.1 U	**0.5**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW19D	LLMW19D-130110-W	0.2 U	0.5 U	**4.9**	**8.7**	0.1 U	**1.8**	**0.1**	**0.9**	0.0200 U	0.0200 U	0.2 U	0.5 U
LLMW20D	LLMW20D-130110-W	**0.9**	**1**	**8.7**	**9.2**	**0.3 J**	0.2 U	0.1 U	0.1 U	0.0200 U	0.0200 U	0.2 U	0.2 U
	LLMWDUP1-130110-W	**0.9**	**1**	**8.6**	**11**	0.1 UJ	0.5 U	0.1 U	0.1 U	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW21D	LLMW21D-130108-W	0.2 U	0.2 U	**0.5**	**1.3**	0.1 U	**0.2**	0.1 U	**0.4**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW22D	LLMW22D-130108-W	0.2 U	0.2 U	**0.4**	**0.7**	0.1 U	0.1 U	0.1 U	**0.4**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW23D	LLMW23D-130108-W	0.2 U	0.2 U	**0.8**	**1.4**	0.1 U	0.1 U	0.1 U	**0.5**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW24D	LLMW24D-130121-W	**0.4**	**0.4**	**0.8**	**2.6 J**	**0.4 J**	**0.2**	0.1 U	**2.1 J**	0.0200 U	0.0200 U	0.2 U	0.2 U
	DUP04-130121-W	**0.4**	**0.4**	**1.1**	**1.6 J**	**0.2 J**	**0.3**	0.1 U	**0.9 J**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW25D	LLMW25D-130121-W	**0.5**	**0.5**	**0.9**	**1.5**	**0.7**	**0.3**	0.1 U	**0.9**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW27D	LLMW27D-130121-W	**0.6**	**0.5**	**814**	**941**	**0.1**	**0.2**	0.1 U	**1**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW29D	LLMW29D-130118-W	**0.4**	**0.4**	**4.5**	**7.1**	0.1 U	**0.2**	0.1 U	**0.9**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW31D	LLMW31D-130201-W	**0.4**	**0.3**	**0.7**	**0.8**	**2.2**	**2.4**	**0.7**	**0.8**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW33D	LLMW33D-130117-W	0.2 U	0.2 U	**1.3**	**1.4**	0.1 U	**0.8**	0.1 U	0.1 U	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW34D	LLMW34D-130116-W	**1**	**0.9**	**2.2**	**3.1**	0.1 U	0.1 U	0.1 U	**0.4**	0.0200 U	0.0200 U	0.2 U	0.2 U

Notes:

U = The analyte was not detected at the indicated reporting limit

J = The result is an estimate

Bold text indicates the analyte was detected.

Table 6

Chemical Analytical Data for Sediment

Everett Smelter - Lowland Area

Everett, Washington

Analyte	Antimony	Arsenic	Cadmium	Lead	Mercury	Thallium
Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Location Designation/Sample ID						
LLSD-01	6 U	**6.3**	**0.5**	**10**	0.03 U	0.3 U
LLSD-02	7 U	**14.3**	**0.6**	**86**	**0.05**	0.2 U
LLSD-03	9 U	**18.7**	**0.8**	**30**	**0.07**	0.4 U
LLSD-04	10 U	**219**	**0.9**	**31**	0.03 U	0.4 U
LLSD-05	10 U	**157**	**2.7**	**532**	**0.15**	0.4 U
LLSD-06	20 U	**105**	**1.8**	**78**	**0.1**	0.8 U
LLSD-07	10 U	**11.5**	**0.8**	**24**	**0.06**	0.5 U

Notes:

U = The analyte was not detected at the indicated reporting limit

Bold text indicates the analyte was detected.

Table 7

Hydraulic Conductivity

Everett Smelter - Lowland Area
Everett, Washington

Location Designation	Test Performed [1]	Hydraulic Conductivity [2] (ft/day)
Shallow Aquifer Wells		
BP05S	Slug Test	1.97
BP08S	Slug Test	1.78
EV22A	Slug Test	1.55
LLMW03S	Slug Test	50.33
LLMW11S	Slug Test	85.57
LLMW12S	Slug Test	196.92
LLMW16S	Slug Test, Drawdown Test[3]	8.18
LLMW22S	Slug Test	254.12
Deep Aquifer Wells		
BP05D	Slug Test, Drawdown Test	27.71
BP05D2	Slug Test, Drawdown Test	2.11
BP08D	Slug Test	14.33
EV22B	Slug Test	0.01
LLMW03D	Slug Test	91.05
LLMW11D	Slug Test, Drawdown Test	24.77
LLMW12D	Slug Test	173.07
LLMW16D	Slug Test, Drawdown Test	91.42
LLMW22D	Slug Test	145.43
LLMW27D	Slug Test	2.74

Notes:

[1] Slug and/or drawdown tests were performed at the indicated wells. See report for methods.

[2] Where both slug and drawdown tests were performed, the indicated hydraulic conductivity result is from the drawdown test (except LLMW16S, see footnote 3). Hydraulic conductivities were calculated for slug tests using Bouwer and Rice (1976) or Butler and Garnett (2000). Hydraulic conductivity values for drawdown tests were calculated from Cooper-Jacob (1946) and Theis Recovery (1935) methods by converting average T values calculated from pumping and recovery phases to K values using assumed aquifer thickness of 35 feet, based on lithology observed at BP-05D2.

[3] Drawdown testing results affected by insufficient water in well. Results presented are from slug test analysis.

Table 8

Average Groundwater Velocity for Select Tidal Study Wells[1]

Everett Smelter - Lowland Area
Everett, Washington

Location ID	Screened Interval Soil Type [2]	Average Effective Porosity (n_e) by Soil Type [3]	Hydraulic Conductivity (K) [4] (ft/day)	Groundwater Gradient (i) [5]	Estimated Average Horizontal Groundwater Velocity [6] (ft/day)
LLMW11S	Sand with occ gravel (SP)	0.30	51.30	0.0026	0.44
LLMW11D	Sand with occ gravel (SP)	0.30	32.19	0.0004	0.04
LLMW12S	Sand with occ gravel (SP)	0.30	196.92	0.0096	6.30
LLMW12D	Sand (SP)	0.32	173.07	0.0027	1.46

Notes:

[1] Horizontal groundwater velocities were calculated for wells that were both part of the tidal study and were slug and/or drawdown tested.

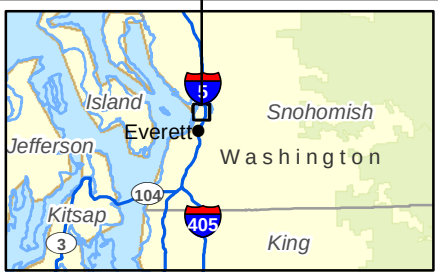
[2] Soil type based on visual classification during well installation (USCS) and grain size analysis to confirm/calibrate visual classifications.

[3] Average effective porosity values by soil type (Argonne National Laboratory Environmental Science Division, U.S. Department of Energy, 2001).

[4] Hydraulic conductivities were calculated from slug tests using Bouwer and Rice (1976) or Butler and Garnett (2000), and from drawdown tests using Cooper-Jacob (1946) and Theis Recovery Method (1935).

[5] Hydraulic gradient at the well calculated using two wells as end points.

[6] Horizontal groundwater velocities are based on average published effective porosities for soil type and hydraulic gradients calculated from a limited number of data points. Groundwater velocities should be considered an estimate. Calculation: v=K/ne*i



N
W E
S

2,000 0 2,000

Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
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Data Sources: ESRI Data & Maps

Projection: NAD 1983 UTM Zone 10N

Vicinity Map

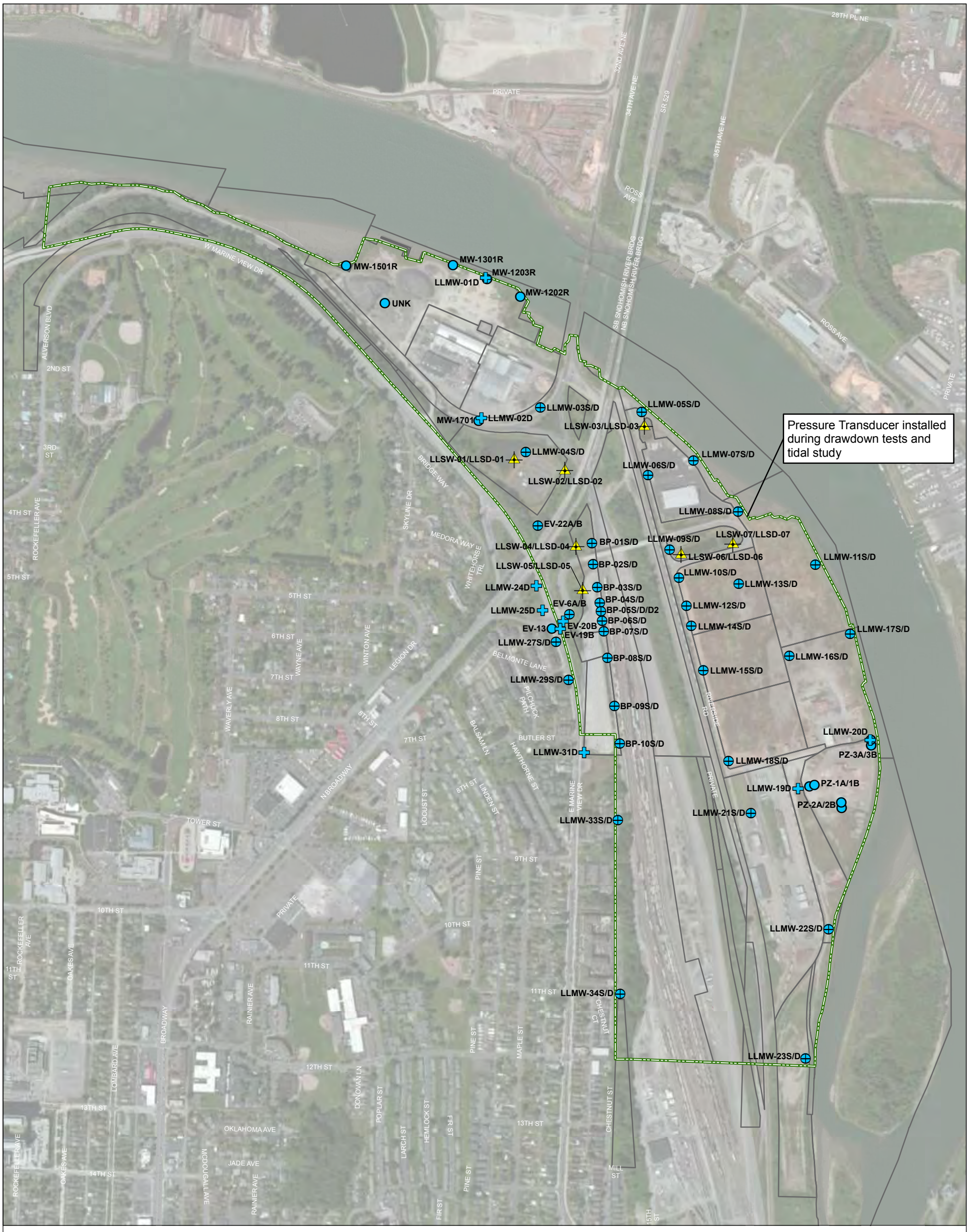
Everett Smelter - Lowland Area

GeoEngineers

Figure 1

Path: \\seal\projects\0050406\GIS\0504068_T1000_VicinityMap_Lowland.mxd Map Revised: 28 May 2013 tward

Path: \\sea\projects\0\0504068\GIS\050406800_T800_SitePlan.mxd Map Revised: 06 June 2013 bmagdasy



Legend

- Lowland Area
- Snohomish County Parcel Boundary

Investigation Locations

- Shallow Aquifer Monitoring Well
- Shallow and Deep Aquifer Monitoring Well Pair
- Deep Aquifer Monitoring Well
- Surface Water and Sediment Sample Location

Notes:
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Data Source: Aerial Image from Microsoft, 2010. Snohomish County GIS, 2012.

N W E S

700 0 700

Feet

Lowland Area Investigation Locations

Everett Smelter - Lowland Area

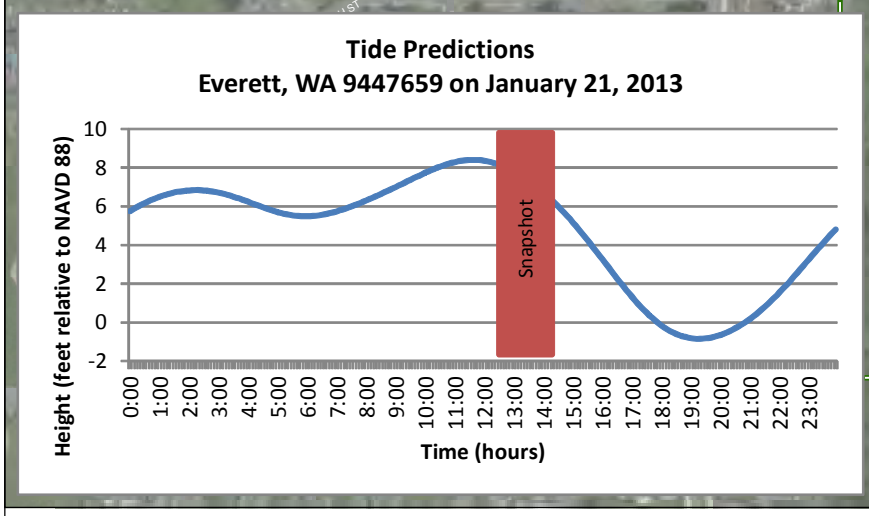
GeoEngineers

Figure 2

Path: \\sea\projects\0\0504068\GIS\050406800_T800_GWElev_Shallow.mxd Map Revised: 26 June 2013 bmagdasy

MW-1203R
7.19
LLMW-03S
11.78
LLMW-04S
14.16
LLMW-06S
8.63
LLMW-08S
6.64
EV-22A
15.16
BP-05S
14.81
BP-08S
15.42
LLMW-10S
8.27
LLMW-13S
9.63
LLMW-15S
8.66
LLMW-16S
9.2
LLMW-17S
6.42
LLMW-21S
8.65
LLMW-22S
8.24

SB SNOHOMISH RIVER BRDG
NB SNOHOMISH RIVER BRDG
PACIFIC HIGHWAY
ROSS AVE
W MARINE VIEW DR
E MARINE VIEW DR
SKYLINE DR
BRIDGE WAY
MEDORA WAY
WHITEHORSE TRL
LEGION DR
NEROAD WAY
BELMONTE LANE
PILCHUCK PATH
BALSAM LN
7TH ST
BUTLER ST
HAWTHORNE ST
LOCUST ST
LINDEN ST
8TH ST
9TH ST
PINE ST



Legend

Lowland Area

LLMW-10S
8.27
Monitoring well designation and groundwater elevation (NAVD88) on January 21, 2013.

Estimated Groundwater Elevation Contour, ft (dashed where inferred)

Extent of Recent Filling (2011 to present)

N
W E
S

400 0 400
Feet

Notes:
1. The locations of all features shown are approximate.
2. Inset tidal prediction chart generated using National Oceanic and Atmospheric Administration (NOAA) tidal prediction data for January 21, 2013. http://tidesandcurrents.noaa.gov/
3. Red overlay box on tidal prediction chart represents the time period for groundwater measurements on January 21, 2013.
4. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerial Image from Microsoft, 2010. Snohomish County GIS, 2012.

Groundwater Elevations
January 21, 2013 – Shallow Aquifer

Everett Smelter - Lowland Area

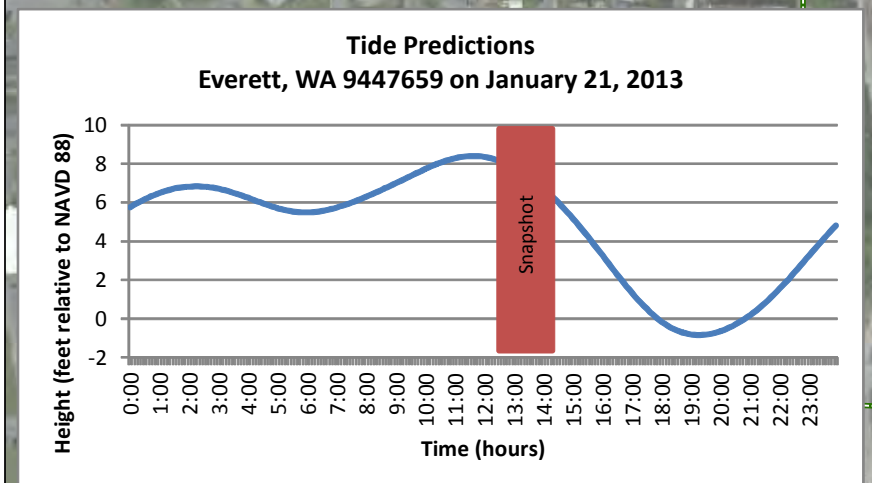
GeoEngineers

Figure 3

Path: \\sea\projects\0\0504068\GIS\050406800_T800_GWElev_Deep.mxd Map Revised: 26 June 2013 bmagdasy

LLMW-01D 7.71
LLMW-02D 7.97
LLMW-03D 8.03
LLMW-04D 8.1
LLMW-06D 7.37
LLMW-08D 7.24
EV-22B 9.03
LLMW-10D 7.63
LLMW-13D 7.3
BP-05D 8.57
LLMW-17D 7.28
LLMW-27D 14.23
BP-08D 7.88
LLMW-15D 7.39
LLMW-16D 6.98
LLMW-29D 14.31
LLMW-21D 7.16
LLMW-22D 7.33

SB SNOHOMISH RIVER BRDG
NB SNOHOMISH RIVER BRDG
ROSS AVE
PACIFIC HIGHWAY
W MARINE VIEW DR
E MARINE VIEW DR
SKYLINE DR
BRIDGEWAY
MEDORA WAY
WHITEHORSE TRL
LEGION DR
N BROADWAY
BELMONTE LANE
PILCHUCK PATH
BALSAM LN
7TH ST
BUTLER ST
HAWTHORNE ST
LINDEN ST
LOCUST ST
8TH ST
9TH ST
PINE ST



Legend

- Lowland Area
- LLMW-10D 7.63 — Monitoring well groundwater elevation (NAVD88) on January 21, 2013.
- Estimated Groundwater Elevation Contour, ft (dashed where inferred)
- Extent of Recent Filling (2011 to present)

N W E S

400 0 400
Feet

Notes:
1. The locations of all features shown are approximate.
2. Inset tidal prediction chart generated using National Oceanic and Atmospheric Administration (NOAA) tidal prediction data for January 21, 2013. http://tidesandcurrents.noaa.gov/
3. Red overlay box on tidal prediction chart represents the time period for groundwater measurements on January 21, 2013.
4. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerial Image from Microsoft, 2010. Snohomish County GIS, 2012.

Groundwater Elevations
January 21, 2013 – Deep Aquifer

Everett Smelter - Lowland Area

GeoEngineers

Figure 4

Path: \\sea\projects\0\0504068\GIS\050406800_T800_MeanGWElev_Shallow.mxd Map Revised: 26 June 2013 bmagdasy

Legend

- Lowland Area
- **MW12S** / **9.01** — Monitoring well designation and mean groundwater elevation for selected 72 hour tidal cycle[3] (NAVD88)
- Estimated Groundwater Elevation Contour, ft (dashed where inferred)
- Inferred Groundwater Flow Direction
- Extent of Recent Filling (2011 to present)

N W E S

200 0 200

Feet

Notes:
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3. Mean groundwater elevations calculated using Serfes (1987) Method.

Data Source: Aerial Image from Microsoft, 2010. Snohomish County GIS, 2012.

Mean Groundwater Elevations - Shallow Aquifer

Everett Smelter - Lowland Area

GeoEngineers

Figure 5

Path: \\sea\projects\0\0504068\GIS\050406800_T800_MeanGWElev_Deep.mxd Map Revised: 26 June 2013 bmagdasy

Legend

- Lowland Area
- MW12D 6.57 — Monitoring well designation and mean groundwater elevation for selected 72 hour tidal cycle[3] (NAVD88)
- Estimated Groundwater Elevation Contour, ft (dashed where inferred)
- Inferred Groundwater Flow Direction
- Extent of Recent Filling (2011 to present)

N W E S

200 0 200

Feet

Notes:
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3. Mean groundwater elevations calculated using Serfes (1987) Method.

Data Source: Aerial Image from Microsoft, 2010. Snohomish County GIS, 2012.

Mean Groundwater Elevations - Deep Aquifer

Everett Smelter - Lowland Area

GeoEngineers

Figure 6

Path: \\sea\projects\0\0504068\GIS\050406800_T800_GW_Arsenic_Shallow_ed.mxd Map Revised: 20 June 2013 bmagdasy

Legend

Lowland Area

Investigation Locations

- Shallow Aquifer Monitoring Well
- Shallow and Deep Aquifer Monitoring Well Pair
- Surface Water and Sediment Sample Location

LLMW-10S → Monitoring Well Designation
4.4 → Dissolved Arsenic Concentration in ug/L

J = Result is an estimate
DRY = Well was dry and therefore no sample could be obtained

N
W E
S

700 0 700
Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerial Image from Microsoft, 2010. Snohomish County GIS, 2012.

Dissolved Arsenic Concentrations in Shallow Aquifer Groundwater and Surface Water

Everett Smelter - Lowland Area

GeoEngineers

Figure 7

Path: \\sea\projects\0\0504068\GIS\050406800_T800_GW_Arsenic_Deep_ed.mxd Map Revised: 20 June 2013 bmagdasy

Legend

Lowland Area

Investigation Locations

Shallow and Deep Aquifer Monitoring Well Pair

Deep Aquifer Monitoring Well

LLMW-10D → Monitoring Well Designation
2.4 → Dissolved Arsenic Concentration in ug/L

U = The analyte was not detected at the indicated reporting limit

N
W E
S

700 0 700
Feet

Dissolved Arsenic Concentrations in Deep Aquifer Groundwater

Everett Smelter - Lowland Area

GeoEngineers

Figure 8

Notes:
1. The locations of all features shown are approximate.
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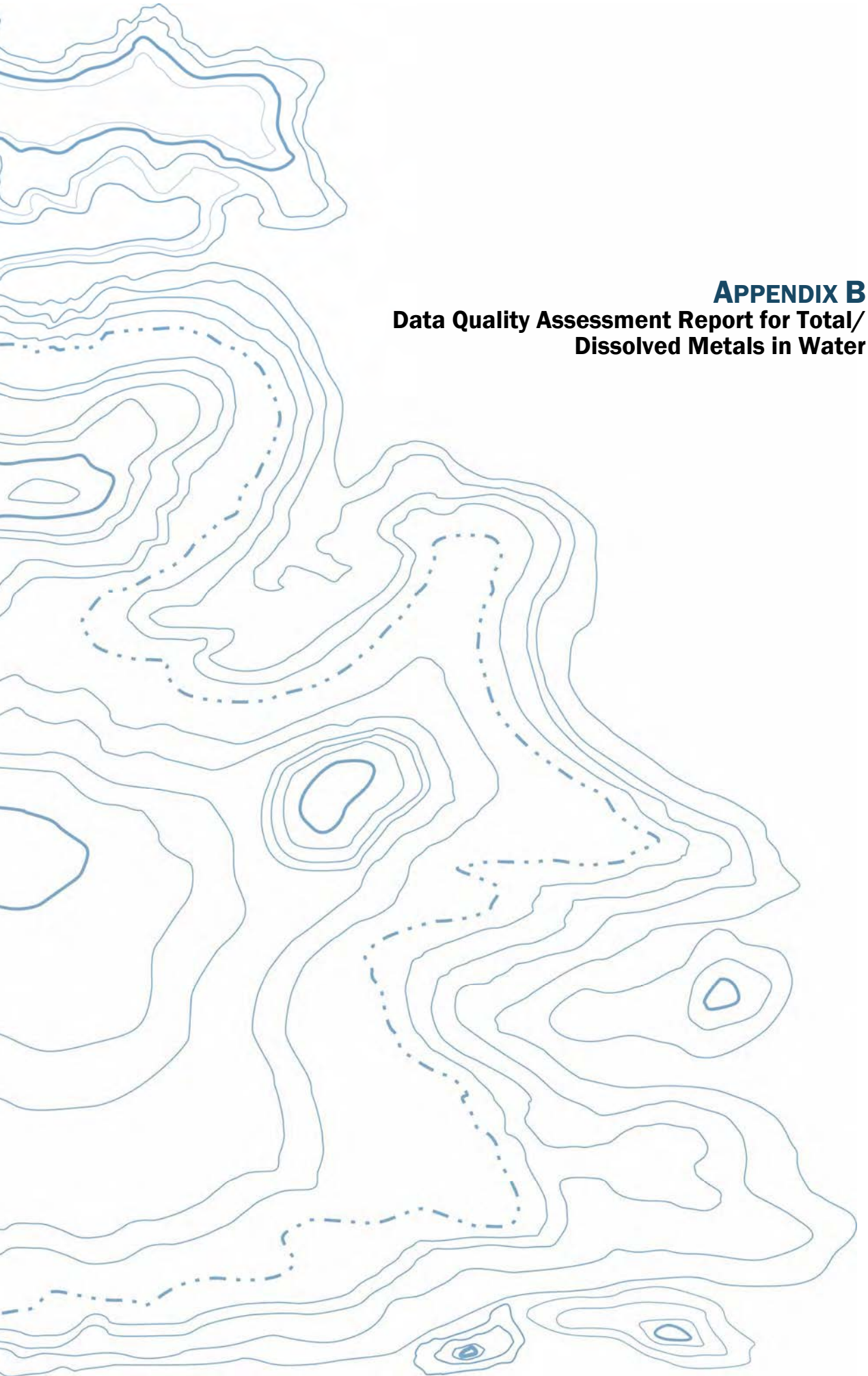
Data Source: Aerial Image from Microsoft, 2010. Snohomish County GIS, 2012.

APPENDIX A
Laboratory Analytical Reports for Metals in Water



APPENDIX B
Data Quality Assessment Report for Total/ Dissolved Metals in Water

DATA QUALITY ASSESSMENT REPORT

TOTAL/DISSOLVED METALS IN WATER BY METHODS SW200.8/SW7470A

ARI Laboratory SDG	Samples Validated (Bold indicates the sample was qualified)
VZ23/VZ24	LLMW01D-130108-W, LLMW02D-130107-W, LLMW03S-130107-W, LLMW03D-130107-W, LLMW08S-130108-W, LLMW08D-130108-W, LLMW018S-130108-W, LLMW018D-130109-W, LLMW21S-130108-W, LLMW21D-130108-W, LLMW22S-130108-W, LLMW22D-130108-W, LLMW23S-130108-W, LLMW23D-130108-W
VZ75/VZ76	LLMW04S-130110-W, LLMW04D-130110-W, LLMW05S-130109-W, LLMW05D-130109-W, LLMW06S-130109-W, LLMW07S-130109-W, LLMW07D-130109-W, LLMW11S-130109-W, LLMW11D-130109-W, LLMW14S-130111-W, LLMW14D-130111-W, LLMW15S-130111-W, LLMW15D-130111-W, LLMW16S-130111-W, LLMW16D-130111-W, LLMW17S-130109-W, LLMW17D-130109-W, LLMW19D-130110-W, **LLMW20D-130110-W, LLMWDUP1-130110-W**
WA06/WA10	BP04S-130115-W, BP04D-130115-W, BP05S-130115-W, BP05D-130115-W, DUP03-130115-W, BP05D2-130115-W
WA08/WA16	**BP01S-130114-W, DUP02-130114-W, BP01D-130114-W,** BP02S-130114-W, BP02D-130114-W, BP03S-130114-W, BP03D-130114-W, BP06S-130114-W, BP06D-130114-W, BP07S-130114-W, BP07D-130114-W, BP08S-130114-W, BP08D-130114-W, BP09S-130114-W, BP09D-130114-W, BP10S-130114-W, BP10D-130114-W
WA61/WA62	LLMW09S-130116-W, LLMW09D-130116-W, LLMW010S-130116-W, LLMW010D-130116-W, LLMW012S-130116-W, LLMW012D-130116-W, LLMW013S-130116-W, LLMW013D-130116-W, LLMW33S-130117-W, LLMW33D-130117-W, LLMW34S-130116-W, LLMW34D-130116-W, EV22A-130116-W, EV22B-130116-W, EV6A-130117-W, EV6B-130117-W, PZ1B-130117-W, PZ2B-130117-W, PZ3B-130117-W
WA66/WA67	**LLMW24D-130121-W, DUP04-130121-W**, LLMW25D-130121-W, LLMW27D-130121-W, LLMW29D-130118-W, EV19B-130118-W, EV20B-130118-W, UNK-130121-W
WC09/WC10	MW1202R-130129-W, MW1203R-130129-W, MW1301R-130129-W, MW1501R-130129-W, MW1701-130129-W
WC37/WC38	LLMW06D-130201-W, LLMW31D-130201-W
WC79/WC80	LLSW01-130205, LLSW02-130204, LLSW03-130204, LLSW04-130205, LLSW05-130205, LLSW06-130204, LLSW07-130204

PROJECT: EVERETT SMELTER LOWLAND AREA (00504-068-00)

This report documents the results of an Environmental Protection Agency (EPA) level 2b data validation of analytical data from the analyses of water samples and the associated laboratory and field quality control (QC) samples. The review included the following:

- Chain of Custody
- Holding Times and Sample Preservation
- Instrument Calibration
- ICP Interference Check Sample
- Method and Calibration Blanks
- Laboratory Control Samples
- Matrix Spikes
- Laboratory Duplicates
- Field Duplicates
- Internal Standards/Tunes

OBJECTIVE

The objective of the data validation was to review laboratory analytical procedures and quality control (QC) results to evaluate whether:

- The samples were analyzed using well-defined and acceptable methods that provide detection limits below applicable regulatory criteria;
- The precision and accuracy of the data are well defined and sufficient to provide defensible data; and
- The quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

Ninety-one (91) groundwater samples and seven (7) surface water samples were analyzed by one or more of the analytical methods listed in the title of this appendix.

DATA PACKAGE COMPLETENESS

Analytical Resources Incorporated (ARI), located in Tukwila, Washington, analyzed the water samples evaluated as part of this data quality assessment. The laboratory provided all required deliverables for the assessment according to the National Functional Guidelines. The laboratory followed adequate corrective action processes and all identified anomalies were discussed in the case narratives.

DATA QUALITY ASSESSMENT SUMMARY

The results for each of the QC elements are summarized below. The data assessment was performed using guidance in the USEPA Contract Laboratory Program *National Functional Guidelines for Inorganic Data Review* (USEPA, 2010).

Chain-of-Custody Documentation

Chain-of-custody (COC) forms were provided with the laboratory analytical reports. There were no anomalies noted on the COC forms; proper COC protocols appear to have been followed for this sampling event.

Holding Times and Sample Preservation

The holding time is defined as the time that elapses between sample collection and sample analysis. The maximum holding time criteria of 6 months (28 days for mercury) is prescribed for the two metals analytical methods to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times of 6 months (28 days for mercury) were met for all analyses.

Instrument Calibration

The laboratory followed the method requirements for satisfactory instrument calibration. Instrument calibration is necessary in order to ensure that the instrument is capable of producing acceptable quantitative data for the metals on the target analyte list in the QAPP. Initial Calibration Verification (ICV) demonstrates that the instrument is capable of acceptable performance at the beginning of the analytical run. The Continuing Calibration Verification (CCV) demonstrates that the initial calibration is still valid by checking the performance of the instrument on any given day that samples are being analyzed.

Each calibration curve was made up of a blank and at least five calibration standards with all measurements being within the working range of the instrument. The calibration curves were fitted using linear regression and each curve had a correlation coefficient of ≥ 0.995.

The ICV/CCV standards were within 90% to 110% of the true value in all cases.

ICP Interference Check Sample

The Interference Check Sample verifies the analytical instrument's ability to overcome isobaric interferences typical of those found in samples. The laboratory analyzed this QC sample at the proper frequency and location of the analytical run. All solution mixtures were within the control limit of 20% of the true value.

Method Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. Method blanks were analyzed with each batch of samples, at a frequency of 1 per 20 samples. For all sample batches, method blanks were analyzed at the required frequency. None of the analytes of interest were detected above the reporting limits in any of the method blanks.

Matrix Spikes

Because the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis. One aliquot of sample is analyzed in the normal manner, and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a percent recovery (%R) is calculated. In the event that a particular element is out of the recovery value control limits in the matrix spiked sample, the laboratory is required to analyze a "post-spiked" sample in order to further isolate any potential quality control issues with the given element.

Matrix spike analyses should be performed once per analytical batch or every 20 field samples, whichever is more frequent. The recovery criteria for matrix spikes are 75% to 125% for all of the elements in this report.

The frequency requirements were met for all analyses, with the following exceptions:

SDG WA08/WA16: The laboratory performed a matrix spike on Sample BP01S-130114-W. The %R value for total arsenic was greater than the control limit. The positive results for total arsenic were qualified as estimated (J) in the samples BP01S-130114-W, BP01D-130114-W, and DUP02-130114-W.

SDG WA66/WA67: The laboratory performed a matrix spike on Sample EV19B-130118-W. The %R values for total and dissolved arsenic were greater than the control limit. However, in both cases the parent sample concentrations were greater than four times the amount spiked into the sample. For this reason, no action was taken.

Laboratory Control Samples (LCS)

A laboratory control sample is essentially a blank sample that is spiked with a known amount of analyte concentration and analyzed. It is to be treated much like a matrix spike, without the possibility for matrix interference. As there is no actual sample matrix in the analysis, the analytical expectations for accuracy and precision are usually more rigorous and qualification would apply to all samples in the batch, instead of the parent sample only.

Laboratory control sample analyses should be performed once per analytical batch or every 20 field samples, whichever is more frequent. The recovery criteria for laboratory control samples are specified in the laboratory documents as are the relative percent difference values. The frequency requirements were met for all analyses, and the %R/RPD values were within the proper control limits.

Laboratory Duplicates

Internal laboratory duplicate analyses are performed to monitor the precision of the analyses. Two separate aliquots of a sample are analyzed as distinct samples in the laboratory, and the RPD between the two results is calculated. Duplicate analyses should be performed once per analytical batch. If one or more of the samples used has a concentration greater than five times the reporting limit for that sample, the absolute difference is used instead of the RPD.

Laboratory duplicates were analyzed at the proper frequency and the specified acceptance criteria were met in all cases.

Field Duplicates

Field duplicate samples were collected and analyzed along with the reviewed sample batches. The duplicate samples were analyzed for the same parameters as the associated parent samples. As mentioned above for the laboratory duplicates the RPD is used as the criteria for assessing precision, unless one or more of the samples used has a concentration greater than five times the reporting limit for that sample, the absolute difference is used instead of the RPD.

The RPD control limits for water samples is 50%, while the RPD control limits for water samples is 35%. The absolute difference control limits for soil samples is twice the PQL value, while the absolute difference control limits for water samples is the same as the PQL value. The four sets of field duplicates shown below were submitted to the laboratory:

- LLMW20D-130110-W and LLMWDUP1-130110-W
- BP05D-130115-W and DUP03-130115
- BP01S-130114-W and DUP03-130115-W
- LLMW24D-130121-W and DUP04-130121

The precision criteria were met for all target analytes, with the following exception:

SDG VZ75/VZ76: Samples LLMW20D-130110-W & LLMWDUP1-130110-W, was submitted to the laboratory. There was a postitive result for dissolved cadmium in one of the samples greater than twice the reporting limit, while cadmium was not detected in the other sample. For this reason, the positive result and reporting limit for dissolved cadmium were qualified as estimated (J/UJ) in both samples.

Reporting Limits and Miscellaneous

All SDGs: The reporting limits the target analytes met the requirements that were prescribed in the QAPP.

Internal Standards/Tunes

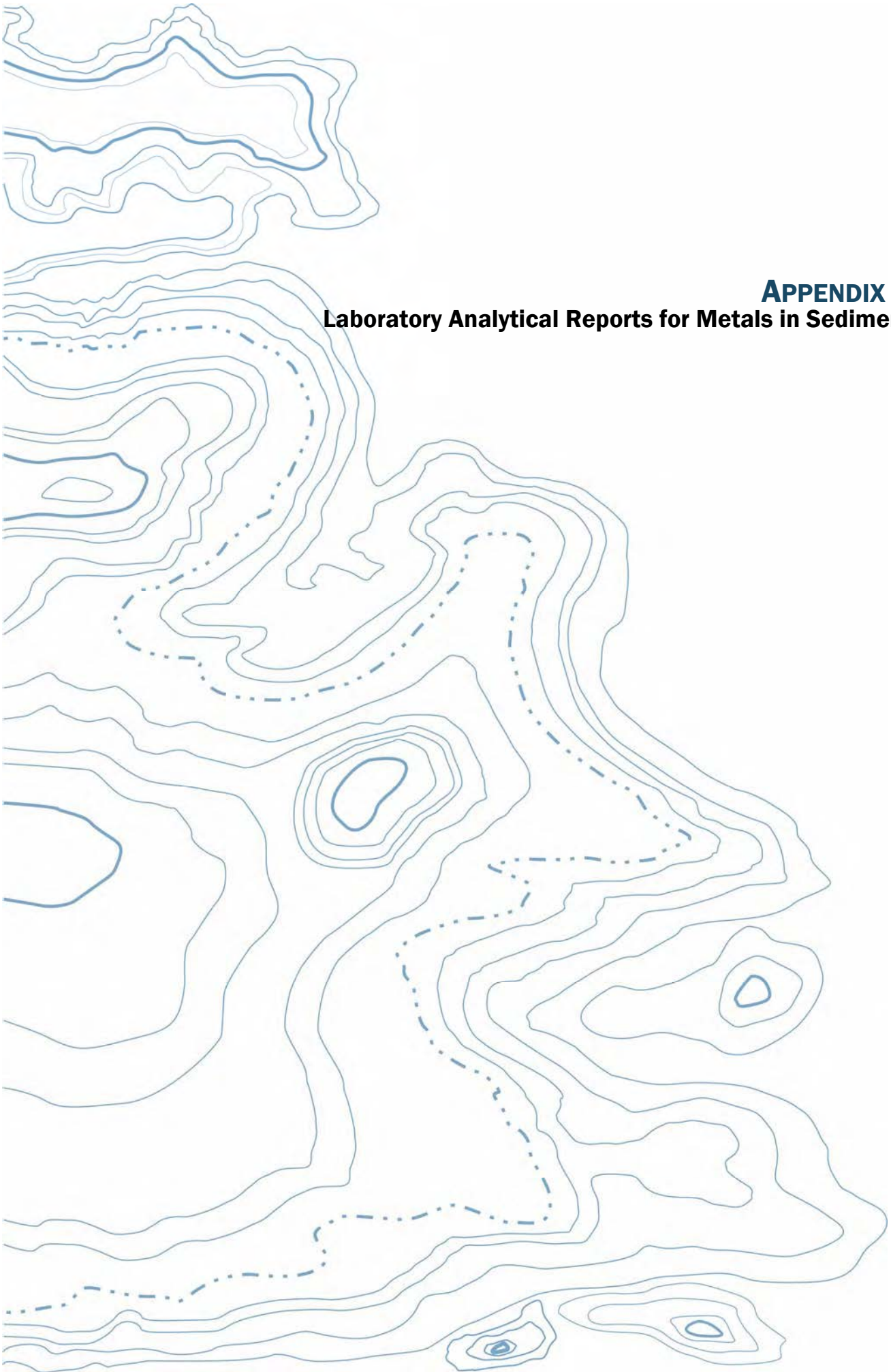
The laboratory appropriately added an internal standard into each sample, with the exception of the instrument tune. The intensity of the internal standard response in each sample was monitored and compared to the intensity of the response for that internal standard in the calibration blank. The percent relative intensity (%RI) in the samples were within 60-125% of the response in the calibration blank for the appropriate analytical run.

OVERALL ASSESSMENT

As was determined by this data quality assessement, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the LCS and MS %R values, with the exceptions mentioned above. Precision was acceptable, as demonstrated by the laboratory duplicate and field duplicate RPD values, with the exceptions noted above.

Data were qualified as estimated because of a matrix spike %R outlier and field duplicate precision outliers.

The data are acceptable for use.



APPENDIX C
Laboratory Analytical Reports for Metals in Sediment

APPENDIX D
Data Quality Assessment Report for Metals in Sediment

DATA QUALITY ASSESSMENT REPORT

METALS IN SEDIMENT BY METHODS SW6010C/SW200.8/SW7471A

ARI Laboratory SDG	Samples Validated
WC78	LLSD06-130204, LLSD07-130204, LLSD03-130204, LLSD02-130204, LLSD01-130204, LLSD04-130204, LLSD05-130204

PROJECT: EVERETT SMELTER LOWLAND AREA (00504-068-00)

This report documents the results of an Environmental Protection Agency (EPA) level 2b data validation of analytical data from the analyses of sediment samples and the associated laboratory and field quality control (QC) samples. The review included the following:

- Chain of Custody
- Holding Times and Sample Preservation
- Instrument Calibration
- ICP Interference Check Sample
- Method and Calibration Blanks
- Laboratory Control Samples
- Matrix Spikes
- Laboratory Duplicates
- Field Duplicates
- Internal Standards/Tunes

OBJECTIVE

The objective of the data validation was to review laboratory analytical procedures and quality control (QC) results to evaluate whether:

- The samples were analyzed using well-defined and acceptable methods that provide detection limits below applicable regulatory criteria;
- The precision and accuracy of the data are well defined and sufficient to provide defensible data; and
- The quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

Seven (7) sediment samples were analyzed by one or more of the analytical methods listed in the title of this appendix.

DATA PACKAGE COMPLETENESS

Analytical Resources Incorporated (ARI), located in Tukwila, Washington, analyzed the sediment samples evaluated as part of this data quality assessment. The laboratory provided all required deliverables for the assessment according to the National Functional Guidelines. The laboratory followed adequate corrective action processes and all identified anomalies were discussed in the case narratives.

DATA QUALITY ASSESSMENT SUMMARY

The results for each of the QC elements are summarized below. The data assessment was performed using guidance in the USEPA Contract Laboratory Program *National Functional Guidelines for Inorganic Data Review* (USEPA, 2010).

Chain-of-Custody Documentation

Chain-of-custody (COC) forms were provided with the laboratory analytical reports. There were no anomalies noted on the COC forms; proper COC protocols appear to have been followed for this sampling event.

Holding Times and Sample Preservation

The holding time is defined as the time that elapses between sample collection and sample analysis. The maximum holding time criteria of 6 months (28 days for mercury) is prescribed for the metals analytical methods to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times of 6 months (28 days for mercury) were met for all analyses.

Instrument Calibration

The laboratory followed the method requirements for satisfactory instrument calibration. Instrument calibration is necessary in order to ensure that the instrument is capable of producing acceptable quantitative data for the metals on the target analyte list in the QAPP. Initial Calibration Verification (ICV) demonstrates that the instrument is capable of acceptable performance at the beginning of the analytical run. The Continuing Calibration Verification (CCV) demonstrates that the initial calibration is still valid by checking the performance of the instrument on any given day that samples are being analyzed.

Each calibration curve was made up of a blank and at least five calibration standards with all measurements being within the working range of the instrument. The calibration curves were fitted using linear regression and each curve had a correlation coefficient of ≥ 0.995.

The ICV/CCV standards were within 90% to 110% of the true value in all cases.

ICP Interference Check Sample

The Interference Check Sample verifies the analytical instrument's ability to overcome isobaric interferences typical of those found in samples. The laboratory analyzed this QC sample at the proper frequency and location of the analytical run. All solution mixtures were within the control limit of 20% of the true value.

Method Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. Method blanks were analyzed with each batch of samples, at a frequency of 1 per 20 samples. For all sample batches, method blanks were analyzed at the required frequency. None of the analytes of interest were detected above the reporting limits in any of the method blanks.

Matrix Spikes

Because the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis. One aliquot of sample is analyzed in the normal manner, and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a percent recovery (%R) is calculated. In the event that a particular element is out of the recovery value control limits in the matrix spiked sample, the laboratory is required to analyze a "post-spiked" sample in order to further isolate any potential quality control issues with the given element.

Matrix spike analyses should be performed once per analytical batch or every 20 field samples, whichever is more frequent. The recovery criteria for matrix spikes are 75% to 125% for all of the elements in this report.

The frequency requirements were met for all analyses, with the following exceptions:

The %R value for antimony was less than the control limit of 80%. Appropriately, in each case the laboratory properly conducted a post-spiked sample. These post-spiked samples were spiked with a higher concentration of element solution as the matrix spike, however, they do not interact with acid and are never heated in the digestion process. The %R values for each of the post spike samples were within the 75% to 125% control limits.

In the process of determining the appropriate action for this potential outlier, it was also noted that there were no detections of antimony in sediment in this sampling event. Based on professional judgment, the antimony reporting limits were not qualified, as there is no effect on the usefulness of the antimony data for this project.

Laboratory Control Samples (LCS)

A laboratory control sample is essentially a blank sample that is spiked with a known amount of analyte concentration and analyzed. It is to be treated much like a matrix spike, without the possibility for matrix interference. As there is no actual sample matrix in the analysis, the analytical expectations for accuracy and precision are usually more rigorous and qualification would apply to all samples in the batch, instead of the parent sample only.

Laboratory control sample analyses should be performed once per analytical batch or every 20 field samples, whichever is more frequent. The recovery criteria for laboratory control samples are specified in the laboratory documents as are the relative percent difference values. The frequency requirements were met for all analyses, and the %R/RPD values were within the proper control limits.

Laboratory Duplicates

Internal laboratory duplicate analyses are performed to monitor the precision of the analyses. Two separate aliquots of a sample are analyzed as distinct samples in the laboratory, and the RPD between

the two results is calculated. Duplicate analyses should be performed once per analytical batch. If one or more of the samples used has a concentration greater than five times the reporting limit for that sample, the absolute difference is used instead of the RPD.

Laboratory duplicates were analyzed at the proper frequency and the specified acceptance criteria were met in all cases.

Field Duplicates

A field duplicate sample was not collected during this sampling event. Sediment sampling will be performed at locations along the Snohomish River; a field duplicate will be analyzed during this sediment sampling round.

Reporting Limits and Miscellaneous

The reporting limits for the target analytes met the requirements that were prescribed in the QAPP.

Internal Standards/Tunes

The laboratory appropriately added an internal standard into each sample, with the exception of the instrument tune. The intensity of the internal standard response in each sample was monitored and compared to the intensity of the response for that internal standard in the calibration blank. The percent relative intensity (%RI) in the samples were within 60-125% of the response in the calibration blank for the appropriate analytical run.

OVERALL ASSESSMENT

As was determined by this data quality assessement, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the LCS and MS %R values, with the exceptions mentioned above. Precision was acceptable, as demonstrated by the laboratory duplicate RPD values.

All data, as qualified, are acceptable for use.

APPENDIX E
Slug and Drawdown Testing

APPENDIX E
SLUG AND DRAWDOWN TESTING

Slug and drawdown testing were performed on selected wells at the Site between January 29 and 31, 2013. The purpose of the slug and drawdown testing was to use the data, in combination with previously gathered site data (specifically aquifer thickness values), to estimate hydraulic conductivity (*K*) within the shallow and deep aquifers in the vicinity of the tested wells. Average hydraulic conductivity for the deep aquifer was also estimated based on a tidal study that was performed at the Site (see Appendix F).

Slug testing was performed on 18 wells (LLMW-03S, LLMW-03D, LLMW-11S, LLMW-11D, LLMW-12S, LLMW-12D, LLMW-16S, LLMW-16D, LLMW-22S, LLMW-22D, LLMW-27D, EV22A, EV22B, BP-05S, BP-05D, BP05-D2, BP08S and BP-08D). The majority of the wells selected for slug testing were selected because they are located generally downgradient of the former smelter. Several wells were selected that are not located directly downgradient of the former smelter; these wells were selected to provide additional spatial coverage at the Site.

Follow-up short-term drawdown testing was performed on a subset of the 18 wells to collect additional data to use to estimate K. During the drawdown phase, a cone of depression develops and often propagates beyond the radius of influence achieved during slug testing. When the pump is shut off, well recovery is monitored in much the same way as in slug testing. The wells that were selected for drawdown testing included LLMW-11S, LLMW-11D, LLMW-13D, BP-05S, BP-05D and BP-05D2. These wells were selected for drawdown testing because they are located generally downgradient of the former smelter and in the area where a plume of groundwater containing relatively high arsenic concentrations has been observed. (Due to a field error, LLMW-16D was drawn down rather than LLMW-13D).

Field procedures, as well as the procedure for data analysis from the slug and drawdown testing are described below. Plots of the slug and drawdown tests are presented in Figures E-1 through E-26.

Slug Testing

Field Procedures

Each slug test was performed in two stages, a falling head stage followed by a rising head stage. For each test, the water level in the well was measured and recorded at 0.25-second intervals using a decontaminated submerged water-level sensor consisting of a piezoelectric pressure transducer and automated datalogger (transducer/datalogger) programmed to record water pressure (head) above the sensor. The water level was also measured using a decontaminated electronic water level indicator ("e-tape") as a check on the transducer/datalogger.

Prior to slug testing, the pre-test static water level was measured in each well from a surveyed reference mark on top of the well casing. For the falling head stage, a slug (weighted 5-foot length of sealed PVC casing) of known volume was rapidly lowered into the well, causing displacement of the water, which rose rapidly above its initial level. The water level in the well was then monitored until it returned (fell) to the approximate pre-test water level. For the rising-head stage, the slug was rapidly removed from the well, causing the water level to drop below its pre-test static level, and the water level in the well was monitored until it returned (rose) to the approximate pre-test static water level. Well LLMW-11D was

tested twice because the falling head data from the first test appeared suspect (see the data points at less than 5 seconds and greater than 12 seconds on the falling head graph of Figure E-4).

Data Analysis

Both falling head stage and rising-head stage data can be used only in wells where the screened interval is under the water table during all portions of the test. In wells where the screened interval is above the water table, only the rising-head stage data is used, because some of water displaced during the falling head stage portion of the test can drain into the unsaturated zone above the water table. Wells in which the screened interval was above the water table included LLMW-11S, LLMW-12S and LLMW-22S.

The data from all slug tests were downloaded from the transducer/datalogger, processed using spreadsheet software, and then plotted to identify the type of hydraulic response. In moderate to low-permeability soils, the recovery of the water level back to its pre-test static level is typically in the form of a monotonic trend, as shown for example in well LLMW-11S (Figure E-3). This type of hydraulic response has been classified as "over-damped" in the technical literature (Butler 1998). Data from wells exhibiting this type of response were analyzed using the method of Bouwer and Rice (1976).

In higher permeability soils, where recovery is more rapid, the recovery of the water level back to its pre-test static level is typically in the form of decaying oscillations (Neville, 2011), as shown for example in wells LLMW-03D, LLMW-12D and LLMW-22D (Figures E-2, E-7 and E-11). This type of hydraulic response has been classified as "under-damped," and is typically due to high hydraulic conductivity of the aquifer in the vicinity of the well. Data from wells exhibiting this type of response were analyzed using a high-conductivity analytical method developed by Butler and Garnett (2000). The authors developed their analytical method based on the work of Van Der Kamp (1976) and Kipp (1985), refining the method to be applicable to wells that do not penetrate the entire thickness of the aquifer, as is the case in wells tested in this study. The Butler and Garnett (2000) method is widely used in slug test data analysis and can be applied to data from both confined and unconfined aquifers. Slug tests in shallow wells were analyzed assuming unconfined conditions because the shallow aquifer is well documented to be unconfined. Slug tests in deep wells were analyzed assuming confined conditions because several lines of evidence suggested the deep aquifer was confined. (This assumption was further corroborated by the tidal study – see Appendix F).

The hydraulic conductivity (K) values were calculated based on aquifer thickness and the slope of the fitted lines shown on Figures E-1 through E-19. Aquifer thicknesses at each location were based on stratigraphy observed during drilling, as recorded on boring logs.

Drawdown Testing

Field Procedure

Short-duration drawdown testing was performed on six wells (LLMW-11S, LLMW-11D, LLMW-16D, BP-05S, BP-05D and BP-05D2). Similar to the slug test procedure, the water level in each well was measured and recorded at 0.25-second intervals using a decontaminated submerged transducer/datalogger installed in the well. The water level was also measured using a decontaminated e-tape as a check on the transducer/datalogger. The pre-test static water level was measured in each well from a surveyed reference mark on top of the well casing. A decontaminated submersible pump with a pumping capacity of 2 gallons per minute (at 30 feet of lift) was used for each test. The well was

pumped for 30 minutes to allow a cone of depression to develop and propagate beyond the radius of influence achieved during slug testing. Well BP-05S was tested twice because the drawdown portion of the first test was inadvertently ended before the 30-minute drawdown period prescribed by the project Sampling and Analysis Plan (SAP).

Data Analysis

Drawdown data were analyzed using the Cooper-Jacob (1946) analytical method for data collected during the pumping phase, and using the Theis Recovery Method (Theis 1935) for the recovery phase. Plots of the aquifer response to pumping as well as the recovery and the trend lines are presented in Figures E-20 through E-26. Transmissivity (T) is calculated based on the slope of the fitted lines shown on Figures E-20 through E-26. Hydraulic conductivity (K) is calculated based on aquifer thickness and T. (Storativity [S] is often estimated along with T by measuring water levels in adjacent observation wells, however S was not estimated during this study because observation wells were not monitored).

It is necessary to use best professional judgement to select the data points used for the fitted line for T. For example, the drawdown portion of the test typically takes some time to reach a constant drawdown rate (see for example the upper [pumping] graph in BP-05S [Figure E-20]). Furthermore, when pumps were shut off at the end of the drawdown phase, residual water in the discharge tubing above the pump likely flowed back into the well, which is a likely explanation of the data points seen above the fitted line in the early portions of the recovery phase (see for example the lower [recovery] graph in BP-05S, [Figure E-20]). These data were not included in the analyses of T (and hence K).

Data collected from wells that were drawdown tested *and* tidally influenced required correction to compensate for the changing ambient groundwater level over the duration of the test. (The tidal correction was not necessary during slug testing because the slug test time is relatively short compared to water level changes due to tidal influence.) The wells that were observed to be tidally influenced during the tidal study (see Appendix F) that were drawdown tested included LLMW-05D, LLMW-11D and LLMW-16D. A tidal correction, based on the tidal efficiency observed at each well during the tidal study, was applied to the wells that were tidally influenced.

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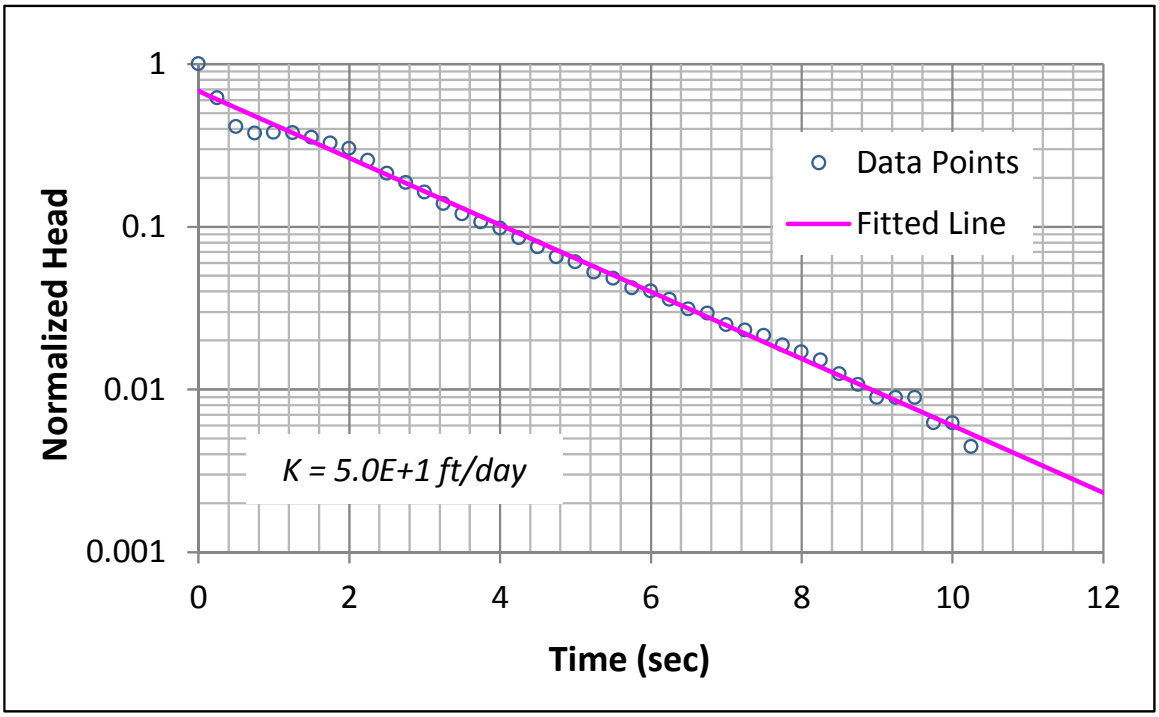

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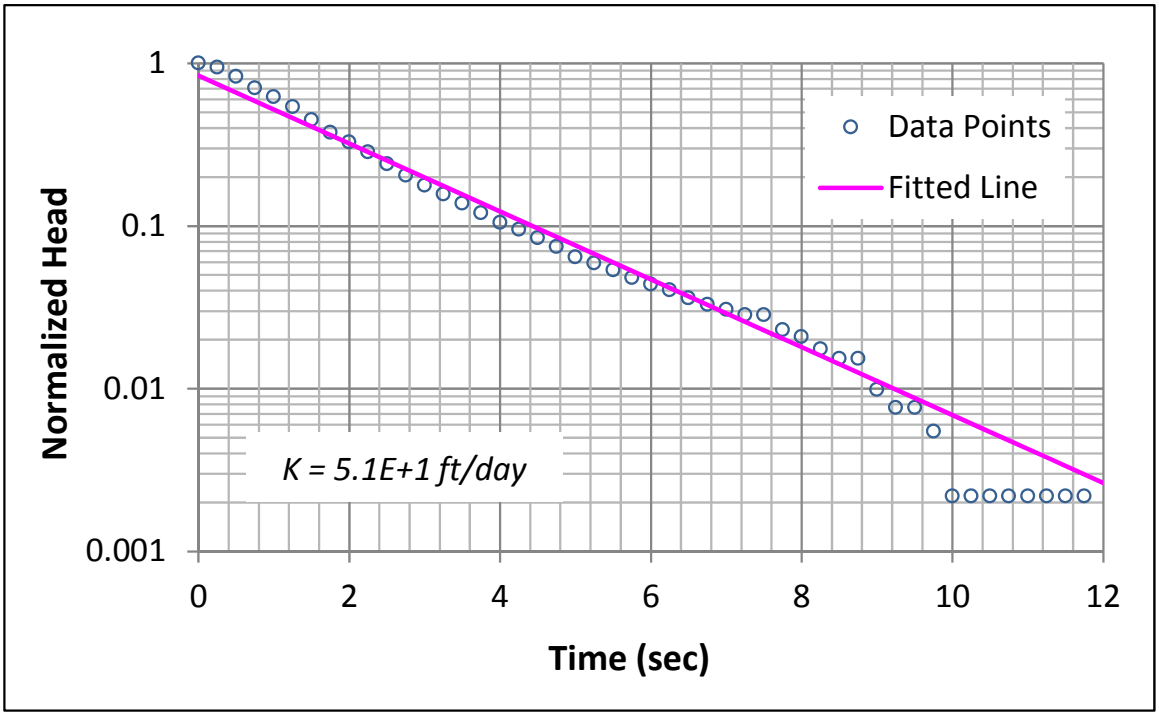

Notes:

1. Slug Test conducted in Monitoring Well MW-03S on 1/30, 2013.
2. Overdamped slug test response analyzed using Bouwer & Rice (1976) method.
3. Formation thickness, B = 12.8 feet used to calculate hydraulic conductivity, K.

Aquifer Slug Test, MW-03S

Everett Smelter – Lowland Area

GeoEngineers

Figure E-1

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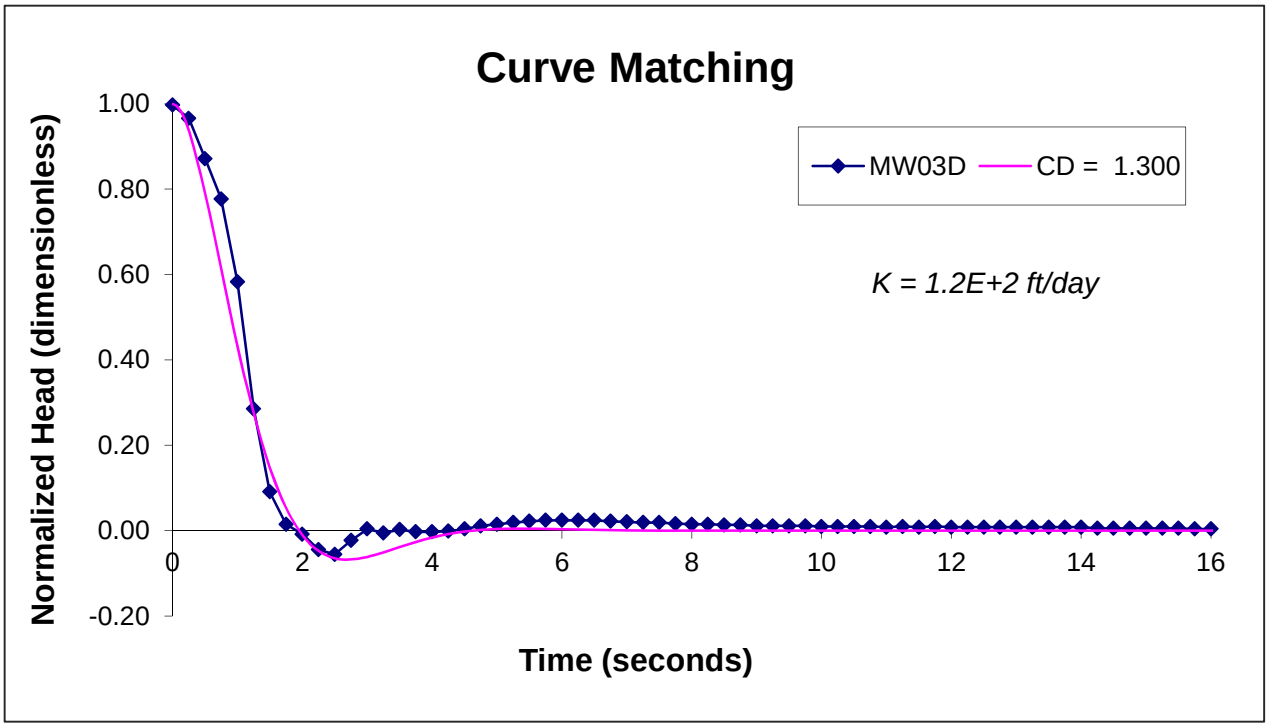

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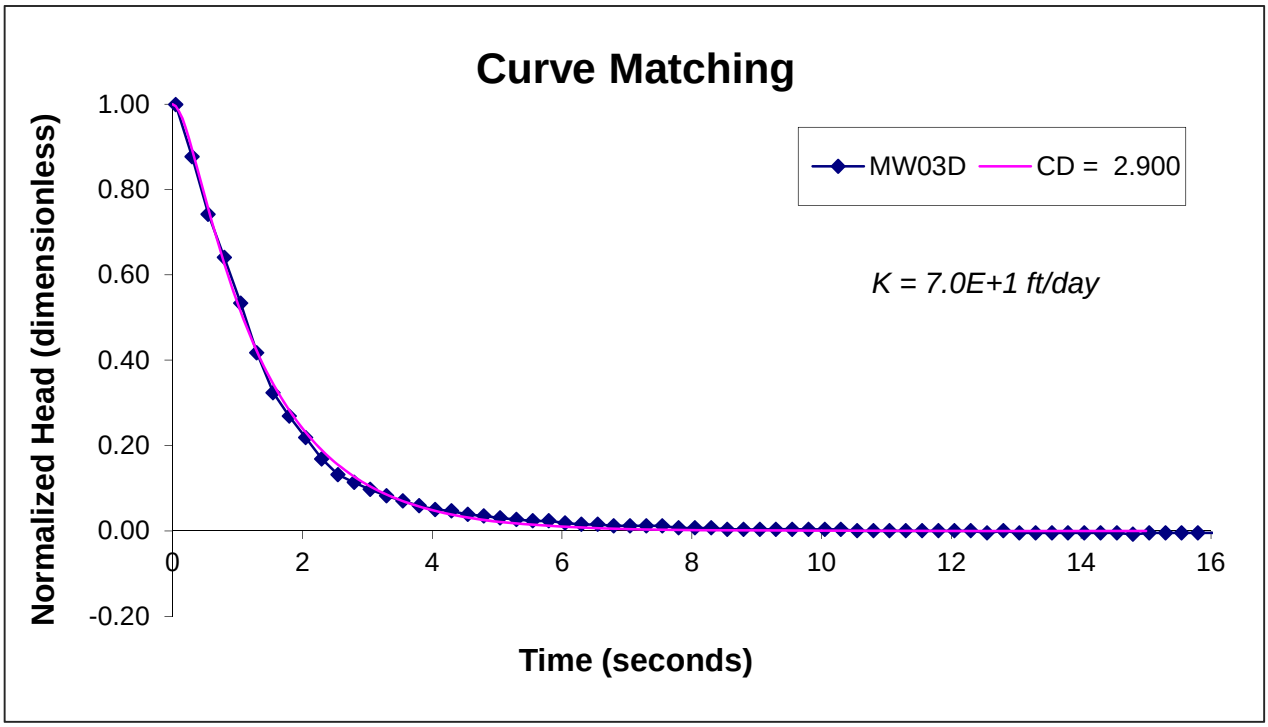

Notes:

1. Slug Test conducted in Monitoring Well MW-03D on 1/30, 2013.
2. Underdamped slug test response analyzed using Butler & Garnett (2000) method for High-K.
3. Formation thickness, B = 30.8 feet used to calculate hydraulic conductivity, K.

Aquifer Slug Test, MW-03D	
Everett Smelter – Lowland Area	
GeoEngineers	Figure E-2

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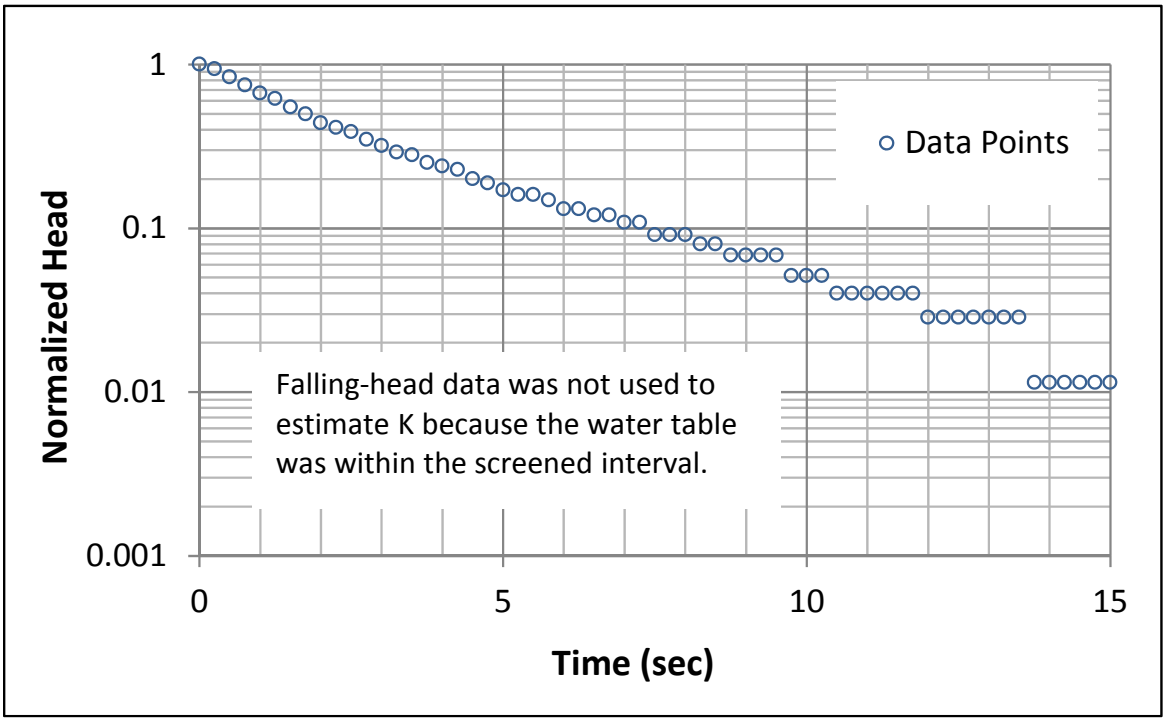

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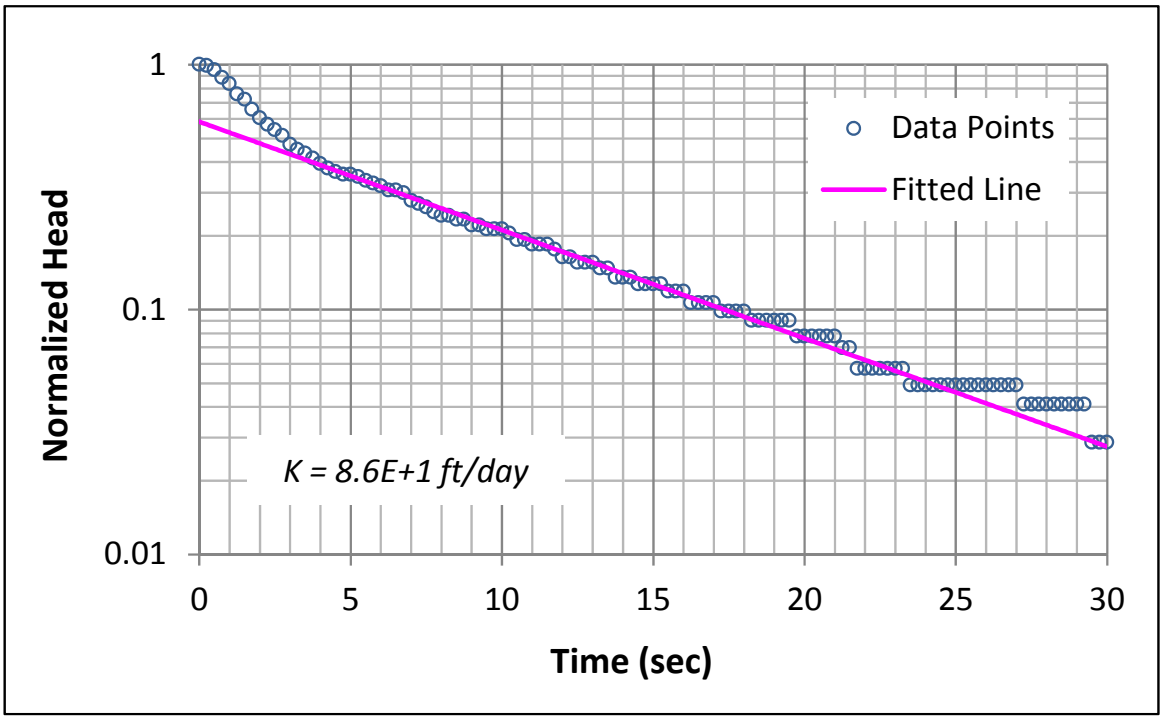
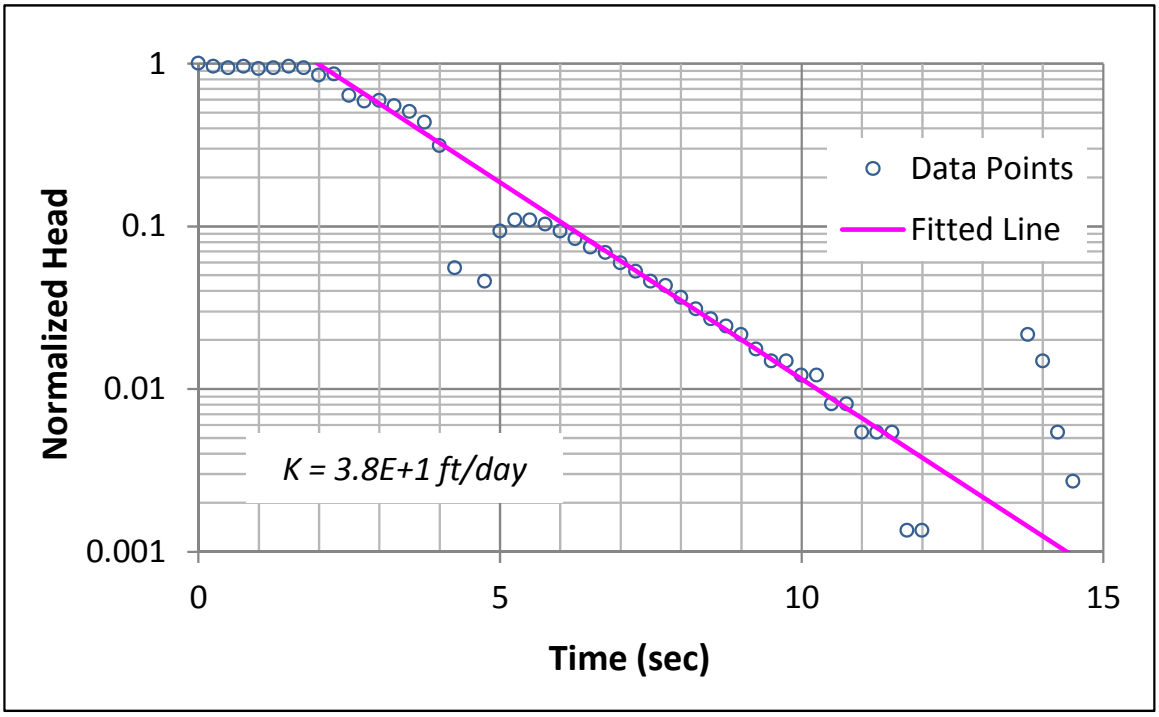


Notes:

1. Slug Test conducted in Monitoring Well MW-11S on 1/31, 2013.
2. Overdamped rising-head slug test response analyzed using Bouwer & Rice (1976) method.
3. Formation thickness, B = 8.5 feet used to calculate hydraulic conductivity, K.

Aquifer Slug Test, MW-11S	
Everett Smelter – Lowland Area	
GeoEngineers	Figure E-3

Falling Head 1



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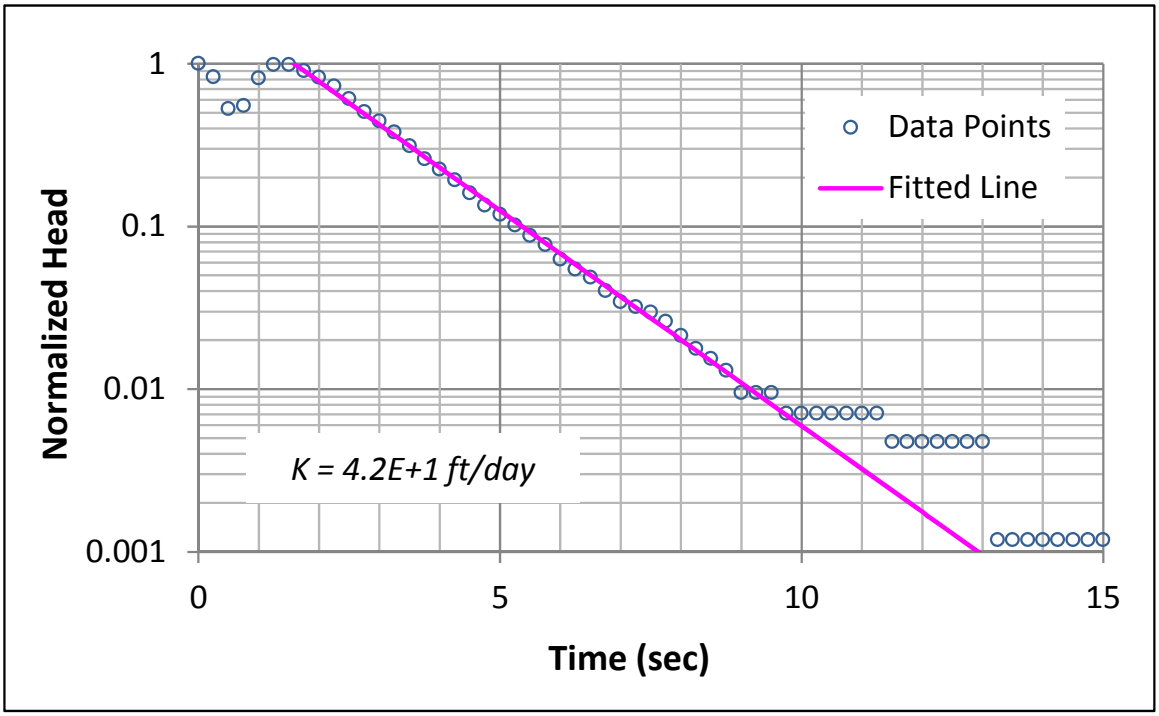

Notes:

1. Slug Test conducted in Monitoring Well MW-11D on 1/29, 2013.
2. Overdamped rising-head slug test response analyzed using Bouwer & Rice (1976) method.
3. Formation thickness, B = 17.7 feet used to calculate hydraulic conductivity, K.

Aquifer Slug Test 1, MW-11D	
Everett Smelter – Lowland Area	
GeoEngineers	Figure E-4

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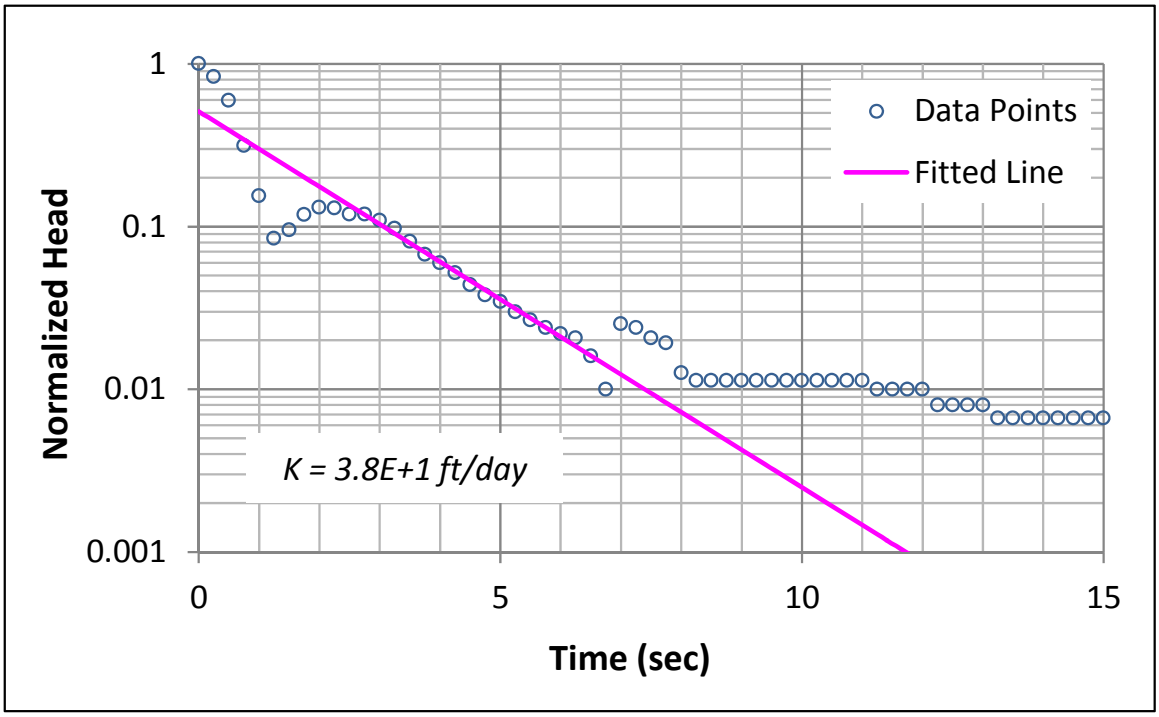

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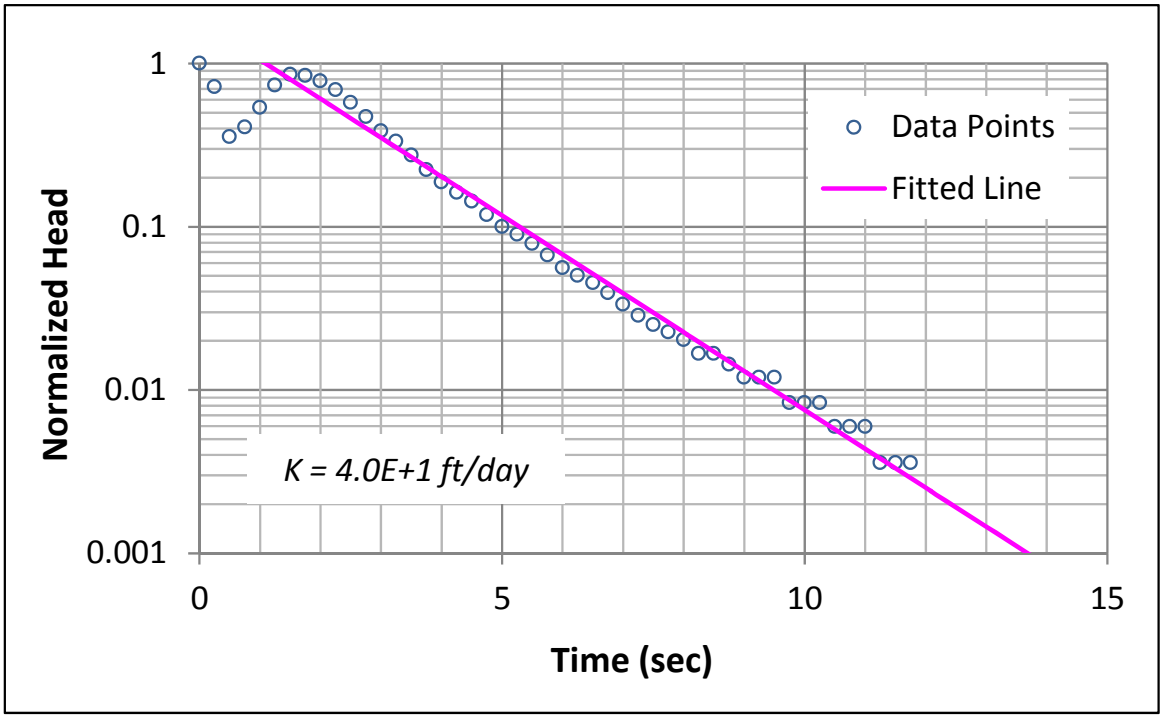

Notes:

1. Slug Test conducted in Monitoring Well MW-11D on 1/31, 2013.
2. Overdamped rising-head slug test response analyzed using Bouwer & Rice (1976) method.
3. Formation thickness, B = 21.1 feet used to calculate hydraulic conductivity, K.

Aquifer Slug Test 2, MW-11D

Everett Smelter – Lowland Area

GeoEngineers | **Figure E-5**

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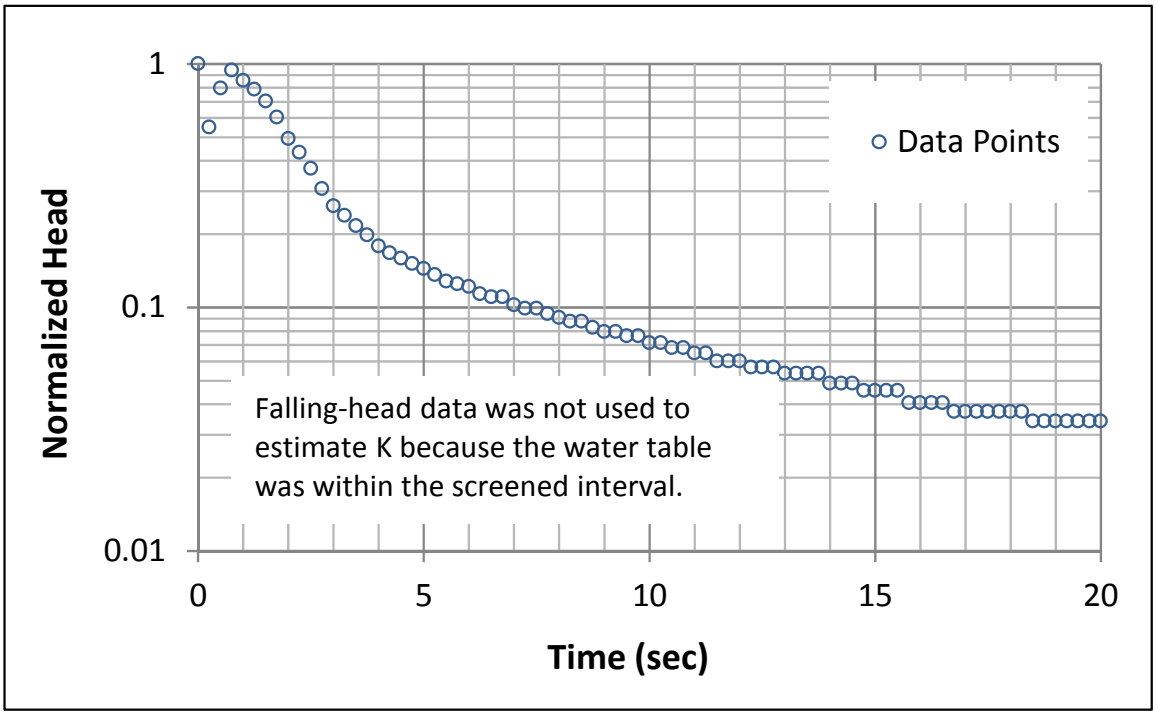

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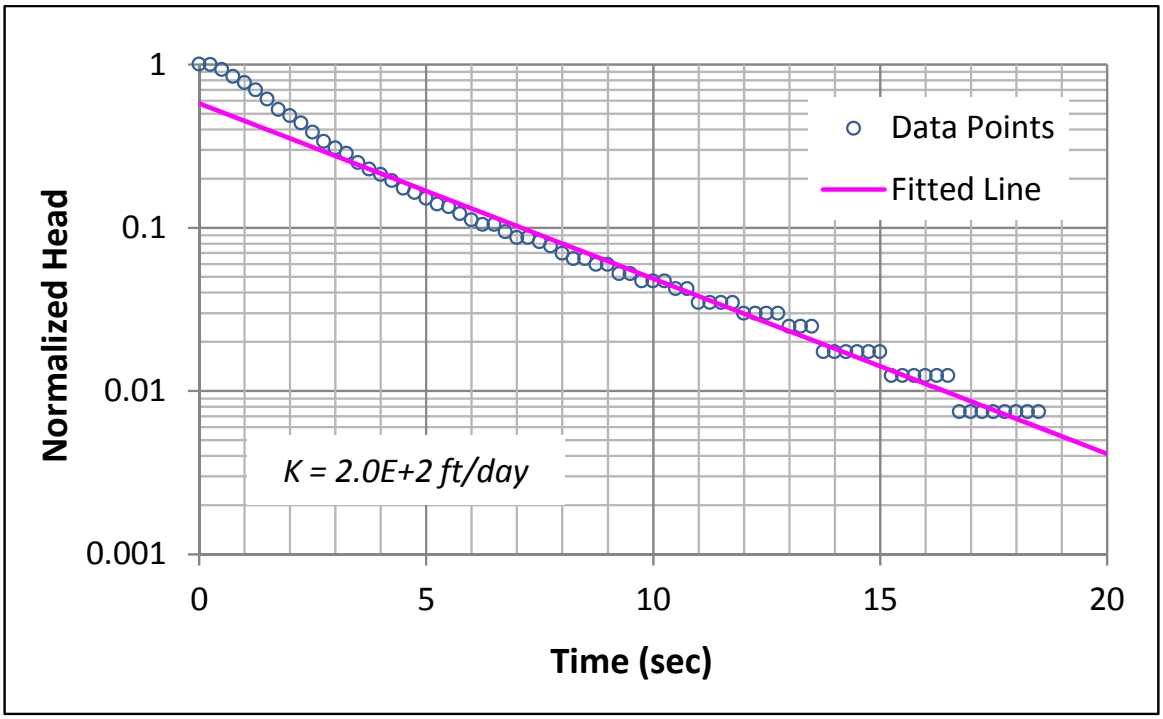

Notes:

1. Slug Test conducted in Monitoring Well MW-12S on 1/30, 2013.
2. Overdamped rising-head slug test response analyzed using Bouwer & Rice (1976) method.
3. Formation thickness, B = 9.4 feet used to calculate hydraulic conductivity, K.

Aquifer Slug Test, MW-12S	
Everett Smelter – Lowland Area	
GeoEngineers	Figure E-6

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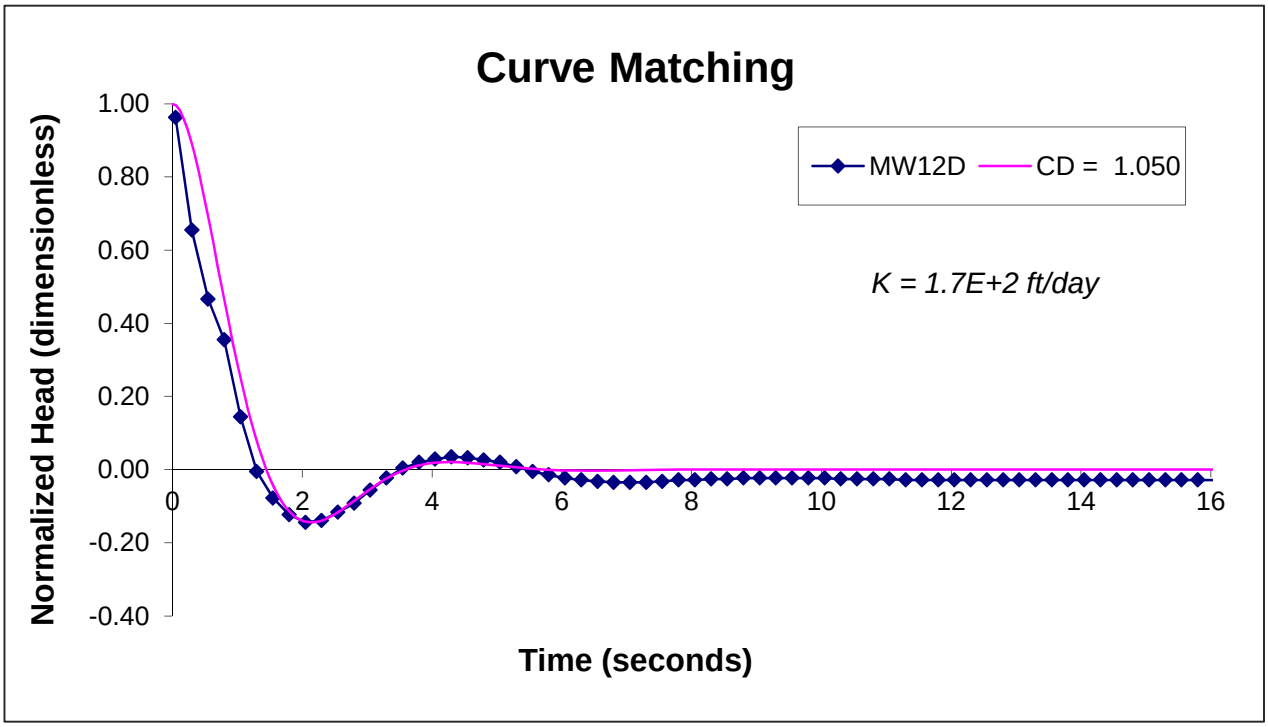

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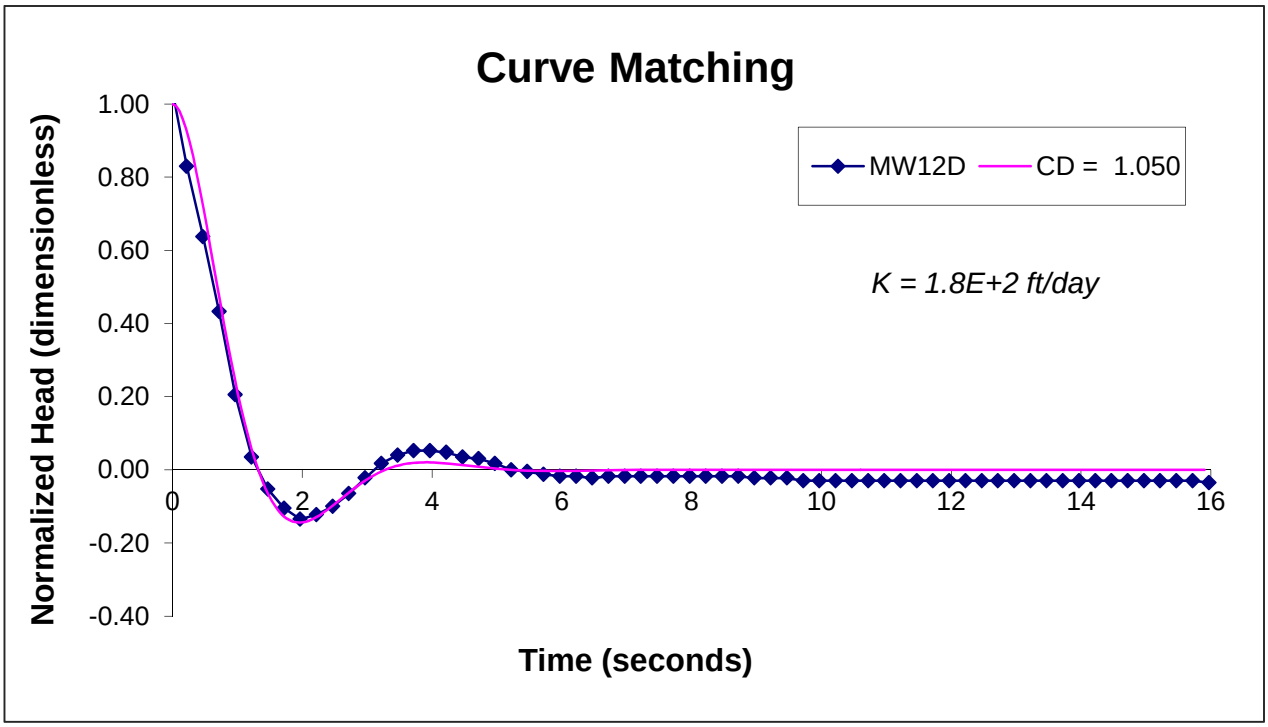

Notes:

1. Slug Test conducted in Monitoring Well MW-12D on 1/30, 2013.
2. Underdamped slug test response analyzed using Butler & Garnett (2000) method for High-K.
3. Formation thickness, B = 25.7 feet used to calculate hydraulic conductivity, K.

Aquifer Slug Test, MW-12D

Everett Smelter – Lowland Area

GeoEngineers

Figure E-7

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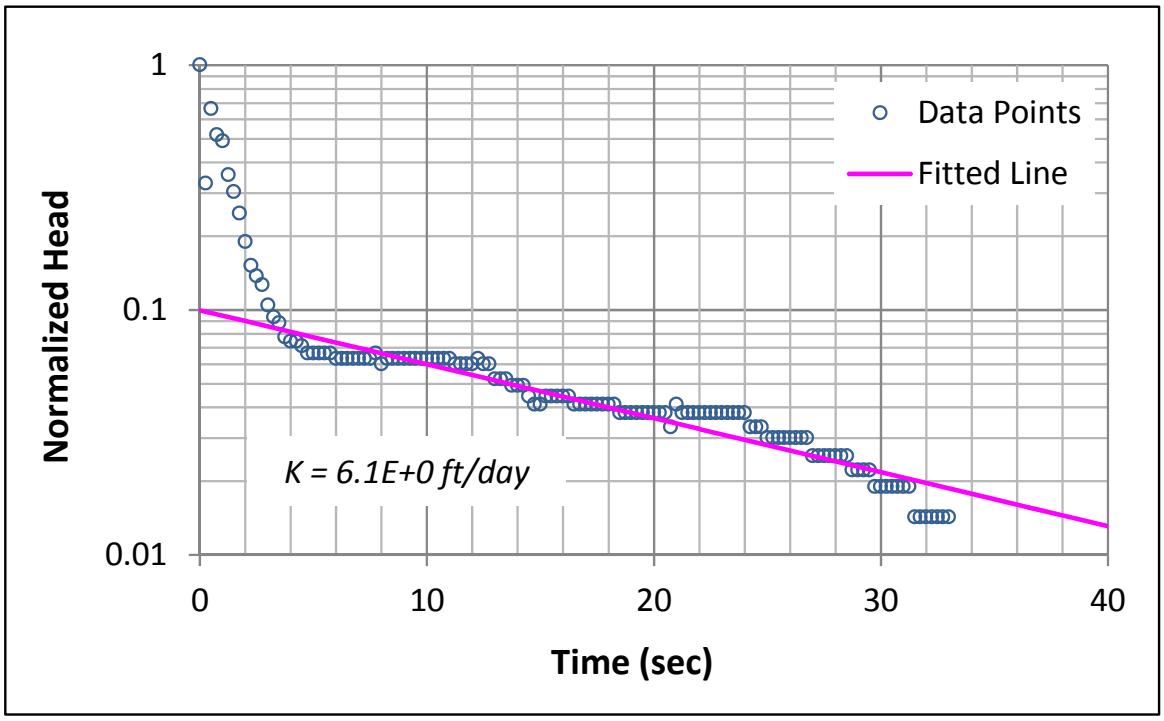

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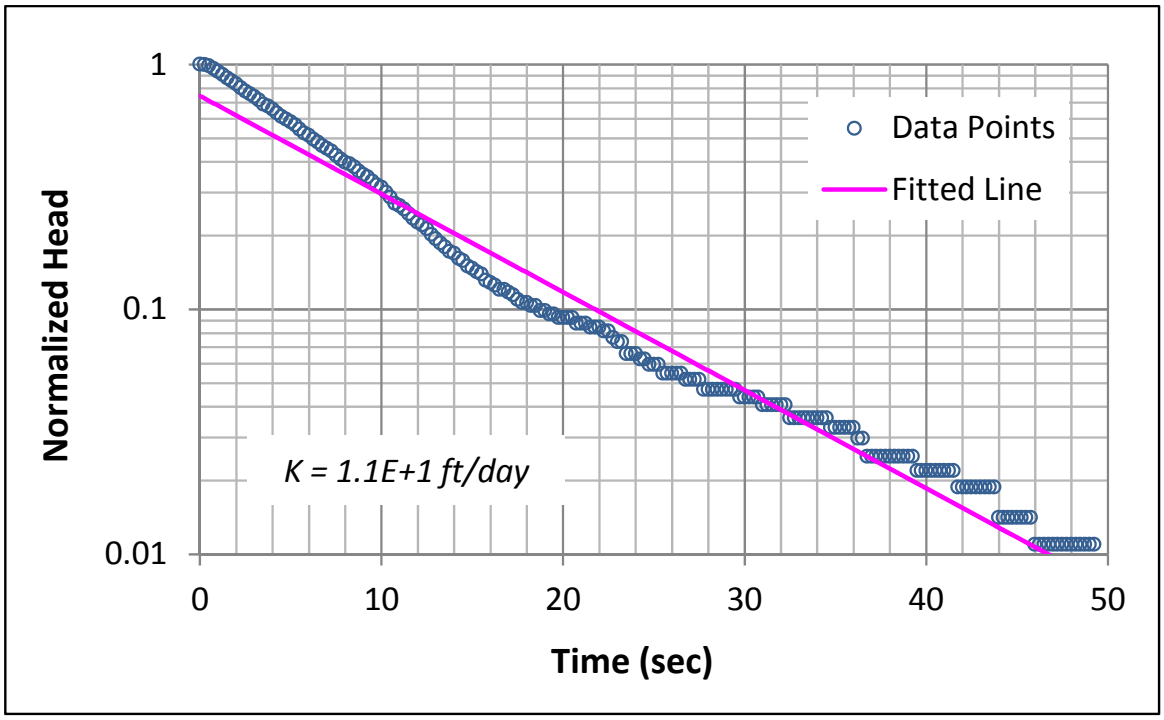
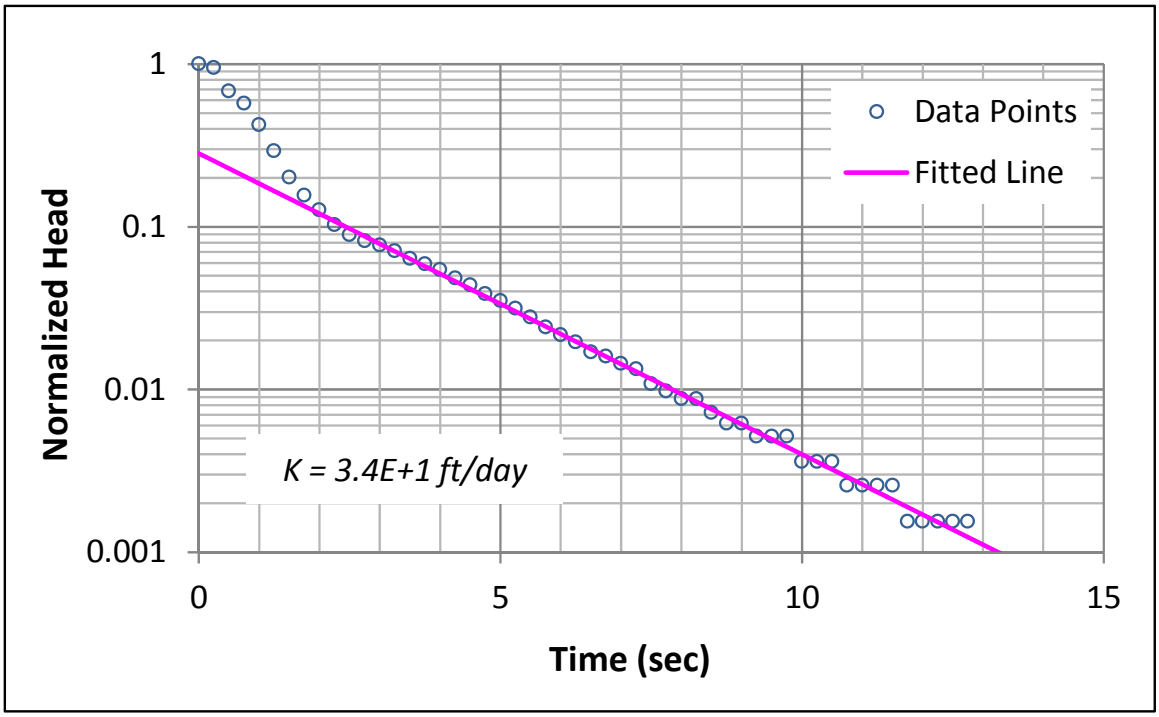


Notes:

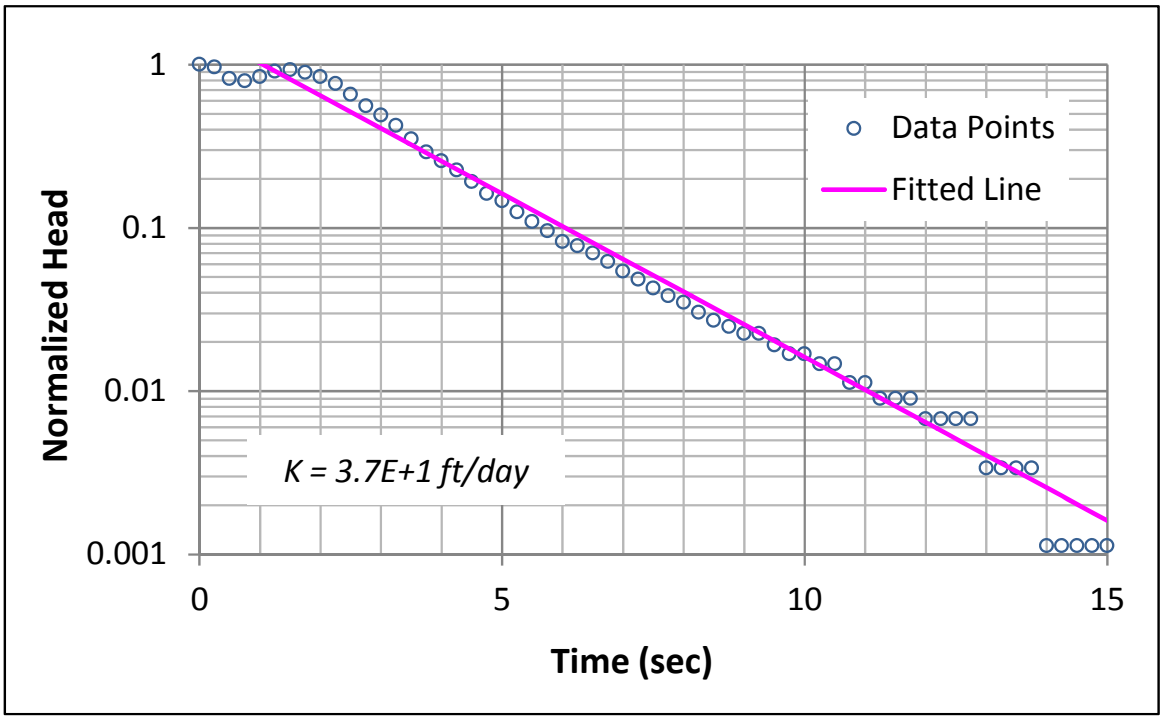
1. Slug Test conducted in Monitoring Well MW-16S on 1/29, 2013.
2. Overdamped rising-head slug test response analyzed using Bouwer & Rice (1976) method.
3. Formation thickness, B = 9.9 feet used to calculate hydraulic conductivity, K.

Aquifer Slug Test, MW-16S	
Everett Smelter – Lowland Area	
GeoEngineers	Figure E-8

Falling Head



Rising Head

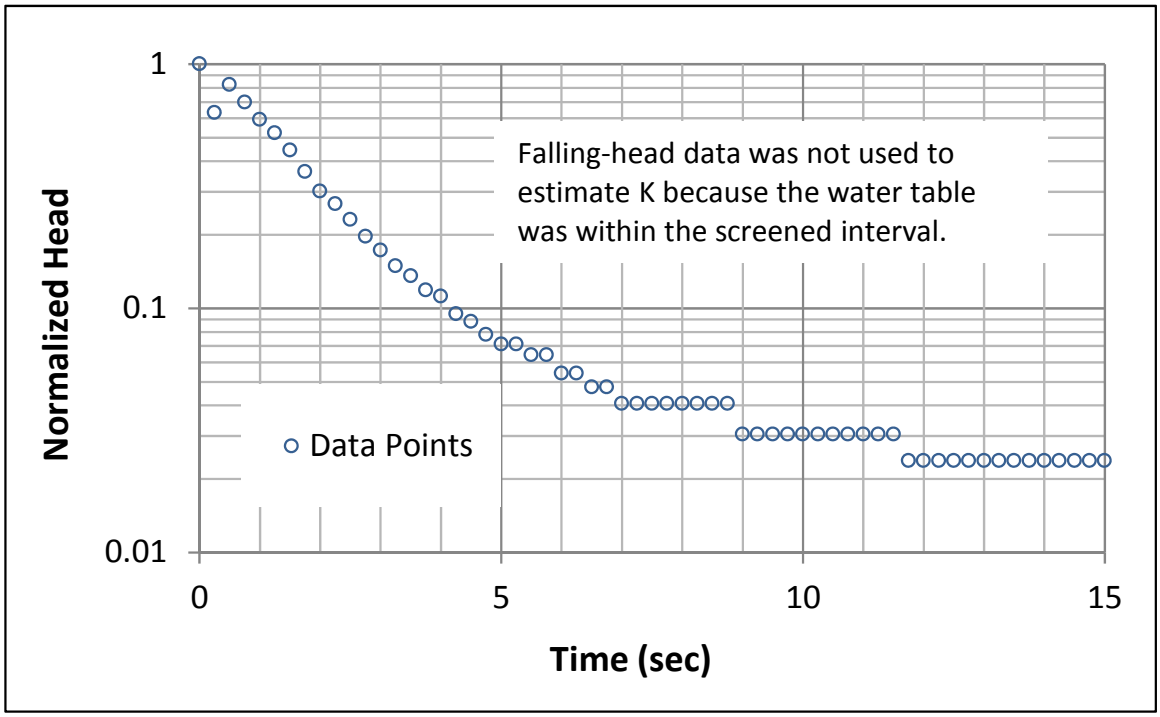


Notes:

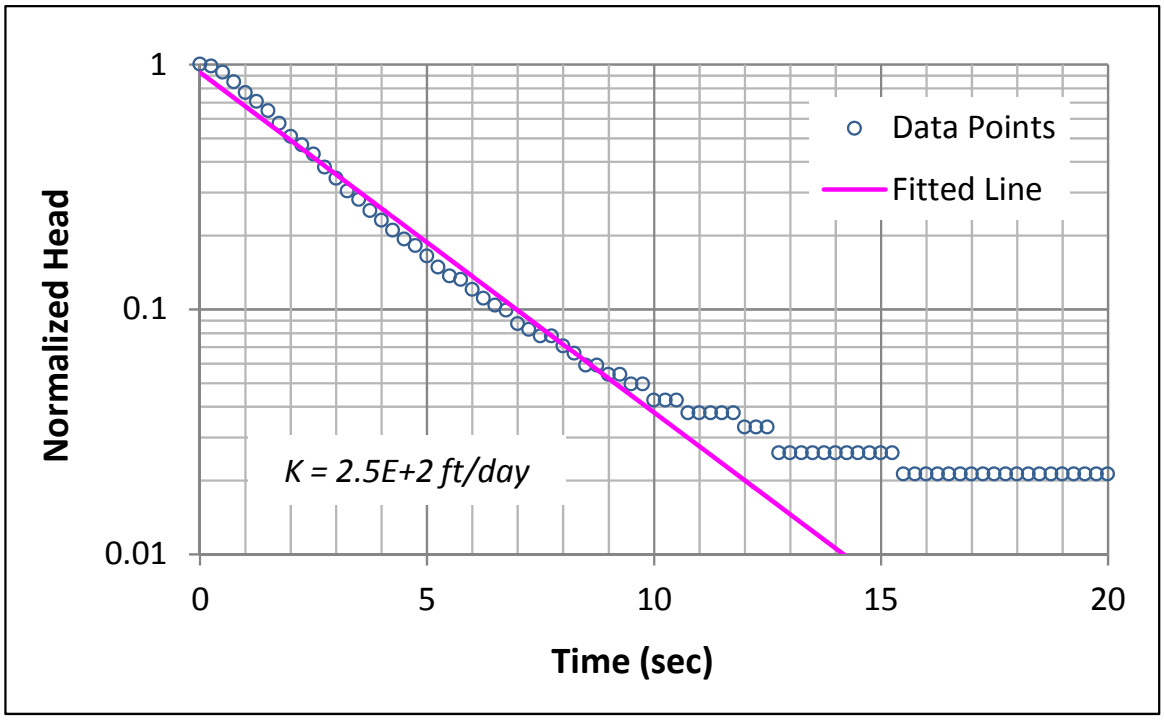
1. Slug Test conducted in Monitoring Well MW-16D on 2/1, 2013.
2. Overdamped rising-head slug test response analyzed using Bouwer & Rice (1976) method.
3. Formation thickness, B = 33.3 feet used to calculate hydraulic conductivity, K.

Aquifer Slug Test, MW-16D	
Everett Smelter – Lowland Area	
GeoEngineers	Figure E-9

Falling Head



Rising Head



Notes:

1. Slug Test conducted in Monitoring Well MW-22S on 1/30, 2013.
2. Overdamped rising-head slug test response analyzed using Bouwer & Rice (1976) method.
3. Formation thickness, B = 8.8 feet used to calculate hydraulic conductivity, K.

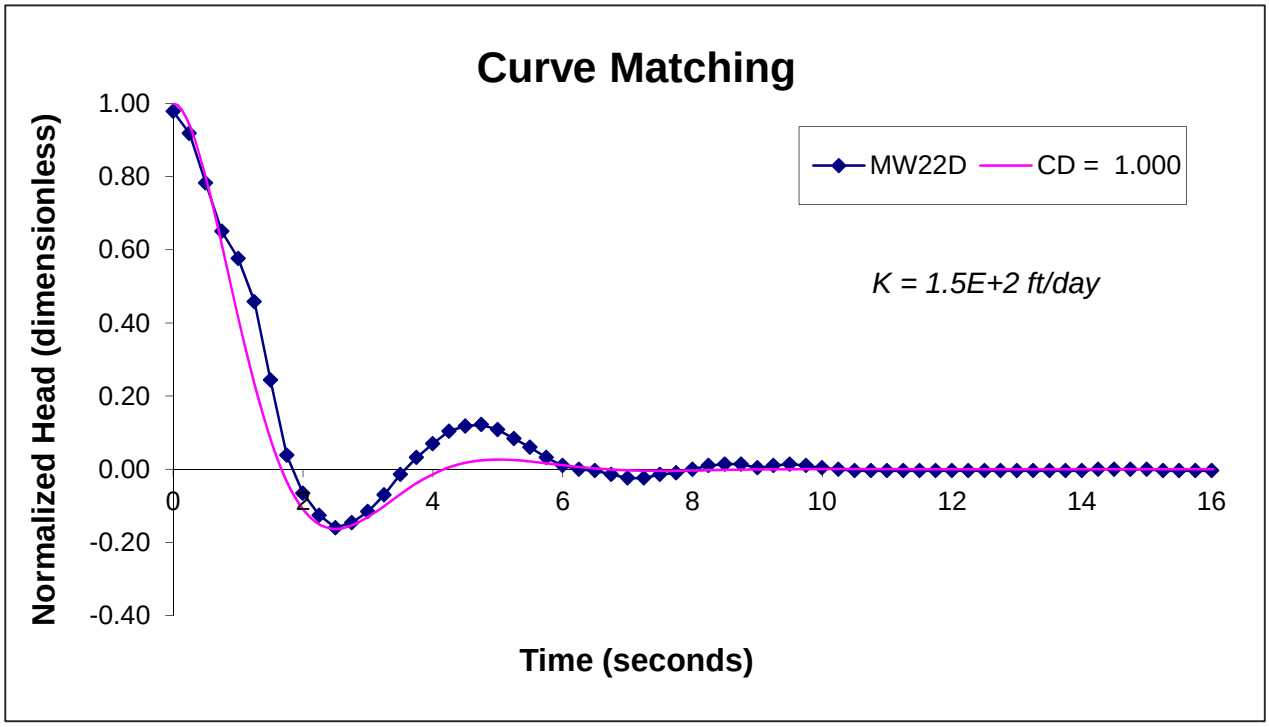
Aquifer Slug Test, MW-22S

Everett Smelter – Lowland Area

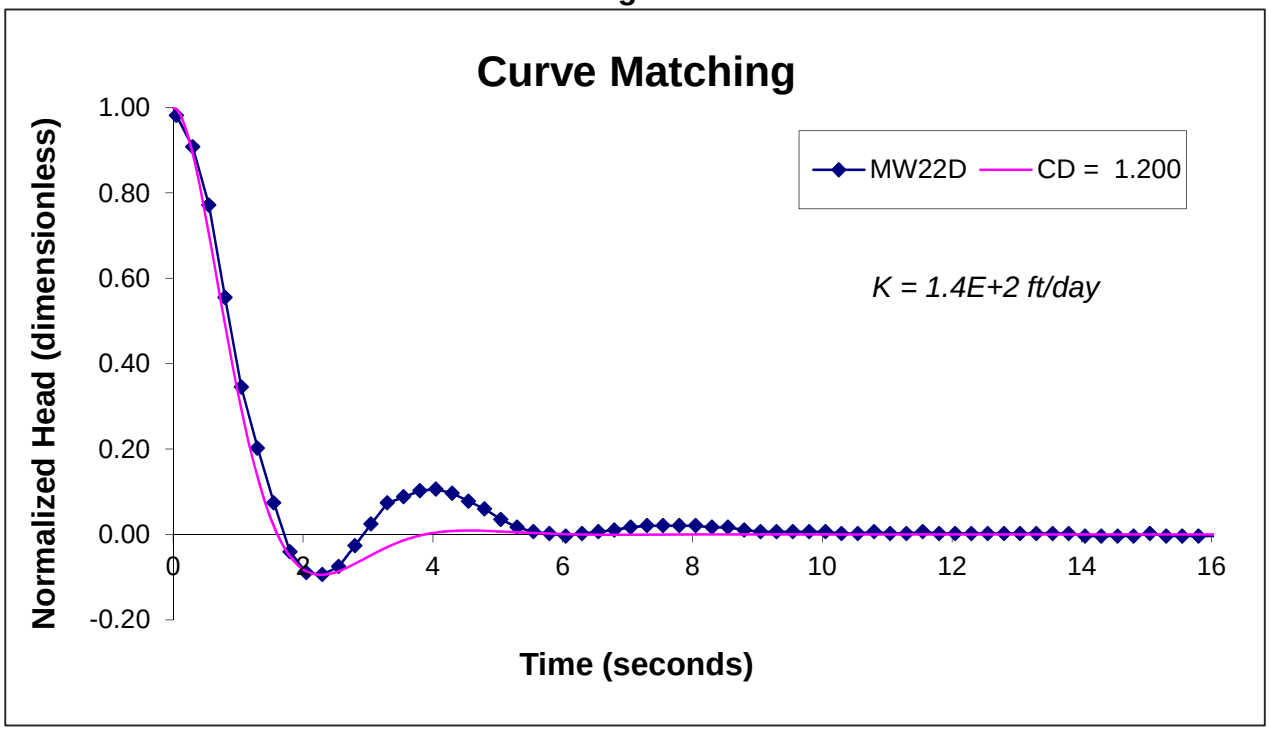
GeoEngineers

Figure E-10

Falling Head



Rising Head



Notes:

1. Slug Test conducted in Monitoring Well MW-22D on 1/30, 2013.
2. Underdamped slug test response analyzed using Butler & Garnett (2000) method for High-K.
3. Formation thickness, B = 27.1 feet used to calculate hydraulic conductivity, K.

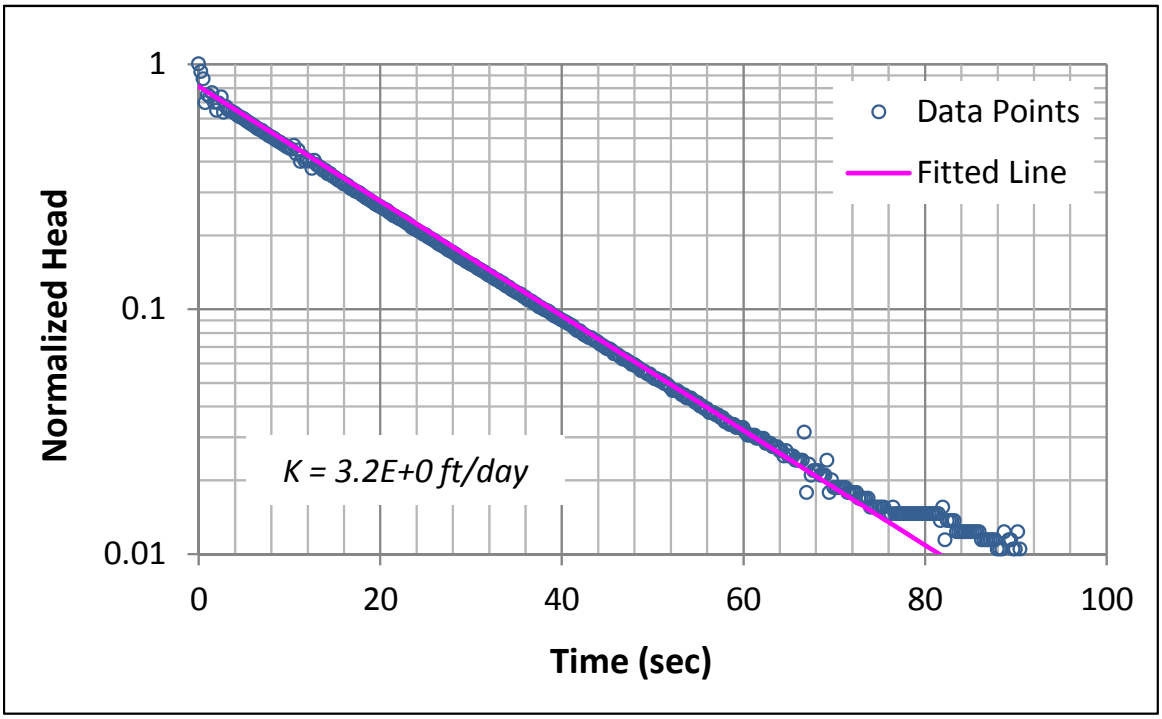
Aquifer Slug Test, MW-22D

Everett Smelter – Lowland Area

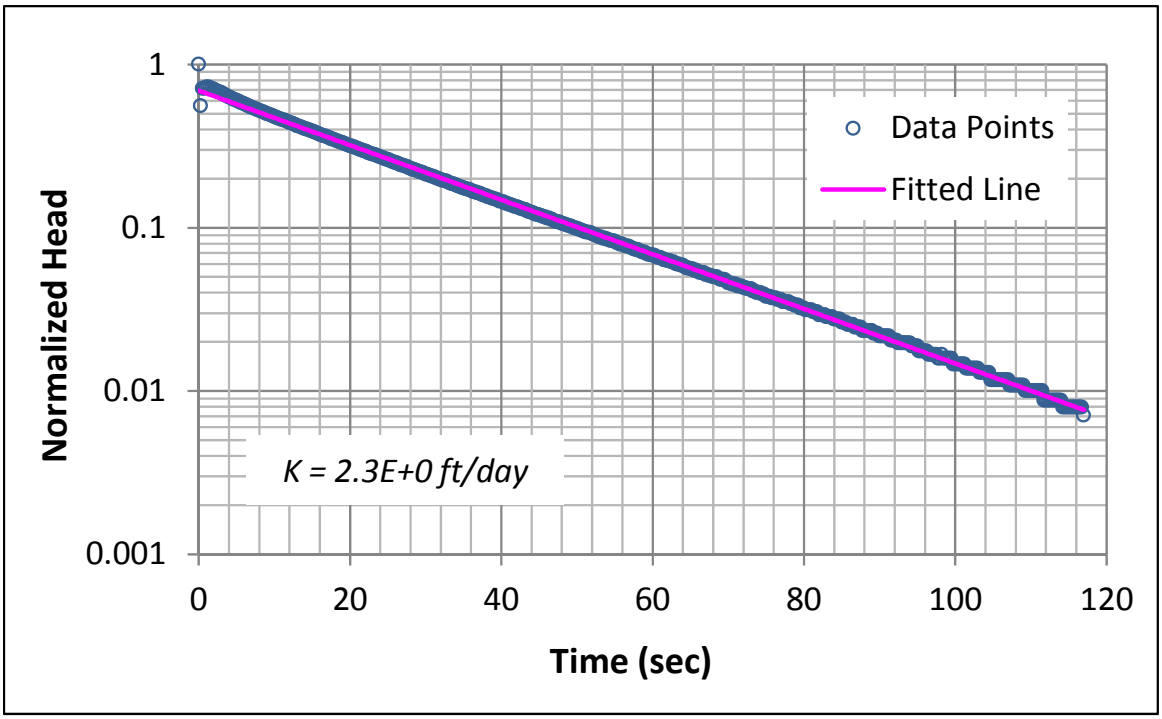
GeoEngineers

Figure E-11

Falling Head



Rising Head



Notes:

1. Slug Test conducted in Monitoring Well MW-27D on 1/30, 2013.
2. Overdamped rising-head slug test response analyzed using Bouwer & Rice (1976) method.
3. Formation thickness, B = 18.2 feet used to calculate hydraulic conductivity, K.

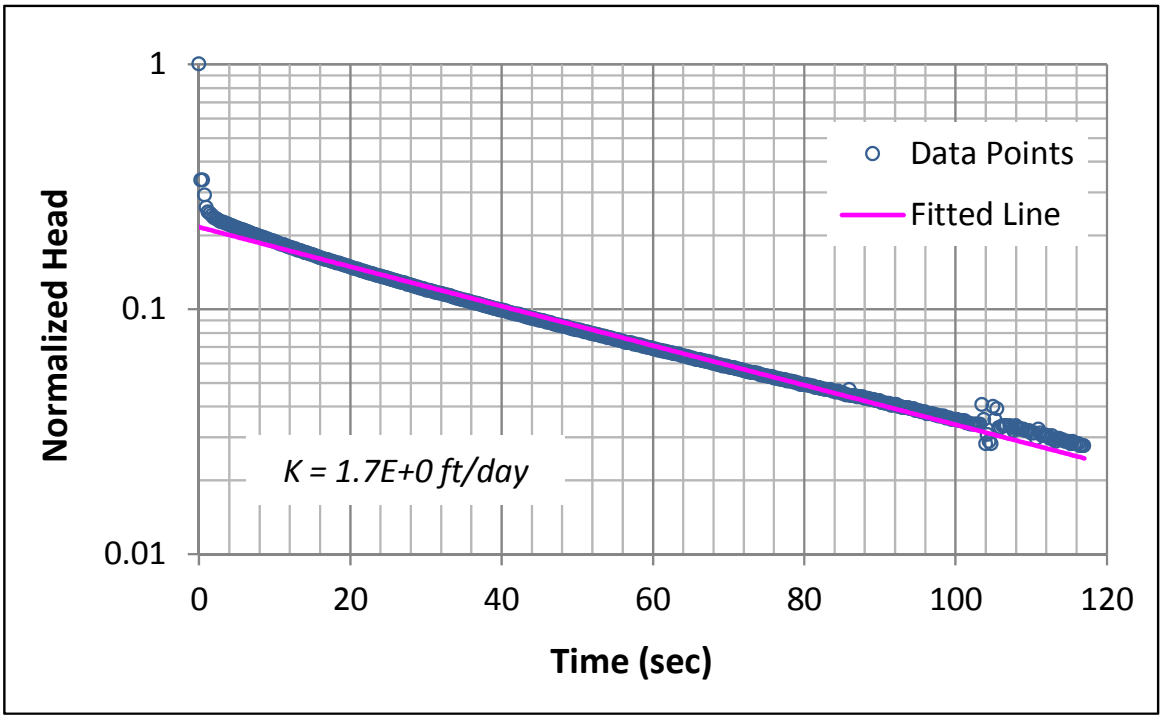
Aquifer Slug Test, MW-27D

Everett Smelter – Lowland Area

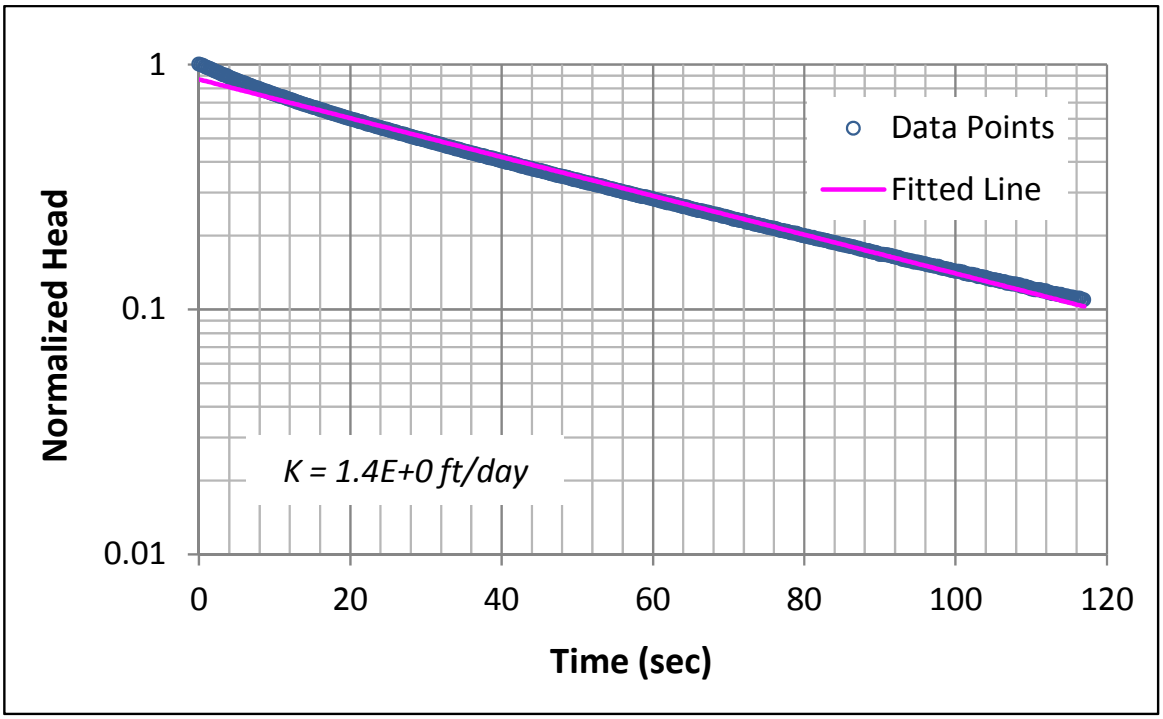
GeoEngineers

Figure E-12

Falling Head



Rising Head

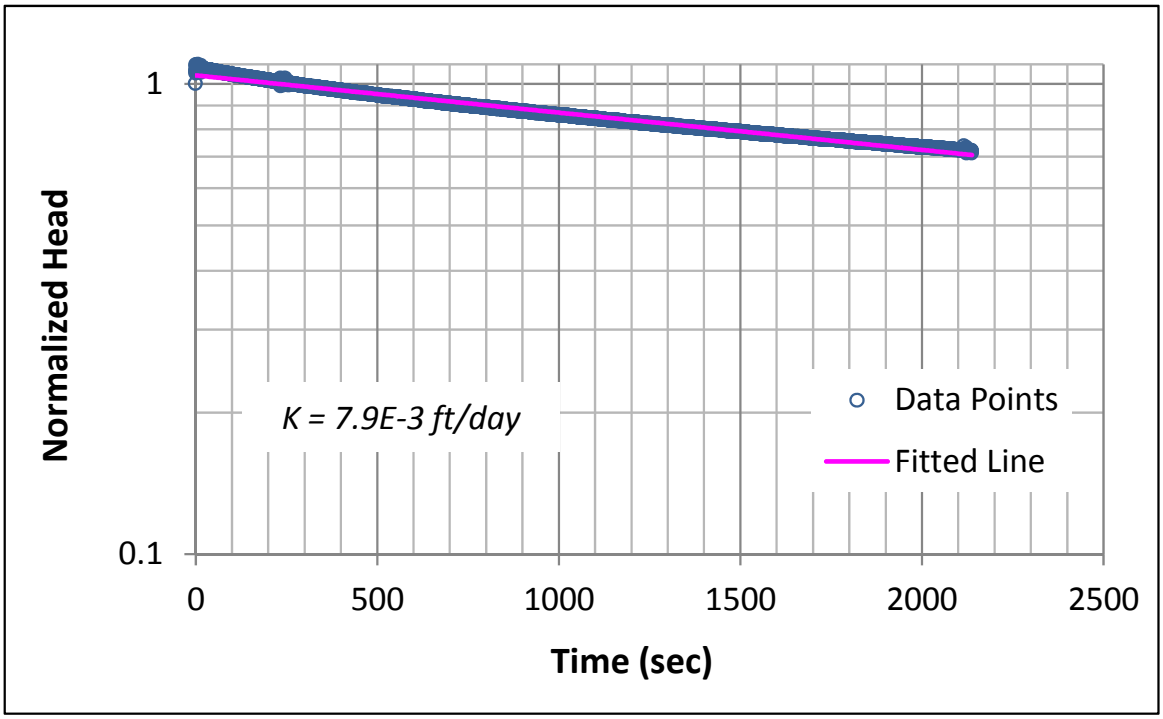


Notes:

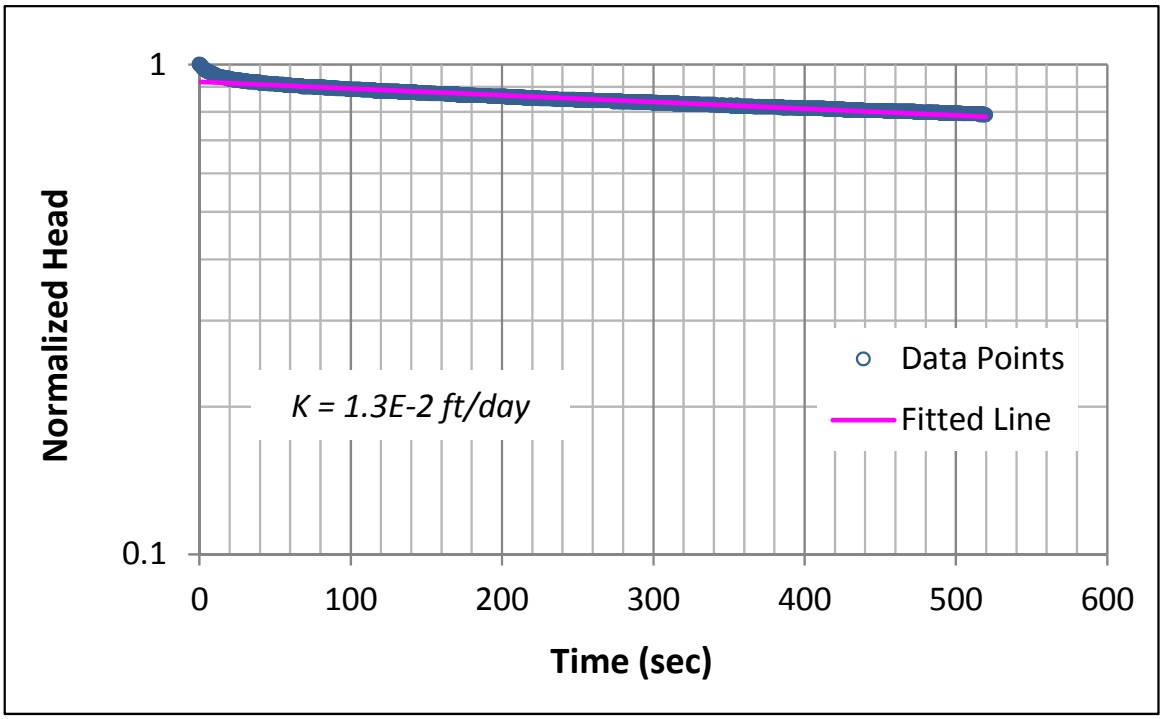
1. Slug Test conducted in Monitoring Well EV-22A on 2/1, 2013.
2. Overdamped rising-head slug test response analyzed using Bouwer & Rice (1976) method.
3. Formation thickness, B = 15.1 feet used to calculate hydraulic conductivity, K.

Aquifer Slug Test, EV-22A	
Everett Smelter – Lowland Area	
GeoEngineers	Figure E-13

Falling Head



Rising Head

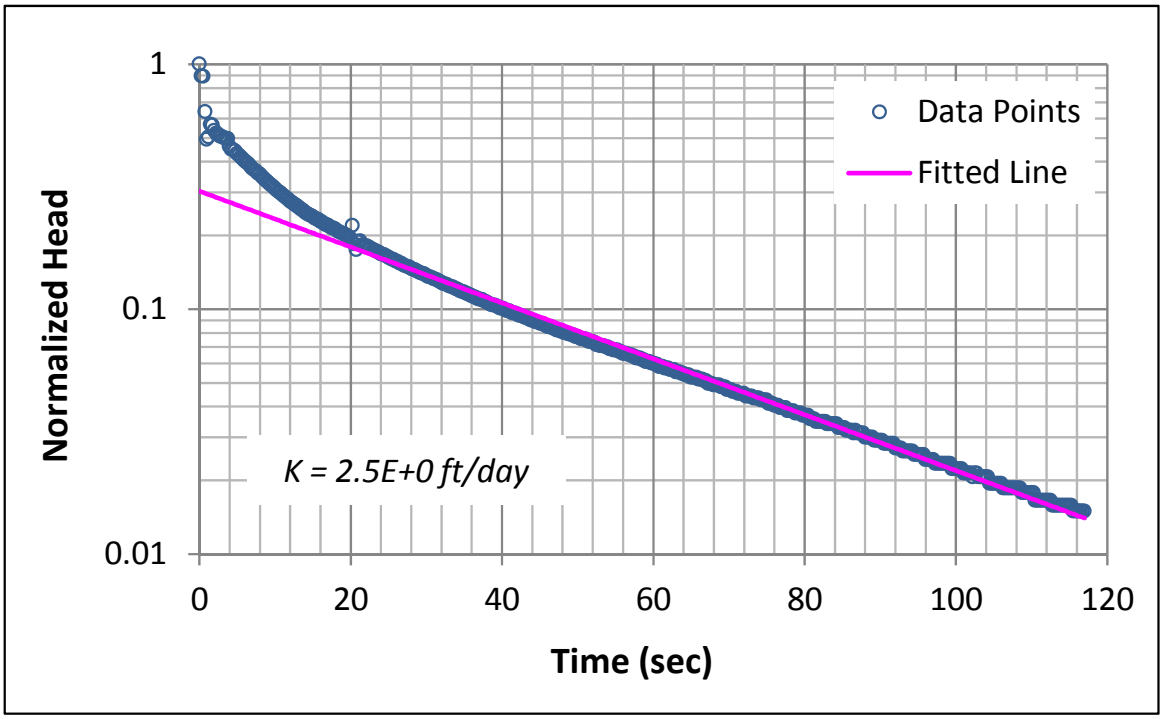


Notes:

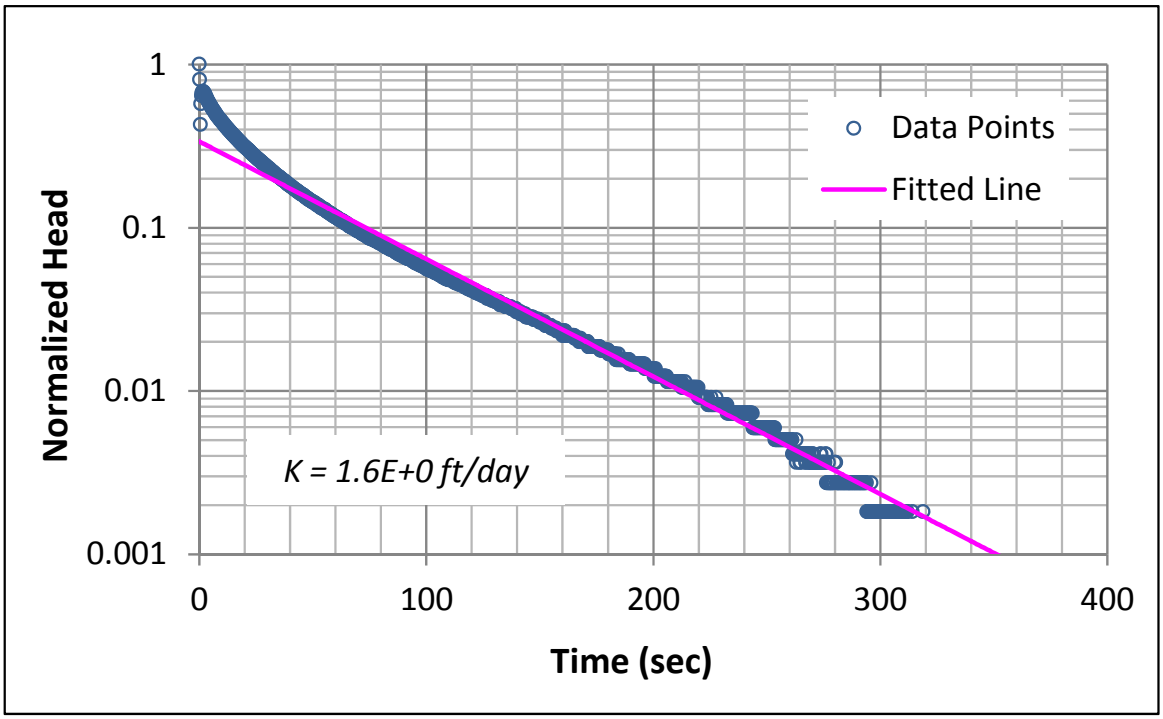
1. Slug Test conducted in Monitoring Well EV-22B on 2/1, 2013.
2. Overdamped rising-head slug test response analyzed using Bouwer & Rice (1976) method.
3. Formation thickness, B = 25.2 feet used to calculate hydraulic conductivity, K.

Aquifer Slug Test, EV-22B	
Everett Smelter – Lowland Area	
GeoEngineers	Figure E-14

Falling Head



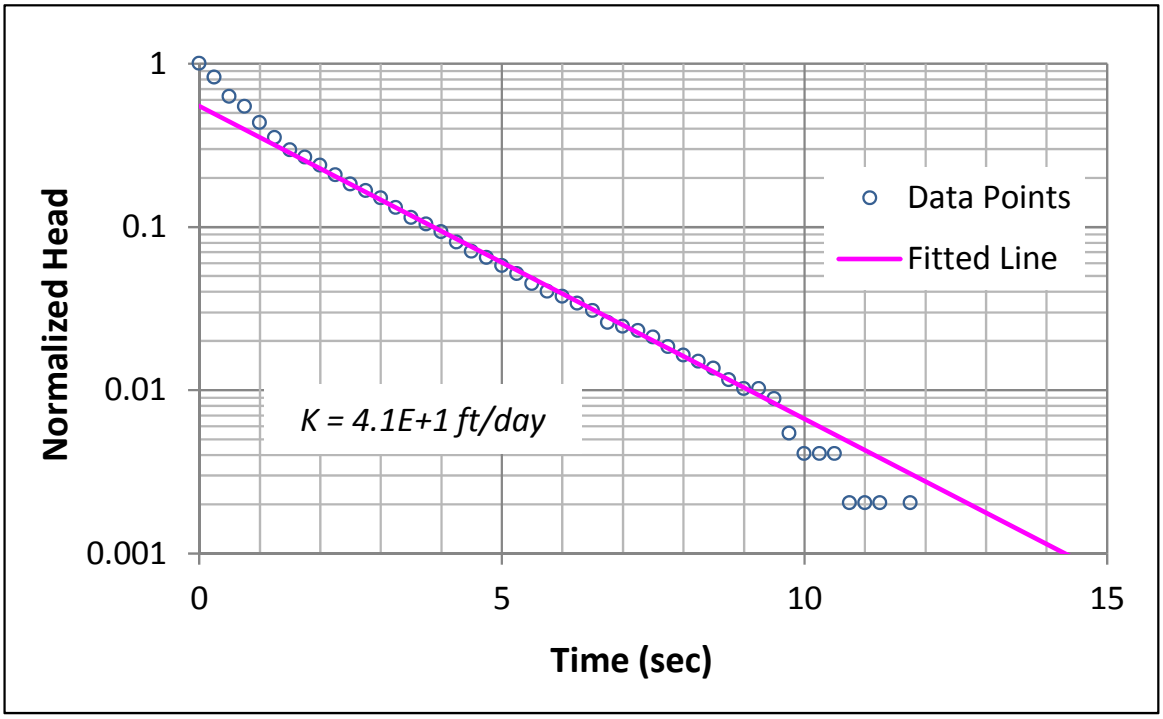
Rising Head

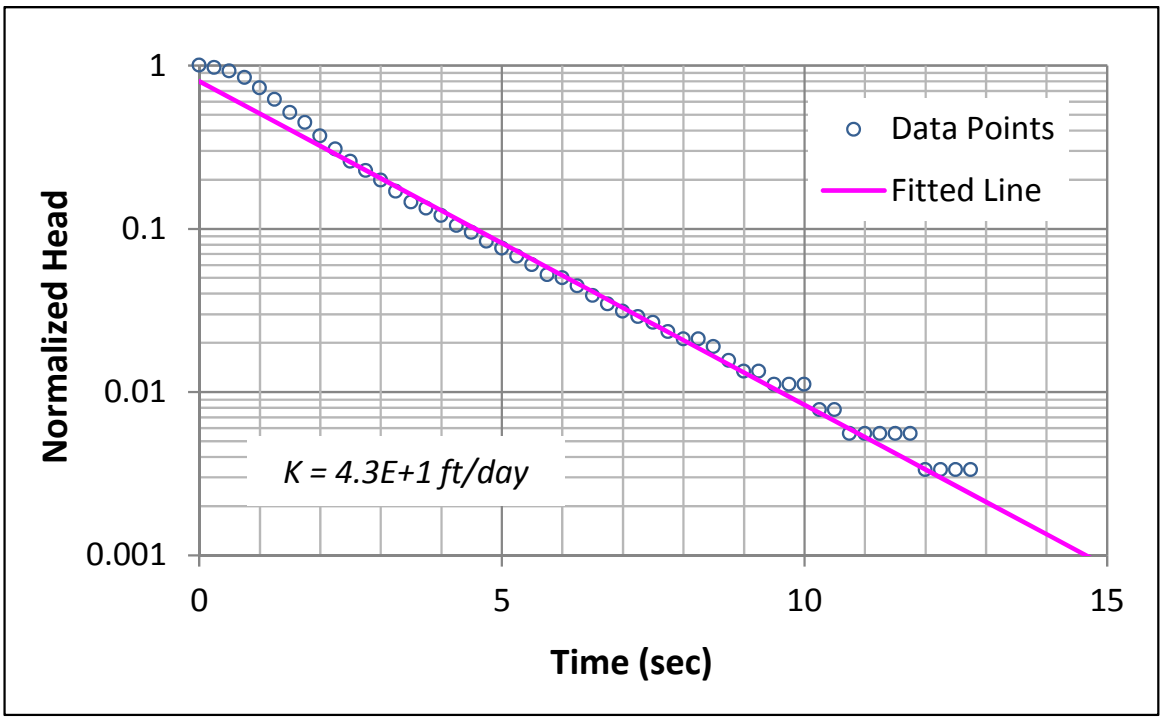


Notes:

1. Slug Test conducted in Monitoring Well BP-05S on 1/31, 2013.
2. Overdamped rising-head slug test response analyzed using Bouwer & Rice (1976) method.
3. Formation thickness, B = 14.6 feet used to calculate hydraulic conductivity, K.

Aquifer Slug Test, BP-05S	
Everett Smelter – Lowland Area	
GeoEngineers	Figure E-15



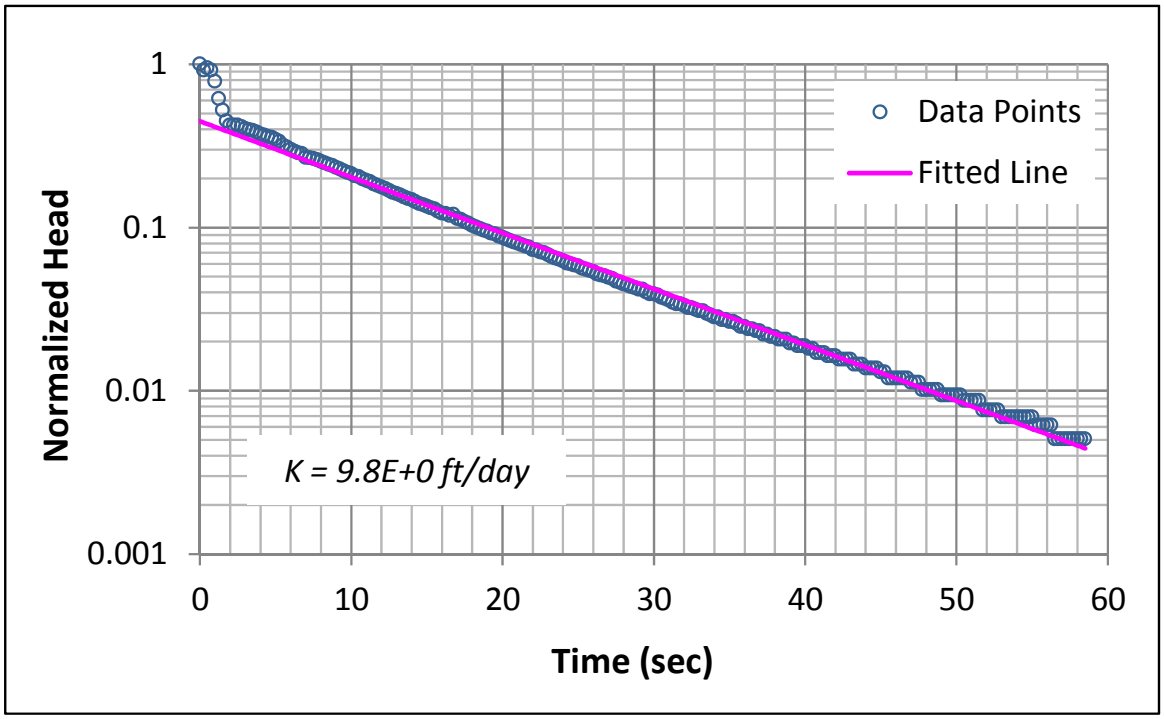


Notes:

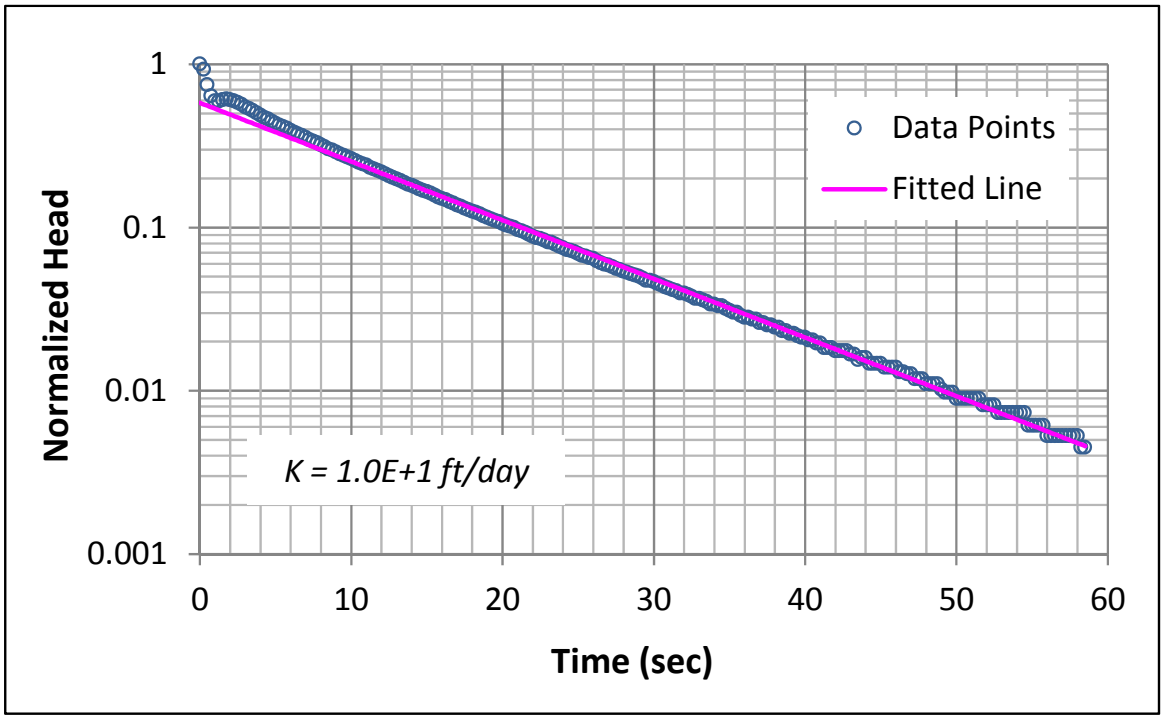
1. Slug Test conducted in Monitoring Well BP-05D on 1/31, 2013.
2. Overdamped rising-head slug test response analyzed using Bouwer & Rice (1976) method.
3. Formation thickness, B = 27.2 feet used to calculate hydraulic conductivity, K.

Aquifer Slug Test, BP-05D	
Everett Smelter – Lowland Area	
GeoEngineers	Figure E-16

Falling Head



Rising Head



Notes:

1. Slug Test conducted in Monitoring Well BP-05D2 on 1/31, 2013.
2. Overdamped rising-head slug test response analyzed using Bouwer & Rice (1976) method.
3. Formation thickness, B = 6 feet used to calculate hydraulic conductivity, K.

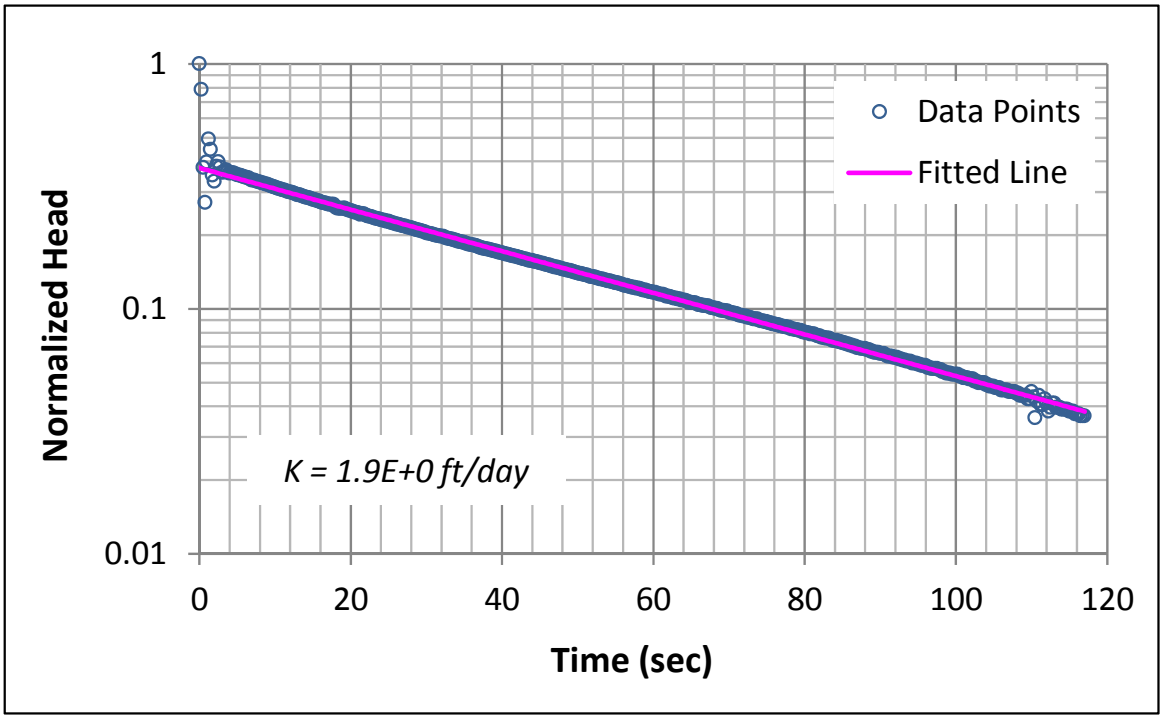
Aquifer Slug Test, BP-05D2

Everett Smelter – Lowland Area

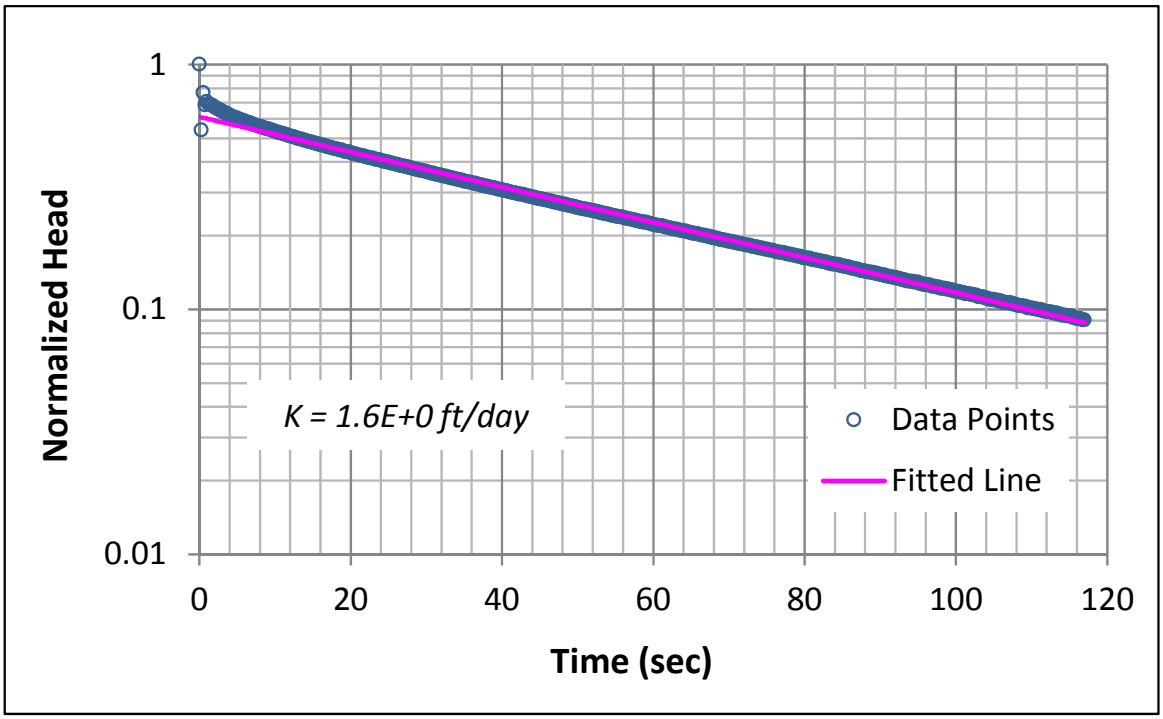
GeoEngineers

Figure E-17

Falling Head



Rising Head

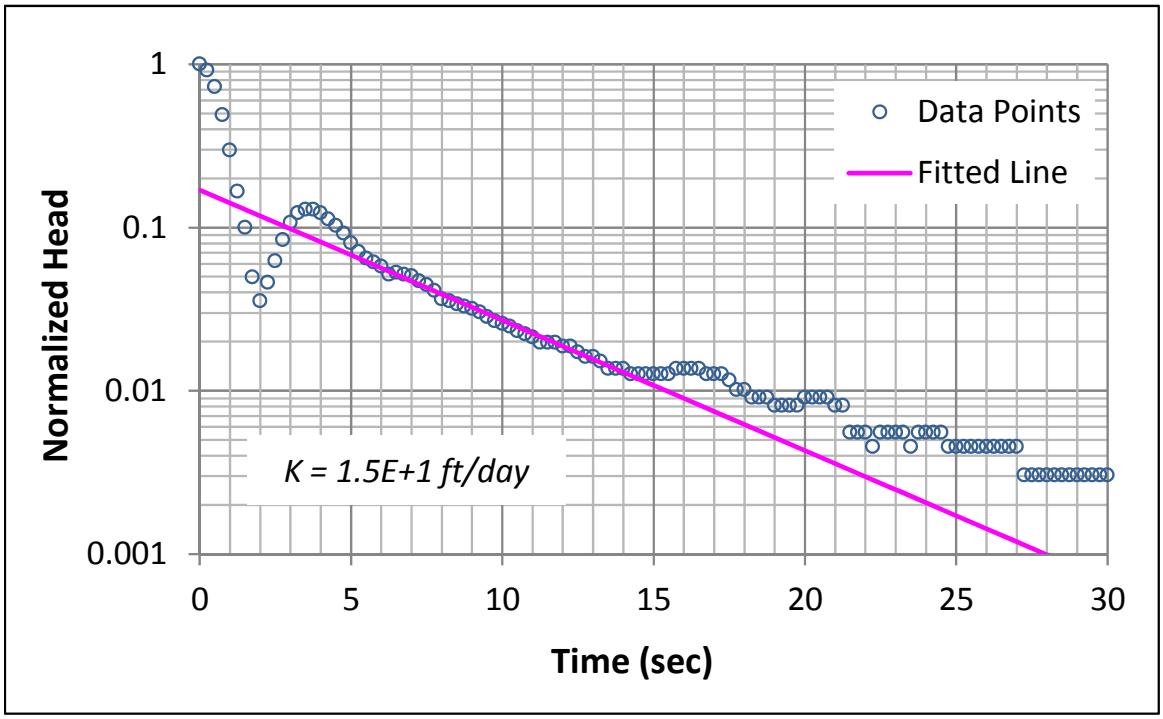


Notes:

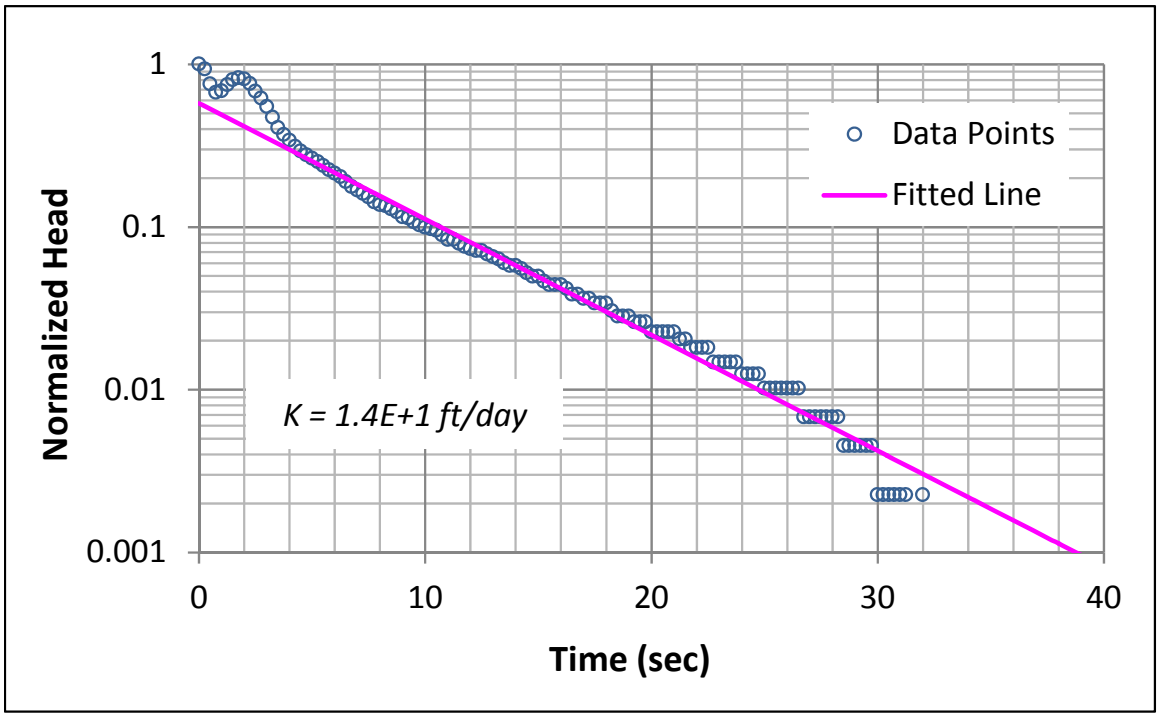
1. Slug Test conducted in Monitoring Well BP-08S on 2/1, 2013.
2. Overdamped rising-head slug test response analyzed using Bouwer & Rice (1976) method.
3. Formation thickness, B = 13.9 feet used to calculate hydraulic conductivity, K.

Aquifer Slug Test, BP-08S	
Everett Smelter – Lowland Area	
GeoEngineers	Figure E-18

Falling Head



Rising Head



Notes:

1. Slug Test conducted in Monitoring Well BP-08D on 2/1, 2013.
2. Overdamped rising-head slug test response analyzed using Bouwer & Rice (1976) method.
3. Formation thickness, B = 26.4 feet used to calculate hydraulic conductivity, K.

Aquifer Slug Test, BP-08D

Everett Smelter – Lowland Area

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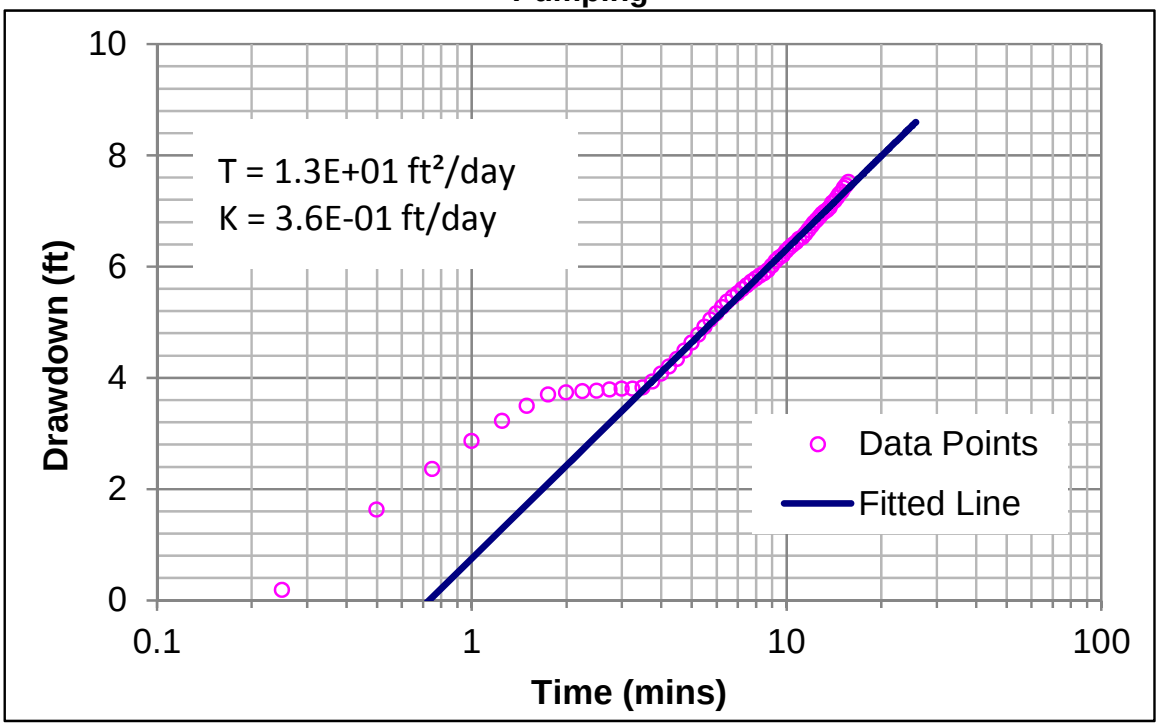
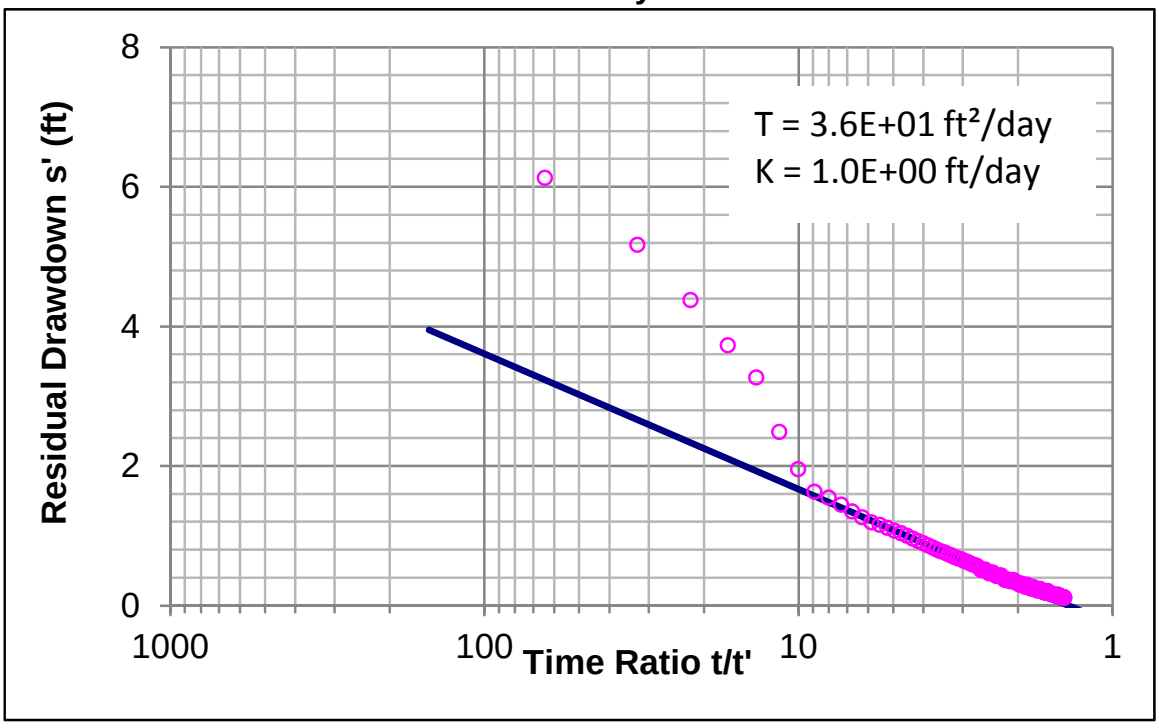
Figure E-19

Pumping



Recovery



Notes:

1. Pumping test conducted in Monitoring Well BP-05S on 1/31/2013. Pumping rate, Q = 2 gpm.
2. Drawdown data analyzed using the Cooper-Jacob (1946) method.
3. Recovery analyzed by the Theis (1935) Recovery Method.
4. T = Transmissivity, K = Hydraulic Conductivity.
5. Formation thickness, B = 35 feet, used to calculate K.

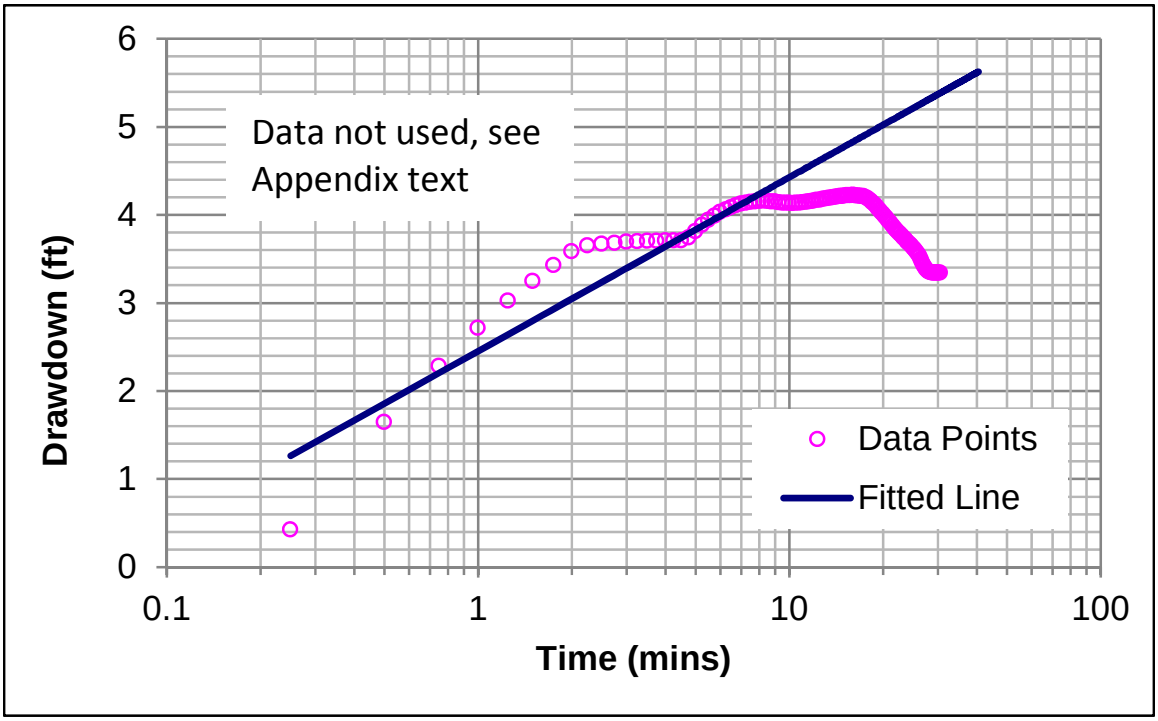
Aquifer Pumping Test 1 at BP-05S

Everett Smelter – Lowland Area

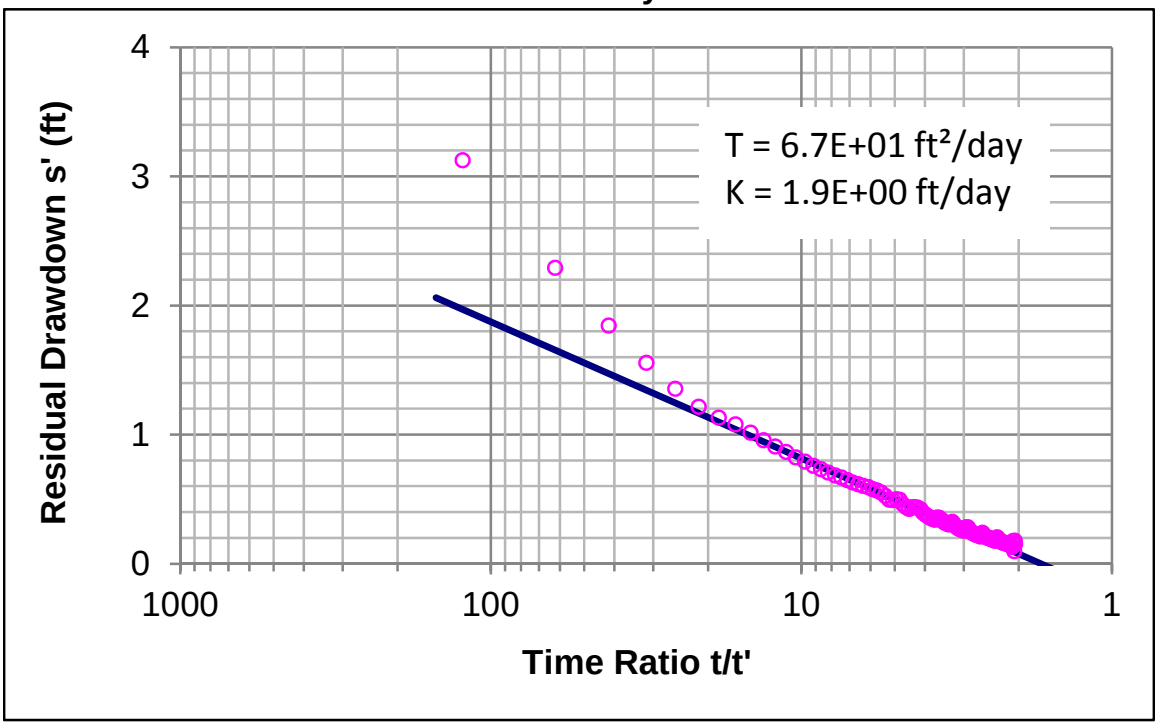
GeoEngineers

Figure E-20

Pumping



Recovery



Notes:

1. Pumping test conducted in Monitoring Well BP-05S on 2/1/2013. Pumping rate, Q = 1.5 gpm.
2. Drawdown data analyzed using the Cooper-Jacob (1946) method.
3. Recovery analyzed by the Theis (1935) Recovery Method.
4. T = Transmissivity, K = Hydraulic Conductivity.
5. Formation thickness, B = 35 feet, used to calculate K.

Aquifer Pumping Test 2 at BP-05S

Everett Smelter – Lowland Area

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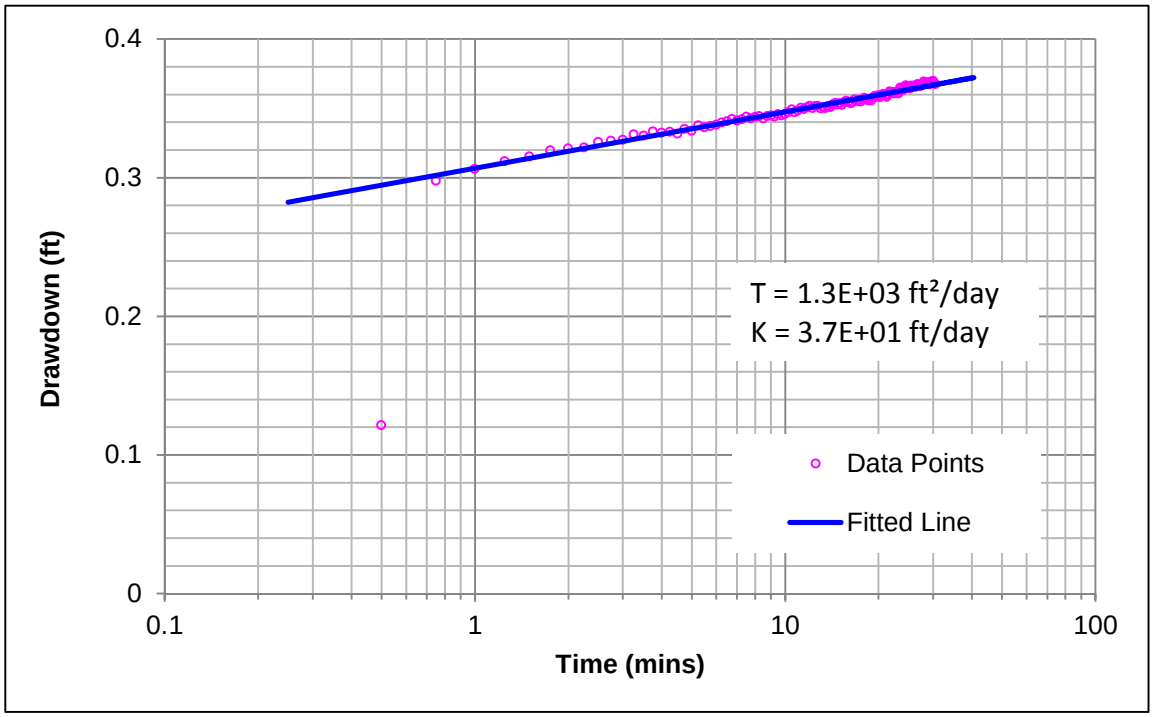
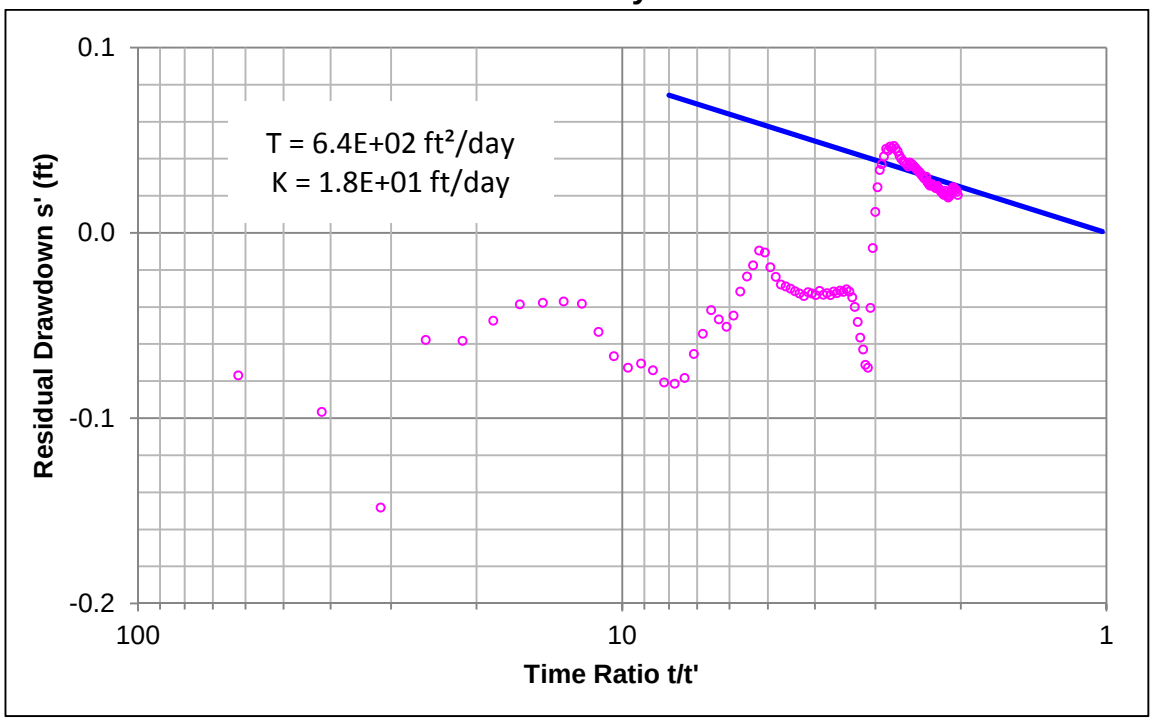
Figure E-21

Pumping



Recovery



Notes:

1. Pumping test conducted in Monitoring Well BP-05D on 1/31/2013. Pumping rate, *Q* = 1.5 gpm.
2. Drawdown data analyzed using the Cooper-Jacob (1946) method.
3. Recovery analyzed by the Theis (1935) Recovery Method.
4. T = Transmissivity, K = Hydraulic Conductivity.
5. Formation thickness, B = 35 feet, used to calculate K.

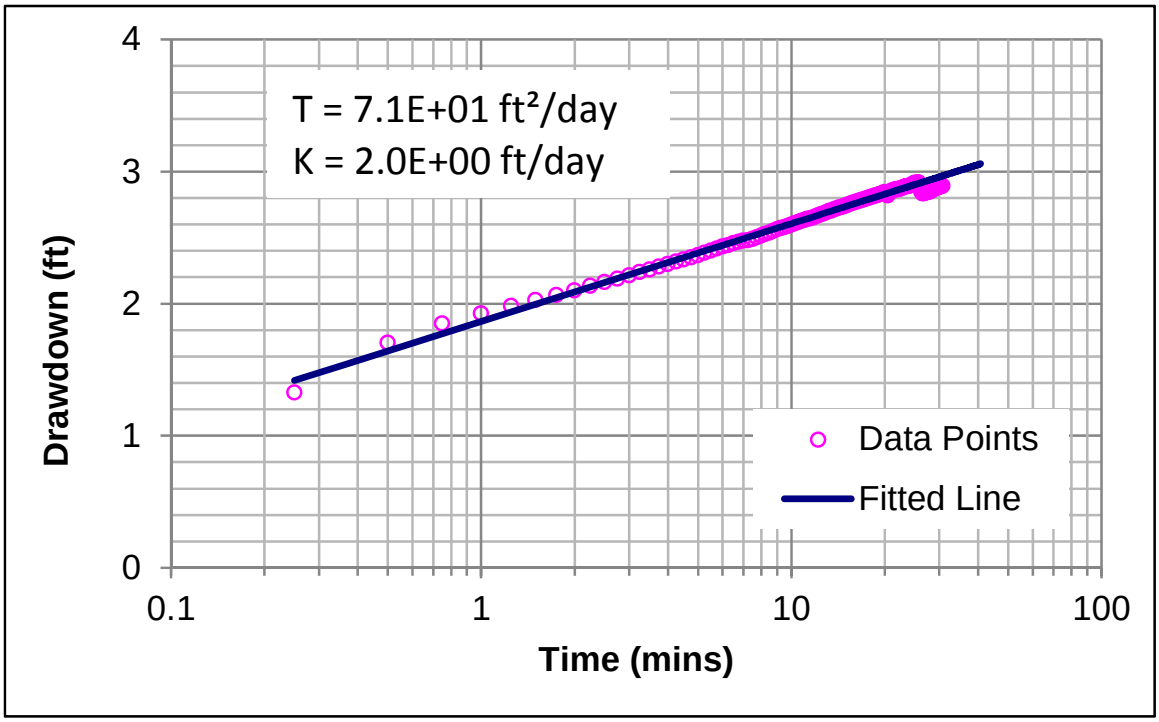
Aquifer Pumping Test at BP-05D

Everett Smelter – Lowland Area

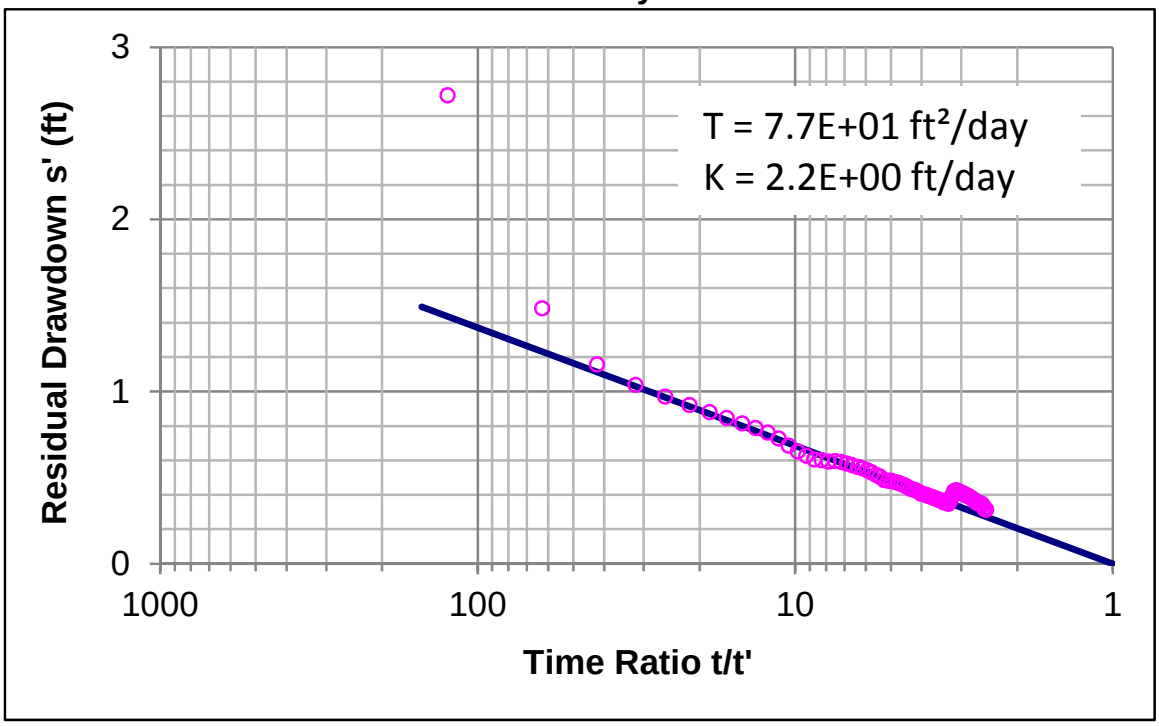
GeoEngineers

Figure E-22

Pumping



Recovery



Notes:

1. Pumping test conducted in Monitoring Well BP-05D2 on 1/31/2013. Pumping rate, *Q* = 1.5 gpm.
2. Drawdown data analyzed using the Cooper-Jacob (1946) method.
3. Recovery analyzed by the Theis (1935) Recovery Method.
4. T = Transmissivity, K = Hydraulic Conductivity.
5. Formation thickness, B = 35 feet, used to calculate K.

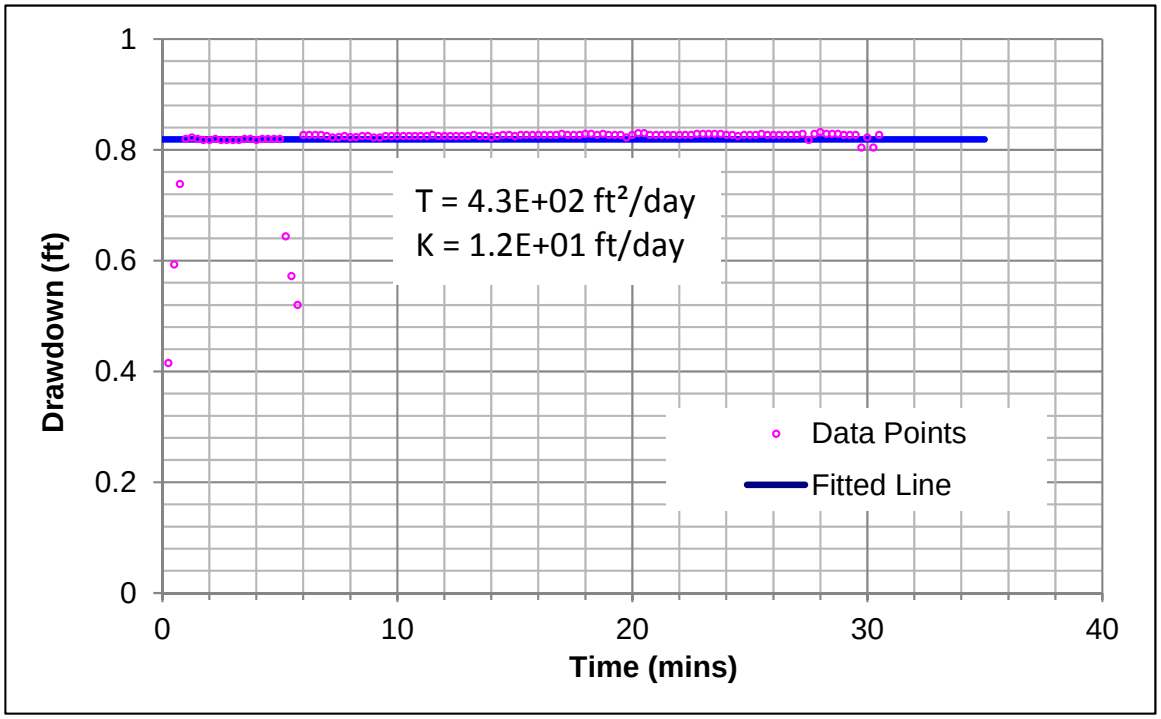
Aquifer Pumping Test at BP-05D2

Everett Smelter – Lowland Area

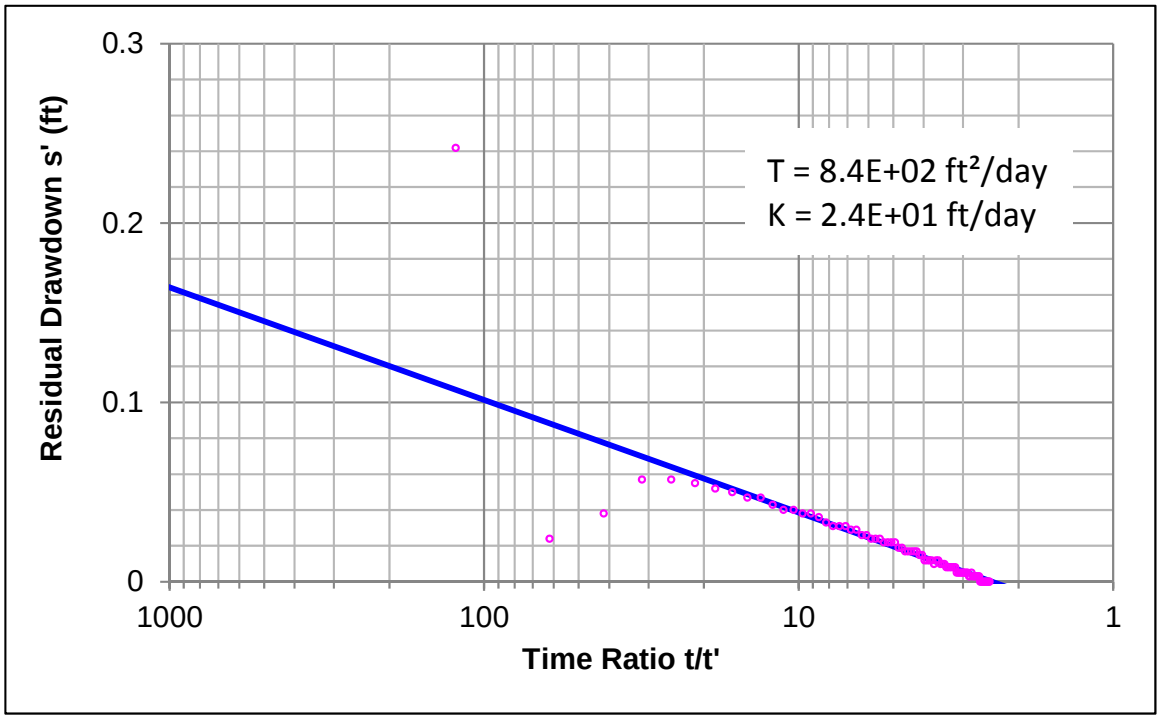
GeoEngineers

Figure E-23

Pumping



Recovery



Notes:

1. Pumping test conducted in Monitoring Well MW-11S on 1/31/2013. Pumping rate, Q = 1.5 gpm.
2. Drawdown data analyzed using Logan (1964) method.
3. Recovery analyzed by the Theis (1935) Recovery Method.
4. T = Transmissivity, K = Hydraulic Conductivity.
5. Formation thickness, B = 35 feet, used to calculate K.

Aquifer Pumping Test at MW-11S

Everett Smelter – Lowland Area

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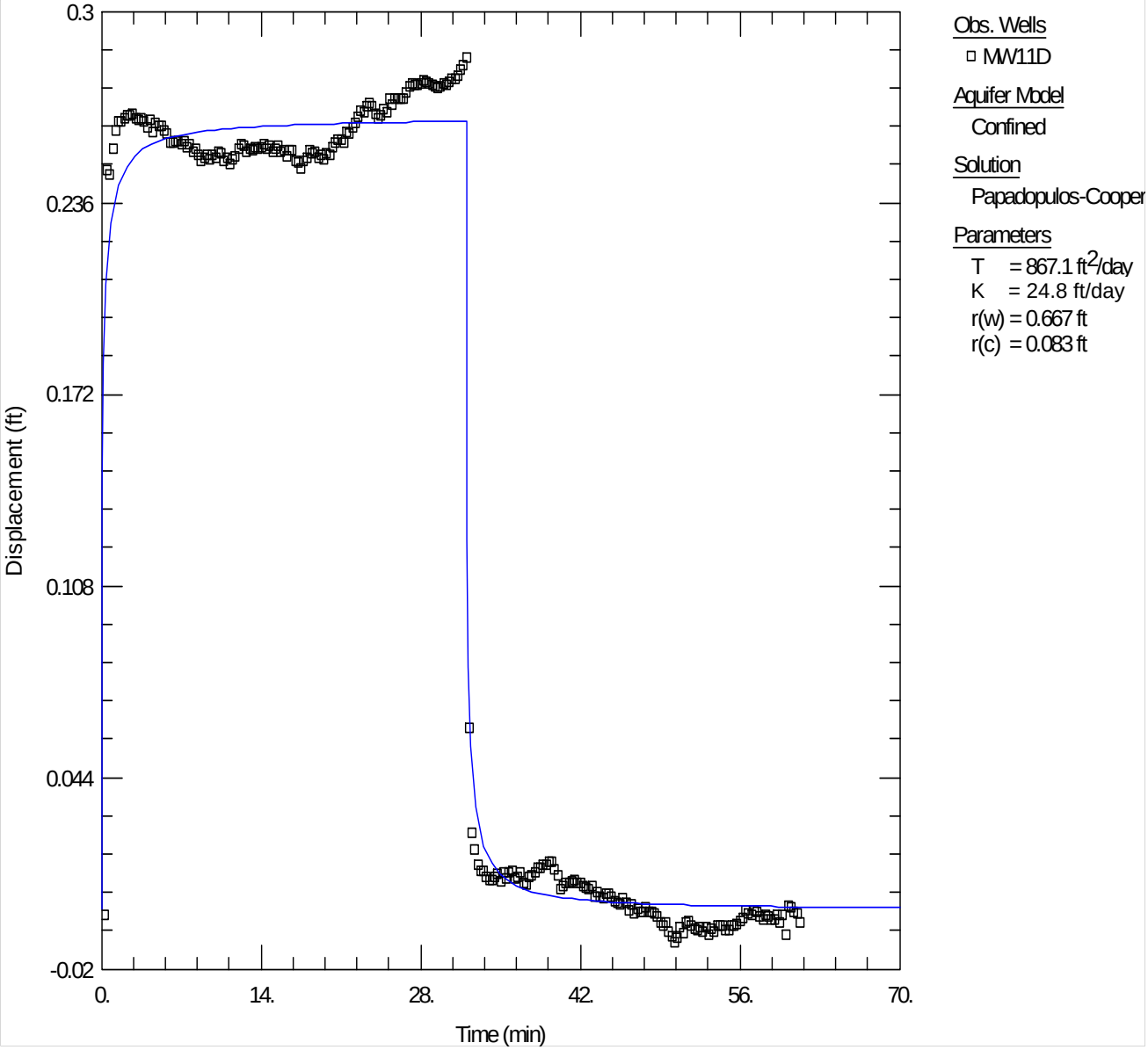
Figure E-24

Pumping and Recovery



Notes:

1. Pumping test conducted in Monitoring Well MW-11D on 1/31/2013. Pumping rate, Q = 1.5 gpm.
2. Drawdown data was analyzed with Papadopulos-Cooper (1967) method using AQTESOLV.
3. T = Transmissivity, K = Hydraulic Conductivity.
4. Formation thickness, B = 35 feet, used to calculate K.

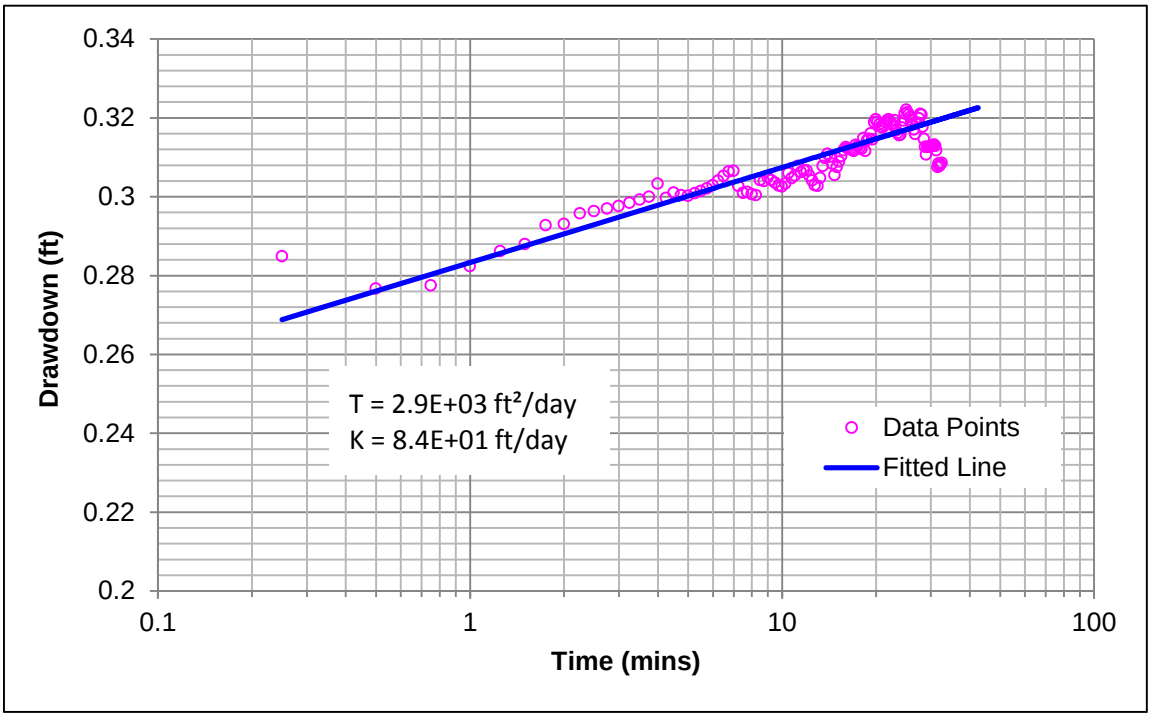
Aquifer Pumping Test at MW-11D

Everett Smelter – Lowland Area

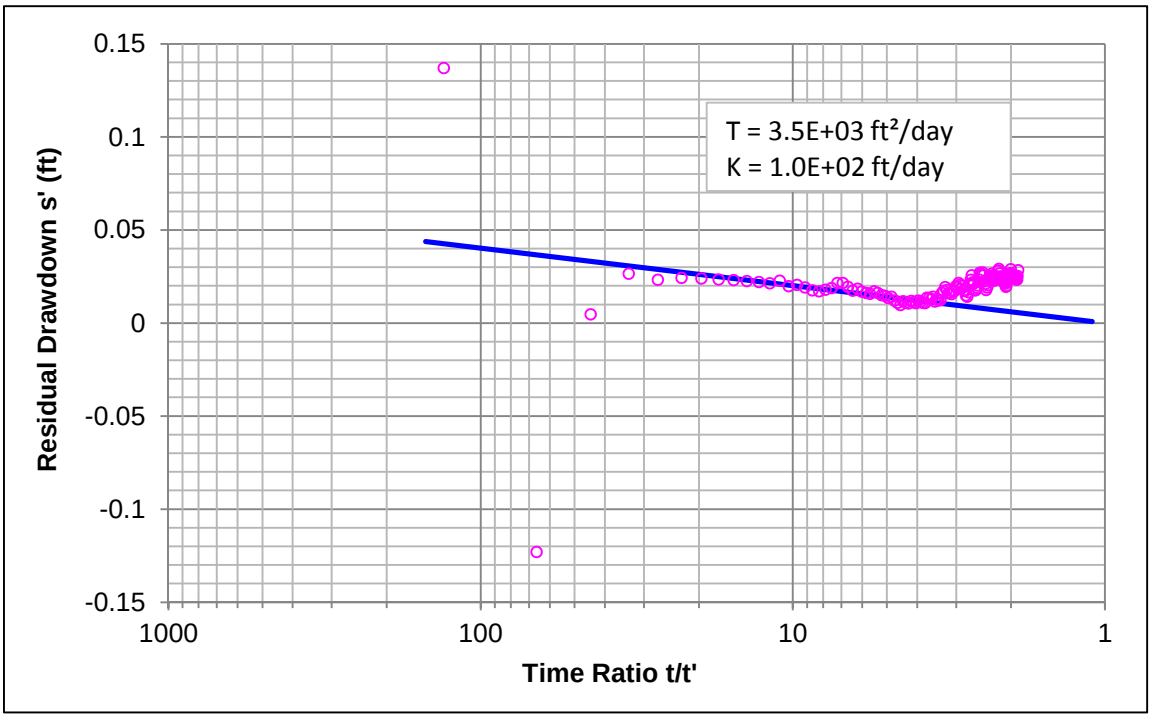
GeoEngineers

Figure E-25

Pumping



Recovery



Notes:

1. Pumping test conducted in Monitoring Well MW-16D on 2/1/2013. Pumping rate, Q = 2 gpm.
2. Drawdown data analyzed using the Cooper-Jacob (1946) method.
3. Recovery analyzed by the Theis (1935) Recovery Method.
4. T = Transmissivity, K = Hydraulic Conductivity.
5. Formation thickness, B = 35 feet, used to calculate K.

Aquifer Pumping Test at MW-16D

Everett Smelter – Lowland Area

GeoEngineers

Figure E-26

APPENDIX F
Tidal Study

APPENDIX F
TIDAL STUDY

Purpose and Objectives

The purpose of the tidal study was to evaluate the influence of Snohomish River water level fluctuations on groundwater conditions at the Everett Smelter Lowland Site to support hydrogeologic conceptual site modeling and evaluation of contaminant fate and transport in groundwater. Water level fluctuations in the Snohomish River in the vicinity of the Site were due to tidal fluctuations of Puget Sound during the tidal study.

The tidal study was conducted to achieve the following objectives:

- To identify and analyze the extent, if any, of tidal response that may reflect such variables as:
  - Aquifer in which wells are completed (i.e., the shallow aquifer versus the deep aquifer).
  - Confined/unconfined conditions (i.e., wells exhibiting unconfined water-table responses versus wells exhibiting confined or leaky-confined aquifer responses).
- To provide a better understanding of measured groundwater levels, groundwater gradients, and their relative degree of variation under tidal influence at the site.
- To estimate values for aquifer apparent hydraulic diffusivity and transmissivity (T). The estimated values were combined with other information to estimate average hydraulic conductivity (K).

The objectives were achieved by performing a tidal study using a selected subset of Lowland monitoring wells as representative indicators of the groundwater response at the Site.

River Level Fluctuations

Puget Sound experiences daily tides that feature complex double highs and lows of uneven magnitude during each full tidal cycle. This pattern is caused by dominant diurnal and semidiurnal lunar/solar cycles that combine to create what is known as a mixed tide (also called a bichromatic tide). This pattern features a continuously changing pattern of primarily high and low tides, with smaller secondary high and low tides mixed in the cycle through each month. The pattern strongly affects the surface water level of the Snohomish River in the vicinity of the Site due to proximity to Puget Sound. A portion of the monthly pattern can be seen in the measured tidal data collected for this study from the water-level sensor installed in the Snohomish River near monitoring well pair LLMW-08S/D (Figure F-1a). (All elevations are relative to NAVD 88).

An additional potential source of River level fluctuation is response to varying precipitation or snowmelt. Records of the surface water level of the Snohomish River at the Monroe, Washington (USGS monitoring station number 12150800) were reviewed to evaluate if this potentially confounding variable needed to be taken into account during the tidal study. During the tidal study, the water level of the Snohomish River at the upgradient station changed by less than 1.5 feet over a one week period, presumably due to factors other than tides (i.e., presumably due to varying precipitation or snowmelt). Given that the fluctuations observed in the Snohomish River adjacent to the Site at the time of the study was on the

order of 12 feet, and that these changes typically took place over periods of hours, it can be assumed that the River level fluctuations at the site were largely attributed to tidal fluctuations of Puget Sound.

Methodology

Aquifers that are hydraulically connected to tidal surface waters typically show a progressively attenuated and delayed tidal response with increasing distance from the shoreline. In order to evaluate tidal-groundwater hydraulic connection at the Site, twelve monitoring wells, oriented perpendicular to the shoreline, were selected to provide a representative hydrogeologic cross section of the portion of the Lowland Area downgradient of the former smelter. The selected wells included BP-05S, BP-05D, LLMW-06S, LLMW-06D, BP-08S, BP-08D, LLMW-11S, LLMW-11D, LLMW-12S, LLMW-12D, LLMW-13S and LLMW-13D. Each of the tidal study wells was equipped with a water-level sensor consisting of a piezoelectric pressure transducer and automated datalogger (transducer/datalogger) programmed to record water pressure (head) above the sensor every minute over a period of eight days from February 5 through 13, 2013.

The following data collection field procedures were followed for the tidal study:

- Prior to installation, the transducer/datalogger was pre-programmed to record pressure head at every minute from 08:00 am on Tuesday, February 5, until 08:00 am on Wednesday, February 13, 2013 (eight days). Programming was performed using one computer only and time-synced to the clock on that computer.
- As a check on the transducer/datalogger, and to account for instrument drift, the water level was measured at the beginning and end of the tidal study using a decontaminated electronic water level indicator ("e-tape"). All measurements were made from a surveyed reference mark on the top of each well casing.
- One transducer/logger was installed as a tidal gauge near well pair LLMW-08S/D to directly measure the river level of the Snohomish River, and one sensor was installed in an on-site cargo container to record the barometric pressure. The cargo container was vented to the atmosphere (i.e., not air tight).
- All materials were decontaminated in general accordance with the project Sampling and Analysis Plan (SAP) dated September 27, 2012.

At the conclusion of the study, all sensors were returned to GeoEngineers for data Processing.

Tidally Influenced Groundwater Levels

The groundwater level data collected in each of the tidal study wells were reduced to NAVD 88 and plotted along with the water level in the Snohomish River for comparison of groundwater elevation and tidal trends during the study period. These comparative plots are shown in the "a" portion of Figures F-2 through F-15 (F-2a through F-15a) over the full period of the tidal study.

The shallow aquifer wells exhibited little to no response to tidal changes as shown in Figures F-8 through F-13. However, all of the deep aquifer wells (BP-05D, BP-08D, LLMW-06D, LLMW-11D, LLMW-12D and LLMW-13D) were observed to be tidally influenced (Figures F-2 through F-7). For each of these wells, the tidal data was examined in more detail to obtain a match with the Snohomish River tide data. This was achieved by applying a double transformation that varies (1) the time lag, which represents the time for

propagation of the tidal effect through the aquifer from the River to the well, and (2) the stage ratio, which shows the relative degree of effect tidal changes in the River had on groundwater at the well during the study period. These values were estimated visually using the following procedure:

- **TIME LAG** was determined by shifting the Date/Time scale (x-axis) of the groundwater record backwards relative to the tidal record from the Snohomish River until the respective peaks and troughs matched. The value of time (in hours and minutes) indicated on the secondary axis represents the time lag or phase shift.
- **STAGE RATIO** was determined by expanding and shifting the elevation scale (y-axis) of the groundwater plot relative to the tidal plot from the Snohomish River, until the respective amplitudes matched. (As the Snohomish River record is truncated below Elevation 0.1 feet, the low tide level was estimated based on the shape of the curve.) The value of stage ratio is calculated as the ratio of secondary axis length (in feet), divided by the primary axis length (12 feet) and expressed as a percentage.

The time lag and stage ratio for each well was determined over a period of two tidal cycles during the study, and the raw data are shown on Figures F-14 through F-26. The data are summarized in Table F-1 below.

TABLE F-1

Monitoring Well	Distance from Shoreline (ft)	Mean Groundwater Elevation (ft; NAVD88)	Time Lag (hours)	Stage Ratio (%)
MW11D	49	6.0	0.6	77
MW06D	361	6.5	1.4	55
MW13D	604	6.1	1.7	54
MW12D	1,013	6.5	2.6	44
BP05D	1,483	7.6	3.4	29
BP08D	1,699	8.4	4.1	30

The wells completed in the deep aquifer that were monitored as part of the Lowland Area study show a marked tidal influence that reflects the mixed tide cycle measured in the Snohomish River (Figures F-2 through F-7), whereas wells completed in the shallow aquifer show only minimal or no tidal influence (Figures F-8 through F-13). Mean groundwater elevations for a selected 72-hour portion of the hourly tide cycle data were calculated using the Serfes (1991) method (Figures F-2 through F-13), which gives the mean of a subset of 25-point moving averages (Y_j) calculated from 48 24-point moving averages (X_i). The mean groundwater elevations calculated for the shallow wells are higher than the mean groundwater elevations for the deep wells, indicating there is a net downward gradient. The results also indicate the shallow aquifer does not appear to be hydraulically connected to the deep aquifer in the locations tested.

Estimation of Hydraulic Parameter

Deep Aquifer Discharge

The time lag and stage ratio data from the tidal study were further analyzed to estimate diffusivity of the deep aquifer (diffusivity for the shallow aquifer could not be estimated because there was no time lag or stage ratio data because the shallow aquifer was not tidally influenced). A method originally developed by

Ferris (1951) was used, whereby time lag and stage ratio is plotted against the horizontal distance between the well and the shoreline (Figure F-14). Both plots (time lag and stage ratio) showed excellent correlation among the data for the deep wells, with strong trends of increasing time lag and decreasing stage ratio with greater distance from the shoreline.

The slopes of the trend lines shown in Figure F-14 are directly proportional to the apparent hydraulic diffusivity of the deep aquifer, with diffusivity being the ratio of transmissivity to storativity (*T*/*S*):

- Aquifer diffusivity based on time lag: 8.45 x 10^7 gpd/ft
- Aquifer diffusivity based on stage ratio: 7.00x 10^7 gpd/ft

The calculations above are predicated on the validity of the Ferris (1951) method and the presumed dominance of the diurnal tidal effect, with a period of just under 24 hours, representing the main lunar-solar diurnal tide component in the Puget Sound.

In order to calculate the transmissivity for the deep aquifer using the above hydraulic diffusivity values, the following two key assumptions were made:

- The average thickness for the deep aquifer is 35 feet. This value is based on an apparent confining layer observed during drilling of well BP-05D2.
- The deep aquifer storativity is 0.0001. The storativity value of 0.0001 was assumed based on the observed confined-like response of groundwater to tidal changes. This represents groundwater conditions in the deep aquifer that are effectively confined by the overlying aquitard that separates the perched shallow aquifer. It also implicitly assumes that there is no significant leakage occurring through the aquitard. This is consistent with an elastic or pressure response to tidal fluctuations that propagate a substantial distance inland, as was observed during the tidal study.

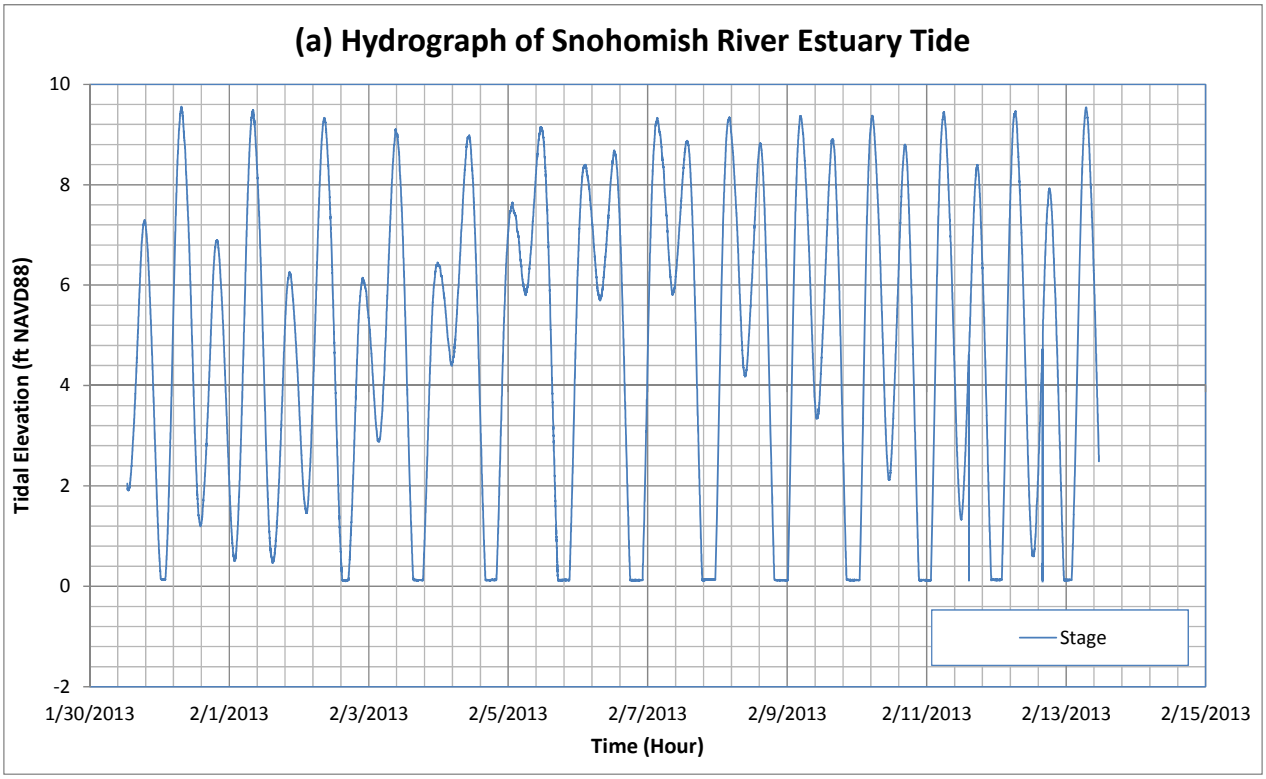
Assuming a small value for the storativity of the deep aquifer, 0.0001, the transmissivity of the aquifer is between 936 and 1,129 ft^2/day (or between 7,000 and 8,450 gpd/ft). Assuming an average thickness of 35 feet for the deep aquifer, the average hydraulic conductivity (K) for the deep aquifer is estimated to be between 27 and 32 ft/day (or between 200 and 241 gpd/ft^2). (Note: these calculations are directly dependent on the assumed values for aquifer storativity and thickness.)

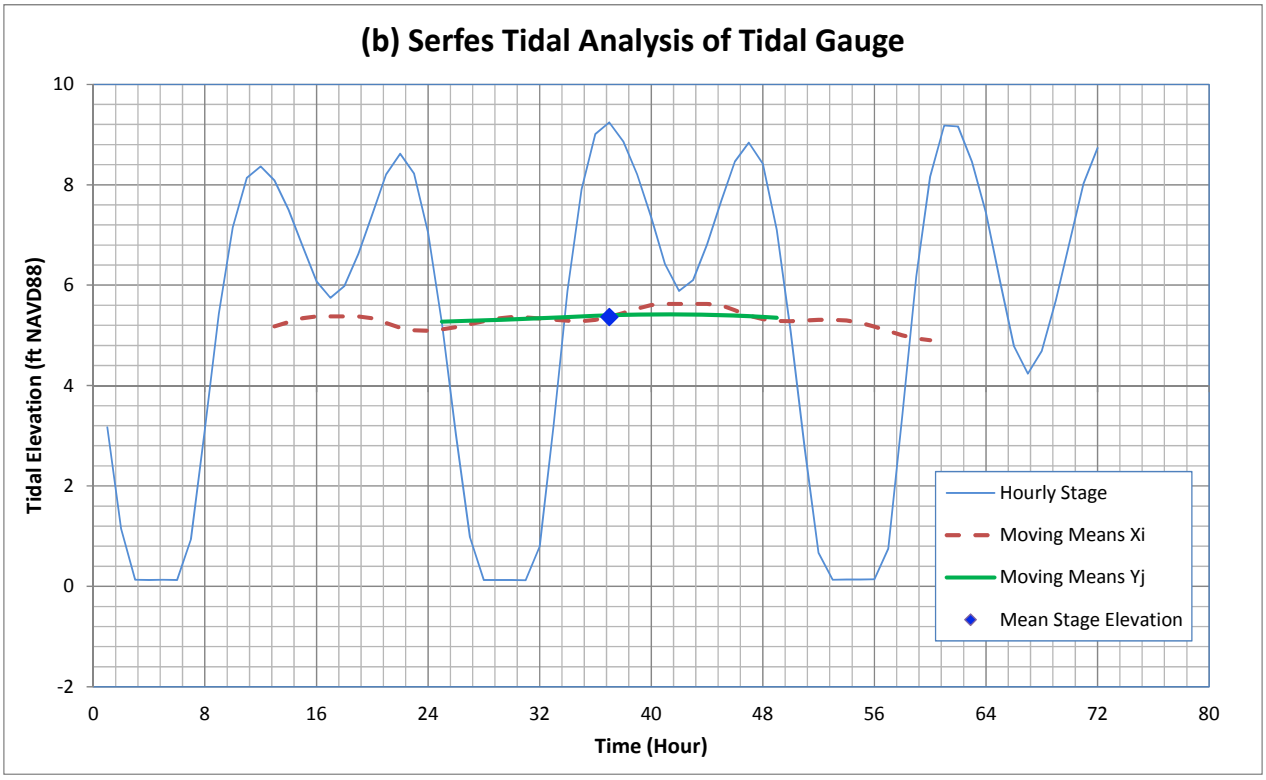
References

Ferris, J.G. (1951). Cyclic Fluctuations of Water Levels as a Basis for Determining Aquifer Transmissibility. International Union of Geodesy and Geophysics, Assoc. Sci. Hydrology Assembly, Publication 33, Brussels V.2:148-155.

Serfes, M.E. (1991). Determining the Mean Hydraulic Gradient of Groundwater affected by Tidal Fluctuations. Ground Water 29 (4): 549-555.

Streltsova, T.D. (1974). Method of additional seepage resistances — Theory and applications. J. Hydr. Div., ASCE, 100(8), 1119–1131.





Notes:

1. Method based on Serfes (1991)
2. X_i: 48 means from moving average of 24 hourly tidal elevation
3. Y_j: 25 means from moving average of 24 means over the 48 X_i
4. Time in hours is from 1500 on 2/5/2013

Reference: Technical Analysis > Tidal Study > Everett Mean GW Elev.xlsx

Serfes Tidal Analysis at Tidal Gauge

Everett Smelter – Lowland Area

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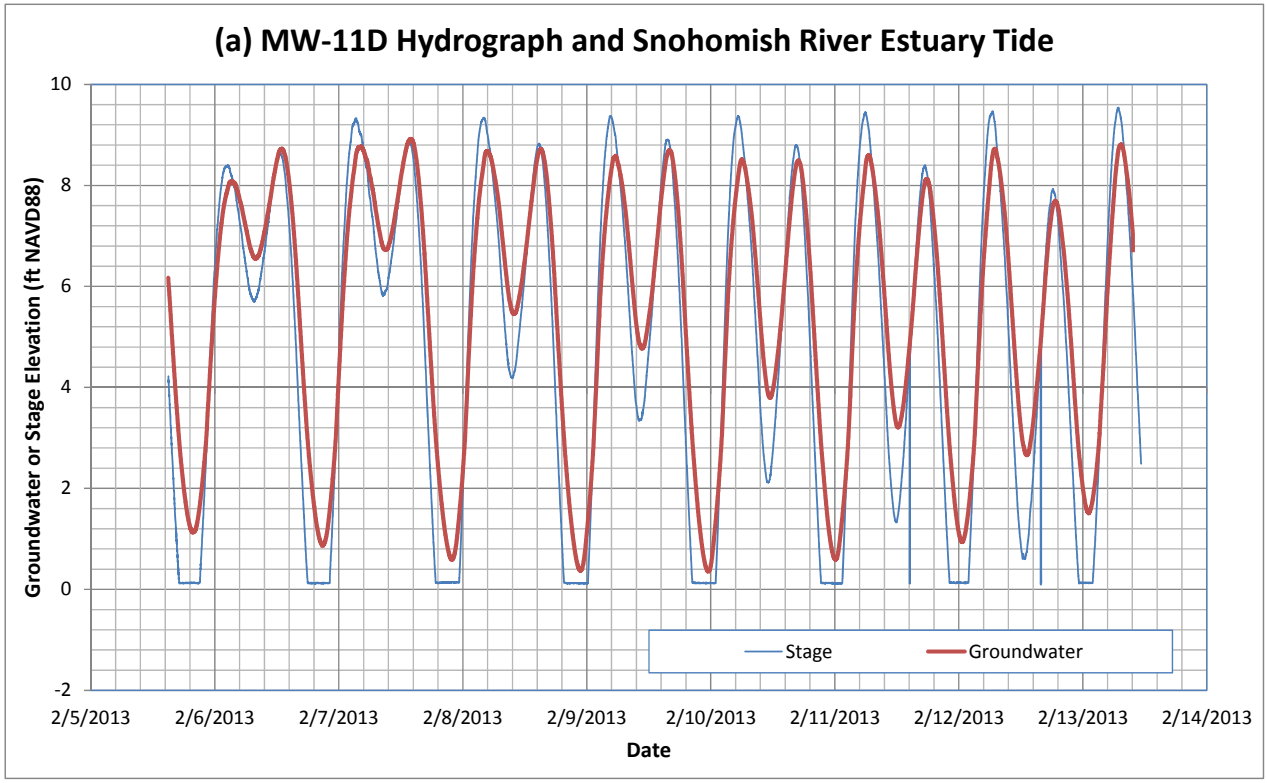
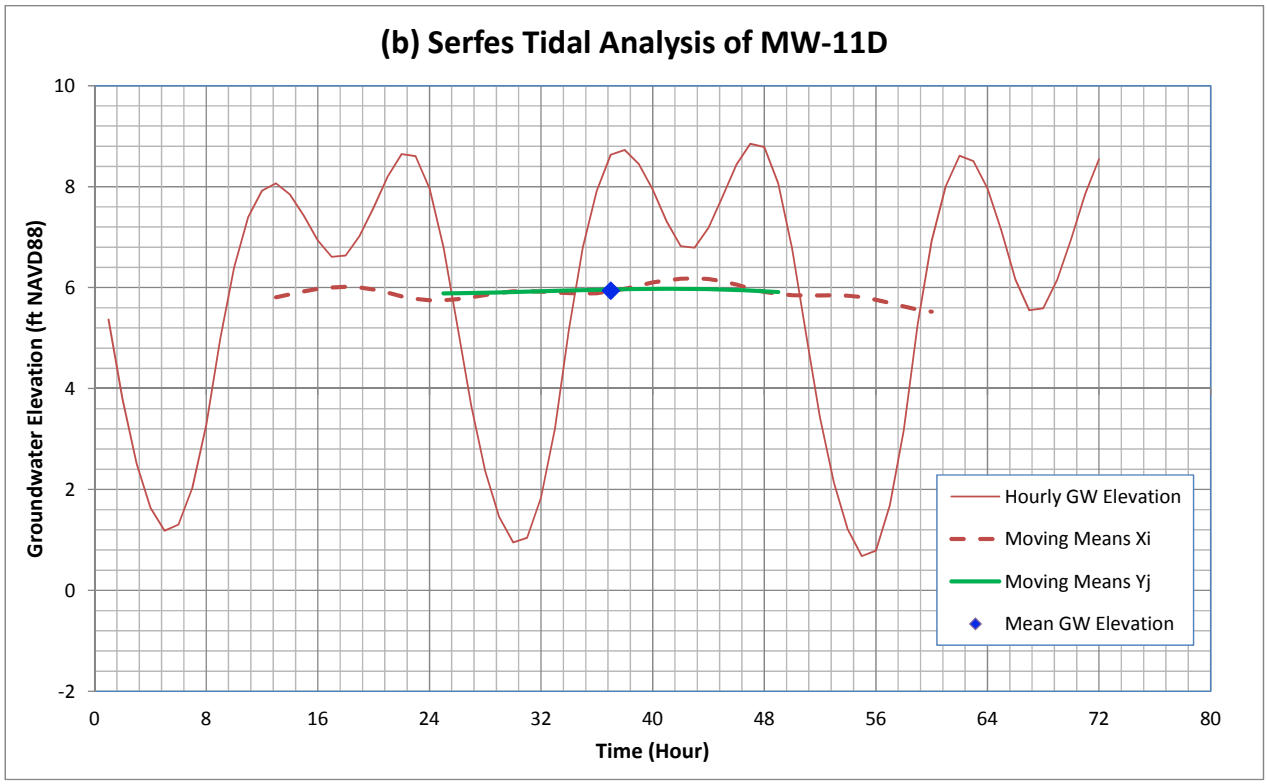
Figure F-1





Notes:

1. Method based on Serfes (1991)
2. X_i: 48 means from moving average of 24 hourly GW elevation
3. Y_j: 25 means from moving average of 24 means over the 48 X_i
4. Time in hours is from 1500 on 2/5/2013
5. Distance to Shoreline: 48.8 feet

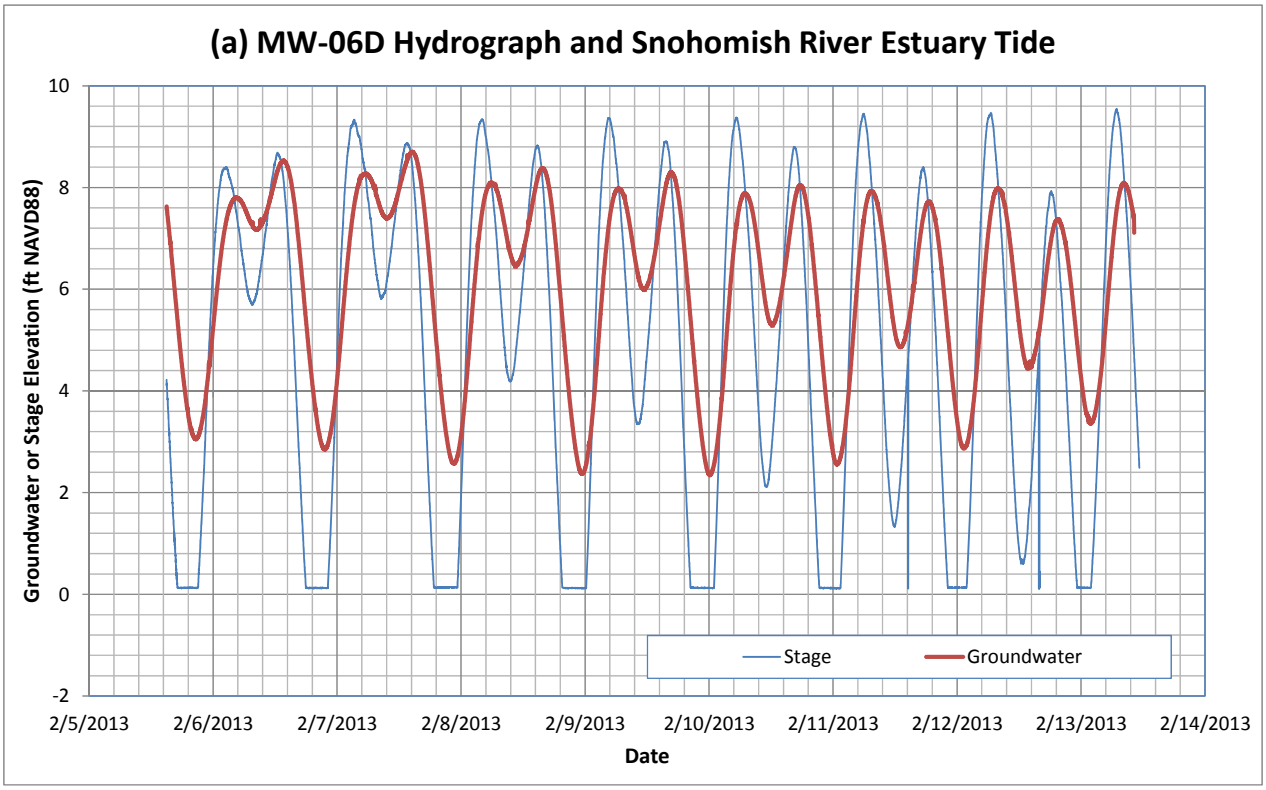
Reference: Technical Analysis > Tidal Study > Everett Mean GW Elev.xlsx

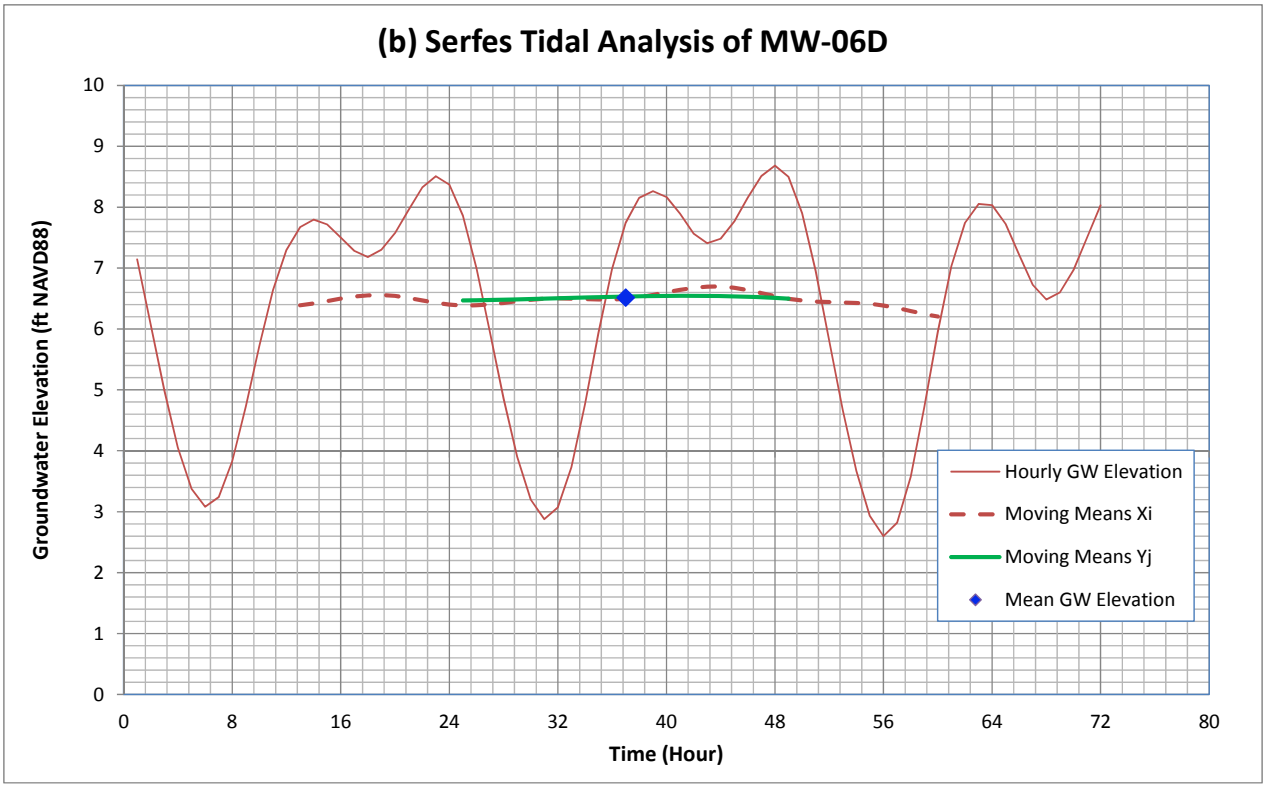
Serfes Tidal Analysis at MW-11D

Everett Smelter – Lowland Area

GeoEngineers

Figure F-2





Notes:

1. Method based on Serfes (1991)
2. X_i: 48 means from moving average of 24 hourly GW elevation
3. Y_j: 25 means from moving average of 24 means over the 48 X_i
4. Time in hours is from 1500 on 2/5/2013
5. Distance to Shoreline: 361 feet

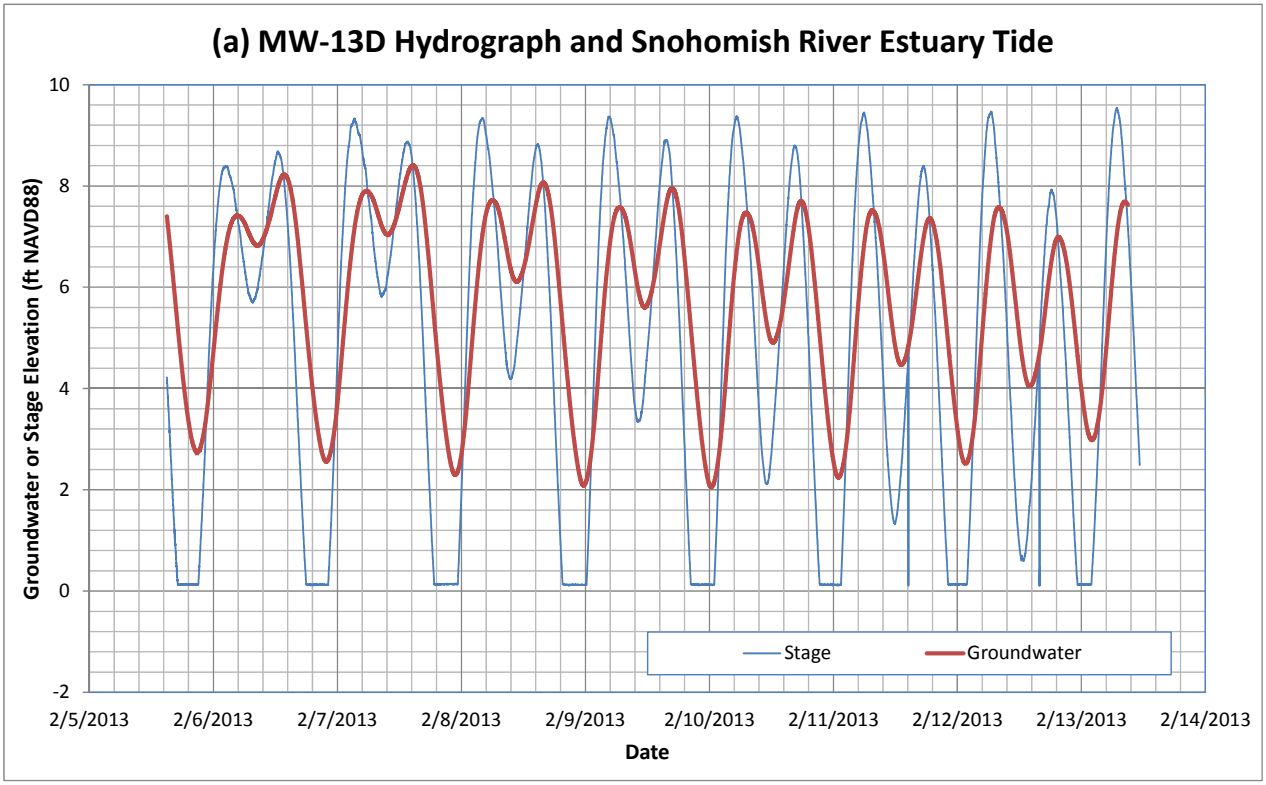
Reference: Technical Analysis > Tidal Study > Everett Mean GW Elev.xlsx

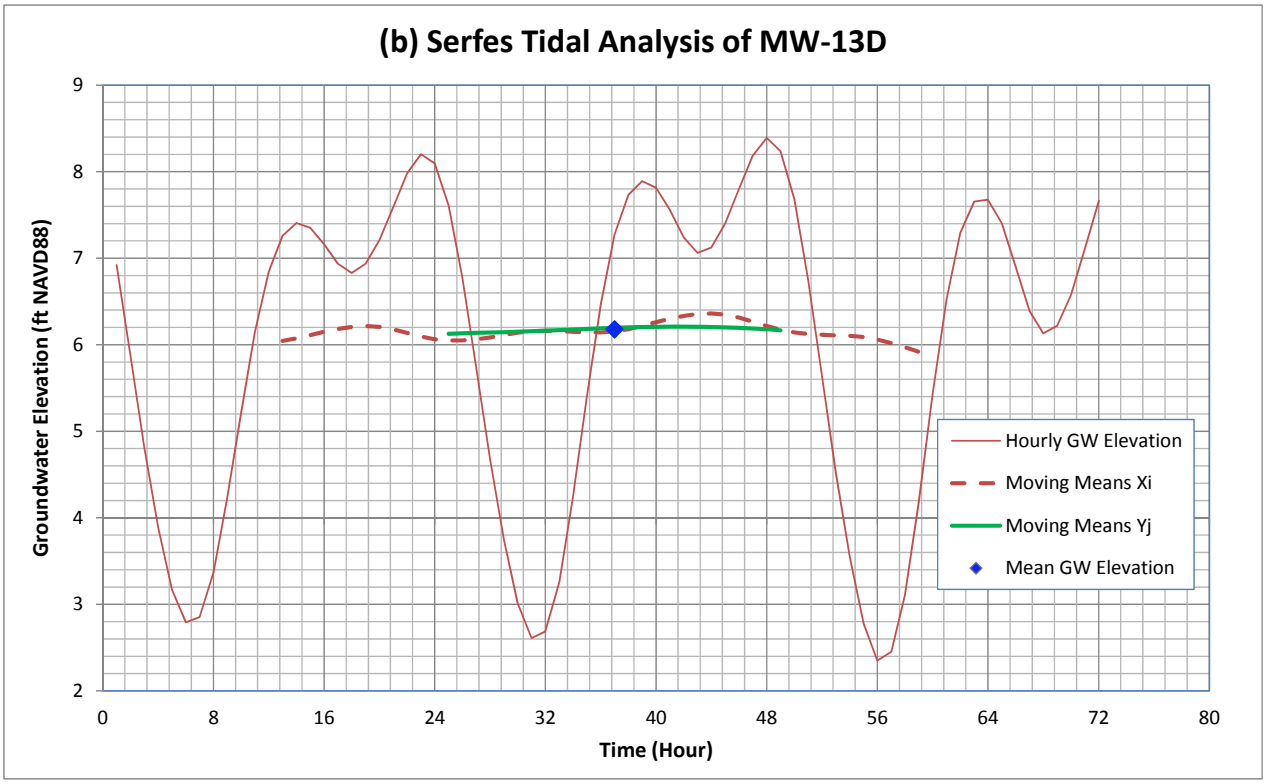
Serfes Tidal Analysis at MW-06D

Everett Smelter – Lowland Area

GeoEngineers

Figure F-3





Notes:

1. Method based on Serfes (1991)
2. X_i: 48 means from moving average of 24 hourly GW elevation
3. Y_j: 25 means from moving average of 24 means over the 48 X_i
4. Time in hours is from 1500 on 2/5/2013
5. Distance to Shoreline: 604 feet

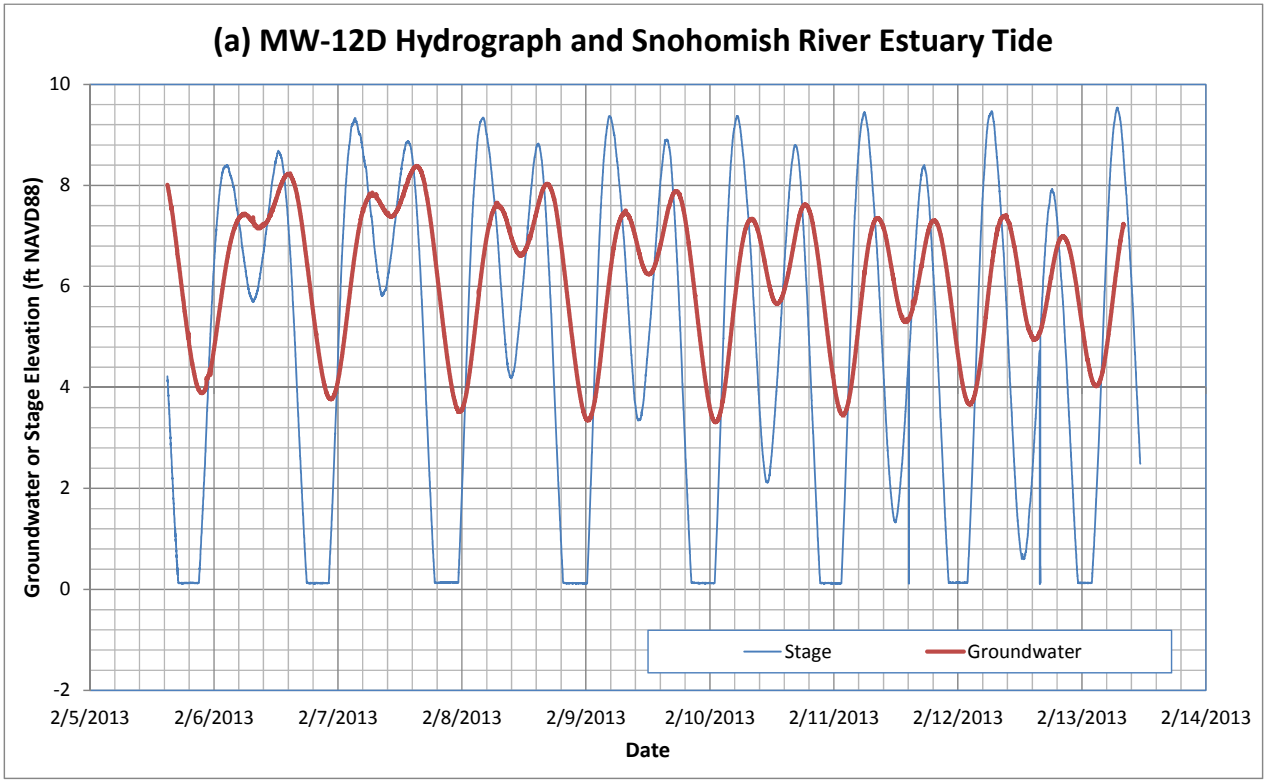
Reference: Technical Analysis > Tidal Study > Everett Mean GW Elev.xlsx

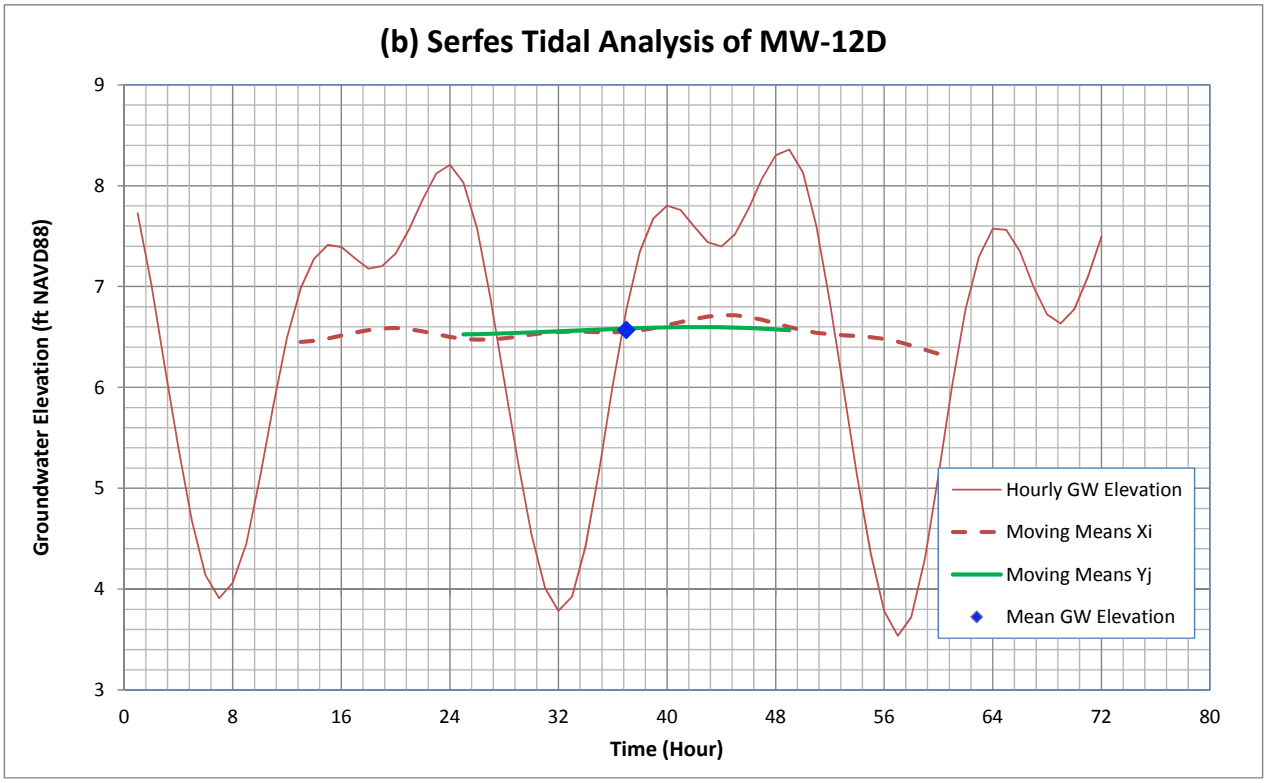
Serfes Tidal Analysis at MW-13D

Everett Smelter – Lowland Area

GeoEngineers

Figure F-4





Notes:

1. Method based on Serfes (1991)
2. X_i: 48 means from moving average of 24 hourly GW elevation
3. Y_j: 25 means from moving average of 24 means over the 48 X_i
4. Time in hours is from 1500 on 2/5/2013
5. Distance to Shoreline: 1,013 feet

Reference: Technical Analysis > Tidal Study > Everett Mean GW Elev.xlsx

Serfes Tidal Analysis at MW-12D

Everett Smelter – Lowland Area

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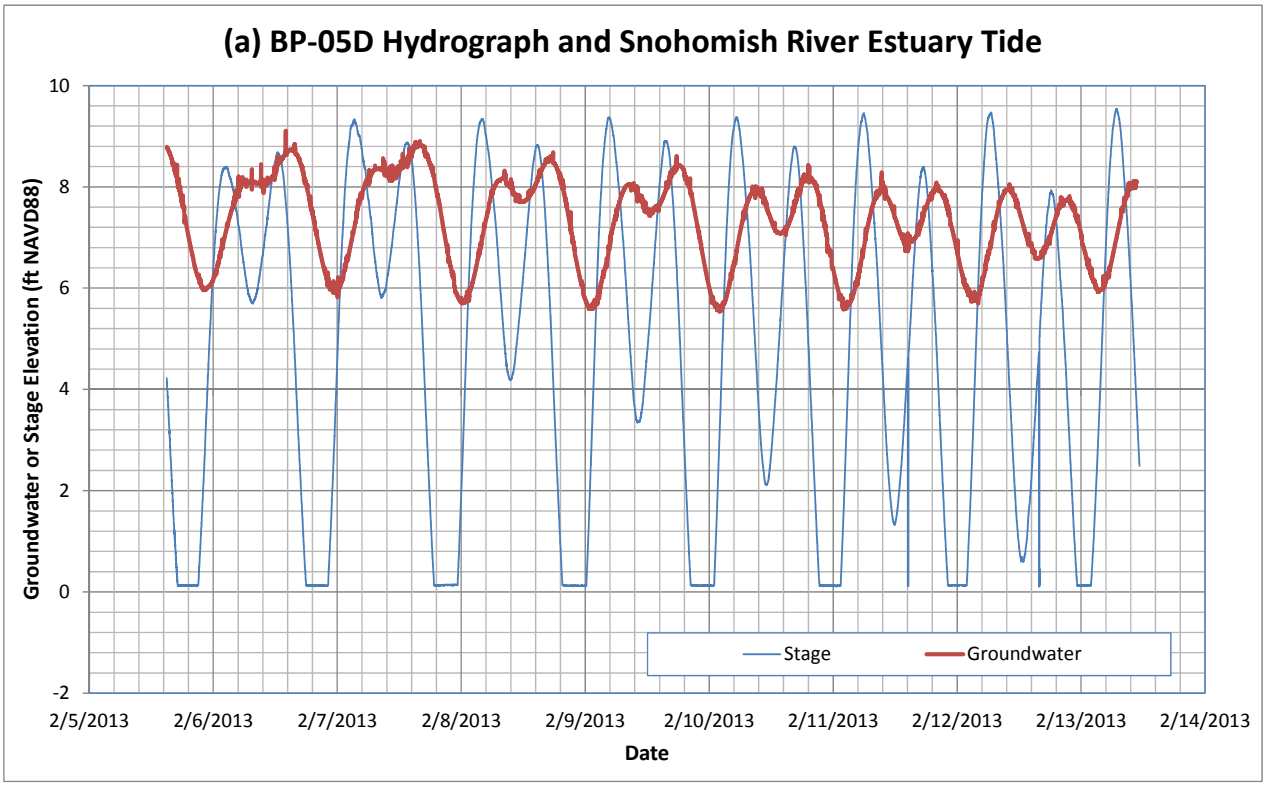
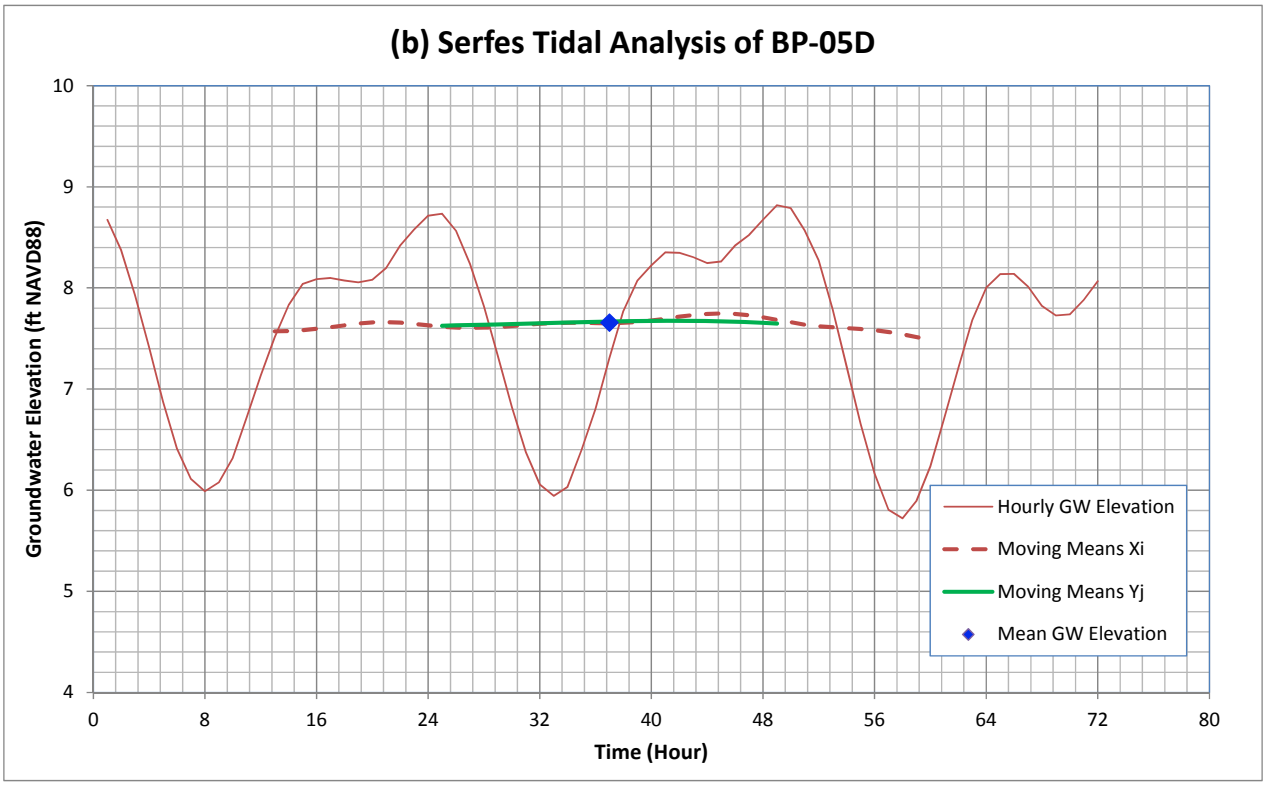
Figure F-5





Notes:

1. Method based on Serfes (1991)
2. X_i: 48 means from moving average of 24 hourly GW elevation
3. Y_j: 25 means from moving average of 24 means over the 48 X_i
4. Time in hours is from 1500 on 2/5/2013
5. Distance to Shoreline: 1,483 feet

Reference: Technical Analysis > Tidal Study > Everett Mean GW Elev.xlsx

Serfes Tidal Analysis at BP-05D

Everett Smelter – Lowland Area

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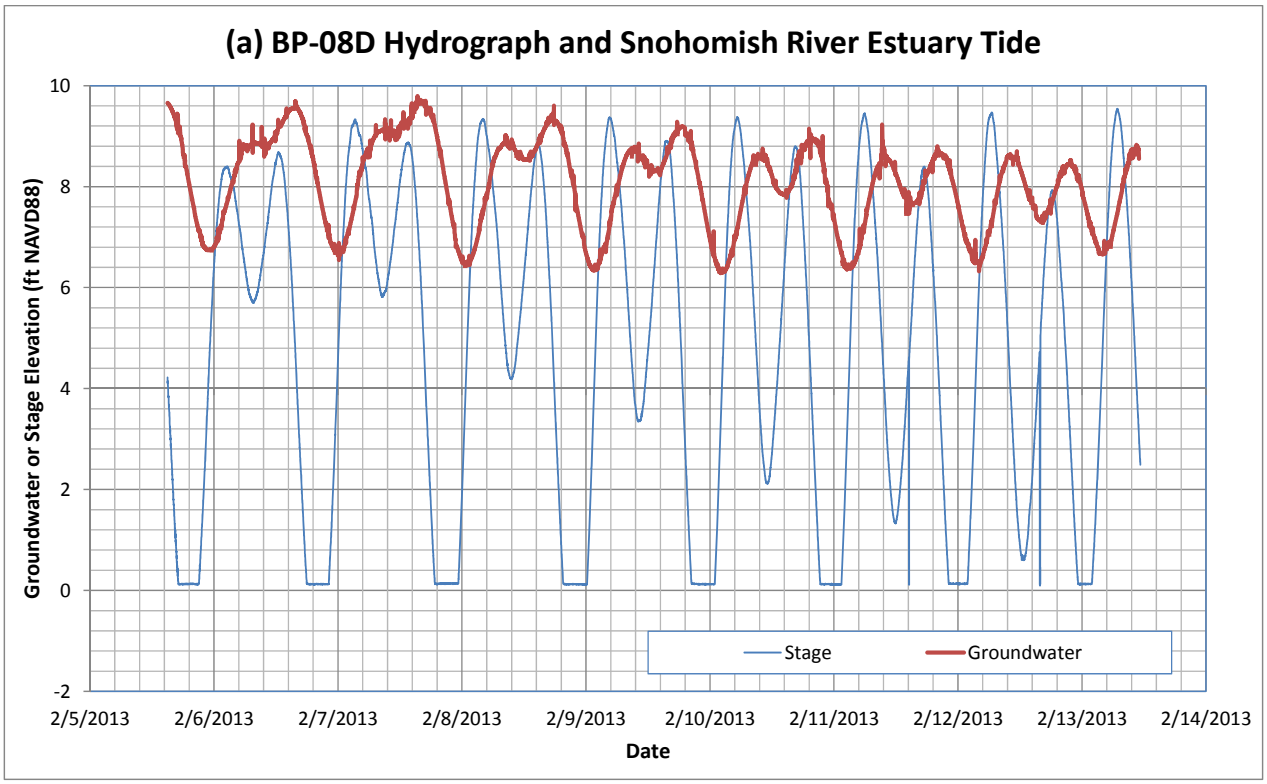
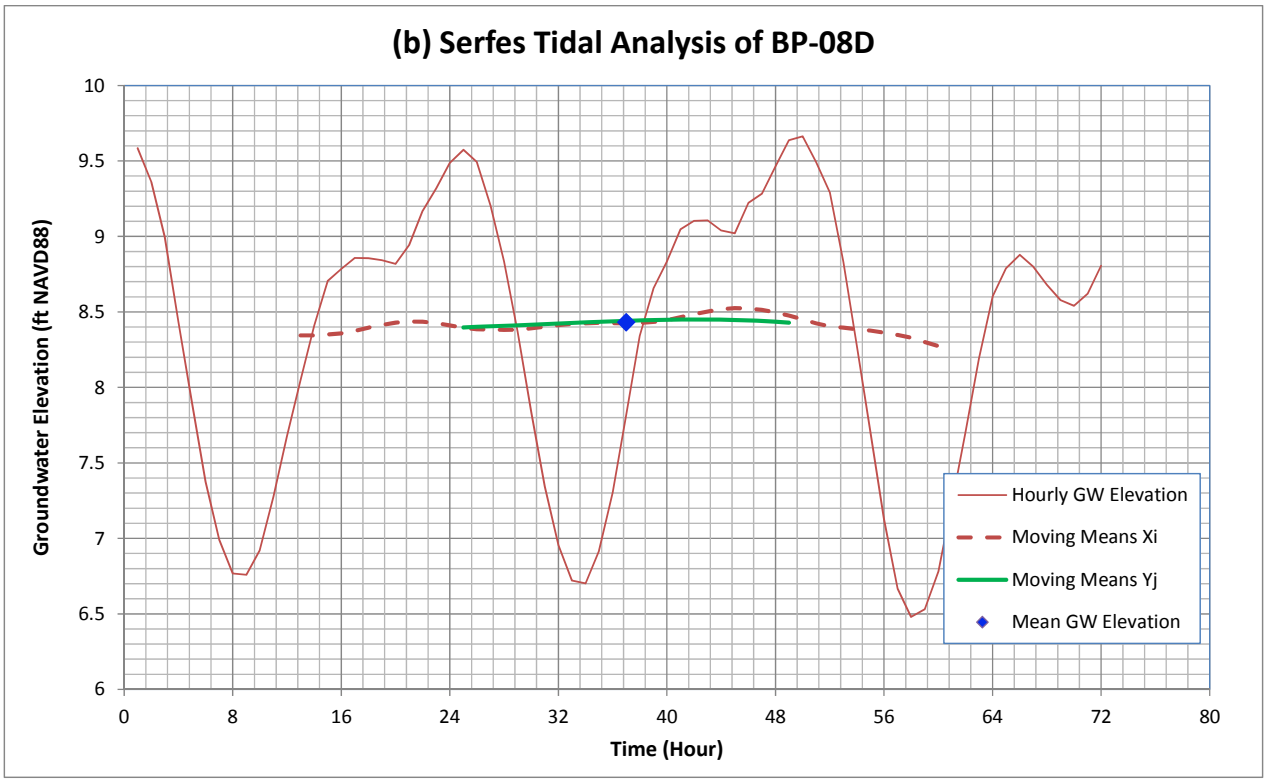
Figure F-6





Notes:

1. Method based on Serfes (1991)
2. X_i: 48 means from moving average of 24 hourly GW elevation
3. Y_j: 25 means from moving average of 24 means over the 48 X_i
4. Time in hours is from 1500 on 2/5/2013
5. Distance to Shoreline: 1,699 feet

Reference: Technical Analysis > Tidal Study > Everett Mean GW Elev.xlsx

Serfes Tidal Analysis at BP-08D

Everett Smelter – Lowland Area

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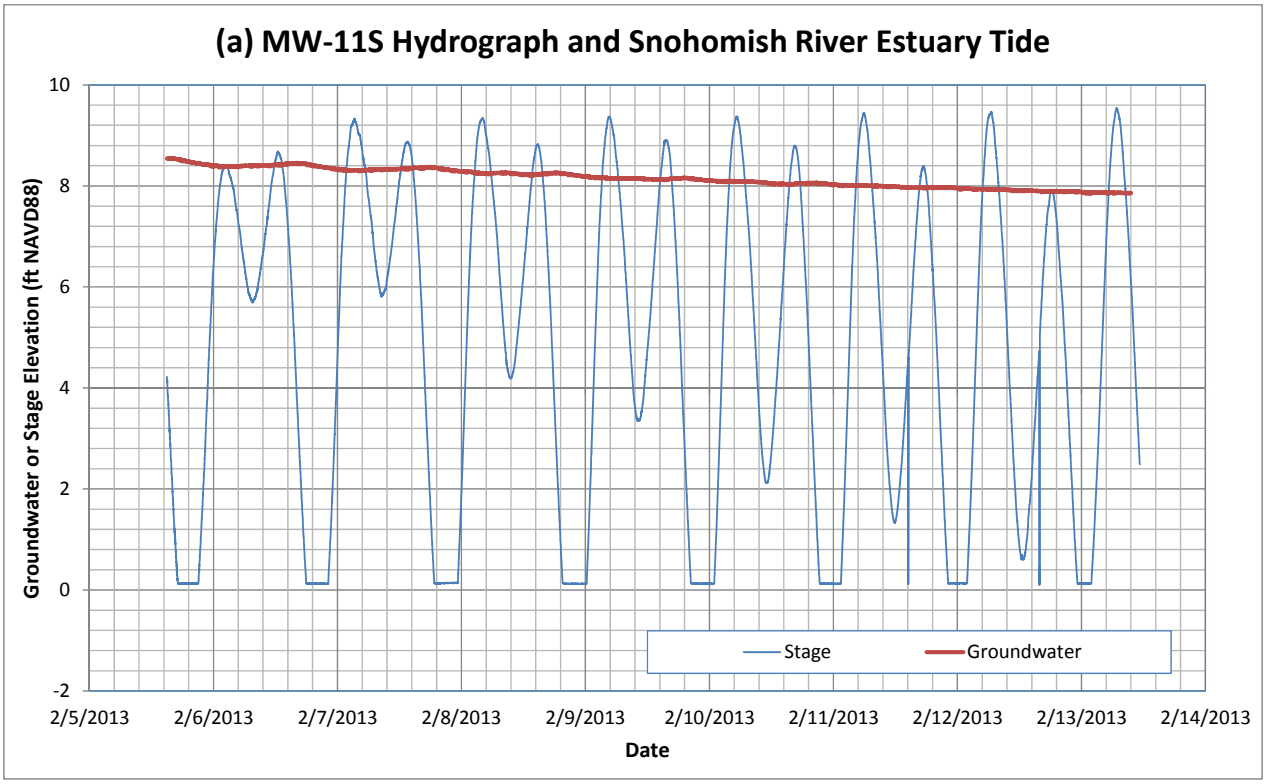
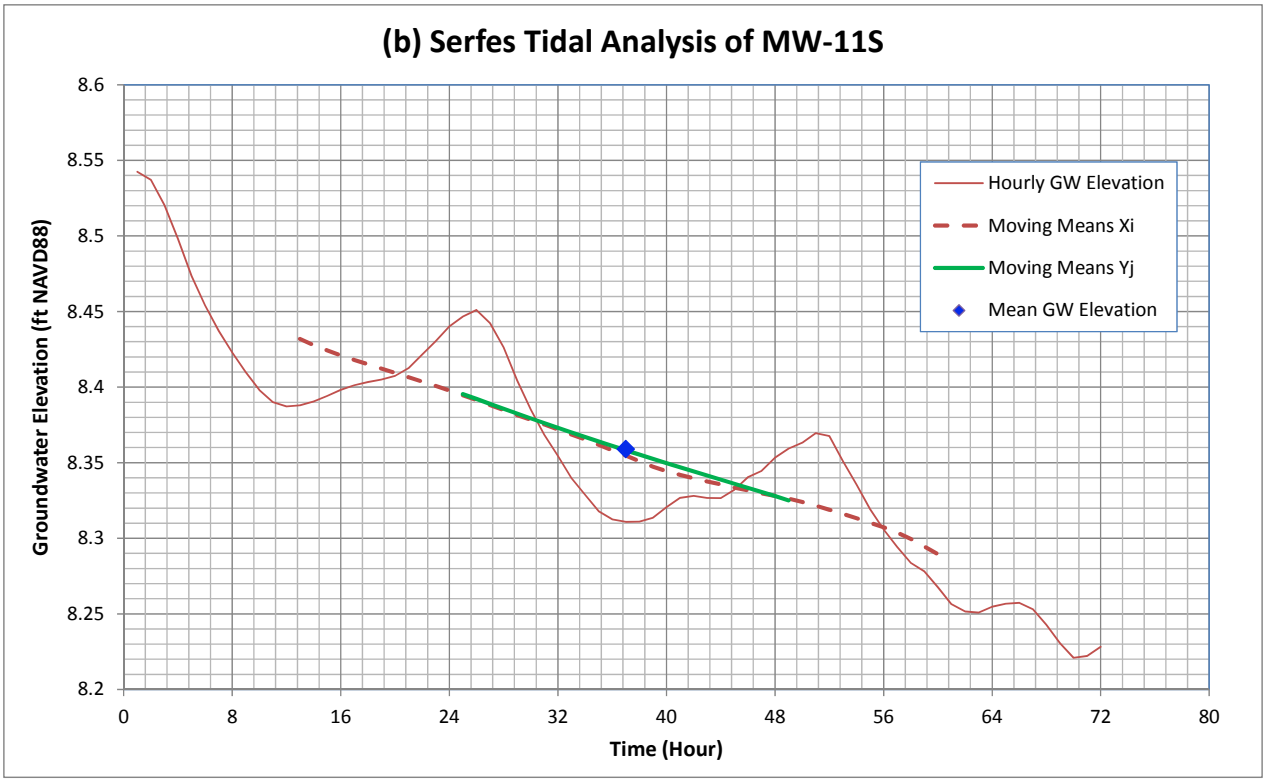
Figure F-7





Notes:

1. Method based on Serfes (1991)
2. X_i: 48 means from moving average of 24 hourly GW elevation
3. Y_j: 25 means from moving average of 24 means over the 48 X_i
4. Time in hours is from 1500 on 2/5/2013
5. Distance to Shoreline: 48.3 feet

Reference: Technical Analysis > Tidal Study > Everett Mean GW Elev.xlsx

Serfes Tidal Analysis at MW-11S

Everett Smelter – Lowland Area

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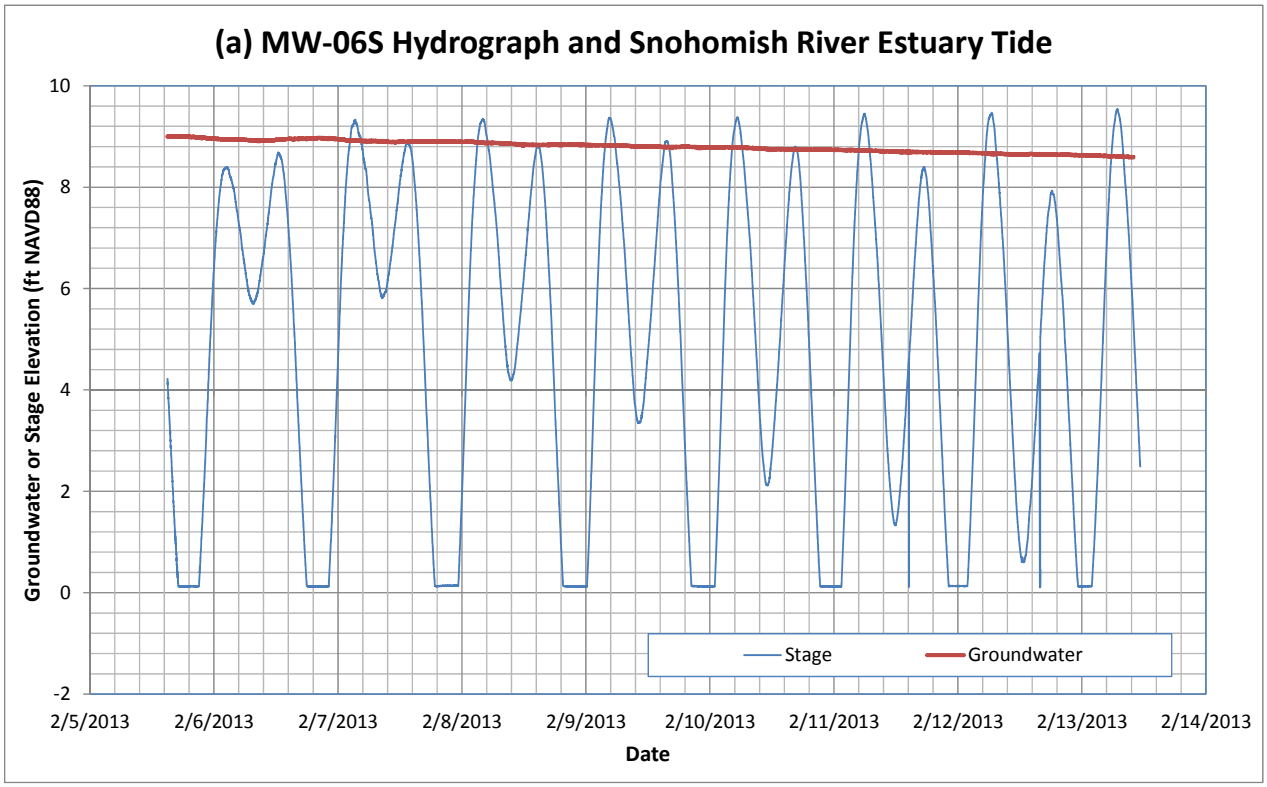
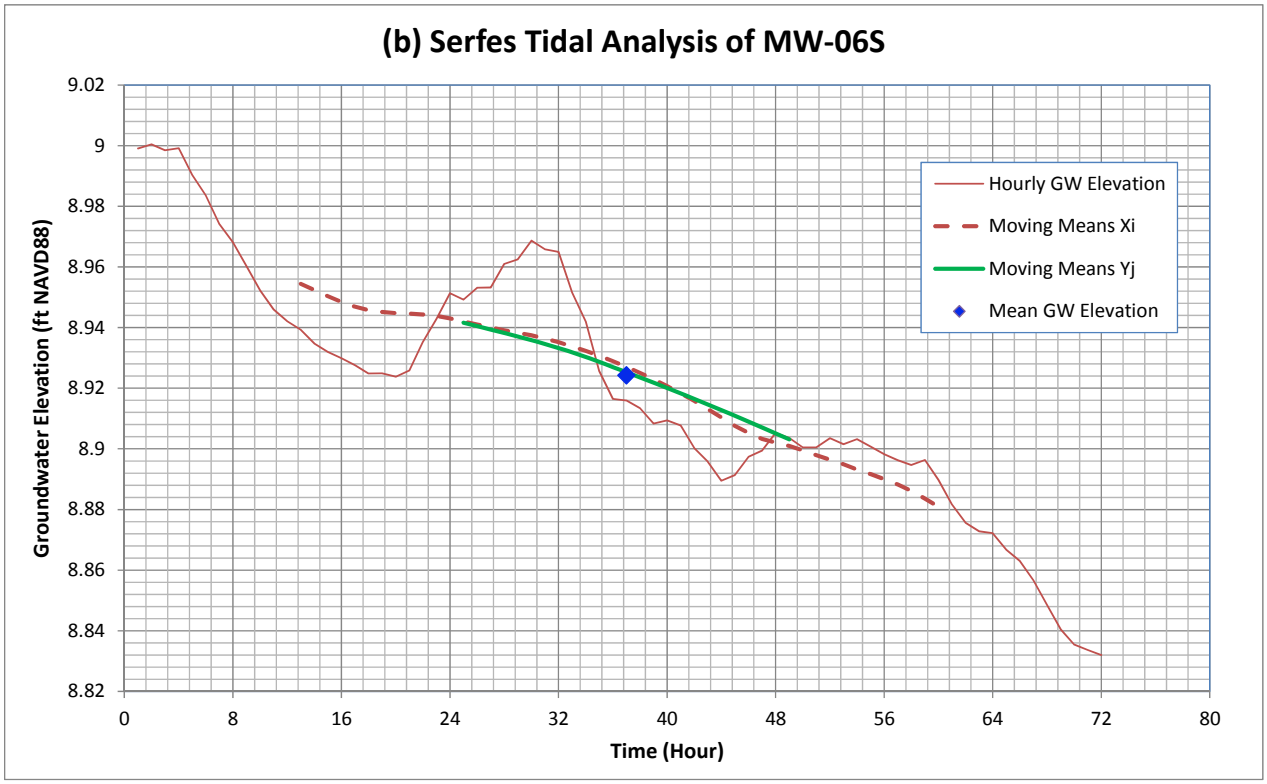
Figure F-8





Notes:

1. Method based on Serfes (1991)
2. X_i: 48 means from moving average of 24 hourly GW elevation
3. Y_j: 25 means from moving average of 24 means over the 48 X_i
4. Time in hours is from 1500 on 2/5/2013
5. Distance to Shoreline: 358 feet

Reference: Technical Analysis > Tidal Study > Everett Mean GW Elev.xlsx

Serfes Tidal Analysis at MW-06S

Everett Smelter – Lowland Area

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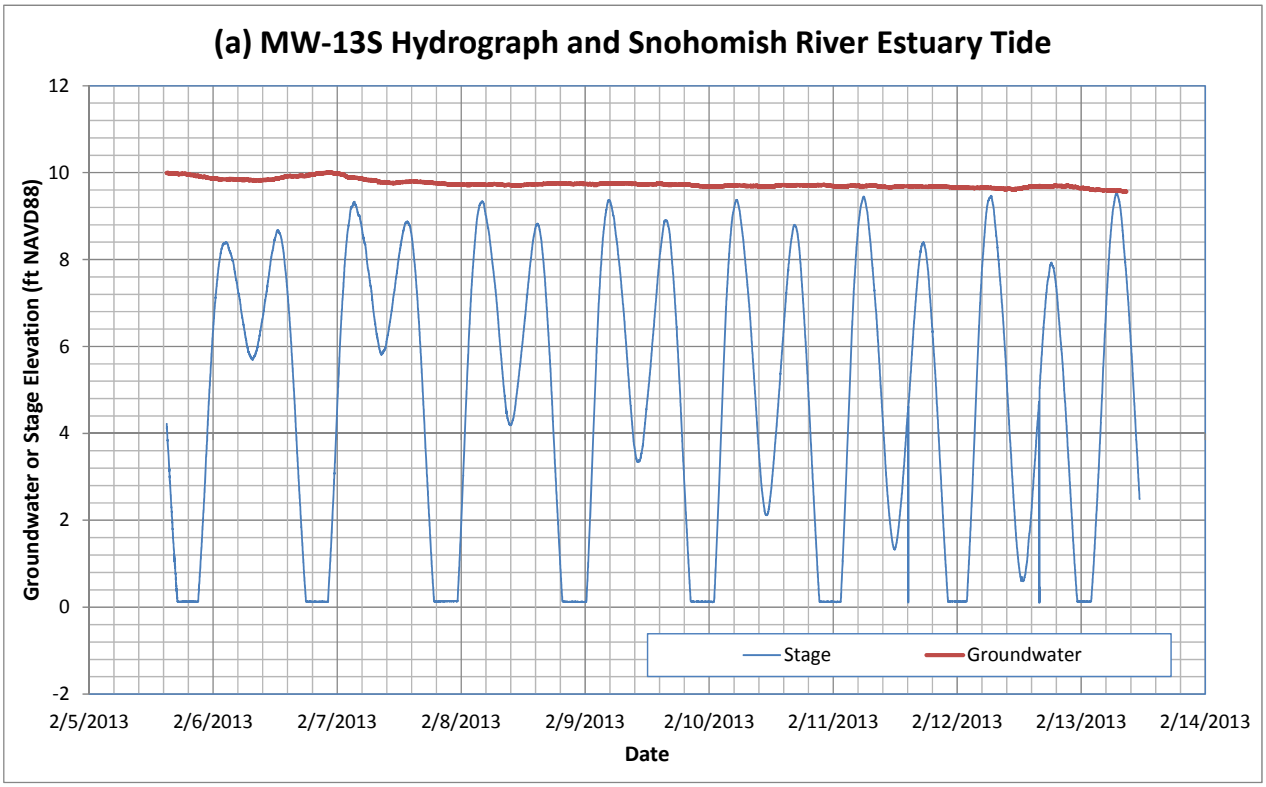
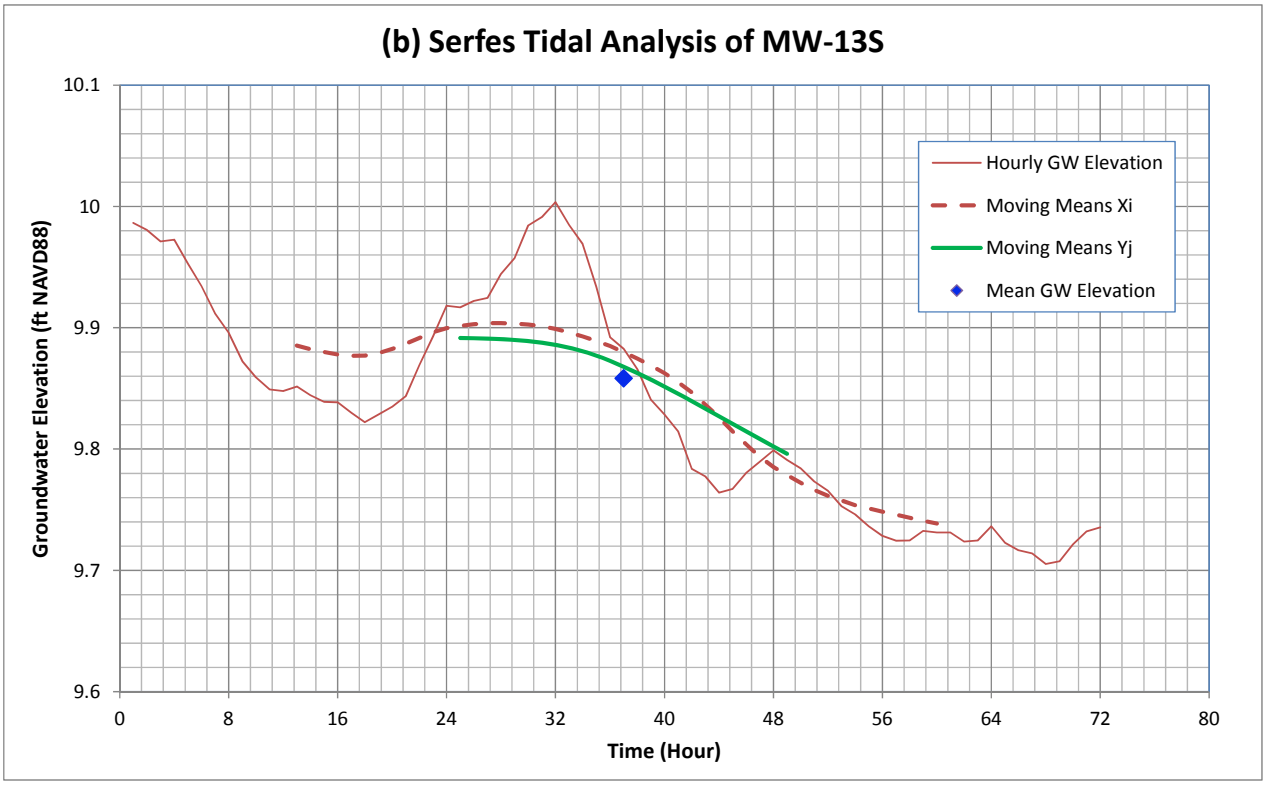
Figure F-9





Notes:

1. Method based on Serfes (1991)
2. X_i: 48 means from moving average of 24 hourly GW elevation
3. Y_j: 25 means from moving average of 24 means over the 48 X_i
4. Time in hours is from 1500 on 2/5/2013
5. Distance to Shoreline: 601 feet

Reference: Technical Analysis > Tidal Study > Everett Mean GW Elev.xlsx

Serfes Tidal Analysis at MW-13S

Everett Smelter – Lowland Area

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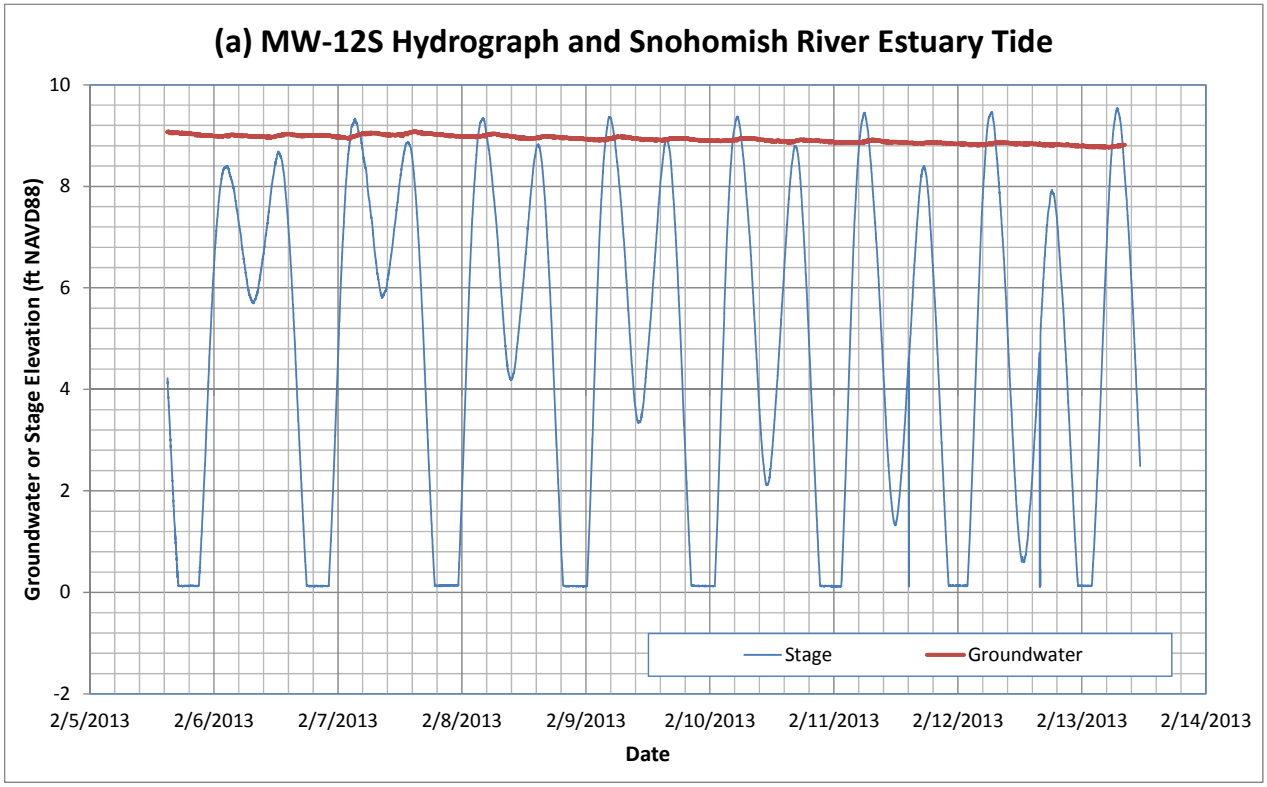
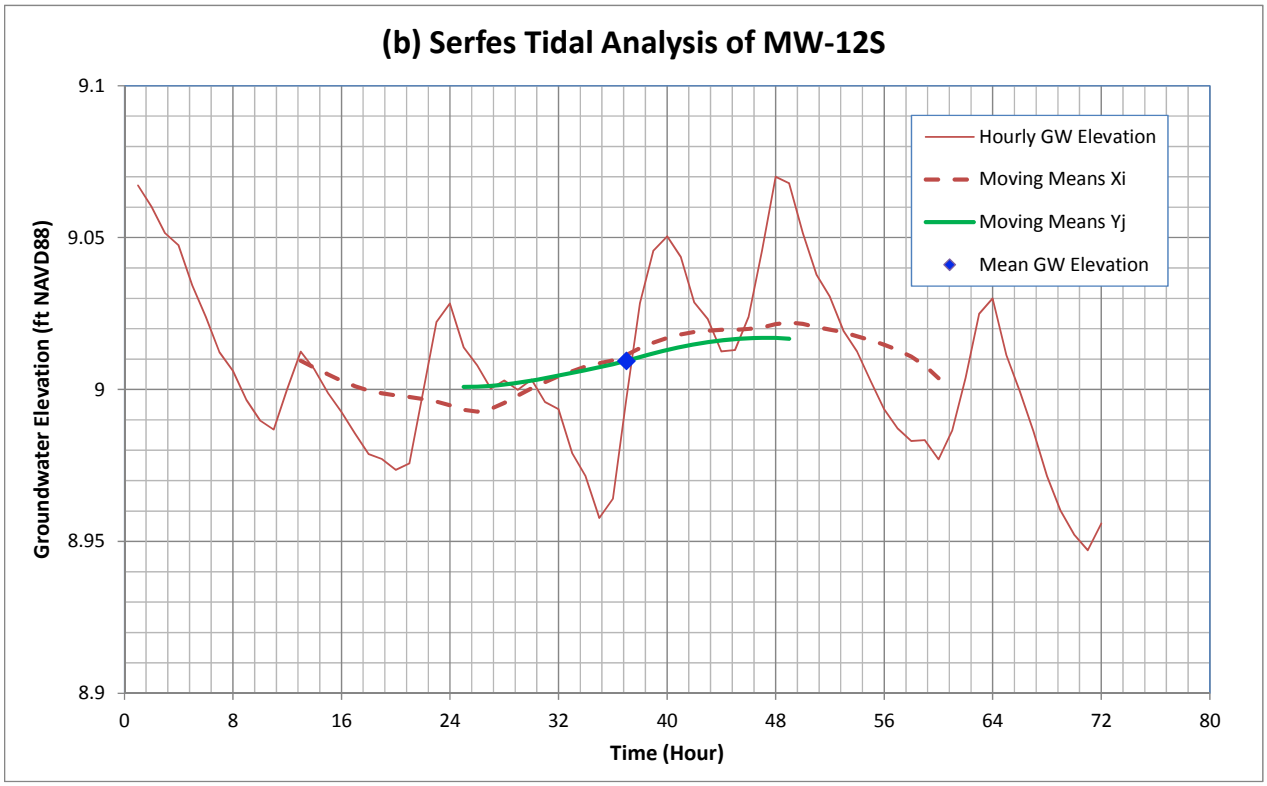
Figure F-10





Notes:

1. Method based on Serfes (1991)
2. X_i: 48 means from moving average of 24 hourly GW elevation
3. Y_j: 25 means from moving average of 24 means over the 48 X_i
4. Time in hours is from 1500 on 2/5/2013
5. Distance to Shoreline: 1,016 feet

Reference: Technical Analysis > Tidal Study > Everett Mean GW Elev.xlsx

Serfes Tidal Analysis at MW-12S

Everett Smelter – Lowland Area

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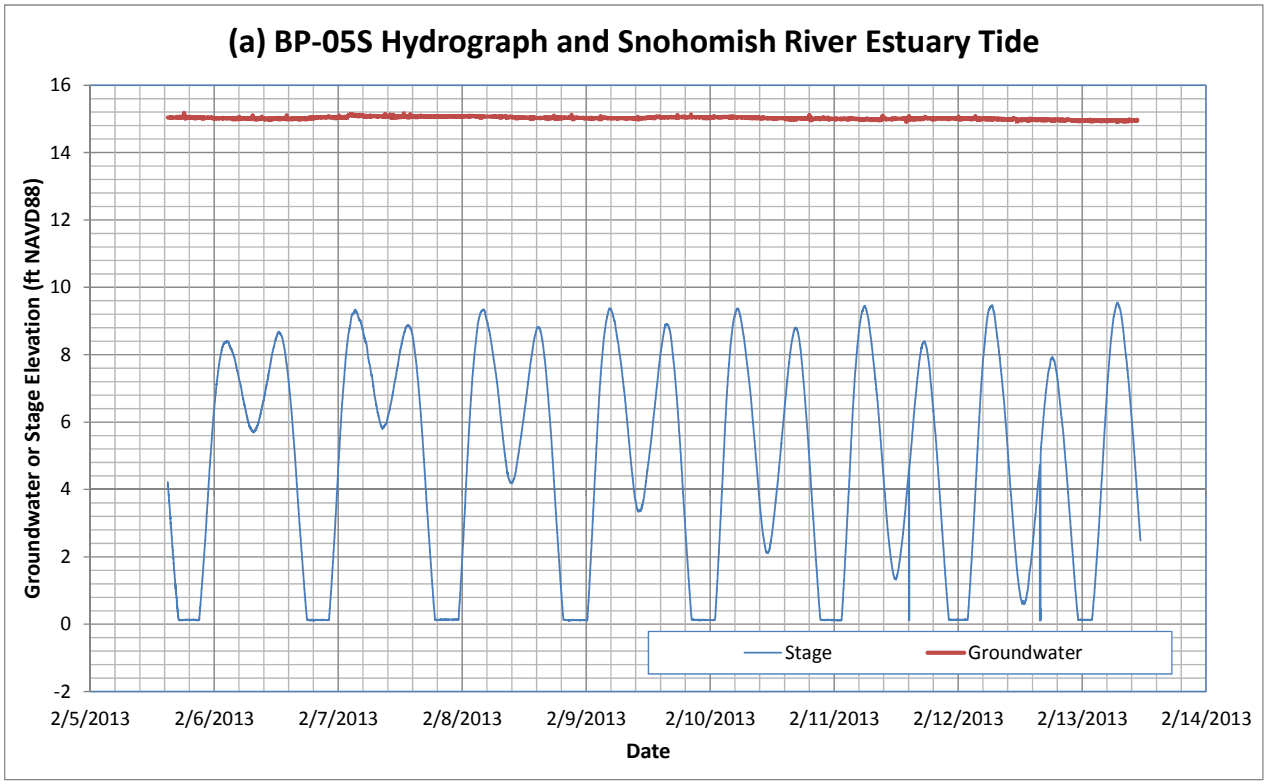
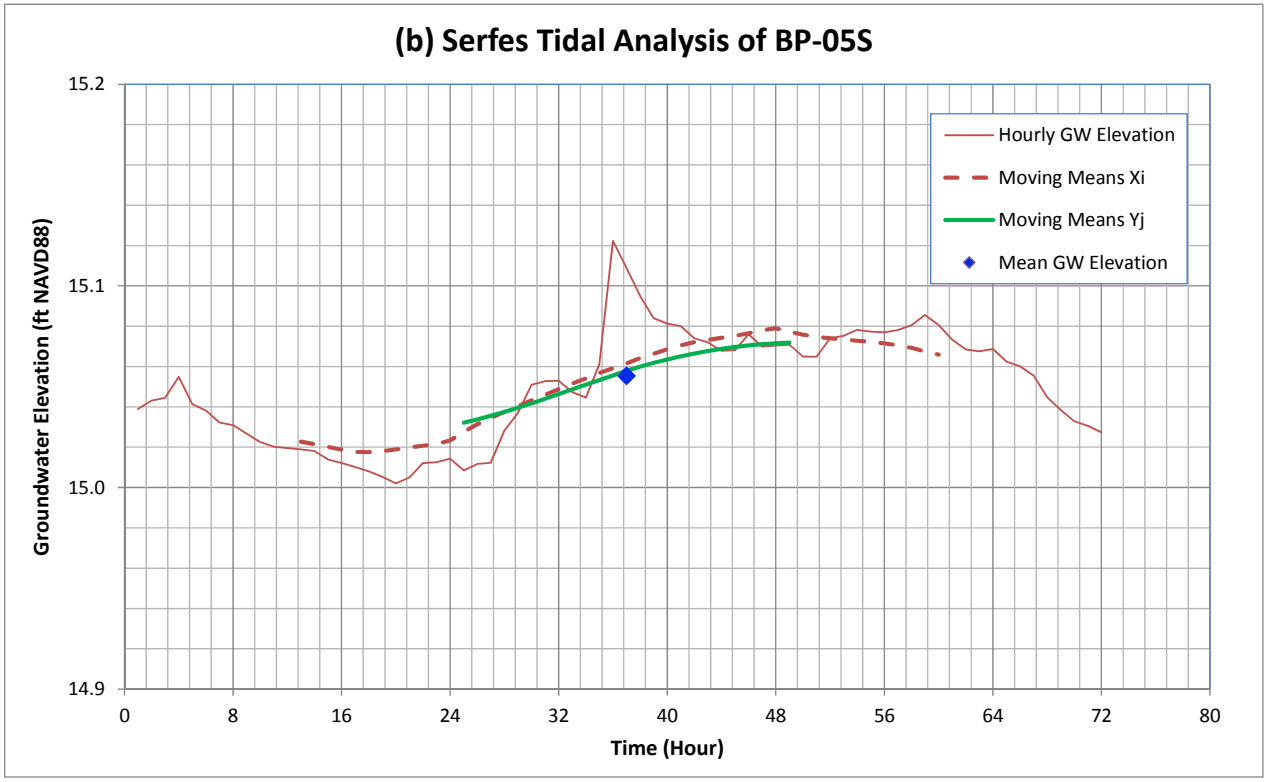
Figure F-11





Notes:

1. Method based on Serfes (1991)
2. X_i: 48 means from moving average of 24 hourly GW elevation
3. Y_j: 25 means from moving average of 24 means over the 48 X_i
4. Time in hours is from 1500 on 2/5/2013
5. Distance to Shoreline: 1,483 feet

Reference: Technical Analysis > Tidal Study > Everett Mean GW Elev.xlsx

Serfes Tidal Analysis at BP-05S

Everett Smelter – Lowland Area

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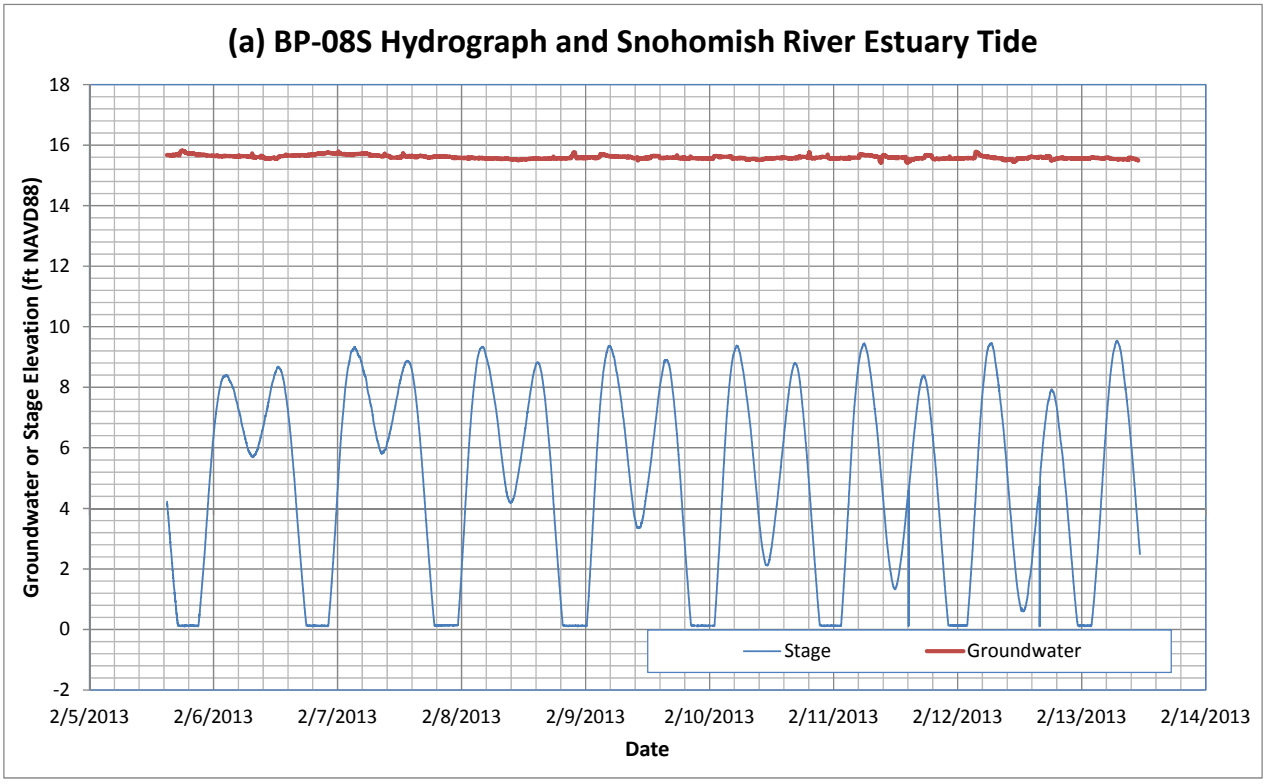
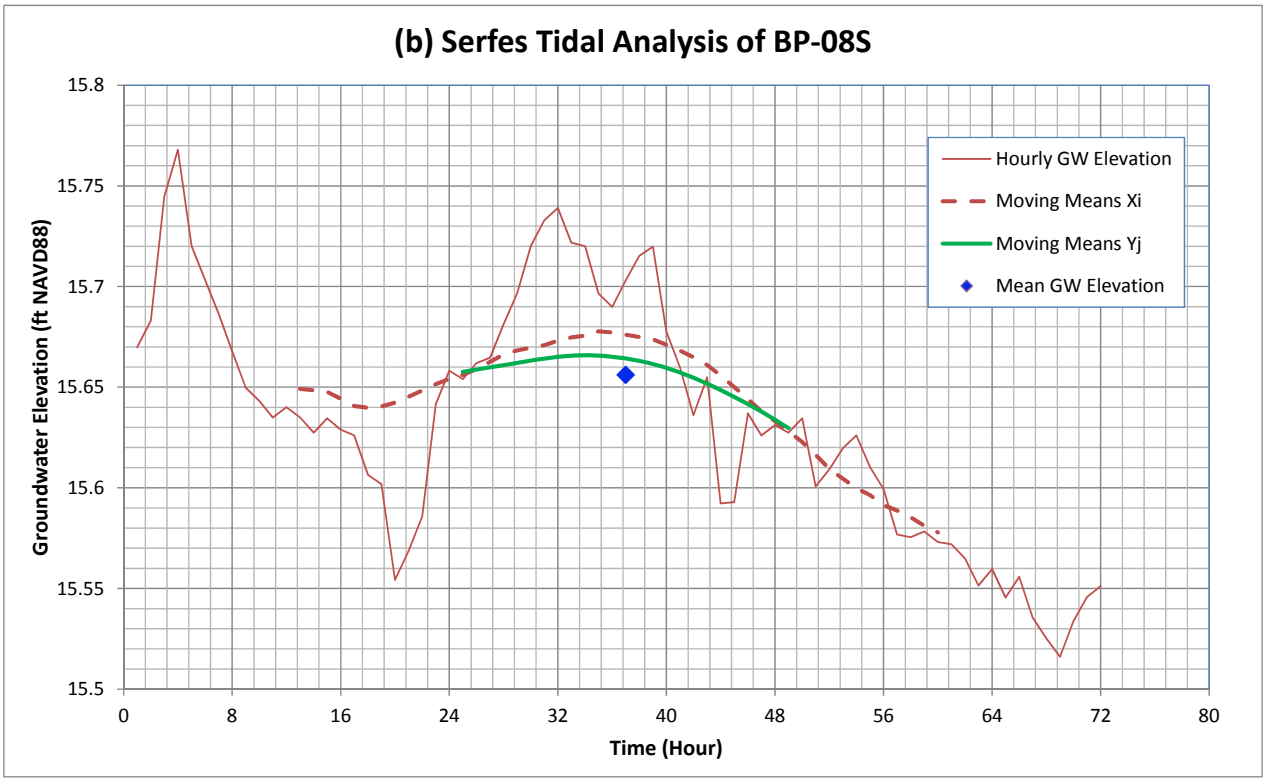
Figure F-12





Notes:

1. Method based on Serfes (1991)
2. X_i: 48 means from moving average of 24 hourly GW elevation
3. Y_j: 25 means from moving average of 24 means over the 48 X_i
4. Time in hours is from 1500 on 2/5/2013
5. Distance to Shoreline: 1,699 feet

Reference: Technical Analysis > Tidal Study > Everett Mean GW Elev.xlsx

Serfes Tidal Analysis at BP-08S

Everett Smelter – Lowland Area

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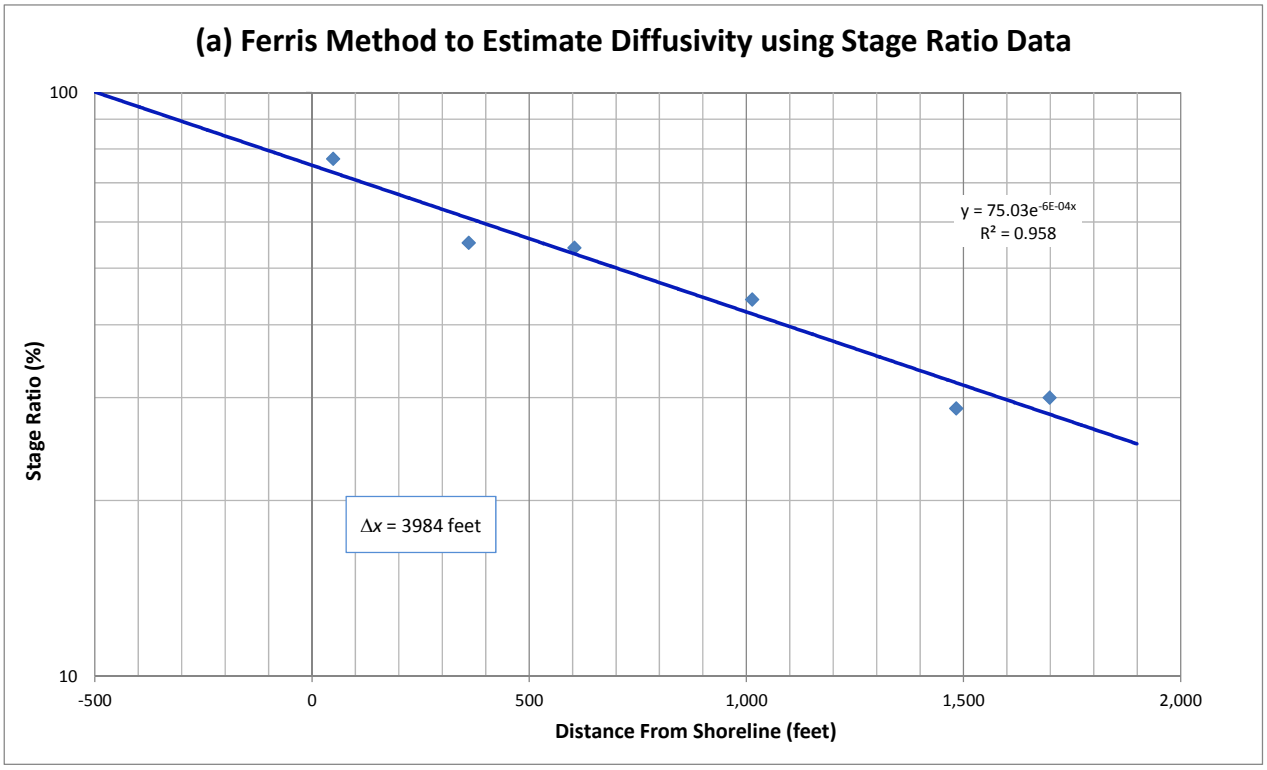
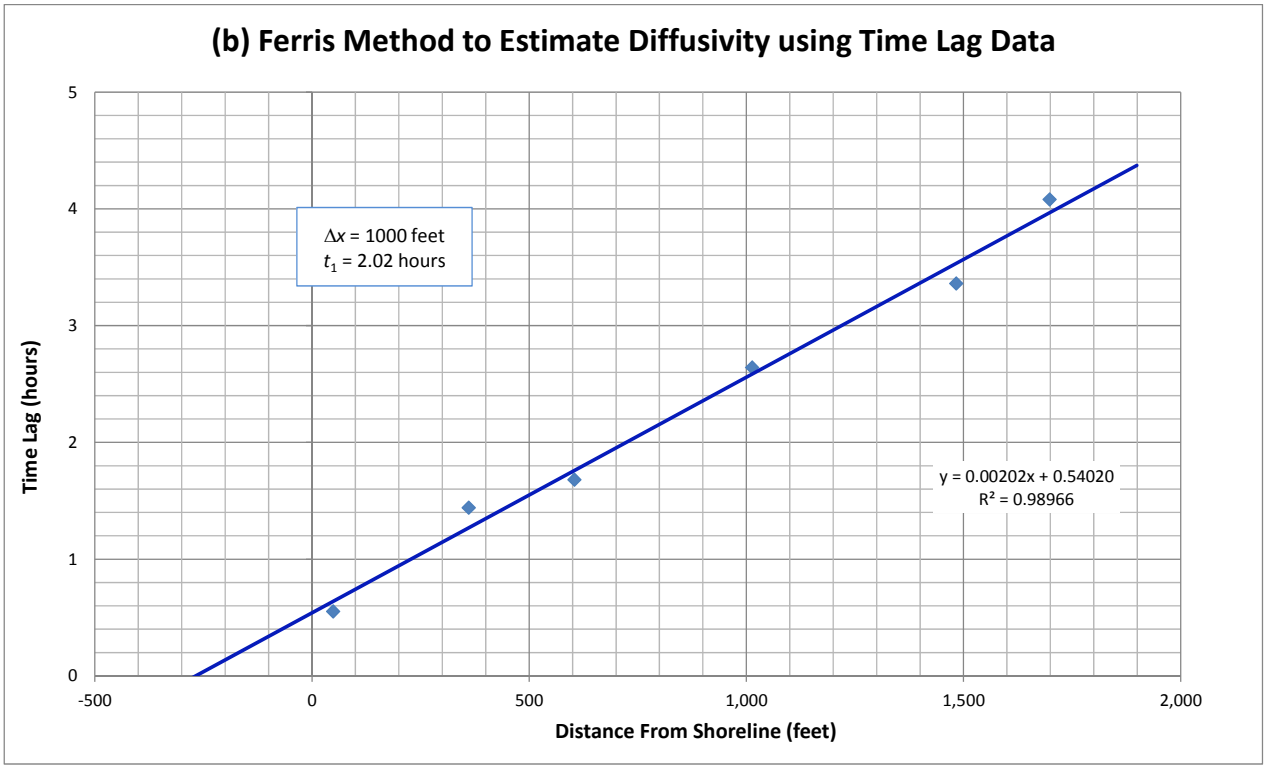
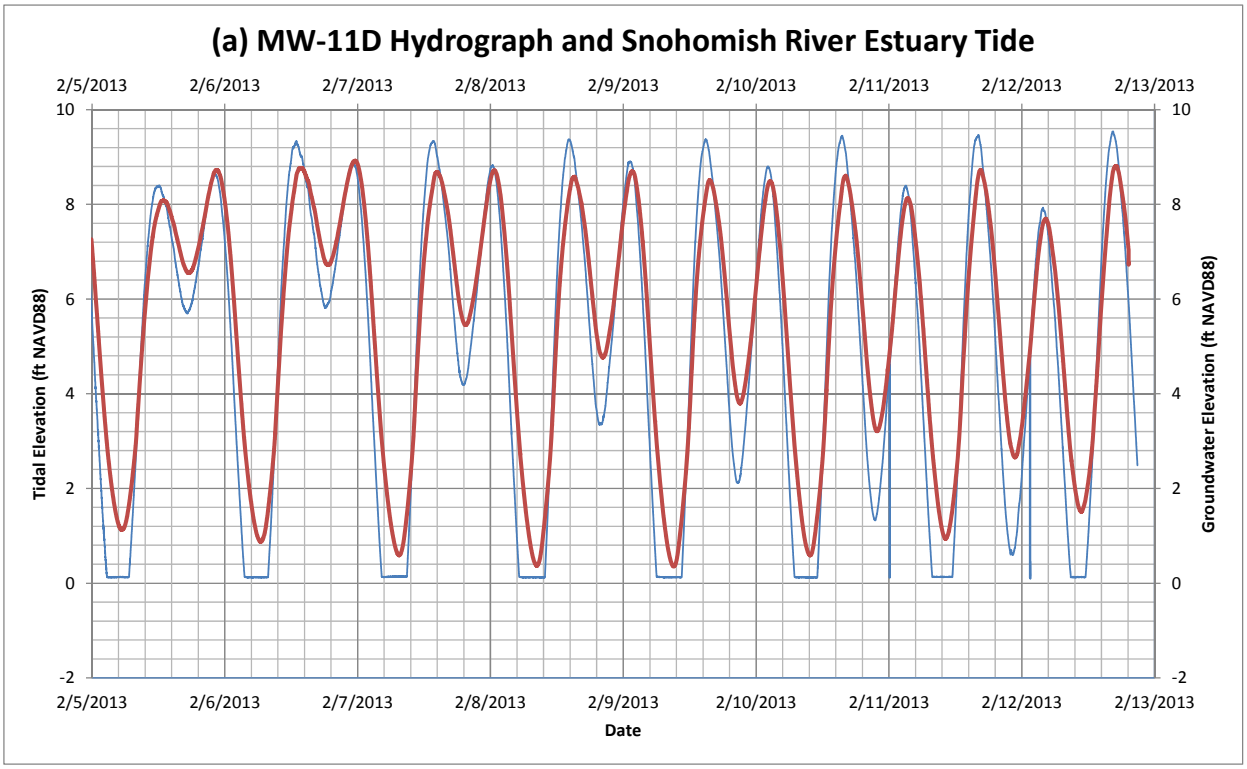
Figure F-13

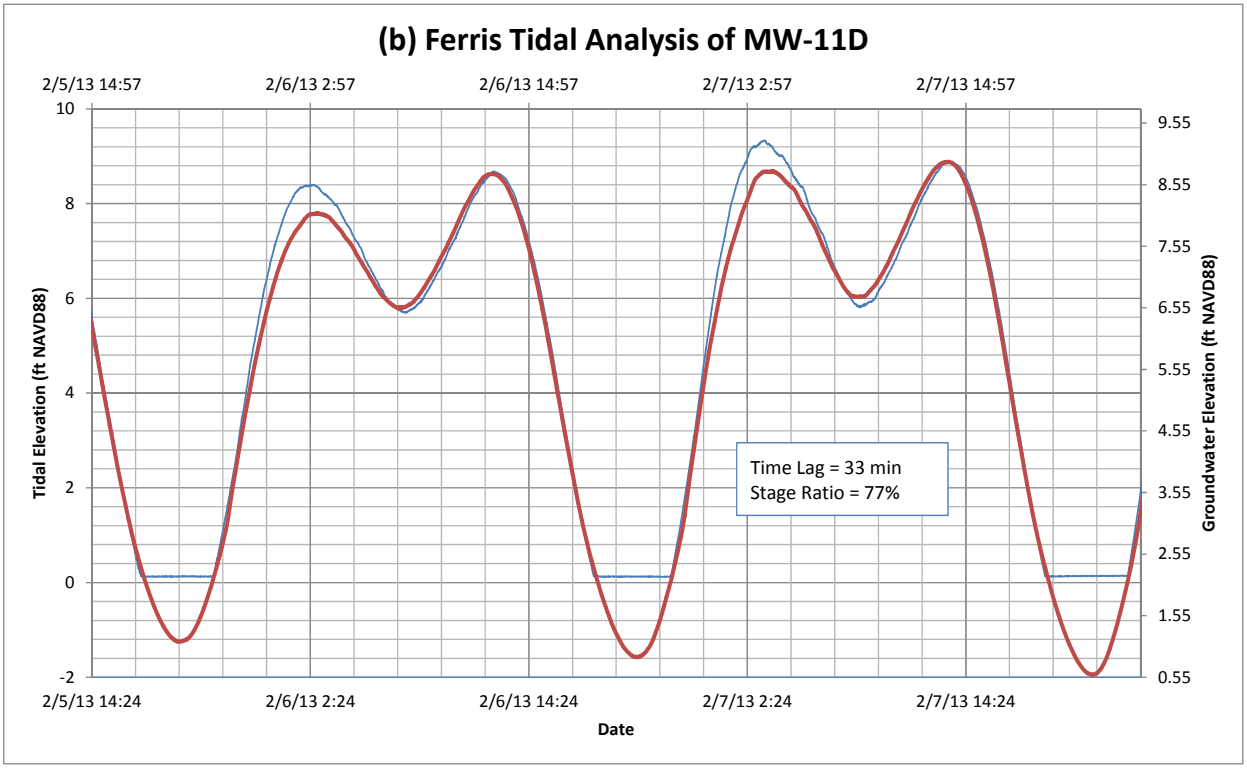




Ferris Tidal Analysis	
Everett Smelter – Lowland Area	
GeoEngineers	Figure F-14

Reference: Technical Analysis > Tidal Study > Everett Tidal match.xlsx.





Notes:
1. Distance to Shoreline: 48.8 feet

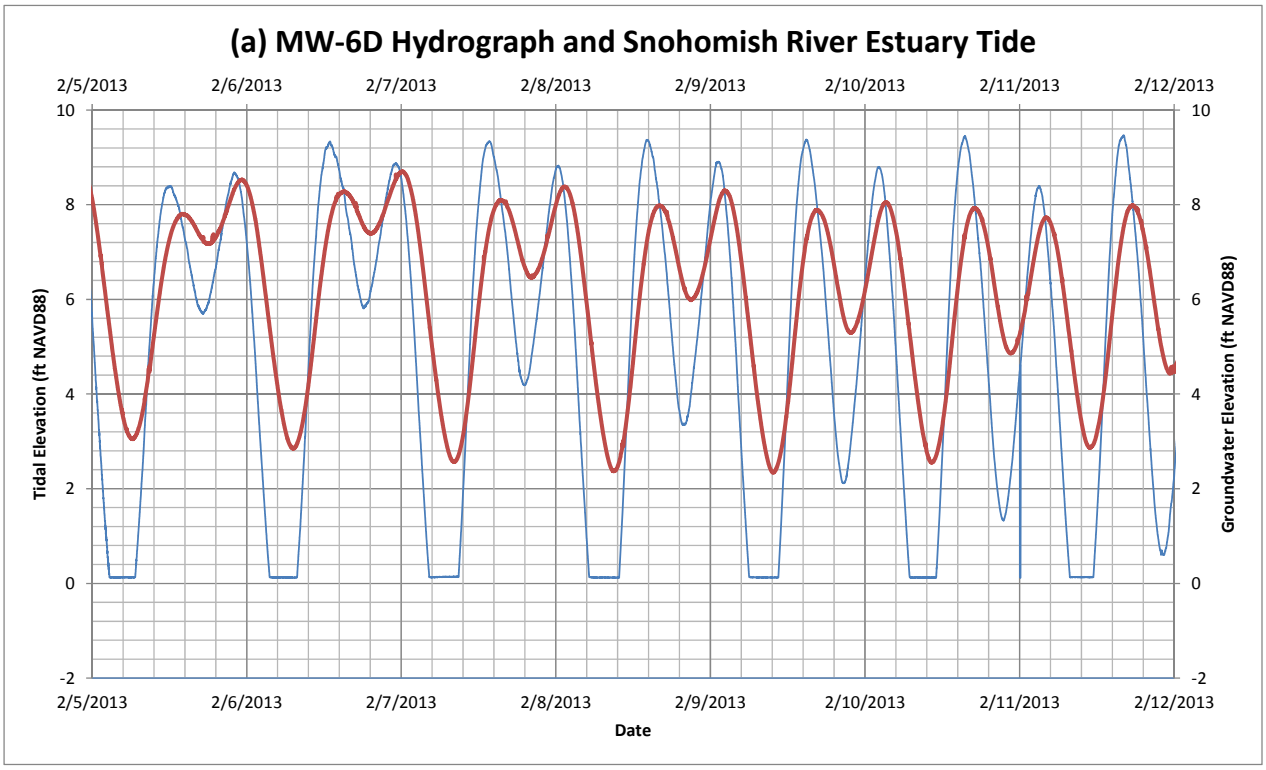
Reference: Technical Analysis > Tidal Study > Everett Tidal match.xlsx.

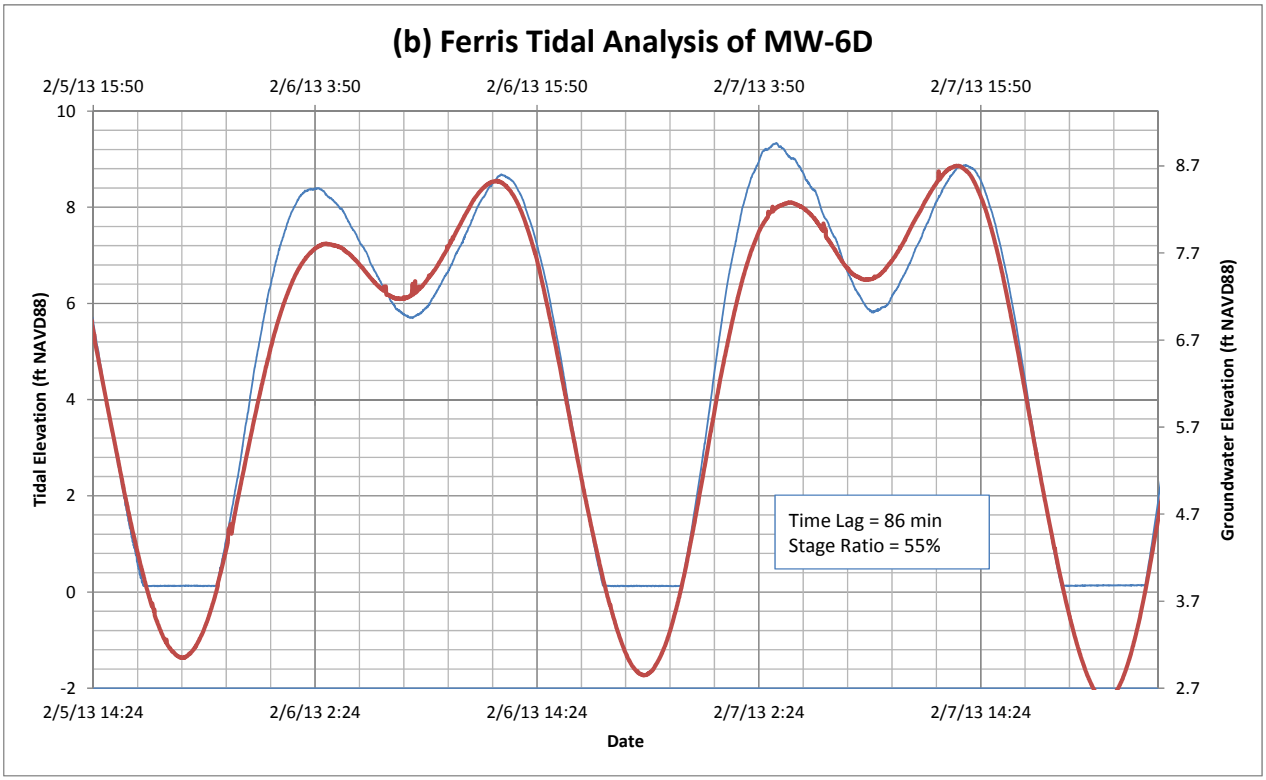
Ferris Tidal Analysis at MW-11D

Everett Smelter – Lowland Area

GeoEngineers

Figure F-15





Notes:
1. Distance to Shoreline: 361 feet

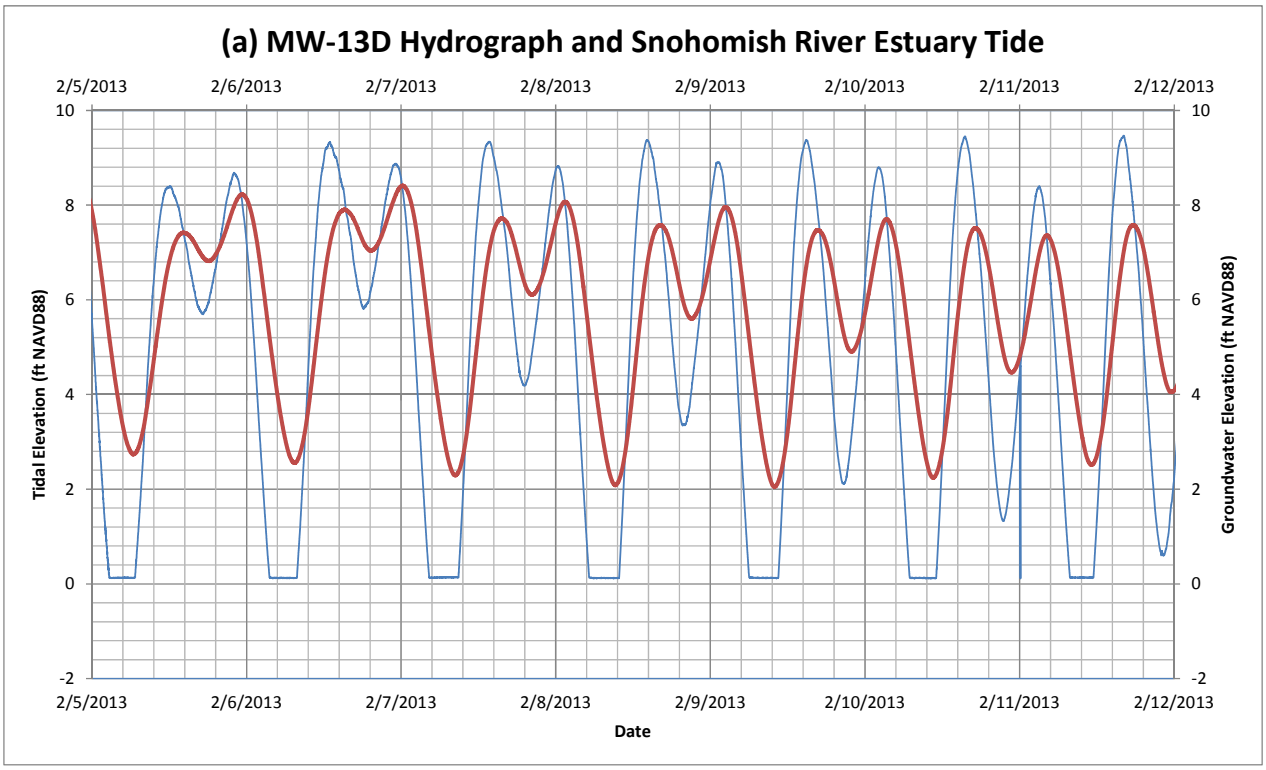
Reference: Technical Analysis > Tidal Study > Everett Tidal match.xlsx.

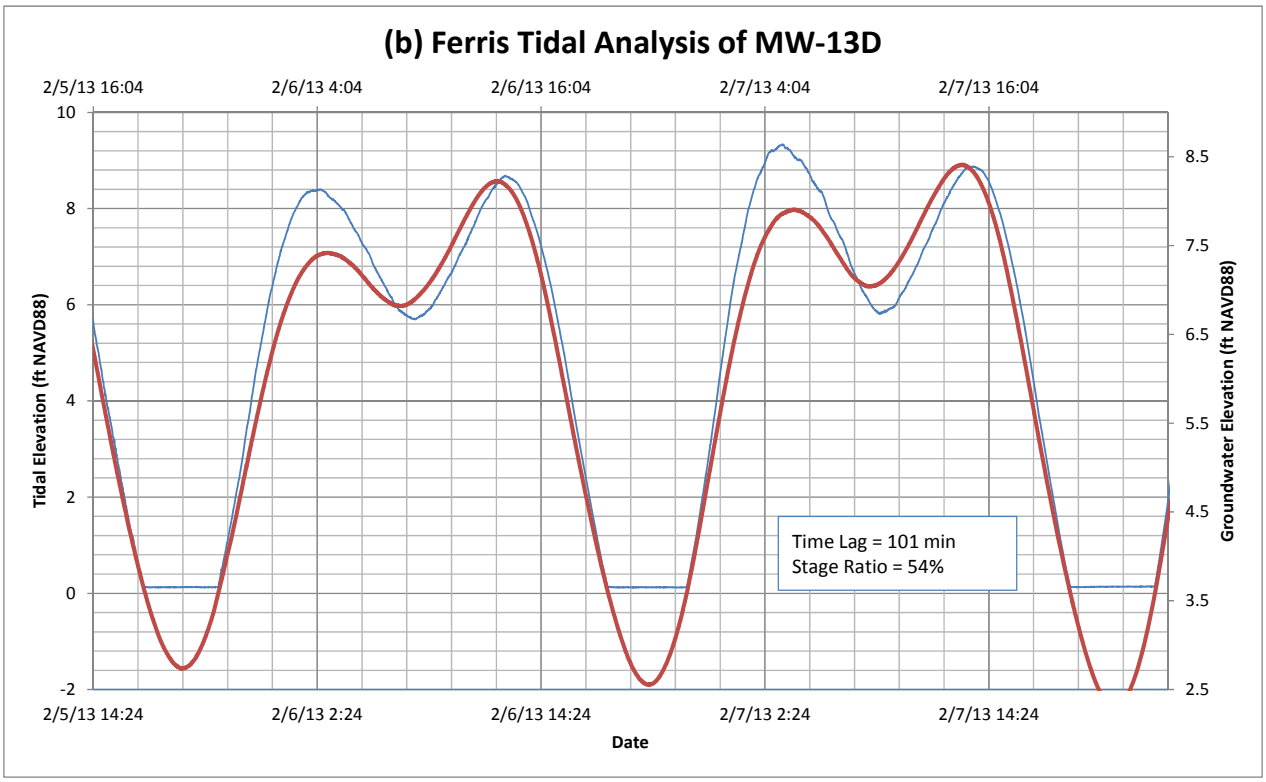
Ferris Tidal Analysis at MW-06D

Everett Smelter – Lowland Area

GeoEngineers

Figure F-16





Notes:
1. Distance to Shoreline: 604 feet

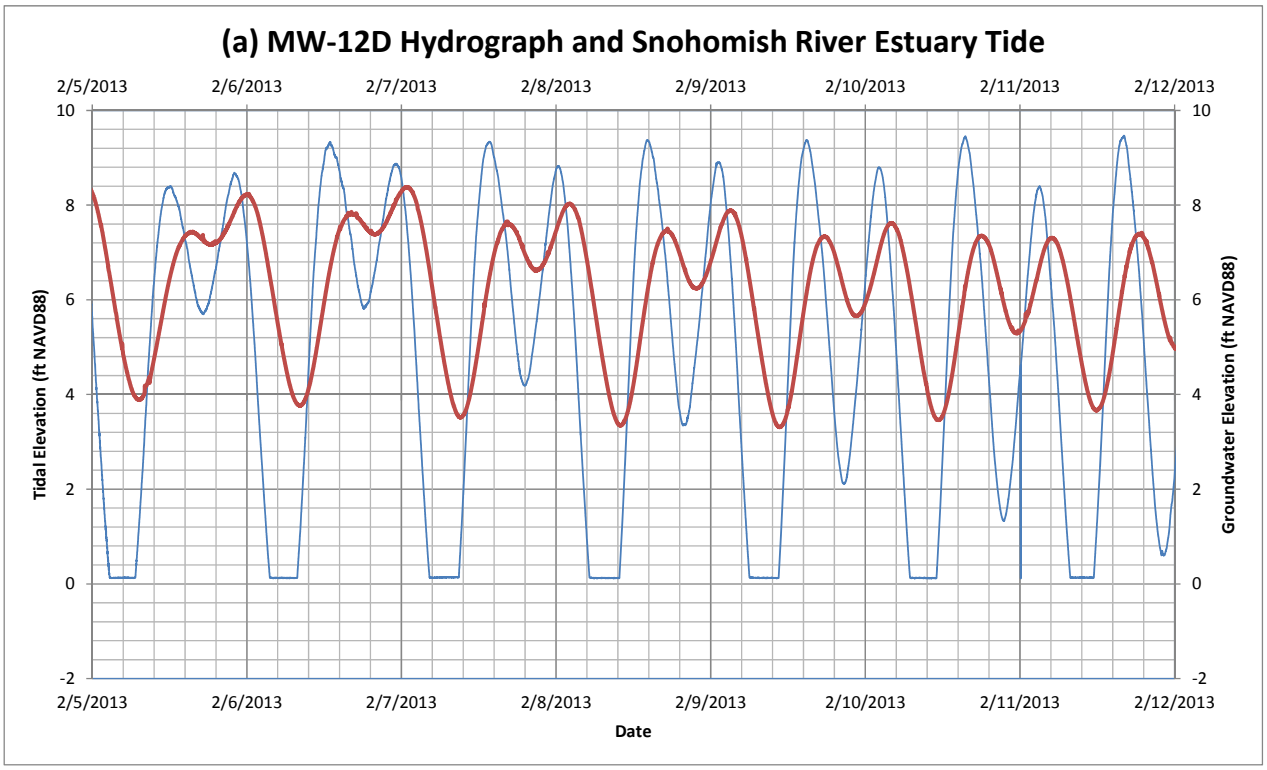
Reference: Technical Analysis > Tidal Study > Everett Tidal match.xlsx.

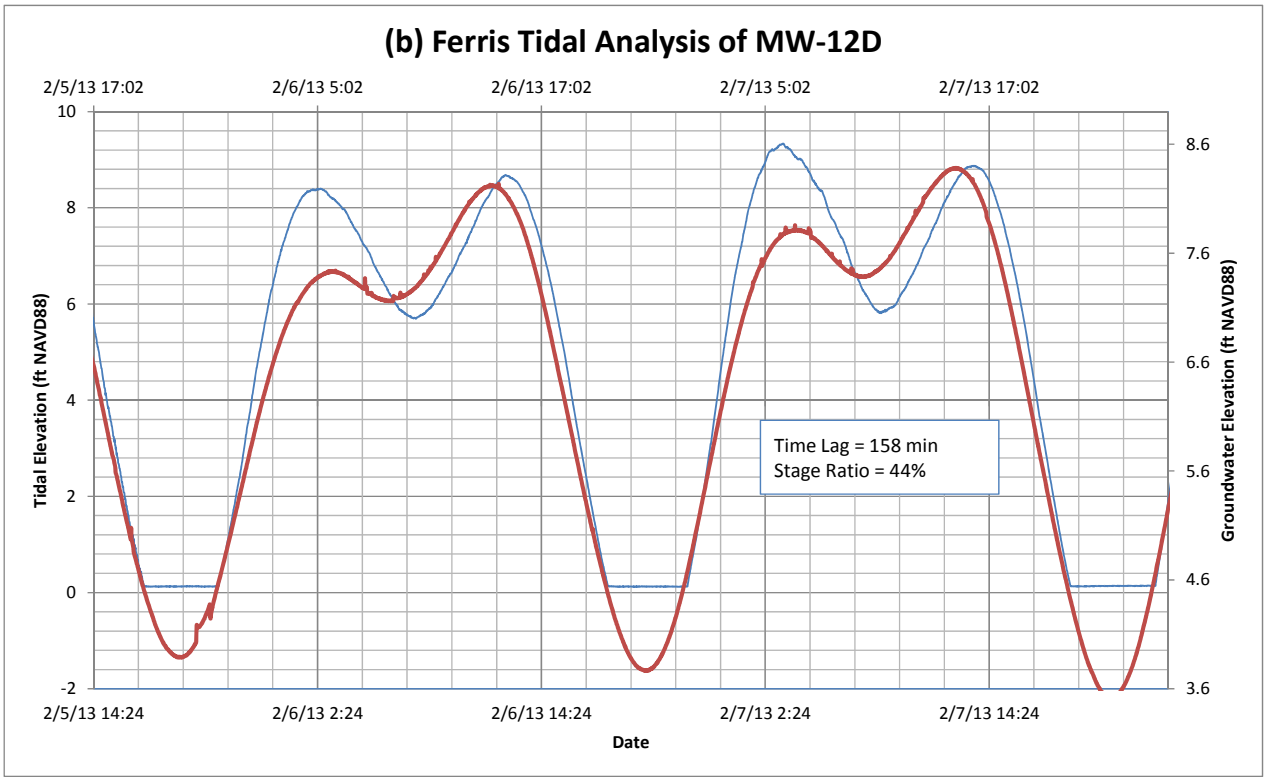
Ferris Tidal Analysis at MW-13D

Everett Smelter – Lowland Area

GeoEngineers

Figure F-17





Notes:
1. Distance to Shoreline: 1,013 feet

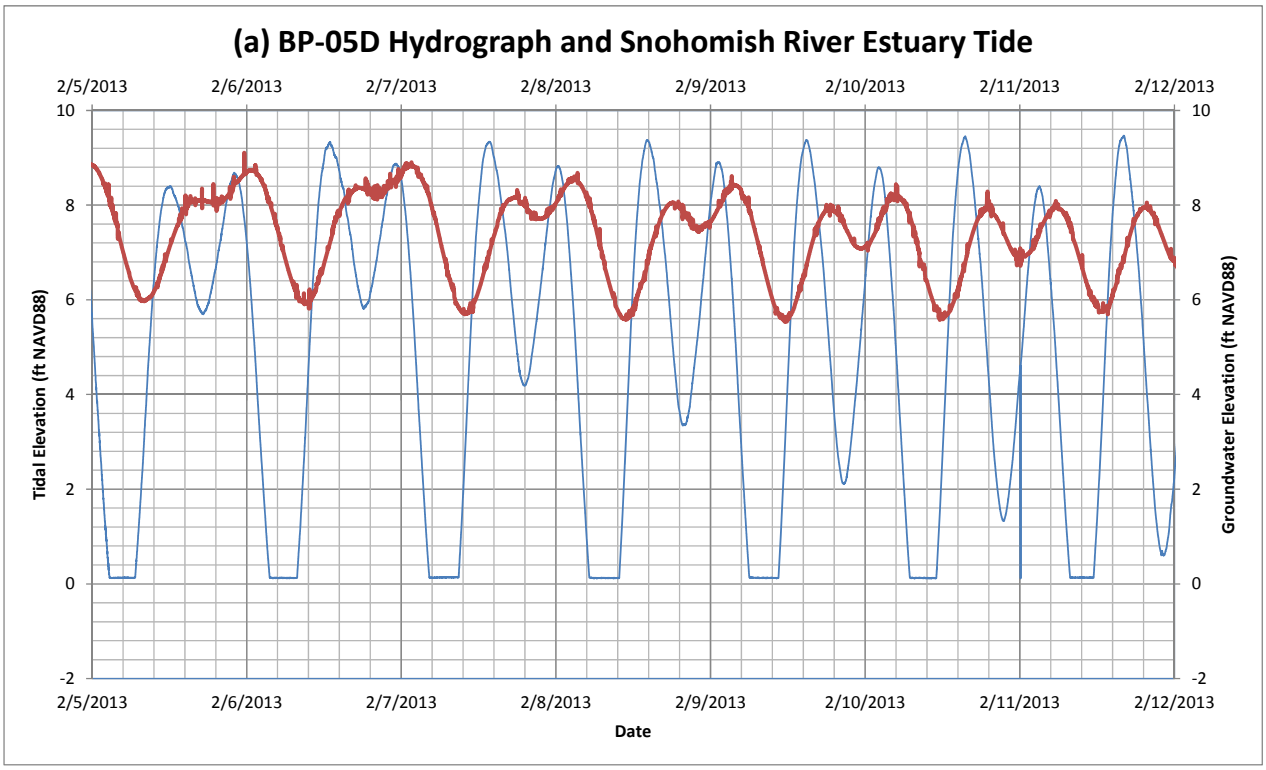
Reference: Technical Analysis > Tidal Study > Everett Tidal match.xlsx.

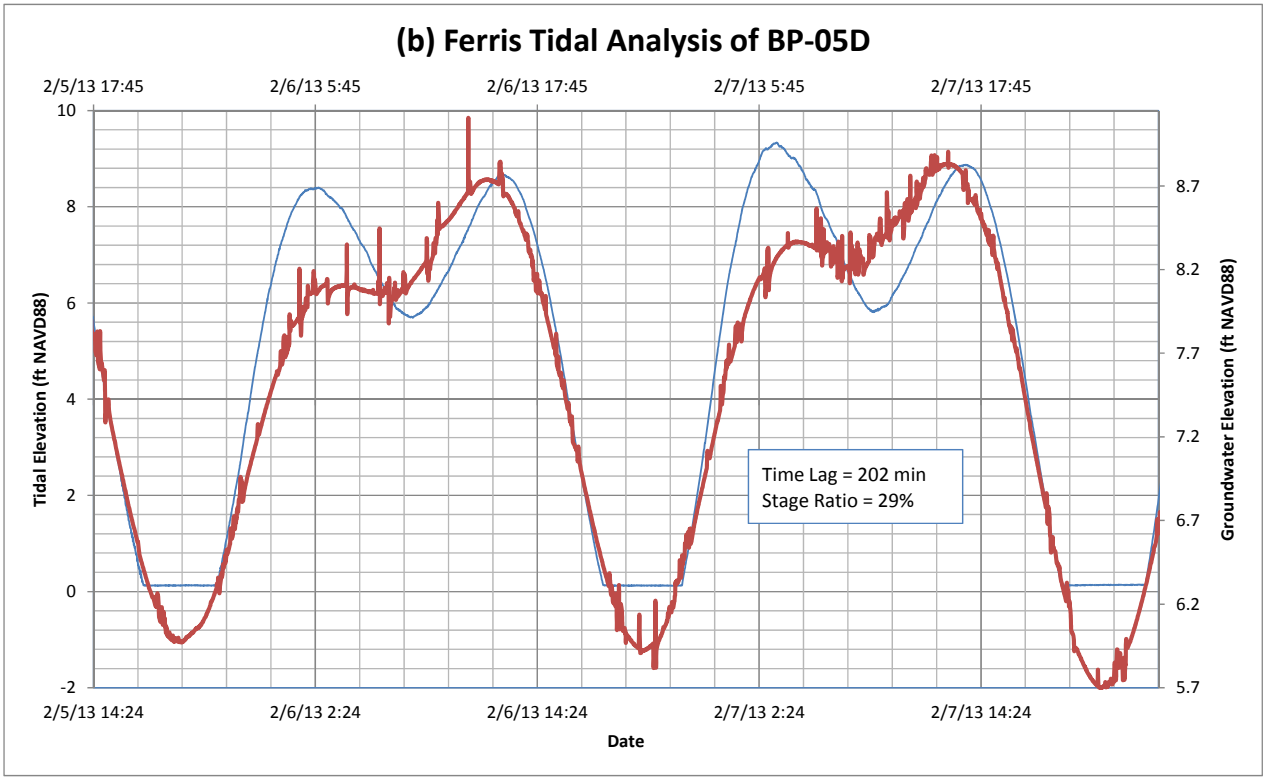
Ferris Tidal Analysis at MW-12D

Everett Smelter – Lowland Area

GeoEngineers

Figure F-18





Notes:
1. Distance to Shoreline: 1,483 feet

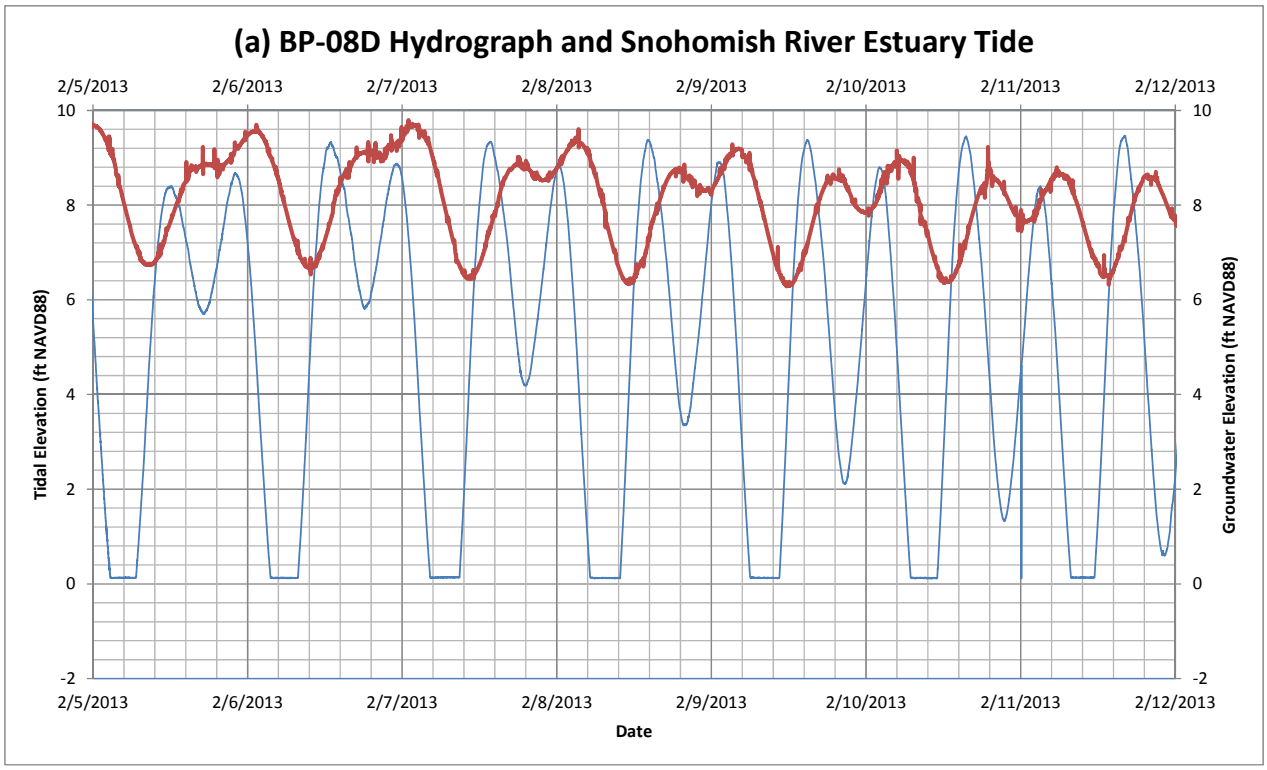
Reference: Technical Analysis > Tidal Study > Everett Tidal match.xlsx.

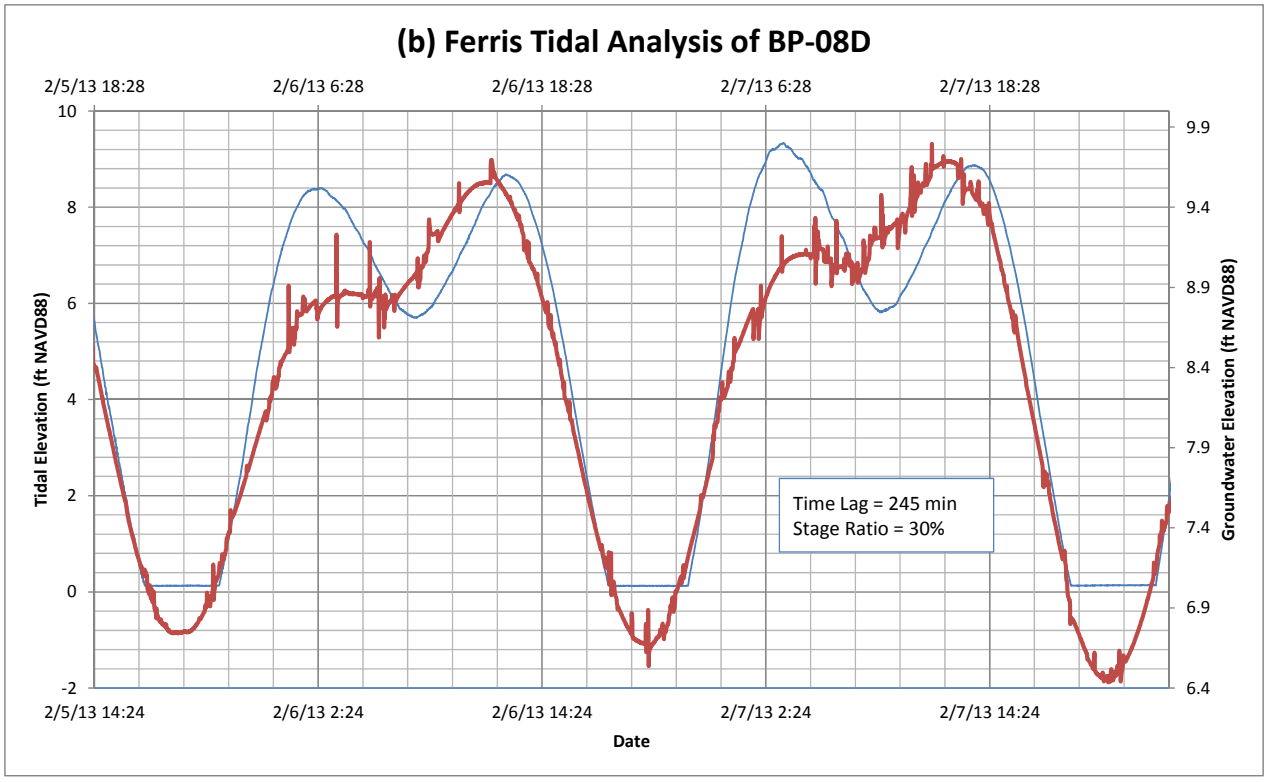
Ferris Tidal Analysis at BP-05D

Everett Smelter – Lowland Area

GeoEngineers

Figure F-19





Notes:
1. Distance to Shoreline: 1,699 feet

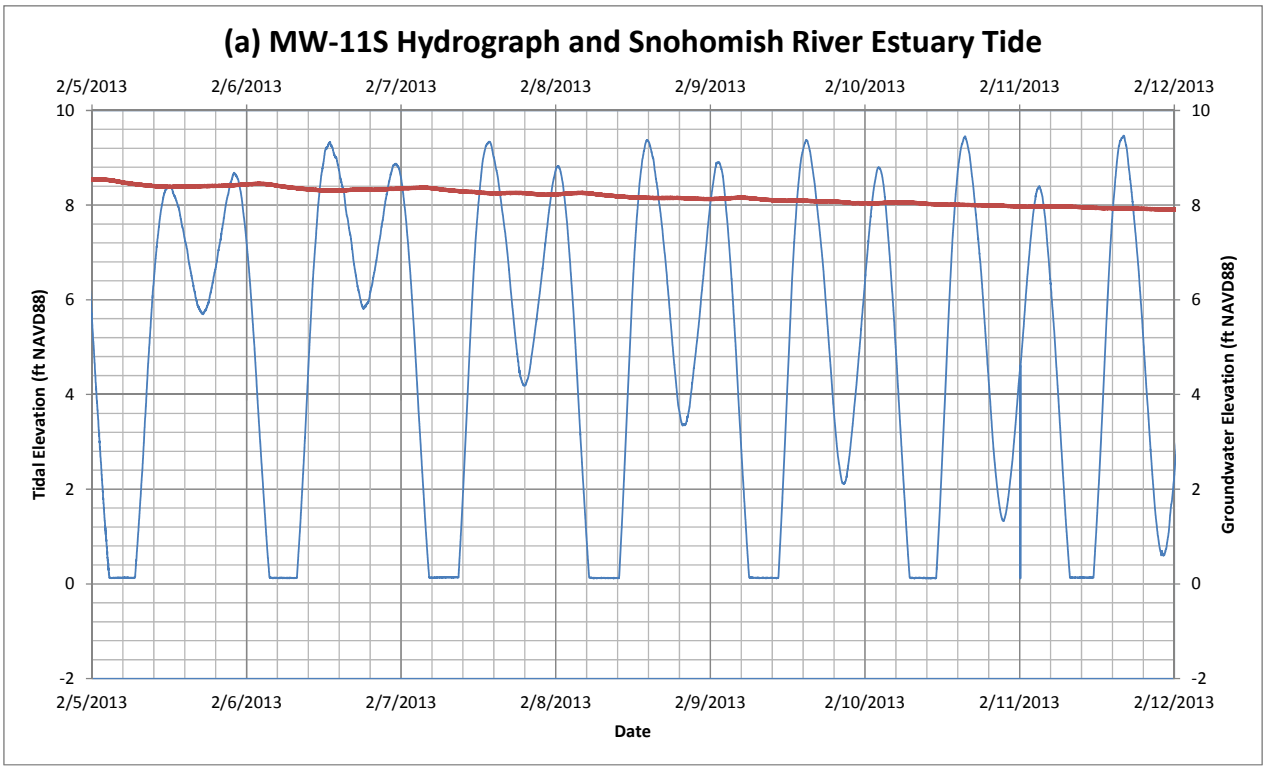
Reference: Technical Analysis > Tidal Study > Everett Tidal match.xlsx.

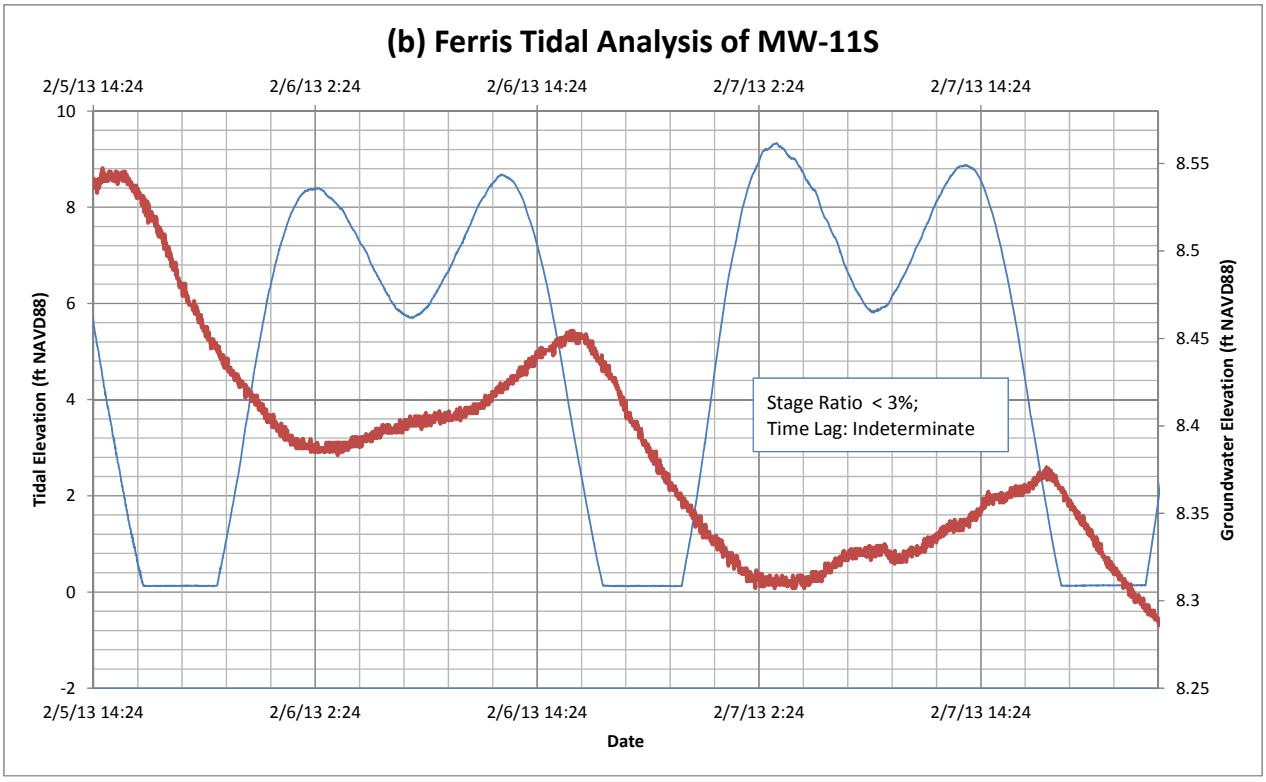
Ferris Tidal Analysis at BP-08D

Everett Smelter – Lowland Area

GeoEngineers

Figure F-20





Notes:
1. Distance to Shoreline: 48.3 feet

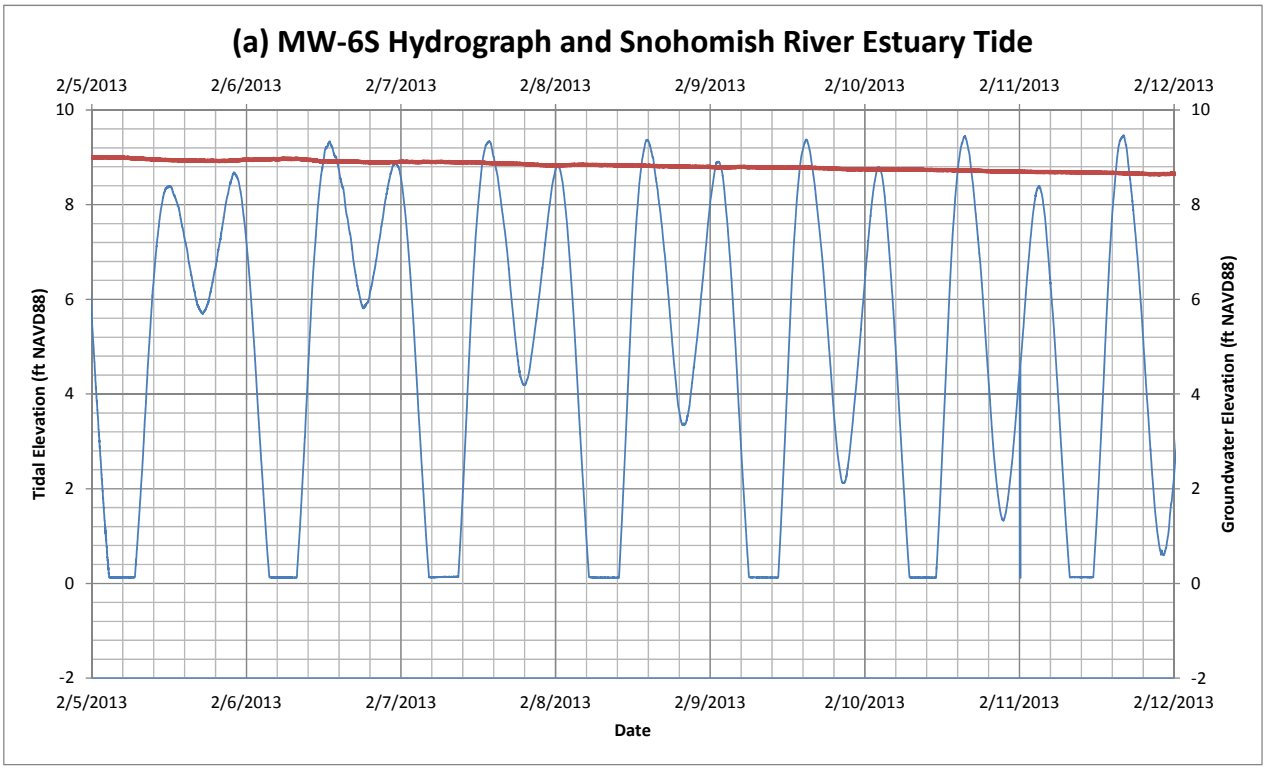
Reference: Technical Analysis > Tidal Study > Everett Tidal match.xlsx.

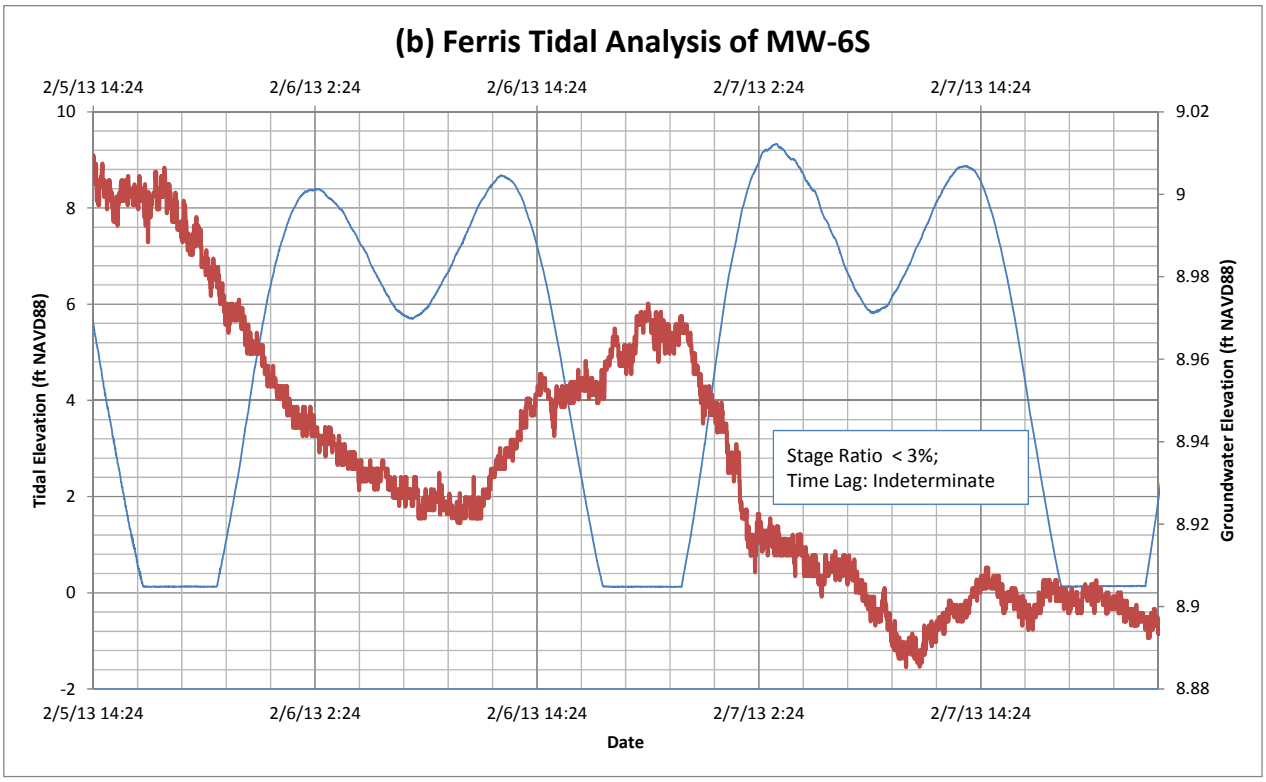
Ferris Tidal Analysis at MW-11S

Everett Smelter – Lowland Area

GeoEngineers

Figure F-21

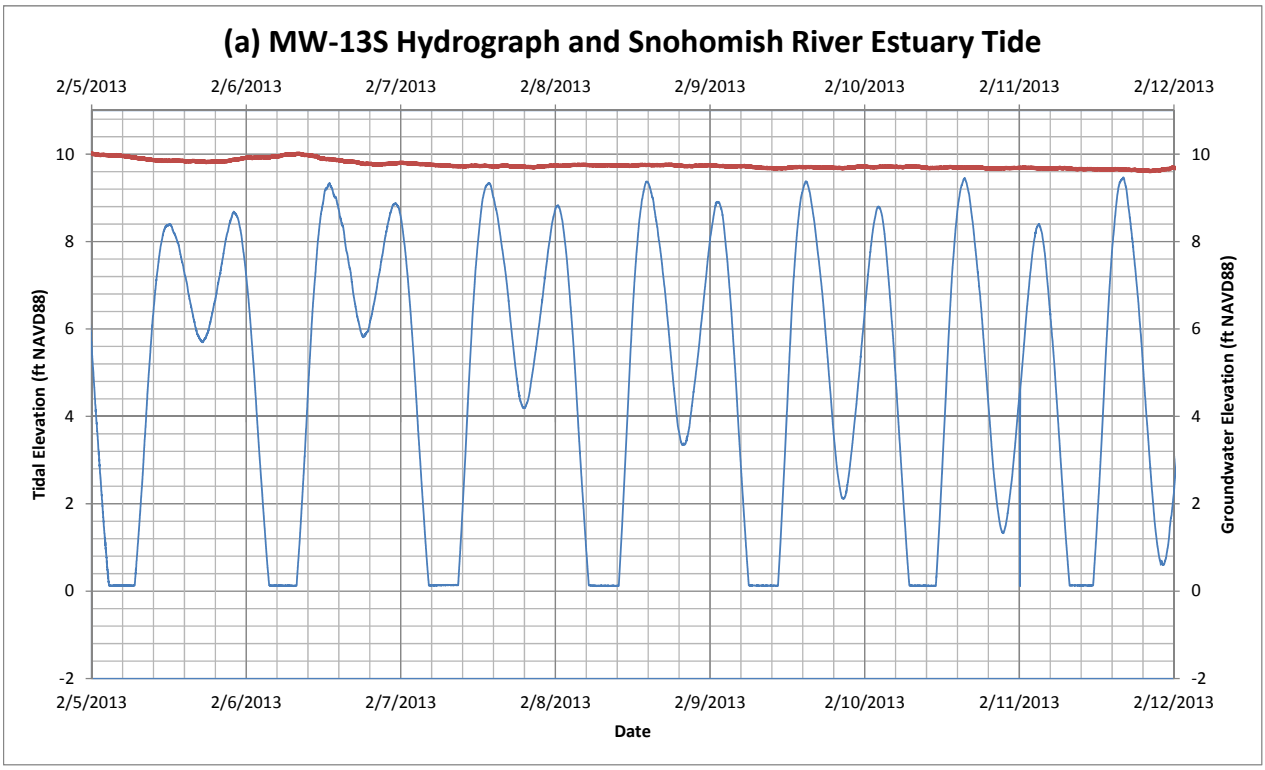


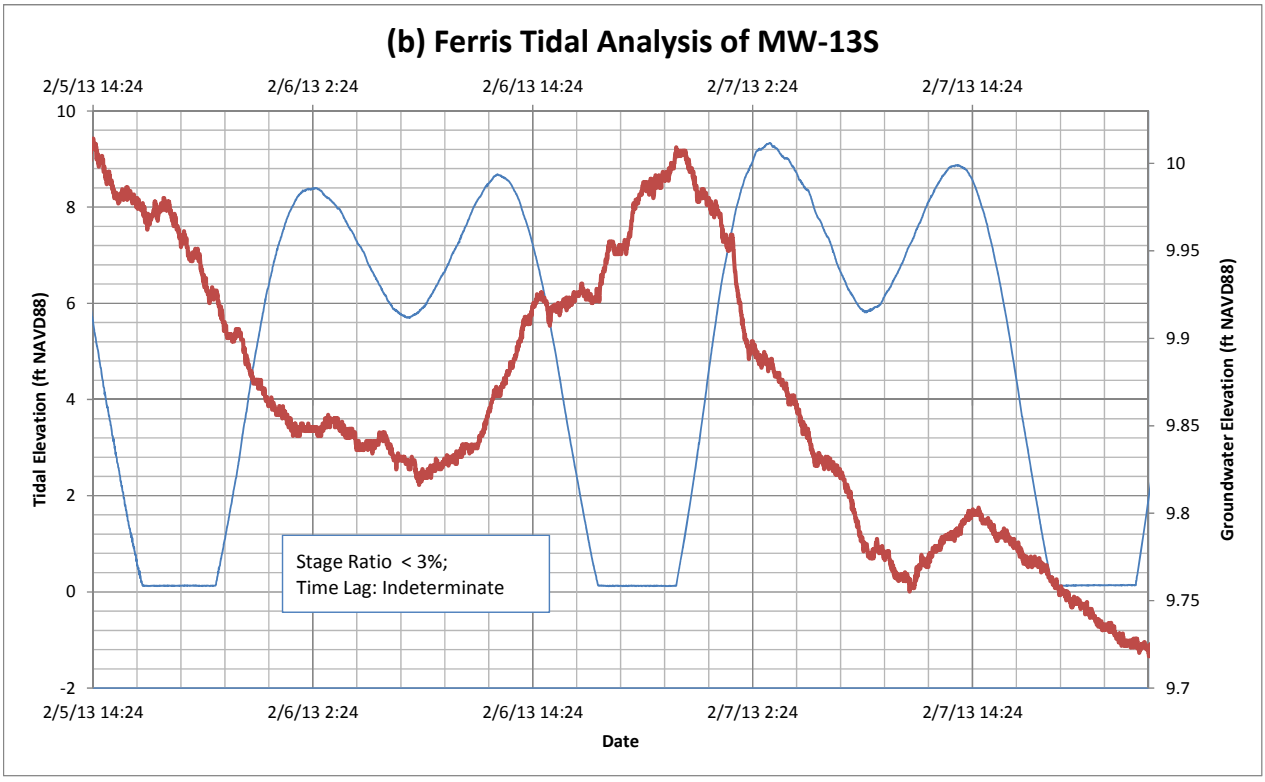


Notes:
1. Distance to Shoreline: 358 feet

Reference: Technical Analysis > Tidal Study > Everett Tidal match.xlsx.

Ferris Tidal Analysis at MW-06S	
Everett Smelter – Lowland Area	
GeoEngineers	Figure F-22





Notes:
1. Distance to Shoreline: 601 feet

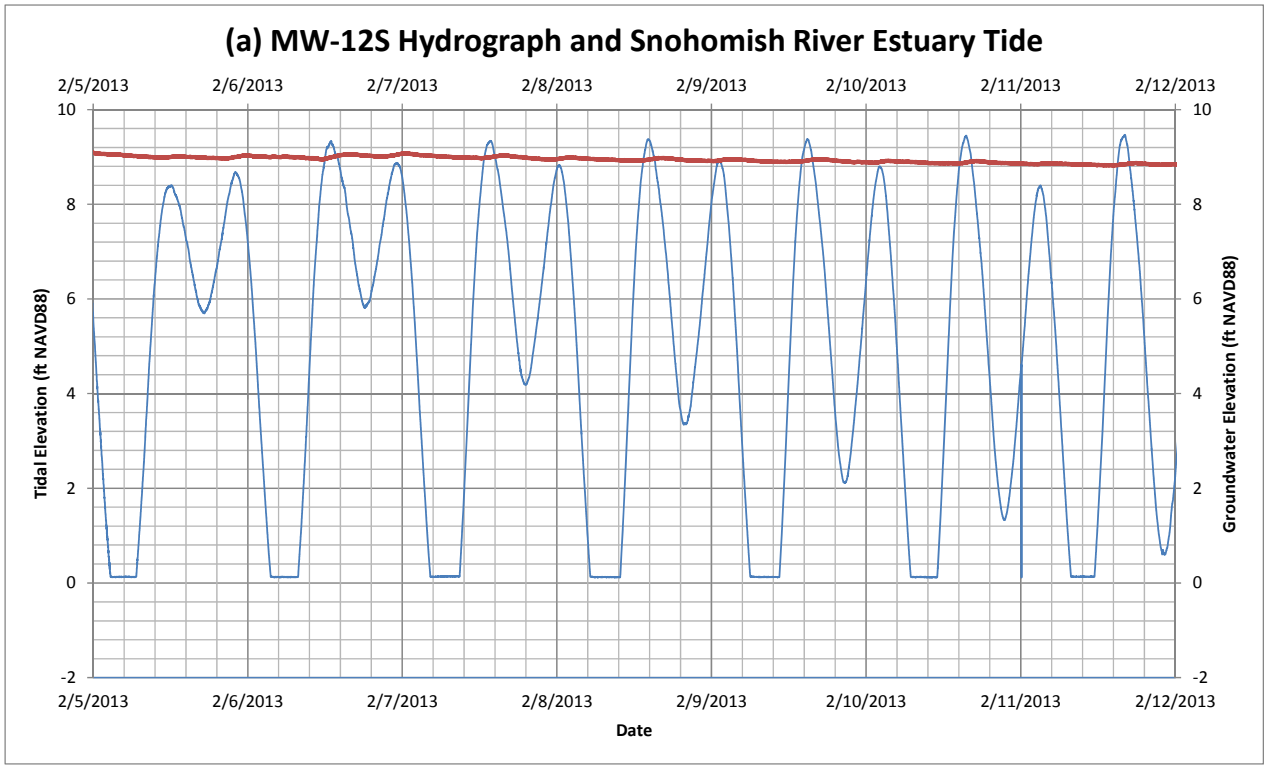
Reference: Technical Analysis > Tidal Study > Everett Tidal match.xlsx.

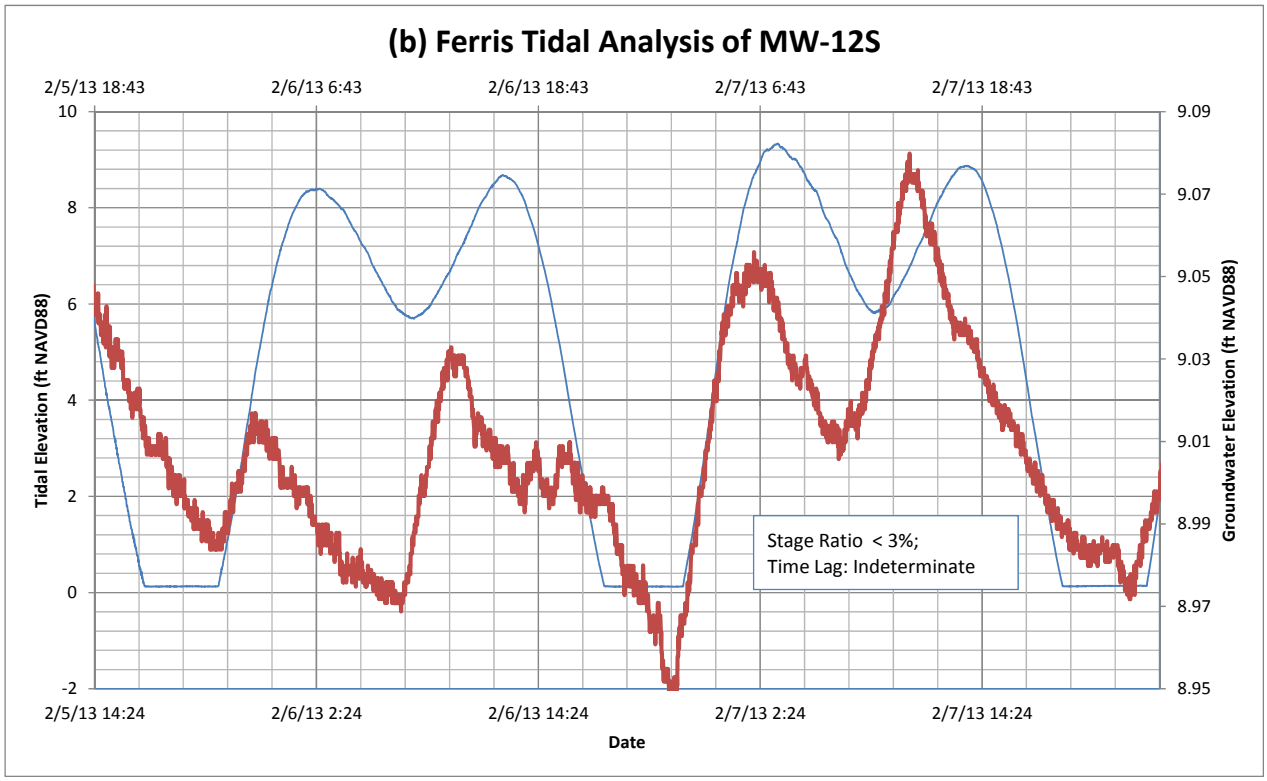
Ferris Tidal Analysis at MW-13S

Everett Smelter – Lowland Area

GeoEngineers

Figure F-23





Notes:
1. Distance to Shoreline: 1,016 feet

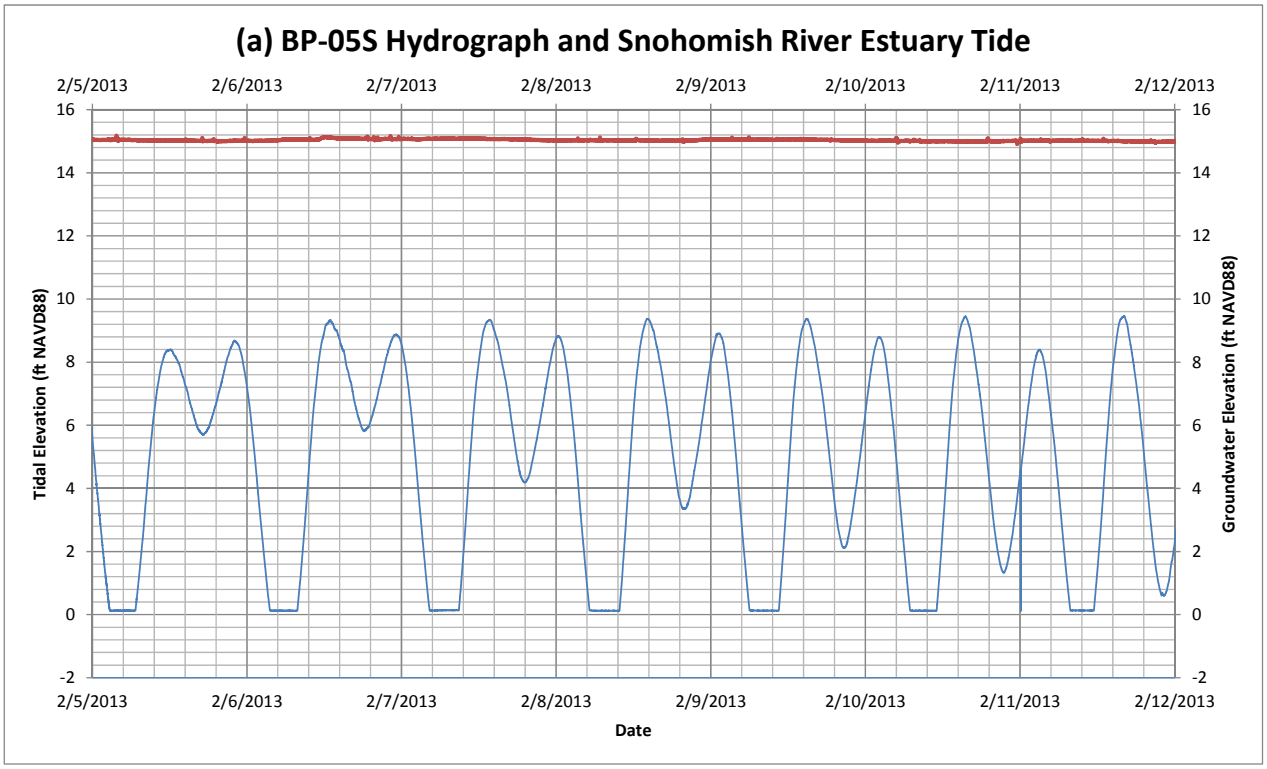
Reference: Technical Analysis > Tidal Study > Everett Tidal match.xlsx.

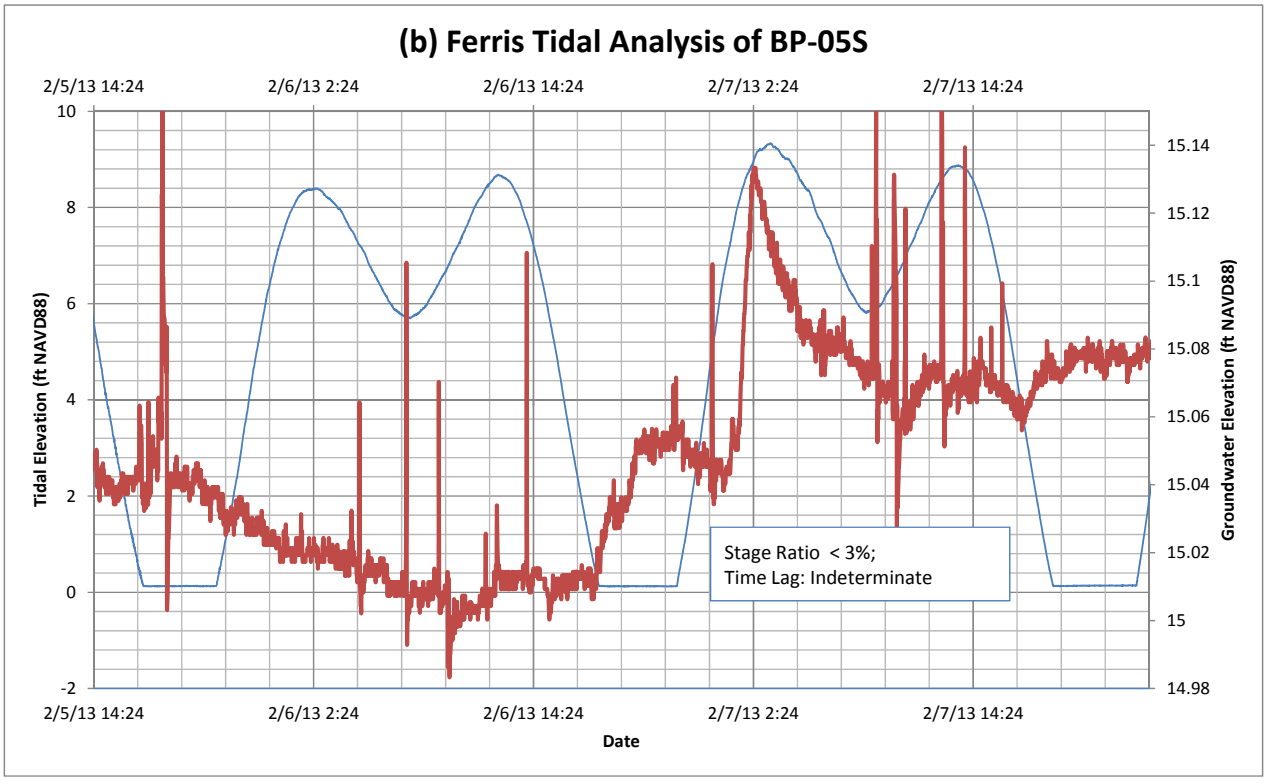
Ferris Tidal Analysis at MW-12S

Everett Smelter – Lowland Area

GeoEngineers

Figure F-24





Notes:

1. Distance to Shoreline: 1,483 feet

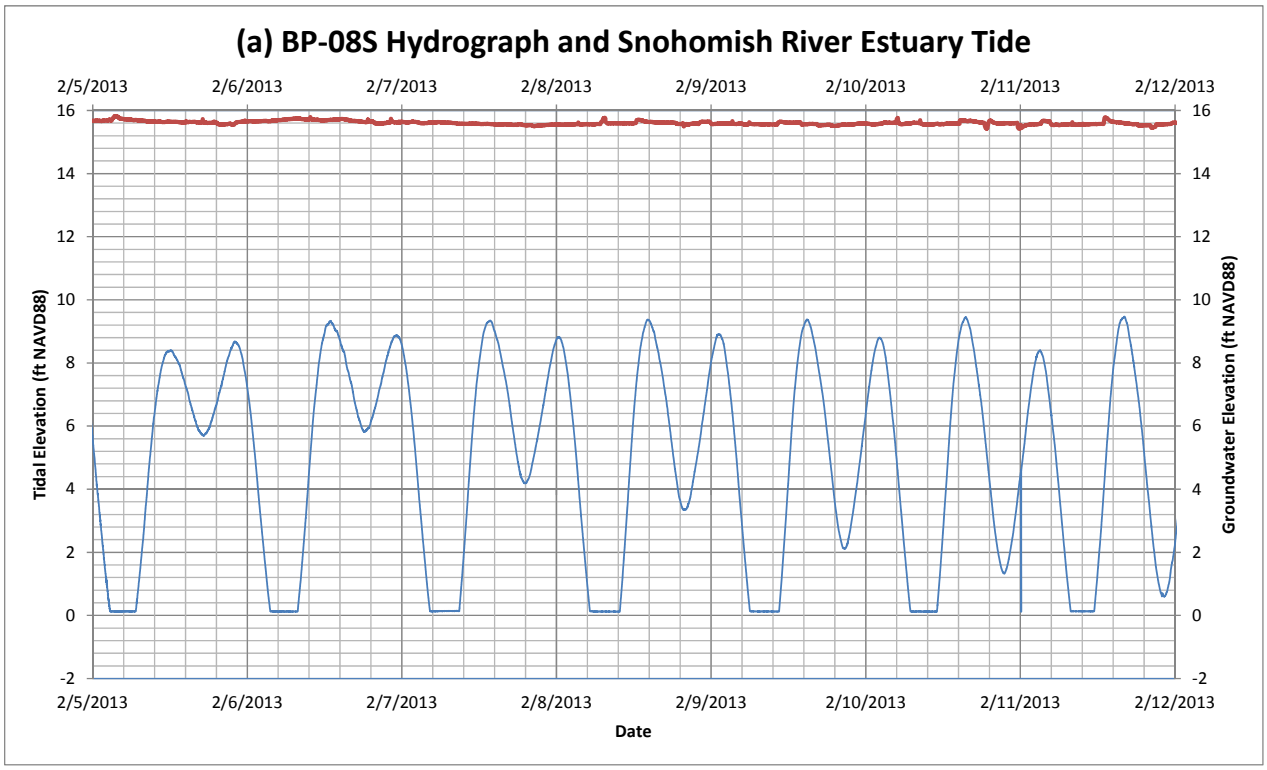
Reference: Technical Analysis > Tidal Study > Everett Tidal match.xlsx.

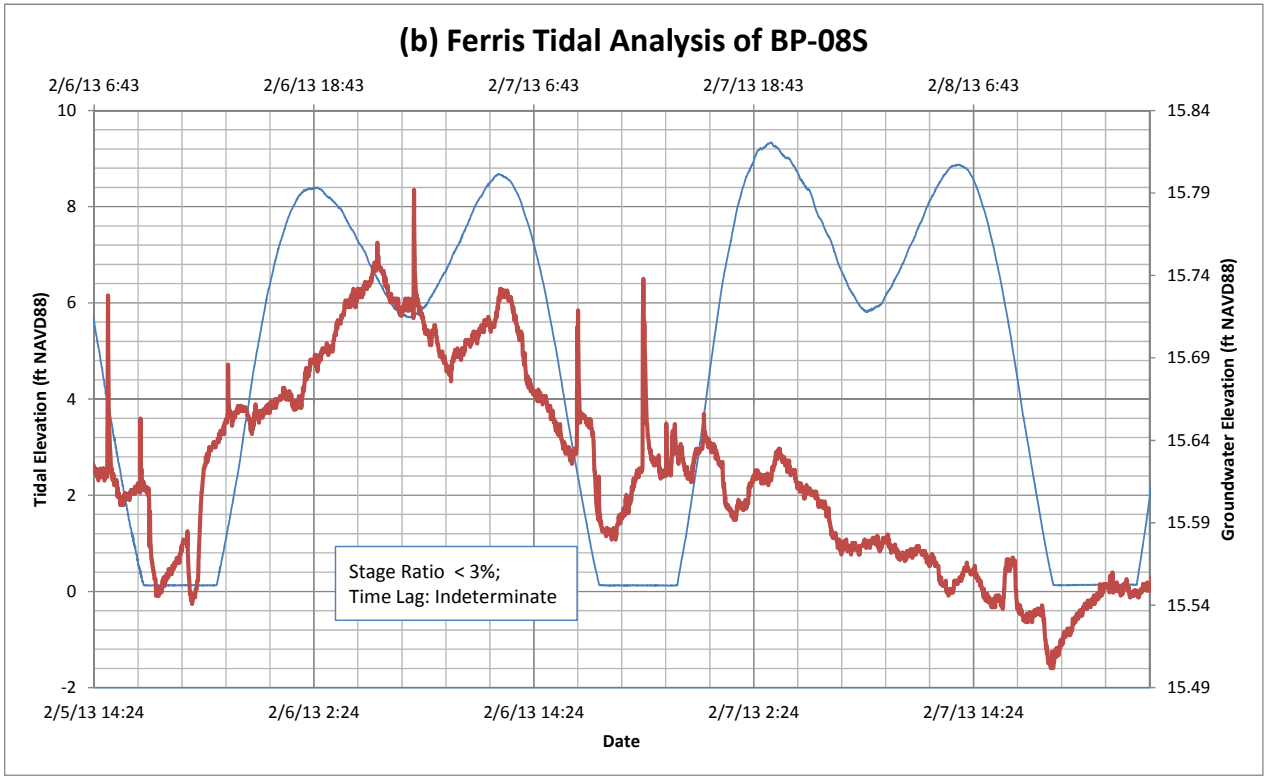
Ferris Tidal Analysis at BP-05S

Everett Smelter – Lowland Area

GeoEngineers

Figure F-25





Notes:
1. Distance to Shoreline: 1,699 feet

Reference: Technical Analysis > Tidal Study > Everett Tidal match.xlsx.

Ferris Tidal Analysis at BP-08S

Everett Smelter – Lowland Area

GeoEngineers

Figure F-26

APPENDIX G
Report Limitations and Guidelines for Use

APPENDIX G
REPORT LIMITATIONS AND GUIDELINES FOR USE[2]

This appendix provides information to help you manage your risks with respect to the use of this report.

Environmental Services are Performed for Specific Purposes, Persons and Projects

GeoEngineers has performed this investigation of the Everett Smelter – Lowland Area in general accordance with the scope and limitations of our proposal, dated July 3, 2012. This report has been prepared for the exclusive use of Washington State Department of Ecology, and their authorized agents. This report is not intended for use by others, and the information contained herein is not applicable to other properties.

GeoEngineers structures our services to meet the specific needs of our clients. For example, an ESA study conducted for a property owner may not fulfill the needs of a prospective purchaser of the same property. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and property. No one except Washington State Department of Ecology should rely on this environmental report without first conferring with GeoEngineers. Use of this report is not recommended for any purpose or project except the one originally contemplated.

This Environmental Report is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the Everett Smelter – Lowland Area. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, it is important not to rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

If important changes are made to the project or property after the date of this report, we recommend that GeoEngineers be given the opportunity to review our interpretations and recommendations. Based on that review, we can provide written modifications or confirmation, as appropriate.

2 Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

Reliance Conditions for Third Parties

Our report was prepared for the exclusive use of our Client. No other party may rely on the product of our services unless we agree to such reliance in advance and in writing. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions. Within the limitations of scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and generally accepted environmental practices in this area at the time this report was prepared.

Environmental Regulations are Always Evolving

Some substances may be present in the vicinity of the subject property in quantities or under conditions that may have led, or may lead, to contamination of the subject property, but are not included in current local, state or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards for appropriate inquiry, or regulatory definitions of hazardous substances, change or if more stringent environmental standards are developed in the future.

Conditions Can Change

This environmental report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by man-made events such as construction on or adjacent to the subject property, by new releases of hazardous substances, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Please contact GeoEngineers before applying this report for its intended purpose so that GeoEngineers may evaluate whether changed conditions affect the continued applicability of the report.

Most Environmental Findings are Professional Opinions

Our interpretations of site conditions are based on field observations and analytical data from widely spaced sampling locations at the subject property. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an informed opinion about subsurface conditions throughout the property. Actual subsurface conditions may differ, sometimes significantly, from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Read These Provisions Closely

It is important to recognize that the geoscience practices (geotechnical engineering, geology and environmental science) are less exact than other engineering and natural science disciplines. Without this understanding, there may be expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory “limitations” provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you need to know more about how these “Report Limitations and Guidelines for Use” apply to your project or property.

GeoEngineers

1101 Fawcett Avenue, Suite 200, Tacoma, Washington 98402, Telephone: 253.383.4940, Fax: 253.383.4923 www.geoengineers.com

Memorandum

To:	Sandra Matthews, ECY
From:	Aaron Waggoner, John Herzog
Date:	October 18, 2013
File:	0504-068-01
Subject:	August 2013 Monitoring Well Installation

This memorandum presents the soil boring, soil sampling and analysis, and monitoring well installation activities that were performed for the Everett Smelter Lowland Area Investigation in August 2013. The investigation area is shown on Figure 1.

The monitoring well drilling and installation activities were completed between August 7 and 14, 2013. The Lowland Area investigation activities included installation of four groundwater monitoring wells; two "deep" wells (LLMW-35D and LLMW-36D) and two "deeper deep" wells (BP-04D2 and BP-07D2) using sonic coring (Sonic) and hollow-stem auger (HSA) drill rigs.

Monitoring well LLMW-35D was installed upgradient of the Lowland Area within the footprint of the former smelter property. Monitoring wells LLMW-36D, BP-04D2 and BP-07D2 were installed on the Benson Property (Figure 2). Monitoring Well LLMW-36D was installed at the base of the slope adjacent to East Marine View Drive. Monitoring wells BP-04D2 and BP-07D2 were installed approximately 4 to 5 feet from their associated existing Benson wells BP-04S/D and BP-07S/D, respectively. Table 1 presents the well construction information. Boring logs with well completion details are provided in Appendix A. A total of 24 samples were analyzed for the project specific metals listed in the Sampling and Analysis Plan (arsenic, lead, cadmium, mercury, thallium, and antimony). The analytical results are provided in Table 2. The results of the data quality review are presented in the data validation report provided in Appendix B. The arsenic and lead results for soil samples collected at the investigation locations are presented in Figure 3.

Following installation, the monitoring wells were developed and surveyed prior to the initiation of the third comprehensive groundwater sampling event. The survey information (i.e., location coordinates and elevations) are summarized in Table 1. All groundwater monitoring well development, sampling, and analysis results will be provided in a separate memorandum.

Field activities were performed in general accordance with the SAP, Quality Assurance Project Plan (QAPP) and Health and Safety Plan (HASP) created for this project, with the following exception, as approved by a representative of Ecology prior to implementation.

The soil boring completed for LLMW-36D was proposed to be completed with a HSA drill rig, continuously sampled with a split-spoon sampler to 11 feet below the bottom of the silt aquitard separating the shallow and deep aquifers, then sampled every 5 feet to the total depth of the boring up to 100 feet bgs. Alternatively, the soil boring was continuously sampled to 90 feet bgs using a Sonic drill rig instead of a HSA drill rig. Ecology and GeoEngineers believe that the contact between fill and native deposits at the base of the slope was better classified using Sonic coring versus HSA drilling.

We trust this meets your needs at the present time. Please call if you require additional services.

AMW:JMH:lw

Attachments:
Table 1. Summary of Monitoring Well and Soil Boring Construction Information
Table 2. Chemical Analytical Results – Soil
Figure 1. Vicinity Map
Figure 2. Lowland Area Investigation Locations
Figure 3. Boring/Monitoring Well Locations: Soil Results – Arsenic and Lead
Appendix A. Boring Logs
Appendix B. Data Validation Report

Table 1

Summary of Monitoring Well and Soil Boring Construction Information

Everett Lowland

Everett, Washington

Location ID	Ecology Well Tag	Location Coordinates[1]		Elevations[2]		Flush / Stickup	Screened Interval Depth (feet bgs)
		Northing (Y)	Easting (X)	Ground Surface Elevation (feet)	Top of Casing Elevation (feet)		
Monitoring Well							
BP-04D2	BHU-406	371552.1957	1308789.9250	15.5962	18.5371	Stickup	60.12-65.12
BP-07D2	BHU-405	371340.7835	1308814.7670	15.8261	18.5811	Stickup	69.76-79.76
LLMW-35D	BIJ-697	371239.0453	1308164.3880	91.1933	90.9797	Flush	81.50-91.50
LLMW-36D	BHU-404	371372.9356	1308601.3920	17.1436	21.0417	Stickup	19.03-29.03

Notes

BP = Benson Property

LLMW = Lowland Monitoring Well

[1] Northing (Y) and Easting(X) are in Wasington State Plane North Coordinate System, NAD 83/96 grid values

[2] Vertical datum is NAVD88, US survey feet

Survey performed by David Evans and Associates, Everett, Washington

Table 2

Chemical Analytical Results - Soil[1]

Everett Lowland

Everett, Washington

Location ID	Sample ID	Analyte	Antimony	Arsenic	Cadmium	Lead	Mercury	Thallium
		Units	*mg/Kg*	*mg/Kg*	*mg/Kg*	*mg/Kg*	*mg/Kg*	*mg/Kg*
		Stratigraphic Unit						
LLMW-35D	LLMW35D-4-5	Fill	0.2 U	**351**	**2.4**	**2.7**	**0.17**	0.2 U
	LLMW35D-5.5-6	Native Surface	0.2 U	**95.3**	**6.7**	**2.5**	**0.03**	0.2 U
	LLMW35D-12-14	Till	0.2 U	**2.2**	0.1 U	**1.7**	0.02 U	0.2 U
	LLMW35D-50-51	Till	0.2 U	**3.0**	**0.2**	**3.1**	**0.03**	0.2 U
	LLMW35D-70-71	Till	0.2 U	**1.9**	**0.1**	**2.9**	0.03 U	0.2 U
	LLMW35D-90-92	Outwash	0.2 U	**2.2**	**0.1**	**2.3**	0.03 U	0.2 U
LLMW-36D	LLMW36D-7-8	Fill	**1.3**	**224**	**2.6**	**11,500**	**0.24**	0.2 U
	LLMW36D-9-9.2	Native Surface	**0.6**	**351**	**6.9**	**3,130**	**0.21**	0.2 U
	LLMW36D-16-16.2	Silt Deposits	0.2 U	**12.3**	0.1 U	**5.4**	**0.02**	0.2 U
	LLMW36D-29-30	Alluvium	0.2 U	**133**	0.1 U	**2.4**	0.03 U	0.2 U
	LLMW36D-59-60	Alluvium	0.2 U	**23.8**	0.1 U	**1.8**	0.03 U	0.2 U
	LLMW36D-89-90	Silt Deposits	0.3 U	**10.2**	**0.4**	**14**	**0.06**	**0.4**
BP-04D2	BP04D2-35-36.5	Alluvium	0.2 U	**41.2**	**0.5**	**324**	0.02 U	0.2 U
	BP04D2-50-51.5	Alluvium	0.2 U	**6.0**	0.1 U	**50.6**	**0.05**	0.2 U
	BP04D2-60-61.5	Alluvium	0.2 U	**3.6**	0.1 U	**1.5**	0.02 U	0.2 U
	BP04D2-65-66	Silt Deposits	0.2 U	**3.2**	0.1 U	**1.9**	**0.03**	0.2 U
	BP04D2-80.5-81.5	Alluvium and Silt Deposits	0.2 U	**5.0**	**0.2**	**15.5**	**0.02**	0.2 U
	BP04D2-80.5-81.5-DUP	Alluvium and Silt Deposits	0.2 U	**5.5**	**0.2**	**3.9**	**0.03**	0.2 U
	BP04D2-100-101.5	Alluvium and Silt Deposits	0.2 U	**2.6**	0.1 U	**3.1**	0.03 U	0.2 U
BP-07D2	BP07D2-35-35.5	Alluvium	0.2 U	**30.3**	**0.4**	**59.0**	**0.29**	0.2 U
	BP07D2-40-41	Alluvium	0.2 U	**36.4**	**0.2**	**27.9**	**0.04**	0.2 U
	BP07D2-60-61	Silt Deposits	0.2 U	**8.5**	**0.2**	**5.0**	0.02 U	0.2 U
	BP07D2-75.5-76.5	Alluvium and Silt Deposits	0.3 U	**15.1**	**0.2**	**6.8**	**0.05**	0.3 U
	BP07D2-81-81.5	Alluvium and Silt Deposits	0.2 U	**6.5**	**0.2**	**4.4**	0.03 U	0.2 U

Notes:

[1] Chemical analysis performed by Analytical Resources, Inc., of Tukwila, Washington.

mg/Kg = milligram per Kilogram

U = Analyte was not detected at or greater than the listed reporting limit.

"DUP" at the end of the sample ID indicates a field duplicate sample.

Bold type indicates the analyte was detected.

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: ESRI Data & Maps

Projection: NAD 1983 UTM Zone 10N

Vicinity Map

Everett Smelter - Lowland Area

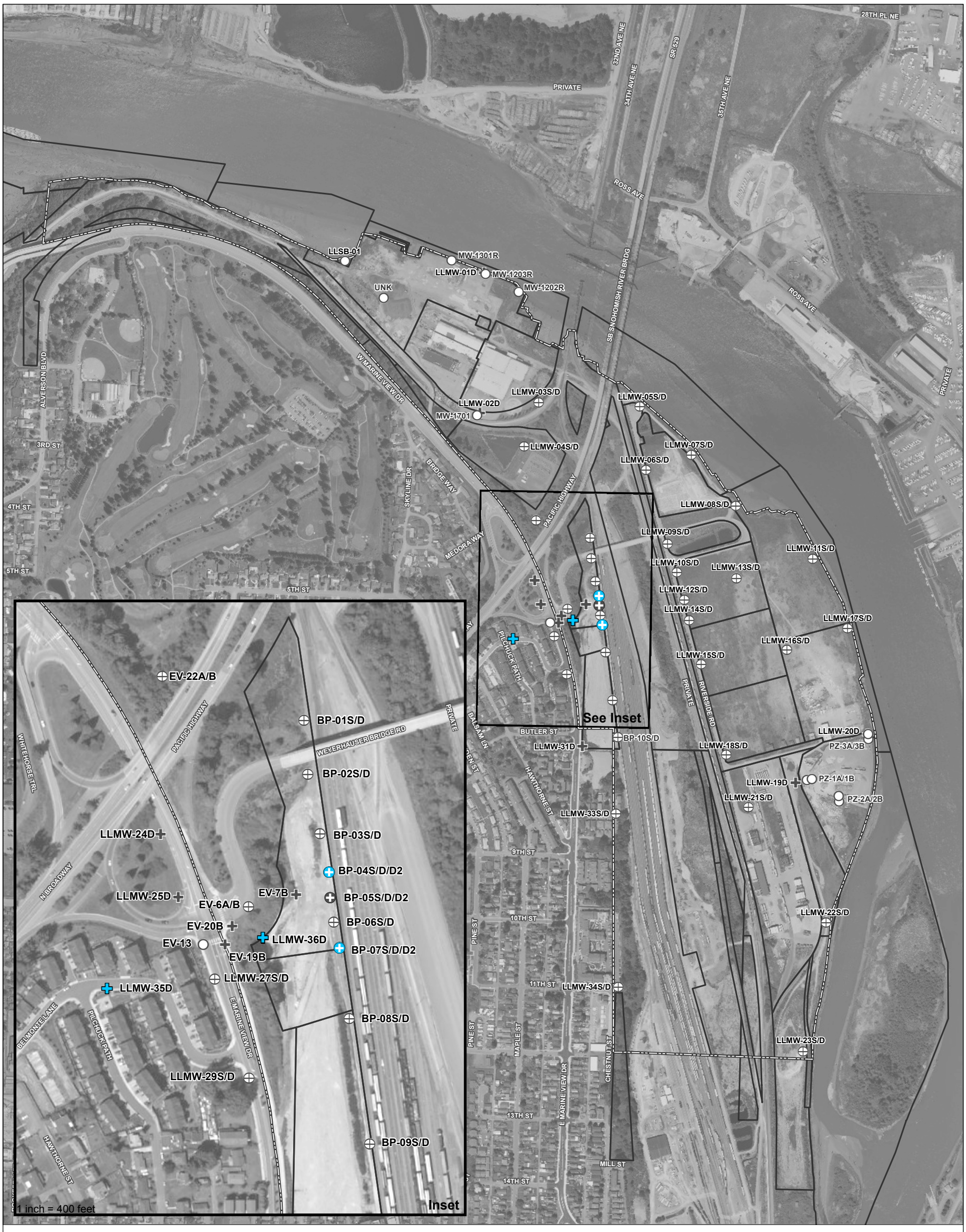
GeoEngineers

Figure 1

Map Revised: 12 September 2013 cgonzales

Path: \\sea\projects\0105040\68\GIS\0504068800_VicinityMap_UplandFence.mxd

Path: \\sea\projects\0\0504068\GIS\050406800_T700_LowlandInvestigations_2012_2013.mxd Map Revised: 17 September 2013 cgonzales



Legend

- Lowland Area
- Snohomish County Parcel Boundary
- Existing Shallow Aquifer Monitoring Well
- Existing Deep Aquifer Monitoring Well
- Existing Shallow and Deep Aquifer Monitoring Well Pair
- Shallow, Deep, and Deeper Deep Monitoring Well Set

Investigation Locations (August 2013)

- Deep Aquifer Monitoring Well
- Shallow, Deep, and Deeper Deep Monitoring Well Set

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerials Express Seattle, 2009. Snohomish County GIS, 2012.

N W E S

700 0 700

Feet

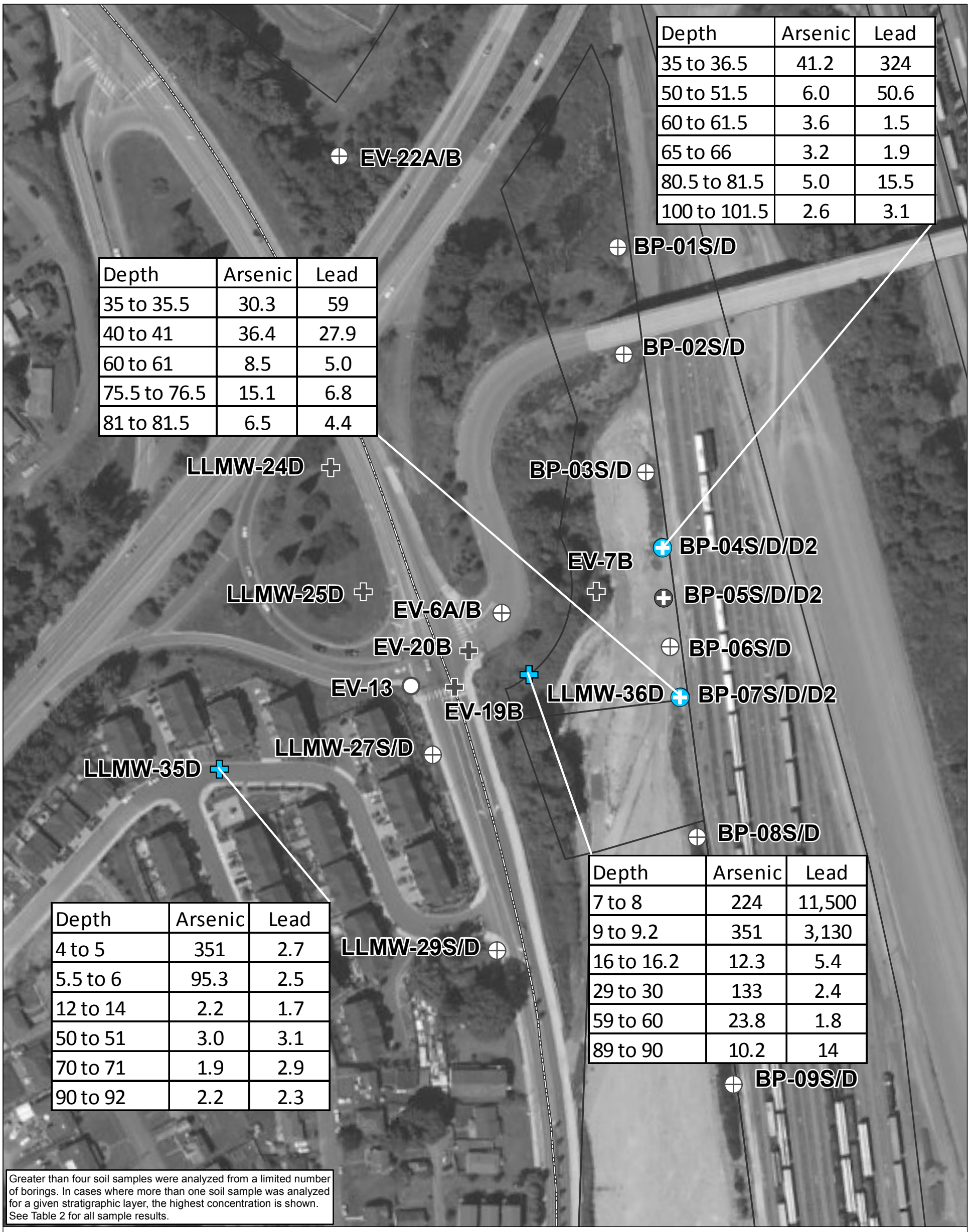
Lowland Area Investigation Locations

Everett Smelter - Lowland Area

GeoEngineers

Figure 2

Path: \\sea\projects\0\0504068\GIS\MXDs\050406800_T700_Soil_ArsenicAndLead.mxd Map Revised: 10 October 2013 cgonzales



Depth	Arsenic	Lead
35 to 36.5	41.2	324
50 to 51.5	6.0	50.6
60 to 61.5	3.6	1.5
65 to 66	3.2	1.9
80.5 to 81.5	5.0	15.5
100 to 101.5	2.6	3.1

Depth	Arsenic	Lead
35 to 35.5	30.3	59
40 to 41	36.4	27.9
60 to 61	8.5	5.0
75.5 to 76.5	15.1	6.8
81 to 81.5	6.5	4.4

Depth	Arsenic	Lead
7 to 8	224	11,500
9 to 9.2	351	3,130
16 to 16.2	12.3	5.4
29 to 30	133	2.4
59 to 60	23.8	1.8
89 to 90	10.2	14

Depth	Arsenic	Lead
4 to 5	351	2.7
5.5 to 6	95.3	2.5
12 to 14	2.2	1.7
50 to 51	3.0	3.1
70 to 71	1.9	2.9
90 to 92	2.2	2.3

Greater than four soil samples were analyzed from a limited number of borings. In cases where more than one soil sample was analyzed for a given stratigraphic layer, the highest concentration is shown. See Table 2 for all sample results.

Legend

- Lowland Area
- Snohomish County Parcel Boundary
- Existing Shallow Aquifer Monitoring Well
- Existing Deep Aquifer Monitoring Well
- Existing Shallow and Deep Aquifer Monitoring Well Pair
- Shallow, Deep, and Deeper Deep Monitoring Well Set

Investigation Locations (August 2013)

- Deep Aquifer Monitoring Well
- Shallow, Deep, and Deeper Deep Monitoring Well Set

Key to Soil Results

Depth in Feet

2.7 Metal Concentration in mg/kg

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Imagery from ESRI, 2013

N W E S

150 0 150

Feet

Boring/Monitoring Well Locations: Soil Results - Arsenic and Lead

Everett Smelter - Lowland Area

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Figure 3

APPENDIX A
Boring Logs

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% RETAINED ON NO. 200 SIEVE	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS
				SP	POORLY-GRADED SANDS, GRAVELLY SAND
	MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
	AC	Asphalt Concrete
	CC	Cement Concrete
	CR	Crushed Rock/ Quarry Spalls
	TS	Topsoil/ Forest Duff/Sod

Groundwater Contact

Measured groundwater level in exploration, well, or piezometer

Measured free product in well or piezometer

Graphic Log Contact

Distinct contact between soil strata or geologic units

Approximate location of soil strata change within a geologic soil unit

Material Description Contact

Distinct contact between soil strata or geologic units

Approximate location of soil strata change within a geologic soil unit

Sampler Symbol Descriptions

2.4-inch I.D. split barrel

Standard Penetration Test (SPT)

Shelby tube

Piston

Direct-Push

Bulk or grab

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

A "P" indicates sampler pushed using the weight of the drill rig.

Laboratory / Field Tests

%F	Percent fines
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
OC	Organic content
PM	Permeability or hydraulic conductivity
PI	Plasticity index
PP	Pocket penetrometer
PPM	Parts per million
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen
NT	Not Tested

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

KEY TO EXPLORATION LOGS

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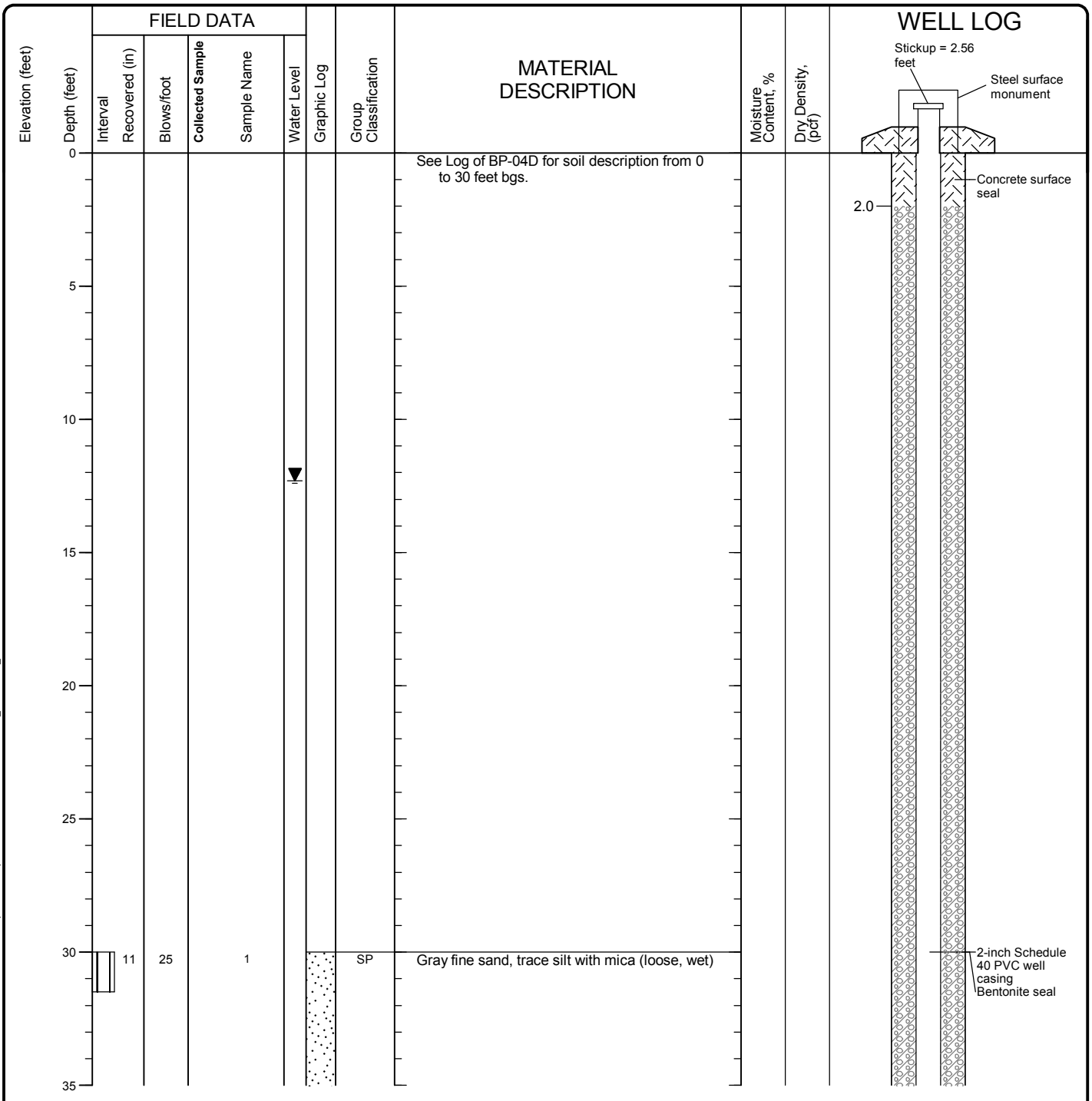
FIGURE A-1

Drilled Start 8/13/2013	End 8/14/2013	Total Depth (ft) 101.5	Logged By AMW / Checked By	Driller Holocene Drilling	Drilling Method Hollow-stem Auger
Hammer Data 140 (lbs) / 30 (in) Drop			Drilling Equipment Mobile B-59 Truck Rig		
Surface Elevation (ft) / Vertical Datum Undetermined			Top of Casing Elevation (ft)		
Easting (X) / Northing (Y)			Horizontal Datum		

DOE Well I.D.: BHU 406
A 2 (in) well was installed on 8/13/2013 to a depth of 100 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
8/14/2013	12.3	

Notes: Auger Data: 4¼-inch I.D.



Note: Please see Figure A-1 for explanation of symbols.

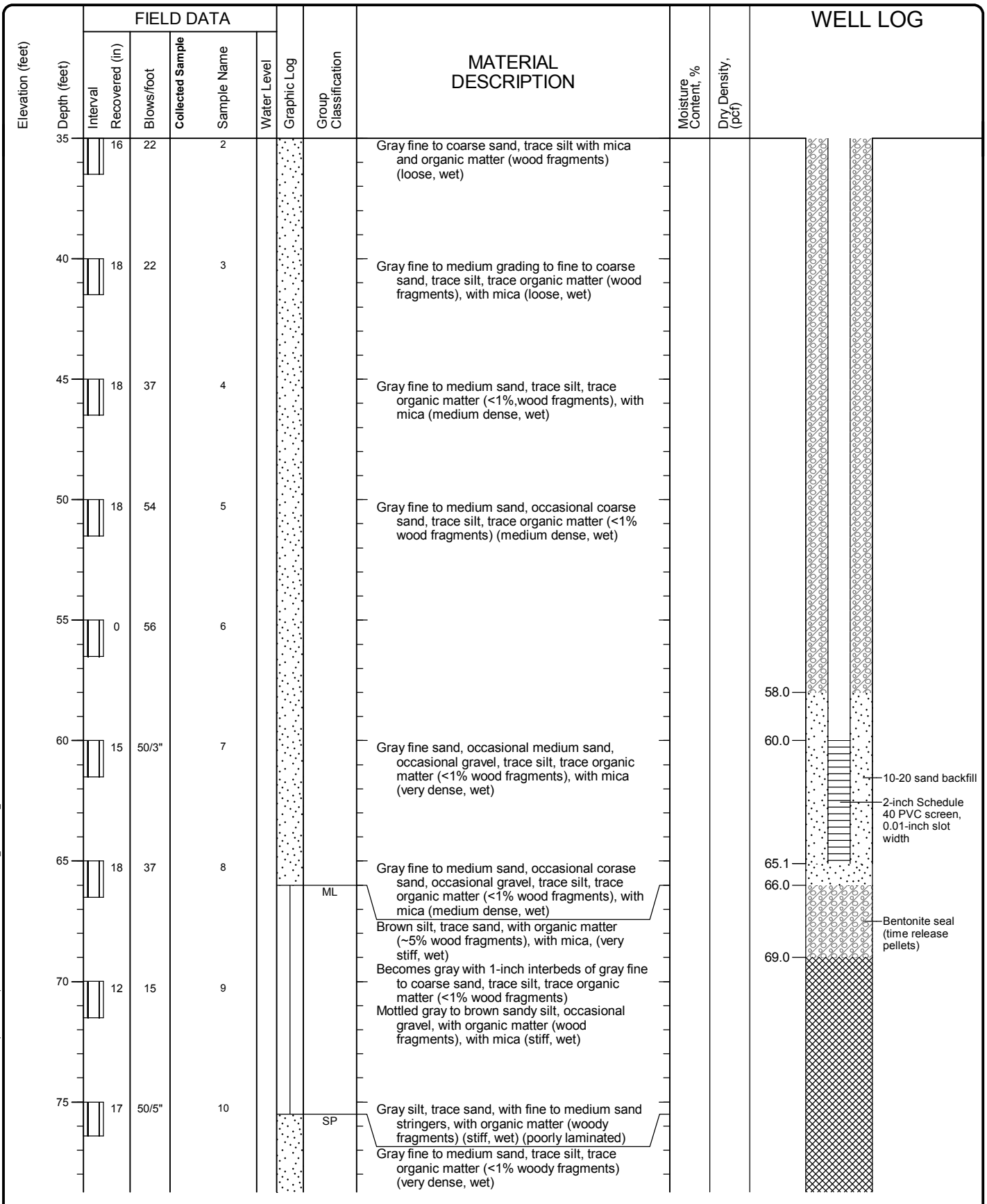
Log of Monitoring Well BP-04D2

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-01

Figure A-2
Sheet 1 of 3

Seattle: Date:9/3/13 Path:\\SEA\PROJECTS\0\0504068\GINT\0504068G01.GPJ DBTemplate\LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_WELL



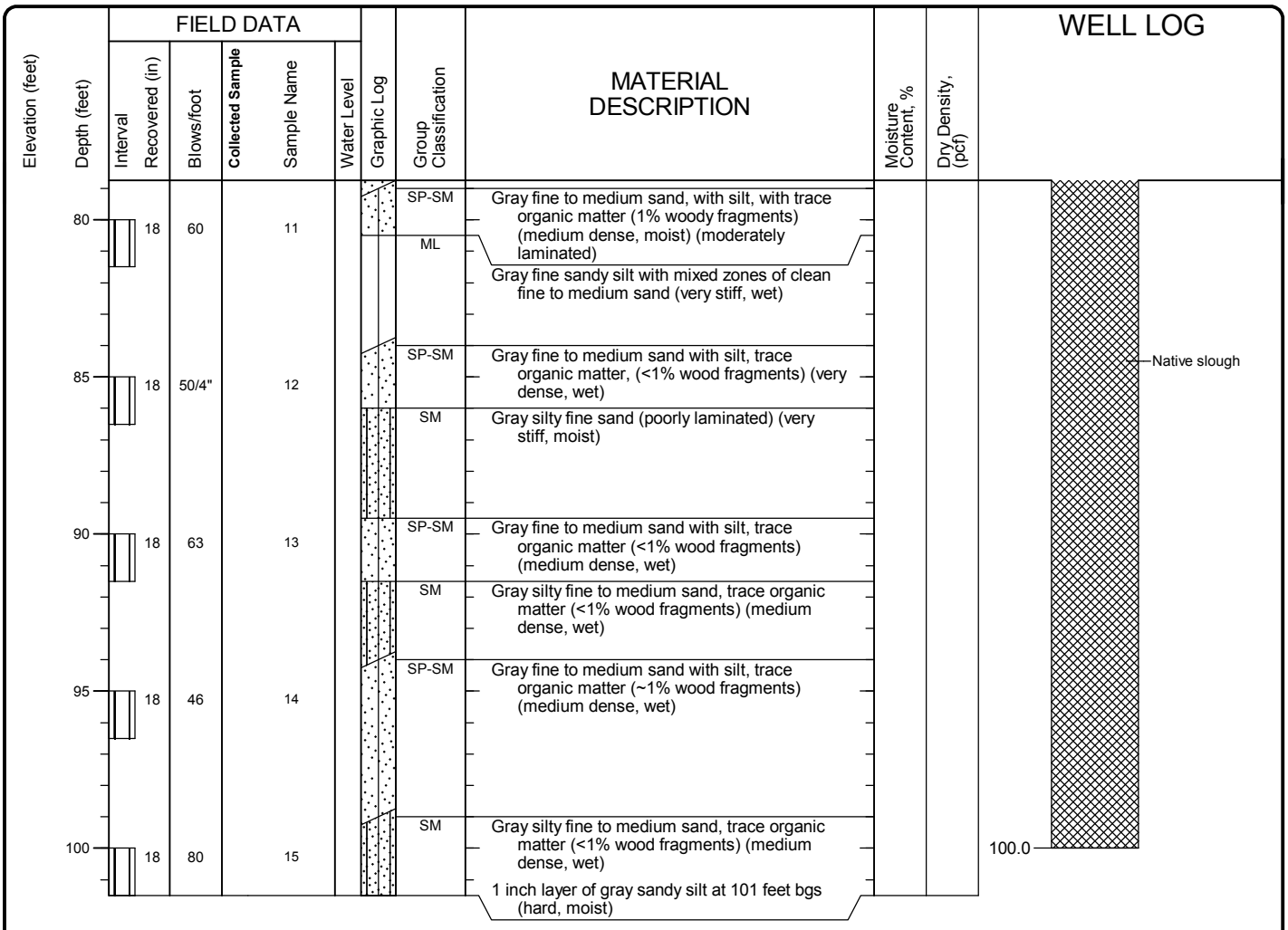
Note: Please see Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-04D2 (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-2
Sheet 2 of 3



Note: Please see Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-04D2 (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-2
Sheet 3 of 3

Drilled Start 8/12/2013	End 8/12/2013	Total Depth (ft) 81.5	Logged By AMW / Checked By	Driller Holocene Drilling	Drilling Method Hollow-stem Auger

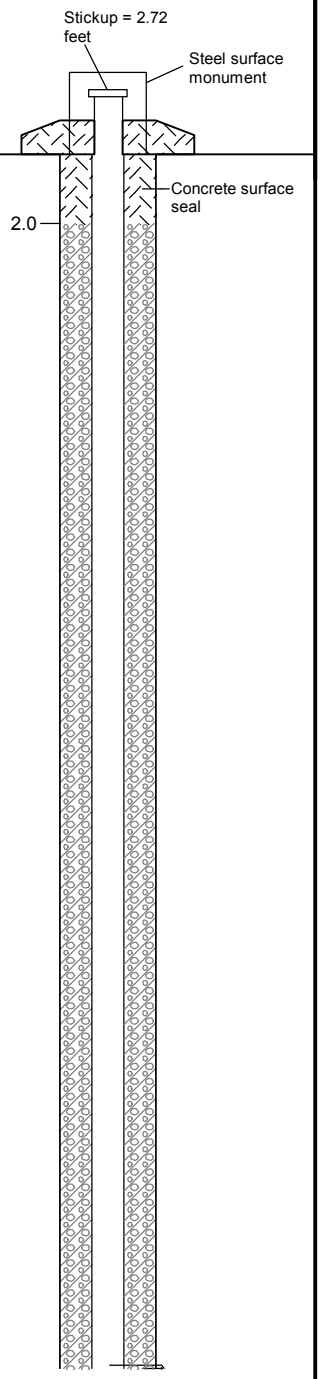
Hammer Data: 140 (lbs) / 30 (in) Drop	Drilling Equipment: Mobile B-59 Truck Rig	DOE Well I.D.: BHU 405 A 2 (in) well was installed on 8/13/2013 to a depth of 79.8 (ft).
Surface Elevation (ft) / Vertical Datum: Undetermined	Top of Casing Elevation (ft)	Groundwater: Date Measured 8/14/2013; Depth to Water (ft) 8.0; Elevation (ft)
Easting (X) / Northing (Y)	Horizontal Datum	

Notes: Auger Data: 4¼-inch I.D.

FIELD DATA

Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)
	0								See Log of BP-07D for soil description from 0 to 35 feet bgs.		
	5					▼					
	10										
	15										
	20										
	25										
	30										
	35										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols.

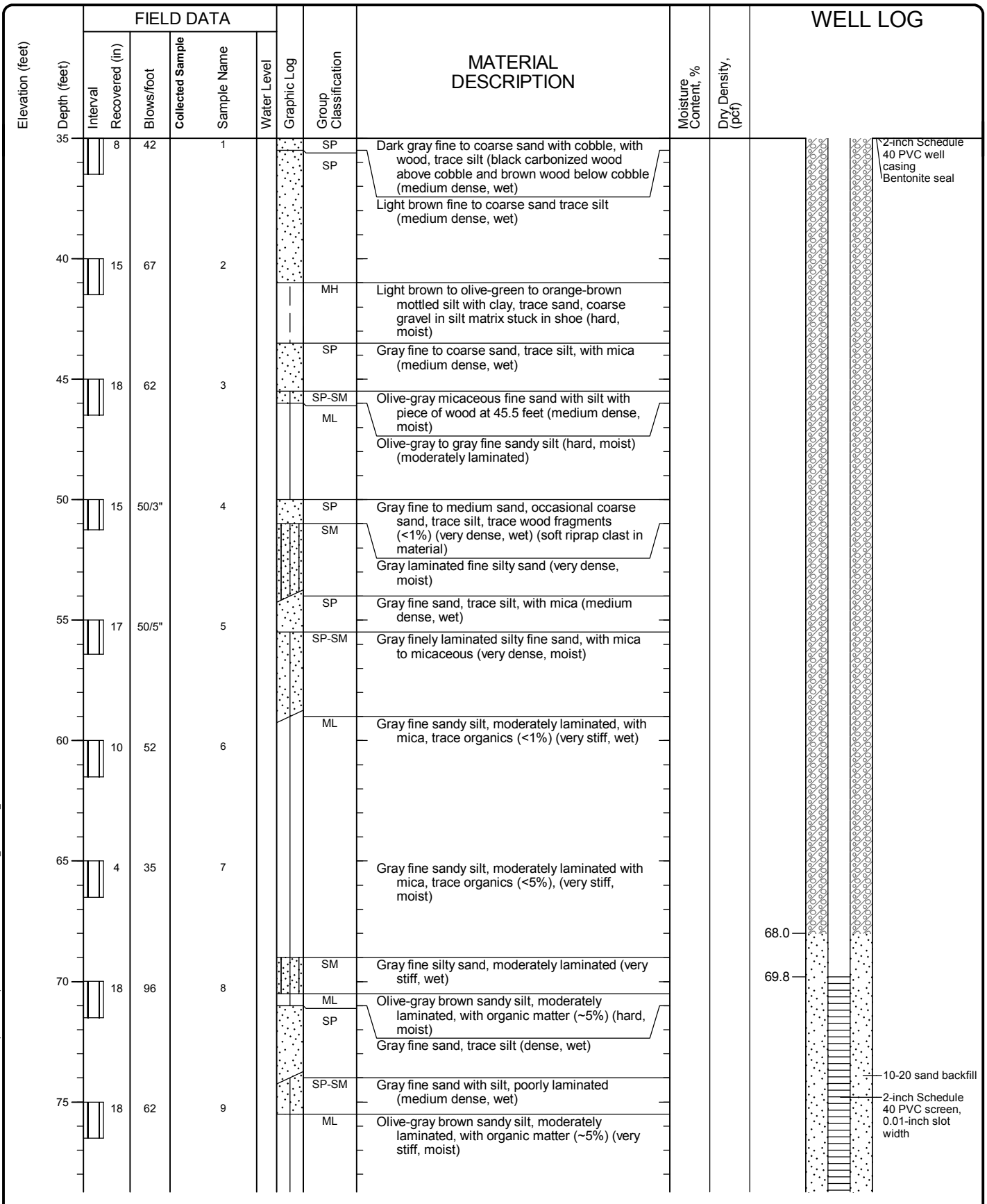
Log of Monitoring Well BP-07D2

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-3
Sheet 1 of 3

Seattle: Date:9/3/13 Path:\\SEA\PROJECTS\0\0504\068\GINT\050406801.GPJ DBTemplate\LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_WELL



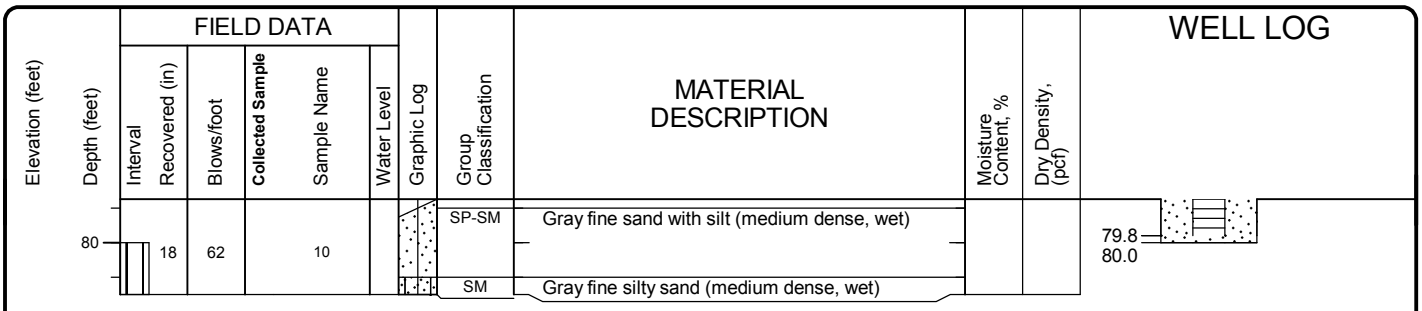
Note: Please see Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-07D2 (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-3
Sheet 2 of 3



Note: Please see Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-07D2 (continued)

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-01

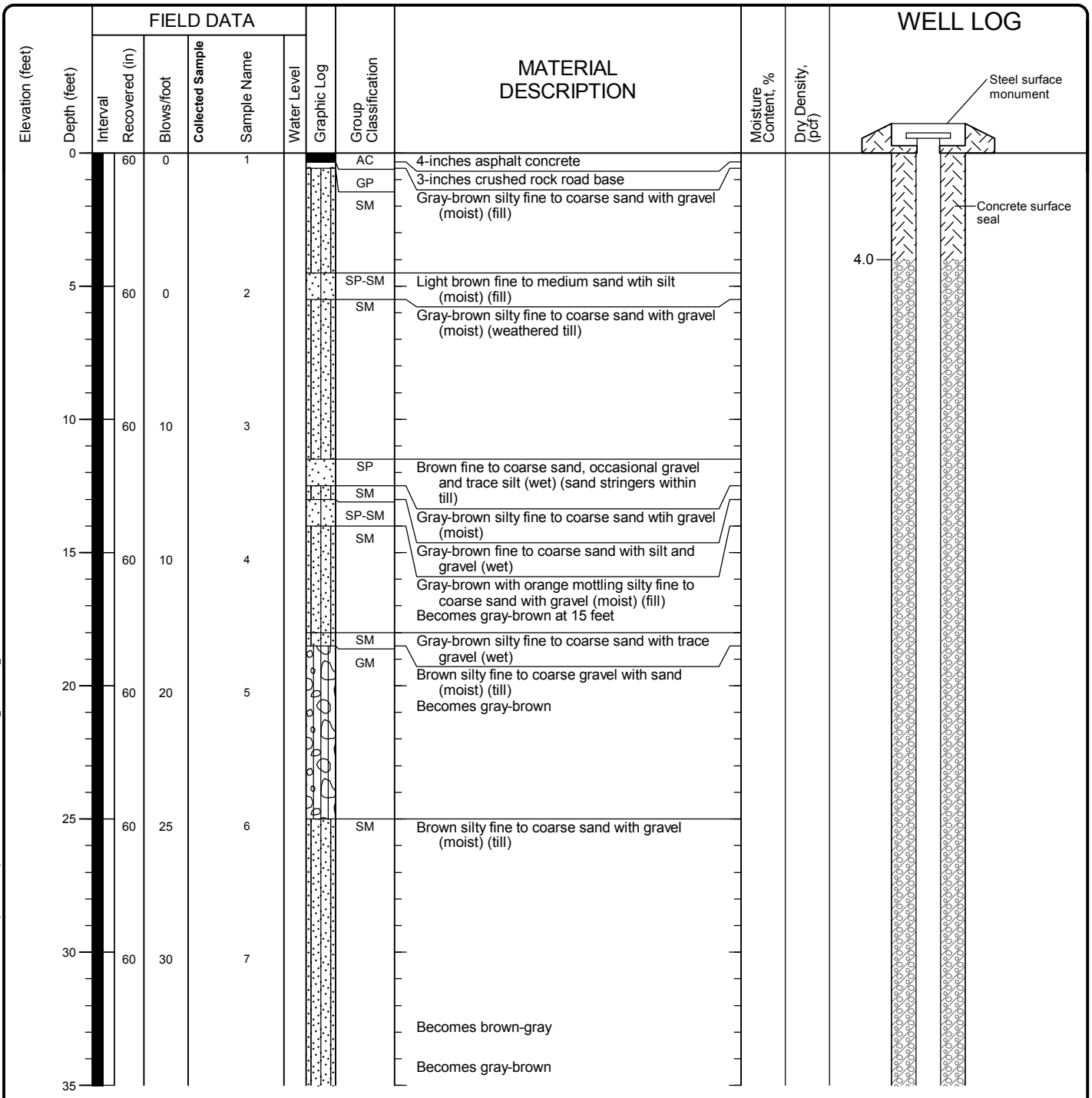
Figure A-3
Sheet 3 of 3

Drilled Start 8/7/2013	End 8/8/2013	Total Depth (ft) 92	Logged By AMW / Checked By	Driller Holt Drilling	Drilling Method Sonic Coring
Hammer Data			Drilling Equipment Terrasonic Track Rig		
Surface Elevation (ft) Undetermined / Vertical Datum			Top of Casing Elevation (ft)		
Easting (X) / Northing (Y)			Horizontal Datum		

DOE Well I.D.: BIJ 697
A 2 (in) well was installed on 8/8/2013 to a depth of 92 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
8/9/2013	76.9	

Notes: Casing: 8in/10-in



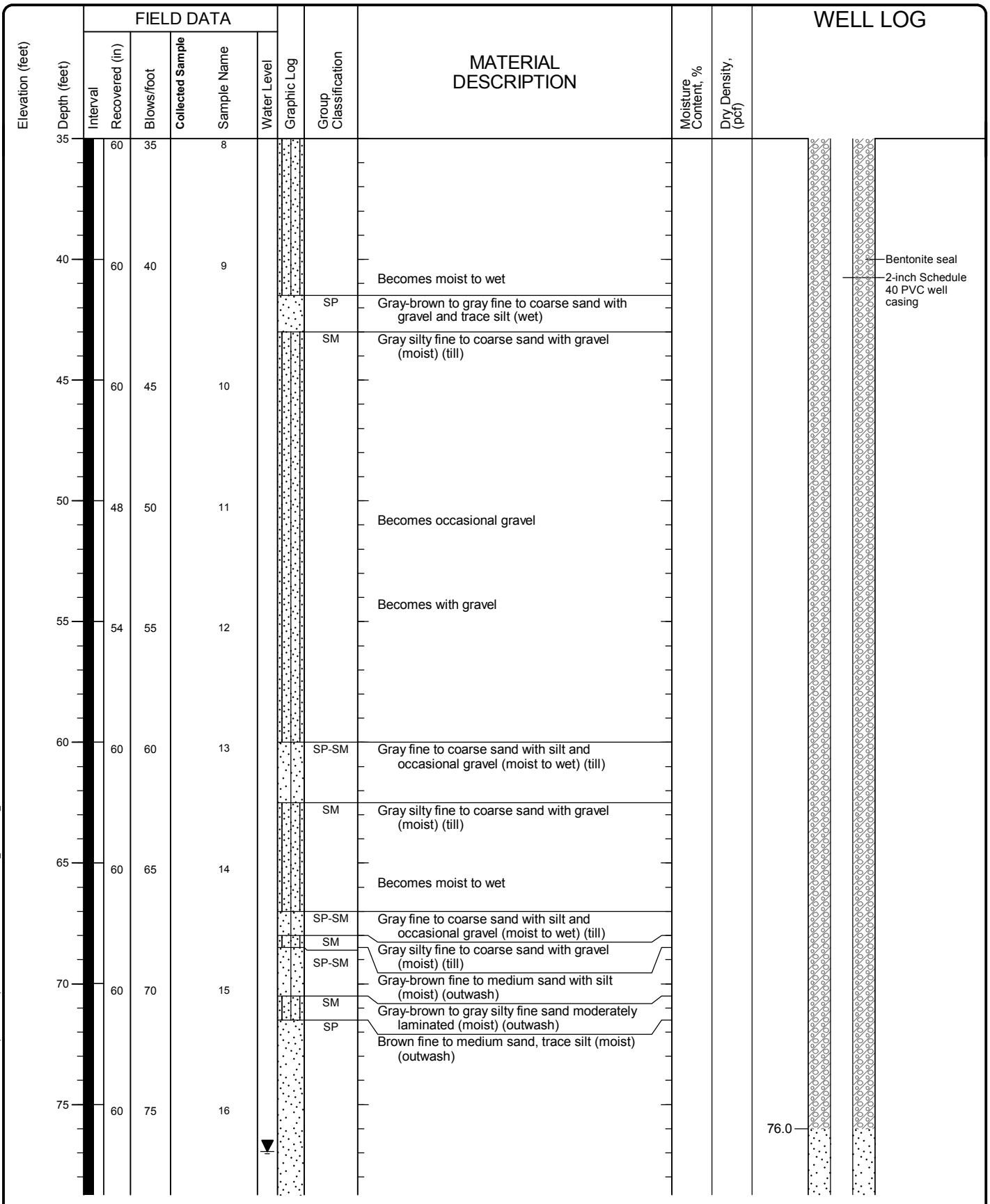
Note: Please see Figure A-1 for explanation of symbols.

Log of Monitoring Well LLMW-35D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-4
Sheet 1 of 3



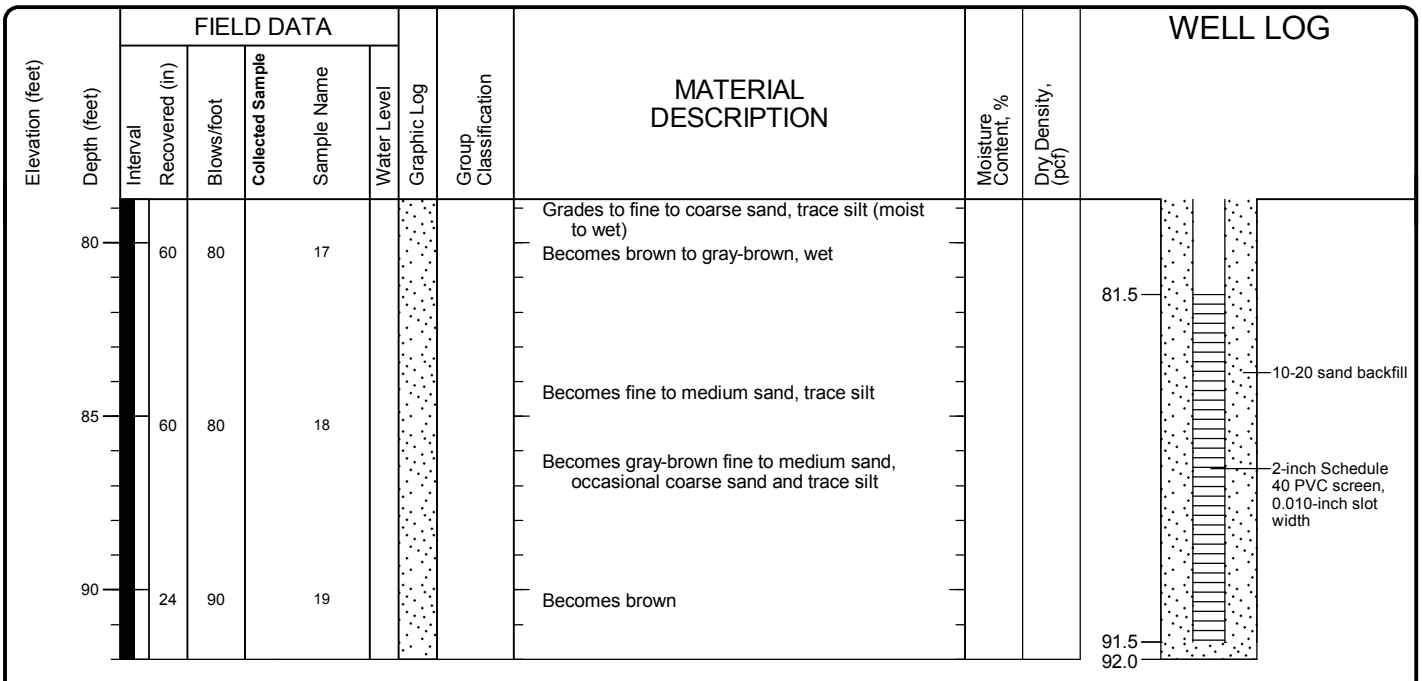
Note: Please see Figure A-1 for explanation of symbols.

Log of Monitoring Well LLMW-35D (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-4
Sheet 2 of 3



Note: Please see Figure A-1 for explanation of symbols.

Log of Monitoring Well LLMW-35D (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-4
Sheet 3 of 3

Drilled	Start 8/8/2013	End 8/9/2013	Total Depth (ft)	90	Logged By / Checked By	AMW	Driller	Holt Drilling	Drilling Method	Sonic Coring

Hammer Data		Drilling Equipment	Terrasonic Track Rig
Surface Elevation (ft) Vertical Datum	Undetermined	Top of Casing Elevation (ft)	
Easting (X) Northing (Y)		Horizontal Datum	

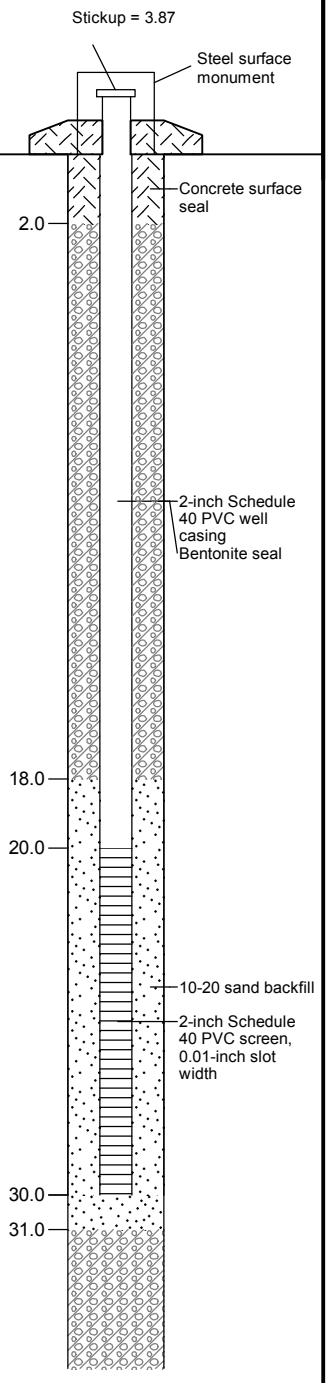
DOE Well I.D.: BHU 404
A 2 (in) well was installed on 8/12/2013 to a depth of 31 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
8/13/2013	4.4	

Notes: Casing: 8in/10-in steel casing

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)
	0		60	0		1			SP-SM	Brown fine to medium sand with silt, occasional coarse sand, occasional gravel and organic matter (rootlets, wood debris) (moist) (fill)		
										Decreased organic matter		
							▼		SM	Brown silty fine to coarse sand with angular gravel and cobbles (moist to wet) (fill with slag)		
	5		60	0		2			GP-GM	Gray-brown fine to coarse gravel with sand, silt and cobbles up to 5 inches in diameter (wet) (fill with slag)		
										Becomes brown-gray		
									SM	Dark brown-gray to gray silty fine to coarse sand with rounded gravel and trace organic matter (wood debris)		
	10		60	10		3			SP-SM	Brown-gray fine to coarse sand with silt, occasional rounded gravel and trace carbonized wood (wet)		
										Becomes brown-gray fine to medium sand with silt (mica)		
	15		60	10		4				Becoms gray to brown-gray fine sand with silt		
									ML	Gray sandy silt with gravel and occasional cobbles (moist)		
									SP-SM			
									SP	Gray fine to coarse sand with silt and occasional gravel (wet)		
										Gray fine sand, trace silt (wet) (mica)		
	20		60	20		5				Becomes light brown		
									SP	Orange-brown to light brown mottled fine to medium sand, trace silt (wet) (mica)		
										Gray sand from 23 to 24.5 feet		
	25		60	20		6				Becomes gray-brown		
										Becomes fine to coarse		
										3½-inch cobble at approximately 29 feet		
	30		60	30		7			SP	Light brown fine to medium sand, trace silt and occasional coarse sand (wet)		
	35											

WELL LOG



Note: Please see Figure A-1 for explanation of symbols.

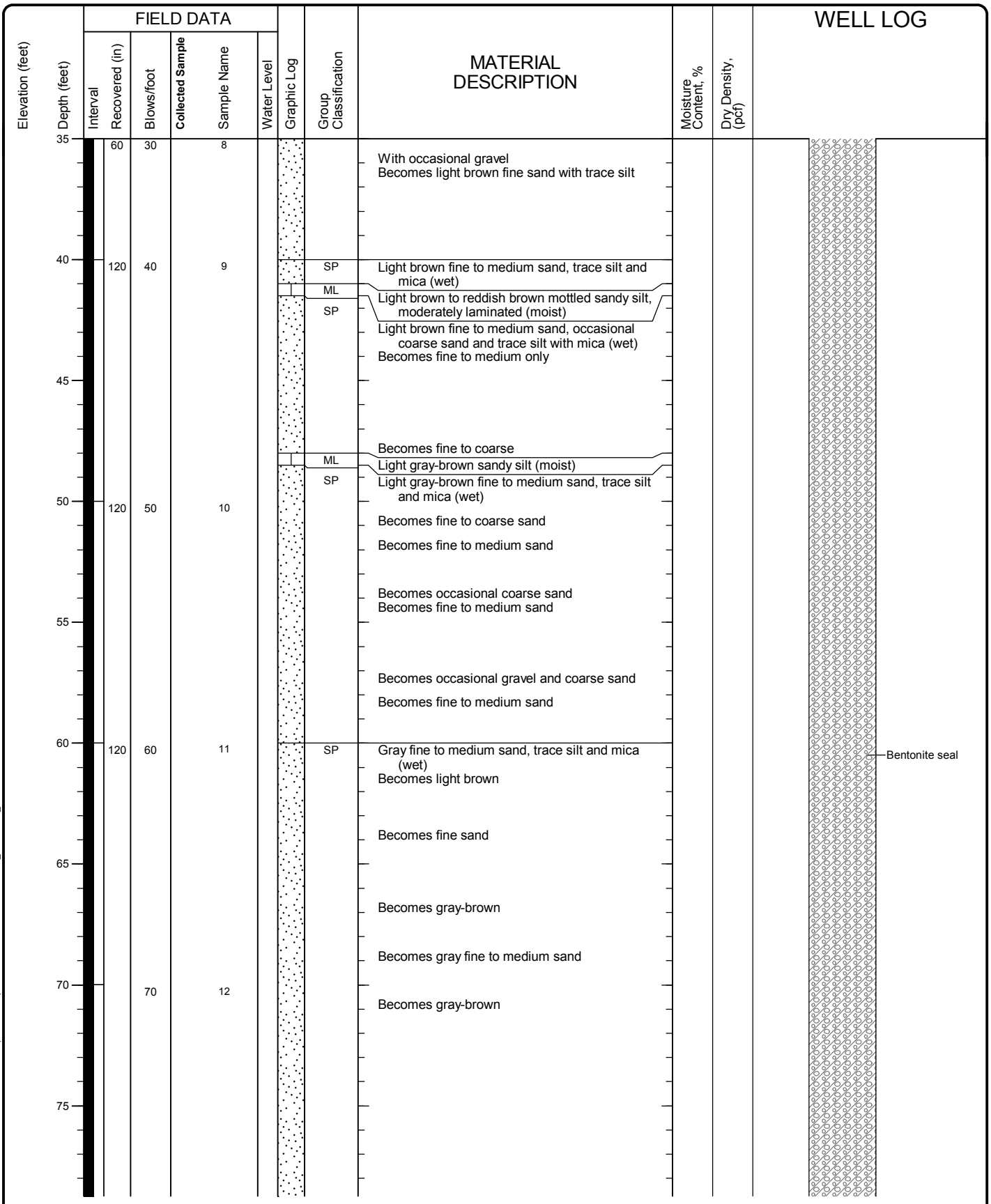
Log of Monitoring Well LLMW-36D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-01

Figure A-5
Sheet 1 of 3

Seattle: Date:9/3/13 Path:\\SEA\PROJECTS\0\0504\068\GINT\050406801.GPJ DBTemplate\LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_WELL



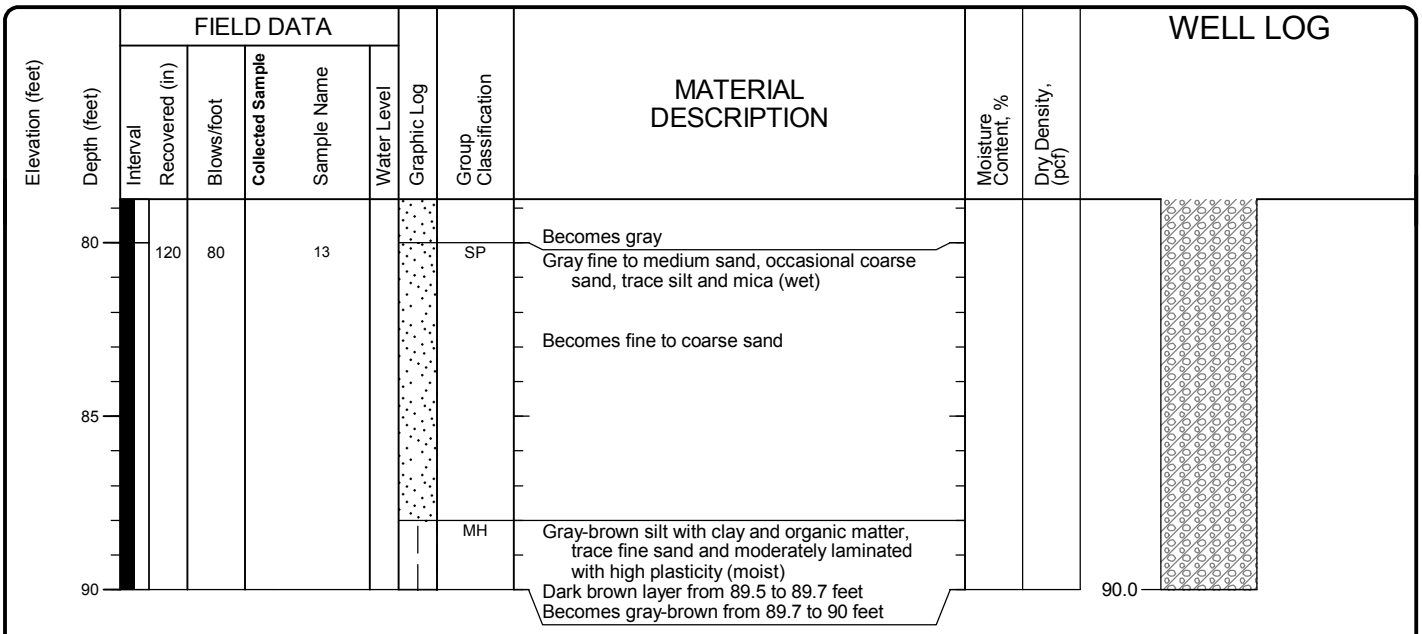
Note: Please see Figure A-1 for explanation of symbols.

Log of Monitoring Well LLMW-36D (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-5
Sheet 2 of 3



Note: Please see Figure A-1 for explanation of symbols.

Log of Monitoring Well LLMW-36D (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-5
Sheet 3 of 3

APPENDIX B
Data Validation Report

DATA VALIDATION REPORT

METALS IN SOIL BY METHODS SW6010C/200.8/7471A

Primary Laboratory SDG	Samples Validated
XB75	LLMW35D-4-5, LLMW35D-5.5-6, LLMW35D-12-14, LLMW35D-50-51, LLMW35D-70-71, and LLMW35D-90-92
XB76	BP04D2-35-36.5, BP04D2-50-51.5, BP04D2-60-61.25, BP04D2-65-66, BP04D2-80.5-81.5, BP04D2-80.5-81.5-DUP, BP04D2-100-101.5, BP07D2-35-35.5, BP07D2-40-41, BP07D2-60-61, BP07D2-75.5-76.5, and BP07D2-81-81.5
XD47	LLS-03 and LLS-04

PROJECT: LOWLAND AREA (0504-068-01)

This report documents the results of an Environmental Protection Agency (EPA) level 2b data validation of analytical data from the analyses of soil samples and the associated laboratory and field quality control (QC) samples. The review included the following:

- Chain of Custody
- Holding Times and Sample Preservation
- Instrument Calibration
- ICP Interference Check Sample
- Method and Calibration Blanks
- Laboratory Control Samples
- Matrix Spikes
- Laboratory Duplicates
- Field Duplicates

OBJECTIVE

The objective of the data validation was to review laboratory analytical procedures and quality control (QC) results to evaluate whether:

- The samples were analyzed using well-defined and acceptable methods that provide detection and reporting limits below applicable regulatory criteria;
- The precision and accuracy of the data are well defined and sufficient to provide defensible data; and

- The quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

Twenty (20) soil samples, including one field duplicate, were analyzed by one or more of the analytical methods listed in the title of this appendix.

DATA PACKAGE COMPLETENESS

Analytical Resources Incorporated (ARI), located in Tukwila, Washington, analyzed the soil samples evaluated as part of this data quality assessment. The laboratory provided all required deliverables for the assessment according to the National Functional Guidelines. The laboratory followed adequate corrective action processes and all identified anomalies were discussed in the case narratives.

DATA QUALITY ASSESSMENT SUMMARY

The results for each of the QC elements are summarized below. The data assessment was performed using guidance in the USEPA Contract Laboratory Program *National Functional Guidelines for Inorganic Data Review* (USEPA, 2010).

Chain-of-Custody Documentation

Chain-of-custody (COC) forms were provided with the laboratory analytical reports. There were no anomalies noted on the COC forms; proper COC protocols appear to have been followed for this sampling event.

Holding Times and Sample Preservation

The holding time is defined as the time that elapses between sample collection and sample analysis. The maximum holding time criteria of 6 months (28 days for mercury) is prescribed for the two metals analytical methods to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times of 6 months (28 days for mercury) were met for all analyses.

Instrument Calibration

The laboratory followed the method requirements for satisfactory instrument calibration. Instrument calibration is necessary in order to ensure that the instrument is capable of producing acceptable quantitative data for the metals on the target analyte list in the QAPP. Initial Calibration Verification (ICV) demonstrates that the instrument is capable of acceptable performance at the beginning of the analytical run. The Continuing Calibration Verification (CCV) demonstrates that the initial calibration is still valid by checking the performance of the instrument on any given day that samples are being analyzed.

Each calibration curve was made up of a blank and at least five calibration standards with all measurements being within the working range of the instrument. The calibration curves were fitted using linear regression and each curve had a correlation coefficient of ≥ 0.995.

The ICV/CCV standards were within 90% to 110% of the true value in all cases.

ICP Interference Check Sample

The Interference Check Sample verifies the analytical instrument's ability to overcome isobaric interferences typical of those found in samples. The laboratory analyzed this QC sample at the proper frequency and location of the analytical run. All solution mixtures were within the control limit of 20% of the true value.

Method Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. Method blanks were analyzed with each batch of samples, at a frequency of 1 per 20 samples. For all sample batches, method blanks were analyzed at the required frequency. None of the analytes of interest were detected above the reporting limits in any of the method blanks.

Matrix Spikes

Because the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis. One aliquot of sample is analyzed in the normal manner, and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a percent recovery (%R) is calculated. In the event that a particular element is out of the recovery value control limits in the matrix spiked sample, the laboratory is required to analyze a "post-spiked" sample in order to further isolate any potential quality control issues with the given element.

Matrix spike analyses should be performed once per analytical batch or every 20 field samples, whichever is more frequent. The recovery criteria for matrix spikes are 75% to 125% for all of the elements in this report.

The frequency requirements were met for all analyses, with the following exceptions:

SDG XB75: The laboratory performed an MS/MSD on Sample LLMW35D-4-5. The %R value for antimony was less than the control limit of 80%. Appropriately, the laboratory properly conducted a post-spiked sample. This post-spiked sample was spiked with a higher concentration of element solution as the matrix spike, however, this solution does not interact with acid and is never heated in the digestion process. The %R value for the post spike sample was within the 75% to 125% control limits. Based on professional judgement, the antimony positive results and reporting limits were not qualified because any positive results were reported to be more than an order of magnitude below the risk-based clean up level.

In the same QC sample set, the %R value for arsenic exceeded the control limit of 120%. In this case, the parent sample concentration for this analyte was greater than 4 times the amount spiked into the sample. No qualifiers were applied for this outlier.

SDG XB76: The laboratory performed an MS/MSD on Sample BP07D2-35-35.5. The %R value for antimony was less than the control limit of 80%. Appropriately, the laboratory properly conducted a post-spiked sample. This post-spiked sample was spiked with a higher concentration of element solution as the matrix spike, however, this solution does not interact with acid and is never heated in the digestion process. The %R value for the post spike sample was within the 75% to 125% control limits. Based on professional judgement, the antimony reporting limits were not qualified because the reporting limits were more than an order of magnitude below the risk-based clean up level.

In the same QC sample set, the %R values for arsenic and lead exceeded the control limit of 120%. The positive results for these target analytes were qualified as estimated (J) in each sample from this soil boring: BP07D2-35-35.5, BP07D2-40-41, BP07D2-60-61, BP07D2-75.5-76.5, and BP07D2-81-81.5.

SDG XD47: The laboratory performed an MS/MSD on Sample LLS-04. The %R value for antimony was less than the control limit of 80%. Appropriately, the laboratory properly conducted a post-spiked sample. This post-spiked sample was spiked with a higher concentration of element solution as the matrix spike, however, this solution does not interact with acid and is never heated in the digestion process. The %R value for the post spike sample was within the 75% to 125% control limits. Based on professional judgement, the antimony reporting limits were not qualified because the reporting limits were more than an order of magnitude below the risk-based clean up level.

Laboratory Control Samples (LCS)

A laboratory control sample is essentially a blank sample that is spiked with a known amount of analyte concentration and analyzed. It is to be treated much like a matrix spike, without the possibility for matrix interference. As there is no actual sample matrix in the analysis, the analytical expectations for accuracy and precision are usually more rigorous and qualification would apply to all samples in the batch, instead of the parent sample only.

Laboratory control sample analyses should be performed once per analytical batch or every 20 field samples, whichever is more frequent. The recovery criteria for laboratory control samples are specified in the laboratory documents as are the relative percent difference values. The frequency requirements were met for all analyses, and the %R/RPD values were within the proper control limits.

Laboratory Duplicates

Internal laboratory duplicate analyses are performed to monitor the precision of the analyses. Two separate aliquots of a sample are analyzed as distinct samples in the laboratory, and the RPD between the two results is calculated. Duplicate analyses should be performed once per analytical batch. If one or more of the samples used has a concentration greater than five times the reporting limit for that sample, the absolute difference is used instead of the RPD.

Laboratory duplicates were analyzed at the proper frequency and the specified acceptance criteria were met for all analyses, with the following exceptions:

SDG XB76: The laboratory performed an internal duplicate on Sample BP07D2-35-35.5. The RPD values for arsenic and mercury were greater than the control limit of 20%. The positive results for these analytes were qualified as estimated (J) each sample from this soil boring.

Field Duplicates

Field duplicate samples were collected and analyzed along with the reviewed sample batches. The duplicate samples were analyzed for the same parameters as the associated parent samples. As mentioned above for the laboratory duplicates the RPD is used as the criteria for assessing precision, unless one or more of the samples used has a concentration greater than five times the reporting limit for that sample, the absolute difference is used instead of the RPD.

The RPD control limits for soil samples is 50%. The absolute difference control limits for soil samples is twice the PQL value. There was one set of field duplicates shown below for this phase of the sampling event:

- BP04D2-80.5-81.5 & BP04D2-80.5-81.5 DUP

The RPD for lead exceeded the control limit in this sample pair. The positive results for this analyte were qualified as estimated (J) in both samples.

OVERALL ASSESSMENT

As was determined by this data quality assessment, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the LCS, MS, and post-spike %R values, with the exceptions noted above. Precision was acceptable, as demonstrated by the laboratory duplicate and field duplicate RPD values, with the exceptions noted above.

Data were qualified as estimated because of matrix spike accuracy outliers and laboratory and field duplicate precision outliers.

All data, as qualified, are acceptable for use.

GeoEngineers

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Memorandum

To:	Sandra Matthews, ECY
From:	Garrett R. Leque, Iain H. Wingard
Date:	October 31, 2013
File:	0504-068-01
Subject:	August/September 2013 Groundwater Sampling

This memorandum presents the groundwater sampling activities that were performed for the Everett Smelter Lowland Area Investigation between August 13 and September 6, 2013. The Lowland Area investigation activities included development of four groundwater monitoring wells (LLMW-35D, LLMW-36D, BP-04D2 and BP-07D2), low-flow groundwater sampling of 91 monitoring wells and two surface water ponds, and disposal of investigation derived waste. The following wells were dry and were, therefore, not sampled: EV-13, LLMW-11S, LLMW-27S, LLMW-29S and LLMW-33S.

The recently installed wells LLMW-35D, LLMW-36D, BP-04D2 and BP-07D2 were developed between August 13 and 16, 2013. The 91 groundwater and two surface water samples were collected between August 19 and September 6, 2013. Forty (40) of the monitoring wells that were sampled are "shallow" wells, installed in the shallow aquifer and 51 of the wells are "deep" wells, installed in the deep aquifer. Wells that were located along the shoreline of the Snohomish River (i.e., within 100 feet of the shoreline), as well as LLMW-13S/D and LLMW-16S/D, were sampled on outgoing tides.

Groundwater elevations were measured and recorded prior to sampling each well using an electronic water level indicator. Groundwater purging and sample collection was completed using low-flow/low-turbidity sampling techniques to minimize the suspension of sediment in the groundwater samples. The wells were purged and groundwater samples were obtained from the wells using dedicated polyethylene tubing and either peristaltic or submersible well pumps. A water quality measuring system (Horiba U-22 or YSI 556) with a flow-through cell was used to monitor water quality parameters during purging. The field measurements were documented on field logs. Following completion of well purging, the flow through cell was disconnected, ferrous iron was measured using Hach color-disk field test kits, and groundwater samples were collected in laboratory-prepared containers. All wells and surface water locations were sampled for total and dissolved metals, with the dissolved samples being filtered in the field through disposable 0.45 um filters.

Two surface water locations and 31 selected wells were sampled for analysis of dissolved arsenic species and groundwater conventionals. Conventionals included total organic carbon (TOC), as well as the remaining conventionals which were collected after passing through the 0.45 um filters: dissolved organic carbon (DOC), calcium, iron, magnesium, manganese, potassium, sodium, alkalinity, nitrate, nitrite, phosphorus and sulfate. Samples collected for arsenic speciation were collected in general accordance with GeoEngineers' document titled "Field Sample Collection Method for Arsenic Speciation in Water."

Samples were logged on the chain-of-custody, placed in a cooler with ice, and delivered to Analytical Resources, Inc., in Tukwila, Washington for analysis.

In addition, groundwater elevations were measured at 22 shallow aquifer and 29 deep aquifer monitoring wells within a 2-hour period on September 4, 2013 to provide a "snap-shot" of groundwater levels/elevations and gradients in the Lowland Area.

Water quality parameters are presented in Table 1. Snapshot groundwater level data on September 4th are presented in Table 2. Metals data (arsenic including arsenic species, antimony, cadmium, lead, mercury and thallium) are shown in Tables 3 and 4. Groundwater "conventionals" data are shown in Table 5. Dissolved arsenic concentrations in shallow and deep groundwater are shown on Figures 1 and 2. Figures showing groundwater elevations and generalized groundwater gradient contours for the shallow and deep aquifers during the September 4th snapshot are shown in Figures 3 and 4.

A data quality review was performed on the analytical data resulting from laboratory analysis of water samples. The laboratory analytical reports are provided in Appendix A and the Data Quality Assessment report is provided in Appendix B.

Field activities were performed in general accordance with the Sampling and Analysis Plan (SAP), Quality Assurance Project Plan (QAPP) and Health and Safety Plan (HASP) created for this project.

We trust this meets your needs at the present time. Please call if you require additional services.

GRL:IHW:tt

Attachments:

Table 1. Water Quality Parameters for Groundwater and Surface Water – August/September 2013

Table 2. Groundwater Level Measurements on September 4, 2013

Table 3. Chemical Analytical Data for Shallow Groundwater and Surface Water – August/September 2013

Table 4. Chemical Analytical Data for Deep Groundwater and Surface Water- August/September 2013

Table 5. Conventionals Data for Shallow Groundwater, Surface Water, and Deep Groundwater - August/September 2013

Figure 1. Dissolved Arsenic Concentrations in Shallow Aquifer Groundwater and Surface Water - August/September 2013

Figure 2. Dissolved Arsenic Concentrations in Deep Aquifer Groundwater - August/September 2013

Figure 3. Groundwater Elevations September 4, 2013 – Shallow Aquifer

Figure 4. Groundwater Elevations September 4, 2013 – Deep Aquifer

Appendix A. Laboratory Data Results

Appendix B. Data Quality Assessment

Table 1

Water Quality Parameters for Groundwater and Surface Water - August/September 2013

Everett Lowland

Everett, Washington

Location Designation	Depth to Water[1] (feet)	pH	Conductivity (S/m)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (Celcius)	Salinity (parts per thousand)	TDS (g/l)	Oxidization Reduction Potential (mV)	Ferrous Iron[2] (mg/L)
Monitoring Wells										
BP-01S	5.70	6.16	0.09	96.6	3.9	17.4	0.0	0.6	-112	3.5
BP-01D	12.85	6.53	0.0456	2.24	4.8	13.2	0.0	0.29	-31	0
BP-02S	6.39	7.32	0.0216	2.24	0.12	16.5	0.12	0.168	-201.4	1.0
BP-02D	13.51	6.55	0.0409	2.13	0.15	13.1	0.26	0.343	-26.9	0.5
BP-03S	5.44	7.14	0.0433	0.90	0.05	19.1	0.24	0.318	-146.6	2.0
BP-03D	12.92	6.93	0.0158	2.68	0.08	12.8	0.09	0.128	-71.9	0
BP-04S	5.44	7.05	0.0963	1.17	2.6	20.8	0.0	0.65	-129	0
BP-04D	12.24	6.33	0.0531	4.71	3.3	13.9	0.0	0.34	-35	0.5
BP-04D2	10.77	7.61	0.0213	6.06	0.06	13.1	0.13	0.179	-141.9	0.5
BP-05D	12.97	6.67	0.0341	1.00	0.48	13.6	0.21	284.06	-51.8	0.0
BP-05S	5.54	8.46	0.0351	2.15	0.05	19.6	0.19	254.80	-261.0	0.0
BP-05D2	7.42	7.62	0.0131	4.30	0.11	13.8	0.08	0.108	-154.3	0.5
BP-06S	5.45	6.36	0.0539	22.8	3.4	19.5	0.0	0.34	-123	1.0
BP-06D	12.85	6.12	0.0542	4.82	3.6	13.4	0.0	0.35	-3	0.5
BP-07S	4.98	7.03	0.129	1.39	0.04	17.2	0.77	0.982	-288.7	1.5
BP-07D	12	6.63	0.0334	1.93	0.11	13.5	0.10	0.135	-61.5	0
BP-07D2	6.75	7.51	0.0236	5.53	0.10	13.7	0.14	0.196	-148.4	1.00
BP-08S	4.84	7.77	0.0162	3.98	1.18	17.3	0.1	1.1	-148	1.0
BP-08D	12.05	7.88	0.0171	3.12	1.08	13.3	0.1	1.1	-52	0.5
BP-09S	4.82	7.91	0.009	2.15	1.13	14.2	0.0	0.6	-171	1.5
BP-09D	13.24	7.25	0.0093	3.98	1.03	13.2	0.0	0.6	-129	1.5
BP-10S	5.19	7.42	0.0097	3.15	1.14	17.0	0.0	0.6	-146	1.0
BP-10D	10.61	7.62	0.0121	3.45	1.18	12.6	0.1	0.8	-102	1.0
EV-6A	48.16	6.46	0.0454	19.3	1.03	14.7	0.28	0.367	41.4	0
EV-6B	51.14	8.03	0.051	2.69	0.54	14.8	0.31	0.409	-367.4	0.0
EV-7B	7.17	6.62	0.0272	3.45	0.65	11.9	0.17	0.235	-34.4	0.0
EV-13[3]	DRY	--	--	--	--	--	--	--	--	--
EV-19B	45.75	6.62	0.0386	3.47	4.19	15.3	0.23	.3087	87.0	0.0
EV-20B	50.49	6.27	0.0137	4.80	5.00	14.7	0.08	0.111	134.3	0.0
EV-22A	15.75	6.62	0.127	9.52	0.22	12.4	0.84	1.079	-163.4	1.0
EV-22B	19.62	6.71	0.361	24.5	1.41	14.1	2.45	2.954	-92.4	1.0
LLMW-01D	10.77	7.12	0.0179	0.77	0.17	13.2	0.11	0.149	143.6	1.5
LLMW-02D	9.57	6.85	0.081	1.02	0.06	13.2	0.53	.689	-126.5	1.5
LLMW-03S	7.6	6.33	0.0585	3.2	3.2	17.1	0.0	0.36	-68	1.5
LLMW-03D	11.64	6.56	0.09	2.10	3.6	13.1	0.2	0.3	-44	0.0
LLMW-04S	9.73	7.12	0.154	7.39	0.24	14.5	0.98	1.248	-200.1	1.5
LLMW-04D	17.24	7.11	0.0405	5.75	0.31	12.7	0.26	0.347	-192.5	0.0
LLMW-05S	6.48	6.22	0.0162	3.29	0.16	19.1	0.09	0.119	-22.8	1.5
LLMW-05D	11.98	6.61	0.0189	2.65	0.13	15.9	0.11	0.149	-102.4	2.0
LLMW-06S	6.44	6.48	0.065	0.35	0.11	19.7	0.35	0.468	-86.1	1.0
LLMW-06D	6.83	6.77	0.0372	3.06	0.11	13.2	0.23	0.312	-79.8	1.0
LLMW-07S	6.47	5.94	0.0338	1.59	0.08	18.2	0.19	0.254	-4.6	2.5
LLMW-07D	9.72	6.83	0.0266	5.06	0.13	14.0	0.16	0.219	-95.7	1.5
LLMW-08S	10.33	8.46	0.0441	4.5	0.87	16.2	0.2	2.8	-198	0.5
LLMW-08D	12.23	8.02	0.0288	3.98	0.73	13.4	0.1	1.8	-192	1.5
LLMW-09S	5.63	6.7	0.0499	1.09	0.11	19.5	0.27	0.361	-94.9	1.0
LLMW-09D	9.12	6.76	0.052	3.88	0.14	13.7	0.32	0.429	-35.1	0.5
LLMW-10S	8.18	6.51	0.075	111.3	3.9	18.6	0.0	0.48	-79	1.0
LLMW-10D	8.78	6.55	0.0441	12.6	3.4	13.0	0.0	0.29	-75	1.0
LLMW-11S	DRY	--	--	--	--	--	--	--	--	--
LLMW-11D	15.92	6.69	0.0381	2.25	0.11	12.8	0.24	0.323	-99.9	2.0
LLMW-12S	8.02	6.58	0.0174	0.56	0.16	17.3	0.09	0.126	-98.5	1.5
LLMW-12D	9.76	6.73	0.0382	1.59	0.21	12.8	0.24	0.324	102.6	0.5
LLMW-13S	13.16	6.28	0.113	3.54	3.8	15.3	0.1	0.7	-121	3.5
LLMW-13D	14.81	6.54	0.0546	4.82	4.8	12.6	0.0	0.35	-98	1.0
LLMW-14S	6.92	8.10	6.88	4.32	0.87	17.8	0.0	0.44	-114	0.5
LLMW14D	8.2	8.89	0.0097	3.72	0.86	13.2	0.0	0.6	-187	0.0
LLMW-15S	7.88	8.56	0.0891	3.98	0.83	17.4	0.0	0.57	-145	1.5
LLMW-15D	9.85	10.91	0.0156	3.71	0.76	13.7	0.1	1.0	-345	0.0
LLMW-16S	12.37	6.12	0.09	508.3	3.3	17.6	0.0	0.57	-76	1.5
LLMW-16D	14.32	6.45	0.095	3.21	3.5	14.1	0.0	0.6	-35	0.5
LLMW-17S	12.79	6.39	0.038	3.15	8.8	15.7	0.0	0.25	102	0.0
LLMW-17D	14.16	6.36	0.053	1.85	3.5	12.8	0.0	0.35	-107	1.5
LLMW-18S	7.57	7.77	0.0132	1.35	0.97	18.3	0.1	0.8	-90	2.0
LLMW-18D	11.86	11.22	0.0203	2.54	0.87	14.1	0.1	1.3	-354	0.5
LLMW-19D	7.57	6.85	0.052	3.71	0.11	13.7	0.32	0.429	-197.8	1.5
LLMW-20D	8.39	5.95	0.574	12.6	0.35	18.5	3.60	4.264	44.9	2.0
LLMW-21S	7.37	6.69	0.0404	4.38	0.30	18.4	0.22	0.301	-218.2	2.0
LLMW-21D	9.82	10.14	0.062	4.59	0.08	13.4	0.39	0.520	-310.4	0.5
LLMW-22S	5.25	6.43	0.904	2.90	0.28	18.8	5.81	6.656	-226.0	1.0
LLMW-22D	6.7	6.69	0.219	4.59	0.15	14.1	1.44	1.788	-75.2	1.0
LLMW-23S	14.69	6.45	0.0317	3.57	0.16	14.5	0.19	0.259	-113.4	1.5
LLMW-23D	20.77	6.66	0.0297	4.32	0.21	13.8	0.18	0.245	-97.0	1.5

Location Designation	Depth to Water[1] (feet)	pH	Conductivity (S/m)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (Celcius)	Salinity (parts per thousand)	TDS (g/l)	Oxidization Reduction Potential (mV)	Ferrous Iron [2] (mg/L)
LLMW-24D	44.48	6.20	0.0686	3.7	0.76	13.2	0.0	0.44	91	0.0
LLMW-25D	51.9	6.16	0.0616	3.9	0.99	13.5	0.0	0.39	87	0.0
LLMW-27S[3]	DRY	--	--	--	--	--	--	--	--	--
LLMW-27D	47.94	6.50	0.0154	7.73	3.89	19.6	0.09	0.125	102.3	0.0
LLMW-29S[3]	DRY	--	--	--	--	--	--	--	--	--
LLMW-29D	41.73	6.81	0.0284	45.8	1.95	15.8	0.17	0.224	66.8	0.0
LLMW-31D	44.55	6.45	0.0443	39.4	0.15	16.2	0.27	0.362	116.5	0.0
LLMW-33S	DRY	--	--	--	--	--	--	--	--	--
LLMW-33D	28.39	6.46	0.0257	2.32	1.18	15.0	0.15	0.206	99.6	0.0
LLMW-34S	10.26	5.96	0.034	43.4	3.0	15.9	0.0	0.21	184	0.0
LLMW-34D	33.85	7.82	0.029	5.08	3.9	14.8	0.0	0.30	-118	0.0
LLMW-35D	77.05	8.90	0.0682	1.75	0.67	15.8	0.0	0.43	-159	0.0
LLMW-36D	8.23	6.31	0.0236	2.44	0.08	12.1	0.15	0.204	91.2	0.0
MW1202R	6.7	8.27	0.0328	4.3	0.73	15.8	0.2	2.1	-123	0.5
MW1203R	9.97	6.46	0.0276	4.10	0.16	16.6	0.16	0.213	-26.3	2.0
MW1301R	8.3	8.01	0.0095	3.2	0.87	16.9	0.0	0.6	-98	0.5
MW1501R	4.16	7.44	0.00279	4.57	1.17	17.6	1.7	17	-103	NR
MW1701	4.54	6.92	0.074	3.56	0.03	16.8	0.43	0.572	-143.1	1.5
PZ-1B	3.36	7.78	0.0091	1.56	0.98	19.0	0.0	0.6	-100	1.5
PZ-2B	3.98	7.36	0.0738	1.21	1.10	17.0	0.0	0.47	-22	0.0
PZ-3B	4.75	5.96	0.382	22.4	3.38	19.7	2.25	2.74	108.9	0.0
UNK	10.56	11.53	0.0633	8.41	0.98	15.6	0.0	0.41	-328	0.0
Surface Water										
LLSW-04	NA	7.33	0.0362	255	1.7	17.5	0.0	0.24	49	0.0
LLSW-05	NA	6.93	0.0147	19.6	2.13	17.7	0.0	0.1	64	0.0

Notes:

[1] Depth to water measured in feet below top of casing at time of sampling.

[2] Ferrous iron measurements were performed in the field on the dissolved groundwater fraction (i.e., after filtration through 0.45 um filters).

[3] The monitoring well was dry and therefore could not be sampled.

S/m - Siemens per meter

NTU = Nephelometric turbidity units

mg/L = milligrams per liter

g/L = grams per liter

mV = Millivolts

-- The investigation activity was not performed at the identified location.

NR = Not recorded (inadvertently not recorded on field form due to field error)

NA = Not applicable

Table 2

Groundwater Level Measurements on September 4, 2013

Everett Lowland

Everett, Washington

Location Designation	Time	Northing (Y)[1]	Easting (X)[1]	TOC Elevation[2] (ft)	DTW TOC (ft)	GW Elevation[2] (ft)
MW-1203R	9:29	373910.15	1307960.38	15.7	10.02	5.68
EV-22A	10:34	372106.2793	1308333.578	28.59	15.76	12.83
BP-02S	9:14	371826.4767	1308735.183	18.85	6.92	11.93
BP-03S	9:16	371659.4186	1308766.223	18.26	4.61	13.65
BP-04S	9:22	371545.1199	1308782.617	18.36	4.91	13.45
BP-05S	9:24	371481.4942	1308791.423	18.56	4.36	14.20
BP-07S	10:04	371337.2871	1308811.404	18.41	3.67	14.74
BP-08S	9:17	371143.3462	1308839.017	18.73	3.50	15.23
LLMW-03S	10:00	372968.3797	1308356.380	17.45	7.31	10.14
LLMW-04S	10:42	372644.1374	1308250.391	21.91	9.04	12.87
LLMW-05S	9:52	372938.0230	1309084.803	14.05	6.50	7.55
LLMW-06S	10:58	372477.6634	1309132.426	12.49	6.39	6.10
LLMW-07S	10:06	372578.1202	1309467.272	13.82	5.71	8.11
LLMW-08S	10:08	372213.2542	1309788.249	16.21	10.8	5.41
LLMW-10S	10:58	371722.2934	1309357.791	15.91	8.28	7.63
LLMW-11S	10:20	371825.3634	1310349.586	19.76	DRY	–
LLMW-12S	10:57	371520.0860	1309412.663	15.61	8.30	7.31
LLMW-13S	10:25	371682.6131	1309796.930	21.49	13.27	8.22
LLMW-14S	10:57	371373.4769	1309447.067	14.74	7.52	7.22
LLMW-15S	10:53	371051.1506	1309535.419	15.94	8.35	7.59
LLMW-16S	10:25	371159.2967	1310164.452	20.02	12.41	7.61
LLMW-17S	10:32	371320.3207	1310602.283	18.27	12.94	5.33
LLMW-21S	10:44	370010.9467	1309885.453	16.04	7.90	8.14
LLMW-22S	10:42	369173.0090	1310445.634	12.87	5.35	7.52
LLMW-27S	10:46	371254.5214	1308467.368	61.46	DRY	–
LLMW-29S	10:42	370978.8889	1308556.936	55.66	DRY	–
EV-7B	10:20	371490.8311	1308696.544	14.87	6.86	8.01
EV-22B	10:32	372111.4369	1308337.155	29.02	19.51	9.51
BP-02D	9:15	372886.6753	1307921.185	18.88	11.49	7.39
BP-03D	9:18	371655.4975	1308766.43	18.37	10.91	7.46
BP-04D	9:21	371541.1801	1308782.814	18.33	10.82	7.51
BP-04D2[3]	9:50	371552.1957	1308789.925	18.54	10.17	8.37
BP-05D	9:26	371477.267	1308791.557	18.65	11.12	7.53
BP-05D2[3]	9:25	371472.412	1308791.713	19.26	7.33	11.93
BP-07D	10:05	371332.8036	1308812.098	18.402	10.93	7.47
BP-07D2[3]	10:03	371340.7835	1308814.767	18.58	7.80	10.78
BP-08D	9:19	371139.579	1308839.538	18.59	11.60	6.99
LLMW-01D	9:16	373911.1708	1307952.929	15.74	12.78	2.96
LLMW-02D	10:16	372887.009	1307921.39	15.15	8.88	6.27
LLMW-03D	10:02	372965.5718	1308351.511	17.45	12.06	5.39
LLMW-04D	10:40	372642.8382	1308246.252	21.98	15.28	6.70
LLMW-05D	9:53	372933.914	1309087.930	13.92	11.97	1.95
LLMW-06D	9:59	372472.7325	1309133.872	12.29	7.59	4.70

Location Designation	Time	Northing (Y)[1]	Easting (X)[1]	TOC Elevation[2] (ft)	DTW TOC (ft)	GW Elevation[2] (ft)
LLMW-07D	10:07	372580.662	1309464.938	13.81	11.40	2.41
LLMW-08D	10:06	372209.3701	1309788.569	16.26	12.72	3.54
LLMW-10D	11:00	371725.4255	1309359.407	15.97	10.73	5.24
LLMW-11D	10:19	371821.896	1310350.780	19.71	18.13	1.58
LLMW-12D	10:58	371523.015	1309414.262	15.71	10.43	5.28
LLMW-13D	10:27	371682.4624	1309793.149	21.24	17.19	4.05
LLMW-14D	10:56	371375.602	1309449.147	14.80	9.50	5.30
LLMW-15D	10:52	371053.2175	1309536.612	16.07	10.3	5.77
LLMW-16D	10:27	371158.166	1310160.437	20.14	16.63	3.51
LLMW-17D	10:34	371317.6575	1310603.072	18.29	16.43	1.86
LLMW-21D	10:45	370011.1759	1309881.28	16.03	10.35	5.68
LLMW-22D	10:50	369167.8357	1310446.091	12.80	8.51	4.29
LLMW-27D	9:42	371259.2652	1308465.435	61.71	47.94	13.77
LLMW-29D	9:37	370982.4647	1308556.215	55.62	41.79	13.83
LLMW-35D	10:37	371239.0453	1308164.388	90.98	77.07	13.91
LLMW-36D	10:28	371372.9356	1308601.392	21.04	8.27	12.77

Notes:

[1] Northing (Y) and Easting(X) are in Washington State Plane North Coordinate System, 83/91 grid values.

[2] Vertical datum is NAVD88, US survey feet.

[3] "D2" level wells not used in groundwater contouring; not shown on Figures 3 and 4.

DTW TOC = Depth to water below top of PVC well casing.

-- = The well was dry and therefore no groundwater elevation could be calculated

GW = Groundwater

Table 3

Chemical Analytical Data for Shallow Groundwater and Surface Water - August/September 2013

Everett Lowland

Everett, Washington

Analyte	Arsenic						Lead	
	Arsenic		Arsenate	Arsenite	DMA	MMA		
Total / Dissolved [1]	Dissolved	Total	Dissolved	Dissolved	Dissolved	Dissolved	Dissolved	Total
Sample Identification								
Monitoring Well (µg/L)								
BP-01S-130821-W	**116**	**208**	**102**	**42.5**	0.95 U	1.6 U	0.1 U	**287**
BP-02S-130822-W	**133**	**130**	--	--	--	--	0.1 U	**4.8**
BP-03S-130820-W	**69.5**	**67.2**	--	--	--	--	0.1 U	**1.4**
BP-04S-130819-W	**113**	**116**	**26.3**	**93.4**	0.95 U	1.6 U	**1.9**	**9.1**
BP-05S-130819-W	**69.5**	**69.4**	**4.3 J**	**61.5**	0.95 U	1.6 U	0.1 U	**1.4**
BP-06S-130820-W	**77**	**76.8**	--	--	--	--	0.1 U	**3.1**
BP-07S-130820-W	**127**	**365**	**6.3**	**86.2**	0.95 U	1.6 U	0.1 U	**1**
BP-08S-130828-W	**110**	**118**	--	--	--	--	0.1 U	**5.9**
BP-09S-130828-W	**276**	**283**	--	--	--	--	0.1 U	**0.3**
BP-10S-130828-W	**201**	**204**	--	--	--	--	0.1 U	**1.2**
EV-22A-130829-W	**7.1**	**7.5**	--	--	--	--	**3.5**	**4**
EV-6A-130828-W	**208**	**314**	**44.7**	**170**	0.96 U	0.77 U	**24.9**	**70.9**
LLMW-03S-130827-W	**2.4**	**2.3**	--	--	--	--	0.1 U	0.1 U
LLMW-04S-130829-W	**4.3**	**4.4**	--	--	--	--	**0.1**	**0.2**
LLMW-05S-130905-W	**17.7**	**18.2**	**2.9 J**	**18.5**	0.96 U	0.77 U	0.1 U	0.1 U
LLMW-06S-130826-W	**6.4**	**6.1**	**5.1**	**4.92 J**	0.95 U	1.6 U	0.1 U	0.1 U
LLMW-07S-130905-W	**44**	**46**	--	--	--	--	2 U	2 U
LLMW-08S-130906-W	**187**	**206**	**39.9**	**115**	0.96 U	0.77 U	0.2 U	**104**
LLMW-09S-130822-W	**24.8**	**23.8**	--	--	--	--	0.1 U	0.1 U
LLMW-10S-130823-W	**30.1**	**31.5**	--	--	--	--	**0.3**	**25.6**
LLMW-12S-130826-W	**61.1**	**62.5**	**21**	**69.1**	0.95 U	1.6 U	**0.2**	0.1 U
LLMW-13S-130821-W	**26.8**	**25.8**	**30.2**	**5.55**	0.95 U	1.6 U	0.1 U	**0.2**
LLMW-14S-130909-W	**20.8**	**22.5**	--	--	--	--	**0.3**	**0.7**
LLMW-15S-130909-W	**6.3**	**8.6**	--	--	--	--	0.1 U	**0.3**
LLMW-16S-130823-W	**386**	**497**	**75.2**	**223**	0.95 U	1.6 U	0.1 U	**54.7**
LLMW-17S-130820-W	**2.4**	**3.7**	--	--	--	--	0.1 U	**0.4**
LLMW-18S-130904-W	**19**	**20**	--	--	--	--	0.1 U	0.1 U
LLMW-21S-130909-W	**91.3**	**90.2**	--	--	--	--	0.1 U	0.1 U
LLMW-22S-130823-W	**6**	**5**	--	--	--	--	**0.2**	0.1 U
LLMW-23S-130822-W	**6.6**	**7.1**	--	--	--	--	0.1 U	**0.3**
LLMW-34S-130826-W	**0.6**	**1.5**	--	--	--	--	0.1 U	**2.4**
MW-1202R-130905-W	**0.7**	**0.7**	--	--	--	--	0.1 U	0.1 U
MW-1203R-130821-W	**0.9**	**1.1**	--	--	--	--	0.1 U	**0.3**
MW-1301R-130905-W	**5.6**	**5.7**	--	--	--	--	0.1 U	**0.1**
MW-1501R-130827-W	**10**	**7**	--	--	--	--	0.5 U	0.5 U
MW-1701-130827-W	**4.3**	**4.4**	--	--	--	--	0.1 U	0.1 U
PZ-1B-130904-W	**166**	**161**	--	--	--	--	0.1 U	**0.2**
PZ-2B-130904-W	**108**	**95**	--	--	--	--	0.1 U	**0.1**
PZ-3B-130828-W	**10.5**	**11**	--	--	--	--	**0.2**	**0.2**
UNK-130827-W	**81.6**	**69.3**	--	--	--	--	**3.8**	**4.1**
Surface Water (µg/L)								
LLSW-04-130906-W	**36.2**	**41.6**	**28.2**	**10.9**	0.96 U	0.77 U	**0.3**	**5.4**
LLSW-05-130906-W	**7.3**	**8.3**	**4.6 J**	**2.10 J**	0.96 U	0.77 U	**0.3**	**1.2**

Notes:

[1] Dissolved samples were field filtered through disposable 0.45 um filters

-- = The investigation activity was not performed at the identified location

MMA = Monomethylarsonic acid

DMA = Dimethylarsenic acid

µg/L = micrograms per liter

U = The analyte was not detected at a concentration greater than the identified reporting limit

J = The analyte was detected and the detected concentration is considered an estimate

Bold font type indicates analyte was detected

Table 4

Chemical Analytical Data for Deep Groundwater and Surface Water - August/September 2013

Everett Lowland

Everett, Washington

	Arsenic						Antimony		Cadmium		Lead		Mercury		Thallium	
Analyte	Arsenic	Arsenic	Arsenate	Arsenite	DMA	MMA										
Total / Dissolved [1]	Dissolved	Total	Dissolved	Dissolved	Dissolved	Dissolved	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total
Sample Identification																
Monitoring Well (µg/L)																
BP-01D-130821-W	0.2 U	**0.2**	2.9 U	0.80 U	0.95 U	1.6 U	--	--	--	--	0.1 U	0.1 U	--	--	--	--
BP-02D-130821-W	0.2 U	**0.2**	--	--	--	--	--	--	--	--	0.1 U	0.1 U	--	--	--	--
BP-03D-130820-W	0.2 U	**0.2**	--	--	--	--	--	--	--	--	0.1 U	**0.1**	--	--	--	--
BP-04D-130820-W	**4,060**	**3,940**	**80**	**3,800**	3.8 U	6.2 U	--	--	--	--	0.1 U	**0.1**	--	--	--	--
BP-04D2-130905-W	**0.4**	**0.4**	--	--	--	--	0.2 U	0.2 U	0.1 U	0.1 U	0.1 U	**0.1**	0.0200 U	0.0200 U	0.2 U	0.2 U
BP-05D-130819-W	**17,300**	**17,500**	**18,100**	**733**	38 U	**99 J**	--	--	--	--	0.1 U	**1.3**	--	--	--	--
DUP-01-130819-W	**17,500**	**18,100**	**17,500**	**667**	38 U	**84 J**	--	--	--	--	0.1 U	**1.4**	--	--	--	--
BP-05D2-130904-W	**3.7**	**4.1**	1.0 U	**4.18 J**	0.96 U	0.77 U	--	--	--	--	0.1 U	**0.2**	--	--	--	--
BP-06D-130820-W	**1,810**	**1,810**	--	--	--	--	--	--	--	--	0.1 U	**0.2**	--	--	--	--
BP-07D-130821-W	**6,610**	**6,530**	**4,860**	**643**	3.8 U	**28.1**	--	--	--	--	0.1 U	0.1 U	--	--	--	--
BP-07D2-130906-W	**47.1**	**49.2**	--	--	--	--	0.2 U	0.2 U	0.1 U	0.1 U	0.1 U	0.1 U	0.0200 U	0.0200 U	0.2 U	0.2 U
BP-08D-130828-W	**0.8**	**0.8**	--	--	--	--	--	--	--	--	0.1 U	0.1 U	--	--	--	--
BP-09D-130828-W	**25.3**	**25.5**	--	--	--	--	--	--	--	--	0.1 U	**0.1**	--	--	--	--
BP-10D-130828-W	**6**	**6.1**	--	--	--	--	--	--	--	--	0.1 U	**0.3**	--	--	--	--
EV-19B-130903-W	**3,560**	**3,090**	**3,270**	1.4 U	3.8 U	3.1 U	--	--	--	--	0.2 U	**0.5**	--	--	--	--
EV-20B-130904-W	**13,200**	**13,000**	**14,440**	1.4 U	3.8 U	3.1 U	--	--	--	--	0.2 U	**0.4**	--	--	--	--
EV-22B-130829-W	**5.1**	**7**	--	--	--	--	--	--	--	--	**0.3**	**3.6**	--	--	--	--
EV6B-130827-W	**6.8**	**12.1**	1.0 U	**0.57 J**	0.96 U	0.77 U	0.2 U	0.2 U	0.1 U	0.1 U	0.1 U	**0.1**	0.0200 U	0.0200 U	0.2 U	0.2 U
EV-7B-130909-W	**2,680**	**2,790**	**2,850**	**3.9 J**	3.8 U	3.1 U	**0.5**	**0.5**	**0.1**	**0.2**	0.1 U	**0.2**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW-01D-130821-W	**28.1**	**26.9**	--	--	--	--	--	--	--	--	0.1 U	0.1 U	--	--	--	--
LLMW-02D-130827-W	**1.4**	**1.4**	--	--	--	--	--	--	--	--	0.1 U	0.1 U	--	--	--	--
LLMW-03D-130827-W	**0.4**	**0.4**	--	--	--	--	--	--	--	--	0.1 U	0.1 U	--	--	--	--
LLMW-04D-130829-W	**1.5**	**1.7**	--	--	--	--	--	--	--	--	0.1 U	0.1 U	--	--	--	--
LLMW-05D-130903-W	**1**	**1**	1.0 U	**1.18 J**	0.96 U	0.77 U	--	--	--	--	0.1 U	0.1 U	--	--	--	--
LLMW-06D-130826-W	**1.5**	**1.4**	2.9 U	**1.12 J**	0.95 U	1.6 U	--	--	--	--	0.1 U	**0.1**	--	--	--	--
LLMW-07D-130905-W	**5**	**5.6**	--	--	--	--	--	--	--	--	0.1 U	**0.2**	--	--	--	--
LLMW-08D-130905-W	**1.4**	**1.2**	1.0 U	**1.01 J**	0.96 U	0.77 U	--	--	--	--	0.1 U	0.1 U	--	--	--	--
LLMW-09D-130822-W	**0.7**	**0.8**	--	--	--	--	--	--	--	--	0.1 U	**0.2**	--	--	--	--
LLMW-10D-130823-W	**2.3**	**3.2**	--	--	--	--	--	--	--	--	0.1 U	**1.2**	--	--	--	--
LLMW-11D-130820-W	**8.1**	**7.8**	**4.4 J**	**6.13**	0.95 U	1.6 U	--	--	--	--	0.1 U	**0.2**	--	--	--	--
LLMW-12D-130826-W	**2,120**	**1,870**	**46.5**	**1,660**	3.8 U	6.2 U	--	--	--	--	0.1 U	0.1 U	--	--	--	--
DUP-02-130826-W	**2,050**	**1,860**	**55**	**1,730**	3.8 U	6.2 U	--	--	--	--	0.1 U	0.1 U	--	--	--	--
LLMW-13D-130821-W	**82.7**	**73**	**14.8**	**81.3**	0.95 U	1.6 U	--	--	--	--	0.1 U	**0.3**	--	--	--	--
DUP-03-130821-W	**81.2**	**66.6**	**17.7**	**81.2**	0.95 U	1.6 U	--	--	--	--	0.1 U	**0.3**	--	--	--	--
LLMW-14D-130909-W	**107**	**98.2**	--	--	--	--	--	--	--	--	0.1 U	0.1 U	--	--	--	--
DUP-04-130909-W	**103**	**131**	--	--	--	--	--	--	--	--	0.1 U	0.1 U	--	--	--	--
LLMW-15D-130909-W	**0.5**	**0.6**	--	--	--	--	--	--	--	--	0.1 U	0.1 U	--	--	--	--
LLMW-16D-130826-W	**0.9**	**1.3**	2.9 U	0.80 U	0.95 U	1.6 U	--	--	--	--	**0.2**	**0.5**	--	--	--	--
LLMW-17D-130820-W	**11.3**	**13**	--	--	--	--	--	--	--	--	0.1 U	0.1 U	--	--	--	--
LLMW-18D-130904-W	**0.6**	**0.8**	--	--	--	--	--	--	--	--	0.1 U	**0.2**	--	--	--	--

	Arsenic						Antimony		Cadmium		Lead		Mercury		Thallium	
Analyte	Arsenic	Arsenic	Arsenate	Arsenite	DMA	MMA										
Total / Dissolved [1]	Dissolved	Total	Dissolved	Dissolved	Dissolved	Dissolved	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total
Sample Identification																
Monitoring Well (µg/L)																
LLMW-19D-130823-W	**25.9**	**40.3**	--	--	--	--	--	--	--	--	0.1 U	0.1 U	--	--	--	--
LLMW-20D-130828-W	**34.2**	**36.9**	--	--	--	--	--	--	--	--	0.1 U	0.1 U	--	--	--	--
LLMW-21D-130909-W	**0.4**	**0.4**	--	--	--	--	--	--	--	--	0.1 U	0.1 U	--	--	--	--
LLMW-22D-130823-W	**0.7**	**0.8**	--	--	--	--	--	--	--	--	0.1 U	**0.1**	--	--	--	--
LLMW-23D-130822-W	**1**	**1.2**	--	--	--	--	--	--	--	--	0.1 U	0.1 U	--	--	--	--
LLMW-24D-130906-W	**0.8**	**0.9**	--	--	--	--	--	--	--	--	0.1 U	**0.1**	--	--	--	--
LLMW-25D-130905-W	**1.4**	**1.5**	1.0 U	0.35 U	0.96 U	0.77 U	--	--	--	--	0.1 U	**0.5**	--	--	--	--
LLMW-27D-130830-W	**4,360**	**4,610**	**4,640**	1.4 U	3.8 U	3.1 U	--	--	--	--	0.1 U	**0.2**	--	--	--	--
DUP-05-130830-W	**4,410**	**4,540**	**4,770**	1.4 U	3.8 U	3.1 U	--	--	--	--	0.1 U	**0.2**	--	--	--	--
LLMW-29D-130828-W	**5.8**	**6.8**	--	--	--	--	--	--	--	--	0.1 U	**0.6**	--	--	--	--
LLMW-31D-130830-W	**1**	**1.4**	--	--	--	--	--	--	--	--	0.1 U	**0.5**	--	--	--	--
LLMW-33D-130903-W	**1.2**	**1.3**	--	--	--	--	--	--	--	--	0.1 U	0.1 U	--	--	--	--
LLMW-34D-130826-W	**1.6**	**1.6**	--	--	--	--	--	--	--	--	0.1 U	**0.3**	--	--	--	--
LLMW-35D-130830-W	**2**	**2**	1.0 U	**1.22 J**	0.96 U	0.77 U	**0.4**	**0.4**	0.1 U	0.1 U	0.1 U	**0.1**	0.0200 U	0.0200 U	0.2 U	0.2 U
LLMW-36D-130906-W	**10.4**	**10.6**	**5.5**	**2.91 J**	0.96 U	0.77 U	**0.3**	**0.3**	0.1 U	0.1 U	**3**	**3.2**	0.0200 U	0.0200 U	0.2 U	0.2 U

Notes:

[1] Dissolved samples were field filtered through disposable 0.45 um filters

-- = The investigation activity was not performed at the identified location

MMA = Monomethylarsonic acid

DMA = Dimethylarsenic acid

"DUP" = Field duplicate sample

µg/L = micrograms per liter

U = The analyte was not detected at a concentration greater than the identified reporting limit

J = The analyte was detected and the detected concentration is considered an estimate

Bold font type indicates analyte was detected.

Table 5

Conventionals Data for Shallow Groundwater, Surface Water, and Deep Groundwater - August/September 2013

Everett Lowland

Everett, Washington

Analyte[1]	Alkalinity	Bicarbonate	Carbonate	Hydroxide	TOC	DOC	Nitrate	Nitrite	Phosphorus	Sulfate	Calcium	Iron	Magnesium	Manganese	Potassium	Sodium
Sample Identification	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Shallow Wells																
BP-01S-130821-W	**493**	**493**	1.0 U	1.0 U	**20.2**	**17.4**	0.1 U	0.1 U	0.1 U	**0.3**	**119**	**72.9**	**28.1**	**1.76**	**7.56**	**20.5**
BP-04S-130819-W	**216**	**216**	1.0 U	1.0 U	**5.47**	**5.53**	0.1 U	0.1 U	0.1 U	**60.9**	**70**	**0.66**	**9.44**	**1.35**	**6.83**	**28.7**
BP-05S-130819-W	**180**	**180**	1.0 U	1.0 U	**6.09**	**6.30**	0.1 U	0.1 U	**0.1**	**17.5**	**41.3**	**0.91**	**5.8**	**0.211**	**5.73**	**31**
BP-07S-130820-W	**443**	**443**	1.0 U	1.0 U	**15.5**	**15.6**	0.1 U	0.1 U	0.1 U	**371**	**221**	**4.1**	**21.2**	**1.79**	**53.7**	**68**
EV6A-130828-W	**199**	**199**	1.0 U	1.0 U	**7.54**	**7.56**	0.1 U	0.1 U	0.1 U	**72.4**	**66.7**	**4.29**	**10.1**	**2.07**	**12.5**	**9.23**
LLMW-05S-130905-W	**110**	**110**	1.0 U	1.0 U	**2.68**	**3.77**	0.1 U	0.1 U	0.1 U	**45.3**	**21.3**	**5.39**	**6.44**	**0.241**	**4.09**	**30.5**
LLMW-06S-130826-W	**368**	**368**	1.0 U	1.0 U	**5.74**	**5.82**	0.1 U	0.1 U	0.1 U	**8.9**	**63.1**	**9.04**	**17.2**	**0.685**	**20.5**	**64.8**
LLMW-08S-130906-W	**516**	**516**	1.0 U	1.0 U	**6.16**	**5.99**	0.1 U	0.1 U	0.1 U	**2.9**	**99.3**	**21.2**	**65.5**	**1.01**	**26.4**	**402**
LLMW-12S-130826-W	**179**	**179**	1.0 U	1.0 U	**6.09**	**6.22**	0.1 U	0.1 U	0.1 UJ	**6.0**	**43.3**	**15**	**7.65**	**0.414**	**5.58**	**18.8**
LLMW-13S-130821-W	**578**	**578**	1.0 U	1.0 U	**12.4**	**12.3**	0.1 U	0.1 U	0.1 U	**1.4**	**145**	**58**	**21.1**	**3.25**	**23.3**	**71**
LLMW-16S-130823-W	**465**	**465**	1.0 U	1.0 U	**8.50**	**9.01**	0.1 U	0.1 U	0.1 U	**0.4**	**95.7**	**94.2**	**66.4**	**3.56**	**19.1**	**51.5**
Surface Water																
LLSW-04-130906-W	**49.8**	**49.8**	1.0 U	1.0 U	**4.87**	**5.38**	**3.4**	0.1 U	0.1 U	**32.9**	**18.9**	**6.54**	**5.47**	**0.143**	**4.05**	**15.6**
LLSW-05-130906-W	**16.5**	**16.5**	1.0 U	1.0 U	**2.85**	**2.87**	0.1 U	0.1 U	0.1 U	**9.8**	**9.46**	**0.28**	**0.69**	**0.071**	**1.23**	**1.08**
Deep Wells																
BP-01D-130821-W	**185**	**185**	1.0 U	1.0 U	**1.70**	**1.76**	0.1 U	0.1 U	0.1 U	**19.0**	**21.4**	**0.18**	**24.5**	**0.198**	**5.87**	**31.4**
BP-04D-130820-W	**135**	**135**	1.0 U	1.0 U	**2.48**	**2.49**	0.1 U	0.1 U	**0.2**	**44.4**	**17.8**	**0.39**	**25.4**	**0.055**	**4.83**	**33.3**
BP-05D-130819-W	**140**	**140**	1.0 U	1.0 U	**2.02**	**1.90**	**2.2**	0.1 U	**0.4**	**37.9**	**26.8**	**1.25**	**29.9**	**0.03**	**3.26**	**19.5**
DUP-01-130819-W	**143**	**143**	1.0 U	1.0 U	**1.92**	**1.89**	**2.2**	0.1 U	**0.4**	**37.7**	**27.2**	**1.65**	**30.2**	**0.032**	**3.19**	**17.2**
BP-05D2-130904-W	**128**	**128**	1.0 U	1.0 U	1.50 U	1.50 U	0.1 U	0.1 U	0.1 U	**19.1**	**25**	**0.77**	**16.9**	**0.088**	**3.07**	**9.84**
BP-07D-130821-W	**173**	**173**	1.0 U	1.0 U	**1.57**	**1.64**	**0.3**	0.1 U	**0.2**	**35.1**	**30.3**	**0.14**	**26.1**	**0.063**	**3.82**	**18.2**
EV-19B-130903-W	**153**	**153**	1.0 U	1.0 U	**1.78**	**1.86**	**1.3 J**	0.1 UJ	**0.2 J**	**31.4**	**33.9**	0.05 U	**28.9**	**0.002**	**3.84**	**14.8**
EV-20B-130904-W	**92.6**	**92.6**	1.0 U	1.0 U	**2.13**	**2.38**	**0.7**	0.1 U	**0.3**	**19.1**	**22.5**	**0.42**	**16.7**	**0.016**	**2.76**	**14**
EV6B-130827-W	**301**	**301**	1.0 U	1.0 U	**3.66**	**5.38**	0.1 UJ	0.1 UJ	0.1 UJ	**9.4**	**27.9**	0.05 U	**54.5**	**0.071**	**7.1**	**25.1**
EV-7B-130909-W	**91.8**	**91.8**	1.0 U	1.0 U	**1.63**	**1.90**	**1.1**	0.1 U	0.1 U	**61.7**	**31.4**	0.05 U	**17.3**	**0.051**	**3.33**	**11.7**
LLMW-05D-130903-W	**218**	**218**	1.0 U	1.0 U	**8.33**	**8.40**	0.1 UJ	0.1 UJ	**1.0 J**	**5.0**	**14**	**4.3**	**12.7**	**0.166**	**9.87**	**106**
LLMW-06D-130826-W	**200**	**200**	1.0 U	1.0 U	**3.59**	**3.56**	0.1 U	0.1 U	**0.2**	**2.0**	**11.1**	**2.37**	**24.4**	**0.146**	**11.8**	**54.9**
LLMW-08D-130905-W	**349**	**349**	1.0 U	1.0 U	**7.44**	**7.28**	0.1 U	0.1 U	0.1 U	**6.4**	**43.2**	**5.85**	**37.7**	**0.196**	**17.4**	**280**
LLMW-11D-130820-W	**204**	**204**	1.0 U	1.0 U	**9.50**	**8.87**	0.1 U	0.1 U	0.1 U	**2.5**	**12.3**	**11.7**	**12.5**	**0.535**	**10.2**	**64.9**
LLMW-12D-130826-W	**188**	**188**	1.0 U	1.0 U	**4.31**	**4.15**	0.1 U	0.1 U	**0.3 J**	**35.5**	**16.6**	**0.590 J**	**24.8**	**0.033 J**	**5.55**	**56.6**
DUP-02-130826-W	**182**	**182**	1.0 U	1.0 U	**3.97**	**4.24**	0.1 U	0.1 U	**0.3**	**35.9**	**17.3**	**1.44 J**	**26.2**	**0.077 J**	**5.91**	**61.3**
LLMW-13D-130821-W	**214**	**214**	1.0 U	1.0 U	**6.12**	**5.96**	0.1 U	0.1 U	**0.6 J**	**1.5**	**18.8**	**4.84**	**13.8**	**0.263**	**7.83**	**72.3**
DUP-03-130821-W	**214**	**214**	1.0 U	1.0 U	**6.00**	**6.12**	0.1 U	0.1 U	**0.4 J**	**1.6**	**19.2**	**4.87**	**14**	**0.284**	**7.97**	**73.2**
LLMW-16D-130826-W	**387**	**387**	1.0 U	1.0 U	**13.0**	**13.1**	0.1 U	0.1 U	**2.0**	0.1 U	**8.38**	**1.57**	**19.4**	**0.137**	**15.8**	**224**
LLMW-25D-130905-W	**97.7**	**97.7**	1.0 U	1.0 U	1.50 U	1.50 U	**1.0**	0.1 U	0.1 U	**52.6**	**18.7**	**0.36**	**16.6**	**0.066**	**3.36**	**18.9**
LLMW-27D-130830-W	**121**	**121**	1.0 U	1.0 U	1.50 U	1.50 U	**2.1**	0.1 U	0.1 U	**31.7**	**24.1**	**0.18**	**20.4**	**0.085**	**3.77**	**15.8**
DUP-05-130830-W	**121**	**121**	1.0 U	1.0 U	1.50 U	1.50 U	**2.1**	0.1 U	0.1 U	**31.8**	**23.9**	**0.19**	**20.2**	**0.083**	**3.72**	**15.6**
LLMW-35D-130830-W	**128**	**128**	1.0 U	1.0 U	**1.99**	**2.04**	**0.4 J**	0.1 UJ	0.1 UJ	**35.8**	**28.9**	0.05 U	**20.3**	**0.328**	**3.62**	**12.5**
LLMW-36D-130906-W	**112**	**112**	1.0 U	1.0 U	**5.61**	**5.67**	0.1 U	0.1 U	0.1 U	**39.4**	**19.5**	**0.06**	**19.8**	**0.157**	**1.59**	**14.8**

Notes:

[1] All samples were filtered through 0.45 um filters with the exception of samples analyzed for total organic carbon (TOC).

Alkalinity = Total alkalinity

Bicarbonate and carbonate as $CaCO_3$

TOC = Total Organic Carbon

DOC = Dissolved Organic Carbon

Nitrate and nitrite as nitrogen

Phosphorous is orthophosphorous as phosphorous

Sulfate is as sulfur

J = The result is an estimate

Bold font indicates the analyte was detected in the sample

DUP = duplicate of the parent sample above

U = The analyte was not detected at the indicated reporting limit

Path: \\sea\projects\0\0504068\GIS\MXDs\050406800_T800_GW_Arsenic_Shallow_S2.mxd Map Revised: 30 October 2013 cgonzales

Legend

Lowland Area

Investigation Locations

- Shallow Aquifer Monitoring Well
- Shallow and Deep Aquifer Monitoring Well Pair
- Surface Water and Sediment Sample Location

LLMW-10S → Monitoring Well Designation
30.1 → Dissolved Arsenic Concentration in ug/L

<5 ug/L
5.1 - 100 ug/L
100.1 - 1,000 ug/L
1,000.1 - 10,000 ug/L
>10,000 ug/L

DRY = Well was dry and therefore no sample could be obtained

N
W E
S

700 0 700
Feet

Dissolved Arsenic Concentrations in Shallow Aquifer Groundwater and Surface Water August/September 2013

Everett Smelter - Lowland Area

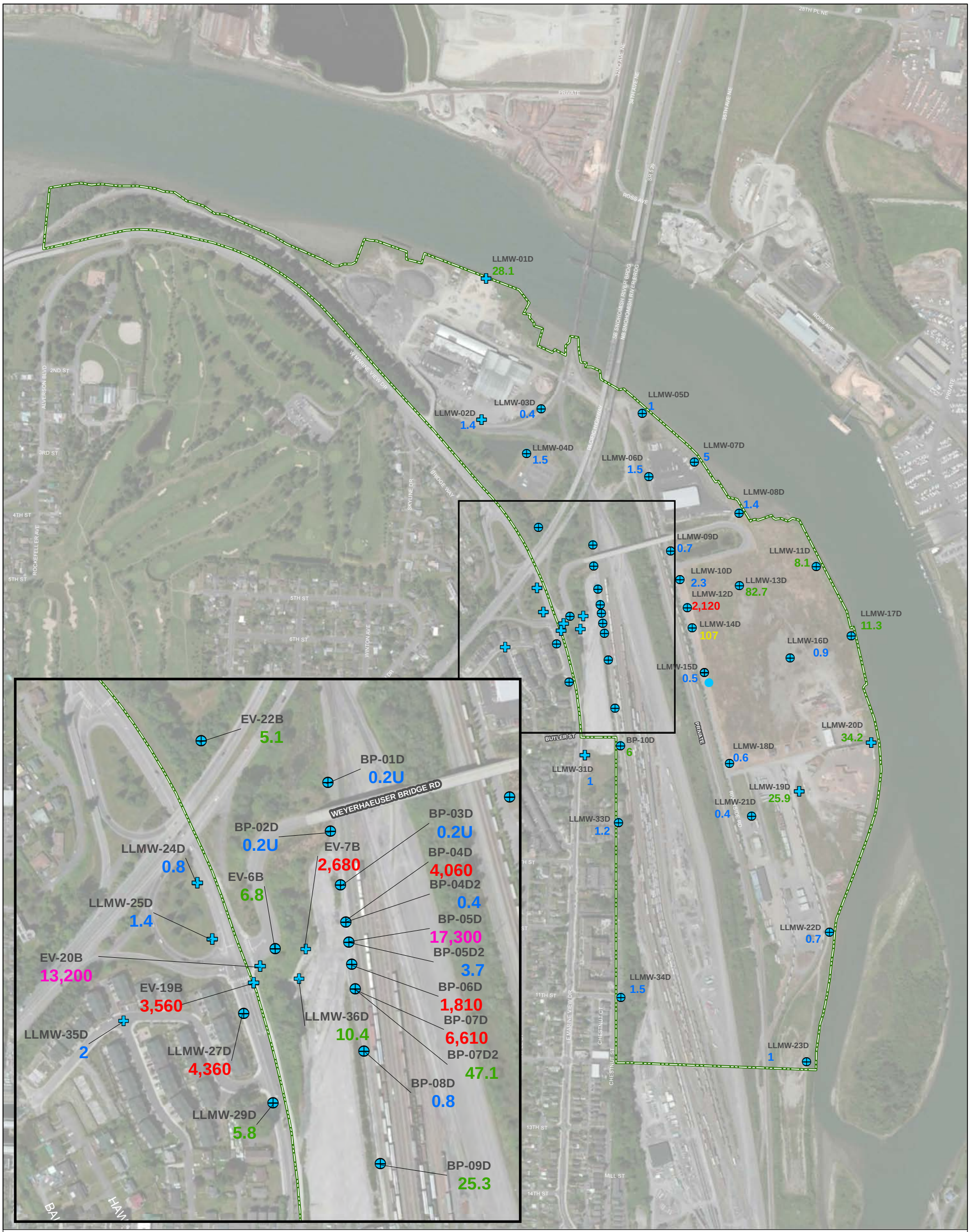
GeoEngineers

Figure 1

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerial Image from Microsoft, 2010. Snohomish County GIS, 2012.

Path: \\sea\projects\0\0504068\GIS\MXDs\050406800_T800_GW_Arsenic_Deep_S2.mxd Map Revised: 30 October 2013 cgonzales



Legend

Lowland Area

Investigation Locations

Shallow and Deep Aquifer Monitoring Well Pair

Deep Aquifer Monitoring Well

LLMW-10D → Monitoring Well Designation
2.3 → Dissolved Arsenic Concentration in ug/L

<5 ug/L
5.1 - 100 ug/L
100.1 - 1,000 ug/L
1,000.1 - 10,000 ug/L
>10,000 ug/L

U = The analyte was not detected at the indicated reporting limit

N
W E
S

700 0 700
Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerial Image from Microsoft, 2010. Snohomish County GIS, 2012.

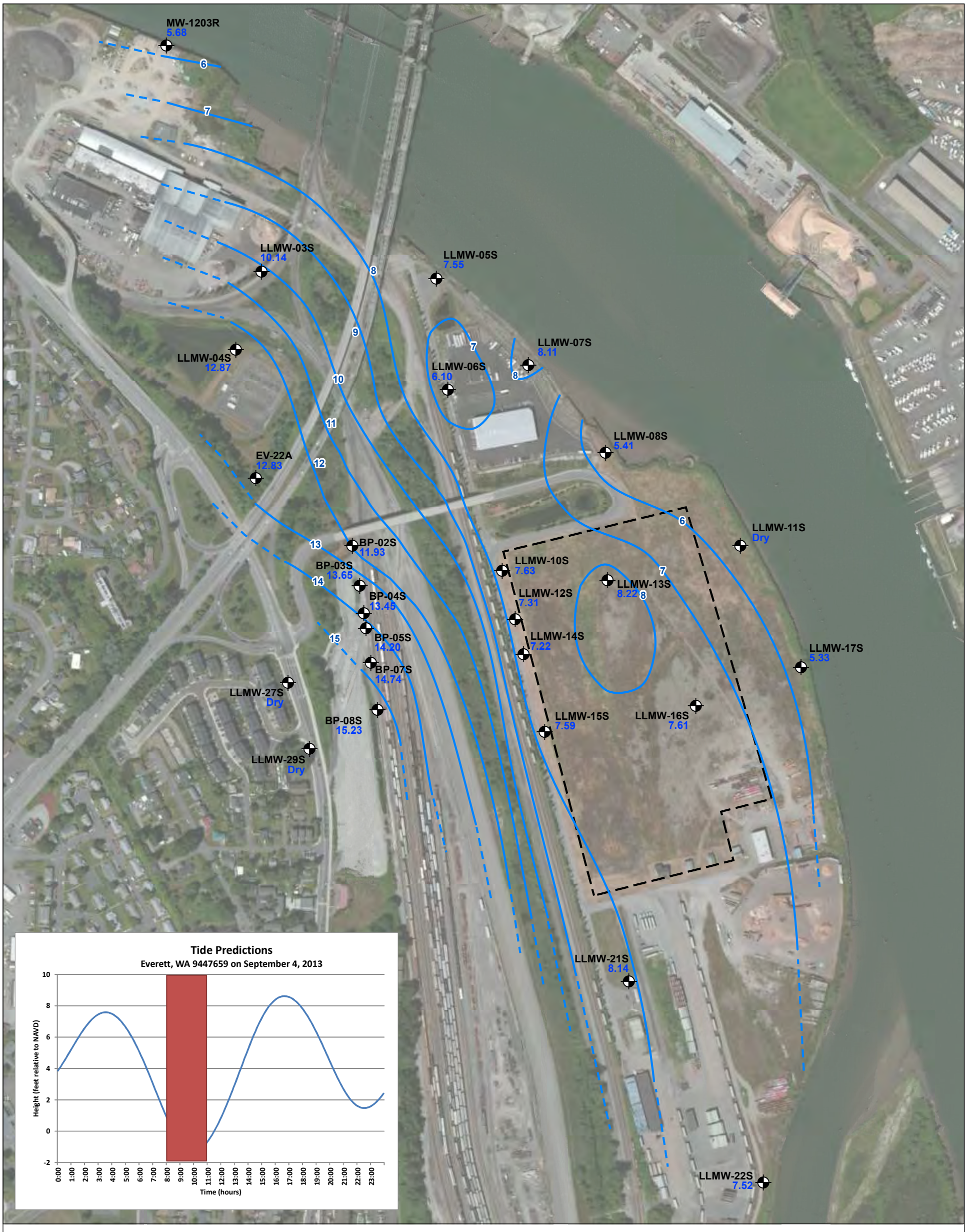
Dissolved Arsenic Concentrations in Deep Aquifer Groundwater August/September 2013

Everett Smelter - Lowland Area

GeoEngineers

Figure 2

Path: \\sea\projects\0\0504068\GIS\MXDs\050406800_T800_GWElev_Shallow_Sept2013.mxd Map Revised: 28 October 2013 cgonzales



LLMW-10S 8.06 Monitoring well designation and groundwater elevation (NAVD88) on September 4, 2013.

Extent of Recent Filling (2011 to present)

Lowland Area

Estimated Groundwater Elevation Contour, ft (dashed where inferred)

N W E S

400 0 400

Feet

1. The locations of all features shown are approximate.
2. Inset tidal prediction chart generated using National Oceanic and Atmospheric Administration (NOAA) tidal prediction data for September 4, 2013. http://tidesandcurrents.noaa.gov/
3. Red overlay box on tidal prediction chart represents the time period for groundwater measurements on September 4, 2013.
4. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerial Image from Microsoft, 2010. Snohomish County GIS, 2012.

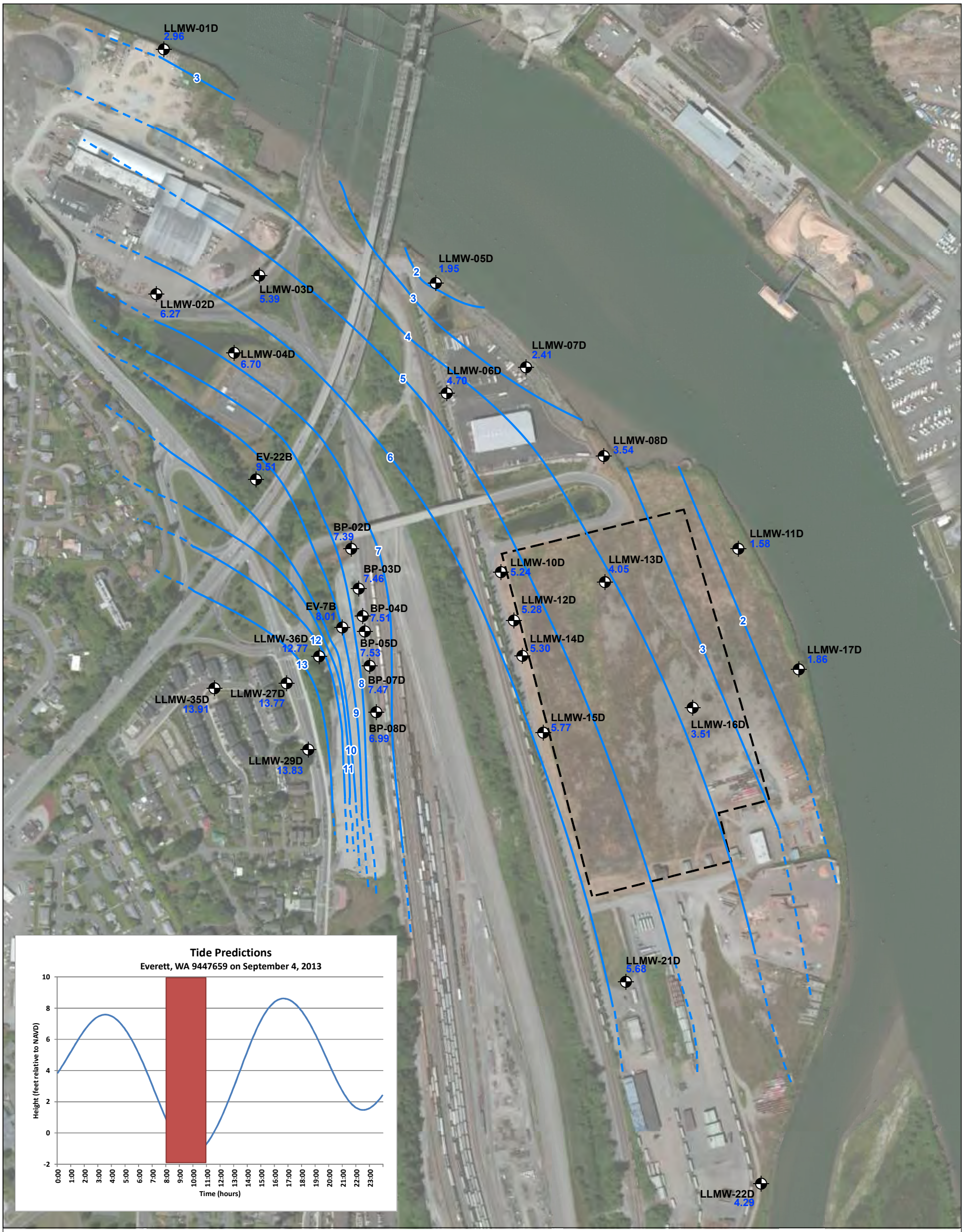
Groundwater Elevations
September 2013 – Shallow Aquifer

Everett Smelter - Lowland Area

GeoEngineers

Figure 3

Path: \\sea\projects\0\0504068\GIS\MXDs\050406800_T800_GWElev_Deep_Sept2013.mxd Map Revised: 28 October 2013 cgonzales



LLMW-10D 5.24 — Monitoring well designation and groundwater elevation (NAVD88) on September 4, 2013.

Extent of Recent Filling (2011 to present)

Lowland Area

Estimated Groundwater Elevation Contour, ft (dashed where inferred)

400 0 400

Feet

Notes:
1. The locations of all features shown are approximate.
2. Inset tidal prediction chart generated using National Oceanic and Atmospheric Administration (NOAA) tidal prediction data for September 4, 2013. http://tidesandcurrents.noaa.gov/
3. Red overlay box on tidal prediction chart represents the time period for groundwater measurements on September 4, 2013.
4. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerial Image from ESRI 2013. Snohomish County GIS, 2012.

Groundwater Elevations September 2013 – Deep Aquifer

Everett Smelter - Lowland Area

GeoEngineers

Figure 4

APPENDIX A
Laboratory Data Results

APPENDIX B
Data Quality Assessment

DATA VALIDATION REPORT

TOTAL/DISSOLVED METALS IN WATER BY METHODS EPA200.8/SW7470A
DISSOLVED ARSENIC SPECIATION BY METHOD EPA6800
CHORIDE, N-NITRATE, N-NITRITE, ORTHO-PHOSPHOROUS, AND SULFATE BY EPA300.0
ALKALINITY, CARBONATE, BICARBONATE, AND HYDROXIDE BY SM2320
TOTAL ORGANIC CARBON BY SM5310B
DISSOLVED ORGANIC CARBON BY SM5310B

Primary Laboratory SDG	Samples Validated (Bold indicates the sample was qualified)
XB72	BP-03S-130820-W, BP-03D-130820-W, BP-04S-130820-W, BP-04D-130820-W, BP-05S-130819-W, BP-05D-130819-W, DUP-01-130819-W, BP-06D-130820-W, LLMW-11D-130820-W, LLMW-17S-130820-W, LLMW-17D-130820-W
	Samples submitted to secondary laboratory for speciation analysis: BP-04S-130820-W, BP-04D-130820-W, BP-05S-130819-W, BP-05D-130819-W, DUP-01-130819-W, LLMW-11D-130820-W
XC05	BP-01S-130821-W, BP-01D-130821-W, BP-02S-130822-W, BP-02D-130821-W, BP-06S-130820-W, BP-07S-130820-W, BP-07D-130821-W, LLMW-01D-130821-W, LLMW-09D-130822-W, LLMW-13S-130821-W, **LLMW-13D-130821-W**, **DUP-03-130821-W**, LLMW-23S-130822-W, LLMW-23D-130822-W, MW-1203R-130821-W
	Samples submitted to secondary laboratory for speciation analysis: BP-01S-130821-W, BP-01D-130821-W, BP-07S-130820-W, BP-07D-130821-W, LLMW-13S-130821-W, LLMW-13D-130821-W, DUP-03-130821-W
XC47	LLMW-02D-130827-W, LLMW-03S-130827-W , LLMW-03D-130827-W, LLMW-06S-130826-W, LLMW-06D-130826-W, **LLMW-12S-130826-W**, **LLMW-12D-130826-W**, **DUP-02-130826-W**, LLMW-16D-130826-W, LLMW-34S-130826-W, LLMW-34D-130826-W, MW-1501R-130827-W, MW-1701-130827-W, UNK-130827-W
	Samples submitted to secondary laboratory for speciation analysis: LLMW-06S-130826-W, LLMW-06D-130826-W, LLMW-12S-130826-W, LLMW-12D-130826-W, DUP-02-130826-W, LLMW-16D-130826-W
XC15	LLMW-09S-130822-W, LLMW-10S-130823-W, LLMW-10D-130823-W, **LLMW-16S-130823-W**, LLMW-19D-130823-W, LLMW-22S-130823-W, LLMW-22D-130823-W
	Samples submitted to secondary laboratory for speciation analysis: LLMW-16S-130823-W
XD14/XD27	BP-08S-130828-W, BP-08D-130828-W, BP-09S-130828-W, BP-09D-130828-W, BP-10S-130828-W, BP-10D-130828-W, EV6A-130828-W, **EV6B-130827-W**, EV-22A-130829-W, EV-22B-130829-W, LLMW-04S-130829-W, LLMW-04D-130829-W, LLMW-20D-130828-W, LLMW-27D-130830-W, DUP-05-130830-W, LLMW-29D-130828-W, LLMW-31D-130830-W, **LLMW-35D-130830-W**, PZ-3B-130828-W

	Samples submitted to secondary laboratory for speciation analysis: EV6A-130828-W, EV6B-130827-W, LLMW-27D-130830-W, DUP-05-130830-W, LLMW-35D-130830-W
XD72	BP-05D2-130904-W, **EV-19B-130903-W**, EV-20B-130904-W, LLMW-05S-130905-W, **LLMW-05D-130903-W**, LLMW-07S-130905-W, LLMW-07D-130905-W, LLMW-08D-130905-W, LLMW-18S-130904-W, LLMW-18D-130904-W, LLMW-25D-130905-W, LLMW-33D-130903-W, MW-1202R-130905-W, MW-1301R-130905-W, PZ-1B-130904-W, PZ-2B-130904-W
	Samples submitted to secondary laboratory for speciation analysis: BP-05D2-130904-W , EV-19B-130903-W, EV-20B-130904-W, LLMW-05S-130905-W, LLMW-05D-130903-W, LLMW-08D-130905-W, LLMW-25D-130905-W,
XE10/XE12	BP-04D2-130905-W, BP-07D2-130906-W, LLMW-08S-130906-W, LLMW-24D-130906-W, LLMW-36D-130906-W, LLSW-04-130906-W, LLSW-05-130906-W
	Samples submitted to secondary laboratory for speciation analysis: LLMW-08S-130906-W, LLMW-36D-130906-W, LLSW-04-130906-W, LLSW-05-130906-W
XE34/XE49	EV-7B-130909-W, LLMW-14S-130909-W, LLMW-14D-130909-W, DUP-04-130909-W, LLMW-15S-130909-W, LLMW-15D-130909-W, LLMW-21S-130909-W, LLMW-21D-130909-W
	Samples submitted to secondary laboratory for speciation analysis: EV-7B-130909-W

PROJECT: LOWLAND AREA (00504-068-00)

This report documents the results of an Environmental Protection Agency (EPA) level 2b data validation of analytical data from the analyses of water samples and the associated laboratory and field quality control (QC) samples. The review included the following:

- Chain of Custody
- Holding Times and Sample Preservation
- Instrument Calibration
- ICP Interference Check Sample
- Method and Calibration Blanks
- Laboratory Control Samples
- Matrix Spikes
- Laboratory Duplicates
- Field Duplicates
- Internal Standards/Tunes

OBJECTIVE

The objective of the data validation was to review laboratory analytical procedures and quality control (QC) results to evaluate whether:

- The samples were analyzed using well-defined and acceptable methods that provide detection limits below applicable regulatory criteria;
- The precision and accuracy of the data are well defined and sufficient to provide defensible data; and
- The quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

Ninety-eight (98) groundwater samples, including field duplicates, were analyzed by one or more of the analytical methods listed in the title of this appendix.

DATA PACKAGE COMPLETENESS

Analytical Resources Incorporated (ARI), located in Tukwila, Washington, was contracted as the primary laboratory as part of this data quality assessment. Applied Speciation and Consulting, LLC (APS), located in Bothell, Washington, was used as a secondary laboratory because of the requirement for specialized capabilities regarding arsenic speciation. Both laboratories provided all required deliverables for the assessment according to the National Functional Guidelines. The laboratory followed adequate corrective action processes and all identified anomalies were discussed in the case narratives.

DATA QUALITY ASSESSMENT SUMMARY

The results for each of the QC elements are summarized below. The data assessment was performed using guidance in the USEPA Contract Laboratory Program *National Functional Guidelines for Inorganic Data Review* (USEPA, 2010).

Chain-of-Custody Documentation

Chain-of-custody (COC) forms were provided with the laboratory analytical reports. There were no anomalies noted on the COC forms; proper COC protocols appear to have been followed for this sampling event, with the following exception:

SDG XE10/XE12: The chain-of-custody reported one sample that was not received with the sample cooler. This discrepancy was noted by GeoEngineers and the laboratory was notified that Sample LLMW-35D-130906-W (as written on COC) should be changed to Sample LLMW-36D-130906-W. No other action was taken as the proper sample ID was communicated to the appropriate personnel and no mis-communication occurred in the handling of samples and data.

Holding Times and Sample Preservation

The holding time is defined as the time that elapses between sample collection and sample analysis. The maximum holding time criteria of 6 months (28 days for mercury) is prescribed for the three metals analytical methods to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times of 6 months (28 days for mercury) were met for all analyses. Sample cooler temperatures and sample preservation were appropriately documented and were within all control limits with the exceptions below:

SDG XB72, XC05, XC15, XC47: Eight deliveries were made from the primary to secondary laboratory. The secondary laboratory noted that for the first four deliveries the sample cooler temperatures were outside of the recommended control limits of 4 to 6°C when received at the secondary laboratory. It was determined that the primary laboratory had removed the samples from their refrigerated area and transported the samples to the secondary laboratory with no ice being used as a refrigerant in the transfer process. The transfer times (i.e. the times that the samples were without refrigeration) ranged from approximately 30 minutes to 2 hours for the four deliveries. Upon receipt at the secondary laboratory, the samples were stored in a refrigerator at a temperature of between 4 to 6°C. Professional judgment was used in determining that the relatively short duration of non-refrigeration would not likely have had a severe effect on the results. No qualifiers were applied. Once the problem was discovered, the last four deliveries were made using ice, and the samples arrived at the secondary laboratory within the recommended temperature range.

SDG XD14: The holding time of 48 hours for nitrite, nitrate, and ortho-phosphorous was exceeded in Samples EV6B-130827-W and LLMW-35D-130830-W. Any positive results and reporting limits (for non-detections) for these target analytes were qualified as estimated (J/UJ) in Samples EV6B-130827-W and LLMW-35D-130830-W.

SDG XD72: The holding time of 48 hours for nitrite, nitrate, and ortho-phosphorous was exceeded in Samples EV-19B-130903-W and LLMW-05D-130903-W. Any positive results and reporting limits (for non-detections) for these target analytes were qualified as estimated (J/UJ) in Samples EV-19B-130903-W and LLMW-05D-130903-W.

Instrument Calibration

The laboratory followed the method requirements for satisfactory instrument calibration. Instrument calibration is necessary in order to ensure that the instrument is capable of producing acceptable quantitative data for the metals on the target analyte list in the QAPP. Initial Calibration Verification (ICV) demonstrates that the instrument is capable of acceptable performance at the beginning of the analytical run. The Continuing Calibration Verification (CCV) demonstrates that the initial calibration is still valid by checking the performance of the instrument on any given day that samples are being analyzed.

Each calibration curve was made up of a blank and at least five calibration standards with all measurements being within the working range of the instrument. The calibration curves were fitted using linear regression and each curve had a correlation coefficient of ≥ 0.995.

The ICV/CCV standards were within 90% to 110% of the true value in all cases.

ICP Interference Check Sample

The Interference Check Sample verifies the analytical instrument's ability to overcome isobaric interferences typical of those found in samples. The laboratory analyzed this QC sample at the proper frequency and location of the analytical run. All solution mixtures were within the control limit of 20% of the true value.

Method Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. Method blanks were analyzed with each batch of samples, at a frequency of 1 per 20 samples. For all sample batches, method blanks were analyzed at the required frequency. None of the analytes of interest were detected above the reporting limits in any of the method blanks, with the exception below:

SDG XB72: The laboratory reported positive results for iron and manganese in the method blank digested on 8/22/13. The associated field samples exhibited concentrations that were greater than ten times the amount found in the method blank for both analytes. No qualifiers were applied in either case.

Matrix Spikes

Because the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis. One aliquot of sample is analyzed in the normal manner, and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a percent recovery (%R) is calculated. In the event that a particular element is out of the recovery value control limits in the matrix spiked sample, the laboratory is required to analyze a "post-spiked" sample in order to further isolate any potential quality control issues with the given element.

Matrix spike analyses should be performed once per analytical batch or every 20 field samples, whichever is more frequent. The recovery criteria for matrix spikes are 75% to 125% for all of the elements in this report.

The frequency requirements were met for all analyses, with the following exceptions:

SDG XC05: The laboratory performed a matrix spike on Sample BP-01S-130821-W. The %R values for total iron and total lead were outside the control limits. The parent sample concentrations for both target analytes were greater than 4 times the amount spiked into the sample; therefore no qualification of the data was required.

SDG XC47: The laboratory performed a matrix spike on Sample LLMW-12S-130826-W. The %R value for ortho-phosphorous was outside the control limits. The positive result and reporting limit for this target analyte were qualified as estimated (J) in the samples from this monitoring well vicinity: LLMW-12S-130826-W and LLMW-12D-130826-W.

SDG XC15: The laboratory performed a matrix spike on Sample LLMW-16S-130823-W. The %R values for total arsenic and total iron were outside the control limits on Sample LLMW-16S-130823-W. The parent sample concentrations for both target analytes were greater than 4 times the amount spiked into the sample; therefore no qualification of the data was required.

SDG XD14: The laboratory performed a matrix spike on Sample EV6B-130827-W. The %R value for ortho-phosphorous was outside the control limits. The reporting limit for this target analyte was qualified as estimated in the parent sample: EV6B-130827-W.

SDG XE34/XE49: The laboratory performed a matrix spike on Sample EV-7B-130909-W. The %R values for total and dissolved arsenic were outside the control limits. The parent sample concentrations for both target analytes were greater than 4 times the amount spiked into the sample; therefore no qualification of the data was required.

Laboratory Control Samples (LCS)

A laboratory control sample is essentially a blank sample that is spiked with a known amount of analyte concentration and analyzed. It is to be treated much like a matrix spike, without the possibility for matrix interference. As there is no actual sample matrix in the analysis, the analytical expectations for accuracy and precision are usually more rigorous and qualification would apply to all samples in the batch, instead of the parent sample only.

Laboratory control sample analyses should be performed once per analytical batch or every 20 field samples, whichever is more frequent. The recovery criteria for laboratory control samples are specified in the laboratory documents as are the relative percent difference values. The frequency requirements were met for all analyses, and the %R/RPD values were within the proper control limits.

Laboratory Duplicates

Internal laboratory duplicate analyses are performed to monitor the precision of the analyses. Two separate aliquots of a sample are analyzed as distinct samples in the laboratory, and the RPD between the two results is calculated. Duplicate analyses should be performed once per analytical batch. If one or more of the samples used has a concentration greater than five times the reporting limit for that sample, the absolute difference is used instead of the RPD.

Laboratory duplicates were analyzed at the proper frequency and the specified acceptance criteria were met for all analyses.

Field Duplicates

Field duplicate samples were collected and analyzed along with the reviewed sample batches. The duplicate samples were analyzed for the same parameters as the associated parent samples. As mentioned above for the laboratory duplicates, the RPD is used as the criteria for assessing precision unless one or more of the samples used has a concentration greater than five times the reporting limit for that sample. In that case, the absolute difference is used instead of the RPD.

The RPD control limits for soil samples is 50%. There were five sets of field duplicates shown below for this phase of the sampling event:

- BP-05D-130819-W and DUP-01-130819-W
- LLMW-12D-130826-W and DUP-02-130826-W

  The RPD value for total iron and total manganese were greater than the control limit above. The positive results for these target analytes were qualified as estimated (J) in both samples.
- LLMW-13D-130821-W and DUP-03-130821-W

  The RPD value for ortho-phosphorous was greater than the control limit above. The positive results for this target analyte were qualified as estimated (J) in both samples.
- LLMW-14D-130909-W and DUP-04-130909-W
- LLMW-27D-130830-W and DUP-05-130830-W

Reporting Limits and Miscellaneous

All SDGs: The reporting limits for all of the analyses met the requirements that were prescribed in the QAPP.

Internal Standards/Tunes

The laboratory appropriately added an internal standard into each sample, with the exception of the instrument tune. The intensity of the internal standard response in each sample was monitored and compared to the intensity of the response for that internal standard in the calibration blank. The percent relative intensity (%RI) in the samples were within 60-125% of the response in the calibration blank for the appropriate analytical run.

OVERALL ASSESSMENT

As was determined by this data quality assessment, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the LCS and MS %R values, with the exceptions mentioned above. Precision was acceptable, as demonstrated by the laboratory duplicate and field duplicate RPD values.

Data were qualified as estimated because of holding time outliers, matrix spike %R outliers, and field duplicate RPD outliers.

All other data, as qualified, are acceptable for use.

GeoEngineers

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Memorandum

To:	Sandra Matthews, ECY
From:	Garrett R. Leque, Iain H. Wingard
Date:	January 15, 2014
File:	0504-068-01
Subject:	October/November 2013 Groundwater Sampling

This memorandum presents the groundwater sampling activities that were performed for the Everett Smelter Lowland Area Investigation between October 30 and November 19, 2013. The Lowland Area investigation activities included low-flow groundwater sampling of 91 monitoring wells and two surface water ponds, a tidal study, and disposal of investigation derived waste. The following four wells were dry and were, therefore, not sampled: EV-13, LLMW-11S, LLMW-27S, LLMW-29S and LLMW-33S.

The 91 groundwater and two surface water samples were collected between October 30 and November 19, 2013. Forty one (41) of the monitoring wells that were sampled are "shallow" wells, installed in the shallow aquifer and 50 of the wells are "deep" wells, installed in the deep aquifer. Wells that were located along the shoreline of the Snohomish River (i.e., within 100 feet of the shoreline), as well as LLMW-13S/D and LLMW-16S/D, were sampled on outgoing tides.

Groundwater elevations were measured and recorded prior to sampling each well using an electronic water level indicator. Groundwater purging and sample collection was completed using low-flow/low-turbidity sampling techniques to minimize the suspension of sediment in the groundwater samples. The wells were purged and groundwater samples were obtained from the wells using dedicated polyethylene tubing and either peristaltic or submersible well pumps. A water quality measuring system (YSI Professional Plus Series) with a flow-through cell was used to monitor water quality parameters during purging. The field measurements were documented on field logs. Following completion of well purging, the flow through cell was disconnected, dissolved ferrous iron was measured using Hach color-disk field test kits, and groundwater samples were collected in laboratory-prepared containers. All wells and surface water locations were sampled for total and dissolved metals, with the dissolved samples being filtered in the field through disposable 0.45 µm filters.

Two surface water locations and 31 selected wells were sampled for analysis of dissolved arsenic species and groundwater conventionals. Four samples were collected as duplicates. Conventionals included total organic carbon (TOC), as well as the remaining conventionals which were collected after passing through the 0.45 µm filters: dissolved organic carbon (DOC), calcium, iron, magnesium, manganese, potassium, sodium, alkalinity, nitrate, nitrite, phosphorus and sulfate. Samples collected for arsenic speciation were collected in general accordance with GeoEngineers' document titled "Field Sample Collection Method for Arsenic Speciation in Water."

Samples were logged on the chain-of-custody, placed in a cooler with ice, and delivered to Analytical Resources, Inc., in Tukwila, Washington for analysis.

In addition, groundwater elevations were measured at 25 shallow aquifer and 33 deep aquifer monitoring wells within a 2-hour period on November 5, 2013 to provide a "snap-shot" of groundwater levels/elevations

and gradients in the Lowland Area. Finally, a tidal study was performed between November 5 and November 7, 2013.

Water quality parameters are presented in Table 1. Snapshot groundwater level data on November 5th are presented in Table 2. Metals data (arsenic including arsenic species, antimony, cadmium, lead, mercury and thallium) are shown in Tables 3 and 4. Groundwater "conventionals" data are shown in Table 5. A data quality review was performed on the analytical data resulting from laboratory analysis of water samples. The laboratory analytical reports are provided in Appendix A and the Data Quality Assessment report is provided in Appendix B.

Dissolved arsenic concentrations in shallow and deep groundwater are shown on Figures 1 and 2. Figures showing groundwater elevations and generalized groundwater gradient contours for the shallow and deep aquifers during the November 5th snapshot are shown in Figures 3 and 4. Mean groundwater elevations based on the tidal study are shown in Figures 5 and 6. The tidal study is included in Appendix C.

Field activities were performed in general accordance with the Sampling and Analysis Plan (SAP), Quality Assurance Project Plan (QAPP) and Health and Safety Plan (HASP) created for this project.

We trust this meets your needs at the present time. Please call if you require additional services.

GRL:IHW:tt

Attachments:

Table 1. Water Quality Parameters for Groundwater and Surface Water – October/November 2013
Table 2. Snapshot Groundwater Level Measurements on November 5, 2013
Table 3. Chemical Analytical Data for Shallow Groundwater and Surface Water – October/November 2013
Table 4. Chemical Analytical Data for Deep Groundwater - October/November 2013
Table 5. Conventionals Data for Shallow Groundwater, Surface Water, and Deep Groundwater - October/November 2013
Figure 1. Dissolved Arsenic Concentrations in Shallow Aquifer Groundwater and Surface Water - October/November 2013
Figure 2. Dissolved Arsenic Concentrations in Deep Aquifer Groundwater - October/November 2013
Figure 3. Snapshot Groundwater Elevations November 5, 2013 – Shallow Aquifer
Figure 4. Snapshot Groundwater Elevations November 5, 2013 – Deep Aquifer
Figure 5. Mean Groundwater Elevations November 5-7, 2013 – Shallow Aquifer
Figure 6. Mean Groundwater Elevations November 5-7, 2013 – Deep Aquifer
Appendix A. Laboratory Data Results
Appendix B. Data Quality Assessment
Appendix C. Tidal Study Results

Table 1

Water Quality Parameters for Groundwater and Surface Water - October/November 2013

Everett Lowland
Everett, Washington

Location Identification	pH	Conductivity (mS/m)	Temperature (Celsius)	Dissolved Oxygen (mg/L)	Oxidization Reduction Potential (mV)	Ferrous Iron [1] (mg/L)	Turbidity (NTU)	Salinity (parts per thousand)	TDS (g/l)	Depth to Water [2] (feet)
Shallow Monitoring Wells										
BP-01S	6.67	80	13.8	0.66	-84.3	1.5	14.1	0.5	0.658	5.49
BP-02S	7.25	46.6	14.1	0.52	261.4	1	11.3	0.29	0.382	5.90
BP-03S	7.33	40	13.4	0.53	-108.9	1.5	4.11	0.25	0.334	4.77
BP-04S	7.72	42.3	13.4	0.34	-70.5	0.5	2.59	0.26	0.353	4.72
BP-05S	8.15	41.3	13.8	0.4	-179.1	1.5	3.96	0.26	0.342	4.70
BP-06S	6.63	56	12.5	0.36	-170.1	2	3.86	0.36	0.481	3.76
BP-07S	6.97	145	13.6	0.22	-216.6	1.5	UR	0.95	1.209	3.29
BP-08S	6.68	114	12.4	0.44	-68.7	3	5.32	0.76	0.982	3.28
BP-09S	6.9	69	13	0.29	-96.5	1.5	3.12	0.45	0.585	3.26
BP-10S	6.62	71	12.9	0.32	-58.9	3	4.17	0.45	0.592	3.18
EV-13	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
EV-22A	6.66	119	12	0.47	-58.6	1	4.83	0.8	1.034	15.07
EV-6A	6.38	147	14.4	1.8	145.4	0	4.51	0.45	0.598	46.53
LLMW-03S	6.59	22.8	15.3	0.42	-56.2	1.5	2.03	0.13	0.182	7.21
LLMW-04S	6.85	148	13.4	0.42	-187.6	2.5	1.11	0.97	1.229	7.84
LLMW-05S	6.34	27.4	15.9	0.48	-4.7	1.5	3.62	0.16	0.215	6.36
LLMW-06S	6.54	45.9	15	0.3	-40	3	2.18	0.28	0.368	5.96
LLMW-07S	6.02	2158	13.4	0.41	70.4	1.5	0.61	16.92	17.856	5.73
LLMW-08S	6.53	328	13.3	0.5	-58.8	4	5.06	2.23	2.6	9.94
LLMW-09S	6.33	111	14	0.43	-107	1	4.85	0.71	0.917	5.00
LLMW-10S	6.67	97	13	0.33	-99.4	3	0.9	0.63	0.819	7.62
LLMW-11S	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
LLMW-12S	6.41	46.9	13.5	0.34	-46.1	1.5	0.54	0.29	0.391	7.19
LLMW-13S	6.75	89	14.4	0.25	-79.4	1.5	4.08	0.56	0.728	12.92
LLMW-14S	6.49	31.6	14.2	0.56	-13.7	1	5.36	0.19	0.259	6.67
LLMW-15S	6.69	61	14.5	0.36	-117.3	2.5	4.12	0.38	0.5	7.62
LLMW-16S	6.58	78	14.6	0.45	-49.5	2.5	3.17	0.48	0.63	12.31
LLMW-17S	6.49	41.3	13.8	6.63	63.5	0	0.87	0.26	0.342	12.65
LLMW-18S	6.44	54	12.5	0.48	197.8	2	3.72	0.35	0.455	7.02
LLMW-21S	6.65	36.8	13.8	0.54	14	2	4.15	0.23	0.309	6.90
LLMW-22S	6.17	2075	13.7	0.38	-70	2	1.6	16.22	17.177	4.88
LLMW-23S	6.6	160	14.1	0.81	-74.7	1.5	3.25	1.04	1.313	15.09
LLMW-27S	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
LLMW-29S	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
LLMW-33S	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
LLMW-34S	6.19	25.1	14.6	0.32	42.6	0	3.72	0.15	0.203	9.03
MW1202R	6.35	280	14.6	0.43	-152.1	1	3.27	1.84	2.262	6.08
MW1203R	6.63	71	15.1	0.51	-113.8	1	2.03	UR	0.565	9.84
MW1301R	6.97	47.6	14.7	1.08	-17.2	0	2.16	UR	0.383	7.96
MW1501R	6.4	1409	14.7	0.48	-15.3	1.5	3.62	10.42	11.336	3.46
MW1701	6.75	83	14.9	0.44	-97.1	2	3.73	0.51	0.669	4.37
PZ-1B	6.23	82	13.2	0.34	-143.3	1.5	2.79	0.53	0.689	2.6
PZ-2B	6.14	56	12	0.37	50.7	0	1.86	0.36	0.481	2.84
PZ-3B	6.21	197	11.7	4.45	108.6	0	1.79	1.38	1.716	3.6
UNK	10.45	53	14.3	0.21	-255.4	0	3.98	0.33	0.435	10.55
Deep Monitoring Wells										
BP-01D	6.94	41.3	11.9	0.24	-26.1	0.5	1.44	0.27	0.358	11.19
BP-02D	6.58	41.6	12	0.76	51.6	0	3.65	0.27	0.359	12.59
BP-03D	7.01	28.4	11.7	0.35	-24	0	1.04	0.18	0.248	11.71
BP-04D	6.8	34.5	11.9	0.45	19.8	1	2.65	0.22	0.399	10.84
BP-04D2	7.57	28.7	12.2	0.45	-150.3	0.5	4.65	0.18	0.246	10.82
BP-05D	6.71	32.1	12.2	0.53	77.8	0	4.55	0.2	0.276	11.43
BP-05D2	7.52	33.2	12.6	0.43	-137.6	0.5	4.14	0.21	0.283	7.38
BP-06D	6.27	49.6	12.3	0.32	-95.6	0.5	4.19	0.32	0.425	11.83
BP-07D	6.39	47.5	12.1	0.35	-121.9	0	3.49	0.31	0.409	10.51
BP-07D2	7.38	32.3	12.2	0.32	-161	1	5.05	0.21	0.277	6.91
BP-08D	6.76	121	12	0.4	30.5	0.5	4.86	0.82	1.046	11.87
BP-09D	6.64	70	12.4	0.35	-51.9	2	3.87	0.45	0.598	12.80
BP-10D	6.54	85	12	0.48	-17.3	3	4.36	0.56	0.735	10.38
EV-6B	7.93	71	13.7	0.29	-343.9	0	4.5	0.45	0.592	51.09
EV-7B	6.42	39	11.5	1.04	58.3	0	3.35	0.26	0.341	7.00
EV-19B	6.47	52	13.6	5.19	69.4	0	1.35	0.33	0.436	48.00
EV-20B	6.09	40.6	14.2	6.08	105.5	0	2.51	0.25	0.332	50.70
EV-22B	6.77	308	11.2	0.44	-34	3	4.29	2.24	2.724	19.48
LLMW-01D	6.98	38	12.7	0.3	-113.2	1.5	2.16	0.24	0.324	8.73
LLMW-02D	6.84	85	13.3	0.54	-91.6	1	3.15	0.54	0.708	9.63
LLMW-03D	6.7	49	12.3	0.37	-58.2	0	1.32	0.32	0.421	9.92
LLMW-04D	7.33	100	12.1	0.42	-256.1	0	1.89	0.67	0.865	14.23
LLMW-05D	6.6	58	14.1	0.26	-43.5	1	2.89	0.36	0.481	8.31
LLMW-06D	6.8	34.9	12.4	0.27	-24.1	1.5	3.72	0.22	0.3	5.81
LLMW-07D	6.69	286	13.2	1.65	-23.2	1.5	11.3	1.96	2.398	7.29
LLMW-08D	6.88	475	12.9	0.35	-96.2	2	1.69	3.38	4.011	7.87
LLMW-09D	6.61	76	13	0.31	-91.2	1	4.76	0.49	0.637	5.00
LLMW-10D	6.8	42.9	12	0.23	-80.7	2.5	4.3	0.28	0.371	8.16

Location Identification	pH	Conductivity (mS/m)	Temperature (Celsius)	Dissolved Oxygen (mg/L)	Oxidization Reduction Potential (mV)	Ferrous Iron [1] (mg/L)	Turbidity (NTU)	Salinity (parts per thousand)	TDS (g/l)	Depth to Water [2] (feet)
LLMW-11D	6.75	42.1	13.1	0.61	-15.3	0.5	1.96	0.27	0.355	11.62
LLMW-12D	6.69	63	11.8	0.22	-118.1	1	4.77	0.42	0.546	8.48
LLMW-13D	6.85	40.8	12.1	0.64	-27.2	2	3.21	0.26	0.354	13.13
LLMW14D	6.68	54	12.4	0.24	-31.9	0	2.32	0.35	0.468	7.08
LLMW-15D	6.74	99	12.6	0.32	-312.3	0	2.38	0.65	0.845	8.46
LLMW-16D	6.71	71	12.9	0.33	13.3	1	4.27	0.46	0.598	12.67
LLMW-17D	6.55	51	13	0.32	-65.4	3.5	16.4	UR	0.429	12.32
LLMW-18D	6.88	82	11.8	0.43	-299	0	4.07	0.54	0.708	8.57
LLMW-19D	6.57	66	12.9	0.89	-50.6	2	4.67	0.42	0.559	7.57
LLMW-20D	6.11	204	13.3	0.46	116.6	0	4.92	3.49	4.128	10.22
LLMW-21D	6.84	60	12	0.28	-97.6	0	3.28	0.39	0.514	8.37
LLMW-22D	6.53	293	12.9	0.39	18.6	0.5	4.21	0.02	2.47	5.72
LLMW-23D	6.47	211	12.7	0.37	-14.9	0.5	5.83	1.43	1.788	16.82
LLMW-24D	6.63	23.5	12.3	0.54	74.3	0	1.32	0.15	0.203	44.37
LLMW-25D	6.41	24.2	12.7	3.31	82.5	0	1.26	0.15	0.206	51.79
LLMW-27D	6.44	26.8	13.5	4.57	45.4	0	25.4	0.17	0.223	48.14
LLMW-29D	6.72	40	13.8	2	56.6	0	9.9	0.25	0.332	42.10
LLMW-31D	6.28	660	13.6	0.32	74.7	0	4.89	0.42	0.553	44.83
LLMW-33D	6.46	23.7	12.7	1.42	41.2	0	2.73	0.15	0.201	28.45
LLMW-34D	8.22	24	12.2	0.53	-108	0	4.12	0.15	0.206	33.79
LLMW-35D	7.86	28.9	12.7	0.32	-98.9	0	2.17	0.18	0.246	77.33
LLMW-36D	6.21	34.9	11.2	0.33	76	0	2.01	0.23	0.308	8.51
Surface Water										
LLSW-04	7.3	21.2	8.8	6.88	2	0	17.3	0.15	0.2	NA
LLSW-05	7.26	17.6	8.8	4.59	31.5	0	23.4	0.12	0.166	NA

Notes:

[1] Ferrous iron measurements were performed in the field on the dissolved groundwater fraction (i.e., after filtration through disposable 0.45 um filters).

[2] Depth to water measured in feet below top of casing at time of sampling.

mS/m - Millisiemens per meter

NTU = Nephelometric turbidity units

UR = Under-reading: The value was lower than the lowest point on the instrument calibration curve

TDS = Total dissolved solids

mg/L = Milligrams per liter

g/L = Grams per liter

mV = Millivolts

NR = Not recorded (the parameter was inadvertently not recorded on field form due to field error)

NA = Not applicable

Table 2

Snapshot Groundwater Level Measurements on November 5, 2013

Everett Lowland

Everett, Washington

Location Designation	Time	Northing (Y)[1]	Easting (X)[1]	TOC Elevation[2] (ft)	DTW TOC (ft)	GW Elevation[2] (ft)
Shallow Wells						
BP-02S	15:51	371826.4767	1308735.183	18.85	4.42	14.43
BP-03S	15:56	371659.4186	1308766.223	18.26	3.35	14.91
BP-04S	16:01	371545.1199	1308782.617	18.36	4.1	14.26
BP-05S	16:08	371481.4942	1308791.423	18.56	3.58	14.98
BP-07S	16:21	371337.2871	1308811.404	18.41	3.23	15.18
BP-08S	16:26	371143.3462	1308839.017	18.73	3.32	15.41
EV-22A	15:44	372106.2793	1308333.578	28.59	15.18	13.41
LLMW-03S	15:22	372968.3797	1308356.380	17.45	6.89	10.56
LLMW-04S	15:37	372644.1374	1308250.391	21.91	8.09	13.82
LLMW-05S	16:08	372938.0230	1309084.803	14.05	6.41	7.64
LLMW-06S	16:02	372477.6634	1309132.426	12.49	6.09	6.40
LLMW-07S	16:20	372578.1202	1309467.272	13.82	6.12	7.70
LLMW-08S	16:33	372213.2542	1309788.249	16.21	9.92	6.29
LLMW-10S	15:45	371722.2934	1309357.791	15.91	7.96	7.95
LLMW-11S	16:09	371825.3634	1310349.586	19.76	DRY	--
LLMW-12S	15:39	371520.0860	1309412.663	15.61	7.52	8.09
LLMW-13S	15:53	371682.6131	1309796.930	21.49	13.34	8.15
LLMW-14S	15:29	371373.4769	1309447.067	14.74	6.78	7.96
LLMW-15S	15:24	371051.1506	1309535.419	15.94	7.76	8.18
LLMW-16S	16:18	371159.2967	1310164.452	20.02	12.49	7.53
LLMW-17S	16:25	371320.3207	1310602.283	18.27	12.57	5.70
LLMW-21S	15:17	370010.9467	1309885.453	16.04	7.29	8.75
LLMW-22S	15:05	369173.0090	1310445.634	12.87	4.91	7.96
MW-1203R	15:05	373910.15	1307960.38	15.7	9.79	5.91
Deep Wells						
EV-7B	15:46	371490.8311	1308696.544	14.87	6.55	8.32
EV-22B	15:45	372111.4369	1308337.155	29.02	19.53	9.49
BP-02D	15:53	372886.6753	1307921.185	18.88	11.15	7.73
BP-03D	15:58	371655.4975	1308766.43	18.37	10.69	7.68
BP-04D	16:02	371541.1801	1308782.814	18.33	10.58	7.75
BP-04D2[3]	16:04	371552.1957	1308789.925	18.54	10.01	8.53
BP-05D	16:09	371477.267	1308791.557	18.65	10.87	7.78
BP-05D2[3]	16:11	371472.412	1308791.713	19.26	7.42	11.84
BP-07D	16:23	371332.8036	1308812.098	18.402	10.71	7.69
BP-07D2[3]	16:19	371340.7835	1308814.767	18.58	7.91	10.67
BP-08D	16:29	371139.579	1308839.538	18.59	11.34	7.25
LLMW-01D	15:02	373911.1708	1307952.929	15.74	8.63	7.11
LLMW-02D	15:14	372887.009	1307921.39	15.15	7.97	7.18
LLMW-03D	15:23	372965.5718	1308351.511	17.45	10.14	7.31
LLMW-04D	15:35	372642.8382	1308246.252	21.98	14.42	7.56
LLMW-05D	16:14	372933.914	1309087.930	13.92	5.57	8.35
LLMW-06D	15:59	372472.7325	1309133.872	12.29	4.94	7.35
LLMW-07D	16:23	372580.662	1309464.938	13.81	5.54	8.27
LLMW-08D	16:30	372209.3701	1309788.569	16.26	8.39	7.87
LLMW-10D	15:46	371725.4255	1309359.407	15.97	9.06	6.91
LLMW-11D	16:10	371821.896	1310350.780	19.71	11.68	8.03
LLMW-12D	15:40	371523.015	1309414.262	15.71	8.87	6.84
LLMW-13D	15:54	371682.4624	1309793.149	21.24	14.17	7.07
LLMW-14D	15:30	371375.602	1309449.147	14.80	8.12	6.68
LLMW-15D	15:25	371053.2175	1309536.612	16.07	9.56	6.51
LLMW-16D	16:19	371158.166	1310160.437	20.14	12.86	7.28
LLMW-17D	16:26	371317.6575	1310603.072	18.29	10.41	7.88
LLMW-21D	15:18	370011.1759	1309881.28	16.03	9.83	6.20
LLMW-22D	15:10	369167.8357	1310446.091	12.80	6.12	6.68
LLMW-27D	15:03	371259.2652	1308465.435	61.71	48.23	13.48
LLMW-29D	15:26	370982.4647	1308556.215	55.62	42.12	13.50
LLMW-35D	15:35	371239.0453	1308164.388	90.98	77.42	13.56
LLMW-36D	15:43	371372.9356	1308601.392	21.04	8.41	12.63

Notes:

[1] Northing (Y) and Easting(X) are in Washington State Plane North Coordinate System, 83/91 grid values.

[2] Vertical datum is NAVD88, US survey feet.

[3] "D2" level wells not used in groundwater contouring; not shown on Figures 1 and 2.

DTW TOC = Depth to water below top of PVC well casing.

-- = The well was dry and therefore no groundwater elevation could be calculated

GW = Groundwater

Table 3

Chemical Analytical Data for Shallow Groundwater and Surface Water - October/November 2013

Everett Lowland

Everett, Washington

Location Identification	Analyte	Antimony		Arsenic		Cadmium		Lead		Mercury		Thallium	
	Unit	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
	Total/Dissovled [1]	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
	Sample ID												
Shallow Monitoring Well													
BP-01	BP-01S-131101-W	--	--	**110**	**110**	--	--	**14.1**	**0.2**	--	--	--	--
BP-02	BP-02S-131030-W	--	--	**122**	**114**	--	--	**2.6**	0.1 U	--	--	--	--
BP-03	BP-03S-131031-W	--	--	**42.6**	**42.4**	--	--	**1.2**	**0.1**	--	--	--	--
BP-04	BP-04S-131031-W	--	--	**49.7**	**44.1**	--	--	**14.2**	**1.4**	--	--	--	--
BP-05	BP-05S-131101-W	--	--	**53.7**	**51.5**	--	--	**0.6**	0.1 U	--	--	--	--
BP-06	BP-06S-131113-W	--	--	**61.1**	**54.0**	--	--	**2.6**	0.1 U	--	--	--	--
BP-07	BP-07S-131113-W	--	--	**243**	**227**	--	--	**0.3**	0.1 U	--	--	--	--
BP-08	BP-08S-131114-W	--	--	**105**	**101**	--	--	**2.6**	0.1 U	--	--	--	--
BP-09	BP-09S-131113-W	--	--	**499**	**289**	--	--	**4.9**	0.1 U	--	--	--	--
BP-10	BP-10S-131113-W	--	--	**171**	**160**	--	--	**0.7**	0.1 U	--	--	--	--
EV-22	EV-22A-131111-W	--	--	**6.0 J**	**3.1 J**	--	--	**3.0 J**	0.1 UJ	--	--	--	--
EV-6	EV-6A-131108-W	--	--	**176**	**33.5**	--	--	**396**	**103**	--	--	--	--
LLMW-03	LLMW-03S-131030-W	--	--	**2.0**	**2.0**	--	--	0.1 U	0.1 U	--	--	--	--
LLMW-04	LLMW-04S-131111-W	--	--	**8.0**	**8.2**	--	--	0.1 U	0.1 U	--	--	--	--
LLMW-05	LLMW-05S-131106-W	**0.2**	0.2 U	**210** [2]	**11.7** [2]	**0.8**	0.1 U	**0.6**	0.1 U	0.020 U	0.020 U	0.2 U	0.2 U
LLMW-06	LLMW-06S-131113-W	0.2 U	0.2 U	**4.7**	**4.5**	**0.1**	0.1 U	0.1 U	0.1 U	0.020 U	0.020 U	0.2 U	0.2 U
LLMW-07	LLMW-07S-131107-W	--	--	**13**	**17**	--	--	1 U	1 U	--	--	--	--
LLMW-08	LLMW-08S-131107-W	--	--	**136**	**136**	--	--	**5.4**	0.1 U	--	--	--	--
LLMW-09	LLMW-09S-131112-W	--	--	**14.2**	**14.4**	--	--	**0.1**	0.1 U	--	--	--	--
LLMW-10	LLMW-10S-131119-W	--	--	**8.4**	**7.4**	--	--	**0.1**	0.1 U	--	--	--	--
LLMW-11	Dry	--	--	--	--	--	--	--	--	--	--	--	--
LLMW-12	LLMW-12S-131119-W	--	--	**43.5**	**41.6**	--	--	0.1 U	0.1 U	--	--	--	--
LLMW-13	LLMW-13S-131114-W	--	--	**24.1**	**23.7**	--	--	0.1 U	0.1 U	--	--	--	--
LLMW-14	LLMW-14S-131111-W	--	--	**18.3 J**	**17.1 J**	--	--	**0.4 J**	0.1 UJ	--	--	--	--
LLMW-15S	LLMW-15S-131111-W	--	--	**9.2**	**9.3**	--	--	**0.1**	0.1 U	--	--	--	--
LLMW-16	LLMW-16S-131113-W	--	--	**238**	**216**	--	--	**0.6**	0.1 U	--	--	--	--
LLMW-17	LLMW-17S-131106-W	--	--	**2.6**	**2.5**	--	--	0.1 U	0.1 U	--	--	--	--
LLMW-18	LLMW-18S-131119-W	--	--	**12.2**	**11.9**	--	--	0.1 U	0.1 U	--	--	--	--
LLMW-21	LLMW-21S-131119-W	--	--	**98.6**	**92.7**	--	--	0.1 U	0.1 U	--	--	--	--
LLMW-22	LLMW-22S-131105-W	--	--	**7**	**7**	--	--	1 U	1 U	--	--	--	--
LLMW-23	LLMW-23S-131104-W	--	--	**5.5**	**5.3**	--	--	**0.2**	0.1 UJ	--	--	--	--
LLMW-34	LLMW-34S-131031-W	--	--	**0.7**	**0.7**	--	--	**0.2**	0.1 U	--	--	--	--
MW-1202R	MW-1202R-131105-W	--	--	**1.1**	**1.2**	--	--	0.1 U	0.1 U	--	--	--	--
MW-1203R	MW-1203R-131105-W	--	--	**0.7**	**0.8**	--	--	0.1 U	0.1 U	--	--	--	--
MW-1301R	MW-1301R-131105-W	--	--	**3.6**	**3.8**	--	--	**0.1**	0.1 U	--	--	--	--
MW-1501R	MW-1501R-131106-W	--	--	**5**	**6**	--	--	1 U	1 U	--	--	--	--
MW-1701	MW-1701-131030-W	--	--	**4.9**	**4.2**	--	--	**0.4**	0.1 U	--	--	--	--
PZ-1B	PZ-1B-131114-W	--	--	**129**	**128**	--	--	**0.2**	0.1 U	--	--	--	--
PZ-2B	PZ-2B-131114-W	--	--	**6.0**	**3.0**	--	--	**0.2**	0.1 U	--	--	--	--
PZ-3B	PZ-3B-131119-W	--	--	**7.5**	**7.1**	--	--	**0.7**	0.6	--	--	--	--
UNK	UNK-131031-W	--	--	**163**	**158**	--	--	**11.2**	8.8	--	--	--	--
Surface Water													
LLSW-04		**--**	--	**96.2**	**65.3**	**--**	--	**1.7**	**0.6**	**--**	--	**--**	**--**
LLSW-05		**--**	--	**94.9**	**60.9**	**--**	--	**2.3**	**0.8**	**--**	--	**--**	**--**

Notes:

[1] Dissolved samples were field filtered through disposable 0.45 micrometer filters.

[2] There was a large discrepancy between total and dissolved arsenic in this well during this sampling event. Turbidity was relatively low throughout low-flow purging and sampling (maximum 12.2 NTU; down to 3.62 NTU at time of sampling). The groundwater was generally clear but intermittently rust-colored. It is therefore possible the total result is elevated due to particulate(s). Total and dissolved arsenic results during three previous quarters of sampling were 8 µg/L and 8.4 µg/L; 9.5 µg/L and 8.3 µg/L; and 18.2 µg/L and 17.7 µg/L.

µg/L = Microgram per liter

-- = The well was dry and therefore no sample could be obtained for analysis; metals sampling was reduced to arsenic and lead only at most wells in Q3 and Q4

U = The analyte was not detected at the indicated reporting limit

J = The result is an estimate

Bold text indicates the analyte was detected.

Table 4

Chemical Analytical Data for Deep Groundwater - October/November 2013

Everett Lowland

Everett, Washington

Monitoring Well Identification	Analyte	Antimony		Arsenic		Cadmium		Lead		Mercury		Thallium	
	Unit	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
	Total/Dissovled [1]	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
	Sample ID												
BP-01	BP-01D-131101-W	--	--	**0.3**	**0.4**	--	--	0.1 U	0.1 U	--	--	--	--
BP-02	BP-02D-131030-W	--	--	**0.4**	0.2 U	--	--	**0.2**	0.1 U	--	--	--	--
BP-03	BP-03D-131031-W	--	--	0.2 U	0.2 U	--	--	**0.1**	0.1 U	--	--	--	--
BP-04	BP-04D-131031-W	--	--	**3,650**	**3,880**	--	--	0.2 U	0.1 U	--	--	--	--
BP-04	BP-04D2-131112-W	0.2 U	0.2 U	**0.4**	**0.3**	0.1 U	0.1 U	**0.2**	0.1 U	0.020 U	0.020 U	0.2 U	0.2 U
BP-05	BP-05D-131101-W	--	--	**18,900**	**18,600**	--	--	**0.4 J**	0.1 U	--	--	--	--
	DUP-01-131101-W	--	--	**18,500**	**18,500**	--	--	**0.2 J**	0.1 U	--	--	--	--
BP-05	BP-05D2-131112-W	--	--	**3.4**	**3.5**	--	--	**0.3**	0.1 U	--	--	--	--
BP-06	BP-06D-131113-W	--	--	**1,740**	**1,750**	--	--	**0.4**	0.1 U	--	--	--	--
BP-07	BP-07D-131113-W	--	--	**5,670**	**5,620**	--	--	**0.2**	0.1 U	--	--	--	--
BP-07	BP-07D2-131113-W	0.2 U	0.2 U	**33.2**	**32.9**	0.1 U	0.1 U	**0.3**	0.1 U	0.020 U	0.020 U	0.2 U	0.2 U
BP-08	BP-08D-131114-W	--	--	**0.6**	**0.7**	--	--	**0.1**	0.1 U	--	--	--	--
BP-09	BP-09D-131113-W	--	--	**24.0**	**24.2**	--	--	**0.2**	0.1 U	--	--	--	--
BP-10	BP-10D-131113-W	--	--	**5.7**	**5.8**	--	--	**0.2**	0.1 U	--	--	--	--
EV-19	EV-19B-131115-W	--	--	**3,090**	**3,080**	--	--	**8.8**	**0.1**	--	--	--	--
EV-20	EV-20B-131115-W	--	--	**13,000**	**12,800**	--	--	**0.1**	0.1 U	--	--	--	--
EV-22	EV-22B-131111-W	--	--	**1.7 J**	**1.7 J**	--	--	**0.9 J**	0.1 UJ	--	--	--	--
EV-6	EV-6B-131108-W	**0.4**	0.2 U	**15.9**	**13.9**	0.1 U	0.1 U	**0.8 J**	0.1 U	0.020 U	0.020 U	0.2 U	0.2 U
EV-7	EV-7B-131114-W	**0.4**	**0.4**	**2,980**	**2,840**	0.1 U	0.1 U	**0.3**	0.1 U	0.020 U	0.020 U	0.2 U	0.2 U
LLMW-01	LLMW-01D-131105-W	--	--	**28.9**	**29.6**	--	--	**0.1**	0.1 U	--	--	--	--
LLMW-02	LLMW-02D-131030-W	--	--	**1.5**	**1.5**	--	--	0.1 U	0.1 U	--	--	--	--
LLMW-03	LLMW-03D-131030-W	--	--	**0.3**	**0.4**	--	--	0.1 U	0.1 U	--	--	--	--
LLMW-04	LLMW-04D-131111-W	--	--	**9.5**	**9.0**	--	--	**0.2**	0.1 U	--	--	--	--
LLMW-05	LLMW-05D-131106-W	0.2 U	0.2 U	**1.1**	**0.9**	**2.1**	0.1 U	**0.2**	0.1 U	0.020 U	0.020 U	0.2 U	0.2 U
LLMW-06	LLMW-06D-131106-W	0.2 U	0.2 U	**1.4**	**1.3**	**1.0**	0.1 U	**0.1**	0.1 U	0.020 U	0.020 U	0.2 U	0.2 U
LLMW-07	LLMW-07D-131107-W	--	--	**7.0**	**4.5**	--	--	**0.2**	0.1 U	--	--	--	--
LLMW-08	LLMW-08D-131107-W	--	--	**1.9**	**1.5**	--	--	0.2 U	0.1 U	--	--	--	--
LLMW-09	LLMW-09D-131112-W	--	--	**1.0**	**0.7**	--	--	**0.3**	0.1 U	--	--	--	--
LLMW-10	LLMW-10D-131119-W	--	--	**2.7**	**2.7**	--	--	**0.3**	0.1 U	--	--	--	--
LLMW-11	LLMW-11D-131030-W	--	--	**8.2**	**8.4**	--	--	**0.1**	**0.1**	--	--	--	--
LLMW-12	LLMW-12D-131119-W	--	--	**1,580**	**1,670**	--	--	**0.1**	0.1 U	--	--	--	--
	DUP-02-131119-W	--	--	**1,610**	**1,590**	--	--	**0.1**	0.1 U	--	--	--	--
LLMW-13	LLMW-13D-131114-W	--	--	**53.7**	**62.9**	--	--	**0.2**	**0.1**	--	--	--	--
	DUP-03-131114-W	--	--	**67.5**	**71.3**	--	--	**0.2**	0.1 U	--	--	--	--
LLMW-14	LLMW-14D-131111-W	--	--	**158 J**	**179 J**	--	--	**1.8 J**	0.1 UJ	--	--	--	--
	DUP-04-131111-W	--	--	**128 J**	**174 J**	--	--	0.1 UJ	0.1 UJ	--	--	--	--
LLMW-15	LLMW-15D-131111-W	--	--	**0.5**	**0.5**	--	--	0.1 U	0.1 U	--	--	--	--
LLMW-16	LLMW-16D-131113-W	--	--	**1.0**	**0.6**	--	--	**0.3**	0.1 U	--	--	--	--
LLMW-17	LLMW-17D-131106-W	--	--	**13.0**	**8.9**	--	--	0.1 U	0.1 U	--	--	--	--
LLMW-18	LLMW-18D-131119-W	--	--	**0.7**	**0.6**	--	--	0.1 U	0.1 U	--	--	--	--
LLMW-19	LLMW-19D-131106-W	--	--	**35.3**	**31.4**	--	--	0.1 U	0.1 U	--	--	--	--
LLMW-20	LLMW-20D-131111-W	--	--	**36**	**14.9**	--	--	**0.6**	**0.4**	--	--	--	--
LLMW-21	LLMW-21D-131119-W	--	--	**0.5**	**0.4**	--	--	0.1 U	0.1 U	--	--	--	--
LLMW-22	LLMW-22D-131105-W	--	--	**0.8**	1 U	--	--	0.1 U	0.1 U	--	--	--	--
LLMW-23	LLMW-23D-131105-W	--	--	**0.8**	**0.7**	--	--	**0.1**	0.1 U	--	--	--	--
LLMW-24	LLMW-24D-131115-W	--	--	**0.7**	**0.7**	--	--	0.1 U	0.1 U	--	--	--	--
LLMW-25	LLMW-25D-131115-W	--	--	**1.6**	**1.5**	--	--	0.1 U	0.1 U	--	--	--	--
LLMW-27	LLMW-27D-131101-W	**0.2**	**0.2**	**4,480**	**4,460**	0.1 U	0.1 U	**0.6**	0.1 U	0.020 U	0.020 U	0.2 U	0.2 U
	DUP-05-131101-W	**0.2**	**0.2**	**4,440**	**4,460**	0.1 U	0.1 U	**0.6**	0.1 U	0.020 U	0.020 U	0.2 U	0.2 U
LLMW-29	LLMW-29D-131105-W	--	--	**5.7**	**5.1**	--	--	**0.2**	0.1 U	--	--	--	--
LLMW-31	LLMW-31D-131106-W	--	--	**1.3**	**1.1**	--	--	**0.1**	0.1 U	--	--	--	--
LLMW-33	LLMW-33D-131101-W	--	--	**1.1**	**1.1**	--	--	**0.1**	0.1 U	--	--	--	--
LLMW-34	LLMW-34D-131031-W	--	--	**4.0**	**1.5**	--	--	**5.9**	0.1 U	--	--	--	--
LLMW-35	LLMW-35D-131108-W	**0.2**	**0.2**	**3.4**	**3.4**	0.1 U	0.1 U	0.1 U	0.1 U	0.020 U	0.020 U	0.2 U	0.2 U
LLMW-36	LLMW-36D-131114-W	**0.3**	**0.3**	**127**	**115**	0.1 U	0.1 U	**4.4**	**2.3**	0.020 U	0.020 U	0.2 U	0.2 U

Notes:

[1] Dissolved samples were field filtered through disposable 0.45 micrometer filters.

µg/L = Microgram per liter

-- = Metals sampling was reduced to arsenic and lead only at most wells in Q3 and Q4

"DUP" = Field duplicate sample

U = The analyte was not detected at the indicated reporting limit

J = The result is an estimate

Bold text indicates the analyte was detected.

Table 5

Conventionals Data for Shallow Groundwater, Surface Water, and Deep Groundwater - October/November 2013

Everett Lowland
Everett, Washington

Analyte		Alkalinity	Bicarbonate	Carbonate	Hydroxide	TOC	DOC	Nitrate	Nitrite	Phosphorus	Sulfate	Chloride	Calcium	Iron	Magnesium	Manganese	Potassium	Sodium
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Total/Dissovled [1]		Dissolved	Dissolved	Dissolved	Dissolved	Total	Dissolved	Dissolved	Dissolved	Dissolved	Dissolved	Dissolved	Dissolved	Dissolved	Dissolved	Dissolved	Dissolved	Dissolved
Location ID	Sample ID																	
Shallow Wells																		
BP-01S	BP-01S-131101-W	**482**	**482**	1.0 U	1.0 U	**17.1**	**17.5**	0.1 U	0.1 U	0.1 U	**0.4**	**12.6**	**108**	**75.2 J**	**26.5**	**2.14**	**7.03**	**19.4**
BP-04S	BP-04S-131031-W	**187**	**187**	1.0 U	1.0 U	**4.88**	**5.01**	0.1 U	0.1 U	0.1 U	**92.5**	**7.3**	**66.6**	**0.69 J**	**10.2**	**1.16**	**5.66**	**30.1**
BP-05S	BP-05S-131101-W	**200**	**200**	1.0 U	1.0 U	**5.73**	**5.87**	0.1 U	0.1 U	0.1 U	**71**	**6.5**	**59**	**2.33 J**	**8.2**	**0.294**	**6.42**	**35.6**
BP-07S	BP-07S-131113-W	**514**	**514**	1.0 U	1.0 U	**15.9**	**16**	**0.2**	0.1 U	0.1 U	**176**	**18.3**	**172**	**3.49 J**	**19.2**	**1.74**	**44.8**	**60.1**
EV-6A	EV-6A-131108-W	**214**	**214**	1.0 U	1.0 U	**8.17**	**4.89**	0.1 U	0.1 U	0.1 U	**113**	**3.9**	**72.9**	**2.62**	**11.6**	**1.63**	**15.9**	**13.7**
LLMW-05S	LLMW-05S-131106-W	**109**	**109**	1.0 U	1.0 U	**2.66**	**2.19**	0.1 U	0.1 U	**0.2**	**41.6**	**7.2**	**27.9**	**81.4**	**8**	**0.242**	**3.75**	**26.8**
LLMW-06S	LLMW-06S-131106-W	**234**	**234**	1.0 U	1.0 U	**3.99**	**4.05**	0.1 U	0.1 U	0.1 U	**48.6**	**4.4**	**48.4**	**6.69**	**13.2**	**0.502**	**14.9**	**39.9**
LLMW-08S	LLMW-08S-131107-W	**466**	**466**	1.0 U	1.0 U	**5.88**	**5.96**	0.1 U	0.1 U	0.1 U	**1.7**	**672**	**85.7**	**13**	**63.4**	**0.804**	**24.2**	**412**
LLMW-12S	LLMW-12S-131119-W	**182**	**182**	1.0 U	1.0 U	**7.07**	**6.91**	**0.3**	0.1 U	0.1 U	**6.1**	**12.2**	**51.4**	**9.94**	**8.1**	**0.36**	**6.88**	**17.4**
LLMW-13S	LLMW-13S-131114-W	**514**	**514**	1.0 U	1.0 U	**11.8**	**11.8**	0.1 U	0.1 U	0.1 U	**1.1**	**34.1**	**117**	**50.7**	**17.2**	**2.94**	**21.4**	**79.2**
LLMW-16S	LLMW-16S-131113-W	**473**	**473**	1.0 U	1.0 U	**8.21**	**8.62**	0.1 UJ	0.1 UJ	0.1 UJ	**14.2**	**19.4**	**78**	**33.2**	**49**	**2.95**	**13.7**	**46.7**
Surface Water																		
LLSW-04	LLSW-04-131119-W	**140**	**140**	1.0 U	1.0 U	**7.15**	**7.17**	**0.2**	0.1 U	0.1 UJ	**30.9**	**9.2**	**40.7**	**2**	**9.9**	**0.272**	**5.68**	**16.7**
LLSW-05	LLSW-05-131119-W	**109**	**109**	1.0 U	1.0 U	**8.36**	**7.7**	**0.1**	0.1 U	0.1 UJ	**18.9**	**3.6**	**42.5**	**1.8**	**3.5**	**0.928**	**4.69**	**6.6**
Deep Wells																		
BP-01D	BP-01D-131101-W	**245**	**245**	1.0 U	1.0 U	**2.51**	**2.68**	0.1 U	0.1 U	0.1 U	**16.3**	**23.3**	**27.6**	**0.33 J**	**29.5**	**0.2**	**6.54**	**40.3**
BP-04D	BP-04D-131031-W	**136**	**136**	1.0 U	1.0 U	**2.07**	**2.26**	0.1 U	0.1 U	**0.4**	**46.8**	**30.6**	**17.6**	**0.61 J**	**25.4**	**0.042**	**4.88**	**33.1**
BP-05D	BP-05D-131101-W	**141**	**141**	1.0 U	1.0 U	**1.64**	**1.7**	**2.3**	0.1 U	**0.5**	**38.6**	**14.6**	**26.2**	**0.23 J**	**29.8**	**0.006**	**3.03**	**15.2**
	DUP-01-131101-W	**145**	**145**	1.0 U	1.0 U	**1.64**	**1.71**	**2.3**	0.1 U	**0.5**	**38.7**	**14.8**	**26.4**	**0.22 J**	**30.1**	**0.006**	**3.05**	**15.6**
BP-05D2	BP-05D2-131112-W	**129**	**129**	1.0 U	1.0 U	1.50 U	1.50 U	**0.3**	0.1 U	0.1 U	**21**	**7.4**	**24.6**	**1.69 J**	**16.7**	**0.097**	**3.03**	**10.2**
BP-07D	BP-07D-131113-W	**170**	**170**	1.0 U	1.0 U	**1.63**	**1.72**	**0.4 J**	0.1 UJ	**0.2 J**	**39.8**	**12**	**31.1**	**0.81**	**27.4**	**0.058**	**3.77**	**19.2**
EV-19B	EV-19B-131115-W	**156**	**156**	1.0 U	1.0 U	**1.74**	**1.61**	**1.2**	0.1 U	**0.1**	**34.2**	**34.8**	**35.9**	**3.26**	**30.5**	**0.054**	**3.95**	**15.9**
EV-20B	EV-20B-131115-W	**102**	**102**	1.0 U	1.0 U	**2.04**	**2.03**	**0.7**	0.1 U	**0.3**	**22.6**	**30.8**	**26.1**	**0.17**	**19.4**	**0.005**	**2.82**	**14.7**
EV-6B	EV-6B-131108-W	**295**	**295**	1.0 U	1.0 U	**3.81**	**4.04**	0.1 U	0.1 U	0.1 U	**41.2**	**20**	**28.1**	**2.15**	**53.6**	**0.086**	**7.14**	**24.6**
EV-7B	EV-7B-131114-W	**94.1**	**94.1**	1.0 U	1.0 U	**1.64**	**1.73**	**1.1**	0.1 U	**0.1**	**67.8**	**14.8**	**30.7**	**0.15**	**18.4**	**0.024**	**3.3**	**12.1**
LLMW-05D	LLMW-05D-131106-W	**223**	**223**	1.0 U	1.0 U	**6.63**	**6.77**	0.1 U	0.1 U	0.1 U	**4.3**	**89.7**	**17.3**	**6.62**	**14**	**0.209**	**10.4**	**114**
LLMW-06D	LLMW-06D-131106-W	**194**	**194**	1.0 U	1.0 U	**3.4**	**3.58**	0.1 U	0.1 U	**0.5**	**2.6**	**32.1**	**10.1**	**2.19**	**23.6**	**0.119**	**11.5**	**51.7**
LLMW-08D	LLMW-08D-131107-W	**395**	**395**	1.0 U	1.0 U	**5.52**	**5.65**	0.1 U	0.1 U	0.1 U	**41.3**	**1260**	**95.2**	**14.7**	**85.6**	**0.321**	**29.8**	**621**
LLMW-11D	LLMW-11D-131030-W	**235**	**235**	1.0 U	1.0 U	**10.6**	**11**	0.1 UJ	0.1 UJ	0.1 UJ	**0.4**	**22.4**	**12.2**	**20.9 J**	**16.1**	**0.353**	**11.6**	**70.5**
LLMW-12D	LLMW-12D-131119-W	**223**	**223**	1.0 U	1.0 U	**6.41**	**6.84**	0.1 U	0.1 U	**0.3**	**27.3**	**38.1**	**18.2**	**1**	**27.4**	**0.023**	**7.19**	**72.8**
	DUP-02-131119-W	**220**	**220**	1.0 U	1.0 U	**6.31**	**6.74**	0.1 U	0.1 U	**0.3**	**26.8**	**38.5**	**17.5**	**0.97**	**26.2**	**0.022**	**6.91**	**69.9**
LLMW-13D	LLMW-13D-131114-W	**227**	**227**	1.0 U	1.0 U	**5.75**	**6.13**	0.1 U	0.1 U	**0.3**	**0.4**	**32.1**	**21.7**	**6.93**	**14.6**	**0.361**	**8.32**	**74.9**
	DUP-03-131114-W	**231**	**231**	1.0 U	1.0 U	**5.9**	**5.93**	**0.1**	0.1 U	**0.3**	**0.4**	**32.3**	**20.9**	**6.39**	**14.7**	**0.338**	**8.22**	**73.7**
LLMW-16D	LLMW-16D-131113-W	**347**	**347**	1.0 U	1.0 U	**12**	**12.4**	**0.2 J**	0.1 UJ	**2.3 J**	0.1 U	**82.1**	**7.1**	**1.49**	**15.8**	**0.099**	**12.9**	**180**
LLMW-25D	LLMW-25D-131115-W	**99.9**	**99.9**	1.0 U	1.0 U	1.50 U	1.50 U	**1.1**	0.1 U	0.1 U	**57.7**	**5.4**	**16.9**	**0.13**	**18**	**0.034**	**3.4**	**20.3**
LLMW-27D	LLMW-27D-131101-W	**118**	**118**	1.0 U	1.0 U	1.50 U	1.50 U	**2.3**	0.1 U	0.1 U	**35**	**9.4**	**24.4**	**3.23 J**	**20.5**	**0.106**	**3.99**	**15.8**
	DUP-05-131101-W	**118**	**118**	1.0 U	1.0 U	1.50 U	1.50 U	**2.3**	0.1 U	0.1 U	**34.7**	**9.3**	**23.9**	**2.76 J**	**20.7**	**0.096**	**3.95**	**15.4**
LLMW-35D	LLMW-35D-131108-W	**144**	**144**	1.0 U	1.0 U	1.50 U	1.50 U	**0.5**	0.1 U	0.1 U	**40.4**	**9.6**	**28.8**	**0.42**	**21**	**0.516**	**3.49**	**11.9**
LLMW-36D	LLMW-36D-131114-W	**131**	**131**	1.0 U	1.0 U	**6.21**	**6.53**	**0.1**	0.1 U	0.1 U	**37.5**	**5.9**	**21.5**	**0.14**	**21.2**	**0.165**	**1.56**	**16.3**

Notes:

[1] All samples were filtered through disposable 0.45 um filters with the exception of samples analyzed for total organic carbon (TOC).

Alkalinity = Total alkalinity

TOC = Total Organic Carbon

DOC = Dissolved Organic Carbon

J = The result is an estimate

U = The analyte was not detected at the indicated reporting limit

DUP = Duplicate of the parent sample above

mg/L = Milligram per liter

Calcium, chloride, iron, lead, magnesium, manganese, potassium, sodium, and sulfate were reported by the laboratory in µg/L. The results in this table are shown in mg/L.

Sulfate is as sulfur

Bicarbonate and carbonate as $CaCO_3$

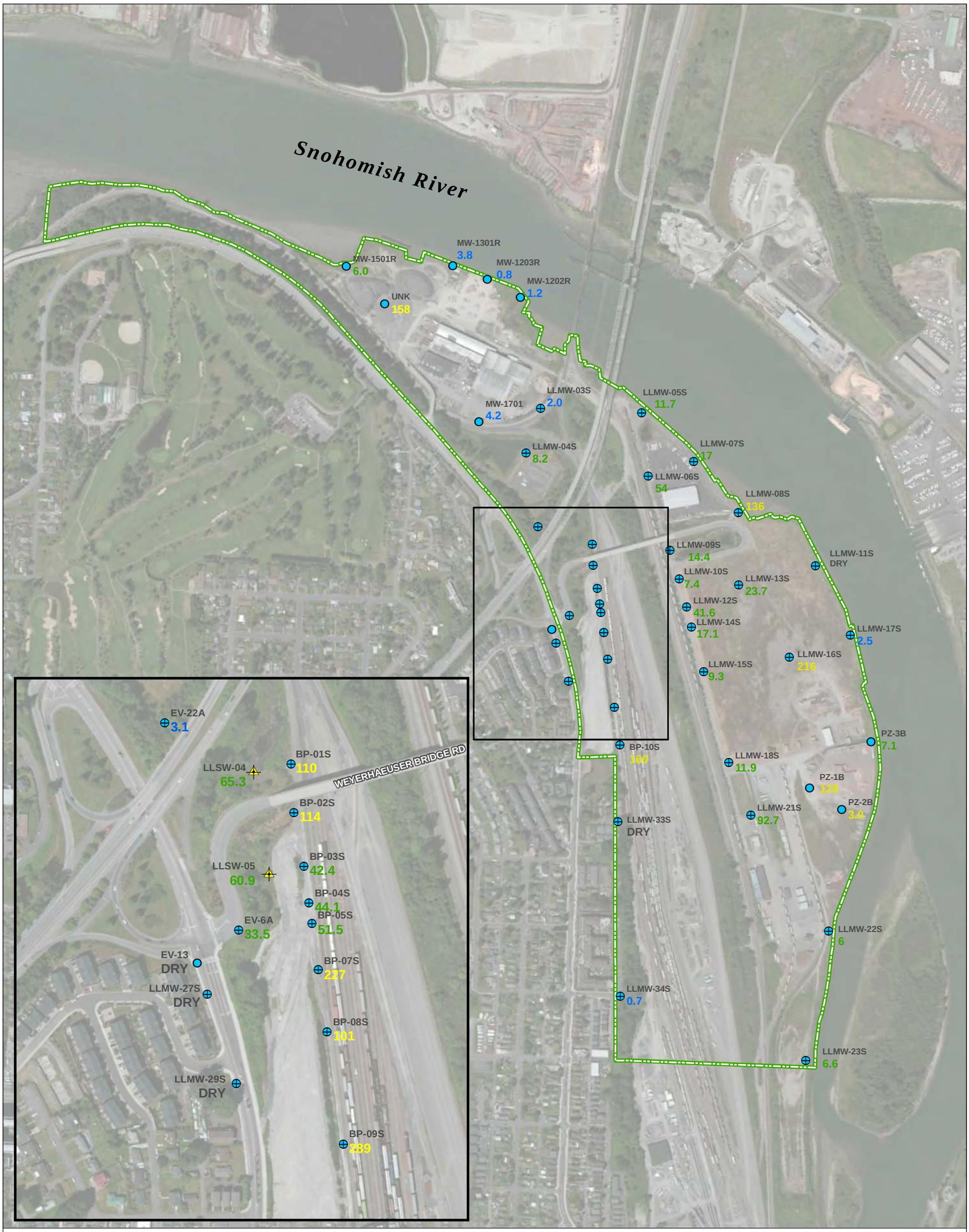
Nitrate and nitrite as nitrogen

Phosphorous is orthophosphorous as phosphorous

Bold font indicates the analyte was detected.

µg/L = Microgram per liter

Path: \\sea\projects\0\0504068\GIS\MXDs\050406800_T800_GW_Arsenic_Shallow_R4.mxd Map Revised: 15 January 2014 cgonzales



Legend

- Lowland Area
- Shallow Aquifer Monitoring Well
- Shallow and Deep Aquifer Monitoring Well Pair
- Surface Water and Sediment Sample Location

LLMW-10S → Monitoring Well Designation
7.4 → Dissolved Arsenic Concentration in ug/L

- <5 ug/L
- 5.1 - 100 ug/L
- 100.1 - 1,000 ug/L
- 1,000.1 - 10,000 ug/L
- >10,000 ug/L

DRY = Well was dry and therefore no sample could be obtained

N W E S

700 0 700
Feet

Dissolved Arsenic Concentrations in Shallow Aquifer Groundwater and Surface Water October/November 2013

Everett Smelter - Lowland Area

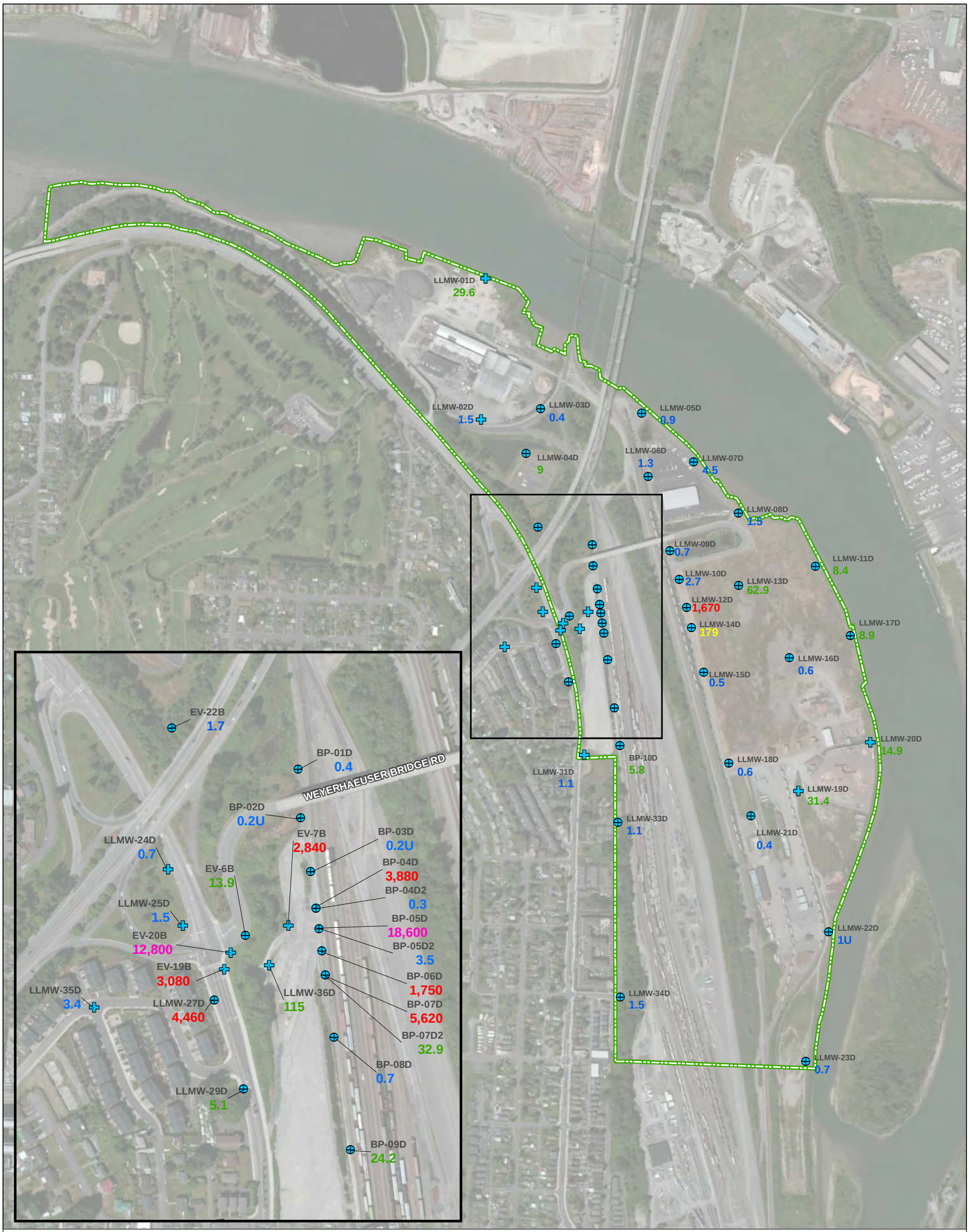
GeoEngineers

Figure 1

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerial Image from Microsoft, 2010. Snohomish County GIS, 2012.

Path: \\sea\projects\0\0504068\GIS\MXDs\050406800_T800_GW_Arsenic_Deep_R4.mxd Map Revised: 15 January 2014 cgonzales



Legend

- Lowland Area
- Deep Aquifer Monitoring Well
- Shallow and Deep Aquifer Monitoring Well Pair

LLMW-10D → Monitoring Well Designation
2.7 → Dissolved Arsenic Concentration in ug/L

- <5 ug/L
- 5.1 - 100 ug/L
- 100.1 - 1,000 ug/L
- 1,000.1 - 10,000 ug/L
- >10,000 ug/L

U = The analyte was not detected at the indicated reporting limit

N W E S

700 0 700
Feet

Dissolved Arsenic Concentrations in Deep Aquifer Groundwater October/November

Everett Smelter - Lowland Area

GeoEngineers

Figure 2

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerial Image from Microsoft, 2010. Snohomish County GIS, 2012.

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ROSS AVE
35TH AVE NE
ROSS AVE
W MARINE VIEW DR
BRIDGE WAY
SKYLINE DR
PACIFIC HIGHWAY
WEYERHAEUSER BRIDGE RD
WHITEHORSE TRL
5TH ST
LEGION DR
WINTON AVE
N BROADWAY
E MARINE VIEW DR
RIVERSIDE RD
7TH ST
BALSAM LN
BUTLER ST
HAWTHORNE ST
LINDEN ST
LOCUST ST
PINE ST
9TH ST
MAPLE ST

LLMW-06D 6.21
LLMW-11D 5.28
LLMW-13D 5.78
LLMW-12D 6.05
EV-7B 7.94
BP-05D 7.32
EV-20B 13.57
LLMW-36D 12.53
LLMW-35D 13.69
BP-08D 6.82

6 7 8 9 10 11 12 13

Legend

Lowland Area

Extent of Recent Filling (2011 to present)

MW12D 6.05 Monitoring well designation and mean groundwater elevation in feet (NAVD 88) from 72-hour tidal study[3]

N W E S

400 0 400
Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document.
3. Results from 72-hour tidal study performed on November 5-7, 2013.
GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: GoogleEarth Pro, 2013. Snohomish County GIS, 2012.

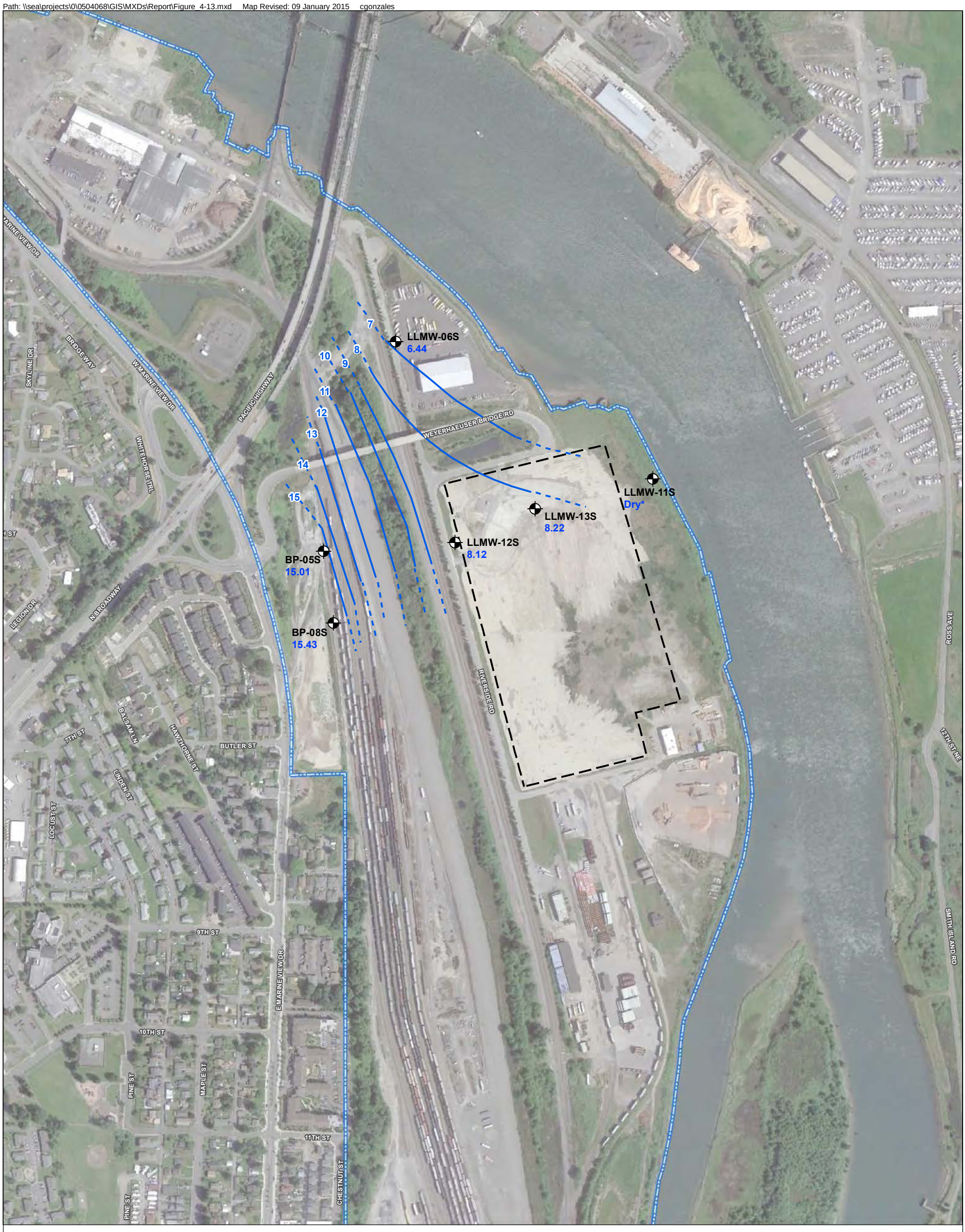
Mean Groundwater Elevations
November 5-7, 2013 – Deep Aquifer

Everett Smelter Site - Lowland Area
Everett, Washington

GeoEngineers

Figure 4-14

Path: \\sea\projects\0\0504068\GIS\MXDs\Report\Figure_4-13.mxd Map Revised: 09 January 2015 cgonzales



Legend

Lowland Area

Extent of Recent Filling (2011 to present)

MW12S 8.12 — Monitoring well designation and mean groundwater elevation in feet (NAVD 88) from 72-hour tidal study[3]

N W E S

400 0 400

Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document.
3. Results from 72-hour tidal study performed on November 5-7, 2013.
* NAVD 88 elevation of bottom of well screen is 10.26 feet.
GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: GoogleEarth Pro, 2013. Snohomish County GIS, 2012.

Mean Groundwater Elevations
November 5-7, 2013 – Shallow Aquifer

Everett Smelter Site - Lowland Area
Everett, Washington

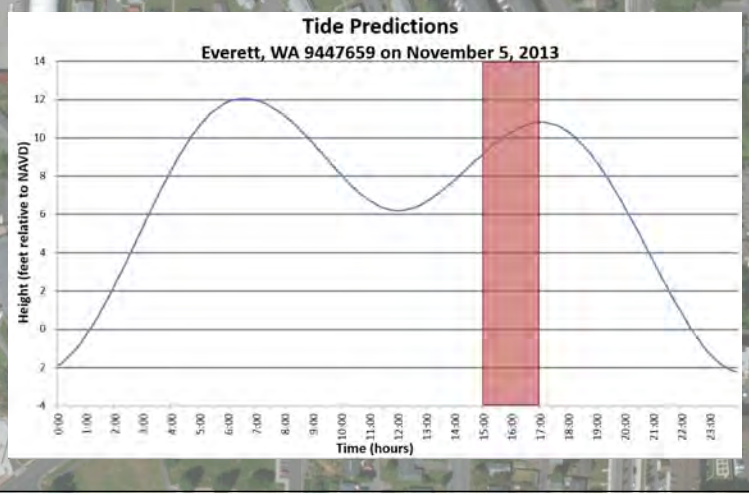
GeoEngineers

Figure 4-13

Path: \\sea\projects\0\0504068\GIS\MXDs\050406800_T800_GWElev_Deep_Nov2013.mxd Map Revised: 09 January 2015 cgonzales

LLMW-01D 7.11
LLMW-02D 7.18
LLMW-03D 7.31
LLMW-04D 7.56
LLMW-05D 8.35
LLMW-06D 7.35
LLMW-07D 8.27
LLMW-08D 7.87
LLMW-10D 6.91
LLMW-11D 8.03
LLMW-12D 6.84
LLMW-13D 7.07
LLMW-14D 6.68
LLMW-15D 6.51
LLMW-16D 7.28
LLMW-17D 7.88
LLMW-21D 6.20
LLMW-22D 6.68
LLMW-27D 13.48
LLMW-29D 13.50
LLMW-35D 13.56
LLMW-36D 12.63
EV-22B 9.49
EV-7B 8.32
BP-02D 7.73
BP-03D 7.68
BP-04D 7.75
BP-05D 7.78
BP-07D 7.69
BP-08D 7.25

8 9 10 11 12 13 7



LLMW-10D 6.91 Monitoring well designation and groundwater elevation (NAVD88) on November 5, 2013.

Extent of Recent Filling (2011 to present)

Lowland Area

Estimated Groundwater Elevation Contour, ft (dashed where inferred)

N W E S

400 0 400

Feet

Notes:
1. The locations of all features shown are approximate.
2. Inset tidal prediction chart generated using National Oceanic and Atmospheric Administration (NOAA) tidal prediction data for November 5, 2013. http://tidesandcurrents.noaa.gov/
3. Red overlay box on tidal prediction chart represents the time period for groundwater measurements on November 5, 2013.
4. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerial Image from ESRI 2013. Snohomish County GIS, 2012.

Snapshot Groundwater Elevations November 5, 2013 – Deep Aquifer

Everett Smelter - Lowland Area

GeoEngineers

Figure 4

Path: \\sea\projects\0\0504068\GIS\MXDs\050406800_T800_GWElev_Shallow_Nov2013.mxd Map Revised: 09 January 2015 cgonzales

LLMW-10S 7.95 Monitoring well designation and groundwater elevation (NAVD88) on November 5, 2013.

Extent of Recent Filling (2011 to present)

Lowland Area

Estimated Groundwater Elevation Contour, ft (dashed where inferred)

1. The locations of all features shown are approximate.
2. Inset tidal prediction chart generated using National Oceanic and Atmospheric Administration (NOAA) tidal prediction data for November 5, 2013. http://tidesandcurrents.noaa.gov/
3. Red overlay box on tidal prediction chart represents the time period for groundwater measurements on November 5, 2013.
4. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerial Image from Microsoft, 2010. Snohomish County GIS, 2012.

N W E S

400 0 400

Feet

Snapshot Groundwater Elevations November 5, 2013 – Shallow Aquifer

Everett Smelter - Lowland Area

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Figure 3

APPENDIX A
Laboratory Data Results

APPENDIX B
Data Quality Assessment

DATA VALIDATION REPORT

TOTAL/DISSOLVED METALS IN WATER BY METHODS EPA200.8, EPA6010C, AND SW7470A
DISSOLVED ARSENIC SPECIATION BY METHOD EPA6800
CHORIDE, N-NITRATE, N-NITRITE, ORTHO-PHOSPHOROUS, AND SULFATE BY EPA300.0
ALKALINITY, CARBONATE, BICARBONATE, AND HYDROXIDE BY SM2320
TOTAL ORGANIC CARBON BY SM5310B
DISSOLVED ORGANIC CARBON BY SM5310B

Primary Laboratory SDG	Samples Validated (Bold indicates the sample was qualified)
XM42/XM44	**BP-01S-131101-W**, **BP-01D-131101-W**, **BP-04S-131031-W**, **BP-04D-131031-W**, **BP-05S-131101-W**, **BP-05D-131101-W**, **DUP-01-131101-W**, **DUP-05-131101-W**, **LLMW-11D-131030-W**, **LLMW-27D-131101-W**
	Samples submitted to subcontracted laboratory for speciation analysis: BP-04S-131031-W, BP-04D-131031-W, BP-05S-131101-W, BP-05D-131101-W, DUP-01-131101-W, DUP-05-131101-W, LLMW-11D-131030-W, LLMW-27D-131101-W
XM45	BP-02S-131030-W, BP-02D-131030-W, BP-03S-131031-W, BP-03D-131031-W, LLMW-02D-131030-W, LLMW-03S-131030-W, LLMW-03D-131030-W, LLMW-33D-131101-W, LLMW-34S-131031-W, LLMW-34D-131031-W, MW-1701-131030-W, UNK-131031-W
XN21/XN26	LLMW-01D-131105-W, LLMW-05S-131106-W, LLMW-05D-131106-W , LLMW-06S-131106-W, LLMW-06D-131106-W, MW-1202R-131105-W, MW-1203R-131105-W, MW-1301R-131105-W, MW-1501R-131106-W
XN27	LLMW-07S-131107-W, LLMW-07D-131107-W, LLMW-08S-131107-W, LLMW-08D-131107-W, LLMW-17S-131106-W, LLMW-17D-131106-W, LLMW-19D-131105-W, LLMW-22S-131105-W, LLMW-22D-131105-W, **LLMW-23S-131104-W**, LLMW-23D-131105-W, LLMW-29D-131105-W, LLMW-31D-131106-W
XN40/XN45	EV-6A-131108-W, **EV-6B-131108-W**, LLMW-35D-131108-W
	Samples submitted to subcontracted laboratory for speciation analysis: EV-6A-131108-W, EV-6B-131108-W, LLMW-35D-131108-W
XN85/XN88	BP-04D2-131112-W, **BP-05D2-131112-W**, BP-06D-131113-W, **BP-07S-131113-W**, BP-07D2-131113-W, LLMW-04S-131111-W, LLMW-04D-131111-W, LLMW-06S-131113-W, LLMW-09S-131112-W, LLMW-09D-131112-W, LLMW-15S-131111-W, LLMW-15D-131111-W, LLMW-20D-131111-W
	Samples submitted to subcontracted laboratory for speciation analysis: BP-07S-131113-W
XN90	BP-09S-131113-W, BP-09D-131113-W, BP-10S-131113-W, BP-10D-131113-W, **DUP-04-131111-W**, **EV-22A-131111-W**, **EV-22B-131111-W**, **LLMW-14S-131111-W**, **LLMW-14D-131111-W**

X032/X034	**BP-07D-131113-W**, BP-08S-131114-W, BP-08D-131114-W, DUP-03-131114-W, EV-7B-131114-W, EV-19B-131115-W, EV-20B-131115-W, LLMW-13S-131114-W, LLMW-13D-131114-W, **LLMW-16S-131113-W**, **LLMW-16D-131113-W**, LLMW-24D-131115-W, LLMW-25D-131115-W, LLMW-36D-131114-W, PZ-1B-131114-W, PZ-2B-131114-W
	Samples submitted to subcontracted laboratory for speciation analysis: BP-07D-131113-W, **DUP-03-131114-**W, EV-7B-131114-W, EV-19B-131115-W, EV-20B-131115-W, LLMW-13S-131114-W, **LLMW-13D-131114-**W, LLMW-36D-131114-W
X098	DUP-02-131119-W, LLMW-10S-131119-W, LLMW-10D-131119-W, LLMW-12S-131119-W, LLMW-12D-131119-W, LLMW-18S-131119-W, LLMW-18D-131119-W, LLMW-21S-131119-W, LLMW-21D-131119-W, **LLSW-04-131119-W**, **LLSW-05-131119-W**, PZ-3B-131119-W
	Samples submitted to subcontracted laboratory for speciation analysis: DUP-02-131119-W, LLMW-12S-131119-W, LLMW-12D-131119-W

PROJECT: LOWLAND AREA (00504-068-00)

This report documents the results of an Environmental Protection Agency (EPA) level 2b data validation of analytical data from the analyses of water samples and the associated laboratory and field quality control (QC) samples. The review included the following:

- Chain of Custody
- Holding Times and Sample Preservation
- Instrument Calibration
- ICP Interference Check Sample
- Method and Calibration Blanks
- Laboratory Control Samples
- Matrix Spikes
- Laboratory Duplicates
- Field Duplicates
- Internal Standards/Tunes

OBJECTIVE

The objective of the data validation was to review laboratory analytical procedures and quality control (QC) results to evaluate whether:

- The samples were analyzed using well-defined and acceptable methods that provide detection limits below applicable regulatory criteria;
- The precision and accuracy of the data are well-defined and sufficient to provide defensible data; and
- The quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

Ninety-seven (97) water samples, including field duplicates, were analyzed by one or more of the analytical methods listed in the title of this appendix.

DATA PACKAGE COMPLETENESS

Analytical Resources Incorporated (ARI), located in Tukwila, Washington, was contracted as the primary laboratory as part of this data quality assessment. Applied Speciation and Consulting, LLC (APS), located in Bothell, Washington, was used as a subcontracted laboratory for arsenic speciation analyses. Both laboratories provided all required deliverables for the assessment according to the National Functional Guidelines. The laboratories followed adequate corrective action processes and all identified anomalies were discussed in the case narratives.

DATA QUALITY ASSESSMENT SUMMARY

The results for each of the QC elements are summarized below. The data assessment was performed using guidance in the USEPA Contract Laboratory Program *National Functional Guidelines for Inorganic Superfund Data Review* (USEPA, 2010).

Chain-of-Custody Documentation

Chain-of-custody (COC) forms were provided with the laboratory analytical reports. There were no anomalies noted on the COC forms; proper COC protocols appear to have been followed for this sampling event.

Holding Times and Sample Preservation

The holding time is defined as the time that elapses between sample collection and sample analysis. The maximum holding time criteria is prescribed to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times were met for all analyses, with the exceptions below:

SDG XM42/XM44: The holding time of 48 hours for nitrite, nitrate, and ortho-phosphorous was exceeded in Sample LLMW-11D-131030-W. The reporting limits for these target analytes were qualified as estimated (UJ) in Sample LLMW-11D-131030-W.

SDG X032/X034: The holding time of 48 hours for nitrite, nitrate, and ortho-phosphorous was exceeded in Samples BP-07D-131113-W, LLMW-16S-131113-W, and LLMW-16D-131113-W. The positive results and reporting limits for these target analytes were qualified as estimated (J/UJ) in these samples.

Sample preservation including cooler temperatures were appropriately documented and were within all control limits, with the exception below:

SDG XN90: The temperature recorded at the laboratory on November 13, 2013 was 8.9°C, which is outside of the recommended control limits of 2° to 6°C. The cooler contained samples that were collected on November 11, 2013 and November 13, 2013. The positive results for all target analytes for all samples collected on November 11, 2013 were qualified as estimated (J), including samples EV-22A-131111-W, EV-22B-131111-W, LLMW-14S-131111-W, LLMW-14D-131111-W, and DUP-04-131111-W. The samples collected on November 13, 2013 were received by the laboratory within 12 hours of the sampling event; therefore no qualifiers were required for these samples.

Instrument Calibration

The laboratory followed the method requirements for satisfactory instrument calibration. Instrument calibration is necessary in order to ensure that the instrument is capable of producing acceptable quantitative data for the metals on the target analyte list in the QAPP. Initial Calibration Verification (ICV) demonstrates that the instrument is capable of acceptable performance at the beginning of the analytical run. The Continuing Calibration Verification (CCV) demonstrates that the initial calibration is still valid by checking the performance of the instrument on any given day that samples are being analyzed.

Each calibration curve was made up of a blank and at least five calibration standards with all measurements being within the working range of the instrument. The calibration curves were fitted using linear regression and each curve had a correlation coefficient of ≥ 0.995.

The ICV/CCV standards were within 90% to 110% of the true value in all cases.

ICP Interference Check Sample

The Interference Check Sample verifies the analytical instrument's ability to overcome isobaric interferences typical of those found in samples. The laboratory analyzed this QC sample at the proper frequency and location of the analytical run.

All solution mixtures were within the control limit of 20% of the true value.

Method Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. Method blanks were analyzed with each batch of samples, at a frequency of 1 per 20 samples.

For all sample batches, method blanks were analyzed at the required frequency. None of the analytes of interest were detected above the reporting limits in any of the method blanks.

Matrix Spikes

Because the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis. One aliquot of sample is analyzed in the normal manner, and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a percent recovery (%R) is calculated. In the event that a particular element is out of the recovery value control limits in the matrix spiked sample, the laboratory is required to analyze a "post-spiked" sample in order to further isolate any potential quality control issues with the given element.

Matrix spike analyses should be performed once per analytical batch or every 20 field samples, whichever is more frequent. The recovery criteria for matrix spikes are 75% to 125% for all of the elements in this report.

The frequency requirements and recovery criteria were met for all analyses, with the exceptions below:

SDG XM42/XM44: The laboratory performed a matrix spike on Sample LLMW-27D-131101-W. The %R values for total and dissolved arsenic were outside the control limits. The parent sample concentrations

for these target analytes were greater than 4 times the amount spiked into the sample; therefore no qualification of the data was required.

SDG XN21/XN26: The laboratory performed a matrix spike on Sample LLMW-05S-131106-W. The %R value for total arsenic was outside the control limits. The parent sample concentration for this target analyte was greater than 4 times the amount spiked into the sample; therefore no qualification of the data was required.

SDG XN27: The laboratory performed a matrix spike on Sample LLMW-23S-131104-W. The %R value for dissolved lead was less than the control limits. The reporting limit for this target analyte was qualified as estimated (UJ) in Sample LLMW-23S-131104-W.

Additionally, the laboratory performed a matrix spike on Sample LLMW-08D-131107-W. The %R value for total sodium was outside the control limits. The parent sample concentration for this target analyte was greater than 4 times the amount spiked into the sample; therefore no qualification of the data was required.

SDG XN85/XN88: The laboratory performed a matrix spike on Sample BP-05D2-131112-W. The %R value for total iron was less than the control limits. The positive results for this target analyte were qualified as estimated (J) in Samples BP-05D2-131112-W and BP-07S-131113-W.

SDG X032/X034: The laboratory performed a matrix spike on Sample EV-7B-131114-W. The %R values for total and dissolved arsenic were outside the control limits. The parent sample concentrations for these target analytes were greater than 4 times the amount spiked into the sample; therefore no qualification of the data was required.

SDG X098: The laboratory performed a matrix spike on Sample LLSW-04-131119-W. The %R value for ortho-phosphorous was less than the control limits. The reporting limits for this target analyte were qualified as estimated (UJ) in Samples LLSW-04-131119-W and LLSW-05-131119-W.

Laboratory Control Samples (LCS)

A laboratory control sample is essentially a blank sample that is spiked with a known amount of analyte concentration and analyzed. It is to be treated much like a matrix spike, without the possibility for matrix interference. As there is no actual sample matrix in the analysis, the analytical expectations for accuracy and precision are usually more rigorous and qualification would apply to all samples in the batch, instead of the parent sample only.

Laboratory control sample analyses should be performed once per analytical batch or every 20 field samples, whichever is more frequent. The recovery criteria for laboratory control samples are specified in the laboratory documents as are the relative percent difference values. The frequency requirements were met for all analyses, and the %R/RPD values were within the proper control limits, with the exception below:

SDG XM42/XM44: The %R value for total iron was greater than the control limits in the LCS extracted on 11/18/2013. The positive results for total iron were qualified as estimated (J) in Samples BP-04S-131031-W, BP-04D-131031-W, LLMW-11D-131030-W, BP-01S-131101-W, BP-01D-131101-W, BP-05S-131101-W, BP-05D-131101-W, DUP-01-131101-W, LLMW-27D-131101-W, and DUP-05-131101-W.

Laboratory Duplicates

Internal laboratory duplicate analyses are performed to monitor the precision of the analyses. Two separate aliquots of a sample are analyzed as distinct samples in the laboratory, and the RPD between the two results is calculated. Duplicate analyses should be performed once per analytical batch. If one or more of the samples used has a concentration greater than five times the reporting limit for that sample, the absolute difference is used instead of the RPD.

Laboratory duplicates were analyzed at the proper frequency and the specified acceptance criteria were met for all analyses, with the exceptions below:

SDG XN40/XN45: A laboratory duplicate analysis was performed on Sample EV-6B-131108-W. The RPD for total lead was greater than the control limits. The positive result for this target analyte was qualified as estimated (J) in Sample EV-6B-131108-W.

SDG XN85/XN88: A laboratory duplicate analysis was performed on Sample BP-05D2-131112-W. The RPD for total iron was greater than the control limits. The positive results for this target analyte were qualified as estimated (J) in Samples BP-05D2-131112-W and BP-07S-131113-W.

Field Duplicates

Field duplicate samples were collected and analyzed along with the reviewed sample batches. The duplicate samples were analyzed for the same parameters as the associated parent samples. As mentioned above for the laboratory duplicates, the RPD is used as the criteria for assessing precision unless one or more of the samples used has a concentration greater than five times the reporting limit for that sample. In that case, the absolute difference is used instead of the RPD.

The RPD control limit for water samples is 35%. There were five sets of field duplicates collected during this sampling event.

SDG XM42/XM44: Two field duplicate sample pairs were submitted with this SDG. The first is BP-05D-131101-W and DUP-01-131101-W and the second is LLMW-27D-131101-W and DUP-05-131101-W. The precision criteria for all target analytes were met for these sample pairs, with the exception below:

For sample pair BP-05D-131101-W and DUP-01-131101-W, the RPD value for total lead was greater than the control limit above. The positive results for this target analyte were qualified as estimated (J) in both samples.

SDG XN90: One field duplicate sample pair, LLMW-14D-131111-W and DUP-04-131111-W, was submitted with this SDG. The precision criteria for all target analytes were met for this sample pair, with the exception below:

The RPD value for total lead was greater than the control limit above. The positive result and reporting limit for this target analyte were qualified as estimated (J/UJ) in these samples.

SDG X032/X034: One field duplicate sample pair, LLMW-13D-131114-W and DUP-03-131114-W, was submitted with this SDG. The precision criteria for all target analytes were met for this sample pair, with the exception below:

The RPD value for arsenate was greater than the control limit above. The positive results for this target analyte were qualified as estimated (J) in both samples.

SDG X098: One field duplicate sample pair, LLMW-12D-131119-W and DUP-02-131119-W, was submitted with this SDG. The precision criteria for all target analytes were met for this sample pair.

Internal Standards/Tunes

The laboratory appropriately added an internal standard into each sample, with the exception of the instrument tune. The instrument tune is used to assess instrument accuracy and precision, prior to calibration; therefore no internal standards are added. The intensity of the internal standard response in each sample was monitored and compared to the intensity of the response for that internal standard in the calibration blank. The percent relative intensity (%RI) in the samples were within 60-125% of the response in the calibration blank for the appropriate analytical run.

OVERALL ASSESSMENT

As was determined by this data quality assessment, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the LCS and MS %R values, with the exceptions mentioned above. Precision was acceptable, as demonstrated by the laboratory duplicate and field duplicate RPD values.

Data were qualified as estimated because of temperature and holding time outliers, MS and LCS %R outliers, and laboratory/field duplicate RPD outliers.

All other data, as qualified, are acceptable for use.

APPENDIX C
Tidal Study Results

APPENDIX C
TIDAL STUDY

METHODS

A tidal study was conducted on a subset of the Lowland Area monitoring wells between November 5 and November 8, 2013. The purpose of the tidal study was to supplement a previous tidal study conducted in February 2013 in order to further evaluate the influence of changes in the level of surface water due to tidal variations in the Snohomish River on shallow and deep groundwater levels. Monitoring well pairs at varying distances from the Snohomish River shoreline were selected for the tidal study to evaluate the lateral and vertical influences of tidal action on groundwater. The November 2013 tidal study included monitoring of groundwater levels in 16 monitoring wells, including the subset of 12 wells evaluated during the February 2013 tidal study (BP-05S/D, BP-08S/D, LLMW-06S/D, LLMW-11S/D, LLMW-12S/D and LLMW-13S/D) and four additional wells (EV-7B, EV-20B, MW-35D, MW-36D). Note that well LLMW-11S was dry.

Groundwater level response to tidal fluctuations was measured using pressure transducers that were programmed to record the hydraulic pressure in the monitoring wells at 1-minute intervals for the duration of the study. Additionally, a pressure transducer was installed in the Snohomish River near monitoring wells LLMW-08S/D to directly monitor and record the surface water level in the Snohomish River for comparison to water levels recorded in monitoring wells in the Lowland Area. The pressure transducers were removed from the monitoring wells after completion of the data collection and the data was later downloaded for analysis.

The 72-hour period selected for analysis was between November 5 at 00:00 (midnight) and November 7 at 11:59. This 72-hour period was selected because it captured the largest tidal range (i.e., an estimated 13-foot change in elevation) of the surface water in the Snohomish River adjacent to the Lowland Area resulting from tidal fluctuations during the study period. The tidal range of 13 feet is considered an estimate because the transducer in the river was dry during the lowest stages of the tide, so although a 10-foot change was recorded, extrapolation of the observed tidal curves yielded an estimate of 13 feet of maximum tidal fluctuation during the 72-hour tidal period.

The data generated as part of the tidal study were analyzed using the Serfes (1987) method to identify the mean groundwater elevations and flow direction for the shallow and deep aquifers and the Ferris (1951) method to identify the hydraulic diffusivity of the deep aquifer, which can be used to estimate hydraulic conductivity.

RESULTS

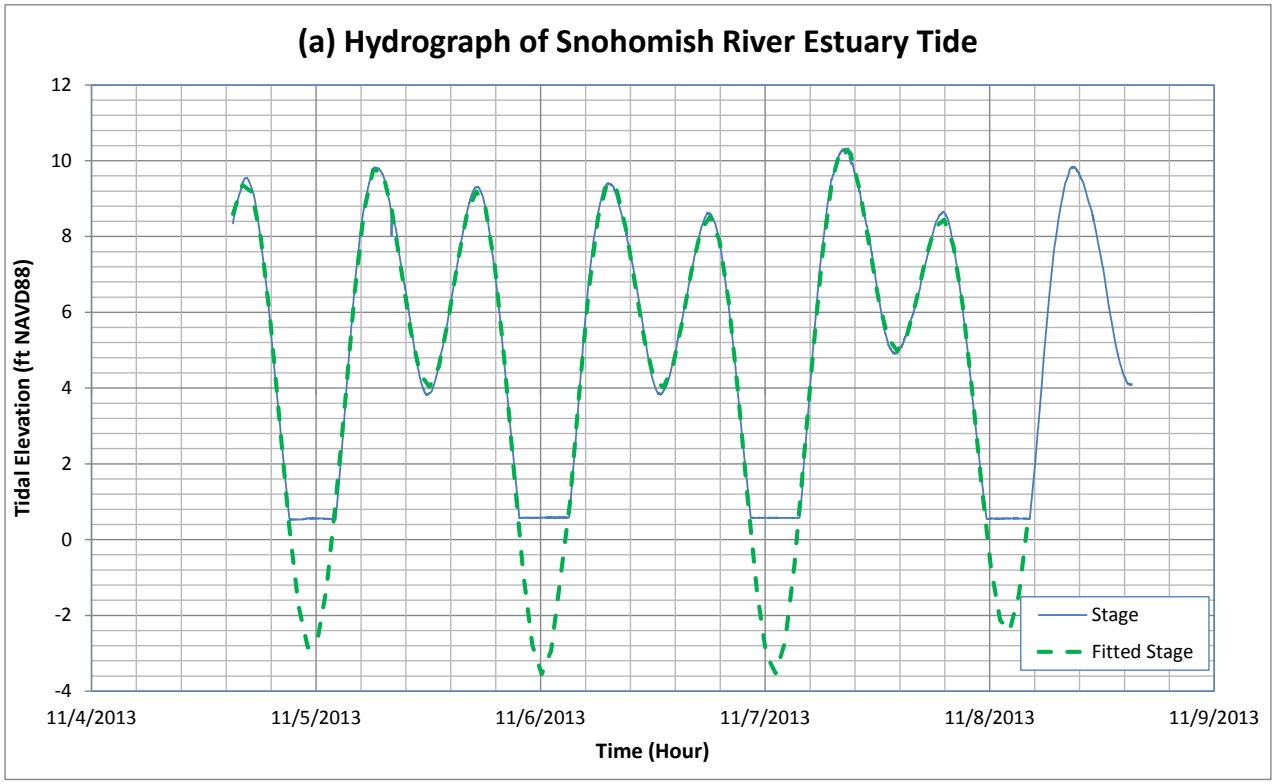
The hydrograph and Serfes analysis for the Snohomish River during the tidal study is shown in Figure C-1, and hydrographs and Serfes analyses of tidal study wells are shown in Figures C-2 through C-17. The Ferris analyses of stage ratio and time lag used to estimate aquifer diffusivity (and therefore hydraulic conductivity) are shown in Figure C-18. The Ferris analyses for each well are shown on Figures C-19 through

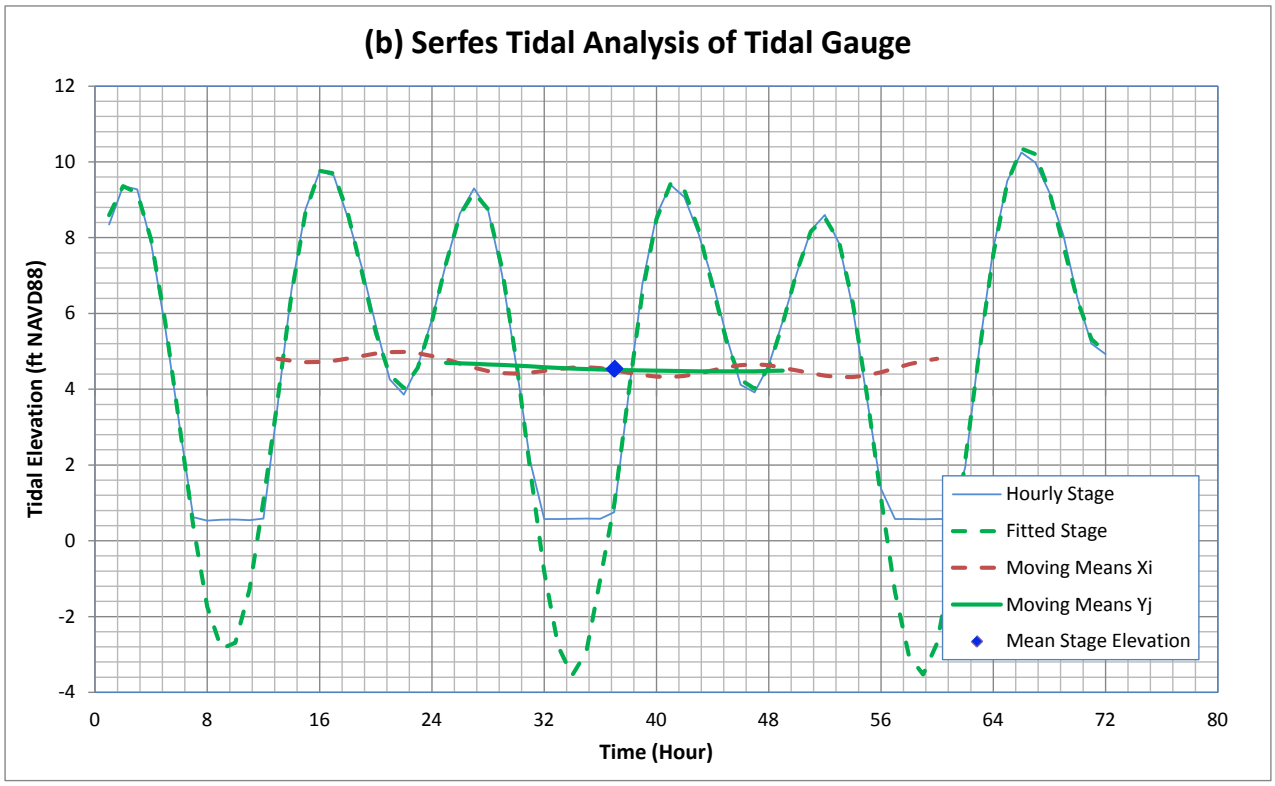
C-33. Figure C-34 presents a graph of water level variations in deep wells at increasing distance from the Snohomish River shoreline.

In general, the results of the November 2013 tidal study confirmed the results of the February 2013 tidal study. The results of the November tidal study include the following:

- Hydraulic conductivity values were estimated from the tidal study data for the deep aquifer using aquifer diffusivity values estimated from both time lag and tidal stage ratio. Based on the observed tidal responses in the deep aquifer, hydraulic conductivity values were between 20 and 38 ft/day, which is similar to the results from the February 2013 tidal study of between 21 and 26 ft/day.
- Wells completed in the deep aquifer show a direct hydraulic response to tidal fluctuations in the Snohomish River. The lower graphs in Figures C-19 through C-26 show the Ferris analyses. The hydraulic response can be observed in deep wells, especially those closest to the shoreline of the Snohomish River.
- There is no appreciable effect on wells completed in the shallow aquifer in response to tidal fluctuations in the Snohomish River. The lower graphs in Figures C-27 through C-33 show the Ferris analyses. There is little to no hydraulic response in shallow wells. Therefore, groundwater in the shallow aquifer appears to be hydraulically distinct from surface water in the Snohomish River as well as groundwater in the deep aquifer.
- A tidal effect was observed in groundwater within the deep aquifer at a distance of approximately 1,700 feet from the shoreline of the Snohomish River, for example in monitoring wells BP-08D and MW-36D, indicating that the deep aquifer behaves as a confined system.
- A reversal of the deep groundwater gradient direction (i.e., when deep groundwater briefly reversed flow direction inland away from the Snohomish River) was observed at the high tides during the tidal study. The tidally-influenced reversal of the groundwater gradient was observed to a distance of approximately 1,000 feet from the shoreline of the Snohomish River at monitoring well LLMW-12D during the highest tide of the study.
- The results of the tidal study confirm that the mean groundwater flow direction for groundwater in the shallow and deep aquifers is to the east-northeast toward the Snohomish River (Figures 5 and 6).

Based on the observed hydraulic responses to tidal fluctuations, the two aquifers appear to be hydraulically distinct, with the deep aquifer in hydraulic continuity with surface water in the Snohomish River.





Notes:

1. Method based on Serfes (1991)
2. X_i: 48 means from moving average of 24 hourly tidal elevation
3. Y_j: 25 means from moving average of 24 means over the 48 X_i
4. Time in hours is from 1507 on 11/4/2013

Reference: Technical Analysis > Tidal Study > Everett R2 Mean GW Elev.xlsx

Serfes Tidal Analysis at Tidal Gauge

Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

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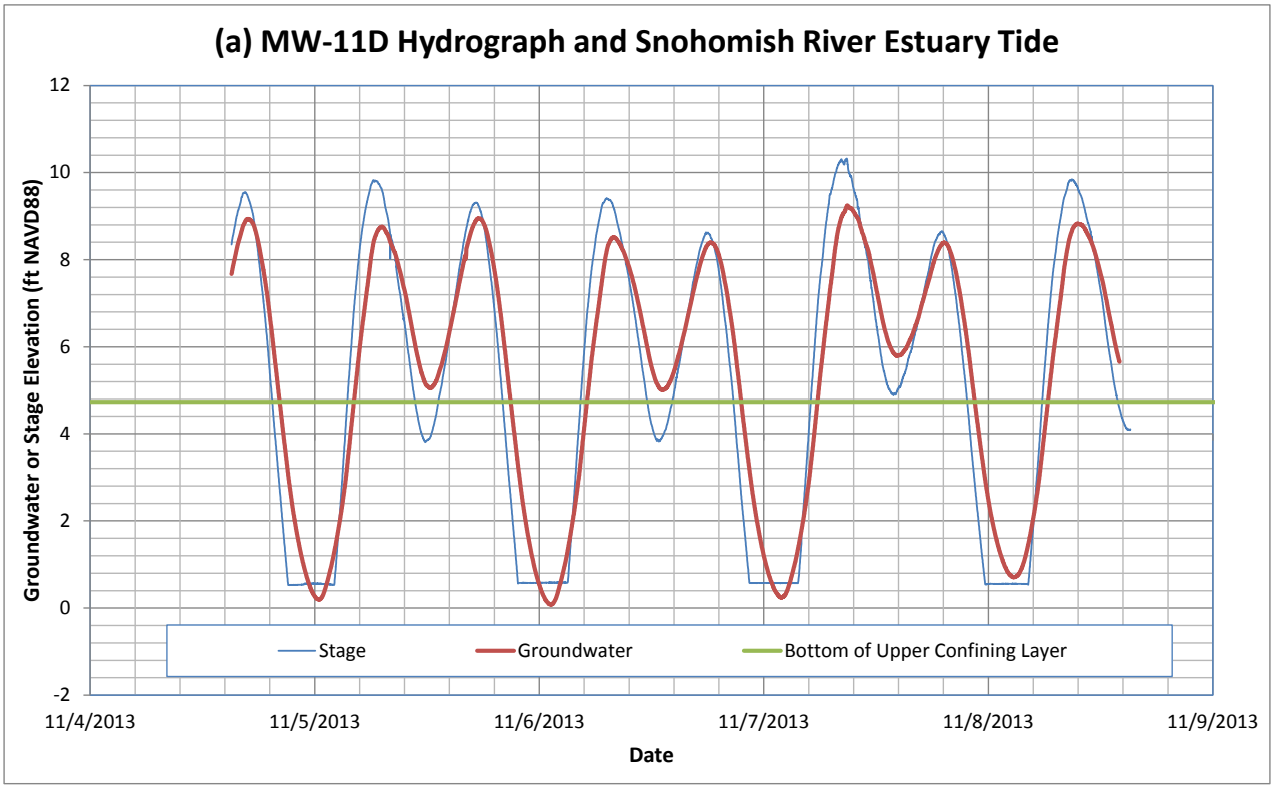
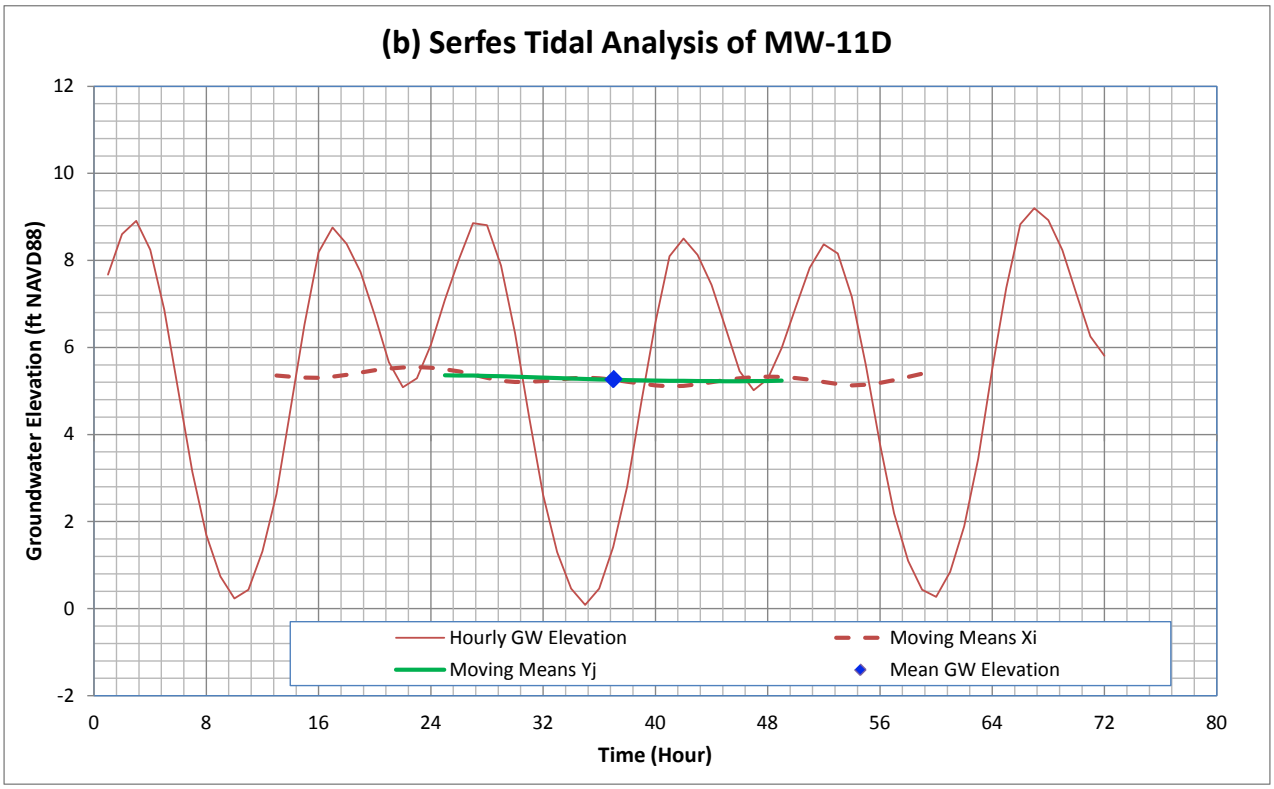
Figure C-1

projects/sites/0035611406/default.aspx mm/dd/yy





Notes:

1. Method based on Serfes (1991)
2. X_i: 48 means from moving average of 24 hourly tidal elevation
3. Y_j: 25 means from moving average of 24 means over the 48 X_i
4. Time in hours is from 1507 on 11/4/2013

Reference: Technical Analysis > Tidal Study > Everett R2 Mean GW Elev.xlsx

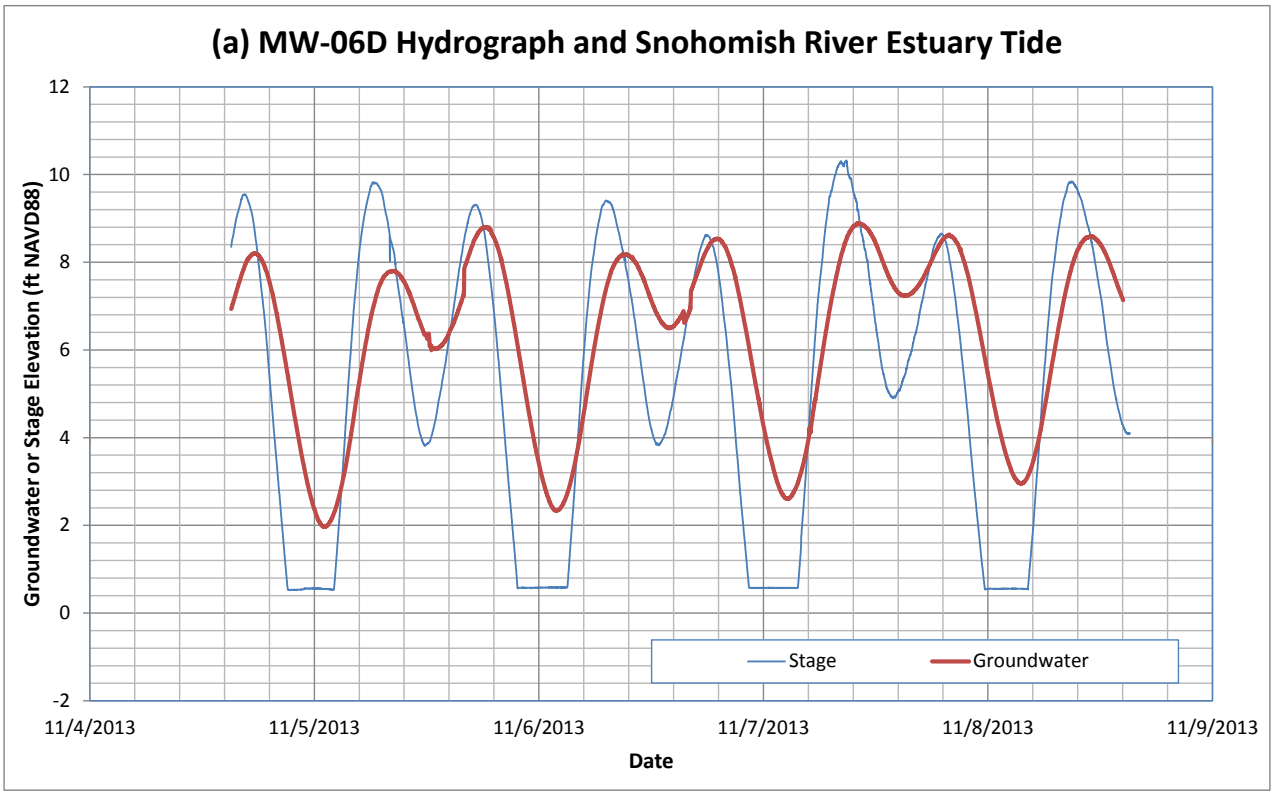
Serfes Tidal Analysis at LLMW-11D

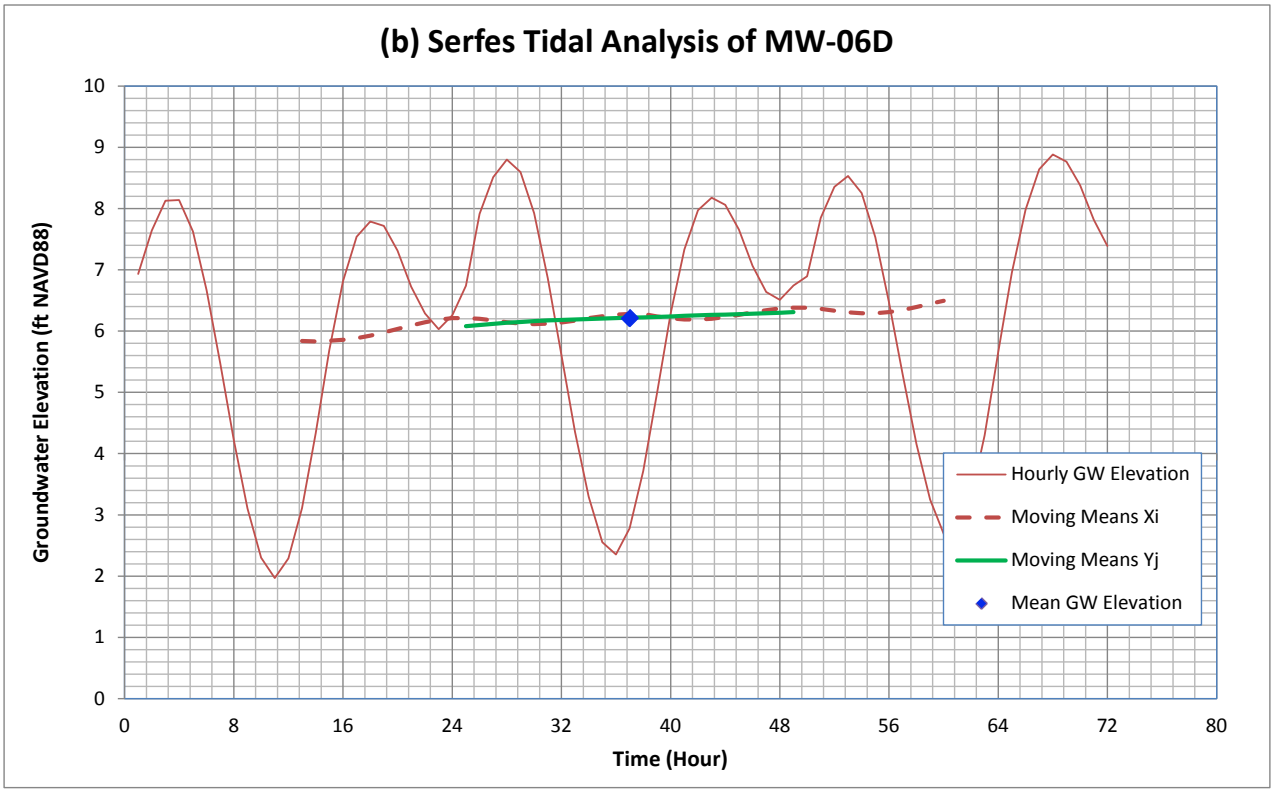
Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

GeoEngineers

Figure C-2

projects/sites/0035611406/default.aspx mm/dd/yy





Notes:

1. Method based on Serfes (1991)
2. X_i: 48 means from moving average of 24 hourly tidal elevation
3. Y_j: 25 means from moving average of 24 means over the 48 X_i
4. Time in hours is from 1507 on 11/4/2013

Reference: Technical Analysis > Tidal Study > Everett R2 Mean GW Elev.xlsx

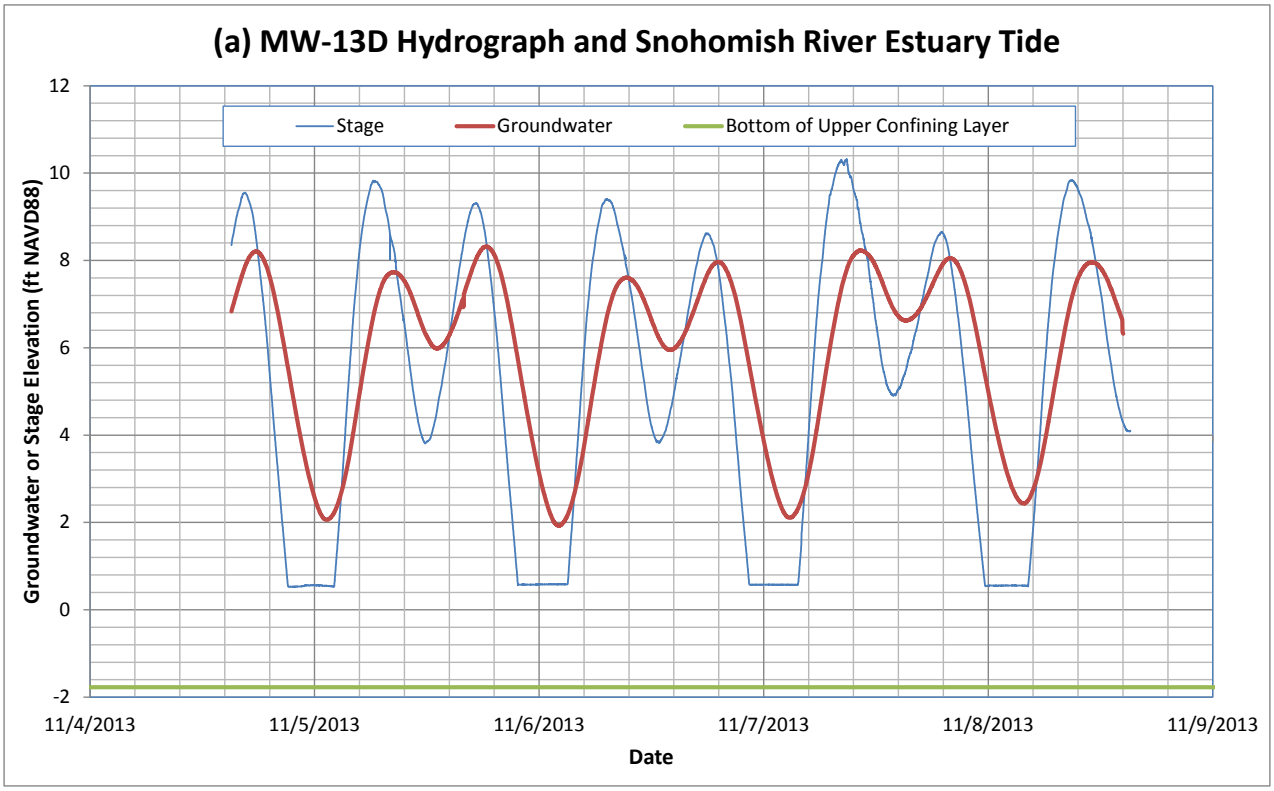
Serfes Tidal Analysis at LLMW-06D

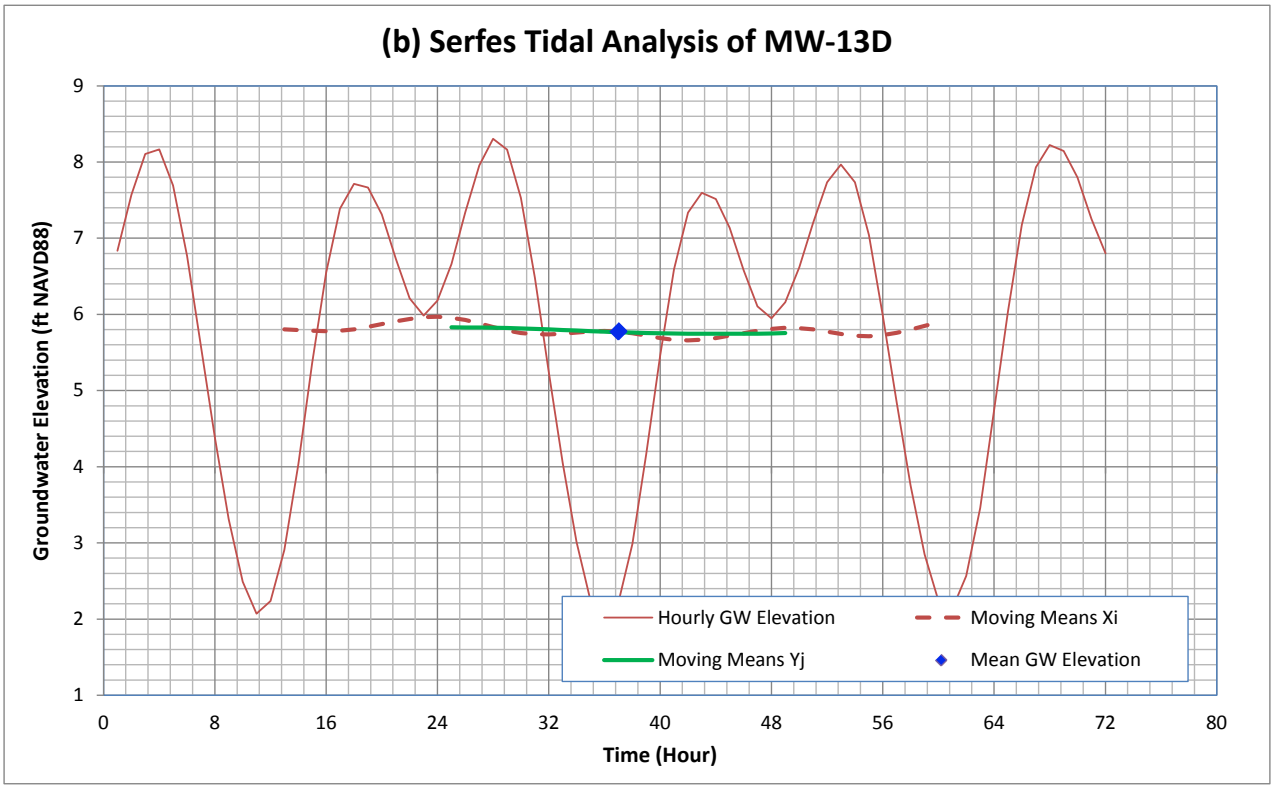
Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

GeoEngineers

Figure C-3

projects/sites/0035611406/default.aspx mm/dd/yy





Notes:

1. Method based on Serfes (1991)
2. X_i: 48 means from moving average of 24 hourly tidal elevation
3. Y_j: 25 means from moving average of 24 means over the 48 X_i
4. Time in hours is from 1507 on 11/4/2013

Reference: Technical Analysis > Tidal Study > Everett R2 Mean GW Elev.xlsx

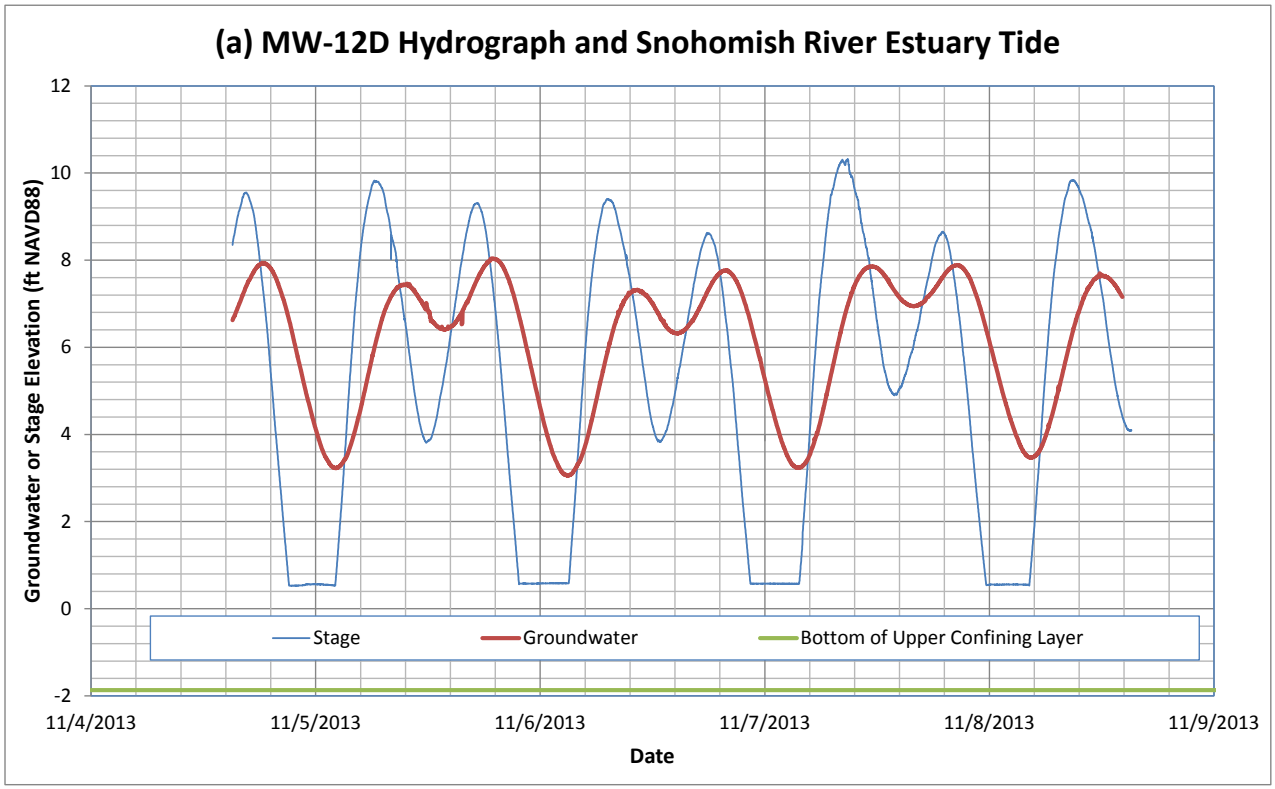
Serfes Tidal Analysis at LLMW-13D

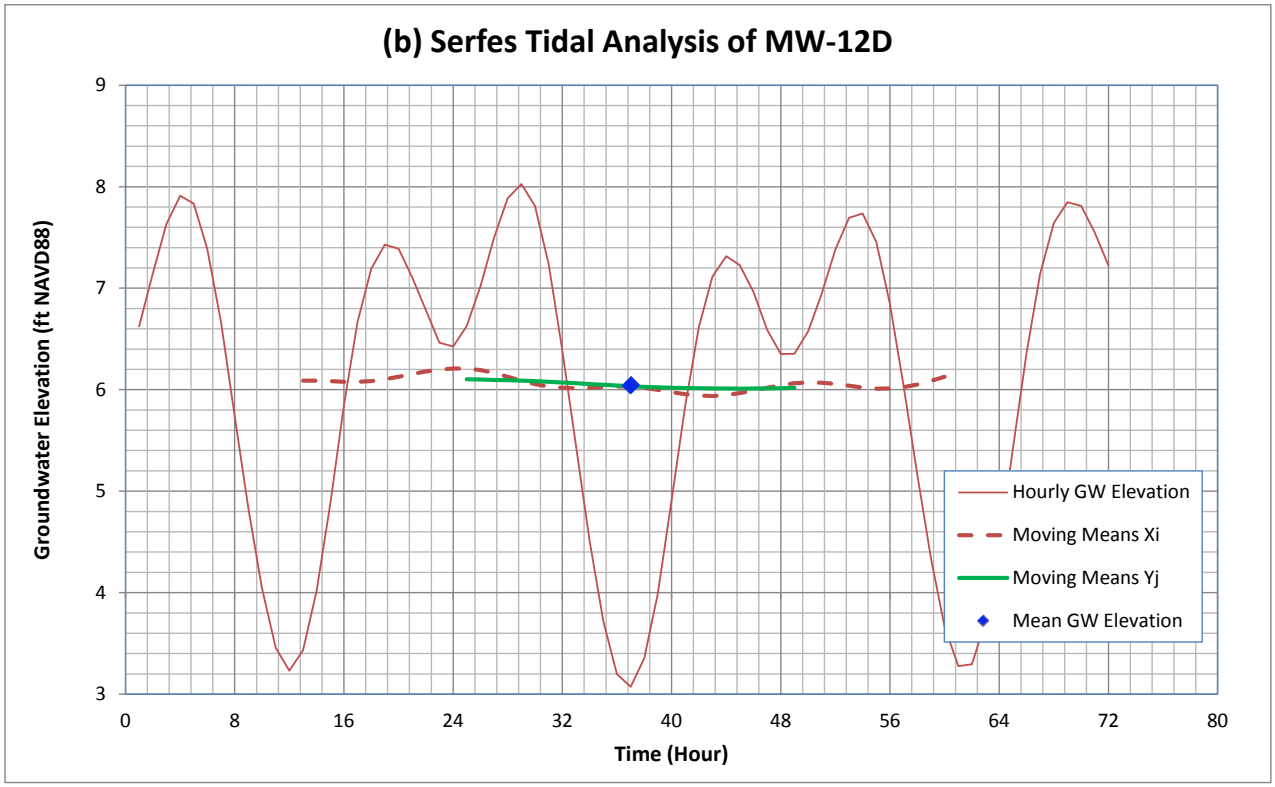
Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

GeoEngineers

Figure C-4

projects/sites/0035611406/default.aspx mm/dd/yy





Notes:

1. Method based on Serfes (1991)
2. X_i: 48 means from moving average of 24 hourly tidal elevation
3. Y_j: 25 means from moving average of 24 means over the 48 X_i
4. Time in hours is from 1507 on 11/4/2013

Reference: Technical Analysis > Tidal Study > Everett R2 Mean GW Elev.xlsx

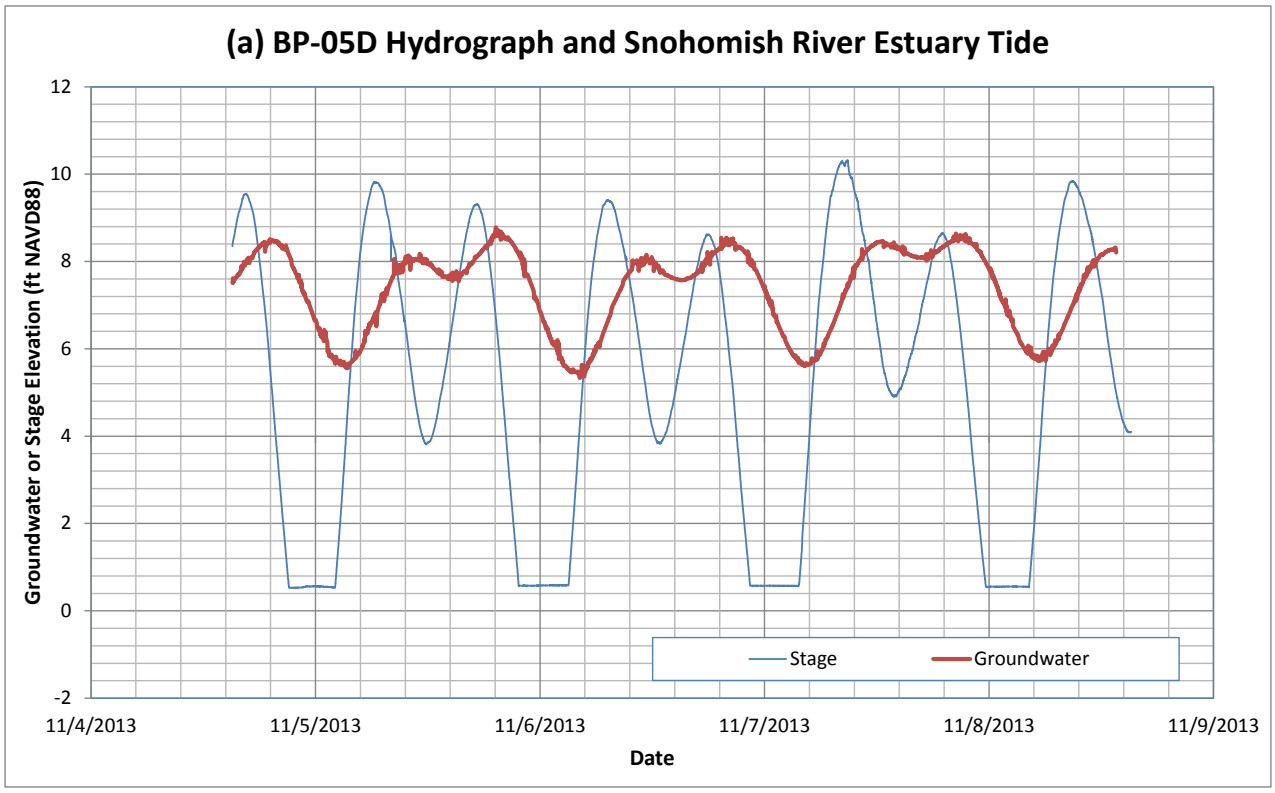
Serfes Tidal Analysis at LLMW-12D

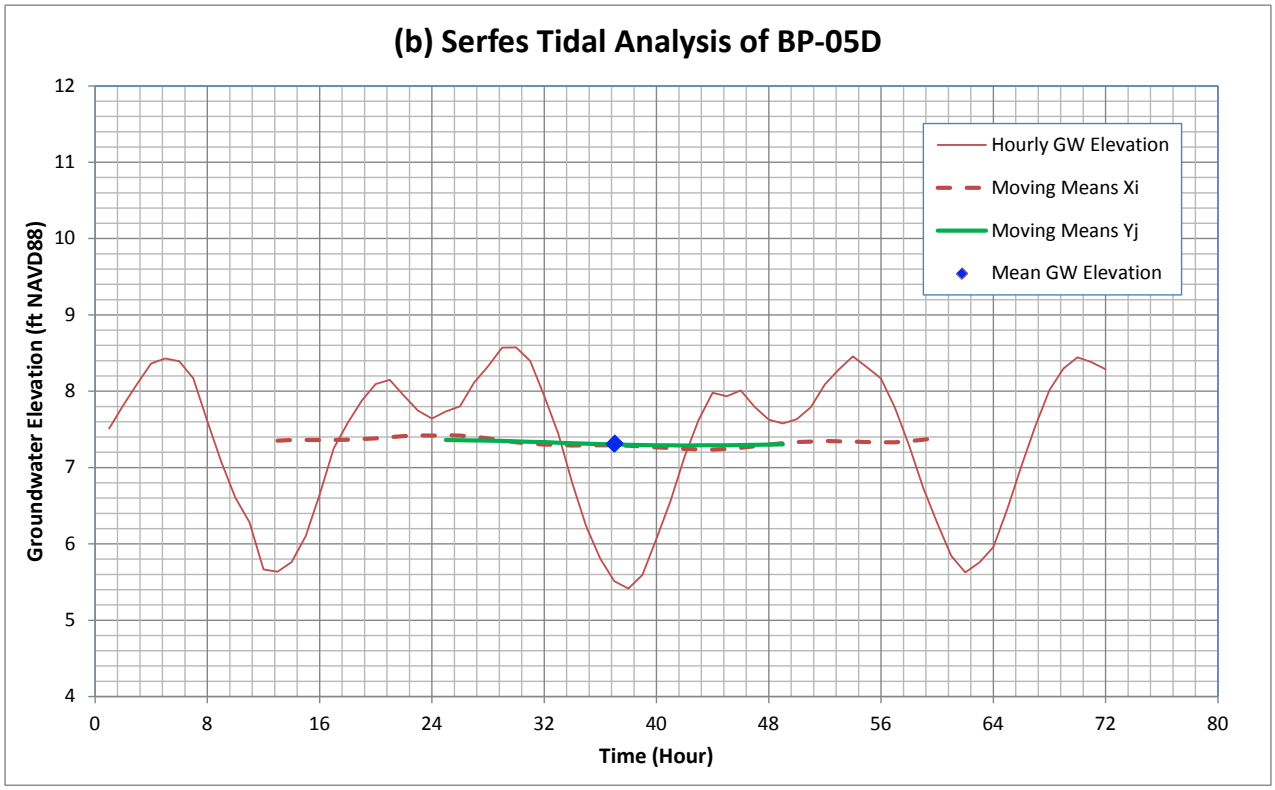
Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

GeoEngineers

Figure C-5

projects/sites/0035611406/default.aspx mm/dd/yy





Notes:

1. Method based on Serfes (1991)
2. X_i: 48 means from moving average of 24 hourly tidal elevation
3. Y_j: 25 means from moving average of 24 means over the 48 X_i
4. Time in hours is from 1507 on 11/4/2013

Reference: Technical Analysis > Tidal Study > Everett R2 Mean GW Elev.xlsx

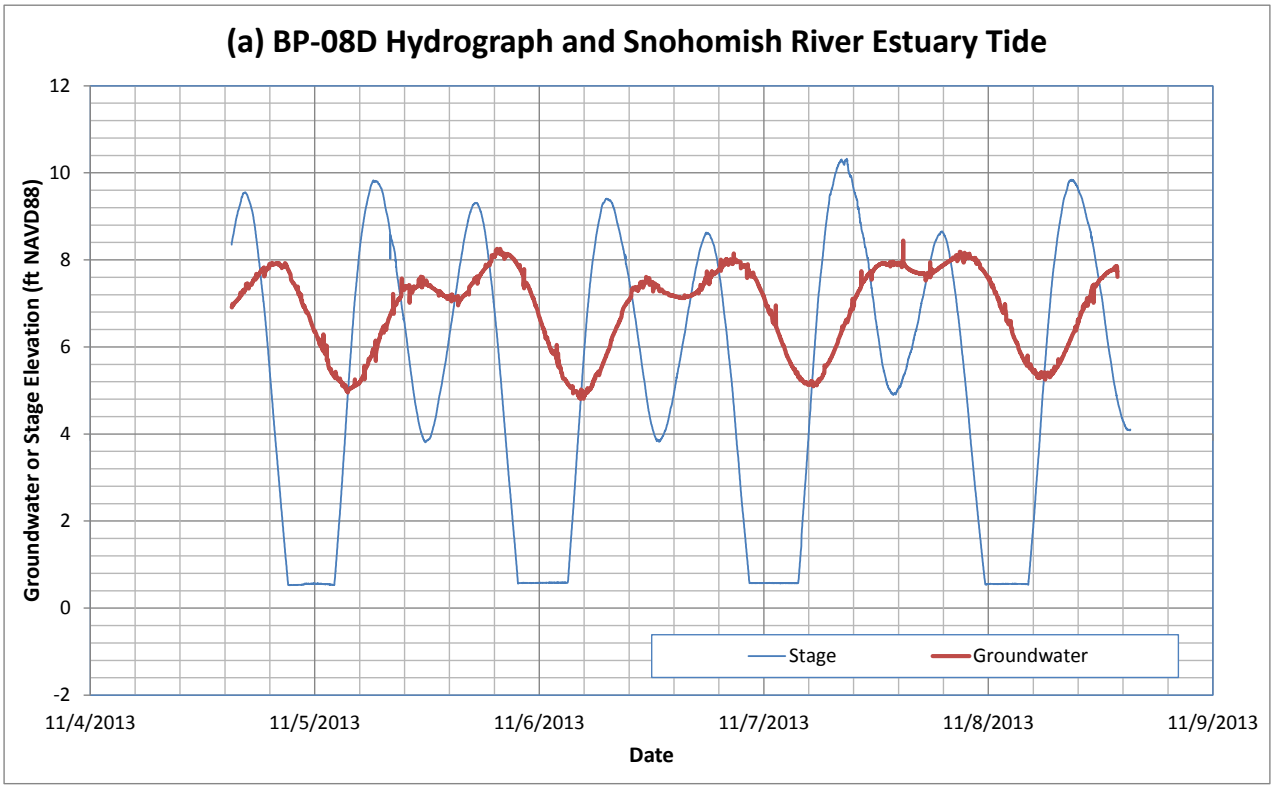
Serfes Tidal Analysis at BP-05D

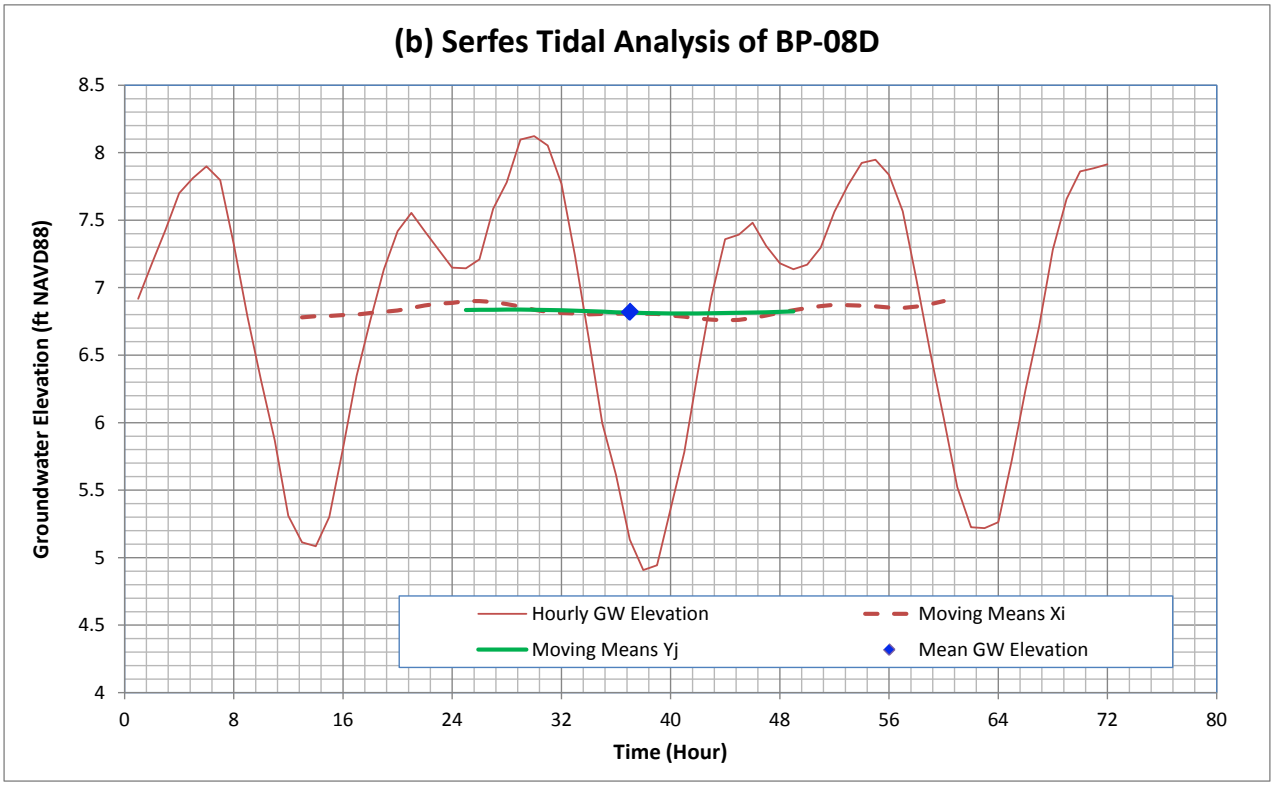
Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

GeoEngineers

Figure C-6

projects/sites/0035611406/default.aspx mm/dd/yy





Notes:

1. Method based on Serfes (1991)
2. X_i: 48 means from moving average of 24 hourly tidal elevation
3. Y_j: 25 means from moving average of 24 means over the 48 X_i
4. Time in hours is from 1507 on 11/4/2013

Reference: Technical Analysis > Tidal Study > Everett R2 Mean GW Elev.xlsx

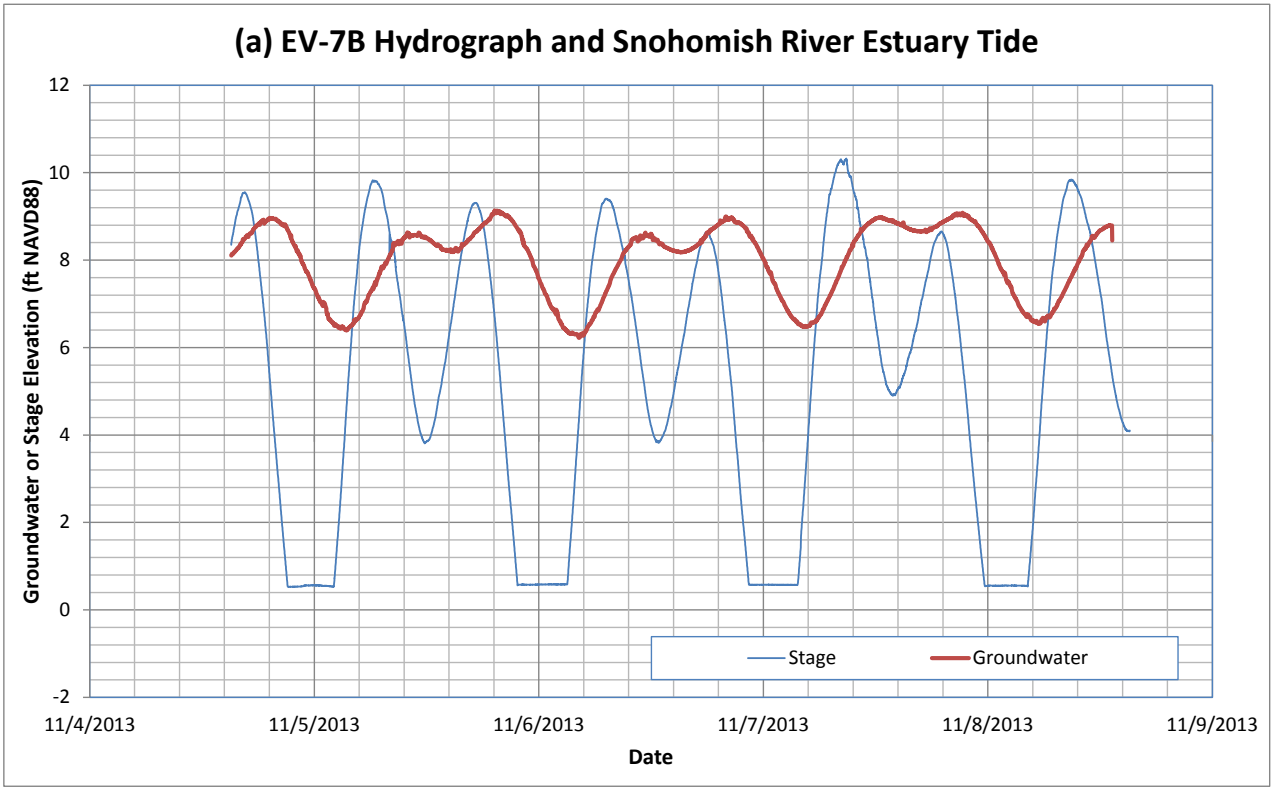
Serfes Tidal Analysis at BP-08D

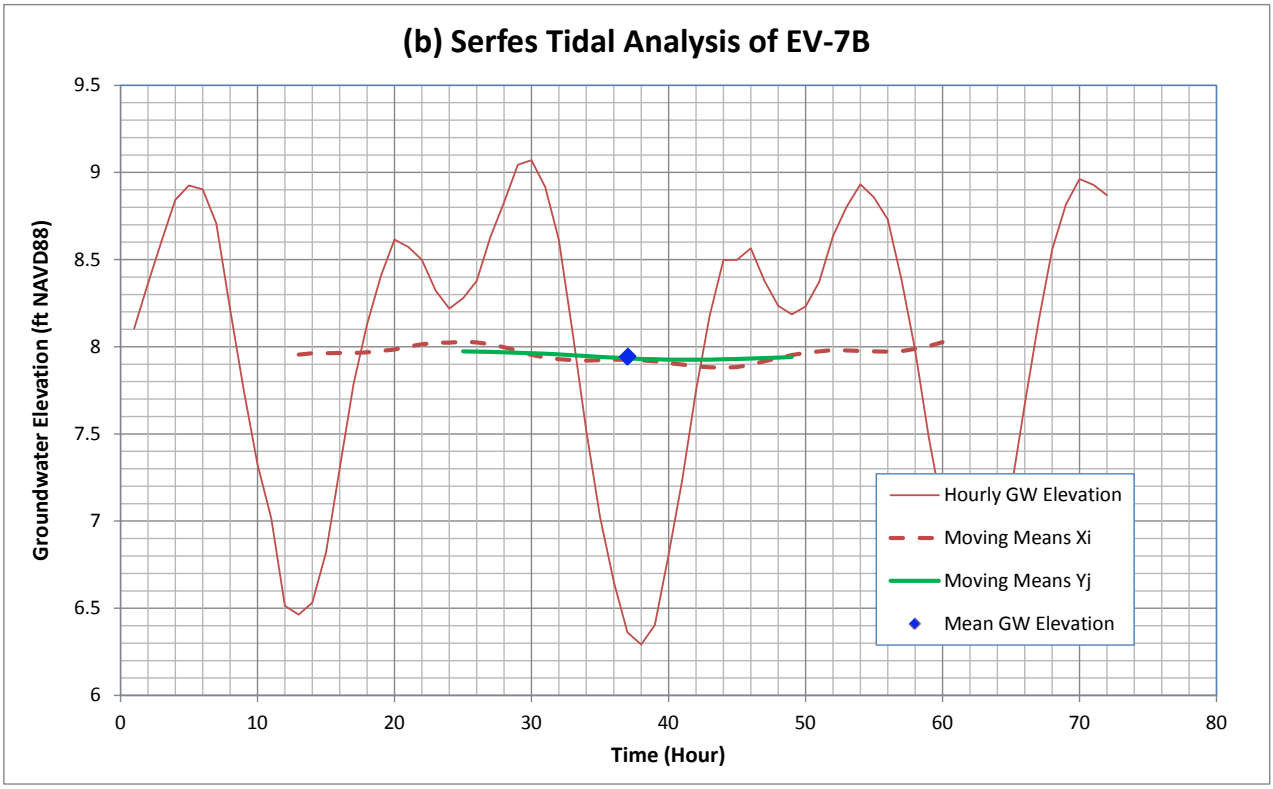
Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

GeoEngineers

Figure C-7

projects/sites/0035611406/default.aspx mm/dd/yy





Notes:

1. Method based on Serfes (1991)
2. X_i: 48 means from moving average of 24 hourly tidal elevation
3. Y_j: 25 means from moving average of 24 means over the 48 X_i
4. Time in hours is from 1507 on 11/4/2013

Reference: Technical Analysis > Tidal Study > Everett R2 Mean GW Elev.xlsx

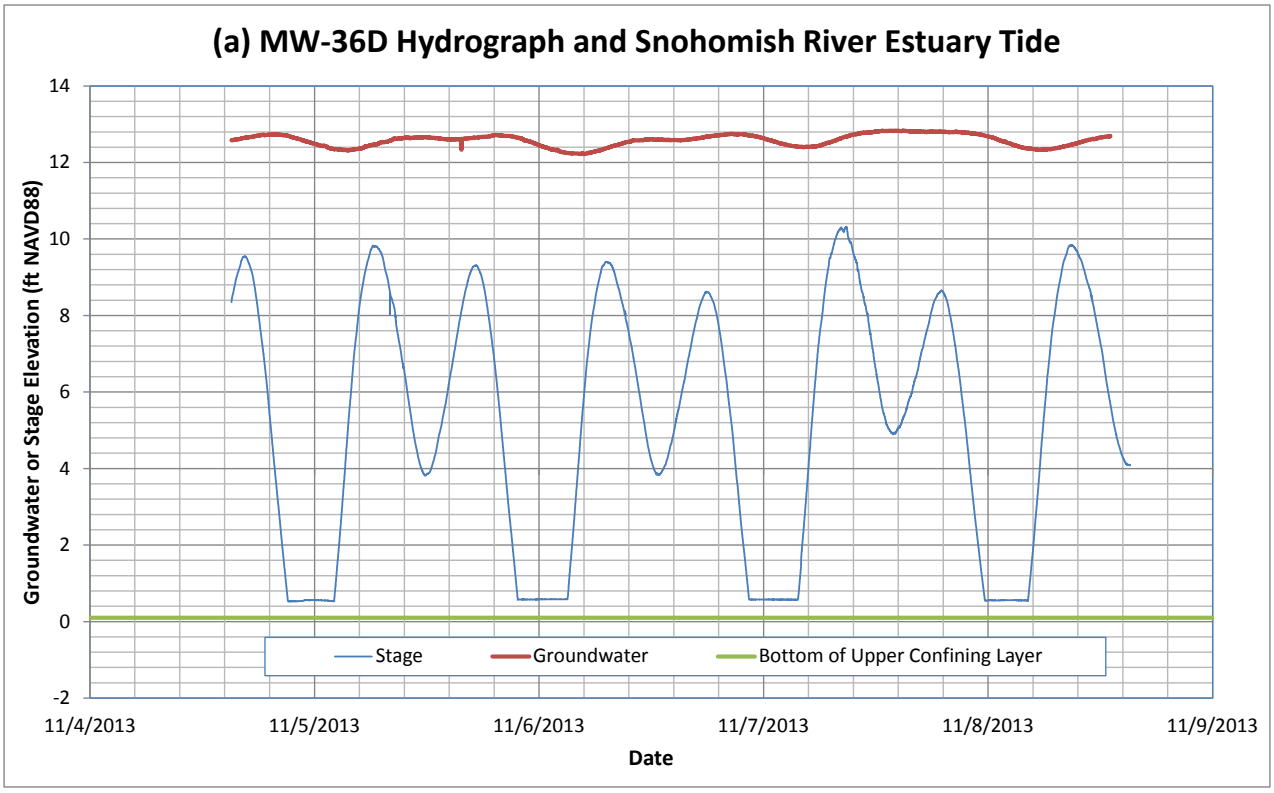
Serfes Tidal Analysis at EV-7B

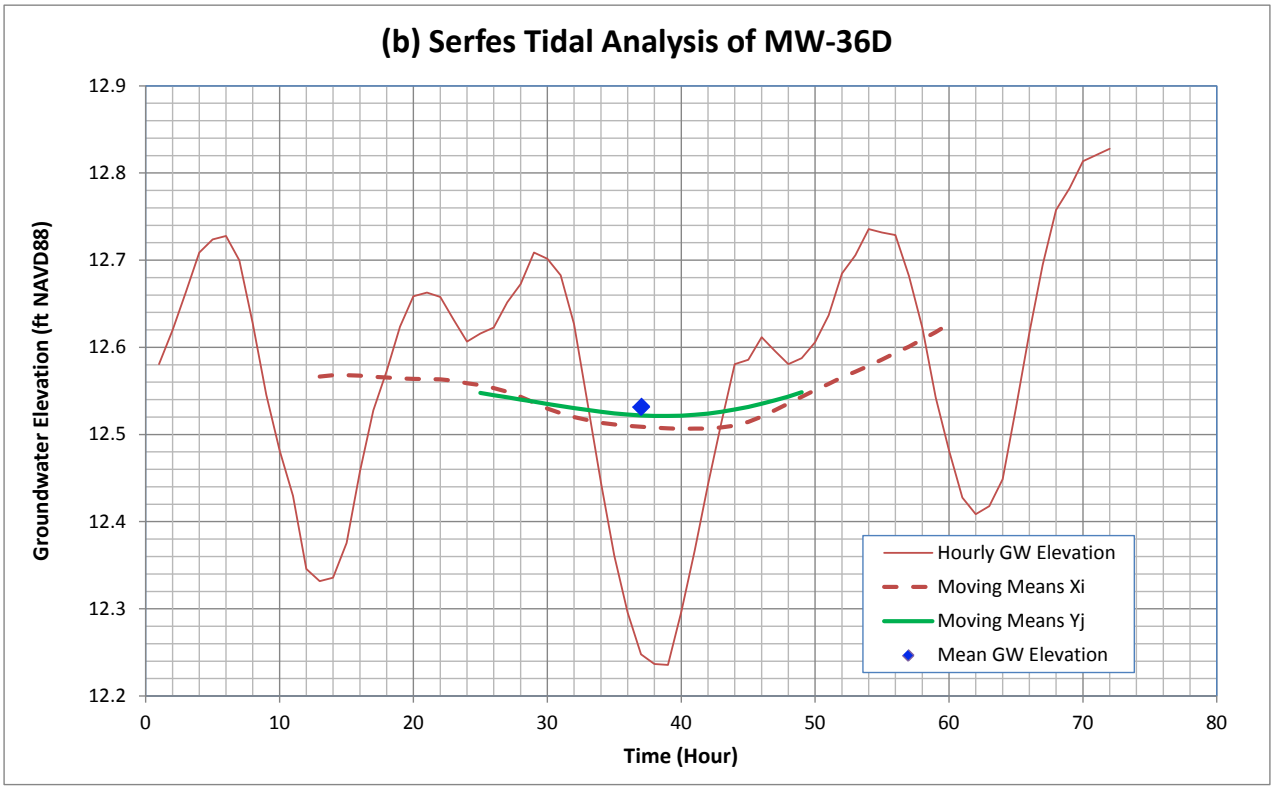
Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

GeoEngineers

Figure C-8

projects/sites/0035611406/default.aspx mm/dd/yy





Notes:

1. Method based on Serfes (1991)
2. X_i: 48 means from moving average of 24 hourly tidal elevation
3. Y_j: 25 means from moving average of 24 means over the 48 X_i
4. Time in hours is from 1507 on 11/4/2013

Reference: Technical Analysis > Tidal Study > Everett R2 Mean GW Elev.xlsx

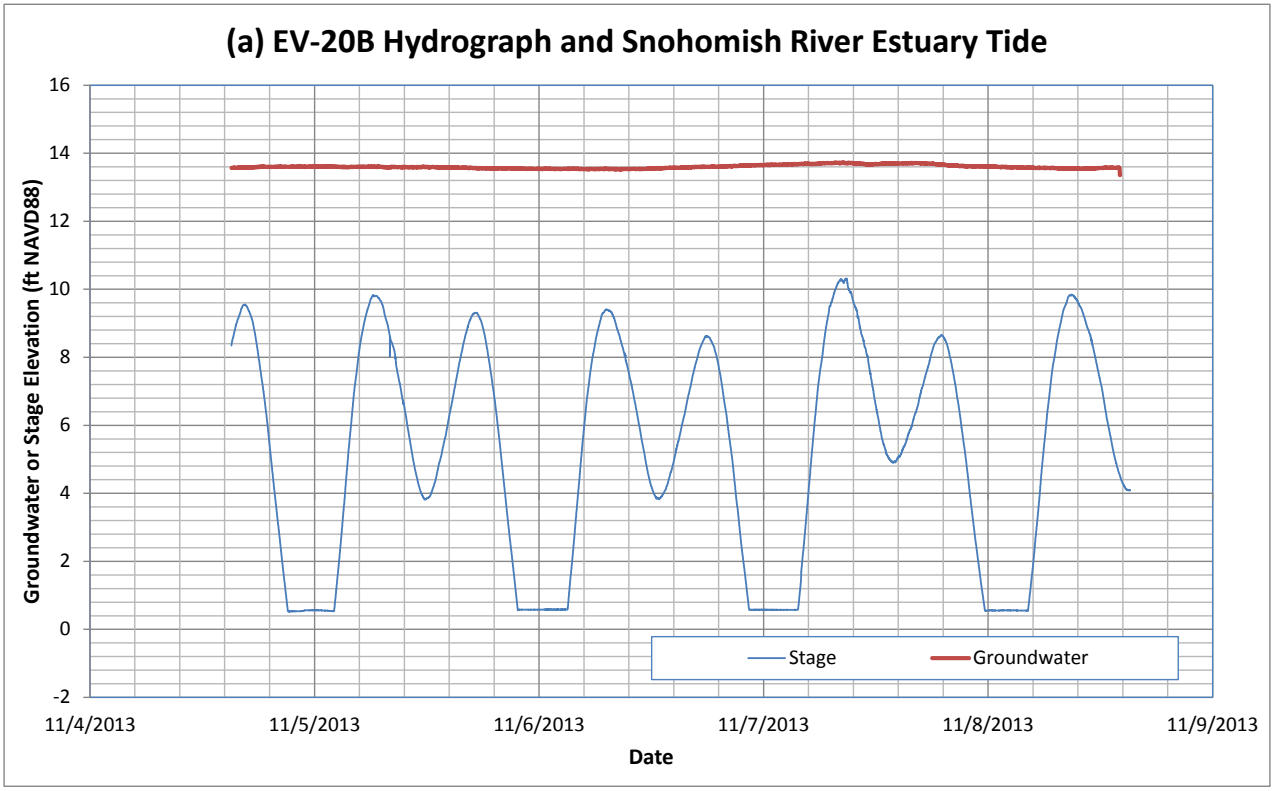
Serfes Tidal Analysis at LLMW-36D

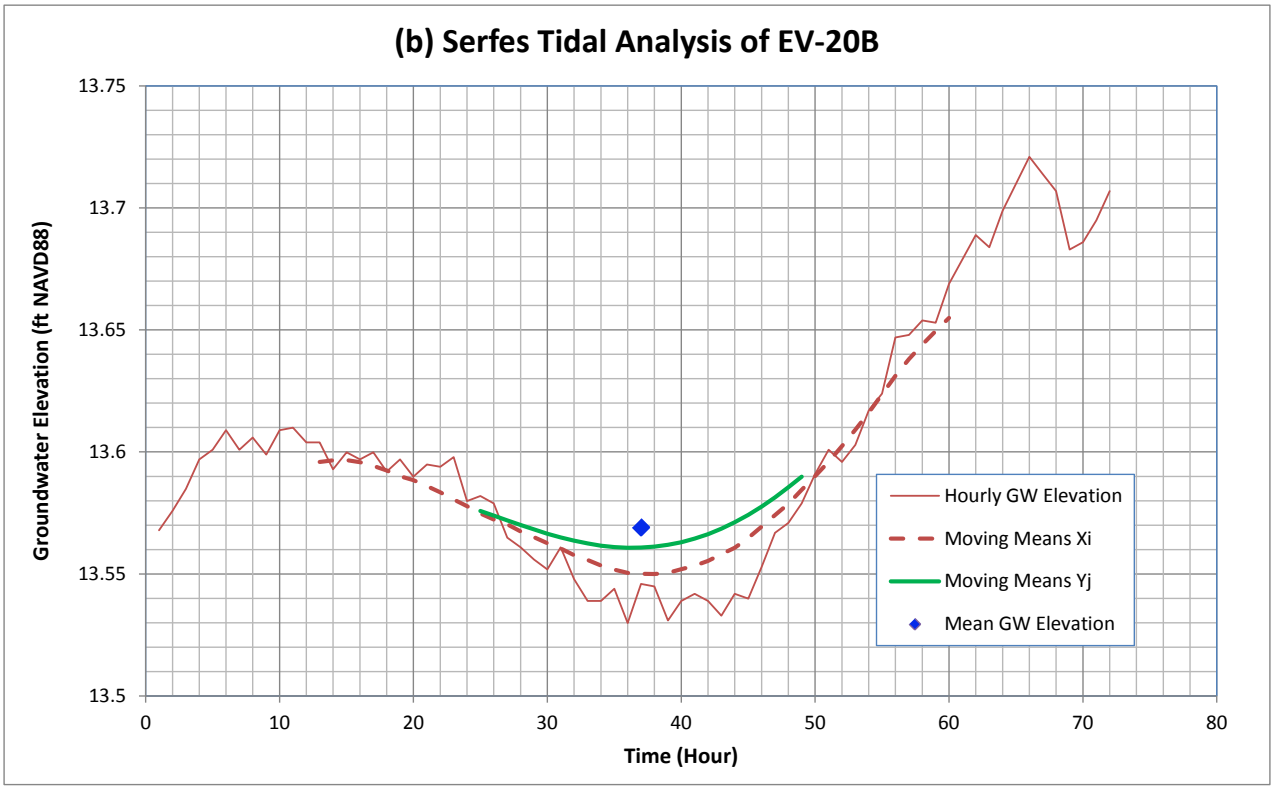
Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

GeoEngineers

Figure C-9

projects/sites/0035611406/default.aspx mm/dd/yy





Notes:

1. Method based on Serfes (1991)
2. X_i: 48 means from moving average of 24 hourly tidal elevation
3. Y_j: 25 means from moving average of 24 means over the 48 X_i
4. Time in hours is from 1507 on 11/4/2013

Reference: Technical Analysis > Tidal Study > Everett R2 Mean GW Elev.xlsx

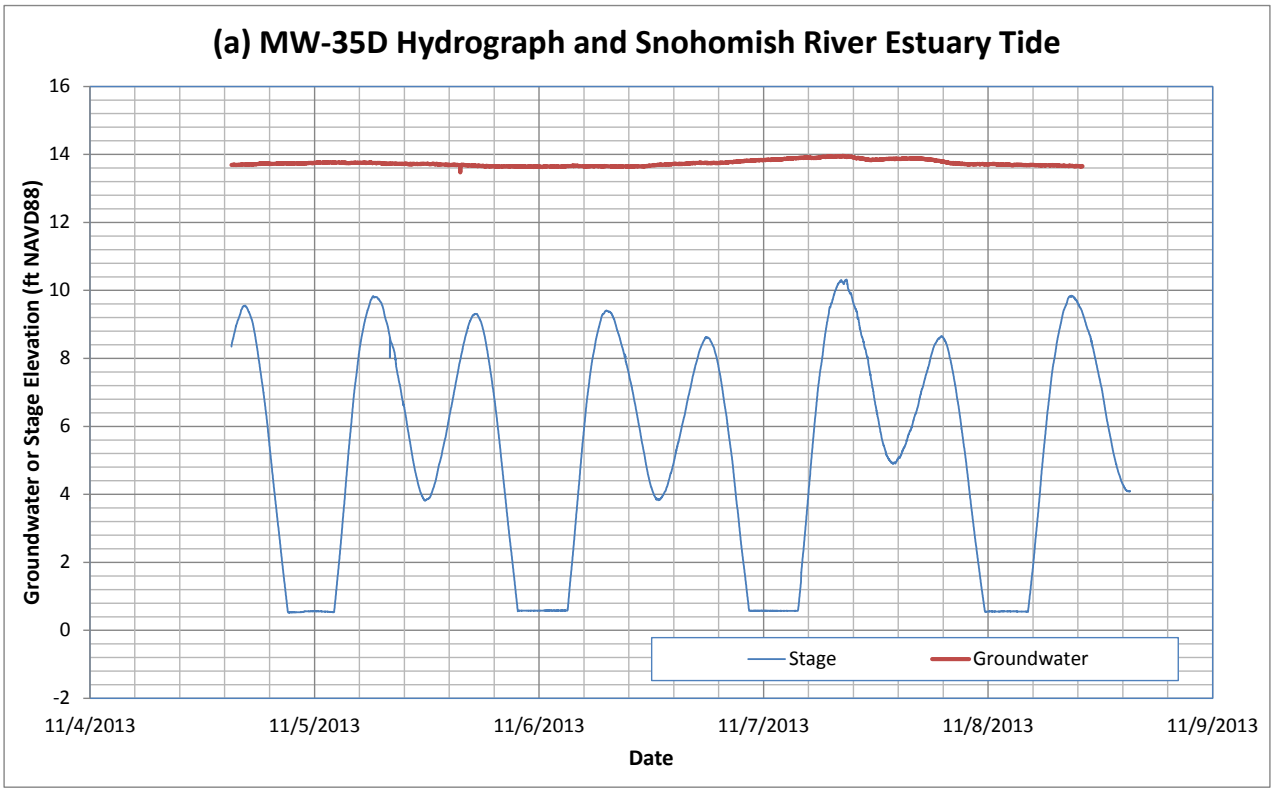
Serfes Tidal Analysis at EV-20B

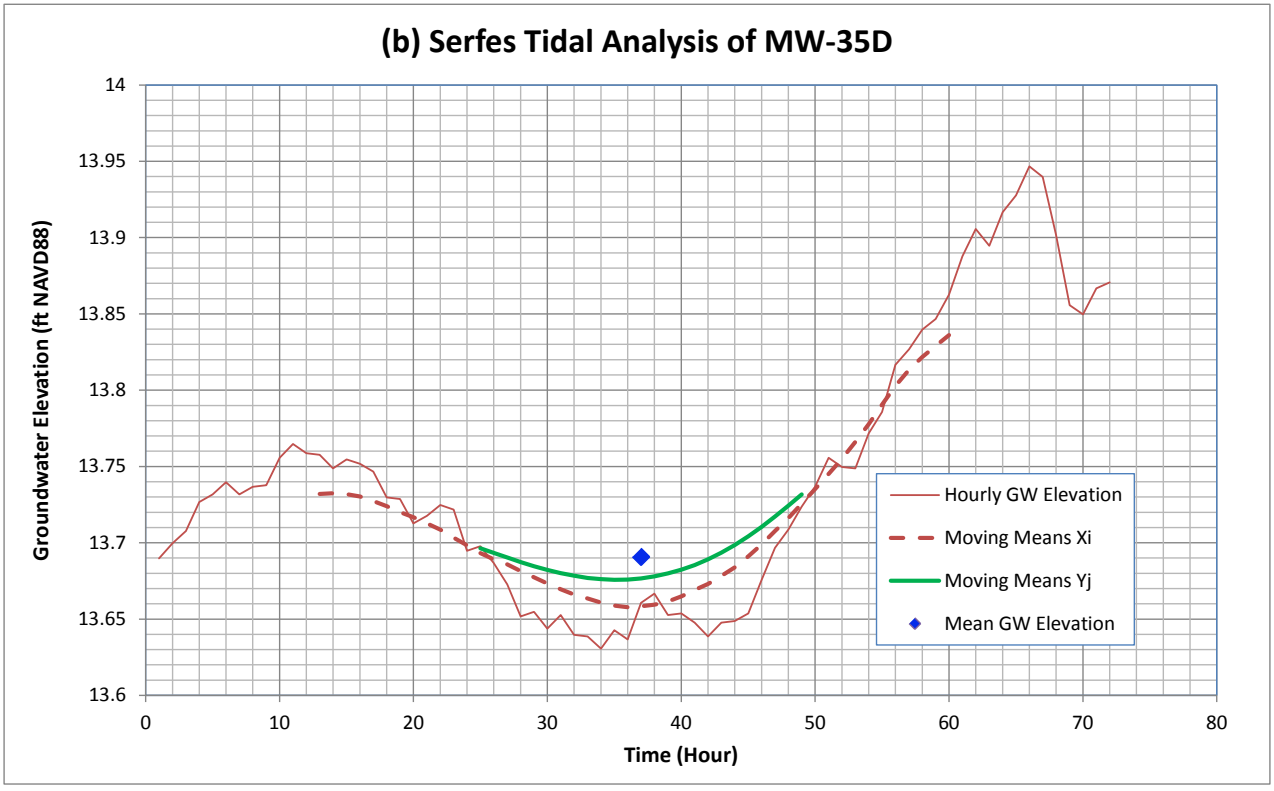
Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

GeoEngineers

Figure C-10

projects/sites/0035611406/default.aspx mm/dd/yy





Notes:

1. Method based on Serfes (1991)
2. X_i: 48 means from moving average of 24 hourly tidal elevation
3. Y_j: 25 means from moving average of 24 means over the 48 X_i
4. Time in hours is from 1507 on 11/4/2013

Reference: Technical Analysis > Tidal Study > Everett R2 Mean GW Elev.xlsx

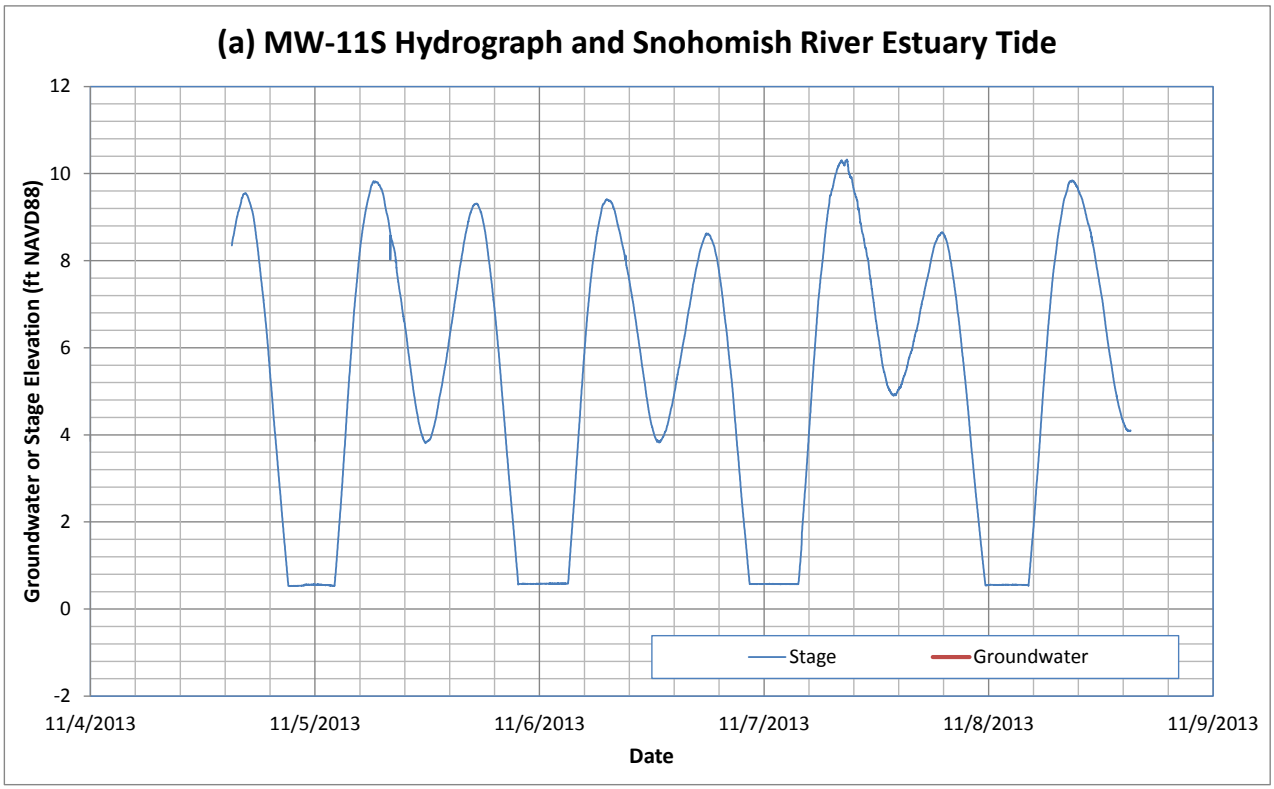
Serfes Tidal Analysis at LLMW-35D

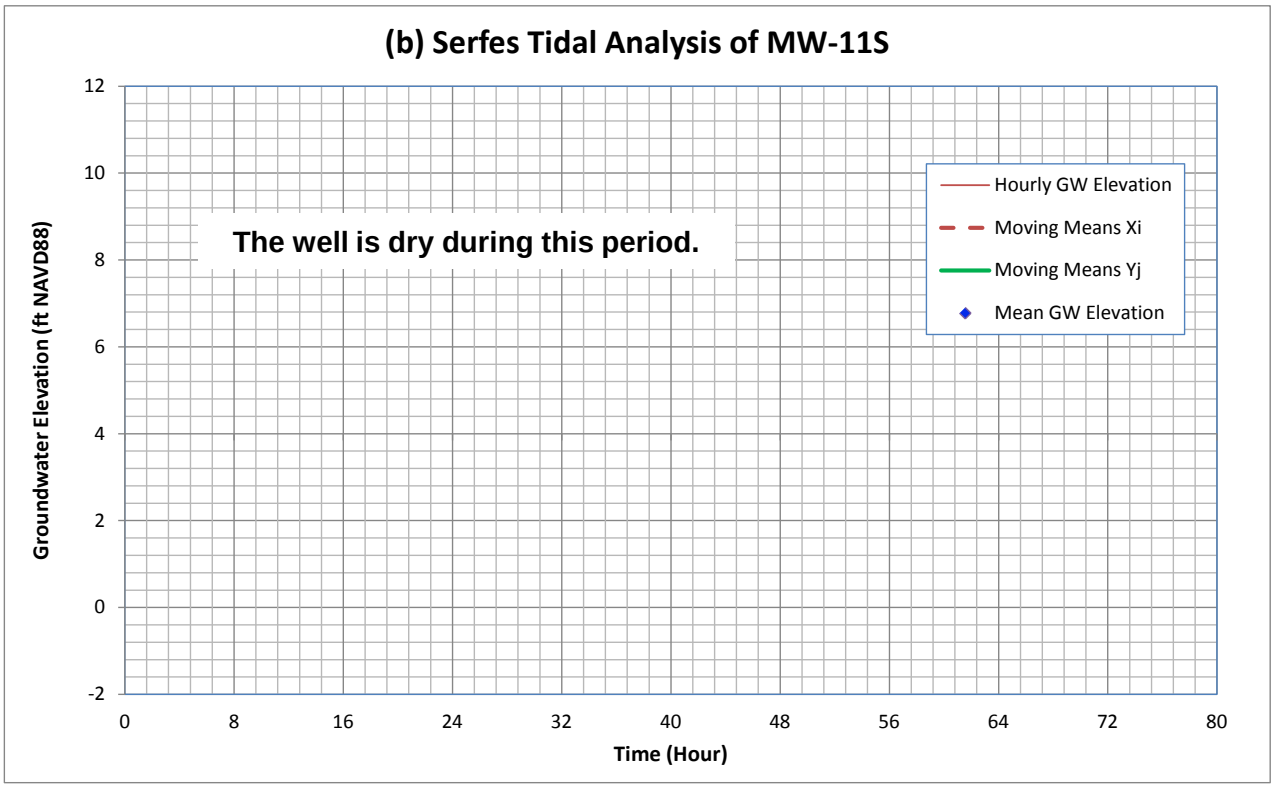
Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

GeoEngineers

Figure C-11

projects/sites/0035611406/default.aspx mm/dd/yy





Notes:

1. Method based on Serfes (1991)
2. X_i: 48 means from moving average of 24 hourly tidal elevation
3. Y_j: 25 means from moving average of 24 means over the 48 X_i
4. Time in hours is from 1507 on 11/4/2013

Reference: Technical Analysis > Tidal Study > Everett R2 Mean GW Elev.xlsx

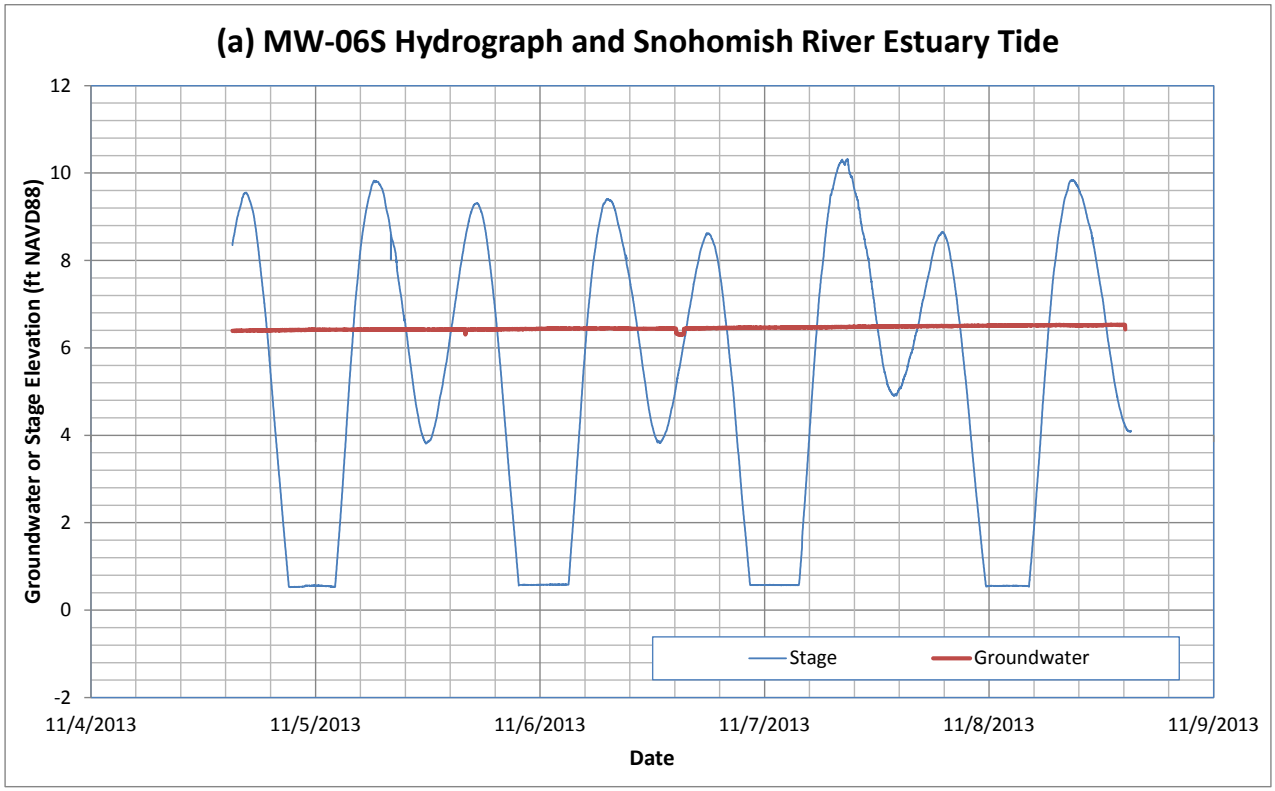
Serfes Tidal Analysis at LLMW-11S

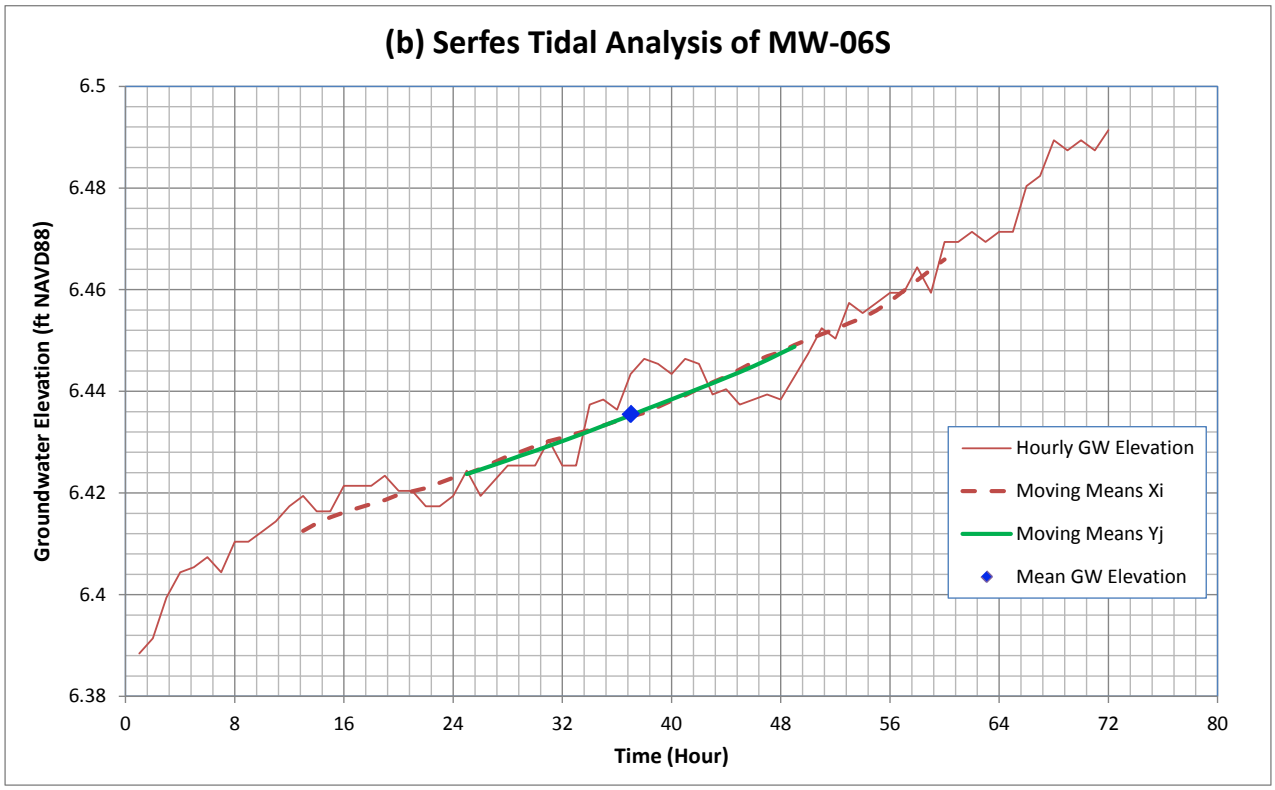
Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

GeoEngineers

Figure C-12

projects/sites/0035611406/default.aspx mm/dd/yy





Notes:

1. Method based on Serfes (1991)
2. X_i: 48 means from moving average of 24 hourly tidal elevation
3. Y_j: 25 means from moving average of 24 means over the 48 X_i
4. Time in hours is from 1507 on 11/4/2013

Reference: Technical Analysis > Tidal Study > Everett R2 Mean GW Elev.xlsx

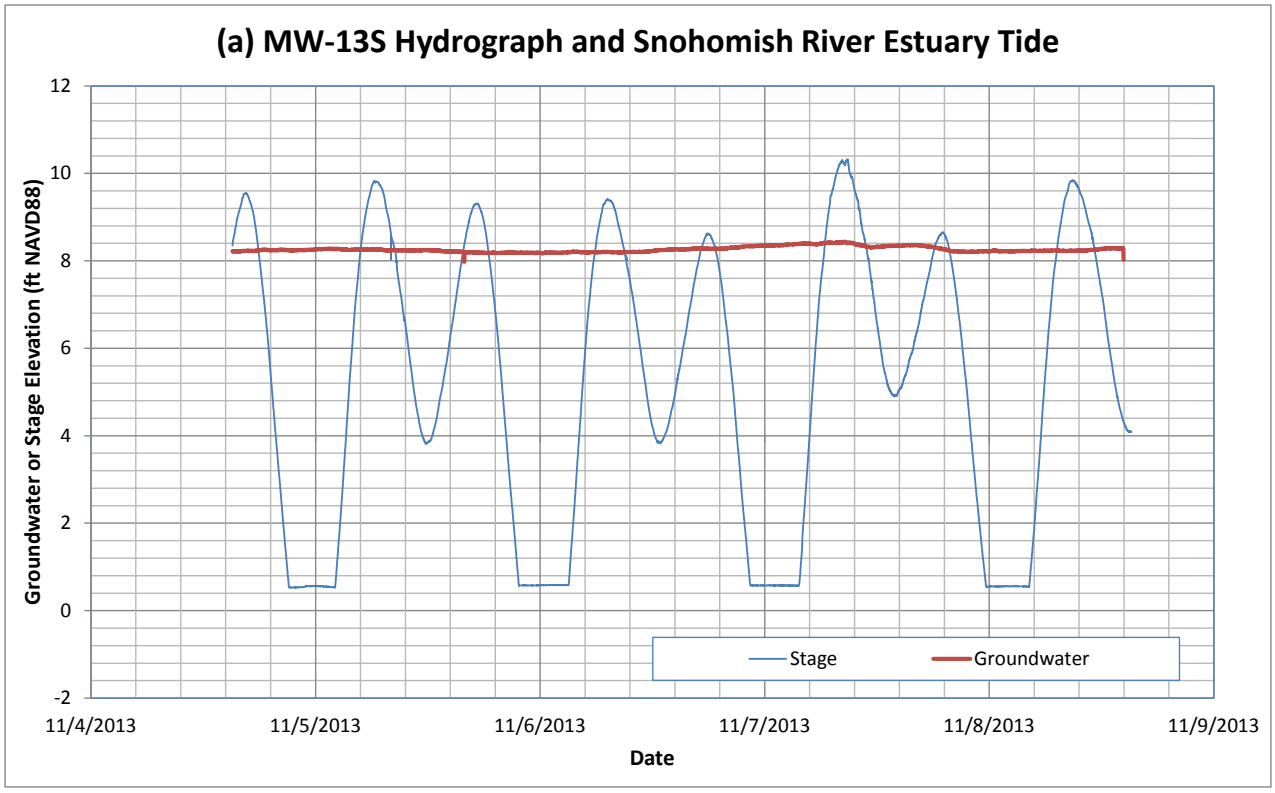
Serfes Tidal Analysis at LLMW-06S

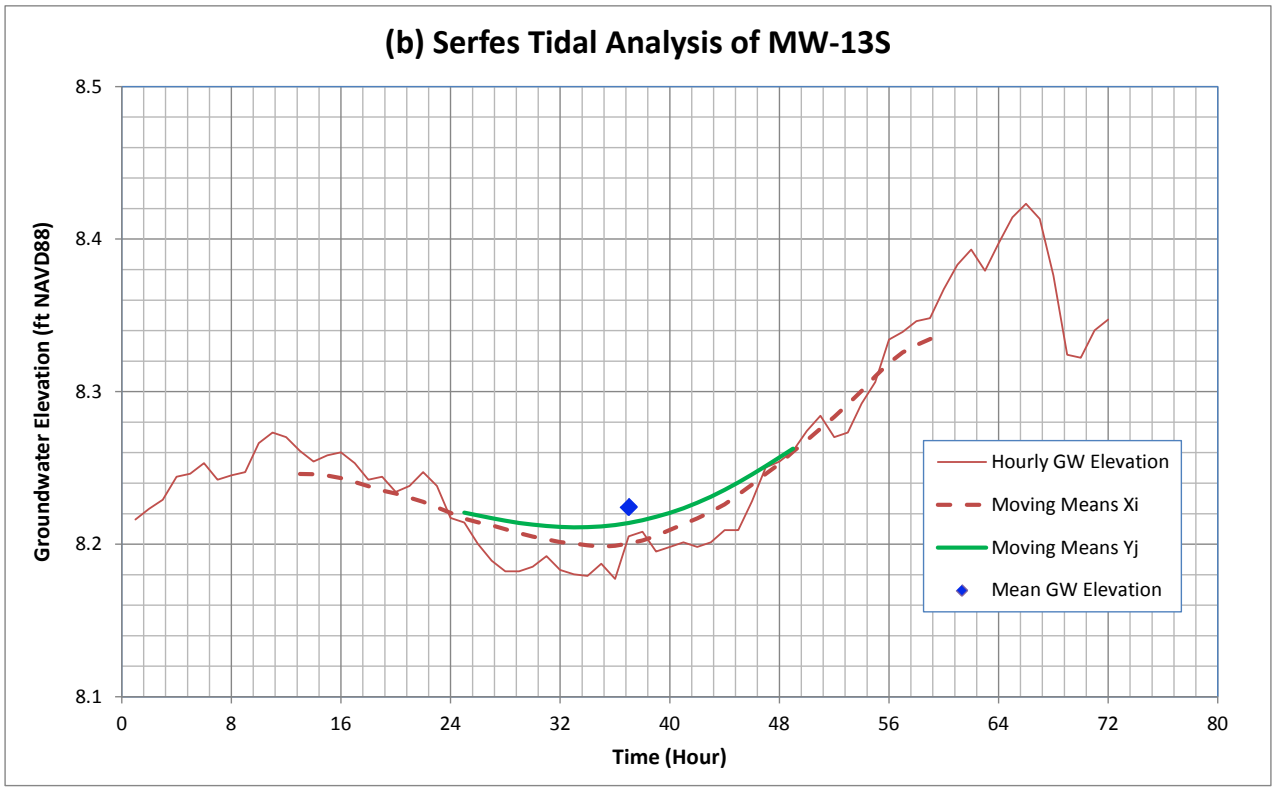
Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

GeoEngineers

Figure C-13

projects/sites/0035611406/default.aspx mm/dd/yy





Notes:

1. Method based on Serfes (1991)
2. X_i: 48 means from moving average of 24 hourly tidal elevation
3. Y_j: 25 means from moving average of 24 means over the 48 X_i
4. Time in hours is from 1507 on 11/4/2013

Reference: Technical Analysis > Tidal Study > Everett R2 Mean GW Elev.xlsx

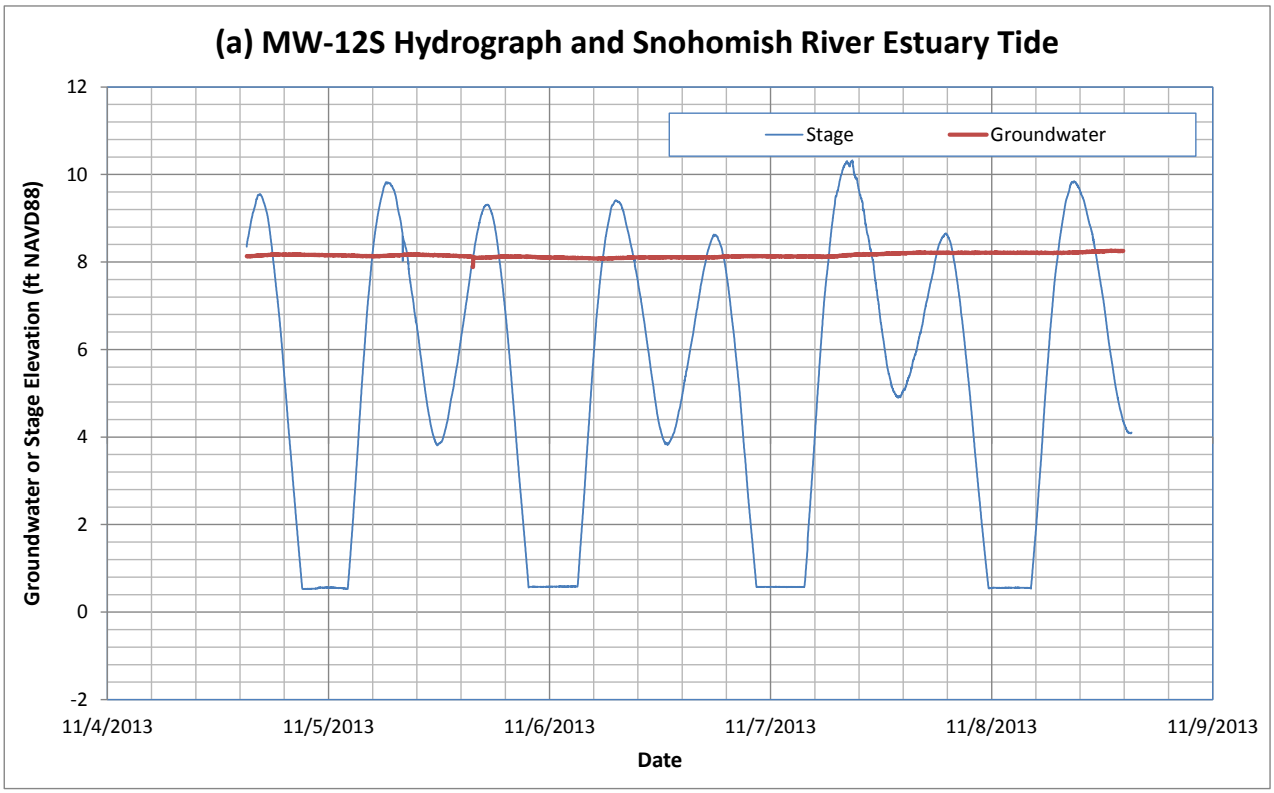
Serfes Tidal Analysis at LLMW-13S

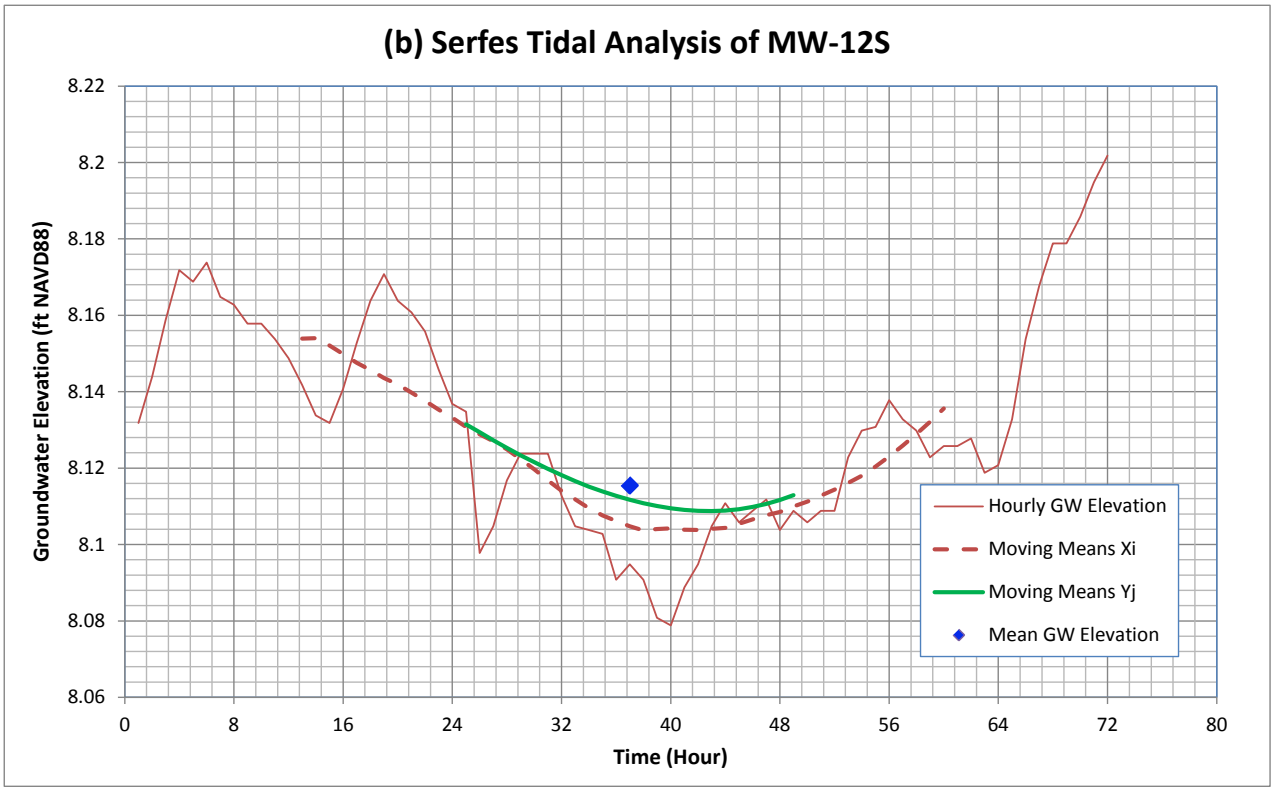
Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

GeoEngineers

Figure C-14

projects/sites/0035611406/default.aspx mm/dd/yy





Notes:

1. Method based on Serfes (1991)
2. X_i: 48 means from moving average of 24 hourly tidal elevation
3. Y_j: 25 means from moving average of 24 means over the 48 X_i
4. Time in hours is from 1507 on 11/4/2013

Reference: Technical Analysis > Tidal Study > Everett R2 Mean GW Elev.xlsx

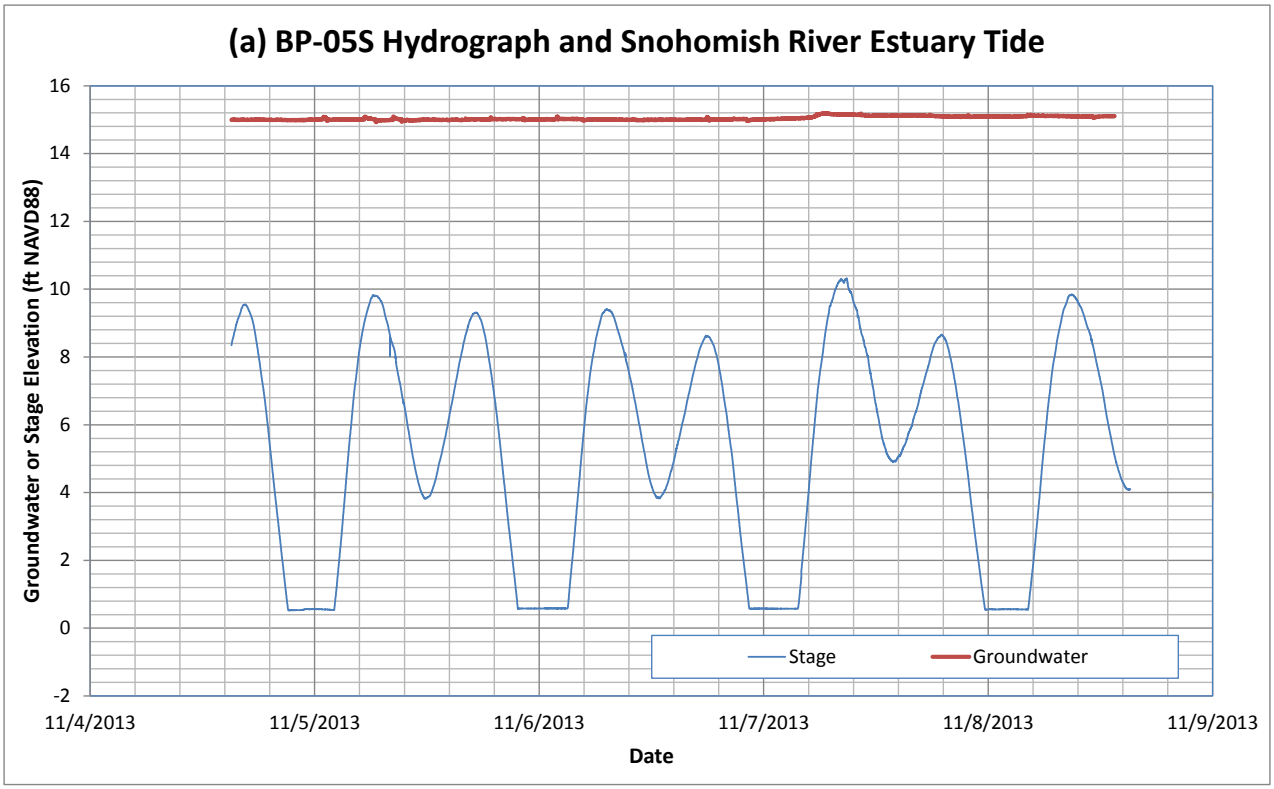
Serfes Tidal Analysis at LLMW-12S

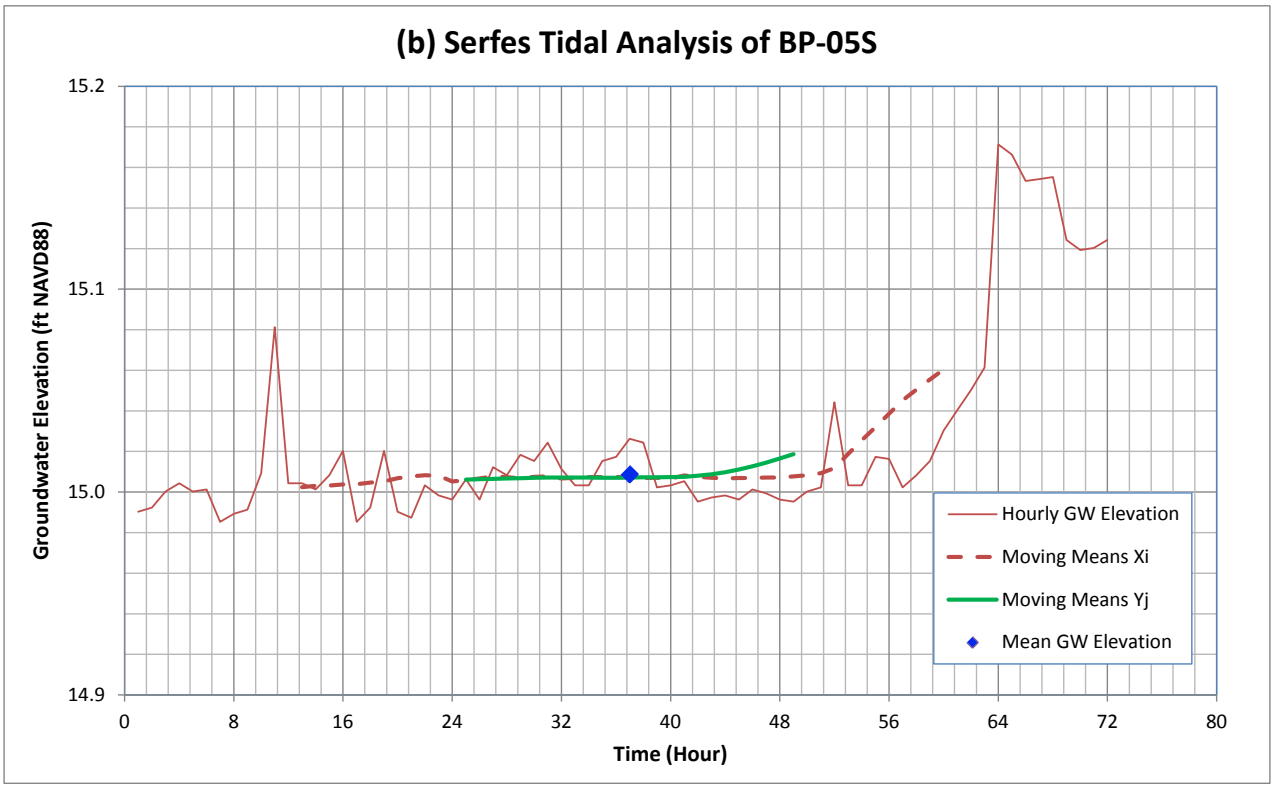
Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

GeoEngineers

Figure C-15

projects/sites/0035611406/default.aspx mm/dd/yy





Notes:

1. Method based on Serfes (1991)
2. X_i: 48 means from moving average of 24 hourly tidal elevation
3. Y_j: 25 means from moving average of 24 means over the 48 X_i
4. Time in hours is from 1507 on 11/4/2013

Reference: Technical Analysis > Tidal Study > Everett R2 Mean GW Elev.xlsx

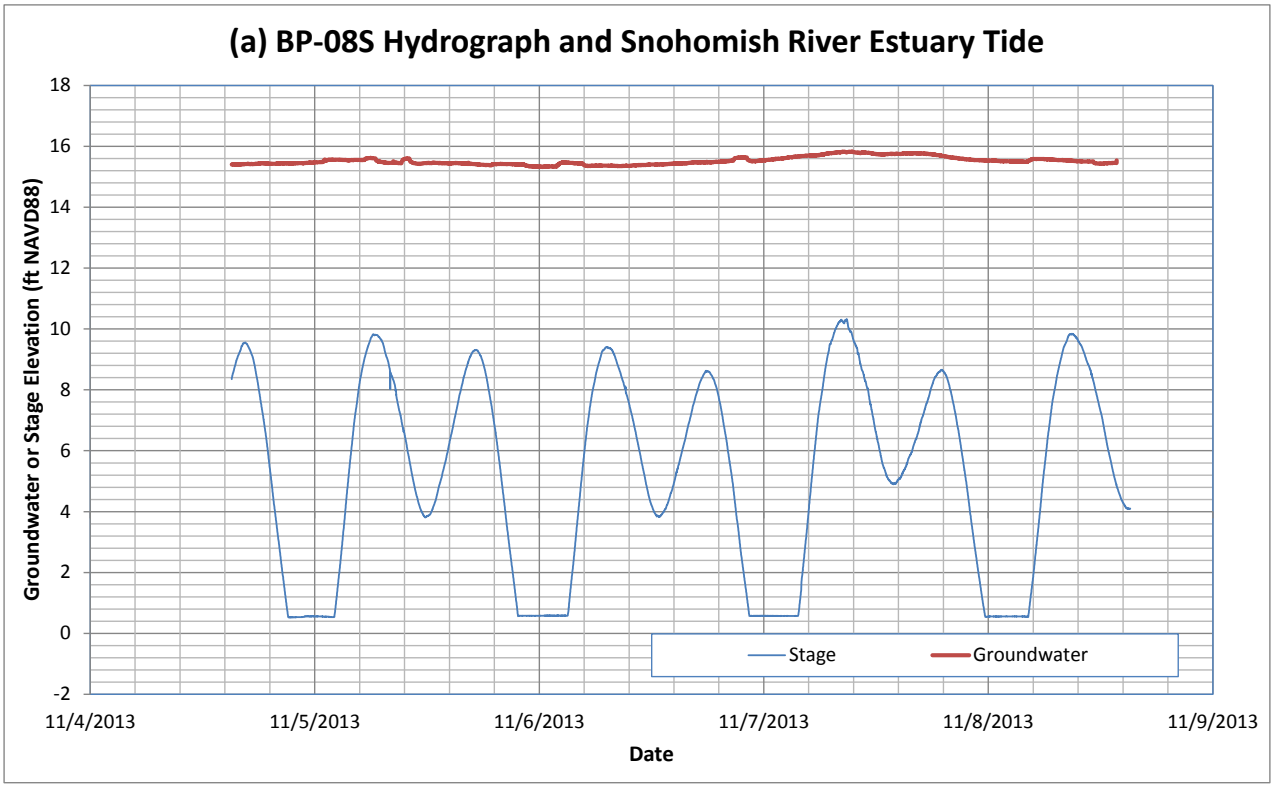
Serfes Tidal Analysis at BP-05S

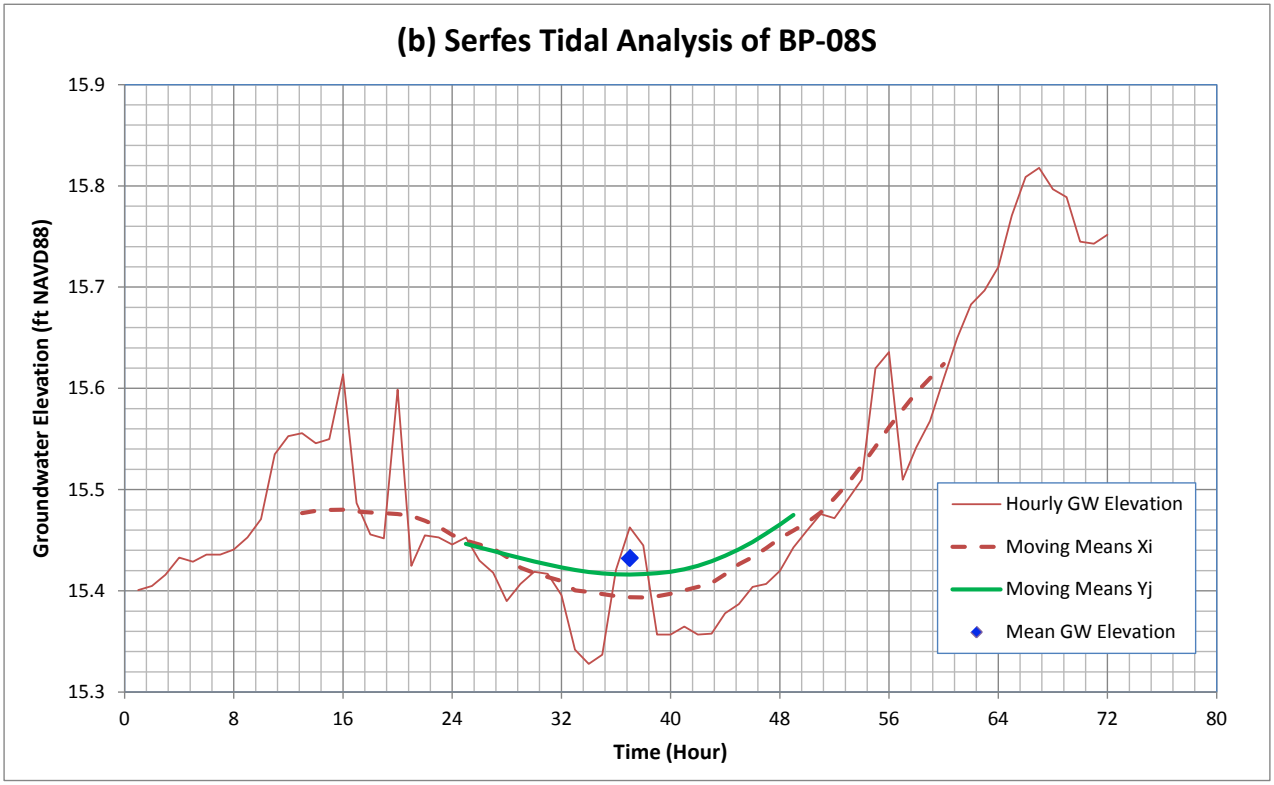
Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

GeoEngineers

Figure C-16

projects/sites/0035611406/default.aspx mm/dd/yy





Notes:

1. Method based on Serfes (1991)
2. X_i: 48 means from moving average of 24 hourly tidal elevation
3. Y_j: 25 means from moving average of 24 means over the 48 X_i
4. Time in hours is from 1507 on 11/4/2013

Reference: Technical Analysis > Tidal Study > Everett R2 Mean GW Elev.xlsx

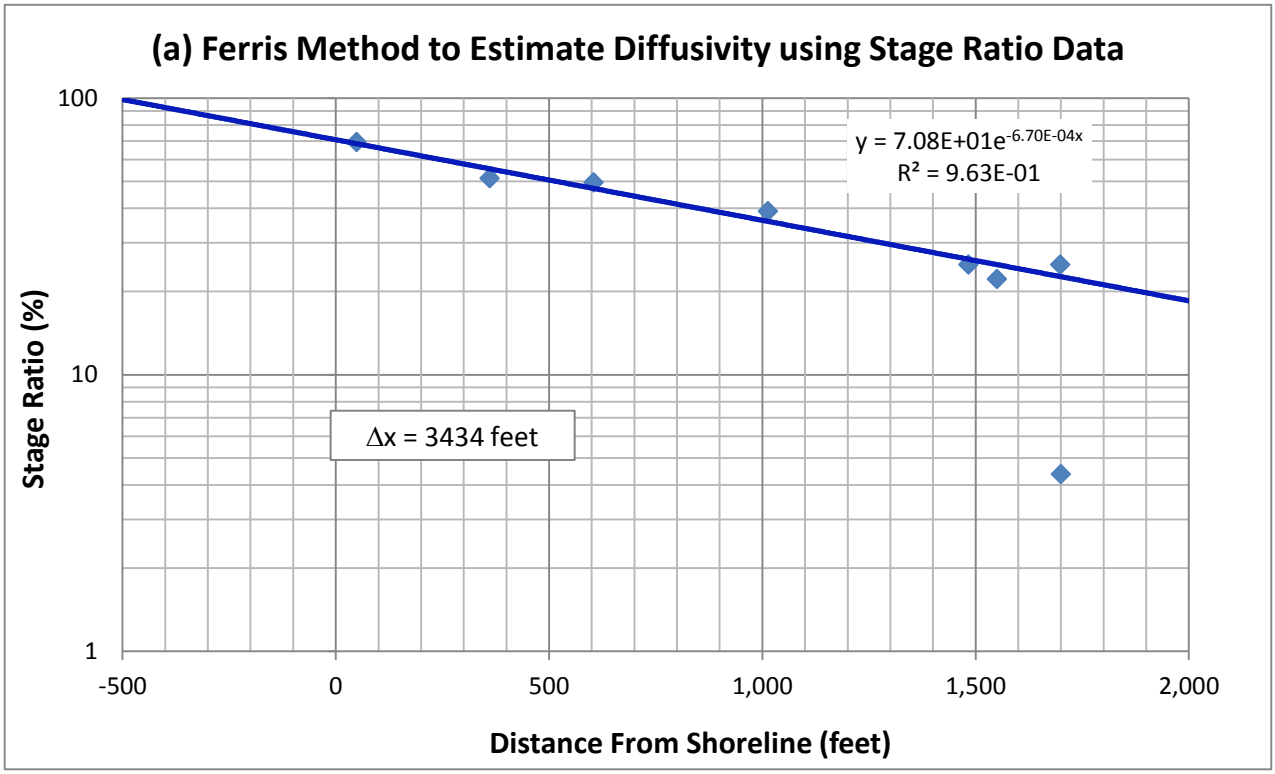
Serfes Tidal Analysis at BP-08S

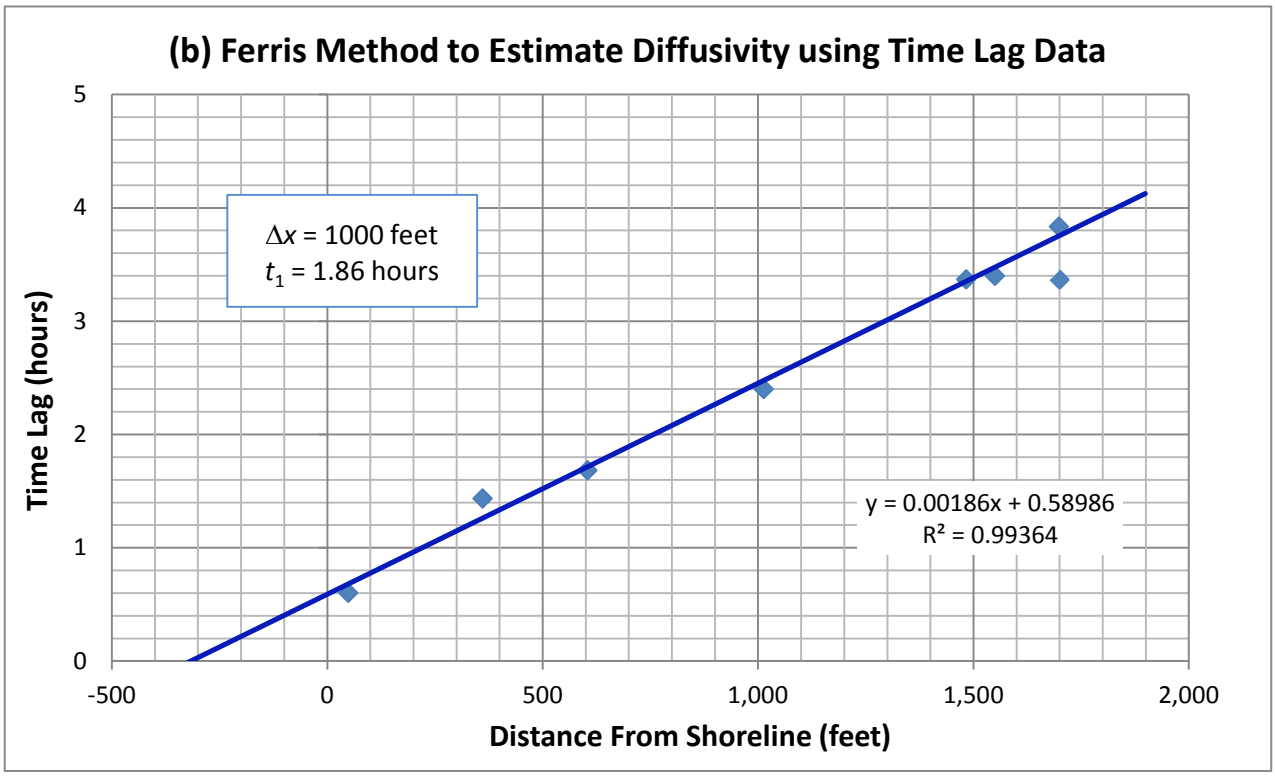
Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

GeoEngineers

Figure C-17

projects/sites/0035611406/default.aspx mm/dd/yy

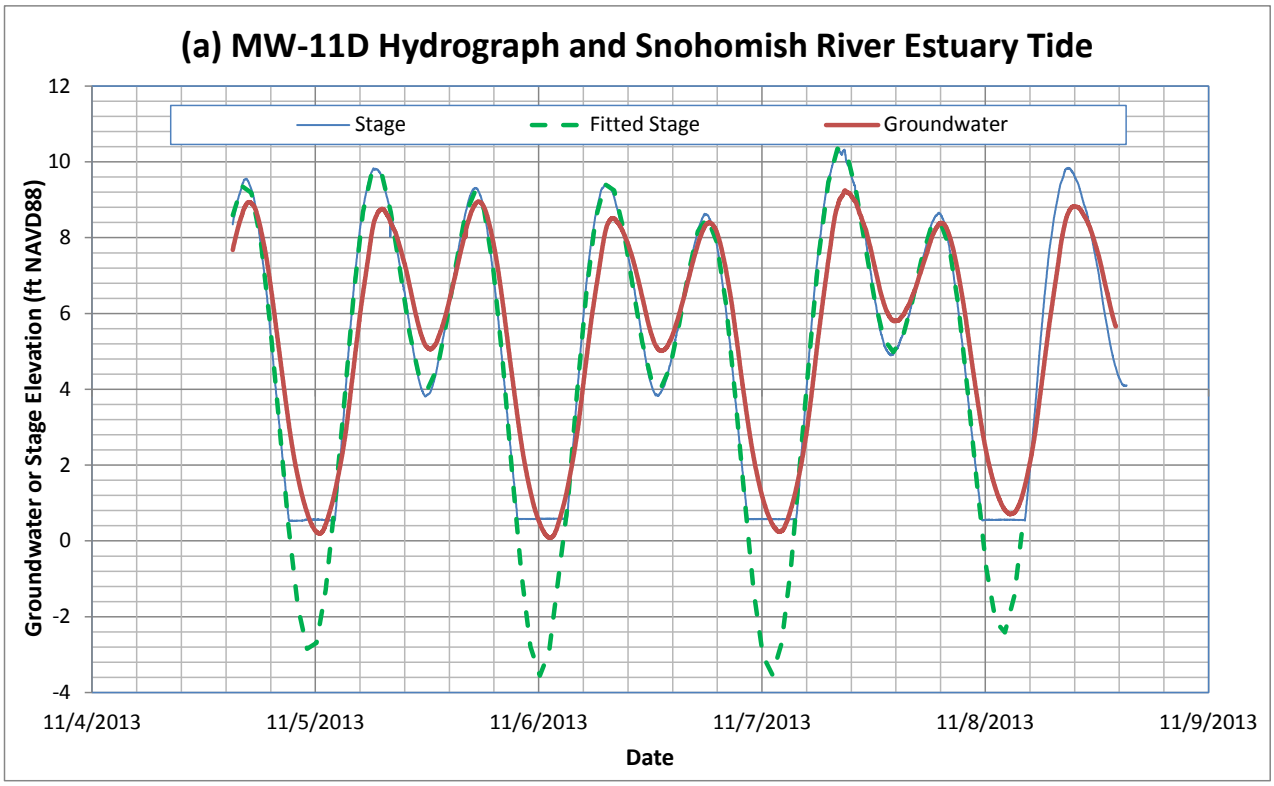


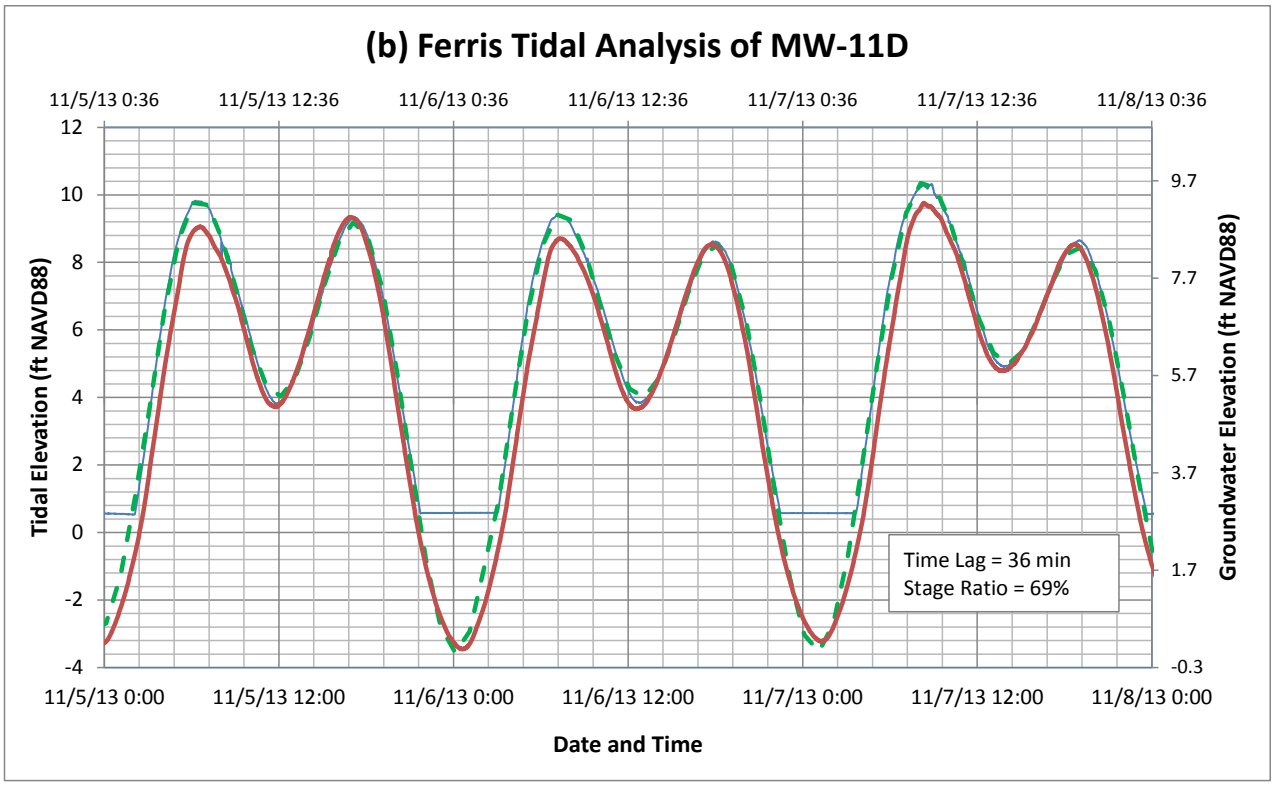


Ferris Tidal Analysis	
Everett Smelter Cleanup Site Round 2 Lowland Area, Everett, WA	
GeoEngineers	Figure C-18

Reference: Technical Analysis > Tidal Study > Everett R2 Tidal match.xlsx.

projects/sites/0035611406/default.aspx mm/dd/yy





projects/sites/0035611406/default.aspx mm/dd/yy

Notes:
1. Distance to Shoreline: 48.8 feet

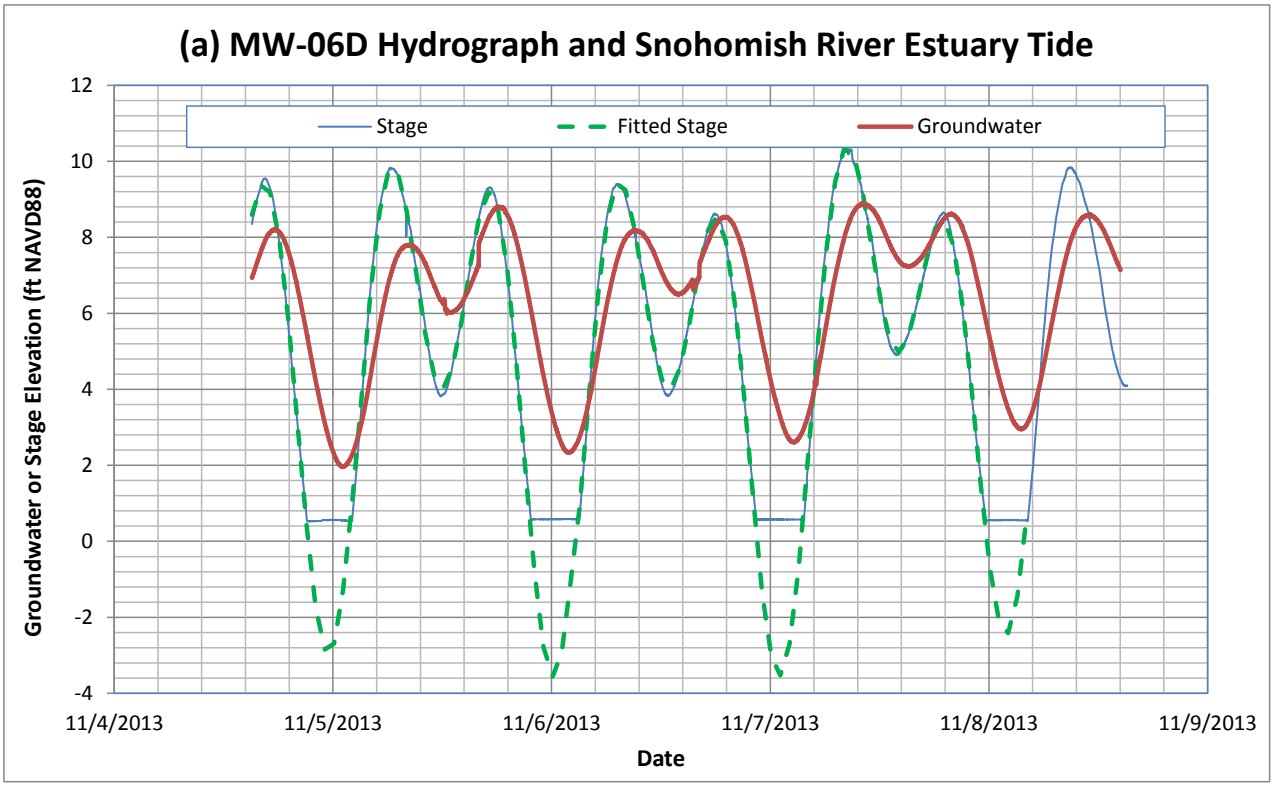
Reference: Technical Analysis > Tidal Study > Everett R2 Tidal match.xlsx.

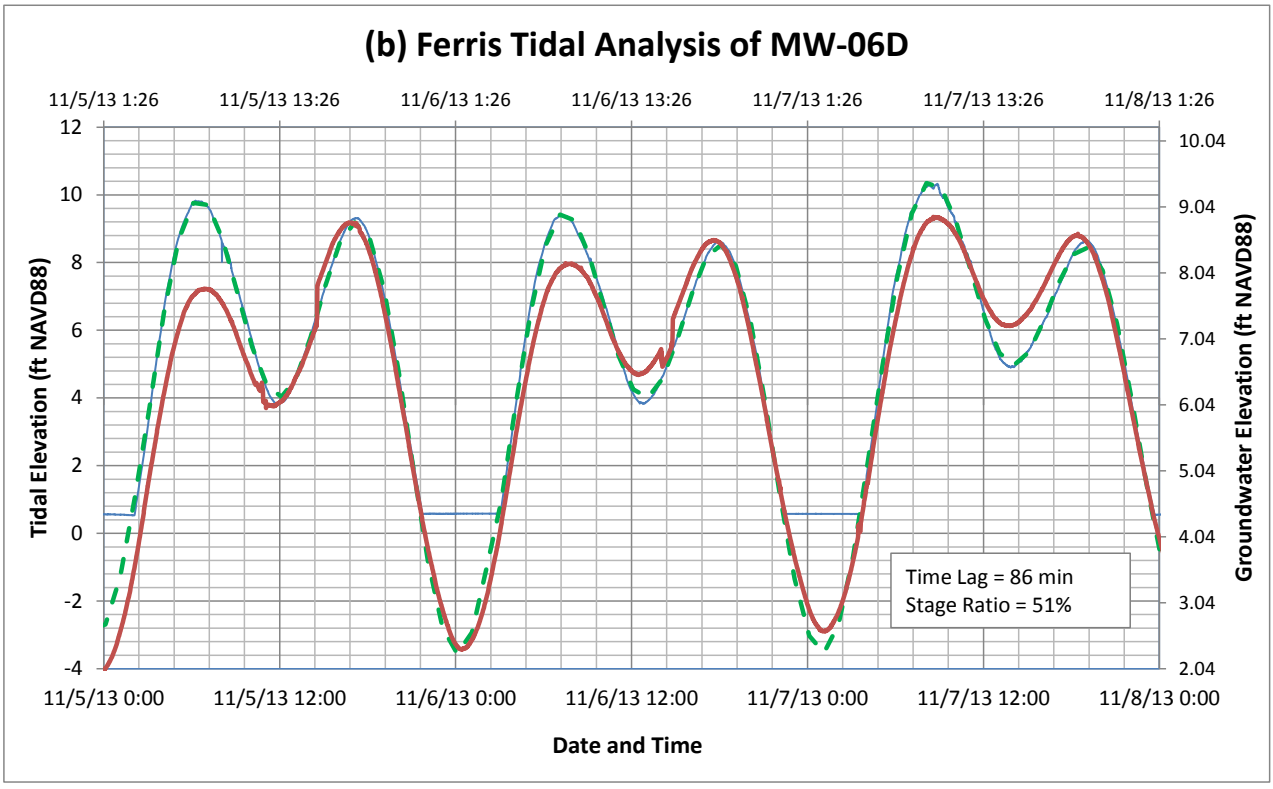
Ferris Tidal Analysis at LLMW-11D

Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

GeoEngineers

Figure C-19





projects/sites/0035611406/default.aspx mm/dd/yy

Notes:
1. Distance to Shoreline: 361 feet

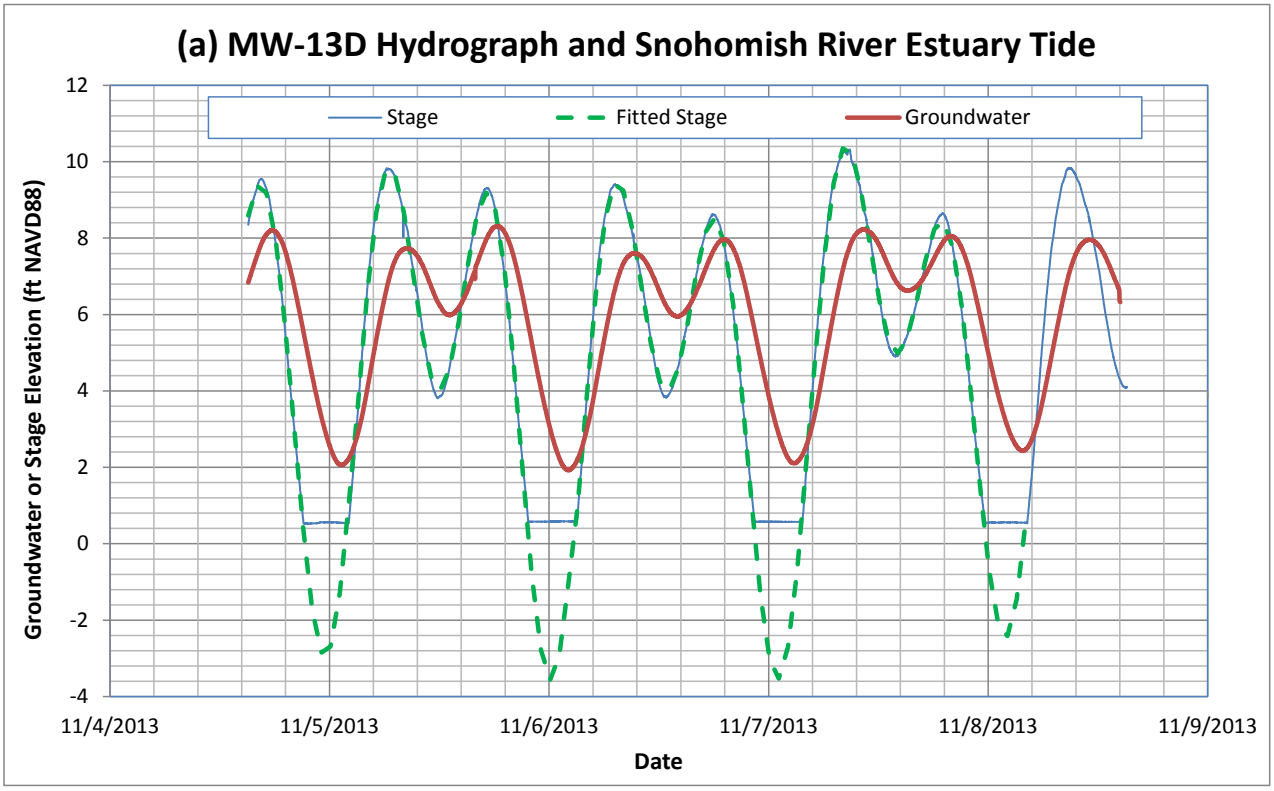
Reference: Technical Analysis > Tidal Study > Everett R2 Tidal match.xlsx.

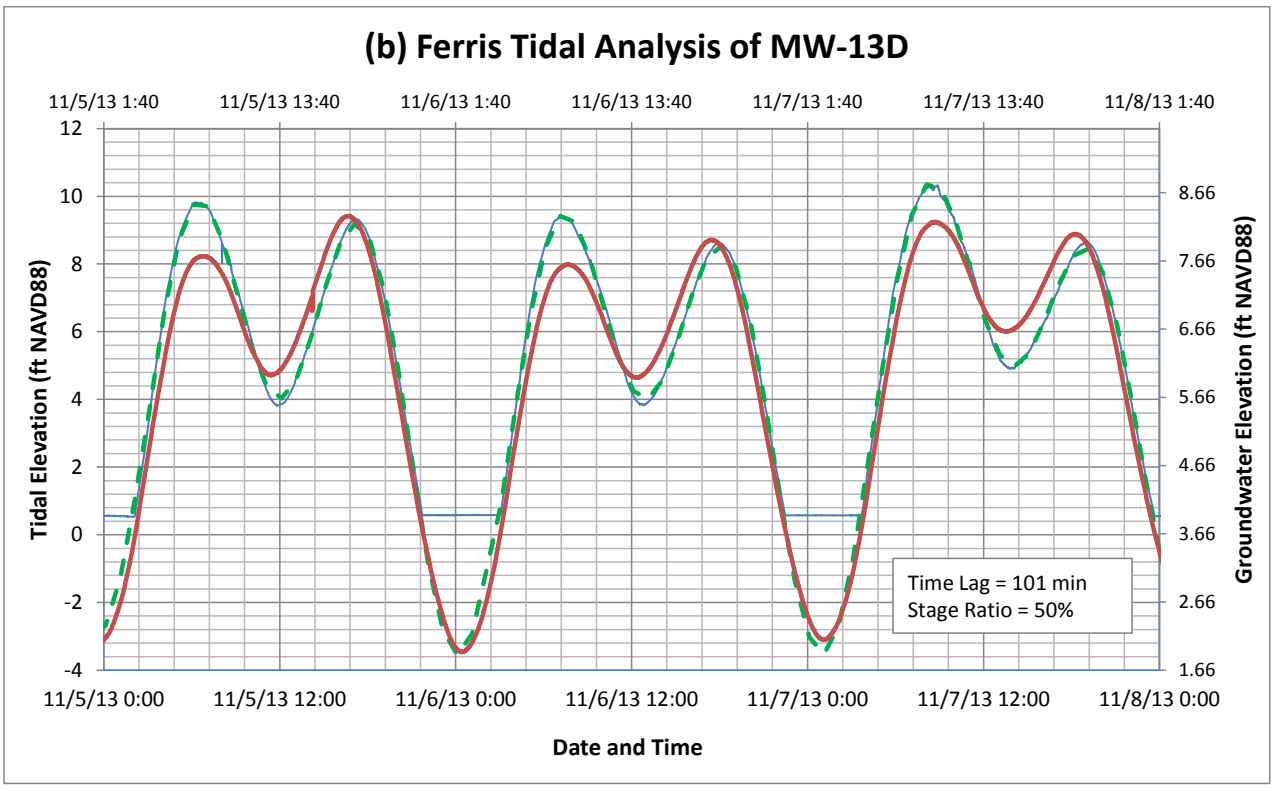
Ferris Tidal Analysis at LLMW-06D

Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

GeoEngineers

Figure C-20





Notes:
1. Distance to Shoreline: 604 feet

Reference: Technical Analysis > Tidal Study > Everett R2 Tidal match.xlsx.

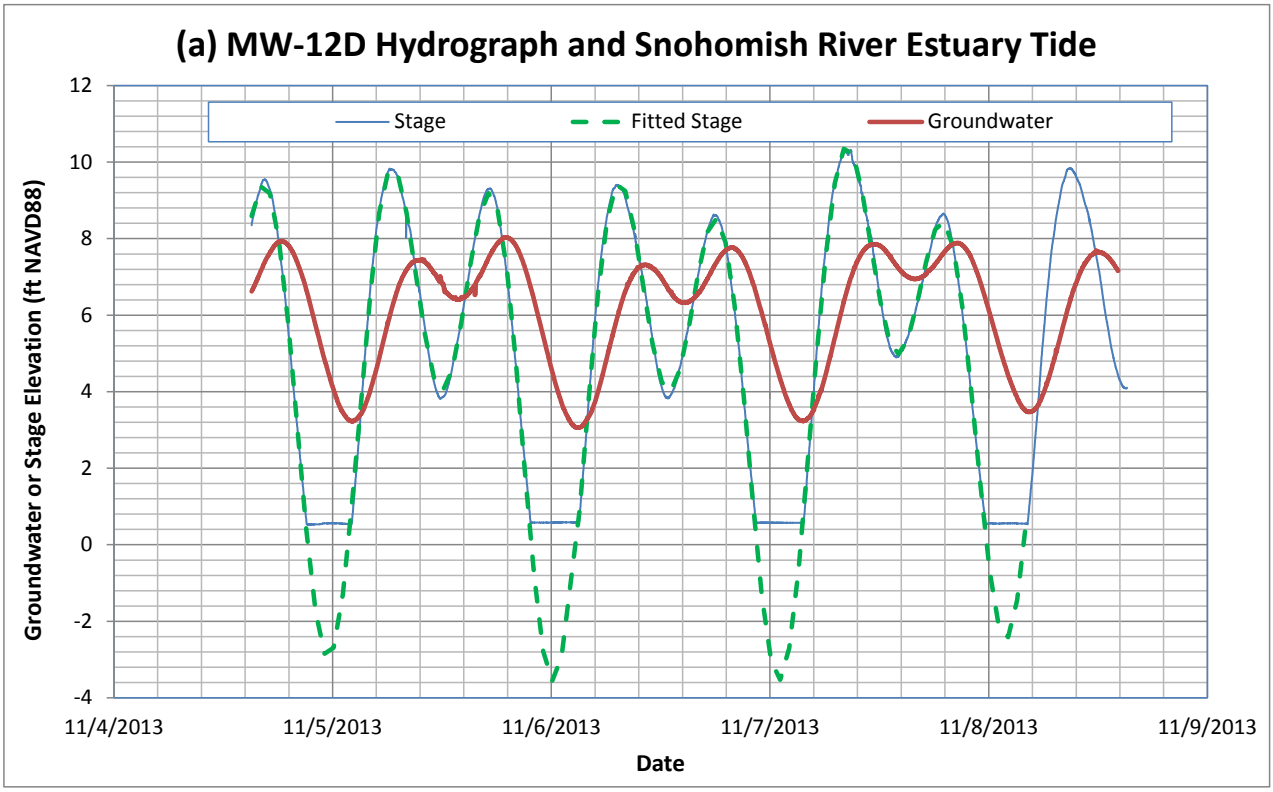
projects/sites/0035611406/default.aspx mm/dd/yy

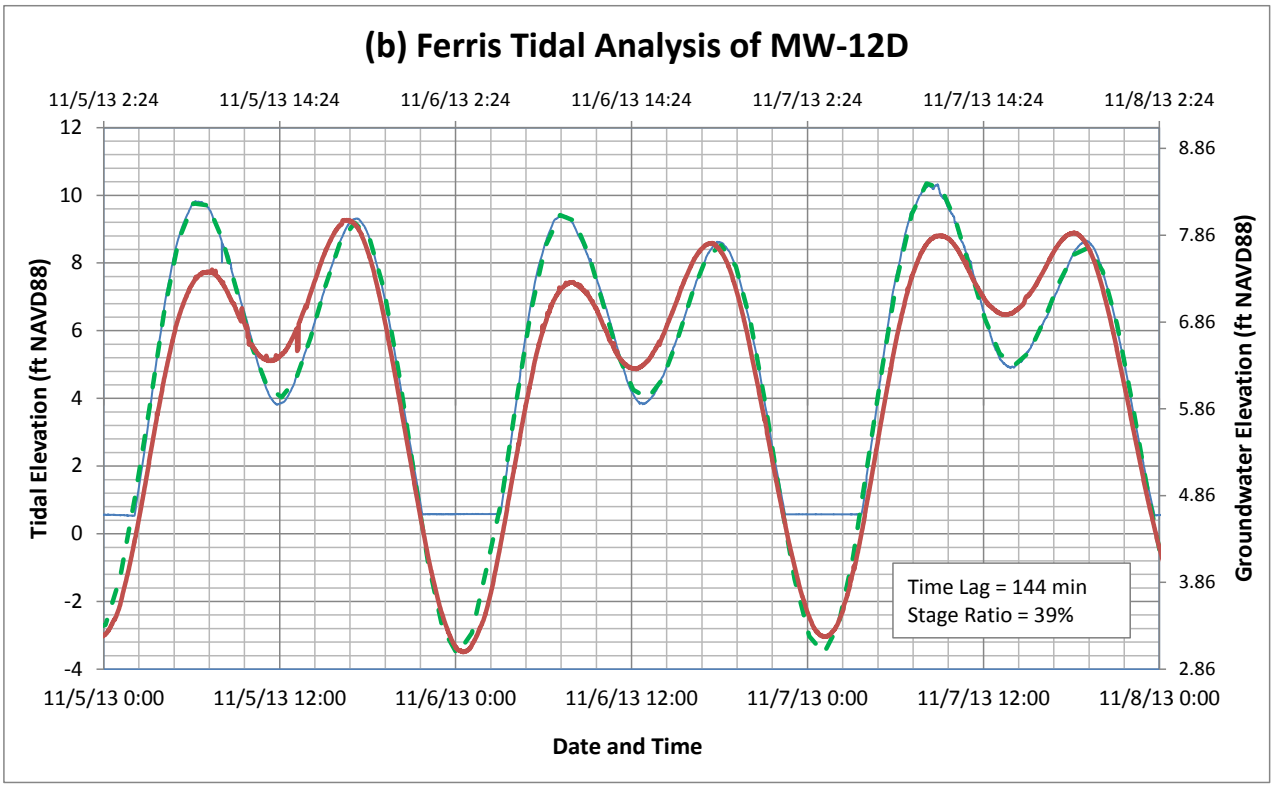
Ferris Tidal Analysis at LLMW-13D

Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

GeoEngineers

Figure C-21





projects/sites/0035611406/default.aspx mm/dd/yy

Notes:
1. Distance to Shoreline: 1,013 feet

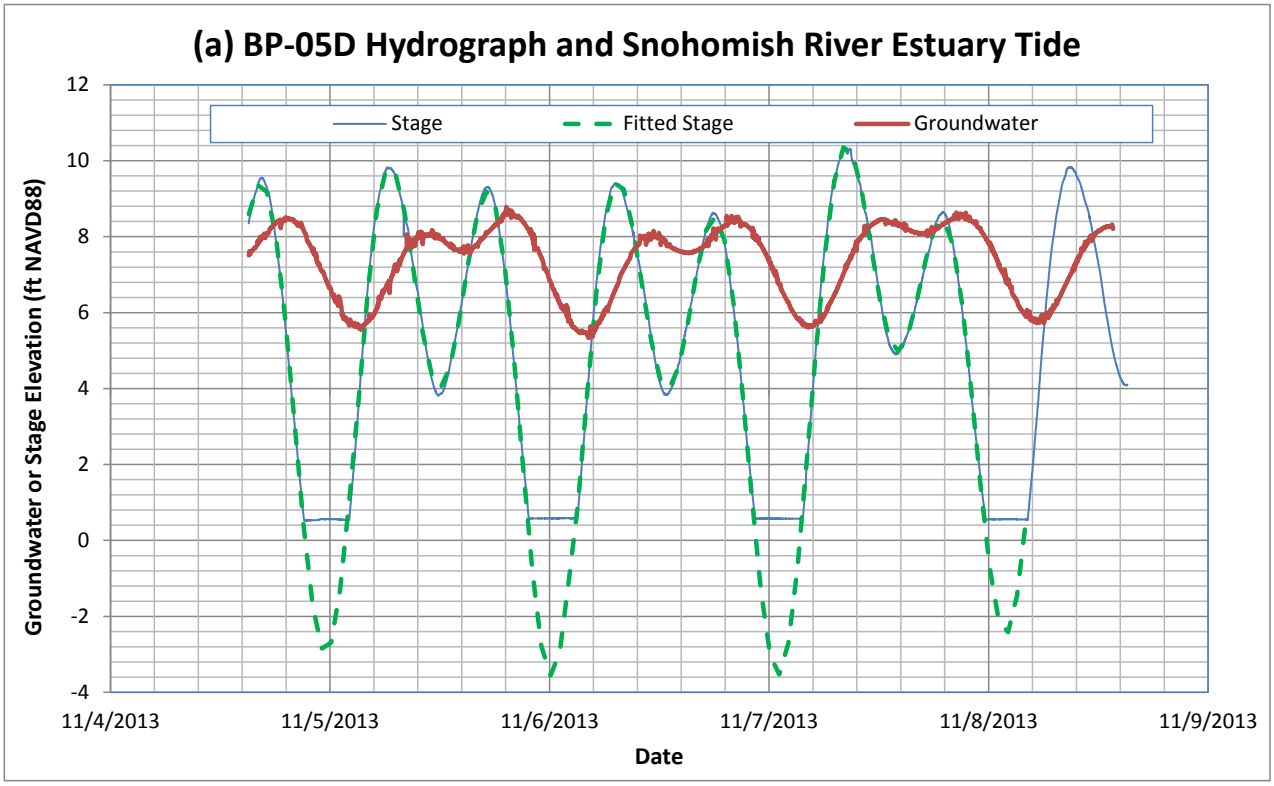
Reference: Technical Analysis > Tidal Study > Everett R2 Tidal match.xlsx.

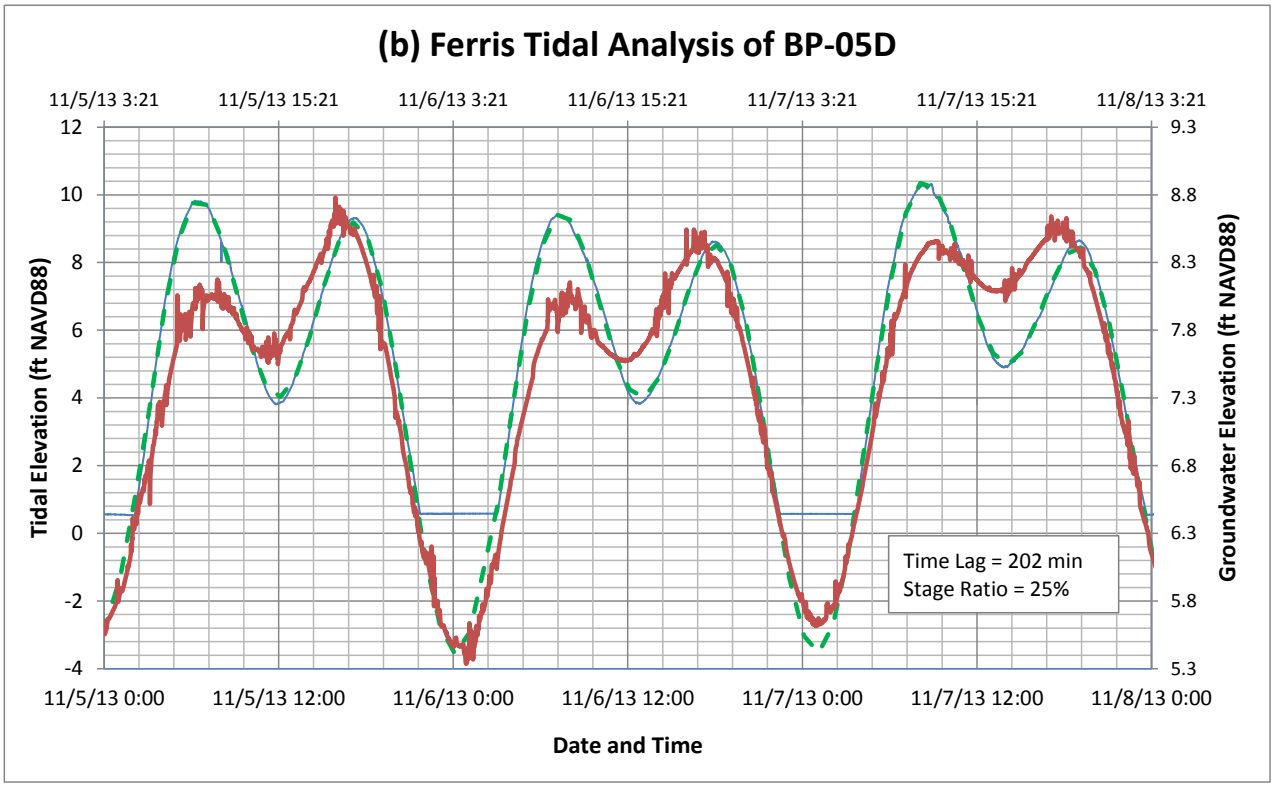
Ferris Tidal Analysis at LLMW-12D

Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

GeoEngineers

Figure C-22





projects/sites/0035611406/default.aspx mm/dd/yy

Notes:
1. Distance to Shoreline: 1,483 feet

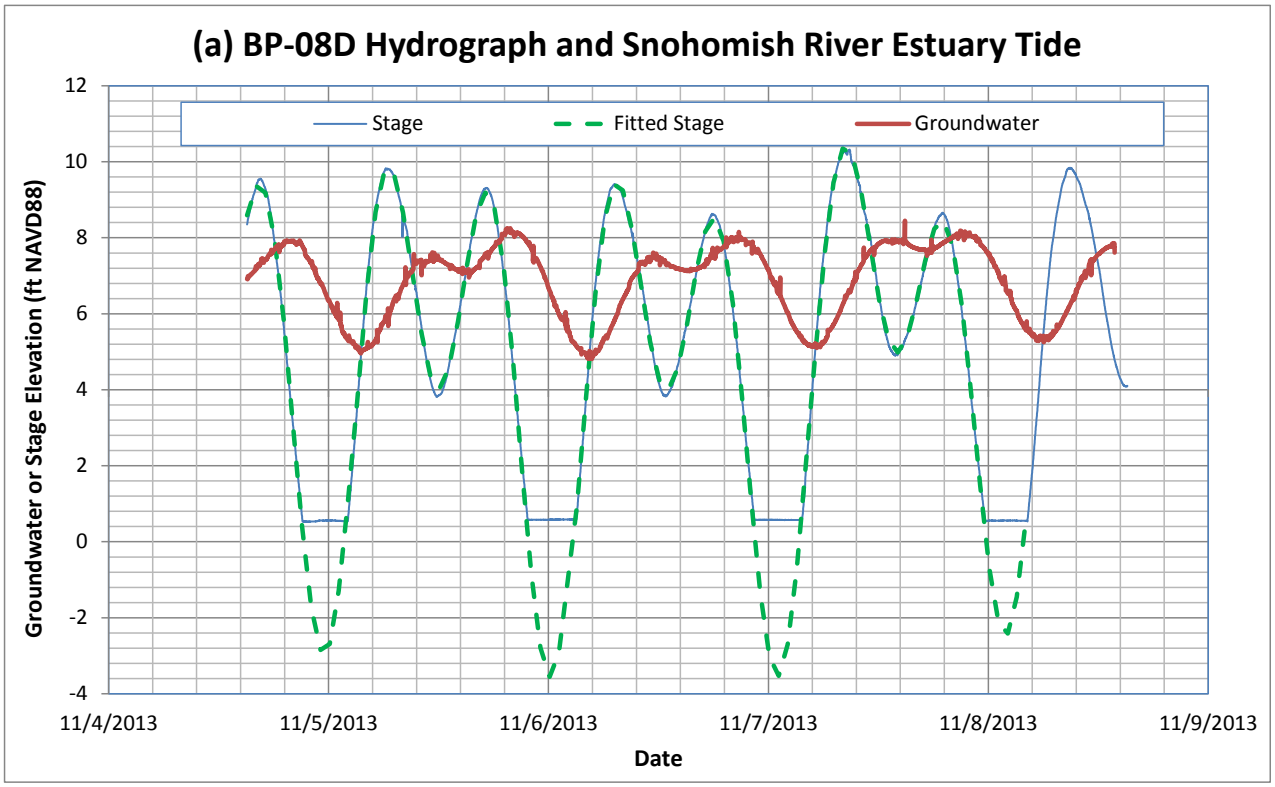
Reference: Technical Analysis > Tidal Study > Everett R2 Tidal match.xlsx.

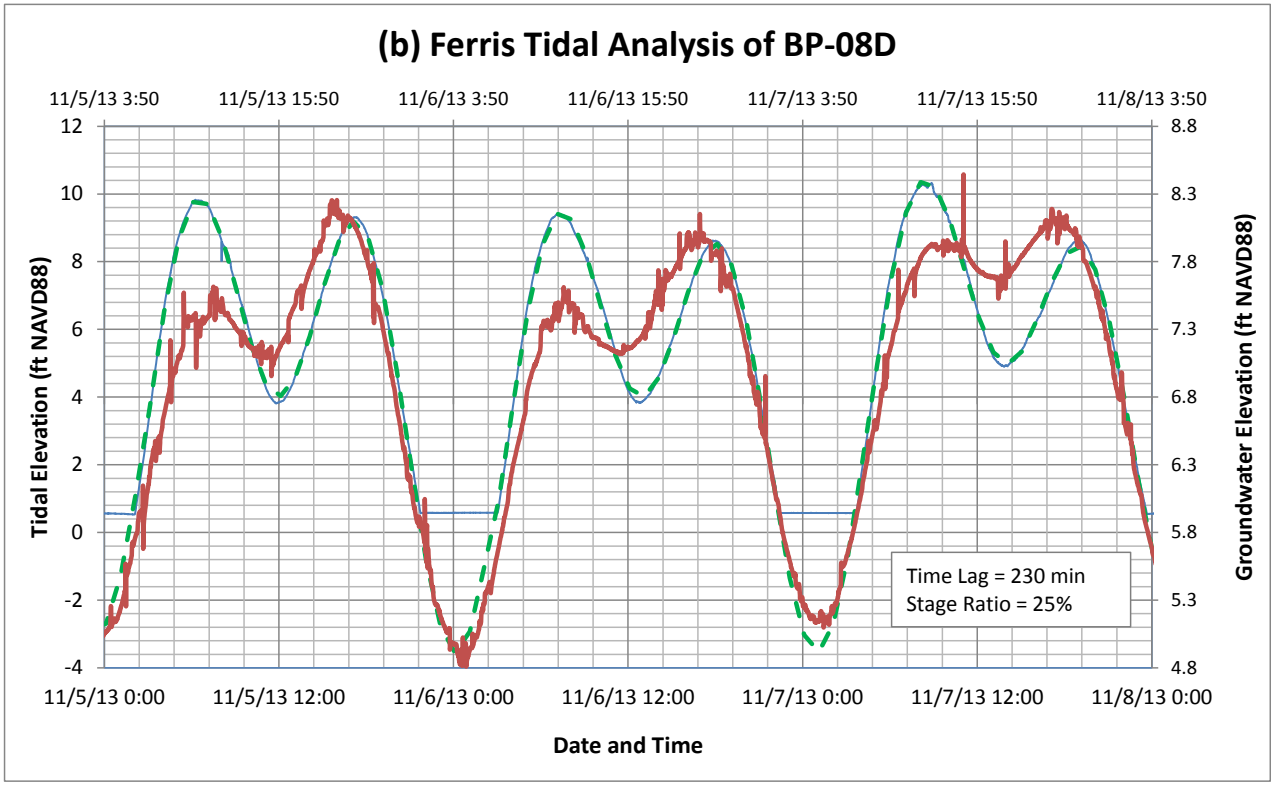
Ferris Tidal Analysis at BP-05D

Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

GeoEngineers

Figure C-23





projects/sites/0035611406/default.aspx mm/dd/yy

Notes:
1. Distance to Shoreline: 1,699 feet

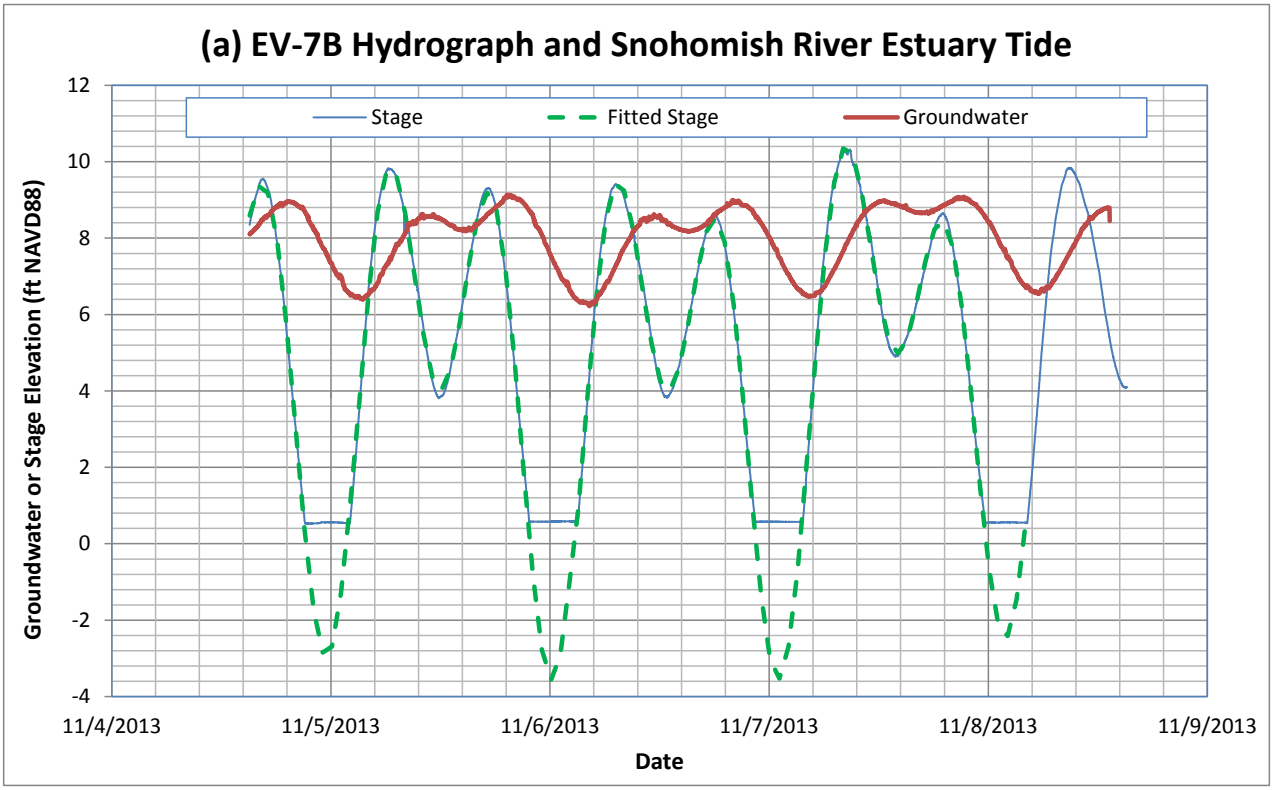
Reference: Technical Analysis > Tidal Study > Everett R2 Tidal match.xlsx.

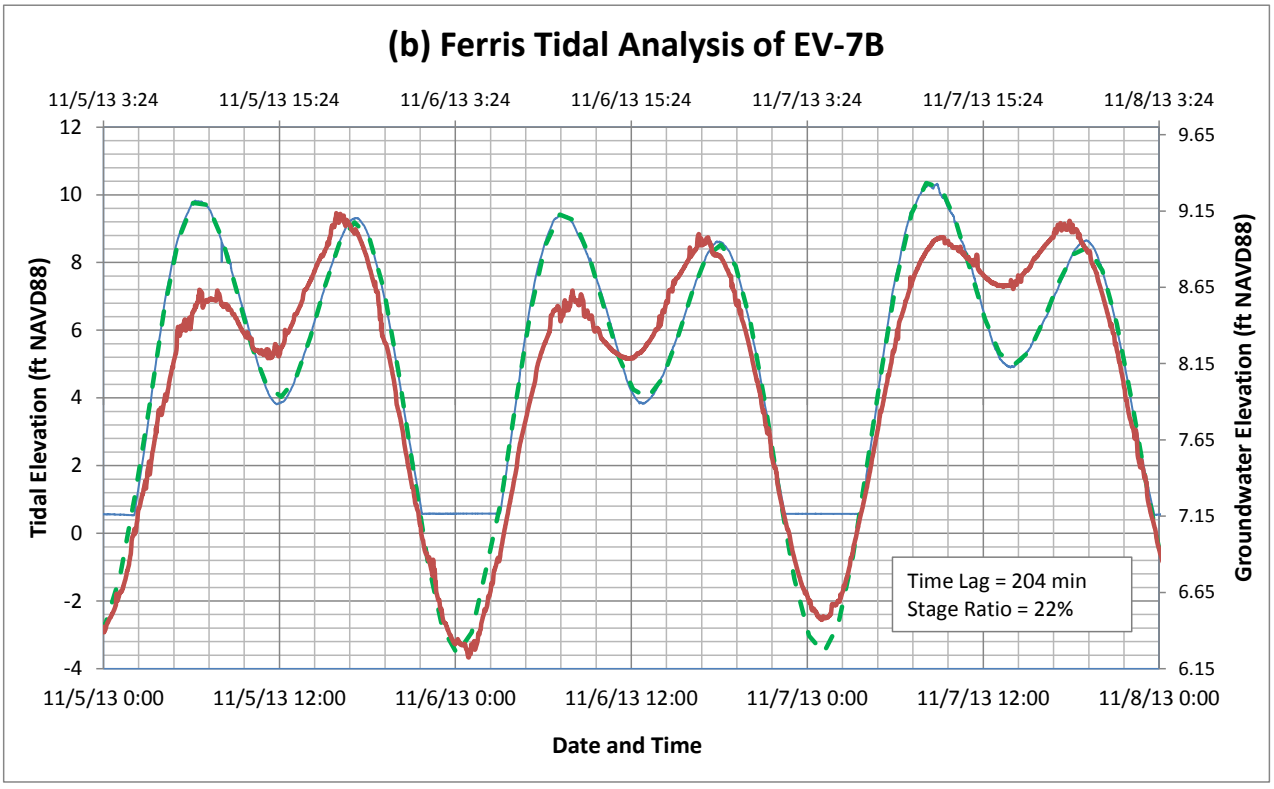
Ferris Tidal Analysis at BP-08D

Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

GeoEngineers

Figure C-24





Ferris Tidal Analysis at EV-7B

Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

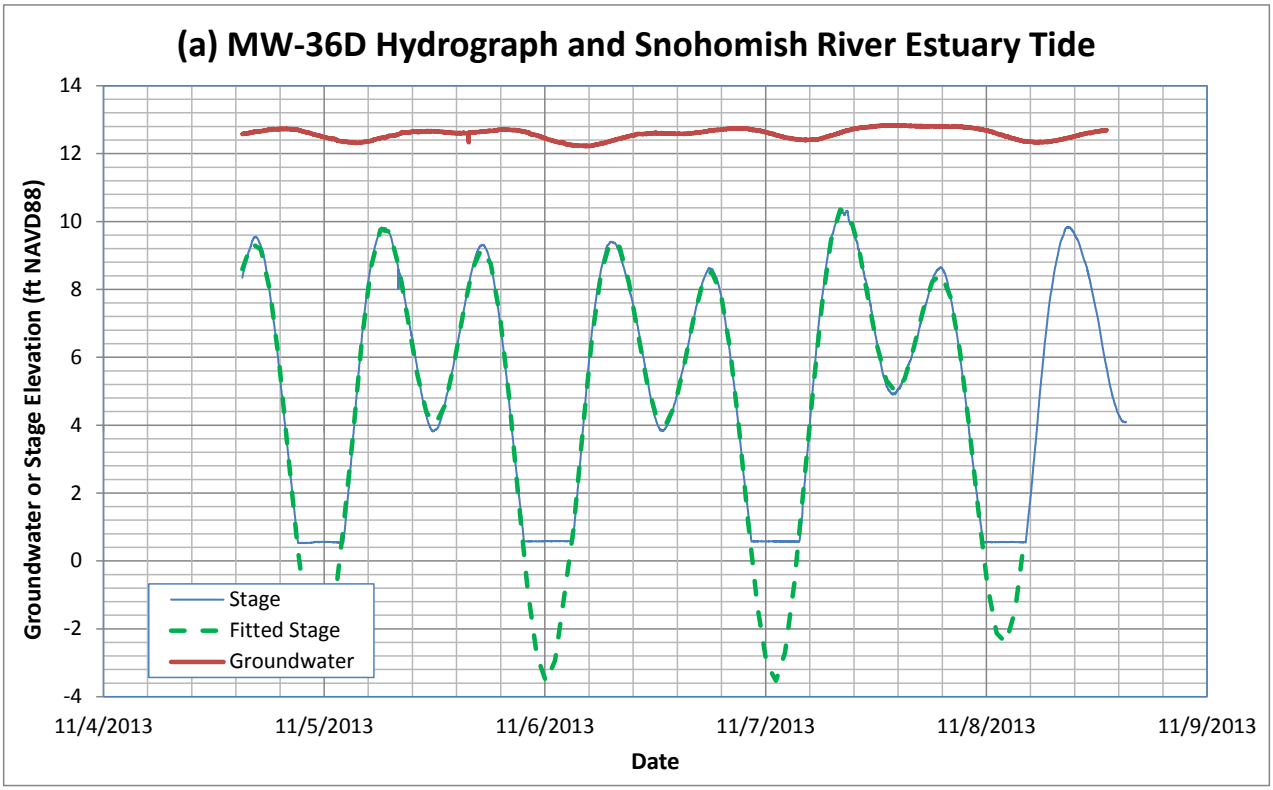
GeoEngineers

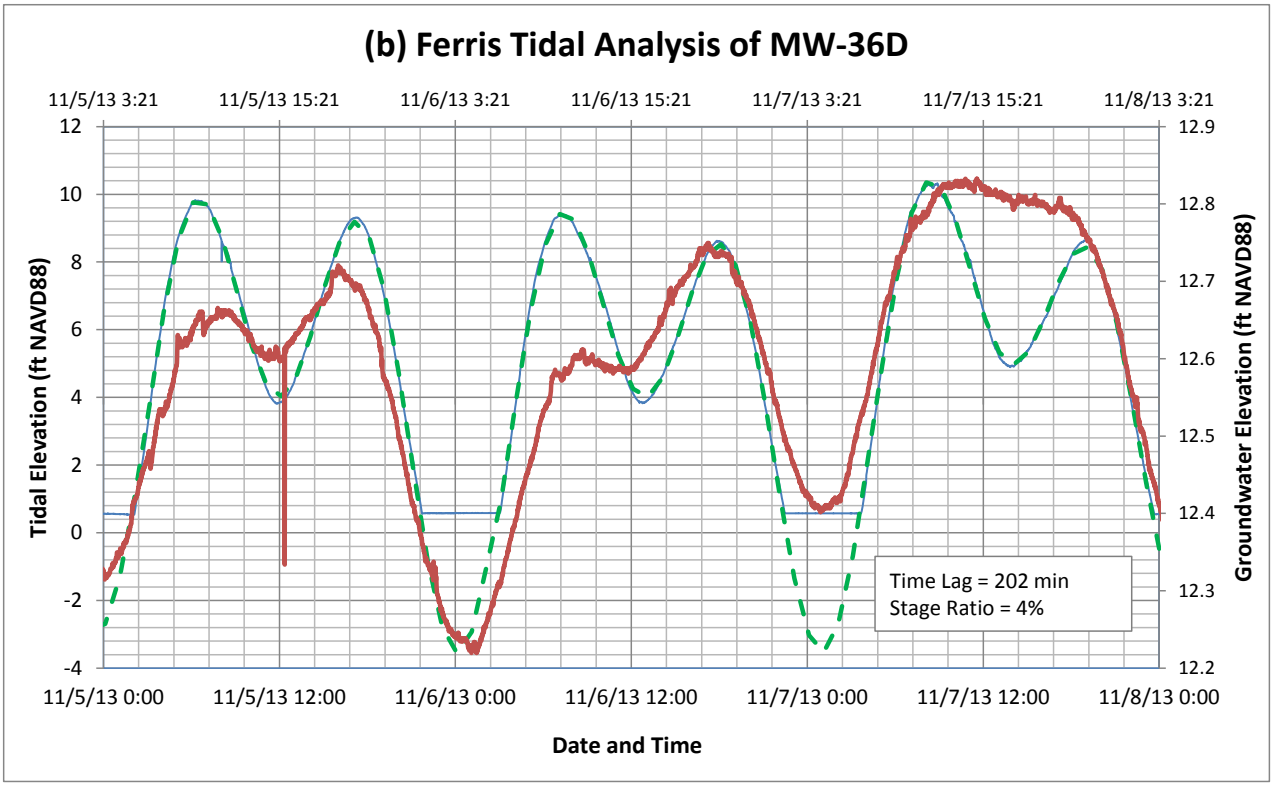
Figure C-25

Notes:
1. Distance to Shoreline: 1,550 feet

Reference: Technical Analysis > Tidal Study > Everett R2 Tidal match.xlsx.

projects/sites/0035611406/default.aspx mm/dd/yy





projects/sites/0035611406/default.aspx mm/dd/yy

Notes:
1. Distance to Shoreline: 1,700 feet

Reference: Technical Analysis > Tidal Study > Everett R2 Tidal match.xlsx.

Ferris Tidal Analysis at LLMW-36D

Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

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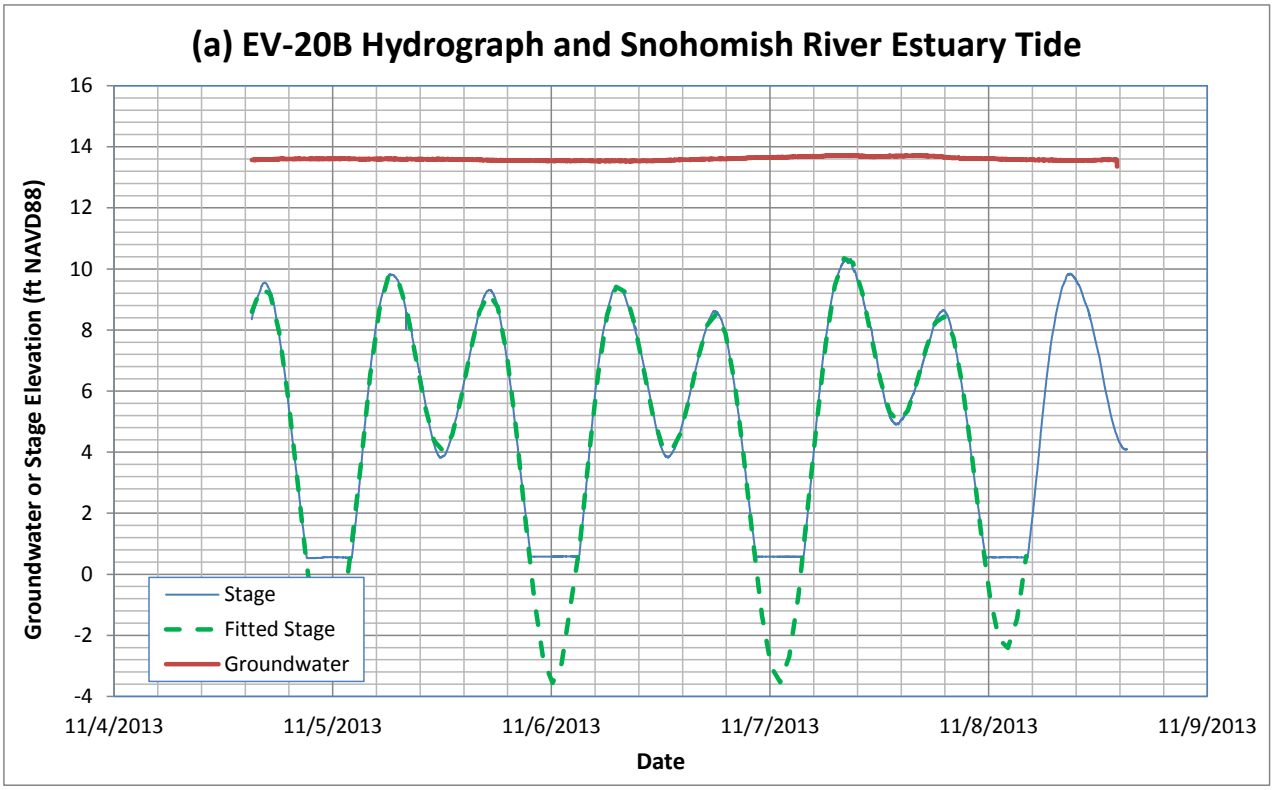
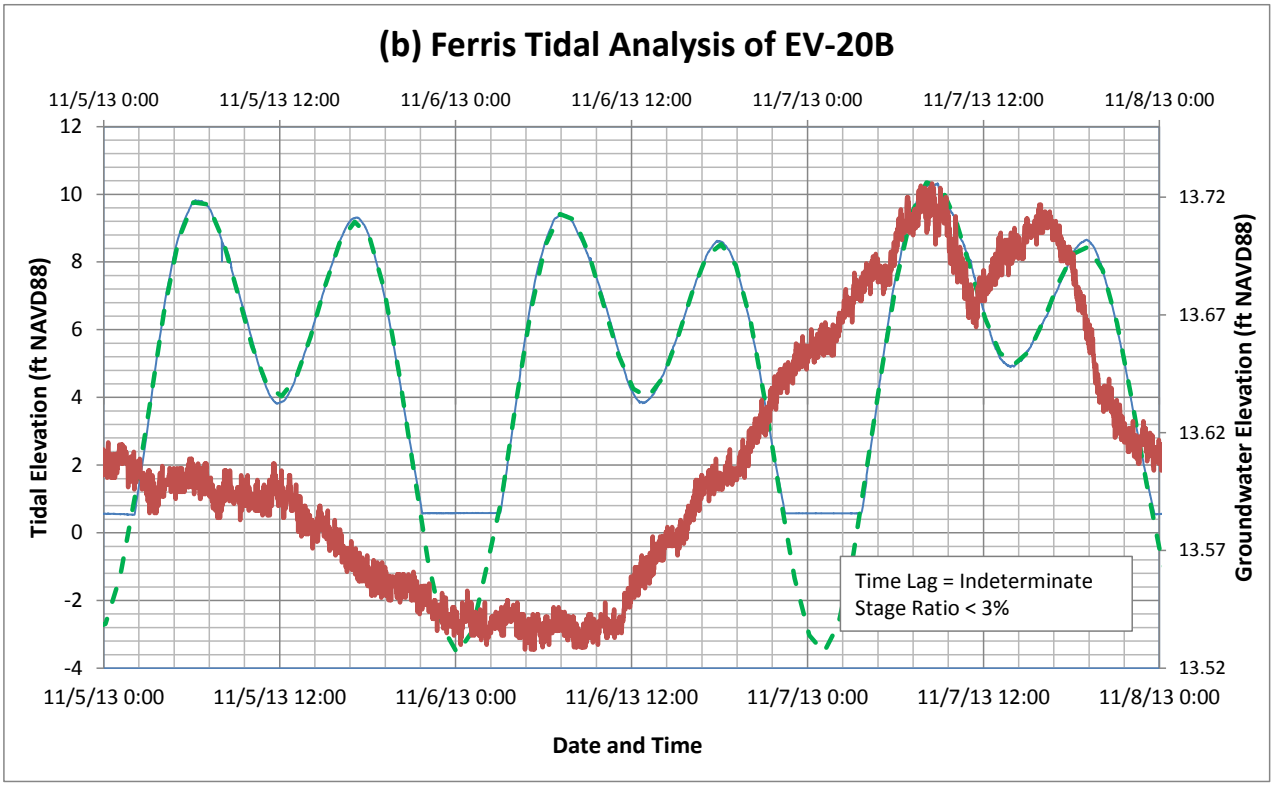
Figure C-26





Notes:
1. Distance to Shoreline: 1,653 feet

Reference: Technical Analysis > Tidal Study > Everett R2 Tidal match.xlsx.

projects/sites/0035611406/default.aspx mm/dd/yy

Ferris Tidal Analysis at EV-20B

Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

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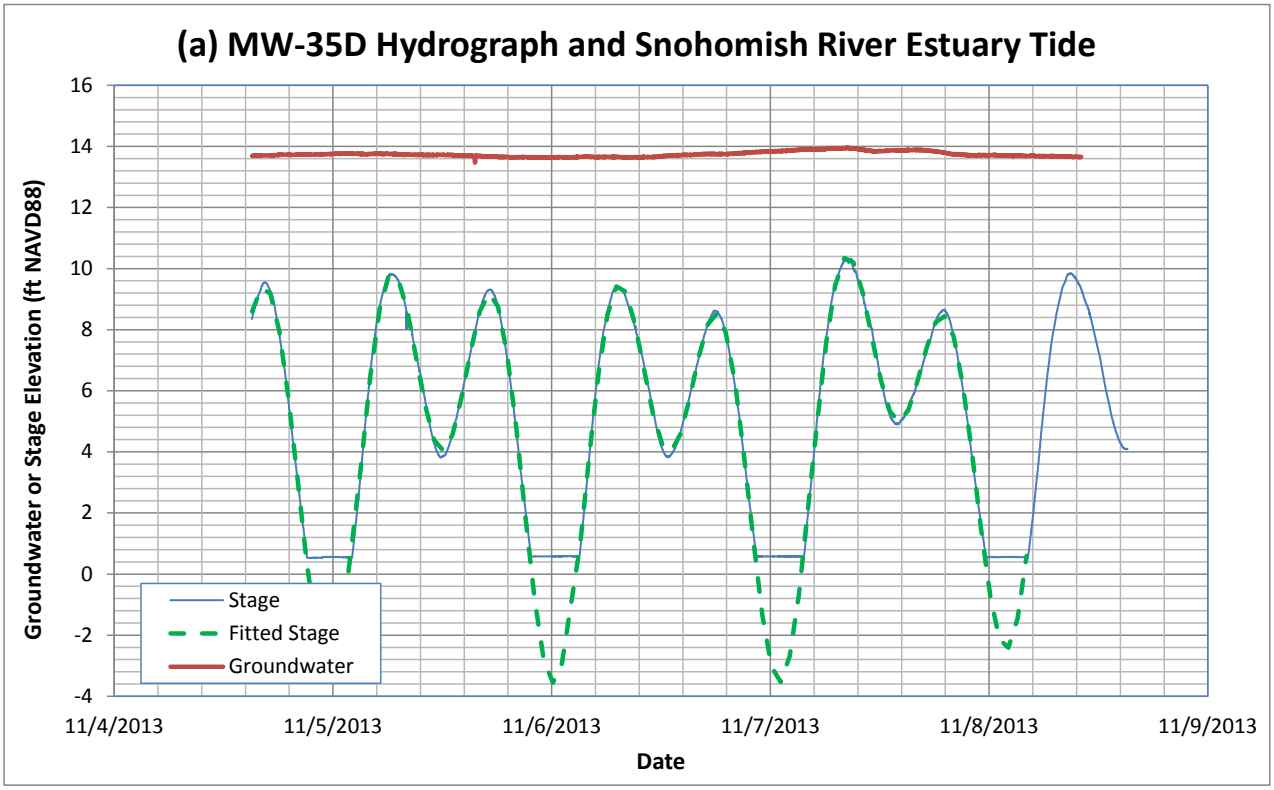
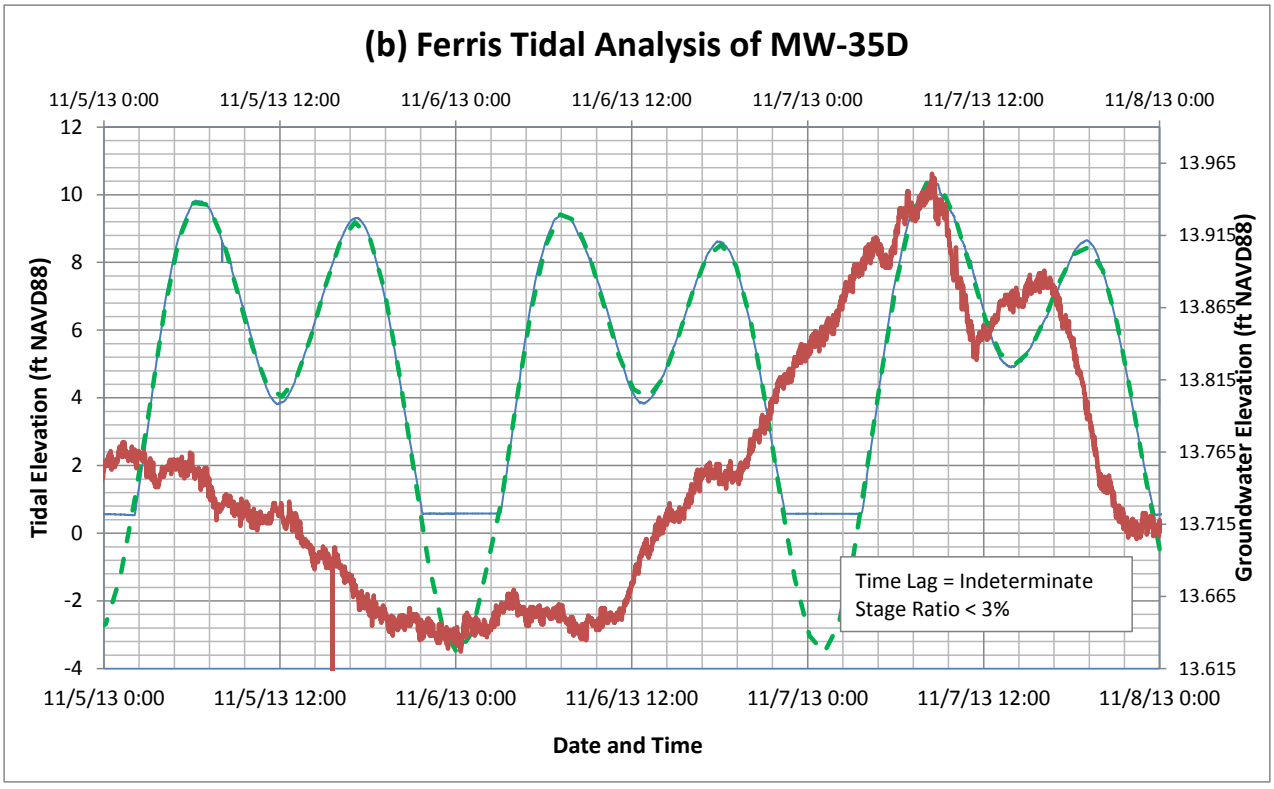
Figure C-27





Notes:
1. Distance to Shoreline: 2,130 feet

Reference: Technical Analysis > Tidal Study > Everett R2 Tidal match.xlsx.

Ferris Tidal Analysis at LLMW-35D

Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

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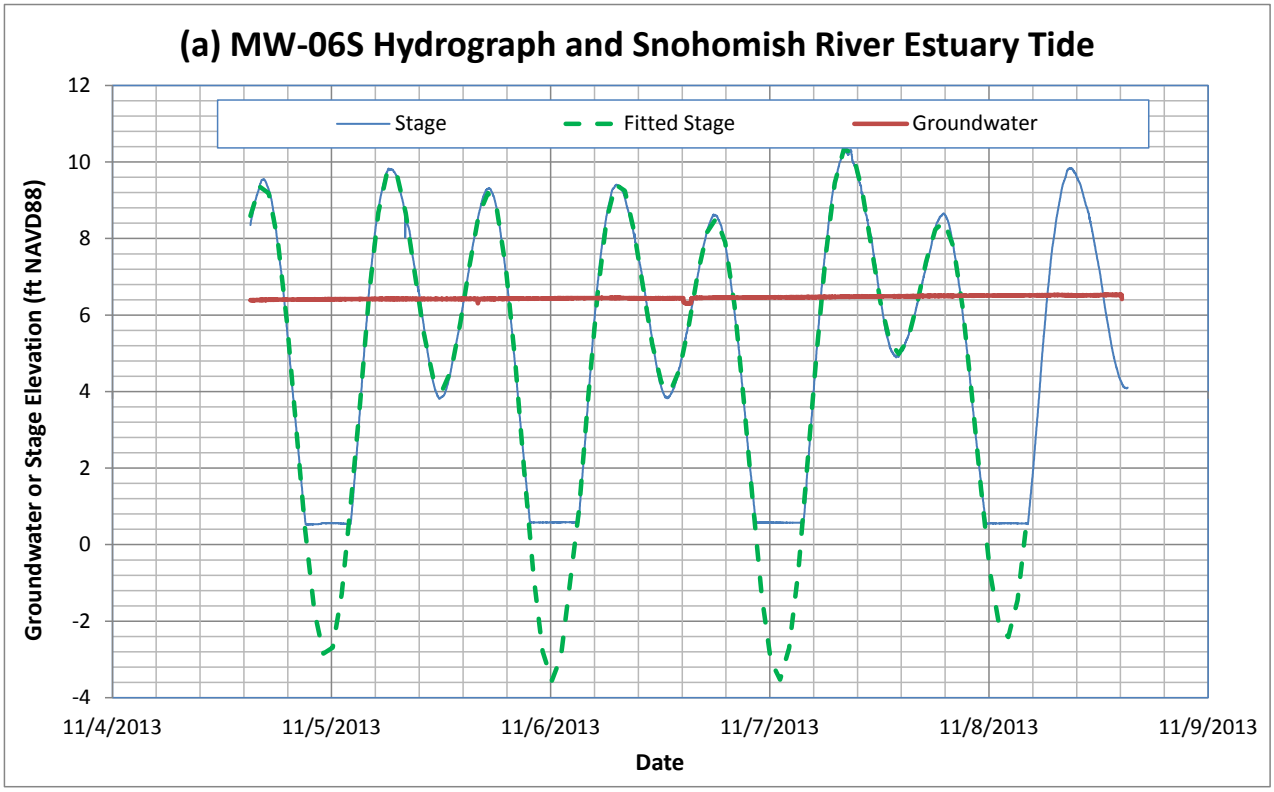
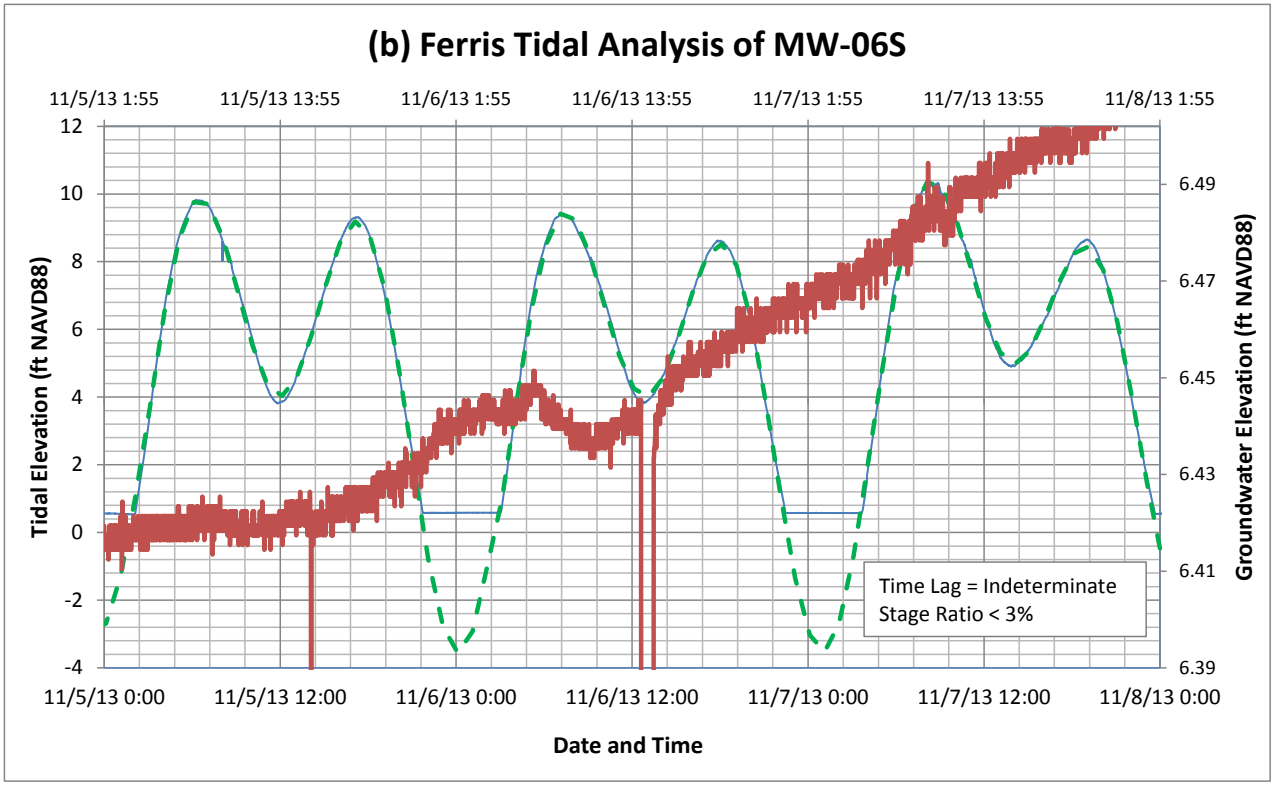
Figure C-28

projects/sites/0035611406/default.aspx mm/dd/yy





Notes:
1. Distance to Shoreline: 358 feet

Reference: Technical Analysis > Tidal Study > Everett R2 Tidal match.xlsx.

projects/sites/0035611406/default.aspx mm/dd/yy

Ferris Tidal Analysis at LLMW-06S

Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

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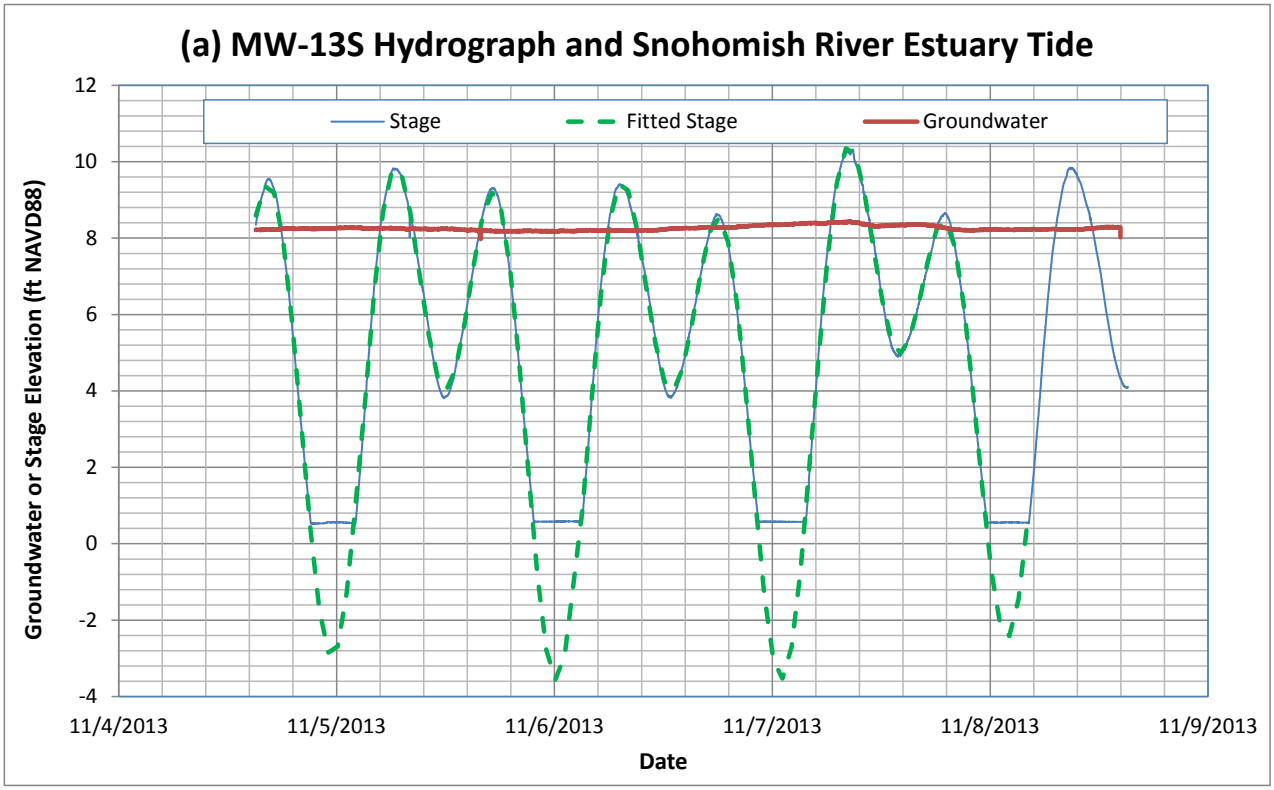
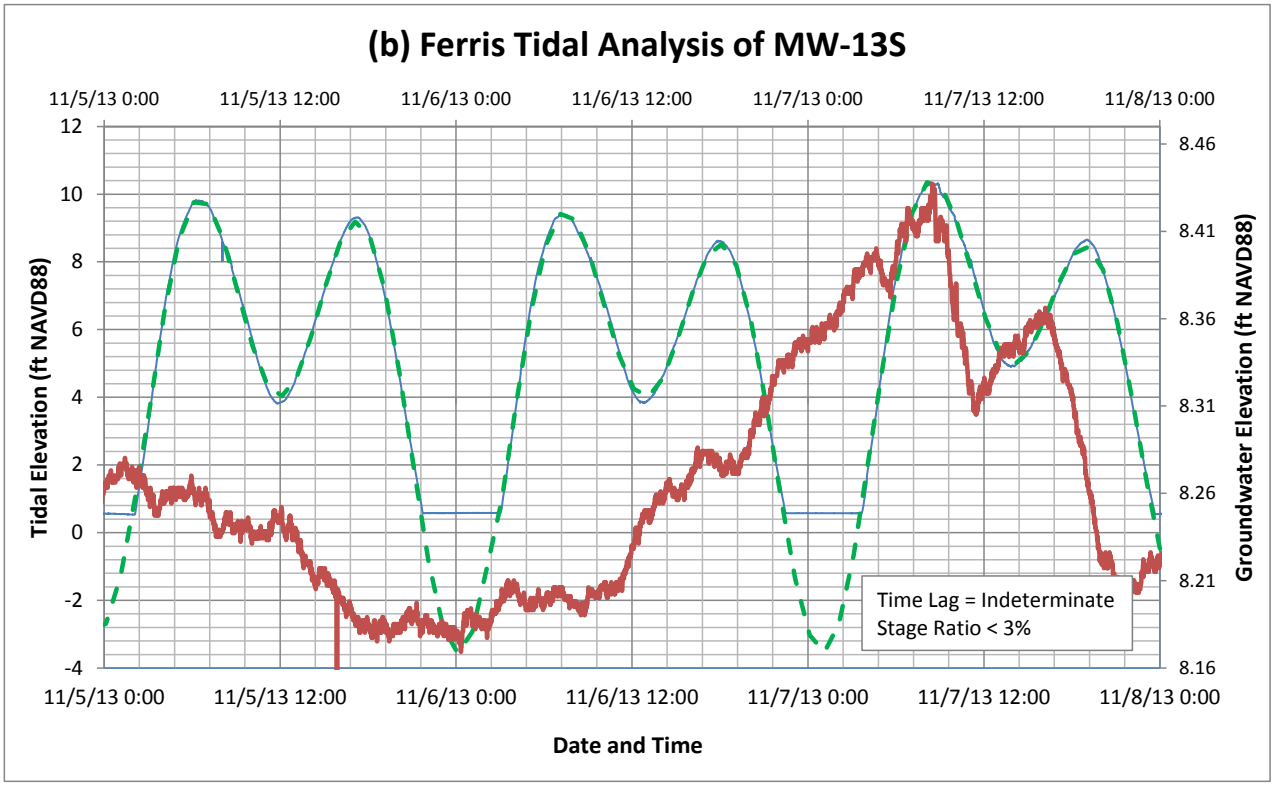
Figure C-29





projects/sites/0035611406/default.aspx mm/dd/yy

Notes:
1. Distance to Shoreline: 601 feet

Reference: Technical Analysis > Tidal Study > Everett R2 Tidal match.xlsx.

Ferris Tidal Analysis at LLMW-13S

Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

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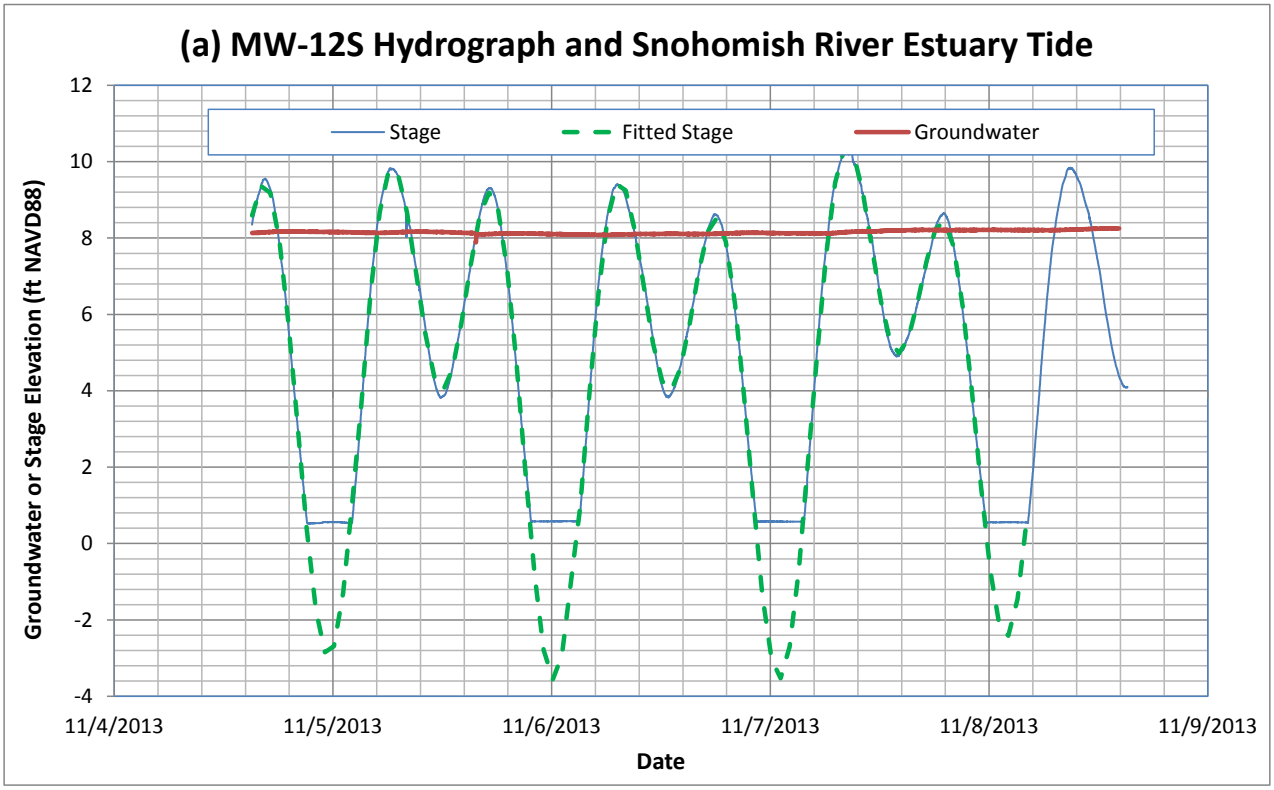
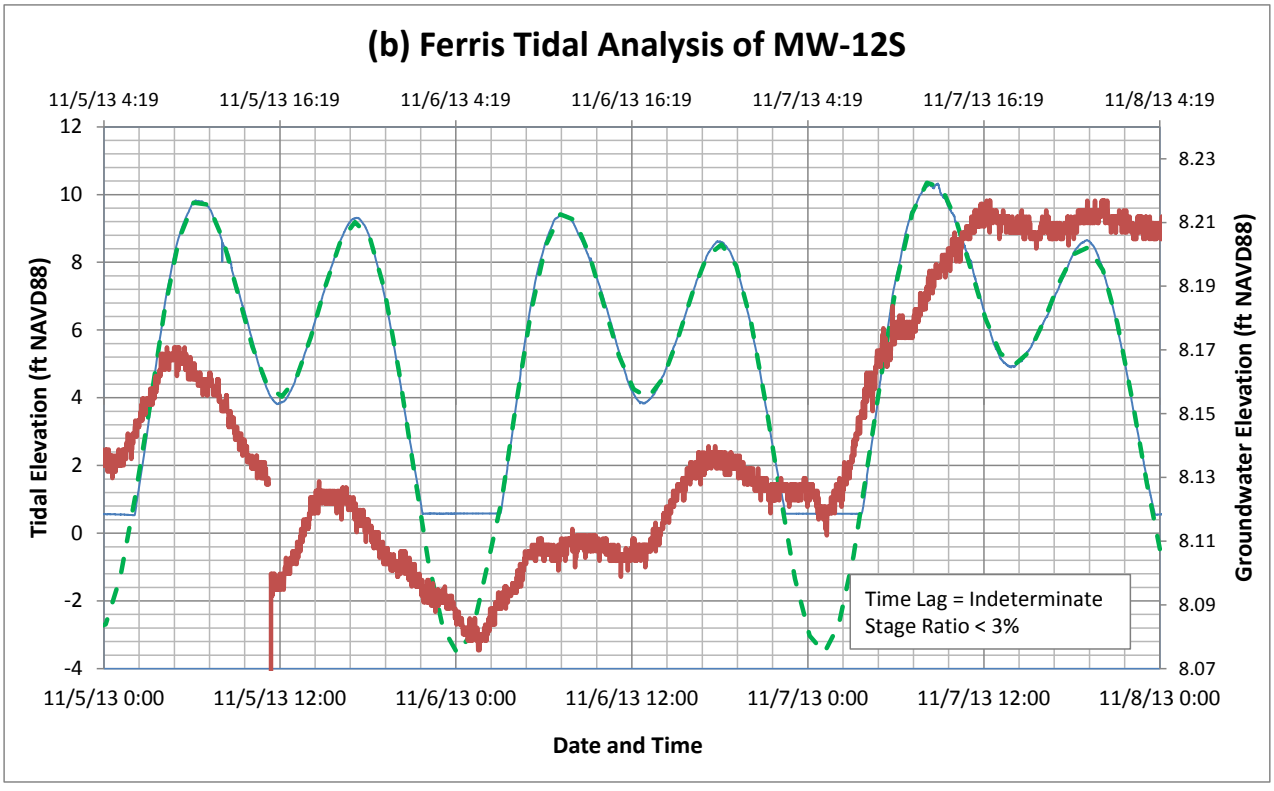
Figure C-30





Notes:
1. Distance to Shoreline: 1,016 feet

Reference: Technical Analysis > Tidal Study > Everett R2 Tidal match.xlsx.

Ferris Tidal Analysis at LLMW-12S

Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

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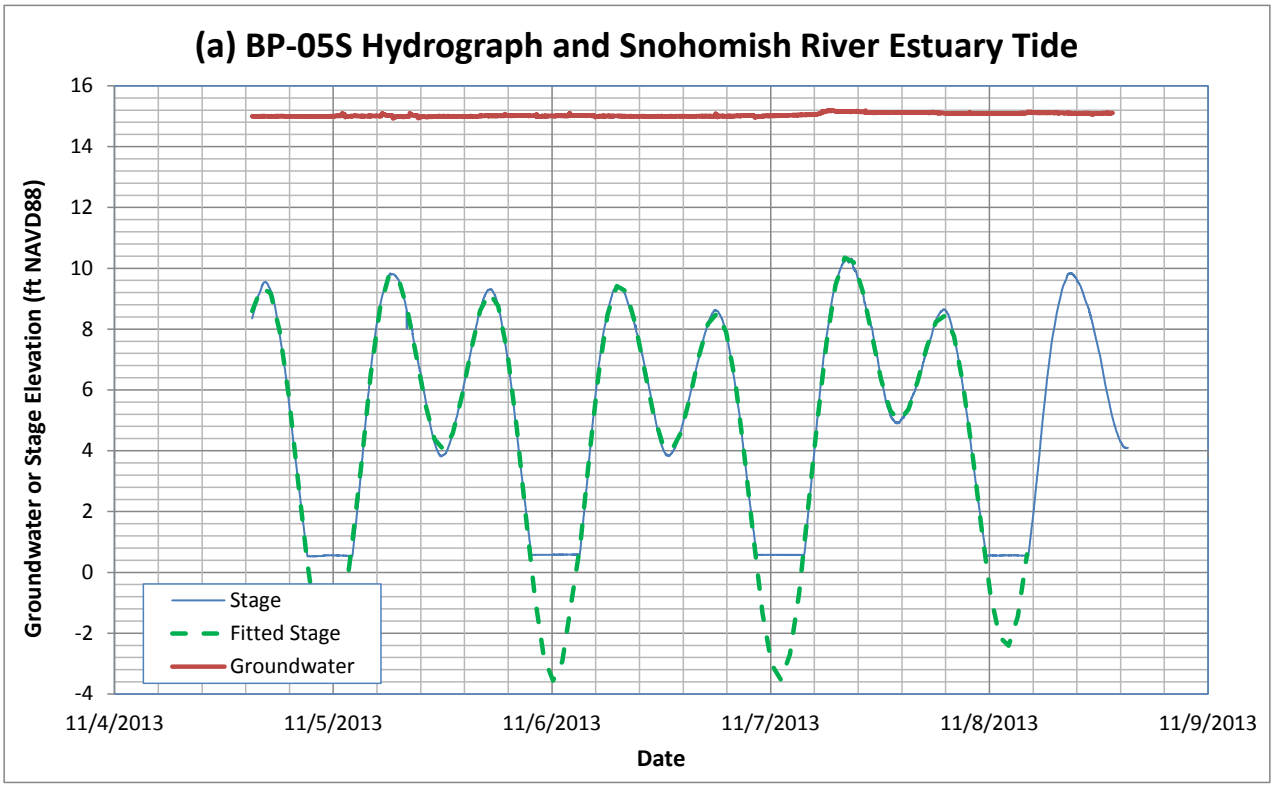
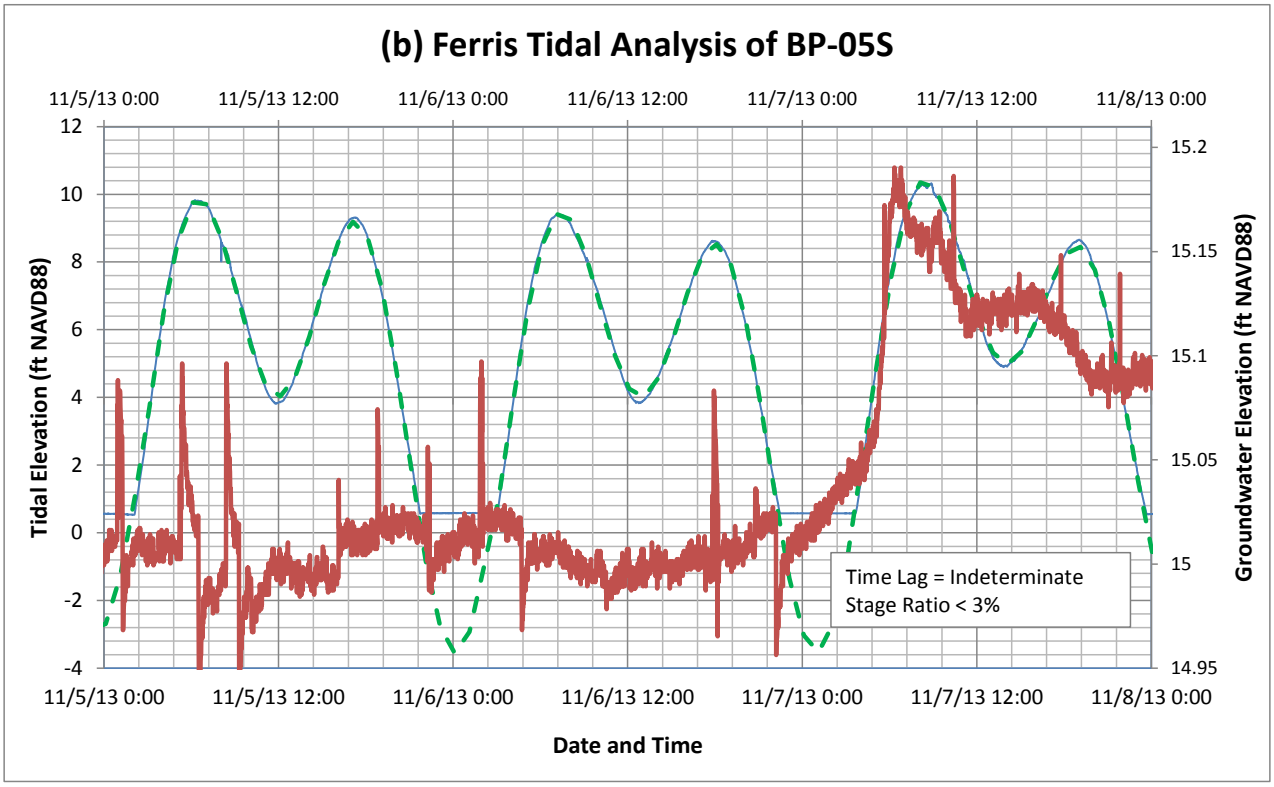
Figure C-31





projects/sites/0035611406/default.aspx mm/dd/yy

Notes:
1. Distance to Shoreline: 1,483 feet

Reference: Technical Analysis > Tidal Study > Everett R2 Tidal match.xlsx.

Ferris Tidal Analysis at BP-05S

Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

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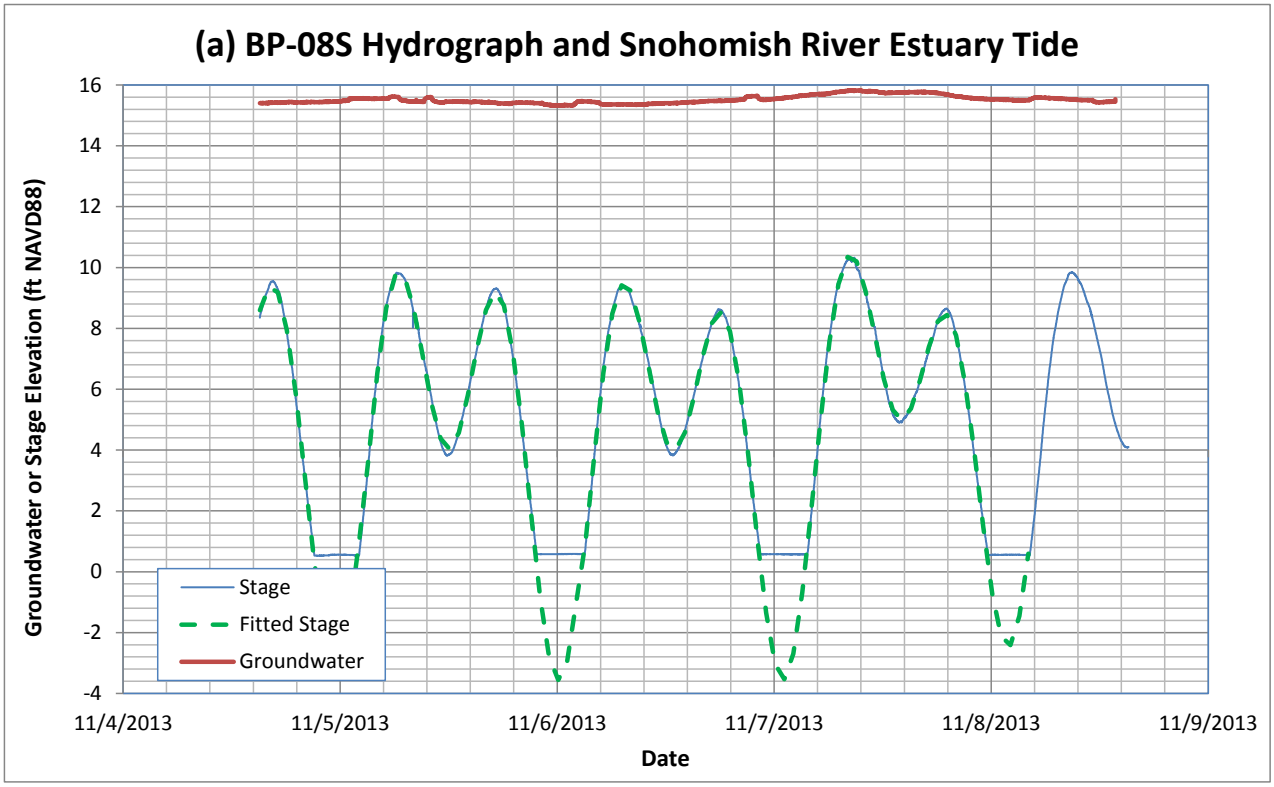
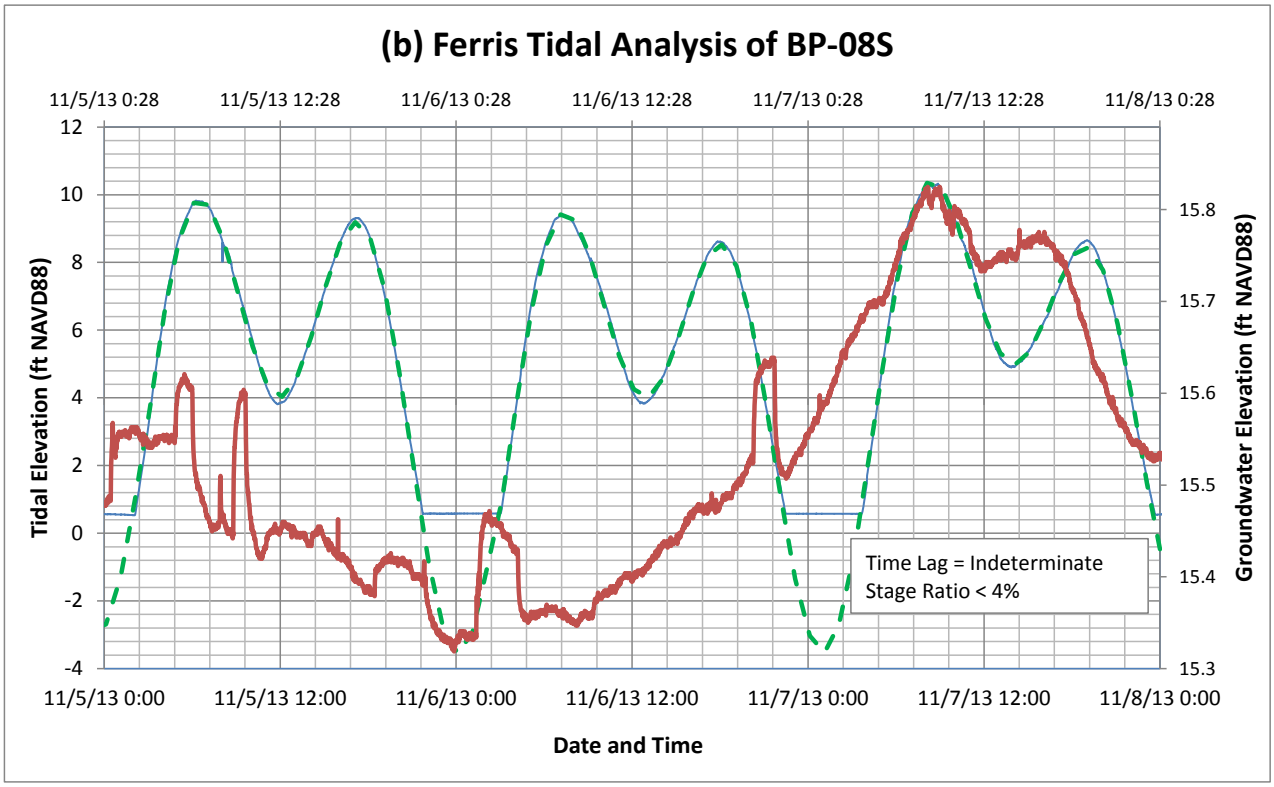
Figure C-32





Notes:
1. Distance to Shoreline: 1,699 feet

Reference: Technical Analysis > Tidal Study > Everett R2 Tidal match.xlsx.

Ferris Tidal Analysis at BP-08S

Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

GeoEngineers

Figure C-33

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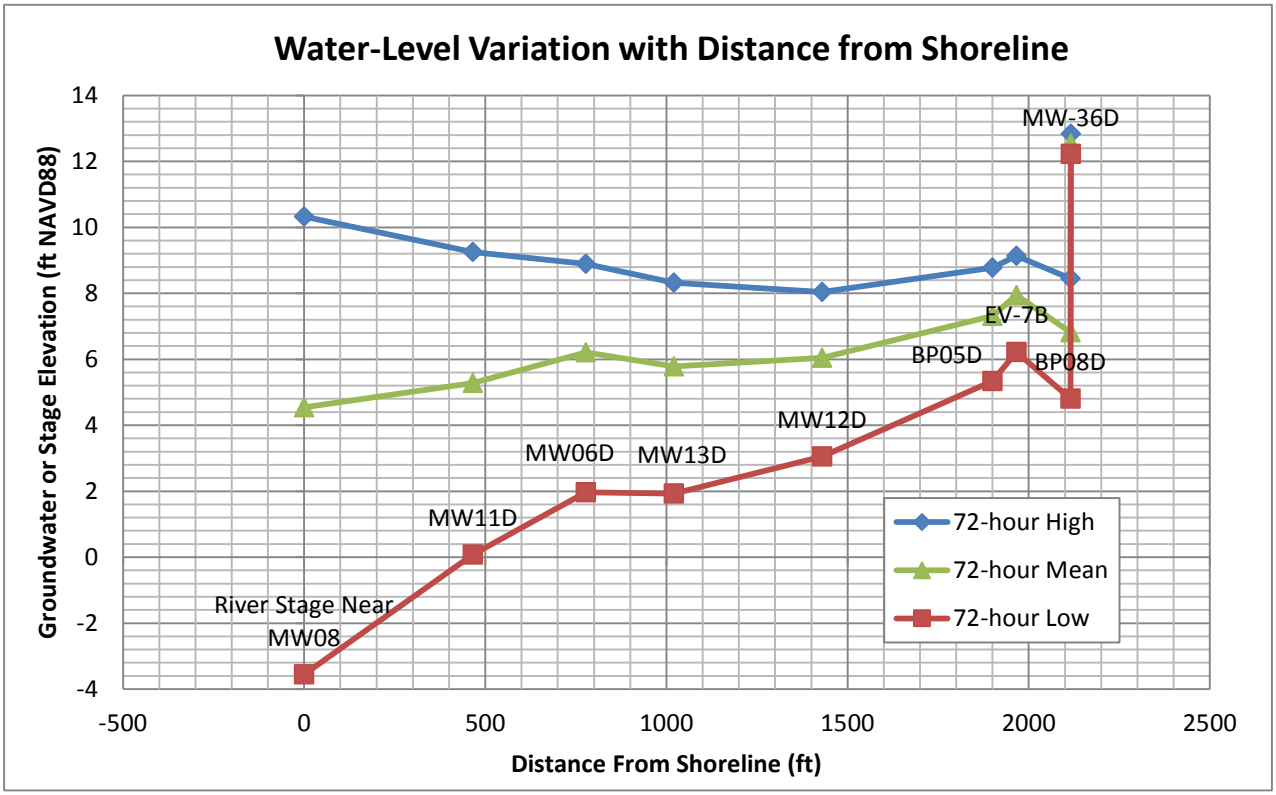

Notes:

1. Mean water level calculation based on Serfes (1991)
2. Shoreline was estimated using Ferris (1951) method

Reference: Technical Analysis > Tidal Study > Everett R2 Mean GW Elev.xlsx
Technical Analysis > Tidal Study > Everett R2 Tidal Match.xlsx

Water-Level Variation with Distance from Shoreline

Everett Smelter Cleanup Site Round 2
Lowland Area, Everett, WA

GeoEngineers

Figure C-34

projects/sites/0035611406/default.aspx mm/dd/yy

GeoEngineers

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Memorandum

To:	Sandra Matthews, Washington State Department of Ecology
From:	Garrett R. Leque, Iain H. Wingard
Date:	November 17, 2014
File:	0504-068-01
Subject:	2014 Focused Source Area Investigation Results

INTRODUCTION

This memorandum presents the results of an investigation that was performed for the Lowland Area of the Everett Smelter Site. The investigation was performed in March and April 2014. The location of the investigation area is shown in Figure 1. Also shown in Figure 1 are the Upland and Lowland Areas that comprise the Everett Smelter Site. The investigation activities were performed in general accordance with Work Assignment C110145AA and amendments, Lowland Sampling and Analysis Plan (SAP) Addenda dated March 24, 2014 and April 27, 2014, the Quality Assurance Project Plan (QAPP) Addendum dated April 24, 2014, and the Health and Safety Plan (HASP) dated March 21, 2014.

The Upland area of the Everett Smelter Site is the location of a former lead smelter. The most contaminated portion of the Upland Area, called the Fenced Area, was cleaned up between 2004 and 2007 (Figure 1). Although cleanup of the Fenced Area has been completed, the concentration of arsenic in groundwater in the Lowland area next to the Fenced Area has remained elevated. The maximum arsenic concentration measured in 2013 in groundwater in the Lowland Area was 18,900 micrograms per liter (µg/L or parts per billion) (Figure 2).

The purpose of the investigation was to complete a focused investigation in an area suspected of having arsenic contaminated fill soil as well as debris from the former smelter that is a significant source of the elevated arsenic concentrations in groundwater. The investigation also included measuring lead concentrations in soil and debris. The investigation focused on an area beneath East Marine View Drive where it was suspected that structural materials (i.e., brick and mortar) from a former smelter exhaust flue and dust chambers were located.

The results of the investigation confirmed that fill soil and flue and dust chamber materials with elevated arsenic and lead concentrations are located in the investigation area. Arsenic was measured at concentrations up to 40,100 milligrams per kilogram (mg/kg or parts per million) in the investigation area and lead was measured at concentrations up to 15,553 mg/kg. Based on the results of the investigation, the material beneath East Marine View Drive is likely a source to elevated arsenic concentrations in deep groundwater in the Lowland Area.

INVESTIGATION ACTIVITIES AND OBSERVATIONS

The current ground surface in the investigation area consists of asphalt roadways (i.e., East Marine View Drive and State Route 529), concrete sidewalks, and grass adjacent to the road right-of-ways. GeoEngineers obtained a City of Everett Public Works Permit, coordinated with the utility notification center as well as a private

locator, and subcontracted traffic control, drilling and analytical laboratory services to complete the investigation activities in the area.

Forty-four soil borings (LLSB-04 through LLSB-47) were completed in two 3-day events. The first event was performed March 26 through 28, 2014. The second event was performed April 29 through May 1, 2014. The purpose of the first event (LLSB-04 through LLSB-25) was to investigate the presence of arsenic-contaminated material in the general historical location of the former smelter exhaust flue and dust chambers. The investigation area is upgradient of where the highest concentrations of arsenic have been measured in groundwater in the Lowland Area (Figure 2). The results of the first event showed that elevated concentrations of arsenic and lead were present in soil beyond the extent of the initial investigation area. Therefore, the investigation area was expanded during a second event (LLSB-26 through LLSB-47).

The boring locations are shown in Figure 3. Borings were drilled using direct push methods and soil was collected from the borings in up to 5-foot lengths. Each 5-foot length was collected in a disposable 1.75-inch-diameter PVC sleeve inside a Macro-Core® sampler. Borings were backfilled in general accordance with the City of Everett Public Works Permit with the one exception: the typical asphalt overlay requirement was not performed, based on a recommendation by the City of Everett inspector. The inspector recommended that holes drilled through asphalt be backfilled to within 1 foot of the surface with bentonite chips, followed by 6 inches of crushed gravel, followed by 6 inches of EZ Street asphalt cold patch.

The direct push borings were drilled at least several feet into native weathered till. Maximum boring depths ranged between 10 and 21 feet below ground surface (bgs). The depth to weathered till increased from approximately 7 feet bgs in the western portion of the investigation area to approximately 15 feet bgs in the eastern portion of the investigation area. Arsenic and lead concentrations were measured and recorded in the field using an X-ray fluorescence (XRF) analyzer on approximate 6-inch to 1-foot intervals the full length of each core. Soil samples were also collected for laboratory analyses. The XRF arsenic and lead measurements are presented in Table 1. The maximum XRF arsenic and lead measurements in each boring are shown in Figures 4 and 5, respectively. Table 1 also identifies the maximum arsenic and lead concentrations in each boring and material type (i.e., fill, fill with brick, weathered till, etc.) associated with each arsenic and lead measurement.

Fill was encountered in the borings from the ground surface to depths of up to 15 feet. The fill generally consisted of brown or gray (occasionally orange) sands to silty sands with varying amounts of gravel. Fill also frequently contained remnant smelter debris such as brick fragments, brick and mortar, wood debris and metal. Small amounts of slag were observed in the fill in four borings (i.e., LLSB-33, LLSB-40, LLSB-41 and LLSB-42). Slag is a by-product known to have been produced by the smelter. Native weathered glacial till (typically gray silty sand) was encountered underneath the fill to the full depths explored.

Logs of each soil boring are provided in Appendix A. Figures 6 and 7 are cross sections, generally oriented west to east through the investigation area. The cross sections in Figures 6 and 7 also include the arsenic concentrations. Figures 8 and 9 are the same cross sections but present the lead concentrations. The arsenic and lead concentrations presented in Figures 6 through 9 were measured using the XRF analyzer. The location of the cross sections are shown in Figure 3.

Laboratory analyses performed on selected individual soil sample intervals or composited (mixed) intervals included:

- Total arsenic and/or total Resource Conservation and Recovery Act (RCRA) metals (eight metals including arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) by Environmental Protection Agency (EPA) Method 200.8 or 6010C.
- Synthetic Precipitation Leaching Procedure (SPLP) for total arsenic by EPA Method 1312 using simulated "western" rainwater with a pH of 5 as the leachate. In the test, soil is mixed for one day with laboratory-prepared artificial rainwater and the resultant arsenic concentration in the water is measured. It is a test to simulate how much arsenic leaches from the soil when it comes into contact with rainwater in the ground.
- Column leaching tests by ASTM International (ASTM) Method D 4874 using deionized water as the leachate. In the test, soil is packed into a glass column and water is passed through the column for 30 days. The test is similar in concept to the SPLP test. However, new deionized water is continually passed through the soil for 30 days. Water samples were collected from the column on days 1, 5, 10, 20 and 30 and tested for arsenic by EPA Method 200.8 or 6010C.
- Permeameter testing on soil by ASTM Method D5084. In the test, soil is packed in a column to a specified density and water is passed through the soil to estimate the soil's hydraulic conductivity. Hydraulic conductivity values can be used with other data to estimate groundwater flow velocity.

Laboratory analyses were performed in April through July 2014. Laboratory analytical results for arsenic are presented in Table 2. Laboratory analytical results for total RCRA (8) metals are presented in Table 3. A data quality review was performed on laboratory analyses and the resulting data validation report is included as Appendix B. The laboratory analytical reports are included as Appendix C.

FINDINGS OF THE INVESTIGATION

Findings of the investigation are presented in the following sections. In the following sections, all depths and concentrations are approximate.

Presence of Structures and Remnant Debris

Brick and mortar or brick fragments were found in multiple borings. This indicates that smelter flue and dust chamber structures or remnant debris from the structures still remain within the investigation area. Figure 3 shows the approximate location of the former Everett Smelter flue and dust chamber structures. The structure locations shown in Figure 3 are based on a drawing in the 1995 Remedial Investigation Report (Hydrometrics, 1995). Table 1 summarizes which borings contained layers of bricks and mortar or brick. Boring logs for each investigation location are in Appendix A. The boring logs provide a detailed description of the materials observed in each boring.

Overview of Arsenic and Lead Concentrations

The highest concentrations of arsenic and lead were measured within and adjacent to the historical flue and dust chamber alignment (Figures 4 and 5). The highest arsenic and lead concentrations were generally present in:

- Fill containing remnant structure debris, or

- Fill soil located immediately adjacent to the historical alignment and fill containing remnant structure debris.

The highest arsenic concentrations measured using XRF ranged from 10,000 to 35,000 mg/kg (Table 1 and Figure 4). The sample with the highest arsenic concentration measured using XRF (i.e., 35,100 mg/kg in LLSB-07 at 5.2 to 5.4 feet bgs) was also analyzed at the laboratory. The laboratory analytical result was 40,100 mg/kg (Table 2). The highest lead concentrations measured using XRF were also within the historical alignment in fill containing remnant structure debris. The highest lead concentrations ranged from 10,000 to 15,000 mg/kg (Table 1 and Figure 5). The highest concentrations of lead were measured where the highest concentrations of arsenic were also measured. The highest concentrations of arsenic and lead were generally measured within a 1-foot soil interval. The interval was present at depths between 3 and 6 feet bgs. An exception was boring LLSB-23. At LLSB-23, the highest arsenic concentration (i.e., 13,757 mg/kg) was measured at 9 feet bgs.

Material with arsenic concentrations from 5,000 to 10,000 mg/kg and lead from 2,500 to 10,000 mg/kg were present within and adjacent to the historical flue and dust chamber alignment in fill containing remnant structure debris or fill soil (Table 1 and Figures 4 and 5). These concentrations were also present over a larger area and in soil at depths generally ranging between 3 and 7.5 feet bgs but up to 12 feet bgs (Table 1).

Arsenic concentrations ranging from 1,000 to 5,000 mg/kg were measured in fill or underlying native weathered till collected from 43 of the 44 boring locations (Table 1 and Figure 4). Arsenic concentrations down to 1,000 mg/kg were measured in fill or native weathered till from the surface to 18 feet bgs. Lead concentrations ranging from 250 to 2,500 mg/kg were measured in fill or native weathered till in 35 of 44 boring locations (Table 1 and Figure 5). Lead concentrations down to 250 mg/kg were measured in soil from the surface to 14 feet bgs.

Arsenic has been transported from relatively shallow source material down into the underlying native soil. Arsenic concentrations up to 7,555 mg/kg were measured in native weathered till. Arsenic concentrations greater than 1,000 mg/kg were measured in weathered till at 16 soil boring locations. Arsenic was 2,500 mg/kg at 4 feet into native weathered till at LLSB-07 (Table 1; location LLSB-07, 10 feet bgs) and was 1,500 mg/kg at 5 feet into native weathered till at LLSB-06 (Table 1; location LLSB-06, 10 feet bgs).

Presence of Water in the Investigation Area

The migration of arsenic has likely been the result of transport by water infiltrating through the source material and native soil. Although the distribution of arsenic concentrations indicate that arsenic has been transported from source material to deeper native soil via water transport, groundwater (i.e., saturated soil or a measurable groundwater table) was not encountered in any of the 44 borings. Additionally, groundwater was not observed at monitoring well EV-13 located in the investigation area during four quarters of groundwater monitoring performed in 2013.

Fill and native weathered till were observed to be wet (i.e., visible presence of water in a soil sample) in various horizons in seven borings. The borings are located within and adjacent to the flue and dust chamber alignment on the western (i.e., LLSB-17, LLSb-18 and LLSB-15) and central (i.e., LLSB-08, LLSB-09 and LLSB-10) portions of the investigation area and in one location in the eastern portion of the investigation area (i.e., LLSB-35). Fill and native weathered till were also observed to be moist in multiple borings located on the western and central portions of the investigation area. The depth at which wet and moist soil was observed increased from the west

to the central portion of the investigation area. The boring logs in Appendix A identify where soil was observed to wet or moist.

Although moisture was not generally observed in borings on the eastern portion of the investigation area, soil mottling was observed at multiple locations (i.e., LLSB-23, LLSB-37 and LLSB38). Soil mottling refers to color blotches that result from soil being repeatedly wet-then-dry. The mottling observed indicates that soil has been wet during a previous period of time.

The observations of moisture and soil mottling present in fill and weathered till during the investigation indicate that water likely, has and currently infiltrates into the unpaved area west of the investigation area and flows beneath the road and to the east. However, infiltration of water likely occurred historically across the entire investigation area prior to paving. Water may have historically flowed along the flue structure from the former smoke stack location west of the investigation area to the end of the flue within the investigation area. A topographical map of the smelter from 1913 shows that the elevation at the western end of the flue was approximately 20 feet higher than the eastern end of the flue located within the investigation area providing a water transport pathway.

Lead Transport in the Investigation Area

Figures 8 and 9 are cross sections presenting the results for lead. The cross sections in Figures 8 and 9 are the same as the cross sections in Figures 6 and 7 but present the lead concentrations. The results of the investigation indicate lead has not been transported as much as arsenic. Elevated lead concentrations are generally limited to shallow fill containing remnant structure debris or shallow fill soil adjacent to fill containing remnant structure debris.

Arsenic Transport in the Investigation Area

The distribution of arsenic concentrations in the investigation area indicates that arsenic transport has predominantly occurred/is occurring in an area along the flue structure alignment and east of the flue. Two cross sections have been prepared to illustrate this finding. The cross sections are shown in Figures 6 and 7. The arsenic concentrations are shown next to each boring in the cross sections. The locations of each cross section is shown on Figure 3.

Soil in borings along the flue structure alignment (i.e., LLSB-06 through LLSB-08 and LLSB-13 through LLSB-16) and east of the flue structure (i.e., LLSB-21, LLSB-23, LLSB-36 and LLSB-47) contain arsenic concentrations ranging from greater than 1,000 mg/kg to 5,000 mg/kg. The arsenic is present in fill overlying the till and within the surface of the weathered till (Table 1). As shown in Figure 6, the surface of the weathered till slopes down to the east in the investigation area. Water and arsenic are expected to travel along the fill/weathered till contact where arsenic is observed at concentrations greater than 1,000 mg/kg to 5,000 mg/kg. The arsenic concentrations presented in the cross section show that substantial arsenic transport has occurred along and east of the flue structure alignment (Figure 6). Figure 7 is a similar cross section, but it is located north of the cross section shown in Figure 6. The cross section shown in Figure 7 goes through the dust chamber. Arsenic concentrations along the fill/weathered till contact north of the flue structure alignment (Figure 7) are lower than those shown in Figure 6. These results indicate that arsenic has been transported from shallow source material to deeper fill east of the dust chamber alignment, but the amount of arsenic present in fill and weathered till east of the dust chamber alignment (Figure 7) is significantly less than along the flue structure alignment (Figure 6).

Results of Leaching Studies

The results from column leaching studies and SPLP testing indicate that the arsenic present along and east of the flue structure alignment is likely the source of elevated arsenic concentrations in deep groundwater in the Lowland Area.

Column leaching studies were performed on three composite soil samples. The composite samples had estimated average arsenic concentrations of approximately 1,000, 2,500 and 5,000 mg/kg (Table 2). The average concentrations that were selected are similar to the concentrations measured in soil present at the fill/weathered till contact east of the flue structure. Thirty pore volumes of water were passed through each of three columns containing the composite soil samples over a 30-day period (i.e., one pore volume of water each day for 30 days). A water sample was collected for analysis from the 1st, 5th, 10th, 20th and 30th volumes of water that were passed through the columns. The arsenic concentrations of the water samples ranged from 8,200 to 29,000 μg/L (Table 2).

SPLP testing was performed on the composite samples used for the column leaching studies described above as well as samples collected of fill in the remnant flue structure (i.e., LLSB-07) and dust chamber (i.e., LLSB-29) areas. The arsenic concentrations in the samples from the flue and dust chamber areas were 10,000 and 35,000 mg/kg, respectively. The arsenic concentrations in SPLP tests ranged from 6,380 to 18,200 μg/L.

Arsenic concentrations in deep groundwater in monitoring wells EV-20 and BP-05D located in the Lowland Area downgradient of the flue structure have ranged from 13,000 to 18,100 μg/l (Figure 2). The concentrations of arsenic measured in deep groundwater are within the range of concentrations measured as part of the column leaching studies and SPLP testing.

Estimation of Hydraulic Conductivity

Permeameter tests were performed to estimate the hydraulic conductivity of two samples of native weathered till. The estimated hydraulic conductivity results are the following:

- 9.81×10^{-7} centimeters per second (cm/s) for a composite sample collected from the western portion of the investigation area within the flue and dust chamber alignment (i.e., a composite of LLSB-07-8-8.5 and LLSB-08-6-6.5), and
- 8.94×10^{-6} cm/s in a sample collected from the eastern portion of the investigation area (i.e., LLSB-39-15.8-17).

These hydraulic conductivity values fall within the range of literature values for till which are 10^{-4} to 10^{-10} cm/s.

RCRA Metals Analysis

Analysis for RCRA (8) metals was performed on composite samples collected from the investigation area. The RCRA metals analysis were performed to support disposal of soil from the investigation area. The results are presented in Table 3.

LIMITATIONS

We have prepared this memorandum for use by the Washington State Department of Ecology for the Everett Smelter Lowland Area Remedial Investigation. Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this memorandum was prepared. No warranty or other conditions, express or implied, should be understood.

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Attachments:

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Table 1

Summary of XRF Measurements

Everett Smelter
Everett, Washington

Location Identification	X Coordinate [1]	Y Coordinate [1]	Depth (feet bgs)	XRF Arsenic Concentration (mg/kg)	XRF Lead Concentration (mg/kg)	XRF Count [2]	Sample Material Type
LLSB-04	1308448.355	371344.0584	1.5	**12.4**	<5.6	9	Fill
			2	**45.3**	**40.3**	10	Fill/brick
			2.5	**454**	**269**	11	Fill/brick
			3	**310**	**12.3**	12	Fill
			3.5	**4,399**	**1,033**	–	Fill
			4	**231**	**131**	–	Fill
			4.5	**206**	**100**	–	Fill
			4.9	**392**	**238**	–	Fill
			5.1	**447**	**757**	–	Fill
			5.5	**1,874**	<5.3	–	Fill
			6	**1,431**	<4.9	–	Fill
			6.5	**1,832**	<14	–	Fill
			7	**1,718**	<5	–	Fill
			7.5	**1,212**	<5.1	–	Weathered till
			8	**1,567**	<5.9	–	Weathered till
			8.5	**1,068**	<5.2	–	Weathered till
			9	**791**	<20	27	Weathered till
			9.5	**1,034**	<4.8	–	Weathered till
			10	**1,039**	<5	–	Weathered till
LLSB-05	1308446.975	371350.0727	1.5	**7.6**	<4.9	–	Fill
			2	**10.7**	**24.4**	–	Fill
			2.5	**400**	**350**	–	Fill
			3	**655**	**308**	–	Fill
			3.5	**1,488**	**369**	–	Fill/brick
			4	**568**	**518**	–	Fill/brick
			4.5	**616**	**371**	42	Fill
			5	**301**	**117**	–	Fill
			5.5	**2,064**	<4.9	–	Fill
			6	**3,846**	**5.7**	–	Fill
			6.5	**2,145**	**6.1**	–	Fill
			7	**2,587**	<5.1	–	Fill
			7.5	**1,343**	<4.7	–	Weathered till
			8	**1,762**	<4.9	53	Weathered till
			8.5	**954**	**5.3**	–	Weathered till
			9	**1,077**	<4.8	–	Weathered till
			9.5	**1,201**	<4.7	–	Weathered till
			10	**940**	<4.7	–	Weathered till
LLSB-06	1308444.939	371358.4424	2	**8.4**	**23.7**	–	Fill
			2.5	**172**	**110**	59	Fill
			3	**716**	**500**	–	Fill/brick
			3.5	**775**	**643**	–	Fill/brick
			4	**719**	**662**	–	Fill/brick
			4.5	**595**	**319**	–	Fill/brick
			5	**65**	**58**	–	Fill
			5.5	**722**	<4.8	67	Fill
			6	**2,598**	**6.1**	–	Weathered till
			6.5	**2,346**	<6	–	Weathered till
			7	**1,783**	<5.5	–	Weathered till
			7.5	**2,066**	<5.1	–	Weathered till
			8	**2,116**	<57	–	Weathered till
			8.5	**1,152**	<5.2	–	Weathered till
			9	**2,314**	<5	–	Weathered till
			9.5	**2,050**	<5.2	–	Weathered till
			10	**2,511**	<4.8	–	Weathered till

Location Identification	X Coordinate [1]	Y Coordinate [1]	Depth (feet bgs)	XRF Arsenic Concentration (mg/kg)	XRF Lead Concentration (mg/kg)	XRF Count [2]	Sample Material Type
LLSB-07	1308443.313	371365.3725	2	**17.9**	<4.0	--	Fill
			2.5	**245**	**270**	--	Fill
			3	**2,487**	**1,239**	--	Fill/brick and mortar
			3.5	**745**	**7**	--	Fill/brick and mortar
			4.1	**3,888**	**1,080**	84	Fill/brick and mortar
			4.2	**223**	**13.5**	--	Fill/brick and mortar
			4.4	**7,408**	**561**	--	Fill/brick and mortar
			5	**15,700**	**784**	86	Fill/brick and mortar
			5.1	**310**	**51**	--	Fill/brick and mortar
			5.4	**35,100**	**1,574**	--	Fill/brick and mortar
			6	**22,000**	**468**	--	Fill/brick and mortar
			6.5	**5,264**	**8.7**	--	Fill
			7	**3,764**	<5.1	--	Weathered till
			7.5	**3,594**	**7.3**	--	Weathered till
			8	**2,616**	<5	--	Weathered till
			8.5	**3,344**	<4.5	--	Weathered till
			9	**2,874**	**6.1**	--	Weathered till
			10	**1,588**	**5.5**	--	Weathered till
			11	**526**	<4.9	--	Weathered till
			12	**474**	<4.9	--	Weathered till
			13	**467**	<4.5	--	Weathered till
			14	**340**	<5	--	Weathered till
			15	**339**	<4.6	--	Weathered till
LLSB-08	1308441.465	371374.5202	2	**72**	**51**	--	Fill
			2.5	**26.5**	**43**	--	Fill/brick
			3	**1,281**	**953**	--	Fill
			3.4	**1,005**	**289**	--	Fill
			3.8	**3,209**	**893**	--	Fill
			4.3	**1,664**	**575**	--	Fill/brick
			4.6	**1,552**	**700**	--	Fill
			6	**539**	<4.7	117	Fill
			6.5	**1,343**	<4.7	--	Fill
			7	**222**	<4.8	--	Weathered till
			7.5	**260**	<4.4	--	Weathered till
			8	**259**	**6.2**	--	Weathered till
			8.5	**186**	<4.4	--	Weathered till
			9	**194**	<5.0	--	Weathered till
			9.5	**219**	<4.8	--	Weathered till
LLSB-09	1308439.265	371383.5439	1.7	**25.8**	<4.7	--	Fill
			2.3	**22.2**	**47**	--	Fill
			3	**577**	**418**	--	Fill
			3.5	**424**	**274**	--	Fill/brick
			3.8	**1,297**	**552**	--	Fill/debris
			4.2	**23,000**	**15,100**	--	Fill/debris
			4.4	**3.12**	**1,004**	--	Fill/debris
			4.6	**6,971**	**1,916**	--	Fill
			5.2	**16,100**	**8,358**	--	Fill
			5.5	**7,774**	**884**	--	Fill
			6.1	**1,264**	<4.6	--	Fill
			7	**814**	**76**	--	Weathered till
			7.5	**695**	<5.9	--	Weathered till
			8	**617**	<4.6	--	Weathered till
			9	**379**	<5.1	--	Weathered till
			10	**426**	<4.6	--	Weathered till
LLSB-10	1308435.92	371387.1187	3.2	**54.7**	**5.3**	--	Fill
			3.5	**291**	**135**	5	Fill/brick
			4	**1,889**	**907**	--	Fill/brick
			4.5	**11,200**	**4,727**	--	Fill/brick
			5	**2,868**	**48**	--	Fill/brick
			6	**761**	**5.6**	11	Fill/brick
			6.5	**760**	<4.6	--	Fill
			7	**484**	<4.8	--	Fill
			7.5	**715**	<4.7	--	Fill
			8	**542**	<4.7	--	Weathered till
			8.5	**463**	<4.6	--	Weathered till
			9	**297**	<5.2	--	Weathered till
			9.5	**238**	<6	18	Weathered till

Location Identification	X Coordinate [1]	Y Coordinate [1]	Depth (feet bgs)	XRF Arsenic Concentration (mg/kg)	XRF Lead Concentration (mg/kg)	XRF Count [2]	Sample Material Type
LLSB-11	1308430.792	371383.6933	2.5	**33.8**	**22.8**	21	Fill
			3	**659**	**297**	22	Fill
			3.5	**219**	**56**	–	Fill/brick
			4	**3,581**	**1,002**	–	Fill/brick
			4.5	**1,377**	**250**	–	Fill
			4.8	**1,282**	**31**	–	Fill
			5.5	**731**	<5.5	–	Fill
			6	**418**	**7.6**	29	Fill
			6.5	**282**	<4.8	–	Weathered till
			7	**267**	<5.2	–	Weathered till
			7.5	**323**	<3.2	–	Weathered till
			8	**543**	**5.7**	–	Weathered till
			8.5	**507**	<4.8	–	Weathered till
			9	**393**	<5	–	Weathered till
			9.5	**656**	<4.8	–	Weathered till
			10	**784**	<4.8	–	Weathered till
LLSB-12	1308432.109	371374.1643	2	**312**	**129**	45	Fill/brick/debris
			2.5	**704**	**694**	–	Fill/brick/debris
			3	**20,000**	**1,494**	–	Fill/brick/debris
			3.5	**1,331**	<5.3	–	Fill/brick/debris
			4	**401**	**6.9**	–	Fill
			4.5	**1,107**	<4.3	–	Fill
			5.2	**326**	**7.6**	51	Fill
			5.5	**270**	<4.7	–	Fill
			6	**274**	<4.8	–	Fill
			6.5	**259**	<4.9	–	Fill
			7.5	**271**	<4.9	–	Weathered till
			8.5	**406**	<4.5	–	Weathered till
			9	**188**	<4.5	–	Weathered till
			9.5	**158**	<4.7	–	Weathered till
LLSB-13	1308433.622	371365.8038	2.5	**1,464**	**766**	62	Fill
			3	**1,781**	**530**	–	Fill/brick and mortar
			3.5	**1,343**	**250**	64	Fill/brick and mortar
			4	**12,700**	**376**	–	Fill/brick and mortar
			4.5	**5,186**	**6.4**	–	Fill
			4.7	**28,700**	**319**	–	Fill
			5	**3,408**	**363**	69	Fill/brick
			5.5	**245**	**42**	–	Fill/brick
			6	**5,246**	**71**	–	Fill/brick
			6.5	**3,435**	<5.2	–	Fill/brick
			7	**1,981**	<5.2	–	Weathered till
			8	**1,818**	<5.5	–	Weathered till
			9	**535**	<4.3	–	Weathered till
			10	**339**	<4.6	–	Weathered till
LLSB-14	1308429.749	371364.1792	2	**284**	**45**	–	Fill
			2.5	**1,360**	**162**	79	Fill/brick and mortar
			2.8	**2**	**435**	–	Fill/debris
			3.1	**10,500**	**2,313**	–	Fill/debris
			3.4	**19,300**	**434**	–	Fill/debris
			4	**4,306**	**45**	–	Fill
			4.5	**2,500**	<5.6	–	Fill
			5	**1,079**	<5.1	90	Fill
			5.5	**3,075**	<5.5	–	Fill
			6	**1,011**	<4.8	–	Fill
			6.5	**1,439**	<4.9	–	Fill
			7	**1,503**	**3.6**	–	Fill
			8	**633**	**5.3**	–	Weathered till
			9	**351**	<4.6	–	Weathered till
LLSB-15	1308436.07	371355.9944	1.8	**90**	<4.8	–	Fill
			2	**1,072**	**164**	98	Fill/brick
			2.5	**45**	**7.4**	–	Fill/brick
			3.1	**51.6**	<4.8	–	Fill/brick
			3.6	**4,769**	<5.5	–	Fill/brick
			4.1	**3,110**	<4.9	108	Fill/brick
			4.5	**3,606**	<5.7	–	Fill/brick
			5.1	**7,555**	<6	–	Weathered till
			5.5	**2,818**	<4.9	–	Weathered till
			6	**2,410**	<5.6	–	Weathered till
			6.5	**2,363**	<5.5	413	Weathered till
			7	**2,464**	<5.1	–	Weathered till
			8	**2,357**	**6.2**	115	Weathered till
			9	**886**	<4.7	–	Weathered till

Location Identification	X Coordinate [1]	Y Coordinate [1]	Depth (feet bgs)	XRF Arsenic Concentration (mg/kg)	XRF Lead Concentration (mg/kg)	XRF Count [2]	Sample Material Type
LLSB-16	1308421.568	371361.068	1.5	**32**	**55**	117	Fill
			2	**22**	<4.9	--	Fill
			2.5	**22,100**	**471**	--	Fill
			3	**3,486**	<5	--	Fill
			3.5	**4,087**	**6.1**	122	Fill
			4	**3,065**	**6.4**	--	Fill
			4.5	**2,751**	<5	--	Fill
			5	**1,543**	<5.4	--	Fill
			5.5	**975**	**5.9**	--	Fill
			6	**1,575**	**6.9**	130	Fill
			6.5	**980**	<5.6	--	Fill
			7	**1,907**	<5	--	Fill
			7.5	**878**	<5.6	--	Weathered till
			8	**802**	<6	--	Weathered till
			9	**504**	**6.1**	--	Weathered till
			10	**316**	**4.5**	--	Weathered till
			10.5	**217**	**5.1**	--	Weathered till
			11	**227**	<4.7	--	Weathered till
			12.5	**232**	<4.9	--	Weathered till
LLSB-17	1308415.64	371351.9272	2.5	**38.8**	**8.9**	145	Fill
			3	**23.2**	<4.9	--	Fill
			3.5	**57.5**	**9.8**	--	Fill
			4	**14.4**	**7**	--	Fill
			4.5	**4.4**	<4.8	--	Fill
			4.9	**1.5**	**4.6**	--	Fill
			6.3	**12.5**	<4.4	--	Fill
			7	**5.5**	**3**	155	Fill
			8	**8.2**	<4.3	--	Fill
			9	**7.4**	<4.4	--	Fill
			10	**1,191**	**14.9**	--	Fill
LLSB-18	1308408.433	371369.373	2.5	**42.5**	<4.8	160	Fill
			3	**200**	**16.2**	--	Fill
			3.5	**68**	<6	--	Fill
			4	**160**	**34**	166	Fill
			4.5	**386**	**22.7**	--	Fill
			8	**1,922**	**94**	--	Fill
			8.5	**464**	**36**	177	Fill
			9	**187**	<4.8	--	Fill
			10	**683**	**58**	159	Fill
			13	**214**	**7.6**	--	Fill
			13.5	**429**	**23.6**	--	Fill
			14	**1,004**	**109**	172	Fill
			14.2	**992**	**14.3**	--	Fill
			19	**128**	<4.6	--	Fill
			19.8	**105**	<4.7	--	Fill
LLSB-19	1308438.972	371347.0886	1.5	**131**	**15**	180	Fill
			2	**187**	**12**	183	Fill
			2.6	**6**	**7.3**	--	Fill
			3	<3.4	<4.8	--	Fill
			3.5	**556**	<4.6	--	Fill
			4	**862**	<4.7	--	Fill
			4.5	**1,608**	<4.7	--	Fill
			5.3	**640**	<4.8	190	Fill
			6	**1,418**	<6	--	Fill
			6.5	**1,407**	<4.9	--	Fill
			7	**1,310**	<4.8	--	Weathered till
			7.5	**698**	<4.9	--	Weathered till
			8	**616**	<3	--	Weathered till
			8.5	**426**	**4.7**	208	Weathered till
			9	**714**	<5	--	Weathered till
			9.5	**593**	<4.9	--	Weathered till

Location Identification	X Coordinate [1]	Y Coordinate [1]	Depth (feet bgs)	XRF Arsenic Concentration (mg/kg)	XRF Lead Concentration (mg/kg)	XRF Count [2]	Sample Material Type
LLSB-20	1308441.693	371337.9254	2	**121**	**12**	214	Fill/brick
			2.5	**237**	**13.6**	215	Fill/brick
			3	<3.5	**7.1**	--	Fill
			3.5	<8.7	**7**	--	Fill
			4	**856**	**5.8**	--	Fill
			4.5	**1,287**	**6.3**	--	Fill
			4.8	**1,063**	**6.4**	--	Fill
			5.1	**399**	**5.4**	221	Fill
			5.5	**354**	**5.2**	--	Fill
			6	**422**	**5.1**	--	Fill
			6.5	**242**	<4.8	--	Fill
			7	**326**	<4.9	--	Weathered till
			7.5	**818**	<4.9	--	Weathered till
			8	**884**	<4.9	--	Weathered till
			8.5	**539**	<5.2	--	Weathered till
			9	**355**	<4.8	--	Weathered till
			9.5	**596**	<4.9	--	Weathered till
			10	**270**	<5.1	--	Weathered till
LLSB-21	1308457.35	371379.3273	2	**41**	**54**	3	Fill
			2.5	**330**	**727**	--	Fill
			3	**82**	**129**	--	Fill
			3.5	**184**	**113**	--	Fill/brick
			4	**204**	**139**	--	Fill/brick
			4.5	**1,580**	**865**	--	Fill/brick
			4.8	**234**	**103**	--	Fill/brick
			6.5	**497**	**194**	--	Fill/brick
			7	**5,325**	**2,706**	--	Fill/brick
			7.8	**3,002**	**117**	14	Fill
			8.2	**2,529**	**57**	--	Fill
			8.5	**1,787**	**88**	17	Fill
			9	**559**	<4.9	19	Weathered till
			9.5	**345**	<22	--	Weathered till
			10.3	**670**	<4.7	24	Weathered till
			11	**364**	<4.3	25	Weathered till
			12	**471**	<5.4	--	Weathered till
			13	**327**	**11.9**	--	Weathered till
			14	**183**	<5	--	Weathered till
			14.8	**97**	**6.6**	29	Weathered till
LLSB-22	1308454.894	371388.6941	2	**79**	**92**	30	Fill
			2.5	**24.1**	**5.8**	--	Fill
			3	**71**	**200**	32	Fill
			3.5	**116**	**12.9**	35	Fill
			4	**1,105**	**724**	37	Fill/brick
			4.5	**1,171**	**341**	38	Fill/brick
			10	**3,226**	**1,000**	40	Fill
			10.5	**89**	**6.2**	41	Fill
			11	**170**	<5.4	--	Fill
			11.5	**261**	<5.2	--	Fill
			12	**157**	<4.8	--	Weathered till
			12.5	**158**	<4.6	45	Weathered till
			13	**185**	<4.8	--	Weathered till
			14	**213**	<4.5	47	Weathered till
			15	**359**	<4.7	--	Weathered till
LLSB-22a [2]	1308454.894	371388.6941	3.5	**94**	**27.6**	--	Fill
			4	**2,102**	**977**	50	Fill/debris
			4.5	**3,085**	**1,229**	51	Fill/debris
			5.5	**2,943**	**819**	53	Fill/debris
			6	**2,930**	**1,000**	--	Fill/debris
			6.5	**5,344**	**1,141**	55	Fill/brick and mortar
			7	**1,524**	**1,334**	--	Fill/brick and mortar
			7.5	**2,626**	**1,023**	--	Fill/brick and mortar
			8	**3,146**	<5.3	--	Fill
			8.5	**1,073**	**5.3**	59	Fill
			9	**731**	<4.6	--	Fill
			9.5	**519**	<5.1	--	Fill

Location Identification	X Coordinate [1]	Y Coordinate [1]	Depth (feet bgs)	XRF Arsenic Concentration (mg/kg)	XRF Lead Concentration (mg/kg)	XRF Count [2]	Sample Material Type
LLSB-23	1308460.798	371369.7174	1.7	**35.7**	**18.3**	62	Fill
			2	**95**	**115**	63	Fill
			2.6	**53**	**190**	–	Fill
			3	**133**	**422**	–	Fill
			3.3	**37**	**295**	–	Fill
			3.5	**171**	**27.1**	–	Fill
			4	**2,310**	**665**	–	Fill/brick/debris
			4.5	**4,793**	**921**	–	Fill/brick/debris
			6.5	**5,718**	**1,030**	–	Fill/brick/debris
			7	**4,568**	**979**	72	Fill/brick/debris
			7.5	**3,647**	**545**	74	Fill
			8	**2,418**	**17.4**	–	Fill
			8.5	**418**	**9.3**	–	Fill
			8.9	**13,757**	**81**	–	Fill
			9.5	**5,224**	<5.4	–	Fill
			10.3	**3,390**	<5.3	–	Fill
			11	**6,920**	**8.3**	–	Fill
			11.5	**3,880**	<5.1	–	Fill
			12	**5,429**	<5.3	–	Weathered till
			12.5	**2,700**	**7**	–	Weathered till
			13	**1,199**	<4.7	84	Weathered till
			13.5	**1,205**	<5	–	Weathered till
			14	**529**	<5.2	85	Weathered till
			14.8	**668**	<4.8	87	Weathered till
LLSB-24	1308464.059	371356.4213	2	**28**	**50**	88	Fill
			2.5	**51**	**143**	92	Fill
			3	**63**	**170**	93	Fill/brick/debris
			3.5	**169**	**287**	–	Fill/brick/debris
			4	**298**	**469**	–	Fill/brick/debris
			4.5	**120**	**2,016**	–	Fill/brick/debris
			5.9	**74**	**128**	–	Fill/debris
			6.5	**48**	**14.4**	–	Fill/debris
			7	**2,220**	**325**	–	Fill/debris
			7.5	**791**	**645**	–	Fill
			8	**964**	**441**	--	Fill
			8.5	**146**	**13.3**	--	Fill
			9	**200**	**358**	103	Weathered till
			9.5	**655**	**23.2**	--	Weathered till
			10	**2,012**	<7	106	Weathered till
			10.5	**1,921**	<5	--	Weathered till
			11	**2,308**	<5.3	--	Weathered till
			11.5	**2,330**	**5.1**	--	Weathered till
			12	**2,553**	<5.1	--	Weathered till
			12.5	**2,506**	**6.6**	112	Weathered till
			13	**3,309**	<5.1	113	Weathered till
			13.6	**1,763**	<5.3	114	Weathered till
			14	**1,592**	<5	116	Weathered till
			14.8	**894**	<5.1	117	Weathered till
LLSB-25	1308467.768	371343.7683	1.6	**21.6**	**16.6**	118	Fill
			2	**41.2**	**37**	–	Fill
			2.5	**262**	**220**	121	Fill
			3	**31.8**	**42**	–	Fill
			3.5	**86**	**198**	–	Fill
			4	**396**	**284**	124	Fill
			4.5	**753**	**246**	–	Fill
			4.9	**1,096**	**36**	–	Fill
			5.9	**102**	**24**	–	Fill
			6.5	**2,227**	**1,294**	–	Fill
			7	**933**	**278**	–	Fill
			7.5	**4,373**	**6,447**	130	Fill/debris
			8	**64.4**	**12.4**	132	Fill
			8.5	**7**	<4.8	–	Fill
			9	**14.8**	<5.6	–	Fill
			9.5	**5.6**	<4.8	135	Fill
			10.2	**655**	<4.8	–	Fill
			11	**832**	<4.9	137	Weathered till
			11.5	**356**	<5.8	138	Weathered till
			12	**319**	<4.7	–	Weathered till
			12.5	**661**	**5.9**	–	Weathered till
			13	**635**	<4.7	–	Weathered till
			14	**123**	**5.9**	–	Weathered till
			14.8	**203**	<5.1	145	Weathered till

Location Identification	X Coordinate [1]	Y Coordinate [1]	Depth (feet bgs)	XRF Arsenic Concentration (mg/kg)	XRF Lead Concentration (mg/kg)	XRF Count [2]	Sample Material Type
LLSB-26	1308424.695	371381.0388	1	**103**	**11.3**	#5	Fill
			1.5	**180**	**34**	#6	Fill
			2	**2,987**	**752**	#8	Fill/brick and mortar
			2.5	**1,714**	**655**	#12	Fill/brick and mortar
			3	**5,301**	**1,318**	#4	Fill/debris
			5.2	**2,300**	**572**	#25	Fill
			5.5	**267**	<4	#13	Fill
			6	**237**	<3	#14	Fill
			6.5	**159**	<3	#15	Fill
			7	**175**	<3	#16	Weathered till
			7.5	**121**	<2	#18	Weathered till
			8	**118**	<3	#19	Weathered till
			8.5	**112**	<11	#21	Weathered till
			9	**77**	<2	#22	Weathered till
			9.5	**84**	<2	#23	Weathered till
			10	**78**	<2	#24	Weathered till
LLSB-27	1308435.36	371396.0149	1	**172**	**40**	#26	Fill
			1.5	**597**	**328**	#27	Fill
			2	**1,072**	**1,165**	#28	Fill/brick
			2.5	**973**	**544**	#29	Fill/brick
			3	**1,823**	**1,823**	#30	Fill/brick
			3.5	**2,062**	**3,417**	#31	Fill
			4	**15,579**	**5,622**	#32	Fill
			4.3	**13,239**	**9,871**	#33	Fill
			5.2	**5,749**	**563**	#34	Fill
			5.5	**3,844**	**1,604**	#36	Fill
			6	**1,273**	**10.7**	#37	Fill
			6.5	**1,051**	**11.7**	#38	Weathered till
			7	**533**	<5	#39	Weathered till
			7.5	**457**	<5	#40	Weathered till
			8	**327**	<4	#41	Weathered till
			8.5	**301**	**8**	#42	Weathered till
			9	**280**	<4	#43	Weathered till
			9.5	**285**	**12.1**	#44	Weathered till
			10	**161**	<3	#35	Weathered till
LLSB-28	1308422.988	371389.8292	1	**64.9**	<1.9	#48	Fill
			1.5	**26**	**126**	#49	Fill
			2	**14.6**	**18.7**	#50	Fill
			2.5	**2,823**	<18	#51	Fill
			3	**1,801**	**10**	#52	Fill
			3.5	**735**	<6	#53	Fill
			4.1	**660**	<7	#54	Fill
			4.5	**1,304**	<26	#55	Fill
			5	**1,058**	<9	#57	Fill
			5.5	**1,725**	**7.3**	#59	Weathered till
			6	**816**	**7.1**	#60	Weathered till
			6.5	**664**	<6	#61	Weathered till
			7	**636**	<6	#62	Weathered till
			7.5	**389**	**5.1**	#63	Weathered till
			8	**317**	<4	#64	Weathered till
			8.5	**423**	**6.1**	#65	Weathered till
			9	**260**	<4	#66	Weathered till
			9.5	**125**	<2	#68	Weathered till
			10	**88**	<2	#47	Weathered till
LLSB-29	1308430.454	371408.1733	1	**23.1**	<1.4	#94	Fill
			1.5	**70**	**41**	#92	Fill
			2	**1,595**	**1,349**	#90	Fill/brick
			2.5	**550**	**833**	#88	Fill/brick
			3	**77**	**8.4**	#87	Fill/brick
			3.5	**124**	**35**	#85	Fill/brick
			3.7	**5,963**	**4,849**	#86	Fill/brick
			5.4	**11,946**	**10,492**	#70	Fill/brick
			6	**2,276**	**308**	#72	Fill
			6.5	**1,460**	**22**	#73	Fill
			7	**741**	<6	#74	Weathered till
			7.5	**577**	<5	#75	Weathered till
			8	**467**	<5	#76	Weathered till
			8.5	**767**	**16.3**	#77	Weathered till
			9	**639**	<6	#80	Weathered till
			9.5	**435**	<5	#84	Weathered till

Location Identification	X Coordinate [1]	Y Coordinate [1]	Depth (feet bgs)	XRF Arsenic Concentration (mg/kg)	XRF Lead Concentration (mg/kg)	XRF Count [2]	Sample Material Type
LLSB-30	1308416.803	371403.2675	1	**74.7**	<1.9	#95	Fill
			1.5	**52**	**35**	#96	Fill
			2	**8.1**	**11.4**	#97	Fill
			2.5	**619**	<6	#98	Fill
			3	**1,040**	<10	#99	Fill
			3.5	**827**	<7	#100	Fill
			4	**993**	<9	#101	Fill
			4.5	**589**	<6	#102	Fill
			5	**326**	**5.1**	#104	Fill
			5.5	**445**	**5.9**	#105	Fill
			6	**184**	<3	#106	Fill
			6.5	**302**	<4	#107	Fill
			7	**159**	<3	#108	Weathered till
			7.5	**37.1**	<1.6	#109	Weathered till
			8	**35.7**	<1.8	#110	Weathered till
			8.5	**89**	**4.7**	#111	Weathered till
			9	**144**	<3	#114	Weathered till
			9.5	**273**	<4	#115	Weathered till
			10	**163**	<3	#116	Weathered till
LLSB-31	1308424.933	371420.4309	1.5	**488**	586	#117	Fill
			2	**195**	**440**	#118	Fill
			2.5	**211**	**374**	#119	Fill
			3.1	**578**	**900**	#124	Fill/brick
			3.5	**19,709**	**15,442**	#125	Fill/brick
			5.1	**1163**	**37**	#127	Fill
			5.4	**40.7**	**13.7**	#128	Fill/brick
			6	**887**	<72	#132	Fill/brick
			6.5	**176**	<3	#134	Fill
			7	**507**	**12**	#135	Fill
			7.5	**589**	**6.9**	#136	Weathered till
			8	**510**	<55	#138	Weathered till
			8.5	**367**	**5**	#139	Weathered till
			9	**108**	<2	#140	Weathered till
			9.5	**6.1**	<1.3	#142	Weathered till
			10	<3.6	**5.9**	#126	Weathered till
LLSB-32	1308412.775	371416.6706	1	**86**	**20.7**	#143	Fill
			1.5	**92**	**26.7**	#144	Fill
			2	**6.2**	<1.2	#145	Fill
			2.5	**1,307**	<11	#147	Fill
			3	**334**	**8.1**	#149	Fill
			3.5	**319**	<4	#151	Fill
			4	**98**	<2	#152	Fill
			4.5	**465**	**7**	#155	Fill
			4.8	**251**	**5.5**	#156	Fill
			5.5	**690**	<6	#157	Weathered till
			6	**239**	<3	#158	Weathered till
			6.5	**226**	<3	#159	Weathered till
			7	**62.1**	<1.9	#160	Weathered till
			7.5	**48.4**	<2	#161	Weathered till
			8	**43.8**	<1.6	#162	Weathered till
			8.5	**19.2**	<1.4	#163	Weathered till
			9	**5.1**	<1.2	#164	Weathered till
			9.5	**4.9**	<1.2	#165	Weathered till
			10	**344**	<13	#148	Weathered till
LLSB-33	1308421.709	371430.7838	2	**137**	**52**	#176	Fill/brick
			2.5	**248**	**149**	#175	Fill/brick
			3	**493**	**469**	#172	Fill/brick
			3.5	**1,224**	**3,888**	#171	Fill/brick
			4	**19,404**	**15,533**	#170	Fill/brick
			4.5	**1,752**	**603**	#169	Fill/debris
			5	**643**	**326**	#168	Fill/debris
			6	**341**	**637**	#181	Fill/brick and mortar
			6.5	**213**	**14.8**	#187	Fill/brick and mortar
			7	**91**	<2	#189	Fill
			7.5	**116**	**5.6**	#190	Weathered till
			8	**54**	**5.7**	#193	Weathered till
			8.5	**9.4**	**6.8**	#194	Weathered till
			9	**6.2**	**6.4**	#196	Weathered till
			9.5	**3.9**	**5.2**	#197	Weathered till
			10	<29	<29	#178	Weathered till

Location Identification	X Coordinate [1]	Y Coordinate [1]	Depth (feet bgs)	XRF Arsenic Concentration (mg/kg)	XRF Lead Concentration (mg/kg)	XRF Count [2]	Sample Material Type
LLSB-34	1308418.604	371440.36	2	**120**	**26.5**	#201	Fill
			2.5	**194**	**30**	#202	Fill
			3	**206**	**108**	#203	Fill
			3.5	**123**	**135**	#204	Fill
			4	**2,575**	**852**	#205	Fill
			4.5	**679**	**424**	#206	Fill
			5	**1,304**	**1,349**	#207	Fill
			5.5	**2,319**	**408**	#208	Fill
			6	**1,299**	**246**	#209	Fill
			6.5	**144**	**43**	#210	Weathered till
			7	**288**	**7.2**	#211	Weathered till
			11	**179**	**9**	#212	Weathered till
			11.5	**47.1**	**19.8**	#215	Weathered till
			11.8	**468**	**475**	#216	Weathered till
			12.3	**82.3**	<2	#217	Weathered till
			13	**119**	<2	#218	Weathered till
			14	**6.2**	**5.7**	#219	Weathered till
			14.9	**27.7**	<1.4	#220	Weathered till
LLSB-35	1308466.101	371392.3688	1.5	**16.9**	**17.6**	#3	Fill/debris
			2	**42**	**98**	#4	Fill/debris
			2.5	**192**	**145**	#5	Fill/debris
			3	**271**	**20**	#6	Fill
			3.5	**97**	**5.8**	#7	Fill
			4	**5.9**	<1.2	#8	Fill
			4.5	**8.5**	**5.7**	#9	Fill
			5	**12.1**	**49**	#10	Fill
			7.1	**4,031**	**466**	#12	Fill
			7.5	**6,643**	**906**	#13	Fill/brick
			8	**2,829**	**997**	#14	Fill/brick
			8.5	**1,440**	**18.9**	#15	Fill
			9	**426**	<5	#16	Fill
			9.5	**8.3**	<1.4	#17	Fill
			10	**131**	**6.6**	#18	Fill
			10.5	**686**	<6	#24	Fill
			11	**338**	5	#21	Fill
			11.5	**287**	<4	#20	Fill
			12	**190**	<3	#19	Fill
			15	**165.72**	<10.58	4	Weathered till
			15.5	**180.44**	<10.08	5	Weathered till
			16	**140.99**	<9.63	6	Weathered till
			16.5	**61.53**	<7.93	7	Weathered till
			17	**45.81**	<7.39	8	Weathered till
LLSB-36	1308471.835	371374.4713	2	**107.29**	**344**	10	Fill
			2.5	**65.55**	**104**	14	Fill
			3	<20.22	<20.22	15	Fill
			3.5	<19.33	<19.33	16	Fill
			4	<18.58	<18.58	17	Fill
			4.5	<22.59	<22.59	18	Fill
			5	**93.51**	**944**	19	Fill
			5.5	<22.45	**45.0**	20	Fill
			6	<21.22	<21.22	21	Fill
			6.5	<25.67	**51.7**	22	Fill
			7	**59.26**	<8.3	23	Fill
			7.5	**1,176.93**	**503**	24	Fill
			8.2	**4,670.44**	**1,121**	25	Fill/brick
			8.5	**4,763.31**	**936**	26	Fill
			9	**1,053.6**	<23.09	27	Fill
			9.4	**1,060.33**	<23.54	28	Fill
			10	**3,397.96**	<49.32	29	Fill
			10.5	**2,622.95**	<40.83	30	Fill
			11	**4,029.23**	<55.24	31	Fill
			11.5	**3,096.83**	<54.78	32	Fill
			12	**1,421.16**	<28.03	33	Weathered till
			12.5	**2,893.12**	<44.78	34	Weathered till
			13	**2,336.21**	<41.93	35	Weathered till
			13.5	**959.83**	<21.1	36	Weathered till
			14	**655.23**	<17.46	37	Weathered till
			14.5	**530.63**	<16.03	38	Weathered till
			15	**642.41**	<16.92	39	Weathered till

Location Identification	X Coordinate [1]	Y Coordinate [1]	Depth (feet bgs)	XRF Arsenic Concentration (mg/kg)	XRF Lead Concentration (mg/kg)	XRF Count [2]	Sample Material Type
LLSB-37	1308475.675	371358.26	2	<25.47	124.57	41	Fill
			2.5	<48.51	**722**	42	Fill
			3	**46.99**	**90.2**	43	Fill
			3.5	<20.37	<20.37	44	Fill
			4	<20.84	**31.6**	45	Fill
			4.5	<20.25	<20.25	46	Fill
			5	**24.35**	<6.76	47	Fill
			7	<25.06	<25.06	48	Fill
			7.5	<26.69	<26.69	49	Fill
			8	<22.78	**64.9**	50	Fill
			8.5	<20.28	<20.28	51	Fill
			9	<38.87	**365**	52	Fill
			11.5	**26.26**	<7.06	53	Fill
			12	**26.55**	<7.06	54	Fill
			12.5	**2,895.13**	<45.85	55	Weathered till
			13	**790.5**	<19.79	56	Weathered till
			13.5	**681.96**	<17.94	57	Weathered till
			14	**620.38**	<17.7	58	Weathered till
			14.5	**851.34**	<20.95	59	Weathered till
			15	**506.57**	<15.64	60	Weathered till
LLSB-37a[2]	1308475.675	371358.26	2	<19.16	<19.16	61	Fill
			3	**60.09**	101.74	62	Fill
			4	<18.87	<18.87	63	Fill
			5	<24.78	**65.4**	64	Fill
			5.5	<22.3	**30.1**	65	Fill
			6	<22.89	<22.89	66	Fill
			6.5	<20.15	<20.15	67	Fill
			7	<19.87	<19.87	68	Fill
			7.5	**35.5**	<6.9	69	Fill
			8	<20.1	<20.1	70	Fill
			8.5	**151.37**	**408**	71	Fill
			9	**788.31**	**65.3**	72	Fill
			9.5	**656.27**	<17.88	73	Fill
			10	**39.75**	<6.97	74	Fill
LLSB-38	1308480.154	371345.035	2	<22.92	**30.8**	2	Fill
			2.5	<20.55	<20.55	3	Fill
			3	**32.57**	**84.7**	4	Fill
			3.5	<19.08	<19.08	5	Fill
			4	<18.82	<18.82	6	Fill
			4.5	<18.5	<18.5	7	Fill
			5	**82.99**	**166**	8	Fill
			5.5	<20.38	<20.38	9	Fill
			6	**42.57**	**298**	10	Fill
			6.5	<18.11	<18.11	11	Fill
			7	<19.36	<19.36	12	Fill
			7.5	<18.02	<18.02	13	Fill
			8	<22.8	**59.5**	14	Fill
			8.5	**495.89**	**490**	15	Fill/brick
			9	**1,751.5**	**2,653**	16	Fill
			9.5	**1,088.05**	**106**	17	Fill
			10	**157.45**	<8.82	18	Fill
			10.5	**413.74**	<13.37	19	Fill
			11	**303.16**	<12.23	20	Weathered till
			11.5	**228.78**	<11.12	21	Weathered till
			12	**203.41**	<10.15	22	Weathered till
			12.5	**409.51**	<13.44	23	Weathered till
			13	**333.93**	<12.66	24	Weathered till
			13.5	**411.63**	<13.4	25	Weathered till
			14	<18.29	<18.29	26	Weathered till
			14.5	**27.77**	**38.5**	27	Weathered till

Location Identification	X Coordinate [1]	Y Coordinate [1]	Depth (feet bgs)	XRF Arsenic Concentration (mg/kg)	XRF Lead Concentration (mg/kg)	XRF Count [2]	Sample Material Type
LLSB-39	1308484.847	371395.1619	2	<18.5	<18.5	28	Fill
			2.5	<20.76	<20.76	29	Fill
			3	**37.37**	**79.0**	30	Fill
			3.5	<17.42	<17.42	31	Fill
			4	<18.97	<18.97	32	Fill
			4.5	<18.32	<18.32	33	Fill
			5	<16.99	<16.99	34	Fill/debris
			6	<16.93	<16.93	35	Fill
			6.5	**29.31**	**56.2**	36	Fill
			7	<17.1	<17.1	37	Fill
			7.5	<30.03	**173**	38	Fill
			8	**39.94**	**71.7**	39	Fill
			8.5	**22.72**	<6.87	40	Fill
			9	**104.12**	**374**	41	Fill
			9.5	**86.67**	**137**	42	Fill
			11	<18.11	<18.11	43	Fill
			11.5	**904.44**	**233**	44	Fill
			12	**362.83**	**259**	45	Fill
			12.5	**851.69**	**484**	46	Fill
			13	**2,755.55**	**888**	47	Fill/brick
			13.5	**1,904.75**	**641**	48	Fill/brick
			14	**858.21**	<21.88	49	Fill
			15	**1,416.76**	**63.9**	50	Fill
			15.5	**133.92**	**30.3**	51	Fill
			16	**1,627.77**	<28.81	52	Weathered till
			16.5	**1,670.19**	<30.01	53	Weathered till
			17	**907.14**	<20.09	54	Weathered till
			17.5	**870.95**	<19.1	55	Weathered till
LLSB-40	1308481.861	371406.8935	1.5	<19.38	<19.38	56	Fill
			2	<19.03	<19.03	57	Fill
			2.5	<21.05	<21.05	58	Fill/debris
			3	**32.61**	<7.11	59	Fill
			3.5	<18.37	<18.37	60	Fill
			4	<18.59	<18.59	61	Fill
			4.5	<18.62	<18.62	62	Fill
			5	<17.84	<17.84	63	Fill
			6.4	<18.49	<18.49	65	Fill
			6.7	<19.47	<19.47	66	Fill
			7.5	**34.38**	**60.4**	67	Fill/slag
			8	<49.21	**629**	68	Fill
			8.5	<18.54	<18.54	69	Fill
			9	<34.41	**177**	70	Fill
			10.5	**104.5**	**292**	71	Fill
			11	**39.04**	**117**	72	Fill
			11.5	**113.63**	<9	73	Fill
			12	<22.6	<22.6	74	Fill
			12.5	<20.51	<20.51	75	Fill
			13	**138.72**	<9.2	76	Fill
			13.5	<17.19	<17.19	77	Fill
			14	**836.94**	<18.88	78	Fill
			14.5	**103.88**	<8.81	79	Fill
			15	<40.78	**238.5**	81	Weathered till
			15.5	<19.08	<19.08	80	Weathered till
			16.5	**79.53**	<10.37	82	Weathered till
			17	**166.32**	<9.04	83	Weathered till
			17.5	**173.39**	<9.53	84	Weathered till
			18	**113.09**	<9.05	85	Weathered till
			18.5	**163.36**	<9.47	86	Weathered till
			19	**147.28**	<9.48	87	Weathered till
			19.5	**97.26**	<8.54	88	Weathered till
			20	**43.27**	<9.06	89	Weathered till
			20.5	<19.82	<19.82	91	Weathered till
			21	<18.87	<18.87	92	Weathered till

Location Identification	X Coordinate [1]	Y Coordinate [1]	Depth (feet bgs)	XRF Arsenic Concentration (mg/kg)	XRF Lead Concentration (mg/kg)	XRF Count [2]	Sample Material Type
LLSB-41	1308460.193	371408.0244	2.5	**25.85**	<6.74	93	Fill
			3	**58.51**	<7.72	94	Fill/brick
			3.5	<19.16	<19.16	95	Fill
			4	<22.02	**45**	96	Fill
			4.5	<18.73	<18.73	97	Fill
			5	<19.84	<19.84	98	Fill
			5.5	<23.46	**61.8**	99	Fill
			6	**77.29**	**85.7**	100	Fill
			6.5	**51.02**	<7.58	101	Fill
			7	**21.81**	<6.46	102	Fill
			7.5	**55.21**	<8.11	103	Fill
			8	**70.66**	<7.66	104	Fill
			8.5	**2,857.89**	**1,344**	105	Fill/brick
			9	**304.32**	<13.23	106	Fill
			9.5	<18.87	<18.87	107	Fill
			10	<21.07	<21.07	108	Fill
			11	**127.86**	<9.11	109	Fill/slag
			11.5	**1,940.74**	<34.99	110	Fill
			12	**836.04**	<19.32	111	Fill
			12.5	**80.28**	<8.17	112	Fill
			13	<20.35	<20.35	113	Weathered till
			13.5	**262.13**	<12.37	114	Weathered till
			14	**327.47**	<12.01	115	Weathered till
			14.5	**400.34**	<13.78	116	Weathered till
LLSB-42	1308455.982	371420.6045	1.5	<18.72	<18.72	146	Fill
			2	**72.73**	**136**	147	Fill
			2.5	**60.72**	<7.58	148	Fill
			3	**39.81**	<7.08	149	Fill
			3.5	<18.12	<18.12	150	Fill
			4	<19.75	<19.75	151	Fill
			4.5	**142.14**	**1,779**	152	Fill
			6	<59.8	**1,048**	153	Fill/slag
			6.5	**184.24**	**534**	154	Fill/slag
			7	**287.41**	**195**	155	Fill/slag
			7.5	**82.33**	<7.7	156	Fill
			8	<18.16	<18.16	157	Fill
			8.5	**33.56**	<7.38	158	Fill
			9	**457.2**	**136**	159	Fill/brick
			9.5	**1,681.62**	**2,678**	160	Fill/brick
			10	**5,556.54**	**7,504**	161	Fill/brick
			11	**31.32**	**166**	162	Weathered till
			11.5	**128.59**	<9.04	163	Weathered till
			12	**319.63**	<12.65	164	Weathered till
			12.5	**546.29**	<17.56	165	Weathered till
			13	**582.98**	<16.75	167	Weathered till
			13.5	**304.57**	<12.48	166	Weathered till
LLSB-43	1308448.436	371400.1918	1.5	**140.6**	**64.0**	120	Fill
			2	<18.37	<18.37	121	Fill
			2.5	**124.72**	**62.5**	122	Fill
			3	**908.44**	**1637**	123	Fill/brick and mortar
			3.5	**378.85**	**166**	124	Fill/brick and mortar
			4	**1,855.05**	**742**	125	Fill
			4.4	**1,613.72**	**170**	119	Fill
			4.7	**1,045.54**	**154**	118	Fill
			5	**1,134.15**	**962**	126	Fill/brick and mortar
			6	**1,285.22**	**1,059**	127	Fill/brick and mortar
			6.5	**1,828.56**	**946**	128	Fill/brick and mortar
			7	**360.1**	**322**	129	Fill/brick and mortar
			7.5	**724.01**	**597**	130	Fill/brick and mortar
			7.7	**3,400.45**	**2,136**	131	Fill
			8	**2,251.98**	<38.16	132	Fill
			8.5	**2,841.26**	<41.08	133	Fill
			9	**1,554.91**	<28.7	134	Fill
			9.5	**1,007.94**	<20.58	135	Weathered till
			10	**858.98**	<20.81	136	Weathered till
			11	**772.99**	<18.21	137	Weathered till
			11.5	**760.84**	<17.71	138	Weathered till
			12	**443.25**	<15.05	139	Weathered till
			12.5	**396.16**	<13.76	140	Weathered till
			13	**545.12**	<15.5	141	Weathered till
			13.5	**399.84**	<13.42	142	Weathered till
			14	**437.16**	<13.64	144	Weathered till
			14.5	**447.36**	<14.22	145	Weathered till

Location Identification	X Coordinate [1]	Y Coordinate [1]	Depth (feet bgs)	XRF Arsenic Concentration (mg/kg)	XRF Lead Concentration (mg/kg)	XRF Count [2]	Sample Material Type
LLSB-44	1308442.851	371414.3491	1.5	**64.34**	**251**	168	Fill
			2	**210.87**	**127**	169	Fill
			2.5	**80.34**	<7.78	170	Fill
			3	**155.7**	<9.77	171	Fill
			3.5	**2,667.46**	**1,369**	172	Fill
			4	**2,065.62**	**623**	173	Fill
			4.5	**598.2**	<16.49	174	Fill/brick
			5	**14,215.54**	**336**	175	Fill/brick
			6	**1,132.08**	**803**	176	Fill/brick and mortar
			6.5	**538.57**	**416**	177	Fill/brick and mortar
			7	**1,679.51**	**222**	178	Fill/brick and mortar
			7.5	**1,535.87**	<26.99	179	Fill/debris
			7.8	**166.19**	<9.25	180	Fill
			8.5	**41.71**	<7.44	181	Fill
			9	**2,632.66**	<39.62	182	Fill
			9.5	**624.29**	<18.2	183	Fill
			10	**577.04**	<16.18	184	Weathered till
			10.2	**466.82**	34.32	185	Weathered till
			10.5	**584.61**	<16.61	186	Weathered till
			11	**333.25**	<12.55	187	Weathered till
			11.5	**632.81**	<17.08	188	Weathered till
			12	**168.38**	<10.71	189	Weathered till
			12.5	**356.37**	<14.63	190	Weathered till
			13	**351.04**	<13.29	191	Weathered till
			13.5	**276.57**	<12.68	192	Weathered till
			14	**487.74**	<16.45	193	Weathered till
			14.5	**371.71**	<14.1	194	Weathered till
			14.8	**336.12**	<15.53	195	Weathered till
LLSB-45	1308438.118	371427.7628	1.5	**280.79**	**345**	196	Fill/brick
			2	**282.71**	**458**	197	Fill
			2.5	**43.65**	<7.29	198	Fill
			3	**30.33**	<6.87	199	Fill
			3.5	<18.62	<18.62	200	Fill
			4	**113.12**	<8.94	201	Fill
			4.5	**198.85**	**426**	202	Fill
			5	**273.53**	<11.57	203	Fill
			6	**265.46**	<12.18	204	Fill
			6.5	**1,602.65**	**838**	205	Fill/brick
			7	**2,461.11**	**1,020**	206	Fill/brick
			7.5	**2,236.48**	**1,078**	207	Fill
			8	**2,589.74**	**296**	208	Fill/debris
			8.5	**470.4**	<12.08	209	Fill/debris
			9	**887.83**	<21.53	210	Fill
			9.5	**388.38**	<12.74	211	Fill
			10	**4,037.58**	<53.37	212	Fill
			10.5	**563.79**	<15.85	213	Fill
			11	**681.45**	<17.15	214	Weathered till
			11.5	**311.73**	<12.12	215	Weathered till
			12	**170.21**	<9.98	216	Weathered till
			12.5	**138.7**	<9.76	217	Weathered till
			13	**112.26**	<8.7	218	Weathered till
			13.5	**154.24**	<10.09	219	Weathered till
			14	**58.77**	<7.8	220	Weathered till
			14.5	**36.84**	<6.98	221	Weathered till
			15	**42.43**	<7.01	222	Weathered till

Location Identification	X Coordinate [1]	Y Coordinate [1]	Depth (feet bgs)	XRF Arsenic Concentration (mg/kg)	XRF Lead Concentration (mg/kg)	XRF Count [2]	Sample Material Type
LLSB-46	1308493.935	371364.431	2	<21.16	<21.16	223	Fill
			2.5	**45.57**	**65.1**	224	Fill
			3	**21.2**	<6.46	225	Fill
			3.5	**41.34**	<7.22	226	Fill
			4	<20.05	<20.05	227	Fill
			4.5	<18.88	<18.88	228	Fill
			5	<18.88	<18.88	229	Fill
			5.5	<21.17	<21.17	230	Fill
			6	<19.54	<19.54	231	Fill
			6.5	<18.43	<18.43	232	Fill
			7	**102.99**	**708**	233	Fill
			7.5	**86.37**	**442**	234	Fill
			8	**34.38**	**179**	235	Fill
			8.5	**49.28**	<7.81	236	Fill
			9	**70.43**	**373**	238	Fill/brick
			9.5	**58.84**	**182**	239	Fill/brick
			10	**1,368.53**	**179**	240	Fill
			11.5	<24.6	**80**	241	Fill
			12	**201.27**	**105**	242	Fill
			12.5	**804.81**	**420**	243	Fill
			13	**648.75**	**682**	244	Fill
			13.5	**2,106.53**	**727**	245	Fill
			14	**304.77**	<11.82	237	Fill
			14.5	<20.68	<20.68	246	Fill
			15	**938.52**	**111**	247	Weathered till
			16.5	**335.94**	<12.6	248	Weathered till
			17.5	**743.49**	<21.74	250	Weathered till
			17.7	**903.75**	<19.46	251	Weathered till
LLSB-47	1308491.886	371380.2305	1.5	<18.15	<18.15	252	Fill
			2	<21.05	<21.05	253	Fill
			2.5	<17.78	<17.78	254	Fill
			3	**20.77**	<6.82	255	Fill
			3.5	**30.88**	**165**	256	Fill
			4	<18.48	<18.48	257	Fill
			4.5	**18.54**	<5.99	258	Fill
			5	<16.85	<16.85	259	Fill
			6	<18.12	<18.12	260	Fill
			6.5	<18.5	<18.5	261	Fill
			7	<18.34	<18.34	262	Fill
			7.5	<21.48	<21.48	263	Fill
			8	**23.19**	**52.6**	264	Fill
			8.5	**77.73**	**338**	265	Fill
			9	**27.86**	<7.04	266	Fill
			9.5	<18.25	<18.25	267	Fill
			10	<23.58	**77.0**	268	Fill
			11	<24.5	**76.1**	269	Fill
			11.5	**46.68**	**169**	270	Fill
			12	**171.23**	**926**	271	Fill/brick
			12.5	**2,936.58**	**414**	272	Fill
			13	**1,527.74**	<28.89	273	Fill
			13.5	**992.06**	<21.14	274	Fill
			14	**4,425.7**	<66	275	Fill
			14.5	**2,404.3**	<39.2	276	Fill
			15	**2,894.22**	<42.13	277	Fill
			15.5	**1,111.7**	<22.74	278	Fill
			16	**2,177.08**	<35.77	279	Weathered till
			16.5	**3,174.05**	<45.39	280	Weathered till
			17	**1,842.47**	<33.95	281	Weathered till
			17.5	**1,476.81**	<29.41	282	Weathered till
			18	**814.61**	<18.2	283	Weathered till
			18.5	**488.98**	<15.36	285	Weathered till
			19	**359.08**	<14.04	286	Weathered till

Notes:

[1] Horizontal datum is Washington State Plane North coordinate system 83/91 (feet).

[2] A second boring was drilled approximately 1 foot east of the original boring due to poor recovery in the original boring.

XRF = X-ray fluorescence. The XRF instrument was operated by Ecology during drilling activities. A Delta Dynamic DP-4000 was used on soil from LLSB-04 through LLSB-35. An Alpha X-Ray Analyzer XT-440 was used on soil from LLSB-36 through LLSB-47.

bgs = below ground surface

Bold font indicates the analyte was detected

Gray-shaded cells indicate the highest arsenic or lead concentrations measured in the boring

< = The analyte was not detected at the identified reporting limit

Table 2

Summary of Soil, Column Leaching and SPLP Arsenic Concentrations

Everett Smelter

Everett, Washington

Sample Identification	Estimated Average Arsenic Concentration [1] (mg/kg)	Total Arsenic [2] (mg/kg)	SPLP Arsenic (µg/L)	Column Leach Arsenic (µg/L)				
				Day 1	Day 5	Day 10	Day 20	Day 30
Comp-1[3]	1,000	1,190; 1,390	8,960	15,100	17,500	14,600	14,800	14,600
Comp-2[4]	2,500	2,250; 2,450	6,380	8,200	11,100	11,000	11,500	10,911
Comp-3[5]	5,000	3,730; 17,800	10,500	25,200	29,900	23,800	21,600	21,700
LLSB-29-5.2-5.5	10,000	4,320	10,100	NA	NA	NA	NA	NA
LLSB-07-5.4-5.9	35,000	40,100	18,200	NA	NA	NA	NA	NA

Notes:

[1] The estimated average arsenic concentration is based on results for soil obtained in the field using an XRF-analyzer. Composite samples were created based on averaging the XRF measurements for discrete samples in an attempt to perform column leach and/or SPLP tests on samples representing the following approximate total arsenic concentrations: 1,000, 2,500, 5,000, 10,000, and 35,000 mg/kg. A comparison of the total arsenic and estimated average arsenic concentration which were based on XRF measurements demonstrates the variability in soil concentrations at the site.

[2] Total arsenic analyses were performed twice on samples LLSB-Comp-1, LLSB-Comp-2, and LLSB-Comp-3. One analysis for total arsenic only and one analysis for RCRA 8 metals. One analysis was performed on samples LLSB-29-5.2-5.5 and LLSB-07-5.4-5.9. The analyses were performed by EPA Method 6010C.

[3] Sample Comp-1 is a composite of 15 samples the majority of which have XRF arsenic concentrations ranging from 563 to 1,471 mg/kg. The average of the XRF concentrations is 978 mg/kg. The samples include LLSB-06-3-3.5, LLSB-09-7-7.5, LLSB-10-7-7.5, LLSB-14-6.5-7, LLSB-16-5.5-6, LLSB-16-8-8.5, LLSB-27-1.3-3.3, LLSB-27-5.8-7.2, LLSB-29-6.3-7.7, LLSB-35-8.3-8.7, LLSB-42-12.2-12.6, LLSB-43-3.8-6.2, LLSB-43-9.3-11.6, LLSB-44-5.8-7.7, and LLSB-44-9.3-10.7.

[4] Sample Comp-2 is a composite of 29 samples the majority of which have XRF arsenic concentrations ranging from 1,388 to 3,200 mg/kg. The average of the XRF concentrations is 2,183 mg/kg. The samples include (LLSB-05-5.5-6, LLSB-06-6-6.5, LLSB-08-3.5-4, LLSB-11-3.5-4, LLSB-14-4.5-5, LLSB-15-6.5-7, LLSB-19-4.5-5, LLSB-22-8-8.5, LLSB-24-10-10.5, LLSB-25-7.5-8, LLSB-26-5.2-5.4, LLSB-28-2.2-2.7, LLSB-29-5.8-6.2, LLSB-33-4.3-5.2, LLSB-34-5.3-5.7, LLSB-35-7.8-8.3, LLSB-36-10.3-10.7, LLSB-38-8.7-9.7, LLSB-39-13.3-15.2, LLSB-41-11.3-12.2, LLSB-41-8.3-8.7, LLSB-42-9.3-9.6, LLSB-43-7.5-7.8, LLSB-43-7.8-8.7, LLSB-44-3.3-4.2, LLSB-44-8.7-9.2, LLSB-45-6.3-6.7, LLSB-46-13.3-13.7, and LLSB-47-15.8-16.3.

[5] Sample Comp-3 is a composite of 27 samples the majority of which have XRF arsenic concentrations ranging from 2,429 to 8,943 mg/kg. The average of the XRF concentrations is 4,991 mg/kg. The samples include LLSB-04-3.2-3.7, LLSB-09-4.5-5, LLSB-10-4.5-5, LLSB-13-4-4.5, LLSB-13-6-6.5, LLSB-15-3.5-4, LLSB-15-5-5.5, LLSB-21-7-7.5, LLSB-23-11-11.5, LLSB-23-4.5-5, LLSB-23-8.5-9, LLSB-26-1.8-2.3, LLSB-26-2.8-3.2, LLSB-27-3.8-4.5, LLSB-27-5-5.4, LLSB-28-2.8-7.7, LLSB-29-3.5-3.8, LLSB-35-7.3-7.7, LLSB-36-8.0-8.7, LLSB-37-12.2-12.7, LLSB-39-12.8-13.2, LLSB-42-9.6-10, LLSB-45-6.8-8.2, LLSB-45-9.8-10.2, LLSB-47-12.3-12.7, LLSB-47-13.8-14.2, and LLSB-47-14.3-15.2.

SPLP = Synthetic Precipitation Leaching Procedure, EPA Method 1312

XRF = X-ray fluorescence

mg/kg = milligram per kilogram

NA = Not analyzed

µg/L = microgram per liter

Column Leach by ASTM Method D4874 using deionized water as the leachate

Table 3

Total RCRA 8 Metals Results

Everett Smelter

Everett, Washington

Analyte	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Sample Identification								
LLSB-09 Comp[1]	**6,760**	**255**	**21.9**	**31**	**2,320**	**3.6**	10 U	**17.6**
LLSB-13 Comp[2]	**5,780**	**61.6**	**18.2**	**37**	**58**	**0.45**	10 U	0.9 U
LLSB-16 Comp[3]	**3,420**	**80.2**	**15.3**	**38**	**33**	**1.51**	10 U	0.8 U
LLSB-Comp-1[4]	**1,390**	**103**	**24.8**	**33.7**	**448**	**2.65**	5 U	**2.6**
LLSB-Comp-2[5]	**2,450**	**133**	**29.5**	**32.4**	**1,700**	**6.2**	6 U	**7.2**
LLSB-Comp-3[6]	**3,730**	**146**	**19.2**	**35**	**1,030**	**7.7**	10 U	**6.5**

Notes:

[1] LLSB-09 Comp was a composite of LLSB-09-3-3.5 and LLSB-09-4.5-5.

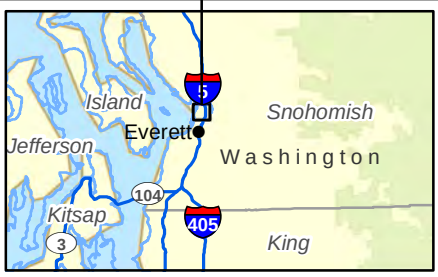
[2] LLSB-13 Comp was a composite of LLSB-13-4-4.5 and LLSB-13-6-6.5.

[3] LLSB-16 Comp was a composite of LLSB-16-2.5-3 and LLSB-16-5.5-6.

[4] Sample Comp-1 is a composite of 15 samples the majority of which have XRF arsenic concentrations ranging from 563 to 1,471 mg/kg. The average of the XRF concentrations is 978 mg/kg. The samples include LLSB-06-3-3.5, LLSB-09-7-7.5, LLSB-10-7-7.5, LLSB-14-6.5-7, LLSB-16-5.5-6, LLSB-16-8-8.5, LLSB-27-1.3-3.3, LLSB-27-5.8-7.2, LLSB-29-6.3-7.7, LLSB-35-8.3-8.7, LLSB-42-12.2-12.6, LLSB-43-3.8-6.2, LLSB-43-9.3-11.6, LLSB-44-5.8-7.7, and LLSB-44-9.3-10.7.

[5] Sample Comp-2 is a composite of 29 samples the majority of which have XRF arsenic concentrations ranging from 1,388 to 3,200 mg/kg. The average of the XRF concentrations is 2,183 mg/kg. The samples include (LLSB-05-5.5-6, LLSB-06-6-6.5, LLSB-08-3.5-4, LLSB-11-3.5-4, LLSB-14-4.5-5, LLSB-15-6.5-7, LLSB-19-4.5-5, LLSB-22-8-8.5, LLSB-24-10-10.5, LLSB-25-7.5-8, LLSB-26-5.2-5.4, LLSB-28-2.2-2.7, LLSB-29-5.8-6.2, LLSB-33-4.3-5.2, LLSB-34-5.3-5.7, LLSB-35-7.8-8.3, LLSB-36-10.3-10.7, LLSB-38-8.7-9.7, LLSB-39-13.3-15.2, LLSB-41-11.3-12.2, LLSB-41-8.3-8.7, LLSB-42-9.3-9.6, LLSB-43-7.5-7.8, LLSB-43-7.8-8.7, LLSB-44-3.3-4.2, LLSB-44-8.7-9.2, LLSB-45-6.3-6.7, LLSB-46-13.3-13.7, and LLSB-47-15.8-16.3.

[6] Sample Comp-3 is a composite of 27 samples the majority of which have XRF arsenic concentrations ranging from 2,429 to 8,943 mg/kg. The average of the XRF concentrations is 4,991 mg/kg. The samples include LLSB-04-3.2-3.7, LLSB-09-4.5-5, LLSB-10-4.5-5, LLSB-13-4-4.5, LLSB-13-6-6.5, LLSB-15-3.5-4, LLSB-15-5-5.5, LLSB-21-7-7.5, LLSB-23-11-11.5, LLSB-23-4.5-5, LLSB-23-8.5-9, LLSB-26-1.8-2.3, LLSB-26-2.8-3.2, LLSB-27-3.8-4.5, LLSB-27-5-5.4, LLSB-28-2.8-7.7, LLSB-29-3.5-3.8, LLSB-35-7.3-7.7, LLSB-36-8.0-8.7, LLSB-37-12.2-12.7, LLSB-39-12.8-13.2, LLSB-42-9.6-10, LLSB-45-6.8-8.2, LLSB-45-9.8-10.2, LLSB-47-12.3-12.7, LLSB-47-13.8-14.2, and LLSB-47-14.3-15.2.



N
W
E
S

2,000 0 2,000

Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: ESRI Data & Maps

Projection: NAD 1983 UTM Zone 10N

Path: \\sea\projects\0105040681GIS\MXDs\Report\A_Memo_Ecology\Figure_1.mxd Map Revised: 10 October 2014 cgonzales

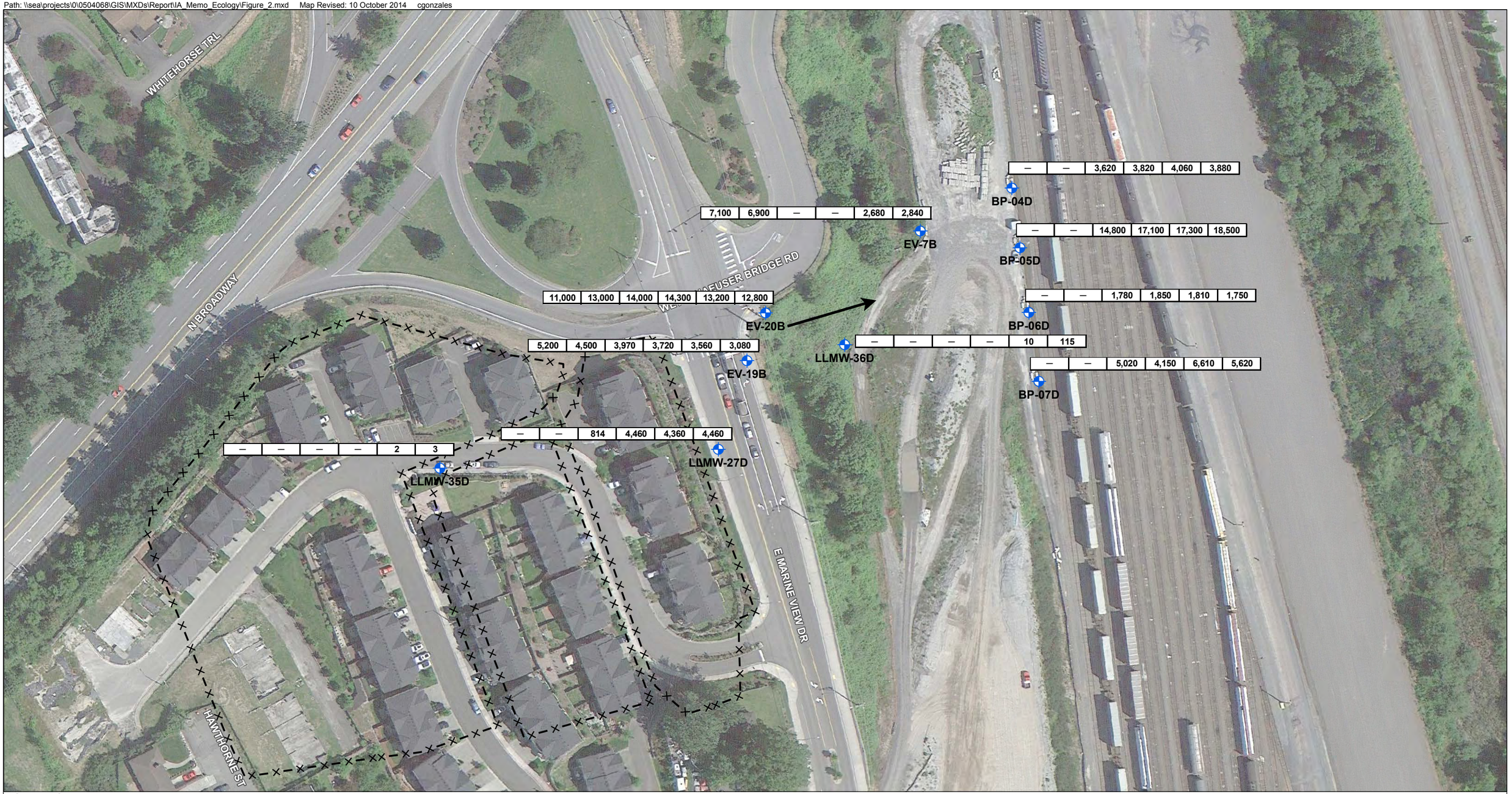
Vicinity Map

Everett Smelter Site, Lowland Area
Everett, Washington

GeoEngineers

Figure 1

Path: \\sea\projects\0\0504068\GIS\MXDs\Report\IA_Memo_Ecology\Figure_2.mxd Map Revised: 10 October 2014 cgonzales



Legend

- Monitoring Well
- Former Fenceline
- Groundwater Flow Direction

Mar-99	Jun-99	Jan-13	Apr-13	Aug-13	Nov-13
5,200	4,500	3,970	3,720	3,560	12,800

Month and Year of Sample
Arsenic in Groundwater (µg/L)

"–" No Sample Collected

Notes:
1.Aerial photo from 2012.
2. Based on Exhibit 4-1 in the January 2000 "Comprehensive Lowland Area Remedial Investigation Report for the Everett Smelter Site," Hydrometrics.
3. The locations of all features shown are approximate.
4. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: GoogleEarth Pro, 2013. Snohomish County GIS, 2012. City of Everett GIS. Washington State Department of Ecology.

N W E S

100 0 100
Feet

Arsenic Concentrations in Deep Groundwater in the Focused Investigation Area

Everett Smelter Site, Lowland Area
Everett, Washington

GeoEngineers

Figure 2

Path: \\sea\projects\0\0504068\GIS\MXDs\Report\IA_Memo_Ecology\Figure_3.mxd Map Revised: 10 October 2014 cgonzales

Notes:
1. Aerial photo from 2012.
2. Based on Sheet 2-1 in the 1995 "Remedial Investigation, Everett Smelter Site," report prepared by Hydrometrics.
3. Geologic Cross Sections A-A' through C-C' were previously prepared in adjacent locations as part of the remedial investigation of the Lowland Area.
4. The locations of all features shown are approximate.
5. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached. document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Data Source: GoogleEarth Pro, 2013. Snohomish County GIS, 2012. City of Everett GIS. Washington State Department of Ecology.

Legend

- Approximate Location of Former Everett Smelter Structures[2]
- D — D' Geologic Cross Section Location[3] (See Figures 5 through 8)
- LLSB-04 ● Investigation Location and Location Designation
- Existing Monitoring Well

N W E S

20 0 20
Feet

Investigation and Geologic Cross Section Locations

Everett Smelter Site, Lowland Area
Everett, Washington

GeoEngineers

Figure 3

Path: \\sea\projects\0\0504068\GIS\MXDs\Report\IA_Memo_Ecology\Figure_4.mxd Map Revised: 10 October 2014 cgonzales

Dust Chambers
Coke Bins
Flue
Stack
Blacksmith Shop
E MARINE VIEW DR

LLSB-34 2,575 4.0'
LLSB-33 19,404 4.0'
LLSB-45 4,038 10.0'
LLSB-31 19,709 3.5'
LLSB-42 5,557 10.0'
LLSB-32 1,307 2.5'
LLSB-44 14,216 5.0'
LLSB-29 11,946 5.4'
LLSB-41 2,858 8.5'
LLSB-40 837 14.0'
LLSB-30 1,040 3.0'
LLSB-43 3,400 7.7'
LLSB-27 15,579 4.0'
LLSB-35 6,643 7.5'
LLSB-28 2,823 2.5'
LLSB-10 11,200 4.5'
LLSB-22 5,344 6.5'
LLSB-39 2,756 13.0'
LLSB-09 23,000 4.2'
LLSB-11 3,581 4.0'
LLSB-21 5,325 7.0'
LLSB-26 5,301 3.0'
LLSB-12 20,000 3.0'
LLSB-36 4,763 3.5'
LLSB-08 3,209 3.8'
LLSB-23 13,757 3.9'
LLSB-47 4,426 14.0'
LLSB-13 28,700 4.7'
LLSB-07 35,100 5.4'
LLSB-46 2,107 13.5'
LLSB-18 1,922 8.0'
LLSB-14 19,300 3.4'
LLSB-24 3,309 13.0'
LLSB-37 2,895 12.5'
LLSB-16 22,100 2.5'
LLSB-06 2,598 6.0'
LLSB-15 7,555 5.1'
LLSB-05 3,846 6.0'
LLSB-25 4,373 7.5'
LLSB-38 1,751 9.0'
LLSB-17 1,191 10.0'
LLSB-19 1,608 4.5'
LLSB-04 4,399 3.5'
LLSB-20 1,287 4.5'

EV-6 (A/B)
EV-20
EV-13
EV-19

Notes:
1. Aerial photo from 2012.
2. Based on Sheet 2-1 in the 1995 "Remedial Investigation, Everett Smelter Site," report prepared by Hydrometrics.
3. The locations of all features shown are approximate.
4. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Data Source: GoogleEarth Pro, 2013. Snohomish County GIS, 2012. City of Everett GIS. Washington State Department of Ecology.

Legend

LLSB-09 ← Investigation Location and Location Designation
23,000 ← Arsenic Concentration in mg/kg
4.2' ← Sample Depth in Feet Below Gound Surface (bgs)

Approximate Location of Former Everett Smelter Structures[2]

Existing Monitoring Well

Maximum Arsenic Concentration Range (mg/kg)

- <1,000
- 1,001 - 2,500
- 2,501 - 5,000
- 5,001 - 10,000
- >10,000

N W E S

20 0 20
Feet

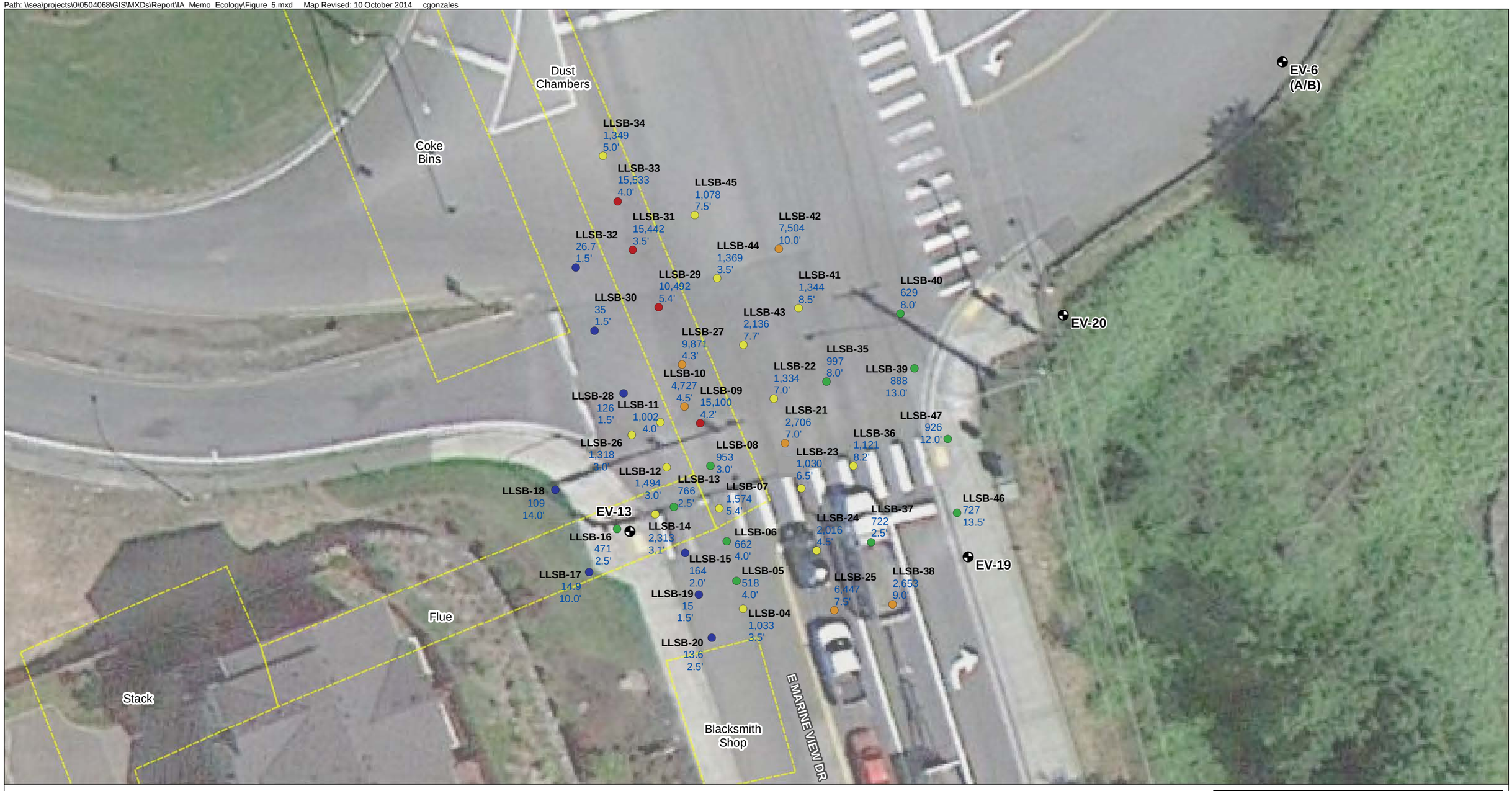
Maximum Arsenic Concentrations in Soil

Everett Smelter Site, Lowland Area
Everett, Washington

GeoEngineers

Figure 4

Path: \\sea\projects\0\0504068\GIS\MXDs\Report\IA_Memo_Ecology\Figure_5.mxd Map Revised: 10 October 2014 cgonzales



Notes:
1. Aerial photo from 2012.
2. Based on Sheet 2-1 in the 1995 "Remedial Investigation, Everett Smelter Site," report prepared by Hydrometrics.
3. The locations of all features shown are approximate.
4. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Data Source: GoogleEarth Pro, 2013. Snohomish County GIS, 2012. City of Everett GIS. Washington State Department of Ecology.

Legend

- LLSB-09 ← Investigation Location and Location Designation
- 23,000 ← Arsenic Concentration in mg/kg
- 4.2' ← Sample Depth in Feet Below Gound Surface (bgs)
- Approximate Location of Former Everett Smelter Structures[2]
- Existing Monitoring Well

Maximum Lead Concentration Range (mg/kg)

- <250
- 251 - 1,000
- 1,001 - 2,500
- 2,501 - 10,000
- >10,000

N W E S

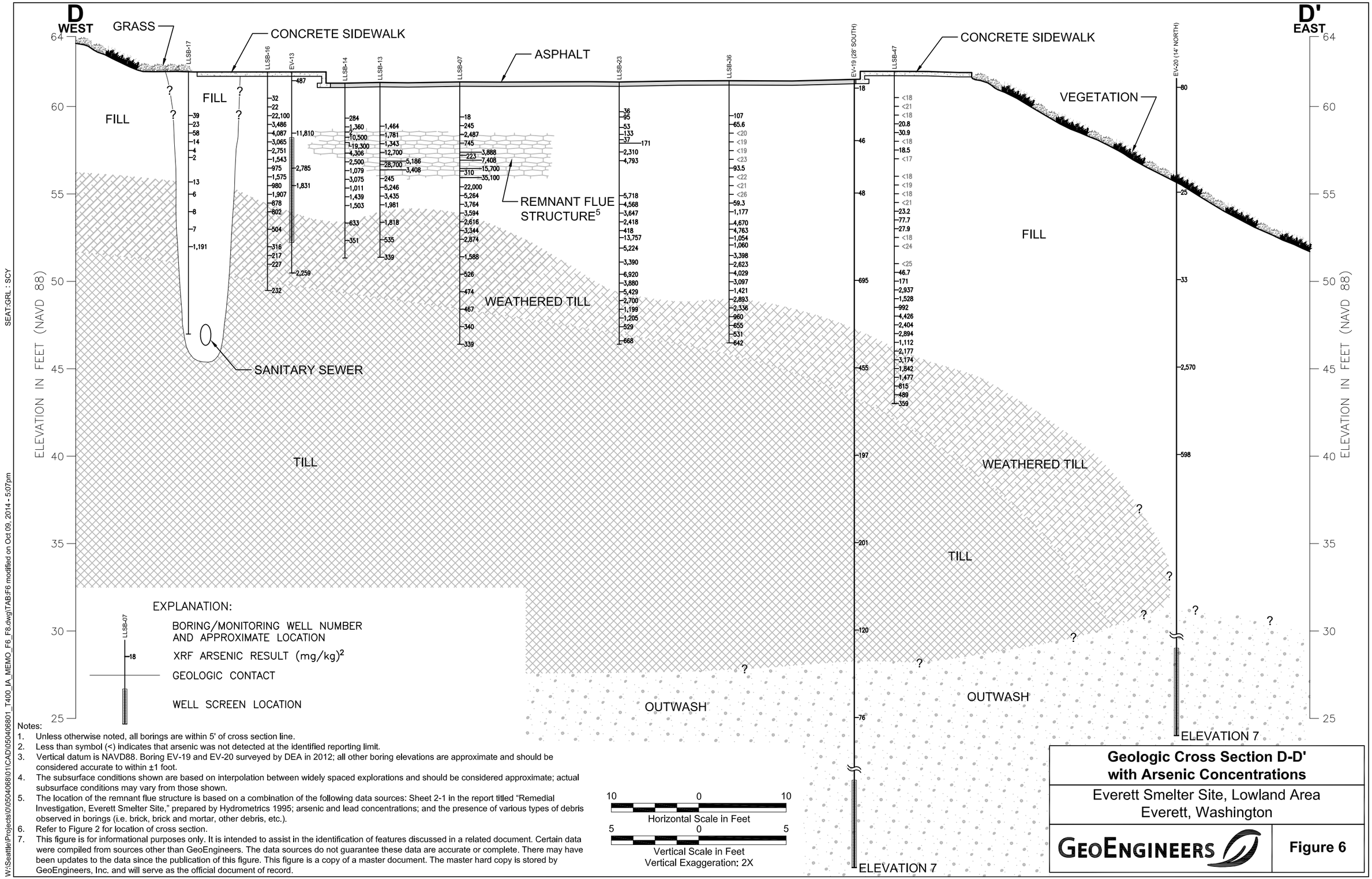
20 0 20
Feet

Maximum Lead Concentrations in Soil

Everett Smelter Site, Lowland Area
Everett, Washington

GeoEngineers

Figure 5



SEAT:GRL : SCY

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Notes:

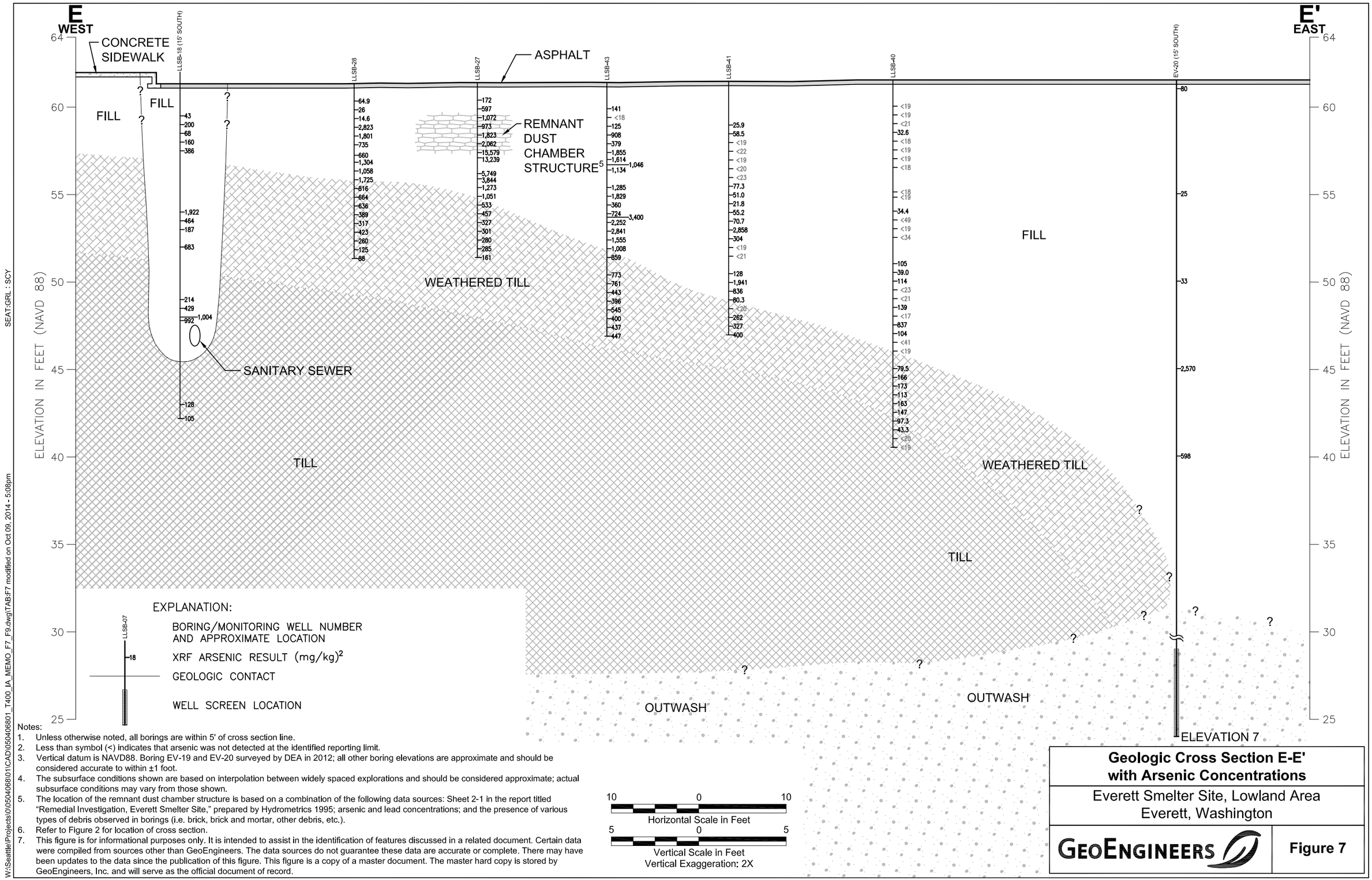
1. Unless otherwise noted, all borings are within 5' of cross section line.
2. Less than symbol (<) indicates that arsenic was not detected at the identified reporting limit.
3. Vertical datum is NAVD88. Boring EV-19 and EV-20 surveyed by DEA in 2012; all other boring elevations are approximate and should be considered accurate to within ±1 foot.
4. The subsurface conditions shown are based on interpolation between widely spaced explorations and should be considered approximate; actual subsurface conditions may vary from those shown.
5. The location of the remnant flue structure is based on a combination of the following data sources: Sheet 2-1 in the report titled "Remedial Investigation, Everett Smelter Site," prepared by Hydrometrics 1995; arsenic and lead concentrations; and the presence of various types of debris observed in borings (i.e. brick, brick and mortar, other debris, etc.).
6. Refer to Figure 2 for location of cross section.
7. This figure is for informational purposes only. It is intended to assist in the identification of features discussed in a related document. Certain data were compiled from sources other than GeoEngineers. The data sources do not guarantee these data are accurate or complete. There may have been updates to the data since the publication of this figure. This figure is a copy of a master document. The master hard copy is stored by GeoEngineers, Inc. and will serve as the official document of record.

Geologic Cross Section D-D' with Arsenic Concentrations

Everett Smelter Site, Lowland Area
Everett, Washington

GeoEngineers

Figure 6



EXPLANATION:

LLSB-07
18

BORING/MONITORING WELL NUMBER AND APPROXIMATE LOCATION

XRF ARSENIC RESULT (mg/kg)[2]

GEOLOGIC CONTACT

WELL SCREEN LOCATION

Notes:

1. Unless otherwise noted, all borings are within 5' of cross section line.
2. Less than symbol (<) indicates that arsenic was not detected at the identified reporting limit.
3. Vertical datum is NAVD88. Boring EV-19 and EV-20 surveyed by DEA in 2012; all other boring elevations are approximate and should be considered accurate to within ±1 foot.
4. The subsurface conditions shown are based on interpolation between widely spaced explorations and should be considered approximate; actual subsurface conditions may vary from those shown.
5. The location of the remnant dust chamber structure is based on a combination of the following data sources: Sheet 2-1 in the report titled "Remedial Investigation, Everett Smelter Site," prepared by Hydrometrics 1995; arsenic and lead concentrations; and the presence of various types of debris observed in borings (i.e. brick, brick and mortar, other debris, etc.).
6. Refer to Figure 2 for location of cross section.
7. This figure is for informational purposes only. It is intended to assist in the identification of features discussed in a related document. Certain data were compiled from sources other than GeoEngineers. The data sources do not guarantee these data are accurate or complete. There may have been updates to the data since the publication of this figure. This figure is a copy of a master document. The master hard copy is stored by GeoEngineers, Inc. and will serve as the official document of record.

10 0 10
Horizontal Scale in Feet

5 0 5
Vertical Scale in Feet
Vertical Exaggeration: 2X

Geologic Cross Section E-E' with Arsenic Concentrations

Everett Smelter Site, Lowland Area
Everett, Washington

GeoEngineers

Figure 7

D WEST — **D'** EAST

GRASS
CONCRETE SIDEWALK
ASPHALT
CONCRETE SIDEWALK
VEGETATION
FILL
FILL
FILL
REMNANT FLUE STRUCTURE[5]
WEATHERED TILL
SANITARY SEWER
TILL
WEATHERED TILL
OUTWASH
OUTWASH
TILL
ELEVATION 7
ELEVATION 7

LLSB-17 LLSB-16 EV-13 LLSB-14 LLSB-13 LLSB-07 LLSB-23 LLSB-36 EV-19 (28' SOUTH) LLSB-47 EV-20 (14' NORTH)

ELEVATION IN FEET (NAVD 88)

EXPLANATION:

- BORING/MONITORING WELL NUMBER AND APPROXIMATE LOCATION (LLSB-07)
- XRF LEAD RESULT (mg/kg)[2] (270)
- GEOLOGIC CONTACT
- WELL SCREEN LOCATION

Notes:

1. Unless otherwise noted, all borings are within 5' of cross section line.
2. Less than symbol (<) indicates that arsenic was not detected at the identified reporting limit.
3. Vertical datum is NAVD88. Boring EV-19 and EV-20 surveyed by DEA in 2012; all other boring elevations are approximate and should be considered accurate to within ±1 foot.
4. The subsurface conditions shown are based on interpolation between widely spaced explorations and should be considered approximate; actual subsurface conditions may vary from those shown.
5. The location of the remnant flue structure is based on a combination of the following data sources: Sheet 2-1 in the report titled "Remedial Investigation, Everett Smelter Site," prepared by Hydrometrics 1995; arsenic and lead concentrations; and the presence of various types of debris observed in borings (i.e. brick, brick and mortar, other debris, etc.).
6. Refer to Figure 2 for location of cross section.
7. This figure is for informational purposes only. It is intended to assist in the identification of features discussed in a related document. Certain data were compiled from sources other than GeoEngineers. The data sources do not guarantee these data are accurate or complete. There may have been updates to the data since the publication of this figure. This figure is a copy of a master document. The master hard copy is stored by GeoEngineers, Inc. and will serve as the official document of record.

10 0 10
Horizontal Scale in Feet
5 0 5
Vertical Scale in Feet
Vertical Exaggeration: 2X

Geologic Cross Section D-D' with Lead Concentrations

Everett Smelter Site, Lowland Area
Everett, Washington

GeoEngineers

Figure 8

SEAT:GRL : SCY

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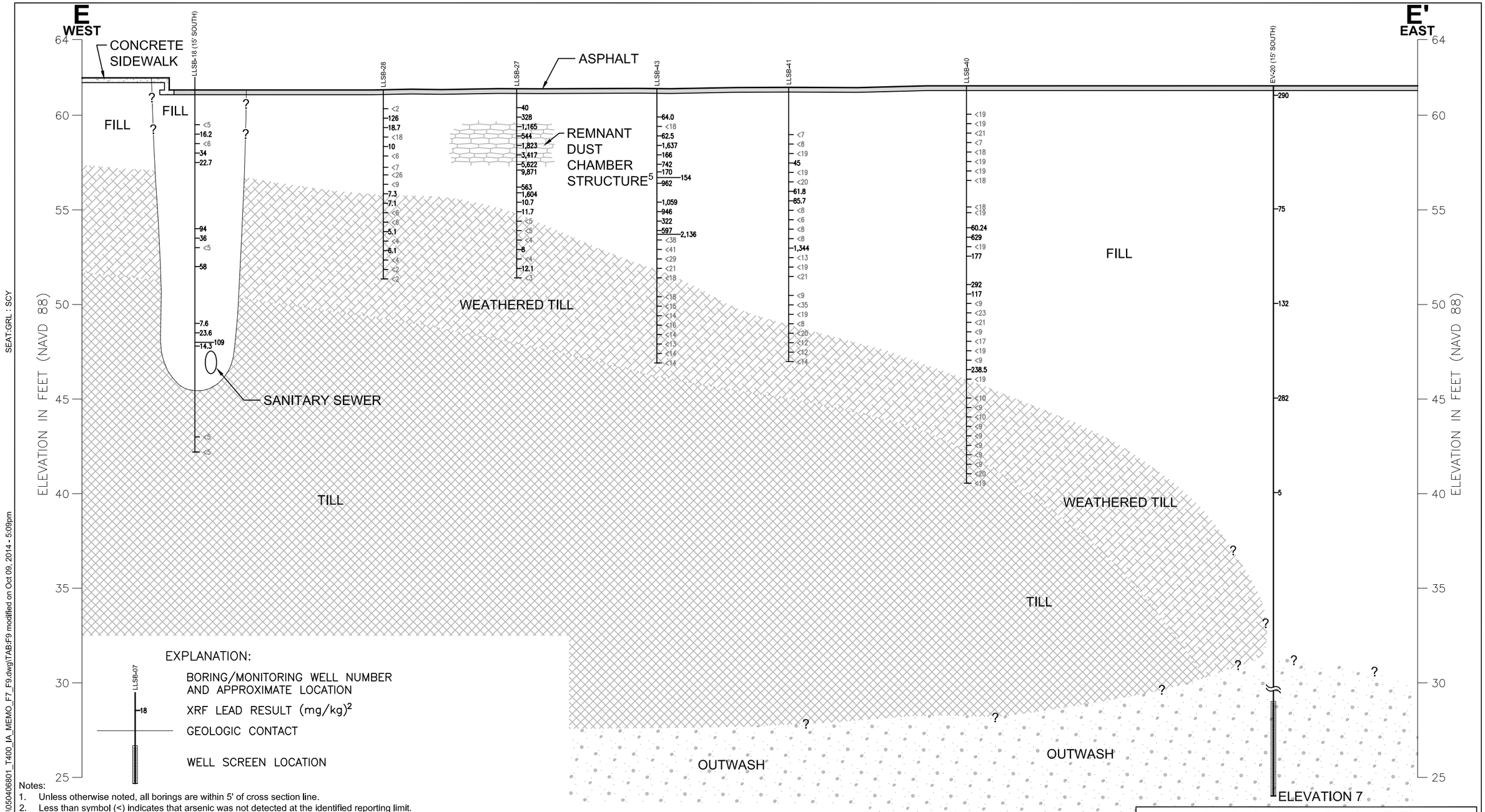


Notes:

1. Unless otherwise noted, all borings are within 5' of cross section line.
2. Less than symbol (<) indicates that arsenic was not detected at the identified reporting limit.
3. Vertical datum is NAVD88. Boring EV-19 and EV-20 surveyed by DEA in 2012; all other boring elevations are approximate and should be considered accurate to within ±1 foot.
4. The subsurface conditions shown are based on interpolation between widely spaced explorations and should be considered approximate; actual subsurface conditions may vary from those shown.
5. The location of the remnant dust chamber structure is based on a combination of the following data sources: Sheet 2-1 in the report titled "Remedial Investigation, Everett Smelter Site," prepared by Hydrometrics 1995; arsenic and lead concentrations; and the presence of various types of debris observed in borings (i.e. brick, brick and mortar, other debris, etc.).
6. Refer to Figure 2 for location of cross section.
7. This figure is for informational purposes only. It is intended to assist in the identification of features discussed in a related document. Certain data were compiled from sources other than GeoEngineers. The data sources do not guarantee these data are accurate or complete. There may have been updates to the data since the publication of this figure. This figure is a copy of a master document. The master hard copy is stored by GeoEngineers, Inc. and will serve as the official document of record.

10 0 10
Horizontal Scale in Feet
5 0 5
Vertical Scale in Feet
Vertical Exaggeration: 2X

Geologic Cross Section E-E' with Lead Concentrations

Everett Smelter Site, Lowland Area
Everett, Washington

GeoEngineers

Figure 9

APPENDIX A
Boring Logs

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% RETAINED ON NO. 200 SIEVE	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS
				SP	POORLY-GRADED SANDS, GRAVELLY SAND
	MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
	AC	Asphalt Concrete
	CC	Cement Concrete
	CR	Crushed Rock/ Quarry Spalls
	TS	Topsoil/ Forest Duff/Sod

Groundwater Contact

Measured groundwater level in exploration, well, or piezometer

Measured free product in well or piezometer

Graphic Log Contact

Distinct contact between soil strata or geologic units

Approximate location of soil strata change within a geologic soil unit

Material Description Contact

Distinct contact between soil strata or geologic units

Approximate location of soil strata change within a geologic soil unit

Sampler Symbol Descriptions

2.4-inch I.D. split barrel

Standard Penetration Test (SPT)

Shelby tube

Piston

Direct-Push

Bulk or grab

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

A "P" indicates sampler pushed using the weight of the drill rig.

Laboratory / Field Tests

%F	Percent fines
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
OC	Organic content
PM	Permeability or hydraulic conductivity
PI	Plasticity index
PP	Pocket penetrometer
PPM	Parts per million
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen
NT	Not Tested

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

KEY TO EXPLORATION LOGS

GeoEngineers

FIGURE A-1

Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	3/26/2014	3/26/2014	10	PDR	GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	62 NAVD88	Hammer Data	Pneumatic	Drilling Equipment	Truck-mounted Geoprobe
Easting (X) / Northing (Y)	1308448.354 / 371344.0584	System Datum	WA State Plane,North NAD 83/91	Groundwater	Date Measured: — Depth to Water (ft): Not encountered — Elevation (ft):

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		48					AS	Asphalt			
								SP	Gray fine to coarse sand with occasional fine gravel, trace silt			
60								BR	Brick fragments			
								SP-SM	Gray fine to coarse sand with silt and occasional fine gravel (moist)			
					3.2-3.7							
								SM	Brown silty fine to coarse sand with occasional fine to coarse gravel (moist)			
	5		60		5-6							
								SM	Brown/red mottled silty fine sand with occasional coarse sand and fine gravel			
55												
					8-9			SM	Gray silty fine to medium sand with occasional coarse sand and fine gravel (moist) (weathered till)			
	10											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-04

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-2
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
3/26/2014	3/26/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308446.975 / 371350.0727	WA State Plane,North NAD 83/91	Date Measured: — Depth to Water (ft): — Elevation (ft): — Not encountered

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		48						AS	Asphalt			
									AS	Crushed asphalt/gravel			
60									SP-SM	Gray fine to medium sand with silt			
									BR	Brick fragments in silty fine to medium sand			
						4-4.5			SP-SM	Brown fine to coarse sand with silt and occasional fine gravel			
	5		60							Grades to more coarse			
						5.5-6							
55									SM	Gray silty fine to medium sand with occasional fine gravel (moist) (weathered till)			
						9-9.5							
	10												

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-05

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-3
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
3/26/2014	3/26/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308444.939 / 371358.4424	WA State Plane,North NAD 83/91	Date Measured: — Depth to Water (ft): Not encountered — Elevation (ft): —

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	Asphalt			
								SP	Gray fine to coarse sand with fine to coarse gravel and trace silt (road bedding)			
60								SP-SM	Gray fine to coarse sand with silt			
					3-3.5			BR	Brown fine to coarse sand with fine to coarse gravel and brick fragments			
								SP-SM	Brown/red mottled fine to coarse sand with silt and occasional fine gravel			
	5		60									
					6-6.5			SM	Gray silty fine to medium sand with occasional coarse sand, fine gravel (moist) (weathered till)			
55												
					9-9.5							
	10											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-06

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-4
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
3/26/2014	3/26/2014	15	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308443.313 / 371365.3725	WA State Plane,North NAD 83/91	Date Measured: — Depth to Water (ft): Not encountered — Elevation (ft): —

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
60	0		48					AS	Asphalt			
								GP	Crushed asphalt gravel			
								SM	Brown silty fine to ocarse sand with occasional fine gravel			
								BR	Brick			
					3.5-4			SM	Brown silty fine to coarse sand with occasional fine gravel			
								BR	Brick			
								SM	Brown silty fine to coarse sand with occasional fine gravel			
55	5		60					BR	Brick			
					5.4-5.9			SP	Gray fine sand (moist)			
								BR	Brick			
								SM	Brown silty fine to coarse sand (moist)			
								SM	Gray silty fine to medium sand with occasional coarse sand and fine gravel (moist) (weathered till)			
					8-8.5							
50	10		60						Grades to no gravel			
	15											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-07

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-5
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
3/26/2014	3/26/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308441.465 / 371374.5202	WA State Plane,North NAD 83/91	Date Measured: Not encountered; Depth to Water (ft): ; Elevation (ft):

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		40					AS	Asphalt			
								GP	Crushed asphalt gravel			
60								SP-SM	Brown fine to coarse sand with silt and occasional gravel			
								BR	Brick fragments			
								SP-SM	Brown fine to coarse sand with silt and occasional gravel			
					3.5-4							
								BR	Brick fragments			
								SP-SM	Gray fine to coarse sand with silt (moist to wet) (weathered till)			
	5		60									
					6-6.5							
55								SP-SM	Gray fine to coarse sand with silt and occasional fine gravel (moist) (weathered till)			
	10											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-08

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-6
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
3/26/2014	3/26/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308439.265 / 371383.5439	WA State Plane,North NAD 83/91	Date Measured: — Depth to Water (ft): Not encountered — Elevation (ft): —

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		40						AS	Asphalt			
									GP	Gray/brown fine to coarse gravel with fine ot coarse sand and trace silt			
60									BR	Brick fragments			
						3-3.5			SM	Brown silty fine to coarse sand with occasional fine gravel, some charred wood and debris			
						4.5-5			SP	Brown fine to medium sand			
	5		60						SM	Brown silty fine to coarse sand with occasional fine gravel (wet)			
									SP-SM	Gray fine to coarse sand with silt (wet) (weathered till)			
55						7-7.5			SP-SM	Gray fine to coarse sand with silt and occasional fine gravel (moist) (weathered till)			
	10												

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-09

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-7
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
3/26/2014	3/27/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308435.92 / 371387.1187	WA State Plane,North NAD 83/91	Date Measured: — Depth to Water (ft): Not encountered — Elevation (ft): —

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		36					AS	Asphalt			
								GP	Crushed asphalt and gravel			
60					3-3.5			SP	Brown fine to medium sand			
								SP-SM	Brown fine to coarse sand with silt and fine to coarse gravel, some brick fragments			
					4.5-5							
	5		60									
55					7-7.5			SM	Gray silty fine to coarse sand with occasional fine gravel (wet)			
								SM	Grades with increased silt content (weathered till)			
								ML	Gray silt with fine sand and occasional fine gravel (hard, moist)			
	10											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-10

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-8
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
3/27/2014	3/27/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308430.792 / 371383.6933	WA State Plane,North NAD 83/91	Date Measured: Not encountered; Depth to Water (ft): ; Elevation (ft):

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		33						AS	Asphalt			
60									SP-SM	Brown fine to coarse sand with silt and fine to coarse gravel			
									BR	Brick			
						3.5-4			SM	Dark brown silty fine to coarse sand			
									SP-SM	Brown fine to coarse sand with silt			
	5		60										
						6-6.5			SP-SM	Gray medium to coarse sand with silt			
55									SP-SM	Gray fine to coarse sand with silt and occasional fine gravel (moist) (weathered till)			
									SM	Gray silty fine to coarse sand with occasional fine gravel			
	10												

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-11

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-9
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
3/27/2014	3/27/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308432.109 / 371374.1643	WA State Plane,North NAD 83/91	Date Measured: — Depth to Water (ft): Not encountered — Elevation (ft): —

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		40						AS	Asphalt			
									GP	Gray fine to coarse gravel with fine to coarse sand and trace silt			
60						2-2.5			SP-SM	Brown fine to coarse sand with silt, occasional fine to coarse gravel and brick and wood debris			
						3-3.5							
									SM	Gray silty fine sand with occasional coarse sand			
	5		60							Grades to silty fine to coarse sand with occasional fine gravel (moist)			
55						6.5-7							
									SM	Gray silty fine to medium sand (weathered till)			
										Grades to with increased silt content			
	10												

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-12

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-10
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	3/27/2014	3/27/2014	10	PDR	GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	62 NAVD88	Hammer Data	Pneumatic	Drilling Equipment	Truck-mounted Geoprobe
Easting (X) / Northing (Y)	1308433.622 / 371365.8038	System Datum	WA State Plane,North NAD 83/91	Groundwater	Date Measured: — Depth to Water (ft): Not encountered — Elevation (ft):

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		40						AS	Asphalt			
									SP	Brown fine to coarse sand with fine gravel			
60						1.5-2							
									BR	Brick			
									SP	White fine to medium sand (likely mortar)			
									BR	Brick			
									SP	Orange fine to medium sand with trace silt			
						4-4.5							
	5		60						BR	Brick			
									SP	Brown fine to coarse sand with fine gravel, trace silt and brick debris			
						6-6.5							
55									SM	Gray silty fine sand with occasional fine gravel (weathered till)			
	10												

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-13

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-11
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
3/27/2014	3/27/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308429.749 / 371364.1792	WA State Plane,North NAD 83/91	Date Measured: Not encountered; Depth to Water (ft): ; Elevation (ft):

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		40					CC	8 inches concrete			
								GP	Coarse gravel			
60								SM	Brown silty fine to coarse sand			
								SP	White fine sand with brick debris (likely mortar)			
					3-3.5			SM	Brown silty fine to coarse sand with wood debris			
								SM	Light brown silty fine to medium sand with occasional fine gravel			
					4.5-5							
	5		60						Becomes more coarse and moist			
					6.5-7							
55								SM	Gray silty fine to medium sand (weathered till)			
	10											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-14

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-12
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
3/27/2014	3/27/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308436.07 / 371355.9944	WA State Plane,North NAD 83/91	Date Measured: — Depth to Water (ft): Not encountered — Elevation (ft): —

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	Asphalt			
								SP	Gray fine to coarse sand with occasional fine gravel and trace silt			
60					2-2.5			SM	Brown/black silty fine to coarse sand with fine gravel, brick debris (charring on gravel)			
								SP-SM	Brown/black fine to coarse sand with silt and fine gravel, brick debris (charring on gravel)			
					3.5-4							
								SM	Gray silty fine to medium sand with occasional coarse sand and fine gravel (weathered till)			
	5		60		5-5.5							
					6.5-7							
55									Becomes moist to wet to 7.5 feet			
	10											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-15

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-13
Sheet 1 of 1

Drilled Start 3/27/2014 End 3/27/2014	Total Depth (ft) 12	Logged By PDR Checked By GRL	Driller Cascade Drilling	Drilling Method Direct Push	
Surface Elevation (ft) 62.5 Vertical Datum NAVD88		Hammer Data Pneumatic		Drilling Equipment Truck-mounted Geoprobe	
Easting (X) 1308421.568 Northing (Y) 371361.068		System Datum WA State Plane,North NAD 83/91		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft): Not encountered	
Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.					

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		48					CC	6 inches concrete			
								SM	Gray silty fine to medium sand (fill) (moist)			
60					2.5-3							
	5		60		5.5-6							
55					8-8.5			SP-SM	Gray fine sand with silt (weathered till)			
	10		24						Grades to more coarse			
								GP	Gray fine to coarse gravel and fractured cobble			
									Refusal at 12 feet			

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-16

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-14
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
3/27/2014	3/27/2014	15	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62.5 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308415.64 / 371351.9272	WA State Plane,North NAD 83/91	Date Measured: — Depth to Water (ft): — Elevation (ft): — Not encountered

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		40						TS	Topsoil (wet)			
									SM	Brown silty fine to coarse sand (moist)			
60									SP-SM	Gray fine to medium sand with silt (moist)			
						3.5-4			SM	Brown silty fine to medium sand with occasional fine to coarse gravel (wet) (potential surface water migrating down borehole) (weathered till)			
	5		60										
55													
	10		24										
50						14-14.5							
	15												

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-17

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-15
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled	Start 3/27/2014	End 3/27/2014	Total Depth (ft) 20	Logged By PDR / Checked By GRL	Driller Cascade Drilling	Drilling Method Direct Push
Surface Elevation (ft) / Vertical Datum	62.5 NAVD88		Hammer Data	Pneumatic	Drilling Equipment	Truck-mounted Geoprobe
Easting (X) / Northing (Y)	1308408.433 / 371369.373		System Datum	WA State Plane,North NAD 83/91	Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)	Not encountered

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		36					TS	Topsoil (moist)			
								SP-SM	Brown fine to coarse sand with fine to coarse gravel and silt, brick debris and wood pieces (wet) (fill)			
60					4.5-5							
	5		36					SM	Gray/brown silty fine to coarse sand with occasional fine to coarse gravel (moist) (fill)			
55												
								SP-SM	Gray/brown fine to coarse sand with silt and occasional fine to coarse gravel (wet) (fill)			
	10		36									
50					13-13.5			WD	Wood debris (fill)			
					14-14.5			SP-SM	Gray fine to coarse sand with silt and occasional fine to coarse gravel (fill)			
	15		36									

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-18

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-16
Sheet 1 of 2

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
-15												Drilling becomes harder
	20							SP	Gray/brown fine to coarse sand with fine to coarse gravel and trace silt (fill?)			

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-18 (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-16
Sheet 2 of 2

Drilled	Start 3/27/2014	End 3/27/2014	Total Depth (ft)	10	Logged By	PDR	Driller	Cascade Drilling	Drilling Method	Direct Push
					Checked By	GRL				

Surface Elevation (ft) Vertical Datum	62 NAVD88	Hammer Data	Pneumatic	Drilling Equipment	Truck-mounted Geoprobe
Easting (X) Northing (Y)	1308438.972 371347.0886	System Datum	WA State Plane,North NAD 83/91	Groundwater Date Measured	Depth to Water (ft) / Elevation (ft): Not encountered

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60						AS	Asphalt			
60						1.5-2			SP-SM	Brown fine to coarse sand with silt and fine to coarse gravel			
									SP-SM	Orange fine to medium sand with silt			
									SP-SM	Gray/brown fine to coarse sand with silt and occasional fine gravel			
						4.5-5							
	5		60										
						6.5-7							
55									SM	Gray silty fine to medium sand with occasional coarse sand and fine to coarse gravel (weathered till)			
	10												

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-19

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-17
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
3/27/2014	3/27/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308441.693 / 371337.9254	WA State Plane,North NAD 83/91	Date Measured: — Depth to Water (ft): Not encountered — Elevation (ft): —

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	Asphalt			
								SP	Gray fine to coare sand with trace silt			
60								SP	Gray fine sand with brick fragments			
					2.5-3			SP-SM	Orange/brown fine to medium sand with silt			
								SM	Gray silty fine to medium sand			
					4.5-5							
	5		60									
55								SM	Gray silty fine to medium sand with occasional fine gravel (weathered till)			
	10											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-20

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-18
Sheet 1 of 1

Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	3/28/2014	3/28/2014	15	PDR	GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) Vertical Datum	62 NAVD88	Hammer Data	Pneumatic	Drilling Equipment	Truck-mounted Geoprobe
Easting (X) Northing (Y)	1308457.35 371379.3273	System Datum	WA State Plane,North NAD 83/91	Groundwater Date Measured	Depth to Water (ft) / Elevation (ft): Not encountered

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		48					AS	Asphalt			
								GP	Gray fine to coarse gravel with fine to coarse sand and trace silt (poor recovery)			
60					2-2.5			SP	Brown fine to medium sand with occasional fine gravel and trace silt			
								SM	Gray/green silty fine sand with fine gravel and brick fragments			
	5		60									
								GP-GM	Brown fine to coarse gravel with silt and fine to coarse sand, brick debris			
55					7-7.5			SP	Orange fine to medium sand with trace silt			
								SP-SM	Gray fine to coarse sand with silt			
					8.5-9							
								SM	Gray silty fine to medium sand with occasional fine to coarse gravel (weathered till)			
	10		60									
50												
	15											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-21

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-19
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
3/28/2014	3/28/2014	15	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308454.894 / 371388.6941	WA State Plane,North NAD 83/91	Date Measured / Depth to Water (ft) / Elevation (ft): Not encountered

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		48					AS	Asphalt			Boring LLSB-22a drilled due to poor recovery in LLSB-22; combined into this one boring log
								SP-SM	Gray fine to coarse sand with silt			
60								SP	Gray fine to coarse sand			
					3-3.5			SP-SM	Gray fine to coarse sand with silt			
								ML	Dark gray silt			
					4.5-5			SM	Brown silty fine to coarse sand with debris (brick)			
	5		60					SM	Brown silty fine to coarse sand with debris (brick)			
55								BR	Bricks/mortar			
					8-8.5			SP-SM	Brown fine to coarse sand with silt			
								SP-SM	Gray fine to coarse sand with fine to coarse gravel and silt			
	10		60					SP-SM	Gray fine to coarse sand with fine to coarse gravel and silt (moist)			
50								GP	Gray gravel (old road grade?) (moist)			
								SM	Brown silty fine to coarse sand with occasional fine to coarse gravel (weathered till)			
	15											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-22/LSB-22a

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-20
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start 3/28/2014 End 3/28/2014	Total Depth (ft) 15	Logged By PDR Checked By GRL	Driller Cascade Drilling	Drilling Method Direct Push	
Surface Elevation (ft) 62 Vertical Datum NAVD88		Hammer Data Pneumatic		Drilling Equipment Truck-mounted Geoprobe	
Easting (X) 1308460.798 Northing (Y) 371369.7174		System Datum WA State Plane,North NAD 83/91		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft): Not encountered	

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		48					AS	Asphalt			
								SP	Gray fine to coarse sand with occasional fine gravel and trace silt			
60								SM	Brown silty fine to medium sand			
								RX	Orange rock			
								ML	Gray/green silt			
								SM	Brown silty fine sand with debris (wood, brick, organics)			
					4.5-5							
	5		48									
55								SP-SM	Light brown fine to coarse sand with silt and mottled colored bands			
					8.5-9				6 inch orange layer			
								SM	Gray silty fine to coarse sand with occasional fine gravel			
	10		60									
					11-11.5			SP-SM	Gray/brown fine to medium sand with silt and occasional fine gravel			
50								SM	Gray/brown silty fine to medium sand with occasional fine gravel (weathered till)			
	15											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-23

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-21
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start 3/28/2014 End 3/28/2014	Total Depth (ft) 15	Logged By PDR Checked By GRL	Driller Cascade Drilling	Drilling Method Direct Push	
Surface Elevation (ft) 62 Vertical Datum NAVD88		Hammer Data Pneumatic		Drilling Equipment Truck-mounted Geoprobe	
Easting (X) 1308464.059 Northing (Y) 371356.4213		System Datum WA State Plane,North NAD 83/91		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft): Not encountered	

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		48						AS	Asphalt			
									CR	Base course			
60									SP	Brown fine to coarse sand with fine gravel Wood and organics Brick pieces			
						3.5-4			ML	Gray/green silt			
									SP-SM	Brown fine to coarse sand with silt and debris			
	5		60						ML	Gray/green silt			
									SM	Gray silty fine sand			
55									WD	Wood (processed)			
						7-7.5			SM	Brown silty fine to coarse sand with occasional fine to coarse gravel			
									SP-SM	Light brown/orange fine sand with silt in varying amounts			
									SM	Gray silty fine to medium sand with occasional coarse sand and fine gravel (weathered till)			
	10		60			10-10.5							
50													
	15												

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-24

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-22
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start 3/28/2014 End 3/28/2014	Total Depth (ft) 15	Logged By PDR Checked By GRL	Driller Cascade Drilling	Drilling Method Direct Push	
Surface Elevation (ft) 62 Vertical Datum NAVD88		Hammer Data Pneumatic		Drilling Equipment Truck-mounted Geoprobe	
Easting (X) 1308467.768 Northing (Y) 371343.7683		System Datum WA State Plane,North NAD 83/91		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft): Not encountered	
Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.					

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		48					AS	Asphalt			
60								SP-SM	Brown fine to coarse sand with silt and fine to coarse gravel			
					3.5-4			SM	Gray silty fine to coarse sand with fine to coarse gravel			
								SP-SM	Brown fine to coarse sand with silt			
	5		60									
								ML	Gray silt			
55								SP-SM	Brown fine to coarse sand with silt			
					7.5-8			GP	Cobbles and black charred gravel debris			
								SP-SM	Orange/brown fine to medium sand with silt			
									Grades to light brown with increased silt content			
	10		60		10-10.5							
50								SM	Gray silty fine to medium sand with occasional fine gravel (weathered till)			
	15											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-25

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-23
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
4/29/2014	4/29/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308424.695 / 371381.039	WA State Plane,North NAD 83/91	Date Measured / Depth to Water (ft) / Elevation (ft): Not encountered

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	8 inches asphalt			
					1.3-2.3			SP-SM	Gray fine to coarse sand with silt and occasional fine to coarse gravel			
60								BR	Brick/mortar			
								WD	Wood debris			
					2.8-3.2			SP-SM	Gray fine to coarse sand with silt and occasional fine to coarse gravel			
	5		60		5.2-5.4			SP-SM	Gray fine to medium sand with silt and gravel			
55								SM	Gray silty fine to medium sand with occasional fine gravel			
								SP-SM	Gray fine sand with silt (weathered till)			
	10											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-26

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-24
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
4/29/2014	4/29/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308435.36 / 371396.015	WA State Plane,North NAD 83/91	Date Measured: — Depth to Water (ft): Not encountered — Elevation (ft): —

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		54					AS	Asphalt			
					1.3-2.3			SP-SM	Brown fine to coarse sand with silt			
60								BR	Brick debris with fine to coarse sand and silt			
								SP-SM	Brown fine to coarse sand with silt			
					3.8-4.5			PEAT	Dark brown peat			
								SP	Orange fine to medium sand with trace silt			
	5		60		5.0-5.4			SP-SM	Brown fine to coarse sand with silt and occasional fine gravel Moist from 5.5 to 6 feet			
					5.8-7.2				Becomes mottled at 6.3 feet			
55								SM	Gray silty fine to medium sand with occasional fine to coarse gravel (weathered till)			
	10											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-27

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-25
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
4/29/2014	4/29/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308422.988 / 371389.829	WA State Plane,North NAD 83/91	Date Measured / Depth to Water (ft) / Elevation (ft): Not encountered

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	Asphalt			
								GP	Gray fine to coarse gravel with fine to coarse sand and trace silt			
								SP	Brown fine sand with trace silt			
60					2.2-2.7			SM	Red/brown silty fine sand (dry)			
					2.8-7.2			SP-SM	Gray fine to coarse sand with silt (moist)			
	5		60									
								SM	Gray silty fine to medium sand with occasional coarse sand and fine to coarse gravel (dry) (weathered till)			
55												
	10											

Note: Please see Figure A-1 for explanation of symbols.

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050408801.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Log of Boring LLSB-28

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-26
Sheet 1 of 1

Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	4/29/2014	4/29/2014	10	PDR	GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	62 NAVD88	Hammer Data	Pneumatic	Drilling Equipment	Truck-mounted Geoprobe
Easting (X) / Northing (Y)	1308430.454 / 371408.173	System Datum	WA State Plane,North NAD 83/91	Groundwater	Date Measured: — Depth to Water (ft): Not encountered — Elevation (ft):

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		46					AS	2 inches asphalt			
								CC	Concrete			
								SP	Gray fine sand with trace silt			
60					1.8-2.7			SP-SM	Brown fine to coarse sand with silt and small brick debris			
					3.5-3.8			PEAT	Dark brown peat with fine sand			
	5		60									
					5.2-5.5			GP	Gray crushed cobble			
					5.8-6.2			SM	Brown silty fine to coarse sand with occasional fine to coarse gravel			
					6.3-7.7							
55								SM	Gray silty fine to medium sand with occasional coarse sand and fine gravel (weathered till)			
									Mottled color (weathered till)			
								CR	Crushed rock			
	10							SM	Gray silty fine to medium sand with occasional coarse sand and fine gravel (weathered till)			

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-29

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-27
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
4/29/2014	4/29/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308416.803 / 371403.267	WA State Plane,North NAD 83/91	Date Measured: — Depth to Water (ft): Not encountered — Elevation (ft): —

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	Asphalt			
								SP	Gray fine to coarse sand with trace silt			
60								ML	Brown silt with fine sand			
					2.8-4.7				Mottled coloring			
								SM	Gray silty fine to medium sand (moist)			
	5		60					SP-SM	Brown fine to medium sand with silt			
								SM	Gray silty fine to medium sand			
55								SP-SM	Gray fine to coarse sand with silt and occasional fine to coarse gravel (weathered till)			
	10											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-30

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-28
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate\LibTemplate\GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
4/29/2014	4/29/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308424.933 / 371420.431	WA State Plane,North NAD 83/91	Date Measured / Depth to Water (ft) / Elevation (ft): Not encountered

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		42					AS	Asphalt			
								CC	Concrete			
60								SM	Brown silty fine sand with occasional coarse sand and fine gravel			
					2.9-3.2			BR	Brick with dark brown silt (peat, organic)			
					3.3-3.7			SM	Brown silty fine sand with occasional coarse sand and fine gravel			
	5		60					OL	Black organic silt			
								SM	Brown silty fine sand with brick			
								SP-SM	Gray fine to medium sand with silt			
55					6.8-8.2							
								SM	Gray silty fine to medium sand with occasional coarse sand and fine gravel (weathered till)			
	10											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-31

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-29
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
4/29/2014	4/29/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308412.775 / 371416.671	WA State Plane,North NAD 83/91	Date Measured: Not encountered; Depth to Water (ft): ; Elevation (ft):

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	8 to 10 inches asphalt			
								SP	Brown fine to coarse sand with trace silt			
60					2.3-2.8			SM	Light brown silty fine to medium sand (moist)			
								SM	Gray silty fine to coarse sand with occasional coarse sand and fine to coarse gravel With small band of mottled color			
	5		60		4.8-5.3			SM	Brown silty fine sand			
								SP-SM	Gray fine to coarse sand with silt and occasional fine to coarse gravel (weathered till)			
55												
	10											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-32

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-30
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
4/29/2014	4/29/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308421.709 / 371430.784	WA State Plane,North NAD 83/91	Date Measured: — Depth to Water (ft): Not encountered — Elevation (ft): —

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	6 to 7 inches asphalt			
								CC	Concrete			
								SM	Brown silty fine to medium sand with brick fragments			
60					3.3-3.7							
					3.8-4.3			BR	Brick			
								WD	Wood debris			
					4.3-5.2			ML	Black silt (organic)			
	5		60					SP-SM	Brown fine to coarse sand with silt			
									Sluff in sleeve Black silt (organic)			
								SP	Gray mortar (fine to medium sand)			
55								SP	Gray silty fine sand			
								SP-SM	Gray fine to coarse sand with silt and occasional fine to coarse gravel (weathered till)			
	10											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-33

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-31
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate\LibTemplate\GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled	Start 4/29/2014	End 4/29/2014	Total Depth (ft) 17.5	Logged By PDR / Checked By GRL	Driller Cascade Drilling	Drilling Method Direct Push
Surface Elevation (ft) / Vertical Datum	62 NAVD88		Hammer Data	Pneumatic	Drilling Equipment	Truck-mounted Geoprobe
Easting (X) / Northing (Y)	1308418.604 / 371440.36		System Datum	WA State Plane,North NAD 83/91	Groundwater: Date Measured	Depth to Water (ft): Not encountered

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		48					AS	6 to 8 inches asphalt			
								CC	Concrete			
60								SP	Gray fine to medium sand with trace silt			
								SM	Dark brown silty fine to medium sand			
					3.8-4.2			SM	Brown silty fine to coarse sand			
	5		30		4.9-5.2			SM	Brown silty fine to medium sand with occasional coarse sand			
					5.3-5.7			SM	Brown silty fine to medium sand			
					5.8-6.3							
55								SP-SM	Gray fine to coarse sand with silt (moist) (weathered till)			
									No recovery			
	10		60					SM	Gray silty fine to medium sand			
50								SP-SM	Brown fine to coarse sand with silt and occasional gravel			
									Mottled (moist)			
								SM	Gray silty fine sand with occasional coarse sand and gravel (weathered till)			
	15		24									

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-34

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-32
Sheet 1 of 2

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate\LibTemplate\GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample / Sample Name Testing	FIELD DATA: Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	45							Occasional crushed rock (cobble)			
								Refusal at 17.5 feet			

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-34 (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-32
Sheet 2 of 2

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
4/30/2014	4/30/2014	17	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) Vertical Datum	Hammer Data	Drilling Equipment
62.5	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308466.101 / 371392.3688		Date Measured: — Depth to Water (ft): Not encountered — Elevation (ft): —

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	6 to 10 inches asphalt			
								CC	6 inches gravel subgrade			
								SP-SM	Brown fine to coarse sand with silt and some wood debris			
60								ML	Gray silt with occasional fine gravel			
								SM	Light brown silty fine to medium sand with occasional fine gravel, silt content varies (fill)			
	5		60									
								SP	Gray fine to coarse sand with trace silt, rocks and brick debris			
								ML	Brown silt with fine sand (silt appears organic)			
55					7.3-7.7							
					7.8-8.3			BR	Brick			
					8.3-8.7			SM	Light brown silty fine sand			
	10		24					SM	Gray/brown mottled silty fine to medium sand with occasional fine gravel (moist to wet)			Rock in shoe
50												
	15		24					SM	Gray silty fine to medium sand with occasional coarse sand and fine gravel (weathered till)			

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-35

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-33
Sheet 1 of 2

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate\LibTemplate\GEOENGINEERS8.GDT\GEI8_GEOTECH_STANDARD

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	FIELD DATA: Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample / Sample Name / Testing	FIELD DATA: Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-35 (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-33
Sheet 2 of 2

Drilled Start 4/30/2014 End 4/30/2014	Total Depth (ft) 15	Logged By PDR Checked By GRL	Driller Cascade Drilling	Drilling Method Direct Push	
Surface Elevation (ft) 62 Vertical Datum NAVD88		Hammer Data Pneumatic		Drilling Equipment Truck-mounted Geoprobe	
Easting (X) 1308466.101 Northing (Y) 371392.369		System Datum WA State Plane,North NAD 83/91		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft): Not encountered	

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	Asphalt			
								GP	Gray fine to coarse gravel (base course)			
60								SM	Brown silty fine to medium sand			
								ML	Gray silt with occasional fine sand			
								SM	Brown silty fine to medium sand			
	5		60					ML	Dark brown silt			
								SM	Gray silty fine sand			
								ML	Gray silt			
55									No recovery			
					7.3-7.7			OL	Dark brown organic silt			
								BR	Brick			
					8.0-8.7			OL	Dark brown organic silt with fine sand			
								SP-SM	Brown fine to medium sand with silt and occasional cobbles (crushed)			
	10		60					SM	Gray silty fine to coarse sand with occasional fine to coarse gravel			
					11.2-12.3							
50												
					12.4-15			SP-SM	Brown fine to medium sand with silt and occasional coarse sand and fine gravel (weathered till)			
									With decreased silt content			
	15								Refusal at 15 feet			

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-36

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-34
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
4/30/2014	4/30/2014	15	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308471.835 / 371374.471	WA State Plane,North NAD 83/91	Date Measured / Depth to Water (ft) / Elevation (ft): Not encountered

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		48					AS	11 inches asphalt			Boring LLSB-37a drilled due to poor recovery in LLSB-37; combined into this one boring log
								GP	Gray fine to coarse gravel (base course)			
60								SM	Brown silty fine to medium sand with varying amounts of silt			
	5		60					SP	Gray fine to medium sand with trace silt			
								SM	Gray silty fine sand			
								SM	Brown silty fine sand with occasional medium to coarse sand			
55								ML	Black silt with fine to medium sand and occasional fine gravel			
					8.3-9.7							
								SM	Brown silty fine to medium sand with occasional coarse sand and fine gravel			
	10		48					ML	Black silt			
								SP-SM	Gray fine to coarse sand with silt			
								ML	Brown silt with fine to medium sand			
50								SM	Gray mottled silty fine to coarse sand with occasional gravel (weathered till)			
					12.2-12.7							
					12.8-15							
	15								Refusal at 15 feet			

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-37/LLSB-37a

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-35
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start 4/30/2014 End 4/30/2014	Total Depth (ft) 15	Logged By PDR Checked By GRL	Driller Cascade Drilling	Drilling Method Direct Push	
Surface Elevation (ft) 62 Vertical Datum NAVD88		Hammer Data Pneumatic		Drilling Equipment Truck-mounted Geoprobe	
Easting (X) 1308480.154 Northing (Y) 371345.035		System Datum WA State Plane,North NAD 83/91		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft): Not encountered	

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	12 inches asphalt concrete			
								GP	Gray fine to coarse gravel (base course)			
60								SP	Gray fine sand			
								SM	Gray silty fine to medium sand			
								GP	Gravel			
								ML	Gray silt			
	5		60					SP	Gray fine to medium sand			
								SM	Gray silty fine to medium sand			
55								SP-SM	Brown with mottling fine to coarse sand with silt			
								ML	Gray silt			
								ML	Brown silt with fine to medium sand (organic)			
					8.7-9.7			BR	Brick			
								ML	Brown silty fine to medium sand (organic)			
	10		60					SM	Brown silty fine to medium sand			
50								ML	Gray with mottling fine to medium sand with silt (weathered till)			
								GP	Gravel lense			
	15							SP-SM	Gray fine to medium sand with silt			

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-38

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-36
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start 4/30/2014 End 4/30/2014	Total Depth (ft) 17.5	Logged By PDR Checked By GRL	Driller Cascade Drilling	Drilling Method Direct Push
Surface Elevation (ft) 62 Vertical Datum NAVD88		Hammer Data Pneumatic		Drilling Equipment Truck-mounted Geoprobe
Easting (X) 1308484.847 Northing (Y) 371395.162		System Datum WA State Plane,North NAD 83/91		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft): Not encountered

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	12 inches asphalt concrete			
								GP	Gray fine to coarse gravel (base course)			
60								SP-SM	Gray fine to coarse sand with silt			
								SM	Brown silty fine sand			
								ML	Gray silt with occasional fine gravel			
	5		60					ML	Brown silt with wood debris			
								SM	Gray silty fine sand			
55												
	10		54									
50					12.3-12.7			ML	Gray silt lense			
					12.8-13.2			SP-SM	Brown fine to coarse sand with silt and brick debris			
					13.3-14.2							
								SM	Red/brown silty fine to medium sand with occasional fine gravel			
	15		24					SP-SM	Gray fine to coarse sand with silt and fine to coarse gravel			
					15.8-17			SP	Brown fine sand			

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-39

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-37
Sheet 1 of 2

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample / Sample Name Testing	FIELD DATA: Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
45							SM	Gray silty fine to coarse sand with fine to coarse gravel (weathered till)			
								Refusal at 17.5 feet			

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-39 (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-37
Sheet 2 of 2

Drilled	Start 4/30/2014	End 4/30/2014	Total Depth (ft) 21	Logged By PDR / Checked By GRL	Driller Cascade Drilling	Drilling Method Direct Push
Surface Elevation (ft) / Vertical Datum	62 NAVD88		Hammer Data	Pneumatic	Drilling Equipment	Truck-mounted Geoprobe
Easting (X) / Northing (Y)	1308481.861 / 371406.893		System Datum	WA State Plane,North NAD 83/91	Groundwater: Date Measured	Depth to Water (ft): Not encountered

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	12 inches asphalt concrete			
								GP	Gray fine to coarse gravel (base course)			
60								SP-SM	Gray fine to coarse sand with silt and occasional fine gravel			
								SM	Brown silty fine to coarse sand with brick debris			
								ML	Gray silt			
								ML	Brown silt with fine to medium sand and occasional fine gravel			
	5		60					SP-SM	Brown fine to coarse sand with silt and occasional fine gravel with varying silt content			
55								SM	Gray silty fine sand with debris (slag)			
								SP-SM	Brown fine to coarse sand with silt and occasional fine to coarse gravel			
	10		60						Varying silt content			
50								SP-SM	Light brown fine to coarse sand with silt and occasional fine gravel			
								SM	Red/brown silty fine to medium sand			
								SP-SM	Brown fine to coarse sand with silt and occasional fine to coarse gravel			
	15		60		14.8-15.7				Becomes gray (weathered till)			

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-40

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-38
Sheet 1 of 2

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate\LibTemplate\GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
45								ML	Gray silt			
								SP-SM	Gray fine to coarse sand with silt and fine to coarse gravel			
	20		12					SP	Brown fine to medium sand with trace silt			
									Refusal at 21 feet			

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-40 (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-38
Sheet 2 of 2

Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	5/1/2014	5/1/2014	15	PDR	GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) Northing (Y)	System Datum	Groundwater
1308460.193 371408.024	WA State Plane,North NAD 83/91	Date Measured: Not encountered; Depth to Water (ft); Elevation (ft)

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	20 inches asphalt			
60								GP	Gray fine to coarse gravel (base course)			
								SP	Brown fine to medium sand with trace silt			
								ML	Brown silt with brick debris			
								SM	Gray silty fine sand with occasional fine to coarse gravel			
	5		60					SP-SM	Gray fine to medium sand with silt and occasional fine to coarse gravel			
55								Cobble	Cobble			
					8.3-8.7			ML	Brown silt with brick fragments			
								SM	Gray silty fine to coarse sand with occasional fine to coarse gravel			
	10		60					GP	Slag			
					11.3-12.2			SM	Brown silty fine to coarse sand with occasional fine to coarse gravel			
50								SP-SM	Gray fine to coarse sand with silt and fine to coarse gravel (weathered till)			
	15											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-41

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-39
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	5/1/2014	5/1/2014	14	PDR	GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308455.982 / 371420.605	WA State Plane,North NAD 83/91	Date Measured: — Depth to Water (ft): Not encountered — Elevation (ft): —

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	10 inches asphalt			
								GP	Gray fine to coarse gravel (base course)			
								SP	Light brown fine to coarse sand with fine to coarse gravel and trace silt			
60								SP-SM	Brown fine to coarse sand with silt			
								SM	Light brown silty fine sand			
	5		60					GM	Black fine to coarse gravel with silt and fine to coarse sand (some gravel shiny (heat) (no odor) (likely slag)			
								SP-SM	Gray fine to medium sand with silt and occasional fine gravel (some gravel is glassy) (likely slag)			
55								SM	Gray silty fine to medium sand			
					9.3-9.6			BR/SM	Brick fragments with brown silty fine to medium sand (organic)			
	10		48		9.6-10.0				No recovery			
								SM	Gray silty fine to coarse sand with fine to coarse gravel (weathered till)			
50					12.2-12.6							
									Refusal at 14 feet			

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-42

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-40
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled: Start 5/1/2014 End 5/1/2014	Total Depth (ft): 15	Logged By: PDR Checked By: GRL	Driller: Cascade Drilling	Drilling Method: Direct Push	
Surface Elevation (ft): 62 Vertical Datum: NAVD88		Hammer Data: Pneumatic		Drilling Equipment: Truck-mounted Geoprobe	
Easting (X): 1308448.436 Northing (Y): 371400.192		System Datum: WA State Plane,North NAD 83/91		Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft): Not encountered	

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	8 inches asphalt			
								SP-SM	Brown fine to coarse sand with silt and fine to coarse gravel			
60								SM	Gray silty fine sand			
								ML	Gray silt			
								SM	Gray silty fine to medium sand with occasional coarse sand and fine gravel, brick and mortar			
					3.8-6.2							
								SP	Light brown fine to medium sand			
	5		60					BR	Bricks and brick fragments, mortar			
55												
					7.5-7.8			SM	Brown silty fine to medium sand with occasional fine gravel			
					7.8-8.7							
					9.3-11.6							
	10		60					SM	Gray silty fine sand with occasional medium to coarse sand and fine to coarse gravel (weathered till)			
50									Some mottled coloring			
	15											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-43

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-41
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	5/1/2014	5/1/2014	15	PDR	GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	62 NAVD88	Hammer Data	Pneumatic
Drilling Equipment	Truck-mounted Geoprobe		
Easting (X) / Northing (Y)	1308442.851 / 371414.349	System Datum	WA State Plane,North NAD 83/91

Groundwater: Date Measured | Depth to Water (ft) | Elevation (ft) — Not encountered

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	12 inches asphalt			
								SP-SM	Gray fine to coarse sand with silt and occasional fine gravel			
60					3.3-4.2			GP	Dark gray fine to coarse gravel with fine to coarse sand and trace silt			
								ML	Light gray silt with fine sand			
	5		60		4.8-5.2			BR	Brick fragments Bricks, mortar, some brown fine to coarse sand with silt			
55					5.8-7.7			WD	Wood fragments			
								SP-SM	Brown fine to coarse sand with fine to coarse gravel and silt			
								WD	Wood fragments			
					8.7-9.2			SM	Gray silty fine to coarse sand with occasional fine gravel			
					9.3-10.7			SP-SM	Gray fine to coarse sand wth silt and occasional fine gravel (weathered till)			
	10		60									
50												
	15											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-44

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-42
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	5/1/2014	5/1/2014	15	PDR	GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308438.118 / 371427.763	WA State Plane,North NAD 83/91	Date Measured: — Depth to Water (ft): — Elevation (ft): — Not encountered

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	12 inches asphalt concrete			
								SP-SM SM	Brown fine to coarse sand with fine to coarse gravel, silt and brick fragments Brown silty fine to medium sand with occasional coarse sand and fine gravel			
60												
	5		60					SP-SM	Gray fine to coarse sand with silt			
								ML	Gray silt (very hard)			
					6.3-6.7			OL	Dark brown organic silt			
55					6.8-8.2			BR	Brick fragments			
								SP-SM	Brown/gray fine sand with silt			
								WD	Large wood debris with brown silt			
								ML	Gray silt with fine sand and occasional fine gravel			
	10		60		9.8-10.2 10.3-11.2			SM	Gray/brown silty fine to medium sand			
50								SP-SM	Gray/brown fine to coarse sand with silt and fine to coarse gravel (weathered till)			
	15											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-45

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-43
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled	Start 5/1/2014	End 5/1/2014	Total Depth (ft) 17.5	Logged By PDR / Checked By GRL	Driller Cascade Drilling	Drilling Method Direct Push
Surface Elevation (ft) 62.5 / Vertical Datum NAVD88			Hammer Data Pneumatic		Drilling Equipment Truck-mounted Geoprobe	
Easting (X) 1308493.935 / Northing (Y) 371364.431			System Datum WA State Plane,North NAD 83/91		Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft): Not encountered	

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					CC	6 inches concrete			
								GP	Gray fine to coarse gravel (base course)			
								SP-SM	Brown fine to medium sand with silt			
								AC	Black asphalt			
60								SM	Gray silty fine sand			
								SP-SM	Brown fine to coarse sand with silt			
								ML	Gray/brown silt with fine to medium sand and occasional fine gravel			
	5		60									
55								SP-SM	Gray fine to coarse sand with silt			
								SM	Dark gray silty fine sand with occasional fine to coarse gravel			
								SP-SM	Brown fine to coarse sand with silt, gravel and brick fragments			
	10		60		9.8-10.2			SP-SM	Gray fine to coarse sand with silt			
								SM	Brown silty fine to medium sand			
50					12.3-13.2			SP-SM	Gray fine to coarse sand with silt and fine to coarse gravel			
					13.3-13.7							
								ML	Dark brown silt			
	15		24		14.8-17			SM	Gray silty fine to coarse sand with fine to coarse gravel (weathered till)			

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-46

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-44
Sheet 1 of 2

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample / Sample Name Testing	FIELD DATA: Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
-45											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-46 (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-44
Sheet 2 of 2

Drilled: Start 5/1/2014 End 5/1/2014	Total Depth (ft): 19	Logged By: PDR Checked By: GRL	Driller: Cascade Drilling	Drilling Method: Direct Push	
Surface Elevation (ft): 62.5 Vertical Datum: NAVD88		Hammer Data: Pneumatic		Drilling Equipment: Truck-mounted Geoprobe	
Easting (X): 1308491.886 Northing (Y): 371380.23		System Datum: WA State Plane,North NAD 83/91		Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft): Not encountered	

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		42					CC	6 inches concrete			
									No recovery			
								SP-SM	Brown fine to coarse sand with silt			
60								SP-SM	Brown fine to coarse sand with silt and fine to coarse gravel			
								ML	Gray silt			
								ML	Brown silt with fine sand			
	5		60					SM	Brown/gray silty fine sand			
55												
								SP-SM	Gray fine to coarse sand with silt and fine to coarse gravel			
	10		60					SM	Brown/gray silty fine to medium sand with occasional fine gravel			
								OL	Dark brown organic silt with fine sand			
50					12.3-12.7			BR	Brick			
					12.8-13.7			ML	Brown silt with fine to medium sand			
								SP-SM	Brown fine sand with silt and occasional fine gravel			
					14.3-15.2							
					15.3-15.7							
	15		48					SM	Brown/gray silty fine to medium sand			
					15.8-16.3							
					16.3-18.2							

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-47

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
45								SM	Gray silty fine sand with occasional medium to coarse sand with fine gravel (weathered till)			
									Refusal at 19 feet			

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-47 (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-45
Sheet 2 of 2

APPENDIX B
Data Validation Report

DATA VALIDATION REPORT

TOTAL METALS IN SOIL BY METHODS EPA6010C/SW7471A
ARSENIC LEACHATE BY SYNTHETIC PRECIPITATION LEACHING PROCEDURE (SPLP) SW1312/EPA6010C

Primary Laboratory SDG	Samples Validated (Bold indicates the sample was qualified)
YH47	LLSB-09-COMP, LLSB-13-COMP, and LLSB-16-COMP
YJ59	LLSB-07-5.4-5.9 and LLSB-29-5.2-5.5
YJ75	LLSB-COMP-1, LLSB-COMP-2, LLSB-COMP-3 (Arsenic analysis)
YK17	LLSB-COMP-1, LLSB-COMP-2, and LLSB-COMP-3 (RCRA 8 metals analysis)
YL30	LLSB-COMP-1, LLSB-COMP-2, and LLSB-COMP-3 (SPLP analysis)
YL74	LLSB-COMP-1-PV1, LLSB-COMP-3-PV1
YM04	LLSB-COMP-1-PV5, LLSB-COMP-3-PV5
YM26	LLSB-COMP-2-PV1
YM79	LLSB-COMP-1-PV10, LLSB-COMP-3-PV10
YM98	LLSB-COMP-2-PV5
YN52	LLSB-COMP-2-PV10
YO07	LLSB-COMP-1-PV20, LLSB-COMP-3-PV20
YP10	LLSB-COMP-2-PV20
YP64	LLSB-COMP-1-PV30, LLSB-COMP-3-PV30
YQ30	LLSB-COMP-2-PV30

PROJECT: LOWLAND AREA (00504-068-01)

This report documents the results of an Environmental Protection Agency (EPA) level 2A data validation of analytical data from the analyses of soil and water samples and the associated laboratory and field quality control (QC) samples. The review included the following:

- Chain of Custody

- Holding Times and Sample Preservation
- Method Blanks
- Laboratory Control Samples
- Matrix Spikes
- Laboratory Duplicates
- Field Duplicates
- Reporting Limits

OBJECTIVE

The objective of the data validation was to review laboratory analytical procedures and quality control (QC) results to evaluate whether:

- The samples were analyzed using well-defined and acceptable methods that provide detection limits below applicable regulatory criteria;
- The precision and accuracy of the data are well-defined and sufficient to provide defensible data; and
- The quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

Two (2) discreet soil samples, six (6) composited soil samples, and fifteen (15) pore volume samples were analyzed by one or more of the analytical methods listed in the title of this appendix.

DATA PACKAGE COMPLETENESS

Analytical Resources Incorporated (ARI), located in Tukwila, Washington, was contracted as part of this data quality assessment. The laboratory provided all required deliverables for the assessment according to the National Functional Guidelines. The laboratory followed adequate corrective action processes and all identified anomalies were discussed in the case narratives.

DATA QUALITY ASSESSMENT SUMMARY

The results for each of the QC elements are summarized below. The data assessment was performed using guidance in the USEPA Contract Laboratory Program *National Functional Guidelines for Inorganic Data Review* (USEPA, 2010).

Chain-of-Custody Documentation

Chain-of-custody (COC) forms were provided with the laboratory analytical reports. There were no anomalies noted on the COC forms, with the exception of minor sample label discrepancies which were rectified the day of receipt. In general, proper COC protocols appear to have been followed for the sampling events.

Holding Times and Sample Preservation

The holding time is defined as the time that elapses between sample collection and sample analysis. The maximum holding time criteria of 6 months (28 days for mercury) is prescribed for the three metals analytical methods to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times of 6 months (28 days for mercury) were met for all analyses. Sample cooler temperatures and sample preservation were appropriately documented and were within all control limits for metals analyses, with the following exception:

Three deliveries were made to the laboratory. Two deliveries logged by the laboratory arrived within the recommended temperature control limits of 4 to 6°C. The laboratory noted that cooler temperatures of one delivery (YJ59) were outside of the recommended control limits. It was determined that the coolers may not have been properly re-filled with wet ice on the day the samples were delivered to the laboratory (May 2, 2014). The time that the samples were greater than 6°C is estimated to be up to several hours. Professional judgment was used in determining that the relatively short time at elevated temperatures would not likely have had a severe effect on the results. No qualifiers were applied.

Method Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. Method blanks were analyzed with each batch of samples, at a frequency of 1 per 20 samples. For all sample batches, method blanks were analyzed at the required frequency. None of the analytes of interest were detected above the reporting limits in any of the method blanks.

Matrix Spikes

Because the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis. One aliquot of sample is analyzed in the normal manner, and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a percent recovery (%R) is calculated. In the event that a particular element is out of the recovery value control limits in the matrix spiked sample, the laboratory is required to analyze a "post-spiked" sample in order to further isolate any potential quality control issues with the given element.

Matrix spike analyses should be performed once per analytical batch or every 20 field samples, whichever is more frequent. The recovery criteria for matrix spikes are 75% to 125% for all of the elements in this report.

The frequency requirements were met for all analyses, with the following exceptions:

SDG YJ59: The laboratory performed a matrix spike on Sample LLSB-07-5.4-5.9. The %R value for arsenic leachate from the SPLP analysis was outside the control limit. The parent sample concentration for this analyte was greater than 4 times the amount spiked into the sample; therefore no qualification of the data was required.

SDG YH47: The laboratory performed a matrix spike on Sample LLSB-09-COMP. The %R values for arsenic, lead, and mercury were outside the control limits. The parent sample concentrations for these analytes were greater than 4 times the amount spiked into the sample; therefore no qualification of the data was required.

SDG YM79: The laboratory performed a matrix spike on Sample LLSB-COMP-1-PV10. The %R value for arsenic was outside the control limits. The parent sample concentration for this analyte was greater than 4 times the amount spiked into the sample; therefore no qualification of the data was required.

Laboratory Control Samples (LCS)

A laboratory control sample is essentially a blank sample that is spiked with a known amount of analyte concentration and analyzed. It is to be treated much like a matrix spike, without the possibility for matrix interference. As there is no actual sample matrix in the analysis, the analytical expectations for accuracy and precision are usually more rigorous and qualification would apply to all samples in the batch, instead of the parent sample only.

Laboratory control sample analyses should be performed once per analytical batch or every 20 field samples, whichever is more frequent. The recovery criteria for laboratory control samples are specified in the laboratory documents as are the relative percent difference values. The frequency requirements were met for all analyses, and the %R/RPD values were within the proper control limits.

Laboratory Duplicates

Internal laboratory duplicate analyses are performed to monitor the precision of the analyses. Two separate aliquots of a sample are analyzed as distinct samples in the laboratory, and the RPD between the two results is calculated. Duplicate analyses should be performed once per analytical batch. If one or more of the samples used has a concentration greater than five times the reporting limit for that sample, the absolute difference is used instead of the RPD.

Laboratory duplicates were analyzed at the proper frequency and the specified acceptance criteria were met for all analyses.

Field Duplicates

There were no field duplicate samples collected and analyzed for this sampling event.

Reporting Limits

All SDGs: The reporting limits for all of the analyses met the requirements that were prescribed in the QAPP.

OVERALL ASSESSMENT

As was determined by this data quality assessment, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the LCS and MS %R values, with the exceptions mentioned above. Precision was acceptable, as demonstrated by the laboratory duplicate RPD values.

No analytical results were qualified. All data are acceptable for the intended use.

APPENDIX C
Laboratory Analytical Data

APPENDIX B
Exploration Logs

1995 RI Everett Smelter

APPENDIX C

LOGS FOR PHASE I/II RESIDENTIAL SOIL BORINGS

Summary of Contents of Appendices C, D, and E

Appendix C contains the logs for Phase I/II residential soil borings S-4, S-8, S-13, S-15, S-22, S-27, S-28, S-34, S-36, S-37, S-39, S-46, S-47, S-50, S-72, and S-101 through S-117.

During Phase I, samples were collected at 26 of these locations (S-4, S-8, S-13, S-15, S-27, S-28, S-46, S-47, S-72, and S-101 through S-117. During the first round of Phase II, eleven of these locations were revisited (S-4, S-8, S-13, S-15, S-27, S-28, S-46, S-47, S-72, S-111, and S-113), as well as six SAIC locations reinvestigated (S-22, S-34, S-36, S-37, S-39, and S-50). As a result, the logs for borings S-4, S-8, S-13, S-15, S-27, S-28, S-46, S-47, S-72, S-111, and S-113 are a combination of two sampling efforts which took place approximately 6 months apart. The logs are reflections of individual preferences of the various geologists that have been involved in the logging. Due to their different styles, terminology as well as scales may vary between the two sections of the logs. However, these logs should be considered one continuous log for the purpose of the RI. The logs for the remaining soil borings are the result of single-event investigations. Phase I locations S-101 through S-110, S-112, and S-114 through S-117 were never revisited; logs from the SAIC effort at Phase II first round locations S-22, S-34, S-36, S-37, S-39, and S-50 were not available.

Appendix D contains the logs for Phase II second round residential soil borings S-74, S-83, S-90 through S-97, S-201 through S-209, and S-301 through S-309. These logs all consist of single-event descriptions.

Appendix E contains the logs of deep soil borings B-1, B-2, EV-2A, and EV-2B, and slag borings SL-1, SL-3, and SL-4. These logs all consist of single-event descriptions.

SUMMARY OF TERMINOLOGY USED ON BORING/WELL LOGS

Drilling Methods Used

HSA - Hollow Stem Auger Drilling method. Reported dimension refers to inside diameter of the hollow stem augers used.

Air Rotary - Forward Rotary Drilling method in which air is used to circulate cuttings from the hole.

Hand Auger - Where indicated, shallow borings completed using 4" diameter stainless steel bucket auger

Sample Collection

Split Spoon Samplers - Except in the case of hand augured borings, samples were collected using standard split spoon samplers. One of two sampler types were used:

- Dames and Moore Sampler - 3" ID split spoon used in conjunction with 300 lb. hammer
- Standard 1 3/8" ID split spoon used in conjunction with a 140 lb. hammer

Blow Counts (noted as Hammer Blows on some logs)

Both split-spoon samplers provide standard penetration data (ASTM D1586), reported on the well logs as the number of blows required to drive the split spoon over a 6-inch sampling interval. Eighteen-inch samples were commonly collected at monitoring well and deep boring sites. Six-inch to one-foot samples were collected at some of the shallow borings. In all cases, the reported blow count refers to the number of blows per 6 inch interval unless specifically noted. In instances where blow counts exceeded 50, the spoon was retrieved and the reported blow count is followed by the amount of penetration achieved for that sampling interval (for example 50/5").

Sample

Sample numbers were assigned to individual sampling intervals in the field. In some instances, distinct variations in lithology are reported within a sampling interval and the sample number is followed by an A and B. In these cases, the retrieved sample was separated into two discrete samples at the lithologic break and analyzed separately.

Sample Type

s.s. = split spoon sample as described above
grab = Grab sample off auger flights

Many of the logs include a drilling and sampling methodology in the header information. For sites indicating that a split spoon sampler was used, all samples were collected accordingly unless specifically noted under sample type. For borings completed with a hollow stem auger, all samples are grab samples taken from the auger bucket unless otherwise noted.

Geologic Description

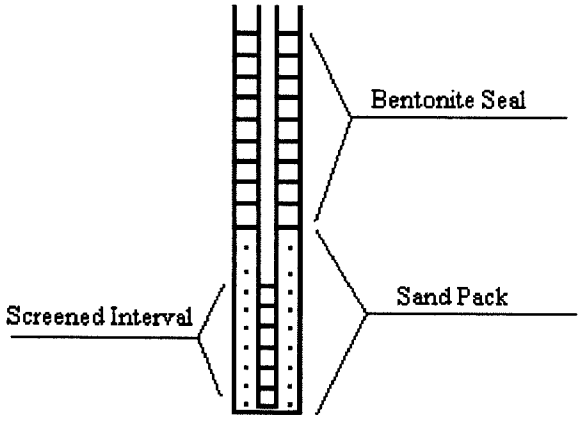
The logs contain field descriptions of soil samples, which generally include color, texture and soil moisture conditions at time of drilling. In some instances, geologic classification and contacts are noted based on interpretation of field data. Where geologic contacts were indistinct due to similarity in appearance, texture, and density, field interpretations were omitted from the logs.

B.O.H. = Bottom of Drilled Hole. In some instances, a sample may have been collected at the bottom of the hole; the sampling depth may therefore be greater than the reported B.O.H.

SWL. = Static Water Level in well at the time of drilling. In some instances, the well may have been allowed to recover prior to static water level measurement. In this case, date is indicated at the time of static water level measurement.

Well Completion Diagrams

In addition to descriptions of well completion, schematic diagrams of well completion are also shown on well logs. The symbols shown on these schematics are defined below:



TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Everett RI/FS — JOB NUMBER ASEV01 — HOLE NUMBER S-4

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 415 Pilchuck Path — ELEVATION G.S. ____ — DATE 1-28-93

RECORDED BY J. C. — DRILL METHOD Hand Auger — DRILLER J.C. — DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 6' — CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ — WELL COMPLETION DESCRIPTION ____

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE / TIME	HAMMER BLOWS	PERCENT RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			EVT 9301-616	0930				Brown to black topsoil, sandy, small gravels
2"								
6"			9301-617	0935				Brown sandy silt
9"								
1'			9301-618	0940				Brown silty sand (brick chips)
2'			9301-619	0945				Brown silty sand, small gravel
3'			9301-620	0950				Black organic material, silty (brick chips)
4'			9301-621	0955				Dark brown silty, mainly wood fibers
5'								
6'			9301-622	1000				Tan silty sand, small gravels
7'								

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT Everett Smelter JOB NUMBER ASEV01 HOLE NUMBER S-4

STATE WA COUNTY Snohomish LOCATION T ___ R ___ SEC. ___ TRACT ___

SITE DESCRIPTION 415 Pilchuck Path ELEVATION G.S. ___ DATE 7-13-93

RECORDED BY RV DRILL METHOD H S A DRILLER J. Lewis DRILLING CO. Boretec

TOTAL DEPTH 13' CASING TYPE AND DESCRIPTION NA

TOTAL DEPTH CASED NA WELL COMPLETION DESCRIPTION NA

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE	RECOVERY	NOTES ON: WATER LEVELS DRILLING FLUID DRILLING RATE WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
7'			EVT-9307		0830	9/6			Dup. 701 (0845) sample: mixture fill/till	7-7.2 olive grey fill
			700			17/6				>7.2 light grey till, sandy
8'			(7'-7'4")			23/6	10%			silt, angular gravel (GM)
						27/6				
9'										
			702		0930	50/5	100%		1 gallon	Light grey silt, very dense, dry, some gravel
10'			(9'-9'2")							Light grey silt, very dense, dry, angular gravel (GM)
						>50/6	100%		2 gallon	
			703		1015	>50/6				
11'			(10'-10'2")							
						50/6			Split: 704 to SAS	Light grey silt, very dense, dry, some gravel (GM, ML)
							100%		>5 gallon	
12'			704		1130					
			(11'10"-12')							
13'										
14'										
15'										

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Everett RI/FS — JOB NUMBER ASEV01 — HOLE NUMBER S-8

STATE WA — COUNTY Snohomish — LOCATION T ___ R ___ SEC. ___ TRACT ___

SITE DESCRIPTION 3010 Fifth Street — ELEVATION G.S. ___ — DATE 1-20-93

RECORDED BY R. V. — DRILL METHOD Hand Auger — DRILLER J.C. — DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 6' — CASING TYPE AND DESCRIPTION ___

TOTAL DEPTH CASED ___ — WELL COMPLETION DESCRIPTION ___

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			ASEV01 9301-507		1500				Topsoil, organic - rich
2"									
6"			9301-508		1505				Brown silt, sandy, gravelly
9"									
1'			9301-509		1510				Brown silt, sandy, gravelly
			9301-510 Dupl. of 509		1515				
2'			9301-511		1520				Gray silt, gravelly, clayey, dark organic material
3'			9301-512		1525				Hit water at 2.5', gray silt, clayey, oxidation spots
4'			9301-513		1530				Gray silt, clayey, some gravel
5'									
6'			9301-514		1535				Gray, silt, clayey, dense
7'									

TEST HOLE LOG

HYDROMETRICS TACOMA, WASHINGTON

PROJECT Everett Smelter JOB NUMBER ASEV01 HOLE NUMBER S-8

STATE WA COUNTY Snohomish LOCATION T ___ R ___ SEC. ___ TRACT ___

SITE DESCRIPTION 3010 5th Street ELEVATION G.S. ___ DATE 7-13-93

RECORDED BY RV/JC DRILL METHOD H S A DRILLER J. Lewis DRILLING CO. Boretec

TOTAL DEPTH 15.5' CASING TYPE AND DESCRIPTION NA

TOTAL DEPTH CASED NA WELL COMPLETION DESCRIPTION NA

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS DRILLING FLUID DRILLING RATE WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
7'			EVT-9307 705 (7'-7'2")	1415	39/6	100%	0.5 gallon		Light grey silt, very dense, dry, some gravel (GM) (1" sand layer at 6.5' medium-fine, well sorted)
8'							0.5 gallon		
9'			706 (10'-10'2")	1600	47/6 50/3 34/6 50/4	0% 100%	1 gallon		Light grey silt, very dense, dry, some gravel (MC, GM)
10'									
11'			707 (11'-11'2")	0815	50/3	100%	1 gallon		Light grey silt, very dense, dry, small gravel (ML, GM)
12'			708 (13'-13'2")	0830					Light grey silt, fine sand (SM)
13'					20/6 50/6	100%	1 gallon		Light grey silt, fine sand, coarser than previous sample, possible water (SM)
14'									
14.75'									Hard drilling, dense silt
15'			709 (15'-15'2")	0845	33/6	100%			Light grey silt, small gravel (5%) (ML, GM) Till first encountered at 5'8"
15.5'									

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Everett RI/FS — JOB NUMBER ASEV01 — HOLE NUMBER S-13

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 515 Pilchuck Path — ELEVATION G.S. ____ — DATE 1-21-93

RECORDED BY V. S. — DRILL METHOD Hand Auger — DRILLER J.C. — DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 6' — CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ — WELL COMPLETION DESCRIPTION ____

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE / TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			EVT 9301-528	1030				Topsoil, organic material, clay
2"								
6"			9301-529	1035				Topsoil, sandy, silty, organic material
9"								
1'			9301-530	1040				Sandy silt, gravel, brown with light gray sand, brick
2'			9301-531	1045				Light gray silt, clayey, sandy
3'			9301-532	1050				Brown sand, some gravel, silt
4'			9301-533	1055				Sand, gravel, light brown, clayey
5'								
6'			9301-534	1100				Light gray sandy silt, some brick
7'								

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT Everett Smelter JOB NUMBER ASEV01 HOLE NUMBER S-13 A1,B,C

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 515 Pilchuch Path ELEVATION G.S. ____ DATE 7-14-93

RECORDED BY J.C. DRILL Method HSA DRILLER ____ DRILLING CO. ____

TOTAL DEPTH 4.75' CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ WELL COMPLETION DESCRIPTION ____

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS DRILLING FLUID DRILLING RATE WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0'								Spud Bar & Drill	Topsoil Smelter debris
1'								Spud Bar & Drill	Bricks
2'									Smelter debris Bricks
3'									Bricks
4'	4.25 4.5		EVI-9507 713		1430	28-6	100%		Smelter debris-till interface Till light grey, silt, dense, small gravel. Light grey silt, very dense small gravel.
5'	4.75 5.0		EVI-9307 714		1550	35-6	100%		S-13 A Auger Refusal 3' S-13 B Auger Refusl Concrete 4' S-13 C Auger Refusal 3.5' Talked to property owner, he said when he added addition to house, they hit an old brick roadway, approximately 7 layers of brick.

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Everett Smelter — JOB NUMBER ASEV01 — HOLE NUMBER S-13

STATE WA — COUNTY Snohomish — LOCATION T ___ R ___ SEC. ___ TRACT ___

SITE DESCRIPTION 515 Pilchuck Path — ELEVATION G.S. ___ — DATE 7-20-93

RECORDED BY Sam Billin — DRILL METHOD HSA — DRILLER R. Gibson DRILLING CO. Boretec

TOTAL DEPTH 17.0' — CASING TYPE AND DESCRIPTION ___

TOTAL DEPTH CASED ___ — WELL COMPLETION DESCRIPTION ___

REMARKS (Note bit-auger size) Till @ <7'

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
7		EVT-	9307 747 7-7.2	1045		55/6 51/6	100%		Slightly moist, gray silt with occasional gravel.
8									
9			748 9-9.2	1120		37/6 53/6	100%		Dry as above
10						59/6			
11			749 11-11.2	1145		26/6 77/6	100%		Two-inch uniform fine sand. Lens at 22', dry, gray silt from 11.2-12'.
12									
13			750 13-13.2			24/6 88/6	100%		Dry, gray silt with occasional well rounded gravel <3/4"
14									

TEST HOLE LOG

HYDROMETRICS TACOMA, WASHINGTON

PROJECT Everett Smelter JOB NUMBER ashi01 HOLE NUMBER S-13

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 515 Pilchuck Path ELEVATION G.S. ____ DATE 7-20-93

RECORDED BY S. Billin DRILL METHOD H S A DRILLER R. GibsonDRILLING CO. Boretec

TOTAL DEPTH 17.0' CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ WELL COMPLETION DESCRIPTION ____

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS DRILLING FLUID DRILLING RATE WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
14						34/6			
						29/6			
15		EVT-	9307 751 15-15.2			22/6	100%		Moist sandy gray silt, some silty sand, Lenses
						17/6			
16						16/6			Slightly moist, gray si\ilt with gravel
17			752 16.6-17		1235	60/6			

TEST HOLE LOG

HYDROMETRICS TACOMA, WASHINGTON

PROJECT Everett RI/FS JOB NUMBER ASEV01 HOLE NUMBER S-15

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 523 Pilchuck Path ELEVATION G.S. ____ DATE 1-26-93

RECORDED BY J. C. DRILL METHOD Hand Auger DRILLER J.C. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 6' CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ WELL COMPLETION DESCRIPTION ____

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS DRILLING FLUID DRILLING RATE WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			EVT 9301-595		1550				Organic material, sandy, crushed gravel
2"									
6"			9301-596		1555				Brown, silty sand
9"									
1'			9301-597		1600				Brown silty sand, 5% clays, brick material
2'			9301-598		1605				Brown silty clay, small gravels
3'			9301-599		1610				Brown silty/very little clay, wet
4'			9301-600		1615				Tan, silty clay Hit top of flume? Hard, pipe? Sized off & had 1' void
5'									
6'			9301-601		1620				Tan, silty clay
7'									

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Everett Smelter — JOB NUMBER ASEV01 — HOLE NUMBER S-15

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 523 Pilchuck Path — ELEVATION G.S. ____ — DATE 7-20-93

RECORDED BY S. Billin — DRILL METHOD HSA — DRILLER R Gibson — DRILLING CO. Boretec

TOTAL DEPTH 15.0' — CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ — WELL COMPLETION DESCRIPTION ____

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
7		EVT-	9307 753 7-7.2		1345	11/6 27/6	100		Moist, light gray silt with occasional gravel
8									
9			754 9-9.2		1400	19/6 29/6	100		slightly moist as above
10									
11			755 11-11.2		1420	25/6 39/6	100		Sandy silt Lens 10.7-11' Very moist, light gray silt with occasional <1% well rounded gravel
12									
13			756 13-13.2		1400	45/6 50/3	100		Dry, light gray silt with occasional <1% coarse gravel
14									

TEST HOLE LOG

HYDROMETRICS TACOMA, WASHINGTON

PROJECT Everett Smelter JOB NUMBER ASEV01 HOLE NUMBER S-15

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 523 Pilchuck Path ELEVATION G.S. ____ DATE 7-20-93

RECORDED BY Sam Billin DRILL METHOD HSA DRILLER R. Gibson DRILLING CO. Boretec

TOTAL DEPTH 15.0' CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ WELL COMPLETION DESCRIPTION ____

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
14						14/6			
						91/6			
15			757 144.8-15		1455				As above

TEST HOLE LOG

HYDROMETRICS

HELENA, MONTANA

PROJECT Everett Smelter JOB NUMBER ASEV-01 HOLE NUMBER S-22

STATE Washington COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 440 Pilchuck Path ELEVATION G.S. ____ DATE 07/22/93

RECORDED BY Sam Billin DRILL METHOD HSA DRILLER Ritch Gibson DRILLING COMPANY Boretec

TOTAL DEPTH 15.7' CASING TYPE AND DESCRIPTION --

TOTAL DEPTH CASED -- WELL COMPLETION DESCRIPTION --

REMARKS (Note bit/auger size) Till @ <4'.

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE / TIME	HAMMER BLOWS	% CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
4		EVT-	9307 782 4-4.2	1145	17/6			Light gray, slightly moist silt with occasional fine gravel.
					22/6	50		
								Coarse gravel at 5.3'.
5					40/2			
6			783 6-6.2	1200	15/6			Slightly moist, light gray, silty fine sand.
					25/6	100		
7			784 7-7.2	1205	35/6			Slightly moist, light gray, uniform, medium-grained sand.
8								
9			785 9-9.2	1210	9/6			Slightly moist, light gray sandy silt.
						100		
					33/6			
					60/6			
10								
11								

TEST HOLE LOG

HYDROMETRICS

HELENA, MONTANA

PROJECT Everett Smelter

HOLE NUMBER S-22

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	% CORE RECOVERY	NOTES ON: WATER LEVELS DRILLING FLUID DRILLING RATE WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
11			786 11-11.2	1215		33/6	100		Light gray sand, silt with large (1") iron stained lenses.
						60/6			
12								1 gallon water added.	
13			787 13.3-13.5	1250		36/6	100		Moist, light gray, sandy silt with occasional fine gravel.
						62/6			
14						133/6			
15			788 RV 15-15.2	1300		63/6			Moist, dense, light gray, sandy silt with occasional gravels.
						58/5			
16									

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Everett RI/FS — JOB NUMBER ASEV01 — HOLE NUMBER S-27

STATE WA — COUNTY Snohomish — LOCATION T ___ R ___ SEC. ___ TRACT ___

SITE DESCRIPTION 520 Pilchuck Path — ELEVATION G.S. ___ — DATE 1-28-93

RECORDED BY J. C. — DRILL METHOD Hand Auger — DRILLER J.C. — DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 6' — CASING TYPE AND DESCRIPTION ___

TOTAL DEPTH CASED ___ — WELL COMPLETION DESCRIPTION ___

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			EVT 9301-623		1055				Topsoil, organic material, sandy
2"									
6"			9301-624		1100				Brown silty sand, brick chips, small gravel
9"									
1'			9301-625		1105				Tan sandy silt, small gravel
2'			9301-626		1110				Brown silty sand, brick chips, black stains
3'			9301-627 9301-630 Dupl.		1115 1130				Tan, silty sand, oxidized, small gravels
4'			9301-628		1120				Tan, silty sand, oxidized
5'									
6'			9301-629		1125				Tan silty sand
7'									

TEST HOLE LOG

HYDROMETRICS TACOMA, WASHINGTON

PROJECT Everett Smelter JOB NUMBER ASEV01 HOLE NUMBER S-27 A

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 520 Pilchuck Path ELEVATION G.S. ____ DATE 7-16-93

RECORDED BY JC DRILL METHOD H S A DRILLER J. Lewis DRILLING CO. Boretec

TOTAL DEPTH 7.2' CASING TYPE AND DESCRIPTION NA

TOTAL DEPTH CASED NA WELL COMPLETION DESCRIPTION NA

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT RECOVERY CORE	NOTES ON: WATER LEVELS DRILLING FLUID DRILLING RATE WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
7'	7.0 7.2		EVT-9307 721	0920		50/3	100%		Light grey silt, soft, moist, small gravel 7.2 Auger Refusal Hit concrete

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT Everett Smelter JOB NUMBER ASEV01 HOLE NUMBER S-27 B

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 520 Pilchuck Path ELEVATION G.S. ____ DATE 7-16-93

RECORDED BY JC DRILL METHOD H S A DRILLER J. Lewis DRILLING CO. Boretec

TOTAL DEPTH 10.4' CASING TYPE AND DESCRIPTION NA

TOTAL DEPTH CASED NA WELL COMPLETION DESCRIPTION NA

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
7'	7.2		EVT-9307 722	0950	13/6	100%			Light grey silt, stiff, small gravels
	7.5								
8'									
9'	9.0		EVT-9307 723	1020	50/6	100%			Light grey silt, very dense, small gravel
	9.3								
10'	10.0		EVT-9307 724	1045	50/4	100%		1 gallon	Light grey silt, very dense, small gravel
	10.4								Till started at 8.0'

TEST HOLE LOG

HYDROMETRICS TACOMA, WASHINGTON

PROJECT Everett RI/FS JOB NUMBER ASEV01 HOLE NUMBER S-28

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 520 Pilchuck Path ELEVATION G.S. ____ DATE 1-28-93

RECORDED BY J. C. DRILL METHOD Hand Auger DRILLER J.C. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 5.5' CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ WELL COMPLETION DESCRIPTION

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS DRILLING FLUID DRILLING RATE WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			EVT 9301-631		1150				Topsoil, organic material, sandy, red brick chips
2"									
6"			9301-632		1155				Brown silty sand, red brick, small gravels
9"									
1'			9301-633		1200				Brown red, white silty sand with brick chips, smelter debris
2'			9301-634		1205				Brown silty sand, red brick smelter debris
3'			9301-635		1210				Tan, silty sand, small gravels
4'			9301-636		1215				Tan, silty sand, small gravels, wet
5'									
5.5'			9301-637		1220				Tan silty sand, wet, auger refusal at 5.5'
6'									
7'									

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Everett Smelter — JOB NUMBER ASEV01 — HOLE NUMBER S-28 A,B,C

STATE WA — COUNTY Snohomish — LOCATION T ___ R ___ SEC. ___ TRACT ___

SITE DESCRIPTION 520 Pilchuck Path — ELEVATION G.S. ___ — DATE 7-16-93

RECORDED BY JC — DRILL METHOD H S A — DRILLER J. Lewis DRILLING CO. Boretec

TOTAL DEPTH 7.2' — CASING TYPE AND DESCRIPTION NA

TOTAL DEPTH CASED NA — WELL COMPLETION DESCRIPTION NA

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
7'	7.0 7.2		EVT-9307 725A	1340		50/3	100%	1 gallon 1 gallon	Light grey silt, very dense, small gravel Till started at 4.8' S-28A Auger Refusal at 2' (large cobble) S-28B Auger Refusal at 7.0' S-28C Auger Refusal at 4.0'

TEST HOLE LOG

HYDROMETRICS

HELENA, MONTANA

PROJECT Everett Smelter JOB NUMBER ASEV-01 HOLE NUMBER S-34

STATE Washington COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 507 Hawthorne ELEVATION G.S. ____ DATE 07/19/93

RECORDED BY Sam Billin DRILL METHOD HSA DRILLER Ritch Gibson DRILLING COMPANY Boretec

TOTAL DEPTH 11.7' CASING TYPE AND DESCRIPTION --

TOTAL DEPTH CASED -- WELL COMPLETION DESCRIPTION --

REMARKS (Note bit/auger size) Till @ 7.2'.

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE / TIME	HAMMER BLOWS	% CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
4				1630	4/6	0		Sand catcher broke, 0% recovery, augered to 5' and resampled.
					10/6			
					23/6			
5								
		EVT-	9307 734 5-5.2	1645	6/6			Slightly moist light brown silt with occasional gravels.
					28/6	70		
6								
			735 6.3-6.5	1050	36/6			Same as above.
7			736 7-7.2	1705	61/6	100	1/2 gallon	Slightly moist, light brown silt with gravel, light gray silt at 7.2'.
			737 7.3-7.5	1710				
8								
9			738 9-9.2	1740	65/6	100	1/4 gallon	Moist, light gray silt, with large (>1") gravel and weathered gravel.
					77/6			
10								
				1800	90/6	0		Apparently sitting on a rock. Stuck, removed. Same as above.
11			739 11.5-11.7	1900	170/2	100		

TEST HOLE LOG

HYDROMETRICS

HELENA, MONTANA

PROJECT Everett Smelter JOB NUMBER ASEV-01 HOLE NUMBER S-36

STATE Washington COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 511 Hawthorne ELEVATION G.S. ____ DATE 07/19/93

RECORDED BY Sam Billin DRILL METHOD HSA DRILLER Ritch Gibson DRILLING COMPANY Boretec

TOTAL DEPTH 10.3' CASING TYPE AND DESCRIPTION --

TOTAL DEPTH CASED -- WELL COMPLETION DESCRIPTION --

REMARKS (Note bit/auger size) Till @ 6.5'.

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	% CORE RECOVERY	NOTES ON: WATER LEVELS DRILLING FLUID DRILLING RATE WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
4		EVT-	9307 729 4-4.2	1315		2/6 4/6 5/6	30%		Moist, light brown, silt with small gravel and 5% brick fragments.
5									
6			730 6-6.2	1340		4/6 16/6	100	<1 liter	Moist, light brown silt with >3/4" gravel and brick fragments, moist, light gray silt at 6.5' with small gravel and no brick.
7			731 7-7.2	1345		35/6 47/6			
8									
9			732 9-9.2	1420		100/6		<1 liter	Dry, light gray silt with occasional small gravel.
10			733 10-10.2	1430		100/4		1.0 gallon	Light gray silt with occasional small gravel.
			Auger refused at 10.3'.						

TEST HOLE LOG

HYDROMETRICS

HELENA, MONTANA

PROJECT Everett Smelter JOB NUMBER ASEV-01 HOLE NUMBER S-37

STATE Washington COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 515 Hawthorne ELEVATION G.S. ____ DATE 07/19/93

RECORDED BY Sam Billin DRILL METHOD HSA DRILLER Ritch Gibson DRILLING COMPANY Boretec

TOTAL DEPTH 8.2' CASING TYPE AND DESCRIPTION --

TOTAL DEPTH CASED -- WELL COMPLETION DESCRIPTION --

REMARKS (Note bit/auger size) Till @ <4'.

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE / TIME	HAMMER BLOWS	% CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
4		EVT-9307-725B RV	4.5-5	1045	50/6 64/6	100		Moist, light gray silt, dense with gravel, sandy silt from 4.0 - 4.2'. Dup taken EVT-9307-726 1030. 4.5 - 5'
5								
6		EVT-9307-727	6.3-6.7	1100	70/6	100	Add 1.0 liter	As above, less dense.
7			728 7.0-7.2	1130	36/6 70/3	100	<1 liter	As above, but drier.
8			7.8-8.2		125/5			Dry, light gray silt with gravel.
			Auger refused				TD = 8.2'	

TEST HOLE LOG

HYDROMETRICS

HELENA, MONTANA

PROJECT Everett Smelter JOB NUMBER ASEV-01 HOLE NUMBER S-39

STATE Washington COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 516 Hawthorne ELEVATION G.S. ____ DATE 07/22/93

RECORDED BY Sam Billin DRILL METHOD HSA DRILLER Ritch Gibson DRILLING COMPANY Boretec

TOTAL DEPTH 16.5' CASING TYPE AND DESCRIPTION --

TOTAL DEPTH CASED -- WELL COMPLETION DESCRIPTION --

REMARKS (Note bit/auger size) Till @ 4.0'.

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE / TIME	HAMMER BLOWS	% CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
4		EVT-	9307 771 4-4.2	0825	5/6			Very wet brown silt above 4.0', moist, light gray silt with gravel 4-5.5'.
					12/6			
					23/6			
5								
					34/6			
6			772 6-6.2	0835				Dry as above. EVT-9307-773 (Dup 6-6.2) 0840.
					74/6			Dry as above.
7			774 6.8-7	0845				
8								
9			778 9-9.2	0910	34/6			Dry gravelly, light gravel silt.
					126/4			
10							2 gallons water added.	
11								

TEST HOLE LOG

HYDROMETRICS

HELENA, MONTANA

PROJECT Everett Smelter

HOLE NUMBER S-39

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE / TIME	HAMMER BLOWS	% CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
11			779 11-11.2	0935	50/6	15		Moist, light gray, sandy silt, low recovery, not well representative.
					77/4			
12								Auger bouncing at 12.5'.
					32/6			Able to drive spoon through moist, light gray sandy silt (13'). Silty gravel lense at 12.5-12.8'.
			780 13-13.2	1010	45/6	100		
13					60/6			
							1 gallon water added.	
14					60/6			
					35/6			
								Moist, light gray sandy silt at 15', dense, light gray silt with occasional gravels 16-16.5'.
15			781 15-15.2	1015	37/6			
					70/6	100		
					42/6			
16								

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Everett RI/FS — JOB NUMBER ASEV01 — HOLE NUMBER S-46

STATE WA — COUNTY Snohomish — LOCATION T ___ R ___ SEC. ___ TRACT ___

SITE DESCRIPTION 510 East Marine View Drive — ELEVATION G.S. ___ — DATE 1-21-93

RECORDED BY V. S. — DRILL METHOD Hand Auger — DRILLER J.C. — DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 6' — CASING TYPE AND DESCRIPTION ___

TOTAL DEPTH CASED ___ — WELL COMPLETION DESCRIPTION ___

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			EVT 9301-515		0930				Topsoil, piece of brick
2"									
6"			9301-516		0935				Brown silt, sandy, gravelly
9"									
1'			9301-517		0940				Topsoil, piece of brick
2'			9301-518		0945				Topsoil, some gravel, brick
3'			9301-519		0950				Topsoil, black clay, brick
4'			9301-520		0955				Topsoil, black clay
5'									
6'			9301-521		1000				Tan sand, silt, gravel, some clay
7'									

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Everett Smelter — JOB NUMBER ASEV01 — HOLE NUMBER S-46

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 510 E. Marine View Drive — ELEVATION G.S. ____ — DATE 7/21/93

RECORDED BY Sam Billin — DRILL METHOD HSA — DRILLER ____ — DRILLING CO. Boretec

TOTAL DEPTH 16.7' — CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ — WELL COMPLETION DESCRIPTION ____

REMARKS (Note bit/auger size) Till @ approximately 6'

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
									0-4" Topsoil with brick fragments 3-4'
									4-5' very wet, loose, brown silt
6		EVT-	9307 758 6-6.2		0900	9/6 19/6	100		Moist, light gray silt
7			759 7-7.2		0905	26/6	100		Moist, light gray, gravelly, sandy silt, EVT 93076-760 Dup at 7-7.2 0910
8						7/6 34/6	30		Sample was 7.5-9'-no effective recovery
9						28/0			

TEST HOLE LOG

HYDROMETRICS TACOMA, WASHINGTON

PROJECT Everett Smelter JOB NUMBER ASEV01 HOLE NUMBER S-46

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 510 Marine View Drive ELEVATION G.S. ____ DATE 7-21-93

RECORDED BY Sam Billin DRILL METHOD HSA DRILLER R. Gibson DRILLING CO. Boretec

TOTAL DEPTH 16.7' CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ WELL COMPLETION DESCRIPTION ____

REMARKS (Note bit/auger size) Till @ approximately 6'

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT RECOVERY CORE	NOTES ON: WATER LEVELS DRILLING FLUID DRILLING RATE WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
9			761 9-9.2	0915		39/6	100		Slightly moist, light gray sandy silt, few gravels
						63/6			Dryer at 10'
10									
11			762 13-13.2	0930		24/6 30/6	100		Slightly moist, light gray silt with occasional fine gravel
12									
13			763 13-13.2	0950		33/6 50/4	100		Dry as above
						54/6	100		
14									
						100/5			
15			764 14.3-15	1030					As above with coarse gravel
								1 gallon water added	
16						111/6			Dry as above with large gravel apparently large cobbles at 16.7. Auger refuseed

TEST HOLE LOG

HYDROMETRICS TACOMA, WASHINGTON

PROJECT Everett Smelter JOB NUMBER ASEV01 HOLE NUMBER S-46

STATE WA COUNTY Snohomish LOCATION T ___ R ___ SEC. ___ TRACT ___

SITE DESCRIPTION 510 Marine View Drive ELEVATION G.S. ___ DATE 7-21-93

RECORDED BY Sam Billin DRILL METHOD HSA DRILLER R. Gibson DRILLING CO. Boretec

TOTAL DEPTH 16.7' CASING TYPE AND DESCRIPTION ___

TOTAL DEPTH CASED ___ WELL COMPLETION DESCRIPTION ___

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
17			765 16.5-16.7		1100	100/2	100		

TEST HOLE LOG

HYDROMETRICS TACOMA, WASHINGTON

PROJECT Everett RI/FS JOB NUMBER ASEV01 HOLE NUMBER S-47

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 502 East Marine View Drive ELEVATION G.S. ____ DATE 1-22-93

RECORDED BY V. S. DRILL METHOD Hand Auger DRILLER J.C. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 6' CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ WELL COMPLETION DESCRIPTION

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS DRILLING FLUID DRILLING RATE WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			EVT 9301-567		1130				Topsoil, sandy, organic material, brick pieces
2"									
6"			9301-568		1135				Topsoil, sandy, organic material
9"									
1'			9301-569		1140				Gravel, sandy, little silt
2'			9301-570		1145				Brown sand, gravelly, little silt, some brick
			9301-574 Dupl. of 570		1205				
3'			9301-571		1150				Brown sand, silty, black clay lenses, trace gravel
4'			9301-572		1155				Tan sand, clayey, little gravel, oxidation staining
5'									
6'			9301-573		1200				Light gray sand, silty, clay lenses some organic material
7'									

TEST HOLE LOG

HYDROMETRICS TACOMA, WASHINGTON

PROJECT Everett Smelter JOB NUMBER ASEV01 HOLE NUMBER S-47

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 502 E. Marine View Drive ELEVATION G.S. ____ DATE 7-14-94

RECORDED BY J.C. DRILL METHOD H S A DRILLER J. Lewis DRILLING CO. Boretec

TOTAL DEPTH 11.2' CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ WELL COMPLETION DESCRIPTION ____

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
7'	7.0 / 7.2		EVT-9307 710	1100	20/6 50/6	100%			Light grey silt, very dense, small gravel
8'									
9'					50/6	0%			No Sample Recovery Large gravel stuck in spoon shoe
10'	10.0 / 10.2		EVT-9307 711	1210	28/6	100%			Light grey silt, dense 1/2" gravel
11'	11.0 / 11.2		EVT-9307 712	1325	50/5	100%			Light grey silt, dense 1/2" to 3/4" gravel
12'									Auger Refusal at 11.2' Till from 4.5 to 6.5' very moist, moldable. Mud rings coming off auger.

TEST HOLE LOG

HYDROMETRICS

HELENA, MONTANA

PROJECT Everett Smelter JOB NUMBER ASEV-01 HOLE NUMBER S-50

STATE Washington COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 528 Hawthorne ELEVATION G.S. ____ DATE 07/21/93

RECORDED BY Sam Billin DRILL METHOD HSA DRILLER Ritch Gibson DRILLING COMPANY Boretec

TOTAL DEPTH 9.7' CASING TYPE AND DESCRIPTION --

TOTAL DEPTH CASED -- WELL COMPLETION DESCRIPTION --

REMARKS (Note bit/auger size) Till @ 4.5'.

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	% CORE RECOVERY	NOTES ON: WATER LEVELS DRILLING FLUID DRILLING RATE WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
4		EVT-	9307 766 4-4.2	1330		8/6			Topsoil - moist loam to 4.5'.
						9/6	100		Moist, light gray silt and gravel 4.5-5.5'.
						13/6			
5									
6		EVT-	9307 767 6-6.2	1400		24/6			Apparent cobbles at 6.0'. Slightly moist, light gray silt with occasional gravel.
						26/6	100		
			768 7-7.2	1405		41/6			Dry, light gray silt with occasional gravel.
7									
8			Auger refusal on cobbles at 6.0'. Pulled out of hole and moved off 3.0'. Drilled straight to 9.0'. Added two gallons water.						
9			769 9-9.2	1545		65/6			Dry gravelly, light gray silt, large cobble fragments at 9.1' (not well representative sample).
							30		
						50/1			
			770 9.6-9.7	1605		200/3	100		As above.
			Both auger and split spoon bouncing off same large cobble. Auger refusal at 9.7'.						

THL-P\S-50.THL\08-10-93\KAB

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Everett RI/FS — JOB NUMBER ASEV01 — HOLE NUMBER S-72

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 514 Pilchuck Path — ELEVATION G.S. ____ — DATE 1-20-93

RECORDED BY R. V. — DRILL METHOD Hand Auger — DRILLER J.C. — DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 6' — CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ — WELL COMPLETION DESCRIPTION ____

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			ASEV01 9301-500		1345				Topsoil, organic - rich
2"									
6"			9301-501		1350				Topsoil, organic - rich
9"									
1'			9301-502		1355				Brown sand, silty, organic - rich
2'			9301-503		1400				Brown sand, silty, plus gray material (flue dust?)
3'			9301-504		1405				Light brown sand, silty, brick fragments, gray material (flue dust?)
4'			9301-505		1410				Light brown sand, clayey, oxidation rust spots
5'									
6'			9301-506		1415				Gray, silt, sandy, clayey, pebbles
7'									

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Everett Smelter — JOB NUMBER ASEV01 — HOLE NUMBER S-72 A, B

STATE WA — COUNTY Snohomish — LOCATION T ___ R ___ SEC. ___ TRACT ___

SITE DESCRIPTION 514 Pilchuck Path — ELEVATION G.S. ___ — DATE 7-15-93

RECORDED BY JC — DRILL METHOD H S A — DRILLER J. Lewis DRILLING CO. Boretec

TOTAL DEPTH 10.0' — CASING TYPE AND DESCRIPTION NA

TOTAL DEPTH CASED NA — WELL COMPLETION DESCRIPTION NA

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
7'	7.0 / 7.3		EVT-9307 718	1515		38/6 50/3	100%	1 gallon	Light grey silt, very dense, small gravel
8'									
9'	9.0 / 9.3		EVT-9307 720	1535		50/5	100%	1 gallon	Light grey silt, very dense, small gravel
10'			Auger Refusal						Till - 5.0'
									Duplicate 7' sample EVT-9307-719 1600 hrs
									S-72A - Auger refusal concrete @ 4.5'
									S-72B - Auger refusal split spoon at 10' Blow counts 50/1" No sample

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Everett RI/FS — JOB NUMBER ASEV01 — HOLE NUMBER S-101

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 108 Skyline Drive — ELEVATION G.S. ____ — DATE 1-21-93

RECORDED BY V. S. — DRILL METHOD Hand Auger — DRILLER J.C. — DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 4' — CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ — WELL COMPLETION DESCRIPTION ____

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			EVT 9103-548		1400				Topsoil, organic material, clay
2"									
6"			9103-549		1405				Silty sand, some pebbles
9"			9103-554		1430				
1'			Dupl. of		549				
			9103-550		1410				Sand, pebbles, silty brown
2'			9103-551		1415				Tan silt, clay, some sand, trace gravel
3'			9103-552		1420				Tan, silt, clayey, some oxidation staining
4'			9103-553		1425				Tan, silt, clayey, sandy
5'									
6'									
7'									

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Everett RI/FS — JOB NUMBER ASEV01 — HOLE NUMBER S-102

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 221 Skyline Drive — ELEVATION G.S. ____ — DATE 1-26-93

RECORDED BY J. S. — DRILL METHOD Hand Auger — DRILLER J.C. — DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 4' — CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ — WELL COMPLETION DESCRIPTION ____

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			EVT 9301-582		1400				Topsoil, organic material, sandy
2"									
6"			9301-583		1405				Brown silt, sandy, small gravels
9"									
1'			9301-584		1410				Brown silt, sandy, small gravels
			9301-585 Dupl. of 584		1415				
2'			9301-586		1420				Brown silt, sandy, pea gravels - 10%, water encountered
3'			9301-587		1425				Tan, sandy clay
4'			9301-588		1430				Tan, sandy clay
5'									
6'									
7'									

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Everett RI/FS — JOB NUMBER ASEV01 — HOLE NUMBER S-103

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 308 Skyline Drive — ELEVATION G.S. ____ — DATE 2-01-93

RECORDED BY J. C. — DRILL METHOD Hand Auger — DRILLER J.C. — DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 4' — CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ — WELL COMPLETION DESCRIPTION ____

REMARKS ____

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			EVT 9301-638		1220				Topsoil, organic material, brown sandy
2"									
6"			9301-639		1225				Brown sandy silt, small gravels
9"									
1'			9301-640		1230				Brown silty sand, large to small gravels
2'			9301-641		1235				Brown silty sand, small gravels
			9301-644 Dupl. of 641		1250				
3'			9301-642		1240				Reddish tan silty sand, small gravels oxidation
4'			9301-643		1245				Wet, silty sand, small gravels, tan
5'									
6'									
7'									

TEST HOLE LOG

HYDROMETRICS TACOMA, WASHINGTON

PROJECT Everett RI/FS JOB NUMBER ASEV01 HOLE NUMBER S-104

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 512 Winton Avenue ELEVATION G.S. ____ DATE 2-01-93

RECORDED BY J.C. DRILL METHOD Hand Auger DRILLER J.C. DRILLING CO. Hydrometrics, Inc

TOTAL DEPTH 4' CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ WELL COMPLETION DESCRIPTION ____

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			EVT 9301-645		1330				Brown topsoil, organic material small gravel
2"									
4"									
6"			9302-646		1335				Brown sandy silt, small gravel
9"									
1'			9301-647		1340				Brown silty sand, small gravel
2'			9301-648		1345				Tan silty sand
3'			9302-649		1350				Tan silty sand, small gravels
4'					1355				Refusal, no sample
5'									
6'									
7'									

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Everett RI/FS — JOB NUMBER ASEV01 — HOLE NUMBER S-105

STATE WA — COUNTY Snohomish — LOCATION T ___ R ___ SEC. ___ TRACT ___

SITE DESCRIPTION 617 Legion Drive — ELEVATION G.S. ___ — DATE 1-21-93

RECORDED BY V. S. — DRILL METHOD Hand Auger — DRILLER J.C. — DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 4' — CASING TYPE AND DESCRIPTION ___

TOTAL DEPTH CASED ___ — WELL COMPLETION DESCRIPTION ___

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			EVT 9301-542		1300				Topsoil, sandy, organic material
2"									
6"			9301-543		1305				Black topsoil, some tan silty clay, organic material
9"									
1'			9301-544		1310				Wood fragments, sandy silt, brown
2'			9301-545		1315				Brown sandy silt, wood fragments, some tan clay
3'			9301-546		1320				Tan sand & gravel
4'			9301-547		1325				Gray sand & gravel
5'									
6'									
7'									

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Everett RI/FS — JOB NUMBER ASEV01 — HOLE NUMBER S-106

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 606 Linden Street — ELEVATION G.S. ____ — DATE 1-22-93

RECORDED BY V. S. — DRILL METHOD Hand Auger — DRILLER J.C. — DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 3.5' — CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ — WELL COMPLETION DESCRIPTION ____

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE / TIME	HAMMER BLOWS	PERCENT RECOVERY CORE	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			EVT 9301-555	0900				Topsoil, pebbles, brown
2"								
6"			9301-556	0905				Brown silt, gravelly, sandy, some clay
9"								
1'			9301-557	0910				Brown sand, some pebbles, silty Refusal at 2'; moved hole 1' east
2'			9301-558	0915				Brown sand & gravel, some silt, oxidation stains
3'			9301-559	0920				Gray silt, sandy, some pebbles
3.5'			9301-560	0925				Refusal at 3.5', silty clay, pebbles, dark gray
4'								
5'								
6'								
7'								

TEST HOLE LOG

HYDROMETRICS TACOMA, WASHINGTON

PROJECT Everett RI/FS JOB NUMBER ASEV01 HOLE NUMBER S-107

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 724 Linden Street ELEVATION G.S. ____ DATE 2-05-93

RECORDED BY J. C. DRILL METHOD Hand Auger DRILLER J.C. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 4' CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ WELL COMPLETION DESCRIPTION ____

REMARKS ____

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS DRILLING FLUID DRILLING RATE WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			EVT 9301-664		1015				Brown organic material, sandy
2"									
6"			9301-665		1020				Brown, silty sand, small gravel
9"									
1'			9301-666		1025				Brown, silty sand, small gravels
2'			9301-667 9301-670 Dupl. of 667		1030 1045				Brown, silty sand, 1/2" - 1/4" gravels
3'			9301-668		1035				Brown, silty sand, small gravels
4'			9301-669		1040				Reddish-brown, silty sand, moist, 1/2"-1/4" gravels
5'									
6'									
7'									

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT Everett RI/FS JOB NUMBER ASEV01 HOLE NUMBER S-108

STATE WA COUNTY Snohomish LOCATION T ___ R ___ SEC. ___ TRACT ___

SITE DESCRIPTION Linden Street ELEVATION G.S. ___ DATE 2-05-93

RECORDED BY J. C. DRILL METHOD Hand Auger DRILLER J.C. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 4' CASING TYPE AND DESCRIPTION ___

TOTAL DEPTH CASED ___ WELL COMPLETION DESCRIPTION

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			EVT 9301-671		1050				Brown organic material, sandy
2"									
6"			9301-672		1055				Brown, silty sand, 3/4" - 1/4" gravels
9"									
1'			9301-673		1100				Light brown silty sand gravels
2'			9301-674		1105				Tan silty clay, moist
3'			9301-675		1110				Tan silty clay, small gravel, moist
4'			9301-676		1115				Light brown silty sand, 1/2" gravel
5'									
6'									
7'									

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Everett RI/FS — JOB NUMBER ASEV01 — HOLE NUMBER S-109

STATE WA — COUNTY Snohomish — LOCATION T ___ R ___ SEC. ___ TRACT ___

SITE DESCRIPTION 901 Maple Street — ELEVATION G.S. ___ — DATE 1-22-93

RECORDED BY V. S. — DRILL METHOD Hand Auger — DRILLER J.C. — DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 4' — CASING TYPE AND DESCRIPTION ___

TOTAL DEPTH CASED ___ — WELL COMPLETION DESCRIPTION ___

REMARKS ___

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			EVT 9301-561		1045				Topsoil, sandy, organic material
2"									
6"			9301-562		1050				Black sand, gravelly, silty
9"									
1'			9301-563		1055				Brown sand, gravelly, little silt
2'			9301-564		1100				Tan, silty clay
3'			9301-565		1105				Tan, sandy silt, little clay
4'			9301-566		1110				Silty clay, tannish-gray, some oxidation stains
5'									
6'									
7'									

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT Everett RI/FS JOB NUMBER ASEV01 HOLE NUMBER S-110

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 812 East Marine View Drive ELEVATION G.S. ____ DATE 2-02-93

RECORDED BY J. C. DRILL METHOD Hand Auger DRILLER J.C. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 4' CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ WELL COMPLETION DESCRIPTION

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			EVT 9301-657		0820				Brown topsoil, organic material, sandy
2"									
6"			9301-658		0825				Brown, silty sand, small gravels
9"									
1'			9301-659		0830				Brown, silty sand, small gravels
2'			9301-660		0835				Brown, silty sand, small gravels
3'			9301-661		0840				Brown to tan sandy silt
4'			9301-662 9301-663 Dupl. of 662		0845 0850				Reddishh-brown sandy silt, small gravels
5'									
6'									
7'									

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Everett RI/FS — JOB NUMBER ASEV01 — HOLE NUMBER S-111

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 520 East Marine View Drive — ELEVATION G.S. ____ — DATE 1-21-93

RECORDED BY V.S. — DRILL METHOD Hand Auger — DRILLER J.C. — DRILLING CO. Hydrometrics Inc.

TOTAL DEPTH 5' — CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ — WELL COMPLETION DESCRIPTION ____

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			EVT 9302-522		0825				Brown sand, silt, tan clay, organic material
2"									
6"			9302-523		0830				Sand, silt, some ggravel, organic material
9"									
1'			9302-524		0835				Brown silty clay, white sand, brick
2'			9302-525		0840				White sand, brown silt, brick
3'			9302-526		0845				White sand, (crystalline), brick, brown silt
4'			9301-527		0850				Gray sand, silt, brick, dark gray clay pebbles
5'									
6'									No sample collection; could not auger past 5 feet
7'									

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Everett RI/FS — JOB NUMBER ASEV01 — HOLE NUMBER S-111

STATE WA — COUNTY Snohomish — LOCATION T ___ R ___ SEC. ___ TRACT ___

SITE DESCRIPTION 520 East Marine View Drive — ELEVATION G.S. ___ — DATE 7-15-93

RECORDED BY J.C. — DRILL METHOD H S A — DRILLER J. Lewis — DRILLING CO Boretec

TOTAL DEPTH 11.3' — CASING TYPE AND DESCRIPTION ___

TOTAL DEPTH CASED ___ — WELL COMPLETION DESCRIPTION ___

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0									Topsoil, fill material, brown medium sand, silt organic material, small gravel
1'									Multi-colored smelter debris (white, red, grey) brick chips mortar, medium sand
2'						3/6			White crystalline material strong odor
						2/6	50%		
3'						2/6			
						2/6			Brick material, medium sand, silt, brown, white specks, small gravel
4'						8/6			
						2/6			
5'	5.0	EVT9307 714A		0900		1/6	90%		Moist gray, medium sand, silt, black streaks, small gravel, strong odor
						1/6			
6'	6.0					8/6			
						11/6			Moist brown fine sand, silt, black streaks, brick material
7'									

TEST HOLE LOG

HYDROMETRICS TACOMA, WASHINGTON

PROJECT Everett Smelter JOB NUMBER ASEV01 HOLE NUMBER S-111

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 520 E. Marine View Drive ELEVATION G.S. ____ DATE 7-15-93

RECORDED BY J. C. DRILL METHOD H S A DRILLER J. Lewis DRILLING CO. Boretec

TOTAL DEPTH 11.3' CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ WELL COMPLETION DESCRIPTION ____

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
7'	6.25		EVT-9307 714B	0935		50/4	90%		Light grey silt, fine sand, small gravel, dense
	7.25								
8'	8.0		EVT-9307 715	1055		28/6 50/3	100%		Light grey silt, very dense, small gravel
	8.5								
9'	9.0		EVT-9307 716	1135		50/5	100%		Light grey silt, very dense, small gravel
	9.2								
10'			EVT-9307 717	1145		28/6 50/5	100%		Light grey silt, very dense, small gravel
	10.8								
11'	11.3								Auger refusal at 11.0' Collected samples 2-4' and 5-6' for archivery

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Everett RI/FS — JOB NUMBER ASEV01 — HOLE NUMBER S-112

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 523 Pilchuck Path — ELEVATION G.S. ____ — DATE 1-26-93

RECORDED BY J. C. — DRILL METHOD Hand Auger — DRILLER J.C. — DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 4' — CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ — WELL COMPLETION DESCRIPTION ____

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE / TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			EVT 9301-602	1700				Brown to black organic material, sandy, some small gravel
2"								
6"			9301-603	1705				Silty, red (brick color) little clays, some oxidation
9"								
1'			9301-604	1710				Brown silty sand, some red, some oxidation HARD
2'			9301-605	1715				Red silty/(brick), some oxidation, little clays
3'			9301-606 9301-608 Dupl.	1720 1730				Sandy silt, red, some oxidation
4'			9301-607	1725				Brown sandy silt (brick chips) & had 1' void
5'								
6'								
7'								

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Everett RI/FS — JOB NUMBER ASEV01 — HOLE NUMBER S-113

STATE WA — COUNTY Snohomish — LOCATION T ___ R ___ SEC. ___ TRACT ___

SITE DESCRIPTION 528 Pilchuck Path — ELEVATION G.S. ___ — DATE 1-28-93

RECORDED BY J. C. — DRILL METHOD Hand Auger — DRILLER J.C. — DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 4' — CASING TYPE AND DESCRIPTION ___

TOTAL DEPTH CASED ___ — WELL COMPLETION DESCRIPTION ___

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE / TIME	HAMMER BLOWS	PERCENT RECOVERY (CORE)	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			EVT 9301-609	0830				Topsoil, organic material (brick chips), sandy
2"								
6"			9301-610	0835				Brown sandy silt, brick chips, small slag
9"								
1'			9301-611	0840				Brownish-red silts with brick chips
2'			9301-612 9301-615 Dupl.	0845 0900				Brownish-red silts, small gravels, small slag
3'			9301-613	0850				Brown silty sand, small gravels
4'			9301-614	0855				Tan sandy silt, small gravels
5'								
6'								
7'								

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Everett Smelter — JOB NUMBER ASEV01 — HOLE NUMBER S-113

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 528 East Marine View Drive — ELEVATION G.S. ____ — DATE 7/20/93

RECORDED BY Sam Bittin — DRILL METHOD HSA — DRILLER R. Gipson — DRILLING CO. Boretec

TOTAL DEPTH 15.0' — CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ — WELL COMPLETION DESCRIPTION ____

REMARKS (Note bit/auger size) Till @ 6.8'

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
6		EVT	9307 740 6-6.2		850	2/6 2/6	100		Brown, silt with black organic? streaking.
7			741 7-7.2		855	2/6	100		EVT-9307-742 Duplicate of 7-2.2' 1005 Light gray silt with light brown marbelling, moist
8						10/6 26/6	100		Very wet 8-9'
9			743 9-9.2		910	44/6 50/6	100		Very densew, light gray silt, with gravels, slightly moist
10						10/6 39/6	100		
11			744 11-11.2		915	50/6			Dense, Light gray, sandy silt with occasional <1/2" gravel moist
12						38/6 88/6	100		
13			745 12.8-13		0930				As above with sandy silt, Lense at 13', slightly moist

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT Everett Smelter JOB NUMBER ASEV01 HOLE NUMBER S-113

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 528 East Marine View Drive ELEVATION G.S. ____ DATE 7/20/93

RECORDED BY Sam Billin DRILL METHOD HSA DRILLER R. Gibson DRILLING CO. Boretec

TOTAL DEPTH 15.0' CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ WELL COMPLETION DESCRIPTION ____

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICA ION
13									
14						43/6 100/6	100		Dry, dense, light gray silt with occasional gravel
15			746 14.8-15		1000				

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Everett RI/FS — JOB NUMBER ASEV01 — HOLE NUMBER S-114

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 110 Bridgeway — ELEVATION G.S. ____ — DATE 1-26-93

RECORDED BY J. S. — DRILL METHOD Hand Auger — DRILLER J.C. — DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 4' — CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ — WELL COMPLETION DESCRIPTION ____

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			EVT 9301-589		1500				Black/brown topsoil/organic material, sandy, small gravels
2"									
6"			9301-590		1505				Black/brown topsoil/organic material, sandy, small gravels
9"									
1'			9301-591		1510				Brown sandy silt, some oxidation
2'			9301-592		1515				Brown silty sand, small gravels
3'			9301-593		1520				Tan, sandy clay, some oxidation, some water, small gravels
4'			9301-594		1525				Gray silty/clay, small gravels
5'									
6'									
7'									

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT Everett RI/FS JOB NUMBER ASEV01 HOLE NUMBER S-115

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 302 Bridgeway ELEVATION G.S. ____ DATE 1-22-93

RECORDED BY V. S. DRILL METHOD Hand Auger DRILLER J.C. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 4' CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ WELL COMPLETION DESCRIPTION ____

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			EVT 9301-575		1300				Topsoil, sandy, some organic material, plastic liner
2"									
6"			9301-576		1305				Brown topsoil, sandy, some organic matter
9"									
1'			9301-577		1310				Brown topsoil, sandy, silty, some black clay stringers, some pebbles
			9301-581 Dupl. of 577		1330				
2'			9301-578		1315				Tan, sandy clay & silt
3'			9301-579		1320				Tan, sandy clay, some oxidation stains
4'			9301-580		1325				Gray silty clay, some sand
5'									
6'									
7'									

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT Everett RI/FS JOB NUMBER ASEV01 HOLE NUMBER S-116

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 2909 Whitehorse Trail ELEVATION G.S. ____ DATE 2-01-93

RECORDED BY J. C. DRILL METHOD Hand Auger DRILLER J.C. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 4' CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ WELL COMPLETION DESCRIPTION ____

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			EVT 9301-651		1622				Brown topsoil, organic material, sandy
2"									
6"			9301-652		1625				Brown, tan sandy/silt, small gravels
9"									
1'			9301-653		1630				Brown silty sand
2'			9301-654		1635				Brown silty sand
3'			9301-655		1640				Brown silty clay
4'			9301-656		1645				Brown, silty sand, wet
5'									
6'									
7'									

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT Everett RI/FS JOB NUMBER ASEV01 HOLE NUMBER S-117

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 2832 Medora Drive ELEVATION G.S. ____ DATE 1-21-93

RECORDED BY V. S. DRILL METHOD Hand Auger DRILLER J.C. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 4' CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ WELL COMPLETION DESCRIPTION ____

REMARKS

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			EVT 9301-535		1105				Brown sand, silt, pebbles
2"									
6"									
9"			9301-536		1110				Brown sand, pebbles, silty, some organic material
1'									
			9301-537		1115				Brown sand, silty, some clay, some gravel
			9301-541 Dupl. of 537		1135				
2'			9301-538		1120				Brown sand, silty, clayey, some orange staining, pebbles
3'			9301-539		1125				Tan sand & silt, clayey, some pebbles
4'			9301-540		1130				Tan silt, sandy, some pebbles
5'									
6'									
7'									

APPENDIX D

LOGS FOR PHASE II RESIDENTIAL SOIL BORINGS

Summary of Contents of Appendices C, D, and E

Appendix C contains the logs for Phase I/II residential soil borings S-4, S-8, S-13, S-15, S-22, S-27, S-28, S-34, S-36, S-37, S-39, S-46, S-47, S-50, S-72, and S-101 through S-117.

During Phase I, samples were collected at 26 of these locations (S-4, S-8, S-13, S-15, S-27, S-28, S-46, S-47, S-72, and S-101 through S-117. During the first round of Phase II, eleven of these locations were revisited (S-4, S-8, S-13, S-15, S-27, S-28, S-46, S-47, S-72, S-111, and S-113), as well as six SAIC locations reinvestigated (S-22, S-34, S-36, S-37, S-39, and S-50). As a result, the logs for borings S-4, S-8, S-13, S-15, S-27, S-28, S-46, S-47, S-72, S-111, and S-113 are a combination of two sampling efforts which took place approximately 6 months apart. The logs are reflections of individual preferences of the various geologists that have been involved in the logging. Due to their different styles, terminology as well as scales may vary between the two sections of the logs. However, these logs should be considered one continuous log for the purpose of the RI. The logs for the remaining soil borings are the result of single-event investigations. Phase I locations S-101 through S-110, S-112, and S-114 through S-117 were never revisited; logs from the SAIC effort at Phase II first round locations S-22, S-34, S-36, S-37, S-39, and S-50 were not available.

Appendix D contains the logs for Phase II second round residential soil borings S-74, S-83, S-90 through S-97, S-201 through S-209, and S-301 through S-309. These logs all consist of single-event descriptions.

Appendix E contains the logs of deep soil borings B-1, B-2, EV-2A, and EV-2B, and slag borings SL-1, SL-3, and SL-4. These logs all consist of single-event descriptions.

SUMMARY OF TERMINOLOGY USED ON BORING/WELL LOGS

Drilling Methods Used

HSA - Hollow Stem Auger Drilling method. Reported dimension refers to inside diameter of the hollow stem augers used.

Air Rotary - Forward Rotary Drilling method in which air is used to circulate cuttings from the hole.

Hand Auger - Where indicated, shallow borings completed using 4" diameter stainless steel bucket auger

Sample Collection

Split Spoon Samplers - Except in the case of hand augured borings, samples were collected using standard split spoon samplers. One of two sampler types were used:

- Dames and Moore Sampler - 3" ID split spoon used in conjunction with 300 lb. hammer
- Standard 1 3/8" ID split spoon used in conjunction with a 140 lb. hammer

Blow Counts (noted as Hammer Blows on some logs)

Both split-spoon samplers provide standard penetration data (ASTM D1586), reported on the well logs as the number of blows required to drive the split spoon over a 6-inch sampling interval. Eighteen-inch samples were commonly collected at monitoring well and deep boring sites. Six-inch to one-foot samples were collected at some of the shallow borings. In all cases, the reported blow count refers to the number of blows per 6 inch interval unless specifically noted. In instances where blow counts exceeded 50, the spoon was retrieved and the reported blow count is followed by the amount of penetration achieved for that sampling interval (for example 50/5").

Sample #

Sample numbers were assigned to individual sampling intervals in the field. In some instances, distinct variations in lithology are reported within a sampling interval and the sample number is followed by an A and B. In these cases, the retrieved sample was separated into two discrete samples at the lithologic break and analyzed separately.

Sample Type

s.s. = split spoon sample as described above
grab = Grab sample off auger flights

Many of the logs include a drilling and sampling methodology in the header information. For sites indicating that a split spoon sampler was used, all samples were collected accordingly unless specifically noted under sample type. For borings completed with a hollow stem auger, all samples are grab samples taken from the auger bucket unless otherwise noted.

Geologic Description

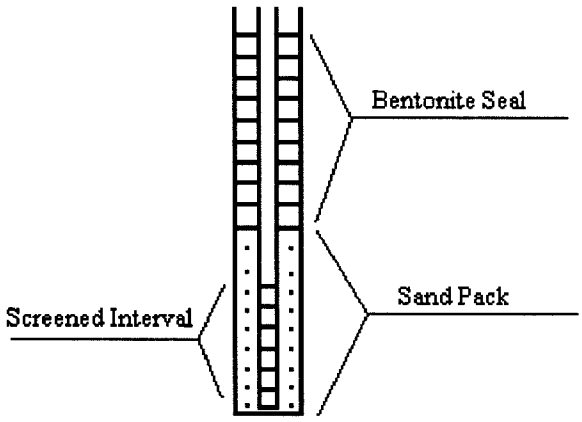
The logs contain field descriptions of soil samples, which generally include color, texture and soil moisture conditions at time of drilling. In some instances, geologic classification and contacts are noted based on interpretation of field data. Where geologic contacts were indistinct due to similarity in appearance, texture, and density, field interpretations were omitted from the logs.

B.O.H. = Bottom of Drilled Hole. In some instances, a sample may have been collected at the bottom of the hole; the sampling depth may therefore be greater than the reported B.O.H.

SWL. = Static Water Level in well at the time of drilling. In some instances, the well may have been allowed to recover prior to static water level measurement. In this case, date is indicated at the time of static water level measurement.

Well Completion Diagrams

In addition to descriptions of well completion, schematic diagrams of well completion are also shown on well logs. The symbols shown on these schematics are defined below:



TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT ASEV-01 JOB NUMBER _____ HOLE NUMBER S-74

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 215 Medora West of clotheslines ELEVATION G.S. _____ DATE 1-11-94

RECORDED BY J. C. DRILL METHOD S. Spoon DRILLER Jeff S. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 4' CASING TYPE AND DESCRIPTION --

TOTAL DEPTH CASED -- WELL COMPLETION DESCRIPTION --

REMARKS (Note bit/auger size) Pancoast Residence

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0		0-2	268		1335				Dark brown fine sand/silt root material small gravels
		6	269		1340		100%		Dark brown fine sand/silt root material small gravels
12		12	270		1345				Red brown fine sand/silt small gravels
24		24	271		1350				Red brown fine sand/silt small gravels
36		36	272		1355				Red brown fine sand/silt small gravels moist
48		48	273		1400		100%		Grey fine sand/silt small gravels dry

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT ASEV-01 JOB NUMBER _____ HOLE NUMBER S-83

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 207 Bridgeway Backyard ELEVATION G.S. _____ DATE 1-13-94

RECORDED BY J. C. DRILL METHOD S. Spoon DRILLER Jeff S. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 4' CASING TYPE AND DESCRIPTION --

TOTAL DEPTH CASED -- WELL COMPLETION DESCRIPTION --

REMARKS (Note bit/auger size) D. Smith Residence

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0		0-2	304		0905	3" ss			Dark brown fine sand/silt root material small gravel
		6	305		0910	2	100%		Dark brown medium to fine sand/small gravel
12		12	306		0915	1			Dark brown medium to fine sand/small gravel
						2			
24		24	307		0920	2" 4 ss			Dark brown fine sand/silt small gravels black streaks
						4			
36		36	308		0925	4	100%		Dark brown fine sand/silt small gravels black streaks some clay wood debris
						4			
48		48	309		0930	4			Dark brown fine sand/silt small gravels black streaks some clay

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT ASEV-01 JOB NUMBER _____ HOLE NUMBER S-90

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 232 Bridgeway ELEVATION G.S. _____ DATE 1-12-94

RECORDED BY J. C. DRILL METHOD S. Spoon DRILLER Jeff S. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 4' CASING TYPE AND DESCRIPTION --

TOTAL DEPTH CASED -- WELL COMPLETION DESCRIPTION --

REMARKS (Note bit/auger size) Burt Residence

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS DRILLING FLUID DRILLING RATE WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0		0-2	274		0830			3" spoon 0-24"	Dark brown clayey silt, some sand organic matter small gravels
		6	275		0835	1			Dark brown silt & sand (fine), trace clay
12		12	276		0840	5		2" spoon 24-48"	
						7			
24		24	277		0845	7			Light brown sand (fine to medium) some silt, small gravels
						11			
36		36	278		0850	20			Medium to coarse sand; brown w/black grains moist
						38			
48		48	279		0855	60			Brown silt, some fine sand, dry small gravels dry
			280		0900	Dup	277/12"		

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT ASEV-01 — JOB NUMBER — HOLE NUMBER S-91

STATE WA — COUNTY Snohomish — LOCATION T — R — SEC. — TRACT

SITE DESCRIPTION 235 Bridgeway — ELEVATION G.S. — DATE 1-12-94

RECORDED BY J. C. — DRILL METHOD S. Spoon — DRILLER Jeff S. — DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 4' — CASING TYPE AND DESCRIPTION --

TOTAL DEPTH CASED -- — WELL COMPLETION DESCRIPTION --

REMARKS (Note bit/auger size) Bates Residence

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT RECOVERY CORE	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0		0-2	281		0905			3" spoon 0-24"	Dark brown silt some clay, roots
		6	282		0910	1			Brown fine-medium sand, silty, some little roots
12		12	283		0915	2		2" spoon 24-48"	Light brown silty clay, small gravels, little roots
						2			
24		24	284		0920	5			silt, fine sand, small gravels, light brown
						7			
36		36	285		0925	9			Grey-brown silt, fine sand, trace clay
						10			
48		48	286		0930	12			Grey-brown silty clay, trace fine sand/small gravels

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT ASEV-01 JOB NUMBER _____ HOLE NUMBER S-92

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 534 East Marine View Drive ELEVATION G.S. _____ DATE 1-12-94

RECORDED BY V. S. DRILL METHOD HSA DRILLER Jeff C. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 14.25' CASING TYPE AND DESCRIPTION --

TOTAL DEPTH CASED -- WELL COMPLETION DESCRIPTION --

REMARKS (Note bit/auger size) Powers Residence

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0		0-2	287		0935			2 1/4" I.D. auger	Black sandy silt, grass & roots
		6"	288		0940	1		4 1/2" O.D.	Brown fine-medium sand, small gravels, brick fragments, some root material
1		12"	289		0945	2		3" spoon 0-2'	Brown silt, fine sand, trace clay
						2			
2		24"	290		0950	2		2" spoon 2'-15' depth	Light brown silt, fine sand, small gravel
						2			
3		36"	291		0955	2			Light brown silt, fine sand, small gravel, w/black silt layer (2")
						3			
4		48"	292		1000	3			Light brown fine sand, some silt, trace small gravel
5		5'				4			
6		6'	293		1005	15			Gray brown fine sand, trace silt/small gravel, dense
						23			
7		7'	294		1010	26			Gray fine sand, little silt, trace small gravel

TEST HOLE LOG

HYDROMETRICS TACOMA, WASHINGTON

PROJECT ASEV-01 JOB NUMBER HOLE NUMBER S-92

STATE WA COUNTY Snohomish LOCATION T R SEC. TRACT

SITE DESCRIPTION 534 East Marine View Drive ELEVATION G.S. DATE 1-12-94

RECORDED BY V. S. DRILL METHOD HSA DRILLER Jeff C. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 14' 3" CASING TYPE AND DESCRIPTION --

TOTAL DEPTH CASED -- WELL COMPLETION DESCRIPTION --

REMARKS (Note bit/auger size) Powers Residence

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
7									
8		8'				24			
9		9'	295		1015	54			Gray-brown-silty fine sand trace small gravel
						60/3"		added 1.5 gallons drilling water starting at 9'5	
10		10'				48		added 2 gallons water at 10'	
11		11'	296		1020	81			Gray brown fine sand, gravelly, little silt, dense
12		12'				18			
13		13'	297		1025	12	30%		Brown silty fine sand wet
14		14'							

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT ASEV-01 JOB NUMBER _____ HOLE NUMBER S-92

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 534 East Marine View Drive ELEVATION G.S. _____ DATE 1-12-94

RECORDED BY V. S. DRILL METHOD HSA DRILLER Jeff C. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 14' 3" CASING TYPE AND DESCRIPTION --

TOTAL DEPTH CASED -- WELL COMPLETION DESCRIPTION --

REMARKS (Note bit/auger size) Powers Residence

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
14		14.25	298	1030		60/3"	–		Brown fine sand, stiff, small gravel, dry
15						ns			

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT ASEV-01 JOB NUMBER _____ HOLE NUMBER S-93

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 610 Hawthorne Front yard ELEVATION G.S. _____ DATE 1-11-94

RECORDED BY J. C. DRILL METHOD S. Spoon DRILLER Jeff S. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 4' CASING TYPE AND DESCRIPTION --

TOTAL DEPTH CASED -- WELL COMPLETION DESCRIPTION --

REMARKS (Note bit/auger size) Willett Residence

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT RECOVERY CORE	NOTES ON: WATER LEVELS DRILLING FLUID DRILLING RATE WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0		0-2	249		1045	3" ss			Dark brown fine sand/silt root material small gravel
		6	250		1050	2	100%		Red brown fine sand/silt root material small gravel
12		12	251		1055	4			Red brown fine sand/silt root material small gravel
						4			
24		24	252		1100	2" ss			Grey fine sand/silt small gravel moist red streaks
						2			
36		36	253		1105	6	100%		Grey fine sand/silt small gravel moist red streaks
						8			
48		48	254		1110	8			Grey fine sand/silt small gravel moist red streaks

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT ASEV-01 JOB NUMBER _____ HOLE NUMBER S-94

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 2901 Butler Backyard ELEVATION G.S. _____ DATE 1-13-94

RECORDED BY J. C. DRILL METHOD S. Spoon DRILLER Jeff S. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 4' CASING TYPE AND DESCRIPTION --

TOTAL DEPTH CASED -- WELL COMPLETION DESCRIPTION --

REMARKS (Note bit/auger size) A. Smith Residence

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE	RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0		0-2	310		0935	3" ss				Dark brown fine sand/silt root material small gravels
						1				
		6	311		0940		100%			
12		12	312		0945	1				Red brown fine sand/silt small gravels root material
						3				
24		24	313		0950	4				Red brown fine sand/silt small gravels
						2" ss				
						1				
36		36	314		0955	1	100%			Red brown fine sand/silt small gravels moist
						1				
48		48	315		1000	4				Light grey fine sand/ silt/small gravels moist
		36	316		1005	Dup	314			

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT ASEV-01 JOB NUMBER _____ HOLE NUMBER S-95

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 3004 Butler Street ELEVATION G.S. _____ DATE 1-11-94

RECORDED BY J. C. DRILL METHOD S. Spoon DRILLER Jeff S. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 4' CASING TYPE AND DESCRIPTION --

TOTAL DEPTH CASED -- WELL COMPLETION DESCRIPTION --

REMARKS (Note bit/auger size) McClune Residence

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT RECOVERY CORE	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0		0-2	255	1115		3" ss 3			Medium brown fine sand/silt medium gravels black staining
		6	256	1120		5	100%		Medium brown fine sand/silt medium gravels black staining
12		12	257	1125		4 5			Red brown fine sand/silt medium gravels moist
24		24	258	1130		2" ss 9 12			Red brown fine sand/silt medium gravels moist
36		36	259	1135		19			Grey fine sand/silt small to medium gravel dry
48		48	260	1140		30			Grey fine sand/silt small to medium gravel dry

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT ASEV-01 JOB NUMBER _____ HOLE NUMBER S-96

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 704 E. Marine View Drive ELEVATION G.S. _____ DATE 1-11-94

RECORDED BY J. C. DRILL METHOD S. Spoon DRILLER Jeff S. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 4' CASING TYPE AND DESCRIPTION --

TOTAL DEPTH CASED -- WELL COMPLETION DESCRIPTION --

REMARKS (Note bit/auger size) Granger Residence

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0		0-2	261		1300	3" ss			Dark brown fine sand/silt root material small gravel
		6	262		1305	2	100%		Dark brown fine sand/silt root material small gravel
12		12	263		1310	2			Red brown fine sand/silt root material small gravel
						2			
24		24	264		1315	2 2" ss			Red brown fine sand/silt small gravels
						3			
36		36	265		1320	5			Light grey fine sand/silt red streaks small gravels wet.
						16			
48		48	266		1325	24	100%		Light grey fine sand/silt small gravels dry
		24	267		1330	Dup	264 24"		

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT ASEV-01 JOB NUMBER HOLE NUMBER S-97

STATE WA COUNTY Snohomish LOCATION T R SEC. TRACT

SITE DESCRIPTION 816 E Marine View Drive East of Driveway ELEVATION G.S. DATE 1-13-94

RECORDED BY J. C. DRILL METHOD S. Spoon DRILLER Jeff S. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 4' CASING TYPE AND DESCRIPTION --

TOTAL DEPTH CASED -- WELL COMPLETION DESCRIPTION --

REMARKS (Note bit/auger size) Anderson Residence

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT RECOVERY CORE	NOTES ON: WATER LEVELS DRILLING FLUID DRILLING RATE WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0		0-2	317	1010		3" ss 1			Dark brown fine sand/silt root material small gravels
		6	318	1015			100%		Red brown fine sand/silt root material small gravels
12		12	319	1020		1			Red brown fine sand/silt root material small gravels
						3			
24		24	320	1025		2" ss 4			Red brown fine sand/silt small gravels
						3			
36		36	321	1030		10			Red brown fine sand/silt small gravels wet.
						15			
48		48	322	1035		25	100%		Light grey fine sand/silt small gravels
		12	323	1040			Dup	319	

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Asarco Everett — JOB NUMBER ASEV-01 — HOLE NUMBER S-201

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION American Legion Memorial Golf Course — ELEVATION G.S. ____ — DATE 2-16-94

RECORDED BY J. C. — DRILL METHOD S. Spoon — DRILLER Jeff S. — DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 48" — CASING TYPE AND DESCRIPTION NA

TOTAL DEPTH CASED NA — WELL COMPLETION DESCRIPTION NA

REMARKS (Note bit/auger size)

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			EVT-940 340		1400	3" ss			Black silty sand gravels, root material, moist
			341		1405	3	100%		Black silty sand gravels, root material, moist
12"			342		1410	3			Reddish brown medium grained sand, small gravels, dry
						2			
24"			343		1415	3			Reddish brown medium grained sand, small gravels, dry
						3			
36"			344		1420	2" ss 3	100%		Light grey silt, wet, small gravel
						7			
48"			345		1425	12			Light grey silt, dry, small gravel

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT Asarco Everett JOB NUMBER ASEV-01 HOLE NUMBER S-202

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION American Legion Memorial Golf Course ELEVATION G.S. ____ DATE 2-16-94

RECORDED BY J. C. DRILL METHOD S. Spoon DRILLER Jeff S. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 48" CASING TYPE AND DESCRIPTION ---------

TOTAL DEPTH CASED -------- WELL COMPLETION DESCRIPTION ----------

REMARKS (Note bit/auger size) ----------

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT RECOVERY CORE	NOTES ON: WATER LEVELS DRILLING FLUID DRILLING RATE WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			366		1610	3" ss			Brown silty sand, root material, small gravels, wet
			367		1615	1	100%		Brown silty sand, root material, small gravels, wet
12"			368		1620	1			Brown silty sand, root material, small gravels, wet
						2			
24"			369		1625	9			Dark grey silt, dry
						2" ss			
						1			
36"			370		1630	7			Light grey silt, oxydyzed, small gravels, dry
							100%		
						9			
48"			371		1635	12			Light grey silt, dry, small gravels

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT Asarco Everett JOB NUMBER ASEV-01 HOLE NUMBER S-203

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION American Legion Memorial Golf Course ELEVATION G.S. ____ DATE 2-16-94

RECORDED BY J. C. DRILL METHOD S. Spoon DRILLER Jeff S. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 48" CASING TYPE AND DESCRIPTION ---------

TOTAL DEPTH CASED -------- WELL COMPLETION DESCRIPTION ----------

REMARKS (Note bit/auger size) ----------

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			359	1535		3" ss			Dark brown fine sand/silt, root material, wet, small gravels
			360	1540		2	100%		Dark brown fine sand/silt, root material, wet, small gravels
12"			361	1545		3			Dark brown fine sand/silt, root material, wet, small gravels
						2			
24"			362	1550		2			Dark brown fine sand/silt, root material, wet, large gravels
						6			
36"						2" ss 7			
						12	NO RECOVERY		
48"						17			
			365	1605	Dup		24"		

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT ASEV-01 JOB NUMBER _____ HOLE NUMBER S-204

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 2315 6th Street Front yard ELEVATION G.S. _____ DATE 1-11-94

RECORDED BY J. C. DRILL METHOD S. Spoon DRILLER Jeff S. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 4' CASING TYPE AND DESCRIPTION NA

TOTAL DEPTH CASED NA WELL COMPLETION DESCRIPTION NA

REMARKS (Note bit/auger size) Chase Residence

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0		0-2	229		0905	3" ss			Light brown fine sand/silt small gravel root material
		6"	230		0910	3	100%		
12		12	231		0915	2			Dark brown fine sand/silt small gravels root material
						3			
24		24	232		0920	2" 3 ss			Red brown fine sand/silt small gravels
						3			
36		36	233		0925	2			Light brown medium sand/30% small gravels wet.
						9			
48		48	234		0930	24			Grey fine sand/silt small gravels dry
			235		0935			Dup 233 36"	

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT ASEV-01 JOB NUMBER _____ HOLE NUMBER S-205

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 718 Legion Drive Front yard ELEVATION G.S. _____ DATE 1-11-94

RECORDED BY J. C. DRILL METHOD S. Spoon DRILLER Jeff S. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 4' CASING TYPE AND DESCRIPTION --

TOTAL DEPTH CASED -- WELL COMPLETION DESCRIPTION --

REMARKS (Note bit/auger size) Meyers Residence

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0		0-2	236	3" ss	0940	3			Dark brown fine sand/silt root material
		6	237		0945	1	100%		Dark brown fine sand/silt root material
12		12	238		0950	3			Dark brown fine sand/silt small gravels
						3			
24		24	239	2" ss	0955	3			Red brown fine sand/silt small gravels
						4	100%		
36		36	240		1000	13			Grey fine sand/silt small gravels moist
						24			
48		48	241		1005	18			Grey fine sand/silt small gravels dry

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT ASEV-01 JOB NUMBER _____ HOLE NUMBER S-206

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 2720 7th Street ELEVATION G.S. _____ DATE 1-11-94

RECORDED BY J. C. DRILL METHOD S. Spoon DRILLER Jeff S. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 4' CASING TYPE AND DESCRIPTION NA

TOTAL DEPTH CASED -- WELL COMPLETION DESCRIPTION --

REMARKS (Note bit/auger size) Everett Housing Authority

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT RECOVERY CORE	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0		0-2	242	1010		3" ss			Dark brown fine sand/silt small gravels root material
		6	243	1015		2	100%		Dark brown fine sand/silt small gravels root material
12		12	244	1020		3			Dark brown fine sand/silt small gravels
						9			
24		24	245	1025		11 2" ss			Red brown fine sand/silt small gravels
						5	100%		
36		36	246	1030		9			Red brown fine sand/silt small gravels moist
						12			Red brown fine sand/silt small gravels moist
48		48	247	1035		14			Light brown fine sand/silt small gravels
		12"	248	1040				Dup 244 12"	

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT ASEV-01 JOB NUMBER _____ HOLE NUMBER S-207

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 836-838 Locust Front Yard ELEVATION G.S. _____ DATE 1-10-94

RECORDED BY J. C. DRILL METHOD S. Spoon DRILLER Jeff S. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 4' CASING TYPE AND DESCRIPTION NA

TOTAL DEPTH CASED NA WELL COMPLETION DESCRIPTION NA

REMARKS (Note bit/auger size) Everett Housing Authority

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0		0-2	218	1450		3" ss			Dark brown fine sand/silt root material small gravels
		6"	219	1455		3	100%		
12"		12"	220	1500		5			Brown fine sand/silt small gravels
						7			Brown fine sand/silt small gravels
24"		24"	221	1505		11 2" ss			Brown fine sand/silt small gravels
						14			Red brown fine sand/silt small gravels moist Red brown fine sand/silt small gravels moist
36"		36"	222	1510		8			Light grey fine grained sand/silt small gravels
						14	100%		Light grey fine grained sand/silt small gravels
48"		48"	223	1515		25			Light grey fine grained sand/silt small gravels
			224	1520		Dup of 48"	223		

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT ASEV-01 JOB NUMBER _____ HOLE NUMBER S-208

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 926 Maple Front yard ELEVATION G.S. _____ DATE 1-13-94

RECORDED BY J. C. DRILL METHOD S. Spoon DRILLER Jeff S. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 4' CASING TYPE AND DESCRIPTION --

TOTAL DEPTH CASED -- WELL COMPLETION DESCRIPTION --

REMARKS (Note bit/auger size) Lindenmuth Residence

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0		0-2	324	1300		3"ss			Dark brown fine sand/silt root material small gravels
		6	325	1305		2	100%		Dark brown fine sand/silt root material small gravels
12		12	326	1310		1			Red brown fine sand/silt root material small gravels
						1			
24		24	327	1315		4 2"ss			Light grey with red spots fine sand/silt small gravels
						8			
36		36	328	1320		16			Light grey with red spots fine sand/silt small gravels moist
						15	100%		
48		48	329	1325		18			Light grey with red spots fine sand/silt small gravels dry

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT ASEV-01 JOB NUMBER _____ HOLE NUMBER S-209

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 1014 E. Marine View Dr. Front yard ELEVATION G.S. _____ DATE 1-13-94

RECORDED BY J. C. DRILL METHOD S. Spoon DRILLER Jeff S. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 4' CASING TYPE AND DESCRIPTION --

TOTAL DEPTH CASED -- WELL COMPLETION DESCRIPTION --

REMARKS (Note bit/auger size) Warren Residence

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0		0-2	330	1330		3"ss			Dark brown fine sand/silt root material small gravel
		6	331	1335		1	100%		
12		12	332	1340		3			Red brown fine sand/silt root material small gravel
						2			
24		24	333	1345		3 2"ss 2			Red brown fine sand/silt small gravel moist
36		36	334	1350		2			80% gravels up to 1 1/4" in size 20% fine red brown sand/silt moist
						2	100%		
48		48	335	1355		16			25% gravels up to 3/4" in size 75% red brown fine sand/silt moist

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Asarco Everett — JOB NUMBER ASEV-01 — HOLE NUMBER S-301

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION American Legion Memorial Golf Course — ELEVATION G.S. ____ — DATE 2-16-94

RECORDED BY J. C. — DRILL METHOD S. Spoon — DRILLER Jeff S. — DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 24" — CASING TYPE AND DESCRIPTION ---------

TOTAL DEPTH CASED --------- — WELL COMPLETION DESCRIPTION ----------

REMARKS (Note bit/auger size) ----------

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			346		1430				Dark brown sandy silt, root material, moist
			347		1435	1	100%		Dark brown sandy silt, root material, moist
12"			348		1440	4			Dark brown fine sand, some silt, small gravels, dry
						3			
24"			349		1445	2			Dark brown fine sand, some silt, small gravels, dry
			350		1450	Dup	of	12"	

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT Asarco Everett JOB NUMBER ASEV-01 HOLE NUMBER S-302

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION American Legion Memorial Golf Course ELEVATION G.S. ____ DATE 2-16-94

RECORDED BY J. C. DRILL METHOD S. Spoon DRILLER Jeff S. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 24" CASING TYPE AND DESCRIPTION ---------

TOTAL DEPTH CASED --------- WELL COMPLETION DESCRIPTION ----------

REMARKS (Note bit/auger size) ----------

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			351		1455	2			Dark brown fine sand/silt, root material, small gravels, moist
			352		1500	2	100%		Dark brown fine sand/silt, root material, small gravels, moist
12"			353		1505	2			Dark brown fine sand/silt, small gravels, moist
24"			354		1510	3			Dark brown fine sand/silt, small gravels, moist

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT Asarco Everett JOB NUMBER ASEV-01 HOLE NUMBER S-303

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION American Legion Memorial Golf Course ELEVATION G.S. ____ DATE 2-16-94

RECORDED BY J. C. DRILL METHOD S. Spoon DRILLER Jeff S. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 24" CASING TYPE AND DESCRIPTION ---------

TOTAL DEPTH CASED -------- WELL COMPLETION DESCRIPTION ----------

REMARKS (Note bit/auger size) ----------

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			355	1515					Dark brown fine sand/silt, root material, small gravels, moist
			356	1520		2	100%		Dark brown fine sand/silt, root material, small gravels, moist
12"			357	1525		2			Dark brown fine sand/silt, moist
						2			
24"			358	1530		3			Light grey fine sand/silt, small gravels, dry

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT ASEV-01 JOB NUMBER _____ HOLE NUMBER S-304

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 520 Waverly Front yard North of Drive way ELEVATION G.S. _____ DATE 1-11-94

RECORDED BY J. C. DRILL METHOD S. Spoon DRILLER Jeff S. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 2' CASING TYPE AND DESCRIPTION NA

TOTAL DEPTH CASED NA WELL COMPLETION DESCRIPTION NA

REMARKS (Note bit/auger size) Agne Residence

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0		0-2"	EVT-9401-225		0845		100%		Dark brown fine sand/silt root material
6"		6"	226		0850	2			Dark brown fine sand/silt small gravel some root material
12"		12"	227		0855	3			Dark brown fine sand/silt small gravels
						3			
24"		24"	228		0900	7			Red brown fine grained sand/silt small gravel

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT ASEV-01 — JOB NUMBER — HOLE NUMBER S-305

STATE WA — COUNTY Snohomish — LOCATION T — R — SEC. — TRACT

SITE DESCRIPTION 2404 8th Street Backyard — ELEVATION G.S. — DATE 1-13-94

RECORDED BY J. C. — DRILL METHOD S. Spoon — DRILLER Jeff S. — DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 2' — CASING TYPE AND DESCRIPTION --

TOTAL DEPTH CASED -- — WELL COMPLETION DESCRIPTION --

REMARKS (Note bit/auger size) Sandstrom Residence

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0		0-2	299		0840	3" ss	100%		Dark brown fine sand/silt root material small gravels
6		6	300		0845	1			Dark brown fine sand/silt root material small gravels
12		12	301		0850	1			Red brown fine sand/silt small gravels
						2			
24		24"	302		0855	4			Red brown fine sand/silt small gravels
		24" X	303		0900	Dup	302		

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT ASEV-01 — JOB NUMBER — HOLE NUMBER S-306

STATE WA — COUNTY Snohomish — LOCATION T — R — SEC. — TRACT

SITE DESCRIPTION 815 Broadway Center Island of Evergreen Apt. Complex — ELEVATION G.S. — DATE 1-10-94

RECORDED BY J. C. — DRILL METHOD 3" S. Spoon — DRILLER Jeff S. — DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 2' — CASING TYPE AND DESCRIPTION NA

TOTAL DEPTH CASED NA — WELL COMPLETION DESCRIPTION NA

REMARKS (Note bit/auger size) BRCR Associates Evergreen Apt.

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0									Grass root material fine sand/silt
		0-2"	200	1320			100%		
6"		86"	203	1335					Dark brown fine sandy silt/ 3/4" rounded gravel some root material
12"		12"	201	1325					Light brown fine grain sand and silt.
24"		24"	202	1330					Light brown silty sand 10% gravels 3/4" size rounded
			204 ERA P. Polutnicip Lot	1340 Soils Soils #217					

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT ASEV-01 JOB NUMBER _____ HOLE NUMBER S-307

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 2731 10 Street By East Door ELEVATION G.S. _____ DATE 1-10-94

RECORDED BY J. C. DRILL METHOD 3" S. Spoon DRILLER Jeff S. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 2' CASING TYPE AND DESCRIPTION NA

TOTAL DEPTH CASED NA WELL COMPLETION DESCRIPTION NA

REMARKS (Note bit/auger size) Everett Housing Authority

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0		0-2	205	1345			100%		Dark brown fine sand/silt root material
6"		6"	206	1350		4			Dark brown fine sand/silt root material
12"		12"	207	1355		11			Light brown fine sand/silt small round gravels (well rounded)
						10			
24"		24"	208	1400		9			Light brown coarse sand and pea gravels
			209	1405		Dup			* Dup of 2"-6" interval

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT ASEV-01 JOB NUMBER _____ HOLE NUMBER S-308

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 1022 Maple Street Backyard North of Sidewalk ELEVATION G.S. _____ DATE 1-10-94

RECORDED BY J. C. DRILL METHOD 3" S. Spoon DRILLER Jeff S. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 2' CASING TYPE AND DESCRIPTION NA

TOTAL DEPTH CASED NA WELL COMPLETION DESCRIPTION NA

REMARKS (Note bit/auger size)

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0		0-2	210	1410			100%		Dark brown silty sand root material
6"		6"	211	1415		2			Dark brown fine sand silt, some root material small gravel
12"		12"	212	1420		2			Redish brown fine sandy/silt small gravels
						1			
24"		24"	213	1425		2			Light brown fine grained sand/silt small gravels wet. 1 large 2" gravel rounded

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT ASEV-01 JOB NUMBER _____ HOLE NUMBER S-309

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION 1108 E. Marine View 15' From Front Picture Window ELEVATION G.S. _____ DATE 1-10-94

RECORDED BY J. C. DRILL METHOD 3" S. Spoon DRILLER Jeff S. DRILLING CO. Hydrometrics, Inc.

TOTAL DEPTH 2' CASING TYPE AND DESCRIPTION NA

TOTAL DEPTH CASED NA WELL COMPLETION DESCRIPTION NA

REMARKS (Note bit/auger size) Peterson

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0		0-2	214	1430			100%		Dark brown fine sand/silt root material
6"		6"	215	1435		2			Dark brown fine sand/silt root material/small gravels
12"		12"	216	1440		2			Redish brown fine sand/ silt small gravels
						3			
24"		24"	217	1445		2			Medium brown fine sand/silt small gravels moist

APPENDIX E

LOGS FOR DEEP SOIL BORINGS AND SLAG BORINGS

Summary of Contents of Appendices C, D, and E

Appendix C contains the logs for Phase I/II residential soil borings S-4, S-8, S-13, S-15, S-22, S-27, S-28, S-34, S-36, S-37, S-39, S-46, S-47, S-50, S-72, and S-101 through S-117.

During Phase I, samples were collected at 26 of these locations (S-4, S-8, S-13, S-15, S-27, S-28, S-46, S-47, S-72, and S-101 through S-117. During the first round of Phase II, eleven of these locations were revisited (S-4, S-8, S-13, S-15, S-27, S-28, S-46, S-47, S-72, S-111, and S-113), as well as six SAIC locations reinvestigated (S-22, S-34, S-36, S-37, S-39, and S-50). As a result, the logs for borings S-4, S-8, S-13, S-15, S-27, S-28, S-46, S-47, S-72, S-111, and S-113 are a combination of two sampling efforts which took place approximately 6 months apart. The logs are reflections of individual preferences of the various geologists that have been involved in the logging. Due to their different styles, terminology as well as scales may vary between the two sections of the logs. However, these logs should be considered one continuous log for the purpose of the RI. The logs for the remaining soil borings are the result of single-event investigations. Phase I locations S-101 through S-110, S-112, and S-114 through S-117 were never revisited; logs from the SAIC effort at Phase II first round locations S-22, S-34, S-36, S-37, S-39, and S-50 were not available.

Appendix D contains the logs for Phase II second round residential soil borings S-74, S-83, S-90 through S-97, S-201 through S-209, and S-301 through S-309. These logs all consist of single-event descriptions.

Appendix E contains the logs of deep soil borings B-1, B-2, EV-2A, and EV-2B, and slag borings SL-1, SL-3, and SL-4. These logs all consist of single-event descriptions.

SUMMARY OF TERMINOLOGY USED ON BORING/WELL LOGS

Drilling Methods Used

HSA - Hollow Stem Auger Drilling method. Reported dimension refers to inside diameter of the hollow stem augers used.

Air Rotary - Forward Rotary Drilling method in which air is used to circulate cuttings from the hole.

Hand Auger - Where indicated, shallow borings completed using 4" diameter stainless steel bucket auger

Sample Collection

Split Spoon Samplers - Except in the case of hand augured borings, samples were collected using standard split spoon samplers. One of two sampler types were used:

- Dames and Moore Sampler - 3" ID split spoon used in conjunction with 300 lb. hammer
- Standard 1 3/8" ID split spoon used in conjunction with a 140 lb. hammer

Blow Counts (noted as Hammer Blows on some logs)

Both split-spoon samplers provide standard penetration data (ASTM D1586), reported on the well logs as the number of blows required to drive the split spoon over a 6-inch sampling interval. Eighteen-inch samples were commonly collected at monitoring well and deep boring sites. Six-inch to one-foot samples were collected at some of the shallow borings. In all cases, the reported blow count refers to the number of blows per 6 inch interval unless specifically noted. In instances where blow counts exceeded 50, the spoon was retrieved and the reported blow count is followed by the amount of penetration achieved for that sampling interval (for example 50/5").

Sample #

Sample numbers were assigned to individual sampling intervals in the field. In some instances, distinct variations in lithology are reported within a sampling interval and the sample number is followed by an A and B. In these cases, the retrieved sample was separated into two discrete samples at the lithologic break and analyzed separately.

Sample Type

s.s. = split spoon sample as described above
grab = Grab sample off auger flights

Many of the logs include a drilling and sampling methodology in the header information. For sites indicating that a split spoon sampler was used, all samples were collected accordingly unless specifically noted under sample type. For borings completed with a hollow stem auger, all samples are grab samples taken from the auger bucket unless otherwise noted.

Geologic Description

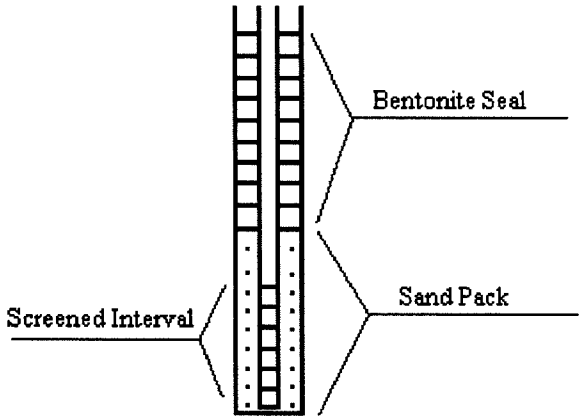
The logs contain field descriptions of soil samples, which generally include color, texture and soil moisture conditions at time of drilling. In some instances, geologic classification and contacts are noted based on interpretation of field data. Where geologic contacts were indistinct due to similarity in appearance, texture, and density, field interpretations were omitted from the logs.

B.O.H. = Bottom of Drilled Hole. In some instances, a sample may have been collected at the bottom of the hole; the sampling depth may therefore be greater than the reported B.O.H.

SWL. = Static Water Level in well at the time of drilling. In some instances, the well may have been allowed to recover prior to static water level measurement. In this case, date is indicated at the time of static water level measurement.

Well Completion Diagrams

In addition to descriptions of well completion, schematic diagrams of well completion are also shown on well logs. The symbols shown on these schematics are defined below:



TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Everett RI/FS — JOB NUMBER ASEV01 — HOLE NUMBER B-1

STATE WA — COUNTY Snohomish — LOCATION T ___ R ___ SEC. ___ TRACT ___

SITE DESCRIPTION Center of median, west of East Marine View Drive, south of SR529 — ELEVATION G.S. ___ — DATE 2-01-93

RECORDED BY V. S. — DRILL METHOD Hollow stem auger — DRILLER J.C. — DRILLING CO. Holt Drilling

TOTAL DEPTH 20' — CASING TYPE AND DESCRIPTION ___

TOTAL DEPTH CASED ___ — WELL COMPLETION DESCRIPTION

REMARKS 2 3/8" split spoon

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			EVT 9302-700		0800				Topsoil, root material, sandy brown with orange oxidation spots
			9302-708 Dupl. of 9302-700		0840				
1'									
2'						2,4, 11			Topsoil, organic - rich, root material, silty clay
2.5'									Sandy silt, pebbles, grayish-brown, clay pellets (sample)
			9302-701		0805				
3'									
4'			9302-702		0810	9,32			Sandy silt, some pebbles, grayish-brown
5'									
6'						12,41			Sandy silt, pebbles, gray-brown (sample)
6.75'			9302-703		0815				Sand, some silt, pebbles, gray (sample)
7'									

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT Everett RI/FS JOB NUMBER ASEV01 HOLE NUMBER B-1

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS DRILLING FLUID DRILLING RATE WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
7'									
8'			EVT 9302-704		0820	13,50 for 6"			Glacial till, silt, rounded pebbles, sandy, up to 2" diameter Tan, weathered granites (could still be fill material)
9'									
10'			9302-705		0825	20,50 for 5"			Gravelly silt, some sand, grading to sand, some silt, large cobbles (3" diameter) brown to tan, top 2" contained moisture
11'									
12'			9302-706		0830	25,50 for 4"			Gravelly silt, largest pebbles, 1" diameter, tan, little sand
13'									
14'			9302-707		0835	50 for 5 1/2"			Gravelly silt, oxidation stains near base, some sand, light brown
14.5"									
15'									
16'									

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT Everett RI/FS JOB NUMBER ASEV01 HOLE NUMBER B-1

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS DRILLING FLUID DRILLING RATE WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
16'									
17'									
18'									
19'									
20'						20,39			Gravelly silt, some sand, tan-gray
10"									
21'			EVT 9302-709	0845					At 20' 10" silty sand & pepper mixture, average grainsize 1 mm, few pebbles (sample)
22'									
23'									

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Everett RI/FS — JOB NUMBER ASEV01 — HOLE NUMBER B-2

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION In median, west of B-1 — ELEVATION G.S. ____ — DATE 2-02-93

RECORDED BY V. S. — DRILL METHOD Hollow stem auger — DRILLER J.C. — DRILLING CO. Holt Drilling

TOTAL DEPTH 15' — CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ — WELL COMPLETION DESCRIPTION ____

REMARKS 2 3/8" split spoon

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			EVT 9302-720 Dupl. of 720		1600				Brown fine sand, some silt (topsoil) Grab sample (moist)
1'			9302-728		1640				
2'			9302-721		1605	4,21 blows per 6"			9" Brown silt, fine sand, trace clay, trace gravel, damp 3" Gray, light brown silt, light, very fine sand, dry (till) sampled till
3'									
4'			9302-722		1610	16,35			6" gray silt - dry cobble 6" light brown silt, some very fine trace gravel, trace clay - damp sampled light brown sediment
5'									
6'			9302-723		1615	13,35			2" brown silt, trace fine sand, trace clay - some roots, moist 10" gray silt, some very fine sand, trace clay - cobble (till) - dry, sampled till
7'									

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT Everett RI/FS JOB NUMBER ASEV01 HOLE NUMBER B-2

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS DRILLING FLUID DRILLING RATE WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
7'									
8'			EVT 9302-724		1620	18 50/5"			Gray silt, some very fine sand -Dry, thin (<1 cm), light brown layer of very fine sand and silt
9'									
10'			9302-725		1625	20 50/5"			Gray silt, some very fine sand, light gravel - Dry
11'									
12'			9302-726		1630	18 50/4.5"			Gray silt, some very fine sand, light gravel - Dry
13'									
14'			9302-727		1635	27 50/6"			Gray silt, some very fine sand, light gravel - Dry
15'									

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Asarco Everett — JOB NUMBER ASEV01 — HOLE NUMBER EV-2A

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION Pilchuck Path — ELEVATION G.S. ____ — DATE 2-01-93

RECORDED BY B. Thompson — DRILL METHOD H.S.A. — DRILLER S. Hauman — DRILLING CO. Holt Drilling

TOTAL DEPTH 20' — CASING TYPE AND DESCRIPTION 4 1/4" ID Hollow Stem Augers

DEPTH	BLOW COUNT	SAMPLE #	SAMPLE TYPE	GEOLOGIC DESCRIPTION	NOTES ON: WATER LEVELS, DRILLING WELL COMPLETION, ETC.
0	NA	S-1	Grab	Brown fine-coarse sand, some silt, little gravel, trace clay contains some brick fragments	(Damp)
	11, 4, 4	S-2	S.S.	As above with fragments of brick & slag Trace white oxidation on sediment	
	11, 6, 9	S-3 A B	S.S.	6" as above with increased white & green oxidation 6" (light brown/ grey silt & fine sand little clay, trace gravel	(Damp)
5'	6, 5, 8	S-4	S.S.	Light brown/grey silt, little fine sand, trace clay, trace fine-medium gravel, gravel is subrounded, mixed lithologies	(Damp)
	19, 40, 50	S-5	S.S.	As above	
	21, 39, 50/5"	S-6	S.S.	As above	
10'	36, 50/4 1/2"	S-7	S.S.	As above, with intervals fine-coarse sand & silt	(Dry)
	25, 50/4"	S-8	S.S.	As above	
	21, 44, 47	S-9	S.S.	As above	(Dry)
	18, 42, 50/3"	S-10	S.S.	As above	
15'					
20'	40, 50/3"	S-11	S.S.	As above No well installed	Boring backfilled with bentonite chips cement surface seal B.O.H. @ 20'

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Asarco Everett — JOB NUMBER ASEV01 — HOLE NUMBER EV-2B

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION Pilchuck Path — ELEVATION G.S. ____ — DATE 8-17-93

RECORDED BY B. Thompson — DRILL METHOD H.S.A. — DRILLER S. Hauman — DRILLING CO. Holt Drilling

TOTAL DEPTH 20' — CASING TYPE AND DESCRIPTION 4 1/4" ID Hollow Stem Augers

DEPTH	BLOW COUNT	SAMPLE #	SAMPLE TYPE	GEOLOGIC DESCRIPTION	NOTES ON: WATER LEVELS, DRILLING WELL COMPLETION, ETC.
0'					
	NA	S-1	Grab	Dark brown, silty sand & gravel	
	10, 2, 2	S-2	S.S.	6" as above with brick fragments 6" light gray silt, some sand to gravel some mottling, orange oxidation staining	
5'	2, 6, 13	S-3	S.S.	Light brown fine--coarse silty sand, some brick fragments, decreasing silt with depth	
	7, 11, 14	S-4	S.S.	Light brown fine silty sand interlayered with light-brown medium sand trace gravel [moist]	
	8, 18, 30	S-5	S.S.	Light brown fine--very fine sand, trace silt [damp]	
10'					
	18, 47, 50/3"	S-6	S.S.	Very light brown silt & fine sand trace medium, coarse sand & gravel [dry]	
	24, 47, 50/3"	S-7		As above with some oxidation/ staining along partings	
15'	23, 49, 50/3"	S-8		As above - mottled oxidation staining	
	24, 50/5"	S-9		Grey silt and very fine sand trace coarser sand, little gravel no oxidation	B.O.H. = 20' sampled to 21.5' Backfilled boring with cuttings and bentonite chips
	23, 41, 50/4"	S-10		Light brown - fine--medium sand some silt, little gravel, some oxidation staining along irregular partings	
20'					
	34, 50/3"	S-11		As above	

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Everett RI/FS — JOB NUMBER ASEV01 — HOLE NUMBER SL-1

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION On median between Kraft Mill access road and East Marine View Drive — ELEVATION G.S. ____ — DATE 2-04-93

RECORDED BY V. S. — DRILL METHOD air rotary — DRILLER J.C. — DRILLING CO. Holt Drilling

TOTAL DEPTH 31' — CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ — WELL COMPLETION DESCRIPTION ____

REMARKS Slag boring, 2 3/8" split spoon

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0				1100					Sand & gravel, road fill, some woodchips
4"									Sand, gravelly, trace silt & clay, brown (fine-medium sand)
1'									
2'									
3'									
4'									
5'									
6'									
7'									

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT Everett RI/FS JOB NUMBER ASEV01 HOLE NUMBER SL-1

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
7'									
8'			EVT 9302-853		0920				Sand, silty, trace gravel, woodwaste, dark brown-gray, trace clay in lenses, some brick fragments
9'									
10'									
11'									
12'									
13'									
14'									Very wet silt (mud), gray
15'									
16'									Dry again, silty sand, trace gravel, gray, trace brick fragments, occasional plant material, trace clay

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT Everett RI/FS JOB NUMBER ASEV01 HOLE NUMBER SL-1

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS DRILLING FLUID DRILLING RATE WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
16'									
17'									
18'									
19'									
20'									
21'									
22'									Sandy silt and clay, little gravel, some slag, brick, gray
23'									
24'									
25'									

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT Everett RI/FS JOB NUMBER ASEV01 HOLE NUMBER SL-1

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS DRILLING FLUID DRILLING RATE WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
25'									
26'									
27'			EVT 9302-852						Slag collected for 4'
28'									
29'									
30'									
31'									End of hole
32'									
33'									
34'									

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Everett RI/FS — JOB NUMBER ASEV01 — HOLE NUMBER SL-3

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION On embankment east of Kraft Mill access road — ELEVATION G.S. ____ — DATE 2-04-93

RECORDED BY V. S. — DRILL METHOD air rotary — DRILLER J.C. — DRILLING CO. Holt Drilling

TOTAL DEPTH 60' — CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ — WELL COMPLETION DESCRIPTION ____

REMARKS Slag boring, 2 3/8" split spoon

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0									
2"				1400					Pavement
									Medium fine sand, trace silt, gravel brown, trace slag
1'									
2'									
3'									
4'									
5'									
6'									Dark gray silty sand, little gravel, trace brick fragments, trace clay
7'									

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT Everett RI/FS JOB NUMBER ASEV01 HOLE NUMBER SL-3

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS DRILLING FLUID DRILLING RATE WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
7'									
8'									
9'									
10'									Clayey sand, some gravel, gray, brick fragments
11'									
12'									Silty sand, brick fragments, trace gravel, plant fragments
13'			EVI 9302-860		1400				
14'									
15'									Fine sand, silty brown, brick fragments, plant material, intermittent gravel
16'									

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT Everett RI/FS JOB NUMBER ASEV01 HOLE NUMBER SL-3

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS DRILLING FLUID DRILLING RATE WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
16'									
17'									
18'									
19'									
20'									
21'									
22'									
23'									
24'									
25'									

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT Everett RI/FS JOB NUMBER ASEV01 HOLE NUMBER SL-3

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
25'									
26'									
27'									
28'									Medium-fine sand, silty, intermittent gravel, brown, no brick
29'									
30'									
31'									
32'									
33'									
34'									

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT Everett RI/FS JOB NUMBER ASEV01 HOLE NUMBER SL-3

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS DRILLING FLUID DRILLING RATE WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
34'									
35'									Sand, silty, little gravel, brick fragments, brown
36'									
37'									
38'									
39'									
40'									
41'									
42'									
43'									

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT Everett RI/FS JOB NUMBER ASEV01 HOLE NUMBER SL-3

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS DRILLING FLUID DRILLING RATE WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
43'									
44'									
45'									
46'									
47'									Gravelly sand
48'									Could not get sample - not enough air pressure Slag, mixed with gravel, woodwaste Water
49'									
50'									
51'									
52'									

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT Everett RI/FS JOB NUMBER ASEV01 HOLE NUMBER SL-3

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS DRILLING FLUID DRILLING RATE WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
52'									
53'									
54'									
55'			EVT 9302-851						Slag, mixed with gravel, woodwaste, Slag sample from 55' - 60'
56'									
57'									
58'									
59'									
60'									End of hole.
61'									

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Everett RI/FS — JOB NUMBER ASEV01 — HOLE NUMBER SL-4

STATE WA — COUNTY Snohomish — LOCATION T ___ R ___ SEC. ___ TRACT ___

SITE DESCRIPTION On Kraft Mill access road near interchange with East Marine View Drive — ELEVATION G.S. ___ — DATE 2-04-93

RECORDED BY V. S. — DRILL METHOD air rotary — DRILLER J.C. — DRILLING CO. Holt Drilling

TOTAL DEPTH 34' — CASING TYPE AND DESCRIPTION ___

TOTAL DEPTH CASED ___ — WELL COMPLETION DESCRIPTION ___

REMARKS Slag boring, 2 3/8" split spoon

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0									
2"				0920					Pavement
									Medium-fine sand, some silt, brown, trace little gravel, some slag, brick, trace clay (lenses)
1'									
2'									
3'									
4'									
5'									
6'									
7'									

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT Everett RI/FS JOB NUMBER ASEV01 HOLE NUMBER SL-4

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS DRILLING FLUID DRILLING RATE WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
7'									Uniform, fine sand, brown
8'									
9'									Sand, gravelly, rounded pebbles, brown
10'									Fine-medium sand, little gravel, brown, little silt
11'									
12'									
13'									
14'									
15'									Gray, clayey silt, little sand
16'									

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT Everett RI/FS JOB NUMBER ASEV01 HOLE NUMBER SL-4

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT RECOVERY	NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
16'									
17'									
18'			EVT 9302-855		1025				Dark gray silty clay, brick fragments, little sand
19'									
20'									Sandy silt, little gravel, gray, trace clay, brick fragments
21'									
22'									Gray silt, sandy, trace clay, intermittent gravel, some wood, brick fragments
23'									
24'									
25'									

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT Everett RI/FS JOB NUMBER ASEV01 HOLE NUMBER SL-4

DEPTH	GRAPHICAL LOG	WELL ELEVATION	SAMPLE	SAMPLE TYPE	TIME	HAMMER BLOWS	PERCENT CORE RECOVERY	NOTES ON: WATER LEVELS DRILLING FLUID DRILLING RATE WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
25'									
26'									
27'									
27.5'									Slag
28'			EVT 9302-850						Slag sample colllected from 28 to 34'
29'									
30'									
31'									
32'									
33'									
34'									End of hole.

APPENDIX F

LOGS FOR MONITORING WELLS

LEGAL DESCRIPTIONS OF MONITORING WELLS
EVERETT SMELTER SITE

Well	Township	Range	Section
EV-1	29 N.	5 E.W.M.	S.E.¼ SEC. 8
EV-3	29 N.	5 E.W.M.	S.E.¼ SEC. 8
EV-4A/B	29 N.	5 E.W.M.	S.E.¼ SEC. 8
EV-5	29 N.	5 E.W.M.	S.E.¼ SEC. 8
EV-6A/B	29 N.	5 E.W.M.	S.E.¼ SEC. 8
EV-7A/B	29 N.	5 E.W.M.	S.E.¼ SEC. 8
EV-8A/B	29 N.	5 E.W.M.	S.E.¼ SEC. 8
EV-9A/B	29 N.	5 E.W.M.	S.E.¼ SEC. 8
MW-1	29 N.	5 E.W.M.	N.E.¼ SEC. 17
MW-2	29 N.	5 E.W.M.	S.E.¼ SEC. 8
MW-3	29 N.	5 E.W.M.	S.E.¼ SEC. 8
MW-4A/B	29 N.	5 E.W.M.	S.E.¼ SEC. 8
MW-5	29 N.	5 E.W.M.	S.E.¼ SEC. 8
WP-1	29 N.	5 E.W.M.	S.E.¼ SEC. 8

SUMMARY OF TERMINOLOGY USED ON BORING/WELL LOGS

Drilling Methods Used

HSA - Hollow Stem Auger Drilling method. Reported dimension refers to inside diameter of the hollow stem augers used.

Air Rotary - Forward Rotary Drilling method in which air is used to circulate cuttings from the hole.

Hand Auger - Where indicated, shallow borings completed using 4" diameter stainless steel bucket auger

Sample Collection

Split Spoon Samplers - Except in the case of hand augured borings, samples were collected using standard split spoon samplers. One of two sampler types were used:

- Dames and Moore Sampler - 3" ID split spoon used in conjunction with 300 lb. hammer
- Standard 1 3/8" ID split spoon used in conjunction with a 140 lb. hammer

Blow Counts (noted as Hammer Blows on some logs)

Both split-spoon samplers provide standard penetration data (ASTM D1586), reported on the well logs as the number of blows required to drive the split spoon over a 6-inch sampling interval. Eighteen-inch samples were commonly collected at monitoring well and deep boring sites. Six-inch to one-foot samples were collected at some of the shallow borings. In all cases, the reported blow count refers to the number of blows per 6 inch interval unless specifically noted. In instances where blow counts exceeded 50, the spoon was retrieved and the reported blow count is followed by the amount of penetration achieved for that sampling interval (for example 50/5").

Sample #

Sample numbers were assigned to individual sampling intervals in the field. In some instances, distinct variations in lithology are reported within a sampling interval and the sample number is followed by an A and B. In these cases, the retrieved sample was separated into two discrete samples at the lithologic break and analyzed separately.

Sample Type

s.s. = split spoon sample as described above
grab = Grab sample off auger flights

Many of the logs include a drilling and sampling methodology in the header information. For sites indicating that a split spoon sampler was used, all samples were collected accordingly unless specifically noted under sample type. For borings completed with a hollow stem auger, all samples are grab samples taken from the auger bucket unless otherwise noted.

Geologic Description

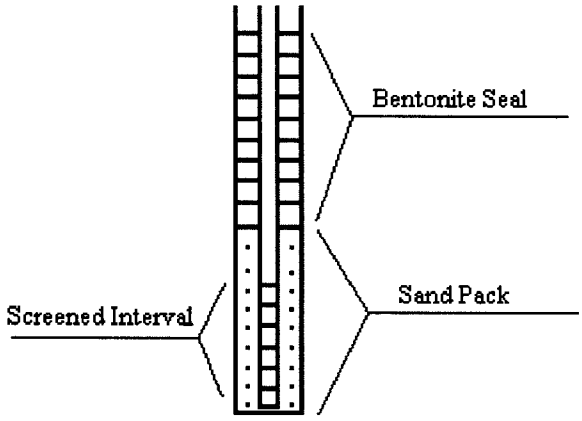
The logs contain field descriptions of soil samples, which generally include color, texture and soil moisture conditions at time of drilling. In some instances, geologic classification and contacts are noted based on interpretation of field data. Where geologic contacts were indistinct due to similarity in appearance, texture, and density, field interpretations were omitted from the logs.

B.O.H. = Bottom of Drilled Hole. In some instances, a sample may have been collected at the bottom of the hole; the sampling depth may therefore be greater than the reported B.O.H.

SWL. = Static Water Level in well at the time of drilling. In some instances, the well may have been allowed to recover prior to static water level measurement. In this case, date is indicated at the time of static water level measurement.

Well Completion Diagrams

In addition to descriptions of well completion, schematic diagrams of well completion are also shown on well logs. The symbols shown on these schematics are defined below:



TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Asarco Everett — JOB NUMBER ASEV01 — HOLE NUMBER MW-1

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION Burlington Northern property — ELEVATION G.S. 15.23 — DATE 2-03-93

RECORDED BY B. Thompson — DRILL METHOD H.S.A. — DRILLER S. Hauman — DRILLING CO. Holt Drilling

TOTAL DEPTH 21 — CASING TYPE AND DESCRIPTION 4 1/4 ID Hollow Stem Augers

Dames & Moore Sampler, completed with 2" PVC well casing

DEPTH	BLOW COUNT	SAMPLE #	SAMPLE TYPE	GEOLOGIC DESCRIPTION	NOTES ON: WATER LEVELS, DRILLING WELL COMPLETION, ETC.
0	NA	S-1	Grab	4" Brown silt & very fine-fine sand, some gravel 6" light brown silt, some very fine-fine sand (damp)	Flush mount steel protective casing cement to grade
	7, 13, 22	S-2	S.S.	Light brown silt, little fine sand, trace gravel	FILL — 2" locking expansion cap; Bentonite chips from 1.5' - 15'
	7, 14, 20	S-3	S.S.	Light brown/yellow-grey silt, little fine sand, trace fine gravel, traces of red & yellow oxidation	
5'	8, 17, 20	S-4	S.S.	Light brown/grey silt, little fine sand trace grey, trace clay, little fine sand, interlayers	
	10, 22, 50/5 1/2	S-5 A B	S.S.	Light brown/grey silt, little fine sand, little coarse-fine gravel, irregular lense of fine sand (damp)	
	22, 36, 33	S-6	S.S.	Grey, light brown silt, little fine sand, little gravel, gravel is subrounded, highly weathered surfaces, dark brown inclusion	
10'	12, 22, 33	S-7	S.S.	Grey/light brown silt & fine sand little gravel, trace clay	TILL
	15, 27, 28	S-8	S.S.	Grey/light brown silt & fine sand Yellow & red oxidation of gravel surface	
	7, 21, 25	S-9	S.S.	Grey/light brown silt & fine sand little gravel	
	15, 23, 27	S-10	S.S.	Light brown/grey fine(+)-coarse(-) sand, some silt, trace fine gravel	
15'	No data	S-11	S.S.	Light brown fine sand, little silt, trace coarse sand, trace gravel (moist)	2" x 5' SCH 40 PVC flush threaded well screen from 16' to 21' with factory cut 0.020" slots
	9, 18, 16	S-12	S.S.	Light brown fine sand, little silt, trace gravel (wet)	Backfilled with #20 silica sand; PVC end cap
	2, 8, 15	S-13	S.S.	Light brown fine sand, very well sorted	
20'	6, 14, 24	S-14	S.S.	Light brown fine-medium sand, trace coarse gravel	B.O.H. @ 21'
21'					

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Asarco Everett — JOB NUMBER ASEV01 — HOLE NUMBER MW-2

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION Burlington Northern property — ELEVATION G.S. 10.53 — DATE 4-13-93

RECORDED BY B. Thompson — DRILL METHOD H.S.A. — DRILLER M. Hickman — DRILLING CO. Holt Drilling

TOTAL DEPTH B.O.H. = 10.0' Sampled to 11.5' well set @ 9.0' — CASING TYPE AND DESCRIPTION 4 1/4" ID Hollow Stem Augers completed with 2" SCH 40 PVC casing

DEPTH	BLOW COUNT	SAMPLE #	SAMPLE TYPE	GEOLOGIC DESCRIPTION	NOTES ON: WATER LEVELS, DRILLING WELL COMPLETION, ETC.
0	NA	S-1	Grab	Silty gravel	Flush mount steel protection casing, locking expansion cap
	2, 3, 2	S-2	S.S.	6" orange/brown silty gravel 6" grey/brown gravelly silt with some wood fragmemts	1' concrete surface seal
	1, 1, 1	S-3	S.S.	Dark brown organic silt with brick fragments, glass & trace metal	1' bentonite pellets
5'	1, 1, 2	S-4	S.S.	Dark brown organic silt, little gravel	Sand pack from 2' to 9'
	50/6"	S-5	S.S.	Log	2" SCH 40 PVC casing with flush threaded joints
	8, 17, 6	S-6	S.S.	Black wood, trace glass, brick organic silt	2" SCH 40 PVC well screen from 2.5' to 9' with 0.020" factory cut slots & PVC end cap
	3, 1, 1	S-7	S.S.	same as above with grey/brown silt, some organics in lower end of spoon	Well set @ 9'
10'	3, 3, 2	S-8	S.S.		
				Grey/brown silt, some organics metal fragments in wash in top of spoon Sampled to 11.5'	
15'					
20'					

FILL

SILT ?

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Asarco Everett — JOB NUMBER ASEV01 — HOLE NUMBER MW-3

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

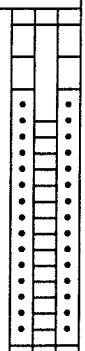
SITE DESCRIPTION Burlington Northern property — ELEVATION G.S. 8.43 — DATE 4-12-93

RECORDED BY B. Thompson — DRILL METHOD 4 1/4" ID HSA — DRILLER M. Hickman — DRILLING CO. Holt Drilling

TOTAL DEPTH B.O.H. @ 10' — CASING TYPE AND DESCRIPTION 4 1/4" ID Hollow Stem Augers

Sampled to 11.5' well set @ 9' — Completed with 2" PVC well casing

DEPTH	BLOW COUNT	SAMPLE #	SAMPLE TYPE	GEOLOGIC DESCRIPTION	NOTES ON: WATER LEVELS, DRILLING WELL COMPLETION, ETC.
0	NA	S-1	Grab	Brown silty sand & gravel	TOP SOIL — Flush mount steel protective casing locking expansion cap
	3, 4, 5	S-2	S.S.	Grey/brown fine-coarse sand	1' concrete surface seal
	4, 4, 4	S-3	S.S.	Grey/brown fine, coarse, silty sand to coarse, coarse, silty sand (wet)	1' bentonite pellets
5'	4, 3, 2	S-4	S.S.	Same	sand pack from 2' to B.O.H.
	1, 2, 1	S-5	S.S.	No recovery	SAND — Heaving sand Add 3 gallons water
	1, 0, 1	S-6	S.S.	Grey/brown fine-coarse sand trace wood fragments	2" SCH 40 PVC casing with flush threaded joints
	1, 0, 1	S-7A S-7B	S.S.	6" same 6" grey/brown clayey silt with some organics	2" SCH 40 PVC well screen 0.020" factory cut slots & PVC end cap
10'	1, 0, 1	S-8	S.S.	Same	SILT? — Well set @ 9.0'
15'					
20'					



TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Asarco Everett — JOB NUMBER ASEV01 — HOLE NUMBER MW-4A

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION Burlington Northern property — ELEVATION G.S. 8.71 — DATE 4-12-93

RECORDED BY B. Thompson — DRILL METHOD H.S.A. — DRILLER M. Hickman — DRILLING CO. Holt Drilling

TOTAL DEPTH 7.0' — CASING TYPE AND DESCRIPTION 4 1/4" ID Hollow Stem Augers

Well completed with 2" PVC casing

DEPTH	BLOW COUNT	SAMPLE #	SAMPLE TYPE	GEOLOGIC DESCRIPTION	NOTES ON: WATER LEVELS, DRILLING WELL COMPLETION, ETC.
0				See MW-4B for sampling descriptions	Flush mount steel protective casing, locking expansion cap 1' concrete surface seal 1' bentonite pellets Sand pack from 2' to B.O.H. 2" SCH 40 PVC casing with flush threaded joints 2" SCH 40 PVC well screen from 2.5' tp 7.0' 0.020" slot size, PVC end cap Well set @ 7.0'
5'					
				B.O.H. @ 7.0'	
10'					
15'					
20'					

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Asarco Everett — JOB NUMBER ASEV01 — HOLE NUMBER MW-4B

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION Burlington Northern property — ELEVATION G.S. ____ — DATE 4-12-93 to 4-13-93

RECORDED BY B. Thompson — DRILL METHOD H.S.A. — DRILLER M. Hickman — DRILLING CO. Holt Drilling

TOTAL DEPTH 26.0' — CASING TYPE AND DESCRIPTION 8 1/4" ID HSA to 13', 4 1/4" ID HSA to 26'

Well completed with 2" SCH 40 PVC casing

DEPTH	BLOW COUNT	SAMPLE #	SAMPLE TYPE	GEOLOGIC DESCRIPTION	NOTES ON: WATER LEVELS, DRILLING WELL COMPLETION, ETC.
0	NA	S-1	Grab	Dark brown silty sand & gravel trace wood debris	TOP SOIL — Flush mount, steel protective casing with cement surface seal
	4, 5, 7	S-2	S.S.	Brown/grey fine-coarse sand	
	1, 4, 4	--	S.S.	Brown/grey medium-very coarse sand (wet)	SAND — Bentonite pellets From 1 - 2'
5'	2, 1, 2	S-3	S.S.	Grey coarse-very coarse sand	Bentonite slurry From 2' - 16'
	1, 1, 1	S-4	S.S.	6" grey fine-coarse sand 3" grey/dark brown sand, some woody organics 1/2" brown silt clay 1/2" dark brown peat	[Heaving sand below peat] [20 gallons of water added]
	1, 0, 1	S-5	S.S.	No recovery	SILT — 2" SCH 40 PVC casing (flush joint threaded)
	1, 0, 0	S-6	S.S.	Grey clayey silt, some peaty organics in thin discontinuous layers	
10'	1, 0, 1	S-7	S.S.	Same	Pulled augers & set 12" ID steel casing @ 13' Backfilled with bentonite slurry & readvanced augers through casing
	1, 0, 1	S-8	S.S.	Same	
	1, 0, 1	S-9	S.S.	Same	Bentonite pellets 16-19'
15'					Sand pack from 19' to 26'
	1, 1, 1	S-10	S.S.	Grey silt, little clay, trace organics	2" x 5' SCH 40 PVC well screen with factory cut 0.020" slots & PVC end cap well set @ 26'
					?-
20'	4, 10, 13	S-11	S.S.	Grey very fine sand	DEEP SAND
	6, 13, 10	S-12	S.S.	Grey very fine sand with 3" medium-coarse sand	
25'				Not sampled due to running sands	
				B.O.H. @ 26'	
30'					
35'					
40'				Notes: 12-inch steel casing removed after well completion	

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Asarco Everett — JOB NUMBER ASEV01 — HOLE NUMBER MW-5

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION Burlington Northern property — ELEVATION G.S. 8.12 — DATE 4-13-93

RECORDED BY B. Thompson — DRILL METHOD H.S.A. — DRILLER M. Hickman — DRILLING CO. Holt Drilling

TOTAL DEPTH B.O.H. = 10' / Well set @ 9' — CASING TYPE AND DESCRIPTION 4 1/4" ID Hollow Stem Auger / Completed with 2" SCH 40 casing

DEPTH	BLOW COUNT	SAMPLE #	SAMPLE TYPE	GEOLOGIC DESCRIPTION	NOTES ON: WATER LEVELS, DRILLING WELL COMPLETION, ETC.
0	Grab	S-1	Grab	Silty sand & gravel	TOP SOIL — Flush mount steel protective casing, locking expansion cap
	27, 8, 5	S-2	S.S.	12" brown fine sand, trace silt 6" brown medium-coarse sand (wet)	SAND — 1' concrete surface seal; 1' bentonite pellets; Sand pack from 2.0' to 9'
	1, 2, 3	S-3	S.S.	12" brown medium-coarse sand, trace gravel 3" grey medium-coarse sand, trace gravel	2" SCH 40 PVC casing (flush threaded joints)
5'	4, 5, 6	S-4	S.S.	12" grey/brown medium sand 6" grey/brown fine sand, little silt	2" SCH 40 PVC well screen from 2.5' to 9' with 0.020" factory cut slots & PVC end caps
	3, 5, 6	S-5	S.S.	Grey medium-coarse sand, trace very coarse sand	
	1, 0, 1	S-6	S.S.	No recovery	
	1, 0, 1	S-7	S.S.	6" grey coarse sand 3" brown silt, some fibrous, woody organics	
10'	1, 0, 0	S-8	S.S.	Brown clayey silt, some organics	SILT — Well set @ 9'
				B.O.H. @ 10' Sampled to 11.5'	
15'					
20'					

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Asarco Everett — JOB NUMBER ASEV01 — HOLE NUMBER EV-1

STATE WA — COUNTY Snohomish — LOCATION T ___ R ___ SEC. ___ TRACT ___

SITE DESCRIPTION S R 529 — ELEVATION G.S. 112.90 — DATE 1-19-93

RECORDED BY B. Thompson — DRILL METHOD H.S.A. — DRILLER M. Hickman — DRILLING CO. Holt Drilling

TOTAL DEPTH 19'(boring) — CASING TYPE AND DESCRIPTION 4 1/4" ID Hollow Stem Augers

Dames & Moore Sampler, completed with 2" PVC well casing

DEPTH	BLOW COUNT	SAMPLE #	SAMPLE TYPE	GEOLOGIC DESCRIPTION	NOTES ON: WATER LEVELS, DRILLING WELL COMPLETION, ETC.
0				4" dark brown, organic silt & fine sand 6" brown sand & silt, trace gravel, trace clay	Flush mount, steel protective casing cemented to grade locking expansion cap
	6, 16, 28	S-1	S.S.		
	20, 25, 23	S-2	S.S	Light brown/grey fine sand, some silt, trace gravel (damp) Gravel is subrounded, mixed lithologies	2" SCH 40, flush threaded PVC well casing
					2' seal-bentonite chips
5'	10, 28, 50/5 1/2"	S-3	S.S	Light brown/grey fine sand & silt trace fine gravel (damp)	2" x 10' SCH 40, flush threaded well screen; 0.020" factory cut slots
	7, 24, 29	S-4	S.S	As above	Backfilled with #20 silica sand
	19, 50/5 3/4"	S-5	S.S	As above with some faint stratification	
10'	35, 50/4 1/4"	S-6	S.S	As above (wet)	
	6, 28, 30	S-7	S.S	As above, with some oxidation/ staining (damp)	
	12, 50/5"	S-8	S.S	As above	
15'	11, 50/5"	S-9	S.S	As above (dry)	Threaded PVC end cap Well set @ 15'
	9, 50/4"	S-10	S.S	As above (dry)	B.O.H. @ 19'
20'					

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Asarco Everett — JOB NUMBER ASEV01 — HOLE NUMBER EV-3

STATE WA — COUNTY Snohomish — LOCATION T ___ R ___ SEC. ___ TRACT ___

SITE DESCRIPTION East Marine View Drive — ELEVATION G.S. 56.85 — DATE 1-22-93

RECORDED BY B. Thompson — DRILL METHOD H.S.A. — DRILLER M. Hickman — DRILLING CO. Holt Drilling

TOTAL DEPTH 55' — CASING TYPE AND DESCRIPTION Drilled with 4 1/2" ID Hollow Stem Augers; Dames & Moore Sampler; well completed with 2" PVC casing

DEPTH	BLOW COUNT	SAMPLE #	SAMPLE TYPE	GEOLOGIC DESCRIPTION		NOTES ON: WATER LEVELS, DRILLING WELL COMPLETION, ETC.
0	-	-	-	4" asphalt, 6" concrete		Flush mount, steel protective casing cemented to grade
				3" brown gravel light clay		Locking expansion plug in top of PVC
	12, 29, 21	S-1 A B		3" dark brown (resinous) fine gravel 6" grey/brown sand & gravel some silt		
	9, 8, 4	S-2	S.S.	6" grey/brown sand & gravel, some silt 7" dark brown very coarse sand 3" orange/brown fine sand, little, silt, trace fine gravel (moist)	FILL	2" Sch 40, Flush-threaded PVC well casing
	8, 4, 4	S-3	S.S.	As above (moist)		
5'						
	8, 20, 17	S-4	S.S.	6" as above 6" gray/brown silt and fine sand light fine gravel, trace clay (dry)		
	4, 19, 18	S-5	S.S.	As above with light fine-coarse gravel, red oxidized surface staining (dry)		
	5, 10, 12	S-6	S.S.	As above		
10'						
	3, 11, 13	S-7	S.S.	As above	Spun	augers, no water
	7, 42, 50/3"	S-8	S.S.	As above with trace coarse sand		
	29, 45, 34	S-9	S.S.	As above		
15'						
	18, 24, 30	S-10	S.S.	As above with fine-coarse sand		
	20, 50/6"	S-11	S.S	As above	TILL	Back filled with bentonite chips hydrated with water
20'						

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Asarco Everett — JOB NUMBER ASEV01 — HOLE NUMBER EV-3

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION East Marine View Drive — ELEVATION G.S. 56.85 — DATE 1-22-93

RECORDED BY B. Thompson — DRILL METHOD H.S.A. — DRILLER M. Hickman — DRILLING CO. Holt Drilling

TOTAL DEPTH 55' — CASING TYPE AND DESCRIPTION Drilled with 4 1/2" ID Hollow Stem Augers; Dames & Moore Sampler; well completed with 2" PVC casing

DEPTH	BLOW COUNT	SAMPLE #	SAMPLE TYPE	GEOLOGIC DESCRIPTION		NOTES ON: WATER LEVELS, DRILLING, WELL COMPLETION, ETC.
25'	9, 39, 50/4"	S-12	S.S.	As above with little clay	TILL	
				Drilling rate increased. Augers advancing smoothly		
30'	6, 11, 10	S-13	S.S.	Light brown fine-medium sand	FLUVIAL	Well annulus grouted up to 25' starting to lose grout at least 25'
				Light brown fine-coarse sand (damp)		
35'	12, 12, 17	S-14	S.S.	2" light brown silt, some clay (oxidized along laminations) (dry)		
	8, 22, 26	S-15	S.S.	2 light brown silt, some clay. Light brown fine-coarse sand (damp)	SAND	
40'	12, 15, 18	S-16	S.S.	As above		2" SCH 40 flush-threaded PVC casing
					FLUVIAL SAND	
45'	24, 41, 50/5"	S-17	S.S.	Light brown, very coarse sand, little fine-medium sand (damp)		2' seal - bentonite pellets
50'	23, 30, 40	S-18	S.S.	Light brown, fine sand (wet)		2" x 5' SCH 40, flush-thread PVC well screen with 0.020" factory cut slots; backfilled with #20 silica sand, PVC end cap
55'				No sample, running sands		B. O. H. @ 55'
60'						
65'						

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Asarco Everett — JOB NUMBER ASEV01 — HOLE NUMBER EV-4A

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION Weyerhaeuser access road — ELEVATION G.S. 57.96 — DATE 1-21-93

RECORDED BY B. Thompson — DRILL METHOD H.S.A. — DRILLER M. Hickman — DRILLING CO. Holt Drilling

TOTAL DEPTH 11' — CASING TYPE AND DESCRIPTION ____

DEPTH	BLOW COUNT	SAMPLE #	SAMPLE TYPE	GEOLOGIC DESCRIPTION	NOTES ON: WATER LEVELS, DRILLING WELL COMPLETION, ETC.
0				See EV-4B for geologic description	Flush mount, steel protective casing cemented to grade locking expansion cap 2" SCH 40 PVC flush-threaded casing 2' seal of bentonite chips from 2-4' 2" x 5' SCH 40 PVC well screen with 0.020" factory cut slots Backfilled with #20 silica sand PVc end cap
5'					
10'					
	3, 2, 0	S-1	S.S.	Blue/grey fine sand, some silt some clay, trace gravel and wood debris	B.O.H. @ 11' (Augered to 11' sampled to 12.5')
15'					
20'					

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Asarco Everett — JOB NUMBER ASEV01 — HOLE NUMBER EV-4B

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION Weyerhaeuser access road — ELEVATION G.S. 57.32 — DATE 1-20-93, 1-21-93

RECORDED BY B. Thompson — DRILL METHOD H.S.A. — DRILLER M. Hickman — DRILLING CO. Holt Drilling

TOTAL DEPTH 60' — CASING TYPE AND DESCRIPTION 4 1/2" Hollow Stem Auger

Dames & Moore Split Spoon Sampler Well completed with 2" SCH 40 PVC

DEPTH	BLOW COUNT	SAMPLE #	SAMPLE TYPE	GEOLOGIC DESCRIPTION		NOTES ON: WATER LEVELS, DRILLING WELL COMPLETION, ETC.
0	4, 4, 8	S-1	S.S.	3" dark brown organic silt & sand 10" brown fine sand, some silt, trace gravel		Flush mount, steel protective casing cemented to grade. 2" locking expansion cap in PVC casing
	4, 11, 7	S-2	S.S.	Dark brown fine sand, some silt, little clay, little gravel		
	5, 6, 8	S-3	S.S.	As above with some wood debris	FILL	
5'	4, 8, 7	S-4	S.S.	Brown fine sand, trace silt, trace fine gravel		2" SCH 40 PVC flush-threaded casing
	7, 5, 4	S-5	S.S.	As above (damp)		
	3, 3, 4	S-6	S.S.	Brown/grey fine sand, trace silt (moist)		Well annulus grouted from 2' to 49'
10'	2, 2, 1	S-7 A B	S.S.	Grey fine sand (wet) underlain by 3" dark brown organic peat layer	3	
	3, 2, 2	S-8	S.S.	Grey fine-medium sand, & silt, some clay, little gravel (wet)		
	12, 6, 8		S.S.	No recovery		
	6, 8, 8		S.S.	No recovery		
15'	3, 4, 3, 5	S-9	S.S.	Blue/grey silt and fine sand interlayered with silt & clay trace slag (moist)	MARSH	
	3, 4, 3, 5	S-10	S.S.	As above, no slag fragments		
20'	3, 4, 14, 16	S-11	S.S.	Above, intermixed with woody detrital material		
	23, 50/4 1/2"	S-12	S.S.	As above, contained isolated cobble		
	27, 50/4 1/2"		S.S.	As above		
25'	37, 50/5 1/2"	S-13	S.S.	Light brown/grey silt & sand some fine gravel, trace clay, gravel is subrounded with mixed lithologics (dry) -cobbles/boulders encountered		
					TILL	
30'	32, 43, 50 1/2"	S-14	S.S.	As above		
				- 31' drilling rate increase Augers advancing smoothly	3	
35'	30, 33, 30	--	S.S.	Recovered small amount of light brown/grey fine sand & large cobble	FLUVIAL	
40'	12, 17, 22	S-15	S.S.	Light brown fine sand very well sorted (dry)		

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Asarco Everett — JOB NUMBER ASEV01 — HOLE NUMBER EV-4B

STATE WA — COUNTY Snohomish — LOCATION T ___ R ___ SEC. ___ TRACT ___

SITE DESCRIPTION ___ — ELEVATION G.S. ___ — DATE 1-20-93 to 1-21-93

RECORDED BY B. Thompson — DRILL METHOD ___ — DRILLER ___ — DRILLING CO. ___

TOTAL DEPTH ___ — CASING TYPE AND DESCRIPTION ___

DEPTH	BLOW COUNT	SAMPLE #	SAMPLE TYPE	GEOLOGIC DESCRIPTION	NOTES ON: WATER LEVELS, DRILLING WELL COMPLETION, ETC.
40'					2" SCH 40 PVC flush-threaded casing well annulus grouted from 49' to surface
45'	25, 50/6"	S-16	S.S.	Light brown fine sand (dry) (very well sorted)	
50'	25, 22, 23	S-17		As above (damp)	2 foot seal - bentonite chips
55'	8, 29, 27	S-18		Brown fine-medium sand 3" brown silt, some clay (damp)	2" x 5' SCH 40 PVC well screen with factory cut 0.020" slots Backfilled with #20 silica sand
	18, 39, 42	S-19		Brown fine sand (wet)	
60'				No sample, running sands	PVC end cap
					B.O.H. @ 60'

FLUVIAL SAND

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Asarco Everett — JOB NUMBER ASEV01 — HOLE NUMBER EV-5

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION Weyerhaeuser property — ELEVATION G.S. 10.50 — DATE 2-2-93

RECORDED BY B. Thompson — DRILL METHOD H.S.A. — DRILLER S. Hauman DRILLING CO. Holt Drilling

TOTAL DEPTH 30' — CASING TYPE AND DESCRIPTION 4 1/4" ID Hollow Stem Augers

Dames & Moore Sampler, completed with 2" PVC well casing

DEPTH	BLOW COUNT	SAMPLE #	SAMPLE TYPE	GEOLOGIC DESCRIPTION	NOTES ON: WATER LEVELS, DRILLING WELL COMPLETION, ETC.
0		S-1	Grab	Brown sand & gravel (wet) some organic silt & roots	FILL? — Flush mount steel proective casing cemented to grade
	4, 7, 11	S-2	S.S.	6" blue/grey silt & clay trace fine sand, some oxidation along bedding planes 6" blue/grey fine-medium sand, light silt trace clay (moist)	2" SCH 40 PVC flush-threaded casing
	5, 4, 5	S-3	S.S.	9" as above with trace gravel 3" brown fine sand & silt trace clay, some wood/organic debris	
5'	2, 3, 3	S-4	S.S.	Mottled brown/grey sand & silt, some clay (moist)	Well annulus sealed with bentonite chips from 1.5 to 21 ft
	1, 1, 1	S-5	S.S.	Brown silt & clay with abundant organic debris	MARSH
	1, 0, 1	S-6	S.S.	3" black peat 9" grey/brown silt & clay with some organic debris (~30%)	
10'	0, 1, 1	S-7		As above (moist)	
	1, 0, 1	S-8		As above (wet)	
	1, 0, 1	S-9		Grey clay, some silt, little organic material (wet)	
	1, 0, 1	S-10		As above	
15'	1, 0, 1	S-11		As above	
	1, 1, 1	S-12		As above (trace organics)	
20'					

TEST HOLE LOG

HYDROMETRICS

TACOMA, WASHINGTON

PROJECT Asarco Everett JOB NUMBER ASEV01 HOLE NUMBER EV-5

STATE WA COUNTY Snohomish LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION Weyerhaeuser property ELEVATION G.S. 10.50 DATE 2-2-93

RECORDED BY B. Thompson DRILL METHOD H.S.A. DRILLER S. Hauman DRILLING CO. Holt Drilling

TOTAL DEPTH 30' CASING TYPE AND DESCRIPTION 4 1/4" ID Hollow Stem Augers

Dames & Moore Sampler, completed with 2" PVC well casing

DEPTH	BLOW COUNT	SAMPLE #	SAMPLE TYPE	GEOLOGIC DESCRIPTION	NOTES ON: WATER LEVELS, DRILLING WELL COMPLETION, ETC.
20'	2, 1, 1	S-13	S.S.	Grey fine sand & silt, little clay	MARSH: #20 silica sand pack from 21 to 30 ft.
25'	2, 3, 2	S-14	S.S.	Grey fine sand, very well sorted	FLUVIAL: 2" x 5' SCH 40 PVC flush threaded well screen with 0.020" factory cut slots PVC end up
30'				B.O.H. @ 30 ft (not sampled due to running sands)	
35'					
40'					

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Asarco Everett — JOB NUMBER ASEV01 — HOLE NUMBER EV-6A

STATE WA — COUNTY Snohomish — LOCATION T ___ R ___ SEC. ___ TRACT ___

SITE DESCRIPTION Weyerhaeuser access road — ELEVATION G.S. 57.55 — DATE 8-17-93

RECORDED BY B. Thompson — DRILL METHOD H.S.A. — DRILLER S. Hauman DRILLING CO. Holt Drilling

TOTAL DEPTH 54.5' — CASING TYPE AND DESCRIPTION 4 1/4" ID Hollow Stem Augers

Sampler: 2 3/8" ID Split Spoon/300 lb. hammer

TOTAL DEPTH CASED ___ — WELL COMPLETION DESCRIPTION Top of PVC: 57.13

DEPTH	BLOW COUNT	SAMPLE #	SAMPLE TYPE	GEOLOGIC DESCRIPTION	NOTES ON: WATER LEVELS, DRILLING WELL COMPLETION, ETC.
0'	8, 8, 8	S-1	S.S.	Orange--brown, fine--medium sand, trace gravel	Flush mount, water-tight, protective casing with concrete surface seal
	4, 3, 4	S-2		Brown, gray silty fine sand, trace clay, trace coarse sand & organic debris	2" ID SCH 40 PVC casing with flush--thread joints
5'	4, 4, 4	S-3		Brown fine--medium sand, some gravel, silty intervals as above with trace clay	6% Grout from 1.5' to 39'
10'	6, 6, 5	S-4		Orange to brown fine sand, trace gravel, trace silt, mottled coloring	
15'	2, 4, 5	S-5		Blue-gray clayey silt, some fine sand, trace gravel, brick fragments & wood, some darker brown mottling	
20'	6, 8, 5	S-6		Blue-gray to brown silty fine sand, trace clay, abundant brick fragments	
25'	2, 3, 5	S-7		Light brown to gray, silty fine sand, little gravel, trace clay, trace brick fragments [moist]	fill
				--change in drilling rate	
30'	6, 5, 4	S-8		Black angular, gravel-sized slag fragments [dry]	slag
35'	12, 14, 23	S-9		As above, but includes more finely crushed slag component	
39'					Bentonite chips from 39'-42'

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Asarco Everett — JOB NUMBER ASEV01 — HOLE NUMBER EV-6A

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION ____ — ELEVATION G.S. ____ — DATE 8-17-93

RECORDED BY ____ — DRILL METHOD ____ — DRILLER ____ — DRILLING CO. ____

TOTAL DEPTH ____ — CASING TYPE AND DESCRIPTION ____

TOTAL DEPTH CASED ____ — WELL COMPLETION DESCRIPTION ____

DEPTH	BLOW COUNT	SAMPLE #	SAMPLE TYPE	GEOLOGIC DESCRIPTION	NOTES ON: WATER LEVELS, DRILLING WELL COMPLETION, ETC.
40'					
	11, 17, 15	S-10		Black slag fragments as above	slag
45'	12, 1, 2	S-11		Gravel-sized slag fragments, oxidized surfaces, minimal recovery [dry]	
				Drill rods dropped at ~ 1 foot before encountering slag again Drilling easier at ~48'	
50'	2, 1, 3	S-12		Blue-gray fine--medium silty sand, trace well rounded gravel trace roots, minor oxidation staining	ATD
					silt
55'	3, 6, 15	S-13		As above, no oxidation or roots siltier and drier at base of spoon one larger well-rounded piece of gravel in spoon	10' screen set @ 54.5' 020 slots PVC end cap

Completion
Concrete surface seal
Grout 1'--39'
Chips 39'--42'
Sand 42'--54.5'

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Asarco Everett — JOB NUMBER ASEV01 — HOLE NUMBER EV-6B

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

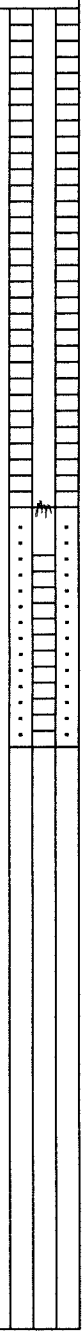
SITE DESCRIPTION Weyerhaeuser access road — ELEVATION G.S. 57.47 — DATE 8-24-93

RECORDED BY Rens Verburg — DRILL METHOD Air Rotary — DRILLER S. Hauman DRILLING CO. Holt Drilling

TOTAL DEPTH 67.5' — CASING TYPE AND DESCRIPTION 9 5/8" OD Casing keyed into silt layer at 60'

8" casing to completion Top of PVC: 57.11

DEPTH	BLOW COUNT	SAMPLE #	SAMPLE TYPE	GEOLOGIC DESCRIPTION	NOTES ON: WATER LEVELS, DRILLING WELL COMPLETION, ETC.
				See Log EV-6A for description of shallow soils	Flush mount, water-tight protective casing with concrete surface seal 2" ID SCH 40 PVC casing with flush-thread joints
50'				Driller estimate: silt from ~50 to 53'	Seal hole before continuing below 56.5'
55'	6, 5, 8	S-14		Recovery 30%, wet gravel-size black slag & well-rounded gravel	
				At ~56.5': blue-gray fine--medium silt, some sand and gravel, root fragments	
60'					Set casing at 60'
	6, 13, 15	S-15		Blue-gray fine--medium sandy silt 61-61.5': sand % increases	
	10, 15, 24	S-16		Blue-gray fine--medium silty sand, trace gravel, poorly sorted	
65'					
	20, 36, 50/4	S-17	A — B	67-68' Blue-gray fine--medium sand, well sorted	Cement: 0-2.5' Bentonite: 2.5-60' Sand: 60-67.5' Screen: 62.5-67.5'
				68-68.5' Dense blue-gray sandy silt, silt contains stringers of blue-gray fine--medium sand	



TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Asarco Everett — JOB NUMBER ASEV01 — HOLE NUMBER EV-7A

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION Located at base of slope, east of ditch — ELEVATION G.S. 11.71 — DATE 8-16-93

RECORDED BY B. Thompson — DRILL METHOD H.S.A. — DRILLER S. Hauman DRILLING CO. Holt Drilling

TOTAL DEPTH 15' — CASING TYPE AND DESCRIPTION 4 1/4" ID Augers

SWL = 2.12' (8-17-93) — Top of PVC: 11.41

DEPTH	BLOW COUNT	SAMPLE #	SAMPLE TYPE	GEOLOGIC DESCRIPTION	NOTES ON: WATER LEVELS, DRILLING WELL COMPLETION, ETC.
0	6, 18, 50/2"	S-1	S.S.	Brown organic loam overlying gray fine-coarse gravel & cobbles rounded to subangular	Flush mount protective with locking expansion cap
	31, 22, 18	S-2	S.S.	Gray/brown silty fine-coarse sand & gravel. Little fine granular slag & brick fragments underlain by 3"- Gray, green clayey silt, some fine gravel [damp]	
5'	18, 14, 15	S-3	S.S.	6" brown silty fine-medium sand some gravel, brick fragments & wood	2" SCH 40 PVC flush thread H.S.A.
	20, 14, 14	S-4		6" black gravel-sized slag fragments [wet] Black fine-coarse gravel-sized slag very angular [wet]	ATD
	15, 19, 12	S-5		As above	2" x 5' SCH 40 Screen 0.020" slots set @ 10 ft
10'	6, 5, 6	S-6		As above (only ~ 10% recovery)	
	3, 3, 3	S-7		Black granular fine-medium sand size slag with little coarser slag 3" brown silt & fine sand with some slag & wood fragments	
15'	2, 2, 2	S-8		Brown clayey silt abundant fibrous woody matter	Cement: 0' - 1.5' Bentonite: 1.5' - 3' Sand: 3' - 15'
20'					

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Asarco Everett — JOB NUMBER ASEV01 — HOLE NUMBER EV-7B

STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION Located at base of slope, east of ditch — ELEVATION G.S. 11.72 — DATE 8-20-93

RECORDED BY B. Thompson — DRILL METHOD Air rotary — DRILLER S. Hauman DRILLING CO. Holt Drilling

TOTAL DEPTH 29' — CASING TYPE AND DESCRIPTION 8 5/8" ID Steel casing keyed into silt layer
6" casing to completion Top of PVC: 11.30

DEPTH	BLOW COUNT	SAMPLE #	SAMPLE TYPE	GEOLOGIC DESCRIPTION	NOTES ON: WATER LEVELS, DRILLING WELL COMPLETION, ETC.
0				See EV-7A for description of shallow soils	Flush mount - water tight protective casing concrete surface seal locking expansion cap
5'					2" SCH 40 PVC riser with flush thread joints
10'					
15'	10, 21, 30	S-9		Slag	Note: Samples S-9 and S-10 were collected inside casing. Depths may not be accurate. Slag-silt contact appeared to be ~ 13 ft based on ease of driving casing
	2, 3, 3	S-10		Gray-green silt (suspect)	
20'					
	3, 9, 13	S-11		6" gray-green silt 6" gray fine--medium sand	8 5/8" casing set @ 18'
25'				Depth of bottom of silt ~ 23 ft	2" x 5' PVC screen with 0.020" slots
	2, 2, 2	S-12		Light-brown fine-medium sand	
30'					Grout: 1' - 20' Bentonite Pellets: 20' - 22' Sand Pack: 22' - 29' Screened interval: 24' - 29'

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Asarco Everett — JOB NUMBER ASEV01 — HOLE NUMBER EV-8A

STATE WA — COUNTY Snohomish — LOCATION T ___ R ___ SEC. ___ TRACT ___

SITE DESCRIPTION South edge of slab (formerly rock wool bldg) — ELEVATION G.S. 12.07 — DATE 8-16-93

RECORDED BY B. Thompson — DRILL METHOD Hollow Stem Auger — DRILLER S. Hauman — DRILLING CO. Holt Drilling

TOTAL DEPTH 11' — CASING TYPE AND DESCRIPTION 4 1/4" ID Augers — Top of PVC: 11.78

SWL = 2.50' (8-17-93) — 2 3/8" ID Split Spoon

DEPTH	BLOW COUNT	SAMPLE #	SAMPLE TYPE	GEOLOGIC DESCRIPTION	NOTES ON: WATER LEVELS, DRILLING WELL COMPLETION, ETC.
0	3, 5, 7	S-1	S.S.	6" dark brown-black peat 8" brown fine--coarse silty sand, some gravel	fill
	4, 7, 11	S-2	S.S.	Black medium--coarse sand [slag] very well rounded grains	Flush mount, water tight protective casing with concrete surface seal Locking expansion cap Bentonite chips from 1.5--4 ft ▼ ATD
5'	7, 14, 24	S-3	S.S.	Black fine--coarse gravel-sized slag fragments very angular	
	25, 18, 13	S-4	S.S.	Same as above [wet]	slag Sand pack (#20 silica sand) from 4--11 ft
	10, 13, 18	S-5	S.S.	Same as above	2" x 5' well screen 0.020" slot size set @ 11 ft
10'	11, 4, 5	S-6	S.S.	6" as above 4" gray/brown silt with fibrous root matter	PVC End Cap
					silt
15'					
20'					

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Asarco Everett — JOB NUMBER ASEV01 — HOLE NUMBER EV-8B

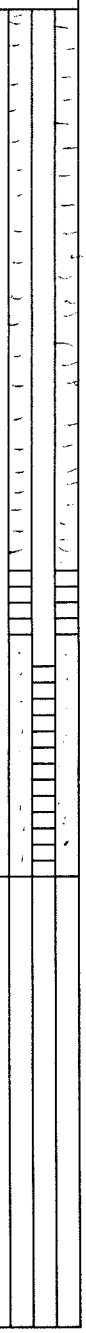
STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION ____ — ELEVATION G.S. 11.61 — DATE 8-18-93

RECORDED BY B. Thompson — DRILL METHOD Air Rotary with casing — DRILLER S. Hauman — DRILLING CO. Holt Drilling

TOTAL DEPTH 26.5' — CASING TYPE AND DESCRIPTION 9 5/8" O.D. Steel casing Top of PVC: 11.07

DEPTH	BLOW COUNT	SAMPLE #	SAMPLE TYPE	GEOLOGIC DESCRIPTION	NOTES ON: WATER LEVELS, DRILLING WELL COMPLETION, ETC.
0					
5'					
10'				See samples from 8A for lithologic description of shallow soils	
15'					Grout from 1.5' to 16.5'
	2, 2, 3	S-7	S.S.	Gray-green silt with fibrous roots and wood debris	
	2, 3, 3	S-8	S.S.	As above with 2" layer of fine-medium sand	2 1/2' bentonite pellets
20'				Sand in cuttings at ~ 20 ft	Sand pack from 19 - 26'
	2, 2, 3	S-9	S.S.	Gray fine sand; very well sorted	2" x 5' SCH 40 PVC screen with .020" factory cut slots (20.8' - 25.8')
	2, 3, 3	S-10	S.S.	Gray fine--medium sand, trace coarse sand	Well set at 26' PVC End Cap
					B.O.H. @ 26.5'
				Note: Used about 25 gallons of water to set casing due to running sands	



TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Asarco Everett — JOB NUMBER ASEV01 — HOLE NUMBER EV-9A

STATE WA — COUNTY Snohomish — LOCATION T ___ R ___ SEC. ___ TRACT ___

SITE DESCRIPTION Located ~ 112 ft north of Benson Shed — ELEVATION G.S. 12.95 — DATE 8-16-93

RECORDED BY B. Thompson — DRILL METHOD H.S.A. — DRILLER S. Hauman DRILLING CO. Holt Drilling

TOTAL DEPTH 16' — CASING TYPE AND DESCRIPTION 4 1/4" ID Augers

Static 3.35' (8-17-93) — Top of PVC: 12.69

DEPTH	BLOW COUNT	SAMPLE #	SAMPLE TYPE	GEOLOGIC DESCRIPTION	NOTES ON: WATER LEVELS, DRILLING WELL COMPLETION, ETC.
0					Flush mount, Steel Protective Casing cemented to grade locking expansion cap
	1, 1, 2	S-1		Brown woody loam; trace gravel	
	11, 18, 15	S-2		Gray-brown silty fine--coarse sand & gravel	
5'	7, 12, 20	S-3		Gray-brown silty fine--coarse sand & gravel mixed with gray-green clayey silt & black, well rounded fine-medium sand, chaotic assemblage	
	2, 3, 4	S-4		Black fine(+)--coarse(-) sand (slag) very well rounded, sheen on lower 3", no odor	2" x 10' SCH 40PVC screen with 0.20" slots set at 16'
	5, 7, 7	S-5		As above with trace of coarser slag fragments One large wood chip Visible sheen, no odor [wet]	
10'	6, 5, 3	S-6		As above, minimal recovery	
	5, 3, 2	S-7		Black--fine(+)--coarse(-) sand (slag) very well rounded	PVC slip cap riveted on end of screen
15'	4, 2, 2	S-8		As above	
	2,2,2	S-9A S-9B		5" as above 12" gray-green silt, some fine sand fibrous woody organic	B.O.H. @ 16' sampled to 17.5' Cement: 0 - 1.5' Bentonite: 1.5 - 4' Sand: 4' - 16'
20'					

TEST HOLE LOG

HYDROMETRICS — TACOMA, WASHINGTON

PROJECT Asarco Everett — JOB NUMBER ASEV01 — HOLE NUMBER EV-9B

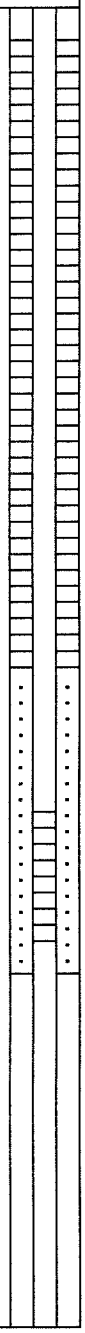
STATE WA — COUNTY Snohomish — LOCATION T ____ R ____ SEC. ____ TRACT ____

SITE DESCRIPTION ____ — ELEVATION G.S. 13.09 — DATE 8-23-93

RECORDED BY R. Verburg — DRILL METHOD Air rotary — DRILLER S. Hauman DRILLING CO. Holt Drilling

TOTAL DEPTH 28.5' — CASING TYPE AND DESCRIPTION 8 5/8" ID Steel casing keyed into silt layer at 18'
6" casing to completion Top of PVC: 12.52

DEPTH	BLOW COUNT	SAMPLE #	SAMPLE TYPE	GEOLOGIC DESCRIPTION	NOTES ON: WATER LEVELS, DRILLING WELL COMPLETION, ETC.
0				See EV-9A for description of shallow soils	Flushmount - water tight protective casing concrete surface seal locking expansion cap
5'					2" SCH 40 PVC riser with flush-thread joints
10'					
15'					Set casing at 18'
	2, 2, 2	S-10		Gray silt, some fine sand, fibrous wood, H_2S smell	
20'					
	2, 2, 5	S-11	A/B	6" as above, root material at interface with 12" gray medium sand, well sorted, trace gravel	Cement: 0 - 17' Bentonite: 17' - 20' Sand: 20' - 28.5' Screen: 23.5' - 28.5'
25'				26' gravel with wood fragments	
	4, 4, 5	S-12		Light brown, silty sand, some rounded gravel and pebble, (~1") poorly sorted	



BORING B-1

TEST DATA

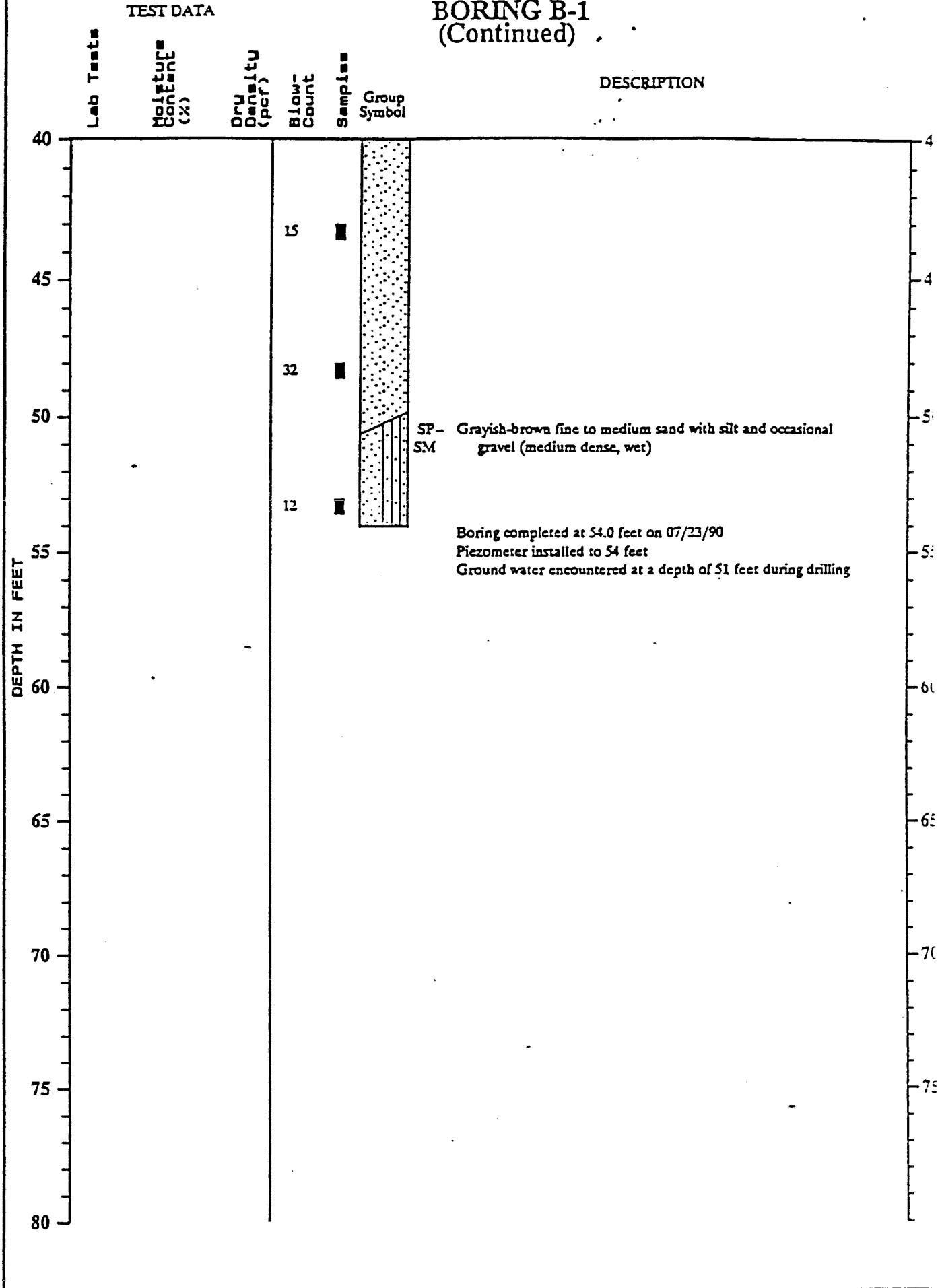
Lab Tests	Moisture Content (%)	Dry Density (pcf)	Blow-Count	Samples	Group Symbol	DESCRIPTION (Surface Elevation (ft.): 58.0)
			5		SP – SM	Brown fine sand with silt and a trace of roots (loose, dry to moist) (fill)
					SM	Dark brown silty fine sand with occasional coarse sand, gravel and organic matter (loose, moist) (fill)
	14	93	8			
	10	102	7			
					SM	Gray silty fine sand with a trace of coarse sand, gravel and slag chips (loose, moist) (fill) (moderate sheen on sample)
	10	102	10			
					SM / ML	Grayish-brown silty fine sand to silt with fine sand, occasional coarse sand and gravel (medium dense/stiff, moist) (fill) (slight sheen)
	16	114	13			
					SM	Dark brown silty fine sand with slag chips (loose, moist) (fill)
	10	106	6			
					SM	Reddish-brown silty fine sand with slag chips (coarse sand to gravel-sized) (very loose to loose, moist to wet) (fill)
	27	88	4			
					SP	Dark gray slag (sand and gravel size) (loose to medium dense, dry)(fill)
			11			

DEPTH IN FEET: 0, 5, 10, 15, 20, 25, 30, 35, 40

Geo Engineers

Log of Boring

BORING B-1
(Continued)



Geo Engineers

Log of Boring

BORING B-2

TEST DATA

DEPTH IN FEET	Lab Tests	Moisture Content (%)	Dry Density (pcf)	Blow-Count	Samples	Group Symbol	DESCRIPTION (Surface Elevation (ft.): 16.0)
0						SM	Brown silty fine sand with gravel, bricks and roots (loose, dry) (fill)
						SP	Dark gray slag (medium to coarse sand sized) (loose, moist) (fill)
				11	■	SM	Dark gray silty fine sand with occasional coarse sand, gravel, slag and roots (loose, wet) (fill) (slight sheen on sample)
5						SP	Dark gray slag (sand, gravel and cobble-sized) (dense, wet) (fill)
		8	163	65	■		
10							
				32	■		
15							
				50	■		
20						SP-SM	Dark brown fine to medium sand with silt and a trace of organic matter (medium dense, wet)
		32	97	17	■		
25						ML	Gray silt with a trace of fine sand and occasional wood fragments (stiff, wet)
		31	92	24	■		
30						ML/SM	Gray interbedded silt and silty fine sand with occasional lenses of fine sand (very stiff/dense, wet)
				43	■		
35							Boring completed at 34.0 feet on 07/23/90 Piezometer installed to 34 feet Ground water encountered at a depth of 1 foot during drilling
40							

Geo Engineers

Log of Boring

Boring Log and Construction Data for Monitoring Well WP-1

Geologic Log

Depth in feet

Approx. Ground Surface Elevation in Feet 0

0 — Brown SAND with wood chips.

Stiff, damp, gray, gravelly SILT with interbedded fine SAND.

5 — Medium dense, wet, gravelly to very gravelly SAND (slag-like materials) with thin layer of yellowish brown silt at 6- to 6.5-foot depth.

10 — Stiff, moist to wet, gray SILT with organics and wood fragments.

Bottom of Boring at 13.0 Feet. Completed 5/21/90.

15

20

25

Sample N

S-1		50
S-2	A/B	24
S-4		33
S-5		18
S-6		9

Monitoring Well Design

Casing Stickup in Feet 1.8

Top of PVC in Feet 1.8

ATD

1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

HARTCROWSER

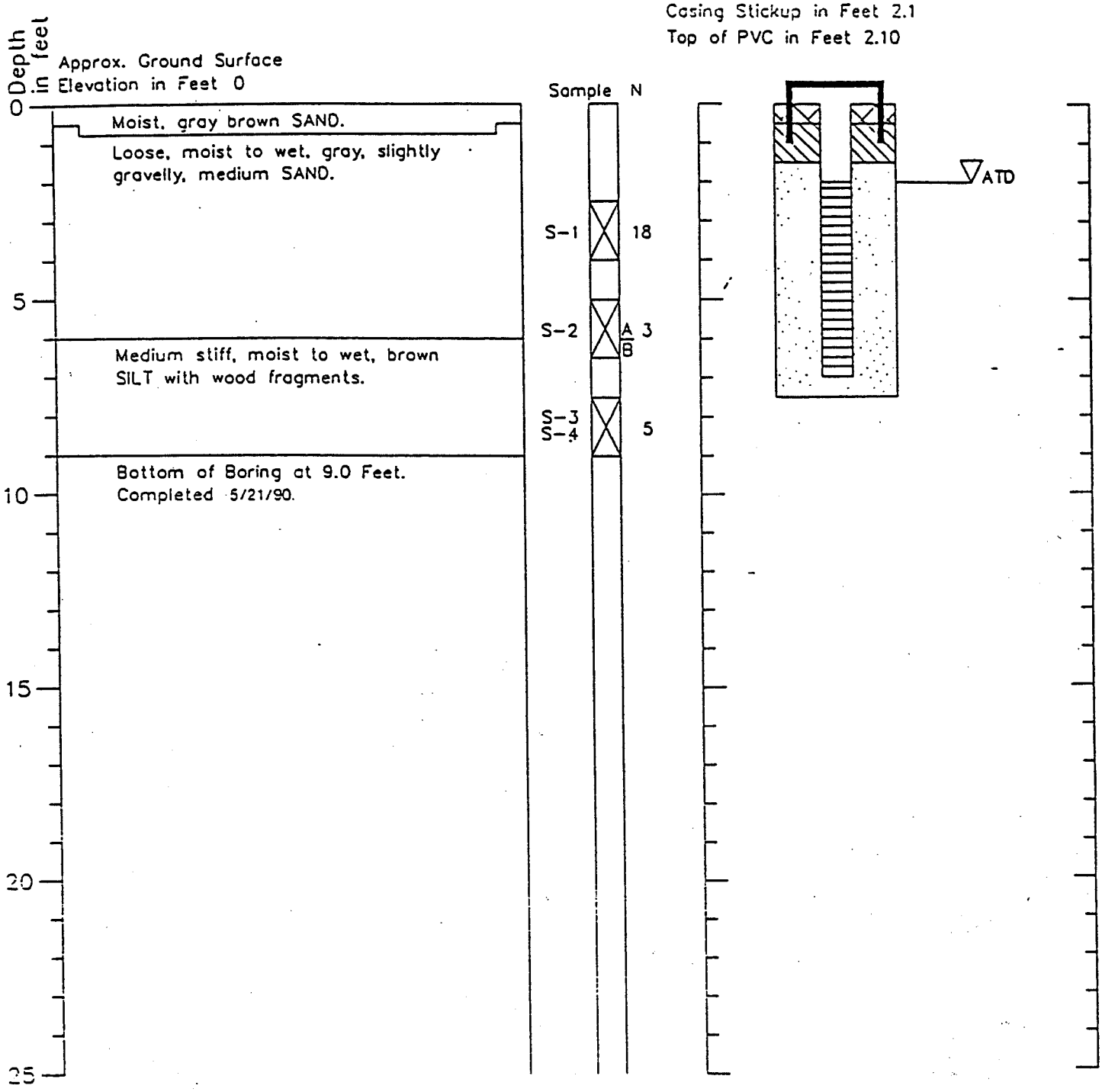
J-2395-06 5/90

Boring Log and Construction Data for Monitoring Well HC-24

Geologic Log

Monitoring Well Design

Casing Stickup in Feet 2.1
Top of PVC in Feet 2.10



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

HARTCROWSER

J-2395-06 5/90

Figure A-4

Boring Log and Construction Data for Monitoring Well HC-25

Geologic Log

Depth in feet

Approx. Ground Surface Elevation in Feet 0

0

Loose to medium dense, wet, gray, medium to fine SAND.

5

Medium stiff, moist to wet, brown SILT with organic fragments and thin peat layer.

Bottom of Boring at 8.0 Feet. Completed 5/21/90.

10

15

20

25

Sample N

S-1 15

S-2 A 7 / B

S-4 6

Monitoring Well Design

Casing Stickup in Feet 2.0

Top of PVC in Feet 0

ATD

1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

HARTCROWSER

J-2395-06 5/90

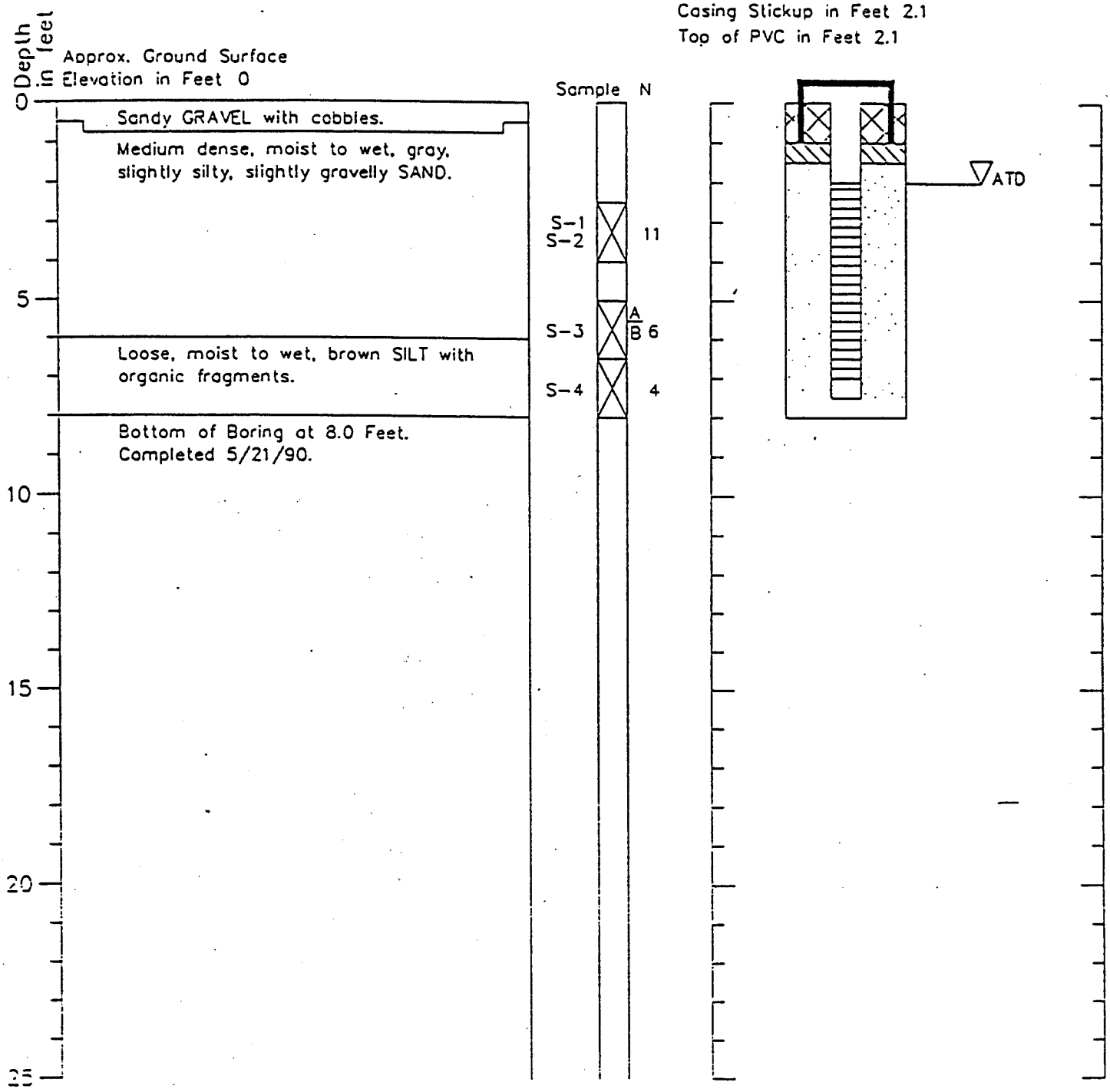
Figure A-5

Boring Log and Construction Data for Monitoring Well HC-26

Geologic Log

Monitoring Well Design

Casing Stickup in Feet 2.1
Top of PVC in Feet 2.1



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

HARTCROWSER

J-2395-06 5/90

Figure A-6

1996 Supplemental Investigation Lowland

APPENDIX A.

LOGS FOR BORINGS AND TEST PITS AND MONITORING WELLS; AND FIELD LOGS FOR OVERPASS SAMPLING AND TIDAL TESTING

LOWLAND BORINGS

LB-1 THRU LB-10

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

GEOTECHNICAL WELL LOG DIAGRAM

Hole Name: LB-1

Date Hole Started: 12/26/96 Date Hole Finished: 12/26/96

Project: ASEV01 Everett Smelter Site

County: Snohomish State: WA

Legal Description:

Descriptive Location:

Recorded By: Jim Swortz

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: Hollow Stem Auger

Drilling Fluids Used:

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Log of materials and laboratory analysis	

Purpose of Hole: Collect soil samples

Target Aquifer:

Hole Diameter (in): 4.25

Total Depth Drilled (ft): 11.50

Static Water Level Below MP: Not Measured

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: All sample numbers are precede by EVT-9602-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	260	Grab	---	0.00	0.0 - 0.5'		0.0 - 0.5' Sand - dark brown, very fine to coarse grained sand, poorly sorted, gravel to 2 inches in diameter, angular to rounded, very wet.
							0.5 - 3.5' Slag - black, coarse grained sand size, angular, minor medium to coarse grained sand, very wet.
	261	SS	5 25 14	0.25	2.0 - 3.5'		
5	262	SS	2 3 2	0.25	5.0 - 6.5'	5	3.5 - 11.5' Sand - dark grey, fine to medium grained, minor silt, minor gravel size slag, very wet.
							Some root material and brick debris at 5-6.5 foot interval.
10	263	SS	1 2 1	0.25	10.0 - 11.5'	10	Abundant black wood fragments at 10-11.5'

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

GEOTECHNICAL WELL LOG DIAGRAM

Hole Name: LB-2

Date Hole Started: 12/26/96 Date Hole Finished: 12/26/96

Project: ASEV01 Everett Smelter Site

County: Snohomish State: WA

Legal Description:

Descriptive Location:

Recorded By: Jim Swortz

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: Hollow Stem Auger

Drilling Fluids Used:

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Log of materials and laboratory analysis	

Purpose of Hole: Collect soil samples

Target Aquifer:

Hole Diameter (in): 4.25

Total Depth Drilled (ft): 11.50

Static Water Level Below MP: Not Measured

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: All sample numbers are precede by EVT-9602-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	264	Grab	---	0.00	0.0 - 0.5'
	265	SS	5 3 3	0.50	2.0 - 3.5'
5	266 267	SS	5 3 1	0.50	5.0 - 6.5'
10	268	SS	1 1 1	0.50	10.0 - 11.5'

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 0.5' Moist sandy loam (topsoil). Organic with abundant roots. Color black (10YR2/1).

0.5 - 6.5' Silty sand with a trace of small slag fragments (stuff from surface?). Very dark gray to dark gray (2.5Y3/1 to 2.5/1). Abundant organic matter (leaves, roots). Sand is fine to medium grained. Moist.

6.5 - 11.5' Clayey silt with gleyed (5G5/1) and non-gleyed areas (2.5Y2.5/1). Root structures with FeOx staining. Sticky and plastic. Fine organic material abundant (black wood fragments, leaf debris)

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

GEOTECHNICAL WELL LOG DIAGRAM

Hole Name: LB-3

Date Hole Started: 12/27/96 Date Hole Finished: 12/27/96

Project: ASEV01 Everett Smelter Site

County: Snohomish State: WA

Legal Description:

Descriptive Location:

Recorded By: Jim Swortz

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: Hollow Stem Auger

Drilling Fluids Used:

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Log of materials and laboratory anatysis	

Purpose of Hole: Collect soil samples

Target Aquifer:

Hole Diameter (in): 4.25

Total Depth Drilled (ft): 11.50

Static Water Level Below MP: Not Measured

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: All sample numbers are precede by EVT-9602-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	269	Grab	---	0.00	0.0 - 0.5'		0.0 - 0.5' Sandy loam - (topsoil), black (10YR2/1), organic with abundant roots, trace slag.
	270	SS	11 11 12	0.50	2.0 - 3.5'		2.0 - 3.5' Silt - Dark olive brown (2.5Y5/3), trace orange, with fine grained sand, dry to slightly damp, slightly plastic, cohesive.
5	271	SS	5 7 5	0.50	5.0 - 6.5'	5	5.0 - 6.5' Sand - dark greyish brown (2.5Y3/2), fine to coarse grained, minor gravel, dry to slightly damp, loose, Gravel is small to medium sized and well rounded, minor clayey silt.
10	272 273	SS	1 1 2	0.50	10.0 - 11.5'	10	10.0 - 11.5' Silt - black (2.5Y2.5/1), includes fine grained sand, abundant organic material (leaves and root material), moist, slightly plastic, loose.

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

GEOTECHNICAL WELL LOG DIAGRAM

Hole Name: LB-4

Date Hole Started: 12/27/96 Date Hole Finished: 12/27/96

Project: ASEV01 Everett Smelter Site

County: Snohomish State: WA

Legal Description:

Descriptive Location:

Recorded By: Jim Swortz

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: Hollow Stem Auger

Drilling Fluids Used:

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Log of materials and laboratory analysis	

Purpose of Hole: Collect soil samples

Target Aquifer:

Hole Diameter (in): 4.25

Total Depth Drilled (ft): 11.50

Static Water Level Below MP: Not Measured

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: All sample numbers are precede by EVT-9602-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	274	Grab	---	0.00	0.0 - 0.5'		0.0 - 0.5' Moist sandy loam (topsoil). Organic with abundant roots. Color black (10YR2/1). Trace gravel size slag, rounded (road spoil).
	275	SS	18 40 27	0.50	2.0 - 3.5'		0.5 - 3.5' Gravelly sandy loam. Black (10YR2/1). Slightly damp, loose. Gravel is medium size and rounded. Organic material (roots and woody material) abundant.
5	276	SS	6 2 3	0.50	5.0 - 6.5'	5	3.5 - 11.5' Fine sand and gravel. Sand is fine to coarse textured, gravel is fine to medium and rounded. Very dark gray (2.5Y3/1). Moist. One small brick fragment in 5-6.5 sample.
10	277	SS	2 2 2	0.50	10.0 - 11.5'	10	Similar to fine sand and gravel above but more silt associated. Slightly sticky and plastic, color is dark olive gray (5Y3/2). Organic leaf and root material present. Moist. One brick fragment and trace of slag (from upper part of hole?)

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2727 Airport Rd. Helena Mt, 59601

GEOTECHNICAL WELL LOG DIAGRAM

Hole Name: LB-5

Date Hole Started: 12/27/96 Date Hole Finished: 12/27/96

Project: ASEV01 Everett Smelter Site

County: Snohomish State: WA

Legal Description:

Descriptive Location:

Recorded By: Jim Swortz

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: Hollow Stem Auger

Drilling Fluids Used:

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Log of materials and laboratory analysis	

Purpose of Hole: Collect soil samples

Target Aquifer:

Hole Diameter (in): 4.25

Total Depth Drilled (ft): 11.50

Static Water Level Below MP: Not Measured

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: All sample numbers are precede by EVT-9602-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	278	Grab	---	0.00	0.0 - 0.5'		0.0 - 0.5' Moist sandy loam (topsoil). Loose. Organic with abundant roots. Color black (10YR2/1).
	279	SS	10 6 11	0.50	2.0 - 3.5'		0.5 - 5.0' Gravelly silty sand. Matrix color is black (2.5Y2/1). Dry to slightly damp. Organic material present consisting of root and wood debris. Gravel is up to medium size and rounded.
5	280	SS	2 4 5	0.50	5.0 - 6.5'	5	5.0 - 6.5' Black, very wet medium to coarse grained sand with silt (black color) and minor gravel. Some large grains of mica (up to 1/4 inch size).
							6.5 - 11.5' Fine to medium grained sandy silt with abundant organic material (leaves and root material). Color is black (2.5Y2.5/1). Moist. Slightly plastic. Loose with small balls of silty material (from drilling).
10	281	SS	4 2 3	0.50	10.0 - 11.5'	10	

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2727 Airport Rd. Helena Mt, 59601

GEOTECHNICAL WELL LOG DIAGRAM

Hole Name: LB-6

Date Hole Started: 12/27/96 Date Hole Finished: 12/27/96

Project: ASEV01 Everett Smelter Site

County: Snohomish State: WA

Legal Description:

Descriptive Location:

Recorded By: Jim Swortz

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: Hollow Stem Auger

Drilling Fluids Used:

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Log of materials and laboratory analysis	

Purpose of Hole: Collect soil samples

Target Aquifer:

Hole Diameter (in): 4.25

Total Depth Drilled (ft): 16.50

Static Water Level Below MP: Not Measured

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: All sample numbers are precede by EVT-9602-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	282	Grab	---	0.00	0.0 - 0.5'
	283	SS	5 6 9	0.50	2.0 - 3.5'
5	284	SS	12 25 20	0.50	5.0 - 6.5'
10	285	SS	18 32 50	0.50	10.0 - 11.5'
15	286	SS	3 4 5	0.50	15.0 - 16.5'

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 0.5' Moist sandy loam (topsoil).Abundant roots. 2.5Y3/2

0.5 - 11.5' Slag. Black angular coarse sand to coarse gravel size material. Wet.

15.0 - 16.5' Clayey silt. Slightly sticky, plastic. Some organic debris (root and wood material). Slightly moist. Color is dark gray (5Y4/1).

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2727 Airport Rd. Helena Mt, 59601

GEOTECHNICAL WELL LOG DIAGRAM

Hole Name: LB-7

Date Hole Started: 12/28/92 Date Hole Finished: 12/28/92

Project: ASEV01 Everett Smelter Site

County: Snohomish State: WA

Legal Description:

Descriptive Location:

Recorded By: Jim Swortz

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: Hollow Stem Auger

Drilling Fluids Used:

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Log of materials and laboratory analysis	

Purpose of Hole: Collect soil samples

Target Aquifer:

Hole Diameter (in): 4.25

Total Depth Drilled (ft): 11.50

Static Water Level Below MP: Not Measured

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: All sample numbers are precede by EVT-9602-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	287	Grab	---	0.00	0.0 - 0.5'		0.0 - 0.5' Moist sandy loam (topsoil). Roots, glass nails, springs, metal and slag fragments present. Black (2.5Y2/1). Loose.
	288	SS	12 25 27	0.50	2.0 - 3.5'		2.0 - 3.5' Coarse sand and gravel with minor silt and fine sand. Some metal and glass fragments in sample. Matrix very dark gray 2.5Y3/1. Moist and loose. Gravel well rounded.
5	289	SS	30 30 11	0.50	5.0 - 6.5'	5	5.0 - 6.5' Slag. Coarse sand to medium gravel size. Angular. Black (2.5Y2/1) Wet and loose. Some fine sand and silt size material. Slight organic (petroleum?) odor.
10	290 291	SS	2 1 1	0.50	10.0 - 11.5'	10	10.0 - 11.5' Silty clay. Cohesive. Very sticky and plastic. Very dark gray (5Y3/1). Some black organic material (leaves and roots).

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Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

GEOTECHNICAL WELL LOG DIAGRAM

Hole Name: LB-8

Date Hole Started: 12/29/92 Date Hole Finished: 12/29/92

Project: ASEV01 Everett Smelter Site

County: Snohomish State: WA

Legal Description:

Descriptive Location:

Recorded By: Jim Swortz

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: Hollow Stem Auger

Drilling Fluids Used:

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Log of materials and laboratory analysis	

Purpose of Hole: Collect soil samples

Target Aquifer:

Hole Diameter (in): 4.25

Total Depth Drilled (ft): 3.50

Static Water Level Below MP: Not Measured

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: All sample numbers are precede by EVT-9602-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	292	Grab	---	0.00	0.0 - 0.5'		0.0 - 0.5' Sand - dark brown, with gravel and slag, silty, moist.
	293	SS	4 4 50	0.50	2.0 - 3.5'		2.0 - 3.5' Sand - black (2.5Y2/1), fine sand fraction is olive brown (2.5Y4/3), fine to medium grained, abundant angular gravel size slag, minor rounded non-slag gravel.
							Hit refusal at 3.5' on a concrete slab.

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2727 Airport Rd. Helena Mt, 59601

GEOTECHNICAL WELL LOG DIAGRAM

Hole Name: LB-9

Date Hole Started: 12/29/92 Date Hole Finished: 12/29/92

Project: ASEV01 Everett Smelter Site

County: Snohomish State: WA

Legal Description:

Descriptive Location:

Recorded By: Jim Swortz

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: Hollow Stem Auger

Drilling Fluids Used:

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Log of materials and laboratory analysis	

Purpose of Hole: Collect soil samples

Target Aquifer:

Hole Diameter (in): 4.25

Total Depth Drilled (ft): 6.50

Static Water Level Below MP: Not Measured

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: All sample numbers are precede by EVT-9602-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	294	Grab	---	0.00	0.0 - 0.5'		0.0 - 3.5' Sand and gravel with minor silt. Very wet with approximately 20% coarse angular gravel size slag. Black (2.5Y2/1). Some organic root material. Some non-slag gravel, well rounded. Poor recovery
	295	SS	5 4 2	0.50	2.0 - 3.5'		
5	296 297	SS	2 1 2	0.50	5.0 - 6.5'	5	5.0 - 6.5' Silt. Very dark brown (10YR2/2). Cohesive, moist, slightly plastic. Minor fine root material.

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2727 Airport Rd. Helena Mt, 59601

GEOTECHNICAL WELL LOG DIAGRAM

Hole Name: LB-10

Date Hole Started: 12/29/92 Date Hole Finished: 12/29/92

Project: ASEV01 Everett Smelter Site

County: Snohomish State: WA

Legal Description:

Descriptive Location:

Recorded By: Jim Swortz

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: Hollow Stem Auger

Drilling Fluids Used:

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Log of materials and laboratory analysis	

Purpose of Hole: Collect soil samples

Target Aquifer:

Hole Diameter (in): 4.25

Total Depth Drilled (ft): 6.50

Static Water Level Below MP: Not Measured

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: All sample numbers are precede by EVT-9602-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	298	Grab	---	0.00	0.0 - 0.5'		0.0 - 0.5' Silty Sand - black (10YR2/1), sandy loam (topsoil), organic with abundant root material, trace glass fragments.
	299	SS	5 4 8	0.50	2.0 - 3.5'		2.0 - 3.5' Silt - dark grayish brown (2.5Y4/2), with fine to medium grained sand, minor rounded gravel (<20%), damp, slightly sticky and plastic, Some gleyed areas (color 5G5/1), moderately cohesive.
5	300	SS	2 4 5	0.50	5.0 - 6.5'	5	5.0 - 6.5' Sand - dark grey, (2.5Y4/1), fine to medium grained, saturated. Minor coarse sand and fine gravel. Grey sandy silt at 6.5 feet.

UPLAND BORINGS

B-3 THRU B-6

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

SOIL BORING LOG

Hole Name: B-3

Date Hole Started: 09/01/95 Date Hole Finished: 09/01/95

ject: ASEV01 Everett Smelter Site

County: Snohomish

State: Washingon

Legal Descnption:

Descriptive Location: Access Ramp area State Rt 529

Recorded By: Jeff Cross

Drilling Company: Hydrometrics

Driller: Pat Miller

Drilling Method: hollow stem auger

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y		

Purpose of Hole: Soil sampling

Target Aquifer:

Hole Diameter (in): 4 1/2"

Total Depth Drilled (ft): 15.25

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: All soil sample numbers prefaced by EVT-9509-; Hole abandoned with bentonite after sampling completed

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	165	grab		0.50	0.0 - 0.5'		0.0 - 0.5' Silt - Light Brown; with very fine sand, root mass; Dry
	166	ss	10,18,11	1.00	2.0 - 3.5'		2.0 - 3.0' Sandy Silt - Light Brown; red brick fragments, oxidation and mottled throughout, green ppt
5	167	ss	18,34,50	1.00	5.0 - 6.5'	5	5.0 - 10.0' Sandy Silt - Light Brown; very fine grained sand, uniform density and grain size
10	168	ss	50/5",25/1"	1.00	10.0 - 11.5'	10	10.0 - 15.0' Sandy Silt - Light Brown; sandy clay lense gray 20% clay Moist
							Added 2 gal of water btwn 11 and 14 feet for drilling purposes. Water level at 14'
15	~~169~~	~~ss~~	~~16C/3"~~	~~1.CC~~	15.0 - 15.3'	15	15.0 - 15.3' Sandy Gravel - Grey, 10% silt, Wet

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Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

SOIL BORING LOG

Hole Name: B-4

Date Hole Started: 09/01/95 Date Hole Finished: 09/01/95

Project: ASEV01 Everett Smelter Site

County: Snohomish

State: Washingon

Legal Description:

Descriptive Location: Access Ramp area State Rt 529

Recorded By: Jeff Cross

Drilling Company: Hydrometrics

Driller: Pat Miller

Drilling Method: hollow stem auger

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y		

Purpose of Hole: Soil sampling

Target Aquifer:

Hole Diameter (in): 4 1/2"

Total Depth Drilled (ft): 15.50

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: All soil sample numbers prefaced by EVT-9509-; Hole abandoned with bentonite after sampling completed

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	170	grab		0.50	0.0 - 0.5'		0.0 - 2.0' Sand - Brown with silt, 10% fine gravel, abundant roots; Dry
		ss	11,10,8	0.00	2.0 - 3.5'		2.0 - 7.0' Sandy Silt - Brown, uniform, Moist (descnbed from auger returns)
5	171	ss	5,3,1	1.50	5.0 - 6.5'	5	as above
	172	ss	30,48,50/5"	1.50	7.5 - 9.0'		7.5 - 10.0' Silty Sand - Light Brown Grey, 5% subrounded gravel; Moist
10	174	ss	62/6"	0.25	10.0 - 11.5'	10	10.0 - 15.5' Silty Sand - Light Brown Grey, 20% fine gravel, mottled with red oxidation
15	175	ss	118/6"	0.50	15.0 - 15.5'	15	slight decrease in gravel content (~10%)

HYDROMETRICS INC.

Consulting Scientists and Engineers
2727 Airport Rd. Helena Mt, 59601

SOIL BORING LOG

Hole Name: B-5

Date Hole Started: 09/07/95 Date Hole Finished: 09/07/95

Project: ASEV01 Everett Smelter Site
Jnty: Snohomish
State: Washingon
Legal Description:
Descriptive Location: Access Ramp area State Rt 529

Recorded By: Jeff Cross
Drilling Company: Hydrometrics
Driller: Pat Miller
Drilling Method: hollow stem auger
Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y		

Purpose of Hole: Soil sampling shallow fill/till
Target Aquifer:
Hole Diameter (in): 4 1/2"
Total Depth Drilled (ft): 16.00

Static Water Level Below MP: 0.00
Date: / /
MP Description:
MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00
Riser Height (ft): 0.00
Ground Surface Elevation (ft): 0.00
MP Elevation (ft): 0.00

Remarks: All soil sample numbers prefaced by EVT-9509-; Hole abandoned with bentonite after sampling completed

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	176	grab		0.50	0.0 - 0.5'		0.0 - 0.5' Silty Sand - Light Brown; fine grained sand, >10% fine rounded gravel, abundant root mass; Dry
	177	ss	32,50/4"	1.00	2.0 - 3.0'		2.0 - 15.0' Sandy Silt - Light Grey; 10-20% fine rounded gravel; Dense to Very Dense; Dry
5	179	ss	83/6"	0.50	5.0 - 5.5'	5	
10	180	ss	17,50/3"	0.75	10.0 - 10.8'	10	
15	181	ss	26,50/5"	1.00	15.0 - 16.0'	15	15.0 - 16.0' Sand - Black/White, fine to medium first 6"; Light grey fine, <10% fine rounded gravel; Medium Dense to Dense; Moist

HYDROMETRICS INC.

Consulting Scientists and Engineers
2727 Airport Rd. Helena Mt, 59601

SOIL BORING LOG

Hole Name: B-6

Date Hole Started: 09/07/95 Date Hole Finished: 09/07/95

Project: ASEV01 Everett Smelter Site
County: Snohomish
State: Washingon
Legal Description:
Descriptive Location: Access Ramp area State Rt 529

Recorded By: Jeff Cross
Drilling Company: Hydrometrics
Driller: Pat Miller
Drilling Method: hollow stem auger
Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y		

Purpose of Hole: Soil sampling shallow fill/till
Target Aquifer:
Hole Diameter (in): 4 1/2"
Total Depth Drilled (ft): 15.50

Static Water Level Below MP: 0.00
Date: / /
MP Description:
MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00
Riser Height (ft): 0.00
Ground Surface Elevation (ft): 0.00
MP Elevation (ft): 0.00

Remarks: All soil sample numbers prefaced by EVT-9509-; Hole abandoned with bentonite after sampling completed

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	182	grab		0.50	0.0 - 0.5'		0.0 - 2.0' Silty Sand - Light Brown; fine grained sand, >10% fine rounded gravel, abundant root mass; Dry
	183	ss	4,11,29	1.20	2.0 - 3.5'		2.0 - 5.0' Silt - Light Brown; ~5% medium rounded gravel, mottled with orange oxidation; Medium Dense; Moist
5	179	ss	12,21/5"	1.00	5.0 - 6.0'	5	5.0 - 10.0' Silt - Light Brown; ~5% medium to fine rounded gravel, mottled with orange oxidation; Medium Dense; Moist
10	185	ss	21,89	0.90	10.0 - 11.0'	10	10.0 - 15.0' Silt - Light Grey with 10% medium rounded gravel for 8"; fine sand for 3", light brown clay nodule at interface; Dense to Very Dense
							Added 2 gallons H2O
15	186	ss	98/6"	0.50	15.0 - 15.5'	15	15.0 - 15.5' Silty Sand - fine to medium grained sand, 10% fine subrounded gravel, orange oxidation and mottles; Very Dense; Moist

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HYDROPUNCH BORINGS

HP-01 THRU HP-45

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-01

Date Hole Started: 08/23/95 Date Hole Finished: 08/23/95

Project: ASEV01 Everett Smelter Site

County: Snohomish

State: Washington

Legal Description:

Descriptive Location: Smelter Site Lowland Area

Recorded By: Bill Thompson

Drilling Company: Hydrometrics, Inc.

Driller: Pat Miller

Drilling Method: auger drill/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		3.0 - 6.0, 27.0 - 30.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purge with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y		

Purpose of Hole: water quality sampling

Target Aquifer:

Hole Diameter (in): 4 1/2"

Total Depth Drilled (ft): 30.00

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; All soil sample numbers prefaced by EVT-9508-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	~~100~~	~~grab~~		~~0.50~~	0.0 - 0.5'
	101	ss	5,10,5,5	0.50	0.5 - 2.5'
5	102	ss	7,6,4,2	0.75	5.0 - 7.0'
10	103	ss	2,1,2,2	1.50	10.0 - 12.0'
15					
20					
25					
30					

GRAPHICS

■ = Screened Interval

GEOLOGICAL DESCRIPTION

0.0 - 2.5' Sandy Gravel - Medium Brown
Some silt, trace of clay; Grey silty clay in tip of spoon, little fine to coarse sand; Moist

2.5 - 10.0' Silty Clay - Grey

Collected water sample EVT-9508-301

3" Grey/Brown with little fine to medium sand
3" Brown silty sand trace of gravel (to 1.5" dia.)
3' Blue grey silty sandy clay trace of fine gravel (65% very fine to fine sand, 25% silt, 10% clay)

10.0 - 12.0' Silt - Grey Brown
Abundant woody organic matter; Moist

Drove Hydropunch to completion depth of 30'

Collected water sample EVT-9508-300

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-02

Date Hole Started: 08/24/95 Date Hole Finished: 08/24/95

Project: ASEV01 - Everett Smelter Site

County: Snohomish

State: Washington

Legal Description:

Descriptive Location:

Recorded By: Bill Thompson

Drilling Company: Hydrometrics, Inc.

Driller: Pat Miller

Drilling Method: auger drill/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		2.0 - 5.0, 23.0 - 25.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purge with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y		

Purpose of Hole: water quality sampling

Target Aquifer:

Hole Diameter (in): 4 1/2"

Total Depth Drilled (ft): 25.50

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; All soil sample numbers prefaced by EVI-9508-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	104	grab		0.50	0.0 - 0.5'
		ss	43,50/3"	0.40	0.5 - 1.0' first water at approximately 1 foot.
	105	ss	24,40,14	0.75	1.5 - 3.0'
5	106	ss	11,5,6	0.50	5.0 - 6.5'
10	107	ss	5,6,3,5	1.00	10.0 - 12.0'
15	108	ss	3,3,5,6	0.00	15.0 - 17.0' Water is filling auger flights from above through auger joints.
20					
25					

GRAPHICS

= Screened Interval

GEOLOGICAL DESCRIPTION

0.0 - 1.0' Gravelly Silt - grey brown, trace sand, moist, first water at approximately 1 foot.

1.5 - 12.0' Slag - black, angular gravel size fragments 0.5 to 1.5", trace fine sand to silt size, wet, sheen on water, slight hydrocarbon odor.
Collected water sample EVT-9508-307

Slag - black, sand to gravel size, wet, slight hydrocarbon (?) odor.

Slag - black, coarse sand to gravel size angular fragments, no odor, wet.

12.0 - 17.0' Silt - grey brown, with fibrous woody fragments.

Clayey Silt - grey brown, some very fine sand and fibrous woody fragments, damp.

Collected water sample EVT-9508-305

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-04

Date Hole Started: 08/24/95 Date Hole Finished: 08/24/95

Project: ASEV01 - Everett Smelter Site

County: Snohomish

State: Washingon

Legal Description:

Descriptive Location:

Recorded By: Bill Thompson

Drilling Company: Hydrometrics

Driller: Pat Miller

Drilling Method: hollow stem auger/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		27.0 - 30.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y		

Purpose of Hole: Soil and groundwater sampling

Target Aquifer: shallow fill and deeper alluvium

Hole Diameter (in): 4 1/2"

Total Depth Drilled (ft): 30.00

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; All soil sample numbers prefaced by EVI-9508-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	~~109~~	~~grab~~		~~0.50~~	0.0 - 0.5'		= Screened Interval
	110	ss	2,5,13	1.50	0.5 - 2.0'		0.0 - 1.0' Sandy Loam - brown, trace gravel, trace plant roots, grey fine to coarse grained sand and trace silt at 8 inches.
5	111	ss	1,2,3	0.40	5.0 - 6.5'	5	5.0 - 10.0' Clayey Silt - grey, trace very fine grained sand, trace fine gravel.
10	112	ss	1,0,1	1.50	10.0 - 11.5' Split spoon is wet.	10	10.0 - 11.5' Silt - Silt, trace woody material, brown peat from 10.25 to 11.2 feet, grey brown silt from 11.2 to 11.5 feet.
	113	ss	1,1,1	1.50	12.5 - 14.0'		12.5 - 14.0' Clayey Silt - grey brown, trace organic fragments.
15						15	
20						20	
	114	ss	1,1,2	1.50	22.0 - 24.0' Spoon is wet.		22.0 - 24.0' Clayey Silt - grey, moist.
25						25	
							Collected water sample EVT-9508-310
30						30	

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HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-05

Date Hole Started: 08/25/95 Date Hole Finished: 08/25/95

Project: ASEV01 - Everett Smelter Site

County: Snohomish

State: Washingon

Legal Description:

Descriptive Location: Benson Property

Recorded By: Bill Thompson

Drilling Company: Hydrometrics

Driller: Pat Miller

Drilling Method: hollow stem auger/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		27.0 - 30.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y		

Purpose of Hole: Soil and groundwater sampling

Target Aquifer: shallow fill and deeper alluvium

Hole Diameter (in): 4 1/2"

Total Depth Drilled (ft): 30.00

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; All soil sample numbers prefaced by EVT-9508-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	~~115~~	~~grab~~		~~0.50~~	0.0 - 0.5'
	116	ss	2,2,12,	1.50	0.5 - 2.0'
5	117	ss	3,7,8	1.50	5.0 - 6.5'
10	118	ss	1,01	1.50	10.0 - 11.5'
15	119	22	1,1,1	1.50	15.0 - 16.5'
20	120	ss	1,2,3	1.50	20.0 - 21.5'
25					
30					

GRAPHICS

GEOLOGICAL DESCRIPTION

■ = Screened Interval

0.0 - 2.0' Loam Soil - brown, organic, trace well rounded gravel at 2.0 feet.

2.0 - 3.0' Boulders

3.0 - 21.5' Clayey Silt

Silt - Grey brown, trace fine gravel and fine to medium sand, gravel size to 1" at 6.5 feet, silt is damp, sand is moist.

Clayey Silt - Grey, with 6-inch peat layer, moist.

Clayey Silt - Grey brown, wood fragments and fibrous woody organic matter throughout, fetid odor, moist.

Clayey Silt - Grey, no organics, slight coarsening downward, some very fine grained sand intermixed with silt from 21 to 21.5", wet.

Drove Hydropunch to completion depth of 30'

Collected water sample EVT-9508-313

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-06

Date Hole Started: 08/25/95 Date Hole Finished: 08/25/95

Project: ASEV01 - Everett Smelter Site

County: Snohomish

State: Washingon

Legal Description:

Descriptive Location: BN Property East of tracks

Recorded By: Bill Thompson

Drilling Company: Hydrometrics

Driller: Pat Miller

Drilling Method: hollow stem auger/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		7.0 - 10.0, 27.0 - 30.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y		

Purpose of Hole: Soil and groundwater sampling

Target Aquifer: shallow fill and deeper alluvium

Hole Diameter (in): 4 1/2"

Total Depth Drilled (ft): 30.00

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; All soil sample numbers prefaced by EVT-9508-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	121	GRAB		0.50	0.0 - 0.5'
	122	SS	10,8,8,8	1.50	0.5 - 2.5'
5	123	SS	2,1,2	1.00	5.0 - 6.5'
10					
15	124	SS	6,16,34/4.5"	0.80	15.0 - 16.5'
	125	SS	6,13,8	1.50	17.5 - 19.0'
20	126	SS	6,5,5	0.70	20.0 - 21.5'
25					
30					

GRAPHICS

■ = Screened Interval

GEOLOGICAL DESCRIPTION

0.0 - 5.0' Sand - light brown, medium grained, trace coarse grained, dry, wet at 2.5 feet.

5.0 - 10.0' Sand - gray brown, medium to coarse grained, wet.

Collected water sample EVT-9508-318

drilling easier

10.0 - 15.0' Sand - grey, fine to medium grainad, loose,

Problem with heaving sands, no sample collected at 10'

15.0 - 17.5' Sand - grey, fine grained, well sorted.

17.5 - 20.0' Sand - grey, fine to medium grained.
3-inch layer of wood and silty fine sand.
grey, medium to coarse grained, 2-inch layer of wood and silty fine sand.

20.0 - 21.5' Sand - grey, fine to coarse grained, 10% silt.

Drove Hydropunch to completion depth of 30'

Collected water sample EVT-9508-317

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-07

Date Hole Started: 08/29/95 Date Hole Finished: 08/29/95

Project: ASEV01 - Everett Smelter Site

County: Snohomish

State: Weshingon

Legal Description:

Descriptive Location: BN Property East of tracks

Recorded By: Rens Verberg

Drilling Company: Hydrometrics

Driller: Pat Miller

Drilling Method: hollow stem auger/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		7.0 - 10.0, 22.0 - 25.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with paristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y		

Purpose of Hole: Soil and groundwater sampling

Target Aquifer: shallow fill and deeper alluvium

Hole Diameter (in): 4 1/2"

Total Depth Drilled (ft): 30.00

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; All soil sample numbers prefaced by EVT-9508-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	127	grab		0.20	0.0 - 0.2'		0.0 - 2.0' Gravelly Sand and Silt - dark brown, fine to coarse grained sand, rounded to angular gravel (ballast), wet, trace roots.
	128	ss	5,4,4	1.40	2.0 - 3.5'		2.0 - 5.0' Sand - light brown, well sorted, trace silt, moist, some oxidation staining, gradual color change to gray with depth.
5	129	ss	7,7,3	1.50	5.0 - 6.5'		5.0 - 10.0' Sand - gray, well sorted, trace silt, wet, water at 5 feet, heaving sands from 5 to 10 feet.
							Collected water sample EVT-9508-321
10	130	ss	20,30,5	1.35	10.0 - 11.5'		10.0 - 15.0' Sand - gray, fine grained, well sorted, slightly silty, wet, heaving sands.
15	131	ss	21, 41, 50/5"	1.20	15.0 - 16.0'		15.0 - 16.0' Sand - gray, fine grained, well sorted, slightly silty, wet, heaving sands.
							Drove Hydropunch to completion depth of 30'
20							
							Collected water sample EVT-9508-320
25							
30							

■ = Screened Interval

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HYDROMETRICS INC.

Consulting Scientists and Engineers
2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-08

Date Hole Started: 08/31/95 Date Hole Finished: 08/31/95

ject: ASEV01- Everett Smelter Sita
nty: Snohomish
State: Washingon
Legal Description:
Descriptive Location: BN Property East of tracks

Recorded By: Jeff Cross
Drilling Company: Hydrometrics
Driller: Pat Miller
Drilling Method: hollow stem auger/hydropunch
Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		5.0 - 8.0, 22.0 - 25.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y		

Purpose of Hole: Soil and groundwater sampling
Target Aquifer: shallow fill and deeper alluvium
Hole Diameter (in): 4 1/2"
Total Depth Drilled (ft): 25.00

Stetic Water Level Below MP: 0.00
Date: / /
MP Description:
MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00
Riser Height (ft): 0.00
Ground Surface Elevation (ft): 0.00
MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; All soil sample numbers prefaced by EVT-9508-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	150	grab		0.20	0.0 - 0.2'
	151	ss	6,6,5	1.20	2.9 - 3.5'
5	152	ss	2,2,1	1.00	5.0 - 6.5'
10	153	ss	1,1,1	1.20	10.0 - 11.5'
15	154	ss	1,2,1	1.50	15.0 - 16.5'
20					
25					

GRAPHICS

GEOLOGICAL DESCRIPTION

= Screened Interval

0.0 - 2.9' Gravelly Sand - Light brown, rounded and angular gravels.

2.9 - 5.0' Sand - Light brown, gray, coarse grained, trace silt, wet.

5.0 - 10.0' Sand - gray, coarse grained, trace silt, some wood debris, heaving sand.

Collected water sample EVT-9508-337

10.0 - 15.0' Silt - gray, trace sand, organic matter (roots, wood).

15.0 - 16.5' Silt - grey, trace sand, organic matter (roots, wood).

Drove Hydropunch to competion depth of 25'

Collected water sample EVT-9508-335

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-09

Date Hole Started: 08/31/95 Date Hole Finished: 08/31/95

ject: ASEV01-Everett Smelter Site

nty: Snohomish

State: Washingon

Legal Description:

Descriptive Location: BN Property near Weyerhaueser

Recorded By: Jeff Cross

Drilling Company: Hydrometrics

Driller: Pat Miller

Drilling Method: hollow stem auger/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		3.0 - 6.0, 22.0 - 25.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y		

Purpose of Hole: Soil and groundwater sampling

Target Aquifer: shallow fill and deeper alluvium

Hole Diameter (in): 4 1/2"

Total Depth Drilled (ft): 25.00

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer saal; All soil sample numbers prefaced by EVT-9508-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	141	grab		0.20	0.0 - 0.2'
	142	ss	5,5,5	1.50	2.0 - 3.5'
5	143	ss	3,2,2]	1.50	5.0 - 6.5'
10	144	ss	1,1,0	1.20	10.0 - 11.5'
15					
20					
25					

GRAPHICS

GEOLOGICAL DESCRIPTION

= Screened Interval

0.0 - 2.0' Gravelly Sand - brown grey, poorly sorted, rounded pebbles, abundant roots.

2.0 - 5.0' Sand - light brown, grey black, coarse grained, trace silt, wet.

Collect water sample EVT-9508-331

5.0 - 6.3' Sand - grey black, coarse grained, poorly sorted, trace silt.

6.3 - 10.0' Silt - grey brown, highly organic with wood and roots.

10.0 - 11.5' Silt - grey, trace sand, organic matter, roots, wood.

Drove hydropuch to completion depth of 25'

Collect water sample EVT-9508-330

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-10

Date Hole Started: 08/30/95 Date Hole Finished: 08/30/95

Project: ASEV01 Everett Smelter Site

County: Snohomish

State: Washingon

Legal Description:

Descriptive Location:

Recorded By: Jeff Cross

Drilling Company: Hydrometrics

Driller: Pat Miller

Drilling Method: hollow stem auger/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		3.0 - 6.0, 24.0 - 27.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y		

Purpose of Hole: Soil and groundwater sampling

Target Aquifer: shallow fill and deeper alluvium

Hole Diameter (in): 4 1/2"

Total Depth Drilled (ft): 27.00

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; All soil sample numbers prefaced by EVT-9508-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	136	grab		0.50	0.0 - 0.5'
	137	ss	1,2,4	0.75	2.0 - 3.5'
5	138	ss	4,3,2	1.00	5.0 - 6.5'
10	139	ss	3,3,3	1.50	10.0 - 11.5'
15	140	ss	1,2,3	1.50	15.0 - 16.5'
20					
25					

GRAPHICS

■ = Screened Interval

GEOLOGICAL DESCRIPTION

0.0 - 0.5' Gravelly Sand - brown grey, abundant roots, rounded pebbles, poorly sorted

2.0 - 5.0' Sand - light brown, coarse grained to 3'; 3 - 3.5' Black Grey coarse sand, wood debris; Wet

5.0 - 1.0' Sand - Black grey
Coarse to fine grained, Small rounded pebbles (5%) Heaving
Collect water sample EVT-9508-329

10.0 - 11.5' Sand - Black grey
Coarse grained, some silt; Heaving

15.0 - 16.5' Silt - Grey
Some medium to fine sand, Root material extensive; 16.3 to 16.5 Medium to coarse sand, very silty

Drove Hydropunch to completion depth of 27'

Collect water sample EVT-9508-328

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-11

Date Hole Started: 08/29/95 Date Hole Finished: 08/29/95

Project: ASEV01 Everett Smelter Site

unty: Snohomish

State: Washingon

Legal Description:

Descriptive Location: BN Property near Weyerhaueser

Recorded By: Jeff Cross

Drilling Company: Hydrometrics

Driller: Pat Miller

Drilling Method: hollow stem auger/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		3.0 - 6.0, 27.0 - 30.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y		

Purpose of Hole: Soil and groundwater sampling

Target Aquifer: shallow fill and deeper alluvium

Hole Diameter (in): 4 1/2"

Total Depth Drilled (ft): 30.00

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; All soil sample numbers prefaced by EVT-9508-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	~~132~~	~~grab~~		~~0.50~~	0.0 - 0.5'
	133	ss	1,1,2	0.75	2.0 - 3.5'
5	134	ss	1,1,2	0.90	5.0 - 6.5' Sampled Silt only
10	135	ss	1,1,1	1.50	10.0 - 11.5'
15					
20					
25					
30					

GRAPHICS

GEOLOGICAL DESCRIPTION

■ = Screened Interval

0.0 - 2.0' Gravelly Sand - brown grey, abundant roots, rounded pebbles, poorly sorted

2.0 - 5.0' Sand - light brown, coarse grained, minor gravel, trace of silt, gradual color change to grey with depth; Wet

Collect water sample EVT-9508-323

5.0 - 6.5' Silty Sand - Grey to 5' at 6' grey silt, root material; Wet

10.0 - 11.5' Silt - Grey, abundant wood fragments, trace sand; Moist

Drove Hydropunch to completion depth of 30'

Collect water sample EVT-9508-322

G474293 01/05/96 10:37:11

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-12

Date Hole Started: 09/01/95 Date Hole Finished: 09/01/95

Project: ASEV01 Everett Smelter Site

County: Snohomish

State: Washingon

Legal Description:

Descriptive Location: Lowland near Butler Street

Recorded By: Jeff Cross

Drilling Company: Hydrometrics

Driller: Pat Miller

Drilling Method: hollow stem auger/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		5.0 - 8.0, 17.0 - 20.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y		

Purpose of Hole: Soil and groundwater sampling

Target Aquifer: shallow fill and deeper alluvium

Hole Diameter (in): 4 1/2"

Total Depth Drilled (ft): 20.00

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; All soil sample numbers prefaced by EVT-9508-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	160	grab		0.50	0.0 - 0.5'
	161	ss	12,24,29	1.30	2.0 - 3.5'
5	162	ss	9,28,48	1.50	5.0 - 6.5'
10	163	ss	9,13,21	1.20	10.0 - 11.5'
15	164	ss	41,50/5.5"	1.00	15.0 - 16.5'
20					

GRAPHICS

GEOLOGICAL DESCRIPTION

■ = Screened Interval

0.0 - 0.5' Gravelly Sand - Light Brown, coarse with trace silt, well rounded pebbles, root mat

2.0 - 5.0' Sandy Silt - Light Brown to Grey, 10% gravels up to 1/2" rounded, some oxidation; Dry

5.0 - 10.0' Sandy Silt - Light Brown to Grey, 20% gravels up to 3/4" rounded, some oxidation

10.0 - 11.5' Sandy Silt - Grey; 10.5-10.75 coarse grey sand, trace silt; 10.75-11.25 grey sandy silt; 11.25-11.5 coarse grey sand, trace silt

11.5 - 16.5' Sand - Grey, coarse, trace silt; Wet

Drove Hydropunch to completion depth of 20'

Collect water sample EVT-9508-343

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-13

Date Hole Started: 08/31/95 Date Hole Finished: 08/31/13

Project: ASEV01 Everett Smelter Site

City: Snohomish

State: Washingon

Legal Description:

Descriptive Location: BN Property near Weyerhaueser

Recorded By: Jeff Cross

Drilling Company: Hydrometrics

Driller: Pat Miller

Drilling Method: hollow stem auger/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		3.0 - 6.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y		

Purpose of Hole: Soil and groundwater sampling

Target Aquifer: shallow fill and deeper alluvium

Hole Diameter (in): 4 1/2"

Total Depth Drilled (ft): 13.50

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; All soil sample numbers prefaced by EVT-9508-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	145	grab		0.50	0.0 - 0.5'
	146	ss	3,3,5	1.00	2.0 - 3.5'
5	147	ss	2,1,1	0.90	5.0 - 6.5'
10	148	ss	1,1,1	1.00	10.0 - 11.5'
	149	ss	1,1,1	1.50	12.0 - 13.5'
15					
20					
25					

GRAPHICS

= Screened Interval

GEOLOGICAL DESCRIPTION

0.0 - 0.5' Gravelly Sand - brown grey, abundant roots, rounded pebbles, poorly sorted

2.0 - 5.0' Sand - light brown, coarse grained, minor gravel, trace silt, organic material (roots), gradual color change to grey; Wet

Collect water sample EVT-9508-333

5.0 - 10.0' Sand - Grey, fine to coarse, trace silt
6.5' Grey silt, trace sand, organic material; Wet

10.0 - 12.0' Sand - Grey, fine to coarse, trace silt

12.0 - 13.5' Silt - Grey
Significant sand gradually becoming silt with trace of sand at 12.5'

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HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-14

Date Hole Started: 09/01/95 Date Hole Finished: 09/01/95

Project: ASEV01 Everett Smelter Site

County: Snohomish

State: Washingon

Legal Description:

Descriptive Location: BN Property East of tracks

Recorded By: Jeff Cross

Drilling Company: Hydrometrics

Driller: Pat Miller

Drilling Method: hollow stem auger/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		5.0 - 8.0, 17.0 - 20.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y		

Purpose of Hole: Soil and groundwater sampling

Target Aquifer: shallow fill and deeper alluvium

Hole Diameter (in): 4 1/2"

Total Depth Drilled (ft): 20.00

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; All soil sample numbers prefaced by EVT-9508-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION (■ = Screened Interval)
	155	grab		0.50	0.0 - 0.5'		0.0 - 2.0' Gravelly Sand - brown, rounded and angular gravels up to 3/4"
	156	ss	11,10,7	0.60	2.0 - 3.5'		2.0 - 5.0' Silty Sand - Black, lots of debris, metal shavings, small fragments of wire, a wood plug 1" long
5	157	ss	2,2,4	0.75	5.0 - 6.5'	5	5.0 - 10.0' Sand - Grey, Coarse sand, trace of silt; Wet Collect water sample EVT-9508-342
10	158	ss	1,1,1	0.75	10.0 - 11.5'	10	10.0 - 11.5' Sandy Silt - Grey, fine to medium grained sand and wood fibers Drove Hydropunch to completion depth of 20'
15	159	ss	1,1,1	0.50	15.0 - 16.5'	15	Collect water sample EVT-9508-343
20						20	

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HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-15

Date Hole Started: 12/05/95 Date Hole Finished: 12/05/95

Project: ASEV01 Everett Smelter Site

County: Snohomish

State: Washington

Legal Description:

Descriptive Location: BN Property East of tracks

Recorded By: Bill Thompson

Drilling Company: Hydrometrics, Inc

Driller: J Niederkorn

Drilling Method: Auger / Hydropunch

Drilling Fluids Used: None

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		3.0 - 6.0, 21.5 - 24.5
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	Y	Common ions, metals	
Boring Samples Taken?	Y		

Purpose of Hole: Hydropunch sampling

Target Aquifer: Shallow Fill and Deep Alluvial

Hole Diameter (in): 4 1/4"

Total Depth Drilled (ft): 28.00

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; All soil sample numbers prefaced by EVT-9508-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	100	Grab		0.50	0.0 - 0.5'
	101	SS	4,2,2	1.00	2.0 - 3.5'
5	102	SS	2,2,1	1.50	5.0 - 6.0'
10	103	SS	1,1,1	0.80	10.0 - 11.5'
15					
20					

GEOLOGICAL DESCRIPTION

= Screened Interval

0.0 - 2.0' Silty SAND and GRAVEL - Dark Brown
Damp

2.0 - 5.0' SAND - Light Grey Brown
Medium to Coarse; Moist

Water sample EVT-9512-301

5.0 - 6.0' Silty SAND - Dark Brown
~~Fine to coarse sand; Wet~~

6.0 - 11.5' Clayey SILT - Bluish Grey
Moist

Drove Hydropunch to completion depth of 24.5'; No cuttings recovered for lithologic description

Collected water sample EVI-9512-300

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-16

Date Hole Started: 12/07/95 Date Hole Finished: 12/07/95

ject: ASEV01 Everett Smelter Site

unty: Snohomish

State: Washington

Legal Description:

Descriptive Location: BN Property East of tracks

Recorded By: Bill Thompson

Drilling Company: Hydrometrics, Inc

Driller: J Niederkorn

Drilling Method: Auger / Hydropunch

Drilling Fluids Used: None

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		3.0 - 6.0, 24.0 - 27.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	Y	Common ions, metals	
Boring Samples Taken?	Y		

Purpose of Hole: Hydropunch sampling

Target Aquifer: Shallow Fill and Deep Alluvial

Hole Diameter (in): 4 1/4"

Total Depth Drilled (ft): 27.00

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; All soil sample numbers prefaced by EVT-9508-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	104	Grab		0.50	0.0 - 0.5'
	105	SS	5,4,4	1.00	2.0 - 3.5'
5	106	SS	1,1,2	0.80	5.0 - 6.5'
10	107	SS	1,1,1	1.00	10.0 - 11.5'
15	108	SS	1,1,1	1.00	15.0 - 16.5'
20					
25					

GRAPHICS

GEOLOGICAL DESCRIPTION

■ = Screened Interval

0.0 - 2.0' Silty SAND and GRAVEL - Dark Brown
Gravel form 1/4" to 3" diameter, well rounded
Dry

2.0 - 5.0' SAND - Light Brown
Medium to Coarse, Trace of gravel; Wet

5.0 - 8.0' Silty SAND, GRAVEL and Wood Chips - Very Dark Brown
Wet

8.0 - 16.5' Clayey SILT - Grey to Green
Contains some woody organic matter; Moist

Drove Hydropunch to completion depth of 27'; No cuttings recovered for lithologic description

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-17

Date Hole Started: 12/08/95 Date Hole Finished: 12/08/95

Project: ASEV01 Everett Smelter Site

County: Snohomish

State: Washington

Legal Description:

Descriptive Location: Smelter Site Lowland Area

Recorded By: Bill Thompson

Drilling Company: Hydrometrics, Inc

Driller: J Niederkorn

Drilling Method: Auger / Hydropunch

Drilling Fluids Used: None

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		3.0 - 6.0, 24.0 - 27.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	Y	Common ions, metals	
Boring Samples Taken?	Y		

Purpose of Hole: Hydropunch sampling

Target Aquifer: Shallow Fill and Deep Alluvial

Hole Diameter (in): 4 1/4"

Total Depth Drilled (ft): 27.00

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; All soil sample numbers prefaced by EVI-9508-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	109	Grab		0.50	0.0 - 0.5'
	110	SS	4,3,4	0.50	2.0 - 3.5'
5	111	SS	5,5,5	0.50	5.0 - 6.5'
10	112	SS	17,18,9	1.00	10.0 - 11.5'
15	113	SS	2,3,2	1.00	15.0 - 16.5'
20					
25					

GRAPHICS

= Screened Interval

GEOLOGICAL DESCRIPTION

0.0 - 2.0' Clayey Sandy SILT - Light Brown
Trace very fine grained sand, slightly clayey, Moist

2.0 - 11.4' SLAG - Black
Fine gravel sized angular fragments to 1" diameter, unconsolidated, Wet

Collected water sample EVT-9512-305

11.4 - 16.5' Clayey SILT - Grey to Green
Contains some woody organic matter; Moist

Drove Hydropunch to completion depth of 27'

Water sample EVT-9512-302 and EVT-9512-302

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-18

Date Hole Started: 12/11/95 Date Hole Finished: 12/11/95

Project: ASEV01 Everette Smelter Site

County: King

State: Washington

Legal Description:

Descriptive Location: Smelter Site Lowland Area

Recorded By: John Ruth

Drilling Company: Hydrometrics, Inc

Driller: Jim Smith

Drilling Method: Auger / Hydropunch

Drilling Fluids Used: None

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	Y		0.0 - 27.0
Surface Casing Used?	N		
Screen/Perforations?	Y		3.0 - 6.0, 24.0 - 27.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	Y	Common ions, metals	
Boring Samples Taken?	Y		

Purpose of Hole: Soil and water quality characterization

Target Aquifer: Shallow Fill and Deep Alluvial

Hole Diameter (in): 4 1/4"

Total Depth Drilled (ft): 27.00

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; All soil sample numbers prefaced by EVT-9508-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	114	Grab		0.50	0.0 - 0.5'
	115	SS	6,9,55	0.80	2.0 - 3.5'
5	116	SS	31,55/6	0.80	5.0 - 6.0' Split Spoon Refusal at 6 feet
10	117	SS	2,3,2	0.50	10.0 - 11.5' Poor Recovery
15	118	SS	1,2,3	0.50	15.0 - 16.5'
20					
25					

GRAPHICS

= Screened Interval

GEOLOGICAL DESCRIPTION

0.3 - 2.0' Clayey Sandy SILT -
Light Brown
Trace very fine grained sand, sticky in part, Very Moist to Wet

2.0 - 6.0' SLAG -
Black
Fine to coarse grained sand size, Moderately to poorly sorted,
Unconsolidated, 15% quartz sand, Wet, Oily odor

Water sample EVI-9512-307 collected from 3-6 feet

10.0 - 16.5' Clayey SILT -
Bluish Grey
Slightly clayey and sticky, abundant wood fragments, Moist

Drove Hydropunch to completion depth of 27'

Water sample EVI-9512-306 collected from depth of 24-27 feet

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-19

Date Hole Started: 12/12/95 Date Hole Finished: 12/12/95

Project: ASEV01 Everett Smelter Site

County: Snohomish

State: Washingon

Legal Description:

Descriptive Location: Smelter Site Lowland Area

Recorded By: John Ruth

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: hollow stem auger/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		5.0 - 8.0, 24.0 - 27.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y		

Purpose of Hole: Soil and groundwater sampling

Target Aquifer: shallow fill and deeper alluvium

Hole Diameter (in): 4 1/4"

Total Depth Drilled (ft): 27.00

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

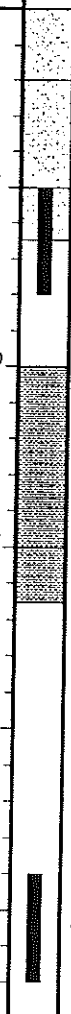
Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; All soil sample numbers prefaced by EVT-9508-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	119	grab		0.00	0.0 - 0.5'
	120	SS	10,22,50	0.70	2.0 - 3.5'
5	121	SS	3,5,5	1.00	5.0 - 6.5'
10	122	SS	2,2,2	1.50	10.0 - 11.5'
15	123	SS	3,2,3	1.50	15.0 - 16.5'
20					
25					



GEOLOGICAL DESCRIPTION

■ = Screened Interval

0.0 - 2.0' Clayey Sand - light brown, light grey, trace gravel, places of iron and pipe, oily odor, wet.

2.0 - 5.0' Clayey Sand - Light grey, fine grained, black from 3.0-3.5, black sand appears to be slag, wet.

5.0 - 6.5' Clayey Sand - Light grey, olive grey, fine to very fine grained, wet, abundant organic debris and wood fragments from 6.0 to 6.5.

Collected water sample EVT-9512-310

10.0 - 15.0' Clayey Silt - light grey, trace very fine grained sand, abundant light brown woody fragments, trace black organic debris.

15.0 - 16.5' Clayey Silt - as above, abundant fine grained sand from 15.5 to 16.0, abundant woody fragments.

Drove Hydropunch to completion depth of 27'

Collected water sample EVT-9512-309

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-20

Date Hole Started: 12/13/95 Date Hole Finished: 12/13/95

Project: ASEV01 Everett Smelter Site

County: Snohomish

State: Washingon

Legal Description:

Descriptive Location: Smelter Site Lowland Area

Recorded By: John Ruth

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: hollow stem auger/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		5.0 - 8.0, 25.0 - 28.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y		

Purpose of Hole: Soil and groundwater sampling

Target Aquifer: shallow fill and deeper alluvium

Hole Diameter (in): 4 1/4"

Total Depth Drilled (ft): 28.00

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; All soil sample numbers prefaced by EVT-9508-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	124	grab		0.00	0.0 - 0.5'
	125	SS	56, 11, 7	0.90	2.0 - 3.5'
5	126	SS	5,3,3	1.00	5.0 - 6.5'
10	127	SS	1,1,1	1.00	10.0 - 11.5'
15	128	SS	2,2,2	1.50	15.0 - 16.5'
20					

GRAPHICS

= Screened Interval

GEOLOGICAL DESCRIPTION

0.0 - 2.0' Clayey Sand - Dark brown, fine to coarse grained, 10% small rounded pebbles, poorly sorted, very moist.

2.0 - 3.5' Sand - Grey, fine grained, trace medium to coarse grained, moderately to well sorted, dry, 15% gravel from 2.0 to 2.5 feet, moist.

5.0 - 6.5' Slag - Black, fine to very fine grained sand size, granular, small very rounded beads, unconsolidated, very moist to wet.

Collected water sample EVT-9512-312

10.0 - 15.0' Clayey Silt - Greenish grey, black, organic, abundant woody fragments, trace very fine grained sand, black slag as above from 10.0 to 10.5 feet, silt is moist, slightly sticky.

15.0 - 16.5' Clayey Silt - Light olive grey, brown in part, abundant organic debris, moist, sticky.

Drove Hydropunch to completion depth of 28'

Collected water sample EVT-9512-311

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-21

Date Hole Started: 12/14/95 Date Hole Finished: 12/15/95

ject: ASEV01 Everett Smelter Site

unty: Snohomish

State: Washingon

Legal Description:

Descriptive Location: Smelter Site Lowland Area

Recorded By: John Ruth

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: hollow stem auger/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		5.0 - 7.5, 25.0 - 28.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y		

Purpose of Hole: Soil and groundwater sampling

Target Aquifer: shallow fill and deeper alluvium

Hole Diameter (in): 4 1/4"

Total Depth Drilled (ft): 28.00

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

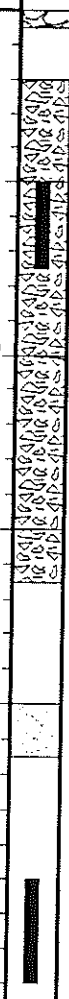
Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluviel aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; All soil sample numbers prefaced by EVT-9508-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	129	grab		0.00	0.0 - 0.5'
	130	SS	80, 33, 18	1.00	2.0 - 3.5'
5	131	SS	12, 14, 14	1.20	5.0 - 6.5'
10	132	SS	13, 15, 8	0.90	10.0 - 11.5'
15	133	SS	19, 21, 15	1.10	15.0 - 16.5'
20	134	SS	8, 13, 25	1.20	20.0 - 21.5'

GRAPHICS



GEOLOGICAL DESCRIPTION

■ = Screened Interval

0.0 - 0.5' Sand and Gravel - Brown, fine to coarse grained sand, gravel to 1-inch in size, unconsolidated, wet.

2.0 - 5.0' Slag - Black, fine gravel size, 1/4 to 2.0 inches in size, angular, grading to sand size, fine to coarse grained sand size from 3.0 to 3.5 feet, unconsolidated, wet.

5.0 - 10.0' Slag - as above, black, predominantly fine to medium gravel size, 20% fine to coarse grained sand size, unconsolidated, wet.

Collected water sample EVT-9512-314

10.0 - 15.0' Slag - as above, primarily gravel size, 1/4 to 1 inch in size, unconsolidated.

15.0 - 16.5' Slag - as above, 1/4 to 1 inch gravel size, 20% fine to coarse grained sand size.

20.0 - 21.5' Sand - grey, very fine to fine grained, moderately to well sorted, unconsolidated, wet, wood fragments from 21.0 to 21.5 feet.

Drove Hydropunch to completion depth of 28'

Collected water sample EVT-9512-315

HYDROMETRICS INC.

Consulting Scientists and Engineers
2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-23

Date Hole Started: 12/15/95 Date Hole Finished: 12/15/95

Project: ASEV01 Everett Smelter Site
County: Snohomish
State: Washingon
Legal Description:
Descriptive Location: Smelter Site Lowland Area

Recorded By: John Ruth
Drilling Company: Hydrometrics
Driller: Jim Neiderkorn
Drilling Method: hollow stem auger/hydropunch
Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		25.0 - 28.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y		

Purpose of Hole: Soil and groundwater sampling
Target Aquifer: shallow fill and deeper alluvium
Hole Diameter (in): 4 1/4"
Total Depth Drilled (ft): 28.00

Static Water Level Below MP: 0.00
Date: / /
MP Description:
MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00
Riser Height (ft): 0.00
Ground Surface Elevation (ft): 0.00
MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; All soil sample numbers prefaced by EVI-9508-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	135	grab		0.00	0.0 - 0.5'		= Screened Interval 0.0 - 0.5' Clayey Sand - Dark brown, very fine to fine grained, silty, clayey, wet. No Sample - Hard drilling, drilling in cobbles.
5	136	SS	28, 14, 16	1.30	5.0 - 6.5'	5	5.0 - 10.0' Slag - Black, predominantly fine gravel size, 1/4 to 1.0 inches in size, fine to medium grained sand size from 5.0 to 5.5 feet, angular, wet.
10	137	SS	13, 23, 20	1.20	10.0 - 11.5'	10	10.0 - 11.5' Slag - as above, black, fine gravel size, angular, 10% yellow angular fragments that are coarse grained sand size, wet.
15	138	SS	6,6,9	1.50	15.0 - 16.5'	15	15.0 - 16.5' Clayey Silt - Dark olive green, clayey, abundant wood fragments, moist. Drove Hydropunch to completion depth of 28'
20						20	
						25	Collected water sample EVT-9512-318

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYOROPUNCH LOG

Hole Name: HP-24

Date Hole Started: 01/08/96 Date Hole Finished: 01/08/96

Project: ASEV01 Everett Smelter Site

County: Snohomish State: Washington

Legal Description:

Descriptive Location: Smelter Site Lowland Area

Recorded By: Bill Thompson

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: hollow stem auger/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		5.0 - 8.0, 23.0 - 27.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y	analysis for arsenic and metals	

Purpose of Hole: Soil and groundwater sampling

Target Aquifer: Shallow fill and deeper alluvium

Hole Diameter (in): 4 1/4"

Total Depth Drilled (ft): 27.00

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; All soil sample numbers prefaced by EVT-9508-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	140	grab		0.00	0.0 - 0.5' 0-6"
	141	SS	9,9,7	1.50	2.0 - 3.5' 2-3.5"
5	142	SS	5,3,3	1.00	5.0 - 6.5' 5-6.5'
10	144	SS	1,1,1	1.00	10.0 - 11.5' 10-11.5'
15	143	SS	2,2,2	1.50	15.0 - 16.5' 15-16.5' Drove Hydropunch to completion depth at 27 ft.
20					
25					

GRAPHICS

= Screened Interval

GEOLOGICAL DESCRIPTION

0.0 - 1.0' Organic Loam - Brown, little F-M Gravel, Damp

1.0 - 2.0' Silty Sand & Gravel - Grey, fine grained, trace medium to ~~coarse grained, moderately to well sorted, dry, 15% gravel~~

2.0 - 4.0' Sandy Silt - Blue Gray, some brown mottling, trace of fine Gravel, grades to Clayes Silt at 3 ft. Damp

4.0 - 11.5' Slag - Black, fine to medium sand, v.well rounded. Wet

Collected Water Sample EVT-9601-321

11.5 - 16.5' Clayey Silt - Gray/brown. Moist

Clayey Silt - Gray Green with abundant woody organic matter throughout. Moist.

Collected Water Sample EVT-9601-365

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-25

Date Hole Started: 01/09/96 Date Hole Finished: 01/09/96

Project: ASEV01 Everett Smelter Site

County: Snohomish

State: Washington

Legal Description:

Descriptive Location: Smelter Site Lowland Area

Recorded By: Bill Thompson

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: hollow stem auger/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		5.0 - 8.0, 23.5 - 26.5
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y	analysis for arsenic and metals	

Purpose of Hole: Soil and groundwater sampling

Target Aquifer: shallow fill and deeper alluvium

Hole Diameter (in): 4 1/4"

Total Depth Drilled (ft): 26.50

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; All soil sample numbers prefaced by EVT-9601-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	145	grab		0.00	0.0 - 0.5'
	146	ss	14,5,8	1.50	2.0 - 3.5'
5	147	ss	4,1,1	0.50	5.0 - 6.5'
10	148	ss	1,1,1	1.50	10.0 - 11.5'
15		ss	1,1,1	0.00	15.0 - 16.5'
20					
25					

GRAPHICS

GEOLOGICAL DESCRIPTION

■ = Screened Interval

0.0 - 1.0'

Sand and Gravel - Silty, (road grade).

1.0 - 10.3'

Sand - light brown, medium grained, well sorted.

Sand - light brown, medium grained with 2" gravel layer, gravel is fine to medium grained and well rounded.

Collected water sample EVT-9601-327 at 5-8'

10.3 - 18.5

Sand - light brown, trace silt then transition to brown clayey silt with some woody organic matter.

No Recovery

Augered to 15 feet. Drove hydropunch to completion depth of 26.5

Collected water sample EVT-9601-326 at 23-26'.

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-26

Date Hole Started: 01/10/96 Date Hole Finished: 01/10/96

bject: ASEV01 Everett Smelter Site

County: Snohomish

State: Washingon

Legal Description:

Descriptive Location: Smelter Site Lowland Area

Recorded By: Bill Thompson

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: hollow stem auger/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		5.0 - 8.0, 22.5 - 24.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y	analysis for arsenic and metals	

Purpose of Hole: Soil and groundwater sampling

Target Aquifer: shallow fill and deeper alluvium

Hole Diameter (in): 4 1/4"

Total Depth Drilled (ft): 24.00

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; All soil sample numbers prefaced by EVT-9601-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	149	grab		0.00	0.0 - 0.5'
	150	ss	17,18,33	0.80	2.0 - 3.5'
5	151	ss	5,15,9	0.80	5.0 - 6.5'
10	152	ss	17,25,9	0.60	10.0 - 11.5'
15	153	ss	14,4,5	0.70	15.0 - 16.5'
20	154	ss	4,4,10	0.00	20.0 - 21.5'

GEOLOGICAL DESCRIPTION

■ = Screened Interval

0.0 - 0.5' Sand - dark brown, organic rich, large amount of root material,10% slag mix.

Slag - black, angular, fine to medium gravel size fragments.

Slag - as above, black, with some sand size fragments, wet.

Collected water sample EVT-9601-329 from 5-8'.

Slag - predominantly silt to sand size with a few gravel size fragments in tip of spoon.

11.5 - 21.5'

Silty Sand - dark gray, trace of gravel, trace of root matter, wet, gravel to one inch, rounded.

Augered to 20 feet. Drove hydropunch to completion depth of 24 feet.

Silty Sand - dark gray, trace gravel end root matter.

Collected water sample EVT-9601-328 at 22.5 to 24'.

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-27

Date Hole Started: 01/11/96 Date Hole Finished: 01/11/96

Project: ASEV01 Everett Smelter Site

County: Snohomish

State: Washingon

Legal Description:

Descriptive Location: Smelter Site Lowland Area

Recorded By: Bill Thompson

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: hollow stem auger/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		5.0 - 8.0, 23.0 - 26.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y	analysis for arsenic and metals	

Purpose of Hole: Soil and groundwater sampling

Target Aquifer: shallow fill and deeper alluvium

Hole Diameter (in): 4 1/4"

Total Depth Drilled (ft): 26.00

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; All soil sample numbers prefaced by EVT-9601-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION (■ = Screened Interval)
	155	grab		0.00	0.0 - 0.5'		Silty Sand and Gravel - gray brown, (grade fill).
							1.0 - 11.0'
	156	ss	2,7,7	1.50	2.0 - 3.5'		Sand - gray, medium to coarse grained, wet.
5	157	ss	1,1,1	1.50	5.0 - 6.5'	5	Sand - gray, medium to coarse grained, well sorted, wet.
							Collected water sample EVT-9601-330 at 5-8'.
10	158	ss	1,1,1	1.50	10.0 - 11.5'	10	Sand - gray, fine to coarse grained, contact with gray silt at 11 feet.
							11.0 - 20.0'
15	159	ss	3,1,1	1.00	15.0 - 16.5'	15	Clayey Silt - grey green, contains some woody organic materiel, moist.
							Augered to 15 feet. Drove hydropunch to completion depth of 26 feet.
20						20	
							Collected water sample EVT-9601-331 at 23-26'.
25						25	

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-28

Date Hole Started: 01/11/96 Date Hole Finished: 01/11/96

cc ASEV01 Everett Smelter Site

County: Snohomish

State: Washingon

Legal Description:

Descriptive Location: Smelter Site Lowland Area

Recorded By: Bill Thompson

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: hollow stem auger/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		5.0 - 8.0, 25.0 - 28.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y	analysis for arsenic and metals	

Purpose of Hole: Soil and groundwater sampling

Target Aquifer: shallow fill and deeper alluvium

Hole Diameter (in): 4 1/4"

Total Depth Drilled (ft): 28.00

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; All soil sample numbers prefaced by EVT-9601-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
							■ = Screened Interval
	161	grab		0.00	0.0 - 0.5'		0.0 - 3.8'
							Silty Sand and Gravel - brown, (grade fill).
	162	ss	6,8,8	0.30	2.0 - 3.5'		Silty Sand and Gravel - as above, (grade fill).
							3.8 - 12.5'
5	163	ss	6,4,3	0.40	5.0 - 6.5'	5	Sand - light gray, fine to medium grained, trace silt, trace gravel, gravel is one-inch in diameter, rounded, includes brick fragments, wet.
							Collected water sample EVT-9601-332 at 5-8'.
10	164	ss	1,1,1	1.50	10.0 - 11.5'	10	Sand - light gray, medium grained, well sorted, wet.
							12.5 - 16.5'
15	165	ss	2,3,3	1.50	15.0 - 16.5'	15	Silt - gray green, trace clay, woody organic material throughout.
							Augered to 15 feet. Drove hydropunch to completion depth of 28 feet.
20						20	
						25	Collected water sample EVT-9601-333 at 25-28'.

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-29

Date Hole Started: 01/19/96 Date Hole Finished: 01/19/96

Project: ASEV01 Everett Smelter Site

County: Snohomish

State: Washingon

Legal Description:

Descriptive Location: Transect #1

Recorded By: WR Wilson

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: hollow stem auger/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		5.0 - 8.0, 22.0 - 26.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y	Arsenic, Cadmium and Lead	

Purpose of Hole: Soil and groundwater sampling

Target Aquifer: shallow fill and deeper alluvium

Hole Diameter (in): 4 1/4"

Total Depth Drilled (ft): 26.00

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surfece Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to complation depth in deeper alluvial aquifer; After watar sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; Soil names based on modified USCS soil classification system; Bottom of silt contact determined by penetration rate of Hydropunch; All soil sample numbers prefaced by EVT-9601-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	~~165, 166 dup~~	~~grab~~		~~0.60~~	0.0 - 0.5'
	167	SS	21,26,23	0.90	2.0 - 3.5'
5	168	SS	2/1', 1	0.30	5.0 - 6.5'
10	169	SS	3,1,1	0.20	10.0 - 11.5'
15	170	SS	3,5,5	0.30	15.0 - 16.5' Sluffed sand in spoon, silt in shoe Drove Hydropunch to completion depth of 26'
20					
25					
30					

GRAPHICS

■ = Screened Interval

0.0 - 5.0' Gravelly SAND - 0.3' of Asphalt cover
Dark Grey
Sand ~70%, very fine to very coarse, subrounded opaque quartz and dark lithics; Gravel ~25%, fine to coarse, rounded, max dia. 1-2"; Silt ~5%; Dense to Very Dense; Moist to Wet
[Fill]

Water Table @ ~2'

5.0 - 12.0' Silty SAND with Gravel - Dark Grey
Sand ~70%, very fine to very coarse, subrounded opaque quartz and dark lithics; Silt ~20%; Grevel ~10%, fine to medium, rounded; Loose to Very Loose; Wet
[Fill]

Collected Water Sample EVT-9601-338

12.0 - 18.0' SILT - Grey Brown
Moderately plastic, grey and brown mottles common, abundant root fibers and woody organic material, <5% very fine to fine sand; Soft; Wet
[Silt Confining Layer]

18.0 - 26.0' Alluvial Sands

Collected water sample EVT-9601-337

G126921 01/31/96 10:33:48

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-30

Date Hole Started: 01/18/96 Date Hole Finished: 01/18/96

Project: ASEV01 Everett Smelter

County: Snohomish

State: Washingon

Legal Description:

Descriptive Location: North end of transect #1

Recorded By: WR Wilson

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: hollow stem auger/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		3.0 - 5.5, 24.0 - 27.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y	Arsenic, Cadmium and Lead	

Purpose of Hole: Soil and groundwater sampling

Target Aquifer: shallow fill and deeper alluvium

Hole Diameter (in): 4 1/4"

Total Depth Drilled (ft): 27.00

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layar and then driving Hydropunch to completion depth in deeper alluvial aquifer; Aftar water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; Soil names based on modifiad USCS soil classification system; Bottom of silt contact detarmined by penetration rate of Hydropunch; All soil sample numbers prefaced by EVT-9601-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	171	grab		0.50	0.5 - 1.0'
	172	SS	6,4,5	0.10	2.0 - 3.5'
5	173	SS	1,1,1	1.50	5.0 - 6.5'
	174	SS	1/1',1	1.50	8.0 - 9.5' Drove Hydropunch to completion depth of 27'
10					
15					
20					
25					
30					

GRAPHICS

= Screened Interval

GEOLOGICAL DESCRIPTION

0.0 - 5.5' Gravelly SAND - 0.5' of Asphalt cover
Dark Grey
Sand ~70%, fine to very coarse, subrounded opaque quartz and dark lithics; Gravel ~25%, fine to medium, rounded, max dia. 1"; Silt ~5%; Medium Dense; Moist to Wet
[Fill]

Collected Water Sample EVT-9601-340

5.5 - 14.0' SILT - Grey Brown
Moderately plastic, grey and brown mottles common, abundant root fibers and woody organic material, <5% very fine to fine sand; Soft; Wet
[Silt Confining Layer]

14.0 - 27.0' [Alluvial Sands]

Collected water sample EVT-9601-339

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-31

Date Hole Started: 01/19/96 Date Hole Finished: 01/19/96

Project: ASEV01 Everett Smelter

County: Snohomish

State: Washingon

Legal Description:

Descriptive Location: Transect #1

Recorded By: WR Wilson

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: hollow stem auger/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		3.0 - 6.0, 23.0 - 26.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y	Arsenic, Cadmium and Lead	

Purpose of Hole: Soil and groundwater sampling

Target Aquifer: shallow fill and deeper alluvium

Hole Diameter (in): 4 1/4"

Total Depth Drilled (ft): 26.00

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; Soil names based on modified USCS soil classification system; Bottom of silt contact determined by penetration rate of Hydropunch; All soil sample numbers prefaced by EVT-9601-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	~~175~~	~~grab~~		~~0.50~~	0.0 - 0.5'
	176	SS	6,11,10	1.10	2.0 - 3.5'
5	177	SS	3,2,1	0.60	5.0 - 6.5'
	178	SS	2/1',1	1.10	8.0 - 9.5' Sheen on water during purge of shallow aquifer
10					Drove Hydropunch to completion depth of 26'
15					
20					
25					
30					

GRAPHICS

= Screened Interval

GEOLOGICAL DESCRIPTION

0.0 - 2.0' SAND - Dark Brown
Sand 95%, medium to coarse, moderately sorted; Gravel 5%, fine rounded; Loose; Moist to Wet

2.0 - 6.0' Gravelly SAND with Silt - Very Dark Grey
Sand ~60%, very fine to very coarse, subrounded opaque quartz and dark lithics; Gravel ~30%, fine to medium, rounded; Silt 10%; Medium Dense; Wet
[Fill] Water Table at ~2-3'
Collected Water Sample EVT-9601-342

6.0 - 14.0' SILT - Grey Brown
Moderately plastic, grey and brown mottles common, abundant root fibers and woody organic material, <5% very fine to fine sand; Soft; Wet
[Silt Confining Layer]

14.0 - 26.0' [Alluvial Sands]

Collected water sample EVT-9601-341

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-32

Date Hole Started: 01/20/96 Date Hole Finished: 01/20/96

Project ASEV01 Everett Smelter

County: Snohomish

State: Washingon

Legal Description:

Descriptive Location: Transect #1

Recorded By: WR Wilson

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: hollow stem auger/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		2.0 - 5.0, 22.0 - 25.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y	Arsenic, Cadmium and Lead	

Purpose of Hole: Soil and groundwater sampling

Target Aquifer: shallow fill and deeper alluvium

Hole Diameter (in): 4 1/4"

Total Depth Drilled (ft): 25.50

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer saal; Soil names based on modified USCS soil classification system; Bottom of silt contact determined by penetration rate of Hydropunch; All soil sample numbers prefaced by EVT-9601-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	~~179~~	~~grab~~		~~0.60~~	0.0 - 0.5' Obstruction kicking auger over
	180	SS	35,50/4"	0.40	2.0 - 3.5' Spoon refusal on soft (wood?) obstruction Timber filling spoon
5	181	SS	1,2,1	1.30	5.0 - 6.5'
		SS	1/9",1/7"	1.40	8.0 - 9.5' Did not collect sample of silt
10					Drove Hydropunch to completion depth of 25.5
15					
20					
25					
30					

GRAPHICS

= Screened Interval

GEOLOGICAL DESCRIPTION

0.0 - 5.2' SAND - Dark Brown
Sand 95%, medium to coarse, moderately sorted; Gravel 5%, fine, rounded; Very Loose; Moist
[Fill]

Water Table @ ~2'

Collected Water Sample EVT-9601-344

5.2 - 14.0' SILT - Grey Brown
Moderately plastic, grey and brown mottles common, abundant root fibers and woody organic material, <5% very fine to fine sand; Soft; Wet
[Silt Confining Layer]

14.0 - 25.5' [Alluvial Sands]

Collected water sample EVT-9601-343

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-33

Date Hole Started: 01/20/96 Date Hole Finished: 01/20/96

oject ASEV01 Everett Smelter

County: Snohomish

State: Washingon

Legal Description:

Descriptive Location: Transect #2

Recorded By: WR Wilson

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: hollow stem auger/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		3.0 - 6.0, 22.0 - 25.5
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y	Arsenic, Cadmium and Lead	

Purpose of Hole: Soil and groundwater sampling

Target Aquifer: shallow fill and deeper alluvium

Hole Diameter (in): 4 1/4"

Total Depth Drilled (ft): 25.50

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt leyer seal; Soil names based on modified USCS soil classification system; Bottom of silt contact determined by penetration rate of Hydropunch; All soil sample numbers prefaced by EVT-9601-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	~~182~~	~~grab~~		~~0.50~~	0.0 - 0.5' Duplicate soil sample 183, 0815
	184	SS	10,20,17	0.60	2.0 - 3.5' Timber filling 0.4' of spoon
5		SS	13,11,16	0.00	5.0 - 6.5' Large angular gravel blocked shoe - no sample recovery
	185	SS	5,2,1	1.10	8.0 - 9.5' Heavy sheen and petrolium odor on spoon and sample
10					Drove Hydropunch to completion depth of 25.5
15					
20					
25					
30					

GRAPHICS

■ = Screened Interval

GEOLOGICAL DESCRIPTION

0.0 - 8.0' Wood Chips and Demolition Wastes - 2-3" diameter angular gravels as road balast; wood chips and various demolition debris

Collected Water Sample EVT-9601-346

8.0 - 17.0' SILT - Grey Brown
Moderately plastic, grey and brown mottles common, abundant root fibers and woody organic material, <5% very fine to fine sand; Soft; Wet
[Silt Confining Layer]

17.0 - 25.5' [Alluvial Sands]

Collected water sample EVT-9601-345

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-34

Date Hole Started: 01/20/96 Date Hole Finished: 01/20/95

Project: ASEV01 Everett Smelter

County: Snohomish

State: Washingon

Legal Description:

Descriptive Location: Transect #2

Recorded By: WR Wilson

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: hollow stem auger/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Usad?	N		
Screen/Perforations?	Y		3.0 - 6.0, 22.0 - 25.5
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y	Arsenic, Cadmium and Lead	

Purpose of Hole: Soil and groundwater sampling

Target Aquifer: shallow fill and deeper alluvium

Hole Diameter (in): 4 1/4"

Total Depth Drilled (ft): 25.50

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and than driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removel to maintain the integrity of silt layer seal; Soil names based on modified USCS soil classification system; Bottom of silt contact determined by penetration rate of Hydropunch; All soil sample numbers prefaced by EVT-9601-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	~~186~~	~~grab~~		~~0.50~~	0.0 - 0.5'
	187	SS	5,3,3	1.10	2.0 - 3.5'
5	188	SS	1,4,2	1.30	5.0 - 6.5'
	189	SS	1,3,1	1.50	8.0 - 9.5' Drove Hydropunch to completion depth of 25.5'
10					
15					
20					
25					
30					

GRAPHICS

GEOLOGICAL DESCRIPTION

■ = Screened Interval

0.0 - 1.0' Demolition Wastes

1.0 - 6.0' Silty SAND - Dark Grey
Sand ~70%, medium to coarse, subrounded opaque quartz and dark lithics; Silt ~15%; Gravel ~5%, fine, rounded; Loose; Wet
(SW)
Water Table @ ~2'

Collected Water Sample EVT-9601-348

6.0 - 15.0' SILT - Grey Brown
Moderately plastic, grey and brown mottles common, abundant root fibers and woody organic material, <5% very fine to fine sand; Soft; Wet
[Silt Confining Layer]

15.0 - 25.5' [Alluvial Sand]

Collected water sample EVT-9601-347

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-35

Date Hole Started: 01/21/96 Date Hole Finished: 01/21/96

'roject: ASEV01 Everett Smelter

County: Snohomish

State: Washingon

Legal Description:

Descriptive Location: Transect #3

Recorded By: WR Wilson

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: hollow stem auger/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		22.0 - 25.5
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y	Arsenic, Cadmium and Lead	

Purpose of Hole: Soil and groundwater sampling

Target Aquifer: shallow fill and deeper alluvium

Hole Diameter (in): 4 1/4"

Total Depth Drilled (ft): 25.50

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; Soil names based on modified USCS soil classification system; Bottom of silt contact determined by penetration rate of Hydropunch; All soil sample numbers prefaced by EVT-9601-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	~~190~~	~~grab~~		~~0.60~~	0.0 - 0.5'
	191	SS	5,6,4	1.30	2.0 - 3.5'
5		SS	1,1,1	0.00	5.0 - 6.5' Formation did not produce sufficient water to collect shallow aquifer water sample
	192	SS	1,1,2	1.30	8.0 - 9.5' Drove Hydropunch to completion depth of 25.5'
10					
15					
20					
25					
30					

GRAPHICS

= Screened Interval

GEOLOGICAL DESCRIPTION

0.0 - 2.5' Silty GRAVEL with Sand - Dark Greyish Brown
Gravel ~60%, fine to coarse, rounded; Silt 25%; Sand 15%, medium to coarse; Loose; Moist to Wet
[Fill] Water table ~2'

2.5 - 8.5' Sandy SILT with Gravel - Dark Greyish Brown
Silt ~65%, olive grey mottles; Sand ~20%, very fine to coarse; Gravel ~15%, fine, rounded; Soft; Wet
[Fill]

8.5 - 16.0' SILT - Grey Brown
Moderately plastic, grey and brown mottles common, abundant root fibers and woody organic material, <5% very fine to fine sand; Soft; Wet
[Silt Confining Layer]

16.0 - 25.5' [Alluvial Sands]

Collected water sample EVT-9601-349

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-36

Date Hole Started: 01/22/96 Date Hole Finished: 01/22/96

Project: ASEV01 Everett Smelter

County: Snohomish

State: Washington

Legal Description:

Descriptive Location: Transect #3

Recorded By: WR Wilson

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: hollow stem auger/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		23.0 - 26.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y	Arsenic, Cadmium and Lead	

Purpose of Hole: Soil and groundwater sampling

Target Aquifer: shallow fill and deeper alluvium

Hole Diameter (in): 4 1/4"

Total Depth Drilled (ft): 26.00

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; Soil names based on modified USCS soil classification system; Bottom of silt contact determined by penetration rate of Hydropunch; All soil sample numbers prefaced by EVT-9601-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	~~193~~	~~grab~~		~~0.50~~	0.0 - 0.5' Duplicate soil sample 194, 0830
		~~SS~~	~~20,49/1"~~	~~0.00~~	7.0 - 7.5'
	195	SS	4,4,5	0.50	12.0 - 13.5' Drove Hydropunch to completion depth of 26'

GRAPHICS

■ = Screened Interval

GEOLOGICAL DESCRIPTION

0.0 - 2.0' Wood Chips - Chips with minor sand and gravel mixed (Fill)

2.0 - 12.0' Concrete Slab and Rubble -

12.0 - 17.0' SILT - Grey Brown
Moderately plastic, grey and brown mottles common, abundant root fibers and woody organic material, <5% very fine to fine sand; Soft; Wet
[Silt Confining Layer]

17.0 - 26.0' [Alluvial Sands]

Collected water sample EVT-9601-337

G216440 01/31/96 12:06:59

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-37

Date Hole Started: 01/22/96 Date Hole Finished: 01/22/96

Project: ASEV01 Everett Smelter

County: Snohomish

State: Weshingon

Legal Description:

Descriptive Location: Transect #1

Recorded By: WR Wilson

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: hollow stem auger/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		3.0 - 6.0, 23.0 - 25.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y	Arsenic, Cadmium and Lead	

Purpose of Hole: Soil and groundwater sampling

Target Aquifer: shallow fill and deeper alluvium

Hole Diameter (in): 4 1/4"

Total Depth Drilled (ft): 25.00

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; Soil names based on modified USCS soil classification system; Bottom of silt contact determined by penetration rate of Hydropunch; All soil sample numbers prefaced by EVT-9601-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	~~196~~	~~grab~~		~~0.50~~	0.0 - 0.5'
	197	SS	6,8,8	1.30	2.0 - 3.5'
5	198	SS	1,1,1	1.20	5.0 - 6.5'
		SS	1,1,1	1.50	8.0 - 9.5' Did not collect sample of silt
10					Drove Hydropunch to completion depth of 25'
15					
20					
25					
30					

GRAPHICS

GEOLOGICAL DESCRIPTION

■ = Screened Interval

0.0 - 2.5' SAND - Dark Yellowish Brown
Sand ~90%, medium to coarse, subangular; Gravel ~10%, fine, rounded; Silt <5%; Loose; Wet Water @ 2-3'
[Fill]

2.5 - 5.5' Gravelly SAND - Dark Grey
Sand ~80%, medium to coarse, subrounded opaque quertz and dark lithics; Gravel ~15%, fine to medium, rounded; Silt ~5%; Medium Dense; Wet [Fill]
~~Collected Water Sample EVT-9601-355~~

5.5 - 15.0' SILT - Grey Brown
Moderetely plastic, grey and brown mottles common, abundant root fibers and woody organic material, <5% very fine to fine sand; Soft; Wet
[Silt Confining Layer]

15.0 - 25.0' [Alluvial Sands]

Collected water sample EVT-9601-354

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-38

Date Hole Started: 01/23/96 Date Hole Finished: 01/23/96

roject: ASEV01 Everett Smelter
County: Snohomish
State: Washingon
Legal Description:
Descriptive Location: Transect #2

Recorded By: WR Wilson
Drilling Company: Hydrometrics
Driller: Jim Neiderkorn
Drilling Method: hollow stem auger/hydropunch
Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		3.0 - 6.0, 22.0 - 25.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with paristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y	Arsenic, Cadmium and Lead	

Purpose of Hole: Soil and groundwater sampling
Target Aquifer: shallow fill and deeper alluvium
Hole Diameter (in): 4 1/4"
Total Depth Drilled (ft): 25.00

Static Water Level Below MP: 0.00
Date: / /
MP Description:
MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00
Riser Height (ft): 0.00
Ground Surface Elevation (ft): 0.00
MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; Soil names besed on modified USCS soil classification system; Bottom of silt contact determined by penetration rate of Hydropunch; All soil sample numbers prefaced by EVT-9601-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	199	grab		0.50	0.5 - 1.0'
	200	SS	3,3,5	1.20	2.0 - 3.5'
5	201	SS	1,1,1	0.30	5.0 - 6.5' Sample all sluff, silt in shoe
		SS	1/1.5'	1.50	8.0 - 9.5' Sample all sluff, silt in shoe
10					Drove Hydropunch to completion depth of 25'
15					
20					
25					
30					

GRAPHICS

= Screened Interval

GEOLOGICAL DESCRIPTION

0.0 - 2.5' Gravelly SAND - 0.5' of Asphalt cover, Dark Yellowish Brown Sand ~75%, very fine to very coarse, subrounded opaque quartz and dark lithics; Gravel ~25%, fine to coarse, rounded, max dia. 1-2"; Loose; Wet [Fill]

2.5 - 5.0' Gravelly SAND - Dark Grey
Sand ~75%, very fine to very coarse, subrounded opaque quartz and dark lithics; Gravel ~20%, fine to medium, rounded; Silt 5%; Loose; Wet
[Fill] Collected water sample EVT-9601-357

5.0 - 12.0' SILT - Grey Brown
Moderately plastic, grey and brown mottles common, abundant root fibers and woody organic material, <5% very fine to fine sand; Soft; Wet
[Silt Confining Layer]

12.0 - 25.0' [Alluvial Sand]

Collected water sample EVT-9601-356

G799442 01/31/96 14:13:32

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-39

Date Hole Started: 01/23/96 Date Hole Finished: 01/23/96

Project: ASEV01 Everett Smelter

County: Snohomish

State: Washingon

Legal Description:

Descriptive Location: Transect #2

Recorded By: WR Wilson

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: hollow stem auger/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		22.0 - 25.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y	Arsenic, Cadmium and Lead	

Purpose of Hole: Soil and groundwater sampling

Target Aquifer: shallow fill and deeper alluvium

Hole Diameter (in): 4 1/4"

Total Depth Drilled (ft): 25.00

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; Soil names based on modified USCS soil classification system; Bottom of silt contact determined by penetration rate of Hydropunch; All soil sample numbers prefaced by EVT-9601-;

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	202	SS	7,13,10	0.80	2.0 - 3.5' No shellow aquifer water sample collected due to concrete
5	203	SS	1,1,1	1.20	5.0 - 6.5' Drove Hydropunch to completion depth of 25'

GRAPHICS

= Screened Interval

GEOLOGICAL DESCRIPTION

0.0 - 2.0' Concrete

2.0 - 5.0' Gravelly SAND - Dark Grey
Sand ~75%, very fine to very coarse, subrounded opaque quartz and dark lithics; Gravel ~20%, fine to medium, rounded; Silt ~5%; Medium Dense; Wet
[Fill]

5.0 - 16.0' SILT - Grey Brown
Moderately plastic, grey and brown mottles common, abundant root fibers and woody organic material, <5% very fine to fine sand; Soft; Wet
[Silt Confining Layer]

16.0 - 25.0' [Alluvial Sand]

Collected water sample EVT-9601-358

G114535 01/31/96 14:10:05

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-40

Date Hole Started: 01/24/96 Date Hole Finished: 01/24/96

roject: ASEV01 Everett Smelter

County: Snohomish

State: Washingon

Legal Description:

Descriptive Location: Transect #3

Recorded By: WR Wilson

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: hollow stem auger/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		4.0 - 7.0, 22.0 - 25.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y	Arsenic, Cadmium and Lead	

Purpose of Hole: Soil and groundwater sampling

Target Aquifer: shallow fill and deeper alluvium

Hole Diameter (in): 4 1/4"

Total Depth Drilled (ft): 25.00

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Haight (ft): 0.00

Ground Surface Elavation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; Soil names based on modified USCS soil classification system; Bottom of silt contact determined by penetration rate of Hydropunch; All soil sample numbers prefaced by EVT-9601-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	~~204~~	~~Grab~~		~~0.60~~	0.0 - 0.5'
	205	SS	4,9,8	1.10	2.0 - 3.5'
5	206	SS	4,6,5	1.00	5.0 - 6.5'
		SS	4,6,3	0.50	8.0 - 9.5' Sample all sluff Drove Hydropunch to completion depth of 25'
10					
15					
20					
25					
30					

GRAPHICS

■ = Screened Interval

GEOLOGICAL DESCRIPTION

0.0 - 1.0' Wood Chips - Mixed with some sand and gravel [Fill]

1.0 - 9.0' SAND - Dark Greyish Brown
Sand ~85%, medium to coarse, subrounded, moderately sorted; Gravel ~10%, fine to medium, rounded; Silt ~5%; Medium Dense; Wet
[Fill]

Collected Water Sample EVT-9601-359

9.0 - 16.0' SILT - Grey Brown
Moderately plastic, grey and brown mottles common, abundant root fibers and woody organic material, <5% very fine to fine sand; Soft; Wet
[Silt Confining Layer]

16.0 - 25.0' [Alluvial Sand]

Collected water sample EVT-9601-360

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-41

Date Hole Started: 01/24/96 Date Hole Finished: 01/24/96

'roject: ASEV01 Everett Smelter

County: Snohomish

State: Washingon

Legal Description:

Descriptive Location: Transect #3

Recorded By: WR Wilson

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: hollow stem auger/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		4.0 - 7.0, 27.0 - 30.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y	Arsenic, Cadmium and Lead	

Purpose of Hole: Soil and groundwater sampling

Target Aquifer: shallow fill and deeper alluvium

Hole Diameter (in): 4 1/4"

Total Depth Drilled (ft): 30.00

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; Soil names based on modified USCS soil classification system; Bottom of silt contact determined by penetration rate of Hydropunch; All soil sample numbers prefaced by EVT-9601-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	207	SS	9,14,11	1.20	2.0 - 3.5'
5	208	SS	4,6,7	1.10	5.0 - 6.5'
10	209	SS	4,6,6	1.00	9.0 - 10.5'
	210	SS	2,3,7	1.10	12.0 - 13.5' Drove Hydropunch to completion depth of 30'
15					
20					
25					
30					

GRAPHICS

= Screened Interval

GEOLOGICAL DESCRIPTION

0.0 - 2.0' Wood Chips

2.0 - 30.0' SAND - Greyish Brown
Sand ~90%, medium to coarse, subrounded opaque quartz and dark lithics; Gravel ~10%, fine , rounded; Silt <5%; Medium Dense; Wet
[Fill]

Collected Water Sample EVT-9601-362

Iron staining at surface of probable original land surface; Silt ~10%; Loose
[Alluvial Sand]

Collected water sample EVT-9601-363

HYDROMETRICS INC.

Consulting Scientists and Engineers
2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-43

Date Hole Started: 01/25/96 Date Hole Finished: 01/25/96

Project: ASEV01 Everett Smelter
County: Snohomish
State: Washingon
Legal Description:
Descriptive Location: Between MW-102 and MW-103

Recorded By: WR Wilson
Drilling Company: Hydrometrics
Driller: Jim Neiderkorn
Drilling Method: hollow stem auger/hydropunch
Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		4.0 - 7.0, 27.0 - 30.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y	Arsenic, Cadmium and Lead	

Purpose of Hole: Soil and groundwater sampling
Target Aquifer: shallow fill and deeper alluvium
Hole Diameter (in): 4 1/4"
Total Depth Drilled (ft): 30.00

Static Water Level Below MP: 0.00
Date: / /
MP Description:
MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00
Riser Height (ft): 0.00
Ground Surface Elevation (ft): 0.00
MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; Soil names based on modified USCS soil classification system; Bottom of silt contact determined by penetration rate of Hydropunch; All soil sample numbers prefaced by EVT-9601-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	216	SS	14,15,11	0.50	2.0 - 3.5'
5	217	SS	8,8,3	1.00	5.0 - 6.5'
		SS	8,13,10	0.00	8.0 - 9.5' Hydropunch screen jammed in spoon, no sample
10	218	SS	9,6,8	1.50	10.0 - 11.5'
15		SS	2,1,1	1.20	17.0 - 18.5' No sample collected Drove Hydropunch to completion depth of 30'
20					
25					
30					

GRAPHICS

= Screened Interval

GEOLOGICAL DESCRIPTION

0.0 - 0.5' Wood Chips
0.5 - 2.0' Concrete

2.0 - 5.5' Gravelly SAND - 0.3' of Asphalt cover
Dark Grey
Sand ~70%, very fine to very coarse, subrounded opaque quartz and dark lithics; Gravel ~25%, fine to coarse, rounded, max dia. 1-2"; Silt ~5%; Dense to Very Dense; Moist to Wet
(Fill)

5.5 - 30.0' SAND - Dark Grey
Sand 90%, medium to coarse; Gravel 10%; Medium Dense; Wet
Collected Water Sample EVT-9601-366

Collected water sample EVT-9601-367

G167782 01/31/96 14:48:03

HYDROMETRICS INC.

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2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-42

Date Hole Started: 01/25/96 Date Hole Finished: 01/25/96

Project: ASEV01 Everett Smelter

County: Snohomish

State: Washingon

Legal Description:

Descriptive Location: Adjacent to MW-108

Recorded By: WR Wilson

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: hollow stem auger/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		4.0 - 7.0, 23.0 - 26.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	Y	Arsenic, Cadmium and Lead	

Purpose of Hole: Soil and groundwater sampling

Target Aquifer: shallow fill and deeper alluvium

Hole Diameter (in): 4 1/4"

Total Depth Drilled (ft): 26.00

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: Sampling conducted by augering to depth of silt layer and then driving Hydropunch to completion depth in deeper alluvial aquifer; After water sampling, annulus was pressure grouted during hydropunch removal to maintain the integrity of silt layer seal; Soil names based on modified USCS soil classification system; Bottom of silt contact determined by penetration rate of Hydropunch; All soil sample numbers prefaced by EVT-9601-

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	~~211~~	~~SS~~		~~0.50~~	0.0 - 0.5' Collected duplicate sample 212, 0935
	213	SS	3,2,3	1.00	2.0 - 3.5'
5	214	SS	4,1,2	1.00	5.0 - 6.5'
10	215	SS	2,1,1	1.50	10.0 - 11.5' Drove Hydropunch to completion depth of 26'
15					
20					
25					
30					

GRAPHICS

= Screened Interval

GEOLOGICAL DESCRIPTION

0.0 - 11.0' Gravelly SAND - Dark Grey
Sand ~80%, medium to coarse; Gravel ~15%, fine, rounded; Silt ~5%; Loose; Wet
[Fill]

Water Table @ ~2'

Collected Water Sample EVT-9601-384

11.0 - 16.0' SILT - Grey Brown
Moderately plastic, grey and brown mottles common, abundant root fibers and woody organic material, <5% very fine to fine sand; Soft; Wet
[Silt Confining Layer]

16.0 - 26.0' [Alluvial Sand]

Collected water sample EVT-9601-365

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-44

Date Hole Started: 01/25/96 Date Hole Finished: 01/25/96

Project ASEV01 Everett Smelter

County: Snohomish

State: Washingon

Legal Description:

Descriptive Location: Between HP-9 and HP-10

Recorded By: WR Wilson

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: hollow stem auger/hydropunch

Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		3.0 - 6.0
Sand Pack?	N		
Annuler Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	N		

Purpose of Hole: Soil and groundwater sampling

Target Aquifer: shallow fill and deeper alluvium

Hole Diameter (in): 4 1/4"

Total Depth Drilled (ft): 6.00

Static Water Level Below MP: 0.00

Date: / /

MP Description:

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): 0.00

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks:

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
				0.00	0.0 - 0.0'		= Screened Interval
							See HP-42 for soil description; No soil samples collected
							Water Table @ ~2'
5					5		Collected Water Sample EVT-9601-368
10					10		
15					15		
20					20		
25					25		
30					30		

G578703 01/31/96 15:10:27

HYDROMETRICS INC.

Consulting Scientists and Engineers
2727 Airport Rd. Helena Mt, 59601

HYDROPUNCH LOG

Hole Name: HP-45

Date Hole Started: 01/26/96 Date Hole Finished: 01/26/96

Project: ASEV01 Everett Smelter
County: Snohomish
State: Washingon
Legal Description:
Descriptive Location: Between HP-9 and HP-10

Recorded By: WR Wilson
Drilling Company: Hydrometrics
Driller: Jim Neiderkorn
Drilling Method: hollow stem auger/hydropunch
Drilling Fluids Used: none

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	Y		22.0 - 25.0
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	purged with peristaltic pump	
Water Samples Taken?	Y	common ions, total and dissolved metals	
Boring Samples Taken?	N		

Purpose of Hole: Soil and groundwater sampling
Target Aquifer: shallow fill end deeper alluvium
Hole Diameter (in): 4 1/4"
Total Depth Drilled (ft): 25.00

Static Water Level Below MP: 0.00
Date: / /
MP Description:
MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00
Riser Height (ft): 0.00
Ground Surface Elevation (ft): 0.00
MP Elevation (ft): 0.00

Remarks:

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
							= Screened Interval
							See MW-5 for soil description; No soil samples collected
5							
10							
				0.00	12.0 - 13.0' Augered to 12' Drove Hydropunch to completion depth of 25'		
15							
20							
25							Collected Water Sample EVT-9601-369
30							

MONITORING WELLS

EV-10 THRU EV-14

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

GEOTECHNICAL WELL LOG DIAGRAM

Hole Name: EV-10

Date Hole Started: 02/22/96 Date Hole Finished: 02/22/96

Project: ASEV01 Everett Smelter Site

County: Snohomish State: WA

Legal Description: East Marine View Drive

Descriptive Location: 142' S, 3' E of EV-3

Recorded By: Jim Swortz

Drilling Company: Hydrometrics

Driller: J.Neiderkorn

Drilling Method: Hollow Stem Augers

Drilling Fluids Used: None

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	Y	2"SCH 40 PVC, flush thread Casing	-0.5 - 11.0
Surface Casing Used?	Y	Flush mount steel protective casing	0.0 - 1.2
Screen/Perforations?	Y	0.010 slotted screen	4.5 - 10.0
Sand Pack?	Y	silica sand	3.5 - 10.0
Annular Seal?	Y	bentonite chips	1.5 - 3.5
Surface Seal?	Y	cement pad	0.0 - 1.5
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	N		

Purpose of Hole: Monitoring Well

Target Aquifer: Shallow fill/till

Hole Diameter (in): 7"OD

Total Depth Drilled (ft): 11.00

Static Water Level Below MP: Dry Hole

Date: 02/22/96

MP Description: Top of PVC casing

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): -0.50

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: All sample numbers preceeded by EVT-9602

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
							■ = Screened Interval
	238	grab		0.00	0.0 - 0.5'		0.0 - 0.5' Sand & Gravel - brown/gray, medium to coarse Sand, 50% Gravel, semi-rounded; trace Silt; moist, [road base fill].
							0.5 - 11.0'
	239	ss	10,9,9	1.50	2.0 - 2.8' Two samples collected from split spoon obtained from 2.0 to 3.5.		Silty Sand - dark to light brown, trace gravel, 1/2 inch black layer; moist.
	240	ss		0.00	2.8 - 3.5'		Fine Sand & Silt - brown/orange, trace gravel, moist.
5	241	ss	5,13,16,	1.00	5.0 - 5.5' Sample 242 is a duplicate to sample 241.	5	Sandy Silt - light brown, mottled orange, trace gravel, moist.
10	243	ss	10,40,50/6"	0.50	10.0 - 10.5'	10	Silty Sand - gray brown, trace gravel, moist, dense from 10.5 to 11.0 feet, cobble at 11.0 feet.
	244	ss		0.50	10.5 - 11.0' Sample 243 collected from 10.0 to 10.5'. sample 244 collected from 10.5 to 11.0'.		

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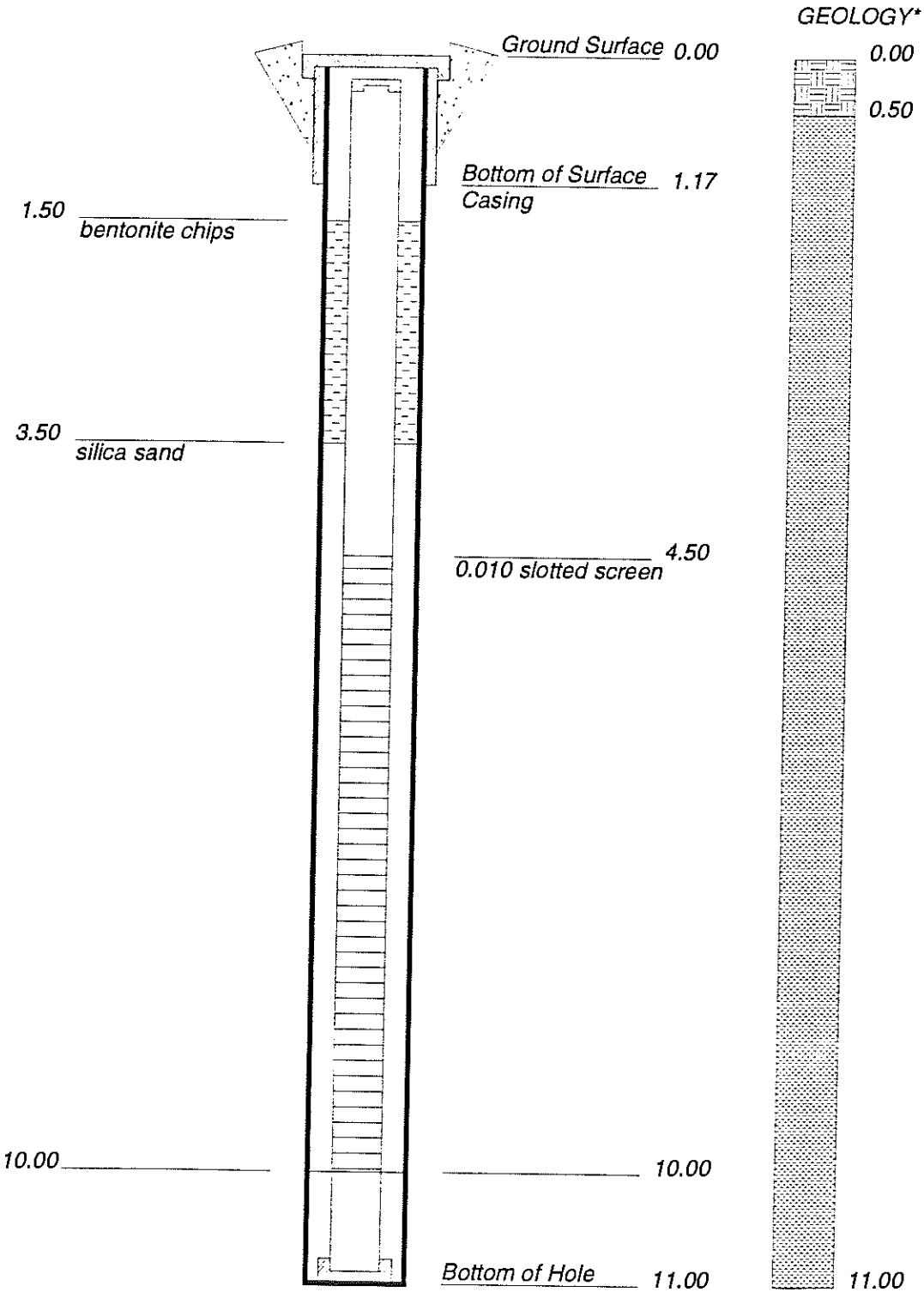
2727 Airport Rd. Helena Mt, 59601

WELL COMPLETION DIAGRAM

Hole Name: EV-10

Date Hole Started: 02/22/96 Date Hole Finished: 02/22/96



*Detailed geologic descriptions are provided on Standard Well Log.

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

GEOTECHNICAL WELL LOG DIAGRAM

Hole Name: EV-11

Date Hole Started: 02/21/96 Date Hole Finished: 02/21/96

Project: ASEV01 Everett Smelter Site

County: Snohomish State: WA

Legal Description: East Marine View Drive

Descriptive Location: 48 ft south of EV-3

Recorded By: Jim Swortz

Drilling Company: Hydrometrics

Driller: J.Neiderkorn

Drilling Method: Hollow Stem Augers

Drilling Fluids Used: None

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	Y	2"SCH 40 PVC, flush thread Casing	-0.5 - 12.5
Surface Casing Used?	Y	Flush mount steel protective casing	0.0 - 1.2
Screen/Perforations?	Y	0.010 slotted screen	4.0 - 12.5
Sand Pack?	Y	silica sand	3.5 - 12.5
Annular Seal?	Y	bentonite chips	1.5 - 3.5
Surface Seal?	Y	cement Pad	0.0 - 1.5
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	N		

Purpose of Hole: Monitoring Well

Target Aquifer: Shallow fill/till

Hole Diameter (in): 7"OD

Total Depth Drilled (ft): 13.50

Static Water Level Below MP: Dry Hole

Date: 02/21/96

MP Description: Top of PVC casing

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): -0.50

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: All sample numbers preceeded by EVT-9602

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	232	grab		0.00	0.0 - 0.5'
	233	ss	16,8,6	0.75	2.0 - 3.5'
5	234	ss	8,25,25	1.50	5.0 - 6.5' Sample 235 is a duplicate to sample 234.
10	236	ss	5, 34, 26	1.00	10.0 - 11.5'
	237	ss	18, 50/5"	1.00	12.5 - 13.5'

GRAPHICS

= Screened Interval

GEOLOGICAL DESCRIPTION

0.0 - 0.5' Sand & Gravel - tan to gray, medium to coarse grained sand, 50% gravel, moist (road base fill)

0.5 - 13.5'

Sandy Silt - brown, sandy silt mixed with dark brown and black fine gravel, cemented in part, interbedded with silty sand, trace gravel, slightly moist.

5

Sandy Silt - tan to gray, mottled orange, trace gravel, moist.

10

Sandy Silt - tan to gray, mottled orange, trace gravel, moist.

Sandy Silt - gray, trace gravel, dense, slightly moist.

HYDROMETRICS INC.

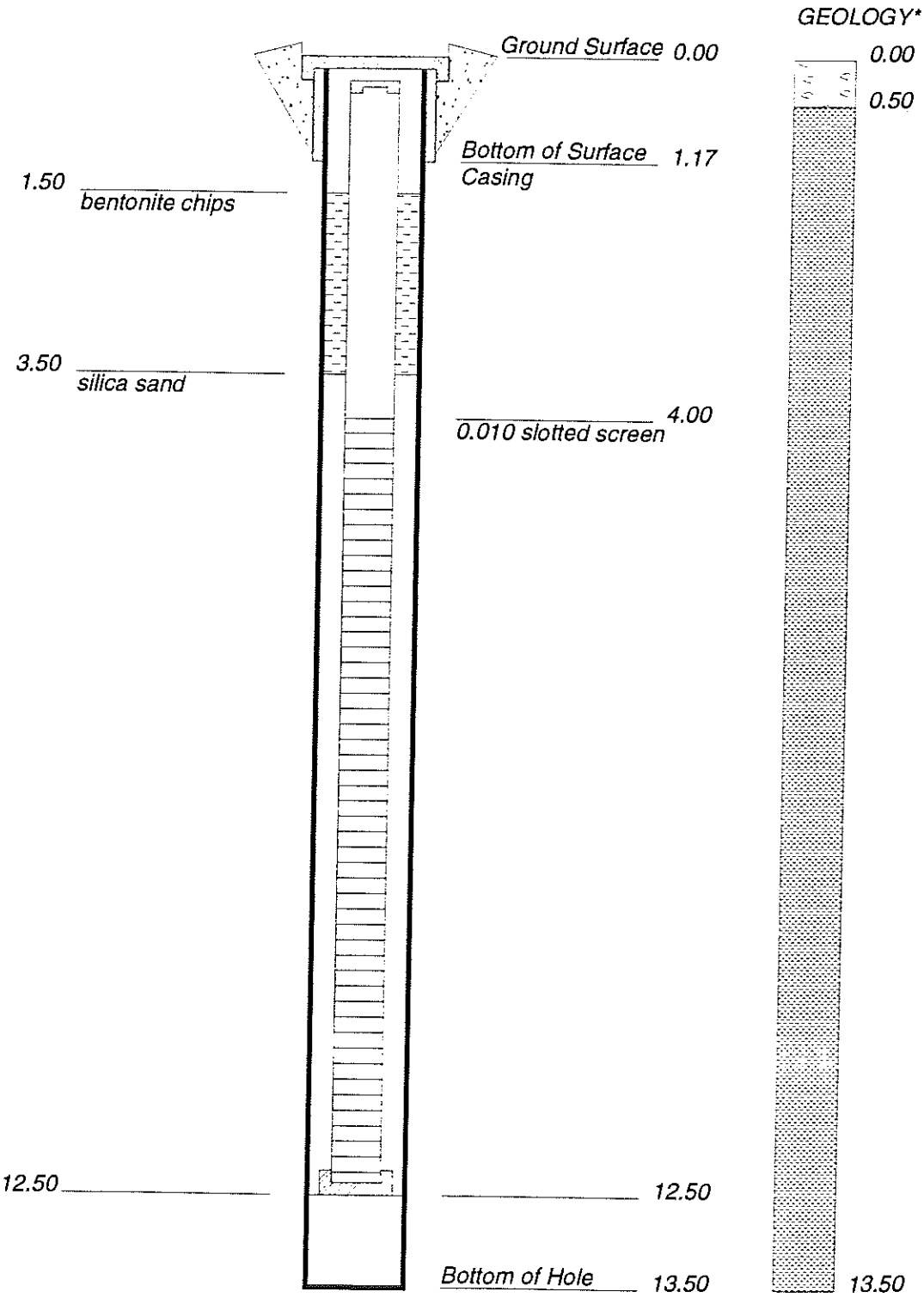
Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

WELL COMPLETION DIAGRAM

Hole Name: EV-11

Date Hole Started: 02/21/96 Date Hole Finished: 02/21/96



*Detailed geologic descriptions are provided on Standard Well Log.

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

GEOTECHNICAL WELL LOG DIAGRAM

Hole Name: EV-12

Date Hole Started: 02/22/96 Date Hole Finished: 02/22/96

Project: ASEV01 Everett Smelter Site

County: Snohomish State: WA

Legal Description: East Marine View Drive

Descriptive Location: 34' North, 4' East of EV-3

Recorded By: Jim Swortz

Drilling Company: Hydrometrics

Driller: J.Neiderkorn

Drilling Method: Hollow Stem Augers

Drilling Fluids Used: None

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	Y	2"SCH 40 PVC, flush thread Casing	-0.5 - 12.5
Surface Casing Used?	Y	Flush mount steel protective casing	0.0 - 1.2
Screen/Perforations?	Y	0.010 slotted screen	4.0 - 12.0
Sand Pack?	Y	silica sand	3.5 - 12.0
Annular Seal?	Y	bentonite chips	1.5 - 3.5
Surface Seal?	Y	cement pad	0.0 - 1.5
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	N		

Purpose of Hole: Monitoring Well

Target Aquifer: Shallow fill/till

Hole Diameter (in): 7"OD

Total Depth Drilled (ft): 13.50

Static Water Level Below MP: Dry Hole

Date: 02/22/96

MP Description: Top of PVC Casing

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): -0.50

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: All sample numbers preceeded by EVT-9602

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	245	grab		0.00	0.0 - 0.5'
	246	ss	15, 7, 6	0.50	2.0 - 3.5'
5	247	ss	4,11,15	1.50	5.0 - 6.5'
10	248	ss	11, 50/5"	1.00	10.5 - 11.5'
	249	ss	15, 50/6"	1.00	12.5 - 13.5'

GRAPHICS

■ = Screened Interval

GEOLOGICAL DESCRIPTION

0.0 - 0.5' Sand & Gravel - grey, medium grained sand, 50% fine gravel, moist (road base fill)

0.5 - 13.5'

Sandy Silt - gray, trace gravel, moist.

5

Sandy Silt - tan to gray, mottled orange, coarse sand lense at 6.25', moist.

10

Silty Sand - tan to gray, mottled orange, loose, moist.

Silty Sand - gray, trace gravel, dense, slightly moist.

G673340 03/20/96 09:40:54

HYDROMETRICS INC.

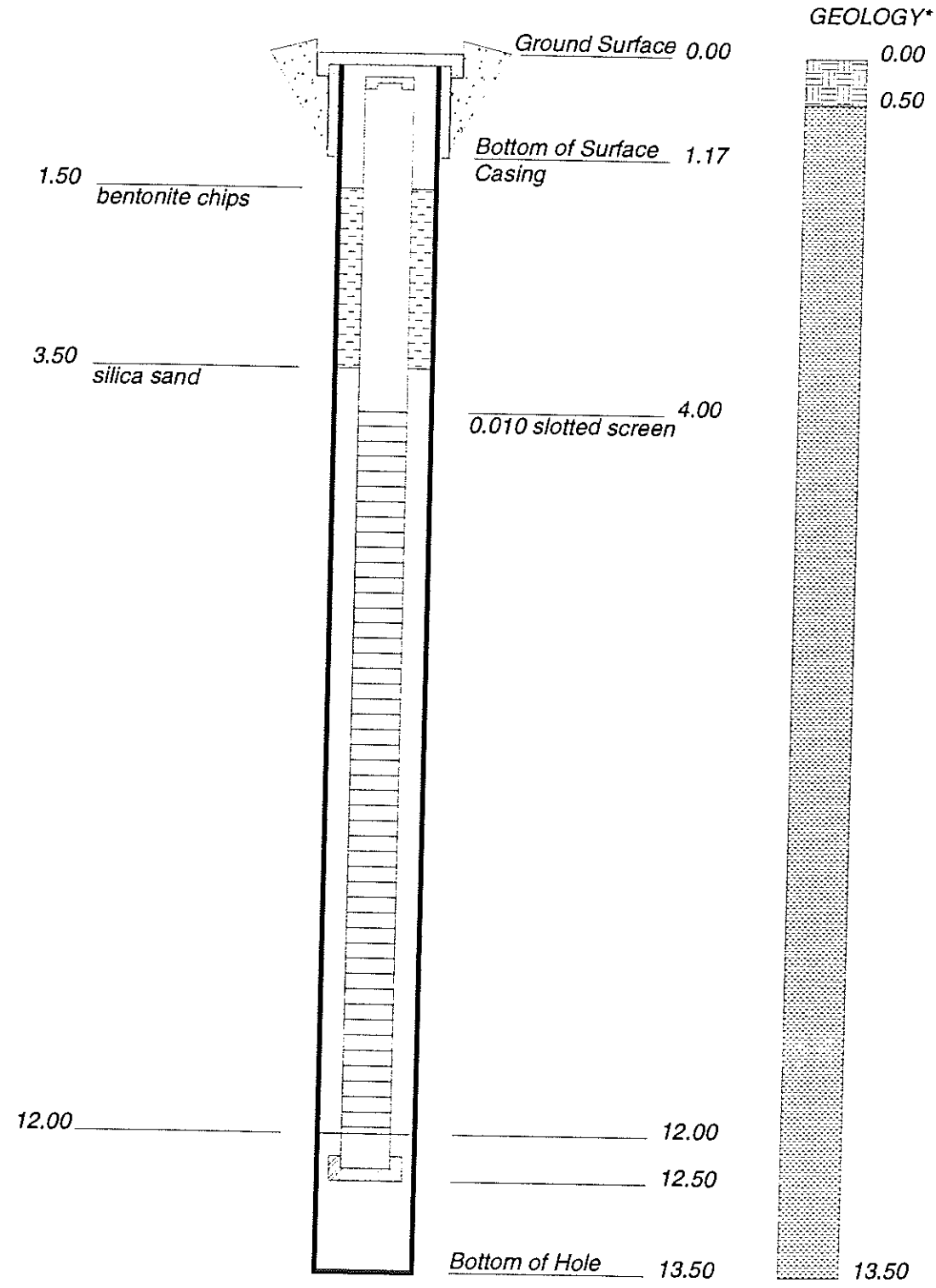
Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

WELL COMPLETION DIAGRAM

Hole Name: EV-12

Date Hole Started: 02/22/96 Date Hole Finished: 02/22/96



*Detailed geologic descriptions are provided on Standard Well Log.

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

GEOTECHNICAL WELL LOG DIAGRAM

Hole Name: EV-13

Date Hole Started: 02/22/96 Date Hole Finished: 02/22/96

Project: ASEV01 Everett Smelter Site

County: Snohomish State: WA

Legal Description: East Marine View Drive

Descriptive Location: 25' S of intersection, 5' W of street

Recorded By: Jim Swortz

Drilling Company: Hydrometrics

Driller: J.Neiderkorn

Drilling Method: Hollow Stem Augers

Drilling Fluids Used: None

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	Y	2"SCH 40 PVC, flush thread Casing	-0.5 - 11.5
Surface Casing Used?	Y	Flush mount steel protective casing	0.0 - 1.2
Screen/Perforations?	Y	0.010 slotted screen	4.0 - 10.0
Sand Pack?	Y	sand pack	3.5 - 10.0
Annular Seal?	Y	bentonite chips	1.5 - 3.5
Surface Seal?	Y	cement pad	0.0 - 1.5
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	N		

Purpose of Hole: Monitoring Well

Target Aquifer: Shallow fill/till

Hole Diameter (in): 7"OD

Total Depth Drilled (ft): 11.50

Static Water Level Below MP: Dry Hole

Date: 02/22/96

MP Description: Top of PVC casing

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): -0.50

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: All sample numbers preceeded by EVT-9602

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	250	grab		0.00	0.0 - 0.5'
	251	ss	2, 9, 24	0.00	2.0 - 3.5'
5	252	ss	18, 35,40	0.50	5.0 - 5.5'
	253	ss		1.00	5.5 - 6.5' Sample 252 collected from 5.0 to 5.5'. Sample 253 collected from 5.5 to 6.5 feet.
10	254	ss	40, 50/2"	0.75	10.0 - 11.5'

GRAPHICS

■ = Screened Interval

GEOLOGICAL DESCRIPTION

0.0 - 0.5' Silty Sand - dark brown, trace gravel, very moist, [road base fill].

0.5 - 11.5'

Silty Sand - gray to tan, mottled orange, trace gravel, slightly dense, moist.

Silty Sand - tan to brown, mottled orange, trace gravel, becoming moist and dense at 6.0 feet.

Silty Sand - gray, trace gravel, dense, slightly moist.

HYDROMETRICS INC.

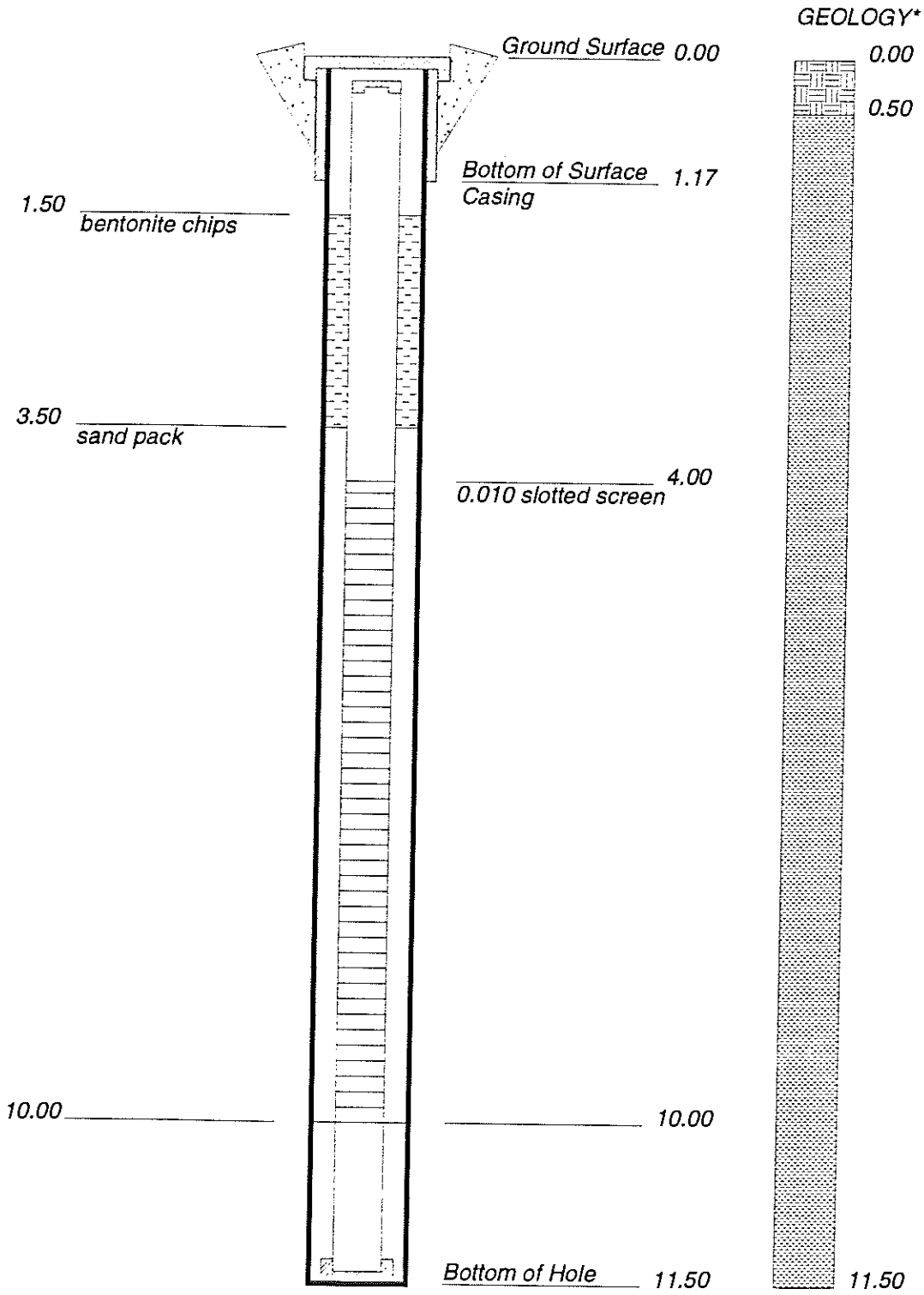
Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

WELL COMPLETION DIAGRAM

Hole Name: EV-13

Date Hole Started: 02/22/96 Date Hole Finished: 02/22/96



*Detailed geologic descriptions are provided on Standard Well Log.

HYDROMETRICS INC.

Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

GEOTECHNICAL WELL LOG DIAGRAM

Hole Name: EV-14

Date Hole Started: 02/23/96 Date Hole Finished: 02/23/96

Project: ASEV01 Everett Smelter Site

County: Snohomish State: WA

Legal Description: East Marine View Drive

Descriptive Location: 7.5' W of street, 107' N of intersection

Recorded By: Jim Swortz

Drilling Company: Hydrometrics

Driller: J.Neiderkorn

Drilling Method: Hollow Stem Augers

Drilling Fluids Used: None

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	Y	2"SCH 40 PVC, flush thread Casing	-0.5 - 11.5
Surface Casing Used?	Y	Flush mount steel protective casing	0.0 - 1.2
Screen/Perforations?	Y	0.010 slotted screen	4.0 - 10.0
Sand Pack?	Y	silica sand	3.5 - 10.0
Annular Seal?	Y	bentonite chips	1.5 - 3.5
Surface Seal?	Y	cement pad	0.0 - 1.5
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	N		

Purpose of Hole: Monitoring Well

Target Aquifer: Shallow fill/till

Hole Diameter (in): 7"OD

Total Depth Drilled (ft): 11.50

Static Water Level Below MP: Dry Hole

Date: 02/23/96

MP Description: Top of PVC casing

MP Height Above or Below Ground (ft): 0.00

Surface Casing Height (ft): 0.00

Riser Height (ft): -0.50

Ground Surface Elevation (ft): 0.00

MP Elevation (ft): 0.00

Remarks: All sample numbers preceeded by EVT-9602

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY	DRILLING AND GEOTECHNICAL NOTES
	255	grab		0.00	0.0 - 0.5'
	256	ss	6, 18, 23	1.50	2.0 - 3.5' Sample 257 is a duplicate to sample 256.
5	258	ss	5, 30, 50/3"	1.50	5.0 - 6.5'
10	259	ss	50/5"	0.50	10.0 - 11.5'

GRAPHICS

■ = Screened Interval

GEOLOGICAL DESCRIPTION

0.0 - 0.5' Silty Sand - gray, trace organic fragments, very wet, [road base fill].

0.5 - 11.5'

Sandy Silt - tan to gray, mottled orange, trace gravel, dense, slightly moist.

Sandy Silt - brown to gray, trace orange mottling, trace gravel, dense, slightly moist.

Sandy Silt - gray brown, trace gravel, dense, slightly moist.

HYDROMETRICS INC.

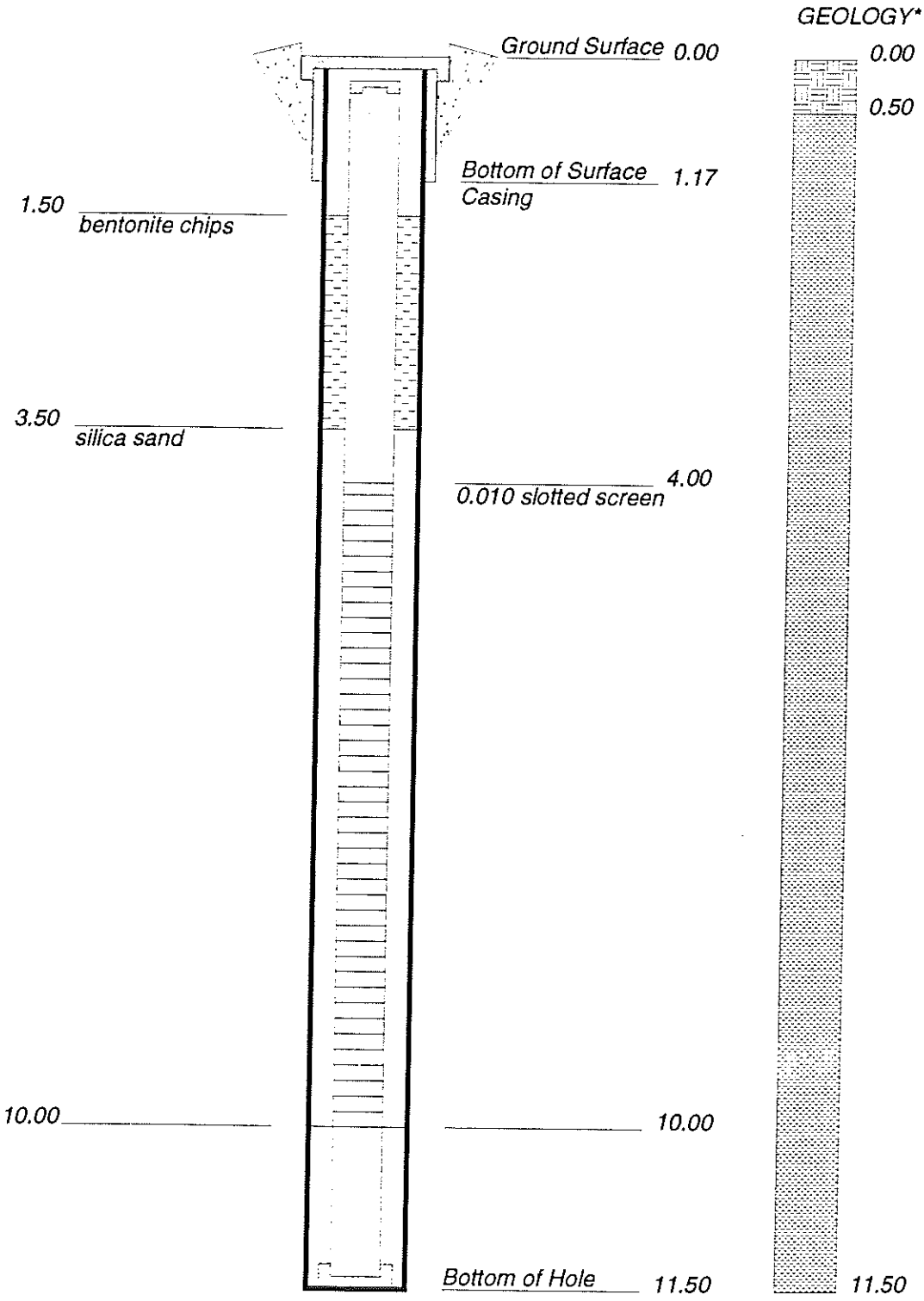
Consulting Scientists and Engineers

2727 Airport Rd. Helena Mt, 59601

WELL COMPLETION DIAGRAM

Hole Name: EV-14

Date Hole Started: 02/23/96 Date Hole Finished: 02/23/96



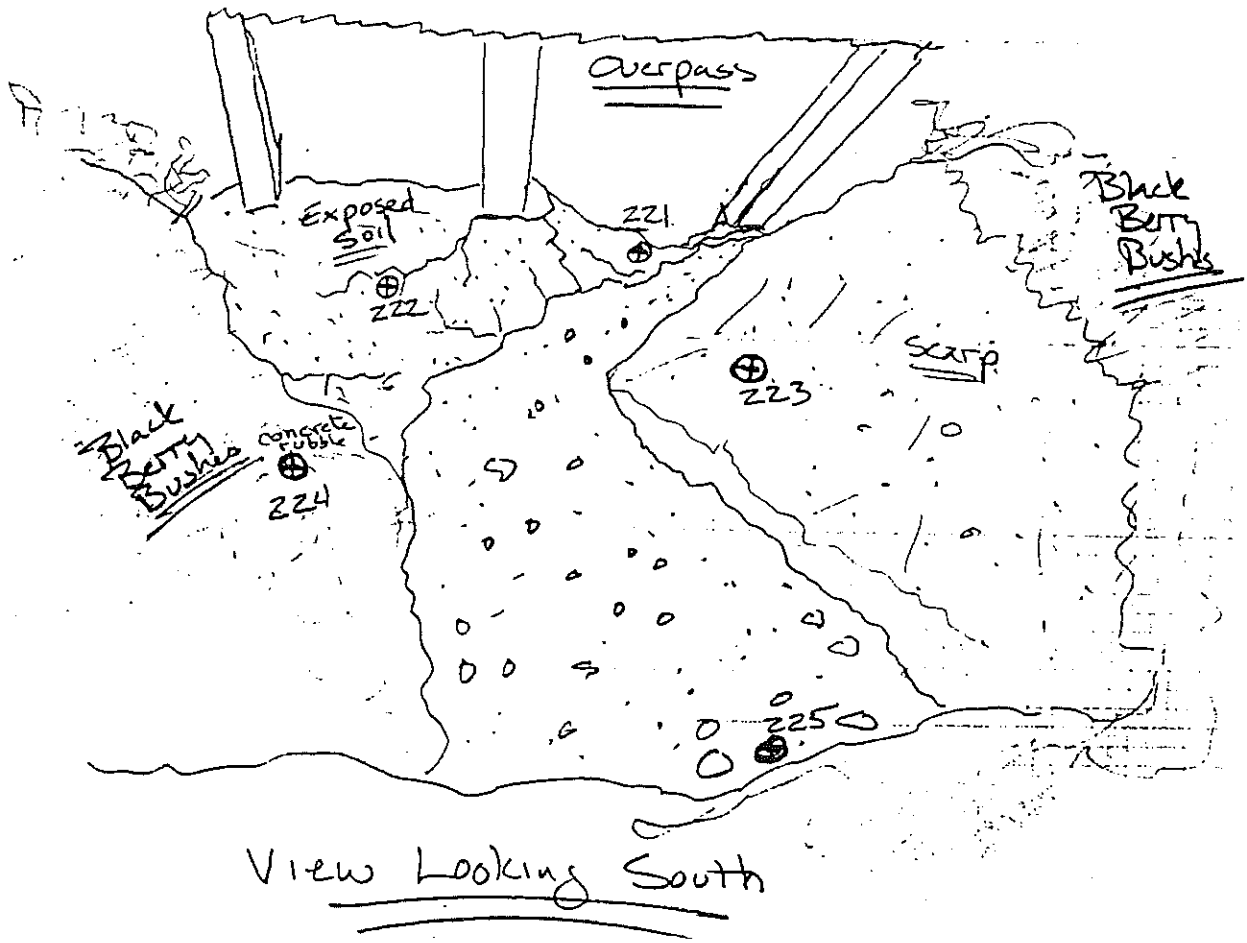
*Detailed geologic descriptions are provided on Standard Well Log.

FIELD LOGS FOR OVERPASS SAMPLING

HYDROMETRICS

DATE 9-13-96	BY B Thompson	CHK.	PROJ. NO. ASEV01	PAGE 1

Soil Sample Locations beneath Northbound Lane of SR 529 Overpass - Everett WA



View Looking South

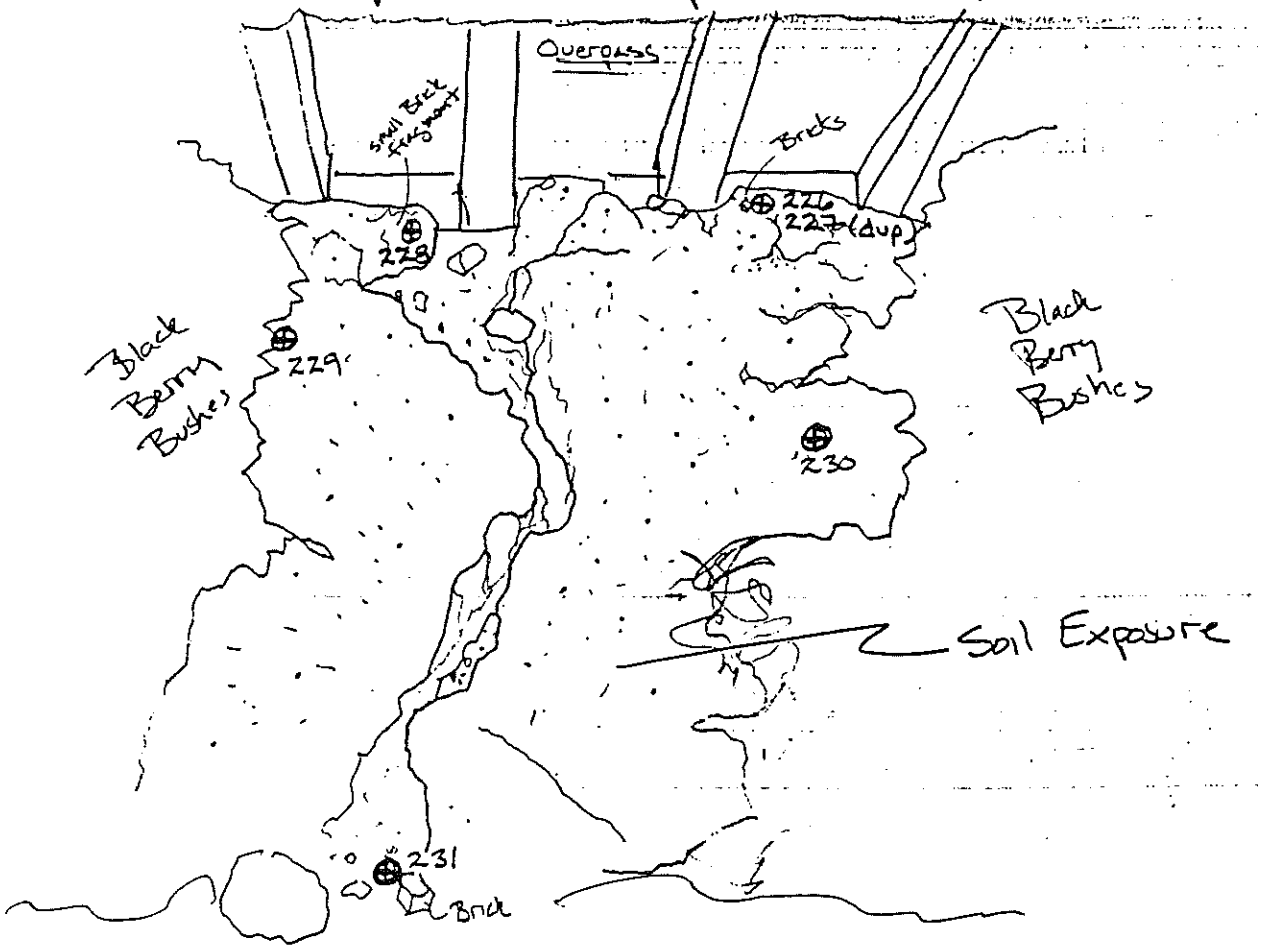
Sample #	Time	Description
EJT-9602-221	1100	– light gray silty Sand, trace gravel. Whitish carbonate(?) ppt on surface of exposure soils very dry and hard
" 222	1105	– as above, no ppt.
" 223	1110	– sand & gravel, little silt (Storm water deposition?)
" 224	1115	– gray sandy silt, lots of concrete rubble
" 225	1120	– Sand and Gravel at base of slope

– No Smelter Debris evident in Fill material

HYDROMETRICS

DATE 9-13-96	BY B. Thompson	CHK.	PROJ. NO. ASEV01	PAGE 2

Soil Sample Locations Beneath South Bound Lane of SR 529 Overpass - Everett, WA



View looking South

Sample #	Time	Description
EVT-9602-226	11:35	- Sandy Silt, trace of Gravel, buried bricks. (photo)
" 227	11:30	- Duplicate of 226 ↑
" 228	11:25	- Sandy Silt, trace of Gravel, small brick fragment
" 229	11:40	- Similar material to above, no debris/brick material
" 230	11:45	- Sandier material, may be stormwater outwash deposits
" 231	11:50	- Sand and Gravel collected from erosional material at base of slope. Brick at this location

Brick Debris at sampling Site EVT-9602-226

Hydrometrics, Inc.

2727 Airport Road • Helena, Montana 59601 • (406) 443-4150 • FAX (406) 443-4155

MEMORANDUM

TO: FILE

FROM: Bill Thompson

DATE: February 19, 1996

SUBJECT: Field Report for Test Pit Investigations in the Marine View Drive Area Everett Smelter Site Investigation

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On February 12, 1996 test pits were excavated at 520 and 504 East Marine View Drive as part of Task 3 of the Smelter Site Lowland Investigation. The excavations were conducted to allow direct inspection of fill and smelter site debris, and shallow groundwater conditions in these areas.

On February 21 through 23, five shallow monitoring wells (EV-10 through EV-14) were installed along East Marine View Drive to further evaluate shallow groundwater flow conditions. This memo summarizes preliminary results from these investigations.

The test pits were excavated with a backhoe. Test Pit No.1 consisted of a trench 20 feet long, 11 feet deep and 18 inches wide. Geology and groundwater conditions encountered in Test Pit No.1 are summarized below:

TEST PIT NO.1

0'- 1.5'	Brown organic loam
1.5'- 2.5'	Brick debris layer
2.5'- 3'	gray to black Silty SAND, some Gravel
3'- 6'	lt. brown to orange Silty SAND, little Gravel; moist
6'- 8'	lt. brown to lt. gray SILT and SAND, trace Gravel; Wet
8'-11'	lt. gray Sandy SILT, trace Gravel; very dense and dry from 10-11'

Brick debris encountered in the first few feet appeared to be the remnants of a building foundation. This is consistent with maps of the smelter site which show an office

building at this location. The contact between the fill and shallow till was not distinct, however, there was a marked increase in the density and consolidation of the soils below a depth of approximately 8 feet, becoming very dense and dry at 11 feet. The fill/shallow till appeared saturated from approximately 6 to 8 feet, however, seepage into the trench was very slow. A total of approximately 10 gallons entered the trench over the one and a half hour period the trench was left open. A water sample (sample number EVT-9602-375) was collected from the trench prior to backfilling, and was analyzed for total and dissolved arsenic at Sound Analytical Laboratory in Tacoma, Washington. The analytical results indicate 58 mg/L total arsenic and 27 mg/L dissolved arsenic in the shallow groundwater in this pit. Test Pit No.1 was backfilled prior to moving to the second test pit location.

A second test pit (No.2) was excavated at 502 East Marine View Drive at the location of a former flue structure. The excavation limits were constrained by the presence of a 3-inch and a 6-inch water main on either side of the flue structure as well as dense vegetation. A trench approximately 20 feet long and 4 to 6 feet deep was excavated in two sections, straddling the 3-inch water main. The geology is summarized below:

TEST PIT NO.2 - 502 E. MARINEVIEW DRIVE

0 - 4'	orange/brown Silty SAND, trace Gravel; Cast iron water main at south end on trench. Soil moist around water main. Brick structure at north end of trench. Flue like opening trending east-west through brick structure. White material lining opening.
4 - 6'	lt.gray Sandy SILT, very dense at 6 ft.

The till was dense and dry at the base of the excavation. Remnants of the brick flue structure were present in the northern half of the excavation at a depth of approximately 3 to 4 feet. The flue structure appeared to be partially intact. A void, that appeared to be a flue channel, was present within the brick structure and formed an east-west trending opening (see photo, Attachment 1). This flue structure had a white substance coating the interior. A soil sample (sample number EVT-9602-220) was collected of the white material coating the opening and sent to Sound Analytical for arsenic analysis.

The soils around the flue structure appeared to be unsaturated down to the depth of the denser till, however, the flue itself was moist to wet inside. There was no free flowing water apparent in the flue structure or entering the trench from adjacent soils at the time of excavation. The test pit was backfilled to grade. Some free standing water was observed in a puddle next to a nearby fire hydrant. A water sample (sample number EVT-9602-376) was collected from this puddle and submitted to Sound Analytical for analysis of total arsenic.

1998 Smelter Area Investigation

APPENDIX B

Soil Boring Logs

HYDROMETRICS INC.
Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: SA-1

Date Hole Started: 03/23/98 Date Hole Finished: 03/23/98

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: Asarco
Legal Description: North End of Pilchuck Path
Descriptive Location: North End of Pilchuck Path inside fenced area.

Recorded By: J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: J Niederkorn
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Source Area Investigation
Target Aquifer: N/A
Hole Diameter (in): 3.5
Total Depth Drilled (ft): 6.25

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface S[illegible]	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft.

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Boring drilled with Piper 2000 mounted on F-250. Drilled with 2 1/4" (ID) hollow stem augers. Samples obtained with "A" rod and a 2" (OD) split spoon under a 140 pound, 30 inch drop, safety hammer using a cat head at 0-1' and 6'. Switched to 3" (OD) split spoon at 2-5'. Boring abandoned with bentonite chips, 1' concrete cap with an aluminum ID tag on top. Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb)

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9803-363	SS		0.50	0.0 - 1.0' 2" SS
	EVT-9803-364	SS		0.50	1.0 - 2.0' 3" SS
	EVT-9803-365	SS		0.40	2.0 - 3.0'
	EVT-9803-366	SS		0.40	3.0 - 4.0'
	EVT-9803-367	SS		0.90	4.0 - 5.0'
5		SS		0.00	5.0 - 6.0' Refusal @ 5'. Drill to 6' and sample with 2" SS.
	~~EVT-9803-368~~	~~SS~~	~~100~~	~~0.25~~	6.0 - 6.3' 2" SS
10					
15					
20					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 0.2'
Asphalt
Black asphalt
(Road Pavement)

0.2 - 4.0'
BRICK, SAND, & GRAVEL
Red brick fragments getting larger with depth (3" at 3-4'), slightly moist to dry; Sand is black/white/gray, medium to fine grained (mortar?); Gravel 1" and smaller subrounded to 2".
(Smelter Debris)

4.0 - 6.3'
BRICK
Red, dry, intact with 1/4" gray and white sand layers approximately 3" apart. At 4' Sand appears to be yellow stained.
(Smelter Debris)

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 7/13/98

HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: SA-2

Date Hole Started: 03/23/98 Date Hole Finished: 03/23/98

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: Asarco
Legal Description: North End of Pilchuck Path
Descriptive Location: 5th & Pilchuck Path inside fenced area.

Recorded By: J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: J Niederkorn
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Source Area Investigation
Target Aquifer: N/A
Hole Diameter (in): 3.5
Total Depth Drilled (ft): 7

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft.

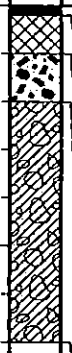
Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Boring drilled with Piper 2000 mounted on F-250. Drilled with 2 1/4" (ID) hollow stem augers. Samples obtained with "A" rod and a 2" (OD) split spoon under a 140 pound, 30 inch drop, safety hammer using a cat head. Boring abandoned with bentonite chips, 1' concrete cap with a aluminum ID tag on top. Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb)

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9803-369	SS		0.80	0.0 - 1.0'
	EVT-9803-370	SS		0.80	1.0 - 2.0'
	EVT-9803-371	SS	9/12	0.80	2.0 - 3.0'
	EVT-9803-372	SS	19/20	0.80	3.0 - 4.0' Duplicate sample 375 at 08:50
5					4.0 - 5.0' Inadvertently drilled past 4-5' interval.
	EVT-9803-373	SS	12/14	0.90	5.0 - 6.0'
	EVT-9803-374	SS	21/26	0.70	6.0 - 7.0'
10					
15					
20					

GRAPHICS



GEOLOGICAL DESCRIPTION

0.0 - 0.2'
ASPHALT
Black Asphalt
(Road Pavement)

0.2 - 1.0'
Gravelly SAND
Dark brown, slightly moist to dry, fine to medium grained, medium den with 1" subround to round gravel with trace red brick fragments at 1'.
(Road Base Fill)

1.0 - 2.0'
Sandy SILT
Brown, some black staining at 1.5', fine to medium grained, medium dense, slightly moist; trace 1/4" round to subrounded gravel; 1.5" intact red brick chunks; trace wood chunks.
(Smelter Debris)

2.0 - 7.0'
Silty SAND
Gray-brown with orange mottling at 2-3', slightly moist to dry, medium fine grained, fining with depth, medium dense; trace 1/4" subrounded gravel at 2-3'.
(Glacial Till)

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 8/5/98

HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: SA-3

Date Hole Started: 03/26/98 Date Hole Finished: 03/26/98

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: Asarco
Legal Description: North Broadway
Descriptive Location: N side of St., 60' SW of access road.

Recorded By: J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: J Niederkorn
Drilling Method: Split Spoon
Drilling Fluids Used: None
Purpose of Hole: Source Area Investigation
Target Aquifer: N/A
Hole Diameter (in): 3.0
Total Depth Drilled (ft): 4

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft.

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Boring sampled with 3" (OD) split spoon on "A" rod under a 140 lb, 30" drop safety hammer on a cat head on an Acker Drill mounted on a Bobcat. Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb)

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	EVT-9803-431	SS		0.75	0.0 - 1.0'		0.0 - 1.0' **Sandy LOAM** Brown, moist, roots to 4".
	EVT-9803-432	SS		0.75	1.0 - 2.0'		1.0 - 2.3' **SAND** Gray, moist, medium to coarse grained, loose.
	EVT-9803-433	SS		1.00	2.0 - 3.0'		2.3 - 4.0' **SILT** Gray, dry, hard, with 1" round to subround gravel. [Glacial Till]
	EVT-9803-434	SS		1.00	3.0 - 4.0'		
5						5	
10						10	
15						15	
20						20	

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 8/5/98

HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: SA-4

Date Hole Started: 03/25/98 Date Hole Finished: 03/25/98

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: Asarco
Legal Description: End of North Pilchuck
Descriptive Location: West side behind last foundation.

Recorded By: J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: J Niederkorn
Drilling Method: Split Spoon
Drilling Fluids Used: None
Purpose of Hole: Source Area Investigation
Target Aquifer: N/A
Hole Diameter (in): 3.0
Total Depth Drilled (ft): 6

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft.

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Boring sampled with 3" (OD) split spoon on "A" rod under a 140 lb, 30" drop safety hammer on a cat head on an Acker Drill mounted on Bobcat. Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb)

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9803-391	SS		0.75	0.0 - 1.0'
	EVT-9803-392	SS		0.75	1.0 - 2.0'
	EVT-9803-393	SS		1.00	2.0 - 3.0'
	EVT-9803-394	SS		1.00	3.0 - 4.0'
5	EVT-9803-395	SS		0.75	4.0 - 5.0' Duplicate sample EVT-9803-397 at 0830
	EVT-9803-396	SS		0.75	5.0 - 6.0'
10					
15					
20					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 1.0'
Silty LOAM
Dark Brown, moist to slightly moist, roots to 4", trace brick fragments at 1'.
[Fill]

1.0 - 2.0'
Sandy SILT
Dark brown to yellow brown, slighlty moist to dry.; Sand is fine grained, trace 1/2" subrounded gravel; Brick fragments 2" chunk of wood at top.
[Smelter Debris]

2.0 - 6.0'
Silty SAND
Grayish brown (orange brown at top) with bands of oxidationat 2-3', slightly moist to dry, medium to fine grained, trace root matter to 4"; Trace 2" and smaller subrounded gravel.
[Glacial Till]

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 7/13/98

HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: SA-5

Date Hole Started: 03/24/98 Date Hole Finished: 03/24/98

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: Asarco
Legal Description: Intersection at 5th and Alley betw Mar Vw Dr & Pilchuck
Descriptive Location: Just inside gate of fenced area.

Recorded By: J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: J Niederkorn
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Source Area Investigation
Target Aquifer: N/A
Hole Diameter (in): 3.5
Total Depth Drilled (ft): 15

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft. to 6'; 2' thereafter

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Boring drilled with Piper 2000 mounted on F-250. Drilled with 2 1/4" (ID) hollow stem augers. Samples obtained with "A" rod and a 2" (OD) split spoon under a 140 pound, 30 inch drop, safety hammer using a cat head. Boring abandoned with bentonite chips, 1' concrete cap with an aluminum ID tag on top. Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb)

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9803-376	SS	6/8	0.75	0.0 - 1.0'
	EVT-9803-377	SS	27/50-2"	0.75	1.0 - 2.0'
	EVT-9803-378	SS	100-5"	0.30	2.0 - 3.0' Difficult drilling; Brick tends to crumble and plug augers.
	EVT-9803-379	SS	200-6"	0.50	3.0 - 4.0'
	EVT-9803-380	SS	100-3"	0.40	4.0 - 5.0'
5	EVT-9803-381	SS	100-3"	0.50	5.0 - 6.0'
	EVT-9803-382	SS	15/24	0.70	8.0 - 9.0'
10	EVT-9803-383	SS	22/31	0.80	11.0 - 12.0'
	EVT-9803-384	SS	23/100-5"	0.80	14.0 - 15.0'
15					
20					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 1.0'
Silty LOAM
Dark Brown, slightly moist, root matter, trace 1/2" subrounded to rounded gravel.
[Fill]

1.0 - 8.0'
BRICK
Red, dry, hard, intact, with 1/4" layers of white and gray sand 3" apart. (mortar)
[Smelter Debris]

8.0 - 15.0'
Silty SAND
Gray to brown, trace dark orange staining, slightly moist to dry, fine grained to silty, medium dense to very dense (becomes more dense with depth).
[Glacial Till]

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 8/5/98

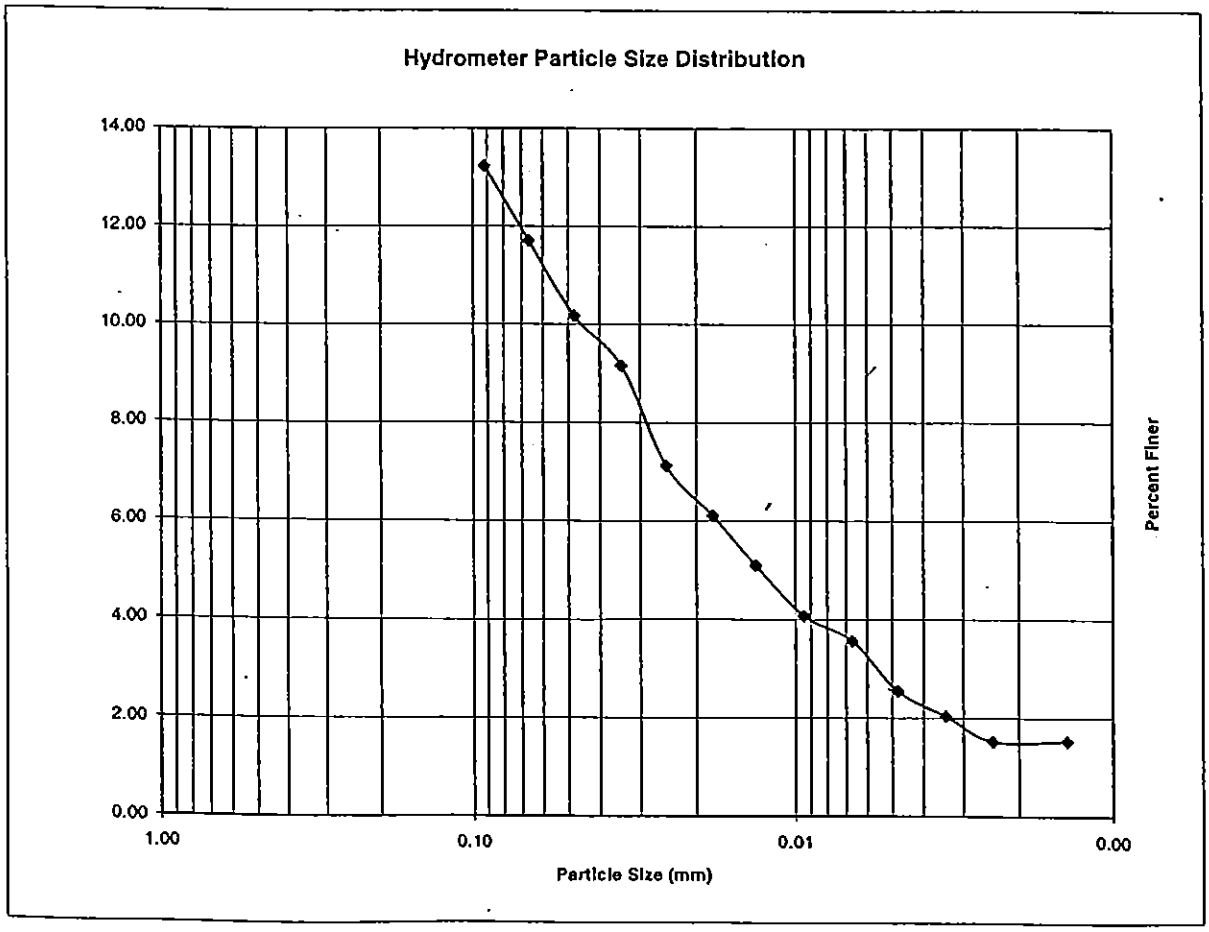
SA-5
11-12'

HYDROMETRICS, INC.
RUSTON LABORATORY
5227 NORTH 49TH STREET
TACOMA, WASHINGTON 98407

HYDROMETER ANALYSIS

LABORATORY NUMBER	98R-00972
SAMPLE NUMBER	EVT-9803-383
DATE	6/25/98
ANALYST	SM

Time	Reading	Rcp	% Finer	Rcl	L	A	D	% Finer of Total
0.25	31	26	90.66	32	11.2	0.0137	0.09	13.23
0.5	28	23	80.20	29	11.7	0.0137	0.07	11.70
1	25	20	69.74	26	12.2	0.0137	0.05	10.17
2	23	18	62.76	24	12.6	0.0137	0.03	9.16
4	19	14	48.81	20	13.2	0.0137	0.02	7.12
8	17	12	41.84	18	13.5	0.0137	0.02	6.10
15	15	10	34.87	16	13.8	0.0137	0.01	5.09
30	13	8	27.89	14	14.2	0.0137	0.01	4.07
60	12	7	24.41	13	14.3	0.0137	0.01	3.56
120	10	5	17.43	11	14.7	0.0137	0.00	2.54
240	9	4	13.95	10	14.8	0.0137	0.00	2.03
480	8	3	10.46025105	9	15	0.0137	0.00	1.53
1440	8	3	10.46025105	9	15	0.0137	0.00	1.53



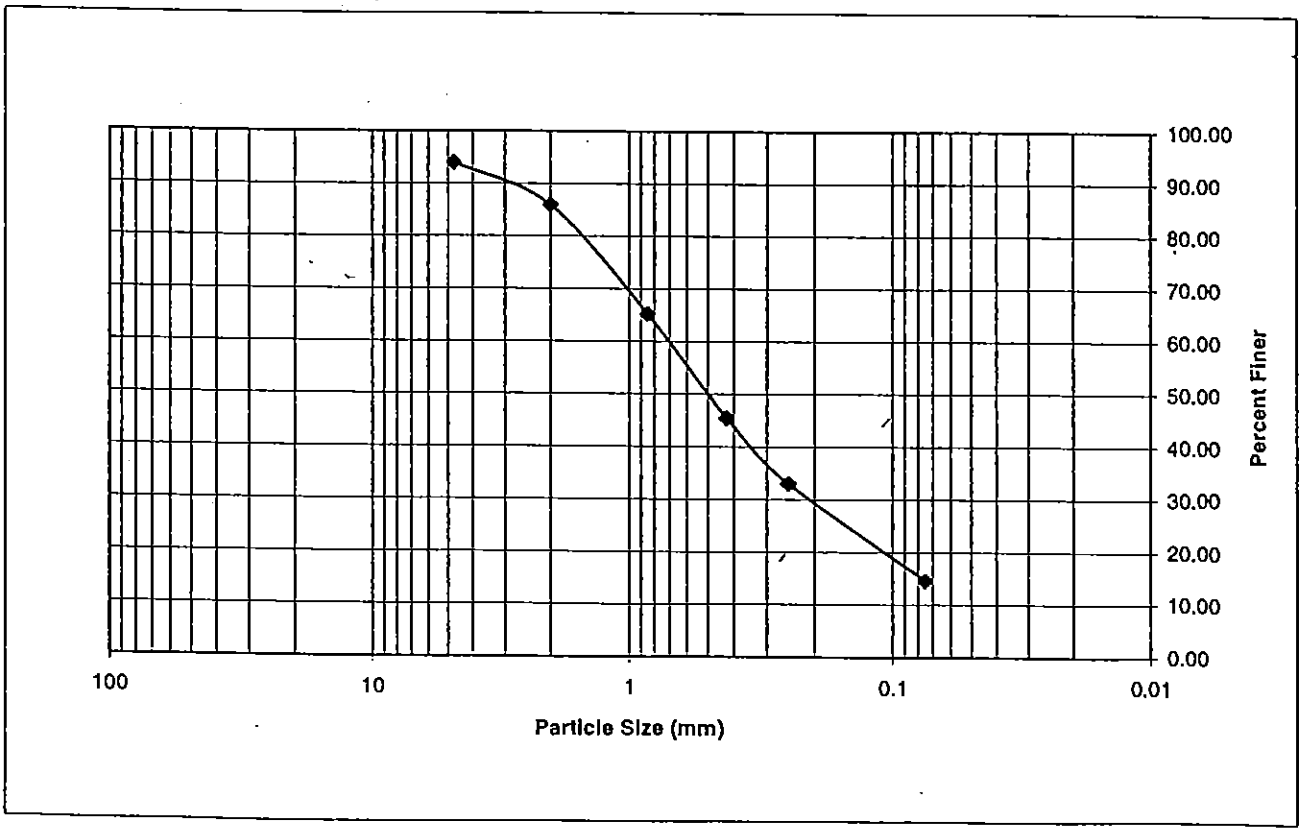
HYDROMETRICS, INC.
RUSTON LABORATORY
5227 NORTH 49TH STREET
RUSTON, WASHINGTON 98407

Laboratory Number: 98R-00972
Sample Number: EVT-9803-383
Date: 6/25/98

Weight of Oven Dry Sample (g): 194

Sieve Number	Sieve Opening (mm)	Weight Retained			
4	4.75	11.7	6.03	6.03	93.97
10	2.00	15.60	8.04	14.07	85.93
20	0.85	40.20	20.72	34.79	65.21
40	0.425	38.30	19.74	54.54	45.46
60	0.250	24.20	12.47	67.01	32.99
200	0.075	35.70	18.40	85.41	14.59
PAN	< 0.075	28.70	14.79		

sum = 194.4



HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: SA-6

Date Hole Started: 03/21/98 Date Hole Finished: 03/2

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: Asarco
Legal Description: E of Pilchuck Alley
Descriptive Location: At former Arsenic ovens

Recorded By: J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: J Niederkorn
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Source Area Investigation
Target Aquifer: N/A
Hole Diameter (in): 3.5
Total Depth Drilled (ft): 11

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft. to 6'; 2' thereafter

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Boring drilled with Acker Drill mounted on Bobcat. Drilled with 2 1/4" (ID) hollow stem augers. Samples obtained with "A" rod and a 2" (OD) split spoon under a 140 pound, 30 inch drop, safety hammer using a cat head. Boring abandoned with bentonite chips, 1' concrete cap with aluminum ID tag on top. Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb)

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9803-353	SS	4/8	0.60	0.0 - 1.0' Refusal at 2'. Moved 4' NW; Duplicate sample EVT-9803-358 @ 1100.
	EVT-9803-354	SS	12/12	0.60	1.0 - 2.0' White substance (gypsum like) in side wall of first hole. sample EVT-9803-355 @ 1000
	EVT-9803-356	SS	4/7	0.40	2.0 - 3.0'
	EVT-9803-357	SS	20/13	0.40	3.0 - 4.0'
	EVT-9803-359	SS	4/26	0.70	4.0 - 5.0' Difficult Drilling
5	EVT-9803-360	SS	37/34	0.70	5.0 - 6.0'
	EVT-9803-361	SS	14/17/32	1.20	7.5 - 9.0'
10		SS	50/99-2"	0.00	10.0 - 11.0' NoRecovery no sample.
15					
20					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 1.5'
Silty LOAM
Brown, slightly moist, with organic matter.

1.5 - 4.0'
BRICK
Red, slightly moist to dry, trace gravel with white material fragments. (same as sample EVT-9803-353)
[Smelter Debris]

4.0 - 9.0'
Silty SAND
Yellow brown grading to gray with depth, some oxidation mottling, sli[illegible] moist, medium to fine grained, medium dense to dense, some subrounded 1' gravel.
[Glacial Till]

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 7/13/98

HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: SA-7

Date Hole Started: 03/19/98 Date Hole Finished: 03/19/98

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: Asarco
Legal Description: E of Pilchuck Alley
Descriptive Location: At former Arsenic mill storage bins

Recorded By: J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: J Niederkorn
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Source Area Investigation
Target Aquifer: N/A
Hole Diameter (in): 3.5
Total Depth Drilled (ft): 11

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft.

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Boring sampled with 3" (OD) split spoon on "A" rod under a 140 lb, 30" drop safety hammer on a cat head on an Acker Drill mounted on a Bobcat. Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb)

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9803-344	SS		0.30	0.0 - 1.0'
	EVT-9803-345	SS		0.30	1.0 - 2.0'
	EVT-9803-346	SS	13/8	0.40	2.0 - 3.0'
	EVT-9803-347	SS	13/8	0.40	3.0 - 4.0'
	EVT-9803-348	SS	15/30	0.80	4.0 - 5.0' Slow Drilling with Acker
5	EVT-9803-349	SS	45/50	0.80	5.0 - 6.0' Duplicate sample number EVT-9803-350 @ 1437
	EVT-9803-351	SS	32/50	0.80	7.5 - 9.0'
10	EVT-9803-352	SS	100-6"	0.50	10.0 - 11.0'
15					
20					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 2.0'
Silty LOAM
Dark brown, slighlty moist to dry, some medium grained sand, organic matter. Trace brick fragments at 2'.
[Fill]

2.0 - 6.5'
Sandy SILT
Light brown to gray brown, with some orange mottling, medium dense, slighlty moist to dry, some 1" subrounded gravel.
[Fill]

6.5 - 11.0'
Silty SAND w/ Gravel
Gray to brown, slighlty moist to dry, fine grained to silt, dense to very dense (ore dense with depth), trace vegetative matter, some 1/4" subrounded gravel.
[Glacial Till]

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 8/5/98

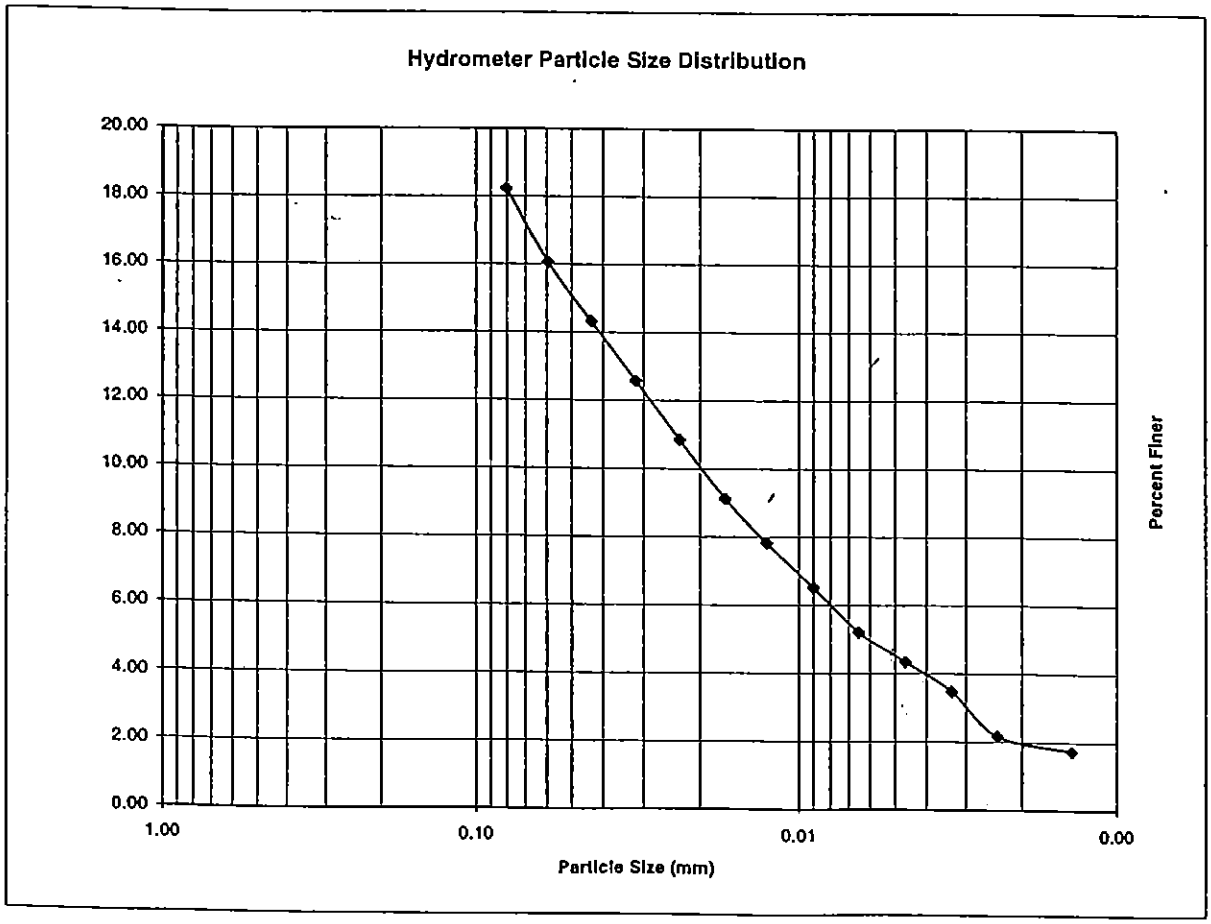
SA-7
10-10.5'

HYDROMETRICS, INC.
RUSTON LABORATORY
5227 NORTH 49TH STREET
TACOMA, WASHINGTON 98407

HYDROMETER ANALYSIS

LABORATORY NUMBER	98R-00907
SAMPLE NUMBER	EVT-9803-352
DATE	6/29/98
ANALYST	SM

Time	Reading	Rcp	% Finer	Rcl	L	A	D	% Finer of Total
0.25	47	42	91.98	48	8.6	0.0137	0.08	18.23
0.5	42	37	81.03	43	9.4	0.0137	0.06	16.06
1	38	33	72.27	39	10.1	0.0137	0.04	14.32
2	34	29	63.51	35	10.8	0.0137	0.03	12.59
4	30	25	54.75	31	11.4	0.0137	0.02	10.85
8	26	21	45.99	27	12	0.0137	0.02	9.12
15	23	18	39.42	24	12.5	0.0137	0.01	7.81
30	20	15	32.85	21	13	0.0137	0.01	6.51
60	17	12	26.28	18	13.5	0.0137	0.01	5.21
120	15	10	21.90	16	13.8	0.0137	0.00	4.34
240	13	8	17.52	14	14.2	0.0137	0.00	3.47
480	10	5	10.95	11	14.7	0.0137	0.00	2.17
1440	9	4	8.76	10	14.8	0.0137	0.00	1.74



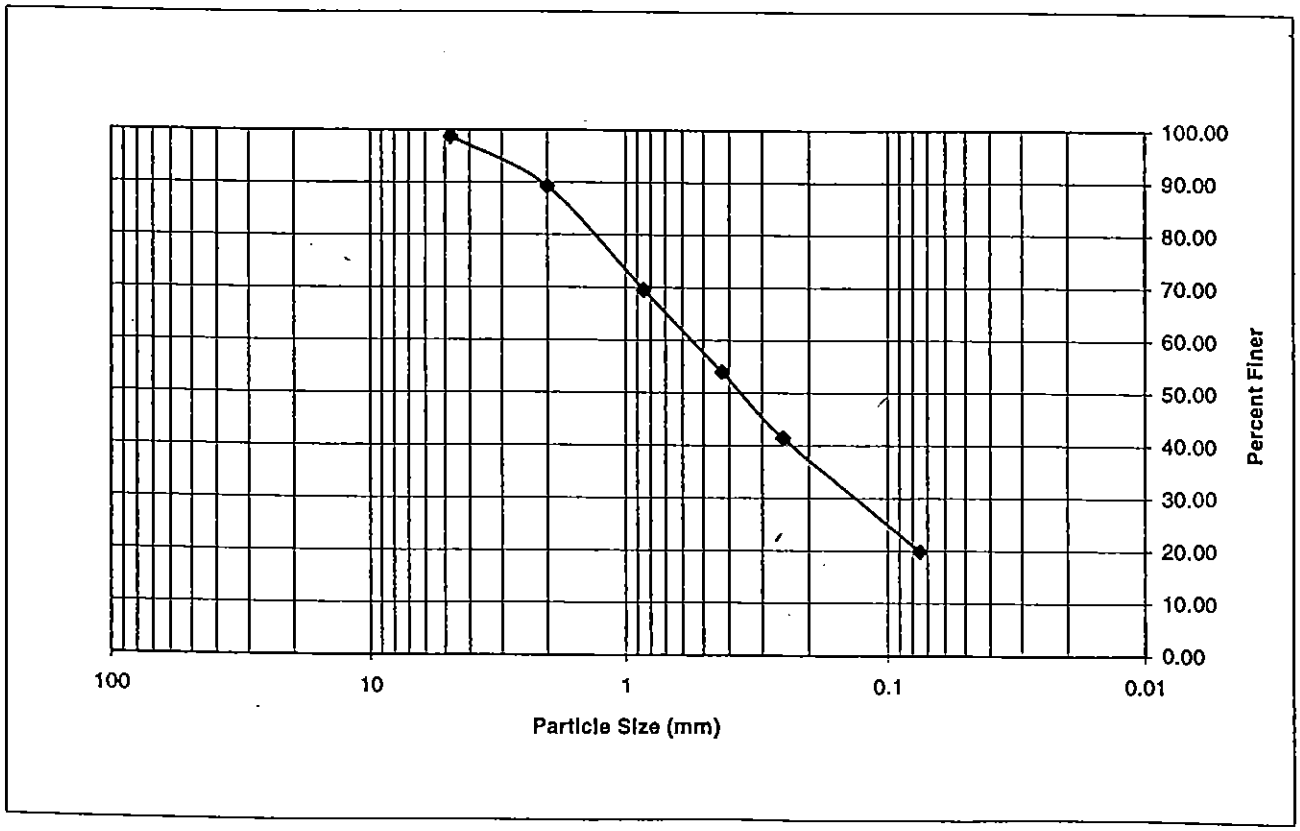
HYDROMETRICS, INC.
RUSTON LABORATORY
5227 NORTH 49TH STREET
RUSTON, WASHINGTON 98407

Laboratory Number: 98R-00907
Sample Number: EVT-9803-352
Date: 6/25/98

Weight of Oven Dry Sample (g): 194

Sieve Number	Sieve Opening (mm)	Weight Retained			
4	4.75	3	1.32	1.32	98.68
10	2.00	21.50	9.43	10.74	89.26
20	0.85	44.90	19.68	30.43	69.57
40	0.425	35.60	15.61	46.03	53.97
60	0.250	28.60	12.54	58.57	41.43
200	0.075	49.30	21.61	80.18	19.82
PAN	< 0.075	45.50	19.95		

sum = 194.4



HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: SA-8

Date Hole Started: 03/18/98 Date Hole Finished: 03/18/98

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: Asarco
Legal Description: 535 Pilchuck Path
Descriptive Location: NW corner of front yard

Recorded By: J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: J Niederkorn
Drilling Method: Split Spoon
Drilling Fluids Used: None
Purpose of Hole: Source Area Investigation
Target Aquifer: N/A
Hole Diameter (in): 3.0
Total Depth Drilled (ft): 5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft.

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Boring sampled with 3" (OD) split spoon on "A" rod under a 140 lb, 30" drop safety hammer on a cat head on an Acker Drill mounted on Bobcat. Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb)

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9803-305	SS		0.70	0.0 - 1.0'
	EVT-9803-306	SS		0.70	1.0 - 2.0'
	EVT-9803-307	SS		0.75	2.0 - 3.0'
	EVT-9803-308	SS		0.75	3.0 - 4.0'
	EVT-9803-309	SS		1.00	4.0 - 5.0'
5					
10					
15					
20					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 2.0'
Silty Gravelly SAND
Brown to yellowish brown, slighlty moist to dry, line grained to silt, medium dense to loose, 2" and smaller subrounded gravel.
(Fill)

2.0 - 4.0'
Gravelly Silty SAND
Grayish brown, with some orange mottling, line grained to medium grained, slightly moist to dry, some 2"and smaller subangular to subrounded gravel.
(Glacial Till)

4.0 - 5.0'
Sandy SILT
Gray mottled brown, coarse grined, dry, dense, trace subangular gravel
(Glacial Till)

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 7/13/98

HYDROMETRICS INC.
Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: SA-9

Date Hole Started: 03/18/98 Date Hole Finished: 03/18/9

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: Asarco
Legal Description: 535 Pilchuck Path
Descriptive Location: NE corner of back yard

Recorded By: J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: J Niederkorn
Drilling Method: Split Spoon
Drilling Fluids Used: None
Purpose of Hole: Source Area Investigation
Target Aquifer: N/A
Hole Diameter (in): 3.0
Total Depth Drilled (ft): 5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft.

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Boring sampled with 3" (OD) split spoon on "A" rod under a 140 lb, 30" drop safety hammer on a cat head on an Acker Drill mounted on a Bobcat. Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb)

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9803-300	SS		0.60	0.0 - 1.0'
	EVT-9803-301	SS		0.50	1.0 - 2.0'
	EVT-9803-302	SS		0.40	2.0 - 3.0'
	EVT-9803-303	SS		0.40	3.0 - 4.0'
	EVT-9803-304	SS		1.40	4.0 - 5.0'
5					
10					
15					
20					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 3.0'
Silty SAND
Dark brown with some yellowish orange mottling, slightly moist , some root matter, medium dense to loose; Some wood chips at 3'.
[Fill]

3.0 - 5.0'
Silty SAND
Brown to orange, medium to fine grained, slightly moist to dry, loose to medium dense some 3" and smaller subrounded gravel.
[Glacial Till]

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 7/13/98

HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: SA-10

Date Hole Started: 03/19/98 Date Hole Finished: 03/1[illegible] 8

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: Taylor
Legal Description: 538 E Marine View Dr
Descriptive Location: NE corner of front yard

Recorded By: J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: J Niederkorn
Drilling Method: Split Spoon
Drilling Fluids Used: None
Purpose of Hole: Source Area Investigation
Target Aquifer: N/A
Hole Diameter (in): 3.0
Total Depth Drilled (ft): 5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft.

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Boring sampled with 3" (OD) split spoon on "A" rod under a 140 lb, 30" drop safety hammer on a cat head on an Acker Drill mounted on a Bobcat. Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb)

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	EVT-9803-325B	SS		0.50	0.0 - 1.0'		0.0 - 1.0' **Silty LOAM** Dark brown, slightly moist, trace rounded to subrounded gravel, some root matter, loose. (Fill)
	EVT-9803-326	SS		0.50	1.0 - 2.0'		
	EVT-9803-327	SS		0.40	2.0 - 3.0'		1.0 - 5.0' **Silty SAND** Orange-brown grading to gray-brown with depth, mottled orange; slig[illegible] moist to dry, medium to fine grained; medium dense to loose; trace 2" and smaller gravel. (Fill)
	EVT-9803-328	SS		0.40	3.0 - 4.0' Duplicate sample at 10:12 EVT-9803-329		
5	EVT-9803-330	SS		0.60	4.0 - 5.0'	5	
10						10	
15						15	
20						20	

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 7/13/98

HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: SA-11

Date Hole Started: 03/18/98 Date Hole Finished: 03/18/98

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: Asarco
Legal Description: 541 Pilchuck Path
Descriptive Location: NE portion of back yard

Recorded By: J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: J Niederkorn
Drilling Method: Split Spoon
Drilling Fluids Used: None
Purpose of Hole: Source Area Investigation
Target Aquifer: N/A
Hole Diameter (in): 3.0
Total Depth Drilled (ft): 5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft.

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Boring sampled with 3" (OD) split spoon on "A" rod under a 140 lb, 30" drop safety hammer on a cat head on an Acker Drill mounted on a Bobcat. Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb)

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	EVT-9803-310	SS		0.70	0.0 - 1.0'		0.0 - 1.0' **Sandy LOAM** Dark brown, slightly moist, some organics, trace subrounded gravel. (Fill)
	EVT-9803-311	SS		0.70	1.0 - 2.0'		1.0 - 4.0' **Silty SAND** Light brown, slightly moist to moist, fine to medium grained, medium to fine grained, medium to loose, trace wood fibers, oxidized in bands. (Fill)
	EVT-9803-312	SS		0.80	2.0 - 3.0'		
	EVT-9803-313	SS		0.80	3.0 - 4.0'		
	EVT-9803-314	SS		0.60	4.0 - 5.0'		4.0 - 5.0' **Silty SAND** Gray, fine to coarse grained, slightly moist to dry, dense, trace gravel subrounded. (Glacial Till)
5						5	
10						10	
15						15	
20						20	

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 7/23/98

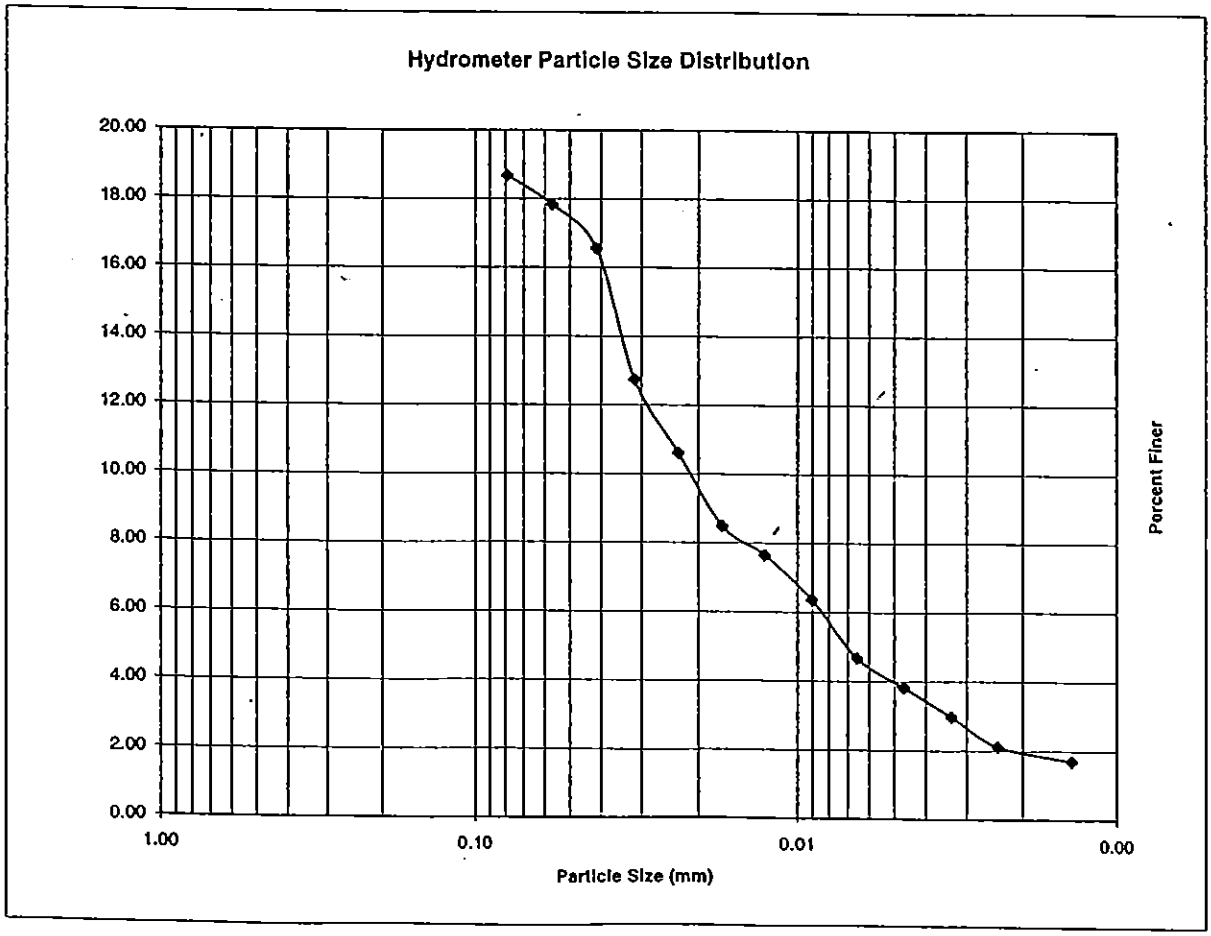
SA-11
4-5'

HYDROMETRICS, INC.
RUSTON LABORATORY
5227 NORTH 49TH STREET
TACOMA, WASHINGTON 98407

HYDROMETER ANALYSIS

LABORATORY NUMBER	98R-00873
SAMPLE NUMBER	EVT-9803-314
DATE	6/25/98
ANALYST	SM

Time	Reading	Rcp	% Finer	Rci	L	A	D	% Finer of Total
0.25	49	44	88.00	50	8.3	0.0137	0.08	18.67
0.5	47	42	84.00	48	8.6	0.0137	0.06	17.82
1	44	39	78.00	45	9.1	0.0137	0.04	16.55
2	35	30	60.00	36	10.6	0.0137	0.03	12.73
4	30	25	50.00	31	11.4	0.0137	0.02	10.61
8	25	20	40.00	26	12.2	0.0137	0.02	8.49
15	23	18	36.00	24	12.5	0.0137	0.01	7.64
30	20	15	30.00	21	13	0.0137	0.01	6.37
60	16	11	22.00	17	13.7	0.0137	0.01	4.67
120	14	9	18.00	15	14	0.0137	0.00	3.82
240	12	7	14.00	13	14.3	0.0137	0.00	2.97
480	10	5	10.00	11	14.7	0.0137	0.00	2.12
1440	9	4	8	10	14.8	0.0137	0.00	1.70



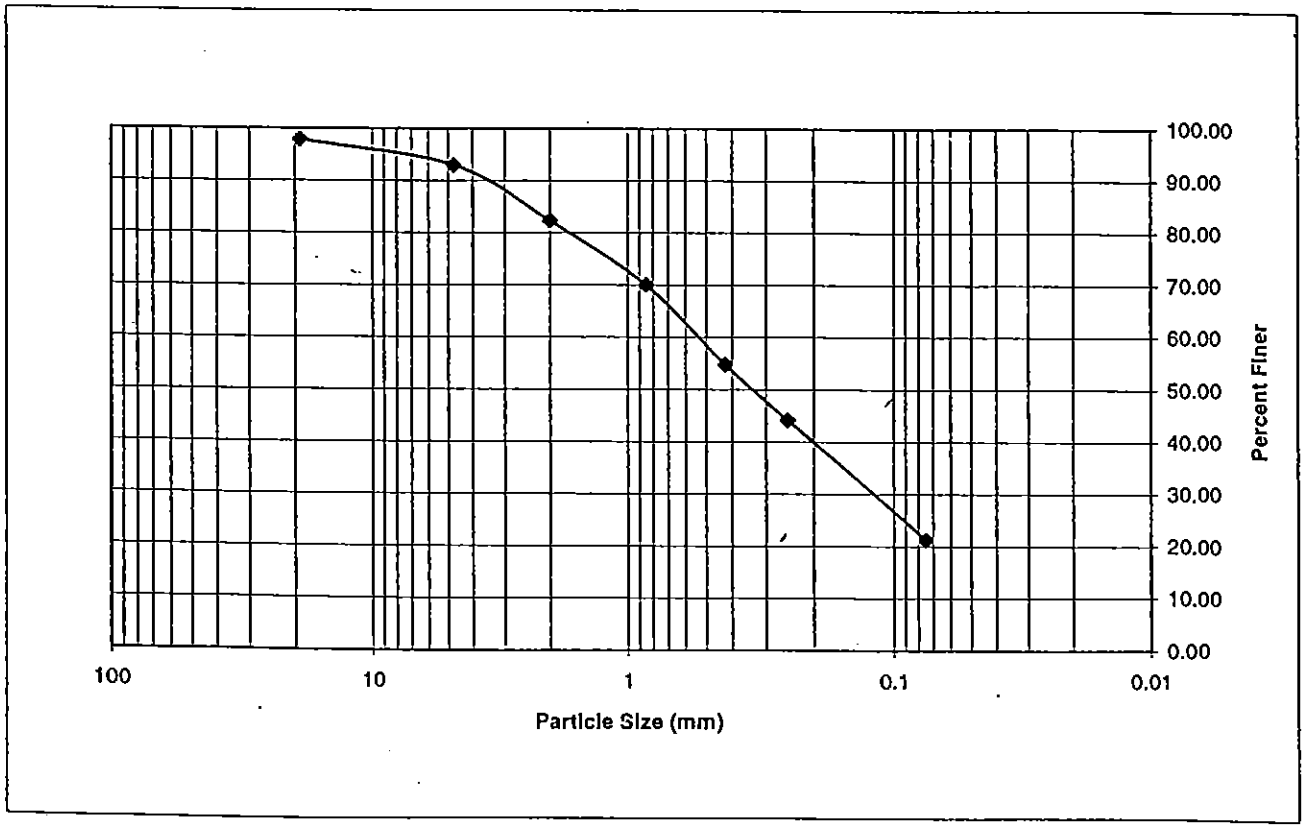
HYDROMETRICS, INC.
RUSTON LABORATORY
5227 NORTH 49TH STREET
RUSTON, WASHINGTON 98407

Laboratory Number: 98R-00873
Sample Number: EVT-9803-314
Date: 6/25/98

Weight of Oven Dry Sample (g):

Sieve Number	Sieve Opening (mm)	Weight Retained	Percent Retained	Cumulative Retained	Percent Finer
.75 inch	19.05	16.7	2.15	2.15	97.85
4	4.75	38.20	4.91	7.06	92.94
10	2.00	82.80	10.65	17.71	82.29
20	0.85	95.60	12.29	30.00	70.00
40	0.425	118.30	15.21	45.22	54.78
60	0.25	82.60	10.62	55.84	44.16
200	0.075	178.40	22.94	78.78	21.22
PAN	< 0.075	163.40	21.01		

sum = 776



HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: SA-12

Date Hole Started: 03/19/98 Date Hole Finished: 03/19...

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: Taylor
Legal Description: 538 E Marine View Dr
Descriptive Location: Between driveway from alley and parking strip.

Recorded By: J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: J Niederkorn
Drilling Method: Split Spoon
Drilling Fluids Used: None
Purpose of Hole: Source Area Investigation
Target Aquifer: N/A
Hole Diameter (in): 3.0
Total Depth Drilled (ft): 5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft.

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Boring sampled with 3" (OD) split spoon on "A" rod under a 140 lb, 30" drop safety hammer on a cat head on an Acker Drill mounted on a Bobcat. Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb)

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	EVT-9803-339	SS		0.70	0.0 - 1.0'		0.0 - 1.0' Silty SAND Dark brown, medium to fine grained, some 1/2" subangular gravel, slighlty moist to dry, loose, some vegetative matter. (Fill)
	EVT-9803-340	SS		0.70	1.0 - 2.0'		1.0 - 2.0' Gravelly Sandy SILT Reddish brown, slightly moist to dry, silt to fine grained sand; Brick fragments, some charred wood.; some 1" subrounded gravel. (Smelter Debris)
	EVT-9803-341	SS		0.70	2.0 - 3.0'		2.0 - 5.0' Gravelly SAND & SILT Orange Brown grading to Brown gray some orange mottling; Silt gradi... to Sand, root matter, medium dense, moist at 2' dry at 4'; 2" and smalle... rounded to subrounded gravel. (Fill)
	EVT-9803-342	SS		0.70	3.0 - 4.0'		
	EVT-9803-343	SS		1.00	4.0 - 5.0'		
5						5	
10						10	
15						15	
20						20	

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 7/13/98

HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: SA-13

Date Hole Started: 03/25/98 Date Hole Finished: 03/25/9[illegible]

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: Asarco
Legal Description: 511 Hawthorne
Descriptive Location: Adjacent to N driveway to former house

Recorded By: J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: J Niederkorn
Drilling Method: Split Spoon
Drilling Fluids Used: None
Purpose of Hole: Source Area Investigation
Target Aquifer: N/A
Hole Diameter (in): 3.0
Total Depth Drilled (ft): 5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft.

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Boring sampled with 3" (OD) split spoon on "A" rod under a 140 lb, 30" drop safety hammer on a cat head on a Piper 2000 Drill mounted on a pickup . Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb)

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	EVT-9803-414	SS		0.60	0.0 - 1.0'		0.0 - 2.0' **Sandy SILT** Dark Brown, slightly moist, roots at 0-1', loose, trace 1/4" and smaller gravel. (Fill)
	EVT-9803-415	SS		0.60	1.0 - 2.0'		
	EVT-9803-416	SS		0.70	2.0 - 3.0'		2.0 - 5.0' **Sandy SILT** Light brown to orange-brown with orange mottling, moist to slightly moist, some vegetative matter, medium dense. (Glacial Till)
	EVT-9803-417	SS		0.70	3.0 - 4.0' Duplicate sample #419 @ 15:00		
5	EVT-9803-418	SS		0.80	4.0 - 5.0'	5	
10						10	
15						15	
20						20	

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 7/13/98

HYDROMETRICS INC.
Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: SA-14

Date Hole Started: 03/24/98 Date Hole Finished: 03/2

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: Asarco
Legal Description: 516 Hawthorne
Descriptive Location: Front Yard

Recorded By: J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: J Niederkorn
Drilling Method: Split Spoon
Drilling Fluids Used: None
Purpose of Hole: Source Area Investigation
Target Aquifer: N/A
Hole Diameter (in): 3.0
Total Depth Drilled (ft): 5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft.

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Boring sampled with 3" (OD) split spoon on "A" rod under a 140 lb, 30" drop safety hammer on a cat head on a Piper 2000 Drill mounted on a pickup . Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb)

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9803-385	SS		0.70	0.0 - 1.0' Duplicate sample at 17:05 # 390
	EVT-9803-386	SS		0.70	1.0 - 2.0'
	EVT-9803-387	SS		0.75	2.0 - 3.0'
	EVT-9803-388	SS		0.75	3.0 - 4.0'
5	EVT-9803-389	SS		1.20	4.0 - 5.0'
10					
15					
20					

GEOLOGICAL DESCRIPTION

0.0 - 1.0'
Sandy SILT
Light brown, moist, organic matter, moist.
[Fill]

1.0 - 3.0'
Silty SAND
Orange-brown, slightly moist to moist, med to fine grained, some ban of oxidation; trace 1/4" subrounded gravel.
[Fill]

3.0 - 5.0'
Silty SAND
Gray, very fine to fine grained, slightly moist to moist; Some 1" subrounded gravel.
[Glacial Till]

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 7/13/98

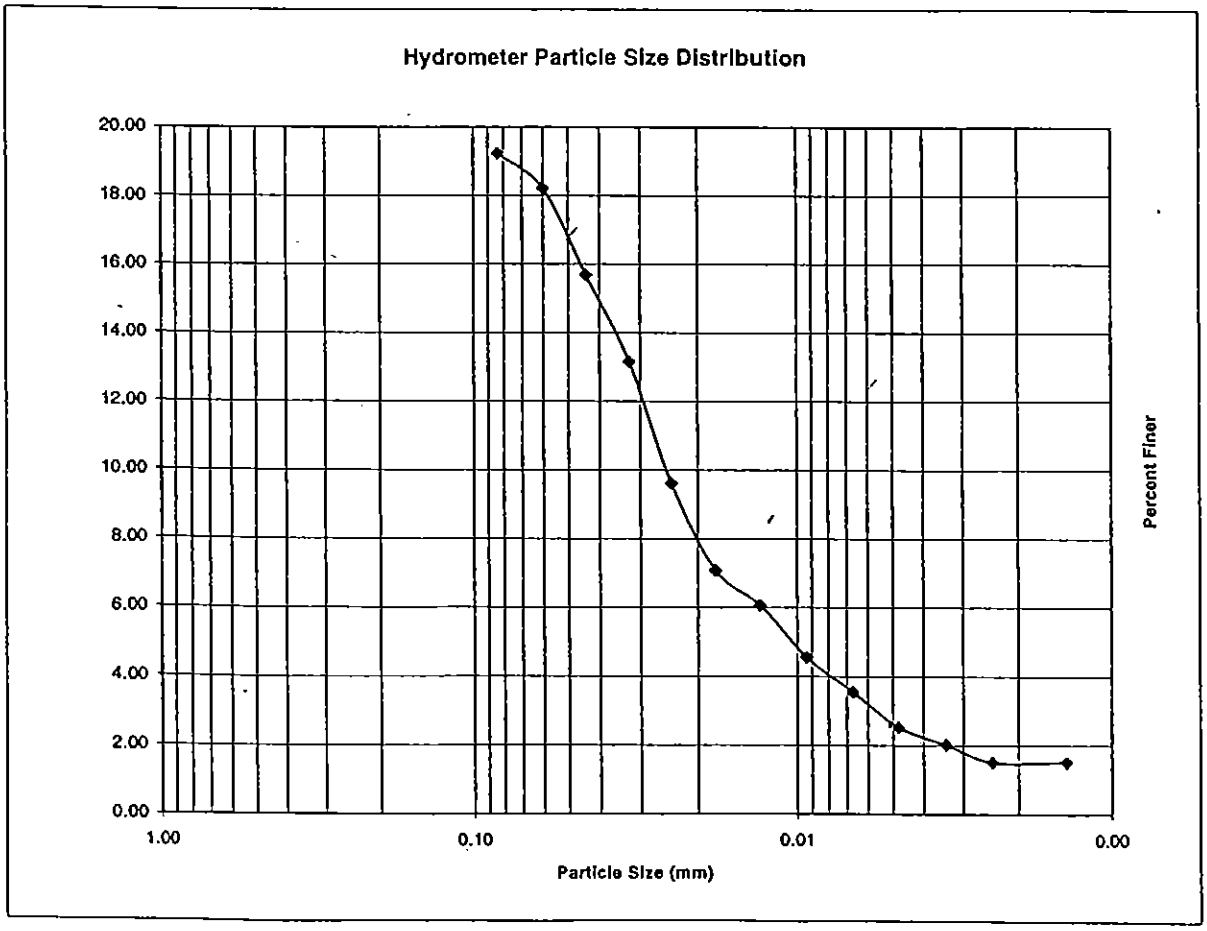
SA-14
3-4'

HYDROMETRICS, INC.
RUSTON LABORATORY
5227 NORTH 49TH STREET
TACOMA, WASHINGTON 98407

HYDROMETER ANALYSIS

LABORATORY NUMBER	98R-00977
SAMPLE NUMBER	EVT-9803-388
DATE	6/25/98
ANALYST	SM

Time	Reading	Rcp	% Finer	Rcl	L	A	D	% Finer of Total
0.25	43	38	76.00	44	9.3	0.0137	0.08	19.23
0.5	41	36	72.00	42	9.6	0.0137	0.06	18.22
1	36	31	62.00	37	10.4	0.0137	0.04	15.69
2	31	26	52.00	32	11.2	0.0137	0.03	13.16
4	24	19	38.00	25	12.4	0.0137	0.02	9.61
8	19	14	28.00	20	13.2	0.0137	0.02	7.08
15	17	12	24.00	18	13.4	0.0137	0.01	6.07
30	14	9	18.00	15	14	0.0137	0.01	4.55
60	12	7	14.00	13	14.3	0.0137	0.01	3.54
120	10	5	10.00	11	14.7	0.0137	0.00	2.53
240	9	4	8.00	10	14.8	0.0137	0.00	2.02
480	8	3	6	9	15	0.0137	0.00	1.52
1440	8	3	6	9	15	0.0137	0.00	1.52



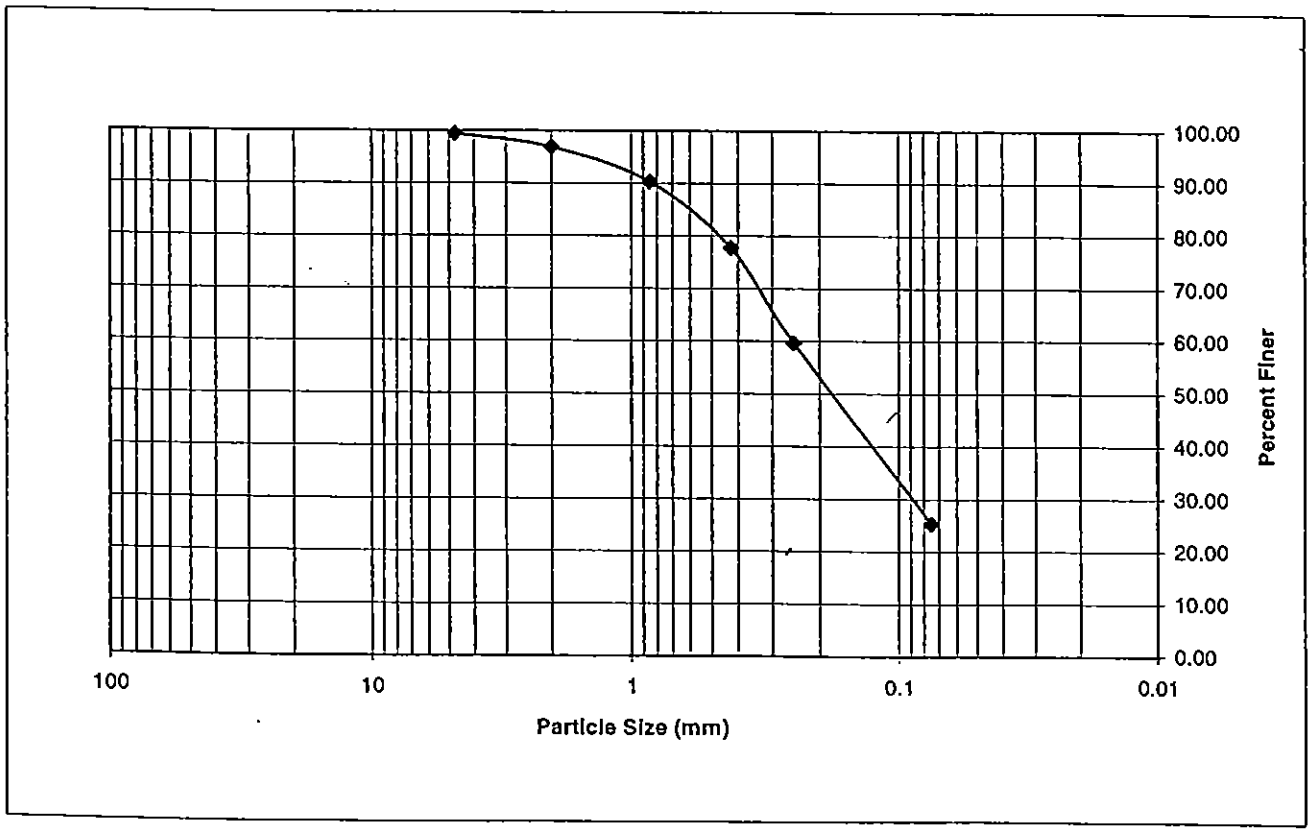
HYDROMETRICS, INC.
RUSTON LABORATORY
5227 NORTH 49TH STREET
RUSTON, WASHINGTON 98407

Laboratory Number: 98R-00977
Sample Number: EVT-9803-388
Date: 6/25/98

Weight of Oven Dry Sample (g): 678.5

Sieve Number	Sieve Opening (mm)	Weight Retained	Percent Retained	Cumulative Retained	Percent Finer
4	4.75	4.2	0.62	0.62	99.38
10	2.00	16.90	2.51	3.13	96.87
20	0.85	44.30	6.57	9.70	90.30
40	0.425	84.70	12.56	22.26	77.74
60	0.250	122.10	18.10	40.36	59.64
200	0.075	231.60	34.34	74.70	25.30
PAN	< 0.075	174.70	25.90		

sum = 678.5



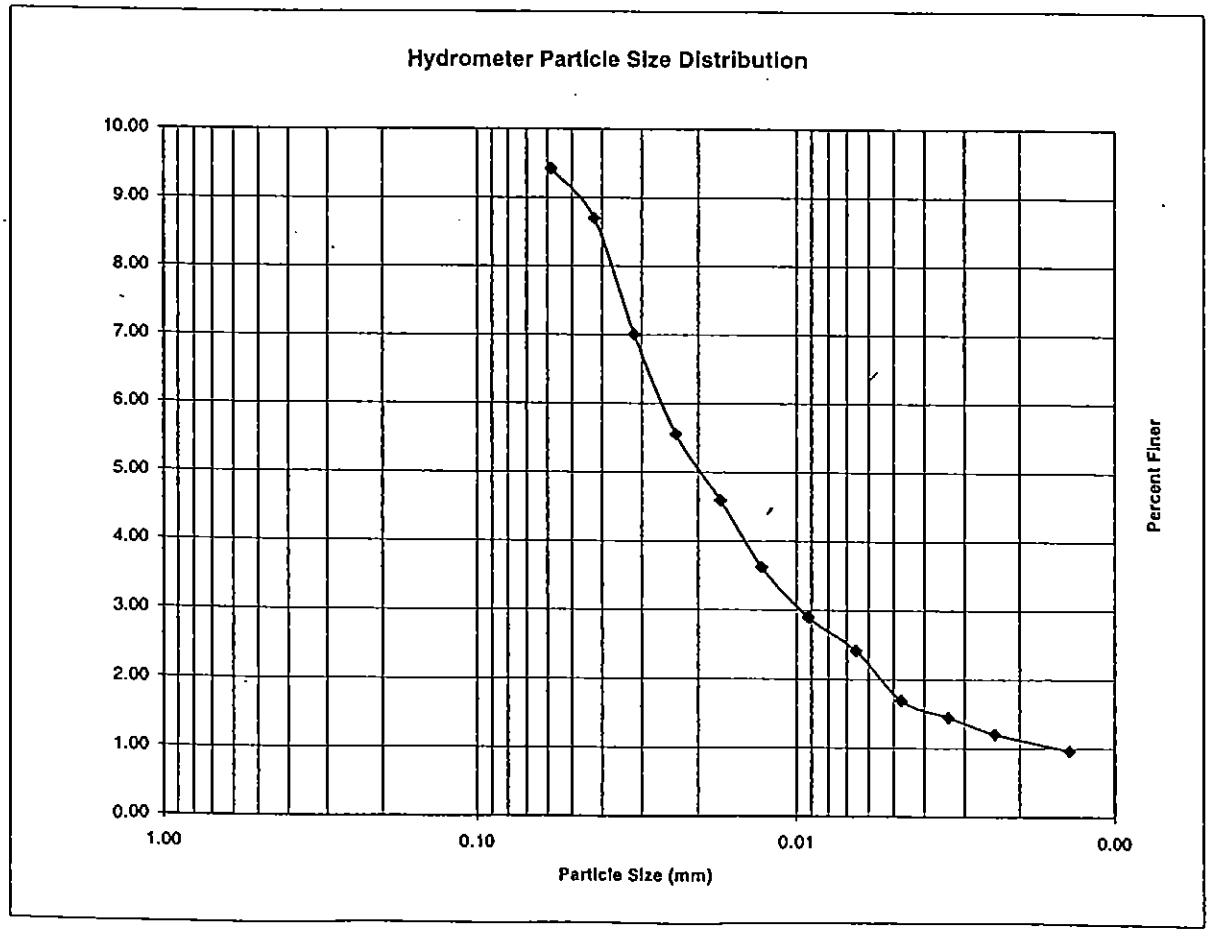
SA-14
4-5'

HYDROMETRICS, INC.
RUSTON LABORATORY
5227 NORTH 49TH STREET
TACOMA, WASHINGTON 98407

HYDROMETER ANALYSIS

LABORATORY NUMBER	98R-00978
SAMPLE NUMBER	EVT-9803-389
DATE	6/25/98
ANALYST	SM

Time	Reading	Rcp	% Finer	Rcl	L	A	D	% Finer of Total
0.25	47	42	84.00	48	8.6	0.0137	0.08	10.15
0.5	44	39	78.00	45	9.1	0.0137	0.06	9.42
1	41	36	72.00	42	9.6	0.0137	0.04	8.70
2	34	29	58.00	35	10.7	0.0137	0.03	7.01
4	28	23	46.00	29	11.7	0.0137	0.02	5.56
8	24	19	38.00	25	12.4	0.0137	0.02	4.59
15	20	15	30.00	21	13	0.0137	0.01	3.62
30	17	12	24.00	18	13.5	0.0137	0.01	2.90
60	15	10	20.00	16	13.8	0.0137	0.01	2.42
120	12	7	14.00	13	14.3	0.0137	0.00	1.69
240	11	6	12.00	12	14.5	0.0137	0.00	1.45
480	10	5	10	11	14.7	0.0137	0.00	1.21
1440	9	4	8	10	14.8	0.0137	0.00	0.97



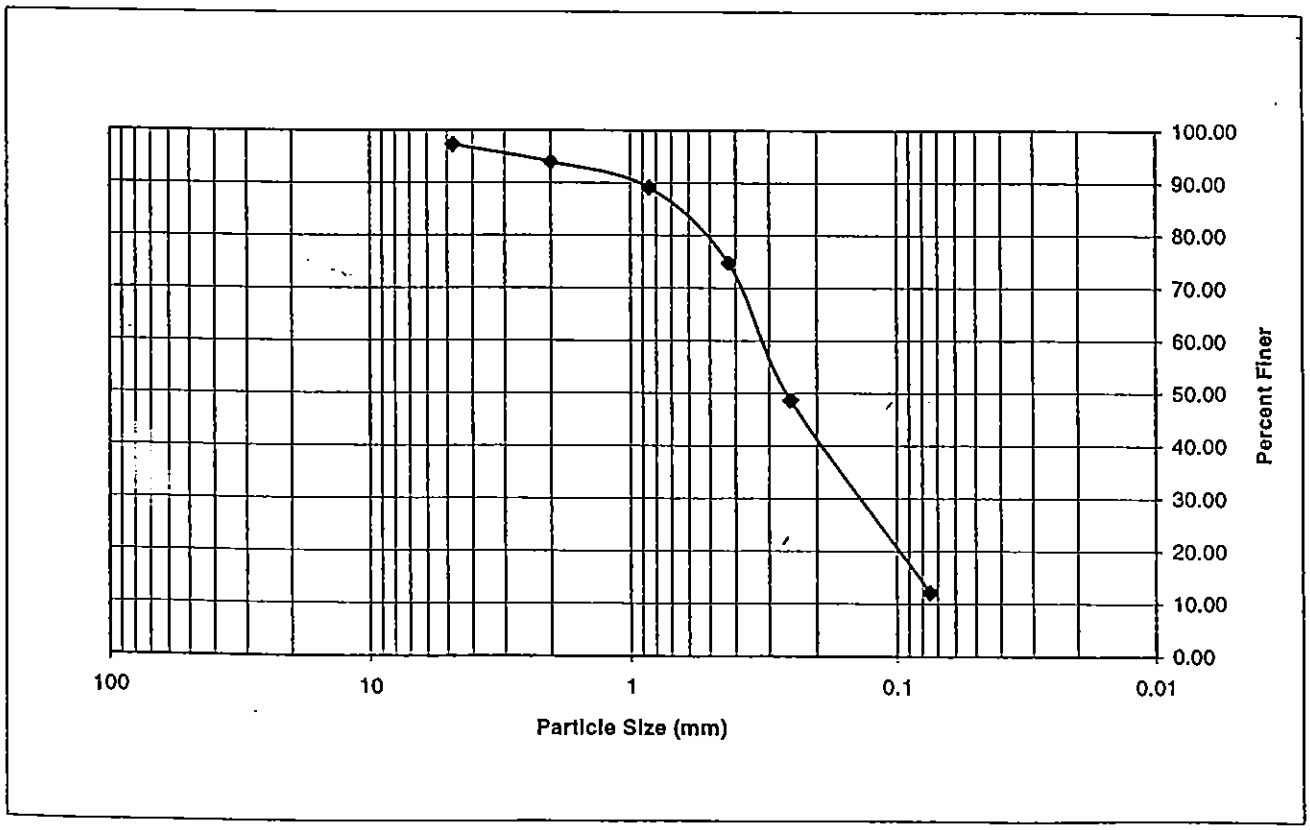
HYDROMETRICS, INC.
RUSTON LABORATORY
5227 NORTH 49TH STREET
RUSTON, WASHINGTON 98407

Laboratory Number: 98R-00978
Sample Number: EVT-9803-389
Date: 6/25/98

Weight of Oven Dry Sample (g): 773.2

Sieve Number	Sieve Opening (mm)	Weight Retained	Percent Retained	Cumulative Retained	Percent Finer
4	4.75	21.3	2.75	2.75	97.25
10	2.00	25.10	3.25	6.00	94.00
20	0.85	37.50	4.85	10.85	89.15
40	0.425	111.20	14.38	25.23	74.77
60	0.250	201.90	26.11	51.35	48.65
200	0.075	282.80	36.58	87.92	12.08
PAN	< 0.075	94.50	12.22		

sum = 774.3



HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: SA-15

Date Hole Started: 03/25/98 Date Hole Finished: 03/25/98

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: City of Everett
Legal Description: R/W Hawthorne St.
Descriptive Location: Asphalt parking strip in front of 522 Hawthorne

Recorded By: J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: J Niederkorn
Drilling Method: Split Spoon
Drilling Fluids Used: None
Purpose of Hole: Source Area Investigation
Target Aquifer: N/A
Hole Diameter (in): 3.0
Total Depth Drilled (ft): 5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft.

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Boring sampled with 3" (OD) split spoon on "A" rod under a 140 lb, 30" drop safety hammer on a cat head on a Piper 2000 Drill mounted on a pickup . Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb)

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	EVT-9803-398	SS		0.65	0.0 - 1.0'		0.0 - 2.0' **Silty SAND** Orange-brown to light brown some orange mottling, medium to fine grained, dry, medium dense; Trace red brick, and wood. [Smelter Debris]
	EVT-9803-399	SS		0.65	1.0 - 2.0'		
	EVT-9803-400	SS		0.70	2.0 - 3.0'		2.0 - 5.0' **Silty SAND** Grayish brown mottled orange (diminishes with depth), medium to fine grained, slightly moist to dry, med dense, 1" subrounded gravel. [Glacial Till]
	EVT-9803-401	SS		0.70	3.0 - 4.0'		
5	EVT-9803-402	SS		0.80	4.0 - 5.0'	5	
10						10	
15						15	
20						20	

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 7/13/98

HYDROMETRICS INC.
Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: SA-16

Date Hole Started: 03/25/98 Date Hole Finished: 03/__/98

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: Asarco
Legal Description: Former site of 515 Hawthorne St
Descriptive Location: In front yard adjacent to driveway

Recorded By: J Swartz
Drilling Company: Hydrometrics, Inc.
Driller: J Niederkorn
Drilling Method: Split Spoon
Drilling Fluids Used: None
Purpose of Hole: Source Area Investigation
Target Aquifer: N/A
Hole Diameter (in): 3.0
Total Depth Drilled (ft): 5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft.

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Boring sampled with 3" (OD) split spoon on "A" rod under a 140 lb, 30" drop safety hammer on a cat head on an Acker Drill mounted on a Bobcat. Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb). Hole abandoned with Bentonite chips and 1' concrete cap with Aluminum ID Tag.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9803-408	SS		0.65	0.0 - 1.0'
	EVT-9803-409	SS		0.65	1.0 - 2.0'
	EVT-9803-410	SS		0.60	2.0 - 3.0' Duplicate sample at 12:00, # 413.
	EVT-9803-411	SS		0.60	3.0 - 4.0'
5	EVT-9803-412	SS		0.80	4.0 - 5.0'
10					
15					
20					

GRAPHICS	GEOLOGICAL DESCRIPTION
	0.0 - 3.0' Silty SAND Dark brown to orange brown, with orange mottling, moist to slightly moist, medium to fine grained, trace red brick fragments at 0-2'; 1" and smaller subrounded gravel. [Smelter Debris]
5	3.0 - 5.0' Silty SAND Gray-brown, with orange staining at 3', dry, dense, with 3" and smaller subrounded gravel. [Glacial Till]
10	
15	
20	

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 7/13/98

HYDROMETRICS INC.
Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: SA-17

Date Hole Started: 03/25/98 Date Hole Finished: 03/25/98

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: Asarco
Legal Description: Former site of 515 Hawthorne St
Descriptive Location: SE corner of yard

Recorded By: J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: J Niederkorn
Drilling Method: Split Spoon
Drilling Fluids Used: None
Purpose of Hole: Source Area Investigation
Target Aquifer: N/A
Hole Diameter (in): 3.0
Total Depth Drilled (ft): 5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft.

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Boring sampled with 3" (OD) split spoon on "A" rod under a 140 lb, 30" drop safety hammer on a cat head on an Acker Drill mounted on a Bobcat. Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb). Hole abandoned with Bentonite chips and 1' concrete cap with Aluminum ID Tag.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	EVT-9803-403	SS		0.60	0.0 - 1.0'		0.0 - 2.0' **Silty LOAM/Sandy SILT** Dark brown to yellow brown, trace orange mottling, slightly moist to moist, root mass, trace red brick fragments. [Smelter Debris]
	EVT-9803-404	SS		0.60	1.0 - 2.0'		
	EVT-9803-405	SS		0.50	2.0 - 3.0'		2.0 - 5.0' **Silty SAND** Light Brown grading to gray brown with some orange mottling; moist to slightly moist, medium to fine grained, medium dense, 3" and smaller subrounded gravel. [Glacial Till]
	EVT-9803-406	SS		0.50	3.0 - 4.0'		
5	EVT-9803-407	SS		1.10	4.0 - 5.0'	5	
10						10	
15						15	
20						20	

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 7/13/99

HYDROMETRICS INC.
Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: SA-18

Date Hole Started: 03/25/98 Date Hole Finished: 03/2_ JF

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: Asarco
Legal Description: Former site of 505 Hawthorne St
Descriptive Location: 10' from NE corner of foundation

Recorded By: J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: J Niederkorn
Drilling Method: Split Spoon
Drilling Fluids Used: None
Purpose of Hole: Source Area Investigation
Target Aquifer: N/A
Hole Diameter (in): 3.0
Total Depth Drilled (ft): 5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft.

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Boring sampled with 3" (OD) split spoon on "A" rod under a 140 lb, 30" drop safety hammer on a cat head on an Acker Drill mounted on a Bobcat. Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb). Hole abandoned with Bentonite chips and 1' concrete cap with Aluminum ID Tag.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	EVT-9803-420	SS		0.80	0.0 - 1.0'		0.0 - 1.0' Silty LOAM Dark brown, slightly moist, worms, root matter. [Fill]
	EVT-9803-421	SS		0.80	1.0 - 2.0'		1.0 - 3.0' Silty SAND Light brown mottled orange, fine to medium grained, medium dense t loose, trace 1/2" subrounded gravel. [Fill]
	EVT-9803-422	SS		0.75	2.0 - 3.0'		
	EVT-9803-423	SS		0.75	3.0 - 4.0'		
	EVT-9803-424	SS		0.60	4.0 - 5.0'		3.0 - 5.0' Sandy SILT Gray with some orange staining, dry, dense to hard, trace 1" subroun gravel; 1" lense of coarse yellowish white and black sand at 4-5'. [Glacial Till]
5						5	
10						10	
15						15	
20						20	

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 7/13/98

HYDROMETRICS INC.
Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: SA-19

Date Hole Started: 03/30/98 Date Hole Finished: 03/30/98

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: R Leedy
Legal Description: 215 Medora Way
Descriptive Location: NW Front yard

Recorded By: J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: J Niederkorn
Drilling Method: Split Spoon
Drilling Fluids Used: None
Purpose of Hole: Source Area Investigation
Target Aquifer: N/A
Hole Diameter (in): 3.0
Total Depth Drilled (ft): 5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft.

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Boring sampled with 3" (OD) split spoon on "A" rod under a 140 lb, 30" drop safety hammer on a cat head on an Acker Drill mounted on a Bobcat. Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb). Hole abandoned with potting soil.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	EVT-9803-453	SS		0.50	0.0 - 1.0'		0.0 - 2.0' **Silty LOAM** Brown, slightly moist, organic matter, trace gravel. (Fill)
	EVT-9803-454	SS		0.50	1.0 - 2.0'		
	EVT-9803-455	SS		0.70	2.0 - 3.0'		2.0 - 5.0' **Silty SAND** Light brown to gray brown, with some orange staining, medium to fine grained, moist from 2-3' dry thereafter, medium dense to dense; Some 3" and smaller gravel, subrounded. (Glacial Till)
	EVT-9803-457	SS		0.50	3.0 - 4.0'		
5	EVT-9803-458	SS		0.60	4.0 - 5.0'	5	
10						10	
15						15	
20						20	

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HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: SA-20

Date Hole Started: 03/30/98 Date Hole Finished: 03/30/

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: M Ryan
Legal Description: 207 Medora Way
Descriptive Location: Center of back yard

Recorded By: J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: J Niederkorn
Drilling Method: Split Spoon
Drilling Fluids Used: None
Purpose of Hole: Source Area Investigation
Target Aquifer: N/A
Hole Diameter (in): 3.0
Total Depth Drilled (ft): 5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft.

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Boring sampled with 3" (OD) split spoon on "A" rod under a 140 lb, 30" drop safety hammer on a cat head on an Acker Drill mounted on a Bobcat. Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb). Hole abandoned with potting soil.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	EVT-9803-448	SS		0.50	0.0 - 1.0'		0.0 - 2.0' **Silty LOAM** Brown, moist to slightly moist, highly organic. [Fill]
	EVT-9803-449	SS		0.50	1.0 - 2.0'		
	EVT-9803-450	SS		0.70	2.0 - 3.0'		2.0 - 5.0' **Sandy SILT** Light brown to gray some orange mottling, medium dense to loose, slightly moist to dry. [Glacial Till]
	EVT-9803-451	SS		0.70	3.0 - 4.0'		
5	EVT-9803-452	SS		1.00	4.0 - 5.0'	5	
10						10	
15						15	
20						20	

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HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: SA-21

Date Hole Started: 03/30/98 Date Hole Finished: 03/30/98

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: M Legg
Legal Description: Last house on Whitehorse Trail.
Descriptive Location: 15' straight out from front door.

Recorded By: J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: J Niederkorn
Drilling Method: Split Spoon
Drilling Fluids Used: None
Purpose of Hole: Source Area Investigation
Target Aquifer: N/A
Hole Diameter (in): 3.0
Total Depth Drilled (ft): 5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft.

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Boring sampled with 3" (OD) split spoon on "A" rod under a 140 lb, 30" drop safety hammer on a cat head on an Acker Drill mounted on a Bobcat. Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb). Hole abandoned with potting soil.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	EVT-9803-444A	SS		0.60	0.0 - 1.0' Duplicate sample 447B @ 1445		0.0 - 2.0' **Silty LOAM** Brown, slighlty moist, roots and organics, trace gravel. (Fill)
	EVT-9803-444B	SS		0.60	1.0 - 2.0'		
	EVT-9803-445	SS		0.70	2.0 - 3.0'		2.0 - 4.0' **Gravelly Sandy SILT** Light brown, slighlty moist to moist, medium dense to loose, subrounded gravel, trace roots and trace red brick fragments. (Smelter Debris)
	EVT-9803-446	SS		0.70	3.0 - 4.0'		
5	EVT-9803-447B	SS		0.60	4.0 - 5.0'	5	4.0 - 5.0' **Silty SAND** Light brown to orange brown with some orange staining, fine grained to silt, moist to slighlty moist, medium dense to loose grained. (Glacial Till)
10						10	
15						15	
20						20	

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HYDROMETRICS INC.
Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: SA-22

Date Hole Started: 04/08/98 Date Hole Finished: 04/0 8

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: City of Everett
Legal Description: Medora Way
Descriptive Location: Middle of Medora Way in front of 215.

Recorded By: J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: J Niederkorn
Drilling Method: Split Spoon
Drilling Fluids Used: None
Purpose of Hole: Source Area Investigation
Target Aquifer: N/A
Hole Diameter (in): 3.0
Total Depth Drilled (ft): 5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft.

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Boring sampled with 3" (OD) split spoon on "A" rod under a 140 lb, 30" drop safety hammer on a cat head on an Acker Drill mounted on a Bobcat. Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb). Hole abandoned with Potting soil. Bentonite chips and 1' concrete cap with an Aluminum ID Tag.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9804-306	SS		0.65	0.0 - 1.0'
	EVT-9804-307	SS		0.65	1.0 - 2.0'
	EVT-9804-308	SS		1.00	2.0 - 3.0'
	EVT-9804-309	SS		1.00	3.0 - 4.0'
5	EVT-9804-310	SS		1.00	4.0 - 5.0' Duplicate sample at 09:30 #311
10					
15					
20					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 0.5'
Asphalt
Ashphalt black
(Road Pavement)

0.5 - 2.0'
SAND & GRAVEL
Dark brown, medium to fine grained, dry; Gravel is 2" and smaller, angular.
(Road Base Fill)

2.0 - 4.0'
Sandy SILT
Light brown to gray, moist to slightly moist, abundant 1" subangular gravel.
(Road Base Fill)

4.0 - 5.0'
Gravelly SILT
Light brown mottled orange, moist, approximately 30-40% 2" and sma subrounded gravel.
(Glacial Till)

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 7/13/98

HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: SA-23

Date Hole Started: 04/08/98 Date Hole Finished: 04/08/98

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: State of Washington
Legal Description: SR 529 median
Descriptive Location: Median from SR529 South to E Marine View Dr. northbound.

Recorded By: J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: J Niederkorn
Drilling Method: Split Spoon
Drilling Fluids Used: None
Purpose of Hole: Source Area Investigation
Target Aquifer: N/A
Hole Diameter (in): 3.0
Total Depth Drilled (ft): 5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft.

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Boring sampled with 3" (OD) split spoon on "A" rod under a 140 lb, 30" drop safety hammer on a cat head on an Acker Drill mounted on a Bobcat. Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb)

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	EVT-9803-425	SS		0.70	0.0 - 1.0'		0.0 - 0.7' Silty LOAM Dark brown, moist, with root mat. [Fill]
	EVT-9803-426	SS		0.70	1.0 - 2.0'		
	EVT-9803-427	SS		0.75	2.0 - 3.0'		0.7 - 5.0' Silty SAND Gray to gray brown with some orange mottling, medium to fine grained, medium dense to dense, slightly moist to dry, with some 1" subrounded gravel. [Glacial Till]
	EVT-9803-428	SS		0.75	3.0 - 4.0'		
5	EVT-9803-429	SS		1.00	4.0 - 5.0' Duplicate sample taken at 08:55 EVT-9803-430	5	
10						10	
15						15	
20						20	

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HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: SA-24

Date Hole Started: 04/01/98 Date Hole Finished: 04/01/98

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: City of Everett
Legal Description: E Marine View Dr.
Descriptive Location: Just past SR529 Northbound in left turn lane.

Recorded By: J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: J Niederkorn
Drilling Method: Split Spoon
Drilling Fluids Used: None
Purpose of Hole: Source Area Investigation
Target Aquifer: N/A
Hole Diameter (in): 3.0
Total Depth Drilled (ft): 5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft.

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Boring sampled with 3" (OD) split spoon on "N" rod under a 300 lb, 30" drop safety hammer on a winch release on an Mobile Drill B-61. Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb).

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	EVT-9804-300	SS		0.50	0.0 - 1.0'		0.0 - 1.0' **ASPHALT & GRAVEL** Black asphalt and 1/2" angular gravel. [Road Pavement]
	EVT-9804-301	SS		0.50	1.0 - 2.0'		1.0 - 2.0' **Gravelly SAND** Light brown, medium grained, dry, dense to medium dense; 40% 1/2" subround gravel. [Road Base Fill]
	EVT-9804-302	SS		1.00	2.0 - 3.0'		
	EVT-9804-303	SS		1.00	3.0 - 4.0'		
	EVT-9804-304	SS		1.00	4.0 - 5.0'		2.0 - 5.0' **Sandy SILT** Light brown with some oxidation staining at 4-5', dry, dense to hard; S is medium to fine grained; Some 2" and smaller subrounded gravel. [Glacial Till]
5						5	
10						10	
15						15	
20						20	

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 7/13/98

HYDROMETRICS INC.
Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: SA-25

Date Hole Started: 03/18/98 Date Hole Finished: 03/18/98

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: City of Everett
Legal Description: Alley between Pilchuck Path and E Mar. Vw.
Descriptive Location: In alley behind 535 Pilchuck Path Garage

Recorded By: J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: J Niederkorn
Drilling Method: Split Spoon
Drilling Fluids Used: None
Purpose of Hole: Source Area Investigation
Target Aquifer: N/A
Hole Diameter (in): 3.0
Total Depth Drilled (ft): 5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft.

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Boring sampled with 3" (OD) split spoon on "A" rod under a 140 lb, 30" drop safety hammer on a cat head on an Acker Drill mounted on a Bobcat. Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb)

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9803-315	SS		0.50	0.0 - 1.0'
	EVT-9803-316	SS		0.50	1.0 - 2.0'
	EVT-9803-317	SS		0.70	2.0 - 3.0'
	EVT-9803-318	SS		0.70	3.0 - 4.0' Duplicate sample @ 1705, EVT-9803-319
5	EVT-9803-320	SS		0.80	4.0 - 5.0'
10					
15					
20					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 0.5'
Asphalt
Black asphalt
(Road Pavement)

0.5 - 2.0'
Gravelly SAND
Gray, dry, medium to coarse grained, loose; 2" and smaller subrounded gravel.
(Road Base Fill)

2.0 - 5.0'
Silty SAND
Orange brown to light brown, medium to fine grained, slightly moist to dry, trace organic matter. 2" and smaller subangular gravel.
(Road Base Fill)

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 7/13/98

HYDROMETRICS INC.
Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: SA-26

Date Hole Started: 03/19/98 Date Hole Finished: 03/1 -B

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: City of Everett
Legal Description: Pilcuck Path
Descriptive Location: In front of 530 Pilchuck Path

Recorded By: J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: J Niederkorn
Drilling Method: Split Spoon
Drilling Fluids Used: None
Purpose of Hole: Source Area Investigation
Target Aquifer: N/A
Hole Diameter (in): 3.0
Total Depth Drilled (ft): 5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft.

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Boring sampled with 3" (OD) split spoon on "A" rod under a 140 lb, 30" drop safety hammer on a cat head on an Acker Drill mounted on a Bobcat. Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb)

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	EVT-9803-321	SS		0.20	0.0 - 1.0'		0.0 - 0.5' **ASPHALT** Black Asphalt; Difficult drilling. [Road Pavement]
	EVT-9803-322	SS		0.20	1.0 - 2.0'		0.5 - 2.0' **Gravelly SAND** Dark gray, medium to coarse grained, slightly moist to dry; approxima y 20-30% 1/4" subrounded gravel. [Road Base Fill]
	EVT-9803-323	SS		0.70	2.0 - 3.0'		
	EVT-9803-324	SS		0.70	3.0 - 4.0'		
	EVT-9803-325A	SS		1.00	4.0 - 5.0'		2.0 - 5.0' **Gravelly Sandy SILT** Light brown to orange brown with trace orange mottling, slightly moist medium dense, gets sandier with depth; some 2" and smaller subrou d gravel. [Road Base Fill]
5						5	
10						10	
15						15	
20						20	

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 7/13/98

HYDROMETRICS INC.
Consulting Scientists and Engineers
Tacoma, Washington

Evaluate structures

Hole Name: TP-3

Date Hole Started: 03/20/98 Date Hole Finished: 03/23/9

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: Asarco
Legal Description: 415 Pilchuck Path
Descriptive Location: Back Yard (Former roaster area)

Recorded By: J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: JN/RY
Drilling Method: Hollow Stem Auger/Backhoe
Drilling Fluids Used: None
Purpose of Hole: Evaluate structures
Target Aquifer: N/A
Hole Diameter (in): 3.5
Total Depth Drilled (ft): 11

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft. to 6'; 2' thereafter

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Test pit dug with a backhoe to 6', grab samples collected with a hand trowel and hoe; Continued drilling from 5' to 11' with Piper 2000 2 1/4" (ID) HSA, sampled with a 2" split spoon using "A" rod, a 140 lb. 30 inch drop safety hammer on a cat head. Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb). Test pits were backfilled and BMPs were applied while test pit borings were abandoned with bentonite chips and a one foot concrete cap with an aluminium ID tag. Test pits also were topped with a concrete patch and aluminum ID tag.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9803-169	GRAB			0.0 - 1.0'
	EVT-9803-170	GRAB			1.0 - 2.0' Complete flue structure, see field book for sketches.
	EVT-9803-171	GRAB			2.0 - 3.0'
	EVT-9803-172	GRAB			3.0 - 4.0'
	EVT-9803-173	GRAB			4.0 - 5.0'
5	EVT-9803-174	GRAB			5.0 - 6.0' Duplicate SS (blow count 5/8) sample for TPB-3 @ 5-6' on 3/23 @ 13:15 #175.
	EVT-9803-176	SS	12/33	0.75	6.0 - 7.0'
	EVT-9803-177	SS	26/43	0.75	7.0 - 8.0'
	EVT-9803-178	SS	87/50-4	0.75	8.0 - 9.0'
	EVT-9803-179	SS	27/24	0.70	9.0 - 10.0'
10	EVT-9803-180	SS	56/60	0.70	10.0 - 11.0' Duplicate sample @ 13:45; EVT-9803-181
15					
20					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 1.0'
Silty LOAM
Brown, slightly moist to dry.
[Fill]

1.0 - 2.0'
Silty SAND
Brown, medium to fine grained, slightly moist to dry, some 1/2" subrounded gravel. Abundant red brick fragments.
[Smelter Debris]

2.0 - 3.0'
Gravelly SAND
Yellow to white, medium grained, slightly moist to dry, 20-30% 1" subrounded gravel with abundant red brick debris.
[Smelter Debris]

3.0 - 4.0'
Gravelly SAND
Same as above no brick or gravel.
[Smelter Debris]

4.0 - 7.0'
BRICK
red, crumbled w/ white-gray, sandsized particles (mortar), dry.
[Smelter Debris]

7.0 - 8.0'
SILT
Light brown to gray brown, dry, stiff; trace medium to coase sand w/ fine subrounded gravel.
[Glacial Till]

8.0 - 9.0'
SAND & SILT
4" of medium grained, gray, slightly moist sand; 4" fo gray-brown, slightly moist to dry, very stiff to hard silt; trace gravel.
[Glacial Till]

9.0 - 11.0'
Slightly Silty SAND
Brown-gray, moist, medium to fine grained, medium dense, trace gravel.
[Glacial Till]

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 7/13/98

HYDROMETRICS INC.
Consulting Scientists and Engineers
Tacoma, Washington

Evaluate structures

Hole Name: TP-4

Date Hole Started: 03/18/98 Date Hole Finished: 04/07/9

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: Asarco
Legal Description: 525 Pilchuck Path
Descriptive Location: Front Yard (Former As kitchens)

Recorded By: B Thompson/J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: JN/RY
Drilling Method: Hollow Stem Auger/Backhoe
Drilling Fluids Used: None
Purpose of Hole: Evaluate structures
Target Aquifer: N/A
Hole Diameter (in): 3.5
Total Depth Drilled (ft): 11

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft. to 7'; 2' thereafter

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Test pit dug with a backhoe to 6', grab samples collected with a hand trowel and hoe; Continued drilling from 5' to 11' with Piper 2000 2 1/4" (ID) HSA, sampled with a 2" split spoon using "A" rod, a 140 lb. 30 inch drop safety hammer on a cat head. Samples submitted to Hydrometri Inc. Ruston laboratory for XRF analysis (As, Pb). Test pits were backfilled and BMPs were applied while test pit borings were abandoned with bentonite chips and a one foot concrete cap with an aluminium ID tag. Test pits also were topped with a concrete patch and aluminum ID tag.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9803-112	GRAB			0.0 - 1.0'
	EVT-9803-113	GRAB			1.0 - 2.0'
	EVT-9803-114	GRAB			2.0 - 3.0'
	EVT-9803-115	GRAB			3.0 - 4.0'
	EVT-9803-116	GRAB			4.0 - 5.0'
5	EVT-9803-117	GRAB			5.0 - 6.0' Duplicate EVT-9803-118 @ 12:12; 2nd Duplicate @ 15:00 4/7/98 at TPB-4 EVT-9804-120 (blow count, 12/18 .6' recovered.
	EVT-9804-121	SS	15/31	1.00	6.0 - 7.0'
	EVT-9804-122	SS	13/35	1.00	8.0 - 9.0'
10	EVT-9804-123	SS	15/20	1.00	10.0 - 11.0'
15					
20					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 1.0'
Sandy LOAM
Dark Brown
[Fill]

1.0 - 2.5'
Gravelly SILT
Brown, gravel well rounded to 2"; Occasional brick debris.
[Smelter Debris]

2.5 - 3.5'
SILT
Dark brown, and abundant brick debris, discontinuoous lenses of me sand (very limited in extent).
[Smelter Debris]

3.5 - 4.5'
SAND
1-2" of sand underlain by orange to light brown silt and fine sand with trace fine gravel.
[Fill]

4.5 - 6.0'
SAND & SILT
Transition to light brown/gray, silt and sand, moist becomes drier at 6'
[Glacial Till]

6.0 - 11.0'
Sandy SILT
Light brown to gray mottled orange, dry, medium dense to loose, trace fine gravel.
[Glacial Till]

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 7/13/98

HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Evaluate structures

Hole Name: TP-5

Date Hole Started: 03/19/98 Date Hole Finished: 03/19/9

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: Asarco
Legal Description: 525 Pilchuck Path
Descriptive Location: Back Yard (Former roaster area)

Recorded By: B Thompson
Drilling Company: Hydrometrics, Inc.
Driller: R Yeager
Drilling Method: Backhoe
Drilling Fluids Used: None
Purpose of Hole: Evaluate structures
Target Aquifer: N/A
Hole Diameter (in): 3x31'
Total Depth Drilled (ft): 5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft.

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Test pit dug with a backhoe to 5', grab samples collected with a hand trowel and hoe. Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb). Test pits were backfilled and BMPs were applied. A one foot concrete cap with an aluminium ID tag was placed at the sample locations.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9803-126	GRAB			0.0 - 1.0'
	EVT-9803-127	GRAB			1.0 - 2.0' Duplicate sample at 08:50 EVT-9803-131
	EVT-9803-128	GRAB			2.0 - 3.0'
	EVT-9803-129	GRAB			3.0 - 4.0'
5	EVT-9803-130	GRAB			4.0 - 5.0'
10					
15					
20					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 1.0'
Sandy LOAM
Brown, little fine well rounded gravel.
[Fill]

1.0 - 2.0'
SAND
Gray/Brown sandy interval with abundant red brick fragments, some white mottling.
[Smelter Debris]

2.0 - 3.0'
Gravelly SILT & SAND
Orange/brown, transitioning into light brown silt and sand with trace gravel.
[Fill]

3.0 - 5.0'
SILT & SAND
Light brown/gray silt & fine sand, with trace of fine gravel, moist (no free water) drier at 4-5' and very dense..
[Glacial Till]

GEOTECH EVTSA-T.GPJ HYD-TUC.GDT 7/13/98

HYDROMETRICS INC.
Consulting Scientists and Engineers
Tacoma, Washington

Evaluate structures

Hole Name: TP-6A

Date Hole Started: 03/18/98 Date Hole Finished: 04/0 98

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: Asarco
Legal Description: 521 Pilchuck Path
Descriptive Location: North side of front yard. (As Kitchens)

Recorded By: B Thompson/J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: JN/RY
Drilling Method: Hollow Stem Auger/Backhoe
Drilling Fluids Used: None
Purpose of Hole: Evaluate structures
Target Aquifer: N/A
Hole Diameter (in): TPB 3.5"; TP 3x12'
Total Depth Drilled (ft): 13

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft. to 7'; 2' thereafter

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Test pit dug with a backhoe to 6', grab samples collected with a hand trowel and hoe; Continued drilling from 5' to 11' with Piper 2000 2 1/4" (ID) HSA, sampled with a 2" split spoon using "A" rod, a 140 lb. 30 inch drop safety hammer on a cat head. Samples submitted to Hydrometric Inc. Ruston laboratory for XRF analysis (As, Pb). Test pits were backfilled and BMPs were applied while test pit borings were abandoned with bentonite chips and a one foot concrete cap with an aluminium ID tag. Test pits also were topped with a concrete patch and aluminum ID tag. Borings adjacent to test pits were labeled TPB-[test pit number].

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9803-106	GRAB			0.0 - 1.0'
	EVT-9803-107	GRAB			1.0 - 2.0'
	EVT-9803-108	GRAB			2.0 - 3.0'
	EVT-9803-109	GRAB			3.0 - 4.0'
	EVT-9803-110	GRAB			4.0 - 5.0'
5	EVT-9803-111	GRAB			5.0 - 6.0' A sample from 5-6' was also obtained at time of drilling TPB; EVT-9804-115 @ 1140 on 04/07/98
	EVT-9804-116	SS	7/25	0.70	6.0 - 7.0'
	EVT-9804-117	SS	15/22	0.70	8.0 - 9.0'
10	EVT-9804-118	SS	10/30	0.60	10.0 - 11.0'
	EVT-9804-119	SS	30/50-5	0.70	12.0 - 13.0'
15					
20					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 1.0'
Silty LOAM
Brown, trace gravel to 1" well rounded brick fragments.
[Smelter Debris]

1.0 - 2.0'
BRICK
Brown sandy SILT overlying brick layer consisting of three rows of red mortared brick; approximately two 1/2" gray sand underlying brick.
[Smelter Debris]

2.0 - 4.0'
Silty SAND
Orange/brown silty sand some brown to black mottling; black charcoal fragments; trace gravel.
[Fill]

4.0 - 6.0'
SILT & SAND
Light brown silt and sand, trace gravel well rounded.
[Glacial Till]

6.0 - 12.0'
Sandy SILT
Light brown to gray mottled orange, dry, medium dense, trace fine gravel.
[Glacial Till]

12.0 - 13.0'
SILT
Light brown to gray, dry, dense, trace fine gravel.
[Glacial Till]

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 8/5/98

HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Evaluate structures

Hole Name: TP-6B

Date Hole Started: 03/18/98 Date Hole Finished: 03/18/9

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: Asarco
Legal Description: 521 Pilchuck Path
Descriptive Location: South side of front yard.

Recorded By: B Thompson
Drilling Company: Hydrometrics, Inc.
Driller: R Yeager
Drilling Method: Backhoe
Drilling Fluids Used: None
Purpose of Hole: Evaluate structures
Target Aquifer: N/A
Hole Diameter (in): 3x7.5'
Total Depth Drilled (ft): 6

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft.

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Test pit dug with a backhoe to 5', grab samples collected with a hand trowel and hoe. Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb). Test pits were backfilled and BMPs were applied. A one foot concrete cap with an aluminium ID tag was placed at the sample locations.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9803-100	GRAB			0.0 - 1.0'
	EVT-9803-101	GRAB			1.0 - 2.0'
	EVT-9803-102	GRAB			2.0 - 3.0'
	EVT-9803-103	GRAB			3.0 - 4.0'
	EVT-9803-104	GRAB			4.0 - 5.0'
5	EVT-9803-105	GRAB			5.0 - 6.0'
10					
15					
20					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 1.0'
Silty LOAM
Brown silty loam with trace of fine gravel. Abundant brick fragments.
(Fill)

1.0 - 2.0'
BRICK
Brick floor intact at 1.5';
0.2' dark brown silty sand over orange brick
0.2' medium sand under brick
underlain by orange/brown silty sand with trace clay, some gravel and cobbles to 2".
(Smelter Debris)

2.0 - 4.0'
Silty SAND
Orange brown silty sand some gravel trace clay; some dark brown to black mottling in soil for 1' below brick layer, wood debris in darker areas.
(Fill)

4.0 - 6.0'
SILT & SAND
Transition to light gray/brown silt to fine sand, trace gravel & cobbles, some orange to gray mottling; very dense.
(Glacial Till)

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 7/13/98

HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Evaluate structures

Hole Name: TP-7

Date Hole Started: 03/19/98 Date Hole Finished: 04/06/98

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: Asarco
Legal Description: 515 Pilchuck Path
Descriptive Location: Back yard (Former As dust chambers)

Recorded By: B Thompson/J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: JN/RY
Drilling Method: Hollow Stem Auger/Backhoe
Drilling Fluids Used: None
Purpose of Hole: Evaluate structures
Target Aquifer: N/A
Hole Diameter (in): TPB 3.5"; TP 3x47'
Total Depth Drilled (ft): 11

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft. to 7'; 2' thereafter

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Test pit dug with a backhoe to 6', grab samples collected with a hand trowel and hoe; Continued drilling from 5' to 11' with Piper 2000 2 1/4" (ID) HSA, sampled with a 2" split spoon using "A" rod, a 140 lb. 30 inch drop safety hammer on a cat head. Samples submitted to Hydrometric Inc. Ruston laboratory for XRF analysis (As, Pb). Test pits were backfilled and BMPs were applied while test pit borings were abandoned with bentonite chips and a one foot concrete cap with an aluminium ID tag. Test pits also were topped with a concrete patch and aluminum ID tag. Borings adjacent to test pits were labeled TPB-[test pit number].

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9803-132	GRAB			0.0 - 1.0'
	EVT-9803-133	GRAB			1.0 - 2.0'
	EVT-9803-134	GRAB			2.0 - 3.0'
	EVT-9803-135	GRAB			3.0 - 4.0'
	EVT-9803-136	GRAB			4.0 - 5.0'
5	EVT-9803-137	GRAB			5.0 - 6.0' A sample from 5-6' was also obtained at time of drilling TPB; EVT-9804-105 @ 1655 on 04/07/98
	EVT-9804-106	SS	14/21	1.00	6.0 - 7.0'
	EVT-9804-107	SS	8/10	1.00	8.0 - 9.0'
10	EVT-9804-108	SS	12/26	0.75	10.0 - 11.0'
15					
20					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 1.0'
Sandy LOAM
Brown Sandy LOAM
[Fill]

1.0 - 2.0'
Silty SAND
Brown loam radinl into silty sand and gravel with traced of red brick fragments, some black mottling.
[Smelter Debris]

2.0 - 3.0'
Silty SAND & GRAVEL
Gray silty fine sand and gravel with yellowish staining and trace red b fragments.
[Smelter Debris]

3.0 - 5.0'
Silty SAND and GRAVEL
Orange Silty SAND grading to orange/brown to light brown Silty SAN and GRAVEL.
[Fill]

5.0 - 7.5'
Silty SAND
Light brown to gray with some orange mottling, fine to very fine grain mosit, med dense, trace fine gravels.
[Glacial Till]

7.5 - 11.0'
Silty SAND
Light brown, fine grained, loose to medium dense, moist.
[Glacial Till]

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 8/5/98

TP-7

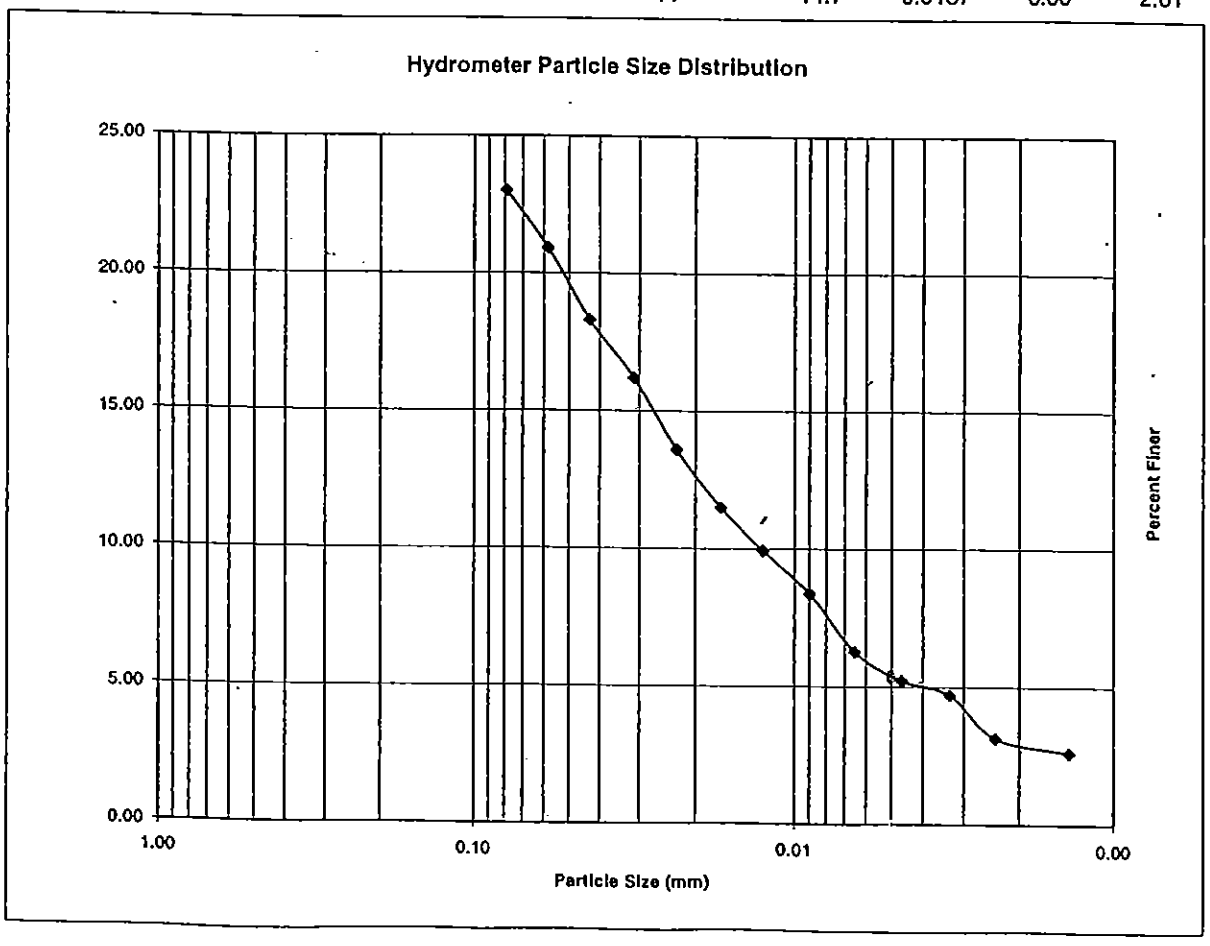
8-9'

HYDROMETRICS, INC.
RUSTON LABORATORY
5227 NORTH 49TH STREET
TACOMA, WASHINGTON 98407

HYDROMETER ANALYSIS

LABORATORY NUMBER	98R-01159
SAMPLE NUMBER	EVT-9803-107
DATE	6/29/98
ANALYST	SM

Time	Reading	Rcp	% Finer	Rcl	L	A	D	% Finer of Total
0.25	49	44	88.00	50	8.3	0.0137	0.08	22.99
0.5	45	40	80.00	46	9	0.0137	0.06	20.90
1	40	35	70.00	41	9.8	0.0137	0.04	18.29
2	36	31	62.00	37	10.4	0.0137	0.03	16.20
4	31	26	52.00	32	11.2	0.0137	0.02	13.59
8	27	22	44.00	28	11.9	0.0137	0.02	11.50
15	24	19	38.00	25	12.4	0.0137	0.01	9.93
30	21	16	32.00	22	12.9	0.0137	0.01	8.36
60	17	12	24.00	18	13.5	0.0137	0.01	6.27
120	15	10	20.00	16	13.8	0.0137	0.00	5.23
240	14	9	18.00	15	14	0.0137	0.00	4.70
480	11	6	12	12	14.5	0.0137	0.00	3.14
1440	10	5	10	11	14.7	0.0137	0.00	2.61



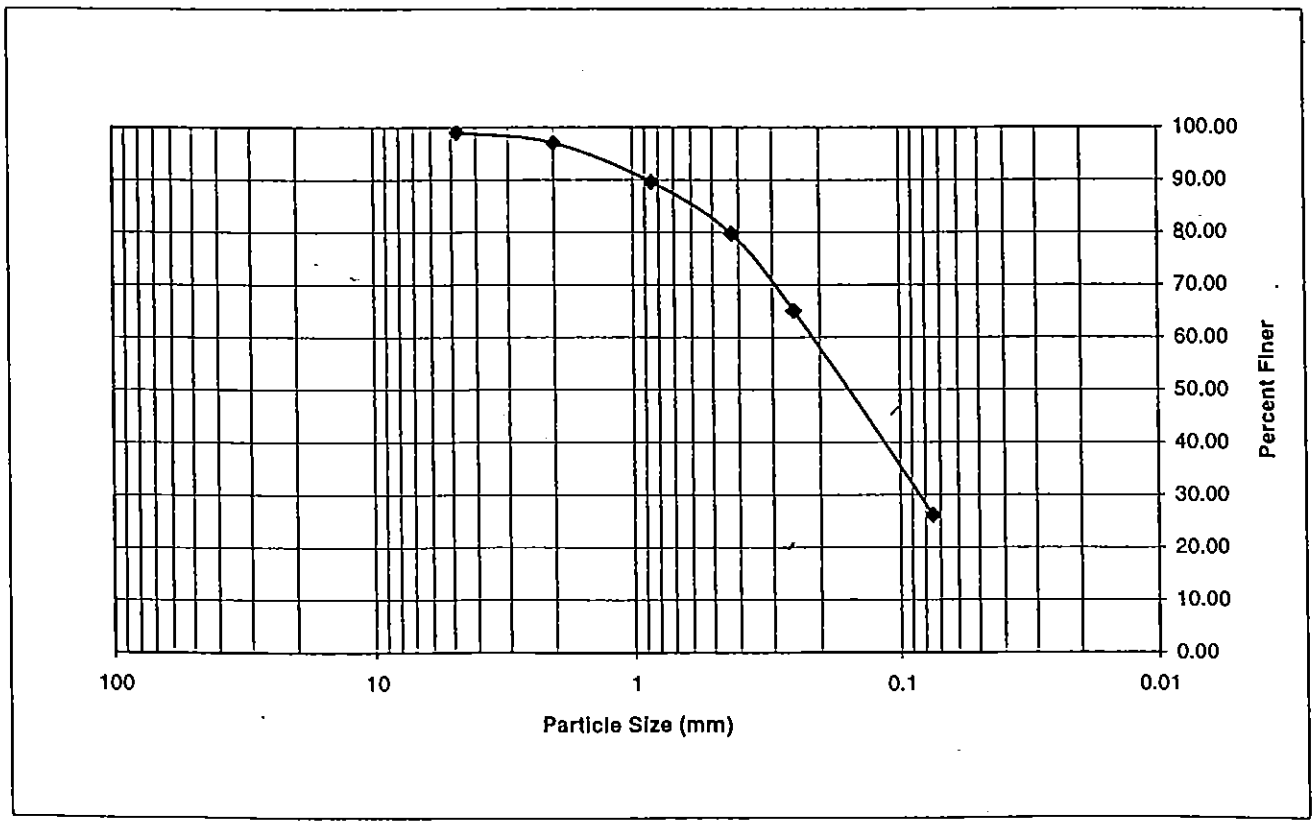
HYDROMETRICS, INC.
RUSTON LABORATORY
5227 NORTH 49TH STREET
RUSTON, WASHINGTON 98407

Laboratory Number: 98R-01159
Sample Number: EVT-9803-107
Date: 6/25/98

Weight of Oven Dry Sample (g): 255.3

Sieve Number	Sieve Opening (mm)	Weight Retained			
4	4.75	2.5	0.98	0.98	99.02
10	2.00	5.00	1.96	2.94	97.06
20	0.85	19.00	7.44	10.38	89.62
40	0.425	25.20	9.87	20.25	79.75
60	0.250	37.60	14.73	34.98	65.02
200	0.075	99.30	38.90	73.87	26.13
PAN	< 0.075	67.10	26.28		

sum = 255.7



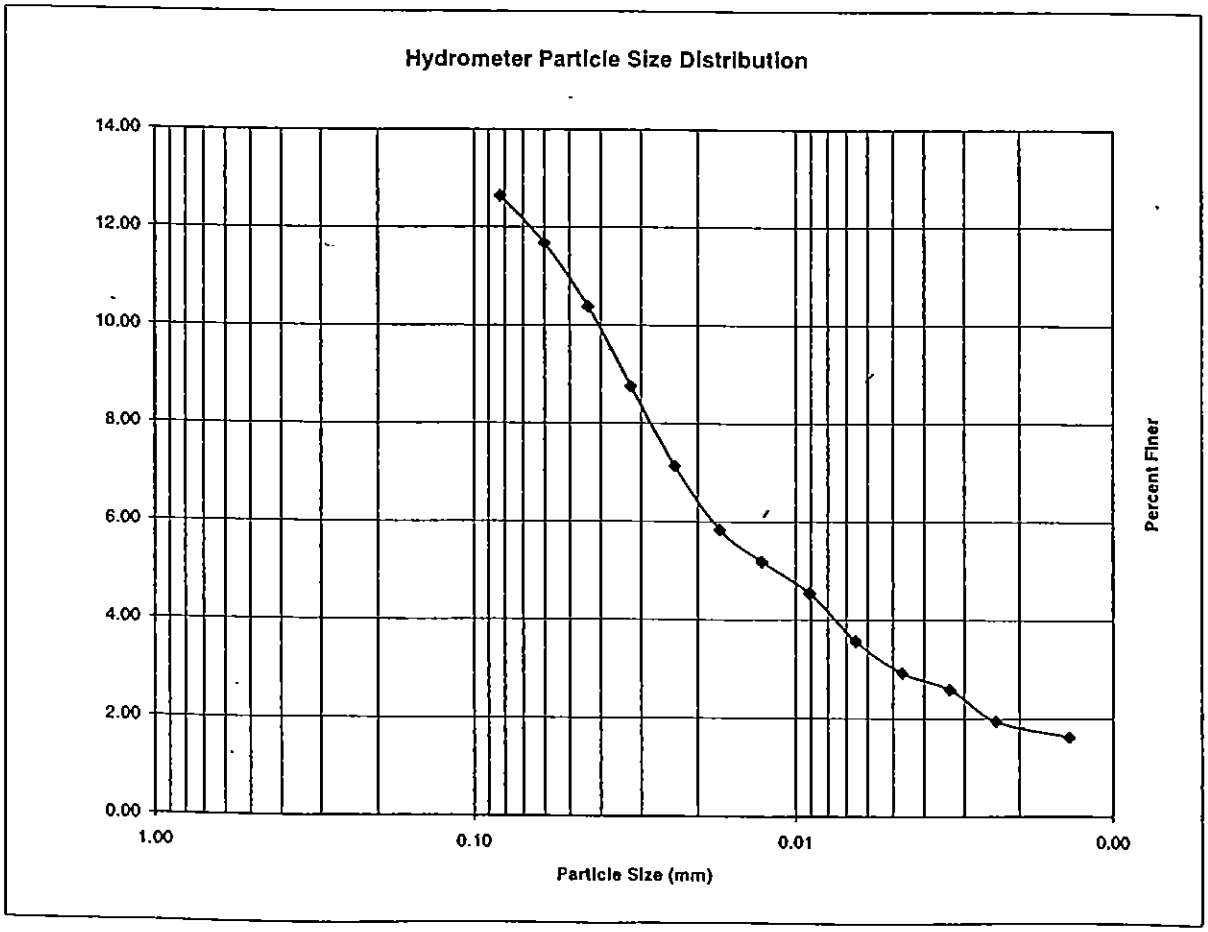
TP-7
10-11'

HYDROMETRICS, INC.
RUSTON LABORATORY
5227 NORTH 49TH STREET
TACOMA, WASHINGTON 98407

HYDROMETER ANALYSIS

LABORATORY NUMBER	98R-01160
SAMPLE NUMBER	EVT-9804-108
DATE	6/29/98
ANALYST	SM

Time	Reading	Rcp	% Finer	Rcl	L	A	D	% Finer of Total
0.25	44	39	84.23	45	9.1	0.0137	0.08	12.64
0.5	41	36	77.75	42	9.6	0.0137	0.06	11.67
1	37	32	69.11	38	10.2	0.0137	0.04	10.37
2	32	27	58.32	33	11.1	0.0137	0.03	8.75
4	27	22	47.52	28	11.8	0.0137	0.02	7.13
8	23	18	38.88	24	12.5	0.0137	0.02	5.84
15	21	16	34.56	22	12.9	0.0137	0.01	5.19
30	19	14	30.24	20	13.2	0.0137	0.01	4.54
60	16	11	23.76	17	13.7	0.0137	0.01	3.57
120	14	9	19.44	15	14	0.0137	0.00	2.92
240	13	8	17.28	14	14.2	0.0137	0.00	2.59
480	11	6	12.96	12	14.5	0.0137	0.00	1.95
1440	10	5	10.80	11	14.7	0.0137	0.00	1.62



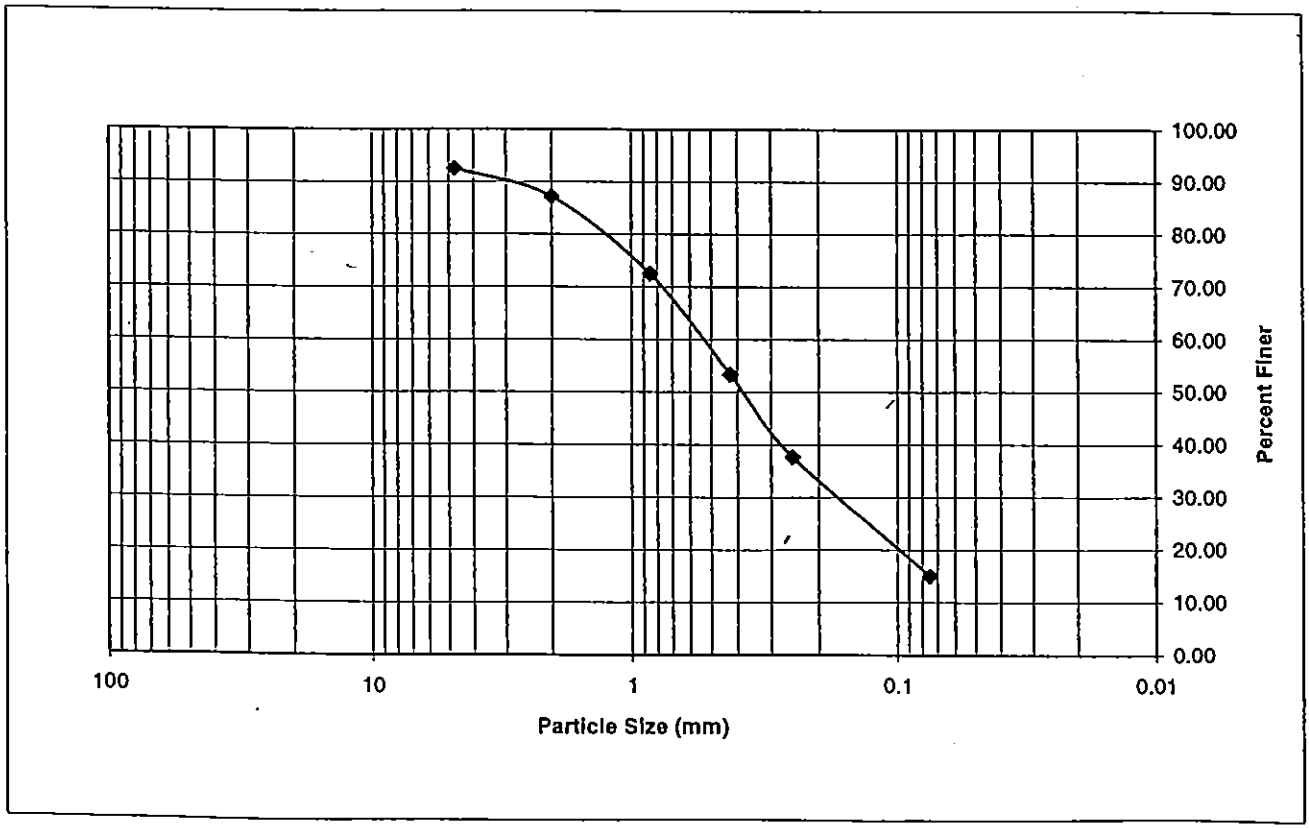
HYDROMETRICS, INC.
RUSTON LABORATORY
5227 NORTH 49TH STREET
RUSTON, WASHINGTON 98407

Laboratory Number: 98R-01160
Sample Number: EVT-9804-108
Date: 6/26/98

Weight of Oven Dry Sample (g): 287.8

Sieve Number	Sieve Opening (mm)	Weight Retained			
4	4.75	21.5	7.47	7.47	92.53
10	2.00	15.40	5.35	12.82	87.18
20	0.85	42.10	14.63	27.45	72.55
40	0.425	55.30	19.21	46.66	53.34
60	0.250	45.10	15.67	62.33	37.67
200	0.075	65.20	22.65	84.99	15.01
PAN	< 0.075	43.70	15.18		

sum = 288.3



HYDROMETRICS INC.
Consulting Scientists and Engineers
Tacoma, Washington

Evaluate structures

Hole Name: TP-8

Date Hole Started: 03/19/98 Date Hole Finished: 03/19/9

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: Asarco
Legal Description: 503 Pilchuck Path
Descriptive Location: SE back yard (Former dust chamber area)

Recorded By: JSwortz
Drilling Company: Hydrometrics, Inc.
Driller: R Yeager
Drilling Method: Backhoe
Drilling Fluids Used: None
Purpose of Hole: Evaluate structures
Target Aquifer: N/A
Hole Diameter (in): 3x22'
Total Depth Drilled (ft): 6

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft.

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Test pit dug with a backhoe to 6', grab samples collected with a hand trowel and hoe. Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb). Test pits were backfilled and BMPs were applied. A one foot concrete cap with an aluminium ID tag was placed at the sample locations.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9803-138	GRAB			0.0 - 1.0'
	EVT-9803-139	GRAB			1.0 - 2.0' Duplicate sample at 13:52, EVT-9803-144
	EVT-9803-140	GRAB			2.0 - 3.0'
	EVT-9803-141	GRAB			3.0 - 4.0'
	EVT-9803-142	GRAB			4.0 - 5.0'
5	EVT-9803-143	GRAB			5.0 - 6.0'
10					
15					
20					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 2.0'
Sandy LOAM
Brown, trace 1/2" subrounded gravel and red brick fragments.
[Smelter Debris]

2.0 - 4.0'
Gravelly Silty SAND
Yellow-brown to gray some black staining at 2-3', slighlty moist, medium to fine grained; approximately 10-20% 2" and smaller subrounded gravel abundant brick fragments.
[Smelter Debris]

4.0 - 5.0'
Sandy SILT
Yellow brown with some orange mottling, moist, fine to coarse sand, trac rounded 1/4" gravel.
[Fill]

5.0 - 6.0'
Gravelly SAND
Light gray, medium grained, slighlty moist to dry, <10% subrounded gravel.
[Glacial Till]

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 7/13/98

HYDROMETRICS INC.
Consulting Scientists and Engineers
Tacoma, Washington

Evaluate structures

Hole Name: TP-9

Date Hole Started: 03/18/98 Date Hole Finished: 03/18/

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: Asarco
Legal Description: 3010 5th St
Descriptive Location: Front Yard (former As dust chambers)

Recorded By: B Thompson
Drilling Company: Hydrometrics, Inc.
Driller: R Yeager
Drilling Method: Backhoe
Drilling Fluids Used: None
Purpose of Hole: Evaluate structures
Target Aquifer: N/A
Hole Diameter (in): 3x22'
Total Depth Drilled (ft): 6

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft.

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Test pit dug with a backhoe to 6', grab samples collected with a hand trowel and hoe. Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb). Test pits were backfilled and BMPs were applied. A one foot concrete cap with an aluminium ID tag was placed at the sample locations.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9803-119	GRAB			0.0 - 1.0'
	EVT-9803-120	GRAB			1.0 - 2.0' Duplicate sample EVT-9803-125
	EVT-9803-121	GRAB			2.0 - 3.0'
	EVT-9803-122	GRAB			3.0 - 4.0'
	EVT-9803-123	GRAB			4.0 - 5.0'
5	EVT-9803-124	GRAB			5.0 - 6.0'
10					
15					
20					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 1.0'
Sandy LOAM
brown, sandy loam, some fine ravel and red brick fragments.
(Fill)

1.0 - 3.0'
Silty GRAVEL
2 in gray, medium sand underlain by light brown to gray to black mottled silty gravel. Gravel to 2" and well rounded; Black wood fragments.
(Fill)

3.0 - 5.0'
Silty SAND & GRAVEL
Orange/brown silty sand & gravel; transitioning to light gray/ brown silt and sand with traced fine gravel; very minor weep @ 5'.
(Fill)

5.0 - 6.0'
SILT & SAND
Light brown/ gray silt and fine sand, trace fine gravel, becoming very dense and dry @ 6'.
(ti)

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 7/13/98

HYDROMETRICS INC.
Consulting Scientists and Engineers
Tacoma, Washington

Evaluate structures

Hole Name: TP-10A

Date Hole Started: 03/20/98 Date Hole Finished: 03/20/9

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: Asarco
Legal Description: 511 Hawthorne
Descriptive Location: SW back yard (former Stack area)

Recorded By: JSwortz
Drilling Company: Hydrometrics, Inc.
Driller: R Yeager
Drilling Method: Backhoe
Drilling Fluids Used: None
Purpose of Hole: Evaluate structures
Target Aquifer: N/A
Hole Diameter (in): 3x25'
Total Depth Drilled (ft): 6

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft.

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Test pit dug with a backhoe to 6', grab samples collected with a hand trowel and hoe. Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb). Test pits were backfilled and BMPs were applied. A one foot concrete cap with an aluminium ID tag was placed at the sample locations.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9803-163	GRAB			0.0 - 1.0'
	EVT-9803-164	GRAB			1.0 - 2.0'
	EVT-9803-165	GRAB			2.0 - 3.0'
	EVT-9803-166	GRAB			3.0 - 4.0'
5	EVT-9803-167	GRAB			4.0 - 5.0'
	EVT-9803-168	GRAB			5.0 - 6.0'
10					
15					
20					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 1.0'
Silty LOAM
Brown, slightly moist to dry.
(Fill)

1.0 - 4.0'
Silty SAND
Gray brown, slightly moist, medium to fine grained (becomes liner with depth), red brick fragments.
(Smelter Debris)

4.0 - 5.0'
Sandy SILT
Light brown mottled black, slightly moist, red brick fragments (flue floor) some 1" rounded gravel.
(Smelter Debris)

5.0 - 6.0'
Sandy SILT
Light brown moist slightly plastic, trace 1/4" and smaller gravel.
(Fill)

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 7/13/98

HYDROMETRICS INC.
Consulting Scientists and Engineers
Tacoma, Washington

Evaluate structures

Hole Name: TP-10B

Date Hole Started: 03/20/98 Date Hole Finished: 04/06/98

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: Asarco
Legal Description: 511 Hawthorne
Descriptive Location: SW back yard (former Stack area)

Recorded By: JSwortz
Drilling Company: Hydrometrics, Inc.
Driller: JN/RY
Drilling Method: Hollow Stem Auger/Backhoe
Drilling Fluids Used: None
Purpose of Hole: Evaluate structures
Target Aquifer: N/A
Hole Diameter (in): TPB 3.5"; TP 3x25'
Total Depth Drilled (ft): 11

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft. to 7'; 2' thereafter

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Test pit dug with a backhoe to 6', grab samples collected with a hand trowel and hoe; Continued drilling from 5' to 11' with Piper 2000 2 1/4" (ID) HSA, sampled with a 2" split spoon using "A" rod, a 140 lb. 30 inch drop safely hammer on a cat head. Samples submitted to Hydrometric Inc. Ruston laboratory for XRF analysis (As, Pb). Test pits were backfilled and BMPs were applied while test pit borings were abandoned with bentonite chips and a one foot concrete cap with an aluminium ID tag. Test pits also were topped with a concrete patch and aluminum ID tag. Borings adjacent to test pits were labeled TPB-(test pit number).

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9803-156	GRAB			0.0 - 1.0' Duplicate sample at 08:52, EVT-9803-162
	EVT-9803-157	GRAB			1.0 - 2.0'
	EVT-9803-158	GRAB			2.0 - 3.0'
	EVT-9803-159	GRAB			3.0 - 4.0'
	EVT-9803-160	GRAB			4.0 - 5.0'
5	EVT-9803-161	GRAB			5.0 - 6.0' Duplicate sample during drilling EVT-9804-100 @ 14:20; Split spoon 15/47.
	EVT-9804-101	SS	25/44	0.80	6.0 - 7.0'
	EVT-9804-102	SS	29/70	0.70	8.0 - 9.0'
10	EVT-9804-103	SS	49/82	0.80	10.0 - 11.0' Duplicate sample @ 14:40, EVT-9804-104.
15					
20					

GRAPHICS

0.0 - 5.0'
Silty SAND
Dark brown to yellow gray, medium to fine grained, slightly moist to dry, red brick fragments (2" from 1-2').
[Smelter Debris]

5.0 - 6.0'
SILT
Yellow brown slightly moist to dry, wood fragments, trace red brick frags, some medium to coarse sand in a 1" lense.
[Smelter Debris]

6.0 - 11.0'
Silty SAND
Brown to gray, fine grained, dry, medium dense to very dense, trace 1/4" subrounded gravel.
[Glacial Till]

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 8/5/98

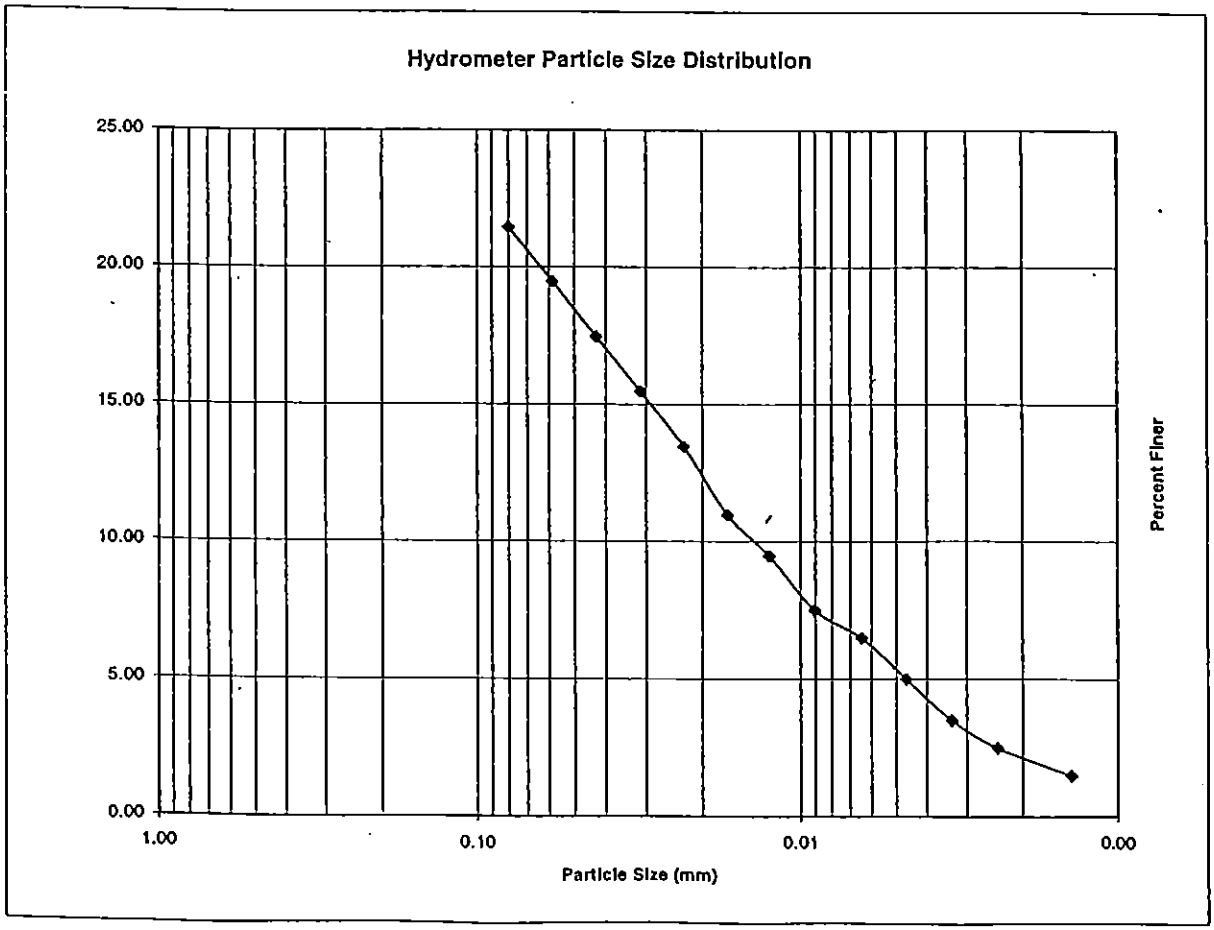
TP-10B
8-9'

HYDROMETRICS, INC.
RUSTON LABORATORY
5227 NORTH 49TH STREET
TACOMA, WASHINGTON 98407

HYDROMETER ANALYSIS

LABORATORY NUMBER	98R-01154
SAMPLE NUMBER	EVT-9804-102
DATE	6/29/98
ANALYST	SM

Time	Reading	Rcp	% Finer	Rcl	L	A	D	% Finer of Total
0.25	48	43	86.00	49	8.5	0.0137	0.08	21.45
0.5	44	39	78.00	45	9.1	0.0137	0.06	19.45
1	40	35	70.00	41	9.8	0.0137	0.04	17.46
2	36	31	62.00	37	10.4	0.0137	0.03	15.46
4	32	27	54.00	33	11.1	0.0137	0.02	13.47
8	27	22	44.00	28	11.9	0.0137	0.02	10.97
15	24	19	38.00	25	12.4	0.0137	0.01	9.48
30	20	15	30.00	21	13	0.0137	0.01	7.48
60	18	13	26.00	19	13.3	0.0137	0.01	6.48
120	15	10	20.00	16	13.8	0.0137	0.00	4.99
240	12	7	14.00	13	14.3	0.0137	0.00	3.49
480	10	5	10	11	14.7	0.0137	0.00	2.49
1440	8	3	6	9	15	0.0137	0.00	1.50



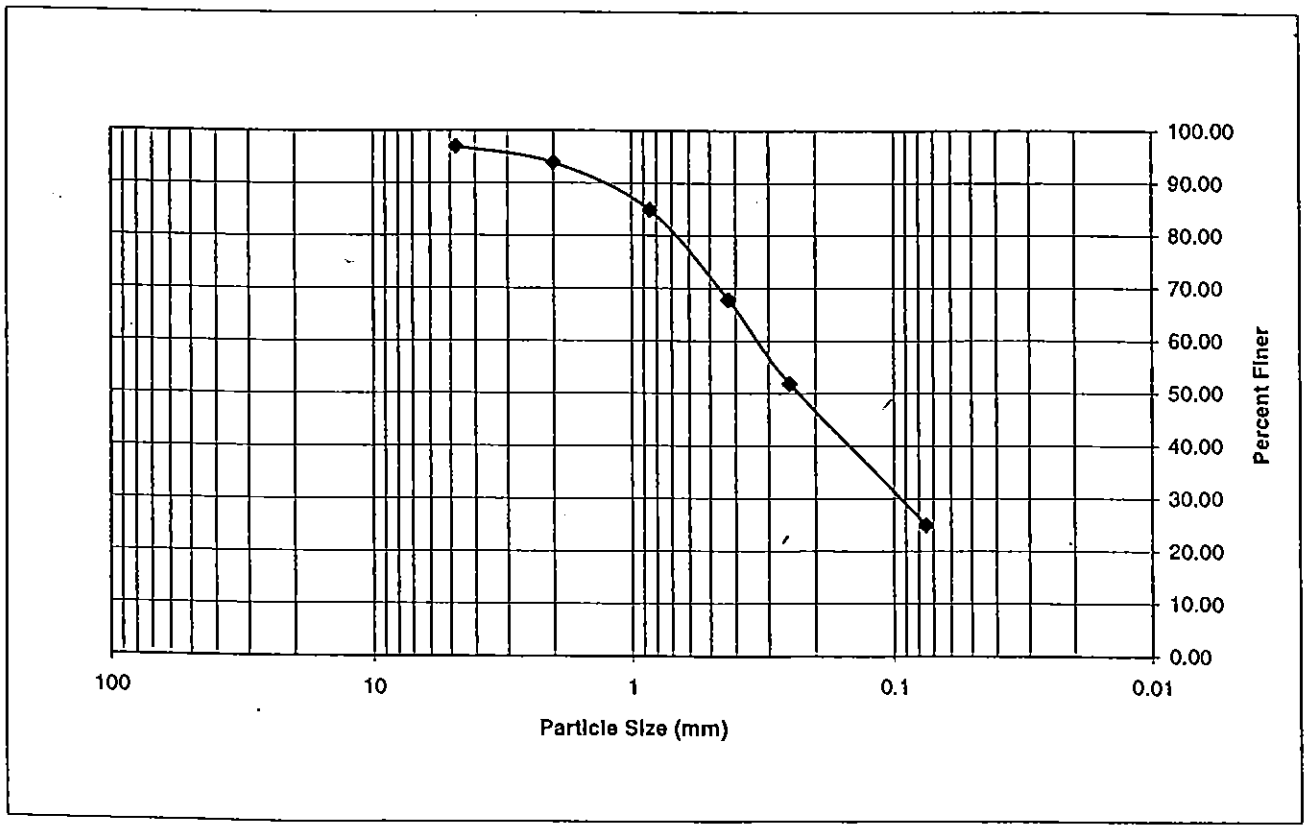
HYDROMETRICS, INC.
RUSTON LABORATORY
5227 NORTH 49TH STREET
RUSTON, WASHINGTON 98407

Laboratory Number: 98R-01154
Sample Number: EVT-9804-102
Date: 6/26/98

Weight of Oven Dry Sample (g): 241.4

Sieve Number	Sieve Opening (mm)	Weight Retained			
4	4.75	7.4	3.07	3.07	96.93
10	2.00	7.40	3.07	6.13	93.87
20	0.85	21.70	8.99	15.12	84.88
40	0.425	41.20	17.07	32.19	67.81
60	0.250	38.50	15.95	48.14	51.86
200	0.075	65.00	26.93	75.06	24.94
PAN	< 0.075	59.60	24.69		

sum = 240.8



HYDROMETRICS INC.
Consulting Scientists and Engineers
Tacoma, Washington

Evaluate structures

Hole Name: TP-11A

Date Hole Started: 03/19/98 Date Hole Finished: 03/19/9

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: Asarco
Legal Description: 520 Pilchuck Path
Descriptive Location: Front yard (former stacks area)

Recorded By: B Thompson
Drilling Company: Hydrometrics, Inc.
Driller: R Yeager
Drilling Method: Backhoe
Drilling Fluids Used: None
Purpose of Hole: Evaluate structures
Target Aquifer: N/A
Hole Diameter (in): 3x45'
Total Depth Drilled (ft): 5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft.

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Test pit dug with a backhoe to 6', grab samples collected with a hand trowel and hoe. Samples submitted to Hydrometrics, Inc. Ruston laboratory for XRF analysis (As, Pb). Test pits were backfilled and BMPs were applied. A one foot concrete cap with an aluminium ID tag was placed at the sample locations.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9803-151	GRAB			0.0 - 1.0'
	EVT-9803-152	GRAB			1.0 - 2.0'
	EVT-9803-153	GRAB			2.0 - 3.0'
	EVT-9803-154	GRAB			3.0 - 4.0'
	EVT-9803-155	GRAB			4.0 - 5.0'
5					
10					
15					
20					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 1.0'
Silty LOAM
Brown, some gravel.
[Fill]

1.0 - 3.0'
SAND & SILT
Brown, fine sand & silt, trace gravel, trace red brick fragments, some 2" darker brown horizons at 2-3'.
[Smelter Debris]

3.0 - 4.0'
BRICK
Four to five rows of mortared brick, gray medium sand and silt. Greenish yellow residue coating bricks and filling cracks (moist).
[Smelter Debris]

4.0 - 5.0'
SAND & SILT
Orange/brown fine sand and silt with trace gravel. Becomes very dense at 5'. Brown to black trace roots at base of excavation.
[Fill]

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 7/13/98

HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Evaluate structures

Hole Name: TP-11B

Date Hole Started: 03/19/98 Date Hole Finished: 04/07/98

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: Asarco
Legal Description: 520 Pilchuck Path
Descriptive Location: Front yard (former stacks area)

Recorded By: JSwortz
Drilling Company: Hydrometrics, Inc.
Driller: JN/RY
Drilling Method: Hollow Stem Auger/Backhoe
Drilling Fluids Used: None
Purpose of Hole: Evaluate structures
Target Aquifer: N/A
Hole Diameter (in): TPB 3.5"; TP 3x45'
Total Depth Drilled (ft): 13.5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	1 ft. to 7'; 2' thereafter

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Test pit dug with a backhoe to 6', grab samples collected with a hand trowel and hoe; Continued drilling from 5' to 11' with Piper 2000 2 1/4" (ID) HSA, sampled with a 2" split spoon using "A" rod, a 140 lb. 30 inch drop safety hammer on a cat head. Samples submitted to Hydrometri Inc. Ruston laboratory for XRF analysis (As, Pb). Test pits were backfilled and BMPs were applied while test pit borings were abandoned with bentonite chips and a one foot concrete cap with an aluminium ID tag. Test pits also were topped with a concrete patch and aluminum ID tag. Borings adjacent to test pits were labeled TPB-[test pit number].

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9803-145	GRAB			0.0 - 1.0'
	EVT-9803-146	GRAB			1.0 - 2.0'
	EVT-9803-147	GRAB			2.0 - 3.0'
	EVT-9803-148	GRAB			3.0 - 4.0'
	EVT-9803-149	GRAB			4.0 - 5.0'
5	EVT-9803-150	GRAB			5.0 - 6.0' Duplicate sample during drilling EVT-9804-109, 08:20, 3/8
	EVT-9804-110	SS	6/15	0.40	6.0 - 7.0'
	EVT-9804-111	SS	12/18	0.70	8.0 - 9.0' Duplicate sample @ 08:45 EVT-9804-114
10					
	EVT-9804-112	SS	16/40	0.80	10.0 - 11.0'
	EVT-9804-113	SS	22/52	1.00	12.0 - 13.5'
15					
20					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 1.0'
Silty LOAM
Brown, with trace gravel.
[Fill]

1.0 - 3.0'
SAND & SILT
Brown to dark brown, fine sand and silt with some fine to medium gra.., trace red brick.
[Smelter Debris]

3.0 - 4.0'
BRICK
Four to five rows of red brick and light gray medium sand. Slight yell to white staining on sand & brick.
[Smelter Debris]

4.0 - 6.0'
SAND & SILT
Orange/brown grading to light brown, fine sand and silt, trace gravel. Tree roots at base of excavation.
[Fill]

6.0 - 7.0'
Silty SAND
Light brown, fine to very fine grained, slightly moist, with 1" rounded gravel.
[Fill]

7.0 - 13.5'
Silty SAND
Light brown with trace orange mottling, dry to slightly moist, medium dense, some interbedded fine grained sand lenses 1/4 to 1/8" thick th transitions to dry silt. Up to 30% silt.
[Glacial Till]

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 8/5/98

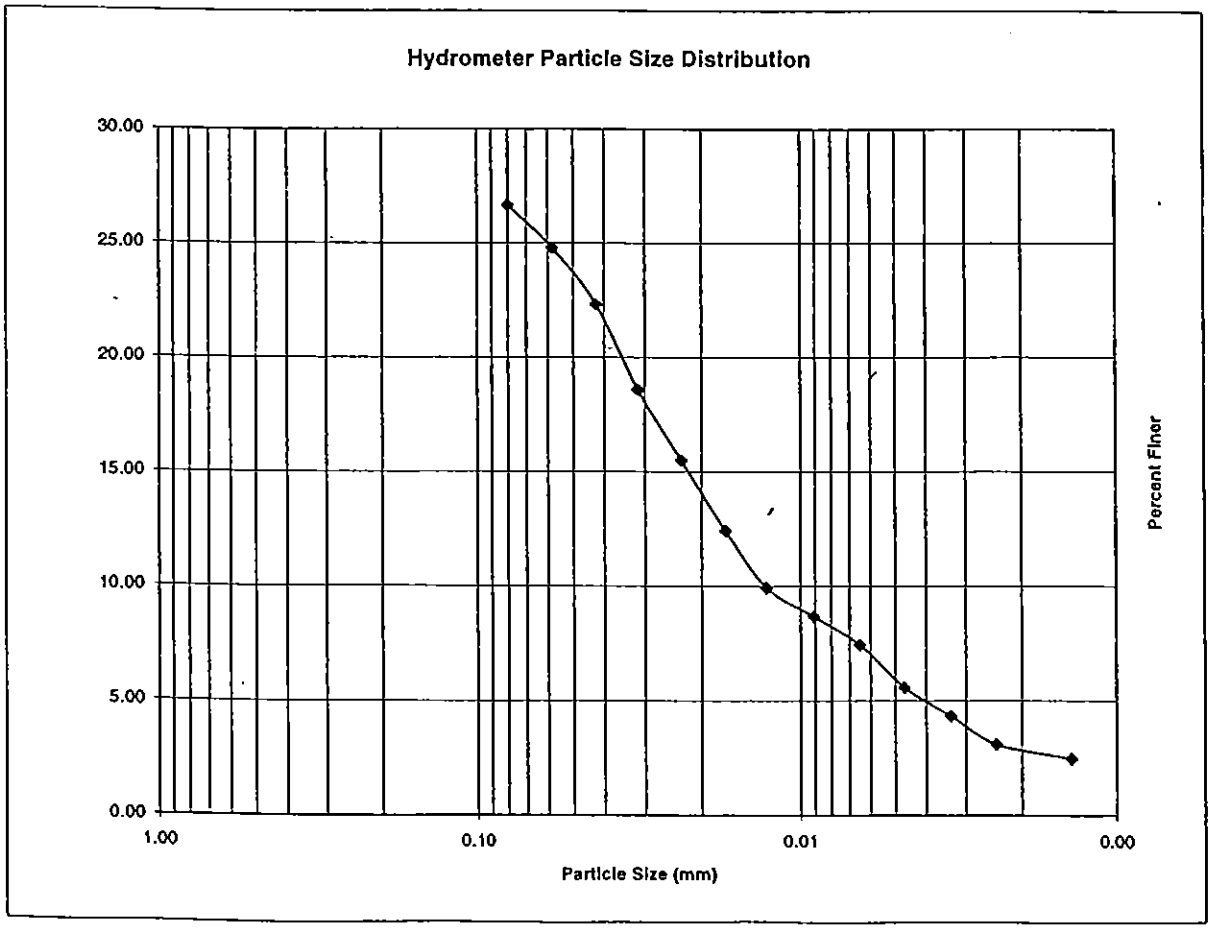
TP-11B
10-11'

HYDROMETRICS, INC.
RUSTON LABORATORY
5227 NORTH 49TH STREET
TACOMA, WASHINGTON 98407

HYDROMETER ANALYSIS

LABORATORY NUMBER	98R-01164
SAMPLE NUMBER	EVT-9804-112
DATE	6/29/98
ANALYST	SM

Time	Reading	Rcp	% Finer	Rcl	L	A	D	% Finer of Total
0.25	48	43	86.00	49	8.5	0.0137	0.08	26.65
0.5	45	40	80.00	46	9	0.0137	0.06	24.79
1	41	36	72.00	42	9.6	0.0137	0.04	22.31
2	35	30	60.00	36	10.6	0.0137	0.03	18.59
4	30	25	50.00	31	11.4	0.0137	0.02	15.50
8	25	20	40.00	26	12.2	0.0137	0.02	12.40
15	21	16	32.00	22	12.9	0.0137	0.01	9.92
30	19	14	28.00	20	13.2	0.0137	0.01	8.68
60	17	12	24.00	18	13.5	0.0137	0.01	7.44
120	14	9	18.00	15	14	0.0137	0.00	5.58
240	12	7	14.00	13	14.3	0.0137	0.00	4.34
480	10	5	10	11	14.7	0.0137	0.00	3.10
1440	9	4	8	10	14.8	0.0137	0.00	2.48



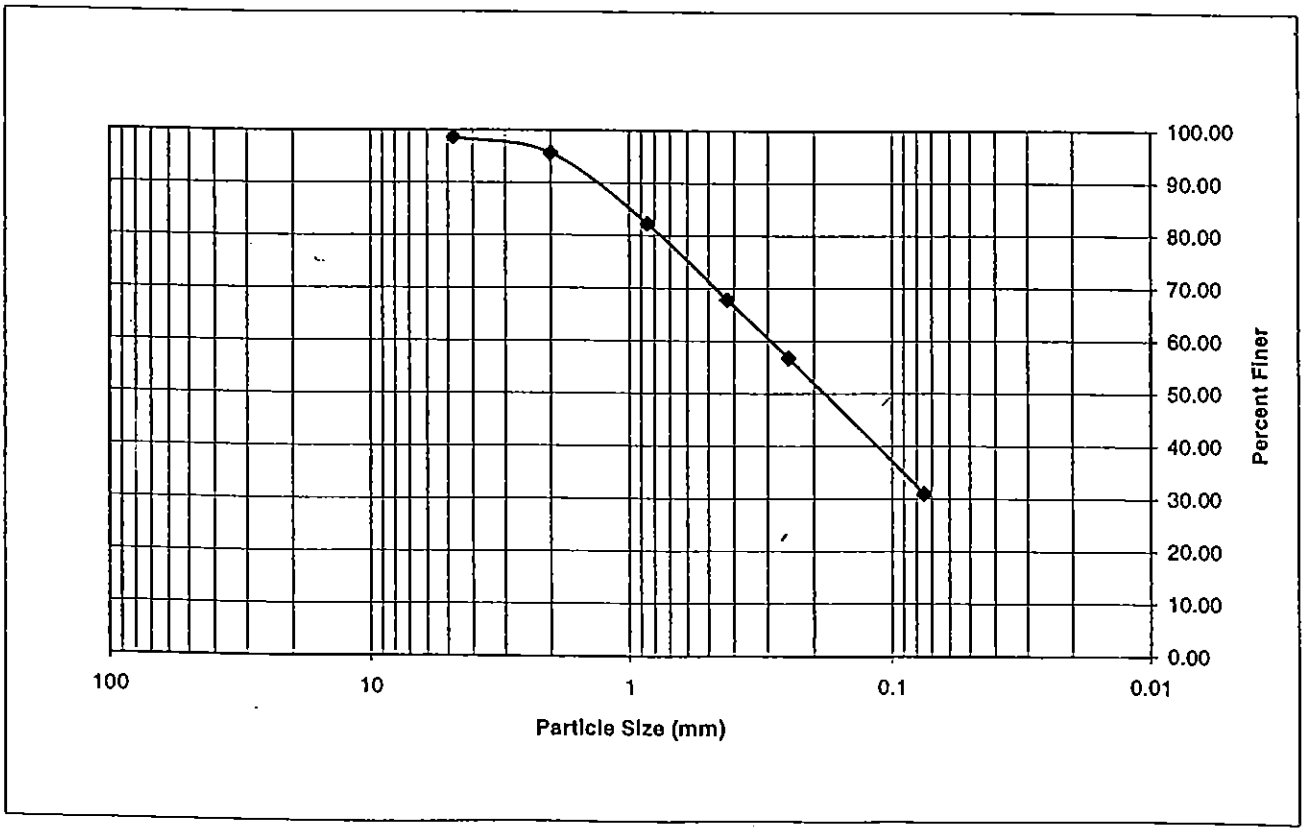
HYDROMETRICS, INC.
RUSTON LABORATORY
5227 NORTH 49TH STREET
RUSTON, WASHINGTON 98407

Laboratory Number: 98R-01164
Sample Number: EVT-9804-112
Date: 6/26/98

Weight of Oven Dry Sample (g): 301.7

Sieve Number	Sieve Opening (mm)	Weight Retained			
4	4.75	4.2	1.39	1.39	98.61
10	2.00	8.90	2.95	4.34	95.66
20	0.85	40.50	13.42	17.77	82.23
40	0.425	43.40	14.39	32.15	67.85
60	0.250	33.60	11.14	43.29	56.71
200	0.075	77.60	25.72	69.01	30.99
PAN	< 0.075	92.50	30.66		

sum = 300.7



HYDROMETRICS INC.
Consulting Scientists and Engineers
Tacoma, Washington

Till Boring

Hole Name: TB-1

Date Hole Started: 04/01/98 Date Hole Finished: 04/01/98

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: City of Everett
Legal Description: E Marine View Dr.
Descriptive Location: 20' S of Wrhsr access on E side.

Recorded By: J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: J Niederkorn
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Extent of Glacial Till
Target Aquifer: N/A
Hole Diameter (in): 8.5
Total Depth Drilled (ft): 36.5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	5 ft.

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Boring drilled with a Mobile Drill B-61 with 4 1/4" (ID) Hollow Stem Auger. Samples obtained with a 2" split spoon, and "A" Rod under a 140 lb., 30" drop, winch release safely hammer. Samples submitted to Hydrometrics, Inc. Ruston lab for XRF analysis (As, Pb). Boring abandoned with bentonite grout, bentonite chips, and 1' concrete cap with an aluminum identification tag.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9804-519	GRAB			0.0 - 0.5'
	EVT-9804-520	SS	5/10/98	1.40	2.0 - 3.5' Brick in cuttings.
5	EVT-9804-521	SS	18/10/10	1.40	5.0 - 6.5'
10	EVT-9804-522	SS	25/14/8	0.50	10.0 - 11.5'
15	EVT-9804-523	SS	60/30/50-4	0.50	15.0 - 16.5'
20					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 1.0'
ASPHALT
Black asphalt and 1/2" angular gravel.
[Road Pavement]

1.0 - 8.0'
SILT
Blue-green to gray, slightly moist to dry, trace gravel and coarse sand; Concrete at 6-6.3'.
[Fill]

8.0 - 13.5'
Gravelly Sandy SILT
Gray, slightly moist, slightly plastic; Sand is coarse to fine grained, angular to subrounded 1/2" gravel.
[Till/Fill]

13.5 - 18.5'
Silty Gravelly SAND
Light brown, medium to fine grained, slightly moist to dry; Gravel 1/2" subangular to subrounded.
[Glacial Till]

18.5 - 23.0'
SAND& GRAVEL
Brown, medium to fine grained, dry, dense to medium dense; Gravel is 3'

Continued Next Page

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 8/5/98

HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Till Boring

Hole Name: TB-1

Date Hole Started: 04/01/98 Date Hole Finished: 04/01/98

(Continued)

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	EVT-9804-524	SS	30/32/50-4	0.50	20.0 - 21.5'		and smaller subrounded, green. [Glacial Till]
25	EVT-9804-525	SS	27/42/50-5	1.30	25.0 - 26.5'	25	23.0 - 28.5' **Silty SAND** Brown, medium to fine grained, slightly moist to dry, dense. [Glacial Till]
30	EVT-9804-526	SS	16/37/50-5	1.40	30.0 - 31.5'	30	28.5 - 33.0' **SILT** Light brown, dry, dense to hard, 1" sand lense at 31'. [Glacial Till]
35	EVT-9804-527	SS	19/33/38	1.50	35.0 - 36.5'	35	33.0 - 36.5' **SAND** Brown, black, and white, medium to coarse grained, slightly moist to dry, clean, dense to medium dense. [Advance Outwash]
40						40	
45						45	
50						50	

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 8/5/98

HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Till Boring

Hole Name: TB-2

Date Hole Started: 03/31/98 Date Hole Finished: 03/31/98

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: City of Everett
Legal Description: E Marine View Dr.
Descriptive Location: 195' S of Wrhsr access on E side.

Recorded By: J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: J Niederkorn
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Extent of Glacial Till
Target Aquifer: N/A
Hole Diameter (in): 8.5
Total Depth Drilled (ft): 36.5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	5 ft.

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Boring drilled with a Mobile Drill B-61 with 4 1/4" (ID) Hollow Stem Auger. Samples obtained with a 2" split spoon, and "A" Rod under a 140 lb., 30" drop, winch release safety hammer. Samples submitted to Hydrometrics, Inc. Ruston lab for XRF analysis (As, Pb). Boring abandoned with bentonite grout, bentonite chips, and 1' concrete cap with an aluminum identification tag.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9803-511	SS			0.0 - 0.5'
	EVT-9803-512	SS	12/9/10	1.00	2.0 - 3.5'
5	EVT-9803-513	SS	3/5/7	1.20	5.0 - 6.5' Smelter debris in cuttings; Red brick and yellow concrete.
10	EVT-9803-514	SS	3/4/2	1.00	10.0 - 11.5'
15	EVT-9803-515	SS	14/17/30	1.50	15.0 - 16.5'
20					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 0.5'
ASPHALT
Black, dry with 1/2" angular gravel.
[Road Pavement]

0.5 - 8.0'
Sandy SILT
Light brown to gray with some orange staining, slightly moist, some red brick fragments and subrounded gravel.
[Fill]

8.0 - 15.0'
Silty SAND
Orange-gray with some black staining, fine grained to silty, dry, some wood fragments and root matter.
[Till/Fill]

15.0 - 25.0'
Silty SAND w/ Gravel
Light brown w/ some orange mottling, fine grained to silty, dry, medium dense to dense. Some 1/2" subrounded gravel.
[Glacial Till]

Continued Next Page

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 8/5/98

HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Till Boring

Hole Name: TB-2

Date Hole Started: 03/31/98 Date Hole Finished: 03/31/98

(Continued)

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	EVT-9803-516	SS	14/50-4	0.50	20.0 - 21.5'		
25		SS	100-4	0.00	25.0 - 26.5'	25	25.0 - 33.0' **SILT** Light brown with trace orange staining, dry, very dense, trace medium sand. [Glacial Till]
30	EVT-9803-517	SS	60/30/34	1.00	30.0 - 31.5' J Niederkorn est. from drilling sand 33'.	30	
35	EVT-9803-518	SS	6/22/19	1.00	35.0 - 36.5'	35	33.0 - 36.5' **SAND** Black, brown, and white, medium grained, medium dense, clean, dry. [Advance Outwash]
40						40	
45						45	
50						50	

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 8/5/98

HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Till Boring

Hole Name: TB-3

Date Hole Started: 03/31/98 Date Hole Finished: 03/31/98

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: City of Everett
Legal Description: E Marine View Dr.
Descriptive Location: 355' S of Wrhsr access off on E side.

Recorded By: J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: J Niederkorn
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Extent of Glacial Till
Target Aquifer: N/A
Hole Diameter (in): 8.5
Total Depth Drilled (ft): 39

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	Metals Analysis	5 ft.

Static Water Level Below MP: N/A
Date: N/A
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Boring drilled with a Mobile Drill B-61 with 4 1/4" (ID) Hollow Stem Auger. Samples obtained with a 2" split spoon, and "A" Rod under a 140 lb., 30" drop, winch release safety hammer. Samples submitted to Hydrometrics, Inc. Ruston lab for XRF analysis (As, Pb). Boring abandoned with bentonite grout, bentonite chips, and 1' concrete cap with an aluminum identification tag.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	EVT-9803-500	GRAB			0.0 - 0.5'		0.0 - 0.6' **ASPHALT** Black asphalt and 1/2" angular gravel. [Road Pavement]
	EVT-9803-501	SS	4/40/50-2	0.50	2.0 - 3.5' Cuttings had trace red brick frags.		0.6 - 8.0' **Silty SAND** Gray to light brown, slightly moist, loose, trace 1/4" subrounded gravel. [Road Base Fill]
5	EVT-9803-502	SS	6/3/6	0.50	5.0 - 6.5'	5	
10	EVT-9803-503	SS	4/3/3	0.40	10.0 - 11.5'	10	8.0 - 15.0' **Silty SAND** Light brown, medium to line grained, slightly moist, 1/4 subrounded gravel trace wood fragments with purple staining at 10-11.5'. [Till/Fill]
15	EVT-9803-504	SS	7/15/21	1.50	15.0 - 16.5' Duplicate sample @ 08:40 EVT-9803-508	15	15.0 - 27.0' **Silty SAND** Light brown some orange mottling at 15', fine grained to silty, slightly moist to dry, medium dense, trace 1/4" subrounded gravel. [Glacial Till]
20						20	

Continued Next Page

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 8/5/98

HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Till Boring

Hole Name: TB-3

Date Hole Started: 03/31/98 Date Hole Finished: 03/31/98

(Continued)

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	EVT-9803-505	SS	8/17/22	1.20	20.0 - 21.5'		
25	EVT-9803-506	SS	10/23/26	1.40	25.0 - 26.5'	25	
							27.0 - 33.0' **Sandy SILT** Grayish brown, dry, medium to fine grained, medium dense to dense gravel, subrounded to round. [Glacial Till]
30	EVT-9803-507	SS	20/40/48	1.20	30.0 - 31.5' J Niederkorn says it drill like sand about 33'.	30	
							33.0 - 39.0' **SAND** Brown, gray, and white, coarse to medium grained clean sand, medium dense, slightly moist to moist. [Advance Outwash]
35	EVT-9803-509	SS	15/21/26	1.50	35.0 - 36.5'	35	
	EVT-9803-510	SS	8/16/13	1.00	37.5 - 39.0'		
40						40	
45						45	
50						50	

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 8/5/98

HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Till Boring

Hole Name: TB-4

Date Hole Started: 03/31/98 Date Hole Finished: 03/31/98

Client: Asarco
Project: Smelter Area Investigation
County: Snohomish State: WA
Property Owner: Asarco
Legal Description: 450 Pilchuck Path
Descriptive Location: SW corner of back yard

Recorded By: J Swortz
Drilling Company: Hydrometrics, Inc.
Driller: J Niederkorn
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Extent of Glacial Till
Target Aquifer: N/A
Hole Diameter (in): 8.5
Total Depth Drilled (ft): 91.5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	N/A	5 ft.

Static Water Level Below MP: 29
Date: 04/02/98
MP Description: Ground Surface
MP Height Above or Below Ground (ft): N/A

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Boring drilled with a Mobile Drill B-61 with 4 1/4" (ID) Hollow Stem Auger. Samples obtained with a 2" split spoon, and "A" Rod under a 140 lb., 30" drop, winch release safety hammer to 50'. Switched to a 3" split spoon using "N" rod under a 300 lb., 30" drop, winch release safety hammer. Boring abandoned with bentonite grout, bentonite chips, and 1' concrete cap with an aluminum identification tag.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
		SS	1/0/2	1.50	0.0 - 1.5' 300# hammer, 3" split spoon.		0.0 - 2.0' **Silty LOAM** Brown, moist to wet. [Fill]
5		SS	49/50-3	0.00	5.0 - 6.5' 140# hammer, 2" split spoon.		2.0 - 8.0' **Sandy SILT** Brown, wet, dense. [Glacial Till]
10		SS	14/57-6	0.50	10.0 - 11.5'		8.0 - 23.0' **Silty SAND** Gray trace orange mottling, fine grained, dry, hard, trace 1/4" subangular to subrounded gravel; Becomes silty at 20'. [Glacial Till]
15		SS	37/50-4	0.30	15.0 - 16.5'		
20							

Continued Next Page

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 8/5/98

HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Till Boring

Hole Name: TB-4

Date Hole Started: 03/31/98 Date Hole Finished: 03/31/98

(Continued)

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
		SS	60/50-4	0.50	20.0 - 21.5'		
25		SS	57/50-3	0.50	25.0 - 26.5' Outside of spoon wet.	25	23.0 - 39.0' **Gravelly Sandy SILT** Gray, dry, dense to hard, some 1/4" subrounded gravel. [Glacial Till]
30		SS	49/50-2	0.50	30.0 - 31.5'	30	
35		SS	100-4	0.30	35.0 - 36.5'	35	
40		SS	46/50-3	1.50	40.0 - 41.5'	40	39.0 - 43.0' **SAND** Gray, wet, medium to fine grained, some 1" and smaller rounded gra l. [Glacial Till]
45		SS	31/50-4	0.60	45.0 - 46.5'	45	43.0 - 71.0' **SILT** Gray to dark gray, moist to wet, medium dense; Some 2" subrounded gravel (20-30% at 50-53'); Some medium to fine grained sand interbedded at 55' and 30-40% from 64-71'. [Glacial Till]
50		SS	17/50-4	0.50	50.0 - 51.5' Switch to 300# hammer and 3" split spoon.	50	

Continued Next Page

HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Till Boring

Hole Name: TB-4

Date Hole Started: 03/31/98 Date Hole Finished: 03/31/98

(Continued)

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
55		SS	17/16/32	1.00	55.0 - 56.5'		
60		SS	28/50-3	0.75	60.0 - 61.5'		
65		SS	15/25/39	1.50	65.0 - 66.5'		
70		SS	25/30/50	1.00	70.0 - 71.5'		
75		SS	30/50-5	0.90	75.0 - 76.5'		71.0 - 76.4' **Silty SAND** Gray, medium to find grained, moist, dense with trace 1" subrounded gravel. [Glacial Till]
80		SS	25/50-2	0.50	80.0 - 81.5'		76.4 - 85.5' **Clayey SILT** Gray, dry, dense, trace sand and 1/4" subround gravel. [Glacial Till]
85							

Continued Next Page

HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Till Boring

Hole Name: TB-4

Date Hole Started: 03/31/98 Date Hole Finished: 03/31/98

(Continued)

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
		SS	32/50-5	1.00	85.0 - 86.5'		85.5 - 91.5' **Sandy SILT** Light brown, dry to slightly moist, sand is fine to medium grained; Som 1/2" rounded gravel. [Glacial Till]
90		SS	100/50-5	0.90	90.0 - 91.5'		
95							
100							
105							
110							
115							

GEOTECH EVTSA-1.GPJ HYD-TUC.GDT 8/5/98

2000 Comprehensive Lowland Report

APPENDIX A
SOIL BORING LOGS

HYDROMETRICS INC.
Consulting Scientists and Engineers
Helena, Montana

Soil Boring Log

Hole Name: HP-45

Date Hole Started: 9/23/98 Date Hole Finished: 9/23/98

Client: ASARCO
Project: Everett Lowland Investigation
County: Snohomish State: Washington
Property Owner:
Legal Description:
Descriptive Location:

Recorded By: BT
Drilling Company: Hydrometrics
Driller: Jim Neiderkorn
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Soil sample/hydropunch
Target Aquifer: Deep Alluvial
Hole Diameter (in): 8-inch
Total Depth Drilled (ft): 30

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	N		

Static Water Level Below MP: 18.5
Date: 9/22/98
MP Description: top of PVC casing
MP Height Above or Below Ground (ft): 0

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Collected split spoon samples to 26.5 and then drove hydropunch to 30 feet. Couldn't get flow into hydropunch after repeated attempts. Water level in augers at 18.5 feet. Placed PVC screen and riser within augers to sample. Collected samples for common ions and total and dissolved metals. Pulled PVC casing and abandoned borehole with bentonite grout and bentonite chips.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9809108	GRAB			0.0 - 0.5'
	EVT-9809109	SS	12,10,6	1.00	2.0 - 3.5'
5	EVT-9809110	SS	2,4,5	0.50	5.0 - 6.5'
10	EVT-9809111	SS	1,2,2	1.30	10.0 - 11.5'
15	EVT-9809112	SS	1,1,2	1.50	15.0 - 16.5'
20	EVT-9809113	SS	2,4,5	1.50	20.0 - 21.5'
25	EVT-9809114	SS	7,12,11	1.50	25.0 - 26.5'
30					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 0.5'
Silt and Sand
light brown to gray, some gravel, gravel is subrounded, up to 1-inch diameter, dry.

0.5 - 7.0'
Sandy Silt
grey to grey green, some gravel, dry.

7.0 - 15.0'
Silty Sand
grey, medium to fine grain, poorly sorted, moist.

15.0 - 17.0'
Peat
with 6-inch grey, fine to medium grain sand horizon.

17.0 - 26.5'
Sand
grey, very fine to fine grain, well sorted, wet.

GEOTECH 0030.GPJ TUC.GDT 4/8/99

HYDROMETRICS INC.
Consulting Scientists and Engineers
Tacoma, Washington

Hydropunch Log

Hole Name: HP-46

Date Hole Started: 2/9/99 Date Hole Finished: 2/9/99

Client: Asarco
Project: Everett Lowland Investigation
County: Snohomish State: Washington
Property Owner: Port of Everett
Legal Description: Former Whsr site near truck scales.
Descriptive Location:

Recorded By: JS
Drilling Company: Hydrometrics (Mobile B-61)
Driller: Jim Niederkorn
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Collect Hydropunch Water Samples
Target Aquifer:
Hole Diameter (in): 8
Total Depth Drilled (ft): 20

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	XRF Analysis	0.0, 0.5', 2-3.5', and 5' interva

Static Water Level Below MP:
Date:
MP Description:
MP Height Above or Below Ground (ft):

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Drilled with a Movile Drill B-61 using 4-1/4" (ID) Hollow Stem Auger; Sampled with a 2" (OD) splid spoon under a 140-lb, 30" drop, winch release safety hammer on "A" rod. Samples submitted to Hydrometrics Ruston XRF lab for metals analysis. Cuttings placed in 55 gallon drums for disposal by the Grandview Residence Council. Borings abandoned with bentonite grout and capped witha 1' concrete cap and ID tag.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	HP-46-1	GRAB			0.0 - 0.5'
	HP-46-2	SS	12/17/20	1.00	0.5 - 2.0'
	HP-46-3	SS	12/14/1	0.20	2.0 - 3.5'
5	HP-46-4	SS	1/2/1	1.50	5.0 - 6.5' Duplicate sample at 09:17 HP-46-4D. Hydropunch from 5-10, EVT-9902-100 Dup. 101
10	HP-46-5	SS	1/1/1	1.30	10.0 - 11.5'
15	HP-46-6	SS	1/1/1	1.30	15.0 - 16.5'
20	HP-46-7	SS	12/16/20	1.40	20.0 - 21.5' Drive hydropunch to 20-25' EVT-9902-102
25					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 2.0'
SAND and GRAVEl
Gray, medium grained, medium dense, slightly moist to dry, 1/2" a
smaller subrounded gravel, and trace brick fragments.
[Fill]

2.0 - 4.5'
SAND
Black with white grains, medium size grains, medium dense, wet, uniform.
[Dredge Fill]

4.5 - 15.0'
SILT
Brown grading to gray, slightly moist, soft plastic, consists primarily of vegetative fibers from 5-10' then becomes more mineral, strong odor of decomposing organic materials.
[Surficial Deposits]

15.0 - 20.0'
SAND
Black with white grains, medium sized grains,loose to medium dense, moist to wet, uniform, trace subrounded 1/4" gravel.
[Alluvium]

GEOTECH 0030.GPJ HYD-TUC.GDT 3/16/99

HYDROMETRICS INC.
Consulting Scientists and Engineers
Tacoma, Washington

Hydropunch Log

Hole Name: HP-47

Date Hole Started: 2/9/99 Date Hole Finished: 2/10/99

Client: Asarco
Project: Everett Lowland Investigation
County: Snohomish State: Washington
Property Owner: Port of Everett
Legal Description: Former Whsr site near truck scales.
Descriptive Location:

Recorded By: JS
Drilling Company: Hydrometrics (Mobile B-61)
Driller: Jim Niederkorn
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	XRF Analysis	0.0, 0.5', 2-3.5', and 5' intervals

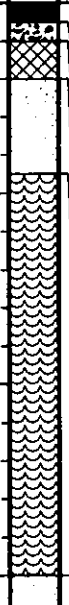
Purpose of Hole: Collect Hydropunch Water Samples
Target Aquifer:
Hole Diameter (in): 8
Total Depth Drilled (ft): 20

Static Water Level Below MP:
Date:
MP Description:
MP Height Above or Below Ground (ft):

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Drilled with a Movile Drill B-61 using 4-1/4" (ID) Hollow Stem Auger; Sampled with a 2" (OD) splid spoon under a 140-lb, 30" drop, winch release safety hammer on "A" rod. Samples submitted to Hydrometrics Ruston XRF lab for metals analysis. Cuttings placed in 55 gallon drums for disposal by the Grandview Residence Council. Borings abandoned with bentonite grout and capped witha 1' concrete cap and ID tag.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	HP-47-1	GRAB			0.0 - 0.5'
	HP-47-2	SS	45/25/10	1.00	0.5 - 2.0' 3" rounded gravel in cuttings.
	HP-47-3	SS	6/12/14	1.30	2.0 - 3.5' Water at time of drilling]
5	HP-47-4	SS	1/1/1	1.00	5.0 - 6.5' Hydropunch 5-10' sample water EVT-9902-103
10	HP-47-7	SS	1/1/4	1.40	10.0 - 11.5' Duplicate sample HP-47-7D @ 08:02
15	HP-47-5	SS	2/4/6	1.40	15.0 - 16.5'
20	HP-47-6	SS	2/4/7	1.40	20.0 - 21.5' Drive hydropunch 20-25' sample EVT-9902-104.
25					



GEOLOGICAL DESCRIPTION

0.0 - 0.5'
ASPHALT
2-inches of asphalt.
[Road Pavement]

0.5 - 1.0'
SLAG
Gray, angular, 1/2 to 1/4-inch, dry, hard.
[Slag Fill]

1.0 - 2.0'
SAND & GRAVEL
Sand and Gravel is Gray, medium grained, medium dense, slightly moist to dry, 1/2" and smaller subrounded gravel.
[Fill]

2.0 - 4.5'
SAND
Black with white grains, medium sized grains,loose to medium dense, moist to wet, uniform, trace subrounded 1/4" gravel.
[Dredge Fill]

4.5 - 15.0'
SILT
Brown grading to gray, slightly moist, soft plastic, consists primarily of vegetative fibers from 5-10' then becomes more mineral, strong odor of decomposing organic materials.
[Surficial Deposits]

15.0 - 20.0'
SAND
Black with white grains, medium sized grains,loose to medium dense, moist to wet, uniform, trace subrounded 1/4" gravel.
[Alluvium]

GEOTECH 0030.GPJ HYD-TUC.GDT 3/16/99

HYDROMETRICS INC.
Consulting Scientists and Engineers
Tacoma, Washington

Hydropunch Log

Hole Name: HP-48

Date Hole Started: 2/10/99 Date Hole Finished: 2/10/99

Client: Asarco
Project: Everett Lowland Investigation
County: Snohomish State: Washington
Property Owner: Port of Everett
Legal Description: Former Whsr site near truck scales.
Descriptive Location:

Recorded By: JS
Drilling Company: Hydrometrics (Mobile B-61)
Driller: Jim Niederkorn
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None

WELL COMPLETION	*Y/N*	*DESCRIPTION*	*INTERVAL*
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	XRF Analysis	0.0, 0.5', 2-3.5', and 5' interva

Purpose of Hole: Collect Hydropunch Water Samples
Target Aquifer:
Hole Diameter (in): 8
Total Depth Drilled (ft): 20

Static Water Level Below MP:
Date:
MP Description:
MP Height Above or Below Ground (ft):

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Drilled with a Movile Drill B-61 using 4-1/4" (ID) Hollow Stem Auger; Sampled with a 2" (OD) splid spoon under a 140-lb, 30" drop, winch release safety hammer on "A" rod. Samples submitted to Hydrometrics Ruston XRF lab for metals analysis. Cuttings placed in 55 gallon drums for disposal by the Grandview Residence Council. Borings abandoned with bentonite grout and capped witha 1' concrete cap and ID tag.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	HP-48-1	GRAB			0.0 - 0.5'
	HP-48-2	SS	12/14/13	0.50	0.5 - 2.0' Firebrick in cuttings.
	HP-48-3	SS	6/8/8	0.70	2.0 - 3.5' Drive hydropunch and sample from 3-8'; EVT-9902-105, dup EVT-9902-106
5	HP-48-4	SS	1/2/1	1.40	5.0 - 6.5'
10	HP-48-5	SS	1/1/2	1.50	10.0 - 11.5'
15	HP-48-6	SS	1/1/5	1.20	15.0 - 16.5'
20		SS	0/0/0	0.00	20.0 - 21.5' No Sample; Drive hydropunch from 20-25' sample EVT-9902-107.
25					

GEOLOGICAL DESCRIPTION

0.0 - 0.5'
ASPHALT
6-inches of asphalt.
[Road Pavement]

0.5 - 2.0'
WOOD & GRAVEL
1" of wood and firebrick fragments, with angular moist gravel.
(Fill)

2.0 - 4.5'
SAND
Black with white grains, medium size grains, medium dense, wet, uniform.
[Dredge Fill]

4.5 - 15.0'
SILT
Brown grading to gray, slightly moist, soft plastic, consists primarily of vegetative fibers from 5-10' then becomes more mineral, strong odor of decomposing organic materials.
[Surficial Deposits]

15.0 - 20.0'
SAND
Black with white grains, medium sized grains,loose to medium dense, moist to wet, uniform, trace subrounded 1/4" gravel.
[Alluvium]

GEOTECH 0030.GPJ HYD-TUC.GDT 3/16/99

HYDROMETRICS INC.
Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: LB-11

Date Hole Started: 8/25/98 Date Hole Finished: 8/25/98

Client: Asarco
Project: Everett Lowland Investigation
County: Snohomish State: Washington
Property Owner: Benson
Legal Description: Benson Property
Descriptive Location: 50' S & 25' W of shed.

Recorded By: JCross
Drilling Company: Hydrometrics (Piper)
Driller: Jeff Cross
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Collect Soil Samples
Target Aquifer:
Hole Diameter (in): 4
Total Depth Drilled (ft): 11.5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	XRF Analysis	0-0.5, 2-3.5, 5-6.5, and 10-11.

Static Water Level Below MP:
Date:
MP Description:
MP Height Above or Below Ground (ft):

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Drilled with a Piper 2000 mounted on a F-250 pickup using 2 1/4" (ID) hollow stem auger; Sampled witha 2" (oD) split spoon sampler w/o liner under a 140-lb, 30" drop, cathead freefall safety hammer on "A" rod. Borings abandoned with bentonite chips. Cuttings placed in 55 gal. drums for disposal in soil stockpile at smelter footprint. Samples submitted to Hydrometrics, Ruston XRF laboratory for metals analysis.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	EVT-9808500	SS		0.50	0.0 - 0.5'		0.0 - 2.5' **PEAT** Dark Brown wood/Peat material; All organic material.
	EVT-9808501	SS	1/1/2/3		0.5 - 2.0' Duplicate sample EVT-9808-505 @ 1655		
	EVT-9808502	SS	12/18/20	1.00	2.0 - 3.5'		
5						5	2.5 - 5.5' **SILT** ML- Greenish gray; fine sand 5%/ silt 90% trace gravels 5%.
	EVT-9808503	SS	4/6/7		5.0 - 6.5'		5.5 - 10.3' **SILT** ML - Greenish gray fine sand 80%/20% silt. moist.
10	EVT-9808504	SS	1/1/1		10.0 - 11.5'	10	10.3 - 11.5' **Clayey SILT** Dark brown clayey SILT; organic material, wood etc., marsh material moldable will rollout, marsh sediment.
15						15	
20						20	
25						25	

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HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: LB-12

Date Hole Started: 8/26/98 Date Hole Finished: 8/26/98

Client: Asarco
Project: Everett Lowland Investigation
County: Snohomish State: Washington
Property Owner: Benson
Legal Description: Benson Property
Descriptive Location: 60' due S of LB-11

Recorded By: JCross
Drilling Company: Hydrometrics (Piper)
Driller: Jeff Cross
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Collect Soil Samples
Target Aquifer:
Hole Diameter (in): 4
Total Depth Drilled (ft): 11.5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	XRF Analysis	0-0.5, 2-3.5, 5-6.5, and 10-11

Static Water Level Below MP:
Date:
MP Description:
MP Height Above or Below Ground (ft):

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Drilled with a Piper 2000 mounted on a F-250 pickup using 2 1/4" (ID) hollow stem auger; Sampled witha 2" (oD) split spoon sampler w/o liner under a 140-lb, 30" drop, cathead freefall safety hammer on "A" rod. Borings abandoned with bentonite chips. Cuttings placed in 55 gal. drums for disposal in soil stockpile at smelter footprint. Samples submitted to Hydrometrics, Ruston XRF laboratory for metals analysis.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9808506	SS	2/6/18/20	0.75	0.0 - 0.5' 3" split spoon.
	EVT-9808507	SS			0.5 - 2.0'
	EVT-9808508	SS	6/7/7	0.50	2.0 - 3.5' 2" split spoon.
5	EVT-9808509	SS	4/4/7	1.00	5.0 - 6.5'
10	EVT-9808510	SS	1/1/2	1.00	10.0 - 11.5'
15					
20					
25					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 1.0'
Sandy SILT
MLS - Light brown, fine sandy silt organic material to 1'.

1.0 - 2.3'
SILT
ML - Greenish gray slilg with fine silty sand small gravels and brick fragments.

2.3 - 3.5'
BRICK
Brick fragments, moist.

5.0 - 6.5'
Sandy SILT
MLS- Greenish gray fine sandy silt, wet.

10.0 - 11.5'
Sandy SILT
MLS- Greenish gray fine sandy silt; marsh sediments, organics material, wet.

GEOTECH 0030.GPJ HYD-TUC.GDT 9/21/99

HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: LB-13

Date Hole Started: 8/26/98 Date Hole Finished: 8/26/98

Client: Asarco
Project: Everett Lowland Investigation
County: Snohomish State: Washington
Property Owner: Benson
Legal Description: Benson Property
Descriptive Location: 25' E of LB-12

Recorded By: JCross
Drilling Company: Hydrometrics (Piper)
Driller: Jeff Cross
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Collect Soil Samples
Target Aquifer:
Hole Diameter (in): 4
Total Depth Drilled (ft): 11.5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	XRF Analysis	0-0.5, 2-3.5, 5-6.5, and 10-

Static Water Level Below MP:
Date:
MP Description:
MP Height Above or Below Ground (ft):

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Drilled with a Piper 2000 mounted on a F-250 pickup using 2 1/4" (ID) hollow stem auger; Sampled witha 2" (oD) split spoon sampler w/o liner under a 140-lb, 30" drop, cathead freefall safety hammer on "A" rod. Borings abandoned with bentonite chips. Cuttings placed in 55 gal. drums for disposal in soil stockpile at smelter footprint. Samples submitted to Hydrometrics, Ruston XRF laboratory for metals analysis.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9808511	SS	18/20/24/24	0.75	0.0 - 0.5' 3" SS
	EVT-9808512	SS			0.5 - 2.0' Duplicate sample EVT-9808-516; Sample obtained from 0-2.0
	EVT-9808513	SS	11/14/8	0.75	2.0 - 3.5'
5	EVT-9808514	SS	2/1/1	0.50	5.0 - 6.5'
10	EVT-9808515	SS	1/1/2	1.00	10.0 - 11.5'
15					
20					
25					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 0.5'
PEAT
PT- Brown organic material.
(Native)

0.5 - 11.3'
Sandy SILT
Greenish gray fine sandy silt with small gravels, moist.

11.3 - 11.5'
SILT
OH- Marsh sediments, dark brown organic material.

HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: LB-14

Date Hole Started: 8/26/98 Date Hole Finished: 8/26/98

Client: Asarco
Project: Everett Lowland Investigation
County: Snohomish State: Washington
Property Owner: Benson
Legal Description: Benson Property
Descriptive Location: 60' due S of LB-12

Recorded By: JCross
Drilling Company: Hydrometrics (Piper)
Driller: Jeff Cross
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Collect Soil Samples
Target Aquifer:
Hole Diameter (in): 4
Total Depth Drilled (ft): 11.5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	XRF Analysis	0-0.5, 2-3.5, 5-6.5, and 10-11

Static Water Level Below MP:
Date:
MP Description:
MP Height Above or Below Ground (ft):

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Drilled with a Piper 2000 mounted on a F-250 pickup using 2 1/4" (ID) hollow stem auger; Sampled witha 2" (oD) split spoon sampler w/o liner under a 140-lb, 30" drop, cathead freefall safety hammer on "A" rod. Borings abandoned with bentonite chips. Cuttings placed in 55 gal. drums for disposal in soil stockpile at smelter footprint. Samples submitted to Hydrometrics, Ruston XRF laboratory for metals analysis.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9808517	SS	12/18/16/11	0.75	0.0 - 0.5' 3" SS
	EVT-9808518	SS			0.5 - 2.0'
	EVT-9808519	SS	6/4/3	0.50	3.0 - 4.5' 2" SS
5					
	EVT-9808520	SS	2/1/2	0.50	5.0 - 6.5'
10	EVT-9808521	SS	1/1/1	1.00	10.0 - 11.5'
15					
20					
25					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 0.5'
Sandy SILT
MLS- Light brown fine sandy silt, organic material.

0.5 - 2.0'
Silty SAND
SM- Silty sand fine grain.

2.0 - 3.5'
Sandy SILT
MLS- Light brown sandy silt.

5.0 - 5.5'
Silty SAND
SM- Light brown silty sand.

5.5 - 6.5'
SAND
SP- Wet light brown, fine to medium sand, some silt.

10.0 - 11.5'
SAND
SP- Lioght brown medium to fine sand, some silt, wet.

HYDROMETRICS INC.
Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: LB-15

Date Hole Started: 8/26/98 Date Hole Finished: 8/26/98

Client: Asarco
Project: Everett Lowland Investigation
County: Snohomish State: Washington
Property Owner: Benson
Legal Description: Benson Property
Descriptive Location: 60' due S of LB-13

Recorded By: JCross
Drilling Company: Hydrometrics (Piper)
Driller: Jeff Cross
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Collect Soil Samples
Target Aquifer:
Hole Diameter (in): 4
Total Depth Drilled (ft): 11.5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	XRF Analysis	0-0.5, 2-3.5, 5-6.5, and 10-11.

Static Water Level Below MP:
Date:
MP Description:
MP Height Above or Below Ground (ft):

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Drilled with a Piper 2000 mounted on a F-250 pickup using 2 1/4" (ID) hollow stem auger; Sampled witha 2" (oD) split spoon sampler w/o liner under a 140-lb, 30" drop, cathead freefall safety hammer on "A" rod. Borings abandoned with bentonite chips. Cuttings placed in 55 gal. drums for disposal in soil stockpile at smelter footprint. Samples submitted to Hydrometrics, Ruston XRF laboratory for metals analysis.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9808522	SS	18/22/>50	0.75	0.0 - 0.5' 3" SS
	EVT-9808523	SS			0.5 - 2.0' Sampled with above SS.
	EVT-9808524	SS	40/76/48	0.50	2.0 - 3.5' Duplicate sample # EVT-9808-527 @ 1730
5	EVT-9808525	SS	18/15/14	0.75	5.0 - 6.5'
10	EVT-9808526	SS	1/1/1		10.0 - 11.5'
15					
20					
25					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 1.0'
SILT
Brown, organic material silty sand, compacted at 0.5'.

1.0 - 3.5'
Sandy SILT
Greenish gray, fine sandy silt, some large gravel.

5.0 - 10.5'
Silty SAND
Greenish gray silty sand, moist at 6.0.

10.5 - 11.5'
SILT
OH- Marsh sediment, organic material, silty, dark brown to black.

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HYDROMETRICS INC.
Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: LB-19

Date Hole Started: 9/29/98 Date Hole Finished: 9/29/98

Client: Asarco
Project: Everett Lowland Investigation
County: Snohomish State: Washington
Property Owner: Bentsen
Legal Description: Bentsen Property
Descriptive Location: 20' W of LB-11

Recorded By: JS
Drilling Company: Hydrometrics (Mobile B-61)
Driller: Jim Niederkorn
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Install Monitor Well
Target Aquifer:
Hole Diameter (in): 8
Total Depth Drilled (ft): 11.5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	N		

Static Water Level Below MP:
Date:
MP Description:
MP Height Above or Below Ground (ft):

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks:

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9809-190	GRAB			0.0 - 0.5'
	EVT-9809-191	SS	2/10/13	1.00	2.0 - 3.5'
5	EVT-9809-192	SS	4/3/2	1.00	4.0 - 5.5' 3" split spoon used for recovery.
	EVT-9809-193	SS	1/1/0	1.00	6.0 - 7.5' Switched back to 2" split spoon; Duplicate sample taken at 11:22, EVT-9809-194
	EVT-9809-195	SS	1/0/0	1.00	8.0 - 9.5'
10	EVT-9809-196	SS	1/5/7	0.70	10.0 - 11.5' 3" split spoon used.
15					
20					
25					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 6.0'
Silty SAND
brown to gray , dry, organics to 4', medium dense to soft.
[Fill]

6.0 - 10.0'
Sandy SILT
Gray, loose to soft, moist to slighlty moist, high organics, trace wood.
[Till/Fill]

10.0 - 11.5'
Clayey SILT
Brown, soft, moist, plastic, plastic abdt yellow stained wood fibers.
[Till/Fill]

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HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Soil Boring Log

Hole Name: LB-20

Date Hole Started: 9/29/98 Date Hole Finished: 9/29/98

Client: Asarco
Project: Everett Lowland Investigation
County: Snohomish State: Washington
Property Owner: Bentsen
Legal Description: Bentsen Property
Descriptive Location: 20' S of LB-11

Recorded By: JS
Drilling Company: Hydrometrics (Mobile B-61)
Driller: Jim Niederkorn
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Install Monitor Well
Target Aquifer:
Hole Diameter (in): 8
Total Depth Drilled (ft): 11.5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	N		
Surface Casing Used?	N		
Screen/Perforations?	N		
Sand Pack?	N		
Annular Seal?	N		
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	N		

Static Water Level Below MP:
Date:
MP Description:
MP Height Above or Below Ground (ft):

Surface Casing Height (ft):
Riser Height (ft):
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks:

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9809-161	SS	2/3/4	1.00	0.0 - 0.5' Piece of slag at surface
	EVT-9809-162	SS	16/11/8	1.00	2.0 - 3.5'
5	EVT-9809-163	SS	4/6/4	1.00	4.0 - 5.5'
	EVT-9809-164	SS	1/1/0	1.00	6.0 - 7.5'
	EVT-9809-165	SS	1/1/0	0.50	8.0 - 9.5'
10	EVT-9809-166	SS	1/1/1	0.70	10.0 - 11.5'
15					
20					
25					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 4.0'
Sandy SILT
Gray to brown , dry , loose to stiff, medium to coarse grained w/ subrounded gravel.
[Till/Fill]

4.0 - 5.5'
Silty SAND w/ Gravel
Light brown to gray, slightly moist to dry, medium dense, medium grained, 1/2" and smaller subrounded gravel.
[Till/Fill]

5.5 - 10.0'
Sandy SILT
Gray, moist, soft, plastic w/ 2" of wood stained black at 7.3'. sand is medium grained.
[Till/Fill]

10.0 - 11.5'
SILT
Brown, dry, nonplastic, organics.

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HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Hole Name: EV-15A

Date Hole Started: 9/29/98 Date Hole Finished: 9/29/98

Client: Asarco
Project: Everett Lowland Investigation
County: Snohomish State: Washington
Property Owner: Bentsen
Legal Description: Bentsen Property
Descriptive Location: 5' south of EV-15 B

Recorded By: JS
Drilling Company: Hydrometrics (Mobile B-61)
Driller: Jim Niederkorn
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Install Monitor Well
Target Aquifer: First Water
Hole Diameter (in): 8
Total Depth Drilled (ft): 12

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	Y	2-inch, flush threaded, Sch 40, PVC	+2.24'-12'
Surface Casing Used?	Y	Steel Monument	+2.41 to -2.59
Screen/Perforations?	Y	Prepack 0.010-inch slot, Sch 40 PVC	7'-12'
Sand Pack?	Y	10/20 Silica Sand	5'-12'
Annular Seal?	Y	Bentonite/Cement Grout	2'-5'
Surface Seal?	Y	Concrete	0' - 2'
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	N		

Static Water Level Below MP: 7.34
Date: 9/30/98
MP Description: Top of PVC
MP Height Above or Below Ground (ft): 2.24

Surface Casing Height (ft): 2.41
Riser Height (ft): 2.24
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Cuttings were placed in 55-gallon drums and labeled. See EV-15B for Lithology.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	1				0.0 - 0.5'		0.0 - 0.0' See EV-15B for Lithology.
5							
10							
15							
20							
25							

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HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Monitor Well Log

Hole Name: EV-15B

Date Hole Started: 9/29/98 Date Hole Finished: 9/29/98

Client: Asarco
Project: Everett Lowland Investigation
County: Snohomish State: Washington
Property Owner: Bentsen
Legal Description: Bentsen Property
Descriptive Location: 20 yards south of shed structure

Recorded By: JS
Drilling Company: Hydrometrics (Mobile B-61)
Driller: Jim Niederkorn
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Install Monitor Well
Target Aquifer: Shallow Alluvial
Hole Diameter (in): 8
Total Depth Drilled (ft): 31.5

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	Y	2-inch, flush threaded, Sch 40, PVC	+2.44-30
Surface Casing Used?	Y	Steel Monument	+2.69-2.31
Screen/Perforations?	Y	Prepack 0.010-inch slot, Sch 40 PVC	25'-30'
Sand Pack?	Y	10/20 Silica Sand	21'-30'
Annular Seal?	Y	Bentonite Grout	1'-21'
Surface Seal?	Y	Concrete	0-1'
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	XRF Analysis	0-0.5', 2-3.5', 5' intervals ther

Static Water Level Below MP: 9.06
Date: 9/30/98
MP Description: Top of PVC
MP Height Above or Below Ground (ft): 2.44

Surface Casing Height (ft): 2.69
Riser Height (ft): 2.44
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Sampled with a 2" (OD) split spoon under a 30-inch drop, winch release, 140-pound safety hammer. Cuttings placed in a 55-gallon drum and labeled for disposal.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	EVT-9809-167	GRAB			0.0 - 0.5'		0.0 - 5.0' **Silty LOAM** Brown, Dry, Loose, abundant vegetative matter, roots, etc.; trace gravel.
		SS	3/5/3	0.00	1.0 - 2.5' No Recovery		
5	EVT-9809-168	SS	1/1/1	0.50	5.0 - 6.5'	5	5.0 - 10.0' **Sandy SILT** Gray, slightly moist, non-plastic, soft, medium grained sand, trace wood at 6.5-feet.
10	EVT-9809-169	SS	1/1/0	1.50	10.0 - 11.5' Duplicate sample @ 14:47 EVT-9809-170.	10	10.0 - 13.0' **SILT** Dark brown, slightly moist, plastic, abundant vegetative matter.
15	EVT-9809-171	SS	1/1/0	1.50	15.0 - 16.5'	15	13.0 - 22.0' **SILT** Gray, slighlty moist, soft, plastic, uniform, some vegetative matter; approximately 20 % fine sand.
20	EVT-9809-172	SS	1/1/0	1.50	20.0 - 21.5' Driller says it felt different at 22'	20	
25						25	22.0 - 28.0' **Sandy SILT** Gray, wet to moist, approximately 40 to 50% coarse to medium sand.

Continued Next Page

HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Monitor Well Log

Hole Name: EV-15B

Date Hole Started: 9/29/98 Date Hole Finished: 9/29/98

(Continued)

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	EVT-9809-173	SS	1/1/4	0.50	25.0 - 26.5'		
30	EVT-9809-174	SS	0/0/5	0.50	30.0 - 31.5'		28.0 - 31.5' **SAND** Gray, wet, loose to medium-dense, well sorted, and uniform.
35							
40							
45							
50							
55							
60							
65							

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HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Monitor Well Log

Hole Name: EV-16A

Date Hole Started: 9/29/98 Date Hole Finished: 9/29/98

Client: Asarco
Project: Everett Lowland Investigation
County: Snohomish State: Washington
Property Owner: Bentsen
Legal Description: Bentsen Property
Descriptive Location: 100 yds S, 30 yds W of Shed.

Recorded By: JS
Drilling Company: Hydrometrics (Mobile B-61)
Driller: Jim Niederkorn
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Install Monitor Well
Target Aquifer: Shallow Alluvial
Hole Diameter (in): 8
Total Depth Drilled (ft): 16

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	Y	2-inch, flush threaded, Sch 40, PVC	+2.47'-12'
Surface Casing Used?	Y	Steel Monument	2.71'-2.29'
Screen/Perforations?	Y	Prepack 0.010-inch slot, Sch 40 PVC	7'-12'
Sand Pack?	Y	10/20 Silica Sand	5'-12'
Annular Seal?	Y	Bentonite Chips	1'-5'
Surface Seal?	Y	Concrete	0-1'
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	XRF Analysis	0-0.5', 2-3.5', 5' intervals th

Static Water Level Below MP: Dry
Date: 9/30/98
MP Description: Top of PVC
MP Height Above or Below Ground (ft): 2.47

Surface Casing Height (ft): 2.71
Riser Height (ft): 2.47
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Sampled with a 2" (OD) split spoon under a 30-inch drop, winch release, 140-pound safety hammer. Cuttings placed in a 55-gallon drum and labeled for disposal.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9809-152	GRAB			0.0 - 0.5'
	EVT-9809-153	SS	2/2/2	1.00	2.0 - 3.5'
5	EVT-9809-154	SS	1/1/1	1.00	5.0 - 6.5'
10	EVT-9809-155	SS	1/1/1	1.00	10.0 - 11.5' Duplicate sample at 08:52 EVT-9809-156
	EVT-9809-157	SS	1/1/0	0.50	12.0 - 13.5'
15	EVT-9809-158	SS	1/1/10	1.50	14.0 - 15.5'
20					
25					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 2.0'
Silty LOAM
Brown, dry, loose, some root material, trace subrounded, 1/4" gravel.
[Fill]

2.0 - 12.0'
Sandy SILT
Gray, soft, slightly moist, very plastic, with approximately 20% medium grained sand; 3" of wood at 11.5' with a piece of glass in the silt.
[Fill]

12.0 - 15.5'
SILT
Gray to brown (becomes more gray with depth), high organics (wood fibers), soft plastic, slightly moist to dry.

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HYDROMETRICS INC.

Consulting Scientists and Engineers
Helena, Montana

Monitor Well Log

Hole Name: EV-17A

Date Hole Started: 9/24/98 Date Hole Finished: 9/24/98

Client: ASARCO

Project: Everett Lowland Investigation

County: Snohomish State: Washington

Property Owner: Weyerhauser

Legal Description:

Descriptive Location: lowland area adjacent to bluff

Recorded By: BT

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: Hollow Stem Auger

Drilling Fluids Used: None

Purpose of Hole: Install Monitor Well

Target Aquifer: First Water

Hole Diameter (in): 8-inch

Total Depth Drilled (ft): 12

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	Y	2-inch, flush threaded, Sch 40, PVC	+3.1-12'
Surface Casing Used?	Y	Steel	+3.5 to -1.5
Screen/Perforations?	Y	0.010-inch slot, Sch 40, PVC	7-12'
Sand Pack?	Y	10-20 silica sand	5-12'
Annular Seal?	Y	Bentonite Chips	0.5-5'
Surface Seal?	Y	Concrete	0-0.5
DEVELOPMENT/SAMPLING			
Well Developed?	Y	pumping	
Water Samples Taken?	Y	common ions and metals	
Boring Samples Taken?	N		

Static Water Level Below MP: 5.79

Date: 9/25/98

MP Description: top of PVC casing

MP Height Above or Below Ground (ft): 3.1

Surface Casing Height (ft): 3.6

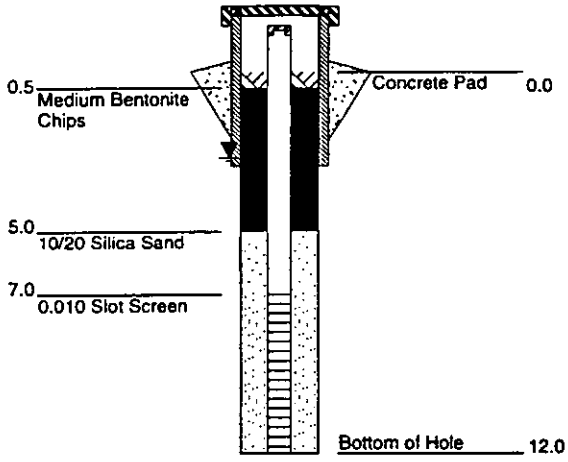
Riser Height (ft): 3.1

Ground Surface Elevation (ft):

MP Elevation (ft):

Remarks: Six feet east of well EV-17B.

WELL CONSTRUCTION



GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 1.0'
Sandy Loam
brown.

1.0 - 4.0'
Fill
Silty Gravel, grey to brown, mixed lithologies with slag fragments, dry.

4.0 - 6.5'
Slag
black, with some brown silty sand, saturated from 6.0-6.5'.

6.5 - 12.0'
Clayey Sand
slightly bluish gray, with minor silt and trace small gravel, overlain by 2-inch peat layer.

STANDARD 0030.GDT 4/8/99

HYDROMETRICS INC.
Consulting Scientists and Engineers
Helena, Montana

Monitor Well Log

Hole Name: EV-17B

Date Hole Started: 9/23/98 Date Hole Finished: 9/24/98

Client: ASARCO

Project: Everett Lowland Investigation

County: Snohomish State: Washington

Property Owner: Weyerhauser

Legal Description:

Descriptive Location: lowland area adjacent to bluff

Recorded By: BT

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: Hollow Stem Auger

Drilling Fluids Used: None

Purpose of Hole: Install Monitor Well

Target Aquifer: Deep Alluvial

Hole Diameter (in): 8-inch

Total Depth Drilled (ft): 30

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	Y	2-inch, flush threaded, Sch 40, PVC	+1.7-23
Surface Casing Used?	Y	steel	+2.2-2.8
Screen/Perforations?	Y	0.010-inch slot, Sch 40, PVC	18-23'
Sand Pack?	Y	10-20 silica sand	14-23'
Annular Seal?	Y	Bentonite Chips	0.5-14
Surface Seal?	Y	Concrete	0-0.5
DEVELOPMENT/SAMPLING			
Well Developed?	Y	pumping	
Water Samples Taken?	Y	common ions and metals	
Boring Samples Taken?	Y	split spoon soil samples submitted for XRF metals analysis	

Static Water Level Below MP: 5.57

Date: 9/25/98

MP Description: top of PVC casing

MP Height Above or Below Ground (ft): 1.7

Surface Casing Height (ft): 2.2

Riser Height (ft): 1.7

Ground Surface Elevation (ft):

MP Elevation (ft):

Remarks:

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	~~EVT-9809115~~	~~GRAB~~			0.0 - 0.5'
	EVT-9809116	SS	17,24,17	1.0'	2.0 - 3.5' 3-inch O.D. split spoon
5	EVT-9809117	SS	17,7,5	1.50	5.0 - 6.5'
10	EVT-9809118	SS	5,2,5	1.00	10.0 - 11.5'
15	EVT-9809119	SS	2,2,4	1.50	15.0 - 16.5'
20	EVT-9809120	SS	7,15,18	1.00	20.0 - 21.5'
25	EVT-9809121	SS	4,12,21	1.00	25.0 - 26.5'
30					no sample due to heaving sands
35					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 1.0'
Sandy Loam
brown.

1.0 - 4.0'
Fill
Silty Gravel, grey to brown, mixed lithologies with slag fragments, dry.

4.0 - 6.5'
Slag
black, with some brown silty sand, saturated from 6.0-6.5'.

6.5 - 12.0'
Clayey Sand
slightly bluish gray, with minor silt and trace small gravel, overlain by 2-inch peat layer, wet.

12.0 - 16.0'
Clayey Sand
As above, transition to brown, well sorted fine to medium sand from 16.0 to 16.5, wet.

16.0 - 22.0'
Sand
brown, fine to medium grain, moderately sorted, thin (3/4-inch) zone of orange (iron) staining, wet.

22.0 - 30.0'
Sand
brown, medium grain, well sorted, wet.

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HYDROMETRICS INC.

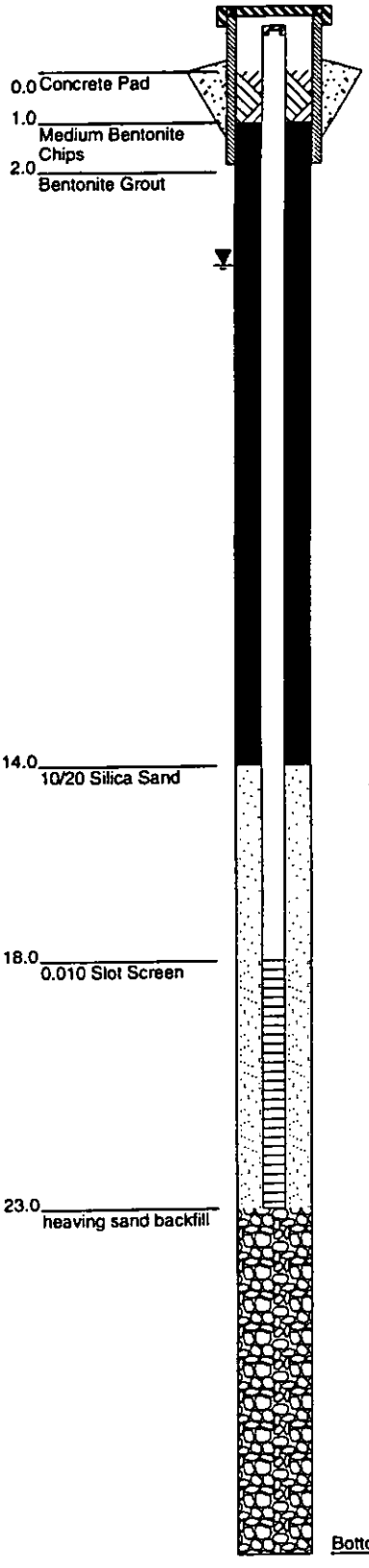
Consulting Scientists and Engineers
Helena, Montana

Monitor Well Log

Hole Name: EV-17B

Date Hole Started: 9/23/98 Date Hole Finished: 9/24/98

Well Construction Diagram



Geological Description

0.0 - 1.0'
Sandy Loam
brown.

1.0 - 4.0'
Fill
Silty Gravel, grey to brown, mixed lithologies with slag fragments, dry.

4.0 - 6.5'
Slag
black, with some brown silty sand, saturated from 6.0-6.5'.

6.5 - 12.0'
Clayey Sand
slightly bluish gray, with minor silt and trace small gravel, overlain by 2-inch peat layer, wet.

12.0 - 16.0'
Clayey Sand
As above, transition to brown, well sorted fine to medium sand from 16.0 to 16.5, wet.

16.0 - 22.0'
Sand
brown, fine to medium grain, moderately sorted, thin (3/4-inch) zone of orange (iron) staining, wet.

22.0 - 30.0'
Sand
brown, medium grain, well sorted, wet.

WELL_DIAGRAM 0 J HYD-TUC.GDT 4/8/99

HYDROMETRICS INC.
Consulting Scientists and Engineers
Helena, Montana

Monitor Well Log

Hole Name: EV-18

Date Hole Started: 9/24/98 Date Hole Finished: 9/24/98

Client: ASARCO
Project: Everett Lowland Investigation
County: Snohomish State: Washington
Property Owner: City of Everett
Legal Description:
Descriptive Location:

Recorded By: BT
Drilling Company: Hydrometrics
Driller: Jim Neiderkorn
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Install Monitor Well
Target Aquifer: Deep Alluvial
Hole Diameter (in): 8-inch
Total Depth Drilled (ft): 55

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	Y	2-inch, flush threaded, Sch 40, PVC	0-55'
Surface Casing Used?	Y	steel	0-1.5'
Screen/Perforations?	Y	0.020-inch slot, Sch 40 PVC	45-55'
Sand Pack?	Y	10-20 silica sand	42-55'
Annular Seal?	Y	Bentonite Grout	1-42
Surface Seal?	Y	Concrete	0-0.5
DEVELOPMENT/SAMPLING			
Well Developed?	Y	pumping	
Water Samples Taken?	Y	common ions and metals	
Boring Samples Taken?	Y	*split spoon soil samples submitted for XRF metals analysis*	

Static Water Level Below MP: 47.37
Date: 9/25/98
MP Description: top of PVC casing
MP Height Above or Below Ground (ft): -0.34

Surface Casing Height (ft):
Riser Height (ft): -0.34
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks:

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9809122	GRAB			1.0 - 1.3' sample collected below asphalt
	EVT-9809123	SS	4,6,8	1.20	2.0 - 3.5' 3" O.D. split spoon using 300 lb hammer
5	EVT-9809124	SS	5,7,32	1.30	5.0 - 6.5'
10	EVT-9809125	SS	3,2,1	1.00	10.0 - 11.5' EVT-9809-134 (duplicate)
15	EVT-9809126	SS	20, 50/6"	1.00	15.0 - 16.5'
20	EVT-9809127	SS	30,50/6"	1.00	20.0 - 21.5'
25	EVT-9809128	SS	22,50/6"	1.00	25.0 - 26.5'
30	EVT-9809129	SS	8,14,16	1.50	30.0 - 31.5' drilling easier at 28 feet
35	EVT-9809130	SS	8,15,17	1.00	35.0 - 36.5'
40	EVT-9809131	SS	9,12,14	1.00	40.0 - 41.5'
45	EVT-9809132	SS	20,50/6"	1.50	45.0 - 46.5'
50			15,20,30		50.0 - 51.5' wet, no sample due to heaving sands
55					
60					

GEOTECH 0030.GPJ D-TUC.GDT 4/8/99

GRAPHICS

GEOLOGICAL DESCRIPTION

1.0 - 1.3'
Road Grade
fine to coarse sand and fine gravel, dry.

1.3 - 4.0'
Fill
Silty gravelly sand - brown to gray, fine grain sand and fine gravel, 10% silt.

4.0 - 7.0'
Fill
Sandy Silt and Gravel - bluish grey, contains fragments of brick and asphalt, dry.

7.0 - 12.0'
Sandy Silt and Gravel
as above, dry, 4 inches of orange silty fine sand overlain by 4 inches of charcoal and ash containing white fragments (bone or shell ?) One piece looks like pipe (?).

12.0 - 19.0'
Sand and Gravel
brown, sand is poorly sorted, gravel is subrounded to 2-inch diameter, dry.

19.0 - 30.0'
Silty Sand
brown, some gravel, moderately dense, slightly damp.

30.0 - 35.0'
Sand
brown, fine grain, well sorted, dry.

35.0 - 43.0'
Sand
brown, medium to coarse grain, moderately to well sorted, dry.

43.0 - 47.0'
Sand
brown, fine to coarse sand, poorly sorted, dry.

47.0 - 55.0'
Sand
brown, medium grain, well sorted, wet.

HYDROMETRICS INC.

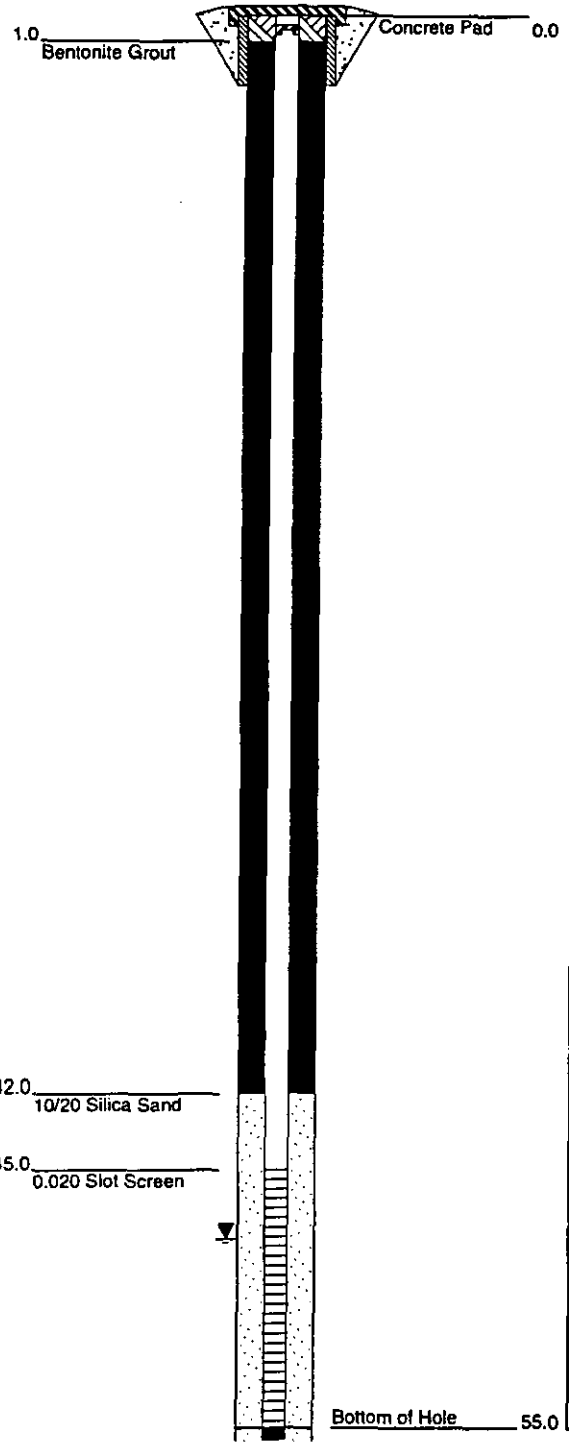
Consulting Scientists and Engineers
Helena, Montana

Monitor Well Log

Hole Name: EV-18

Date Hole Started: 9/24/98 Date Hole Finished: 9/24/98

Well Construction Diagram



Geological Description

1.0 - 1.3'
Road Grade
fine to coarse sand and fine gravel, dry.

1.3 - 4.0'
Fill
Silty gravelly sand - brown to gray, fine grain sand and fine gravel, 10% silt.

4.0 - 7.0'
Fill
Sandy Silt and Gravel - bluish grey, contains fragments of brick and asphalt, dry.

7.0 - 12.0'
Sandy Silt and Gravel
as above, dry, 4 inches of orange silty fine sand overlain by 4 inches of charcoal and ash containing white fragments (bone or shell ?) One piece looks like pipe (?).

12.0 - 19.0'
Sand and Gravel
brown, sand is poorly sorted, gravel is subrounded to 2-inch diameter, dry.

19.0 - 30.0'
Silty Sand
brown, some gravel, moderately dense, slightly damp.

30.0 - 35.0'
Sand
brown, fine grain, well sorted, dry.

35.0 - 43.0'
Sand
brown, medium to coarse grain, moderately to well sorted, dry.

43.0 - 47.0'
Sand
brown, fine to coarse sand, poorly sorted, dry.

47.0 - 55.0'
Sand
brown, medium grain, well sorted, wet.

WELL_DIAGRAM 0 J HYD-TUC.GDT 4/8/99

HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Monitor Well Log

Hole Name: EV-19

Date Hole Started: 9/25/98 Date Hole Finished: 9/25/98

Client: Asarco
Project: Everett Lowland Investigation
County: Snohomish State: Washington
Property Owner: City of Everett
Legal Description: Everett Right of Way
Descriptive Location: 10' South of TB-1

Recorded By: JS
Drilling Company: Hydrometrics (Mobile B-61)
Driller: Jim Niederkorn
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Install Monitor Well
Target Aquifer: Alluvial
Hole Diameter (in): 8
Total Depth Drilled (ft): 55

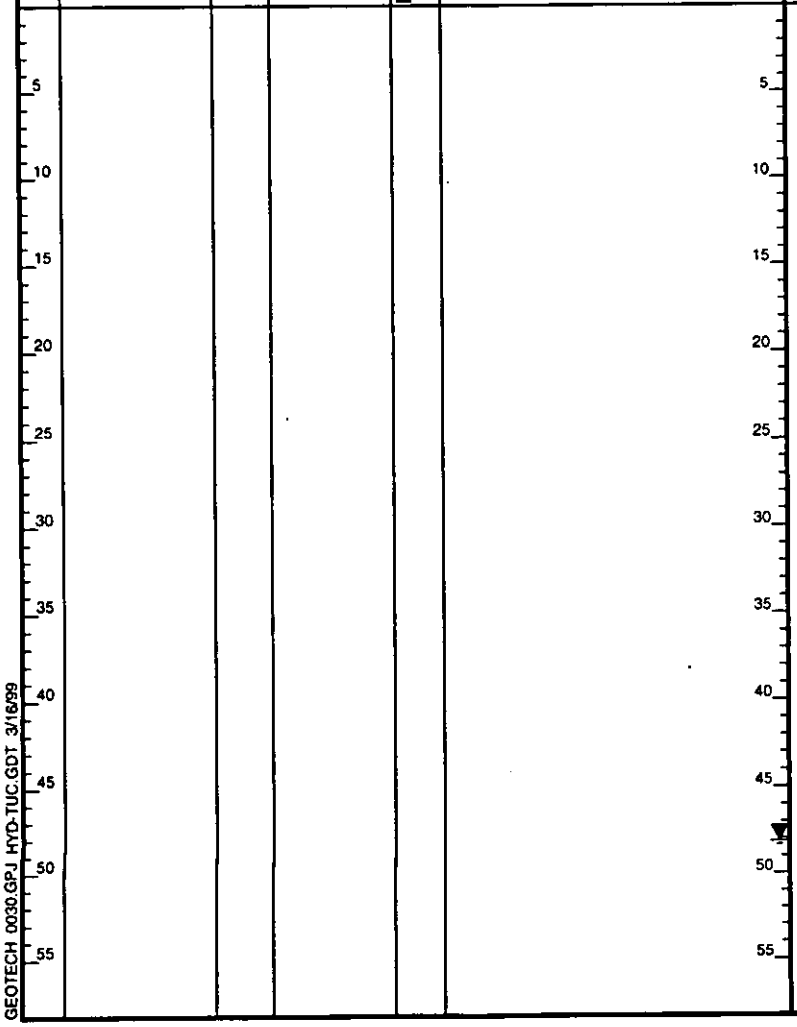
WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	Y	2-inch, flush threaded, Sch 40, PVC	0.42'-55.0'
Surface Casing Used?	Y	Flush Monument	0.0'-3.0'
Screen/Perforations?	Y	Prepack 0.010-inch slot, Sch 40 PVC	50'-5'
Sand Pack?	Y	10/20 Silica Sand	44'-55'
Annular Seal?	Y	Bentonite Grout	1'-44'
Surface Seal?	Y	Concrete	0-1'
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	N		

Static Water Level Below MP: 47.75
Date: 9/28/98
MP Description: Top of PVC
MP Height Above or Below Ground (ft): -0.42

Surface Casing Height (ft): 0.00
Riser Height (ft): -0.42
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Not Sampled See TB-1 for Lithology. Cuttings placed in labeled 55-gallon drums.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
							0.0 - 0.0' See TB-1 log for lithology.



HYDROMETRICS INC.
Consulting Scientists and Engineers
Tacoma, Washington

Monitor Well Log

Hole Name: EV-20

Date Hole Started: 9/28/98 Date Hole Finished: 9/28/98

Client: Asarco
Project: Everett Lowland Investigation
County: Snohomish State: Washington
Property Owner: City of Everett
Legal Description: Everett Right of Way
Descriptive Location: 2' off Sidwalk on SE corner Mar. view. Dr.

Recorded By: JS
Drilling Company: Hydrometrics (Mobile B-61)
Driller: Jim Niederkorn
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Install Monitor Well
Target Aquifer: Alluvial
Hole Diameter (in): 8
Total Depth Drilled (ft): 55

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	Y	2-inch, flush threaded, Sch 40, PVC	+2.07'-55.0'
Surface Casing Used?	Y	Steel Monument	+2.47-2.53
Screen/Perforations?	Y	Prepack 0.010-inch slot, Sch 40 PVC	50'-55'
Sand Pack?	Y	10/20 Silica Sand	45'-55'
Annular Seal?	Y	Bentonite Grout	1'-45'
Surface Seal?	Y	Concrete	0-1'
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	XRF Analysis	0-0.5', 2-3.5', 5' intervals ther

Static Water Level Below MP: 50.81
Date: 9/30/98
MP Description: Top of PVC
MP Height Above or Below Ground (ft): 2.07

Surface Casing Height (ft): 2.47
Riser Height (ft): 2.07
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Sampled with a 3" (ID) split spoon under a 30-inch drop, winch release, 300-pound, safety hammer under "N" rod. Cuttings placed in a 55-gallon drum and labeled for disposal. Sampled to 50-feet; drilled to 55-feet, did not sample to help prevent heaving sands.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9809-140	GRAB			0.0 - 0.5'
		SS	32/50-1	0.00	2.0 - 4.0' No recovery
5	EVT-9809-141	SS	10/10/9	0.10	5.0 - 6.5'
10	EVT-9809-142	SS	2/2/2	1.00	10.0 - 11.5'
15	EVT-9809-143	SS	4/2/2	1.00	15.0 - 16.5' Duplicate sample @ 11:12 EVT-9809-144
20	EVT-9809-145	SS	6/14/42	1.00	20.0 - 21.5'
25					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 4.0'
Silty LOAM
Brown, dry, abundant vegetation, loose, trace rounded gravel 1/4" and under.
[Fill]

4.0 - 8.0'
Silty SAND
Brown dry, fine grained, trace 1/4" rounded gravel.
[Fill]

8.0 - 13.0'
SAND
Dark brown, fined grained, loose, slighlty moist to dry, trace organics.
[Till/Fill]

13.0 - 18.0'
Sandy SILT
Red to yellowish brown with some black staining, some oxidation, slightly moist, soft, some 1" subrounded gravels.
[Till/Fill]

18.0 - 22.0'
SAND
Light brown to gray, slightly moist, sorted, fine grained, medium dense to dense, some 1" subrounded gravels.
[Till/Fill]

22.0 - 55.0'
SAND
Gray, dry to 49', medium to fine grained, medium dense to dense, well sorted.
[Alluvium]

Continued Next Page

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HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Monitor Well Log

Hole Name: EV-20

Date Hole Started: 9/28/98 Date Hole Finished: 9/28/98

(Continued)

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	EVT-9809-146	SS	12/24/25	1.50	25.0 - 26.5'		
30	EVT-9809-147	SS	8/14/17	1.50	30.0 - 31.5'		
35	EVT-9809-148	SS	4/14/12	1.50	35.0 - 36.5'		
40	EVT-9809-149	SS	10/24/28	1.50	40.0 - 41.5'		
45	EVT-9809-150	SS	10/28/37	1.50	45.0 - 46.5' Water at 49' at time of drilling		
50	EVT-9809-151	SS	14/26/38	1.50	50.0 - 51.5'		
55							
60							
65							

GEOTECH 0030.GPJ HYD-TUC.GDT 3/16/99

HYDROMETRICS INC.
Consulting Scientists and Engineers
Tacoma, Washington

Monitor Well Log

Hole Name: EV-21A

Date Hole Started: 2/8/99 Date Hole Finished: 2/8/99

Client: Asarco
Project: Everett Lowland Investigation
County: Snohomish State: Washington
Property Owner: Port of Everett
Legal Description:
Descriptive Location: On acess road for construction of new bridge

Recorded By: JS
Drilling Company: Hydrometrics (Mobile B-61)
Driller: Jim Niederkorn
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Install Monitor Well
Target Aquifer: Shallow Alluvial
Hole Diameter (in): 8
Total Depth Drilled (ft): 10

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	Y	2-inch, flush threaded, Sch 40, PVC	+5-10.0
Surface Casing Used?	Y	Steel Monument	+5.1-2.9
Screen/Perforations?	Y	Prepack 0.010-inch slot, Sch 40 PVC	5-10'
Sand Pack?	Y	10/20 Silica Sand	5-10'
Annular Seal?	Y	Bentonite Grout	1-4'
Surface Seal?	Y	Concrete	0-1
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	XRF Analysis	

Static Water Level Below MP:
Date:
MP Description:
MP Height Above or Below Ground (ft):

Surface Casing Height (ft): 5.1
Riser Height (ft): 5.0
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Drilled with a Movile Drill B-61 using 4-1/4" (ID) Hollow Stem Auger; Sampled with a 2" (OD) splid spoon under a 140-lb, 30" drop, winch release safety hammer on "A" rod. Samples submitted to Hydrometrics Ruston XRF lab for metals analysis. Cuttings placed in 55 gallon drums for disposal by the Grandview Residence Council.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
							0.0 - 0.0' See log for EV-21B for lithology.
5							
	EV-21A-1	SS	1/3/4	1.30	8.0 - 9.5'		8.0 - 10.0' **SILT** Green to gray, soft, plastic, slightly moist, abundant vegetative fibers. [Surficial Deposits]
10							
15							
20							
25							

GEOTECH 0030.GPJ HYD-TUC.GDT 3/16/99

HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Monitor Well Log

Hole Name: EV-21B

Date Hole Started: 2/8/99 Date Hole Finished: 2/8/99

Client: Asarco
Project: Everett Lowland Investigation
County: Snohomish State: Washington
Property Owner: Port of Everett
Legal Description:
Descriptive Location: On acess road for construction of new bridge

Recorded By: JS
Drilling Company: Hydrometrics (Mobile B-61)
Driller: Jim Niederkorn
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Install Monitor Well
Target Aquifer: Deep Alluvial
Hole Diameter (in): 8
Total Depth Drilled (ft): 25

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	Y	2-inch, flush threaded, Sch 40, PVC	+5-25.0
Surface Casing Used?	Y	Steel Monument	+5.1-2.9
Screen/Perforations?	Y	Prepack 0.010-inch slot, Sch 40 PVC	19-24
Sand Pack?	Y	10/20 Silica Sand	19-24'
Annular Seal?	Y	Bentonite Grout	1-15'
Surface Seal?	Y	Concrete	0-1
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	XRF Analysis	0.0, 0.5', 2-3.5', and 5' interva

Static Water Level Below MP:
Date:
MP Description:
MP Height Above or Below Ground (ft):

Surface Casing Height (ft): 5.1
Riser Height (ft): 5.0
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Drilled with a Movile Drill B-61 using 4-1/4" (ID) Hollow Stem Auger; Sampled with a 2" (OD) splid spoon under a 140-lb, 30" drop, winch release safety hammer on "A" rod. Samples submitted to Hydrometrics Ruston XRF lab for metals analysis. Cuttings placed in 55 gallon drums for disposal by the Grandview Residence Council.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EV-21B-1	GRAB			0.0 - 0.5' Red brick in cuttings.
	EV-21B-2	SS	34/36/17	1.30	0.5 - 2.0'
	EV-21B-3	SS	17/9/19	1.40	2.0 - 3.5'
5	EV-21B-4	SS	4/5/9	1.20	5.0 - 6.5' Water at time of drilling. Duplicate sample at 11:00, EVT-9902-4D.
10	EV-21B-5	SS	1/1/1	1.30	10.0 - 11.5'
15	EV-21B-6	SS	1/0/1	1.30	15.0 - 16.5'
20	EV-21B-7	SS	1/5/16	1.20	20.0 - 21.5'
25					

GEOLOGICAL DESCRIPTION

0.0 - 0.5'
ASPHALT
[Road Pavement]

0.5 - 1.5'
BRICK and SAND
Red, dry, hard; Sand is slightly moist, medium dense to dense, medium to fine grained.
[Fill]

2.0 - 8.0'
Silty SAND
Black with white grains, moist to wet, medium to fine grained, medium dense to loose, uniform, some vegetative fibers and strong odors.
[Dredge Fill]

8.0 - 17.0'
SILT
Gray to brown, slightly moist, plastic, soft, abundant vegetative fibers, strong rotting vegetation odor; becomes less organic with depth.
[Surficial Deposits]

17.0 - 25.0'
SAND
Black with white grains, set, poorly sorted, fine to coarse grained, some subrounded gravel < 1/4".
[Alluvium]

GEOTECH 0030.GPJ HYD-TUC.GDT 3/16/99

HYDROMETRICS INC.

Consulting Scientists and Engineers
Helena, Montana

Monitor Well Log

Hole Name: EV-22A

Date Hole Started: 9/22/98 Date Hole Finished: 9/22/98

Client: ASARCO
Project: Everett Lowland Investigation
County: Snohomish State: Washington
Property Owner: City of Everett
Legal Description:
Descriptive Location: southwest of PUD substation

Recorded By: BT
Drilling Company: Hydrometrics
Driller: Jim Neiderkorn
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Install Monitor Well
Target Aquifer: First Water
Hole Diameter (in): 8-inch
Total Depth Drilled (ft): 20

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	Y	2-inch, flush threaded, Sch 40, PVC	+2.15-20
Surface Casing Used?	Y	steel	+2.35-2.65
Screen/Perforations?	Y	0.010-inch slot, Sch 40, PVC	15-20
Sand Pack?	Y	10-20 silica sand	12.5-20
Annular Seal?	Y	Bentonite Chips	1-12.5
Surface Seal?	Y	Concrete	0-0.5
DEVELOPMENT/SAMPLING			
Well Developed?	Y	pumping	
Water Samples Taken?	Y	common ions and metals	
Boring Samples Taken?	Y	split spoon soil samples submitted for XRF metals analysis	

Static Water Level Below MP: 18.89
Date: 9/24/98
MP Description: top of PVC casing
MP Height Above or Below Ground (ft): 2.15

Surface Casing Height (ft): 2.35
Riser Height (ft): 2.15
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: well was completed with Timco instapack well screen containing 20-40 silica sand

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9809100	GRAB			0.0 - 0.5'
	EVT-9809101	SS	8,13,14		2.0 - 3.5' 3" O.D. split spoon with 300 lb hammer
5	EVT-9809102	SS	6,4,3		5.0 - 6.5'
10	EVT-9809103	SS	1,1,1		10.0 - 11.5'
15	EVT-9809104	SS	2,4,4		15.0 - 16.5'
20	EVT-9809105	SS	1,1,5		20.0 - 21.5'
25					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 2.0'
Sand and Silt
light brown, trace gravel, gravel is subrounded up to 1.5 inches in diameter, dry.

2.0 - 5.0'
Silty Sand
dark brown, more gravel than above, trace of wood and roots, dry.

5.0 - 8.0'
Silty Sand
medium to dark brown, trace gravel.

8.0 - 15.0'
Sand
black and white (salt and pepper), medium to dark brown at 8 feet, medium to fine grained, well sorted, trace fine gravel, moist.

15.0 - 17.0'
Sand
grey, fine grain, well sorted, trace of woody organics, wet.

17.0 - 20.0'
Silt
grey, damp.

GEOTECH 0030.GPJ D-TUC.GDT 4/8/99

HYDROMETRICS INC.

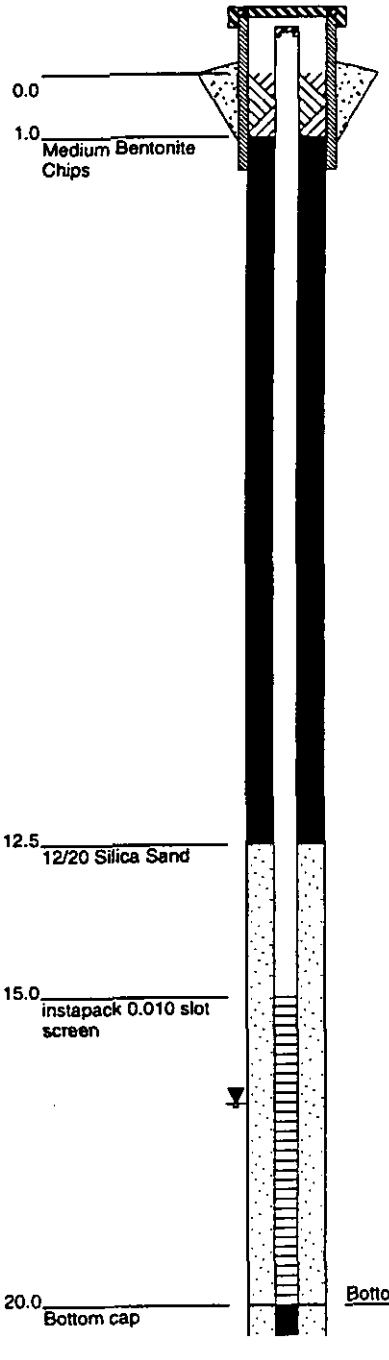
Consulting Scientists and Engineers
Helena, Montana

Monitor Well Log

Hole Name: EV-22A

Date Hole Started: 9/22/98 Date Hole Finished: 9/22/98

Well Construction Diagram



Geological Description

0.0 - 2.0'
Sand and Silt
light brown, trace gravel, gravel is subrounded up to 1.5 inches in diameter, dry.

2.0 - 5.0'
Silty Sand
dark brown, more gravel than above, trace of wood and roots, dry.

5.0 - 8.0'
Silty Sand
medium to dark brown, trace gravel.

8.0 - 15.0'
Sand
black and white (salt and pepper), medium to dark brown at 8 feet, medium to fine grained, well sorted, trace fine gravel, moist.

15.0 - 17.0'
Sand
grey, fine grain, well sorted, trace of woody organics, wet.

17.0 - 20.0'
Silt
grey, damp.

Bottom of Hole 20.0

WELL_DIAGRAM C:\2J HYD-TUC.GDT 4/8/99

HYDROMETRICS INC.
Consulting Scientists and Engineers
Helena, Montana

Monitor Well Log

Hole Name: EV-22B

Date Hole Started: 9/22/98 Date Hole Finished: 9/22/98

Client: ASARCO

Project: Everett Lowland Investigation

County: Snohomish State: Washington

Property Owner: City of Everett

Legal Description:

Descriptive Location: southwest of PUD substation

Recorded By: BT

Drilling Company: Hydrometrics

Driller: Jim Neiderkorn

Drilling Method: Hollow Stem Auger

Drilling Fluids Used: None

Purpose of Hole: Install Monitor Well

Target Aquifer: Deep Alluvial

Hole Diameter (in): 8-inch

Total Depth Drilled (ft): 35

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	Y	2-inch, flush threaded, Sch 40, PVC	+2.5-35
Surface Casing Used?	Y	steel	+2.85-2.15
Screen/Perforations?	Y	0.010-inch slot, Sch 40, PVC	30-35
Sand Pack?	Y	10-20 silica sand	27-35
Annular Seal?	Y	Bentonite Grout	1-27
Surface Seal?	Y	Concrete	0-1
DEVELOPMENT/SAMPLING			
Well Developed?	Y	pumping	
Water Samples Taken?	Y	common ions and metals	
Boring Samples Taken?	Y	split spoon soil samples submitted for XRF metals analysis	

Static Water Level Below MP: 20.02

Date: 9/24/98

MP Description: top of PVC casing

MP Height Above or Below Ground (ft): 2.5

Surface Casing Height (ft): 2.85

Riser Height (ft): 2.5

Ground Surface Elevation (ft):

MP Elevation (ft):

Remarks: well was completed with Timco instapack well screen containing 20-40 silica sand

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
25	EVT-9809106	SS	2,2,2		25.0 - 26.5' Split spoon samples were previously collected at well EV-22A to 21 feet.
30	EVT-9809107	SS	7,5,5		30.0 - 31.5'

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 2.0'
Sand and Silt
light brown, trace gravel, gravel is subrounded up to 1.5 inches in diameter, dry.

2.0 - 5.0'
Silty Sand
dark brown, more gravel than above, trace of wood and roots, dry.

5.0 - 8.0'
Silty Sand
medium to dark brown, trace gravel.

8.0 - 15.0'
Sand
black and white (salt and pepper), medium to dark brown at 8 feet, medium to fine grained, well sorted, trace fine gravel, moist.

15.0 - 17.0'
Sand
grey, fine grain, well sorted, trace of woody organics, wet.

17.0 - 27.0'
Silt
grey, with wood fragments, damp.

27.0 - 35.0'
Sand
grey, fine grain, trace gravel, wet.

GEOTECH 0030.GD-TUC.GDT 4/8/99

HYDROMETRICS INC.

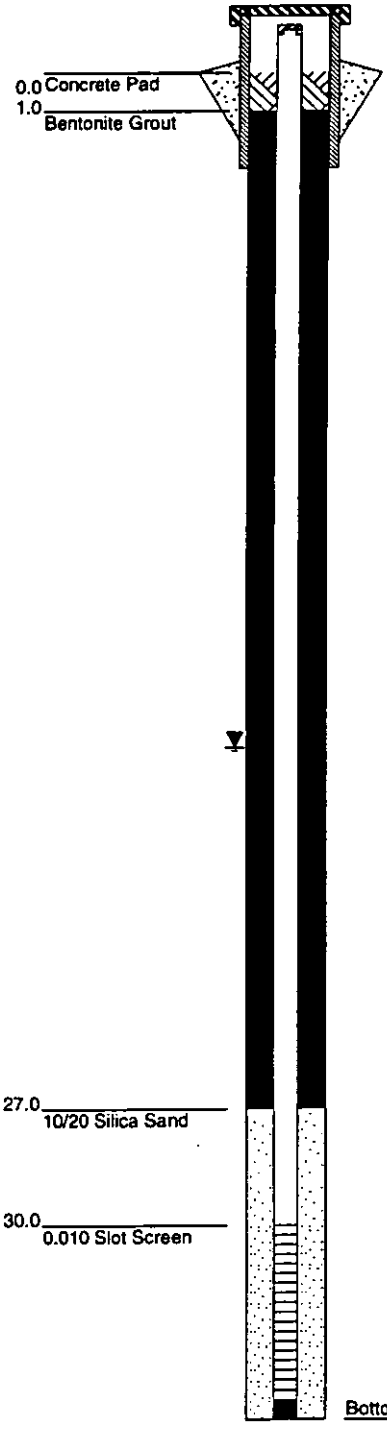
Consulting Scientists and Engineers
Helena, Montana

Monitor Well Log

Hole Name: EV-22B

Date Hole Started: 9/22/98 Date Hole Finished: 9/22/98

Well Construction Diagram



Geological Description

0.0 - 2.0'
Sand and Silt
light brown, trace gravel, gravel is subrounded up to 1.5 inches in diameter, dry.

2.0 - 5.0'
Silty Sand
dark brown, more gravel than above, trace of wood and roots, dry.

5.0 - 8.0'
Silty Sand
medium to dark brown, trace gravel.

8.0 - 15.0'
Sand
black and white (salt and pepper), medium to dark brown at 8 feet, medium to fine grained, well sorted, trace fine gravel, moist.

15.0 - 17.0'
Sand
grey, fine grain, well sorted, trace of woody organics, wet.

17.0 - 27.0'
Silt
grey, with wood fragments, damp.

27.0 - 35.0'
Sand
grey, fine grain, trace gravel, wet.

WELL_DIAGRAM 00J HYD-TUC.GDT 4/8/99

HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Monitor Well Log

Hole Name: EV-23A

Date Hole Started: 9/30/98 Date Hole Finished: 9/30/98

Client: Asarco
Project: Everett Lowland Investigation
County: Snohomish State: Washington
Property Owner: Weyerhaeuser
Legal Description: Lowland
Descriptive Location: Under Old Bridge

Recorded By: JS
Drilling Company: Hydrometrics (Mobile B-61)
Driller: Jim Niederkorn
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Install Monitor Well
Target Aquifer: Shallow Alluvial
Hole Diameter (in): 8
Total Depth Drilled (ft): 12

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	Y	2-inch, flush threaded, Sch 40, PVC	0.39'-12'
Surface Casing Used?	Y	Flush Monument	0.0'-3.0'
Screen/Perforations?	Y	Prepack 0.010-inch slot, Sch 40 PVC	7'-12'
Sand Pack?	Y	10/20 Silica Sand	5'-12'
Annular Seal?	Y	Bentonite Chips	1'-5'
Surface Seal?	Y	Concrete	0-1'
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	N		

Static Water Level Below MP: 11.14
Date: 9/30/98
MP Description: Top of PVC
MP Height Above or Below Ground (ft): -0.39

Surface Casing Height (ft): 0.00
Riser Height (ft): -0.39
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Cuttings were placed in 55-gallon drums and labeled. See EV-23B for Lithology.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
							0.0 - 0.0' See EV-23B for lithology.
5					5		
10					10		
15					15		
20					20		
25					25		

HYDROMETRICS INC.
Consulting Scientists and Engineers
Tacoma, Washington

Monitor Well Log

Hole Name: EV-23B

Date Hole Started: 9/30/98 Date Hole Finished: 9/30/98

Client: Asarco
Project: Everett Lowland Investigation
County: Snohomish State: Washington
Property Owner: Weyerhaeuser
Legal Description: Lowland
Descriptive Location: Under Old Bridge

Recorded By: JS
Drilling Company: Hydrometrics (Mobile B-61)
Driller: Jim Niederkorn
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Install Monitor Well
Target Aquifer: Alluvial
Hole Diameter (in): 8
Total Depth Drilled (ft): 30

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	Y	2-inch, flush threaded, Sch 40, PVC	0.19'-30'
Surface Casing Used?	Y	Flush Monument	0.0'-3.0'
Screen/Perforations?	Y	Prepack 0.010-inch slot, Sch 40 PVC	25'-30'
Sand Pack?	Y	10/20 Silica Sand	23'-30'
Annular Seal?	Y	Bentonite Grout	1'-23'
Surface Seal?	Y	Concrete	0-1'
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	XRF Analysis	0-0.5', 2-3.5', 5' intervals there

Static Water Level Below MP: 7.09
Date: 9/30/98
MP Description: Top of PVC
MP Height Above or Below Ground (ft): -0.19

Surface Casing Height (ft): 0.00
Riser Height (ft): -0.19
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Sampled with a 2" (OD) split spoon under a 30-inch drop, winch release, 300-pound, safety hammer under "N" rod. Cuttings placed in a 55-gallon drum and labeled for disposal. Sampled to 25' for concern for heaving sands. Sands Heaved to hig to set well. Pulled augers, set teflon plug redrilled wel and set well.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	EVT-9809-175	GRAB			0.0 - 0.5'
	EVT-9809-176	SS	1/2/1	0.20	2.0 - 3.5'
5	EVT-9809-177	SS	1/3/4	0.40	5.0 - 6.5' Duplicate Sample EVT-9809-182 @ 09:20
10	EVT-9809-183	SS	1/1/1	0.20	10.0 - 11.5'
15		SS	1/1/0	0.00	15.0 - 16.5'
	EVT-9809-178	SS	1/2/1	1.00	17.0 - 18.5' Used a 3" (ID) Split Spoon; Duplicate sample EVT-9809-179 @ 09:27
20	EVT-9809-180	SS	1/3/4	0.70	20.0 - 21.5'
25					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 8.0'
Silty SAND
Light brown to black dry to slightly moist, becomes wet at 5', medium to fine grained, some 1/4" subrounded gravel; abundant wood smells like creosote at 5'.
[Fill]

8.0 - 16.0'
SILT
Gray, moist, soft, plastic, abundant organic matter.
[Glacial Till]

16.0 - 30.0'
SAND
Gray, wet to moist, medium grained, loose; Silt at 21.3' plastic.
[Glacial Till]

Continued Next Page

GEOTECH 0030.GPJ HYD-TUC.GDT 3/16/99

HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Monitor Well Log

Hole Name: EV-23B

Date Hole Started: 9/30/98 Date Hole Finished: 9/30/98

(Continued)

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES	GRAPHICS	GEOLOGICAL DESCRIPTION
	EVT-9809-181	SS	3/3/3	0.50	25.0 - 26.5'		
30							
35							
40							
45							
50							
55							
60							
65							

GEOTECH 0030.GPJ HYD-TUC.GDT 3/16/99

HYDROMETRICS INC.

Consulting Scientists and Engineers
Tacoma, Washington

Monitor Well Log

Hole Name: MW-107D

Date Hole Started: 2/4/99 Date Hole Finished: 2/5/99

Client: Asarco
Project: Everett Lowland Investigation
County: Snohomish State: Washington
Property Owner: Port of Everett
Legal Description: Port of Everett
Descriptive Location: South foot of Sand pile; 100' E of Fence.

Recorded By: JS
Drilling Company: Hydrometrics (Mobile B-61)
Driller: Jim Niederkorn
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Install Monitor Well
Target Aquifer: Deep Alluvial
Hole Diameter (in): 8
Total Depth Drilled (ft): 25

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	Y	2-inch, flush threaded, Sch 40, PVC	5.0'-25'
Surface Casing Used?	Y	Steel Monument	+5.1-2.9
Screen/Perforations?	Y	Prepack 0.010-inch slot, Sch 40 PVC	20'-25'
Sand Pack?	Y	10/20 Silica Sand	20'-25'
Annular Seal?	Y	Bentonite Grout	1.0'-15.0'
Surface Seal?	Y	Concrete	0-1'
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	XRF Analysis	0.0, 0.5', 2-3.5', and 5' interv

Static Water Level Below MP:
Date:
MP Description:
MP Height Above or Below Ground (ft):

Surface Casing Height (ft): 5.1
Riser Height (ft): 5.0
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Drilled with a Movile Drill B-61 using 4-1/4" (ID) Hollow Stem Auger; Sampled with a 2" (OD) splid spoon under a 140-lb, 30" drop, winch release safety hammer on "A" rod. Samples submitted to Hydrometrics Ruston XRF lab for metals analysis. Cuttings placed in 55 gallon drums for disposal by the Grandview Residence Council.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	MW-107D-1	GRAB			0.0 - 0.5'
	MW-107D-2	SS	4/8/12	0.20	0.5 - 2.0'
	MW-107D-3	SS	4/10/12	0.60	2.0 - 3.5' Water ATD 3'.
5	MW-107D-4	SS	1/3/2	0.30	5.0 - 6.5'
10	MW-107D-5	SS	1/0/1	0.70	10.0 - 11.5' Duplicate sample MW-107D-5D @ 14:22
15	MW-107D-6	SS	2/2/3	0.50	15.0 - 16.5' Heaving Sand
20	MW-107D-7	SS	4/8/12	0.80	20.0 - 21.5' Heaving Sand
25					

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 2.0'
Silty SAND
Gray, slightly moist to moist, mediim to fine grained, poorly sorted, medium dense, some wood fibers and 1/4" subrounded gravel.
[Fill]

2.0 - 8.0'
SAND
Black with white grains, medium to coarsegrained, moist to wet, medium dense, subrounded to subangular grains, slight odor may be petroleum based.
[Dredge Fill]

8.0 - 13.0'
SILT
Greenish Gray, soft, plastic, slightly moist, abundant vegetative fibers, strong odor of rotting organics.
[Surficial Deposits]

13.0 - 25.0'
SAND
Black with white, angular, medium to coarse grains with some fines, wet, loose, uniform, trace wood frags.
[Alluvium]

HYDROMETRICS INC.
Consulting Scientists and Engineers
Tacoma, Washington

Monitor Well Log

Hole Name: MW-109D

Date Hole Started: 2/3/99 Date Hole Finished: 2/4/99

Client: Asarco
Project: Everett Lowland Investigation
County: Snohomish State: Washington
Property Owner: Port of Everett
Legal Description: Former Whsr site near storage shed
Descriptive Location: 100' North of Shed entrance; 10' off access road.

Recorded By: JS
Drilling Company: Hydrometrics (Mobile B-61)
Driller: Jim Niederkorn
Drilling Method: Hollow Stem Auger
Drilling Fluids Used: None
Purpose of Hole: Install Monitor Well
Target Aquifer: Deep Alluvial
Hole Diameter (in): 8
Total Depth Drilled (ft): 25

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	Y	2-inch, flush threaded, Sch 40, PVC	+5.0-25.0
Surface Casing Used?	Y	Steel Monument	+5.1-2.9
Screen/Perforations?	Y	Prepack 0.010-inch slot, Sch 40 PVC	20-25'
Sand Pack?	Y	10/20 Silica Sand	20'-25'
Annular Seal?	Y	Bentonite Grout	2.0-12.0'
Surface Seal?	Y	Concrete	0-2'
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	N		
Boring Samples Taken?	Y	XRF Analysis	0.0, 0.5', 2-3.5', and 5' interva

Static Water Level Below MP:
Date:
MP Description:
MP Height Above or Below Ground (ft):

Surface Casing Height (ft): 5.1
Riser Height (ft): 5.0
Ground Surface Elevation (ft):
MP Elevation (ft):

Remarks: Drilled with a Movile Drill B-61 using 4-1/4" (ID) Hollow Stem Auger; Sampled with a 2" (OD) splid spoon under a 140-lb, 30" drop, winch release safety hammer on "A" rod. Samples submitted to Hydrometrics Ruston XRF lab for metals analysis. Cuttings placed in 55 gallon drums for disposal by the Grandview Residence Council.

DEPTH	SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	RECOVERY (feet)	DRILLING AND GEOTECHNICAL NOTES
	MW-109D-1	GRAB			0.0 - 0.5'
	MW-109D-2	SS	3/3/3	1.50	0.5 - 2.0'
	MW-109D-3	SS	3/9/8	1.50	2.0 - 3.5'
5	MW-109D-4	SS	1/2/1	0.50	5.0 - 6.5' Water at time of drilling
10	MW-109D-5	SS	1/1/1	1.20	10.0 - 11.5'
15	MW-109D-6	SS	1/3/1	1.00	15.0 - 16.5' Duplicate sample MW-109D-6D @ 1557. Heaving Sand
20	MW-109D-7	SS	5/6/12	1.00	20.0 - 21.5' Heaving Sand
25					

GEOLOGICAL DESCRIPTION

0.0 - 2.0'
Sandy SILT w/ WOOD
Gray to brown, unsorted, slightly moist, trace gravel with abundant waste.
[Fill]

2.0 - 8.0'
SAND
Black with white grains, medium sized grains, loosely packed, moist to wet, uniform, trace subrounded 1/4" gravel, strong sulfur odor.
[Dredge Fill]

8.0 - 12.0'
SILT
Gray to brown, soft, moist, plastic, abundant vegetative fibers.
[Surficial Deposits]

12.0 - 25.0'
SAND
Black with white grains, medium sized grains,loose to medium dense, moist to wet, uniform, trace subrounded 1/4" gravel.
[Alluvium]

GEOTECH 0030.GPJ HYD-TUC.GDT 3/16/99

2006 HWA EMVD Widening

APPENDIX B

BORING LOGS

RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N-VALUE

COHESIONLESS SOILS			COHESIVE SOILS		
Density	N (blows/ft)	Approximate Relative Density(%)	Consistency	N (blows/ft)	Approximate Undrained Shear Strength (psf)
Very Loose	0 to 4	0 - 15	Very Soft	0 to 2	<250
Loose	4 to 10	15 - 35	Soft	2 to 4	250 - 500
Medium Dense	10 to 30	35 - 65	Medium Stiff	4 to 8	500 - 1000
Dense	30 to 50	65 - 85	Stiff	8 to 15	1000 - 2000
Very Dense	over 50	85 - 100	Very Stiff	15 to 30	2000 - 4000
			Hard	over 30	>4000

USCS SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS				GROUP DESCRIPTIONS
Coarse Grained Soils	Gravel and Gravelly Soils	Clean Gravel (little or no fines)	GW	Well-graded GRAVEL
	More than 50% of Coarse Fraction Retained on No. 4 Sieve		GP	Poorly-graded GRAVEL
		Gravel with Fines (appreciable amount of fines)	GM	Silty GRAVEL
			GC	Clayey GRAVEL
	Sand and Sandy Soils	Clean Sand (little or no fines)	SW	Well-graded SAND
			SP	Poorly-graded SAND
More than 50% Retained on No. 200 Sieve Size	50% or More of Coarse Fraction Passing No. 4 Sieve	Sand with Fines (appreciable amount of fines)	SM	Silty SAND
			SC	Clayey SAND
Fine Grained Soils	Silt and Clay	Liquid Limit Less than 50%	ML	SILT
			CL	Lean CLAY
			OL	Organic SILT/Organic CLAY
50% or More Passing No. 200 Sieve Size	Silt and Clay	Liquid Limit 50% or More	MH	Elastic SILT
			CH	Fat CLAY
			OH	Organic SILT/Organic CLAY
Highly Organic Soils			PT	PEAT

TEST SYMBOLS

%F	Percent Fines	
AL	Atterberg Limits:	PL = Plastic Limit LL = Liquid Limit
CBR	California Bearing Ratio	
CN	Consolidation	
DD	Dry Density (pcf)	
DS	Direct Shear	
GS	Grain Size Distribution	
K	Permeability	
MD	Moisture/Density Relationship (Proctor)	
MR	Resilient Modulus	
PID	Photoionization Device Reading	
PP	Pocket Penetrometer Approx. Compressive Strength (tsf)	
SG	Specific Gravity	
TC	Triaxial Compression	
TV	Torvane Approx. Shear Strength (tsf)	
UC	Unconfined Compression	

SAMPLE TYPE SYMBOLS

- 2.0" OD Split Spoon (SPT) (140 lb. hammer with 30 in. drop)
- Shelby Tube
- 3-1/4" OD Split Spoon with Brass Rings
- Small Bag Sample
- Large Bag (Bulk) Sample
- Core Run
- Non-standard Penetration Test (3.0" OD split spoon)

GROUNDWATER SYMBOLS

- Groundwater Level (measured at time of drilling)
- Groundwater Level (measured in well or open hole after water level stabilized)

COMPONENT DEFINITIONS

COMPONENT	SIZE RANGE
Boulders	Larger than 12 in
Cobbles	3 in to 12 in
Gravel	3 in to No 4 (4.5mm)
Coarse gravel	3 in to 3/4 in
Fine gravel	3/4 in to No 4 (4.5mm)
Sand	No. 4 (4.5 mm) to No. 200 (0.074 mm)
Coarse sand	No. 4 (4.5 mm) to No. 10 (2.0 mm)
Medium sand	No. 10 (2.0 mm) to No. 40 (0.42 mm)
Fine sand	No. 40 (0.42 mm) to No. 200 (0.074 mm)
Silt and Clay	Smaller than No. 200 (0.074mm)

COMPONENT PROPORTIONS

PROPORTION RANGE	DESCRIPTIVE TERMS
< 5%	Clean
5 - 12%	Slightly (Clayey, Silty, Sandy)
12 - 30%	Clayey, Silty, Sandy, Gravelly
30 - 50%	Very (Clayey, Silty, Sandy, Gravelly)
Components are arranged in order of increasing quantities.	

NOTES: Soil classifications presented on exploration logs are based on visual and laboratory observation. Soil descriptions are presented in the following general order:

Density/consistency, color, modifier (if any) GROUP NAME, additions to group name (if any), moisture content. Proportion, gradation, and angularity of constituents, additional comments. (GEOLOGIC INTERPRETATION)

Please refer to the discussion in the report text as well as the exploration logs for a more complete description of subsurface conditions.

MOISTURE CONTENT

DRY	Absence of moisture, dusty, dry to the touch.
MOIST	Damp but no visible water.
WET	Visible free water, usually soil is below water table.

HWA GeoSciences Inc.

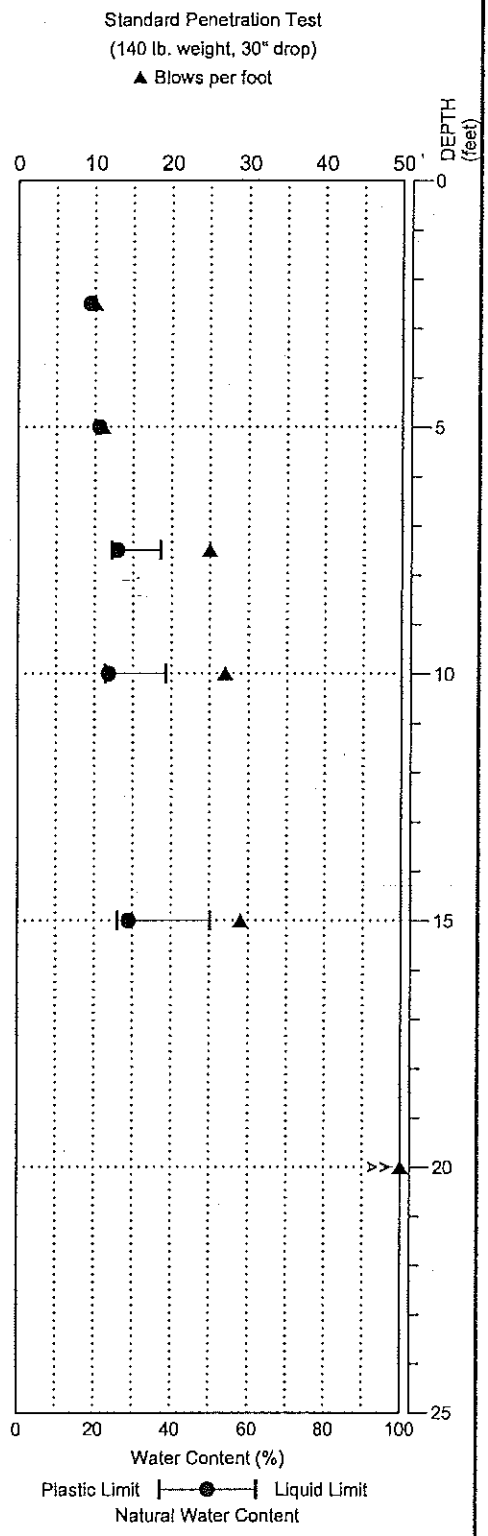
East Marine View Drive Widening & Utility Improvements
Everett, Washington

LEGEND OF TERMS AND SYMBOLS USED ON EXPLORATION LOGS

PROJECT NO.: 2004-065-22 FIGURE: B-1

DRILLING COMPANY: Holt Drilling, Inc. SURFACE ELEVATION: ± feet DATE STARTED: 5/27/2004
DRILLING METHOD: Hollow Stem Auger - Track Mounted DATE COMPLETED: 5/27/2004
SAMPLING METHOD: SPT w/ wireline hammer LOGGED BY: B. Hawkins
LOCATION: See Figure 2

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	PID (ppm)	GROUNDWATER
0			6" Portland Cement Concrete Sidewalk					
		SP	Loose/medium dense, brown, fine to medium SAND, moist. [FILL]					
		SM	Loose/medium dense, dark brown, very silty, fine to coarse SAND, moist. Rootlets noted.		S-1	2-5-5		
5		SM	Medium dense, dark brown and red brown, very silty, fine to medium SAND with occasional coarse sand, moist. Wood/black organic matter noted. Some gravel noted. Gray lenses jumbled throughout. Trace organics noted.		S-2	3-7-4		
		CL	Very stiff, yellow brown with red oxidation staining, slightly fine sandy, lean CLAY, moist. Trace coarse sand dropstones noted. [GLACIOLACUSTRINE]		S-3	5-10-15		
10		CL	Very stiff, yellow brown with vertical gray seams, slighlly fine sandy, lean CLAY, moist. Trace coarse sand and gravel dropstones. Oxidation stains noted. Trace organics noted.		S-4	3-11-16		
15		CH	Very stiff, yellow brown, fat CLAY, moist. Some fine sandy lenses with oxidation stains.		S-5	6-11-18		
20		SM	Very dense, olive gray, very silty, fine to medium SAND, moist. Coarse sand/fine gravel dropstones noted. [TILL]		S-6	9-29-27		
25			Total depth = 21.5 feet. No ground water seepage observed.					



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

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East Marine View Drive Widening & Utility Improvements
Everett, Washington

BORING: BH- 1

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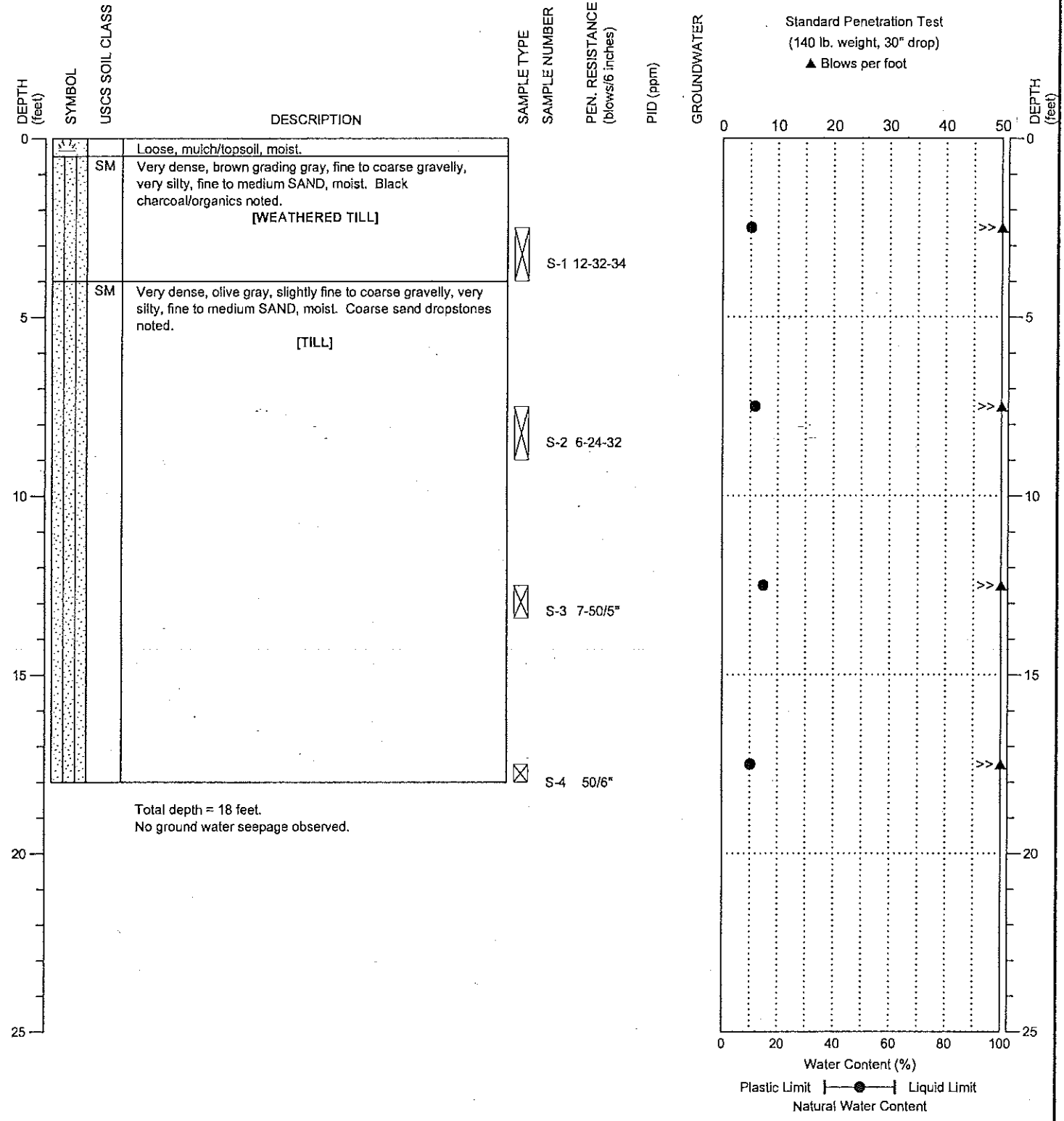
PROJECT NO.: 2004-065-22 FIGURE: B-2

BORINGE 2004065.GPJ 6/25/04

DRILLING COMPANY: Holt Drilling, Inc. SURFACE ELEVATION: ± feet DATE STARTED: 5/27/2004
DRILLING METHOD: Hollow Stem Auger - Track Mounted DATE COMPLETED: 5/27/2004
SAMPLING METHOD: SPT w/ wireline hammer LOGGED BY: B. Hawkins
LOCATION: See Figure 2



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

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East Marine View Drive Widening & Utility Improvements
Everett, Washington

BORING: BH- 2

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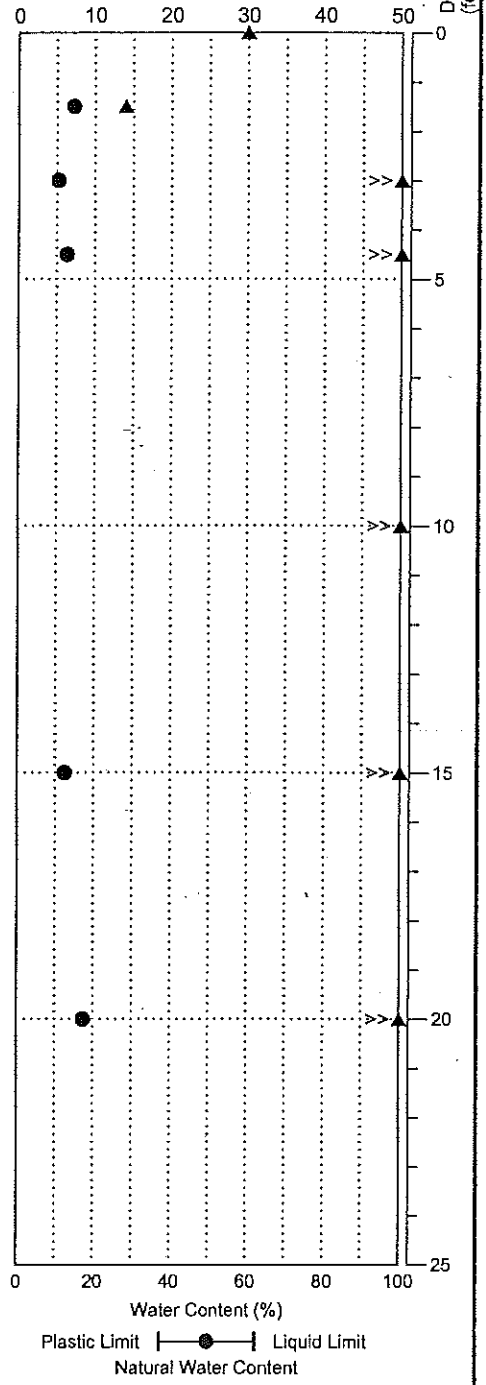
PROJECT NO.: 2004-065-22 FIGURE: B-3

BORINGE 2004065.GPJ 6/25/04

DRILLING COMPANY: Holt Drilling, Inc. SURFACE ELEVATION: ± feet DATE STARTED: 5/27/2004
DRILLING METHOD: Hollow Stem Auger - Track Mounted DATE COMPLETED: 5/27/2004
SAMPLING METHOD: SPT w/ wireline hammer LOGGED BY: B. Hawkins
LOCATION: See Figure 2

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	PID (ppm)	GROUNDWATER
0		SM	2" Hot Mix Asphalt (HMA) Pavement over Granular Base No recovery in S-1, possibly driving on large gravel. Medium dense, olive brown and gray, fine to coarse gravelly, silty, fine to medium SAND, moist. [FILL/WEATHERD TILL]		S-1	26-19-11		
					S-2	6-9-5		
		SM	Very dense, olive gray, fine to coarse gravelly, silty to very silty, fine to medium SAND, moist. [TILL]		S-3	19-40-39		
5					S-4	15-50/3"		
10			No recovery in S-5.		S-5	50/6"		
15					S-6	23-50/3"		
20			Sample S-7 very moist to wet.		S-7	29-50/6"		
25								

Standard Penetration Test
(140 lb. weight, 30" drop)
▲ Blows per foot



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

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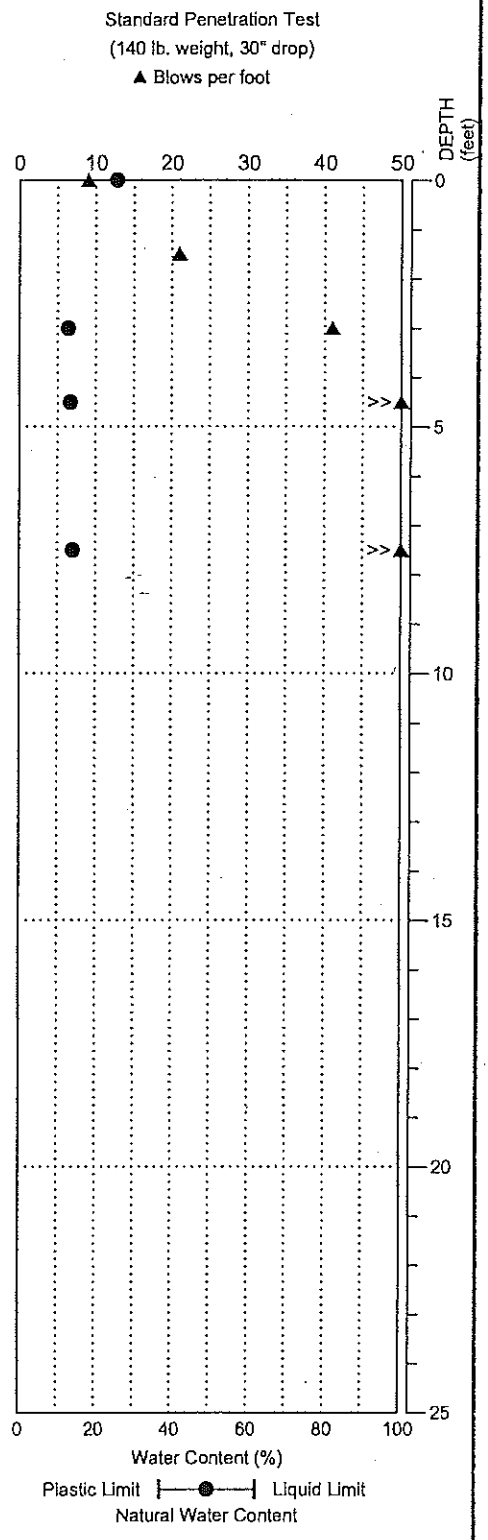
East Marine View Drive Widening & Utility Improvements
Everett, Washington

BORING:
BH- 3

PROJECT NO.: 2004-065-22 FIGURE: B-4

DRILLING COMPANY: Holt Drilling, Inc. SURFACE ELEVATION: ± feet DATE STARTED: 5/27/2004
DRILLING METHOD: Hollow Stem Auger - Track Mounted DATE COMPLETED: 5/27/2004
SAMPLING METHOD: SPT w/ wireline hammer LOGGED BY: B. Hawkins
LOCATION: See Figure 2

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	PID (ppm)	GROUNDWATER
0			6" Grass/Topsoil - Lawn area.					
		SM	Loose to medium dense, brown grading gray, fine to coarse gravelly, silty, fine to medium SAND, moist. Rootlets noted. [WEATHERED TILL]		S-1	2-2-7		
			No recovery in S-2.		S-2	1-4-17		
		ML	Hard, olive brown, fine to coarse gravelly, fine to medium sandy, SILT, moist. [TILL]		S-3	1-17-24		
5					S-4	1-26-40		
		SM	Very dense, brown grading red brown, very silty, fine to medium SAND, moist. [TILL]		S-5	50/6"		
10			Total depth = 8 feet. No ground water seepage observed.					
15								
20								
25								



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

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East Marine View Drive Widening & Utility Improvements
Everett, Washington

BORING:
BH- 4

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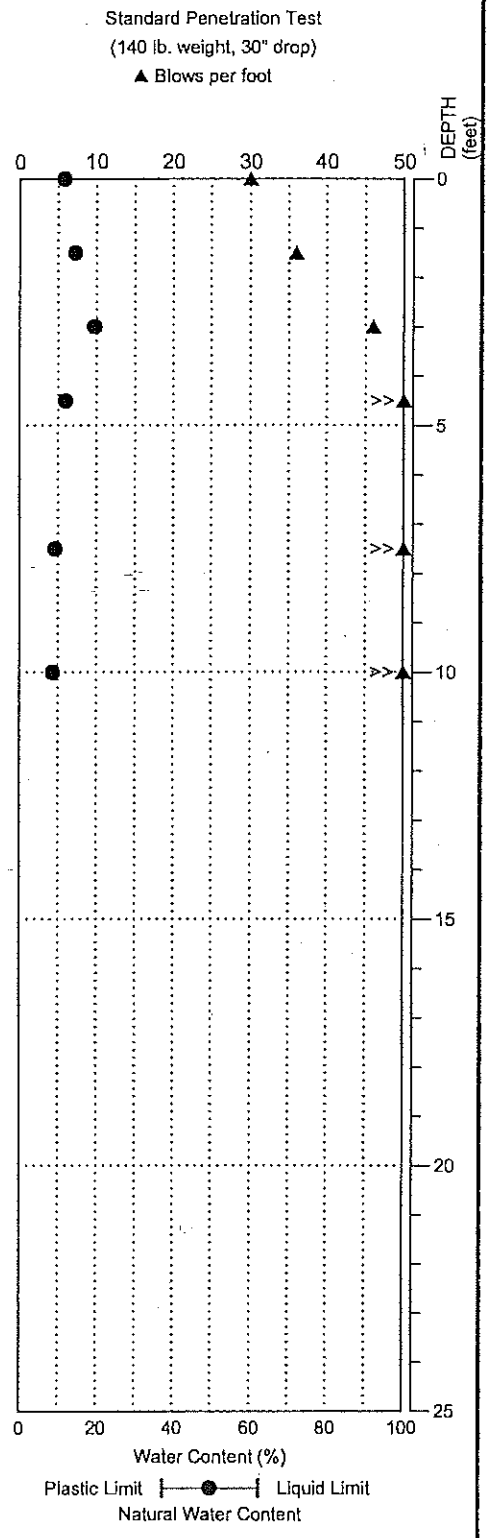
PROJECT NO.: 2004-065-22 FIGURE: B-5

BORINGE 2004065.GPJ 6/25/04

DRILLING COMPANY: Holt Drilling, Inc. SURFACE ELEVATION: ± feet DATE STARTED: 5/28/2004
DRILLING METHOD: Hollow Stem Auger - Track Mounted DATE COMPLETED: 5/28/2004
SAMPLING METHOD: SPT w/ wireline hammer LOGGED BY: B. Hawkins
LOCATION: See Figure 2

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	PID (ppm)	GROUNDWATER
0			4" Grass/Topsoil - Lawn area.					
		SM	Dense, olive gray, fine to coarse gravelly, silty, fine to medium SAND, moist to wet. **[WEATHERED TILL]**		S-1	6-9-21		
					S-2	1-20-16		
		ML	Hard, olive brown, fine to medium sandy, SILT, moist. Coarse sand dropstones noted. 1-inch medium to coarse sand lens in middle of Sample S-4. **[TILL]**		S-3	6-18-28		
5					S-4	36-50/3"		
			Drilling cuttings wet from approximately 6 to 7 feet below ground surface.					
		SM	Very dense, olive gray, slightly fine gravelly, very silty, fine to medium SAND, moist.		S-5	16-50/3"		
10					S-6	50/3"		
15								
20								
25								

Total depth = 10.25 feet.
Cuttings wet during drilling interval from approximately 6 to 7 feet. After removing auger flights from hole, bubbling water was observed in hole at depth of approximately 1.5 feet. Several hours later, water had come to surface, trickling out of hole. City of Everett to examine hole to determine cause of water.



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

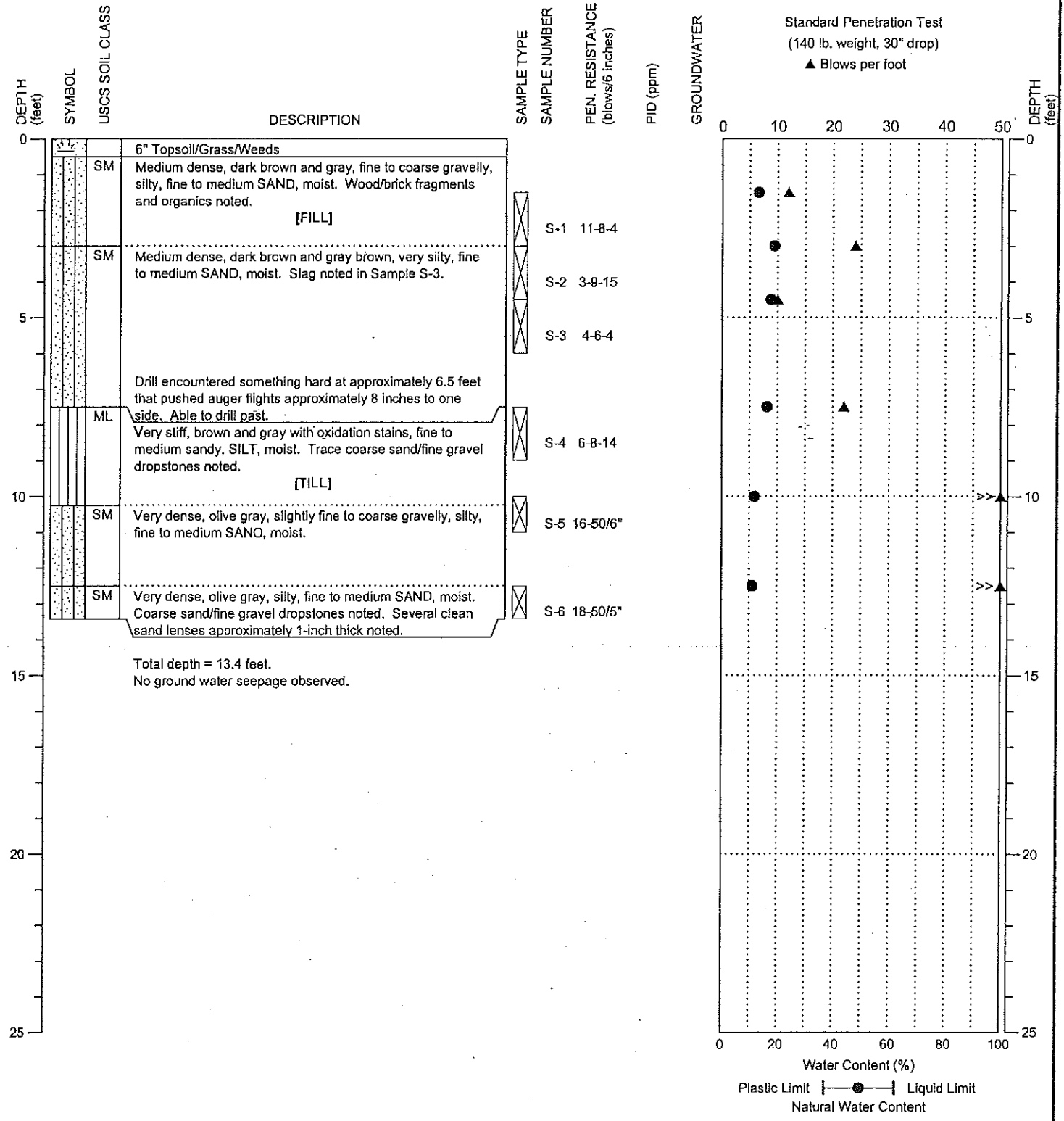
HWA GeoSciences Inc.

East Marine View Drive Widening & Utility Improvements
Everett, Washington

BORING: BH- 5

PROJECT NO.: 2004-065-22 FIGURE: B-6

DRILLING COMPANY: Holt Drilling, Inc. SURFACE ELEVATION: ± feet DATE STARTED: 5/28/2004
DRILLING METHOD: Hollow Stem Auger - Track Mounted DATE COMPLETED: 5/28/2004
SAMPLING METHOD: SPT w/ wireline hammer LOGGED BY: B. Hawkins
LOCATION: See Figure 2



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GeoSciences Inc.

East Marine View Drive Widening & Utility Improvements
Everett, Washington

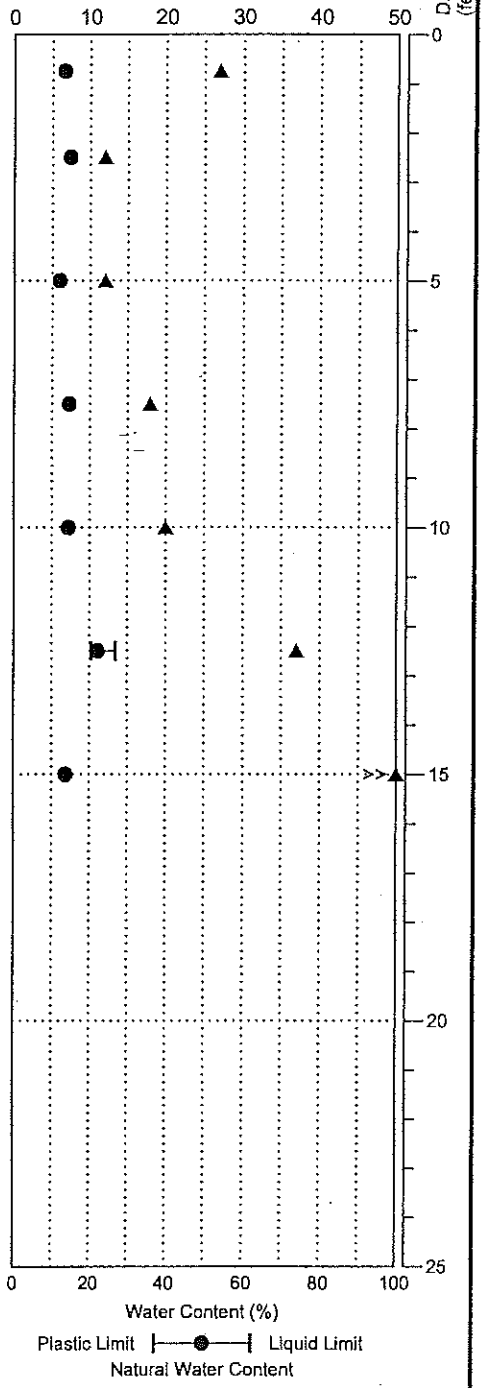
BORING:
BH- 6

PROJECT NO.: 2004-065-22 FIGURE: B-7

DRILLING COMPANY: Holt Drilling, Inc. SURFACE ELEVATION: ± feet DATE STARTED: 5/28/2004
DRILLING METHOD: Hollow Stem Auger - Track Mounted DATE COMPLETED: 5/28/2004
SAMPLING METHOD: SPT w/ wireline hammer LOGGED BY: B. Hawkins
LOCATION: See Figure 2

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	PID (ppm)	GROUNDWATER
0			8" Hot Mix Asphalt (HMA) Pavement					
		SM	Medium dense, olive brown to dark brown, fine to coarse gravelly, silty, fine to medium SAND, moist. Rootlets/organics noted. Orange brick fragments noted. [FILL]		S-1	6-18-9		
					S-2	4-5-7		
5		SM	Medium dense, dark brown and gray, slightly fine to coarse gravelly, very silty, fine to medium SAND, moist.		S-3	5-7-5		
			Sample S-4 becoming wet.		S-4	1-1-17		
10		SM	Medium dense, dark brown/black, organic silty SAND, moist. Burnt wood debris/abundant organics.		S-5	14-10-10		
		SM	Medium dense, red brown, fine to coarse gravelly, silty, fine to medium SAND, moist. Wood/organics noted.					
		CL ML	Hard, mottled brown and gray, fine sandy, silty CLAY, moist. Oxidation stains noted. [GLACIDLACUSTRINE]		S-6	12-14-23		
15		SM	Very dense, brown gray, fine to coarse gravelly, silty, fine to medium SAND, moist. Coarse sand dropstones noted. Oxidation stains noted. [TILL]		S-7	8-25-42		
20			Total depth = 16.5 feet. No ground water seepage observed.					
25								

Standard Penetration Test
(140 lb. weight, 30" drop)
▲ Blows per foot



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GeoSciences Inc.

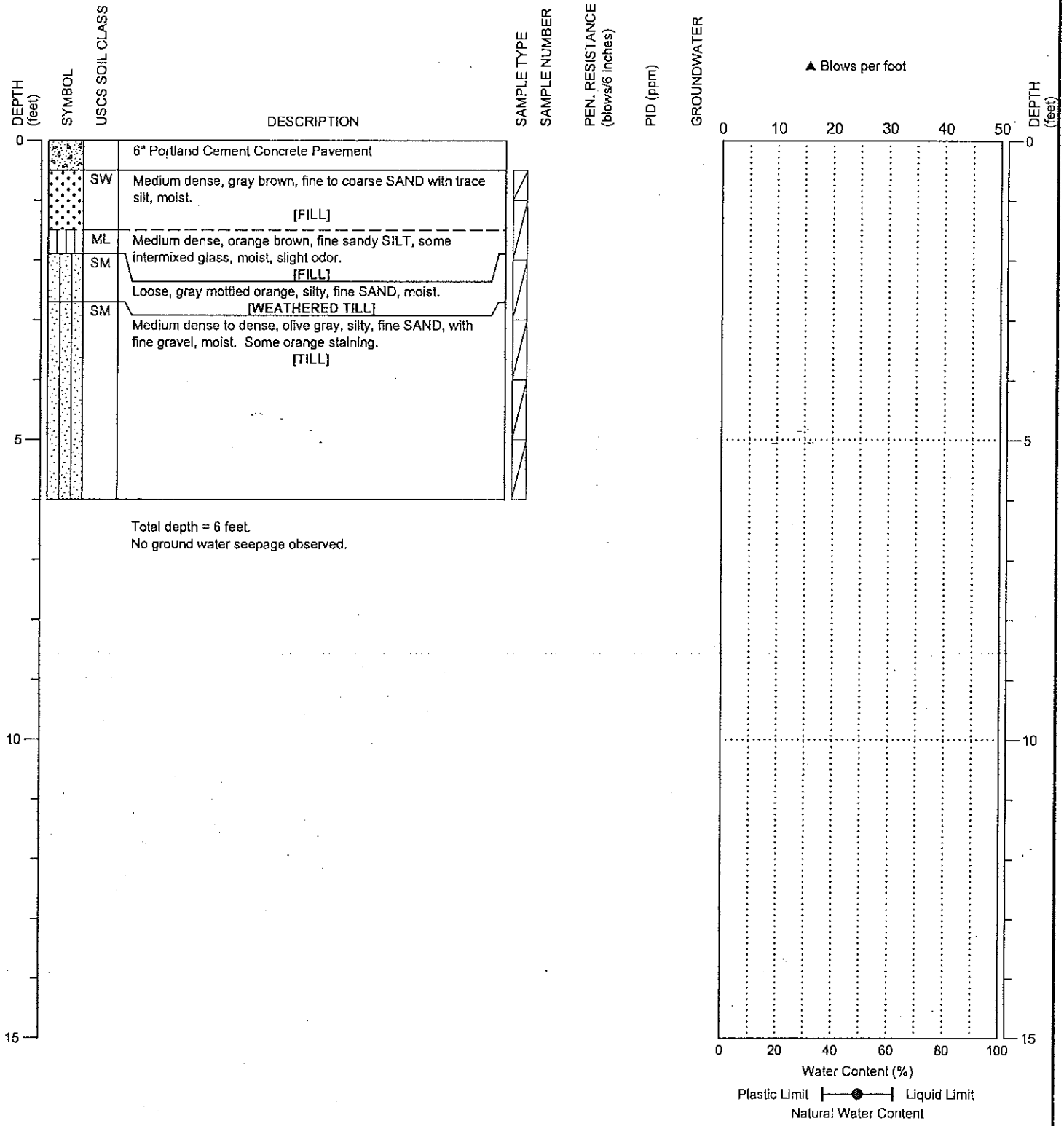
East Marine View Drive Widening & Utility Improvements
Everett, Washington

BORING:
BH- 7

PROJECT NO.: 2004-065-22 FIGURE: B-8

DRILLING COMPANY: Geo-Tech Explorations, Inc. SURFACE ELEVATION: ± feet
DRILLING METHOD: Truck mounted Geoprobe 6600
SAMPLING METHOD: 5-foot continuous core w/ PETG liner
LOCATION: See Figure 2

DATE STARTED: 5/26/2004
DATE COMPLETED: 5/26/2004
LOGGED BY: B. Robinson



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GeoSciences Inc.

East Marine View Drive Widening & Utility Improvements
Everett, Washington

BORING: SP-01

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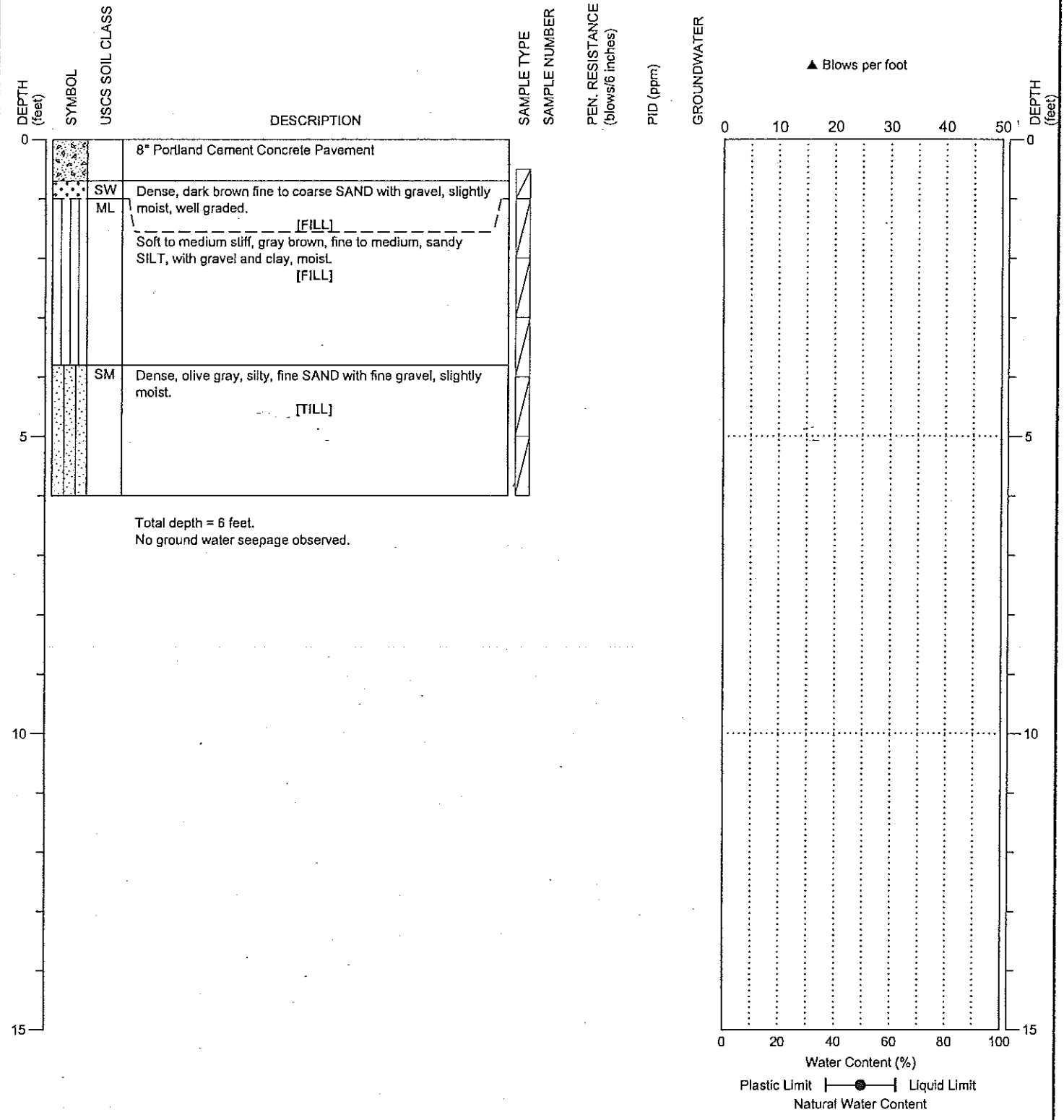
PROJECT NO.: 2004-065-22 FIGURE: B-9

BORINGE 2004065.GPJ 6/25/04

DRILLING COMPANY: Geo-Tech Explorations, Inc. SURFACE ELEVATION: ± feet
DRILLING METHOD: Truck mounted Geoprobe 6600
SAMPLING METHOD: 5-foot continuous core w/ PETG liner
LOCATION: See Figure 2

DATE STARTED: 5/26/2004
DATE COMPLETED: 5/26/2004
LOGGED BY: B. Robinson



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GeoSciences Inc.

East Marine View Drive Widening & Utility Improvements
Everett, Washington

BORING: SP-02

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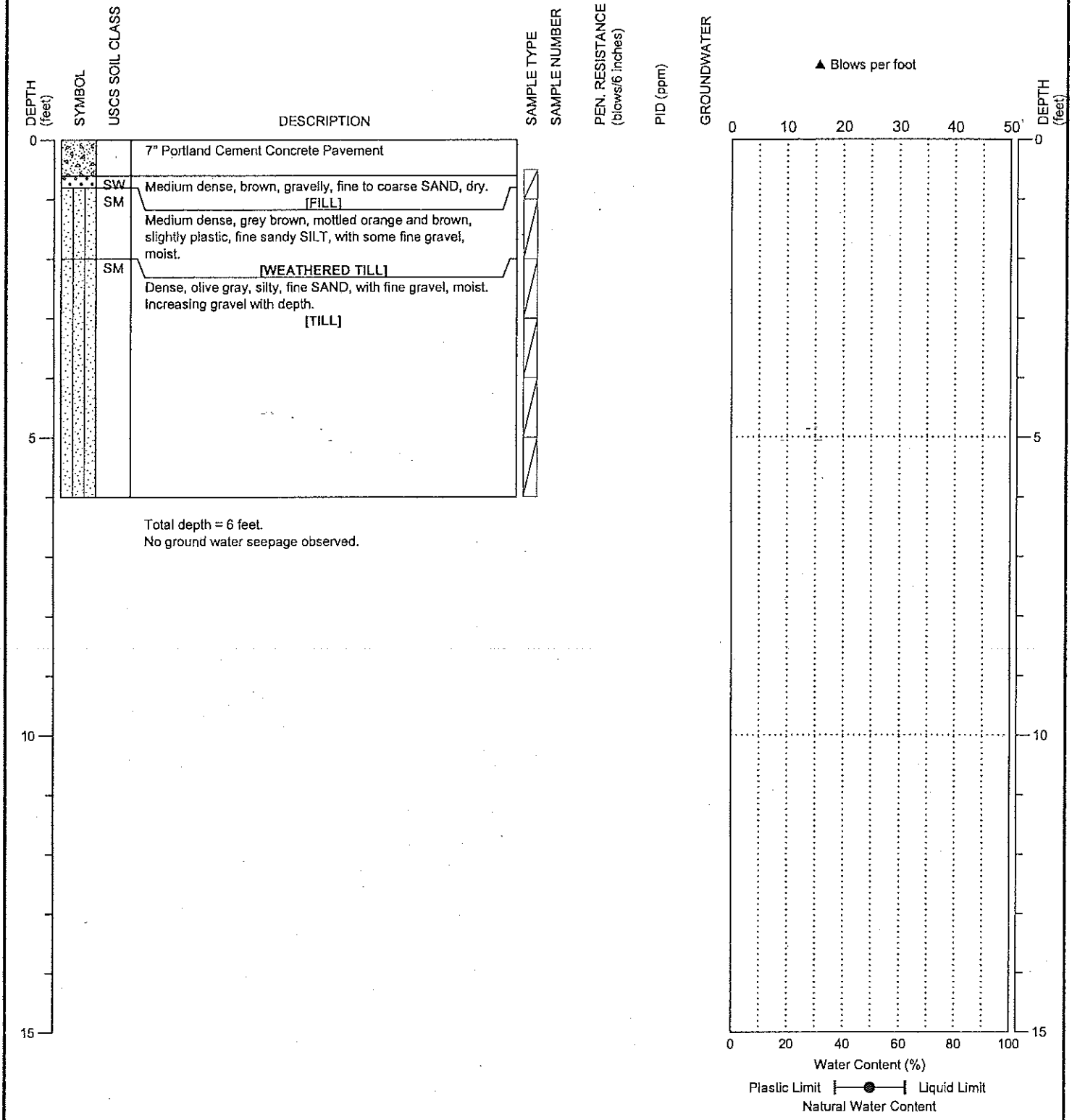
PROJECT NO.: 2004-065-22 FIGURE: B-10

BORINGE 2004065.GPJ 6/25/04

DRILLING COMPANY: Geo-Tech Explorations, Inc. SURFACE ELEVATION: ± feet
DRILLING METHOD: Truck mounted Geoprobe 6600
SAMPLING METHOD: 5-foot continuous core w/ PETG liner
LOCATION: See Figure 2

DATE STARTED: 5/26/2004
DATE COMPLETED: 5/26/2004
LOGGED BY: B. Robinson



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

East Marine View Drive Widening & Utility Improvements
Everett, Washington

BORING: SP-03

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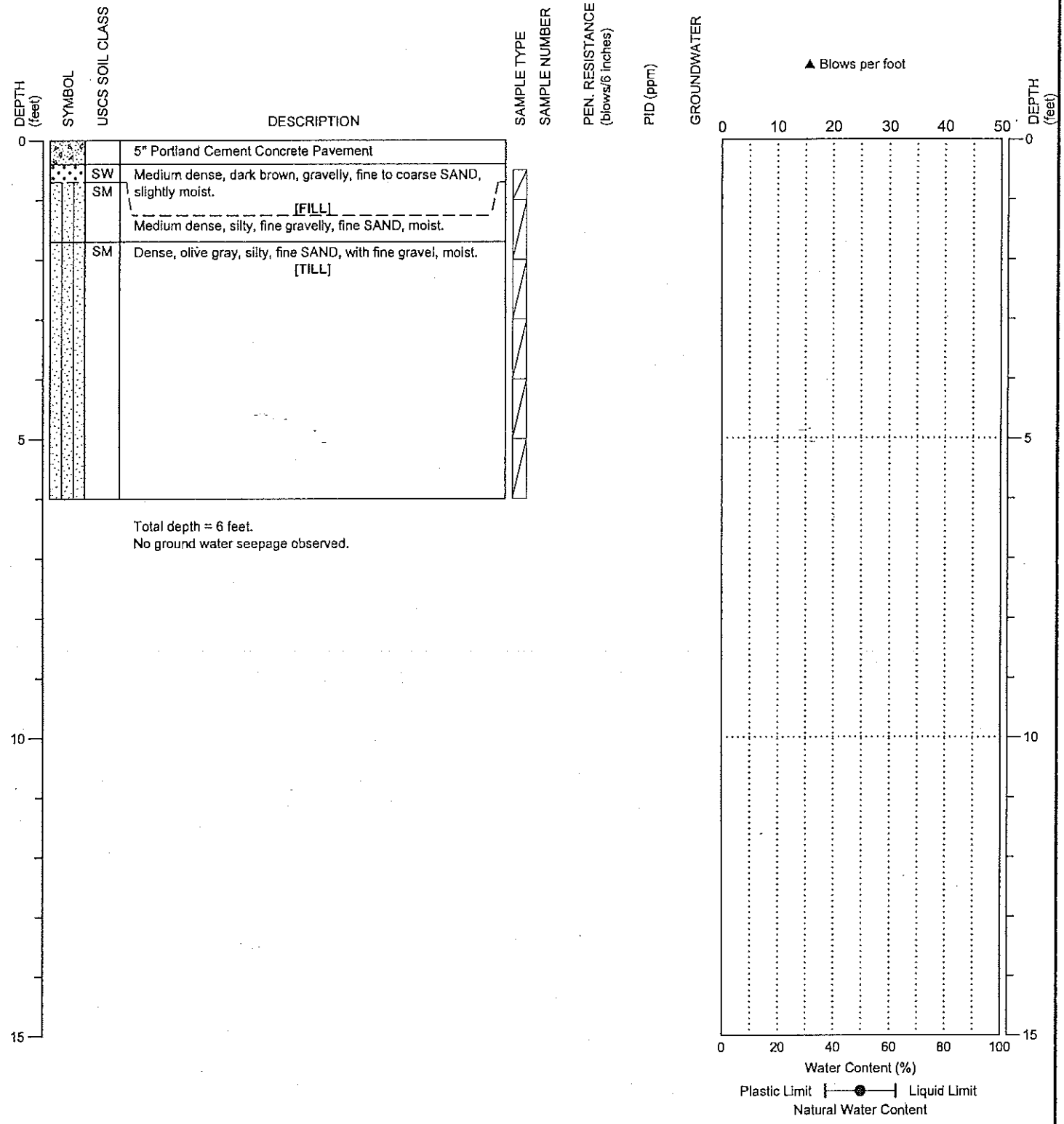
PROJECT NO.: 2004-065-22 FIGURE: B-11

BORINGE 2004065.GPJ 6/25/04

DRILLING COMPANY: Geo-Tech Explorations, Inc. SURFACE ELEVATION: ± feet
DRILLING METHOD: Truck mounted Geoprobe 6600
SAMPLING METHOD: 5-foot continuous core w/ PETG liner
LOCATION: See Figure 2

DATE STARTED: 5/26/2004
DATE COMPLETED: 5/26/2004
LOGGED BY: B. Robinson



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GeoSciences Inc.

East Marine View Drive Widening & Utility Improvements
Everett, Washington

BORING: SP-04

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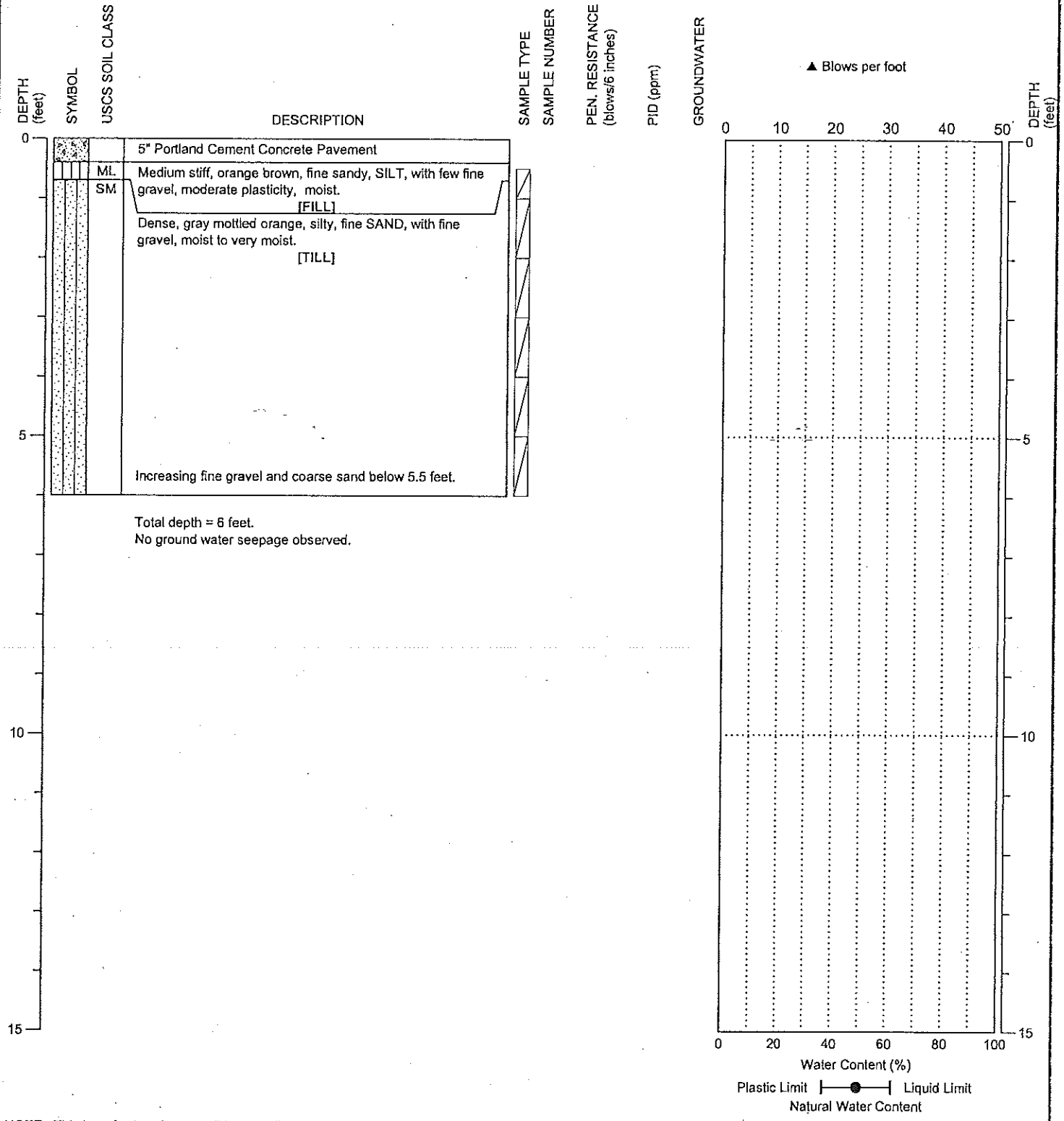
PROJECT NO.: 2004-065-22 FIGURE: B-12

BORINGE 2004065.GPJ 6/25/04

DRILLING COMPANY: Geo-Tech Explorations, Inc. SURFACE ELEVATION: ± feet
DRILLING METHOD: Truck mounted Geoprobe 6600
SAMPLING METHOD: 5-foot continuous core w/ PETG liner
LOCATION: See Figure 2

DATE STARTED: 5/26/2004
DATE COMPLETED: 5/26/2004
LOGGED BY: B. Robinson



Total depth = 6 feet.
No ground water seepage observed.

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GeoSciences Inc.

East Marine View Drive Widening & Utility Improvements
Everett, Washington

BORING: SP-05

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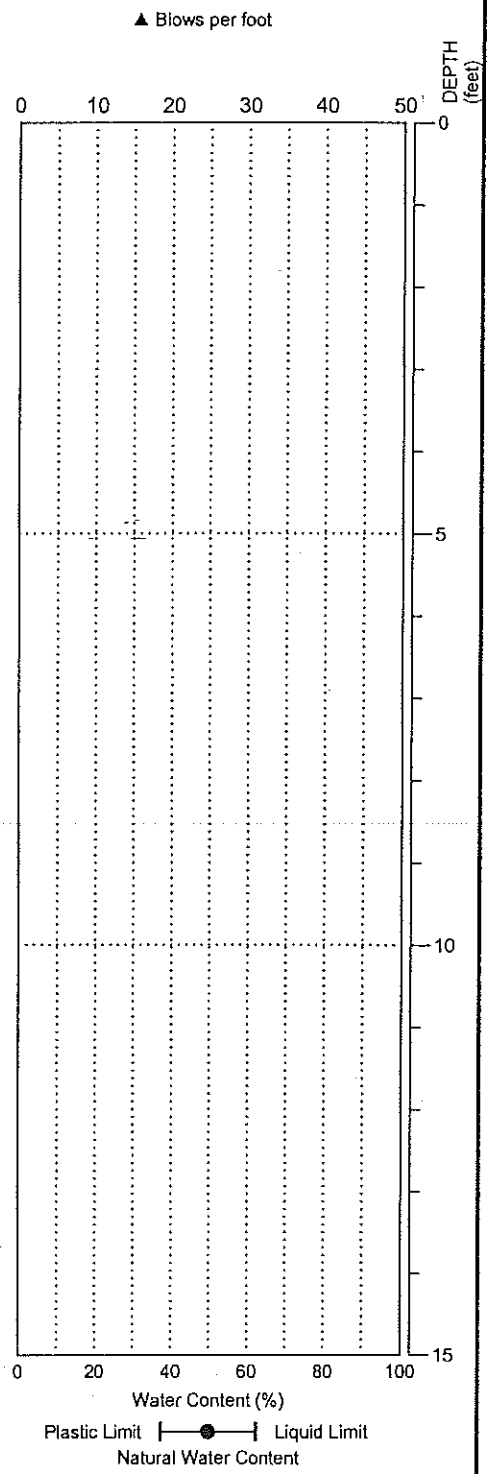
PROJECT NO.: 2004-065-22 FIGURE: B-13

DRILLING COMPANY: Geo-Tech Explorations, Inc. SURFACE ELEVATION: ± feet
DRILLING METHOD: Truck mounted Geoprobe 6600
SAMPLING METHOD: 5-foot continuous core w/ PETG liner
LOCATION: See Figure 2

DATE STARTED: 5/26/2004
DATE COMPLETED: 5/26/2004
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION
0			4" Portland Cement Concrete Pavement
		SM	Loose to medium dense, light brown and gray, silty, fine SAND, slightly moist. [FILL]
		SM	Dense, olive gray, silty, fine SAND, with some coarse sand and fine gravel, moist to very moist. [TILL]
5			Becoming very dense below 4 feet.
10			
15			

SAMPLE TYPE
SAMPLE NUMBER
PEN. RESISTANCE (blows/6 inches)
PID (ppm)
GROUNDWATER



Total depth = 6 feet.
No ground water seepage observed.

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GeoSciences Inc.

East Marine View Drive Widening & Utility Improvements
Everett, Washington

BORING: SP-06

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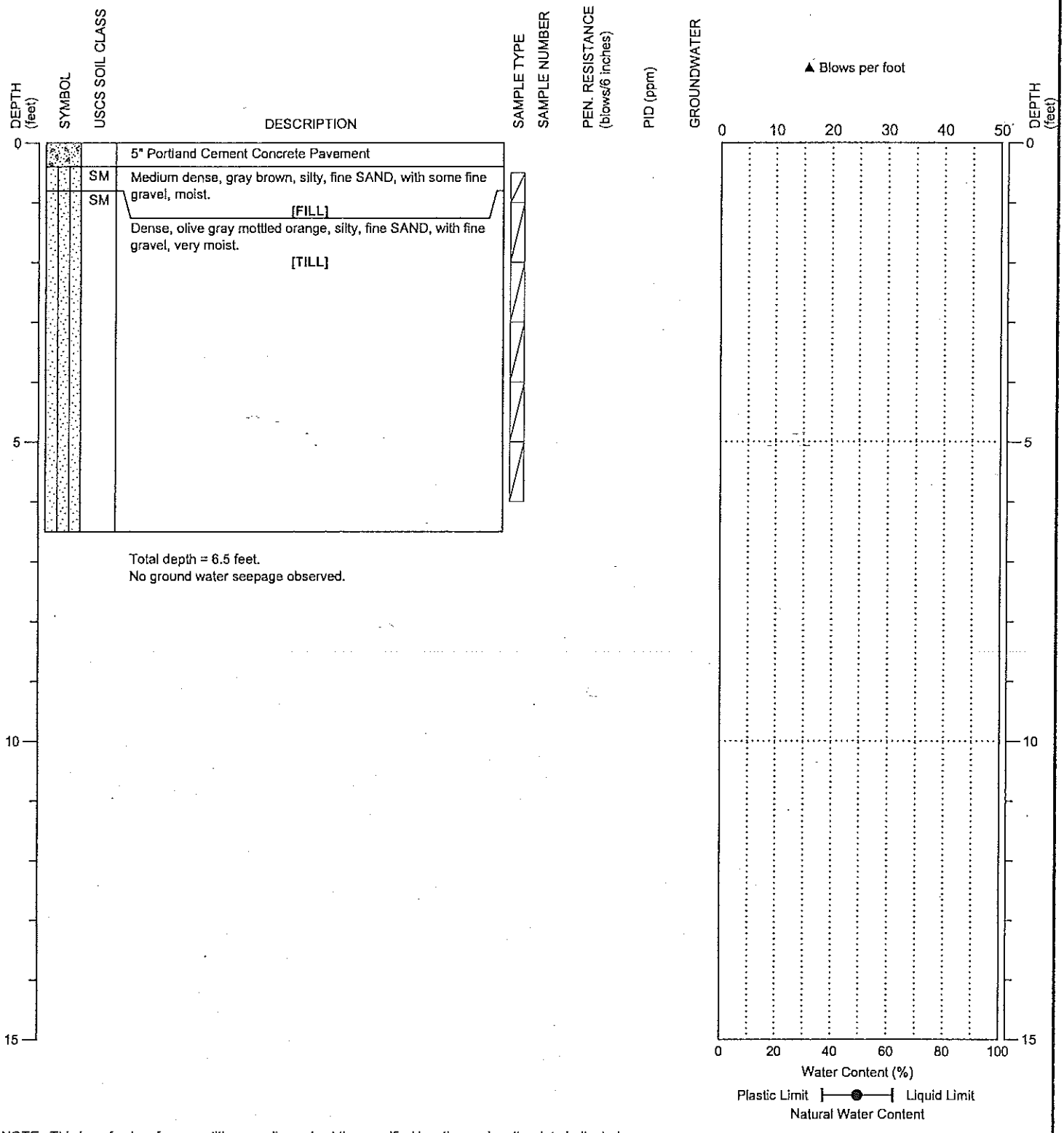
PROJECT NO.: 2004-065-22 FIGURE: B-14

DRILLING COMPANY: Geo-Tech Explorations, Inc. SURFACE ELEVATION: ± feet
DRILLING METHOD: Truck mounted Geoprobe 6600
SAMPLING METHOD: 5-foot continuous core w/ PETG liner
LOCATION: See Figure 2

DATE STARTED: 5/26/2004
DATE COMPLETED: 5/26/2004
LOGGED BY: B. Robinson



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

East Marine View Drive Widening & Utility Improvements
Everett, Washington

BORING: SP-07

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PROJECT NO.: 2004-065-22 FIGURE: B-15

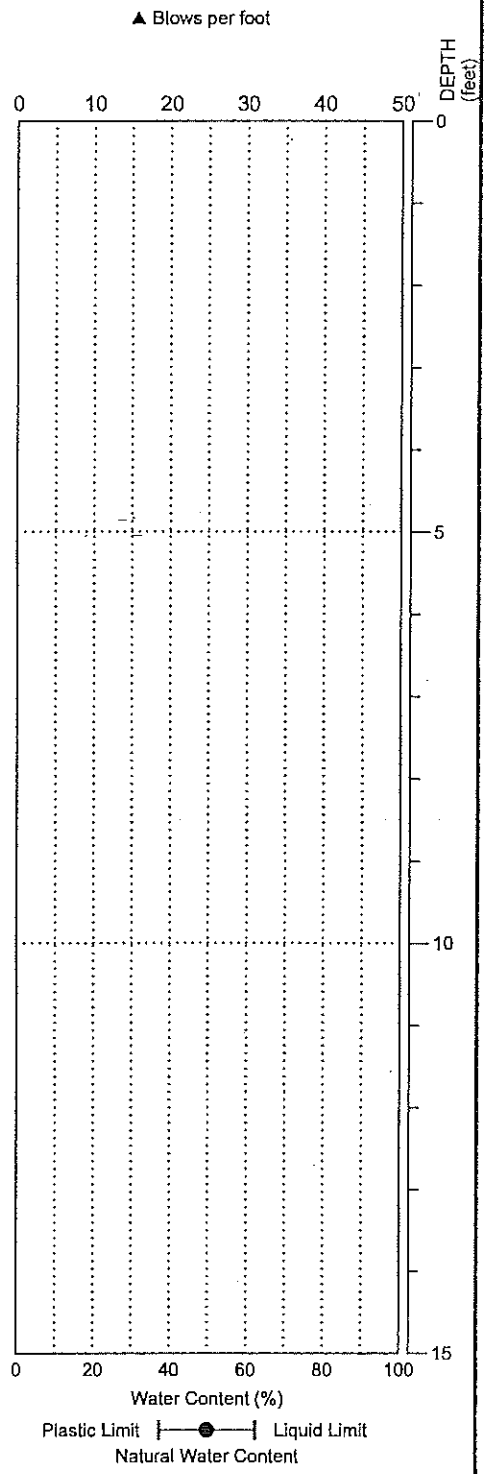
BORINGE 2004065.GPJ 6/25/04

DRILLING COMPANY: Geo-Tech Explorations, Inc. SURFACE ELEVATION: ± feet
DRILLING METHOD: Truck mounted Geoprobe 6600
SAMPLING METHOD: 5-foot continuous core w/ PETG liner
LOCATION: See Figure 2

DATE STARTED: 5/26/2004
DATE COMPLETED: 5/26/2004
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION
0			5" Portland Cement Concrete Pavement
		ML	Medium stiff, brown and yellow fine sandy, SILT, with gravel, moist. [FILL]
		SM	Dense, olive gray, mottled orange and brown, silty, fine SAND, with scattered fine to medium gravel, moist. [TILL]
5			Becoming very dense below 6 feet. Grading to silty fine to coarse sand with fine to medium gravel
10			Total depth = 9 feet. No ground water seepage observed.
15			

SAMPLE TYPE
SAMPLE NUMBER
PEN. RESISTANCE (blows/6 inches)
PID (ppm)
GROUNDWATER



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

East Marine View Drive Widening & Utility Improvements
Everett, Washington

BORING: SP-08

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PROJECT NO.: 2004-065-22 FIGURE: B-16

BORINGE 2004065.GPJ 6/25/04

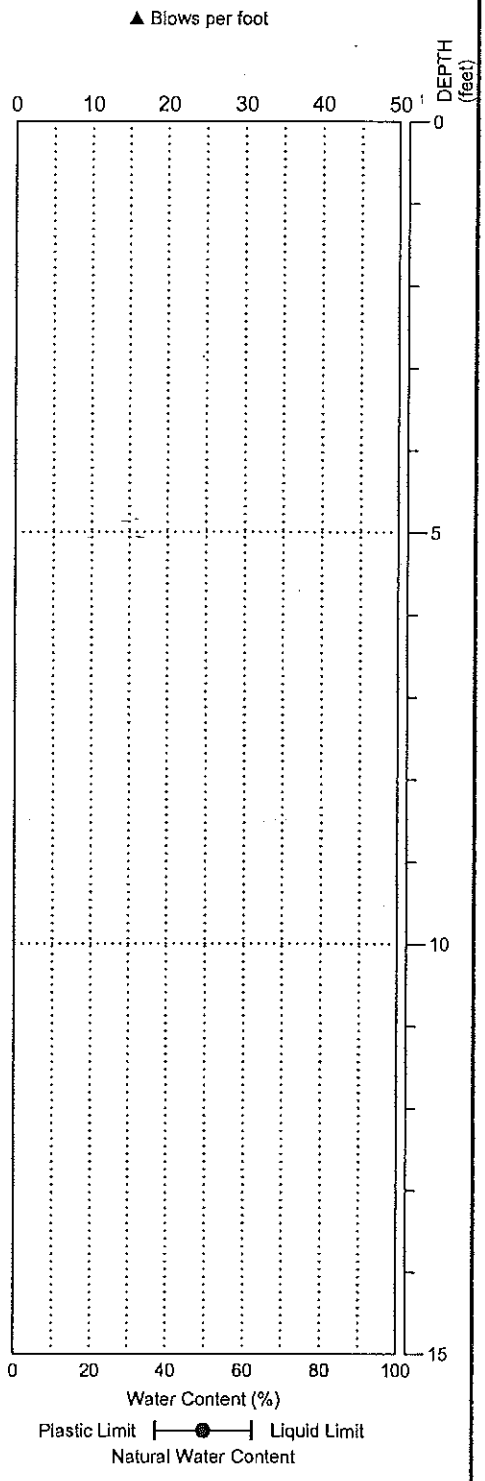
DRILLING COMPANY: Geo-Tech Explorations, Inc. SURFACE ELEVATION: ± feet
DRILLING METHOD: Truck mounted Geoprobe 6600
SAMPLING METHOD: 5-foot continuous core w/ PETG liner
LOCATION: See Figure 2

DATE STARTED: 5/26/2004
DATE COMPLETED: 5/26/2004
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION
0			5" Portland Cement Concrete Sidewalk
		SW	Medium dense, gray brown, fine gravelly, fine to coarse SAND, moist, well graded. [FILL]
5		SM	Loose, olive gray, silty, fine SAND, with fine gravel, moist. [SEWER TRENCH BACKFILL]
10			
15			

SAMPLE TYPE
SAMPLE NUMBER
PEN. RESISTANCE (blows/6 inches)
PID (ppm)
GROUNDWATER

Total depth = 6 feet.
No ground water seepage observed.



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

East Marine View Drive Widening & Utility Improvements
Everett, Washington

BORING: SP-09

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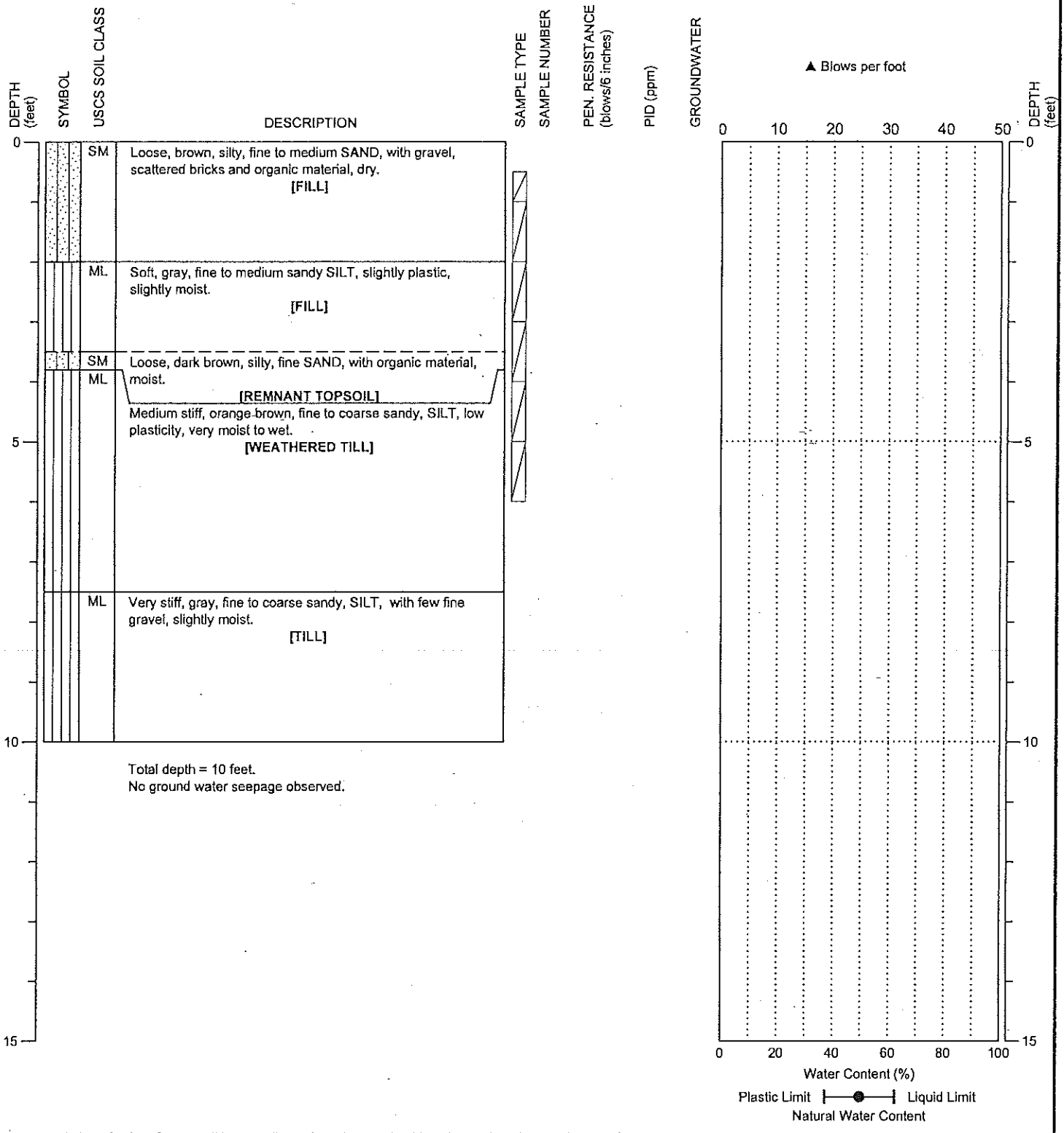
PROJECT NO.: 2004-065-22 FIGURE: B-17

BORINGE 2004065.GPJ 6/25/04

DRILLING COMPANY: Geo-Tech Explorations, Inc. SURFACE ELEVATION: ± feet
DRILLING METHOD: Truck mounted Geoprobe 6600
SAMPLING METHOD: 5-foot continuous core w/ PETG liner
LOCATION: See Figure 2

DATE STARTED: 5/26/2004
DATE COMPLETED: 5/26/2004
LOGGED BY: B. Robinson



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HWA GeoSciences Inc.

East Marine View Drive Widening & Utility Improvements
Everett, Washington

BORING: SP-10

PROJECT NO.: 2004-065-22 FIGURE: B-18

BORINGE 2004065.GPJ 6/25/04

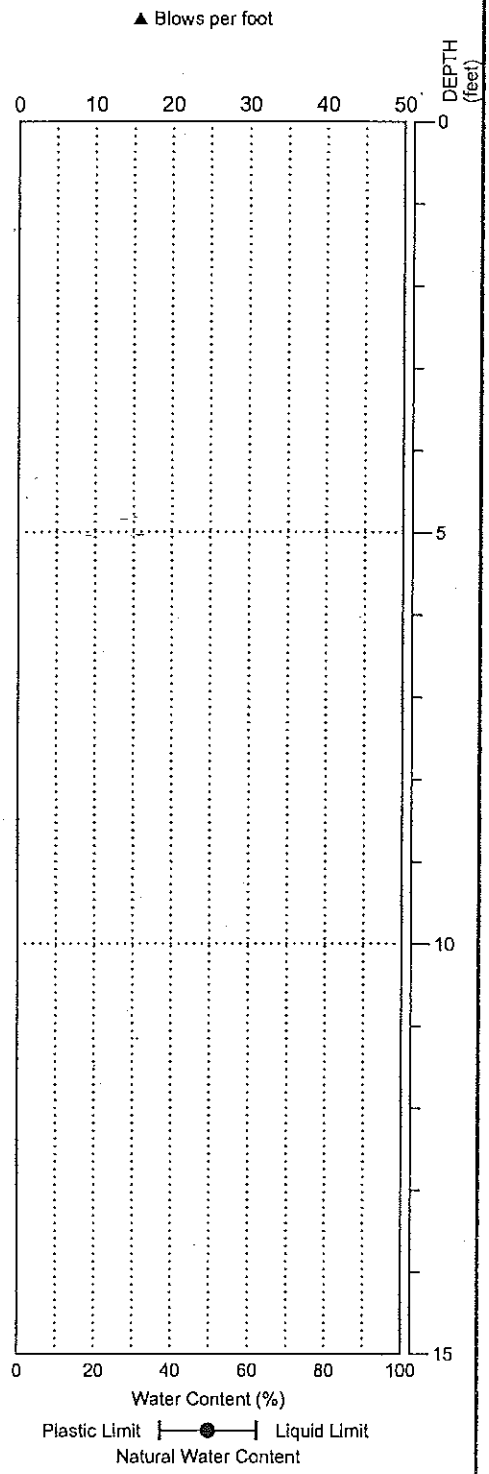
DRILLING COMPANY: Geo-Tech Explorations, Inc. SURFACE ELEVATION: ± feet
DRILLING METHOD: Truck mounted Geoprobe 6600
SAMPLING METHOD: 5-foot continuous core w/ PETG liner
LOCATION: See Figure 2

DATE STARTED: 5/26/2004
DATE COMPLETED: 5/26/2004
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION
0			5" Portland Cement Concrete Sidewalk
		SM	Loose, brown gray, gravelly silty, fine SAND, wet. [FILL]
		SM	Loose to medium dense, light brown mottled yellow orange, silty gravelly, fine SAND, moist. [WEATHERED TILL]
5		SM	Dense, olive gray mottled orange, silty gravelly, fine SAND, slightly moist. [TILL]
10			
15			

SAMPLE TYPE
SAMPLE NUMBER
PEN. RESISTANCE (blows/6 inches)
PID (ppm)
GROUNDWATER

Total depth = 6 feet.
No ground water seepage observed.



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HWA GEOSCIENCES INC.

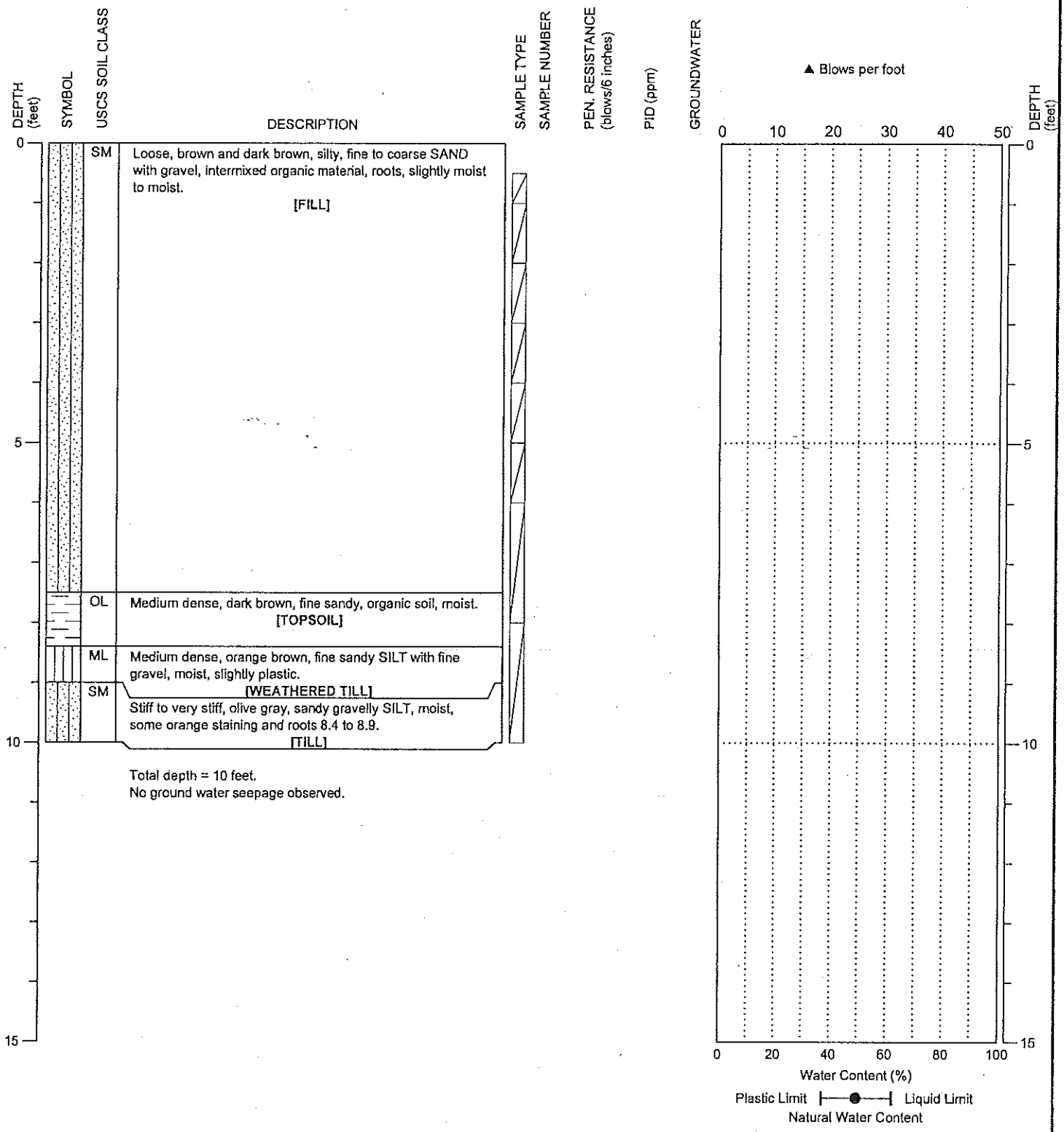
East Marine View Drive Widening & Utility Improvements
Everett, Washington

BORING: SP-11

PROJECT NO.: 2004-065-22 FIGURE: B-19

DRILLING COMPANY: Geo-Tech Explorations, Inc. SURFACE ELEVATION: ± feet
DRILLING METHOD: Truck mounted Geoprobe 6600
SAMPLING METHOD: 5-foot continuous core w/ PETG liner
LOCATION: See Figure 2

DATE STARTED: 5/26/2004
DATE COMPLETED: 5/26/2004
LOGGED BY: B. Robinson



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GeoSciences Inc.

East Marine View Drive Widening & Utility Improvements
Everett, Washington

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PROJECT NO.: 2004-065-22 FIGURE: B-20

BORINGE 2004065.GPJ 6/25/04

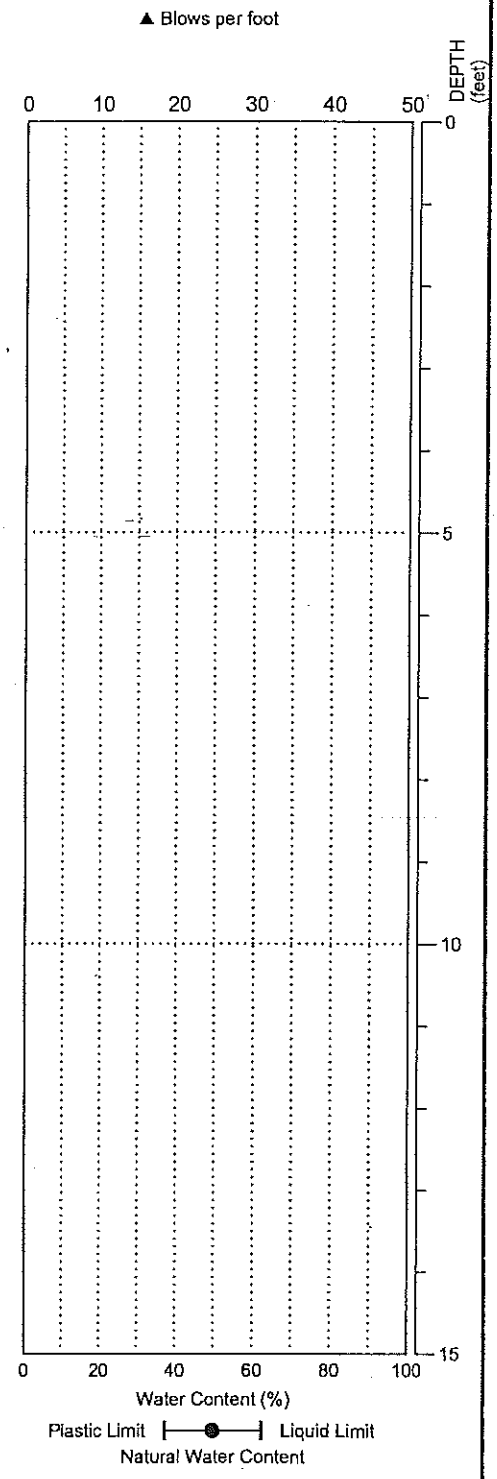
DRILLING COMPANY: Geo-Tech Explorations, Inc. SURFACE ELEVATION: ± feet
DRILLING METHOD: Truck mounted Geoprobe 6600
SAMPLING METHOD: 5-foot continuous core w/ PETG liner
LOCATION: See Figure 2

DATE STARTED: 5/28/2004
DATE COMPLETED: 5/28/2004
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION
0			7" Portland Cement Concrete Pavement
		SM	Medium dense, yellow brown, silty, fine SAND with trace gravel, moist.
		SM	[WEATHERED TILL] Dense, olive gray, silty fine SAND, with few fine gravel, few clean fine sand layers, moist. [TILL]
5			Orange stains on gravels below 6 feet.
10			
15			

SAMPLE TYPE
SAMPLE NUMBER
PEN. RESISTANCE (blows/6 inches)
PID (ppm)
GROUNDWATER

Total depth = 6 feet.
No ground water seepage observed.



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GeoSciences Inc.

East Marine View Drive Widening & Utility Improvements
Everett, Washington

BORING: SP-13

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PROJECT NO.: 2004-065-22 FIGURE: B-21

BORINGE 2004065.GPJ 6/25/04

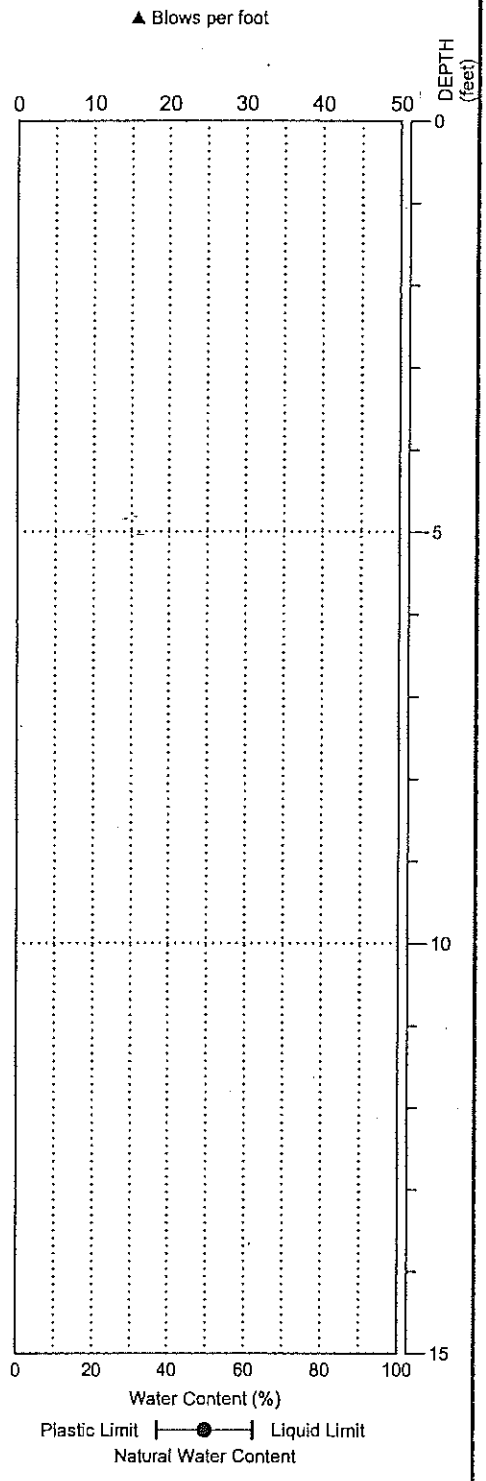
DRILLING COMPANY: Geo-Tech Explorations, Inc. SURFACE ELEVATION: ± feet
DRILLING METHOD: Truck mounted Geoprobe 6600
SAMPLING METHOD: 5-foot continuous core w/ PETG liner
LOCATION: See Figure 2

DATE STARTED: 5/27/2004
DATE COMPLETED: 5/27/2004
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION
0			5" Portland Cement Concrete Pavement
		SM	Loose, dark brown, silty, fine SAND with fine gravel, slighlly moist. [FILL]
		SM	Loose to medium dense, yellow brown, silty fine to coarse SAND with fine gravel, slightly moist. [FILL]
5		SM	Dense, olive gray, silty fine SAND with fine gravel, moist. [TILL]
10			
15			

SAMPLE TYPE
SAMPLE NUMBER
PEN. RESISTANCE (blows/6 inches)
PID (ppm)
GROUNDWATER

Total depth = 6 feet.
No ground water seepage observed.



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

East Marine View Drive Widening & Utility Improvements
Everett, Washington

BORING: SP-14

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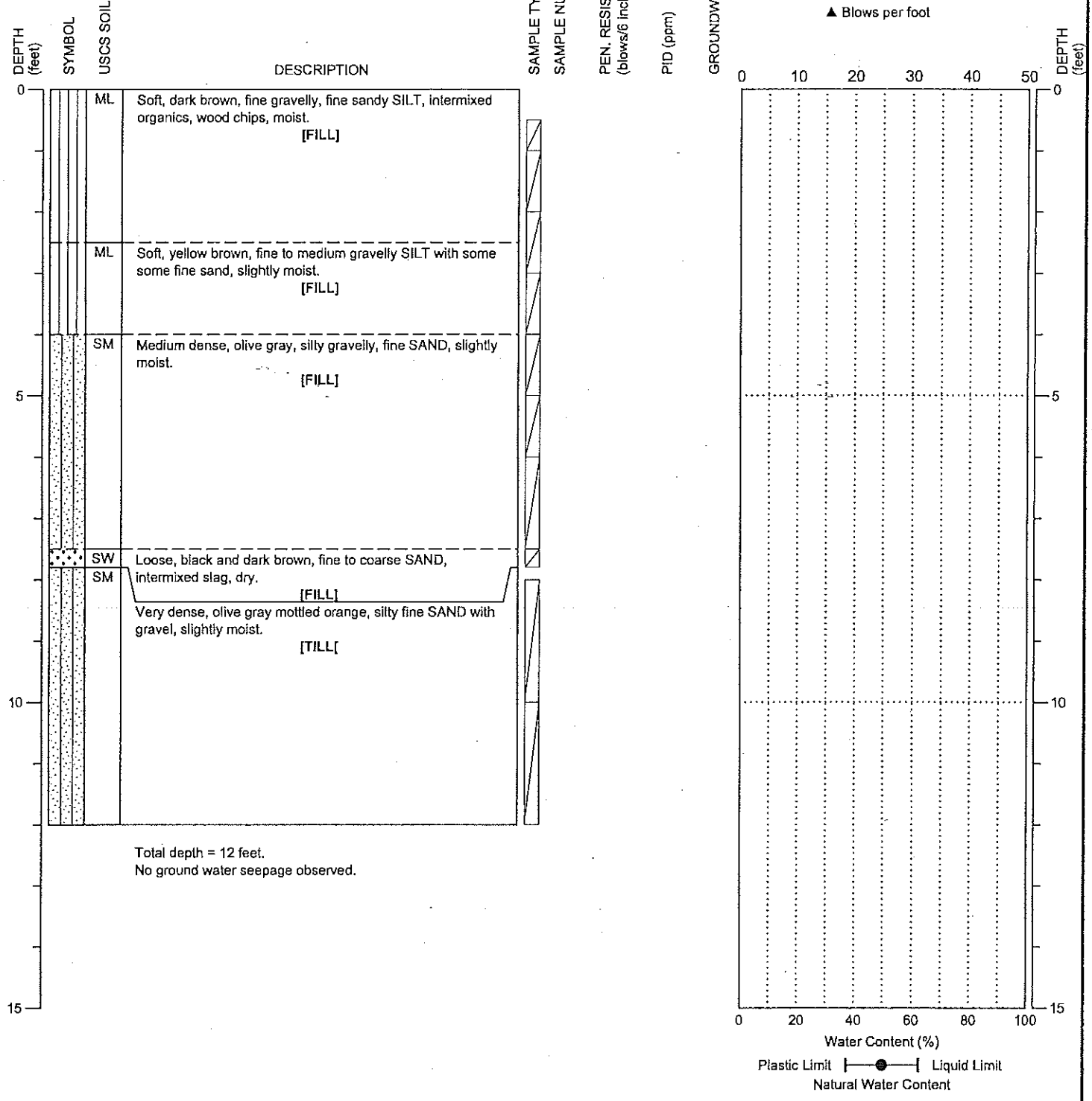
PROJECT NO.: 2004-065-22 FIGURE: B-22

DRILLING COMPANY: Geo-Tech Explorations, Inc. SURFACE ELEVATION: ± feet
DRILLING METHOD: Truck mounted Geoprobe 6600
SAMPLING METHOD: 5-foot continuous core w/ PETG liner
LOCATION: See Figure 2

DATE STARTED: 5/27/2004
DATE COMPLETED: 5/27/2004
LOGGED BY: B. Robinson



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

East Marine View Drive Widening & Utility Improvements
Everett, Washington

BORING: SP-15

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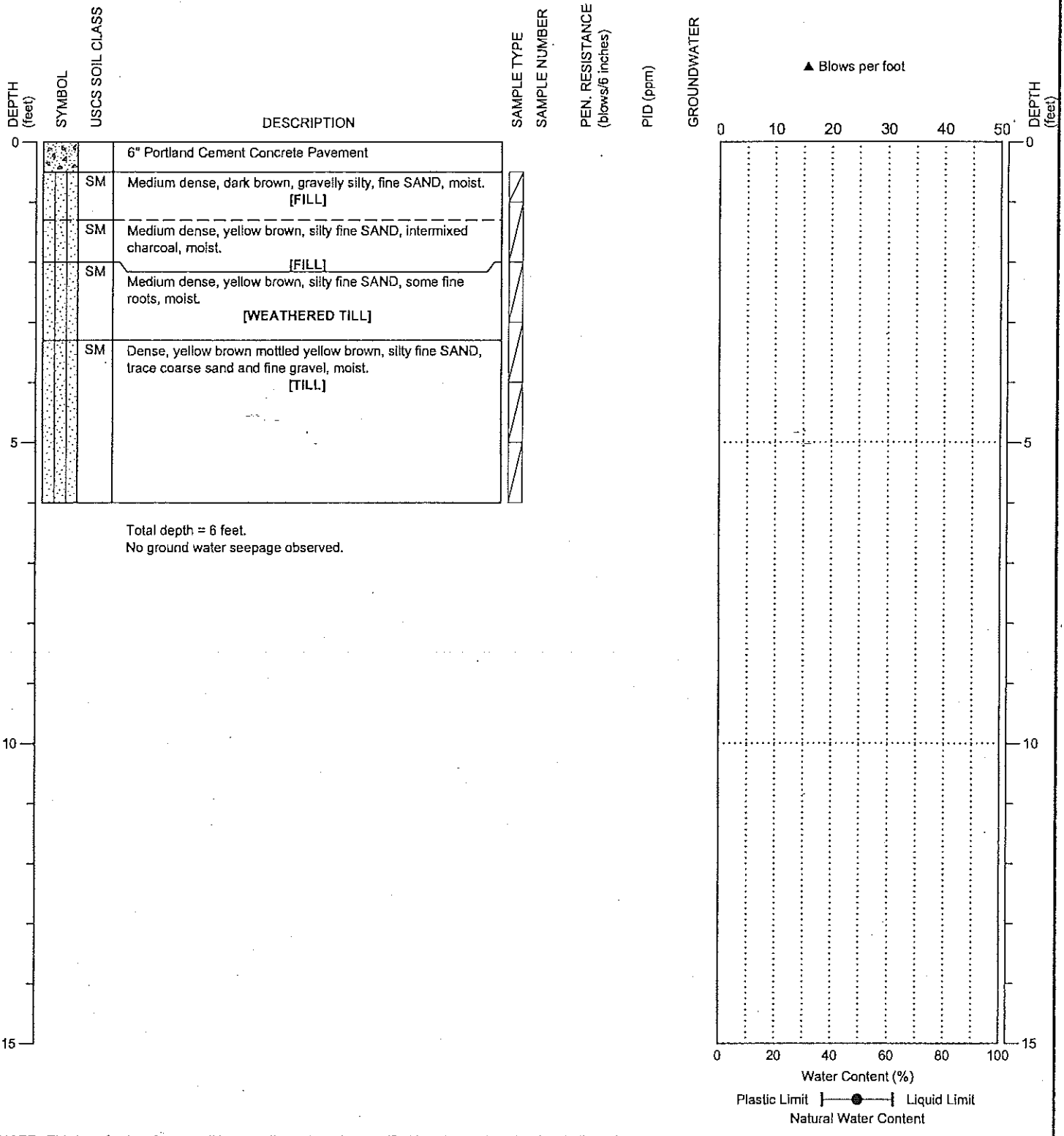
PROJECT NO.: 2004-065-22 FIGURE: B-23

BORINGE 2004065.GPJ 6/25/04

DRILLING COMPANY: Geo-Tech Explorations, Inc. SURFACE ELEVATION: ± feet
DRILLING METHOD: Truck mounted Geoprobe 6600
SAMPLING METHOD: 5-foot continuous core w/ PETG liner
LOCATION: See Figure 2

DATE STARTED: 5/28/2004
DATE COMPLETED: 5/28/2004
LOGGED BY: B. Robinson



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GeoSciences Inc.

East Marine View Drive Widening & Utility Improvements
Everett, Washington

BORING: SP-16

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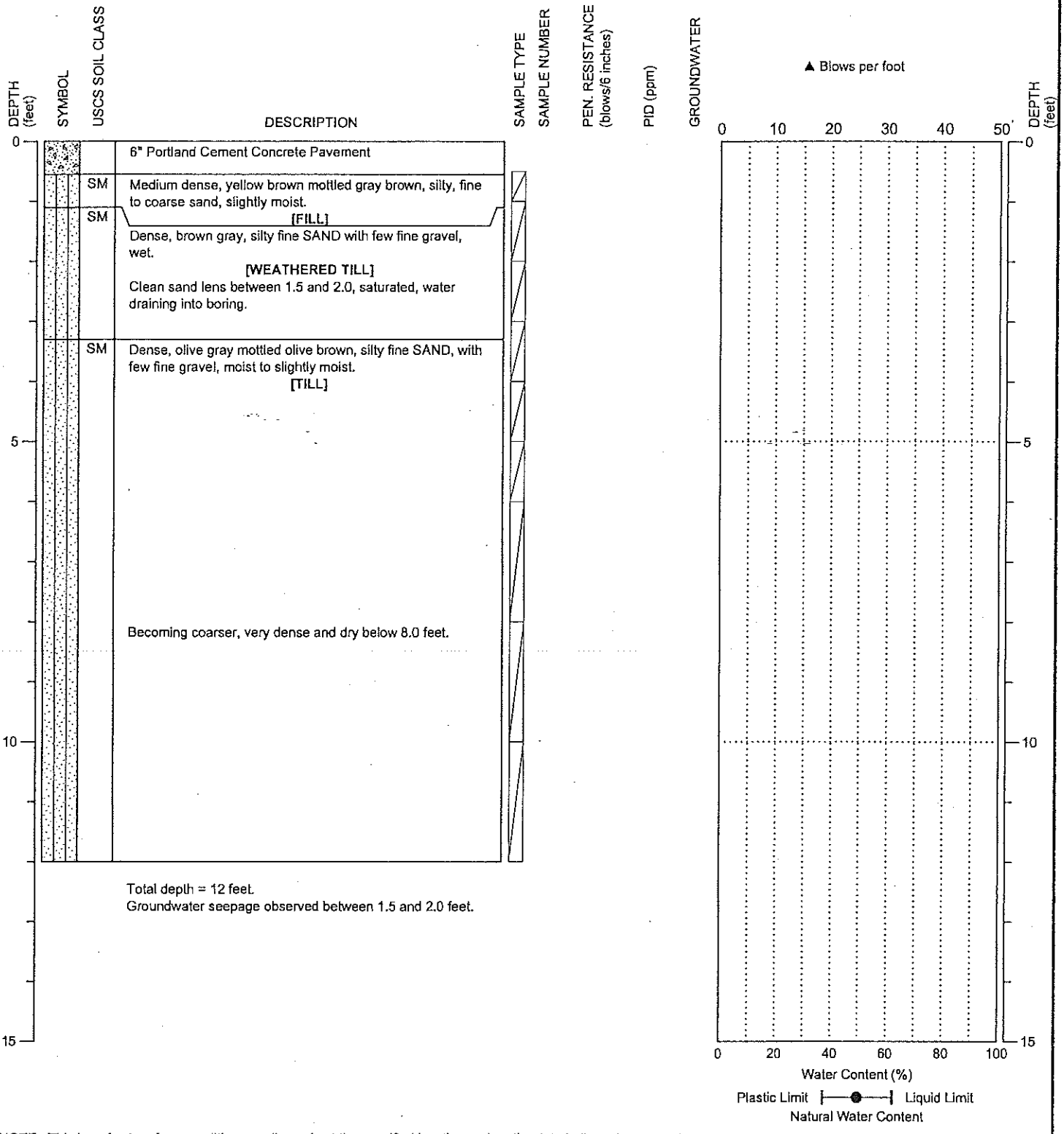
PROJECT NO.: 2004-065-22 FIGURE: B-24

BORINGE 2004065.GPJ 6/25/04

DRILLING COMPANY: Geo-Tech Explorations, Inc. SURFACE ELEVATION: ± feet
DRILLING METHOD: Truck mounted Geoprobe 6600
SAMPLING METHOD: 5-foot continuous core w/ PETG liner
LOCATION: See Figure 2

DATE STARTED: 5/28/2004
DATE COMPLETED: 5/28/2004
LOGGED BY: B. Robinson



Total depth = 12 feet.
Groundwater seepage observed between 1.5 and 2.0 feet.

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

East Marine View Drive Widening & Utility Improvements
Everett, Washington

BORING: SP-17

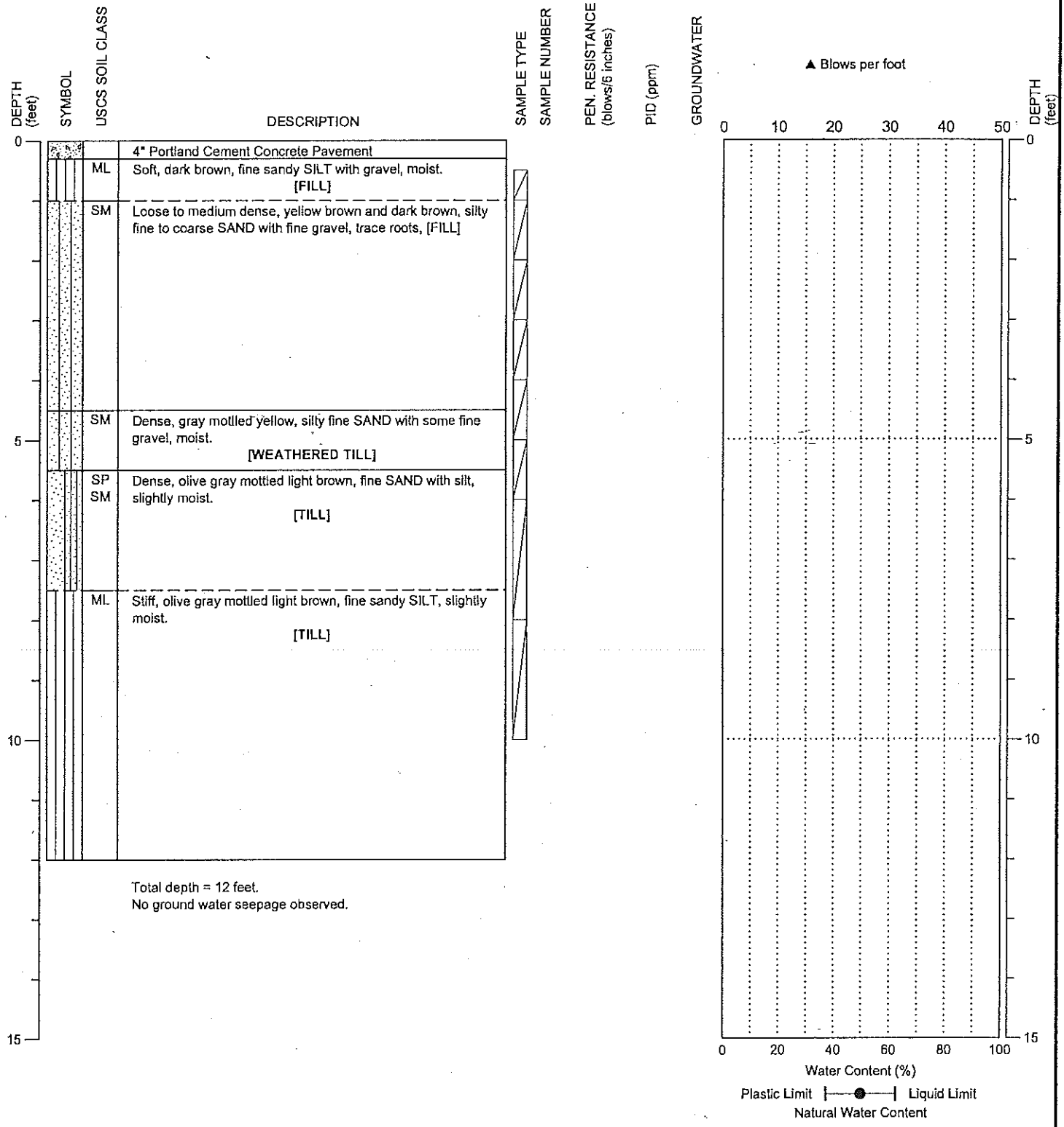
PAGE: 1 of 1

PROJECT NO.: 2004-065-22 FIGURE: B-25

BORINGE 2004065.GPJ 6/25/04

DRILLING COMPANY: Geo-Tech Explorations, Inc. SURFACE ELEVATION: ± feet
DRILLING METHOD: Truck mounted Geoprobe 6600
SAMPLING METHOD: 5-foot continuous core w/ PETG liner
LOCATION: See Figure 2

DATE STARTED: 5/27/2004
DATE COMPLETED: 5/27/2004
LOGGED BY: B. Robinson



Total depth = 12 feet.
No ground water seepage observed.

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GeoSciences Inc.

East Marine View Drive Widening & Utility Improvements
Everett, Washington

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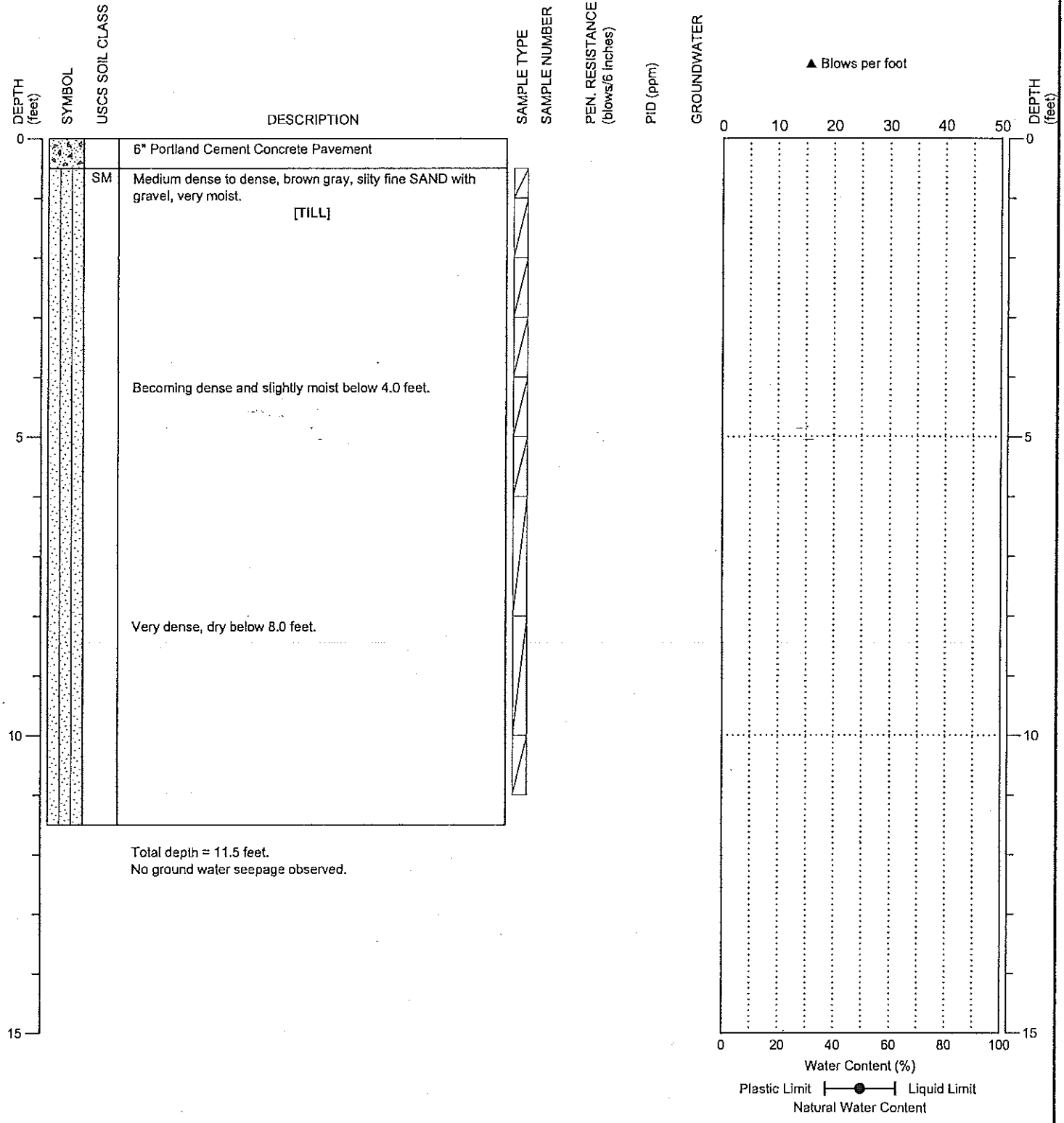
PROJECT NO.: 2004-065-22 FIGURE: B-26

BORINGE 2004065.GPJ 6/25/04

DRILLING COMPANY: Geo-Tech Explorations, Inc. SURFACE ELEVATION: ± feet
DRILLING METHOD: Truck mounted Geoprobe 6600
SAMPLING METHOD: 5-foot continuous core w/ PETG liner
LOCATION: See Figure 2

DATE STARTED: 5/27/2004
DATE COMPLETED: 5/27/2004
LOGGED BY: B. Robinson



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

East Marine View Drive Widening & Utility Improvements
Everett, Washington

BORING: SP-19

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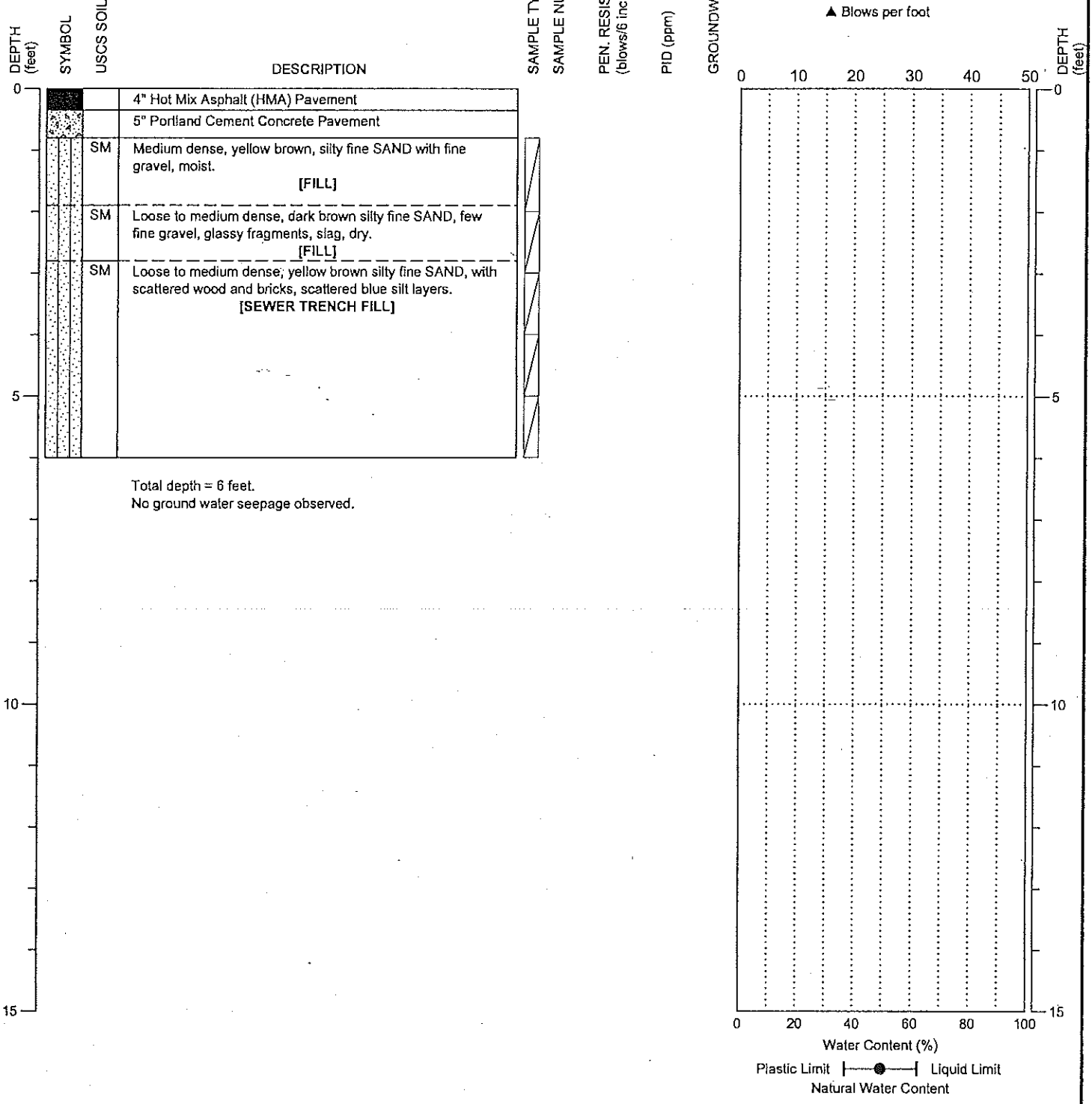
PROJECT NO.: 2004-065-22 FIGURE: B-27

BORINGE 2004065.GPJ 6/25/04

DRILLING COMPANY: Geo-Tech Explorations, Inc. SURFACE ELEVATION: ± feet
DRILLING METHOD: Truck mounted Geoprobe 6600
SAMPLING METHOD: 5-foot continuous core w/ PETG liner
LOCATION: See Figure 2

DATE STARTED: 5/28/2004
DATE COMPLETED: 5/28/2004
LOGGED BY: B. Robinson



Total depth = 6 feet.
No ground water seepage observed.

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GeoSciences Inc.

East Marine View Drive Widening & Utility Improvements
Everett, Washington

BORING: SP-20

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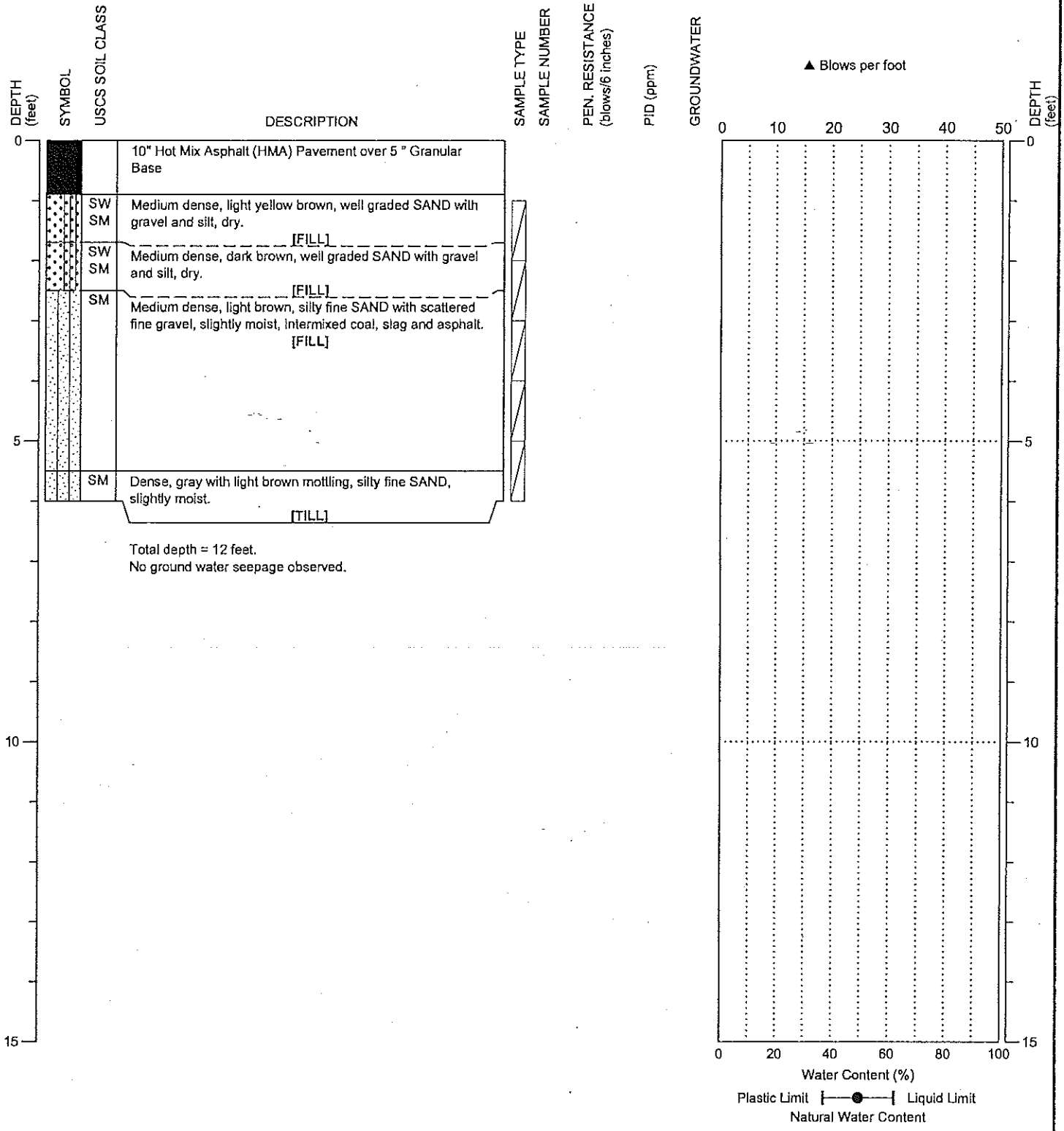
PROJECT NO.: 2004-065-22 FIGURE: B-28

BORINGE 2004065.GPJ 6/25/04

DRILLING COMPANY: Geo-Tech Explorations, Inc. SURFACE ELEVATION: ± feet
DRILLING METHOD: Truck mounted Geoprobe 6600
SAMPLING METHOD: 5-foot continuous core w/ PETG liner
LOCATION: See Figure 2

DATE STARTED: 5/28/2004
DATE COMPLETED: 5/28/2004
LOGGED BY: B. Robinson



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

East Marine View Drive Widening & Utility Improvements
Everett, Washington

BORING: SP-21

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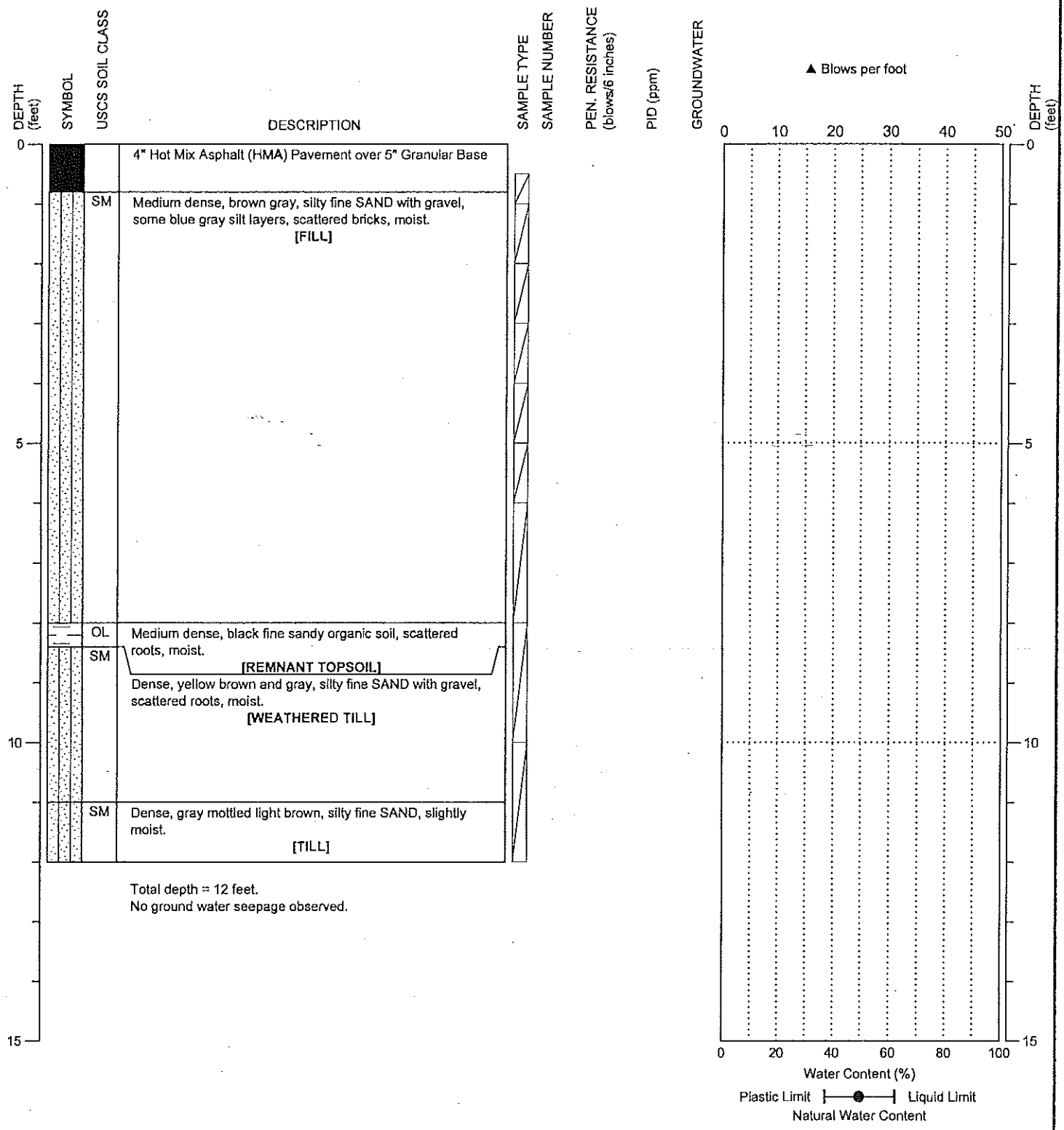
PROJECT NO.: 2004-065-22 FIGURE: B-29

BORINGE 2004065.GPJ 6/25/04

DRILLING COMPANY: Geo-Tech Explorations, Inc. SURFACE ELEVATION: ± feet
DRILLING METHOD: Truck mounted Geoprobe 6600
SAMPLING METHOD: 5-foot continuous core w/ PETG liner
LOCATION: See Figure 2

DATE STARTED: 5/27/2004
DATE COMPLETED: 5/27/2004
LOGGED BY: B. Robinson



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GeoSciences Inc.

East Marine View Drive Widening & Utility Improvements
Everett, Washington

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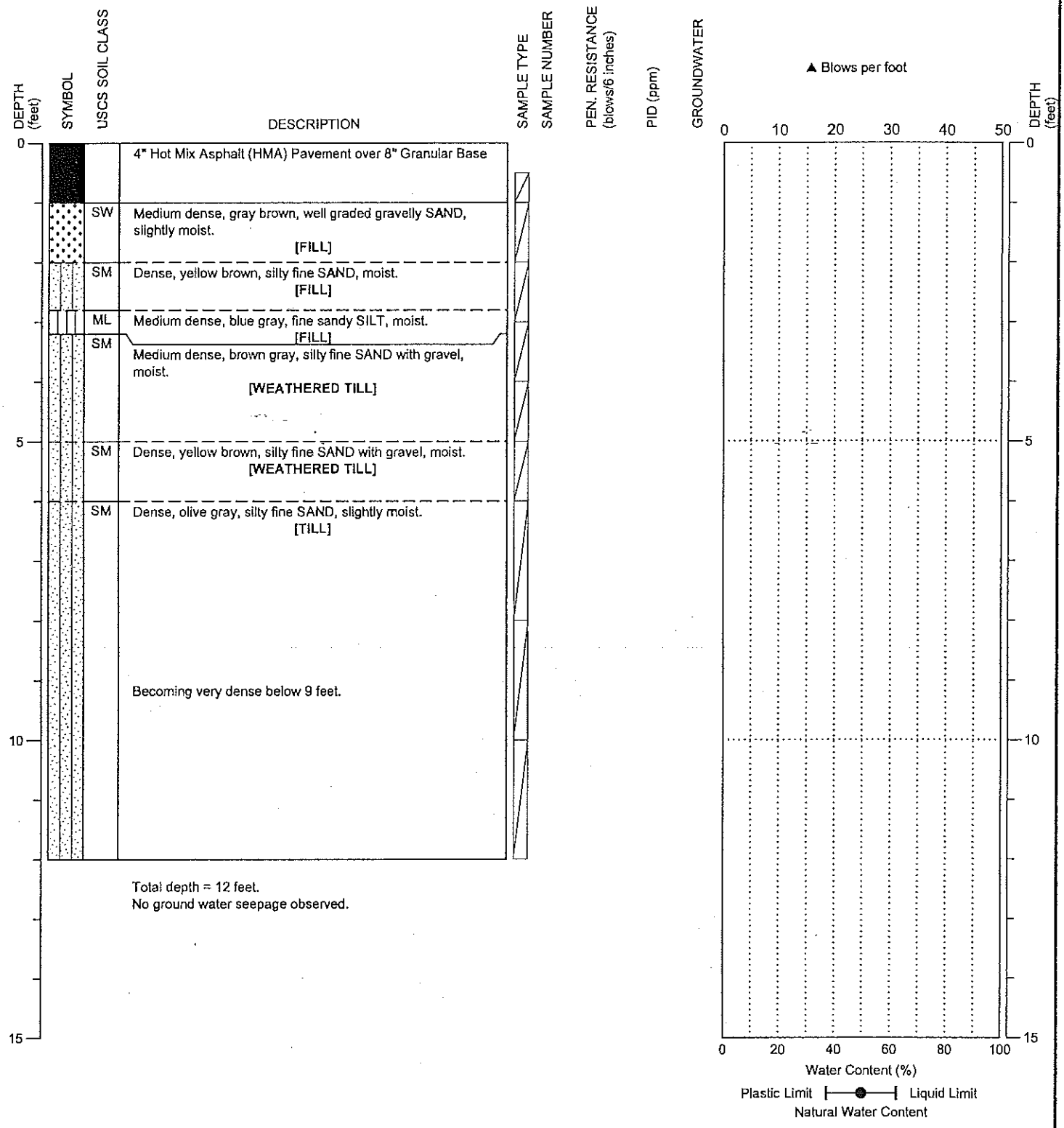
PROJECT NO.: 2004-065-22 FIGURE: B-30

BORINGE 2004065.GPJ 6/25/04

DRILLING COMPANY: Geo-Tech Explorations, Inc. SURFACE ELEVATION: ± feet
DRILLING METHOD: Truck mounted Geoprobe 6600
SAMPLING METHOD: 5-foot continuous core w/ PETG liner
LOCATION: See Figure 2

DATE STARTED: 5/27/2004
DATE COMPLETED: 5/27/2004
LOGGED BY: B. Robinson



Total depth = 12 feet.
No ground water seepage observed.

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GeoSciences Inc.

East Marine View Drive Widening & Utility Improvements
Everett, Washington

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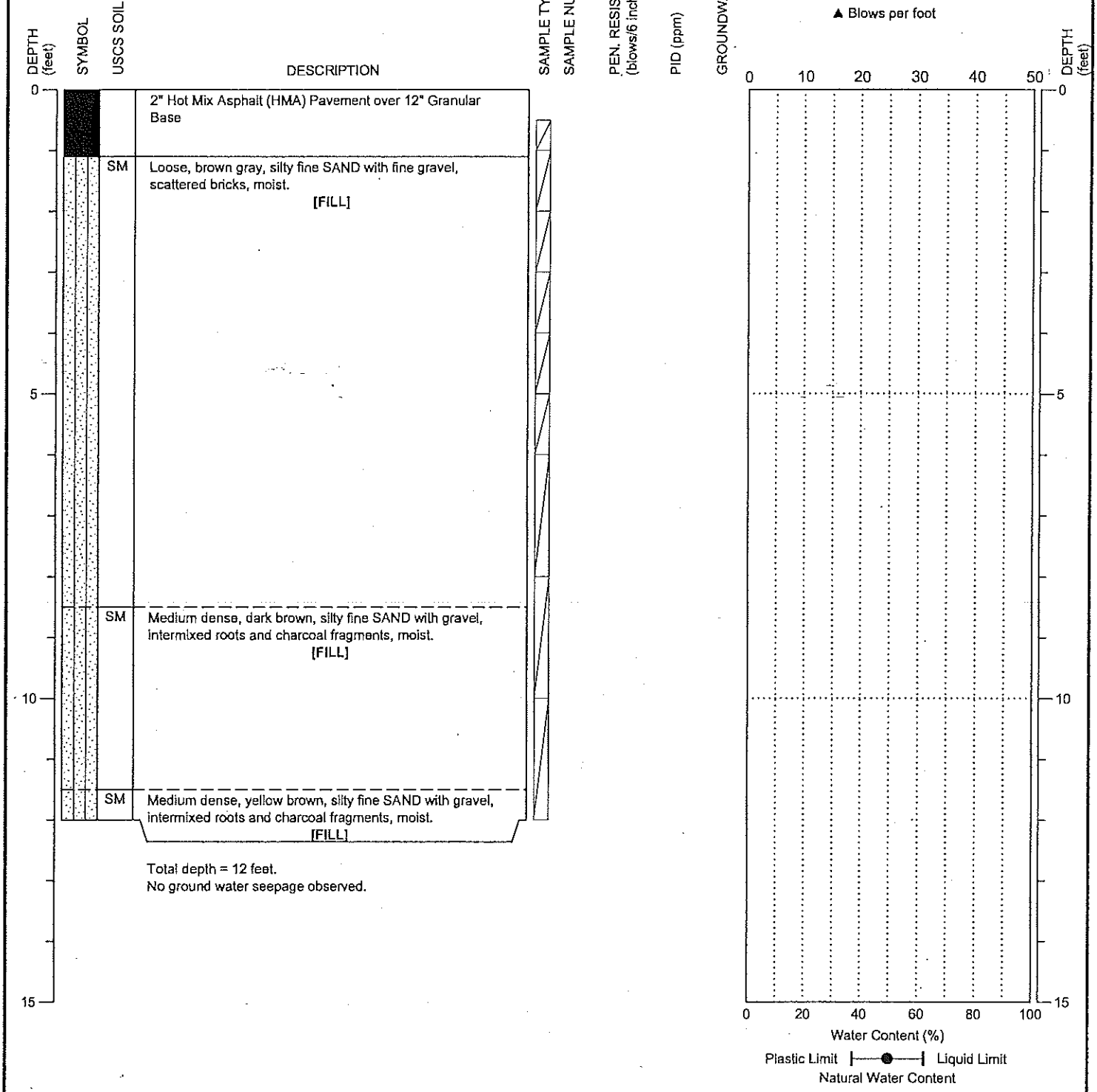
PROJECT NO.: 2004-065-22 FIGURE: B-31

BORINGE 2004065.GPJ 6/25/04

DRILLING COMPANY: Geo-Tech Explorations, Inc. SURFACE ELEVATION: ± feet
DRILLING METHOD: Truck mounted Geoprobe 6600
SAMPLING METHOD: 5-foot continuous core w/ PETG liner
LOCATION: See Figure 2

DATE STARTED: 5/27/2004
DATE COMPLETED: 5/27/2004
LOGGED BY: B. Robinson



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GeoSciences Inc.

East Marine View Drive Widening & Utility Improvements
Everett, Washington

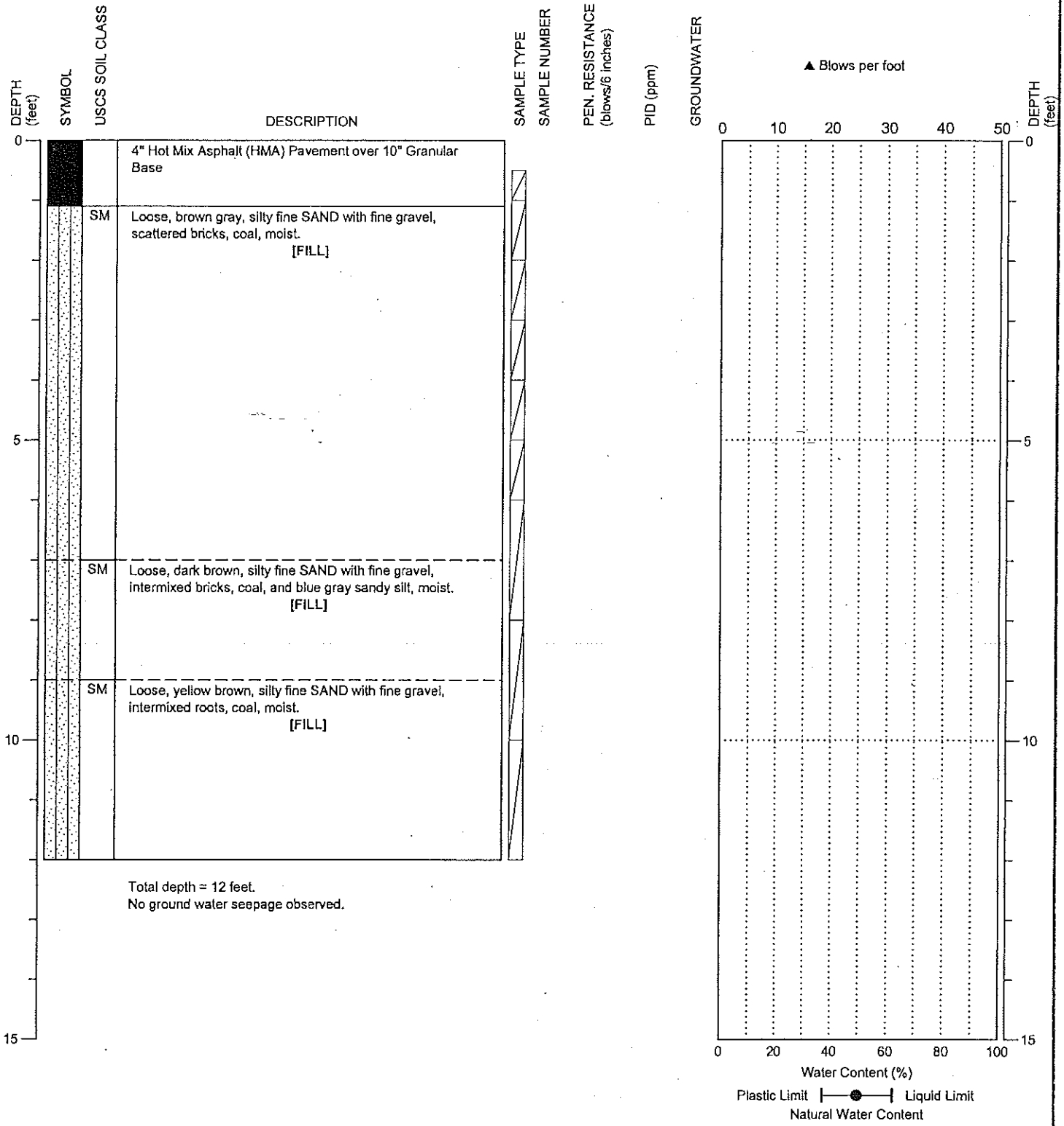
BORING: SP-24

PAGE: 1 of 1

PROJECT NO.: 2004-065-22 FIGURE: B-32

DRILLING COMPANY: Geo-Tech Explorations, Inc. SURFACE ELEVATION: ± feet
DRILLING METHOD: Truck mounted Geoprobe 6600
SAMPLING METHOD: 5-foot continuous core w/ PETG liner
LOCATION: See Figure 2

DATE STARTED: 5/27/2004
DATE COMPLETED: 5/27/2004
LOGGED BY: B. Robinson



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

East Marine View Drive Widening & Utility Improvements
Everett, Washington

BORING:
SP-25

PAGE: 1 of 1

PROJECT NO.: 2004-065-22 FIGURE: B-33

BORINGE 2004065.GPJ 6/25/04

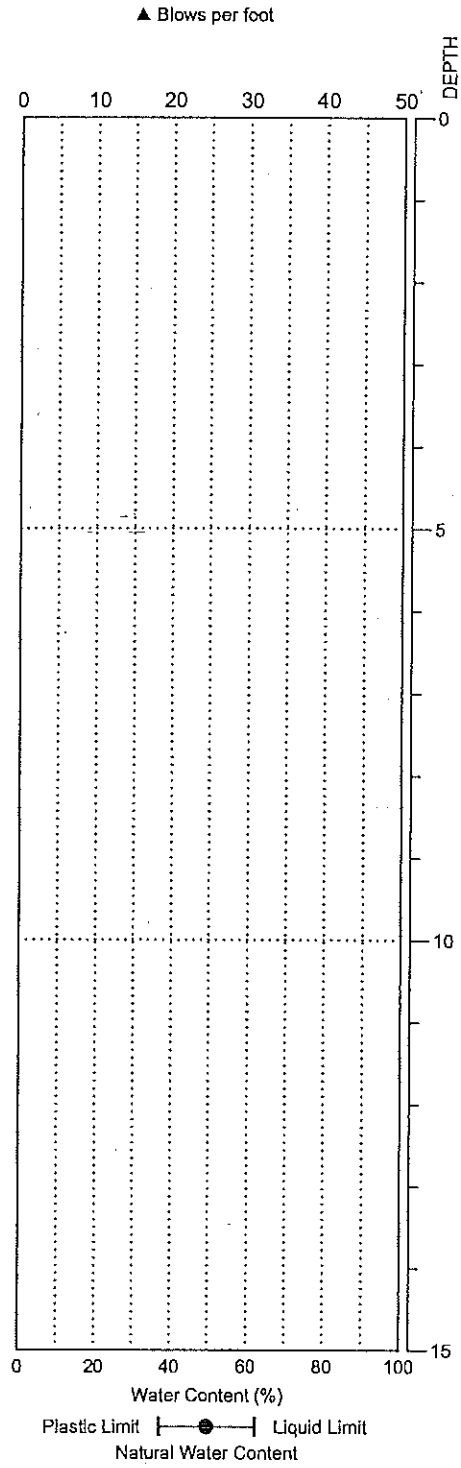
DRILLING COMPANY: Geo-Tech Explorations, Inc. SURFACE ELEVATION: ± feet
DRILLING METHOD: Truck mounted Geoprobe 6600
SAMPLING METHOD: 5-foot continuous core w/ PETG liner
LOCATION: See Figure 2

DATE STARTED: 5/27/2004
DATE COMPLETED: 5/27/2004
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION
0			4" Hot Mix Asphalt (HMA) Pavement over 8" Granular Base
		SP	Medium dense, brown gray, medium SAND, slightly moist. [FILL]
		SM	Medium dense, orange brown, silty fine SAND with fine gravel, moist. [FILL]
		SM	Medium dense, light brown and orange brown, silty fine SAND with some fine gravel, moist. [WEATHERED TILL]
5		SM	Dense, olive gray with light brown mottling, silty fine SAND, moist. [TILL]
			No mottling below 6.0
10			Very dense below 9 feet, increasing gravel content with depth..
15			

Total depth = 12 feet.
No ground water seepage observed.

SAMPLE TYPE
SAMPLE NUMBER
PEN. RESISTANCE (blows/6 inches)
PID (ppm)
GROUNDWATER



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

East Marine View Drive Widening & Utility Improvements
Everett, Washington

BORING: SP-26

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PROJECT NO.: 2004-065-22 FIGURE: B-34

BORINGE 2004065.GPJ 6/25/04

1991 Mill E Phase 1c

Key to Exploration Logs

Sample Descriptions

Classification of soils in this report is based on visual field and laboratory observations which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field nor laboratory testing unless presented herein. Visual-manual classification methods of ASTM D 2488 were used as an identification guide.

Soil descriptions consist of the following:
Density/consistency, moisture, color, minor constituents, MAJOR CONSTITUENT, additional remarks.

Density/Consistency

Soil density/consistency in borings is related primarily to the Standard Penetration Resistance. Soil density/consistency in test pits is estimated based on visual observation and is presented parenthetically on the test pit logs.

SAND or GRAVEL Density	Standard Penetration Resistance in Blows/Foot	SILT or CLAY Consistency	Standard Penetration Resistance in Blows/Foot	Approximate Shear Strength in TSF
Very loose	0 - 4	Very soft	0 - 2	<0.125
Loose	4 - 10	Soft	2 - 4	0.125 - 0.25
Medium dense	10 - 30	Medium stiff	4 - 8	0.25 - 0.5
Dense	30 - 50	Stiff	8 - 15	0.5 - 1.0
Very dense	>50	Very stiff	15 - 30	1.0 - 2.0
		Hard	>30	>2.0

Moisture

Dry	Little perceptible moisture
Damp	Some perceptible moisture, probably below optimum
Moist	Probably near optimum moisture content
Wet	Much perceptible moisture, probably above optimum

Minor Constituents

	Estimated Percentage
Not identified in description	0 - 5
Slightly (clayey, silty, etc.)	5 - 12
Clayey, silty, sandy, gravelly	12 - 30
Very (clayey, silty, etc.)	30 - 50

Legends

Sampling

BORING SAMPLES

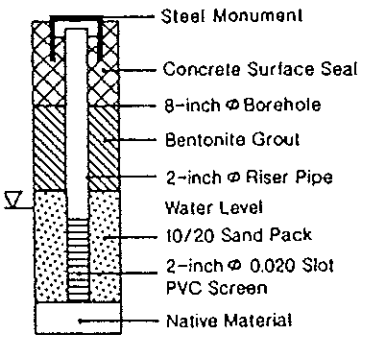
⊠	Split Spoon
⊘	Shelby Tube
▥	Cuttings
*	No Sample Recovery
P	Tube Pushed, Not Driven

Test Symbols

CA	Chemical Analysis
GS	Grain Size Classification

Monitoring Well Construction Details

Hollow-Stem Auger Method



Cable Tool Method
Intermediate Wells

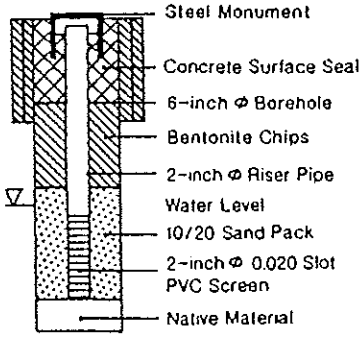


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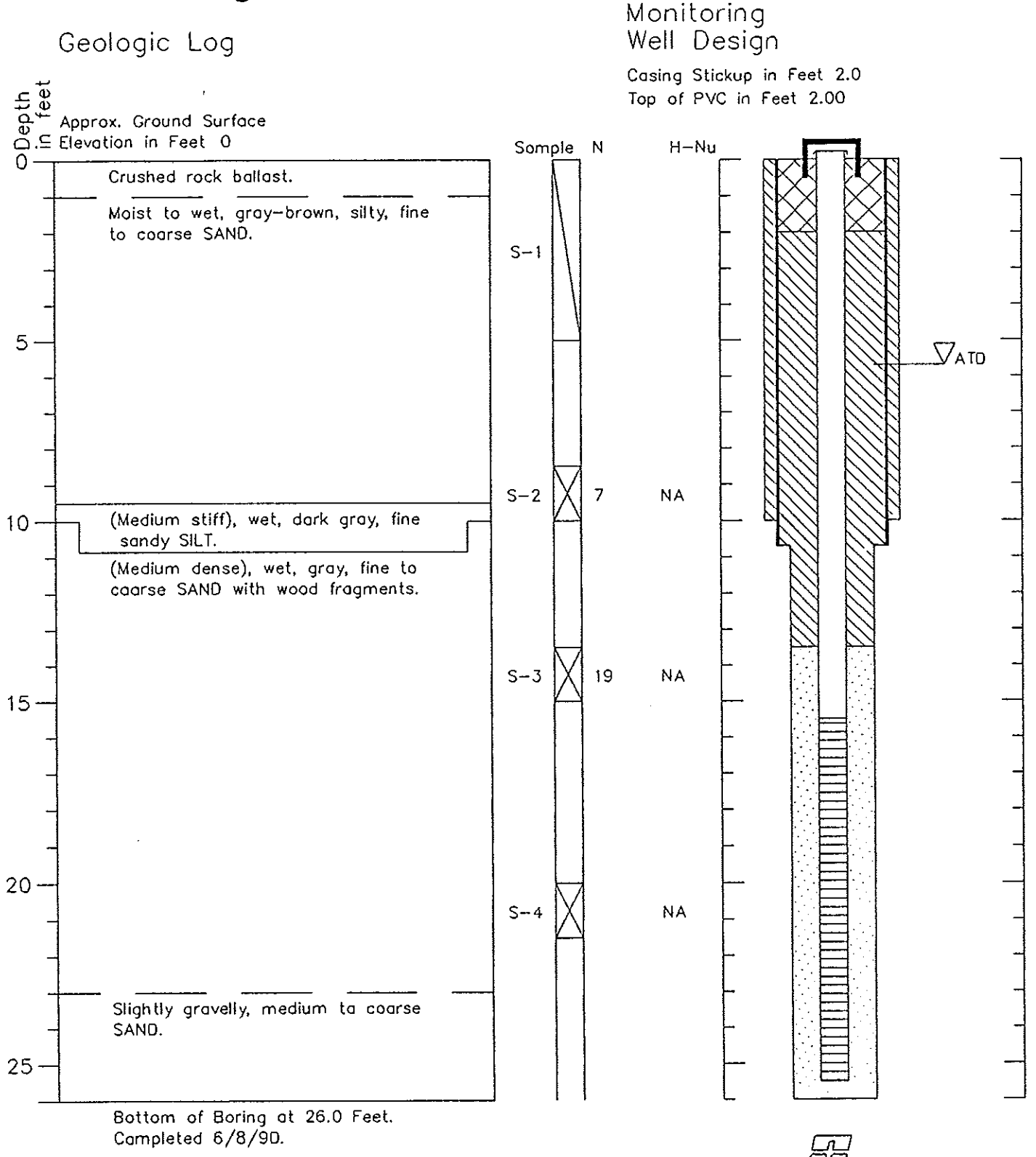
Figure A-1

Boring Log and Construction Data for Monitoring Well HC-15D



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

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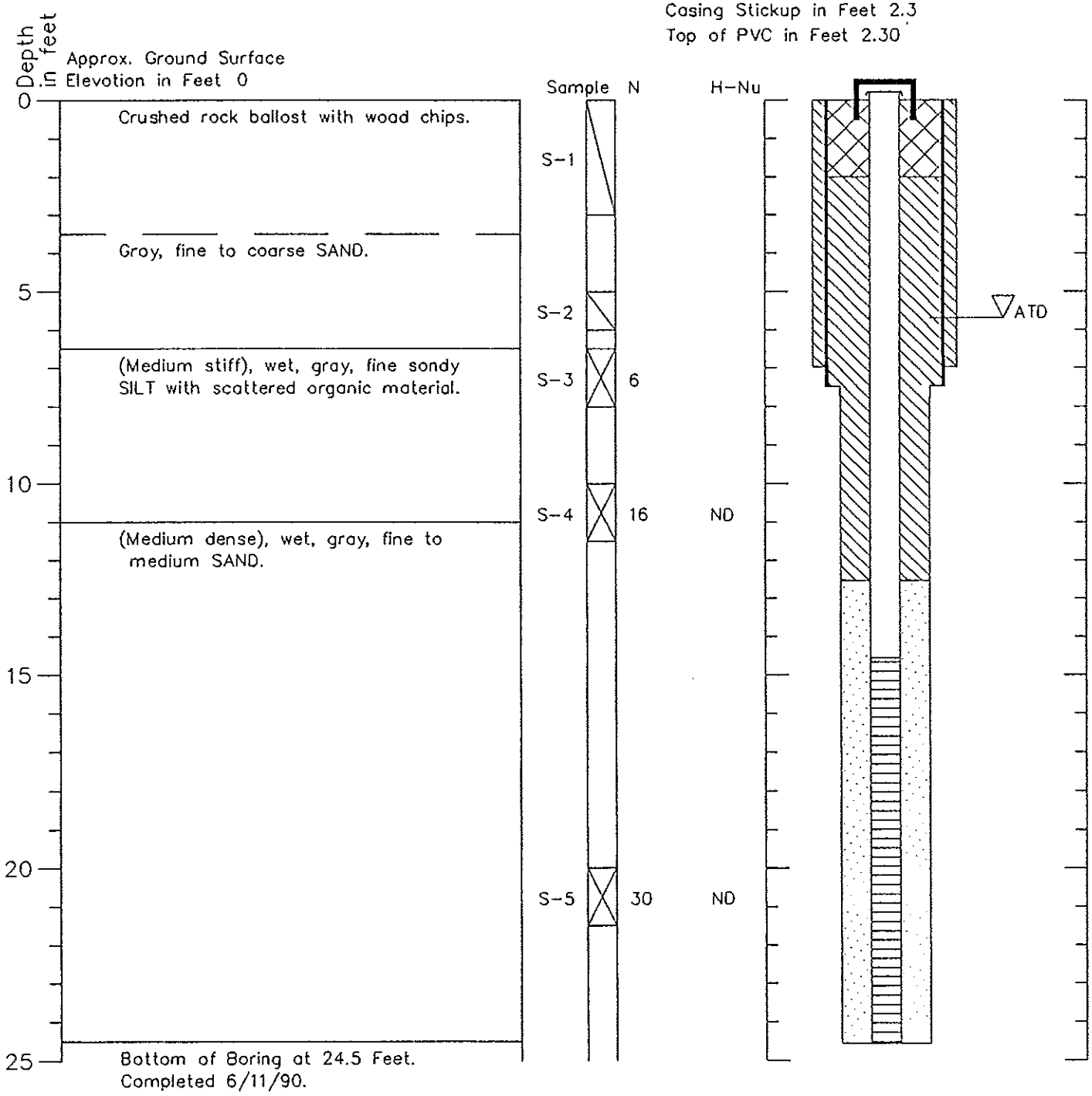
Figure A-2

Boring Log and Construction Data for Monitoring Well HC-23D

Geologic Log

Monitoring Well Design

Casing Stickup in Feet 2.3
Top of PVC in Feet 2.30



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is ot time of drilling (ATD) or for date specified. Level may vary with time.

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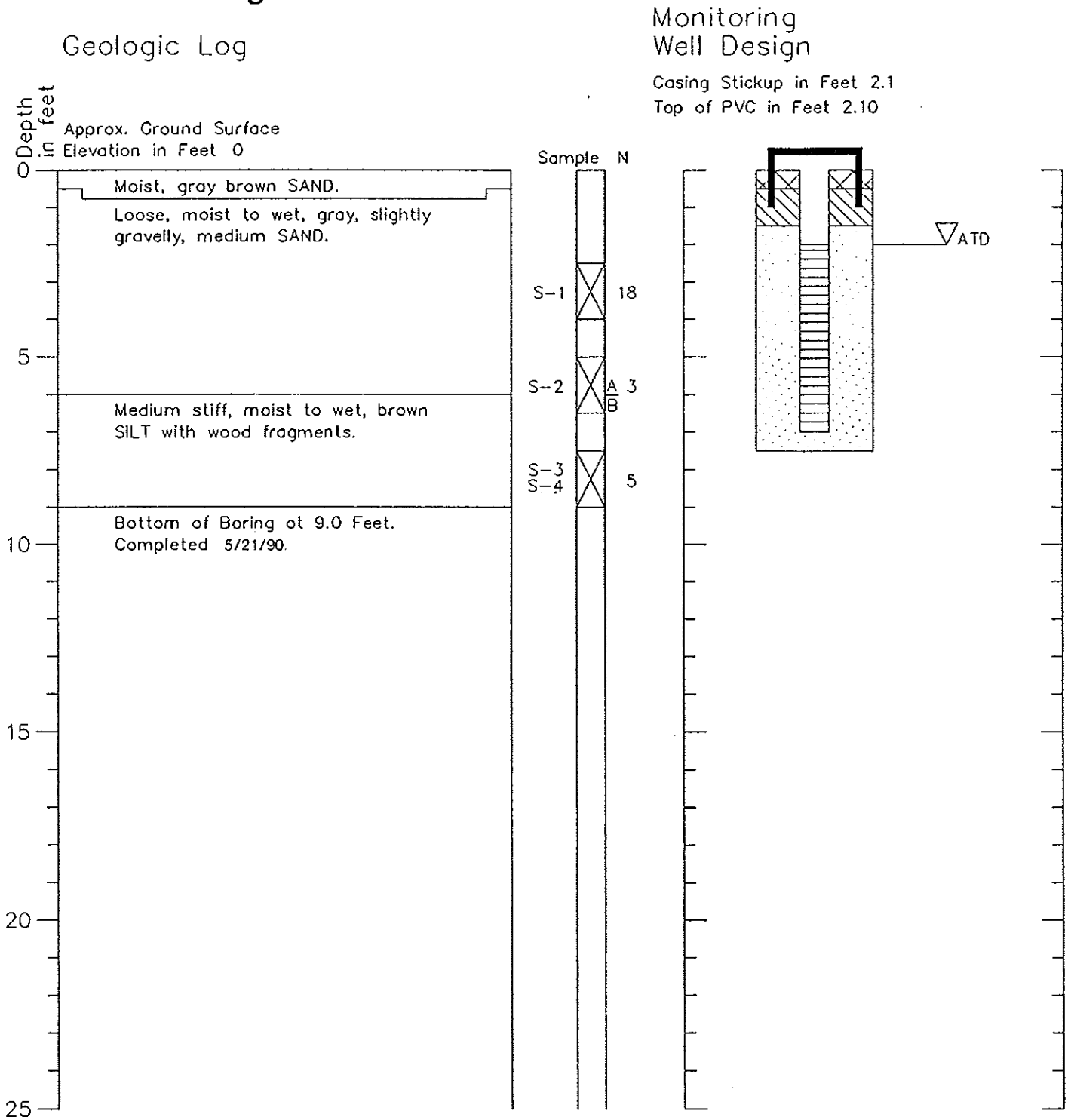
Figure A-3

Boring Log and Construction Data for Monitoring Well HC-24



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

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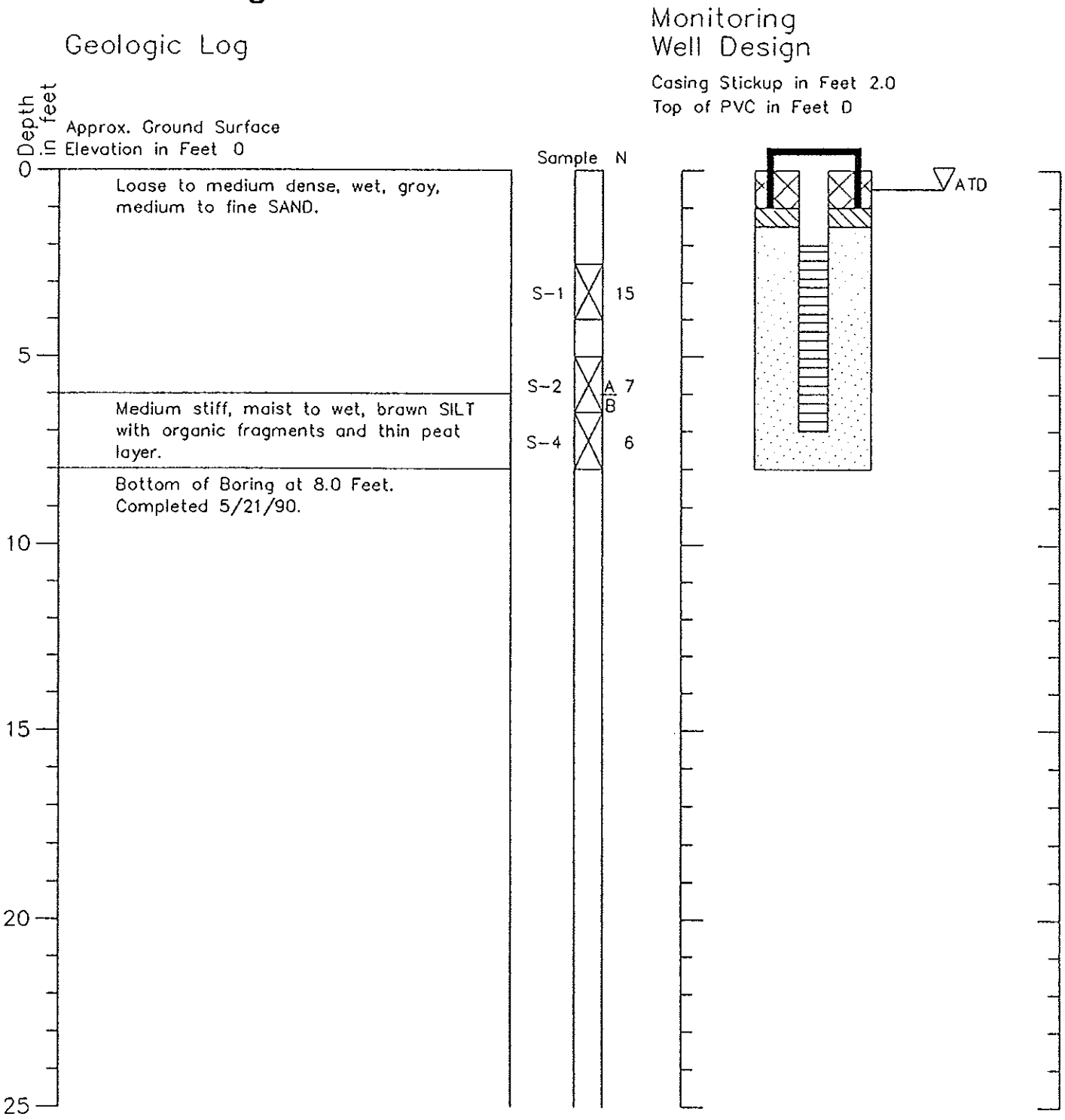
Figure A-4

Boring Log and Construction Data for Monitoring Well HC-25



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

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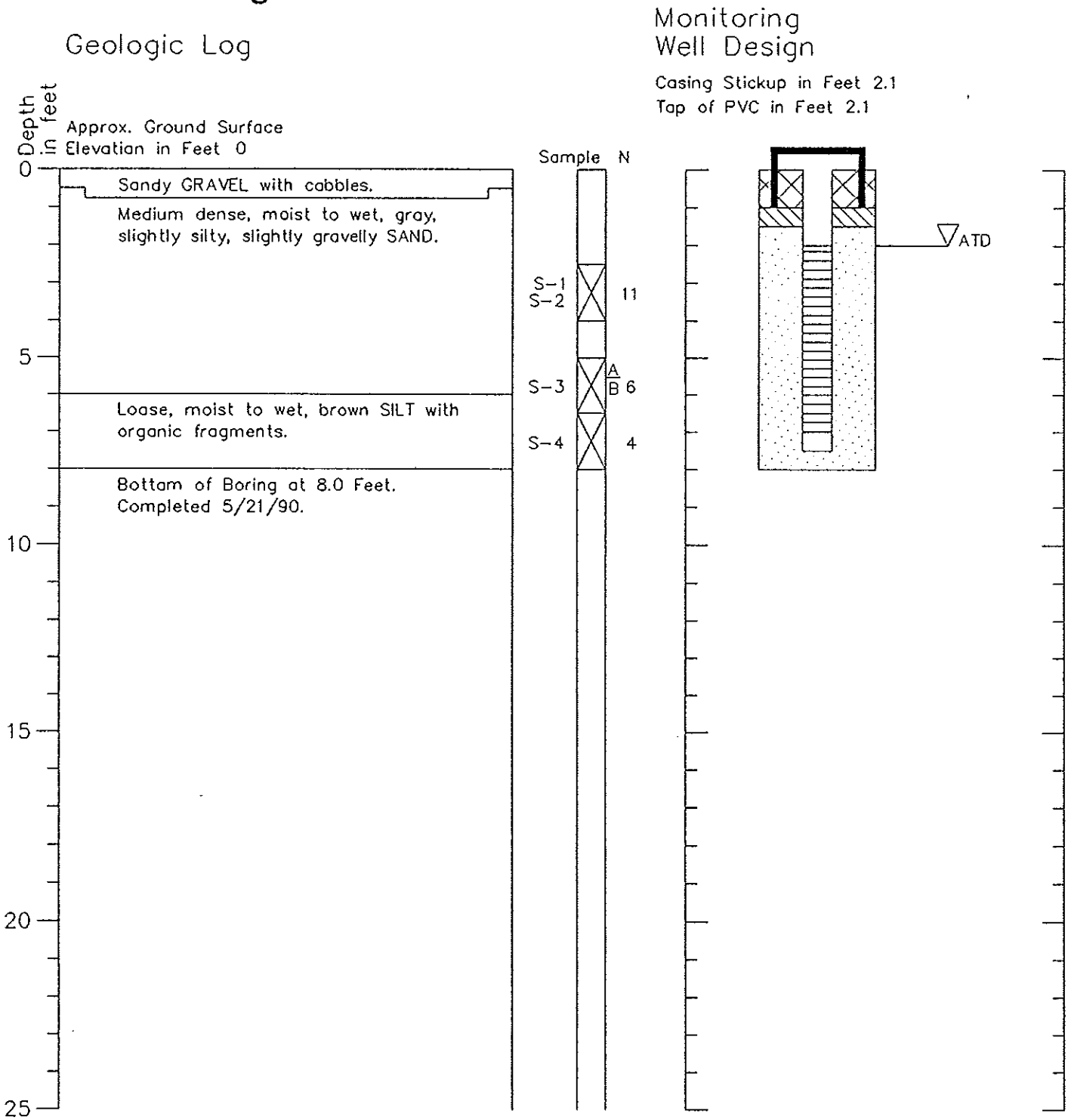
Figure A-5

Boring Log and Construction Data for Monitoring Well HC-26



1. Refer to Figure A–1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

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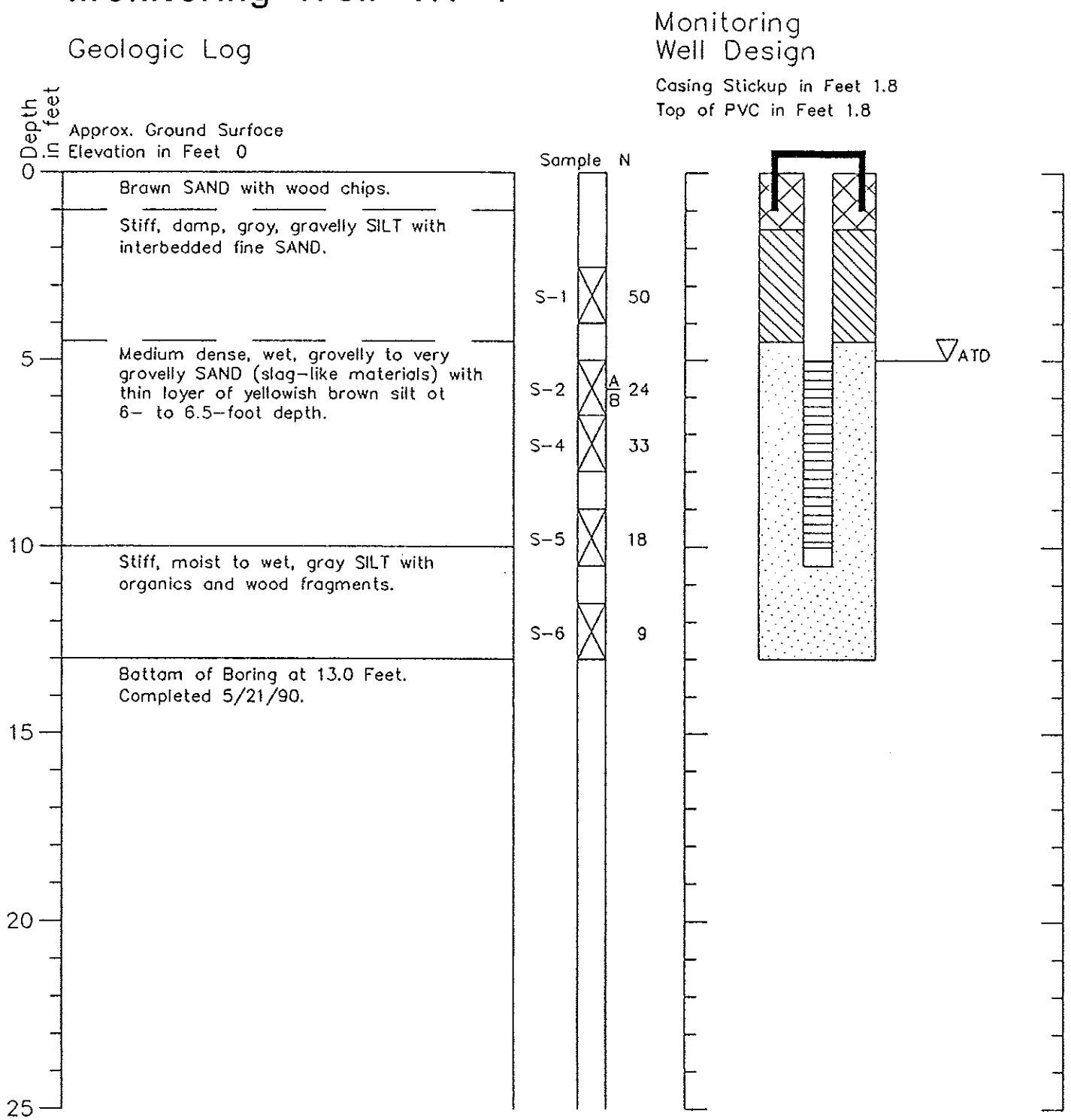
Figure A-6

Boring Log and Construction Data for Monitoring Well WP-1



1. Refer to Figure A-1 for explanotion of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

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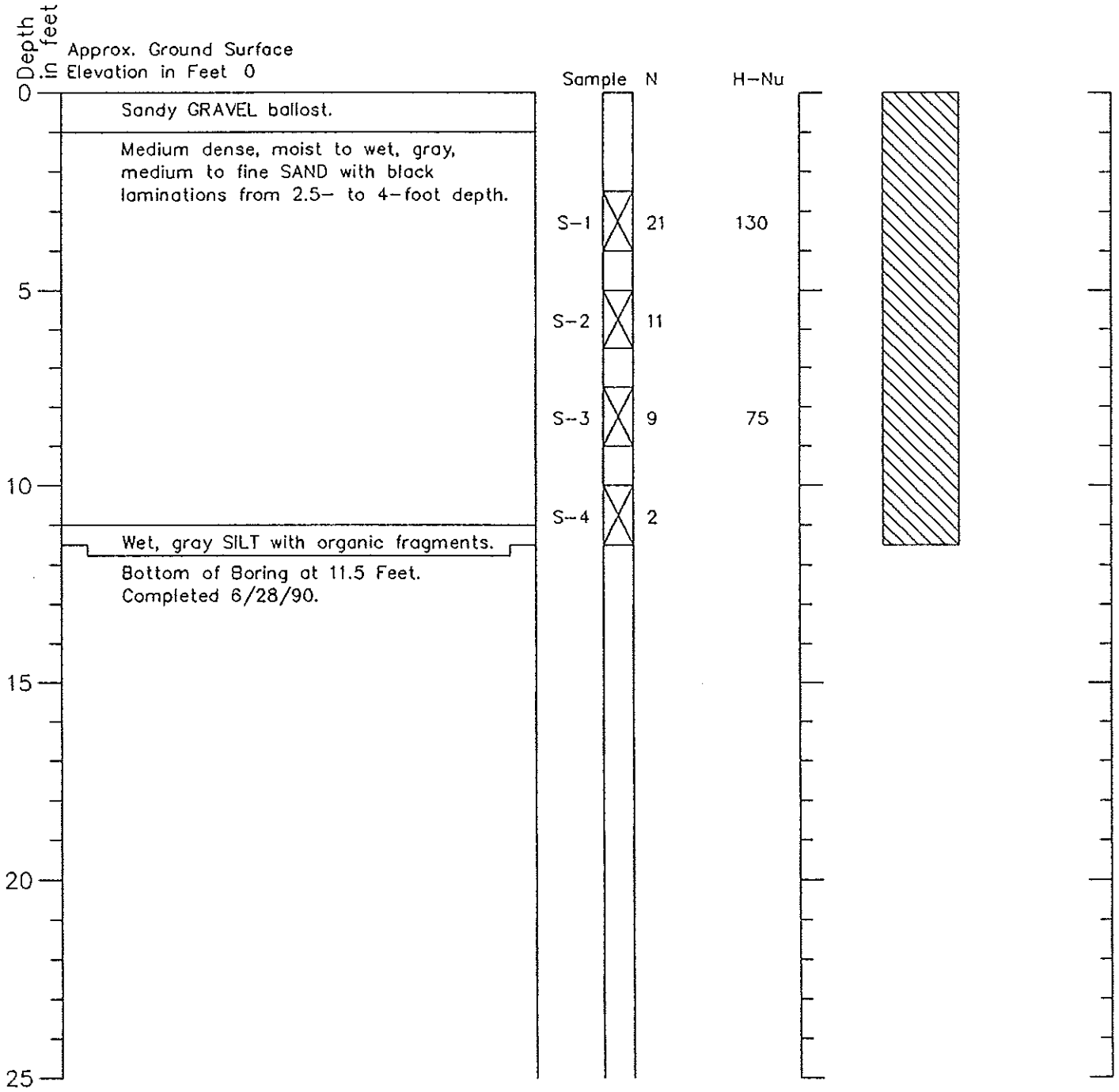
Figure A-7

Boring Log A-1

Geologic Log



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

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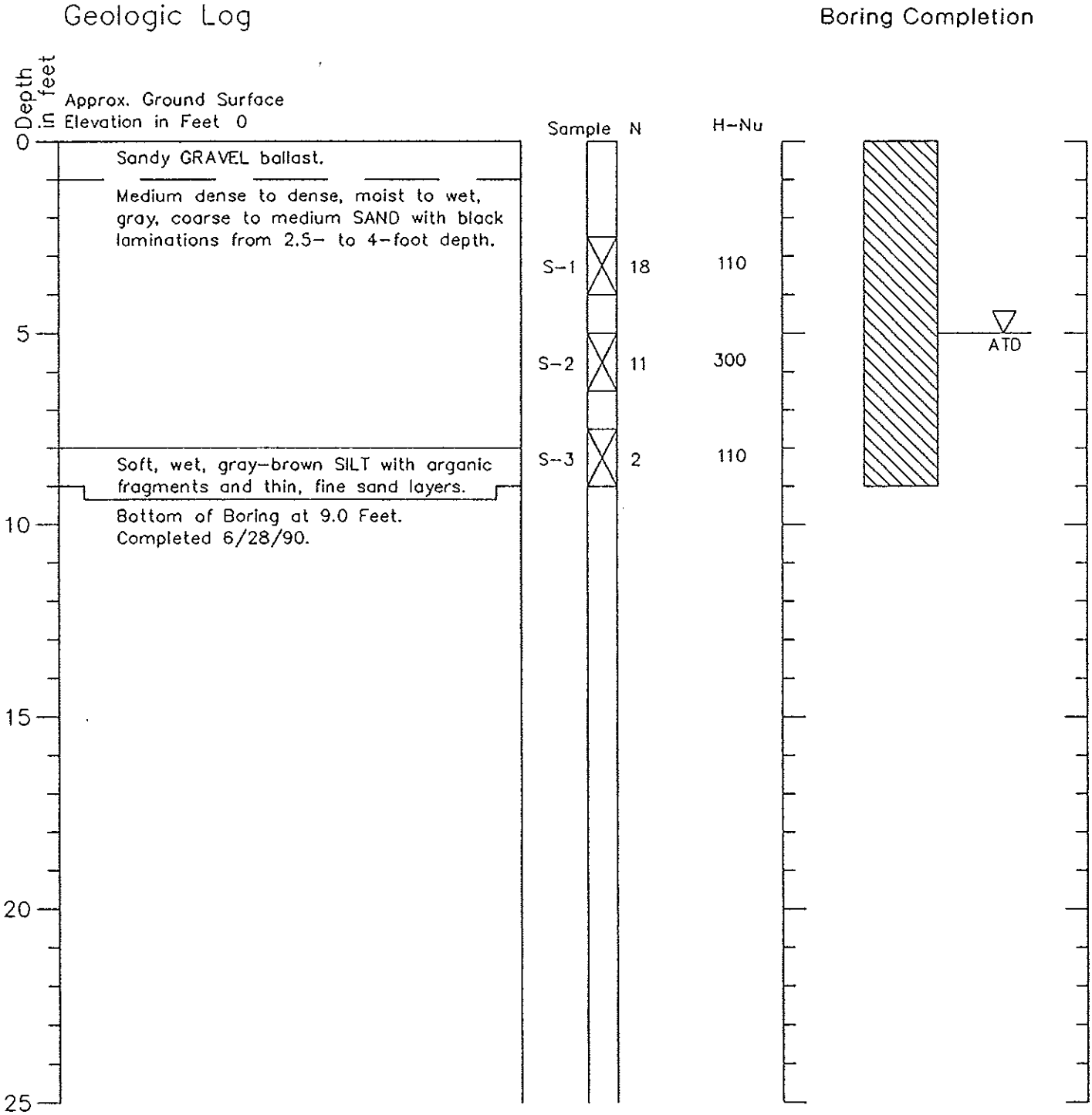
Figure A-8

Boring Log B-1



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

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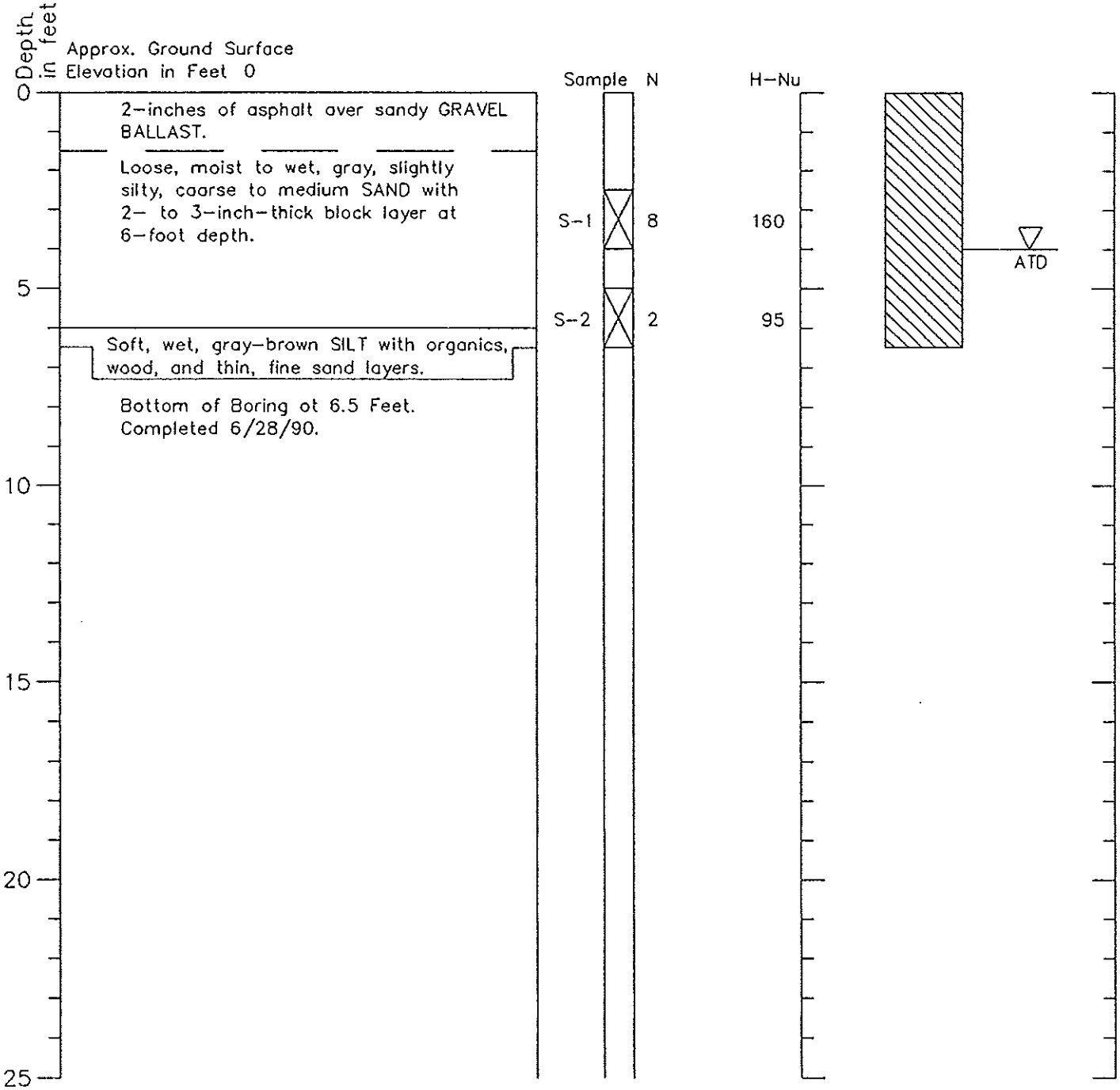
Figure A-9

Boring Log C-1

Geologic Log

Boring Completion



1. Refer to Figure A-1 for explanotion of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

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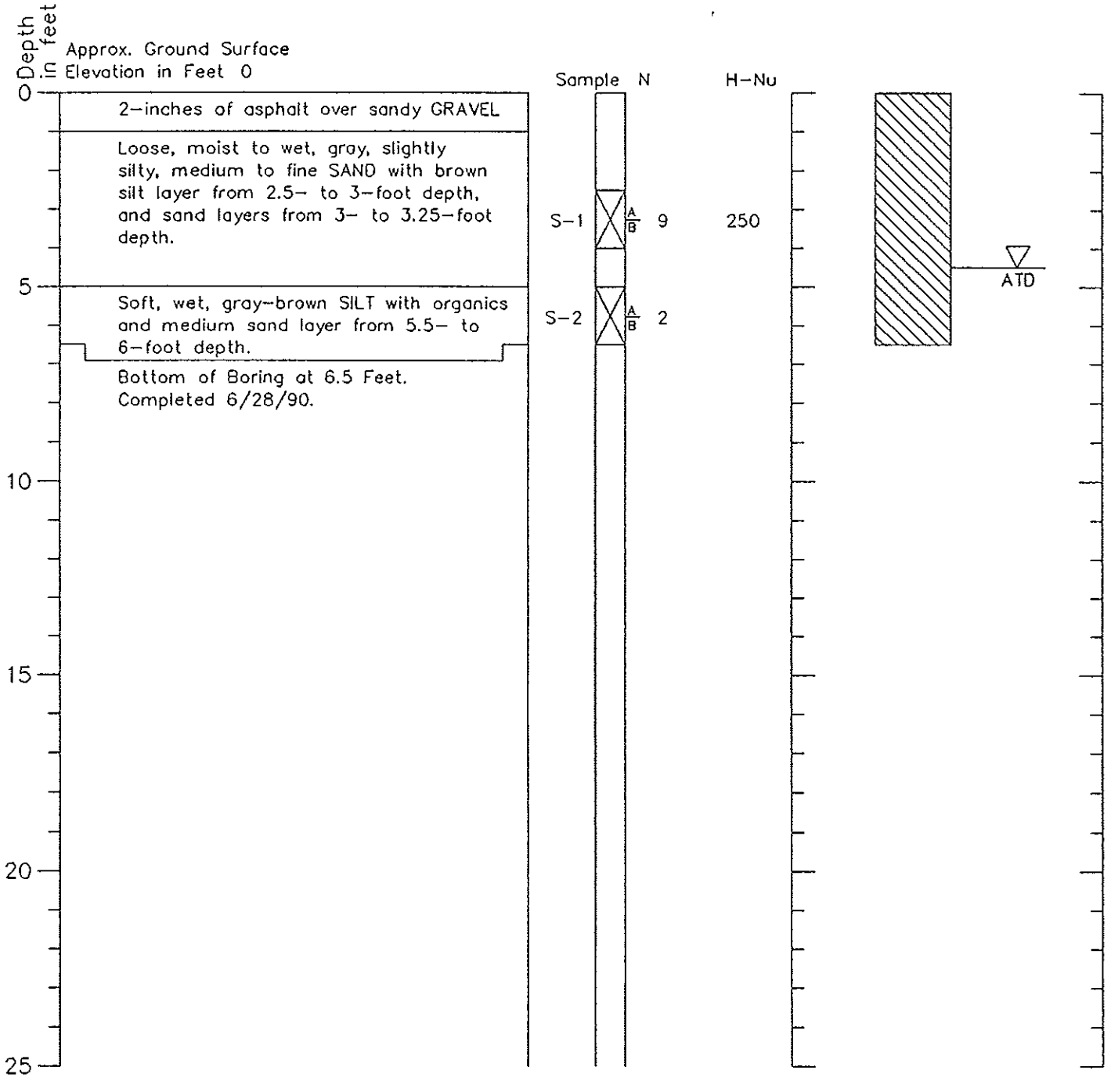
Figure A-10

Boring Log D-1

Geologic Log

Boring Completion



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

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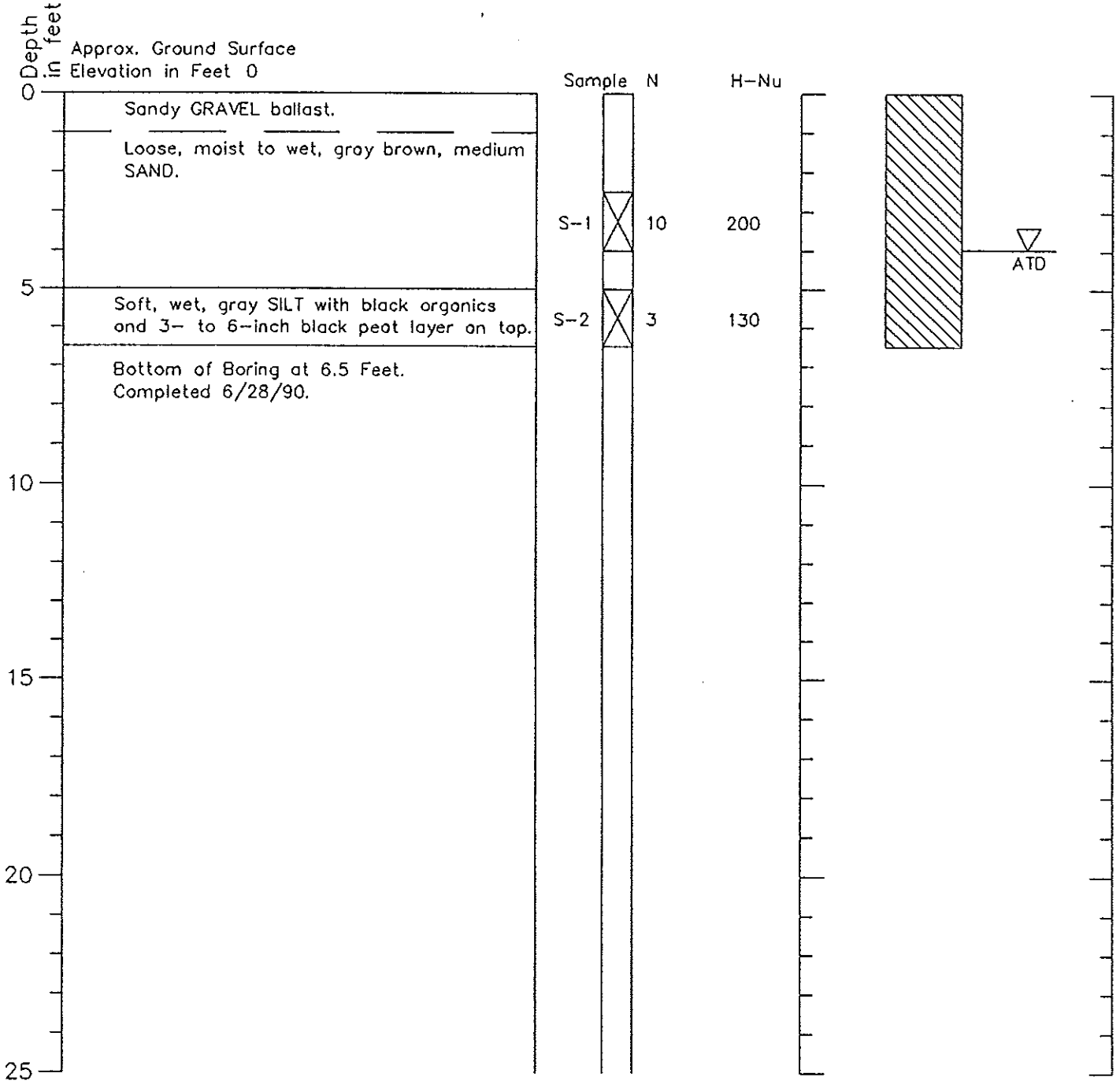
J-2395-06 6/90

Figure A-11

Boring Log E-1

Geologic Log

Boring Completion



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

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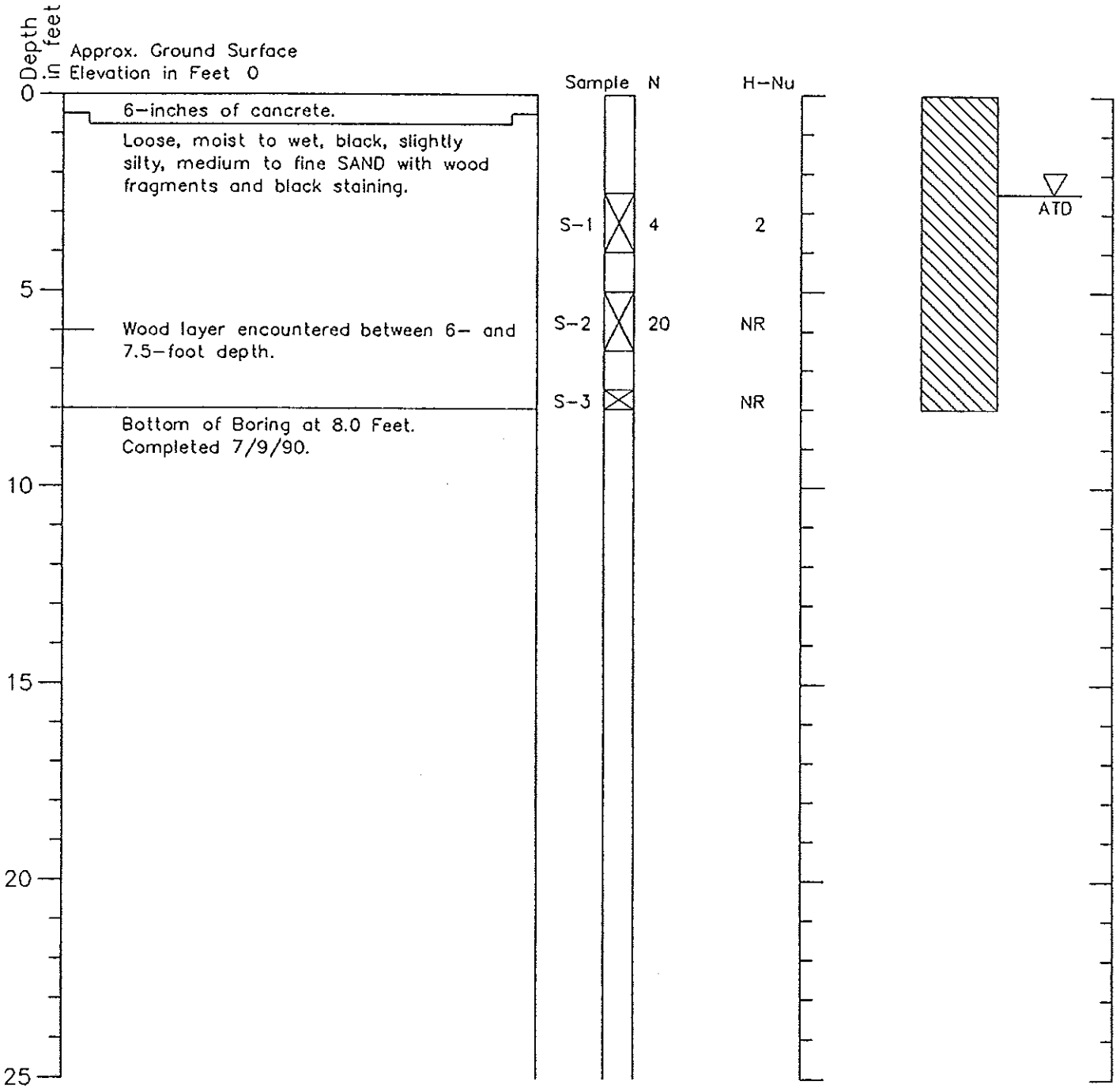
Figure A-12

Boring Log F-1

Geologic Log



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

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Figure A-13

1996 W East South End Environmental Assessment

EXPLORATORY TEST PIT LOG

PROJECT NAME	Weyerhaeuser - Everett Phase II	TEST PIT NO.	TP92- 1
LOCATION	Southend Landfill	PAGE	1 OF 1
DUG BY	A.L. Sleister	REFERENCE ELEV.	8.63'
METHOD	Trackhoe	TOTAL DEPTH	9.00'
LOGGED BY	Nick Garson	DATE COMPLETED	08/31/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
			5			**0 to 6.0 feet: MIXED WOOD DEBRIS/WOOD WASTE (WOOD)**, reddish brown to brown, contains bark, timbers, large branches/log fragments, damp. (FILL)
						@ 6.0 feet: water seeped rapidly.
						6.0 to 8.0 feet: SAND (SP), gray, fine to medium, with few fine to coarse gravel, trace silt, wet. (FILL)
						@ 8.0 feet: water gushing.
			10			**8.0 to 9.0 feet: CLAYEY SILT (ML/CL)**, brownish gray to gray, low to medium plasticity, wet. (ALLUVIUM)
						Bottom of Test Pit = 9.0 feet.
			15			
			20			
			25			
			30			

REMARKS

EXPLORATORY TEST PIT LOG

PROJECT NAME	Weyerhaeuser - Everett Phase II	TEST PIT NO.	TP92- 2
LOCATION	Southend Landfill	PAGE	1 OF 1
DUG BY	A.L. Sleister	REFERENCE ELEV.	9.32'
METHOD	Trackhoe	TOTAL DEPTH	20.00'
LOGGED BY	Nick Garson	DATE COMPLETED	08/31/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
			5			**0 to 4.0 feet: MIXED WOOD DEBRIS/WOOD WASTE (WOOD)**, reddish brown to brown, contains bark and few timbers, damp. (FILL)
			10			**4.0 to 5.0 feet: SANDY SILT (ML)**, dark brown to black with fine to medium gravel and slag?, peat-like, damp. (FILL)
			15			**5.0 to 9.5 feet: SAND (SP)**, gray, fine to medium, trace silt, moist. (FILL)
			20			@ 9.5 feet: water seeping slowly, sand unit partially caving with water seepage.
			25			**9.5 to 20.0 feet: CLAYEY SILT (ML/CL)**, organic-rich, brownish gray to gray, low to medium plasticity, peat-like with depth, wet at 9.5 to 10.0 feet, moist below 10.0 feet. (ALLUVIUM)
			30			Bottom of Test Pit = 20.0 feet.

REMARKS

EXPLORATORY TEST PIT LOG

PROJECT NAME	Weyerhaeuser - Everett Phase II	TEST PIT NO.	TP92-3
LOCATION	Southend Landfill	PAGE	1 OF 1
DUG BY	A.L. Sleister	REFERENCE ELEV.	12.99'
METHOD	Trackhoe	TOTAL DEPTH	20.00'
LOGGED BY	Nick Garson	DATE COMPLETED	08/31/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
			5			**0 to 9.5 feet: MIXED WOOD DEBRIS/WOOD WASTE (WOOD)**, reddish brown to brown, contains bark and small timbers, damp. (FILL)
			10			@ 9.5 feet: water seeped rapidly. **9.5 to 19.0 feet: CLAYEY SILT (ML/CL)**, brownish gray to gray, low to medium plasticity, 9.5 to 10.0 feet wet, moist below 10.0 feet, grades into a sandy silt with depth. (ALLUVIUM)
			15			
			20			**19.0 to 20.0 feet: SANDY SILT (ML)**, brownish gray, fine to medium, moist. (ALLUVIUM) Bottom of Test Pit = 20.0 feet.
			25			
			30			

REMARKS

EXPLORATORY TEST PIT LOG

PROJECT NAME	Weyerhaeuser - Everett Phase II	TEST PIT NO.	TP92- 4
LOCATION	Southend Landfill	PAGE	1 OF 1
DUG BY	A.L. Sleister	REFERENCE ELEV.	16.34'
METHOD	Trackhoe	TOTAL DEPTH	20.00'
LOGGED BY	Nick Garson	DATE COMPLETED	08/31/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
			5			**0 to 12.0 feet: MIXED WOOD DEBRIS/WOOD WASTE (WOOD)**, reddish brown to brown, contains bark and small timbers. (FILL)
			10			@ 12.0 feet: water seeping rapidly.
			15			**12.0 to 19.0 feet: CLAYEY SILT (ML/CL)**, brownish gray to gray, low to medium plasticity, 12.0 to 12.5 feet wet, moist below, grades into a sandy silt with depth. (ALLUVIUM)
			20			**19.0 to 20.0 feet: SANDY SILT (ML)**, brownish gray, fine to medium, moist. (ALLUVIUM)
			25			Bottom of Test Pit = 20.0 feet.
			30			

REMARKS

EXPLORATORY TEST PIT LOG

PROJECT NAME	Weyerhaeuser - Everett Phase II	TEST PIT NO.	TP92- 5
LOCATION	Southend Landfill	PAGE	1 OF 1
DUG BY	A.L. Sleister	REFERENCE ELEV.	18.59'
METHOD	Trackhoe	TOTAL DEPTH	20.00'
LOGGED BY	Nick Garson	DATE COMPLETED	08/31/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
			5, 10, 15, 20, 25, 30			**0 to 12.0 feet: MIXED WOOD DEBRIS/WOOD WASTE (WOOD)**, reddish brown to brown, contains bark and small timbers, damp. (FILL)
						@ 12.0 feet: water seeping rapidly.
						12.0 to 18.0 feet: SAND (SP), very dense, gray to black, medium to coarse, micaceous, porous, poorly to moderately well lithified, 12.0 to 12.5 feet wet, moist below 12.5 feet, frequency of cables and metallic objects increases with depth. (FILL)
						@ 18.0 feet: cables found.
						Bottom of Test Pit = 18.0 feet.

REMARKS

EXPLORATORY TEST PIT LOG

PROJECT NAME	Weyerhaeuser - Everett Phase II	TEST PIT NO.	TP92- 6
LOCATION	Southend Landfill	PAGE	1 OF 1
DUG BY	A.L. Sleister	REFERENCE ELEV.	13.80'
METHOD	Trackhoe	TOTAL DEPTH	20.00'
LOGGED BY	Nick Garson	DATE COMPLETED	08/31/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
TP92-6-S-1			5, 10, 15, 20, 25, 30			**0 to 9.0 feet: MIXED WOOD DEBRIS/WOOD WASTE** (WOOD), reddish brown to brown, contains bark and a few small timbers, damp. (FILL) **9.0 to 11.0 feet: MIXED SAND/WOOD WASTE** (OL/OH), dark brown to black, medium to coarse, organic rich, moist. (FILL) @ 11.0 feet: water seeping rapidly. **11.0 to 19.0 feet: CLAYEY SILT (ML/CL)**, brownish gray to gray, low to medium plasticity, 11.0 to 11.5 feet wet, moist below 11.5 feet, grades into a sandy silt. (ALLUVIUM) **19.0 to 20.0 feet: SANDY SILT (ML)**, brownish gray, fine to medium, wet. (ALLUVIUM) Bottom of Test Pit = 20.0 feet.

REMARKS

EXPLORATORY TEST PIT LOG

PROJECT NAME	Weyerhaeuser - Everett Phase II	TEST PIT NO.	TP92-7
LOCATION	Southend Landfill	PAGE	1 OF 1
DUG BY	A.L. Sleister	REFERENCE ELEV.	14.48'
METHOD	Trackhoe	TOTAL DEPTH	20.00'
LOGGED BY	Nick Garson	DATE COMPLETED	08/31/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
TP92-7-S-1			5, 10, 15, 20, 25, 30			**0 to 8.5 feet: MIXED WOOD DEBRIS/WOOD WASTE (WOOD)**, reddish brown to brown, contains bark, small timbers and large logs, damp. (FILL) @ 7.5 feet: crushed 55-gallon drum (contents unknown). **8.5 to 9.5 feet: GRAVEL (OL/OH)**, gray to black. (FILL) **9.5 to 11.5 feet: LIME WASTE (LW)**, white to gray, soft to firm. (FILL) **11.5 to 18.0 feet: CLAYEY SILT (ML/CL)**, brownish gray to gray, low to medium plasticity, 13.0 to 13.5 feet wet, moist below 13.5 feet, grades into a sandy silt. (ALLUVIUM) @ 13.0 feet: water seeping rapidly. @ 17.0 feet: remains of a 5-gallon container. **18.0 to 20.0 feet: SANDY SILT (ML)**, brownish gray, fine to medium, moist. (ALLUVIUM) Bottom of Test Pit = 20.0 feet.

REMARKS

EXPLORATORY TEST PIT LOG

PROJECT NAME	Weyerhaeuser - Everett Phase II	TEST PIT NO.	TP92- 8
LOCATION	Southend Landfill	PAGE	1 OF 1
DUG BY	A.L. Sleister	REFERENCE ELEV.	17.12'
METHOD	Trackhoe	TOTAL DEPTH	20.00'
LOGGED BY	Nick Garson	DATE COMPLETED	08/31/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
			5			**0 to 11.0 feet: MIXED WOOD DEBRIS/WOOD WASTE (WOOD)**, reddish brown to brown, contains bark, small timbers and a few large logs, damp. (FILL)
			10			@ 11.0 feet: water seeping rapidly.
TP92-8-S-1						**11.0 to 12.5 feet: MIXED SAND/WOOD WASTE (OL/OH)**, dark brown to black, medium to coarse, organic rich, 11.0 to 11.5 feet wet, moist below 11.5 feet. (FILL)
			15			**12.5 to 20.0 feet: CLAYEY SILT (ML/CL)**, brownish gray to gray, low to medium plasticity, moist. (ALLUVIUM)
			20			Bottom of Test Pit = 20.0 feet.
			25			
			30			

REMARKS

EXPLORATORY TEST PIT LOG

PROJECT NAME	Weyerhaeuser - Everett Phase II	TEST PIT NO.	TP92- 9
LOCATION	Southend Landfill	PAGE	1 OF 1
DUG BY	A.L. Sleister	REFERENCE ELEV.	15.28'
METHOD	Trackhoe	TOTAL DEPTH	20.00'
LOGGED BY	Nick Garson	DATE COMPLETED	08/31/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
			5			**0 to 11.0 feet: MIXED WOOD DEBRIS/WOOD WASTE (WOOD)**, reddish brown to brown, contains bark and small timbers, damp. (FILL)
			10			@ 11.0 feet: water seeping slow to moderately.
			15			**11.0 to 18.0 feet: MIXED SAND/WOOD WASTE (OL/OH)**, dark brown to black, medium to coarse, organic rich, 11.0 to 11.5 feet wet, moist below 11.5 feet. (FILL)
			20			**18.0 to 20.0 feet: CLAYEY SILT (ML/CL)**, brownish gray to gray, low to medium plasticity, moist. (ALLUVIUM)
			25			Bottom of Test Pit = 20.0 feet.
			30			

REMARKS

EXPLORATORY TEST PIT LOG

PROJECT NAME	Weyerhaeuser - Everett Phase II	TEST PIT NO.	TP92-10
LOCATION	Southend Landfill	PAGE	1 OF 1
DUG BY	A.L. Sleister	REFERENCE ELEV.	14.74'
METHOD	Trackhoe	TOTAL DEPTH	18.00'
LOGGED BY	Nick Garson	DATE COMPLETED	09/01/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
			5			**0 to 8.0 feet: MIXED WOOD DEBRIS/WOOD WASTE (WOOD)**, reddish brown to brown, bark, various metallic objects, a large plastic container, damp. (FILL)
TP92-9-S-1			10			**8.0 to 11.0 feet: LIME WASTE (LW)**, white to gray, soft to firm. (FILL)
			15			**11.0 to 15.0 feet: MIXED SAND, WOOD WASTE AND DEBRIS (WOOD)**, dark brown to black, medium to coarse, organic rich, wet @ 12.0 to 12.5 feet, moist below 12.5 feet, includes wire, metal, and some scattered lime. (FILL) @ 12.0 feet: water seeping rapidly. **15.0 to 18.0 feet: CLAYEY SILT (ML/CL)**, brownish gray to gray, low to medium plasticity, scattered roots and organic material, moist. (ALLUVIUM) Bottom of Test Pit = 18.0 feet.
			20			
			25			
			30			

REMARKS

EXPLORATORY TEST PIT LOG

PROJECT NAME	**Weyerhaeuser - Everett Phase II**	TEST PIT NO.	**TP92-11**
LOCATION	**Southend Landfill**	PAGE	**1 OF 1**
DUG BY	**A.L. Sleister**	REFERENCE ELEV.	**16.25'**
METHOD	**Trackhoe**	TOTAL DEPTH	**16.00'**
LOGGED BY	**Nick Garson**	DATE COMPLETED	**09/01/92**

SAMPLING METHOD AND NUMBER	PID (in ppm)	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
			5			**0 to 10.0 feet: MIXED WOOD DEBRIS/WOOD WASTE (WOOD)**, reddish brown to brown, layered, contains bark, timbers, scattered piping and wire, damp. (FILL)
			10			**10.0 to 10.5 feet: LIME WASTE (LW)**, whitish brown, moist, soft to firm. (FILL)
TP92-11-S-1			15			**10.5 to 15.0 feet: SAND (SP)**, dark gray, fine to medium with few fine to coarse gravel, occasional timbers, wood waste, nails and metal debris, wet at 10.5 to 11.0 feet, moist below. (FILL) @ 11.0 feet: water seeping slowly. **15.0 to 16.0 feet: CLAYEY SILT (ML/CL)**, brownish gray to gray, low to medium plasticity, wet. (ALLUVIUM)
			20			Bottom of Test Pit = 16.0 feet.
			25			
			30			

REMARKS

EXPLORATORY TEST PIT LOG

PROJECT NAME	Weyerhaeuser - Everett Phase II	TEST PIT NO.	TP92-12
LOCATION	Southend Landfill	PAGE	1 OF 1
DUG BY	A.L. Sleister	REFERENCE ELEV.	16.03'
METHOD	Trackhoe	TOTAL DEPTH	16.00'
LOGGED BY	Nick Garson	DATE COMPLETED	09/01/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
			0			**0 to 9.0 feet: MIXED WOOD DEBRIS/WOOD WASTE (WOOD)**, reddish brown to brown, contains bark and a few small timbers, damp. (FILL)
			5			
						@ 9.0 feet: water seeping slowly.
TP92-12-S-1			10			**9.0 to 15.0 feet: MIXED SAND, WOOD WASTE AND LIME WASTE (OL/OH)**, whitish brown (lime) to dark gray (fill), fine to medium with scattered gravel, organic rich, contains occasional timbers, wood waste, wires, and metal debris, 9.0 to 9.5 feet wet, moist below 9.5 feet. (FILL) @ 11.0 feet: 55-gallon drum lid.
			15			**15.0 to 16.0 feet: CLAYEY SILT (ML/CL)**, brownish gray to gray, low to medium plasticity, 9.0 to 9.5 feet wet, moist below 9.5 feet. (ALLUVIUM)
			20			Bottom of Test Pit = 16.0 feet.
			25			
			30			

REMARKS

EXPLORATORY TEST PIT LOG

PROJECT NAME	Weyerhaeuser - Everett Phase II	TEST PIT NO.	TP92-13
LOCATION	Southend Landfill	PAGE	1 OF 1
DUG BY	A.L. Sleister	REFERENCE ELEV.	17.01'
METHOD	Trackhoe	TOTAL DEPTH	16.00'
LOGGED BY	Nick Garson	DATE COMPLETED	09/01/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
TP92-13-S-1			5, 10, 15, 20, 25, 30			0 to 10.5 feet: **MIXED WOOD DEBRIS/WOOD WASTE (WOOD)**, reddish brown to brown, contains bark and a few small timbers, damp. (FILL) **10.5 to 11.5 feet: LIME WASTE (FILL)**, thin, interlayered lime waste layers, gray to white, soft to firm. @ 11.0 feet: water seeping rapidly. **11.5 to 14.0 feet: MIXED SAND, WOOD WASTE, AND LIME WASTE (OL/OH)**, dark brown to black, fine to coarse with scattered gravel, contains rags and timber, 11.0 to 11.5 feet wet, moist below 11.5 feet. (FILL) **14.0 to 16.0 feet: CLAYEY SILT (ML/CL)**, brownish gray to gray, low to medium plasticity, contains minor wood waste, moist. (ALLUVIUM) Bottom of Test Pit = 16.0 feet.

REMARKS

EXPLORATORY TEST PIT LOG

PROJECT NAME	Weyerhaeuser - Everett Phase II	TEST PIT NO.	TP92-14
LOCATION	Southend Landfill	PAGE	1 OF 1
DUG BY	A.L. Sleister	REFERENCE ELEV.	17.61'
METHOD	Trackhoe	TOTAL DEPTH	15.00'
LOGGED BY	Nick Garson	DATE COMPLETED	09/01/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
			5			**0 to 13.0 feet: MIXED WOOD WASTE/WOOD DEBRIS (WOOD)**, reddish brown to brown, contains bark and small timbers, damp. (FILL)
			10			
TP92-14-S-1			15			**13.0 to 15.0 feet: MIXED SAND/WOOD WASTE (OL/OH)**, dark brown to black, fine to medium with scattered gravel and cobbles, contains piping and metallic cables, wet. (FILL) @ 14.0 feet: water seeping rapidly. Bottom of Test Pit = 15.0 feet.
			20			
			25			
			30			

REMARKS

EXPLORATORY TEST PIT LOG

PROJECT NAME	Weyerhaeuser - Everett Phase II	TEST PIT NO.	TP92-15
LOCATION	Southend Landfill	PAGE	1 OF 1
DUG BY	A.L. Sleister	REFERENCE ELEV.	19.13'
METHOD	Trackhoe	TOTAL DEPTH	18.00'
LOGGED BY	Nick Garson	DATE COMPLETED	09/01/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
			5			**0 to 12.0 feet: MIXED WOOD DEBRIS/WOOD WASTE (WOOD)**, reddish brown to brown, contains bark and small timbers, damp. (FILL)
			10			
			15			**12.0 to 16.0 feet: MIXED SAND/WOOD WASTE (OL/OH)**, dark gray, fine to coarse with scattered gravel and cobbles, organic rich, 13.0 to 13.5 feet wet, moist below 13.5 feet, contains white kiln bricks, timbers, wires and metallic debris. (FILL)
TP92-15-S-1						@ 13.0 feet: water seeping rapidly.
			20			**16.0 to 18.0 feet: CLAYEY SILT (ML/CL)**, brownish gray to gray, low to medium plasticity, contains wood waste, moist. (ALLUVIUM)
			25			Bottom of Test Pit = 18.0 feet.
			30			

REMARKS

EXPLORATORY TEST PIT LOG

PROJECT NAME	Weyerhaeuser - Everett Phase II	TEST PIT NO.	TP92-16
LOCATION	Southend Landfill	PAGE	1 OF 1
DUG BY	A.L. Sleister	REFERENCE ELEV.	18.12'
METHOD	Trackhoe	TOTAL DEPTH	18.00'
LOGGED BY	Nick Garson	DATE COMPLETED	09/01/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
			5			**0 to 11.0 feet: MIXED WOOD DEBRIS/WOOD WASTE (WOOD)**, reddish brown to brown, layered, contains bark and small timbers, damp. (FILL)
			10			
TP92-16-S-1						**11.0 to 13.0 feet: LIME WASTE (FILL)**, gray to white, soft to firm.
						@ 11.0 feet: water seeping slowly.
			15			**13.0 to 17.0 feet: MIXED SAND, WOOD DEBRIS AND LIME WASTE (OL/OH)**, dark gray, fine to coarse with abundant gravel, 11.0 to 11.5 feet wet, moist below 11.5 feet, contains wood debris, logs, pipes, and metallic objects increasing with depth.
						17.0 to 18.0 feet: CLAYEY SILT (ML/CL), brownish gray to gray, low to medium plasticity, moist. (ALLUVIUM)
			20			Bottom of Test Pit = 18.0 feet.
			25			
			30			

REMARKS

EXPLORATORY TEST PIT LOG

PROJECT NAME	Weyerhaeuser - Everett Phase II	TEST PIT NO.	TP92-16A
LOCATION	Southend Landfill	PAGE	1 OF 1
DUG BY	A.L. Sleister	REFERENCE ELEV.	18.06'
METHOD	Trackhoe	TOTAL DEPTH	18.00'
LOGGED BY	Nick Garson	DATE COMPLETED	09/01/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
			5			**0 to 10.5 feet: MIXED WOOD DEBRIS/WOOD WASTE (WOOD)**, reddish brown to brown, contains bark and a few timbers. (FILL)
			10			**10.5 to 11.5 feet: LIME WASTE (LW).** (FILL) @ 11.0 to 11.5 feet: water seeping slowly.
TP92-16A-S-1			15			**11.5 to 17.0 feet: MIXED SAND/WOOD WASTE (OL/OH)**, dark gray, fine to coarse with abundant gravel, and cobbles, contains wood debris and metallic objects, 11.5 to 12.0 feet wet, moist below 12.0 feet, grades into CLAYEY SILT. (FILL)
			20			**17.0 to 18.0 feet: CLAYEY SILT (ML/CL)**, brownish gray to gray, low to medium plasticity, moist. (ALLUVIUM)
			25			Bottom of Test Pit = 18.0 feet.
			30			

REMARKS

EXPLORATORY TEST PIT LOG

PROJECT NAME	Weyerhaeuser - Everett Phase II	TEST PIT NO.	TP92-17
LOCATION	Southend Landfill	PAGE	1 OF 1
DUG BY	A.L. Sleister	REFERENCE ELEV.	9.79'
METHOD	Trackhoe	TOTAL DEPTH	8.00'
LOGGED BY	Nick Garson	DATE COMPLETED	09/01/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
TP92-S-1			5, 10, 15, 20, 25, 30			**0 to 2.0 feet: SOIL (OL/OH)**, dark brown, organic rich, contains roots, pebbles, cobbles, damp. Relatively scarce timbers and wood debris. **2.0 to 6.0 feet: SAND (SP/SM)**, light brown to dark brown, fine to coarse with gravel and pebbles, moist, very little wood debris. (ALLUVIUM) @ 6.0 feet: water seeping rapidly. **6.0 to 8.0 feet: CLAYEY SILT (ML/CL)**, brownish gray to gray, low to medium plasticity, 6.0 to 6.5 feet wet, moist below 6.5 feet. (ALLUVIUM) Bottom of Test Pit = 8.0 feet.

REMARKS

EXPLORATORY TEST PIT LOG

PROJECT NAME	Weyerhaeuser - Everett Phase II	TEST PIT NO.	TP92-18
LOCATION	Southend Landfill	PAGE	1 OF 1
DUG BY	A.L. Sleister	REFERENCE ELEV.	6.51'
METHOD	Trackhoe	TOTAL DEPTH	12.00'
LOGGED BY	Nick Garson	DATE COMPLETED	09/01/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
			5			**0 to 3.0 feet: SOIL (OL/OH), dark brown, organic rich, contains roots, pebbles, cobbles, damp.** @ 3.0 feet: very slight water seepage. **3.0 to 4.0 feet: SAND (SP/SM), light brown to dark brown, fine to coarse with gravel and pebbles, little to no wood debris, moist. (ALLUVIUM)** **4.0 to 12.0 feet: CLAYEY SILT (ML/CL), brownish gray to gray, low to medium plasticity, moist (wet @ 3.0, 5.0, and 11.0 feet). (ALLUVIUM)** @ 5.0 feet: water seeping slowly @ 11.0 feet: water seeping very rapidly.
			10			
			15			Bottom of Test Pit = 12.0 feet.
			20			
			25			
			30			

REMARKS

EXPLORATORY TEST PIT LOG

PROJECT NAME	Weyerhaeuser - Everett Phase II	TEST PIT NO.	TP92-19
LOCATION	Southend Landfill	PAGE	1 OF 1
DUG BY	A.L. Sleister	REFERENCE ELEV.	6.37'
METHOD	Trackhoe	TOTAL DEPTH	6.00'
LOGGED BY	Nick Garson	DATE COMPLETED	09/01/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
TP92-19-S-1			5, 10, 15, 20, 25, 30			0 to 2.5 feet: SOIL (OL/OH), dark brown, organic rich, contains roots, pebbles, cobbles, kiln bricks, and timbers. 2.5 to 3.5 feet: SAND (SP/SM), light brown to dark brown, fine to coarse with gravel and pebbles, moist, little to no wood debris. (ALLUVIUM) @ 3.5 feet: water seeping rapidly. 3.5 to 6.0 feet: CLAYEY SILT (ML/CL), brownish gray to gray, low to medium plasticity, 3.5 to 4.0 feet wet, moist below 4.0 feet. (ALLUVIUM) Bottom of Test Pit = 6.0 feet.

REMARKS

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser Everett	BORING NO.	WP 01
LOCATION	South End Landfill	PAGE	1 OF 2
DRILLED BY	Ramlo Drilling	GROUND ELEV.	
DRILL METHOD	Hollow Stem Auger	TOTAL DEPTH	21.50'
LOGGED BY	H. Corner	DATE COMPLETED	08/01/95

SAMPLING METHOD	PID (in ppm)	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
			0 to 1.5 feet: WOOD CHIPS, brown, trace fine to coarse gravel, moist. (FILL)
	>2000	5-2-3	**1.5 to 5.5 feet: SAND (SP),** dark gray, with few fines, few gravel, and trace wood chips, moist. Transition from overlying wood chips to underlying alluvial sediments. (ALLUVIUM)
	1218	1-1-1	**5.5 to 13.0 feet: SILT (MH),** light gray, medium plasticity, few to little organic materials, trace fine gravels, moist. (ALLUVIUM)
	>2000	1-1-2	**13.0 to 18.0 feet: SILTY CLAYEY SAND (SM-SC),** light gray, clay slightly plastic, trace organic material, moist to wet. (ALLUVIUM)
			18.0 to 21.5 feet: SAND (SP), gray, medium, trace coarse, wet. (ALLUVIUM)

GROUND WATER LEVELS: ▽ ATD

DEPTH IN FEET: 5, 10, 15, 20

ABANDONMENT DETAILS

LITHOLOGIC COLUMN

SAMPLES

REMARKS

Open triangle = water level observed in boring during drilling.
ATD = at time of drilling.

EMCON

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser Everett	BORING NO.	WP 01
LOCATION	South End Landfill	PAGE	2 OF 2
DRILLED BY	Ramlo Drilling	GROUND ELEV.	
DRILL METHOD	Hollow Stem Auger	TOTAL DEPTH	21.50'
LOGGED BY	H. Corner	DATE COMPLETED	08/01/95

SAMPLING METHOD	PID (in ppm)	BLOWS PER 6 INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	ABANDONMENT DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
	>2000	1-3-10						**18.0 to 21.5 feet: SAND (SP),** continued.

Total depth drilled = 20.0 feet.
Total depth sampled = 21.5 feet.

BORING ABANDONMENT DETAILS:

0 to 1.0 foot: Slough.
1.0 to 2.5 feet: Bentonite chips.
2.5 to 17.0 feet: Bentonite slurry.
17.0 to 21.5 feet: Native material (heave).

NOTES:

Approximately 3 feet of native material heaved into inside of auger after drilling to maximum explored depth.

Temporary well point screen was set from 20.0 to 23.0 feet, into heaving sands and undisturbed soil.

Temporary well point was removed after sampling.

25
30
35
40

REMARKS
Open triangle = water level observed in boring during drilling.
ATD = at time of drilling.

EMCON

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser Everett	BORING NO.	WP 02
LOCATION	South End Landfill	PAGE	1 OF 2
DRILLED BY	Ramlo Drilling	GROUND ELEV.	
DRILL METHOD	Hollow Stem Auger	TOTAL DEPTH	26.50'
LOGGED BY	H. Comer	DATE COMPLETED	08/01/95

SAMPLING METHOD	PID (in ppm)	BLOWS PER 6 INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	ABANDONMENT DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
								0 to 8.5 feet: WOOD CHIPS, reddish-brown, moist. (FILL)
	> 2000	4-4-6		5				
	> 2000	6-15-11		10				**8.5 to 11.5 feet: SAND (SP),** dark gray to black, medium to coarse, some peat, trace to few fine gravel, damp to slightly wet. Transition from overlying wood chips to underlying alluvial sediments. (ALLUVIUM)
	--	3-3-2		15				**11.5 to 21.0 feet: INTERBEDDED CLAYEY SILT AND SAND (MH/SC),** medium to dark gray, fine sand, medium plasticity silt and clay, few fine gravel, trace organic material, moist to wet. (ALLUVIUM) @ 13.0 to 15.0 feet: perched water.
				20				

REMARKS

Open triangle = water level observed in boring during drilling.
ATD = at time of drilling.

EMCON

LOG OF EXPLORATORY BORING

PROJECT NAME	**Weyerhaeuser Everett**	BORING NO.	**WP 02**
LOCATION	**South End Landfill**	PAGE	**2 OF 2**
DRILLED BY	**Ramlo Drilling**	GROUND ELEV.	
DRILL METHOD	**Hollow Stem Auger**	TOTAL DEPTH	**26.50'**
LOGGED BY	**H. Corner**	DATE COMPLETED	**08/01/95**

SAMPLING METHOD	PID (in ppm)	BLOWS PER 6 INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	ABANDONMENT DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
	>2000	2-3-8	▽ ATD					**11.5 to 21.0 feet: INTERBEDDED CLAYEY SILT AND SAND (MH/SC)**, continued.
								21.0 to 26.5 feet: SAND (SP), gray, medium, trace to few coarse, trace fine, wet. (ALLUVIUM)
	135	NM		25				
				30				Total depth drilled = 25.0 feet. Total depth sampled = 26.5 feet. **BORING ABANDONMENT DETAILS:** 0 to 0.5 foot: Slough. 0.5 to 2.0 feet: Bentonite chips. 2.0 to 22.0 feet: Bentonite slurry. 22.0 to 26.5 feet: Native material (heave). NOTES: Approximately 3 feet of native material heaved into inside of auger after drilling to maximum explored depth. Temporary well point screen was set from 22.0 to 25.0 feet, into heaving sands. Temporary well point was removed after sampling.
				35				
				40				

REMARKS

Open triangle = water level observed in boring during drilling.
ATD = at time of drilling.

EMCON

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser Everett	BORING NO.	WP 03
LOCATION	South End Landfill	PAGE	1 OF 2
DRILLED BY	Ramlo Drilling	GROUND ELEV.	
DRILL METHOD	Hollow Stem Auger	TOTAL DEPTH	26.50'
LOGGED BY	H. Corner	DATE COMPLETED	08/02/95

SAMPLING METHOD	PID (in ppm)	BLOWS PER 6 INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	ABANDONMENT DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
								0 to 10.5 feet: WOOD CHIPS, red-brown, slightly moist. Below 8.0 feet, red-brown to dark gray, trace to few fine to coarse gravel, trace fines, trace fine to medium sand, moist. (FILL)
	16	7-10-7		5				
	>2000	7-14-20		10				**10.5 to 23.0 feet: INTERBEDDED CLAYEY SAND AND CLAY (SC/CH)**, gray, fine sand, medium to high plasticity clay, damp. (ALLUVIUM)
	--	1-3-3		15				
			▽	20				

REMARKS

Open triangle = water level observed in boring during drilling.
ATD = at time of drilling.

EMCON

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser Everett	BORING NO.	WP 03
LOCATION	South End Landfill	PAGE	2 OF 2
DRILLED BY	Ramlo Drilling	GROUND ELEV.	
DRILL METHOD	Hollow Stem Auger	TOTAL DEPTH	26.50'
LOGGED BY	H. Corner	DATE COMPLETED	08/02/95

SAMPLING METHOD	PID (in ppm)	BLOWS PER 6 INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	ABANDONMENT DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
	1300	1-2-3	ATD					**10.5 to 23.0 feet: INTERBEDDED CLAYEY SAND AND CLAY (SC/CH),** continued.
	400	3-3-14		25				**23.0 to 26.5 feet: SAND WITH SILT (SP-SM),** gray, medium, few fine, few coarse, low plasticity silt, wet. (ALLUVIUM)
				30				Total depth drilled = 25.0 feet. Total depth sampled = 26.5 feet. **BORING ABANDONMENT DETAILS:** 0 to 1.0 foot: Slough. 1.0 to 2.5 feet: Bentonite chips. 2.5 to 21.0 feet: Bentonite slurry. 21.0 to 26.5 feet: Native material (heave). NOTES: Approximately 4 feet of native material heaved into inside of auger after drilling to maximum explored depth. Temporary well point screen was set from 23.0 to 26.0 feet, into heaving sands. Temporary well point was removed after sampling.
				35				
				40				

REMARKS

Open triangle = water level observed in boring during drilling.
ATD = at time of drilling.

EMCON

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser Everett	BORING NO.	WP 04
LOCATION	South End Landfill	PAGE	1 OF 3
DRILLED BY	Ramlo Drilling	GROUND ELEV.	
DRILL METHOD	Hollow Stem Auger	TOTAL DEPTH	36.50'
LOGGED BY	H. Corner	DATE COMPLETED	08/02/95

SAMPLING METHOD	PID (in ppm)	BLOWS PER 6 INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	ABANDONMENT DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
								0 to 8.0 feet: WOOD CHIPS, brown-red, slightly moist. (FILL)
	>2000	6-6-8		5				
								8.0 to 16.0 feet: SAND (SP), brown-gray to black, fine to medium, few fines, few coarse sand, trace fine gravel, trace wood chips. (FILL)
	>2000	8-7-17		10				
								@ 11.5 feet: possible lime particles interlayered with sand.
	>2000	3-11-3	▽ ATD	15				
								16.0 to 25.5 feet: INTERBEDDED CLAYEY SILT AND SAND (MH/SC), gray, medium to high plasticity silt and clay, fine sand, little organic material, moist to wet, trace medium to coarse sand below 23.0 feet. (ALLUVIUM)
				20				

REMARKS

Open triangle = water level observed in boring during drilling.
ATD = at time of drilling.

EMCON

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser Everett	BORING NO.	WP 04
LOCATION	South End Landfill	PAGE	2 OF 3
DRILLED BY	Ramlo Drilling	GROUND ELEV.	
DRILL METHOD	Hollow Stem Auger	TOTAL DEPTH	36.50'
LOGGED BY	H. Corner	DATE COMPLETED	08/02/95

SAMPLING METHOD	PID (in ppm)	BLOWS PER 6 INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	ABANDONMENT DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
	>2000	1-2-3						**16.0 to 25.5 feet: INTERBEDDED CLAYEY SILT AND SAND (MH/SC)**, continued.
	>2000	3-9-12		25				@ 25.0 to 36.0 feet: heaving sands.
								25.5 to 36.5 feet: SAND (SP), gray, medium, trace fine to coarse, sand, wet. (ALLUVIUM)
	–	5-9-20		30				
	--	10-7-10		35				
				40				Total depth drilled = 35.0 feet. Total depth sampled = 36.5 feet. See Page 3 for Boring Abandonment Details.

REMARKS

Open triangle = water level observed in boring during drilling.
ATD = at time of drilling.

EMCON

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser Everett	BORING NO.	WP 04
LOCATION	South End Landfill	PAGE	3 OF 3
DRILLED BY	Ramlo Drilling	GROUND ELEV.	
DRILL METHOD	Hollow Stem Auger	TOTAL DEPTH	36.50'
LOGGED BY	H. Corner	DATE COMPLETED	08/02/95

SAMPLING METHOD	PID (in ppm)	BLOWS PER 6 INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	ABANDONMENT DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION

45

50

55

60

BORING ABANDONMENT DETAILS:

0 to 1.5 foot: Slough.
1.5 to 2.5 feet: Bentonite chips.
2.5 to 25.0 feet: Bentonite slurry.
25.0 to 36.5 feet: Native material (heave).

NOTES:

Approximately 10 feet of native material heaved into inside of auger after drilling to maximum explored depth.

Temporary well point screen was set from 25.0 to 28.0 feet, into heaving sands.

Temporary well point was removed after sampling.

REMARKS

Open triangle = water level observed in boring during drilling.
ATD = at time of drilling.

EMCON

LOG OF EXPLORATORY BORING

PROJECT NAME Weyerhaeuser Everett
LOCATION South End Landfill
DRILLED BY Ramlo Drilling
DRILL METHOD Hollow Stem Auger
LOGGED BY H. Corner

BORING NO. WP 05
PAGE 1 OF 3
GROUND ELEV.
TOTAL DEPTH 36.50'
DATE COMPLETED 08/02/95

SAMPLING METHOD	PID (in ppm)	BLOWS PER 6 INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	ABANDONMENT DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
	--	3-3-4		5				**0 to 8.5 feet: WOOD CHIPS**, red-brown, moist, few to little silty sand below 3.5 feet. (FILL)
	>2000	1-1-1		10				**8.5 to 19.0 feet: SILT (MH)**, gray, high plasticity, low toughness, some organic material, moist to 18.0 feet, wet below 18.0 feet. (ALLUVIUM)
	2000	1/6"-1/2"	▽ ATD	15				
				20				**19.0 to 36.5 feet: INTERBEDDED CLAYEY SILT AND SAND (MH/SC)**, see Page 2 for description.

REMARKS
Open triangle = water level observed in boring during drilling.
ATD = at time of drilling.

EMCON

LOG OF EXPLORATORY BORING

PROJECT NAME Weyerhaeuser Everett
LOCATION South End Landfill
DRILLED BY Ramlo Drilling
DRILL METHOD Hollow Stem Auger
LOGGED BY H. Corner

BORING NO. WP 05
PAGE 2 OF 3
GROUND ELEV.
TOTAL DEPTH 36.50'
DATE COMPLETED 08/02/95

SAMPLING METHOD	PID (in ppm)	BLOWS PER 6 INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	ABANDONMENT DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
	--	3-10-9						**19.0 to 36.5 feet: INTERBEDDED CLAYEY SILT AND SAND (MH/SC)**, continued: gray, medium to high plasticity silt and clay, fine to medium sand, trace to little fine gravel, trace to little organic material, moist to 20.5 feet, wet below 20.5 feet. (ALLUVIUM)
	--	2-6-7		25				
	--	4-9-8		30				
	--	2-2-11		35				
				40				Total depth drilled = 35.0 feet. Total depth sampled = 36.5 feet. See Page 3 for Boring Abandonment Details.

REMARKS
Open triangle = water level observed in boring during drilling.
ATD = at time of drilling.

EMCON

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser Everett	BORING NO.	WP 05
LOCATION	South End Landfill	PAGE	3 OF 3
DRILLED BY	Ramlo Drilling	GROUND ELEV.	
DRILL METHOD	Hollow Stem Auger	TOTAL DEPTH	36.50'
LOGGED BY	H. Corner	DATE COMPLETED	08/02/95

SAMPLING METHOD	PID (in ppm)	BLOWS PER 6 INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	ABANDONMENT DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION

45

50

55

60

BORING ABANDONMENT DETAILS:

0 to 1.0 foot: Slough.
1.0 to 2.5 feet: Bentonite chips.
2.5 to 32.0 feet: Bentonite slurry.
32.0 to 36.5 feet: Native material (heave).

NOTES:

Approximately 3 feet of native material heaved into inside of auger after drilling to maximum explored depth.

Temporary well point screen was set from 32.0 to 35.0 feet, into heaving sand and silt.

Temporary well point was removed after sampling.

REMARKS

Open triangle = water level observed in boring during drilling.
ATD = at time of drilling.

EMCON

2005 Sierra Pacific

PROJECT: SPI Everett
Everett, Washington

Log of Boring No. GP-01

BORING LOCATION: North Area

ELEVATION AND DATUM: 13.65 feet MLLW

DRILLING CONTRACTOR: ESN Northwest, Inc.

DATE STARTED: 5/10/05

DATE FINISHED: 5/10/05

DRAFT

DRILLING METHOD: Direct push

TOTAL DEPTH (ft.): 21.0

MEASURING POINT: Ground surface

DRILLING EQUIPMENT: Geoprobe 5400

DEPTH TO WATER (ft.): FIRST 7.0 COMPL. 7.0

SAMPLING METHOD: Geoprobe macro-core sampler [4' x 1.5" & 3' x 1.5"]

LOGGED BY: J. Morrice

HAMMER WEIGHT: NA DROP: NA

RESPONSIBLE PROFESSIONAL: J. Morrice REG. NO. L.Hg. 795

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM READING (ppm)	DESCRIPTION: NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	REMARKS
					Surface Elevation: 13.65 feet	
0					POORLY GRADED SAND (SP): brown (10YR 5/3), moist, 95% fine sand, 5% non-plastic fines	
1					SILT (ML): brown (10YR 5/3), moist, 95% fines, 5% gravel, non-plastic, soft	
2						
3					dark brown wood	
4					POORLY GRADED SAND (SP): brown (10YR 5/3), moist, 95% medium sand, 5% non-plastic fines	
5	GP-04 1-10					
6						
7					wet	Grab groundwater sample GP-01 S collected through 1-inch OD PVC temporary well casing; 3 feet of well screen (0.010-inch slot size) placed in borehole from 7 to 10 feet bgs.
8						
9						
10					LEAN CLAY (CL): dark grayish brown (10YR 4/2), wet, 100% fines, medium plasticity, soft, rootlets	
11						
12						
13						
14					5% fine sand	
15						

PROJECT: SPI Everett
Everett, Washington

Log of Boring No. GP-01 (cont'd)

DRAFT

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	REMARKS
16					LEAN CLAY (CL): (cont'd)	
17					POORLY GRADED SAND (SP): gray (N 5/), wet, 95% medium sand, 5% non-plastic fines	
18						Grab groundwater sample GP-01 D collected through 1-inch OD PVC temporary well casing; 3 feet of well screen (0.010-inch slot size) placed in borehole from 18 to 21 feet bgs.
19						
20						
21					Bottom of boring at 21 feet.	
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						
33						

PROJECT: SPI Everett Everett, Washington	**Log of Boring No. GP-02**
BORING LOCATION: North Area	ELEVATION AND DATUM: 13.94 feet MLLW
DRILLING CONTRACTOR: ESN Northwest, Inc.	DATE STARTED: 5/10/05 — DATE FINISHED: 5/10/05
DRILLING METHOD: Direct push	TOTAL DEPTH (ft.): 21.0 — MEASURING POINT: Ground surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER (ft.): FIRST 7.0 — COMPL. 7.0
SAMPLING METHOD: Geoprobe macro-core sampler [4' x 1.5" & 3' x 1.5"]	LOGGED BY: J. Morrice
HAMMER WEIGHT: NA — DROP: NA	RESPONSIBLE PROFESSIONAL: J. Morrice — REG. NO. L.Hg. 795

DRAFT

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 13.94 feet	REMARKS
1	GP-02 1-10				POORLY GRADED SAND (SP): brown (10YR 5/3), moist, 95% fine sand, 5% non-plastic fines	
2					SILT (ML): dark grayish brown (10YR 4/2), moist, 90% fines, 10% gravel, non-plastic, firm	
3						Grab groundwater sample GP-02 S collected through 1-inch OD PVC temporary well casing; 3 feet of well screen (0.010-inch slot size) placed in borehole from 7 to 10 feet bgs.
4						
5						
6					dark brown wood	
7					POORLY GRADED SAND (SP): gray (N 5/), wet, 95% medium sand, 5% non-plastic fines	
8						
9						
10					LEAN CLAY (CL): gray (N 5/), wet, 100% fines, medium plasticity, soft, rootlets	
11						
12						
13						
14						
15						

PROJECT: SPI Everett
Everett, Washington

Log of Boring No. GP-02 (cont'd)

DRAFT

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	REMARKS
16					LEAN CLAY (CL): (cont'd)	
17					POORLY GRADED SAND (SP): gray (N 5/), wet, 95% medium to coarse sand, 5% non-plastic fines	
18						Grab groundwater sample GP-02 D collected through 1-inch OD PVC temporary well casing; 3 feet of well screen (0.010-inch slot size) placed in borehole from 18 to 21 feet bgs.
19						
20						
21					Bottom of boring at 21 feet.	
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						
33						

OAKBOREV (REV. 3/00)

PROJECT: SPI Everett Everett, Washington	**Log of Boring No. GP-03**
BORING LOCATION: North Area	ELEVATION AND DATUM: 14.20 feet MLLW
DRILLING CONTRACTOR: ESN Northwest, Inc.	DATE STARTED: 5/10/05 — DATE FINISHED: 5/10/05
DRILLING METHOD: Direct push	TOTAL DEPTH (ft.): 24.0 — MEASURING POINT: Ground surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER (ft.) — FIRST: 6.0 — COMPL.: 5.0
SAMPLING METHOD: Geoprobe macro-core sampler [4' x 1.5" & 3' x 1.5"]	LOGGED BY: J. Morrice
HAMMER WEIGHT: NA — DROP: NA	RESPONSIBLE PROFESSIONAL: J. Morrice — REG. NO. L.Hg. 795

DRAFT

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	REMARKS
					Surface Elevation: 14.20 feet	
1					POORLY GRADED SAND (SP): dark grayish brown (10YR 4/2), moist, 95% fine sand, 5% non-plastic fines	
2						
3					SILT (ML): dark grayish brown (10YR 4/2), moist, 90% fines, 10% gravel, non-plastic, firm	
4						
5	GP-03 2-9					
6					SILTY SAND (SM): mottled black and dark brown (2.5Y 2.5/1 and 10YR 3/3), moist to wet, 60% fine sand, 40% non-plastic fines, brick fragments	Grab groundwater sample GP-03 S collected through 1-inch OD PVC temporary well casing; 3 feet of well screen (0.010-inch slot size) placed in borehole from 6 to 9 feet bgs.
7						
8					POORLY GRADED SAND (SP): dark grayish brown (10YR 4/2), wet, 95% medium sand, 5% non-plastic fines	
9						
10					LEAN CLAY (CL): brown (10YR 5/3), wet, 100% fines, medium plasticity, soft, rootlets	
11						
12						
13						
14						
15						

PROJECT: SPI Everett
Everett, Washington

Log of Boring No. GP-03 (cont'd)

DRAFT

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	REMARKS
16					LEAN CLAY (CL): (cont'd)	
17						
18						
19						
20						
21					POORLY GRADED SAND (SP): gray (N 5/), wet, 95% fine to medium sand, 5% non-plastic fines	Grab groundwater sample GP-03 D collected through 1-inch OD PVC temporary well casing; 3 feet of well screen (0.010-inch slot size) placed in borehole from 21 to 24 feet bgs.
22						
23						
24					Bottom of boring at 24 feet.	
25						
26						
27						
28						
29						
30						
31						
32						
33						

PROJECT: SPI Everett Everett, Washington	**Log of Boring No. GP-04**
BORING LOCATION: Cogen Area	ELEVATION AND DATUM: 13 feet MLLW
DRILLING CONTRACTOR: ESN Northwest, Inc.	DATE STARTED: 5/11/05 — DATE FINISHED: 5/17/05
DRILLING METHOD: Direct push	TOTAL DEPTH (ft.): 54.0 — MEASURING POINT: Ground surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER (ft.): FIRST 4.0 — COMPL. 5.0
SAMPLING METHOD: Geoprobe macro-core sampler [4' x 1.5" & 3' x 1.5"]	LOGGED BY: J. Morrice
HAMMER WEIGHT: NA — DROP: NA	RESPONSIBLE PROFESSIONAL: J. Morrice — REG. NO. L.Hg. 795

DRAFT

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 13 feet	REMARKS
0					ASPHALTIC CONCRETE	
1					SILTY GRAVEL with SAND (GM): brown (10YR 5/3), moist, 55% fine gravel, 25% medium sand, 20% non-plastic fines	
2					SILTY SAND (SM): dark gray (5Y 4/1), moist to wet, 75% fine sand, 25% non-plastic fines	
3						
4	GP-04 2-6					Grab groundwater sample GP-04 S collected through 1-inch OD PVC temporary well casing; 3 feet of well screen (0.010-inch slot size) placed in borehole from 4 to 7 feet bgs.
5						
6						
7					LEAN CLAY (CL): dark gray (5Y 4/1), wet, 95% fines, 5% fine sand, medium plasticity, soft, wood layers	
8						
9					no sand, abundant wood (~15%)	
10						
11						
12						
13					POORLY GRADED SAND (SP): dark gray (5Y 4/1), wet, 95% fine to medium sand, 5% non-plastic fines, woody layers	
14						
15						

PROJECT: SPI Everett
Everett, Washington

Log of Boring No. GP-04 (cont'd)

DRAFT

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	REMARKS
16					POORLY GRADED SAND (SP): (cont'd)	Grab groundwater sample GP-04 D collected through 1-inch OD PVC temporary well casing; 3 feet of well screen (0.010-inch slot size) placed in borehole from 15 to 18 feet bgs.
17						
18						
19						
20						
21					90% medium sand, 5% fine gravel, 5% non-plastic fines	
22						
23						
24						
25						
26						
27					sand becoming fine	
28						
29					POORLY GRADED SAND with SILT (SP-SM): dark gray (5Y 4/1), wet, 90% fine sand, 10% non-plastic fines	
30						
31					SILTY SAND (SM): dark gray (5Y 4/1), wet, 80% fine sand, 20% non-plastic fines	
32						
33						

PROJECT: SPI Everett
Everett, Washington

Log of Boring No. GP-04 (cont'd)

DRAFT

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	REMARKS
34					SILTY SAND (SM): (cont'd)	
35						
36						
37						
38						
39						
40						
41						
42						
43						
44						
45						
46						
47						
48						
49						
50						
51						

OAKBOREV (REV. 3/00)

PROJECT: SPI Everett
Everett, Washington

Log of Boring No. GP-04 (cont'd)

DRAFT

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	REMARKS
52					SILTY SAND (SM): (cont'd)	Grab groundwater sample GP-04 DD collected through 1-inch OD PVC temporary well casing; 3 feet of well screen (0.010-inch slot size) placed in borehole from 51 to 54 feet bgs.
53						
54					Bottom of boring at 54 feet.	
55						
56						
57						
58						
59						
60						
61						
62						
63						
64						
65						
66						
67						
68						
69						

OAKBOREV (REV. 3/00)

PROJECT: SPI Everett Everett, Washington	**Log of Boring No. GP-05**
BORING LOCATION: Cogen Area	ELEVATION AND DATUM: 13.29 feet MLLW
DRILLING CONTRACTOR: ESN Northwest, Inc.	DATE STARTED: 5/11/05 — DATE FINISHED: 5/11/05
DRILLING METHOD: Direct push	TOTAL DEPTH (ft.): 21.0 — MEASURING POINT: Ground surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER (ft.): FIRST 4.0 — COMPL. 4.0
SAMPLING METHOD: Geoprobe macro-core sampler [4' x 1.5" & 3' x 1.5"]	LOGGED BY: J. Morrice
HAMMER WEIGHT: NA — DROP: NA	RESPONSIBLE PROFESSIONAL: J. Morrice — REG. NO. L.Hg. 795

DRAFT

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 13.29 feet	REMARKS
1	GP-05 4-6				POORLY GRADED SAND (SP): brown (10YR 5/3), moist, 95% fine sand, 5% non-plastic fines	
2						
3						
4						Grab groundwater sample GP-05 S collected through 1-inch OD PVC temporary well casing; 3 feet of well screen (0.010-inch slot size) placed in borehole from 4 to 7 feet bgs.
5					▼ wet	
6						
7						
8					LEAN CLAY (CL): brown (10YR 5/3), wet, 95% fines, 5% fine sand, medium plasticity, soft, rootlets and wood fragments	
9						
10						
11						
12					SILT with SAND (ML): gray (N 5/), wet, 80% fines, 20% fine sand, low plasticity, soft	
13						
14						
15						

PROJECT: SPI Everett
Everett, Washington

Log of Boring No. GP-05 (cont'd)

DRAFT

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	REMARKS
16					POORLY GRADED SAND (SP): gray (N 5/), wet, 95% medium sand, 5% non-plastic fines	sand in bottom of shoe
17						
18						Grab groundwater sample GP-05 D collected through 1-inch OD PVC temporary well casing; 3 feet of well screen (0.010-inch slot size) placed in borehole from 18 to 21 feet bgs.
19						
20						
21					Bottom of boring at 21 feet.	
22						
23						
24						
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31						
32						
33						

PROJECT: SPI Everett Everett, Washington	**Log of Boring No. GP-06**
BORING LOCATION: Dry Kiln Area	ELEVATION AND DATUM: 12.02 feet MLLW
DRILLING CONTRACTOR: ESN Northwest, Inc.	DATE STARTED: 5/11/05 — DATE FINISHED: 5/11/05
DRILLING METHOD: Direct push	TOTAL DEPTH (ft.): 21.0 — MEASURING POINT: Ground surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER (ft.) FIRST: 4.0 — COMPL.: 4.0
SAMPLING METHOD: Geoprobe macro-core sampler [4' x 1.5" & 3' x 1.5"]	LOGGED BY: J. Morrice
HAMMER WEIGHT: NA — DROP: NA	RESPONSIBLE PROFESSIONAL: J. Morrice — REG. NO. L.Hg. 795

DRAFT

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 12.02 feet	REMARKS
1					SILTY SAND (SM): brown (10YR 5/3), moist, 60% fine sand, 40% non-plastic fines	
2						
3	GP-06 2-6				SILTY GRAVEL (GM): dark gray (5Y 4/1), moist, 70% fine gravel, 30% non-plastic fines	
4					WOOD	Grab groundwater sample GP-06 S collected through 1-inch OD PVC temporary well casing; 3 feet of well screen (0.010-inch slot size) placed in borehole from 4 to 7 feet bgs. clay in side of shoe
5					POORLY GRADED SAND (SP): dark gray (5Y 4/1), wet, 95% medium sand, 5% non-plastic fines	
6						
7						
8						
9						
10						
11					LEAN CLAY (CL): gray (N 5/), wet, 95% fines, 5% fine sand, medium plasticity, soft, rootlets	
12						
13						
14					SILT (ML): gray (N 5/), wet, 90% fines, 10% fine sand, low plasticity, soft	
15						

PROJECT: SPI Everett
Everett, Washington

Log of Boring No. GP-06 (cont'd)

DRAFT

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	REMARKS
16					SILT (ML): (cont'd)	
17					POORLY GRADED SAND (SP): gray (N 5/), wet, 95% medium sand, 5% non-plastic fines	
18						Grab groundwater sample GP-06 D collected through 1-inch OD PVC temporary well casing; 3 feet of well screen (0.010-inch slot size) placed in borehole from 18 to 21 feet bgs.
19						
20					wood	
21					Bottom of boring at 21 feet.	
22						
23						
24						
25						
26						
27						
28						
29						
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31						
32						
33						

OAKBOREV (REV. 3/00)

PROJECT: SPI Everett Everett, Washington	**Log of Boring No. GP-07**
BORING LOCATION: Dry Kiln Area	ELEVATION AND DATUM: 15.98 feet MLLW
DRILLING CONTRACTOR: ESN Northwest, Inc.	DATE STARTED: 5/10/05 / DATE FINISHED: 5/10/05
DRILLING METHOD: Direct push	TOTAL DEPTH (ft.): 21.0 / MEASURING POINT: Ground surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER (ft.) FIRST: 11.0 / COMPL.: 11.0
SAMPLING METHOD: Geoprobe macro-core sampler [4' x 1.5" & 3' x 1.5"]	LOGGED BY: J. Morrice
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: J. Morrice / REG. NO. L.Hg. 795

DRAFT

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 15.98 feet	REMARKS
0					SANDY SILT (ML): dark brown (10YR 3/3), moist, 70% fines, 30% fine sand, non-plastic, soft	
2					POORLY GRADED GRAVEL (GP): gray (N 5/), moist, 95% fine gravel, 5% sand	
4	GP-07 4-12				SANDY SILT (ML): dark brown (10YR 3/3), moist, 60% fines, 40% fine sand, non-plastic, soft	
6					brick	
8						
9					brick	
10						
11					wet	
12					wood POORLY GRADED SAND (SP): dark gray (5Y 4/1), wet, 95% medium sand, 5% non-plastic fines	Grab groundwater sample GP-07 S collected through 1-inch OD PVC temporary well casing; 3 feet of well screen (0.010-inch slot size) placed in borehole from 12 to 15 feet bgs.
13					LEAN CLAY (CL): gray (N 5/), wet, 100% fines, medium plasticity, soft, rootlets	
14						
15						

PROJECT: SPI Everett
Everett, Washington

Log of Boring No. GP-07 (cont'd)

DRAFT

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	REMARKS
16					LEAN CLAY (CL): (cont'd)	
17					POORLY GRADED SAND (SP): dark gray (5Y 4/1), wet, 95% fine to medium sand, 5% non-plastic fines	
18						Grab groundwater sample GP-07 D collected through 1-inch OD PVC temporary well casing; 3 feet of well screen (0.010-inch slot size) placed in borehole from 18 to 21 feet bgs.
19						
20					grades to fine sand	
21					Bottom of boring at 21 feet.	
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						
33						

OAKBOREV (REV. 3/00)

PROJECT: SPI Everett Everett, Washington	**Log of Boring No. GP-08**
BORING LOCATION: Dry Kiln Area	ELEVATION AND DATUM: 13.49 feet MLLW
DRILLING CONTRACTOR: ESN Northwest, Inc.	DATE STARTED: 5/10/05 — DATE FINISHED: 5/10/05
DRILLING METHOD: Direct push	TOTAL DEPTH (ft.): 21.0 — MEASURING POINT: Ground surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER (ft.) — FIRST: 7.0 — COMPL.: 6.0
SAMPLING METHOD: Geoprobe macro-core sampler [4' x 1.5" & 3' x 1.5"]	LOGGED BY: J. Morrice
HAMMER WEIGHT: NA — DROP: NA	RESPONSIBLE PROFESSIONAL: J. Morrice — REG. NO. L.Hg. 795

DRAFT

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	REMARKS
					Surface Elevation: 13.49 feet	
1					POORLY GRADED SAND (SP): brown (10YR 5/2), moist, 95% fine sand, 5% non-plastic fines	
2						
3						
4						
5						
6						
7					⊤ wet	
8	GP-08 6-11					Grab groundwater sample GP-08 S collected through 1-inch OD PVC temporary well casing; 3 feet of well screen (0.010-inch slot size) placed in borehole from 8 to 11 feet bgs.
9						
10					⊤ gray (N 5/)	
11					LEAN CLAY (CL): gray (N 5/), wet, 100% fines, medium plasticity, soft, rootlets	
12						
13					POORLY GRADED SAND (SP): gray (N 5/), wet, 95% fine sand, 5% non-plastic fines	
14						
15						

PROJECT: SPI Everett
Everett, Washington

Log of Boring No. GP-08 (cont'd)

DRAFT

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	REMARKS
16					POORLY GRADED SAND (SP): (cont'd)	
17						
18						Grab groundwater sample GP-08 D collected through 1-inch OD PVC temporary well casing; 3 feet of well screen (0.010-inch slot size) placed in borehole from 18 to 21 feet bgs.
19						
20						
21					Bottom of boring at 21 feet.	
22						
23						
24						
25						
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33						

OAKBOREV (REV. 3/00)

PROJECT: SPI Everett Everett, Washington	**Log of Boring No. GP-09**
BORING LOCATION: Mill Area	ELEVATION AND DATUM: 13.43 feet MLLW
DRILLING CONTRACTOR: ESN Northwest, Inc.	DATE STARTED: 5/11/05 — DATE FINISHED: 5/11/05
DRILLING METHOD: Direct push	TOTAL DEPTH (ft.): 21.0 — MEASURING POINT: Ground surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER (ft.): FIRST 5.0 — COMPL. 5.0
SAMPLING METHOD: Geoprobe macro-core sampler [4' x 1.5" & 3' x 1.5"]	LOGGED BY: J. Morrice
HAMMER WEIGHT: NA — DROP: NA	RESPONSIBLE PROFESSIONAL: J. Morrice — REG. NO. L.Hg. 795

DRAFT

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 13.43 feet	REMARKS
1–4					POORLY GRADED SAND with SILT (SP-SM): brown (10YR 5/3), moist, 90% fine sand, 10% non-plastic fines	
5–7	GP-09 5-8				POORLY GRADED SAND (SP): gray (N 5/), wet, 95% medium sand, 5% non-plastic fines	Grab groundwater sample GP-09 S collected through 1-inch OD PVC temporary well casing; 3 feet of well screen (0.010-inch slot size) placed in borehole from 4 to 7 feet bgs.
8					wood	
9–12						very soft, no recovery, silt on end of sampler
13–14					SILT (ML): gray (N 5/), wet, 90% fines, 10% fine sand, low plasticity, soft, wood and rootlets	
15						

PROJECT: SPI Everett
Everett, Washington

Log of Boring No. GP-09 (cont'd)

DRAFT

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	REMARKS
16					SILT (ML): (cont'd)	
17					POORLY GRADED SAND (SP): gray (N 5/), wet, 95% medium sand, 5% non-plastic fines	
18						Grab groundwater sample GP-09 D collected through 1-inch OD PVC temporary well casing; 3 feet of well screen (0.010-inch slot size) placed in borehole from 18 to 21 feet bgs.
19						
20						
21					Bottom of boring at 21 feet.	
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33						

PROJECT: SPI Everett Everett, Washington	**Log of Boring No. GP-10**
BORING LOCATION: Log Decks	ELEVATION AND DATUM: 13.50 feet MLLW
DRILLING CONTRACTOR: ESN Northwest, Inc.	DATE STARTED: 5/11/05 — DATE FINISHED: 5/11/05
DRILLING METHOD: Direct push	TOTAL DEPTH (ft.): 21.0 — MEASURING POINT: Ground surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER (ft.) — FIRST: 7.0 — COMPL.: 7.0
SAMPLING METHOD: Geoprobe macro-core sampler [4' x 1.5" & 3' x 1.5"]	LOGGED BY: J. Morrice
HAMMER WEIGHT: NA — DROP: NA	RESPONSIBLE PROFESSIONAL: J. Morrice — REG. NO. L.Hg. 795

DRAFT

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 13.50 feet	REMARKS
0					POORLY GRADED SAND with SILT (SP-SM): brown (10YR 5/3), moist, 90% fine sand, 10% non-plastic fines	
6					CONCRETE	Grab groundwater sample GP-10 S collected through 1-inch OD PVC temporary well casing; 3 feet of well screen (0.010-inch slot size) placed in borehole from 6 to 9 feet bgs. Sheen on purge water
7	GP-10 7-9				POORLY GRADED SAND (SP): gray (N 5/), wet, 95% medium sand, 5% non-plastic fines, strong odor	
9					LEAN CLAY (CL): gray (N 5/), wet, 95% fines, 5% fine sand, medium plasticity, soft, rootlets	
13					POORLY GRADED SAND with SILT (SP-SM): gray (N 5/), wet, 90% fine sand, 10% non-plastic fines, wood layers	
15						

PROJECT: SPI Everett
Everett, Washington

Log of Boring No. GP-10 (cont'd)

DRAFT

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	REMARKS
16					POORLY GRADED SAND with SILT (SP-SM): (cont'd)	
17						push sampler to 21' to collect water sample.
18						Grab groundwater sample GP-10 D collected through 1-inch OD PVC temporary well casing; 3 feet of well screen (0.010-inch slot size) placed in borehole from 18 to 21 feet bgs.
19						
20						
21					Bottom of boring at 21 feet.	
22						
23						
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OAKBOREV (REV. 3/00)

PROJECT: SPI Everett Everett, Washington	**Log of Boring No. GP-11**
BORING LOCATION: Log Decks	ELEVATION AND DATUM: 11.3 feet MLLW
DRILLING CONTRACTOR: ESN Northwest, Inc.	DATE STARTED: 5/11/05 — DATE FINISHED: 5/11/05
DRILLING METHOD: Direct push	TOTAL DEPTH (ft.): 15.0 — MEASURING POINT: Ground surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER (ft.) — FIRST: 7.0 — COMPL.: 7.0
SAMPLING METHOD: Geoprobe macro-core sampler [4' x 1.5" & 3' x 1.5"]	LOGGED BY: J. Morrice
HAMMER WEIGHT: NA — DROP: NA	RESPONSIBLE PROFESSIONAL: J. Morrice — REG. NO. L.Hg. 795

DRAFT

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	REMARKS
					Surface Elevation: 11.3 feet	
1–7	GP-11 4-7				POORLY GRADED SAND with SILT (SP-SM): brown (10YR 5/3), moist, 90% fine sand, 10% non-plastic fines	Grab groundwater sample GP-11 S collected through 1-inch OD PVC temporary well casing; 3 feet of well screen (0.010-inch slot size) placed in borehole from 4 to 7 feet bgs.
7–10					LEAN CLAY (CL): brown (10YR 5/3), wet, 95% fines, 5% fine sand, medium plasticity, soft, rootlets	
11–15					POORLY GRADED SAND (SP): gray (N 5/), wet, 95% fine to medium sand, 5% non-plastic fines	Grab groundwater sample GP-11 D collected through 1-inch OD PVC temporary well casing; 3 feet of well screen (0.010-inch slot size) placed in borehole from 12 to 15 feet bgs.

PROJECT: SPI Everett
Everett, Washington

Log of Boring No. GP-11 (cont'd)

DRAFT

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	REMARKS
					Bottom of boring at 15 feet.	
16						
17						
18						
19						
20						
21						
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33						

OAKBOREV (REV. 3/00)

2011-2013 Supplemental Remedial Investigation Borings

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% RETAINED ON NO. 200 SIEVE	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS
				SP	POORLY-GRADED SANDS, GRAVELLY SAND
	MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
	CC	Cement Concrete
	AC	Asphalt Concrete
	CR	Crushed Rock/ Quarry Spalls
	TS	Topsoil/ Forest Duff/Sod

Measured groundwater level in exploration, well, or piezometer

Groundwater observed at time of exploration

Perched water observed at time of exploration

Measured free product in well or piezometer

Graphic Log Contact

Distinct contact between soil strata or geologic units

Approximate location of soil strata change within a geologic soil unit

Material Description Contact

Distinct contact between soil strata or geologic units

Approximate location of soil strata change within a geologic soil unit

Sampler Symbol Descriptions

2.4-inch I.D. split barrel

Standard Penetration Test (SPT)

Shelby tube

Piston

Sonic Core

Bulk or grab

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

A "P" indicates sampler pushed using the weight of the drill rig.

Laboratory / Field Tests

%F	Percent fines
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
OC	Organic content
PM	Permeability or hydraulic conductivity
PP	Pocket penetrometer
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen
NT	Not Tested

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

KEY TO EXPLORATION LOGS

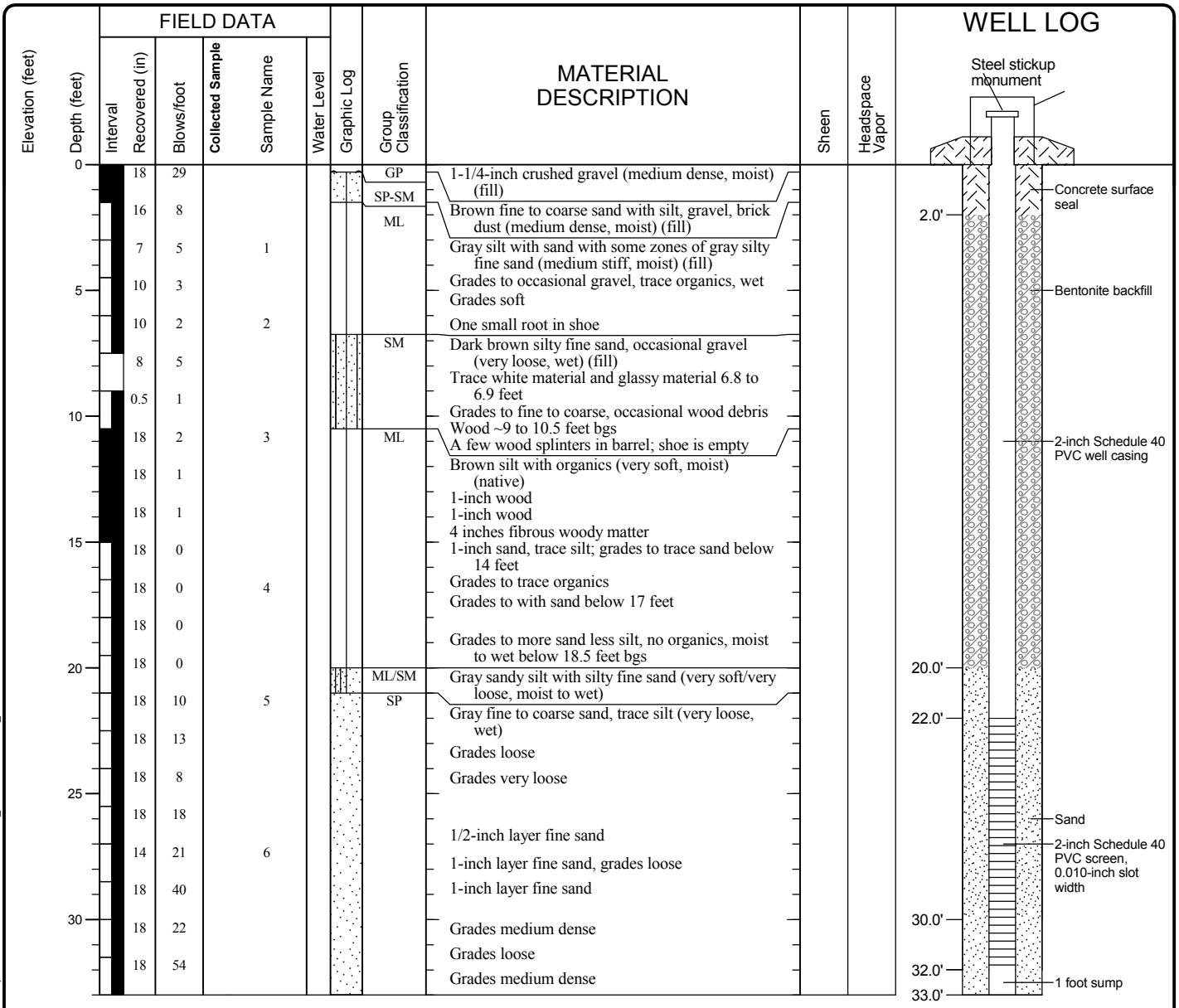
GeoEngineers

FIGURE A-1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
1/6/2012	1/6/2012	33	GRL/TSD / GRL	Holocene	HSA

Hammer Data	Drilling Equipment	
140 (lbs) / 30 (in) Drop	Mobile B-61 Truck Rig	
Surface Elevation (ft) Vertical Datum: Undetermined	Top of Casing Elevation (ft)	A 2 (in) well was installed on 1/6/2012 to a depth of (ft). Well was developed on 1/6/2012.
Easting (X) Northing (Y)	Horizontal Datum	Groundwater: Date Measured 1/6/2012; Depth to Water (ft) 4.0; Elevation (ft)

Notes:



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-01D

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-2
Sheet 1 of 1

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	1/6/2012	1/6/2012	9.5	GRL/TSD / GRL	Holocene	HSA

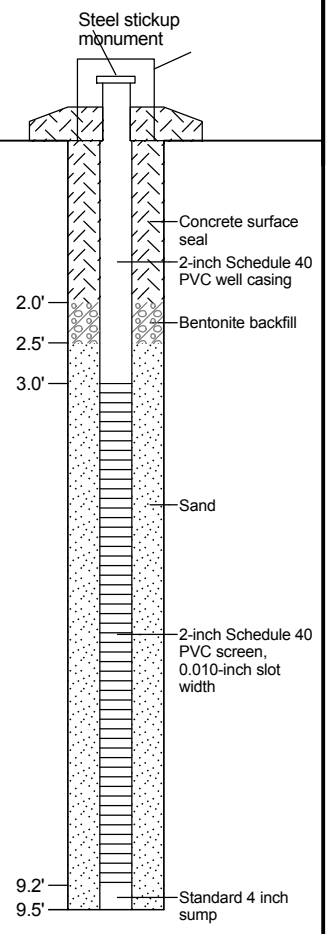
Hammer Data	Drilling Equipment	
140 (lbs) / 30 (in) Drop	Mobile B-61 Truck Rig	A 2 (in) well was installed on 1/6/2012 to a depth of (ft). Well was developed on 1/6/2012.
Surface Elevation (ft) Vertical Datum: Undetermined	Top of Casing Elevation (ft)	Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)
Easting (X) Northing (Y)	Horizontal Datum	

Notes:

FIELD DATA: Interval Recovered (in); Blows/foot; Collected Sample; Sample Name; Water Level

Elevation (feet)	Depth (feet)	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor
	0			Soil information shown in BP-01D		
	5					

WELL LOG



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-01S

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

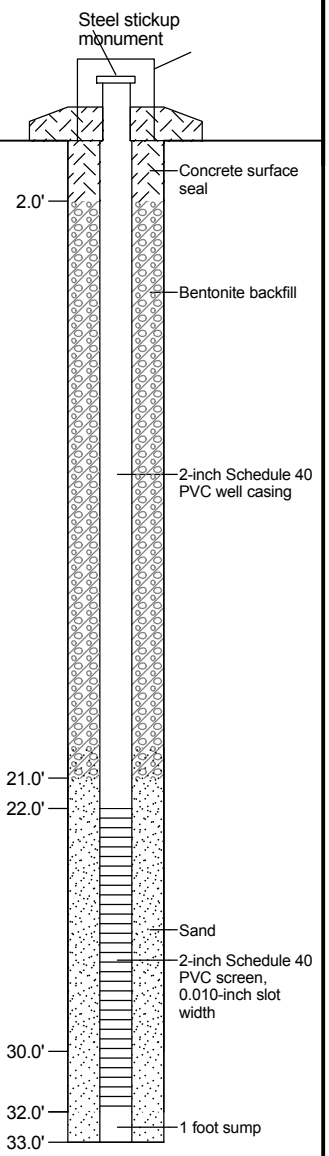
Figure A-3
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
1/5/2012	1/5/2012	34	GRL/TSD / GRL	Holocene	HSA

Hammer Data	Drilling Equipment	
140 (lbs) / 30 (in) Drop	Mobile B-61 Truck Rig	A 2 (in) well was installed on 1/5/2012 to a depth of (ft). Well was developed on 1/5/2012.
Surface Elevation (ft) Vertical Datum: Undetermined	Top of Casing Elevation (ft)	Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)
Easting (X) Northing (Y)	Horizontal Datum	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor
	0		18	22					SP-SM	Brown fine to coarse sand with silt, trace organics, gravel (loose, moist) (fill)		
			18	29					SP	Brown fine to medium sand, trace silt (loose, moist) (fill)		
			18	9		1				4-inch silty fine to medium sand layer		
									SM	4-inch layer silty fine to coarse sand with gravel, wood, topped with geotextile fabric		
	5		18	6					SP	Brown silty fine to coarse sand with gravel (very loose, moist) (fill)		
			18	7						Grades to trace wood		
			6	5					SM	Brown fine to medium sand, trace silt, trace organics (very loose, wet) (fill)		
			15	4						Black silty sand and metal debris (one nail), occasional gravel (very loose, wet) (fill)		
	10		18	3		2			ML	Slag in shoe (1 piece ~3/4-inch diameter)		
									SM	Gray silt with sand, trace organics (soft, wet) (fill)		
			18	0					PT	Grades with wood		
			18	0					ML	2 inches gray silty fine sand (very loose, moist) (fill)		
	15		18	0		3				2 inches peat (soft, moist) (native)		
										Gray silt, trace organics (soft, moist)		
			18	0						Grades to very soft		
			18	0						1-inch layer fine to medium sand		
										I-inch fine sand with silt in shoe		
	20		18	4						Grades to sand		
			18	3					SM	Silty fine sand, trace organics (loose, moist)		
										Grades moist to wet		
			18	34		4			SP	Gray fine sand, trace silt (very loose, wet)		
			18	13						Grades to medium dense		
	25									3-inch layer silty fine sand/sandy silt		
			18	34						4-inch layer silty fine sand/sandy silt		
									SP	Gray fine to medium sand, trace silt (dense, wet)		
			14	8		5			WD	Wood (dense, moist)		
									SP	Gray fine to coarse sand with wood, trace silt (loose, wet)		
			16	20						Grades to no wood, medium dense		
	30		18	15						1/2-inch layer wood		
			18	14						Wood in shoe		
										Grades to trace wood		



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-02D

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-4
Sheet 1 of 1

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	1/5/2012	1/5/2012	9	GRL/TSD / GRL	Holocene	HSA

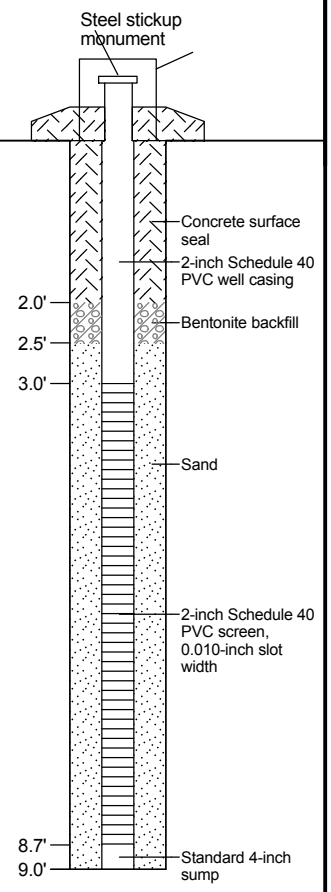
Hammer Data: 140 (lbs) / 30 (in) Drop	Drilling Equipment: Mobile B-61 Truck Rig	A 2 (in) well was installed on 1/5/2012 to a depth of (ft). Well was developed on 1/5/2012.
Surface Elevation (ft) Vertical Datum: Undetermined	Top of Casing Elevation (ft)	Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)
Easting (X) Northing (Y)	Horizontal Datum	

Notes:

FIELD DATA

Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor
	0								Soil information shown in BP-02D		
	5										

WELL LOG



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-02S

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-5
Sheet 1 of 1

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	1/4/2012	1/5/2012	32	GRL/TSD / GRL	Holocene	HSA

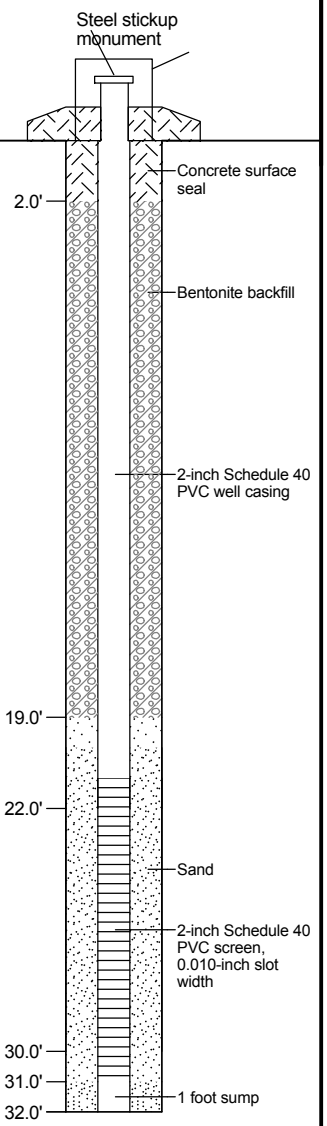
Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-61 Truck Rig
Surface Elevation (ft) Vertical Datum	Undetermined	Top of Casing Elevation (ft)	
Easting (X) Northing (Y)		Horizontal Datum	

A 2 (in) well was installed on 1/4/2012 to a depth of (ft). Well was developed on 1/4/2012.

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
1/4/2012	2.5	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor
	0		18	42					GP	1-1/4-inch crushed gravel (medium dense, moist) (fill)		
			15	40					GM	1-inch layer silty fine to coarse gravel with sand (medium dense, moist) (fill)		
			18	17		1			WD	2-inch layer burnt material (very stiff, moist) (fill)	MS	
	5		18	29					GM	1-inch layer silty fine to coarse gravel with sand (medium dense, moist) (fill)		
			18	2		2			GP	1-1/4-inch crushed gravel surface (medium dense, moist) (fill)		
			18	3		3			GP-GM	Dark brown fine to coarse gravel with sand, silt and slag, wood (some burnt) glass, metal debris and potential "rock wool" slag (medium dense, wet) (fill)		
			18	5		4			SM	Black soil or slag (size is "silty fine to coarse sand with gravel") (loose, wet) (fill) (Note: blocky organic sheen on sample; MS on water at top of sampler)		
	10		18	2					WD	Dark brown burnt wood and silt (very stiff, wet) (fill)		
			18	0					SP-SM	Gray silt with sand (very soft, moist) (fill)		
			18	0					PT	Dark brown peat (very soft, moist) (fill)		
			18	0		5			ML	Gray silt, trace sand, trace organics (very soft, moist) (fill)		
	15		18	0						Brown silt with organics (very soft, moist) (fill)		
			18	0					SP	Wood debris (soft, wet) (fill)		
			18	0					ML	Gray fine sand with silt (very loose, moist) (fill)		
			18	1		6				Brown peat with silt (soft, moist) (native)		
	20		18	5					SP	Brown and gray silt with organics (soft, moist)		
			18	20						Grades to very soft		
			18	20						Grades to trace organics		
			18	20		7				Gray fine to medium sand, trace silt (very loose, moist)		
	25		18	31						Gray silt, trace organics (very soft, moist)		
			18	36						Gray fine sand, trace silt (very loose, wet)		
			16	17						Stopped drilling 1/4/2012 at 21.5 feet; resumed drilling 1/5/2012		
	30									Grades to loose		
										1- to 2-inch pockets of silt with organics		
										Grading slightly more coarse; medium dense		
										~3 mm wood layer		
										Grades to dense		
										Grades to fine to coarse, medium dense		
										0.5-inch layer of wood		



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-03D

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-6
Sheet 1 of 1

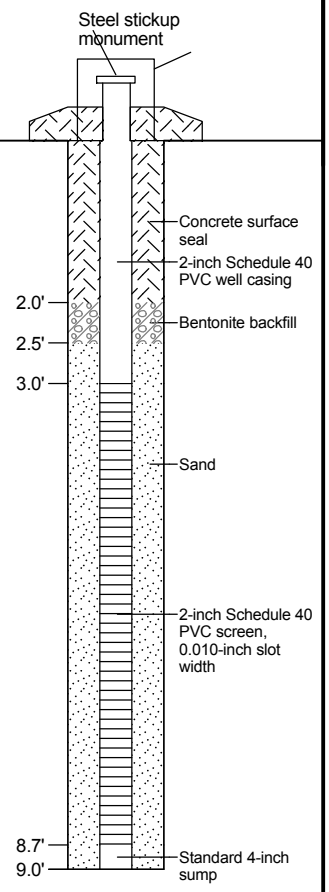
Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	1/4/2012	1/5/2012	9	GRL/TSD / GRL	Holocene	HSA

Hammer Data: 140 (lbs) / 30 (in) Drop	Drilling Equipment: Mobile B-61 Truck Rig	A 2 (in) well was installed on 1/5/2012 to a depth of (ft). Well was developed on 1/4/2012.
Surface Elevation (ft) Vertical Datum: Undetermined	Top of Casing Elevation (ft)	Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)
Easting (X) Northing (Y)	Horizontal Datum	

Notes:

FIELD DATA | WELL LOG

Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor
	0							Soil information shown in BP-03D		
	5									



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-03S

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-7
Sheet 1 of 1

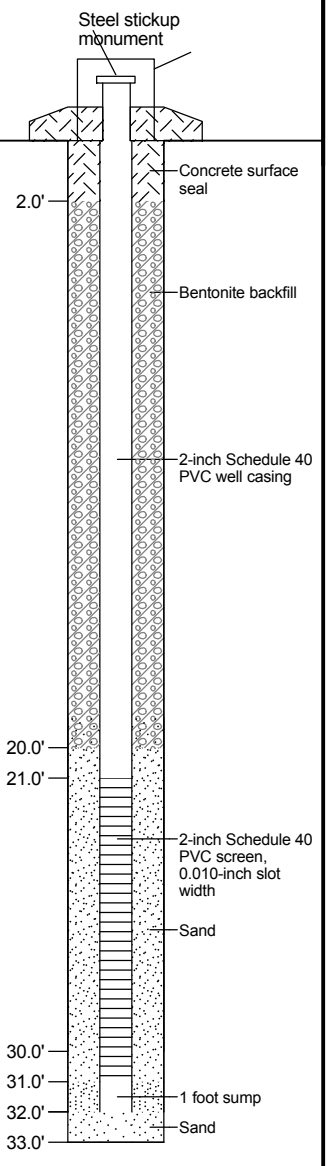
Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
1/4/2012	1/4/2012	33	GRL/TSD / GRL	Holocene	HSA

Hammer Data	Drilling Equipment	Groundwater
140 (lbs) / 30 (in) Drop	Mobile B-61 Truck Rig	Date Measured: 1/4/2012; Depth to Water (ft): 1.5; Elevation (ft):
Surface Elevation (ft) / Vertical Datum: Undetermined	Top of Casing Elevation (ft)	A 2 (in) well was installed on 1/4/2012 to a depth of (ft). Well was developed on 1/4/2012.
Easting (X) / Northing (Y)	Horizontal Datum	

Notes:

Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor
0		12	15					GP	1-1/4-inch crushed gravel surface (loose, moist) (fill)		
								ML			
		14	22		1			SLAG	Light brown sandy silt, occasional gravel with slag (stiff, moist) (fill)		
		15	45						Slag with sand, trace silt (loose, wet) (fill)		
									Note: Slag is medium sand to coarse gravel-sized		
5		18	55						Grades to dense		
		18	26		2						
		12	27						~6-inch layer contains medium to coarse sand-sized white material (only <5% by mass); flaky - coating the slag		
		13	4		3			ML	3 inches gray silt, trace sand, trace slag (soft, moist) (fill)		
10		18	2					PT	Dark brown peat (soft, moist to wet) (native)		
		18	1					0	Brown silt with organics (decomposing fibrous/woody material) (soft, moist)		
		18	1		4				Grades to very soft		
									5-inch layer of gray silt with organics		
15		18	1								
		18	0						Grades to gray, one 1 cm and two 5 mm layers of silty fine sand		
		18	0						Increasing number of silty sand layers (all <5 mm thick)		
20		18	2						Grades to silt with sand, trace organics to sandy silt, trace organics		
		18	6		5			SM	Gray silty fine sand, trace organics (very loose, moist)		
								SP			
		18	0						Gray fine sand, trace silt, trace organics (loose, wet)		
		18	14						Grades to fine to medium sand, trace silt, very loose		
25		18	12						Grades to medium dense		
		18	24		6						
		18	12						4 inches wood		
30		18	14						1/2-inch wood		
		18	15						Grades to fine to coarse 1-inch wood		
									1-inch wood in shoe		

WELL LOG



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-04D

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-8
Sheet 1 of 1

Seattle Date:3/12/12 Path:P:\0\0504068\GINT\0504068800.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

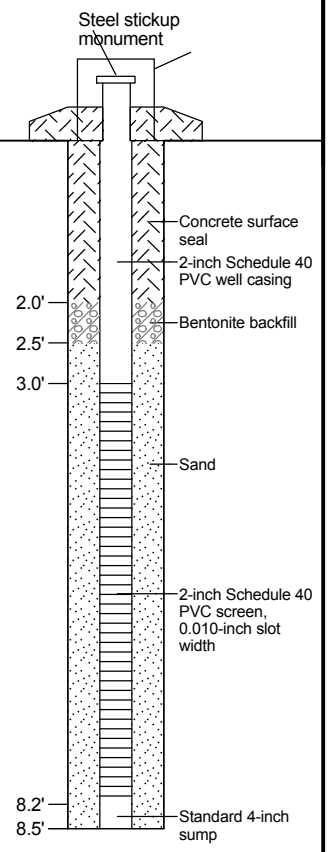
Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	1/4/2012	1/4/2012	8.5	GRL/TSD / GRL	Holocene	HSA

Hammer Data	Drilling Equipment	
140 (lbs) / 30 (in) Drop	Mobile B-61 Truck Rig	A 2 (in) well was installed on 1/4/2012 to a depth of (ft). Well was developed on 1/4/2012.
Surface Elevation (ft) Vertical Datum: Undetermined	Top of Casing Elevation (ft)	Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)
Easting (X) Northing (Y)	Horizontal Datum	

Notes:

FIELD DATA | WELL LOG

Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor
	0							Soil information shown in BP-04D		
	5									



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-04S

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-9
Sheet 1 of 1

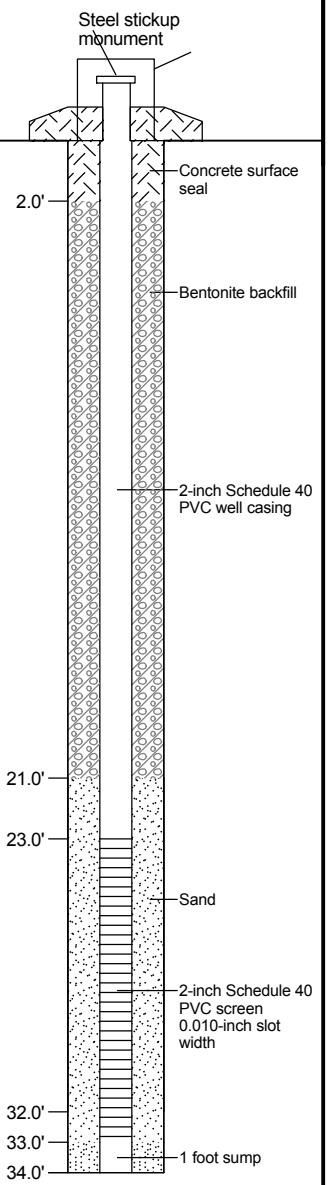
Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	1/3/2012	1/3/2012	34	GRL/TSD / GRL	Holocene	HSA

Hammer Data	Drilling Equipment	Groundwater
140 (lbs) / 30 (in) Drop	Mobile B-61 Truck Rig	A 2 (in) well was installed on 1/3/2012 to a depth of (ft). Well was developed on 1/3/2012.
Surface Elevation (ft) Vertical Datum: Undetermined	Top of Casing Elevation (ft)	Date Measured: 1/3/2012 — Depth to Water (ft): 2.3 — Elevation (ft):
Easting (X) Northing (Y)	Horizontal Datum	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor
	0		16	25					GP	1-1/4-inch gravel ballast surface (loose, moist) (fill)		
									SM			
			18	18		1	▽		GP-GM	Dark brown silty fine to coarse sand with gravel (loose, moist) (fill)		
			18	32		2			SP-SM	Gray fine to coarse gravel with silt and sand (loose, moist) (fill)		
	5								SM			
			12	25						Brown fine to medium sand with silt, occasional gravel (loose, wet) (fill)		
			16	21		3			ML	Blacky silty fine to coarse sand, occasional gravel and slag (loose, wet) (fill)	HS	
			18	4						Grades with gravel, wood debris, metal debris (one nail or heavy gauge wire); do not observe slag 3 to 4.5 feet. Contains pulpy papery debris at ~3.5 feet. Grades medium dense		
			15	3					ML			
	10								ML/SM			
			18	2		4			ML	Grades to no metal debris; loose		
			18	0						Gray with white sandy silt, occasional gravel (stiff, wet) (fill) (Note: White material likely bentonite; HS on water at top of sampler)		
			18	1		5				Gray sandy silt, trace wood debris, occasional gravel (soft, moist to wet) (fill)		
	15		18	0						Gray silt, trace sand/silty fine to medium sand, occasional gravel (soft to very loose, moist to wet) (fill)		
			18	0						Brown sandy silt with organics (rootlets) (very soft, wet) (native)		
			18	0						Grades to gray with sand, trace organics, moist		
			18	0						One 1.5-foot layer silty fine sand with organics		
	20									One 1-inch layer silty fine sand		
			18	22		6				Fibrous wood over 1.5-inch layer fine sand, trace silt at ~16.6 feet bgs		
									SM	1 inch sand		
			14	17		7			SP	Sand in shoe		
										Increasing sand content		
			8	24						Grades wet		
	25									Gray silty fine sand, trace wood (medium dense, wet)		
			18	32						Gray fine to coarse sand, trace wood (medium dense, wet)		
			11	32						Grades to dense		
			18	NR								
	30		18	35		8						
										Grades to brown		
			18	16						Grades to medium dense		

WELL LOG



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-05D

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-10
Sheet 1 of 1

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	1/3/2012	1/3/2012	9.5	GRL/TSD / GRL	Holocene	HSA

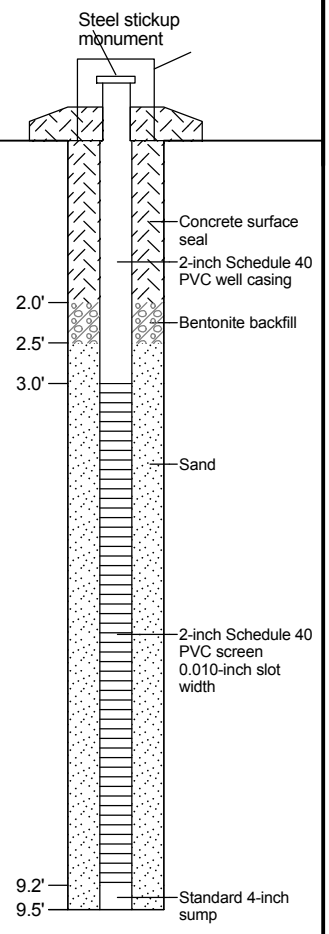
Hammer Data: 140 (lbs) / 30 (in) Drop	Drilling Equipment: Mobile B-61 Truck Rig	A 2 (in) well was installed on 1/3/2012 to a depth of (ft). Well was developed on 1/3/2012.
Surface Elevation (ft) Vertical Datum: Undetermined	Top of Casing Elevation (ft)	Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)
Easting (X) Northing (Y)	Horizontal Datum	

Notes:

FIELD DATA: Interval Recovered (in) | Blows/foot | Collected Sample / Sample Name | Water Level

Elevation (feet)	Depth (feet)	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor
	0			Soil information shown in BP-05D		
	5					

WELL LOG



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-05S

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-11
Sheet 1 of 1

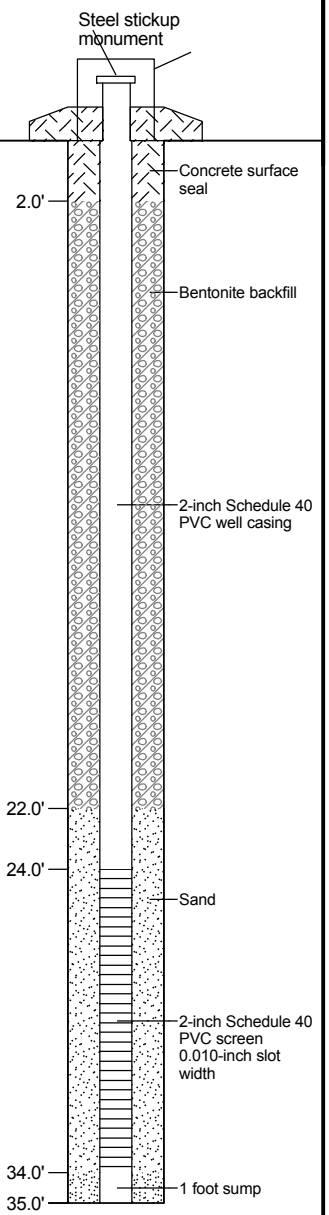
Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/30/2011	12/30/2011	35	GRL/TSD / GRL	Holocene	HSA

Hammer Data: 140 (lbs) / 30 (in) Drop	Drilling Equipment: Mobile B-61 Truck Rig	A 2 (in) well was installed on 12/30/2011 to a depth of (ft). Well was developed on 12/30/2011.
Surface Elevation (ft) Vertical Datum: Undetermined	Top of Casing Elevation (ft)	Groundwater: Date Measured 12/30/2011; Depth to Water (ft) 3.0; Elevation (ft)
Easting (X) Northing (Y)	Horizontal Datum	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor
	0		18	28					SP	1-1/4-inch crushed gravel surface (medium dense, moist) (fill)		
			16	24					ML	Dark brown silt with organics (very stiff, moist) (fill)		
			13	NR					GM	3-inch long piece of wood		
									WD	Gray silty gravel with sand (medium dense, moist) (fill)		
	5		12	2		1			ML	Dark brown burnt wood with gravel and sand (soft, wet) (fill)		
			14	21						Dark brown sandy silt with organics including burnt wood; slag (soft, wet) (fill) (Slag includes only one piece approximately 3 inches long)		
			18	8						Grades to stiff		
			15	5		2				Grades to medium stiff		
	10		18	4		3			ML	Grades to with gravel		
			18	1		4				Grades to gray silt, trace organics, medium stiff, moist (Note: Brick dust in shoe)		
			18	0						Grades to with sand, soft		
			18	1						Brown silt with organics (soft, moist) (native)		
	15		18	1						Grades to very soft		
			18	1						One 1-inch area fine sand		
			18	2						1-inch long piece of wood		
	20		18	2						1-inch layer fine sand		
			18	0								
			18	1		5			SM	Gray silty fine sand (very loose, wet)		
			18	9								
	25		18	12					SP	Gray fine to coarse sand, trace silt (medium dense, wet)		
			18	12						1-inch fine to medium sand		
			18	20		6						
	30		18	18						Grades to brown (looks oxidized)		
			18	24						Grades to gray with 1-inch zones of brown		
			18	52								
	35									Grades to very dense		

WELL LOG



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-06D

GeoEngineers

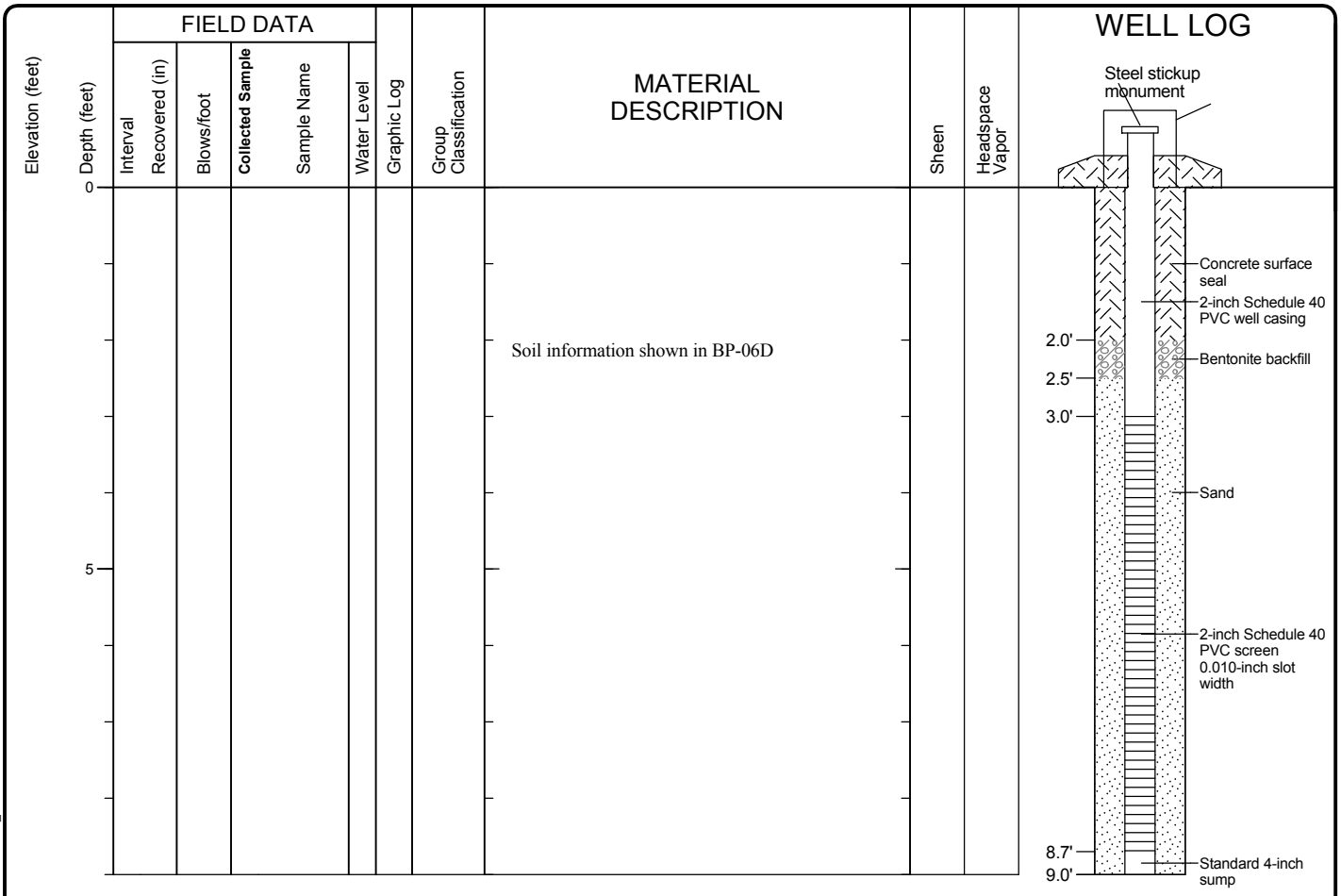
Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-12
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/30/2011	12/30/2011	9	GRL/TSD / GRL	Holocene	HSA

Hammer Data: 140 (lbs) / 30 (in) Drop	Drilling Equipment: Mobile B-61 Truck Rig	A 2 (in) well was installed on 12/30/2011 to a depth of (ft). Well was developed on 12/30/2011.
Surface Elevation (ft) Vertical Datum: Undetermined	Top of Casing Elevation (ft)	Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)
Easting (X) Northing (Y)	Horizontal Datum	

Notes:



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-06S

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-13
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/29/2011	12/29/2011	36.5	GRL/TSD / GRL	Holocene	HSA

Hammer Data: 140 (lbs) / 30 (in) Drop	Drilling Equipment: Mobile B-61 Truck Rig	A 2 (in) well was installed on 12/29/2011 to a depth of (ft). Well was developed on 12/29/2011.
Surface Elevation (ft) Vertical Datum: Undetermined	Top of Casing Elevation (ft)	Groundwater: Date Measured 12/29/2011; Depth to Water (ft) 3.0; Elevation (ft)
Easting (X) Northing (Y)	Horizontal Datum	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor
	0		11	NR					GP	1-1/4-inch crushed gravel surface (loose, moist) (fill)		
			11	9					ML	Dark brown sandy silt with organics (stiff, moist) (fill)		
			5	1/18"					WD	Burnt wood (stiff, moist to wet) (fill)		
	5		9	1/18"		1			SM	Brown silty fine to coarse sand, occasional gravel, trace organics (very loose, wet) (fill)	SS	
			16	0					WD	Dark brown decomposed possibly burnt wood/organics (very soft, wet) (fill)	HS	
			15	2					ML	Gray silt with sand, occasional gravel (very soft, wet) (fill)	SS	
			18	1								
	10		8	0							NS	
			12	2		2			ML	1-inch brown silt with organics (soft, moist) (native)		
			18	1					ML	Brown silt, trace sand, trace organics (soft, moist)		
	15		18	1		3				Grades to very soft		
			18	1						Grades to organic fibers		
			18	0						Grades to sandy silt		
			18	0						Grades to moist to wet		
	20		18	0		4						
			18	2					SM	Gray silty fine sand (very loose, wet)		
			18	2					ML	Gray sandy silt (soft, moist to wet)		
			18	2						Grades to silty fine sand/sandy silt in ~4-inch layers		
			18	2		5						
	25		18	1/18"					SP-SM	Grades to wet		
			18	6						Gray fine sand with silt (very loose, wet)		
			18	19					SP	Two 1-inch layers sandy silt		
			18	22		6				Gray fine to coarse sand, trace silt (loose, wet)		
	30		18	46						1-inch layer sandy silt		
			18	58						Grades to medium dense		
			12	17						Trace organics (1/2-inch layers)		
	35									Trace organics (1/2-inch layers)		
										Grades to dense		
										Grades to very dense		
										Grades to medium dense		

WELL LOG

Steel stickup monument
Concrete surface seal
2.0'
Bentonite backfill
2-inch Schedule 40 PVC well casing
23.5'
Sand
25.5'
2-inch Schedule 40 PVC screen 0.010-inch slot width
35.5'
1 foot sump
36.5'

Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-07D

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-14
Sheet 1 of 1

Seattle Date:3/12/12 Path:P:\0\0504068\GINT\0504068800.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

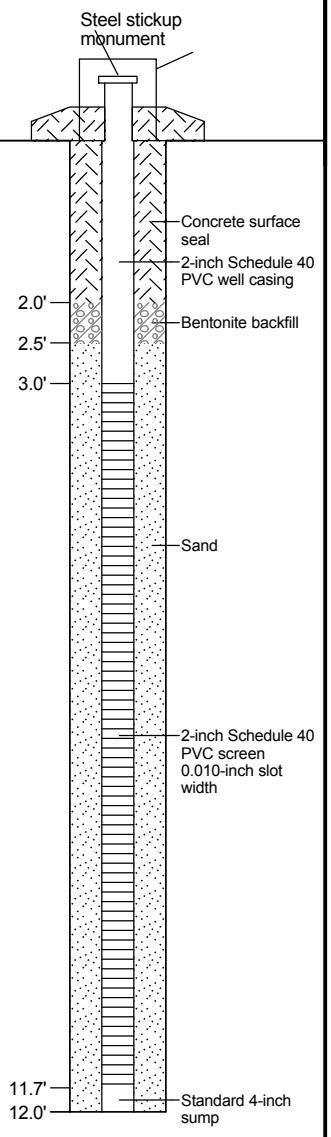
Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/29/2011	12/29/2011	12	GRL/TSD / GRL	Holocene	HSA

Hammer Data: 140 (lbs) / 30 (in) Drop	Drilling Equipment: Mobile B-61 Truck Rig	A 2 (in) well was installed on 12/29/2011 to a depth of (ft). Well was developed on 12/29/2011.
Surface Elevation (ft) Vertical Datum: Undetermined	Top of Casing Elevation (ft)	Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)
Easting (X) Northing (Y)	Horizontal Datum	

Notes:

FIELD DATA | WELL LOG

Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor
	0							Soil information shown in BP-07D		
	5									
	10									



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-07S

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-15
Sheet 1 of 1

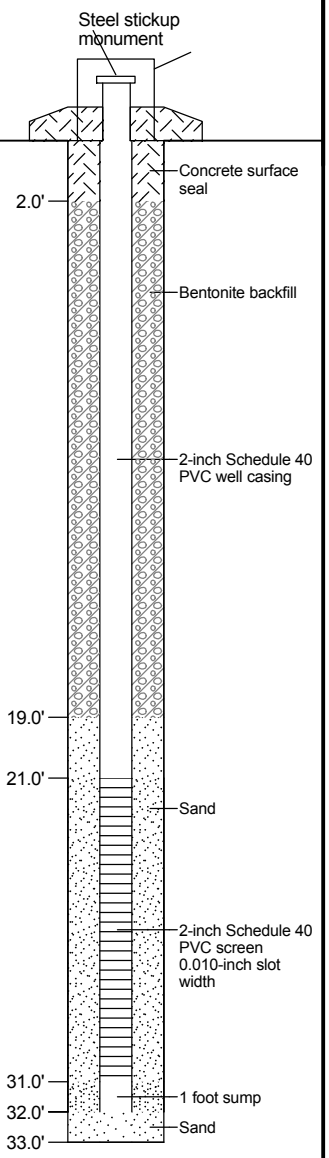
Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/28/2011	12/29/2011	33	GRL/TSD / GRL	Holocene	HSA

Hammer Data: 140 (lbs) / 30 (in) Drop	Drilling Equipment: Mobile B-61 Truck Rig	A 2 (in) well was installed on 12/29/2011 to a depth of (ft). Well was developed on 12/29/2011.
Surface Elevation (ft) Vertical Datum: Undetermined	Top of Casing Elevation (ft)	Groundwater: Date Measured 12/28/2011; Depth to Water (ft) 0.5; Elevation (ft)
Easting (X) Northing (Y)	Horizontal Datum	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor
	0		5	NR					GP	1-1/4-inch crushed rock surface (medium dense, moist to wet) (fill)		
			7	20					SM	Grades to wet Gray fine silty sand, occasional gravel (medium dense, wet) (fill)		
			18	13		1			ML	Brown silt with organics (stiff, moist to wet) (fill)		
	5		2	5						Grades to gray silt, trace organics, trace sand (stiff, moist) (fill)		
			18	3		2				Grades to medium stiff		
			18	2						Grading between trace sand to with sand, occasional gravel, soft		
			18	3		3						
	10		5	1					ML	Dark brown silt with organics (very soft, moist) (native)		
			18	1		4			ML	Gray silt, trace sand, trace organics (very soft, moist)		
			18	2						Grades to no sand, soft		
	15		18	0						Small (1 inch) piece of wood Grades to sandy silt, very soft		
			18	0								
			18	1								
	20		18	0		5						
			18	2					SM	Gray silty fine sand (very loose, wet)		
			18	11					SP-SM	Gray sand with silt (medium dense, wet)		
			18	19		6			SP	Gray fine to coarse sand, trace silt (medium dense, wet)		
	25		18	28								
			18	24								
			18	22					WD	Chunk of wood (yellow in color) ~ 1/2 inch		
									SP	Gray fine to medium sand, trace silt (medium dense, wet)		
	30		18	12					WD			
									SP	Brown organic matter (decomposing wood) ~1 inch		
			5	9						Gray fine to coarse sand, trace silt (medium dense, wet) Grades to fine to medium sand, trace wood 3-inch wood, decomposing		

WELL LOG



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-08D

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-16
Sheet 1 of 1

Seattle Date:3/12/12 Path:P:\0\0504068\GINT\0504068OO.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start 12/28/2011	End 12/29/2011	Total Depth (ft) 9	Logged By GRL/TSD Checked By GRL	Driller Holocene	Drilling Method HSA

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-61 Truck Rig
Surface Elevation (ft) Vertical Datum	Undetermined	Top of Casing Elevation (ft)	
Easting (X) Northing (Y)		Horizontal Datum	

A 2 (in) well was installed on 12/29/2011 to a depth of (ft).
Well was developed on 12/29/2011.

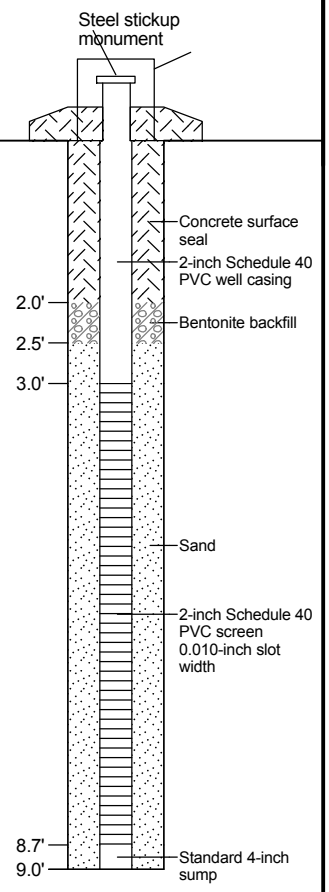
Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

FIELD DATA: Interval Recovered (in) | Blows/foot | Collected Sample / Sample Name | Water Level | Graphic Log | Group Classification | MATERIAL DESCRIPTION | Sheen | Headspace Vapor | Elevation (feet) | Depth (feet)

Soil information shown in BP-08D

WELL LOG



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-08S

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-17
Sheet 1 of 1

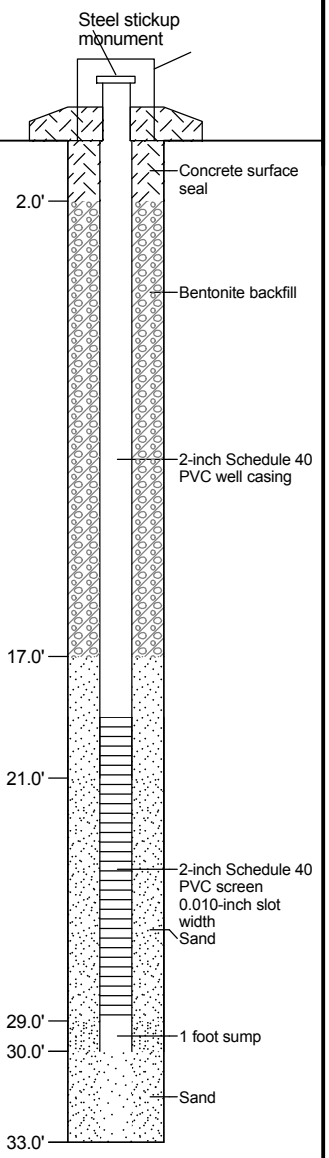
Seattle Date:3/12/12 Path:P:\0\0504068\GINT\0504068800.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/28/2011	12/28/2011	31.5	GRL/TSD / GRL	Holocene	HSA

Hammer Data: 140 (lbs) / 30 (in) Drop	Drilling Equipment: Mobile B-61 Truck Rig	A 2 (in) well was installed on 12/28/2011 to a depth of (ft). Well was developed on 12/28/2011.
Surface Elevation (ft) Vertical Datum: Undetermined	Top of Casing Elevation (ft)	Groundwater: Date Measured 12/28/2011; Depth to Water (ft) 2.5; Elevation (ft)
Easting (X) Northing (Y)	Horizontal Datum	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor
	0		4	10					SM	Brown silty fine to coarse sand with gravel, occasional wood (medium dense, moist to wet) (fill)		
			6	2			▽			Grades to wet, very loose		
			12	4		1						
	5		13	6		2			ML	Grades to occasional wood debris (potentially treated; potential piece of RR tie?), loose (HS with color)	HS	
			1	2						Brown silt with organics (medium stiff, moist to wet) (fill)	SS	
			14	2		3				Grades to gray silt, trace organics, trace sand (medium stiff, moist) (fill)		
			15	2						Grades to soft		
	10		18	2		4			SP	SS Gray fine to coarse sand, trace silt (very loose, wet) (fill)		
			11	1						NS		
			18	9						Grades to loose		
	15		18	1/18"		5			PT	1-inch organics, rootlets, sand (native)		
			11	8		6			ML	Brown silt, trace sand with organics (very soft, moist)		
			12	17		7				1-inch layer of fine to coarse sand with silt Grades to medium stiff		
	20		18	13					SP-SM	Brown fine sand with silt (medium dense, wet)		
			17	19					SP	Brown to gray fine to medium sand, trace silt (medium dense, wet)		
			18	22						Grades to gray		
			13	11		8				Grading between fine sand to fine to medium sand, slight silt content changes every 3 to 4 inches		
	25		15	23						Grades to fine to coarse sand		
			18	17		9				Grades to brown fine to medium sand Grades fine		
			18	17					SM/ML	Grades to gray		
	30		18	20						Green to gray silty sand to sandy silt (medium dense to very stiff, moist)		
										3/4-inch fine to medium sand, trace silt		



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-09D

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-18
Sheet 1 of 1

Seattle Date:3/12/12 Path:P:\0\0504068\GINT\0504068800.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start 12/28/2011	End 12/28/2011	Total Depth (ft) 14	Logged By GRL/TSD Checked By GRL	Driller Holocene	Drilling Method HSA

Hammer Data: 140 (lbs) / 30 (in) Drop	Drilling Equipment: Mobile B-61 Truck Rig	A 2 (in) well was installed on 12/28/2011 to a depth of (ft). Well was developed on 12/28/2011.
Surface Elevation (ft) Vertical Datum: Undetermined	Top of Casing Elevation (ft)	Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)
Easting (X) Northing (Y)	Horizontal Datum	

Notes:

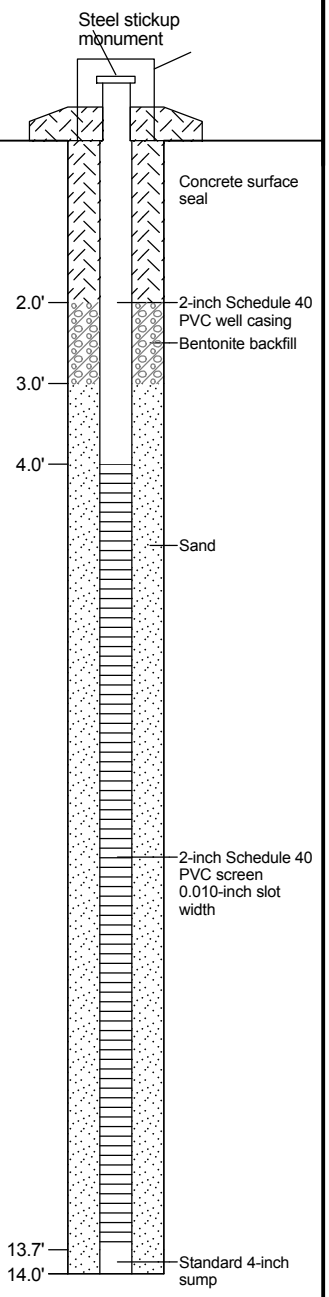
FIELD DATA: Elevation (feet); Depth (feet); Interval Recovered (in); Blows/foot; Collected Sample; Sample Name; Water Level; Graphic Log; Group Classification

MATERIAL DESCRIPTION

Soil information shown in BP-09D

Sheen; Headspace Vapor

WELL LOG



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-09S

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-19
Sheet 1 of 1

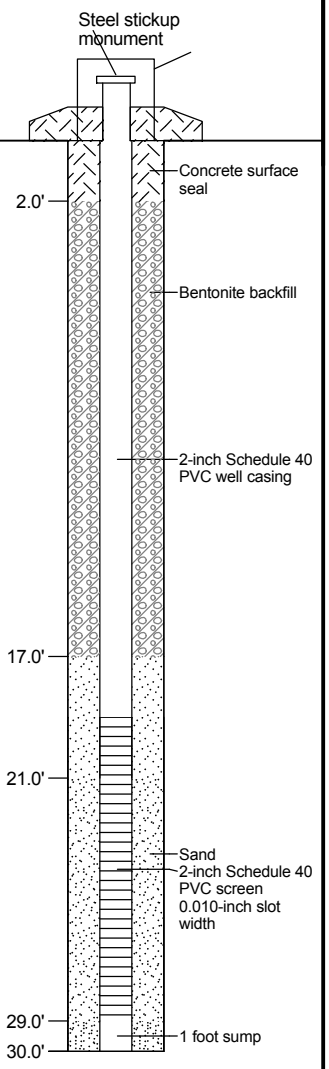
Seattle Date:3/12/12 Path:P:\0\0504068\GINT\0504068800.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/27/2011	12/27/2011	30	GRL/TSD / GRL	Holocene	HSA

Hammer Data: 140 (lbs) / 30 (in) Drop	Drilling Equipment: Mobile B-61 Truck Rig	A 2 (in) well was installed on 12/27/2011 to a depth of (ft). Well was developed on 12/27/2011.
Surface Elevation (ft) Vertical Datum: Undetermined	Top of Casing Elevation (ft)	Groundwater: Date Measured 12/27/2011; Depth to Water (ft) 2.0; Elevation (ft)
Easting (X) Northing (Y)	Horizontal Datum	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor
	0		6	18					GP	1-1/4-inch crushed rock surface (medium dense, wet) (fill)		
			7	5		1	▽		ML	Brown sandy silt with wood (medium stiff, wet) (fill)		
			9	1/18"						Grades to occasional gravel, very soft		
	5		4	1/18"								
			11	4		2			GP	Dark brown fine to coarse gravel, trace wood (loose, wet) (fill)		
			16	3		3			ML	Gray silt with sand, trace organics, occasional gravel (soft, wet) (fill)		
			9	2		4			SP	Brown fine to medium sand (very loose, wet) (fill)		
	10		12	2		5			ML	Gray silt with sand and wood (soft, wet) (native)		
			9	3						Grades to gray/brown		
			10	5								
	15		0	1						Grades to medium stiff		
			12	8		6				Grades to very soft		
			13	25					SP-SM	Gray fine to coarse sand with silt, trace wood debris (medium dense, moist) (trace shell fragments 17.5 to 17.6 feet)		
	20		7	34						Grades to occasional gravel		
			16	67		7				Grades to no wood, dense		
			18	50/5"						Grades to brown		
			16	60/6"						Grades to very dense		
	25		18	29		8			GP	3-inch layer of gravel/coarse sand		
			18	40					SP	Brown fine to medium sand, trace silt (medium dense, moist)		
			18	37		9				Grades to dense		
	30											



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-10D

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-20
Sheet 1 of 1

Seattle Date:3/12/12 Path:P:\0\0504068\GINT\0504068800.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start 12/27/2011	End 12/27/2011	Total Depth (ft) 9	Logged By GRL/TSD Checked By GRL	Driller Holocene	Drilling Method HSA

Hammer Data 140 (lbs) / 30 (in) Drop	Drilling Equipment Mobile B-61 Truck Rig	A 2 (in) well was installed on 12/27/2011 to a depth of (ft). Well was developed on 12/27/2011.
Surface Elevation (ft) Undetermined Vertical Datum	Top of Casing Elevation (ft)	Groundwater Date Measured / Depth to Water (ft) / Elevation (ft)
Easting (X) Northing (Y)	Horizontal Datum	

Notes:

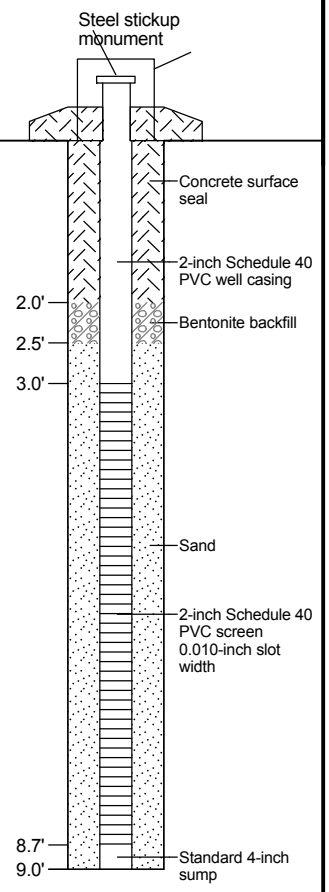
FIELD DATA: Elevation (feet); Depth (feet); Interval Recovered (in); Blows/foot; Collected Sample; Sample Name; Water Level; Graphic Log; Group Classification

MATERIAL DESCRIPTION

Soil information shown in BP-10D

Sheen; Headspace Vapor

WELL LOG



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-10S

GeoEngineers

Project: Everett Benson Smelter - Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-21
Sheet 1 of 1

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	1/8/2013	1/8/2013	72	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft) / Vertical Datum	16.46 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371367.4523 1308612.59	Horizontal Datum	WA State Plane North 83/91

A 2 (in) well was installed on 1/8/2013 to a depth of 72 (ft).

Groundwater

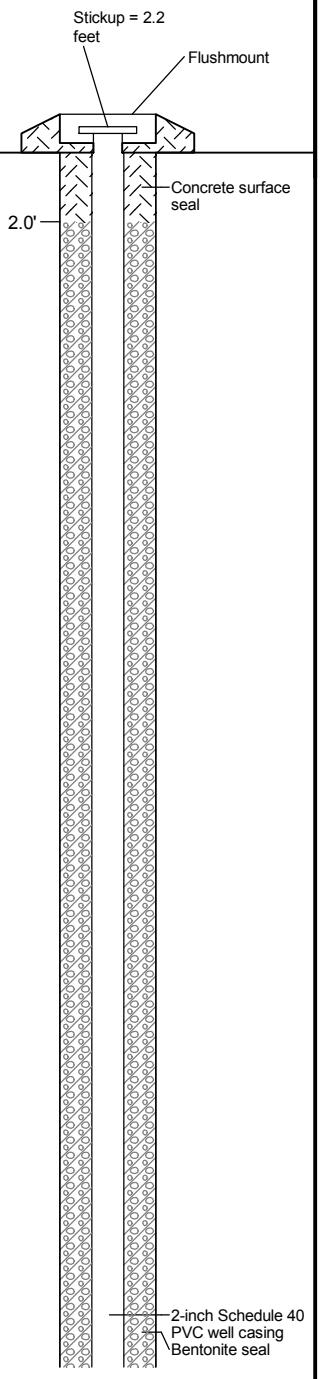
Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

FIELD DATA

Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0								See boring log BP-05D for sampling and material description from 0 to 33 feet bgs.		
15	5										
	10										
5	15										
0	20										
-5	25										
-10	30										
-15	35										

WELL LOG

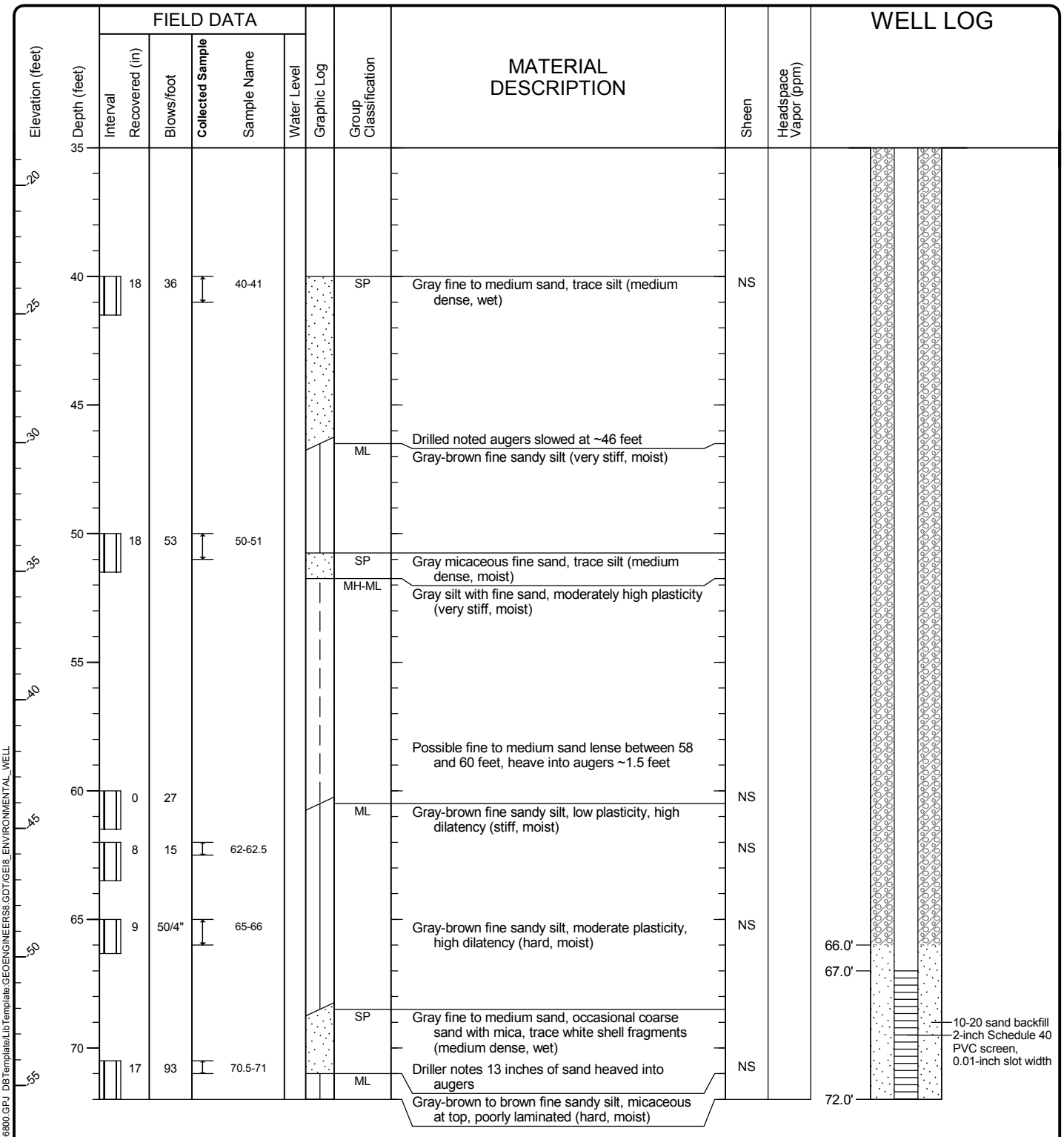


Note: Please see Figure A-1 for explanation of symbols

Log of Boring BP-05D2

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00



Note: Please see Figure A-1 for explanation of symbols

Log of Boring BP-05D2 (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-2
Sheet 2 of 2

Drilled	Start	End	Total Depth (ft)	Logged By	Driller	Drilling Method
	1/2/2013	1/2/2013	38	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-59 Track Rig
Surface Elevation (ft)	16.0827	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	373911.1708	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1307952.929		

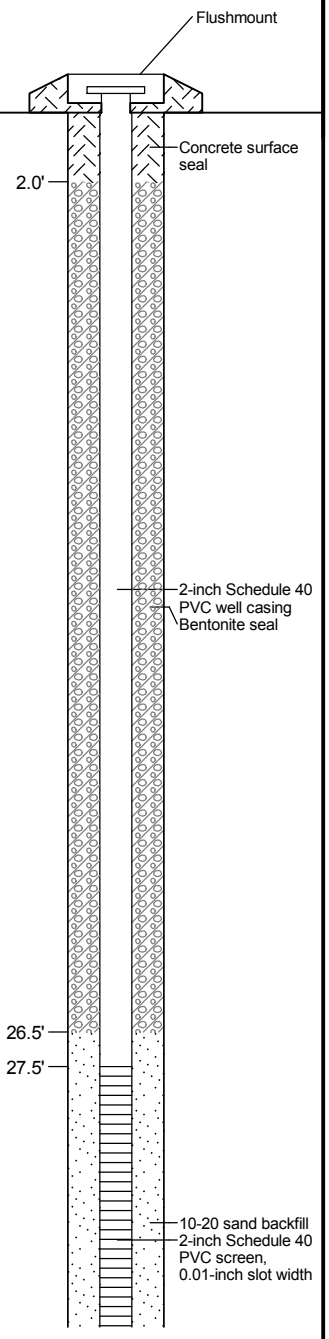
DOE Well I.D.: BHU-093
A 2 (in) well was installed on 1/2/2013 to a depth of 38 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
1/2/2013	7.5	8.6

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0								AC	20 inches asphalt		
			15	62					GP-GM	Light brown fine to coarse gravel with sand, with silt (medium dense, moist) (fill)	SS	
			13	38		3-4			SP	Light brown fine to coarse sand, occasional gravel, trace silt (medium dense, moist) (fill)	SS	
	5		17	17							SS	
			10	11						Light brown fine to coarse sand, occasional gravel, trace silt (loose, moist) (fill)	NS	
			11	4						Light brown fine to coarse sand, trace silt, trace wood fragments (very loose, wet) (fill)	NS	
			12	7							NS	
	10									Becomes gray		
			10	14						Gray fine to coarse sand, trace silt (loose, wet) (fill)	NS	
			12	8		12.5-13				Gray fine to coarse sand, trace silt (very loose, wet) (fill)	NS	
									Wood	Wood (fill)		
			8	7					SP	Gray fine to medium sand with organic matter, trace silt (very loose, wet) (fill)	NS	
	15		10	3		15-16			Wood	Brown silty sawdust with wood fragments (soft, wet) (fill)		
			4	5						Sawdust with wood fragments (loose, wet) (fill)		
			4	6						Sawdust with bark and wood fragments (very loose, wet) (fill)		
	20		11	50/5"						Wood (log)		
			0	19					SP	Sand in shoe (fill)		
	25		18	6		25-25.2			ML	Dark gray-brown fine sandy silt with organic matter (~1%) (medium stiff, wet) (native)	NS	
						26-26.5						
			15	3					SP	Gray fine to coarse sand, trace silt, with mica (very loose, wet)	NS	
			8	14						Driller noted heaving sands	NS	
	30		13	29						Dark gray fine to coarse sand, occasional gravel, trace silt, with mica, trace organic matter (~1%) (medium dense, wet)	NS	
			12	38		32.5-33.5						
	35											

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-01D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-3
Sheet 1 of 2

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	WELL LOG
-20	35		4	33						Dark gray fine to coarse sand with mica, trace silt, occasional gravel, trace organic matter (~1%) (medium dense, wet)			37.5' 38.0'

Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-01D (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-3
Sheet 2 of 2

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/21/2012	12/21/2012	32	GRL	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-59 Track Rig
Surface Elevation (ft) / Vertical Datum	15.384 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	372887.009 / 1307921.39	Horizontal Datum	WA State Plane North 83/91

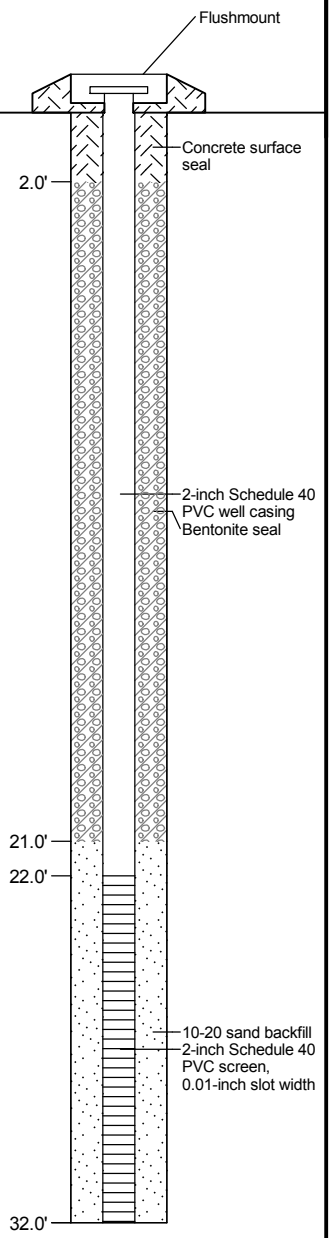
DOE Well I.D.: BHU-027
A 2 (in) well was installed on 12/21/2012 to a depth of 32 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/21/2012	3.3	12.1

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
15	0		18	29					SP	Gray fine to coarse sand with gravel, trace silt, occasional cobbles (medium dense, moist) (fill)		
			16	15		2-3			SP	Brown fine to coarse sand, trace silt, occasional gravel (loose, moist) (fill)		
			11	14						Brown fine to coarse sand, trace silt (loose, wet) (fill)		
10	5		16	8						2mm silt layer at 3.5 feet Grades to gray and becomes very loose		
			12	9		6-7						
			18	14						Becomes loose		
5	10		24	14						Grades with gravel		
			17	10								
			16	4		12-13				Brown fine to coarse sand (very loose, wet) (fill)		
0	15		18	8								
			18	24						Becomes loose		
			18	11								
						17.4-17.6			ML	Gray silt with organics (native)		
			18	14					SP	Grades to black, trace wood material (loose, wet) Gray fine to coarse sand, trace wood (loose, wet)		
5	20		16	17		20-21				Gray fine to coarse sand with 3 silt/wood layers from 19.8 to 21 feet (stiff, wet)		
			14	13						Gray fine to coarse sand, trace wood at 22.5 feet (loose, wet)		
			16	13						Gray fine to coarse sand, trace wood and silt (medium dense, wet)		
-10	25		17	8						(loose, wet)		
			18	12						Grading coarser (loose, wet)		
-15	30		18	14		27-28				One wood piece (3") at 28 feet (loose, wet)		

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-02D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-4
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/26/2012	12/26/2012	31	GRL	Holocene Drilling	Hollow-stem Auger

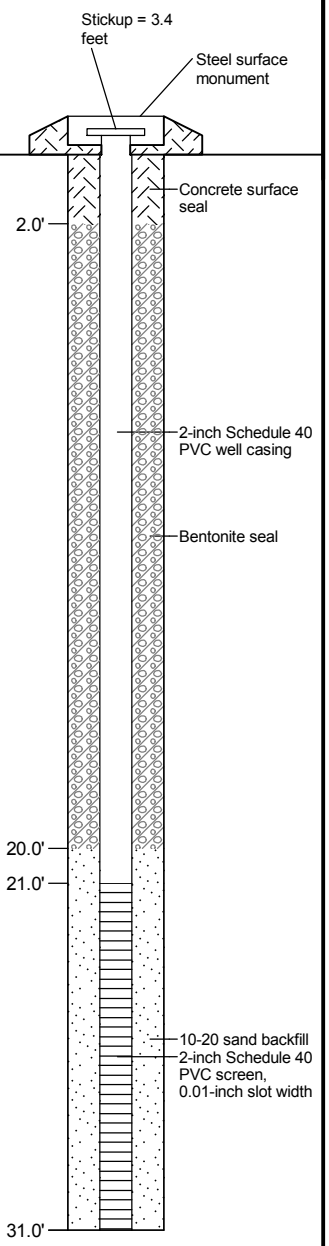
Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Turbo Track Rig
Surface Elevation (ft)	14.4339	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	372965.5718	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1308351.511		

DOE Well I.D.: BHU-087
A 2 (in) well was installed on 12/26/2012 to a depth of 31 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/26/2012	3.0	11.4

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		18	18					ML	Dark brown sandy silt with abundant organic matter (fill)	SS	
			16	12		1.75-2			SP-SM	Gray-brown to brown fine to coarse sand with silt and gravel, trace organic matter (~1% rootlets) (loose, moist) (fill)	SS	
			10	6					SP	Light brown fine to coarse sand, occasional gravel, trace silt (black band from 1.75 to 2 feet) (very loose, moist) (fill)	SS	
10	5		10	6		5-5.2			SP		NS	
			13	26					SM-ML	Light brown fine to coarse sand, occasional gravel, trace silt (very loose, wet) (fill)	NS	
			14	21					SP	Light brown fine to coarse sand , trace silt, occasional gravel, trace wood (~5%) (fill)	NS	
5			13	13		9-10				Gray silty fine sand to fine sandy silt, with mica (medium stiff, wet) (fill)	NS	
	10		1	12		10.5-10.6			ML	Gray fine to coarse sand, trace silt (very loose, wet) (fill)	NS	
			3	5						Gray-brown medium to coarse sand, trace fine sand, trace silt, trace fine gravel, trace mica (medium dense, wet) (fill)	NS	
0			11	2		13.5-14				Gray fine to coarse sand, trace silt, occasional gravel (loose, wet) (fill)	NS	
	15		14	5						Gray-brown fine to coarse sand, trace silt, trace organics (~1% wood fragments) (loose, wet) (fill)	NS	
			9	2						Brown fine sandy silt with organic matter (soft, wet) (native)	NS	
-5			18	6						Gray-brown fine sandy silt with organic matter (fibrous reeds/wood) (very soft, wet)	NS	
	20		17	24		20-21			SM	Gray-brown fine sandy silt with organci matter (very soft, wet)	NS	
			13	27					SP to SP-SM	Gray brown fine sandy silt with organic matter (soft, wet)	NS	
-10			13	23					SP	Gray silty fine sand with mica, trace organic matter (~1%) (very loose, wet)	NS	
	25		10	32						Gray silty fine sand grading to fine sand with silt, moderately laminated (loose, wet)	NS	
										Gray fine sand, trace silt (loose, wet)	NS	
-15			18	41		28-29				Gray fine to medium sand, trace silt (medium dense, wet)	NS	
	30									Gray fine to medium sand, trace silt, trace organics with mica (~1%) (loose, wet)	NS	
										Gray fine to coarse sand, trace silt with mica (medium dense, wet)		
										Gray fine to coarse sand, trace silt with mica (medium dense, wet)	NS	



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-03D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-5
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/26/2012	12/26/2012	8.5	GRL	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Turbo Track Rig
Surface Elevation (ft) / Vertical Datum	14.5247 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	372968.4709 / 1308355.578	Horizontal Datum	WA State Plane North 83/91

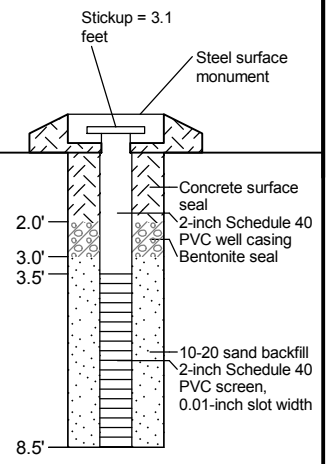
DOE Well I.D.: BHU-088
A 2 (in) well was installed on 12/26/2012 to a depth of 31 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
10	0								See LLMW-03D for sampling and material description		
	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-03S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-6
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\050406800.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/28/2012	12/28/2012	33	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Turbo Track Rig
Surface Elevation (ft) / Vertical Datum	18.8925 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	372642.8382 / 1308246.252	Horizontal Datum	WA State Plane North 83/91

DOE Well I.D.: BHU-089
A 2 (in) well was installed on 12/28/2012 to a depth of 33 (ft).

Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		18	12					SP-SM	Brown fine to coarse sand with silt, with gravel, rootlets (loose, moist) (fill)	NS	
			18	23		2-3			SP	Brown fine to coarse sand, trace silt, occasional gravel (loose, moist) (fill)	NS	
			2	20					SM	Orange-brown silty fine to coarse sand with gravel, trace organics (loose, moist) (fill)	NS	
	5		1	15							NS	
			8	4					ML	Brown to gray-brown sandy silt with gravel (soft, moist) (fill)	NS	
			12	2					SM	Gray silty fine to coarse sand with gravel, trace wood (~5%) (very loose, wet) (fill)	NS	
	10		18	5						Gray silty fine to coarse sand with gravel, trace wood (~1%) (loose, wet) (fill)	NS	
			13	13							NS	
			12	22					SP	Black to dark gray fine to coarse sand, trace organic matter (loose, wet) (fill)	NS	
			13	9						Gray fine to medium sand, occasional coarse sand, trace silt (loose, wet) (fill)	NS	
						14.3-14.5				Gray fine to medium sand, trace silt (loose, wet) (fill)		
	15		17	5					SM	Becomes dark gray to black with wood fragments (very loose, wet) (fill)		
			5	8					ML	Black silty sand, trace wood fragments (very loose, wet) (native)		
			15	7		18-19				Gray-brown fine sandy silt with organic matter (~1%) (soft, moist)		
										Becomes ~5% to 30% organic matter at shoe		
	20		11	5					ML to SM	Gray-brown fine sandy silt with organic matter (medium dense, wet)	NS	
										Gray fine sandy silt with interbeds of silty fine sand (soft, wet)		
			11	20					SP	Gray fine to coarse sand, trace silt with mica (loose, wet)	NS	
			13	16						Gray fine to coarse sand, trace silt with wood fragments with mica (loose, wet)	NS	
	25		12	33						Gray fine to coarse sand, trace silt with mica (medium dense, wet)	NS	
	30		15	57		30-31				Gray fine to coarse sand, trace silt with mica (medium dense, wet)	NS	
			5	35					Wood	Wood	NS	
									SP	Gray fine to coarse sand, trace silt with mica (medium dense, wet)		

WELL LOG

Stickup = 3.7 feet
Steel surface monument
Concrete surface seal
2.0'
2-inch Schedule 40 PVC well casing
Bentonite seal
21.0'
22.0'
10-20 sand backfill
2-inch Schedule 40 PVC screen, 0.01-inch slot width
32.0'
33.0'

Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-04D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-7
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/28/2012	12/28/2012	14	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Turbo Track Rig
Surface Elevation (ft)	18.6052	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	372644.2517	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1308249.764		

DOE Well I.D.: BHU-090
A 2 (in) well was installed on 12/28/2012 to a depth of 33 (ft).

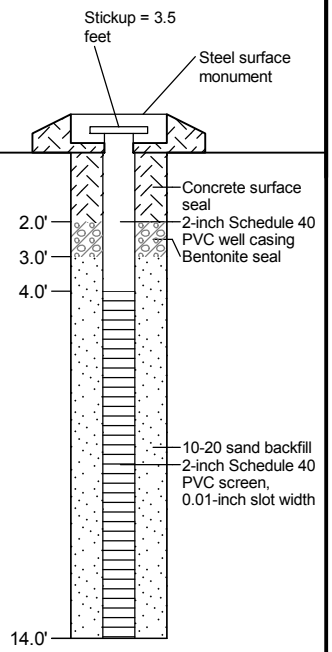
Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

FIELD DATA

Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0								See LLMW-04D for sampling and material description		
15											
	5										
10											
	10										
5											

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-04S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-8
Sheet 1 of 1

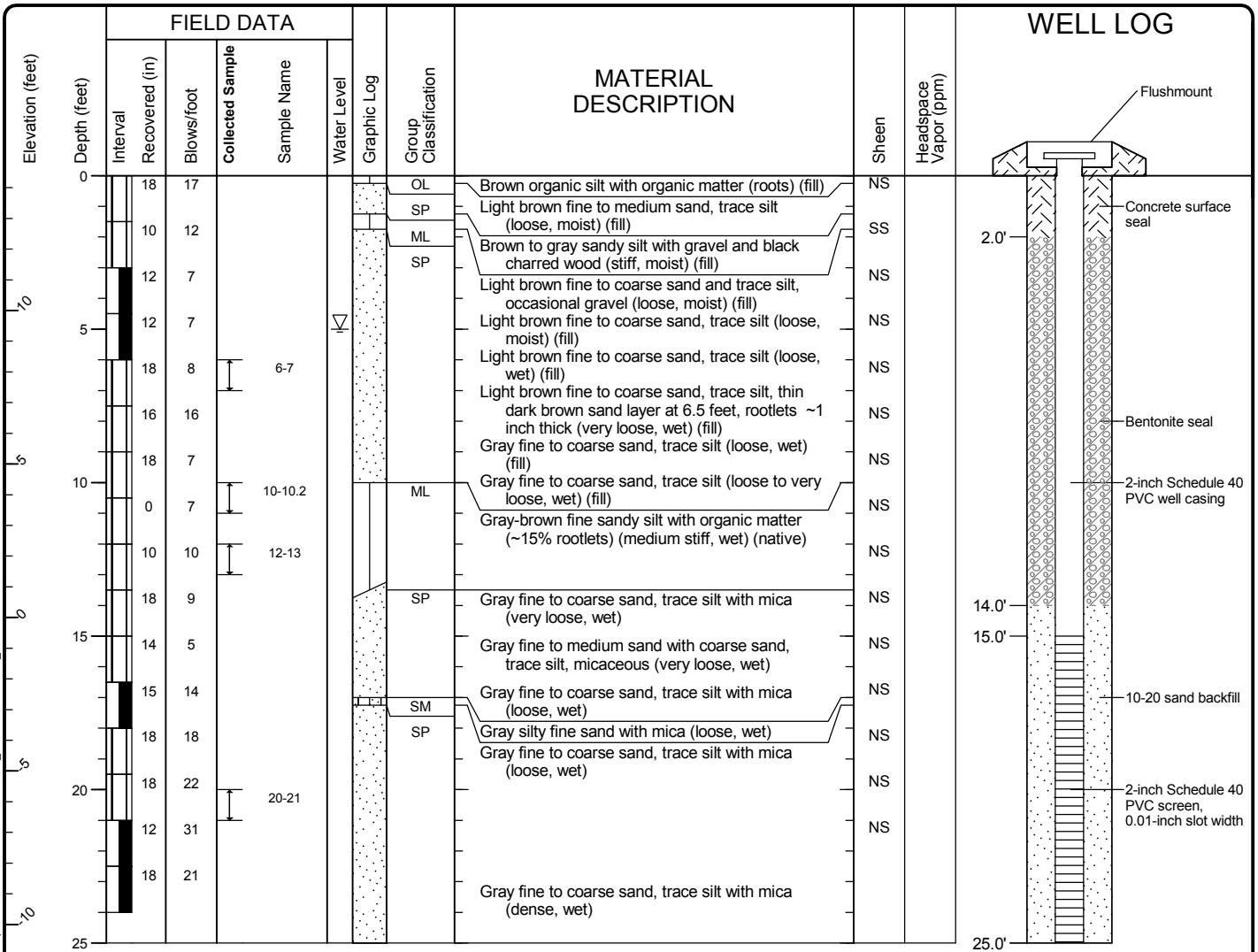
Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/10/2012	12/10/2012	25	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Turbo Track Rig
Surface Elevation (ft) / Vertical Datum	14.3948 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	372934.1281 1309088.27	Horizontal Datum	WA State Plane North 83/91

DOE Well I.D.: BHU-010
A 2 (in) well was installed on 12/10/2012 to a depth of 25 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/10/2012	5.0	9.4

Notes:



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-05D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-9
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/10/2012	12/10/2012	9	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Turbo Track Rig
Surface Elevation (ft)	14.4241	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	372938.3312	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1309085.133		

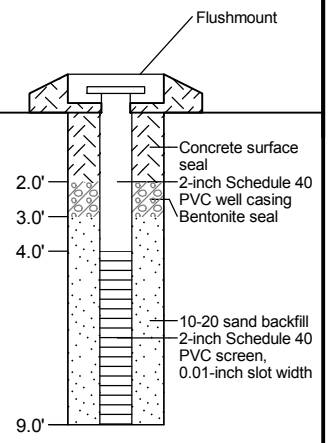
DOE Well I.D.: BHU-011
A 2 (in) well was installed on 12/10/2012 to a depth of 25 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0								See LLMW-05D for sampling and material description		
10	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-05S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-10
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/27/2012	12/27/2012	28.5	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft)	12.7123	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	372472.7325	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1309133.872		

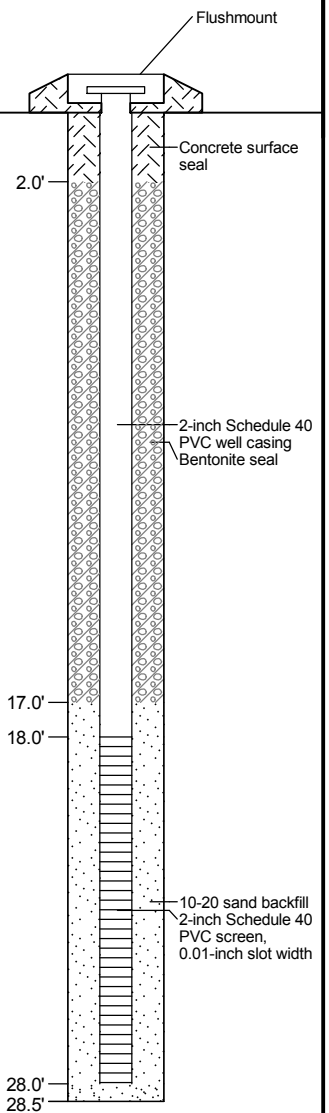
DOE Well I.D.: BHU-092
A 2 (in) well was installed on 12/27/2012 to a depth of 28.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0								CC	Concrete		
									Unknown	Unknown: cleared with vactor truck due to potential utilities		
	5		15	2							NS	
			15	3		6.5-7.5			SP	Gray-brown fine to coarse sand, with gravel, trace silt (very loose, wet) (fill)	NS	
			6	2		8-8.2			ML	Gray-brown fine sandy silt with organic matter (~15 to 20%) (very soft, wet) (native)	NS	
	10		13	0							NS	
			12	2		11-12				Gray-brown fine sandy silt with organic matter (~15%) (very soft, wet)	NS	
			6	11					Wood	Wood	NS	
	15		12	9					ML	Gray-brown fine sandy silt, trace organic matter (~5%) (medium stiff, wet)	NS	
			18	9					SP/ML	Gray fine to medium sand, trace silt with mica (very loose, wet)	NS	
			7	15						Gray fine to medium sand, trace silt (very loose, wet) Interbedded with gray-brown fine sandy silt with mica (medium stiff, wet)	NS	
	20		18	14					SP	Gray fine to coarse sand, trace silt with mica (loose, wet)	NS	
			9	2					SP-SM			
									SP	Becomes fine sand with silt and wood with mica (loose, wet)		
			12	1		23-24				Gray fine to medium sand, trace silt, trace wood (~1%) (very loose, wet) Gray fine to medium sand, trace silt (very loose, wet)		
	25		12	16						Gray fine to medium sand, trace silt (loose, wet)		
									Wood	Brown wood zone		
									SP	Gray fine to coarse sand, trace silt (loose, wet)		

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Log of Monitoring Well LLMW-06D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-11
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/27/2012	12/27/2012	7	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	12.7338 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	372477.6634 / 1309132.426	Horizontal Datum	WA State Plane North 83/91

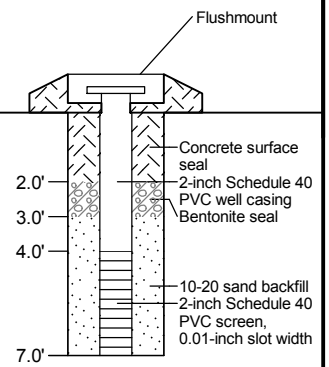
DOE Well I.D.: BHU-091
A 2 (in) well was installed on 12/27/2012 to a depth of 28.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
10	0								See LLMW-06D for sampling and material description		
	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-06S

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-12
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/7/2012	12/7/2012	25	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Turbo Track Rig
Surface Elevation (ft) / Vertical Datum	14.088 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	372580.8285 / 1309464.763	Horizontal Datum	WA State Plane North 83/91

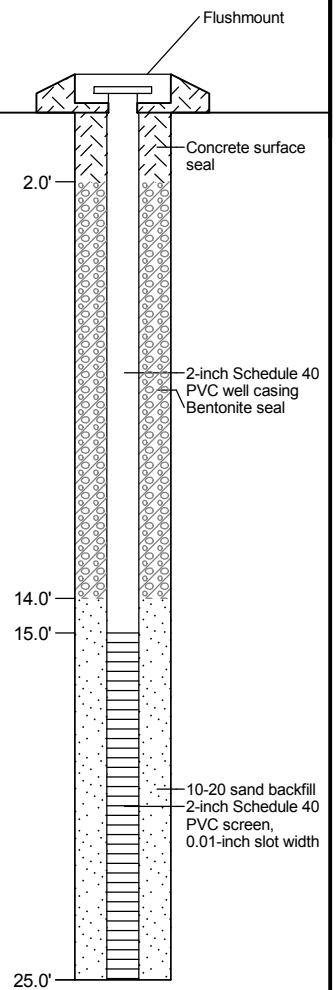
DOE Well I.D.: BHU-009
A 2 (in) well was installed on 12/7/2012 to a depth of 25 (ft).

Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		18	26					AC	Asphalt	SS	
									SP	Light brown fine to medium sand, trace silt, organic matter (loose, moist) (fill)		
			11	30					SP	Dark brown to brown fine to coarse sand with gravel and brick fragments, occasional charred wood, trace silt (medium dense, moist) (fill)	NS	
			18	13		3-4					NS	
			11	11					SP	Light brown fine to coarse sand, trace silt, occasional gravel (loose, moist) (fill)	NS	
	5		15	7						Orange-brown to light brown fine to coarse sand, trace silt , occasional gravel (loose, wet) (fill)	NS	
			8	6						Light brown fine to coarse sand, trace silt, occasional gravel (loose, wet) (fill)	NS	
			18	4						Dark brown fine to coarse sand, trace silt, occasional gravel, wood fragments (loose, wet) (fill)	NS	
	10					10-10.2				Gray fine to coarse sand, trace silt, occasional gravel (very loose, wet) (fill)		
			0	0		10.5-11			ML	Gray-brown fine sandy silt with organic matter and rootlets (~25%) (soft, wet) (native)		
			9	5						Gray-brown fine sandy silt with thin lenses of silty sand, trace organic matter and rootlets (~1%) (soft, wet)	NS	
			18	14					SP	Gray fine to medium sand, occasional coarse sand with alternating gradation of sand, trace organic matter and lenses of silty sand, micaceous (wet)	NS	
	15		15	13						Gray fine to coarse sand, trace silt, micaceous (loose, wet)	NS	
			18	4						Gray fine to coarse sand, trace silt, micaceous (loose, wet)	NS	
			18	19		18-19				Gray fine to coarse sand, trace silt, micaceous (medium dense, wet)	NS	
	20		18	24						Gray fine to coarse sand, trace silt, micaceous (loose, wet)	NS	
			18	28						Gray fine to coarse sand, trace silt, occasional gravel, micaceous (medium dense, wet)	NS	
			18	22						Gray fine to coarse sand, trace silt, micaceous (loose, wet)	NS	
	25											



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-07D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-13
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/7/2012	12/7/2012	9	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Turbo Track Rig
Surface Elevation (ft)	14.057	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	372578.2673	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1309467.087		

DOE Well I.D.: BHU-008
A 2 (in) well was installed on 12/7/2012 to a depth of 25 (ft).

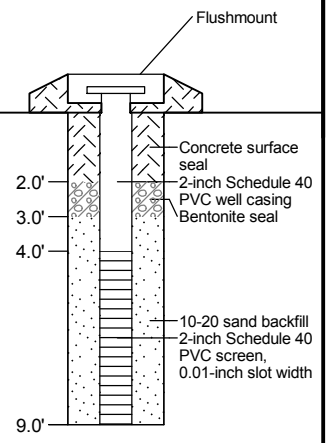
Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0								See LLMW-07D for sampling and material description		
10											
	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-07S

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-14
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/10/2012	12/11/2012	25.5	AMW	Holocene Drilling	Hollow-stem Auger

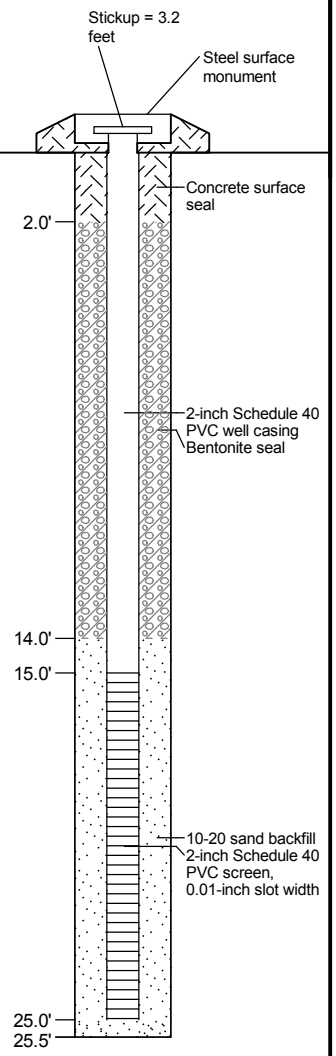
Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft)	13.4459	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	372209.3701	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1309788.569		

DOE Well I.D.: BHU-012
A 2 (in) well was installed on 12/10/2012 to a depth of 25.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/10/2012	5.5	7.9

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		12	25					SP	Brown fine to medium sand with coarse sand, occasional gravel, trace silt (loose, moist) (fill)	NS	
									GP	Brown coarse gravel, trace silt (loose, moist) (fill)		
			18	15					SP	Brown coarse gravel with sand, with silt (loose, moist) (fill)	NS	
									ML	Light brown fine to medium sand, trace silt, trace organic matter (~5%) (loose, moist) (fill)	NS	
			12	6		3-4			SP-SM	Brown fine sandy silt with brick fragments and charred wood, occasional gravel (medium stiff, moist) (fill)	NS	
	5		15	0						Brown to gray to orange fine to coarse sand with gravel, with silt (loose, moist) (fill)	NS	
			8	4						Dark brown to light brown fine to coarse sand with silt, occasional gravel (very loose, wet) (fill)	NS	
			6	0					SP	Brown fine to coarse sand with silt, occasional gravel, trace rootlets (~1%) (loose, wet) (native)	NS	
			12	0						Gray brown to gray fine to coarse sand, trace silt (very loose, wet)	NS	
	10		4	0						Dark gray to black fine to coarse sand, trace silt (very loose, wet)	NS	
			12	0		12-13			ML	Gray fine to coarse sand, occasional gravel, trace silt (very loose, wet)	NS	
			12	10					SP-SM	Dark gray-brown fine sandy silt with wood fragments (very soft, wet)	SS	
	15		14	21					SP	Dark gray-brown fine to coarse sand with silt, occasional gravel, trace wood (~5%) (very loose, wet)	NS	
			6	3					Wood	Dark gray-brown fine to coarse sand, occasional gravel, trace silt (loose, wet)	NS	
			4	0					SP	Wood	NS	
			18	3		20-21				Gray fine to coarse sand, trace silt, wood fragments (~25%) (very loose, wet)	NS	
	20		18	25						Gray fine to coarse sand, trace silt with mica (very loose, wet)	NS	
			18	28						Gray fine to coarse sand, trace silt, micaceous (loose, wet)	NS	
			0							Gray fine to coarse sand, trace silt, occasional fine gravel, micaceous (loose, wet)		
	25											



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-08D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-15
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/10/2012	12/11/2012	10	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft)	13.2146	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	372213.2542	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1309788.249		

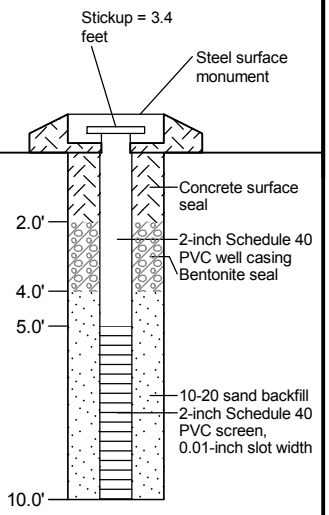
DOE Well I.D.: BHU-013
A 2 (in) well was installed on 12/10/2012 to a depth of 25.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0								See LLMW-08D for sampling and material description		
10											
	5										
5											
	10										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-08S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-16
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/6/2012	12/6/2012	27	AMW	Holocene Drilling	Hollow-stem Auger

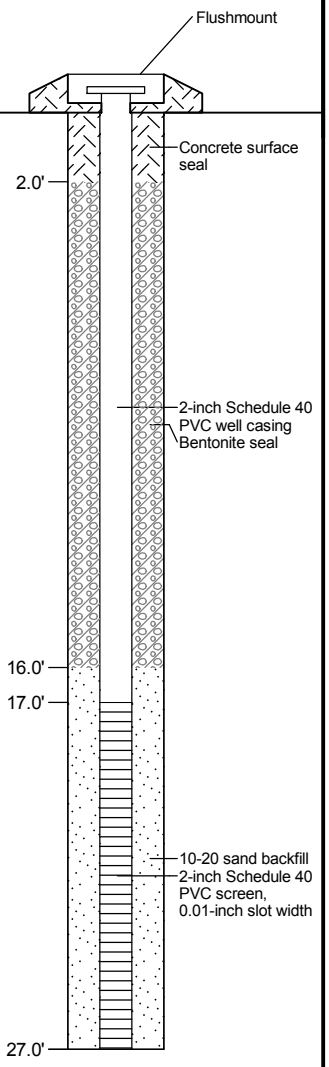
Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft)	13.1786	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	371933.0232	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1309291.53		

DOE Well I.D.: BHU-006
A 2 (in) well was installed on 12/6/2012 to a depth of 27 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0								GP	3 inch minus crushed rock (fill)		
			15	22					SP-SM	Brown fine to coarse sand with silt, occasional gravel (loose, moist) (fill)	NS	
									SP	Gray-brown fine to coarse sand, trace silt (loose, wet) (fill)		
			14	22							NS	
	5		18	20		4.5-5				Gray-brown fine to coarse sand, trace silt (loose, wet) (fill)	SS/MS	
			18	3							NS	
			12	3		7.3-7.5			ML	Gray-brown fine to coarse sand, trace silt (loose, wet) (fill)	NS	
										Gray-brown fine sandy silt with trace organic matter (~1%) (soft, moist) (native)		
			12	3						Gray-brown fine sandy silt with trace organic matter (~1%) (soft, moist)	NS	
	10		6	0		10.5-11				Gray-brown fine sandy silt with trace organic matter (~1%) (soft, moist)	NS	
										Gray-brown fine sandy silt with organic matter and rootlets (~15%) (very soft, moist)		
			12	4						Gray-brown fine sandy silt with organic matter and rootlets (>15%) (soft, moist)	NS	
			8	2					SM	Gray-brown fine sandy silt with organic matter and rootlets (~15%) (very soft, wet)	NS	
									ML	Gray silty fine sand (loose, wet)		
	15		18	6						Gray-brown fine sandy silt, trace organic matter	NS	
										Gray-brown fine sandy silt with silty fine sand interbeds, trace organic matter (~1%)		
			6	14					SP	Gray fine to coarse sand, trace silt (very loose, wet)	NS	
			12	16		18-19				Gray fine to coarse sand, trace silt (medium dense, wet)	NS	
	20		6	16						Gray fine to coarse sand, trace silt (medium dense, wet)	NS	
			6	15						Gray fine to coarse sand, trace silt (medium dense, wet)	NS	
			18	26						Occasional silt ripup clasts	NS	
										Gray fine to coarse sand, trace silt (medium dense, wet)		
			18	24						Gray fine to coarse sand, trace silt (medium dense, wet)	NS	
	25									Occasional brown silt ripup clasts		



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-09D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-17
Sheet 1 of 1

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/6/2012	12/6/2012	6	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	13.1484 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371929.4722 / 1309290.945	Horizontal Datum	WA State Plane North 83/91

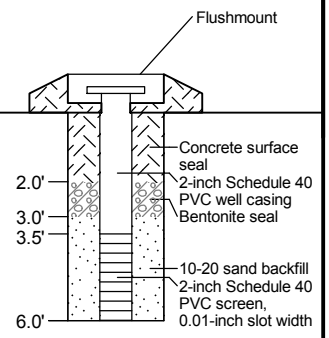
DOE Well I.D.: BHU-007
A 2 (in) well was installed on 12/6/2012 to a depth of 27 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
0	0								See LLMW-09D for sampling and material description		
	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-09S

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-18
Sheet 1 of 1

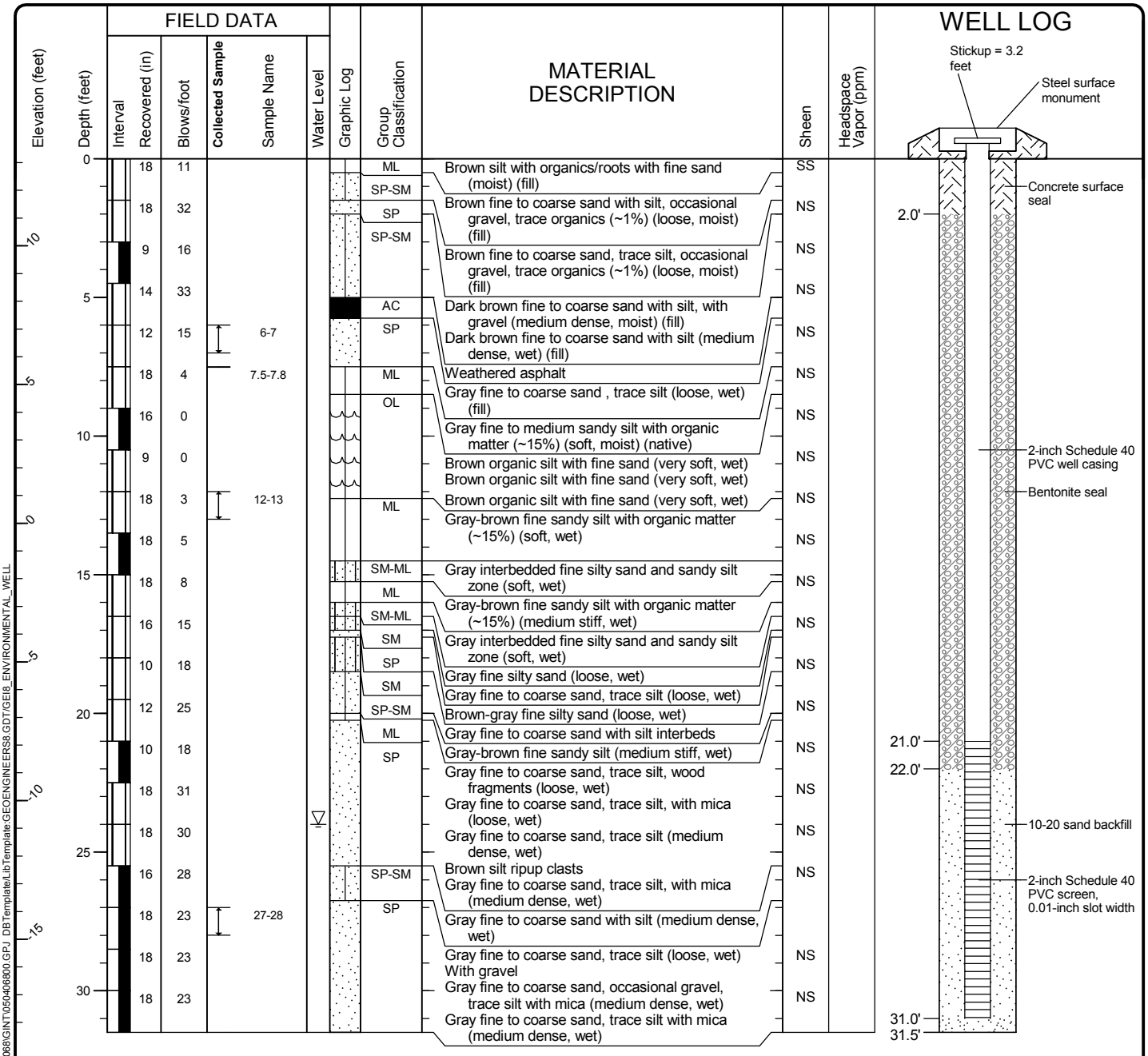
Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/11/2012	12/11/2012	31.5	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	13.1425 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371725.4255 / 1309359.407	Horizontal Datum	WA State Plane North 83/91

DOE Well I.D.: BHU-014
A 2 (in) well was installed on 12/11/2012 to a depth of 31.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/11/2012	24.0	-10.9

Notes:



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-10D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-19
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/11/2012	12/11/2012	6.5	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	13.183 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371722.2934 / 1309357.791	Horizontal Datum	WA State Plane North 83/91

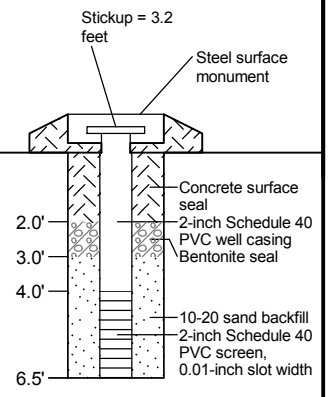
DOE Well I.D.: BHU-015
A 2 (in) well was installed on 12/11/2012 to a depth of 31.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
10	0								See LLMW-10D for sampling and material description		
	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-10S

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

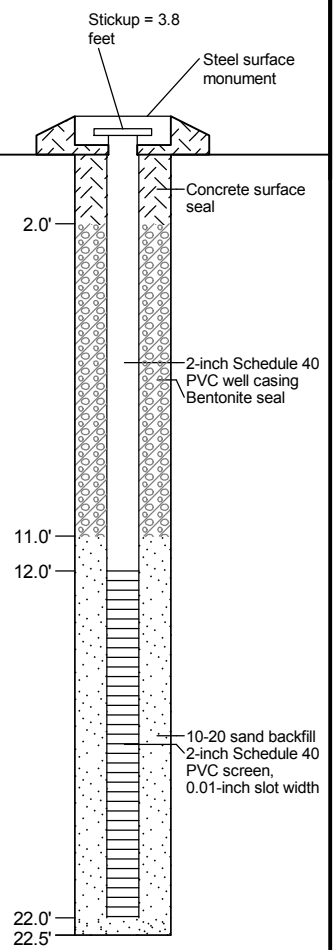
Figure A-20
Sheet 1 of 1

Drilled Start 12/13/2012	End 12/13/2012	Total Depth (ft) 22.5	Logged By AMW / Checked By	Driller Holocene Drilling	Drilling Method Hollow-stem Auger

Hammer Data: 140 (lbs) / 30 (in) Drop		Drilling Equipment: CME 850 Track Rig	DOE Well I.D.: BHU-040 A 2 (in) well was installed on 12/13/2012 to a depth of 22.5 (ft).
Surface Elevation (ft): 16.0257 Vertical Datum: NAVD88		Top of Casing Elevation (ft):	Groundwater Date Measured: 1/2/2013 Depth to Water (ft): 4.5 Elevation (ft): 11.5
Easting (X): 371822.9079 Northing (Y): 1310350.261		Horizontal Datum: WA State Plane North 83/91	

Notes:

Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
0		14	5					SP	Brown fine to coarse sand, trace silt with rootlets, occasional gravel (moist) (fill)	NS	
		16	31						Brown fine to coarse sand, trace silt with roots (fill)	NS	
		18	23					SM	Brown silty sand with gravel, with rootlets (loose, moist) (fill)	SS	
					3.5-4.5			SP			
5		15	47					SP-SM	Light brown fine to medium sand, trace silt (loose, moist) (fill)	SS	
					5-6			SP	Dark brown fine to coarse sand, with silt, occasional gravel (medium dense, moist) (fill)	SS	
		10	23						Orange-brown fine to coarse sand, trace silt, occasional gravel (loose, moist) (fill)	SS	
		12	31						Orange-brown fine to coarse sand, trace silt (loose, moist to wet) (fill)	SS	
		11	10						Becomes gray-brown (medium dense) (fill)	NS	
10		12	9		10.5-10.7				Gray-brown with orange mottling fine to coarse sand, trace silt (very loose, wet) (fill)	NS	
					11-11.5			ML	Becomes gray with rotten wood (fill)	NS	
								SP	Gray fine sandy silt (stiff, wet) (native)	NS	
		12	27						Gray-brown fine to medium sand, trace silt, micaceous (medium dense, wet)	NS	
		9	27						Gray fine to coarse sand, trace silt, occasional gravel, trace organic layer with mica (<1%) (medium dense, wet)	NS	
15		6	25						Gray fine to coarse sand, trace silt, occasional gravel, trace organic layer with mica (~5%) (loose, wet)	NS	
		13	41							NS	
		12	30						Gray fine to coarse sand, trace silt, occasional gravel, with mica (medium dense, wet)	NS	
20		12	32		19.5-20.5					NS	
			36						Gray fine to coarse sand, trace silt, occasional gravel, trace wood fragments with mica (twigs and bark) (medium dense, wet)		



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-11D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-21
Sheet 1 of 1

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Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/13/2012	12/13/2012	9.5	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft) / Vertical Datum	15.999 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371826.1136 1310349.231	Horizontal Datum	WA State Plane North 83/91

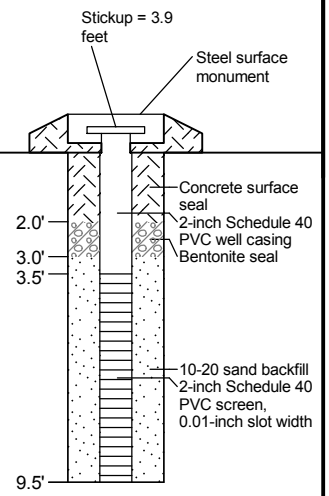
DOE Well I.D.: BHU-041
A 2 (in) well was installed on 12/13/2012 to a depth of 22.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
15	0								See LLMW-11D for sampling and material description		
10	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-11S

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-22
Sheet 1 of 1

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/12/2012	12/12/2012	27.5	PDR	Holocene Drilling	Hollow-stem Auger

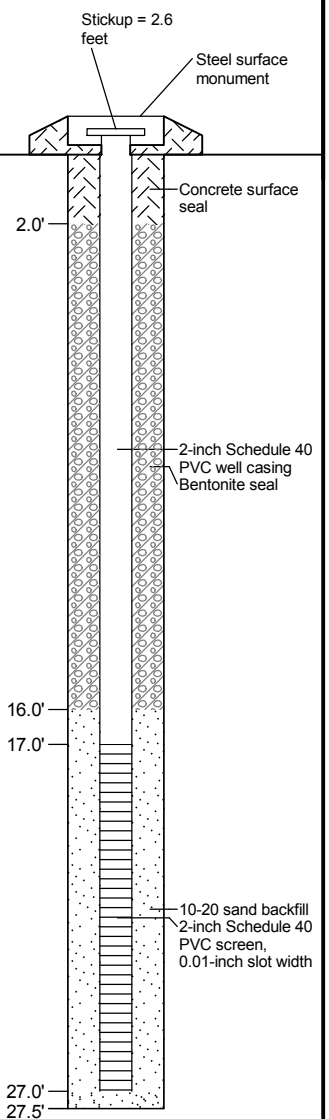
Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft)	13.6305	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	371523.5091	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1309414.28		

DOE Well I.D.: BHU-016
A 2 (in) well was installed on 12/12/2012 to a depth of 27.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/12/2012	4.5	9.1

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		17	6					SM	Brown silty fine to medium sand, trace organics (fill)	NS	
			18	8						Brown silty fine sand, occasional wood debris (loose, moist)	NS	
			15	14					SP-SM	Gray fine to medium sand, trace silt	NS	
	5		16	11		5-5.5				Gray fine to medium sand, trace silt, occasional fine gravel	NS	
			15	17						Grades to coarse sand	NS	
			18	3						Gray fine to coarse sand with trace silt, occasional fine gravel (medium dense, wet)	NS	
			8	0/18"		8.5-8.7			ML	Brown silt with organics	NS	
	10		18	0/18"		10-10.5				Gray silt with organics (soft, moist)	NS	
			18	2						Gray/brown silt with increasing organics and occasional 1 cm layer of fine sandy silt (soft, moist)	NS	
			14	3					SP	Gray silt	NS	
									ML	Gray fine to medium sand interbed		
									SP	Gray silt, occasional organics (soft, moist)		
	15		14	7					ML	Gray fine sand interbed	NS	
			18	6					SM	Gray silt, occasional organics (soft, moist)	NS	
			18	13					SP	Gray silty fine to medium sand with occasional wood debris	NS	
	20		18	16						Gray fine to coarse sand, trace silt (dense, wet)	NS	
			11	25		21-22					NS	
			18	23							NS	
			18	25							NS	
	25		16	24							NS	
										Gray fine to coarse sand, trace silt, occasional fine gravel (dense, wet)		



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-12D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-23
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/12/2012	12/12/2012	7	PDR	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	13.8405 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371520.5241 / 1309412.436	Horizontal Datum	WA State Plane North 83/91

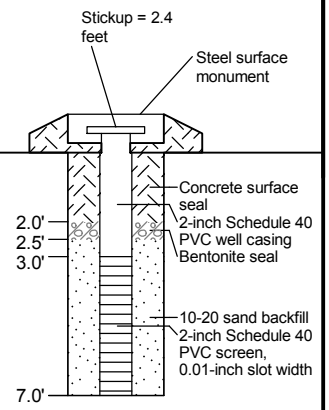
DOE Well I.D.: BHU-017
A 2 (in) well was installed on 12/12/2012 to a depth of 27.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
10	0								See LLMW-12D for sampling and material description		
	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-12S

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-24
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068800.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/17/2012	12/17/2012	37	AMW	Holocene Drilling	Hollow-stem Auger

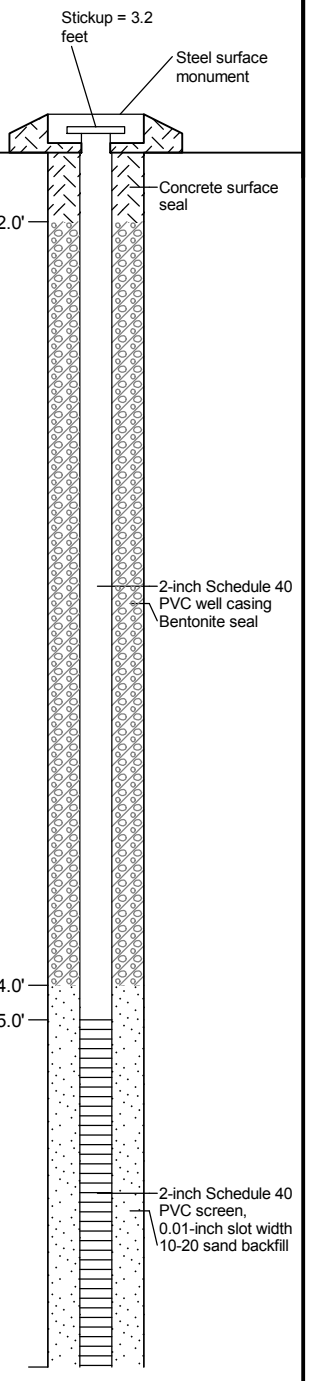
Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft) / Vertical Datum	18.4782 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371682.4624 1309793.149	Horizontal Datum	WA State Plane North 83/91

DOE Well I.D.: BHU-045
A 2 (in) well was installed on 12/17/2012 to a depth of 37 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0								SP-SM	Light brown fine to coarse sand with gravel/cobbles, with silt (wet at surface, then moist below 6 inches) (fill)		
	5		8	50/5"					SM	Brown fine to coarse silty sand with gravel (very dense, moist) (fill)	NS	
			0	50/2"							NS	
			11	50/5"					SP	Gray fine to coarse sand, trace silt (very dense, moist) (fill)		
	10		8	21					SP-SM	Gray fine to coarse sand, trace silt, with gravel (very dense, moist) (fill)	NS	
			14	15		10.5-11.5				Black fine to coarse sand with silt, with charred wood (loose, moist) (fill)	NS	
			12	17					SP	Black fine to coarse sand with silt, with gravel, with charred wood (loose, moist to wet) (fill)	NS	
			10	40					SM	Gray fine to coarse sand, trace silt (loose, wet) (fill)	NS	
									SP	Dark gray fine to coarse sand, trace silt (loose, wet) (fill)		
	15		8	9						Gray fine silty sand, laminated (loose, wet) (fill)	NS	
			8	10						Gray fine to coarse sand, trace silt, wood in shoe (medium dense, wet) (fill)	NS	
			12	9						Gray fine to coarse sand, trace silt, with mica (very loose, wet) (fill)	NS	
						18.7-19			ML	Gray fine to coarse sand, with gravel, trace silt (very loose, wet) (fill)		
	20		14	8						Gray fine sandy silt, trace organic matter, low plasticity (~1%) (medium stiff, wet) (native)	NS	
			14	18					SM	Gray fine to coarse silty sand (very loose, wet)	NS	
			18	10		23-24			SM	Gray-brown fine to coarse silty sand, trace organic matter (~1%) (loose, wet)	NS	
			18	15						Gray-brown silty fine to coarse sand, trace wood (loose, wet)	NS	
	25		7	16					SP-SM	Gray-brown silty fine to coarse sand with wood, occasional gravel (loose, wet)	NS	
			13	45					SP	Gray-brown fine to coarse sand with gravel, with silty, trace wood (loose, wet)	NS	
			5	25						Gray-brown fine to coarse sand, trace wood (<1%) (medium dense, wet)	NS	
	30		12	46						Gray fine sand with silt lense	NS	
			15	51		32-33			SP-SM	Gray fine to coarse sand, trace silt (wet)	NS	
			12	50/6"					SP	Gray fine to coarse sand with silt (wet)	NS	
	35									Gray fine to coarse sand, occasional fien gravel, trace silt (medium dense, wet)	NS	



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-13D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-25
Sheet 1 of 2

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	WELL LOG
	35		17	61							NS		35.0'
													37.0'

Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-13D (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-25
Sheet 2 of 2

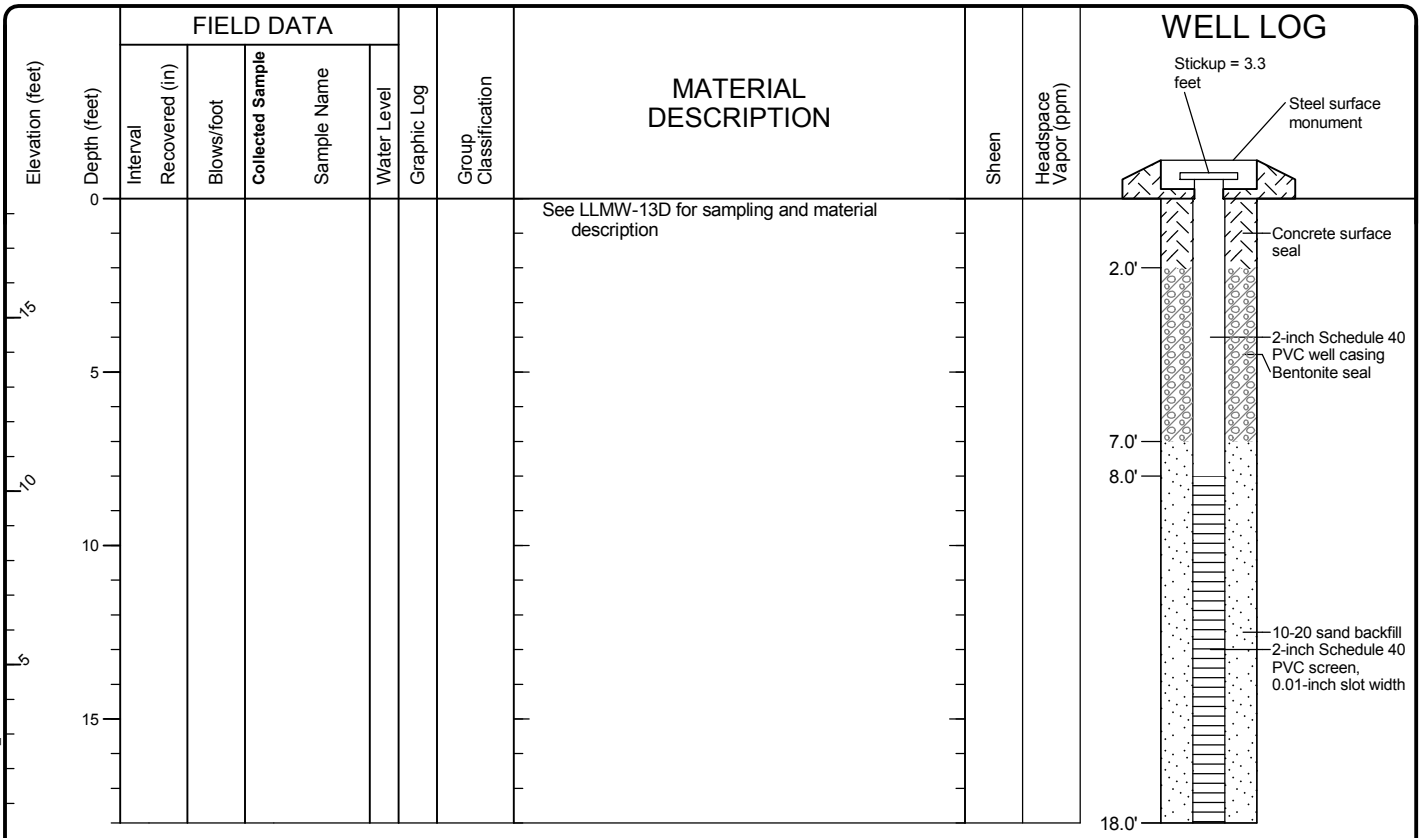
Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/17/2012	12/17/2012	18	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft) / Vertical Datum	18.4337 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371682.6131 / 1309796.93	Horizontal Datum	WA State Plane North 83/91

DOE Well I.D.: BHU-044
A 2 (in) well was installed on 12/17/2012 to a depth of 37 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-13S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-26
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/12/2012	12/12/2012	31	PDR	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	12.4895 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371375.9911 1309449.16	Horizontal Datum	WA State Plane North 83/91

DOE Well I.D.: BHU-018
A 2 (in) well was installed on 12/12/2012 to a depth of 31 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/12/2012	4.5	8.0

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		18	5					TS	2 inches topsoil (fill)	NS	
									SM	Brown silty fine to medium sand with organics ((loose, moist) (fill)		
			16	7							NS	
									SP	Brown fine to medium sand with trace silt (loose, moist) (fill)		
			7	5							NS	
			10	5			▽			Brown fine to coarse sand with trace silt (loose, moist) (fill)	NS	
	5					5.5-6				Gray fine to coarse sand with trace silt (loose, wet) (fill)		
			10	3							NS	
						7-7.2			ML	Brown silt with organics (soft, wet) (native)		
			18	0		8-9				Brown silt (soft, wet)	NS	
			16	0							NS	
	10		8	0							NS	
			18	0/18"					ML	Gray silt with trace organics and some fine sand (soft, moist)	NS	
										With organics		
			18	5		13.5-14				Wood debris	NS	
									SM	Gray fine to medium silty sand (loose, wet)		
	15		15	4					SP-SM	Gray fine to coarse sand with silt (loose, wet)	NS	
			15	14							NS	
									ML	Brown silty interbed		
			18	6					SP	Gray fine to coarse sand with trace silt (dense, wet)		
									ML	Gray silt with fine sand (soft, wet)		
	20		16	24					Wood	Wood debris	NS	
									SP	Gray fine to coarse sand with trace silt (medium dense, wet)		
			18	24							NS	
			18	10						Gray fine to coarse sand with trace silt (dense, wet)	NS	
									Wood	Wood debris		
			18	21					SP	Gray fine to coarse sand with trace silt (dense, wet)	NS	
	25		18	17						Gray fine to coarse sand with trace silt (medium dense, wet)	NS	
			18	25						Gray fine to coarse sand with trace silt (medium dense, wet)	NS	
			18	22		29-30				Gray fine to coarse sand with trace silt (dense, wet)	NS	
	30											

WELL LOG

Stickup = 2.8 feet
Steel surface monument
Concrete surface seal
2.0'
2-inch Schedule 40 PVC well casing
Bentonite seal
19.0'
20.0'
10-20 sand backfill
2-inch Schedule 40 PVC screen, 0.01-inch slot width
30.0'
31.0'

Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-14D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-27
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/12/2012	12/12/2012	6	PDR	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	12.4877 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371374.1753 1309446.946	Horizontal Datum	WA State Plane North 83/91

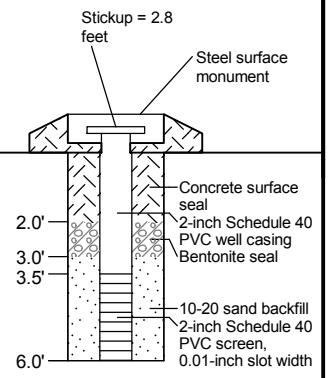
DOE Well I.D.: BHU-019
A 2 (in) well was installed on 12/12/2012 to a depth of 31 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
10	0								See LLMW-14D for sampling and material description		
	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-14S

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-28
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/13/2012	12/13/2012	34	PDR	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft)	13.0987	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	371053.2175	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1309536.612		

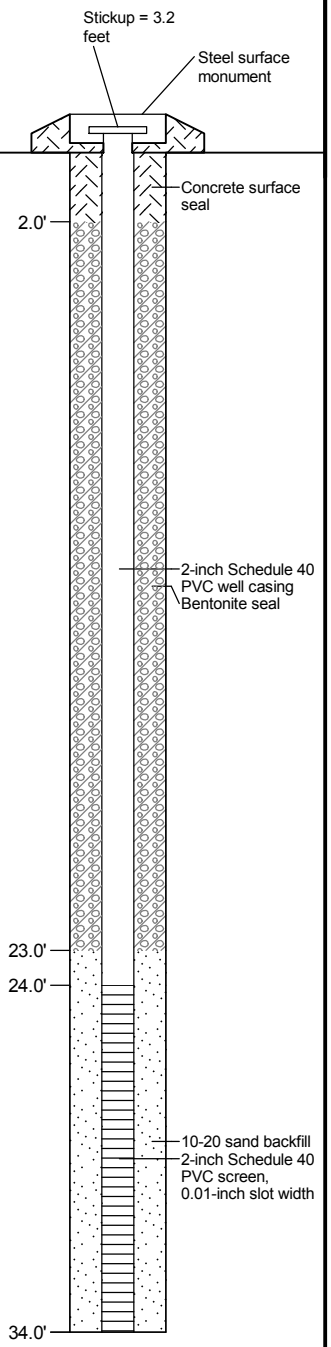
DOE Well I.D.: BHU-020
A 2 (in) well was installed on 12/13/2012 to a depth of 34 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/13/2012	6.0	7.1

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		18	10					TS	3 inches topsoil (fill)	NS	
			18	39		2-3			SP-SM	Brown fine to medium sand with silt (medium dense, moist) (fill)	NS	
			10	22					GP-GM	Brown fine to coarse sand with silt (medium dense, moist) (fill)	NS	
			10	15		4-4.5			SP	Brown fine to coarse gravel with fine sand and silt (dense, moist) (fill)	NS	
	5		18	15					ML	Dark gray fine to coarse sand with trace silt; black staining (dense, moist) (fill)	NS	
			7	14					SP	Black silt with fine sand and organics (medium dense, moist) (fill)	NS	
			9	10						Brown fine to coarse sand with trace silt (loose, wet) (fill)	NS	
	10		12	1					Wood	Gray fine to coarse sand with trace silt (loose, wet) (fill)		
			7	4		11.5-12			SP	Wood (fill)		
			18	1		14-15			ML	Brown silt with occasional fine sand and organics (medium dense, moist) (native)		
	15		15	4								
			14	3								
			17	8								
	20		15	6					Wood	Wood/gravel		
			18	6					ML	Gray silt with trace fine sand (soft, wet)	NS	
			16	23					SM	Gray silty fine sand (loose, wet)	NS	
	25		14	62					SP	Gray fine to coarse sand with trace silt (dense, wet)	NS	
			17	20							NS	
			6	8					Wood	Wood in shoe	NS	
			5	26					Wood/SM	Brown wood with fine sand, trace silt		
	30		12	33		30.5-31.5			SP-SM	Gray fine to coarse sand with silt (dense, wet)	NS	
			6	14					SP	Gray fine to coarse sand with trace silt (dense, wet)	NS	
									Unknown	No sample this interval		

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-15D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-29
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/13/2012	12/13/2012	9.5	PDR	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	13.2143 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371051.1506 / 1309535.419	Horizontal Datum	WA State Plane North 83/91

DOE Well I.D.: BHU-021
A 2 (in) well was installed on 12/13/2012 to a depth of 34 (ft).

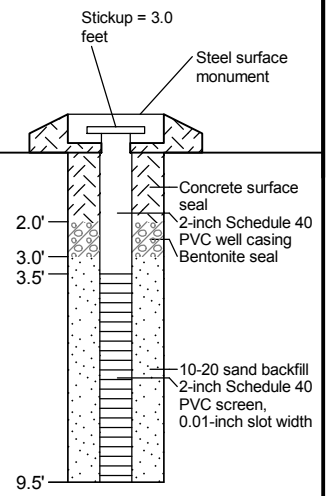
Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

FIELD DATA

Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
10	0								See LLMW-15D for sampling and material description		
5	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-15S

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-30
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\050406800.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/14/2012	12/14/2012	34	PDR	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft) / Vertical Datum	17.1441 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371158.166 / 1310160.437	Horizontal Datum	WA State Plane North 83/91

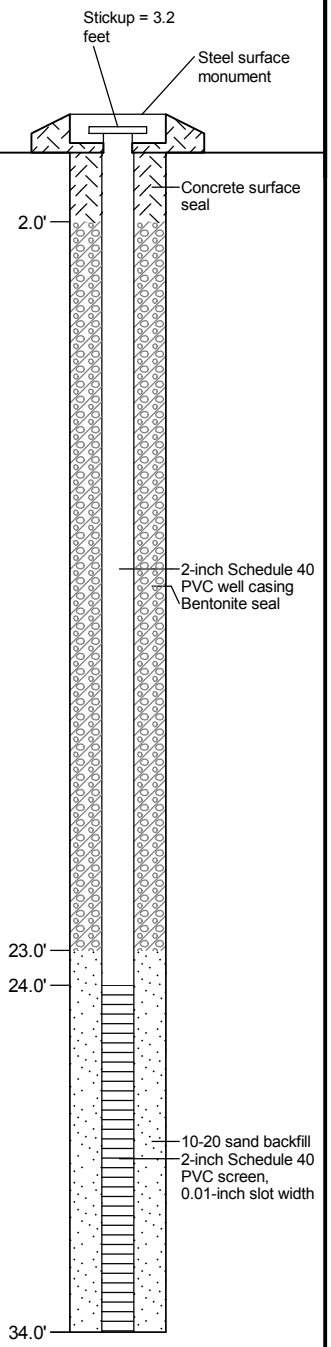
DOE Well I.D.: BHU-042
A 2 (in) well was installed on 12/14/2012 to a depth of 34 (ft).

Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
0		13	21					SM	Light brown silty sand with gravel, with organic matter (charred wood) (loose, wet) (fill)	NS	
		12	17							NS	
		18	32							NS	
		8	50/2"					SP	Light brown fine to medium sand, occasional coarse sand and gravel, trace silt (very dense, moist) (fill)	NS	
5		6	50/3"					SM	Becomes moist Light brown silty sand with gravel (very dense, moist) (fill)	NS	
10		6	4					SP-SM	Black and brown fine to coarse sand with silt, with gravel and brick fragments (very loose, moist) (fill)	NS	
		0	0								
		12	2		12.5-12.7 13-13.5					NS	
		18	0					ML/OL	Gray-brown fine sandy silty to organic silt (very soft, wet) (native)	NS	
15		12	0		15-16			ML	Gray-brown fine sandy silt with organic matter (~15%) (very soft, wet) Becomes very stiff	NS	
		15	4						Becomes soft	NS	
		18	5						Gray-brown fine sandy silt with wood/organic matter (~12%) (soft, wet) moderate dilatency, moderate plasticity	NS	
20		18	5							NS	
		18	13						Gray-brown fine sandy silt with wood/organic matter (soft, wet) high dilatency, high plasticity	NS	
		9	14					SP	Gray fine to coarse sand with trace silt (loose, wet)	NS	
25		8	11						Gray fine to coarse sand with wood, trace silt, with mica (loose, wet)	NS	
		10	15					SP-SM	Gray fine to coarse sand with wood, trace silt, with mica (loose, wet)	NS	
		9	21						Gray fine to coarse sand with wood, with silt (loose, wet)	NS	
30		14	61		29.5-30.5			SP	Gray fine to coarse sand, trace silt, with mica (loose, wet)	NS	
		18	56						Gray fine to coarse sand, occasional fine gravel, trace silt, with mica (loose, wet) occasional brown silt ripup clasts	NS	
		8	54						Gray fine to coarse sand with gravel, trace silt, with mica (medium dense, wet)		



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-16D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-31
Sheet 1 of 1

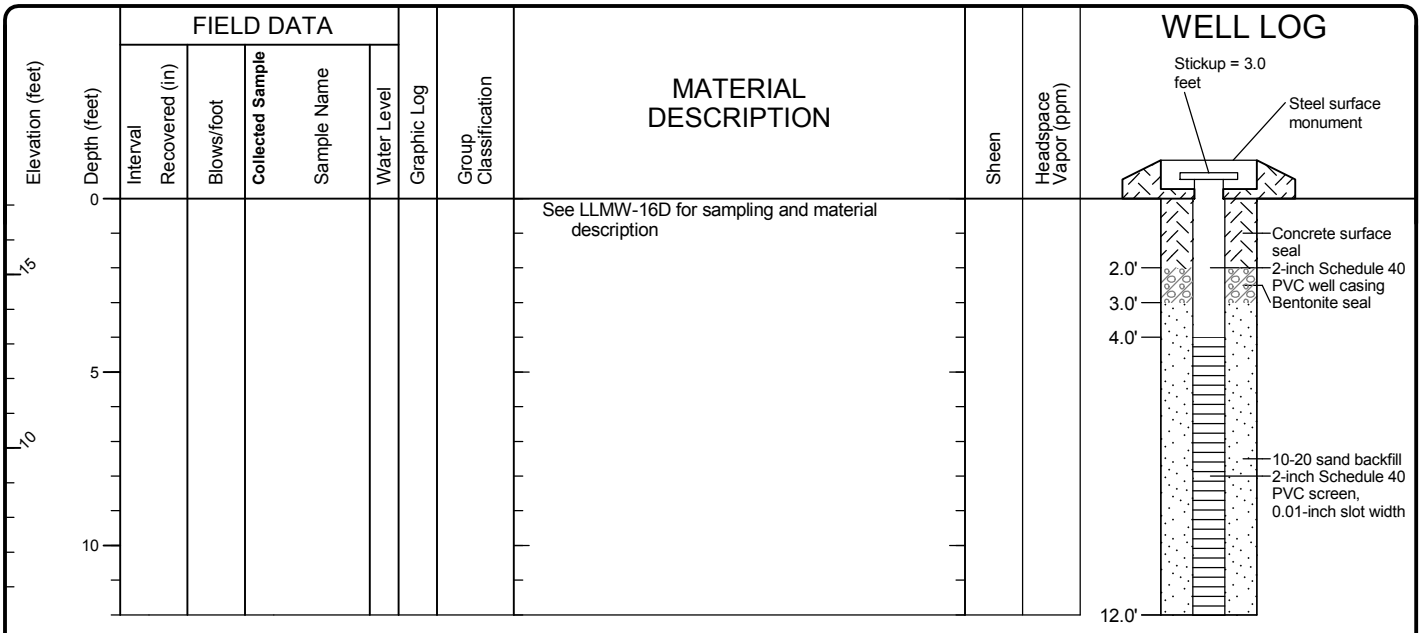
Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/14/2012	12/14/2012	12	PDR	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft) / Vertical Datum	17.1917 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371159.2967 1310164.452	Horizontal Datum	WA State Plane North 83/91

DOE Well I.D.: BHU-043
A 2 (in) well was installed on 12/14/2012 to a depth of 34 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-16S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-32
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/12/2012	12/13/2012	25.5	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft)	15.2671	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	371317.6575	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1310603.072		

DOE Well I.D.: BHU-038
A 2 (in) well was installed on 12/12/2012 to a depth of 25.5 (ft).

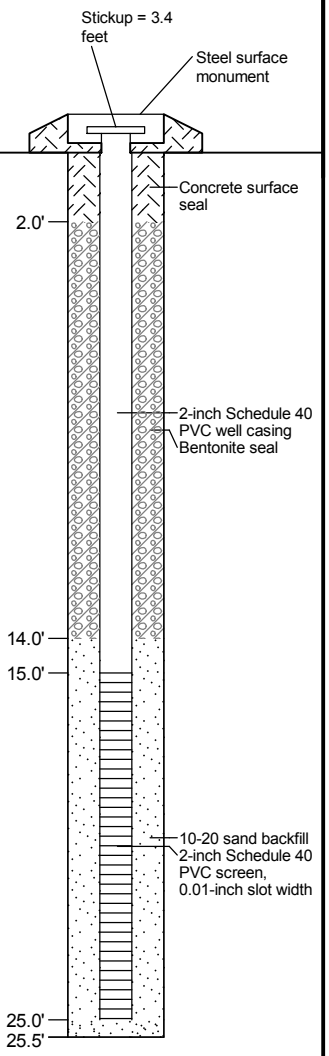
Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
5	0		12	6					SP	Brown fine to medium sand, occasional coarse sand and gravel, trace silt, wood fragments and rootlets (loose, moist) (fill)	NS	
			12	17						Brown fine to coarse sand, occasional gravel, trace silt, occasional rootlets (loose, moist) (fill)	NS	
			16	20						Brown fine to coarse sand with gravel, trace silt, occasional rootlets (~1%) (loose, moist) (fill)	SS	
10	5		18	10		5-6				Dark brown fine to coarse sand, occasional gravel, trace silt (very loose, moist) (fill)	SS	
			14	12						Light brown fine to coarse sand, trace silt (loose, moist)	SS	
			13	14							NS	
5	10		15	19						Gray-brown fine to coarse sand, occasional fine gravel, trace silt (loose, wet)	NS	
			12	11							NS	
			10	8		12-12.2 12.5-13			ML	Gray-brown fine to coarse sand, occasional fine gravel, trace silt (loose, wet) Gray fine to medium sand, trace organic matter, with mica (~5%) (very loose, wet) (fill)	NS	
			8	12					SP	Gray fine sandy silt , trace organics, 1 inch piece of wood, with mica (medium stiff, wet) (native)	NS	
0	15		12	16						Gray fine to medium sand with coarse sand, trace silt, occasional wood (~1%), with mica (loose, wet)	NS	
			14	29						Gray fine to coarse sand, trace silt, with wood (loose, wet)	NS	
			0	25						Gray fine to coarse sand, trace silt, occasional wood (medium dense, wet) (native)		
5	20		9	40						Gray fine to coarse sand with gravel, trace silt, with mica (medium dense, wet)	NS	
			12	40		21-22				Gray fine to coarse sand with gravel, trace silt (medium dense, wet)	NS	
			12	49						Gray fine to coarse sand with gravel, trace silt (medium dense, wet)	NS	
-10	25		9	41						Gray fine to coarse sand with gravel, trace silt (medium dense, wet)	NS	

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-17D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-33
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\050406800.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/12/2012	12/13/2012	11	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft) / Vertical Datum	15.3209 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371320.3207 / 1310602.283	Horizontal Datum	WA State Plane North 83/91

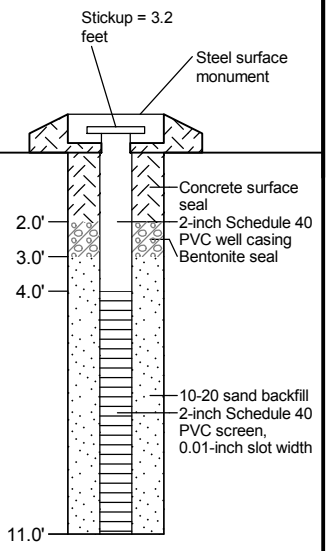
DOE Well I.D.: BHU-039
A 2 (in) well was installed on 12/12/2012 to a depth of 25.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
5	0								See LLMW-17D for sampling and material description		
10	5										
5	10										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-17S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-34
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/13/2012	12/13/2012	30	PDR	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	13.1053 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	370391.758 / 1309718.714	Horizontal Datum	WA State Plane North 83/91

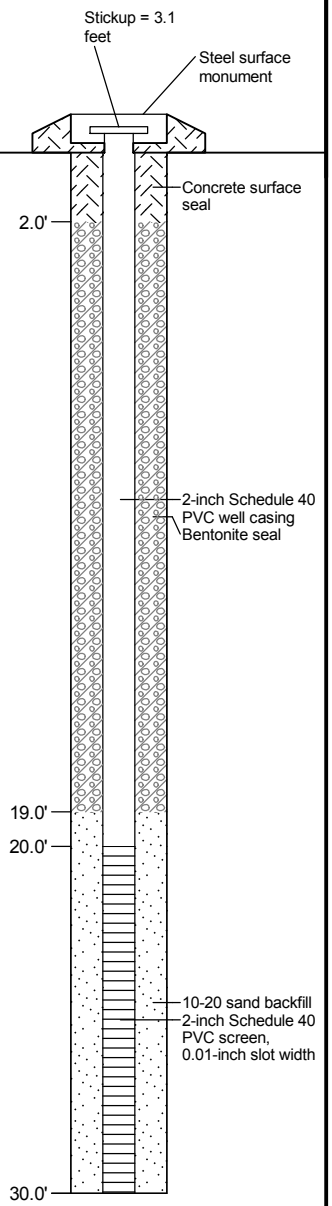
DOE Well I.D.: BHU-022
A 2 (in) well was installed on 12/13/2012 to a depth of 30 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/13/2012	4.0	9.1

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		18	13					SOD	2 inched grass/topsoil (fill)	NS	
									GM	Brown silty fine to coarse gravel with fine to medium sand (dense, moist) (fill)	NS	
			8	50/3"						Becomes gray		
									CC	Rock in shoe	NS	
			3	42						Concrete debris (fill)		
									SP-SM	Brown fine to coarse sand with silt (dense, wet) (fill)	NS	
	5		18	28					SP	Gray fine to coarse sand with occasional fine to coarse gravel (dense, wet) (fill)	NS	
			18	10		6-7			Wood	Wood in shoe (fill)		
									SP	Gray fine to coare sand (dense, wet) (fill)	NS	
			14			8.5-8.7			ML	Dark gray silt with fine sand and organics (stiff, wet) (fill)	NS	
			16	18					SP-SM	Gray fine to coarse sand with silt (very loose, wet) (fill)	NS	
	10		18	0		11-12			ML	Dark gray silt with fine sand and organics (soft, wet) (native)	NS	
			16	0						Grades to brown	NS	
			18	0						Brown silt with organics, occasional fine sand (soft, wet)	NS	
	15		12	0						Brown silt with organics (soft, wet)		
			18	2						Increasing organics	NS	
			18	9						Grades to gray		
									ML	Gray silt with fine to medium sand interbeds		
	20		18	22					SP	Gray fine to medium sand with trace silt, with trace organics		
			18	17		21-22				Gray fine to medium sand with trace silt (dense, wet)		
										Gray fine to medium sand, trace wood debris		
			10	22						Gray fine to coarse sand with occasional gravel, trace silt (medium dense, wet)	NS	
			18	25							NS	
	25		18	28						Gray fine to coarse sand, trace silt (dense, wet)	NS	
			13	32							NS	
	30		13	28							NS	

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-18D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-35
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/13/2012	12/13/2012	7.5	PDR	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	13.2735 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	370389.0772 1309715.292	Horizontal Datum	WA State Plane North 83/91

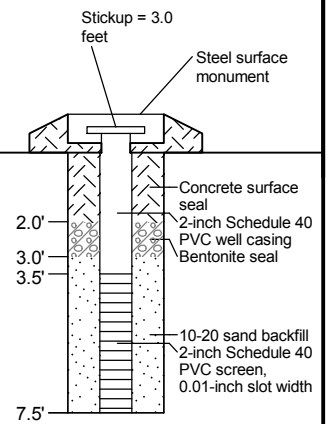
DOE Well I.D.: BHU-023
A 2 (in) well was installed on 12/13/2012 to a depth of 30 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
10	0								See LLMW-18D for sampling and material description		
	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-18S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-36
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/6/2012	12/6/2012	27	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	11.642 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	370189.3895 / 1310224.846	Horizontal Datum	WA State Plane North 83/91

DOE Well I.D.: BHU-005
A 2 (in) well was installed on 12/6/2012 to a depth of 27 (ft).

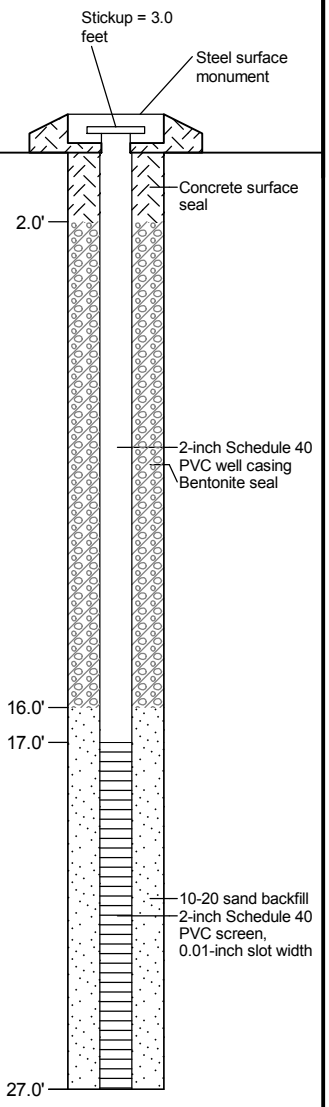
Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
0		15	50/4"					SP-SM	Brown fine to coarse sand, concrete rubble (very dense, moist) (fill)	SS	
		18	80					Rock	Rock (fill)	NS	
		13	54		3-4			SP	Orange-brown fine to coarse sand with gravel (moist) (fill)	NS	
								ML	Olive brown fine sandy silt with gravel and brick fragments (hard, moist) (fill)	NS	
5		18	24					SP	Dark gray fine to coarse sand, occasional gravel, trace silt (medium dense, wet) (fill)	NS	
		10	7						Brown silt lense at 3.75 feet Dark gray fine to coarse sand, trace silt (loose, wet) (fill)	NS	
		14	4		7.8-8			ML	Gray fine to coarse sand, occasional fine gravel, trace silt (very loose, wet) (fill)	NS	
		9	4		9-10				Dark gray grades to gray-brown fine sandy silt with organic matter and rootlets (~15%) (soft, moist) (native)	NS	
10		10	3						Gray-brown fine sandy silt with organic matter and rootlets (soft, moist)	NS	
		17	5						1 inch lense of gray silty sand, occasional carbonized wood, micaceous (very loose, moist)	NS	
		18	5						1 inch lense of gray silty sand, occasional carbonized wood, micaceous (very loose, moist)	NS	
15		18	11					SP-SM	Gray fine to coarse sand with silt (very loose, wet)	NS	
		18	17					ML	Gray-brown fine sandy silt (very soft, wet)		
		18	21					SP-SM	Gray fine to coarse sand with silt (very loose, wet)		
								SP	Gray fine to coarse sand, trace silt, occasional brown silt ripup clasts (loose, wet)	NS	
20		18	11								
		0	44								
25		14	22		25-26				Gray fine to coarse sand, trace silt, with mica (loose, wet)	NS	

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-19D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-37
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/12/2012	12/12/2012	21	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft)	11.3205	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	370542.4429	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1310748.178		

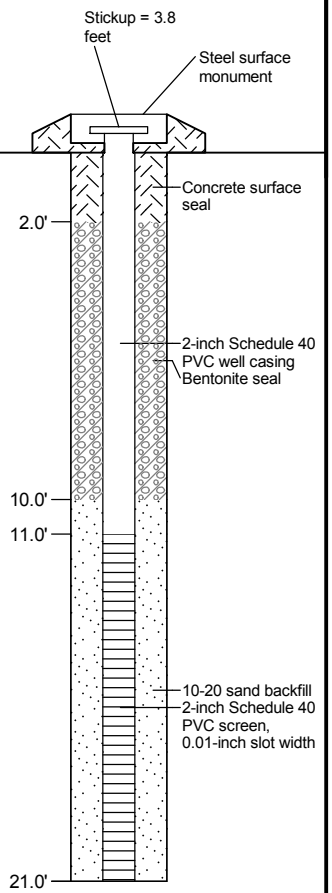
DOE Well I.D.: BHU-037
A 2 (in) well was installed on 12/12/2012 to a depth of 21 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/12/2012	3.0	8.3

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		18	25					AC	Asphalt	SS	
									SP	Brown fine to coarse sand with gravel, trace silt, trace wood fragments/bark (loose, moist) (fill)	SS	
			16	30						Brown fine to coarse sand, occasional gravel, trace silt, rusty scrap metal at 2.5 feet (medium dense, moist) (fill)	NS	
			9	8						Brown fine to coarse sand, occasional gravel, trace silt with thin silt layer (1 inch thick) at 3.5 feet in the sand (very loose, wet) (fill)	SS	
	5		10	5		4.5-5.5				Brown fine to caorse sand, occasional gravel, trace silt (very loose, wet) (fill)	NS	
			16	2						Brown fine to coarse sand, occasional grvel, trace silt (wet) (fill)		
			0			7.2-7.4			ML	Gray-brown fine sandy silt, trace organic matter (~1%) (very soft, wet) (native)		
			2	11		9-9.5				Gray-brown fine sandy silt, trace organic matter (<1%) (medium stiff, wet)	SS	
	10		12	13					SP	Orange-brown fine to coarse sand, trace silt, with mica (loose, wet)	SS	
			12	13						Gray fine to coarse sand, trace silt, with mica, wood fragments at 12.5 feet (loose, wet)	SS	
			10	15		13.5-14.5				Gray fine to coarse sand, trace silt, occaional wood/bark, with mica (loose, wet)	NS	
	15		10	26							NS	
			6	25						Gray fine to coarse sand, trace silt, with mica (medium dense, wet)	NS	
			12	16						Gray fine to coarse sand with fine subrounded gravel, trace silt, with mica (loose, wet)	NS	
	20		8	23						Gray fine to coarse sand with gravel, trace silt, with mica, trace wood (loose, wet)	NS	

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-20D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-38
Sheet 1 of 1

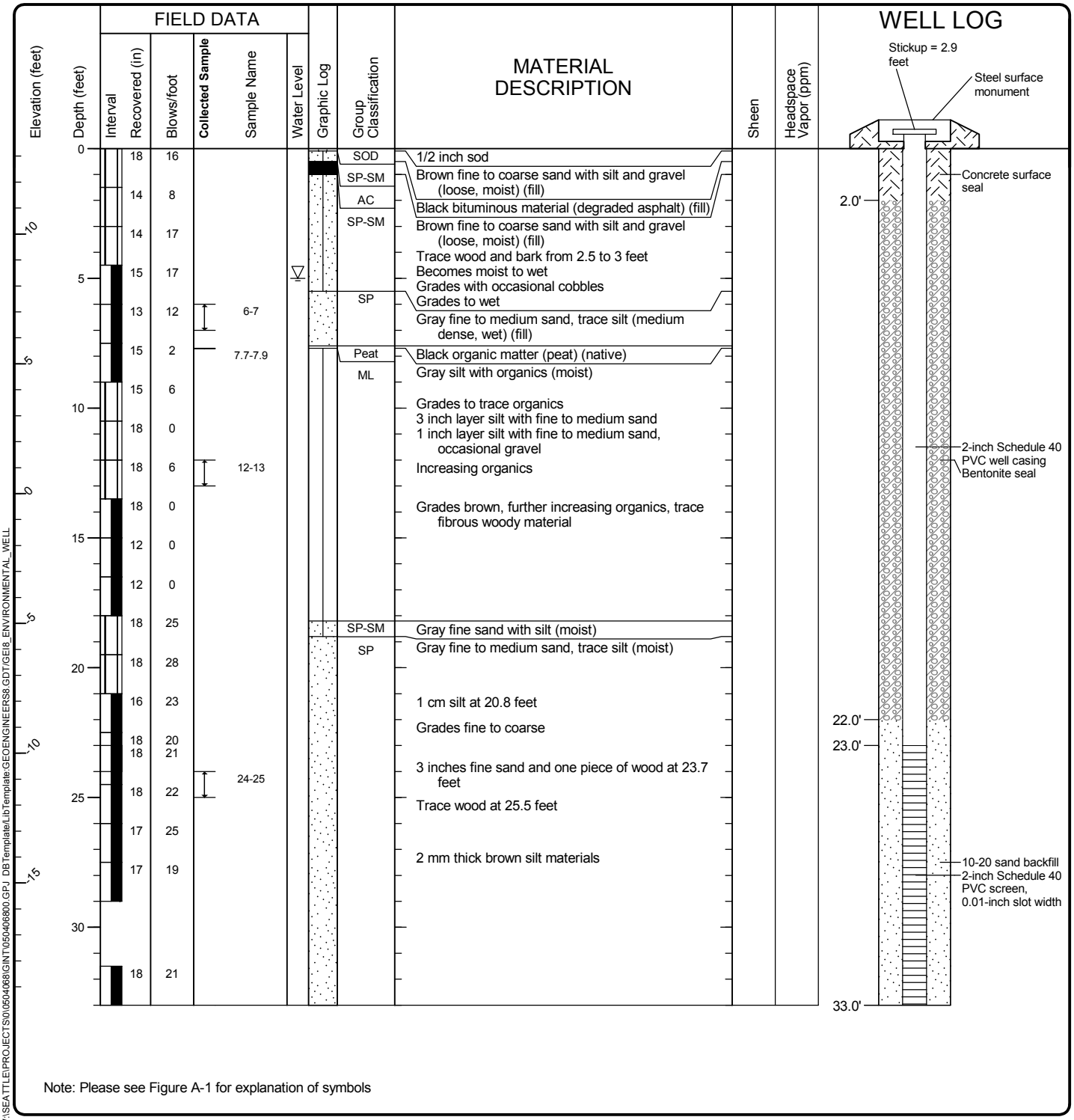
Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/20/2012	12/20/2012	33	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft)	13.2943	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	370011.1759	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1309881.28		

DOE Well I.D.: BHU-025
A 2 (in) well was installed on 12/20/2012 to a depth of 33 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/20/2012	5.0	8.3

Notes:



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-21D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-39
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/20/2012	12/20/2012	7	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	13.6214 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	370010.9467 / 1309885.453	Horizontal Datum	WA State Plane North 83/91

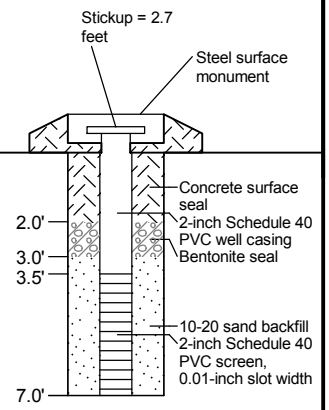
A 2 (in) well was installed on 12/20/2012 to a depth of 33 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
10	0								See LLMW-21D for sampling and material description		
	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-21S

GeoEngineers

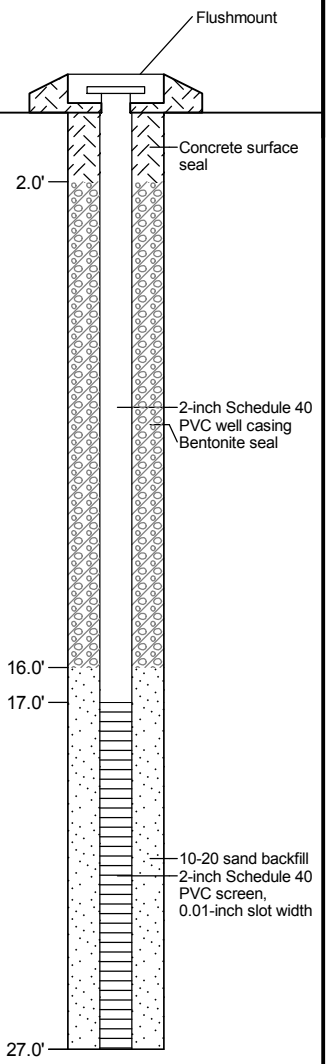
Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-40
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\050406800.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled: Start 12/5/2012 End 12/5/2012	Total Depth (ft): 27	Logged By: AMW Checked By:	Driller: Holocene Drilling	Drilling Method: Hollow-stem Auger	
Hammer Data: 140 (lbs) / 30 (in) Drop		Drilling Equipment: Diedrich D-120	DOE Well I.D.: BHU-003 A 2 (in) well was installed on 12/5/2012 to a depth of 27 (ft).		
Surface Elevation (ft): 13.1426 Vertical Datum: NAVD88		Top of Casing Elevation (ft):	Groundwater Date Measured:	Depth to Water (ft):	Elevation (ft):
Easting (X): 369167.8357 Northing (Y): 1310446.091		Horizontal Datum: WA State Plane North 83/91			
Notes:					

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		14	50/4"					SP	Brown fine to coarse sand with gravel (fill)	NS	
									CC	Concrete (fill)		
			8	50/2"					SP	Brown fine to coarse sand with gravel, trace silt (very dense, moist) (fill)	SS	
									CC	Concrete with brick fragments (fill)		
			18	31		3-4			SM	Brown silty sand with wood, brick fragments (fill)	NS	
	5		15	26					SP	Gray-brown with orange mottling fine to coarse sand, trace silt (medium dense, moist) (fill)	NS	
			12	9						Gray-brown fine to coarse sand, trace silt (medium dense, wet) (fill)	NS	
			12	6		8-8.2			ML	Gray fine to coarse sand, occasional gravel, trace silt (very loose, wet) (fill)	NS	
			17	5						Dark gray fine to coarse sand, occasional gravel, trace silt (very loose, wet) (fill)	NS	
	10		14	3		10.5-11.5				Brown fine sandy silt, trace rootlets (~1%) (medium stiff, moist) (native)	NS	
			18	6						Gray-brown fine sandy silt with organic matter and rootlets (~5%) (soft, moist)	NS	
			16	5					Wood	Gray-brown fine sandy silt with organic matter and wood fragments (soft, moist)	NS	
			12	12					ML	Gray-brown fine sandy silt with organic matter and wood fragments (soft, moist)	NS	
	15		7	32					SM/ML	Piece of wood undergraded	NS	
			18	32					SM	Gray-brown fine sandy silt with organic matter (medium stiff, moist)	NS	
			18	42		20-21			SP	Gray-brown fine interbedded silty sand and sandy silt, trace organic matter (soft, wet)	NS	
			18	34						Gray fine silt sand with organic matter and rootlets (~15%) (loose, wet)	NS	
			18	47						Gray fine to coarse sand with gravel, trace silt, trace mica (medium dense, wet)	NS	
	25		18	46						Gray fine to coarse sand, trace silt (medium dense, wet)	NS	
			12	41						Gray fine to coarse sand, occasional rounded gravel, trace silt, trace mica (medium dense, wet)	NS	
										Gray fine to coarse sand, occasional fine gravel, trace silt, micaceous (medium dense, wet)	NS	
										Gray fine to coarse sand with fine gravel, trace silt, micaceous (medium dense, wet)	NS	
										Gray fine to coarse sand with fine gravel, trace silt, micaceous (medium dense, wet)	NS	
										Gray fine to coarse sand, trace silt, micaceous (medium dense, wet)	NS	



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-22D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-41
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/5/2012	12/5/2012	7	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft)	13.1787	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	369173.009	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1310445.634		

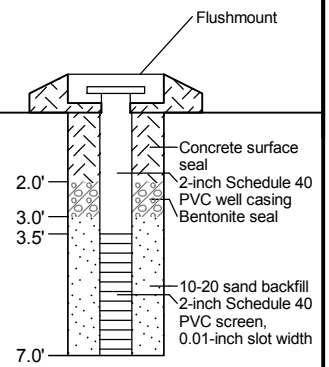
DOE Well I.D.: BHU-004
A 2 (in) well was installed on 12/5/2012 to a depth of 27 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
10	0								See LLMW-22D for sampling and material description		
	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-22S

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-42
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/4/2012	12/5/2012	40	AMW	Holocene Drilling	Hollow-stem Auger

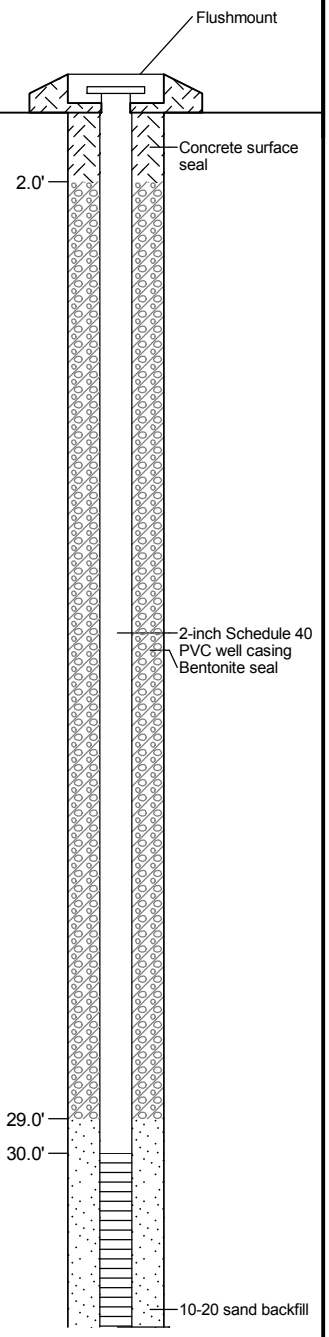
Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	25.9105 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	368226.9076 1310278.89	Horizontal Datum	WA State Plane North 83/91

DOE Well I.D.: BHU-001
A 2 (in) well was installed on 12/4/2012 to a depth of 40 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
25	0							SP	Gray-brown fine to medium sand, trace silt (medium dense, moist) (fill)		
20	5	15	11							NS	
		15	31		8-9				Gray-brown fine to medium sand, trace silt (medium dense, moist) (fill)		
15	10	15	18						Gray-brown fine to coarse sand, occasional gravel, trace silt (medium dense, moist) (fill)	NS	
10	15	5	5						Gray-brown fine to coarse sand, occasional gravel, trace silt (medium dense, moist) (fill)	NS	
		15	19		17-18				Gray-brown fine to medium sand, trace wood fragments (~1%), yellow brick fragments at 16.5 feet (medium dense, moist) (fill)	NS	
		13	0						Gray-brown fine to medium sand, trace wood chips (~1%) (medium dense, moist) (fill)		
5	20	11	15		20-21				Gray-brown fine to coarse sandl, trace silt (medium dense, wet) (fill)	NS	
		10	14					Wood			
								SP	Dark brown wood fibers/bark (bogfuel) (wet) (fill)	NS	
0		7	4		22.9-23.1			SM	Gray-brown fine to coarse sand, occasional gravel, trace silt, trace wood (~1%) (medium dense, wet) (fill)	NS	
		9						SP	Gray-brown fine to medium sand, trace silt (loose, wet) (fill)		
-5	25	5	4		26-26.5			ML	Gray-brown silty fine to medium sand, trace wood (~5%) (loose, wet) (native)	NS	
		12	6						Gray-brown fine to coarse sand, trace silt, occasional rootlets (loose, wet)	NS	
									Gray-brown sandy silt with rootlets (~15%) (medium stiff, wet)		
-10		18	20					SP	Gray-brown sandy silt with rootlets (~5%) (medium stiff, moist)	NS	
	30	15	18						Gray fine to medium sand, trace to no silt, trace rootlets (~1%), micaceous (loose, wet)	NS	
		18	19						Gray fine to medium sand, trace silt, trace rootlets (~1%), micaceous	NS	
-15		18	38						Gray fine to medium sand, occasional coarse sand, occasional fine gravel, trace silt, micaceous, small silt ripups in matrix (medium dense, wet)	NS	
	35	18	37							NS	



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-23D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-43
Sheet 1 of 2

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\050406800.GPJ DBTemplate\LibTemplate\GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	WELL LOG
10	35					35-36				Gray fine to medium sand, occasional coarse sand, trace silt, micaceous (medium dense, wet) (native)	NS		2-inch Schedule 40 PVC screen, 0.01-inch slot width
			18	31						Gray fine to medium sand, occasional coarse sand, trace silt, micaceous (medium dense, wet)	NS		
			12	37						Gray fine to coarse sand, trace silt, micaceous (medium dense, wet)			
	40												40.0'

Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-23D (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-43
Sheet 2 of 2

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/4/2012	12/5/2012	24	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft)	25.9515	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	368222.1107	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1310277.448		

DOE Well I.D.: BHU-002
A 2 (in) well was installed on 12/4/2012 to a depth of 40 (ft).

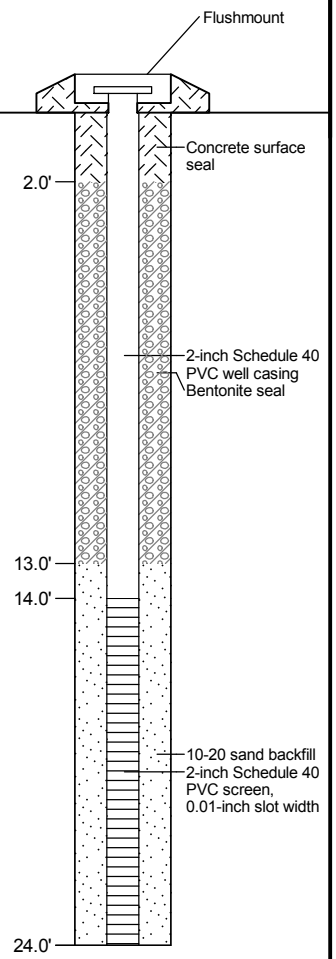
Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

FIELD DATA

Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
25	0								See LLMW-23D for sampling and material description		
20	5										
15	10										
10	15										
5	20										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-23S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-44
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/20/2012	12/20/2012	56.5	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft) / Vertical Datum	54.6587 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371665.5506 1308321.72	Horizontal Datum	WA State Plane North 83/91

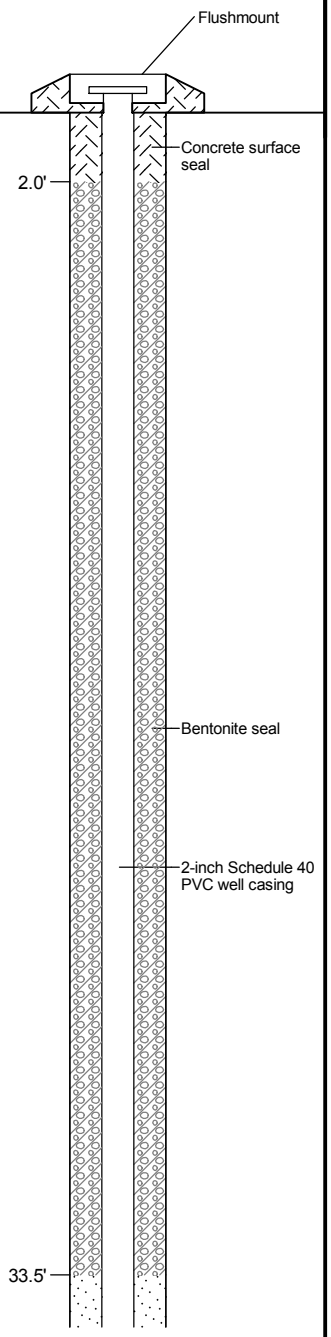
A 2 (in) well was installed on 12/21/2012 to a depth of 56.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/20/2012	45.0	9.7

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
50	0		18	4					SM	Brown silty fine to coarse sand, occasional gravel, abundant rootlets/sod in upper 6 inches (very loose, moist) (fill/topsoil)	NS	
			16	42		1.3-1.5			SP-SM	Gray-brown fine to coarse sand with silt and gravel (medium dense, moist) (weathered till)	NS	
			8	50/5"						Gray-brown fine to coarse sand with silt, occasional gravel (very dense, moist) (till)	NS	
	5		3	50/3"							NS	
			8	50/2"		6-6.5			SM	Gray-brown silty fine to coarse sand with gravel (very dense, moist) (till)	NS	
			1	50/3"							NS	
45	10		2	50/4"						Gray-brown silty fine to coarse sand with gravel (very dense, moist) (till)	NS	
40	15		0	50/5"								
35	20		0									
30	25											
25	30		15	70		30-31			SP	Light brown fine to medium sand, trace silt (very dense, moist) (outwash)	NS	
20	35											

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Boring LLMW-24D

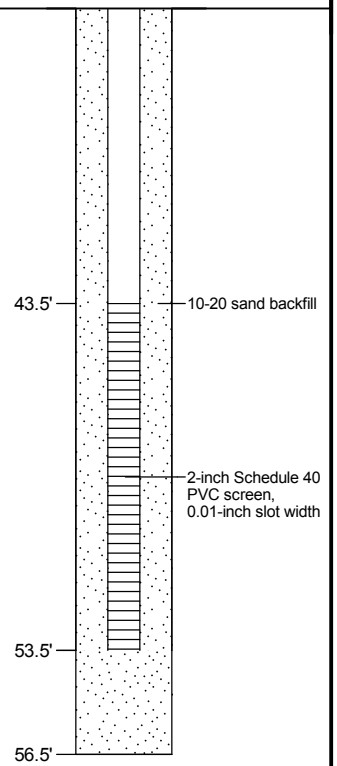
GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-45
Sheet 1 of 2

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	35		18	63						Light brown fine to medium sand, trace silt (very dense, moist)		
15	40		14	50/5"						Light brown fine to medium sand, trace silt (very dense, moist)		
10	45		11	50/5"		45-46				Light brown fine to medium sand, trace silt (very dense, wet)	NS	
5	50		11	50/5"						Light brown fine to medium sand, trace silt (very dense, wet)	NS	
0	55		10	57						Light brown fine to coarse sand, occasional gravel, trace silt (very dense, wet)	NS	

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Boring LLMW-24D (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-45
Sheet 2 of 2

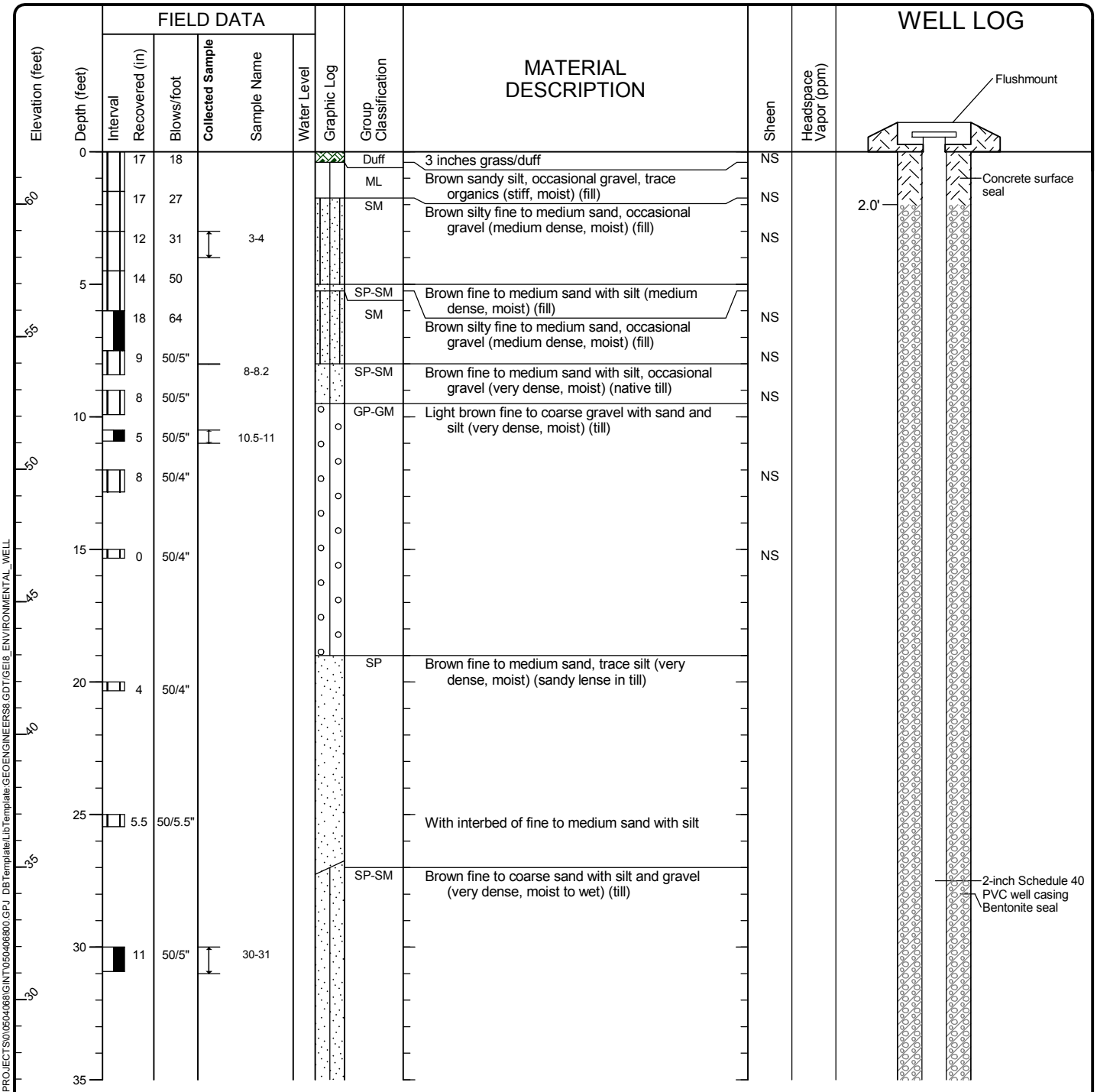
Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/19/2012	12/19/2012	65	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft) / Vertical Datum	61.9771 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371489.9394 1308367.759	Horizontal Datum	WA State Plane North 83/91

A 2 (in) well was installed on 12/19/2012 to a depth of 65 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/19/2012	55.0	7.0

Notes:



Note: Please see Figure A-1 for explanation of symbols

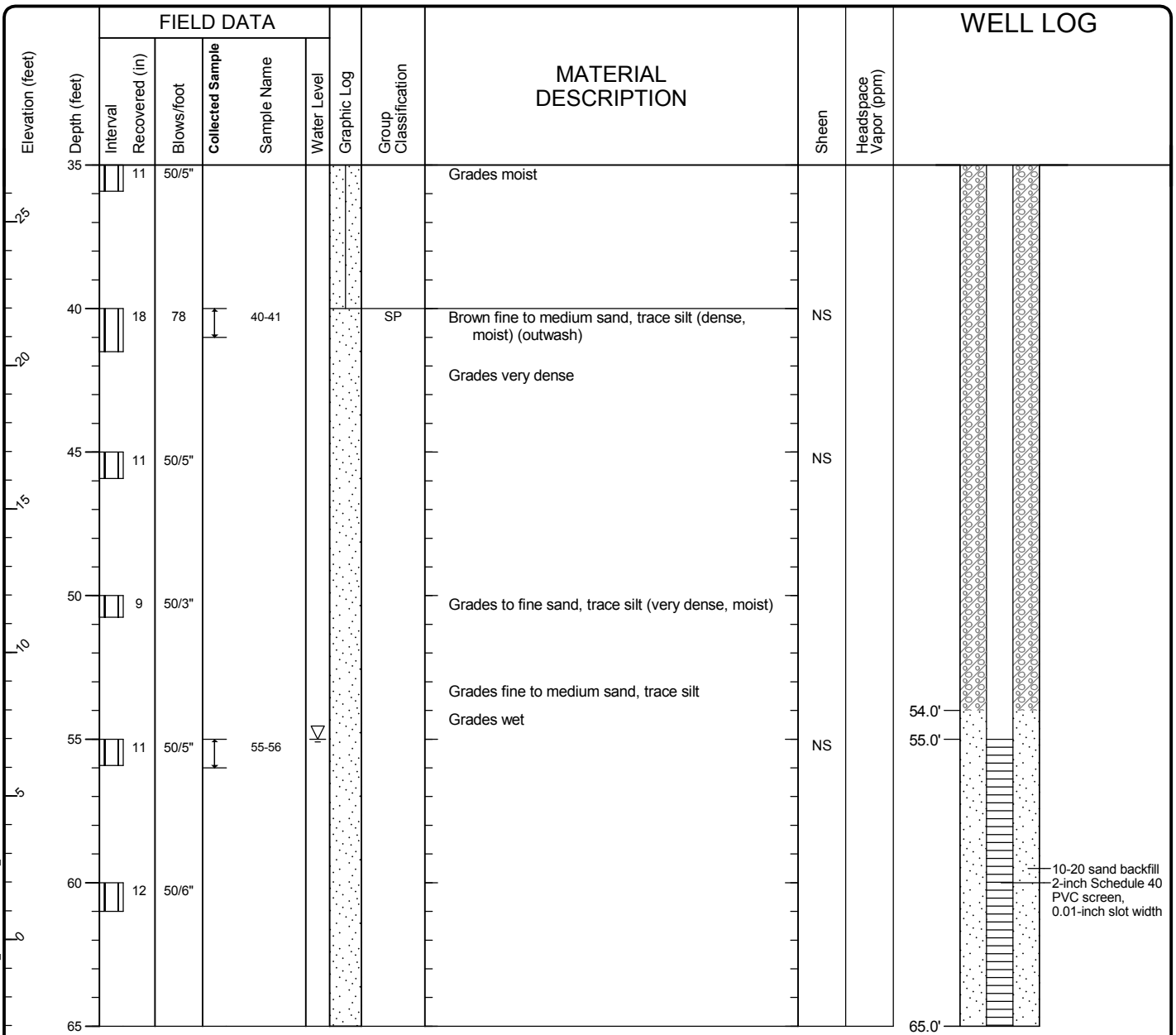
Log of Boring LLMW-25D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-46
Sheet 1 of 2

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL



Note: Please see Figure A-1 for explanation of symbols

Log of Boring LLMW-25D (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-46
Sheet 2 of 2

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
1/9/2013	1/9/2013	61.5	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-59 Track Rig
Surface Elevation (ft)	61.9264	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	371259.2652	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1308465.435		

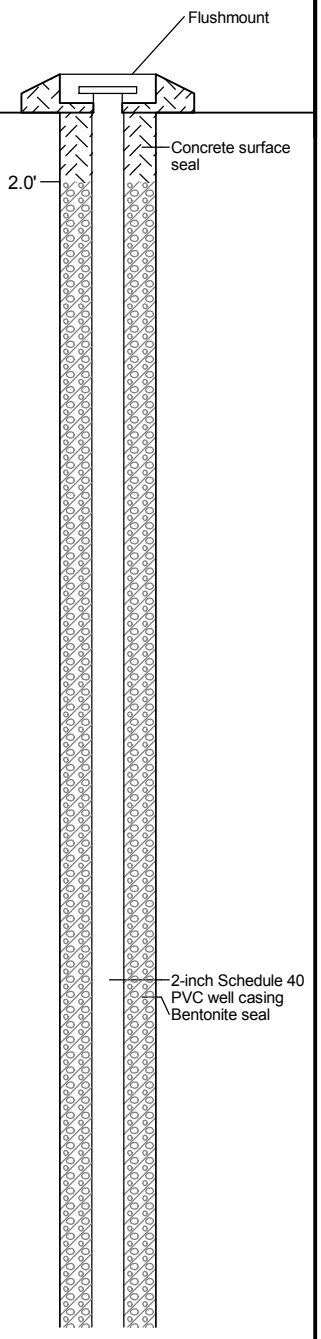
DOE Well I.D.: BHU-031
A 2 (in) well was installed on 1/10/2013 to a depth of 61.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
60	0		18	20					CC	4 inches concrete sidewalk	NS	
									GP-GM	Brown fine gravel with sand and silt (loose, moist) (base course, fill)		
			18	14					SM	Brown silty fine to medium sand, occasional gravel (loose, moist) (fill)	NS	
			16	25						Grades reddish-brown	NS	
55	5								SP-SM	Reddish-brown fine to medium sand with silt, occasional gravel (loose, moist) (fill)		
			15	20					SP	Brown fine to medium sand, trace silt (loose, moist) (fill)	NS	
									SM	Brown silty fine to coarse sand with gravel (loose, moist)		
			18	51						Grades with no gravel, orange-brown mottling		
			14	63						Grades brown, occasional gravel (medium dense, moist)		
50	10		15	93					SP-SM	Brown fine to coarse sand with silt, occasional gravel (very dense, moist) (native)		
			3	50/3"								
			9	50/3"								
45	15		3.5	50/3.5"								
			9	50/5"		15.5-16						
			3.5	50/3.5"								
40	20		5.5	50/5.5"						Grades with gravel		
35	25		18	45		25-26				Light brown fine to medium sand with silt (medium dense, moist)	NS	
									SP	Light brown fine to medium sand, trace silt (dense, moist)		
30	30		18	81		30-31					NS	
	35											

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

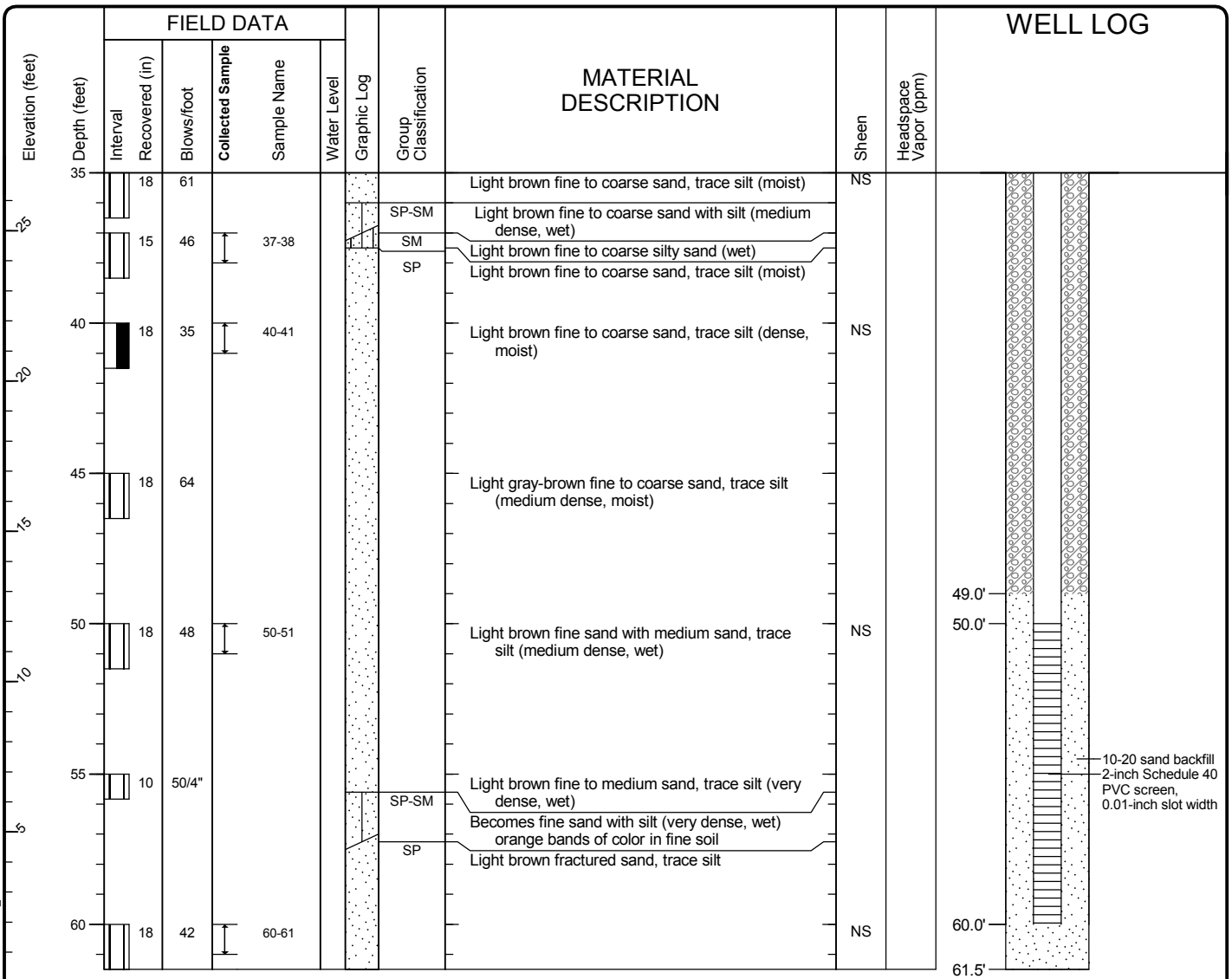
Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Log of Monitoring Well LLMW-27D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-47
Sheet 1 of 2



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-27D (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-47
Sheet 2 of 2

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	1/9/2013	1/9/2013	36	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-59 Track Rig
Surface Elevation (ft)	61.8712	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	371254.3715	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1308467.345		

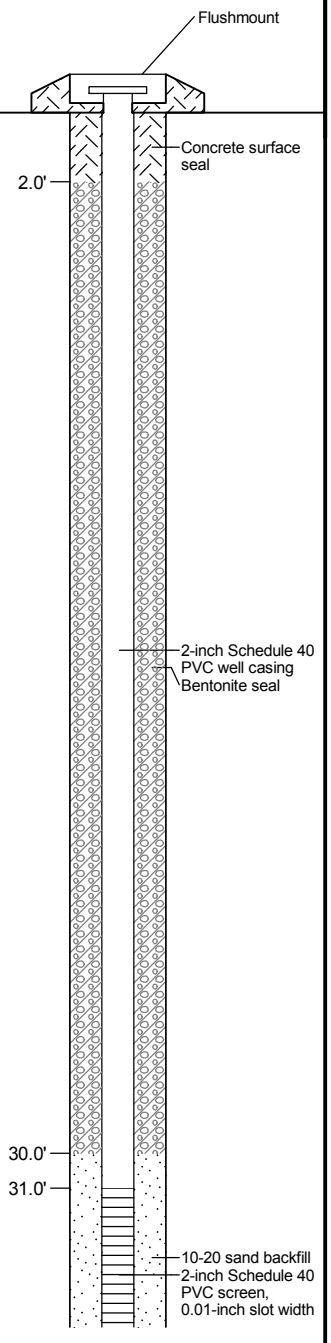
DOE Well I.D.: BHU-032
A 2 (in) well was installed on 1/9/2013 to a depth of 61.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
60	0								See LLMW-27D for sampling and material description		
55	5										
50	10										
45	15										
40	20										
35	25										
30	30										
	35										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Log of Monitoring Well LLMW-27S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-48
Sheet 1 of 2

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample	FIELD DATA: Sample Name	FIELD DATA: Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	WELL LOG
	35											36.0'

Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-27S (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-48
Sheet 2 of 2

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	1/8/2013	1/8/2013	61.5	GRL	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-59 Track Rig
Surface Elevation (ft)	56.0371	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	370982.4647	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1308556.215		

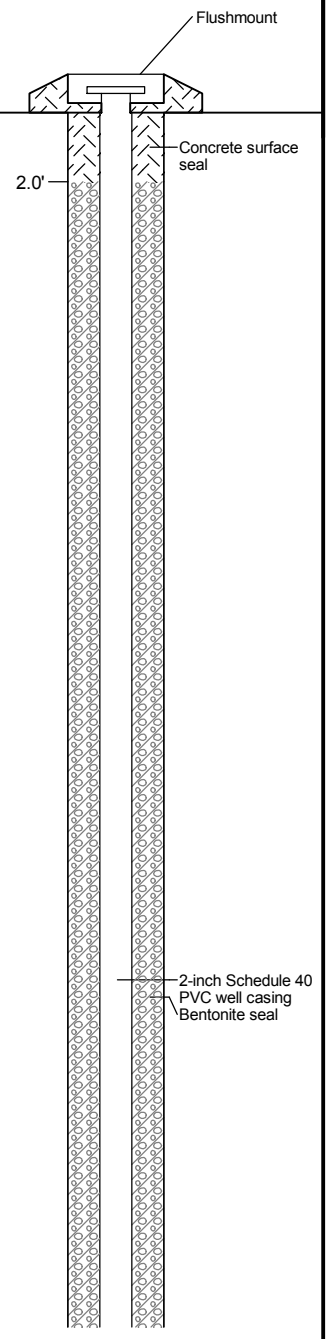
DOE Well I.D.: BHU-028
A 2 (in) well was installed on 1/8/2013 to a depth of 61.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
1/8/2013	44.1	11.9

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
55	0		15	41					AC	Asphalt concrete	NS	
									SM	Brown silty fine to coarse sand with gravel (medium dense, moist) (fill)		
			16	35		2-3				Grades dense	NS	
										Grades very dense		
			4	50/6"							NS	
50	5		1	50/5"							NS	
			15	22		6-7				Increased gravel content, grades medium dense	NS	
			12	36							NS	
			15	17							NS	
45	10									Grades loose		
			15	16						Grades medium dense	NS	
			16.5	56		12.5-13.5					NS	
									SP-SM	Brown fine to coarse sand with silt, occasional gravel (medium dense, moist) (native)		
			18	69						Grades very dense	NS	
40	15		12	76							NS	
										Grades dense		
			10	78/11"							NS	
										Grades very dense		
			18	48							NS	
										Grades to dense, lacks gravel		
35	20		15	65		20-21			SM	Brown silty fine to coarse sand, occasional gravel (medium dense, moist) (till)	NS	
			18	49							NS	
30	25		12	76/9"						Grades to very dense	NS	
									SP-SM	Brown fine to coarse sand with silt (very dense, moist) (outwash)		
25	30		15	78/9"		30-31					NS	
	35											

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

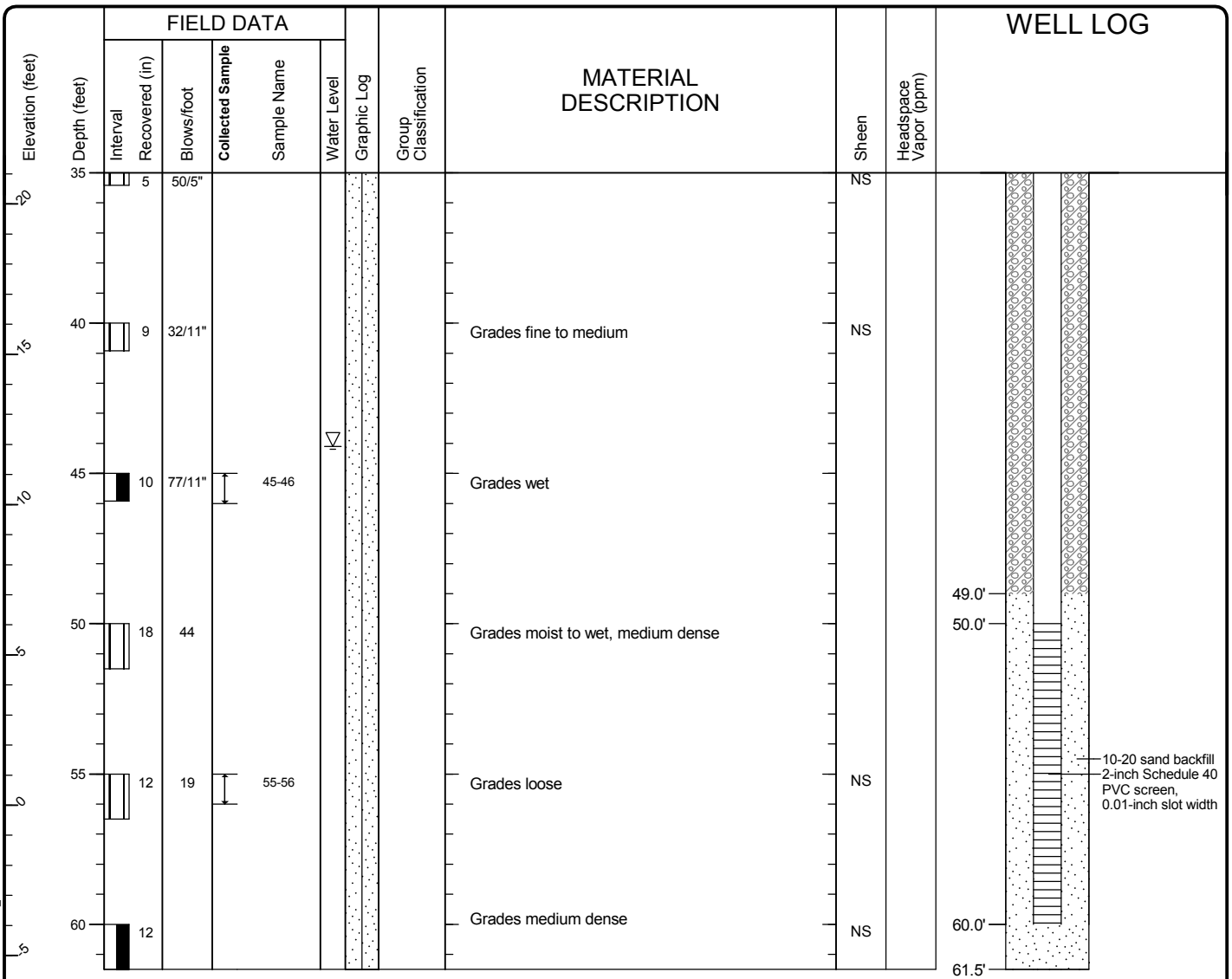
Log of Monitoring Well LLMW-29D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-49
Sheet 1 of 2

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068800.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-29D (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-49
Sheet 2 of 2

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	1/8/2013	1/8/2013	10	GRL	Holocene Drilling	Hollow-stem Auger

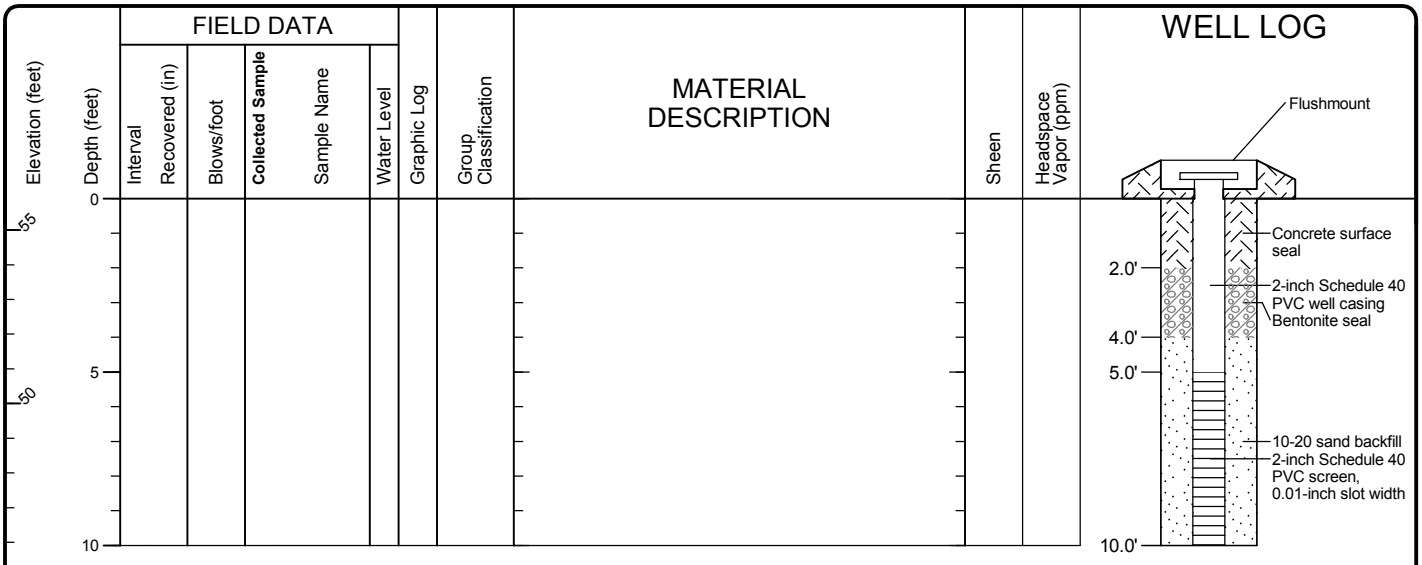
Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-59 Track Rig
Surface Elevation (ft) / Vertical Datum	55.9093 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	370978.6854 1308557.008	Horizontal Datum	WA State Plane North 83/91

DOE Well I.D.: BHU-029
A 2 (in) well was installed on 1/8/2013 to a depth of 61.5 (ft).

Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-29S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-50
Sheet 1 of 1

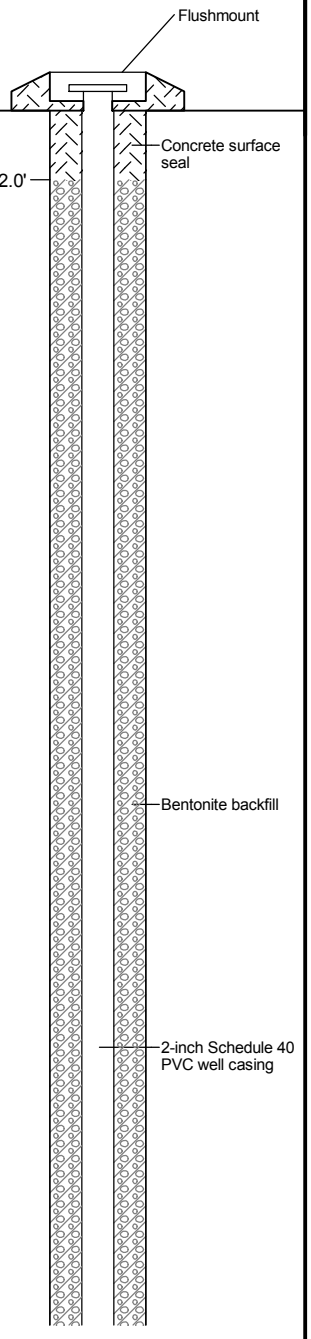
Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	1/23/2013	1/23/2013	64	GRL	Holocene	Hollow-stem Auger

Hammer Data	Drilling Equipment	
140 (lbs) / 30 (in) Drop	CME 850	A 2 (in) well was installed on 1/23/2013 to a depth of 64 (ft).
Surface Elevation (ft) Vertical Datum: 59	Top of Casing Elevation (ft)	Groundwater: Date Measured 1/23/2013; Depth to Water (ft) 46.0; Elevation (ft) 13.0
Easting (X) Northing (Y)	Horizontal Datum	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
55	0		12	30					SP-SM	Brown fine to coarse sand with silt, occasional gravel, and trace organic matter (medium dense, moist) (fill)	NS	
			18	44						Grades to darker brown with gravel		
									SM	Brown silty fine sand with gravel (medium dense, moist) (fill)		
			13	14		3-4				Grades fine to coarse, occasional gravel		
50	5		15	4						Grades gray-brown, fine, loose		
			1	3								
			12	7						Grades to very loose		
										2 inch oxidized iron stained layer, contains ~5% black pieces of decomposing wood		
45	10		17	50		9.1-9.3			SM	Light brown silty fine to coarse sand with occasional gravel (medium dense, moist) (native) (weathered till)		
			18	41						Grades very dense		
			11	50/5"		12-13				Rig chatter at 12 feet Grades to no gravel (till)		
40	15		18	32						Grades fine, dense		
			16	50/4"								
			11	50/5"						Grades occasional gravel, very dense		
35	20		9	50/3"						Grades brown, fine to coarse		
			5	50/5"		20-20.5						
30	25		5	50/5"		25-25.5				Less chatter		
									SP-SM	Brown fine to coarse sand with silt and occasional gravel (very dense, moist) (till)		
									SM	Brown silty fine to coarse sand with occasional gravel (very dense, moist) (till)		
25	30		5	50/5"								
	35											

WELL LOG



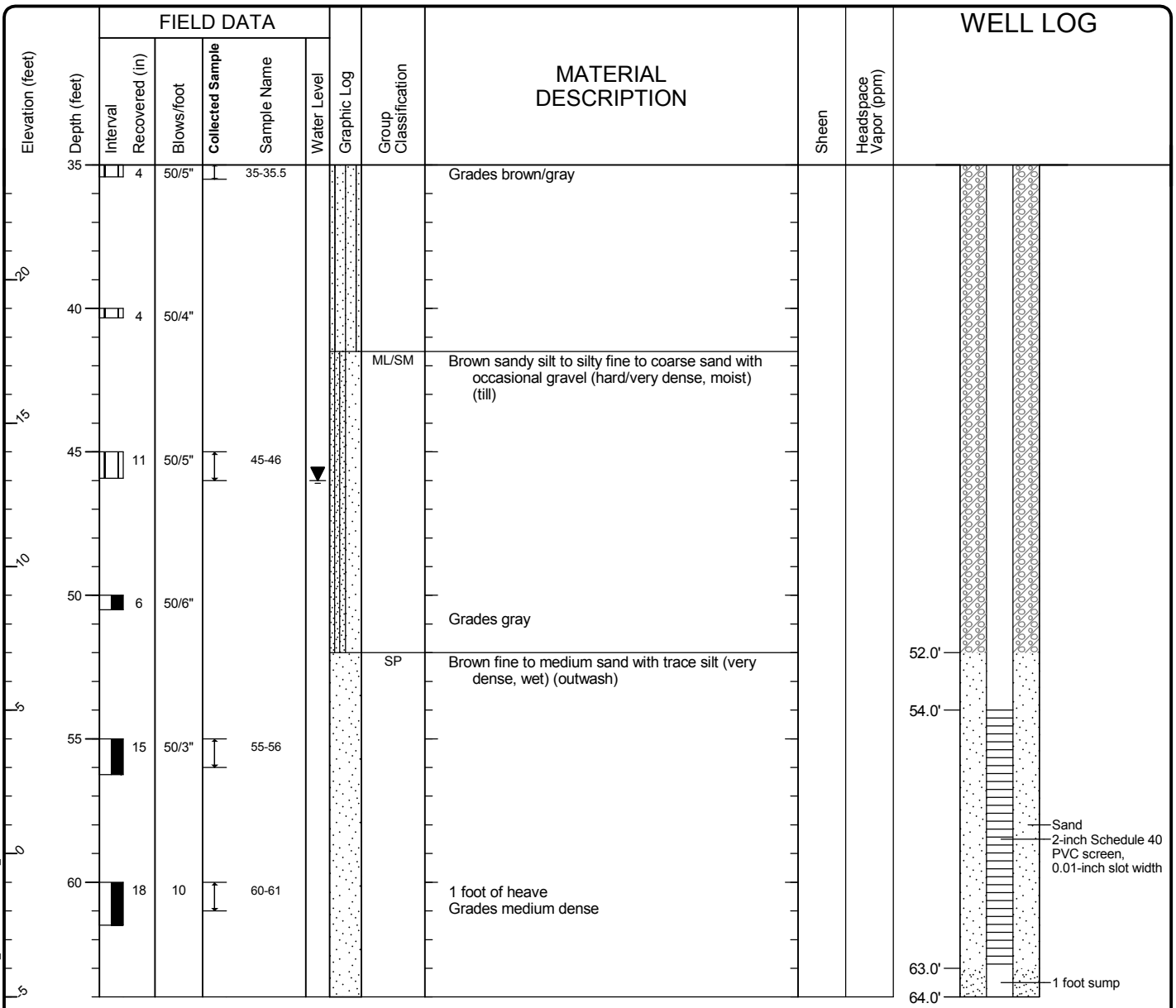
Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-31D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-51
Sheet 1 of 2



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-31D (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-51
Sheet 2 of 2

Drilled	Start	End	Total Depth (ft)	Logged By	Driller	Drilling Method
	1/3/2013	1/7/2013	45.5	AMW	Holocene Drilling	Hollow-stem Auger

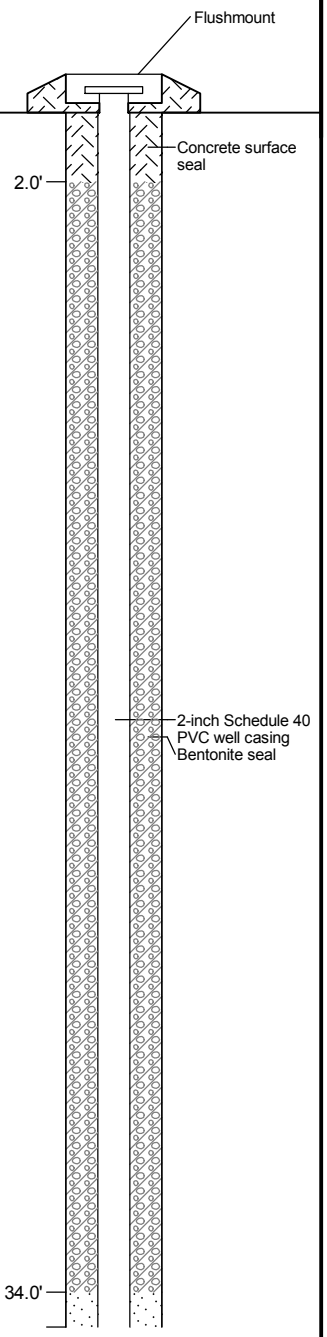
Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-59 Track Rig
Surface Elevation (ft)	37.5673	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	369961.949	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1308914.525		

DOE Well I.D.: BHU-094
A 2 (in) well was installed on 1/7/2013 to a depth of 45.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		18	49					AC	7 inches asphalt concrete	NS	
			18	34					SP-SM	Light brown fine to coarse sand with gravel, with silt (medium dense, moist) (fill)	NS	
35			14	14		3-4					NS	
	5		14	10		4.5-4.7			SM	Brown to orange-brown fine to coarse silty sand with gravel, occasional brick fragments (loose, moist) (fill)	NS	
			11	50/6"					GM	Light orange-brown silty fine to coarse sand with gravel (very loose, moist) (fill/colluvium)	NS	
30			17	40					SM	Gray-brown silty fine to coarse gravel with sand (very dense, moist) (weathered till)	NS	
			18	28						Orange-brown mottled to gray-brown silty fine to coarse sand with gravel (medium dense, wet) (weathered till)	NS	
	10		11	23		10.5-11.5				Gray-light brown mottled orange silty fine to coarse sand with gravel (medium dense, wet) (till)	NS	
25			7	50/3"					SM	Light brown silty fine to coarse sand with gravel (loose, wet) (till)	NS	
			10	50/4"						Gray-brown silty fine to coarse sand with gravel (very dense, moist) (till)	NS	
			11	50/4"						Gray silty fine to coarse sand with gravel (very dense, moist) (till)	NS	
	15		9	50/3"						Gray silty fine to coarse sand with gravel (very dense, moist) (till)	NS	
20										Becomes light brown Light brown silty fine to coarse sand with gravel (<3") (very dense, moist) (till)		
	20		11	50/5"						Light brown silty fine to coarse sand with gravel (very dense, moist) (till)	NS	
15												
	25		6	50/6"		24-24.5				Gray silty fine to coarse sand, occasional gravel (very dense, moist) (till)	NS	
									SP-SM	Light brown fine sand with silt (very dense, moist)		
10			12	50/5"							NS	
			18	100					SP	Light brown fine sand, trace silt (very dense, moist) moderately laminated	NS	
	30								SM	Light brown fine silty sand with a clay filled verticle fracture 4" long		
5									ML	Light tan poorly laminated silt with sand (hard, moist)		
									ML	Light brown fine sandy silt (very stiff, moist) moderately laminated		
	35		14	50/4"					SP	Light brown fine to medium sand, trace silt (very	NS	



Note: Please see Figure A-1 for explanation of symbols

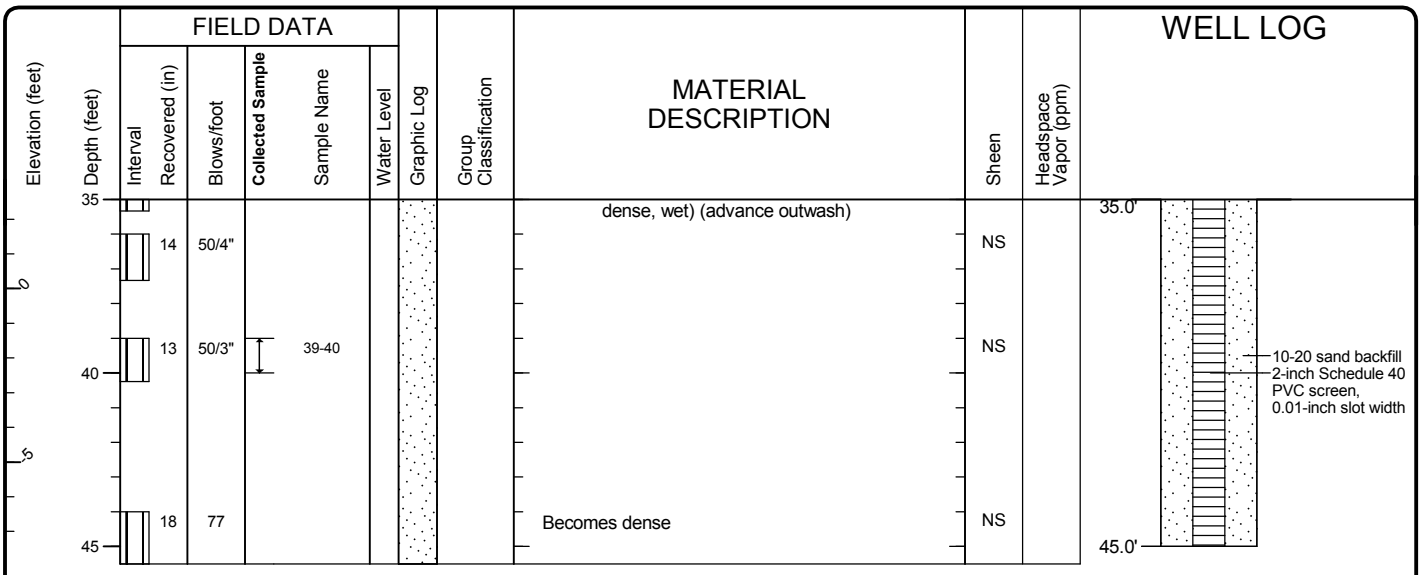
Log of Monitoring Well LLMW-33D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-52
Sheet 1 of 2

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-33D (continued)

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-52
Sheet 2 of 2

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
1/3/2013	1/7/2013	10.5	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-59 Track Rig
Surface Elevation (ft) / Vertical Datum	37.7314 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	369957.8312 / 1308912.956	Horizontal Datum	WA State Plane North 83/91

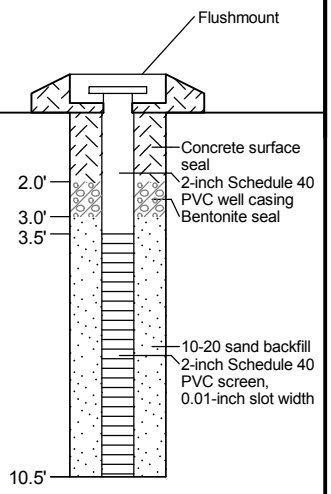
DOE Well I.D.: BHU-095
A 2 (in) well was installed on 1/7/2013 to a depth of 45.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0							See LLMW-33D for sampling and material description		
-5										
	5									
-10										
	10									

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-33S

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-53
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/20/2012	12/20/2012	75.3	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft) / Vertical Datum	53.2995 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	368696.1556 1308930.669	Horizontal Datum	WA State Plane North 83/91

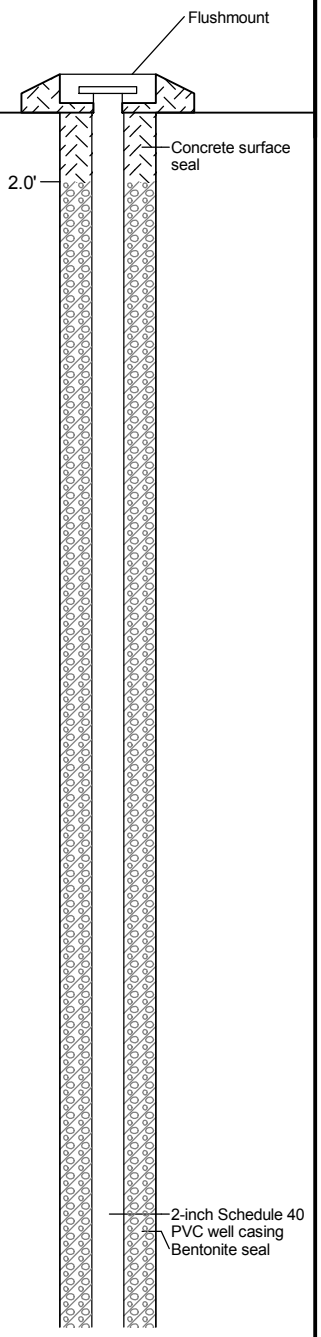
DOE Well I.D.: BHU-046
A 2 (in) well was installed on 12/19/2012 to a depth of 75.3 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/19/2012	70.0	-16.7

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0								AC	Asphalt concrete		
									SM	Brown silty fine to coarse sand with gravel (moist)		
50			8	20						Light brown silty fine sand with medium to coarse sand, occasional gravel (loose, moist)	NS	
			2	23							NS	
	5		14	10		4.5-5.5				Light brown silty fine sand with medium to coarse sand, with gravel (very loose, moist)	NS	
			13	5		6-6.2				Becomes orange-brown	NS	
45			18	26						Orange-brown silty fine to coarse sand with gravel, trace carbonized wood (very loose, moist to wet)	NS	
			14	16					SP-SM	Orange-brown to light brown mottled silty fine to coarse sand, occasional gravel (medium dense, moist to wet)	NS	
	10		15	14						Gray-light brown with orange mottling fine to coarse sand with silt (loose, moist)	NS	
			17	50/5"		11.5-11.7			SP	Light gray-brown slight orange mottling fine to coarse sand with silt, occasional gravel (loose, wet)	NS	
40			10	50/4"					SM	Light brown fine to medium sand, trace silt (loose, wet)	NS	
	15		2	50/2"						Light brown silty fine sand, occasional medium to coarse sand, occasional gravel (very dense, wet) (native)	NS	
										Light brown silty fine to medium sand, with gravel (very dense, moist to wet)		
35										Light brown silty fine to medium sand, with gravel and coarse sand (very dense, wet)		
	20		0	50/5"						3 inch rock in shoe	NS	
30												
	25		10	50/5"						Light brown silty fine to coarse sand, occasional gravel (very dense, moist)	NS	
25									SP-SM	Light brown fine to coarse sand with silt, with gravel (very dense, moist)		
	30		5	50/5"							NS	
20									SM	Gray silty fine to medium sand, occasional coarse sand and gravel (very dense, moist)		
	35											

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

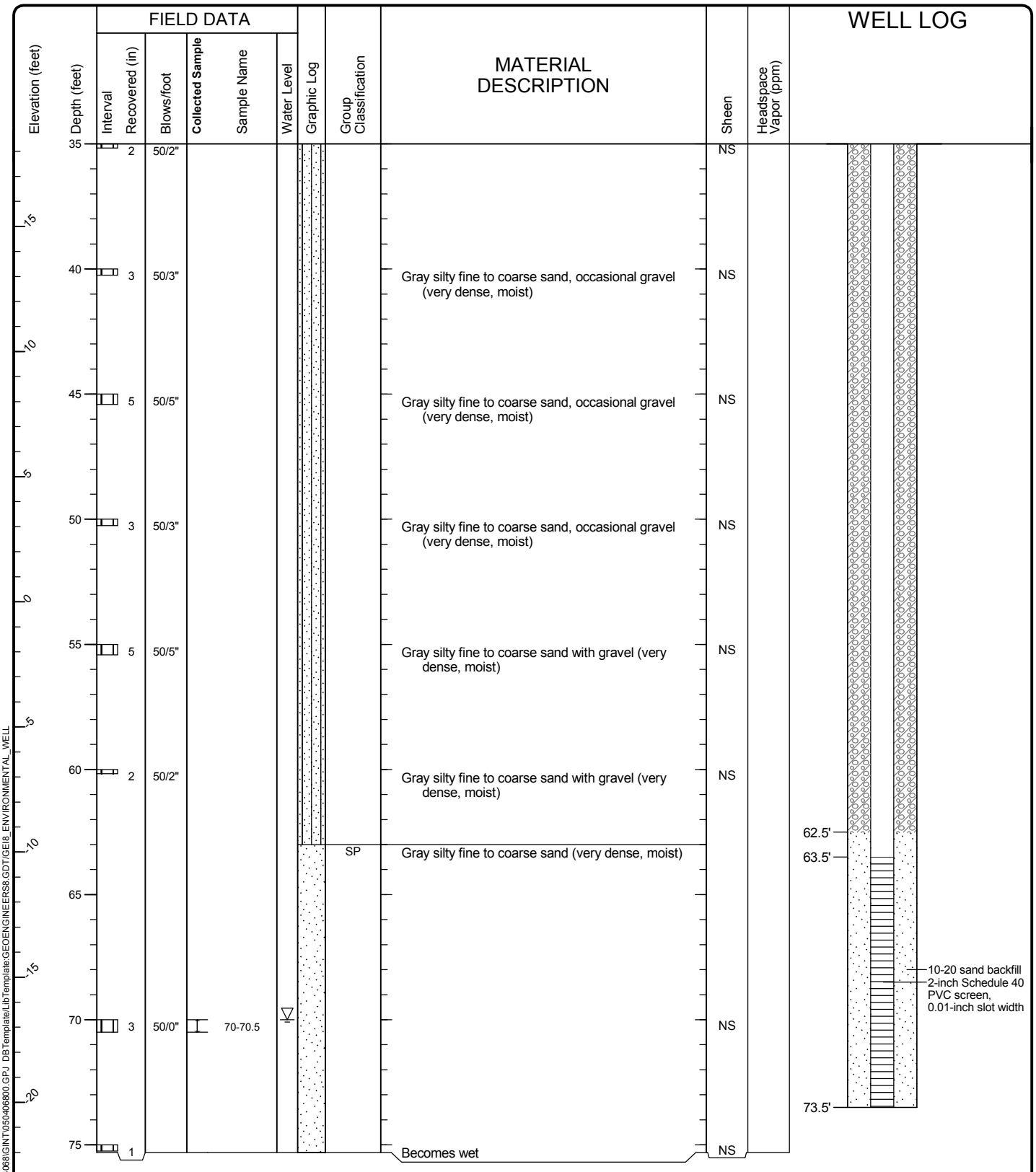
Log of Monitoring Well LLMW-34D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-54
Sheet 1 of 2

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-34D (continued)

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-54
Sheet 2 of 2

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/20/2012	12/20/2012	12	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft)	53.2239	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	368693.8425	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1308931.771		

DOE Well I.D.: BHU-047
A 2 (in) well was installed on 12/20/2012 to a depth of 75.3 (ft).

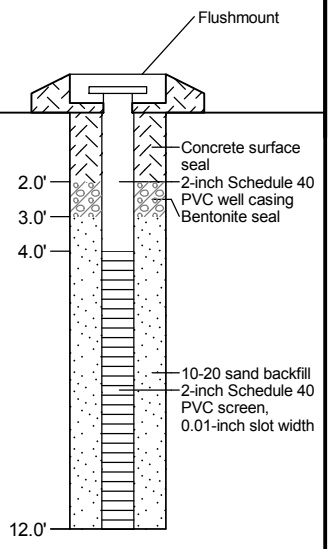
Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0								See LLMW-34D for sampling and material description		
50											
	5										
45											
	10										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-34S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-55
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
1/7/2013	1/7/2013	20	GRL	Holocene Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
12.6436 NAVD88	Pneumatic	AMS Powerprobe 9500 D

Easting (X) / Northing (Y)	System Datum	Groundwater: Date Measured	Depth to Water (ft)	Elevation (ft)
373990.7175 / 1306949.75	WA State Plane North 83/91			

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
10	0		36						GP	Gray fine to coarse gravel with sand, trace silt (moist) (fill)	NS		
									Wood	Brown wood debris			
	5		40			4-5			SP-SM	Brown fine to coarse sand with silt and gravel, trace wood debris (moist) (fill)	NS		
										Grades to wet at 5 feet			
5						6-7			Wood	Brown wood debris with brown fine to medium sand with silt, occasional gravel (wet) (fill)	NS		
			40								NS		
									SP-SM	Brown fine to coarse sand with silt and gravel, trace wood debris (wet) (fill)			
0	10					10.8-11			ML	Brown silt, trace organics (wet) (native)	NS		
											NS		
						13-14				Grades with 1 inch sand interbeds	NS		
	15									Grades with wood, trace sand			
-5			48						SP	Gray fine to medium sand, trace silt, trace wood (wet)	NS		
						19-20					NS		
	20												

Note: Please see Figure A-1 for explanation of symbols

Log of Boring LLSB-01

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-56
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_STANDARD

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
1/7/2013	1/7/2013	20	GRL	Holocene Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
14.7497 NAVD88	Pneumatic	AMS Powerprobe 9500 D

Easting (X) / Northing (Y)	System Datum	Groundwater: Date Measured	Depth to Water (ft)	Elevation (ft)
373634.9832 / 1307691.419	WA State Plane North 83/91			

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
10	0		30						SP	Dark brown fine to coarse sand, trace silt, occasional gravel (moist) (fill)			
									SP	Brown-orange fine to medium sand (moist) (fill)			
						3-4				Gravel			
	5		48							Grades to brown Grades to wet Grades to medium to coarse sand			
5			48										
	10					10-10.2			ML	Gray silt, trace organics (wet) (native)			
						10.6-10.8			Wood	Wood (wet)			
			0			12-13			ML	Gray silt, trace organics, trace sand (wet) Grades sandy silt			
0									SP	Gray fine sand, trace silt, trace wood (wet)			
	15					15-16				Grades fine to medium Lacks wood			
			40							Grades <1cm layers of wood			
-5	20					19-20							

Note: Please see Figure A-1 for explanation of symbols

Log of Boring LLSB-02

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-57
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
1/7/2013	1/7/2013	20	GRL	Holocene Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
15.0686 NAVD88	Pneumatic	AMS Powerprobe 9500 D

Easting (X) / Northing (Y)	System Datum	Groundwater: Date Measured	Depth to Water (ft)	Elevation (ft)
373543.2766 / 1308050.649	WA State Plane North 83/91			

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		44						SP	Brown fine to medium sand (moist) (fill)			
						2-3					NS		
						3-4					NS		
			46							Grades to brown-orange			
10	5										NS		
			48						Wood	Wood debris (wet) (fill)			
	10					9.5-10.5			SP	Gray fine to coarse sand trace silt (wet) (fill)	NS		
5						11-11.2			ML	Gray silt, trace organics (wet) (native)	NS		
			40										
						13-14					NS		
0	15								SP	Gray fine to medium sand, trace silt (wet)	NS		
			44										
											NS		
						19-20					NS		
	20									Refusal due to heaving sands (wet)			

Note: Please see Figure A-1 for explanation of symbols

Log of Boring LLSB-03

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-58
Sheet 1 of 1

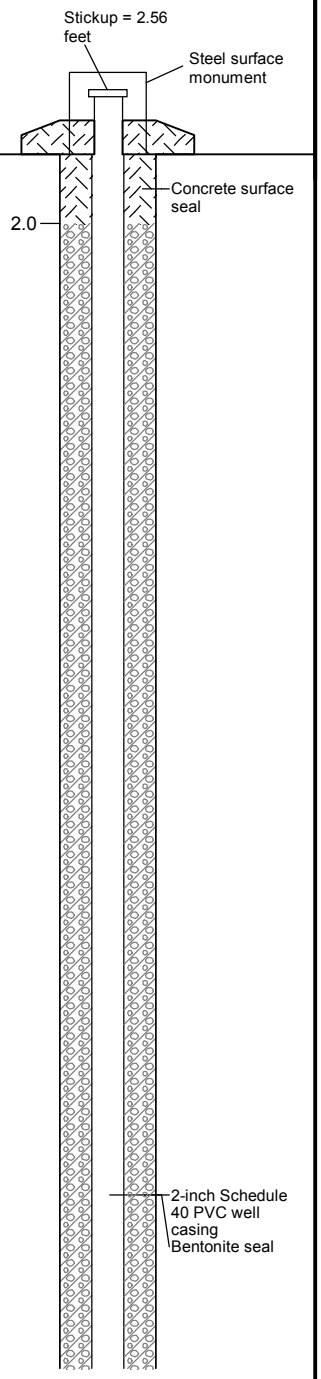
Drilled	Start 8/13/2013	End 8/14/2013	Total Depth (ft)	101.5	Logged By / Checked By	AMW	Driller	Holocene Drilling	Drilling Method	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-59 Truck Rig	DOE Well I.D.: BHU 406 A 2 (in) well was installed on 8/13/2013 to a depth of 100 (ft).
Surface Elevation (ft) Vertical Datum	Undetermined	Top of Casing Elevation (ft)		Groundwater Date Measured: 8/14/2013 Depth to Water (ft): 12.3 Elevation (ft):
Easting (X) Northing (Y)		Horizontal Datum		

Notes: Auger Data: 4¼-inch I.D.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample	FIELD DATA: Sample Name	FIELD DATA: Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)
	0								See Log of BP-04D for soil description from 0 to 30 feet bgs.		
	30	11	25		1			SP	Gray fine sand, trace silt with mica (loose, wet)		

WELL LOG



Note: Please see Figure A-1 for explanation of symbols.

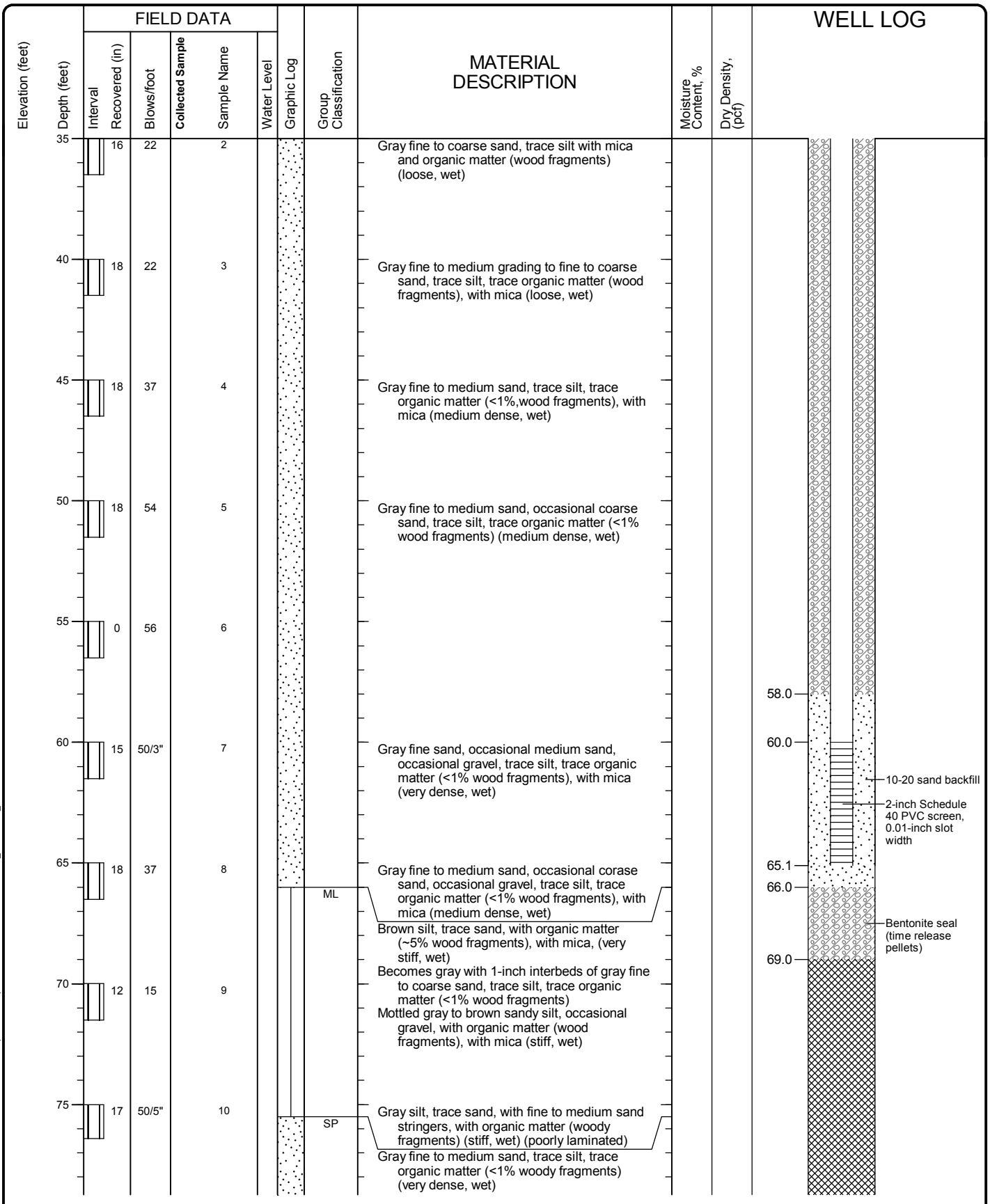
Log of Monitoring Well BP-04D2

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-2
Sheet 1 of 3

Seattle: Date:9/3/13 Path:\\SEA\PROJECTS\0\0504068\GINT\0504068G01.GPJ DBTemplate\LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_WELL



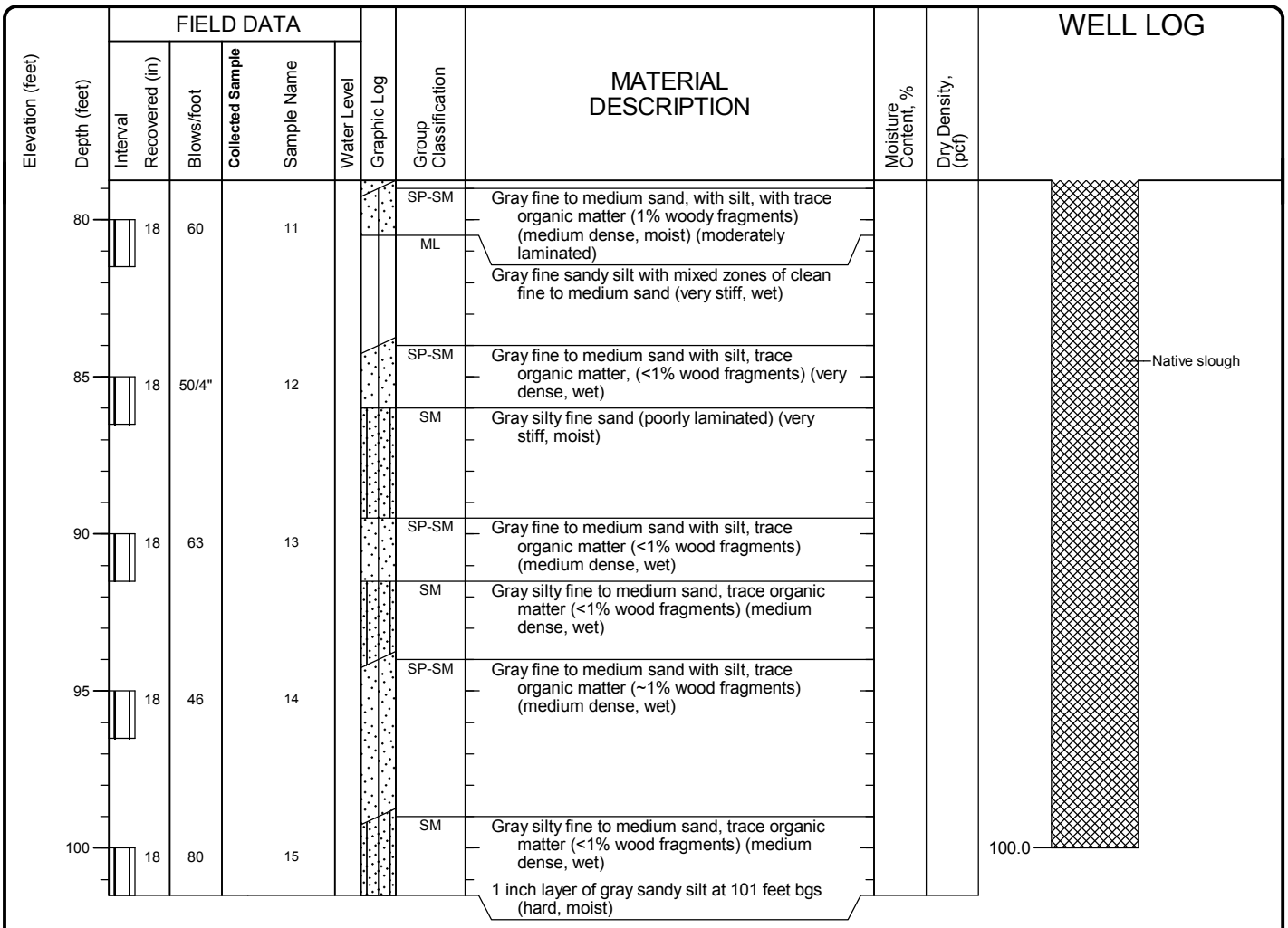
Note: Please see Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-04D2 (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-2
Sheet 2 of 3



Note: Please see Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-04D2 (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-2
Sheet 3 of 3

Drilled	Start 8/12/2013	End 8/12/2013	Total Depth (ft) 81.5	Logged By AMW / Checked By	Driller Holocene Drilling	Drilling Method Hollow-stem Auger

Hammer Data: 140 (lbs) / 30 (in) Drop	Drilling Equipment: Mobile B-59 Truck Rig	DOE Well I.D.: BHU 405 A 2 (in) well was installed on 8/13/2013 to a depth of 79.8 (ft).	
Surface Elevation (ft) Vertical Datum: Undetermined	Top of Casing Elevation (ft)	Groundwater: Date Measured 8/14/2013; Depth to Water (ft) 8.0; Elevation (ft)	
Easting (X) Northing (Y)	Horizontal Datum		

Notes: Auger Data: 4¼-inch I.D.

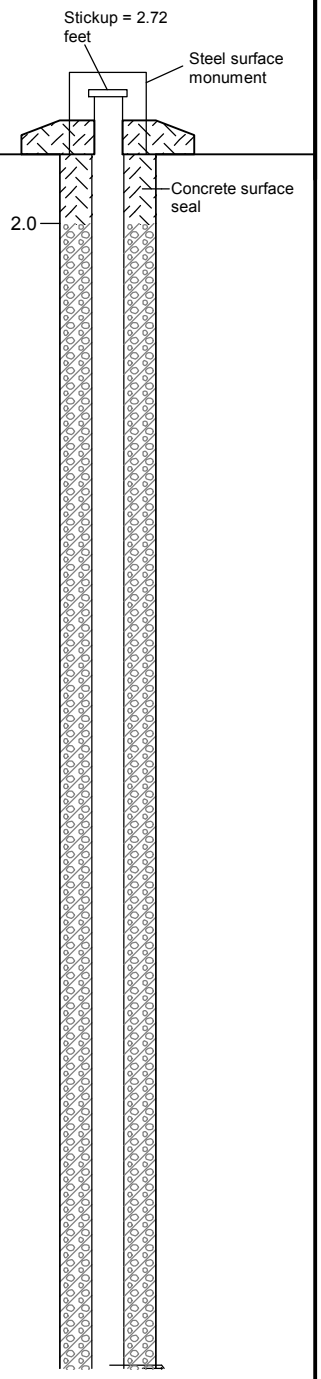
FIELD DATA | MATERIAL DESCRIPTION | WELL LOG

Elevation (feet) | Depth (feet) | Interval Recovered (in) | Blows/foot | Collected Sample | Sample Name | Water Level | Graphic Log | Group Classification | Moisture Content, % | Dry Density, (pcf)

0

See Log of BP-07D for soil description from 0 to 35 feet bgs.

5 10 15 20 25 30 35



Note: Please see Figure A-1 for explanation of symbols.

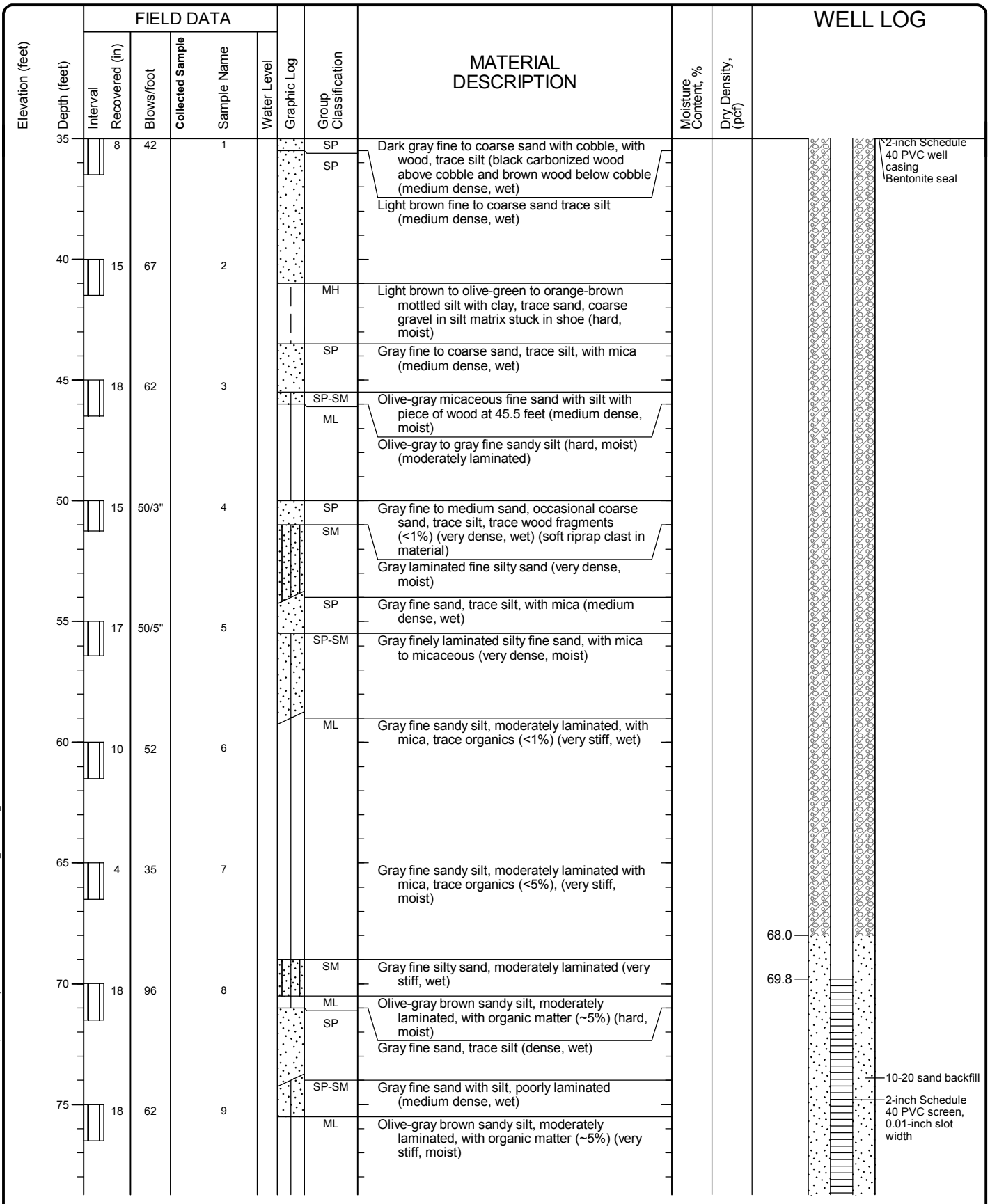
Log of Monitoring Well BP-07D2

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-3
Sheet 1 of 3

Seattle: Date:9/3/13 Path:\\SEA\PROJECTS\0\0504\068\GINT\050406801.GPJ DBTemplate\LibTemplate\GEOENGINEERS8.GDT/GEI8_GEOTECH_WELL



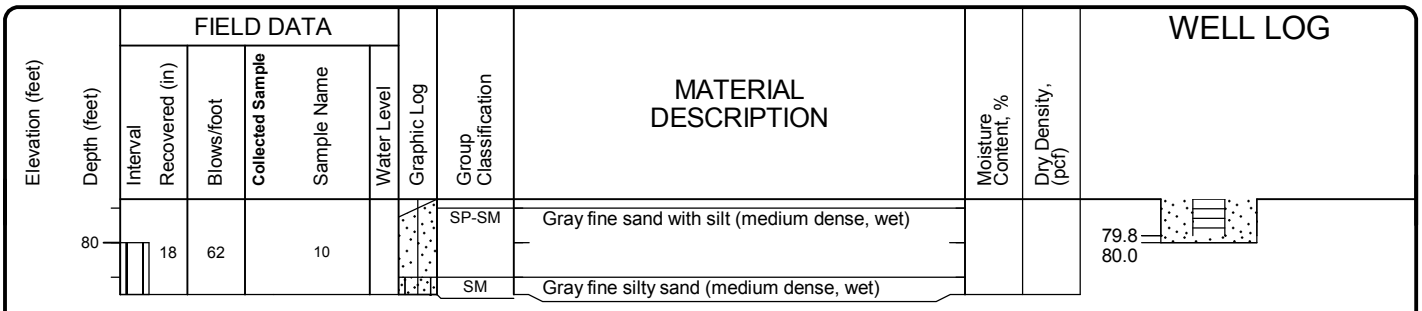
Note: Please see Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-07D2 (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-3
Sheet 2 of 3



Note: Please see Figure A-1 for explanation of symbols.

Log of Monitoring Well BP-07D2 (continued)

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-01

Figure A-3
Sheet 3 of 3

Drilled	Start 8/7/2013	End 8/8/2013	Total Depth (ft)	92	Logged By / Checked By	AMW	Driller	Holt Drilling	Drilling Method	Sonic Coring

Hammer Data		Drilling Equipment	Terrasonic Track Rig
Surface Elevation (ft) Vertical Datum	Undetermined	Top of Casing Elevation (ft)	
Easting (X) Northing (Y)		Horizontal Datum	

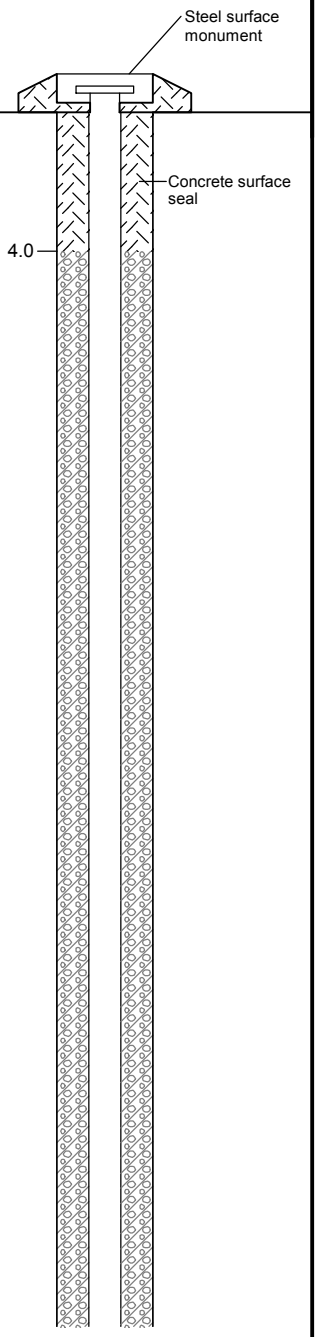
DOE Well I.D.: BIJ 697
A 2 (in) well was installed on 8/8/2013 to a depth of 92 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
8/9/2013	76.9	

Notes: Casing: 8in/10-in

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)
0	0		60	0		1			AC	4-inches asphalt concrete		
									GP	3-inches crushed rock road base		
									SM	Gray-brown silty fine to coarse sand with gravel (moist) (fill)		
5	5		60	0		2			SP-SM	Light brown fine to medium sand wtih silt (moist) (fill)		
									SM	Gray-brown silty fine to coarse sand with gravel (moist) (weathered till)		
10	10		60	10		3			SP	Brown fine to coarse sand, occasional gravel and trace silt (wet) (sand stringers within till)		
									SM			
									SP-SM	Gray-brown silty fine to coarse sand wtih gravel (moist)		
									SM	Gray-brown fine to coarse sand with silt and gravel (wet)		
15	15		60	10		4				Gray-brown with orange mottling silty fine to coarse sand with gravel (moist) (fill)		
										Becomes gray-brown at 15 feet		
									SM	Gray-brown silty fine to coarse sand with trace gravel (wet)		
									GM	Brown silty fine to coarse gravel with sand (moist) (till)		
20	20		60	20		5				Becomes gray-brown		
25	25		60	25		6			SM	Brown silty fine to coarse sand with gravel (moist) (till)		
30	30		60	30		7						
										Becomes brown-gray		
35	35									Becomes gray-brown		

WELL LOG



Note: Please see Figure A-1 for explanation of symbols.

Log of Monitoring Well LLMW-35D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-01

Figure A-4
Sheet 1 of 3

Seattle: Date:9/3/13 Path:\\SEA\PROJECTS\0\0504068\GINT\0504068G01.GPJ DBTemplate\LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_WELL

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	WELL LOG
	35		60	35		8							
	40		60	40		9				Becomes moist to wet			Bentonite seal; 2-inch Schedule 40 PVC well casing
									SP	Gray-brown to gray fine to coarse sand with gravel and trace silt (wet)			
									SM	Gray silty fine to coarse sand with gravel (moist) (till)			
	45		60	45		10							
	50		48	50		11				Becomes occasional gravel			
										Becomes with gravel			
	55		54	55		12							
	60		60	60		13			SP-SM	Gray fine to coarse sand with silt and occasional gravel (moist to wet) (till)			
									SM	Gray silty fine to coarse sand with gravel (moist) (till)			
	65		60	65		14				Becomes moist to wet			
									SP-SM	Gray fine to coarse sand with silt and occasional gravel (moist to wet) (till)			
									SM				
									SP-SM	Gray silty fine to coarse sand with gravel (moist) (till)			
	70		60	70		15				Gray-brown fine to medium sand with silt (moist) (outwash)			
									SM	Gray-brown to gray silty fine sand moderately laminated (moist) (outwash)			
									SP	Brown fine to medium sand, trace silt (moist) (outwash)			
	75		60	75		16							
													76.0

Note: Please see Figure A-1 for explanation of symbols.

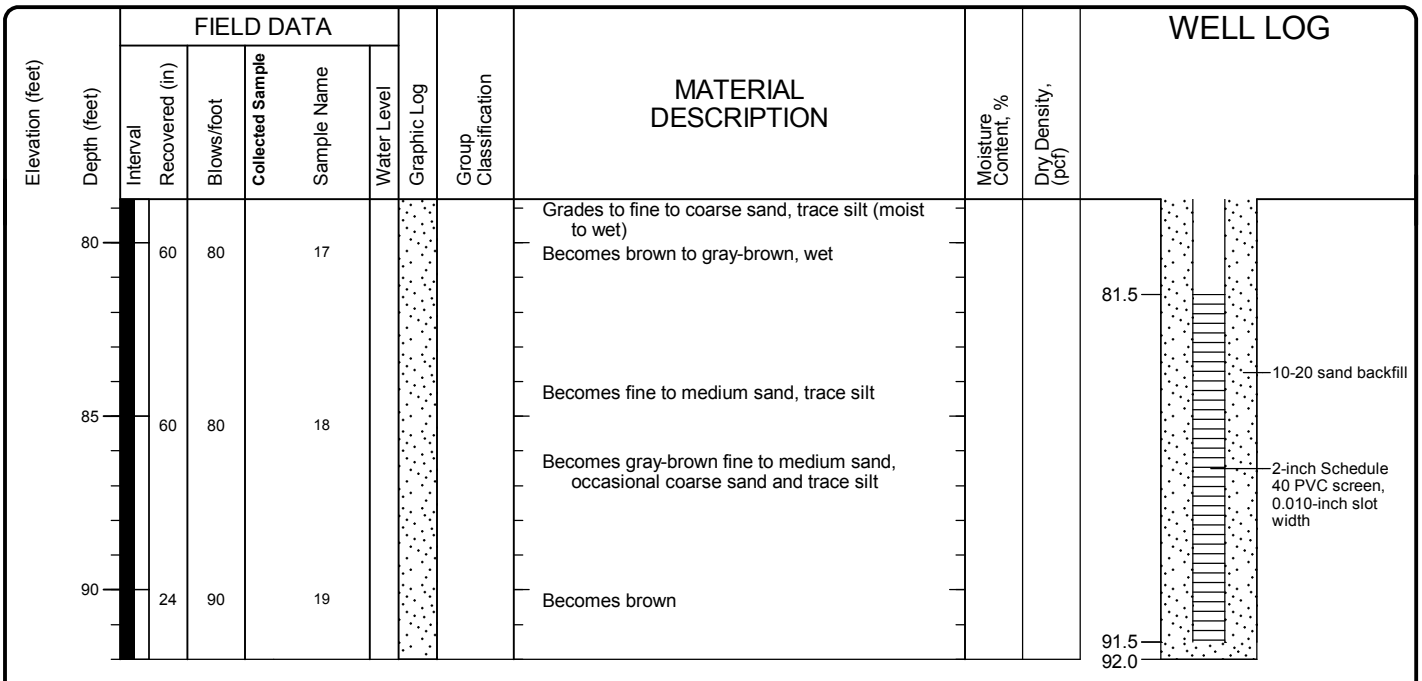
Log of Monitoring Well LLMW-35D (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-4
Sheet 2 of 3

Seattle: Date:9/3/13 Path:\\SEA\PROJECTS\0\0504068\GINT\0504068G01.GPJ DBTemplate\LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_WELL



Note: Please see Figure A-1 for explanation of symbols.

Log of Monitoring Well LLMW-35D (continued)

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-01

Figure A-4
Sheet 3 of 3

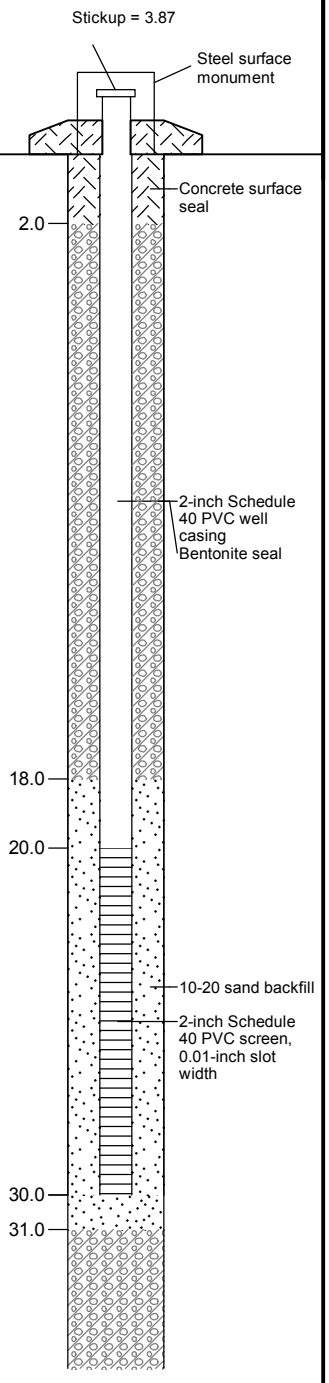
Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
8/8/2013	8/9/2013	90	AMW	Holt Drilling	Sonic Coring

Hammer Data	Drilling Equipment	DOE Well I.D.: BHU 404 A 2 (in) well was installed on 8/12/2013 to a depth of 31 (ft).
Surface Elevation (ft) Vertical Datum: Undetermined	Top of Casing Elevation (ft)	Groundwater Date Measured: 8/13/2013 Depth to Water (ft): 4.4 Elevation (ft):
Easting (X) Northing (Y)	Horizontal Datum	

Notes: Casing: 8in/10-in steel casing

Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)
0		60	0		1			SP-SM	Brown fine to medium sand with silt, occasional coarse sand, occasional gravel and organic matter (rootlets, wood debris) (moist) (fill)		
									Decreased organic matter		
						▼		SM	Brown silty fine to coarse sand with angular gravel and cobbles (moist to wet) (fill with slag)		
5		60	0		2			GP-GM	Gray-brown fine to coarse gravel with sand, silt and cobbles up to 5 inches in diameter (wet) (fill with slag)		
									Becomes brown-gray		
								SM	Dark brown-gray to gray silty fine to coarse sand with rounded gravel and trace organic matter (wood debris)		
10		60	10		3			SP-SM	Brown-gray fine to coarse sand with silt, occasional rounded gravel and trace carbonized wood (wet)		
									Becomes brown-gray fine to medium sand with silt (mica)		
15		60	10		4				Becoms gray to brown-gray fine sand with silt		
								ML	Gray sandy silt with gravel and occasional cobbles (moist)		
								SP-SM	Gray fine to coarse sand with silt and occasional gravel (wet)		
								SP	Gray fine sand, trace silt (wet) (mica)		
20		60	20		5				Becomes light brown		
								SP	Orange-brown to light brown mottled fine to medium sand, trace silt (wet) (mica)		
									Gray sand from 23 to 24.5 feet		
25		60	20		6				Becomes gray-brown		
									Becomes fine to coarse		
									3½-inch cobble at approximately 29 feet		
30		60	30		7			SP	Light brown fine to medium sand, trace silt and occasional coarse sand (wet)		
35											

WELL LOG



Note: Please see Figure A-1 for explanation of symbols.

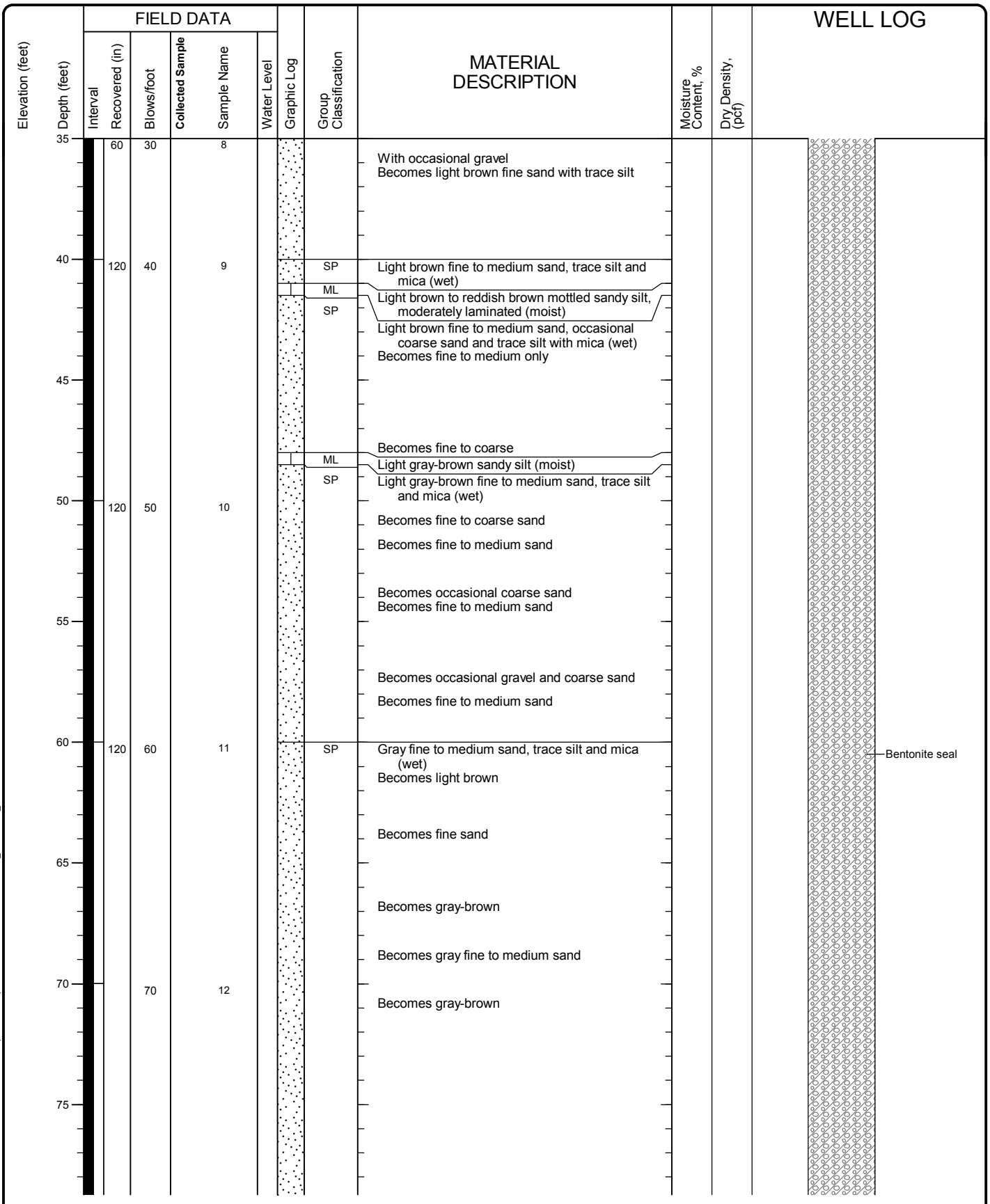
Log of Monitoring Well LLMW-36D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-5
Sheet 1 of 3

Seattle: Date:9/3/13 Path:\\SEA\PROJECTS\0\0505\04068\GINT\050406801.GPJ DBTemplate\LibTemplate\GEOENGINEERS8.GDT/GEI8_GEOTECH_WELL



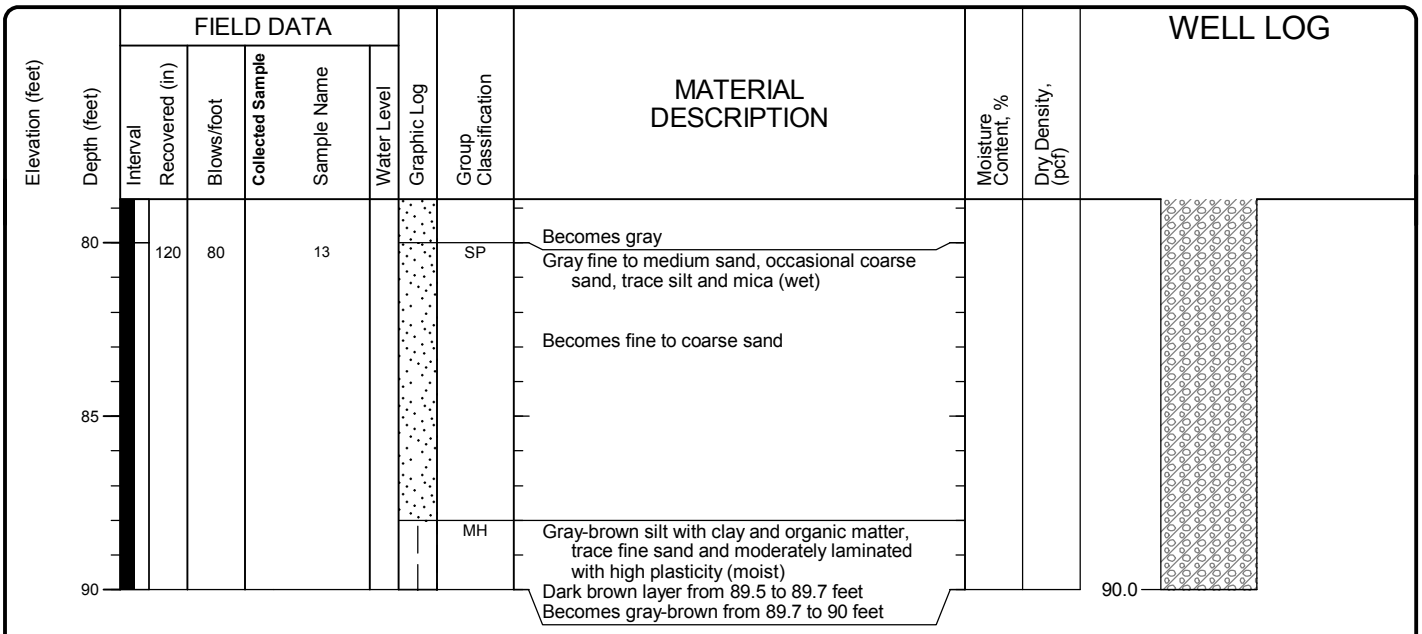
Note: Please see Figure A-1 for explanation of symbols.

Log of Monitoring Well LLMW-36D (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-5
Sheet 2 of 3



Note: Please see Figure A-1 for explanation of symbols.

Log of Monitoring Well LLMW-36D (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-5
Sheet 3 of 3

2014 Focused Source-Area Investigation Borings

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
3/26/2014	3/26/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308448.354 / 371344.0584	WA State Plane,North NAD 83/91	Date Measured: — Depth to Water (ft): Not encountered — Elevation (ft): —

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		48					AS	Asphalt			
								SP	Gray fine to coarse sand with occasional fine gravel, trace silt			
60								BR	Brick fragments			
								SP-SM	Gray fine to coarse sand with silt and occasional fine gravel (moist)			
					3.2-3.7							
								SM	Brown silty fine to coarse sand with occasional fine to coarse gravel (moist)			
	5		60		5-6							
								SM	Brown/red mottled silty fine sand with occasional coarse sand and fine gravel			
55												
					8-9			SM	Gray silty fine to medium sand with occasional coarse sand and fine gravel (moist) (weathered till)			
	10											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-04

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-2
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
3/26/2014	3/26/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308446.975 / 371350.0727	WA State Plane,North NAD 83/91	Date Measured / Depth to Water (ft) / Elevation (ft): Not encountered

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		48					AS	Asphalt			
								AS	Crushed asphalt/gravel			
60								SP-SM	Gray fine to medium sand with silt			
								BR	Brick fragments in silty fine to medium sand			
					4-4.5			SP-SM	Brown fine to coarse sand with silt and occasional fine gravel			
	5		60						Grades to more coarse			
					5.5-6							
55								SM	Gray silty fine to medium sand with occasional fine gravel (moist) (weathered till)			
					9-9.5							
	10											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-05

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-3
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
3/26/2014	3/26/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308444.939 / 371358.4424	WA State Plane,North NAD 83/91	Date Measured: — Depth to Water (ft): Not encountered — Elevation (ft): —

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	Asphalt			
								SP	Gray fine to coarse sand with fine to coarse gravel and trace silt (road bedding)			
60								SP-SM	Gray fine to coarse sand with silt			
					3-3.5			BR	Brown fine to coarse sand with fine to coarse gravel and brick fragments			
								SP-SM	Brown/red mottled fine to coarse sand with silt and occasional fine gravel			
	5		60									
					6-6.5			SM	Gray silty fine to medium sand with occasional coarse sand, fine gravel (moist) (weathered till)			
55												
					9-9.5							
	10											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-06

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-4
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
3/26/2014	3/26/2014	15	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308443.313 / 371365.3725	WA State Plane,North NAD 83/91	Date Measured: — Depth to Water (ft): Not encountered — Elevation (ft): —

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		48					AS	Asphalt			
								GP	Crushed asphalt gravel			
60								SM	Brown silty fine to ocarse sand with occasional fine gravel			
					3.5-4			BR	Brick			
								SM	Brown silty fine to coarse sand with occasional fine gravel			
								BR	Brick			
								SM	Brown silty fine to coarse sand with occasional fine gravel			
	5		60					BR	Brick			
					5.4-5.9			SP	Gray fine sand (moist)			
								BR	Brick			
								SM	Brown silty fine to coarse sand (moist)			
55								SM	Gray silty fine to medium sand with occasional coarse sand and fine gravel (moist) (weathered till)			
					8-8.5							
	10		60						Grades to no gravel			
50												
	15											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-07

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-5
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
3/26/2014	3/26/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308441.465 / 371374.5202	WA State Plane,North NAD 83/91	Date Measured: Not encountered; Depth to Water (ft): ; Elevation (ft):

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		40					AS	Asphalt			
								GP	Crushed asphalt gravel			
60								SP-SM	Brown fine to coarse sand with silt and occasional gravel			
								BR	Brick fragments			
								SP-SM	Brown fine to coarse sand with silt and occasional gravel			
					3.5-4							
								BR	Brick fragments			
								SP-SM	Gray fine to coarse sand with silt (moist to wet) (weathered till)			
	5		60									
					6-6.5							
55								SP-SM	Gray fine to coarse sand with silt and occasional fine gravel (moist) (weathered till)			
	10											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-08

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-6
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
3/26/2014	3/26/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308439.265 / 371383.5439	WA State Plane,North NAD 83/91	Date Measured: — Depth to Water (ft): Not encountered — Elevation (ft): —

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		40						AS	Asphalt			
60									GP	Gray/brown fine to coarse gravel with fine ot coarse sand and trace silt			
									BR	Brick fragments			
						3-3.5			SM	Brown silty fine to coarse sand with occasional fine gravel, some charred wood and debris			
						4.5-5			SP	Brown fine to medium sand			
	5		60						SM	Brown silty fine to coarse sand with occasional fine gravel (wet)			
									SP-SM	Gray fine to coarse sand with silt (wet) (weathered till)			
55						7-7.5			SP-SM	Gray fine to coarse sand with silt and occasional fine gravel (moist) (weathered till)			
	10												

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-09

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-7
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
3/26/2014	3/27/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308435.92 / 371387.1187	WA State Plane,North NAD 83/91	Date Measured: — Depth to Water (ft): Not encountered — Elevation (ft): —

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		36					AS	Asphalt			
60								GP	Crushed asphalt and gravel			
					3-3.5			SP	Brown fine to medium sand			
								SP-SM	Brown fine to coarse sand with silt and fine to coarse gravel, some brick fragments			
					4.5-5							
	5		60									
55					7-7.5			SM	Gray silty fine to coarse sand with occasional fine gravel (wet)			
								SM	Grades with increased silt content (weathered till)			
								ML	Gray silt with fine sand and occasional fine gravel (hard, moist)			
	10											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-10

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-8
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
3/27/2014	3/27/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308430.792 / 371383.6933	WA State Plane,North NAD 83/91	Date Measured: Not encountered; Depth to Water (ft): ; Elevation (ft):

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		33						AS	Asphalt			
60									SP-SM	Brown fine to coarse sand with silt and fine to coarse gravel			
									BR	Brick			
						3.5-4			SM	Dark brown silty fine to coarse sand			
									SP-SM	Brown fine to coarse sand with silt			
	5		60										
						6-6.5			SP-SM	Gray medium to coarse sand with silt			
55									SP-SM	Gray fine to coarse sand with silt and occasional fine gravel (moist) (weathered till)			
									SM	Gray silty fine to coarse sand with occasional fine gravel			
	10												

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-11

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-9
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
3/27/2014	3/27/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308432.109 / 371374.1643	WA State Plane,North NAD 83/91	Date Measured: — Depth to Water (ft): Not encountered — Elevation (ft): —

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		40					AS	Asphalt			
								GP	Gray fine to coarse gravel with fine to coarse sand and trace silt			
60					2-2.5			SP-SM	Brown fine to coarse sand with silt, occasional fine to coarse gravel and brick and wood debris			
					3-3.5							
								SM	Gray silty fine sand with occasional coarse sand			
	5		60						Grades to silty fine to coarse sand with occasional fine gravel (moist)			
55					6.5-7							
								SM	Gray silty fine to medium sand (weathered till)			
									Grades to with increased silt content			
	10											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-12

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-10
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	3/27/2014	3/27/2014	10	PDR	GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	62 NAVD88	Hammer Data	Pneumatic	Drilling Equipment	Truck-mounted Geoprobe
Easting (X) / Northing (Y)	1308433.622 / 371365.8038	System Datum	WA State Plane,North NAD 83/91	Groundwater	Date Measured: — Depth to Water (ft): Not encountered — Elevation (ft):

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		40						AS	Asphalt			
									SP	Brown fine to coarse sand with fine gravel			
60						1.5-2							
									BR	Brick			
									SP	White fine to medium sand (likely mortar)			
									BR	Brick			
									SP	Orange fine to medium sand with trace silt			
						4-4.5							
	5		60						BR	Brick			
									SP	Brown fine to coarse sand with fine gravel, trace silt and brick debris			
						6-6.5							
55									SM	Gray silty fine sand with occasional fine gravel (weathered till)			
	10												

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-13

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-11
Sheet 1 of 1

Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	3/27/2014	3/27/2014	10	PDR	GRL	Cascade Drilling	Direct Push

Surface Elevation (ft)	62	Hammer Data	Pneumatic	Drilling Equipment	Truck-mounted Geoprobe
Vertical Datum	NAVD88				
Easting (X)	1308429.749	System Datum	WA State Plane,North	Groundwater	
Northing (Y)	371364.1792		NAD 83/91	Date Measured	Depth to Water (ft) / Elevation (ft)
					Not encountered

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		40					CC	8 inches concrete			
								GP	Coarse gravel			
60								SM	Brown silty fine to coarse sand			
								SP	White fine sand with brick debris (likely mortar)			
					3-3.5			SM	Brown silty fine to coarse sand with wood debris			
								SM	Light brown silty fine to medium sand with occasional fine gravel			
					4.5-5							
	5		60						Becomes more coarse and moist			
					6.5-7							
55								SM	Gray silty fine to medium sand (weathered till)			
	10											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-14

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-12
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
3/27/2014	3/27/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308436.07 / 371355.9944	WA State Plane,North NAD 83/91	Date Measured: — Depth to Water (ft): Not encountered — Elevation (ft): —

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	Asphalt			
								SP	Gray fine to coarse sand with occasional fine gravel and trace silt			
60					2-2.5			SM	Brown/black silty fine to coarse sand with fine gravel, brick debris (charring on gravel)			
								SP-SM	Brown/black fine to coarse sand with silt and fine gravel, brick debris (charring on gravel)			
					3.5-4							
	5		60		5-5.5			SM	Gray silty fine to medium sand with occasional coarse sand and fine gravel (weathered till)			
55					6.5-7				Becomes moist to wet to 7.5 feet			
	10											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-15

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-13
Sheet 1 of 1

Drilled Start 3/27/2014 End 3/27/2014	Total Depth (ft) 12	Logged By PDR Checked By GRL	Driller Cascade Drilling	Drilling Method Direct Push	
Surface Elevation (ft) 62.5 Vertical Datum NAVD88		Hammer Data Pneumatic		Drilling Equipment Truck-mounted Geoprobe	
Easting (X) 1308421.568 Northing (Y) 371361.068		System Datum WA State Plane,North NAD 83/91		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft): Not encountered	

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0	48					CC	6 inches concrete			
							SM	Gray silty fine to medium sand (fill) (moist)			
60				2.5-3							
	5	60		5.5-6							
55				8-8.5			SP-SM	Gray fine sand with silt (weathered till)			
	10	24						Grades to more coarse			
							GP	Gray fine to coarse gravel and fractured cobble			
								Refusal at 12 feet			

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-16

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-14
Sheet 1 of 1

Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	3/27/2014	3/27/2014	15	PDR	GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	62.5 NAVD88	Hammer Data	Pneumatic	Drilling Equipment	Truck-mounted Geoprobe
Easting (X) / Northing (Y)	1308415.64 / 371351.9272	System Datum	WA State Plane,North NAD 83/91	Groundwater	Date Measured: — Depth to Water (ft): Not encountered — Elevation (ft):

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		40						TS	Topsoil (wet)			
									SM	Brown silty fine to coarse sand (moist)			
60									SP-SM	Gray fine to medium sand with silt (moist)			
						3.5-4			SM	Brown silty fine to medium sand with occasional fine to coarse gravel (wet) (potential surface water migrating down borehole) (weathered till)			
	5		60										
55													
	10		24										
50						14-14.5							
	15												

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-17

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-15
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled	Start 3/27/2014	End 3/27/2014	Total Depth (ft) 20	Logged By PDR / Checked By GRL	Driller Cascade Drilling	Drilling Method Direct Push
Surface Elevation (ft) / Vertical Datum	62.5 NAVD88		Hammer Data	Pneumatic	Drilling Equipment	Truck-mounted Geoprobe
Easting (X) / Northing (Y)	1308408.433 / 371369.373		System Datum	WA State Plane,North NAD 83/91	Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)	Not encountered

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		36					TS	Topsoil (moist)			
								SP-SM	Brown fine to coarse sand with fine to coarse gravel and silt, brick debris and wood pieces (wet) (fill)			
60					4.5-5							
	5		36					SM	Gray/brown silty fine to coarse sand with occasional fine to coarse gravel (moist) (fill)			
55												
								SP-SM	Gray/brown fine to coarse sand with silt and occasional fine to coarse gravel (wet) (fill)			
	10		36									
50					13-13.5			WD	Wood debris (fill)			
					14-14.5			SP-SM	Gray fine to coarse sand with silt and occasional fine to coarse gravel (fill)			
	15		36									

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-18

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-16
Sheet 1 of 2

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate\LibTemplate\GEOENGINEERS8.GDT\GEI8_GEOTECH_STANDARD

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
-15												Drilling becomes harder
	20							SP	Gray/brown fine to coarse sand with fine to coarse gravel and trace silt (fill?)			

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-18 (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-16
Sheet 2 of 2

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
3/27/2014	3/27/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308438.972 / 371347.0886	WA State Plane,North NAD 83/91	Date Measured: — Depth to Water (ft): Not encountered — Elevation (ft): —

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	Asphalt			
60					1.5-2			SP-SM	Brown fine to coarse sand with silt and fine to coarse gravel			
								SP-SM	Orange fine to medium sand with silt			
								SP-SM	Gray/brown fine to coarse sand with silt and occasional fine gravel			
					4.5-5							
	5		60									
					6.5-7							
55								SM	Gray silty fine to medium sand with occasional coarse sand and fine to coarse gravel (weathered till)			
	10											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-19

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-17
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
3/27/2014	3/27/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308441.693 / 371337.9254	WA State Plane,North NAD 83/91	Date Measured: — Depth to Water (ft): Not encountered — Elevation (ft): —

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	Asphalt			
								SP	Gray fine to coare sand with trace silt			
60								SP	Gray fine sand with brick fragments			
					2.5-3			SP-SM	Orange/brown fine to medium sand with silt			
								SM	Gray silty fine to medium sand			
					4.5-5							
	5		60									
55								SM	Gray silty fine to medium sand with occasional fine gravel (weathered till)			
	10											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-20

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-18
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
3/28/2014	3/28/2014	15	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308457.35 / 371379.3273	WA State Plane,North NAD 83/91	Date Measured: Not encountered; Depth to Water (ft): ; Elevation (ft):

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		48					AS	Asphalt			
								GP	Gray fine to coarse gravel with fine to coarse sand and trace silt (poor recovery)			
60					2-2.5			SP	Brown fine to medium sand with occasional fine gravel and trace silt			
								SM	Gray/green silty fine sand with fine gravel and brick fragments			
	5		60									
								GP-GM	Brown fine to coarse gravel with silt and fine to coarse sand, brick debris			
55					7-7.5			SP	Orange fine to medium sand with trace silt			
								SP-SM	Gray fine to coarse sand with silt			
					8.5-9							
								SM	Gray silty fine to medium sand with occasional fine to coarse gravel (weathered till)			
	10		60									
50												
	15											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-21

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-19
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled	Start 3/28/2014	End 3/28/2014	Total Depth (ft) 15	Logged By PDR / Checked By GRL	Driller Cascade Drilling	Drilling Method Direct Push
Surface Elevation (ft) 62 / Vertical Datum NAVD88			Hammer Data Pneumatic		Drilling Equipment Truck-mounted Geoprobe	
Easting (X) 1308454.894 / Northing (Y) 371388.6941			System Datum WA State Plane,North NAD 83/91		Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft): Not encountered	

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		48					AS	Asphalt			Boring LLSB-22a drilled due to poor recovery in LLSB-22; combined into this one boring log
								SP-SM	Gray fine to coarse sand with silt			
60								SP	Gray fine to coarse sand			
					3-3.5			SP-SM	Gray fine to coarse sand with silt			
								ML	Dark gray silt			
					4.5-5			SM	Brown silty fine to coarse sand with debris (brick)			
	5		60					SM	Brown silty fine to coarse sand with debris (brick)			
55								BR	Bricks/mortar			
					8-8.5			SP-SM	Brown fine to coarse sand with silt			
								SP-SM	Gray fine to coarse sand with fine to coarse gravel and silt			
	10		60					SP-SM	Gray fine to coarse sand with fine to coarse gravel and silt (moist)			
50								GP	Gray gravel (old road grade?) (moist)			
								SM	Brown silty fine to coarse sand with occasional fine to coarse gravel (weathered till)			
	15											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-22/LSB-22a

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-20
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate\LibTemplate\GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start 3/28/2014 End 3/28/2014	Total Depth (ft) 15	Logged By PDR Checked By GRL	Driller Cascade Drilling	Drilling Method Direct Push	
Surface Elevation (ft) 62 Vertical Datum NAVD88		Hammer Data Pneumatic		Drilling Equipment Truck-mounted Geoprobe	
Easting (X) 1308460.798 Northing (Y) 371369.7174		System Datum WA State Plane,North NAD 83/91		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft): Not encountered	
Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.					

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		48					AS	Asphalt			
								SP	Gray fine to coarse sand with occasional fine gravel and trace silt			
60								SM	Brown silty fine to medium sand			
								RX	Orange rock			
								ML	Gray/green silt			
								SM	Brown silty fine sand with debris (wood, brick, organics)			
					4.5-5							
	5		48									
55								SP-SM	Light brown fine to coarse sand with silt and mottled colored bands			
					8.5-9				6 inch orange layer			
								SM	Gray silty fine to coarse sand with occasional fine gravel			
	10		60									
					11-11.5			SP-SM	Gray/brown fine to medium sand with silt and occasional fine gravel			
50								SM	Gray/brown silty fine to medium sand with occasional fine gravel (weathered till)			
	15											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-23

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-21
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start 3/28/2014 End 3/28/2014	Total Depth (ft) 15	Logged By PDR Checked By GRL	Driller Cascade Drilling	Drilling Method Direct Push	
Surface Elevation (ft) 62 Vertical Datum NAVD88		Hammer Data Pneumatic		Drilling Equipment Truck-mounted Geoprobe	
Easting (X) 1308464.059 Northing (Y) 371356.4213		System Datum WA State Plane,North NAD 83/91		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft): Not encountered	

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		48						AS	Asphalt			
									CR	Base course			
60									SP	Brown fine to coarse sand with fine gravel Wood and organics Brick pieces			
						3.5-4			ML	Gray/green silt			
									SP-SM	Brown fine to coarse sand with silt and debris			
	5		60						ML	Gray/green silt			
									SM	Gray silty fine sand			
55									WD	Wood (processed)			
						7-7.5			SM	Brown silty fine to coarse sand with occasional fine to coarse gravel			
									SP-SM	Light brown/orange fine sand with silt in varying amounts			
									SM	Gray silty fine to medium sand with occasional coarse sand and fine gravel (weathered till)			
	10		60			10-10.5							
50													
	15												

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-24

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-22
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled	Start 3/28/2014	End 3/28/2014	Total Depth (ft)	15	Logged By	PDR	Checked By	GRL	Driller	Cascade Drilling	Drilling Method	Direct Push
Surface Elevation (ft) Vertical Datum	62 NAVD88				Hammer Data	Pneumatic					Drilling Equipment	Truck-mounted Geoprobe
Easting (X) Northing (Y)	1308467.768 371343.7683				System Datum	WA State Plane,North NAD 83/91					Groundwater Date Measured	Depth to Water (ft) Not encountered

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		48						AS	Asphalt			
60									SP-SM	Brown fine to coarse sand with silt and fine to coarse gravel			
									SM	Gray silty fine to coarse sand with fine to coarse gravel			
						3.5-4							
									SP-SM	Brown fine to coarse sand with silt			
	5		60										
									ML	Gray silt			
55									SP-SM	Brown fine to coarse sand with silt			
						7.5-8			GP	Cobbles and black charred gravel debris			
									SP-SM	Orange/brown fine to medium sand with silt			
										Grades to light brown with increased silt content			
	10		60			10-10.5							
50									SM	Gray silty fine to medium sand with occasional fine gravel (weathered till)			
	15												

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-25

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-23
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
4/29/2014	4/29/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308424.695 / 371381.039	WA State Plane,North NAD 83/91	Date Measured: Not encountered; Depth to Water (ft): ; Elevation (ft):

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	8 inches asphalt			
					1.3-2.3			SP-SM	Gray fine to coarse sand with silt and occasional fine to coarse gravel			
60								BR	Brick/mortar			
								WD	Wood debris			
					2.8-3.2			SP-SM	Gray fine to coarse sand with silt and occasional fine to coarse gravel			
	5		60		5.2-5.4			SP-SM	Gray fine to medium sand with silt and gravel			
55								SM	Gray silty fine to medium sand with occasional fine gravel			
								SP-SM	Gray fine sand with silt (weathered till)			
	10											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-26

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-24
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
4/29/2014	4/29/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308435.36 / 371396.015	WA State Plane,North NAD 83/91	Date Measured: — Depth to Water (ft): Not encountered — Elevation (ft): —

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		54					AS	Asphalt			
					1.3-2.3			SP-SM	Brown fine to coarse sand with silt			
60								BR	Brick debris with fine to coarse sand and silt			
								SP-SM	Brown fine to coarse sand with silt			
					3.8-4.5			PEAT	Dark brown peat			
								SP	Orange fine to medium sand with trace silt			
	5		60		5.0-5.4			SP-SM	Brown fine to coarse sand with silt and occasional fine gravel Moist from 5.5 to 6 feet			
					5.8-7.2				Becomes mottled at 6.3 feet			
55								SM	Gray silty fine to medium sand with occasional fine to coarse gravel (weathered till)			
	10											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-27

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-25
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
4/29/2014	4/29/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308422.988 / 371389.829	WA State Plane,North NAD 83/91	Date Measured / Depth to Water (ft) / Elevation (ft): Not encountered

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	Asphalt			
								GP	Gray fine to coarse gravel with fine to coarse sand and trace silt			
								SP	Brown fine sand with trace silt			
60					2.2-2.7			SM	Red/brown silty fine sand (dry)			
					2.8-7.2			SP-SM	Gray fine to coarse sand with silt (moist)			
	5		60					SM	Gray silty fine to medium sand with occasional coarse sand and fine to coarse gravel (dry) (weathered till)			
55												
	10											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-28

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-26
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	4/29/2014	4/29/2014	10	PDR	GRL	Cascade Drilling	Direct Push

Surface Elevation (ft)	62	Hammer Data	Pneumatic	Drilling Equipment	Truck-mounted Geoprobe
Vertical Datum	NAVD88				
Easting (X)	1308430.454	System Datum	WA State Plane,North	Groundwater	
Northing (Y)	371408.173		NAD 83/91	Date Measured: Not encountered	Depth to Water (ft): Not encountered

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		46						AS	2 inches asphalt			
									CC	Concrete			
									SP	Gray fine sand with trace silt			
60						1.8-2.7			SP-SM	Brown fine to coarse sand with silt and small brick debris			
						3.5-3.8			PEAT	Dark brown peat with fine sand			
	5		60										
						5.2-5.5			GP	Gray crushed cobble			
						5.8-6.2			SM	Brown silty fine to coarse sand with occasional fine to coarse gravel			
						6.3-7.7							
55									SM	Gray silty fine to medium sand with occasional coarse sand and fine gravel (weathered till)			
										Mottled color (weathered till)			
									CR	Crushed rock			
	10								SM	Gray silty fine to medium sand with occasional coarse sand and fine gravel (weathered till)			

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-29

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-27
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
4/29/2014	4/29/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308416.803 / 371403.267	WA State Plane,North NAD 83/91	Date Measured: Not encountered; Depth to Water (ft): ; Elevation (ft):

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	Asphalt			
								SP	Gray fine to coarse sand with trace silt			
60								ML	Brown silt with fine sand			
					2.8-4.7				Mottled coloring			
								SM	Gray silty fine to medium sand (moist)			
	5		60					SP-SM	Brown fine to medium sand with silt			
								SM	Gray silty fine to medium sand			
55								SP-SM	Gray fine to coarse sand with silt and occasional fine to coarse gravel (weathered till)			
	10											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-30

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-28
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate\LibTemplate\GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
4/29/2014	4/29/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308424.933 / 371420.431	WA State Plane,North NAD 83/91	Date Measured / Depth to Water (ft) / Elevation (ft): Not encountered

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		42					AS	Asphalt			
								CC	Concrete			
60								SM	Brown silty fine sand with occasional coarse sand and fine gravel			
					2.9-3.2			BR	Brick with dark brown silt (peat, organic)			
					3.3-3.7			SM	Brown silty fine sand with occasional coarse sand and fine gravel			
	5		60					OL	Black organic silt			
								SM	Brown silty fine sand with brick			
								SP-SM	Gray fine to medium sand with silt			
55					6.8-8.2							
								SM	Gray silty fine to medium sand with occasional coarse sand and fine gravel (weathered till)			
	10											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-31

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-29
Sheet 1 of 1

Drilled Start 4/29/2014 End 4/29/2014	Total Depth (ft) 10	Logged By PDR Checked By GRL	Driller Cascade Drilling	Drilling Method Direct Push
Surface Elevation (ft) 62 Vertical Datum NAVD88		Hammer Data Pneumatic		Drilling Equipment Truck-mounted Geoprobe
Easting (X) 1308412.775 Northing (Y) 371416.671		System Datum WA State Plane,North NAD 83/91		Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft): Not encountered

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	8 to 10 inches asphalt			
								SP	Brown fine to coarse sand with trace silt			
60					2.3-2.8			SM	Light brown silty fine to medium sand (moist)			
								SM	Gray silty fine to coarse sand with occasional coarse sand and fine to coarse gravel With small band of mottled color			
	5		60		4.8-5.3			SM	Brown silty fine sand			
								SP-SM	Gray fine to coarse sand with silt and occasional fine to coarse gravel (weathered till)			
55												
	10											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-32

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-30
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
4/29/2014	4/29/2014	10	PDR / GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308421.709 / 371430.784	WA State Plane,North NAD 83/91	Date Measured: — Depth to Water (ft): Not encountered — Elevation (ft): —

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	6 to 7 inches asphalt			
								CC	Concrete			
								SM	Brown silty fine to medium sand with brick fragments			
60					3.3-3.7							
					3.8-4.3			BR	Brick			
								WD	Wood debris			
					4.3-5.2			ML	Black silt (organic)			
	5		60					SP-SM	Brown fine to coarse sand with silt			
									Sluff in sleeve Black silt (organic)			
								SP	Gray mortar (fine to medium sand)			
55								SP	Gray silty fine sand			
								SP-SM	Gray fine to coarse sand with silt and occasional fine to coarse gravel (weathered till)			
	10											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-33

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-31
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate\LibTemplate\GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled	Start 4/29/2014	End 4/29/2014	Total Depth (ft) 17.5	Logged By PDR / Checked By GRL	Driller Cascade Drilling	Drilling Method Direct Push
Surface Elevation (ft) / Vertical Datum	62 NAVD88		Hammer Data	Pneumatic	Drilling Equipment	Truck-mounted Geoprobe
Easting (X) / Northing (Y)	1308418.604 / 371440.36		System Datum	WA State Plane,North NAD 83/91	Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)	Not encountered

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		48					AS	6 to 8 inches asphalt			
								CC	Concrete			
60								SP	Gray fine to medium sand with trace silt			
								SM	Dark brown silty fine to medium sand			
					3.8-4.2			SM	Brown silty fine to coarse sand			
	5		30		4.9-5.2			SM	Brown silty fine to medium sand with occasional coarse sand			
					5.3-5.7			SM	Brown silty fine to medium sand			
					5.8-6.3							
55								SP-SM	Gray fine to coarse sand with silt (moist) (weathered till)			
									No recovery			
	10		60					SM	Gray silty fine to medium sand			
50								SP-SM	Brown fine to coarse sand with silt and occasional gravel			
									Mottled (moist)			
								SM	Gray silty fine sand with occasional coarse sand and gravel (weathered till)			
	15		24									

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-34

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-32
Sheet 1 of 2

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate\LibTemplate\GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample / Sample Name Testing	FIELD DATA: Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	45							Occasional crushed rock (cobble)			

Refusal at 17.5 feet

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-34 (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-32
Sheet 2 of 2

Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	4/30/2014	4/30/2014	17	PDR	GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) Vertical Datum	Hammer Data	Drilling Equipment
62.5	Pneumatic	Truck-mounted Geoprobe

Easting (X)	Northing (Y)	System Datum
1308466.101	371392.3688	

Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)
	Not encountered	

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60						AS	6 to 10 inches asphalt			
									CC	6 inches gravel subgrade			
									SP-SM	Brown fine to coarse sand with silt and some wood debris			
60									ML	Gray silt with occasional fine gravel			
									SM	Light brown silty fine to medium sand with occasional fine gravel, silt content varies (fill)			
	5		60										
									SP	Gray fine to coarse sand with trace silt, rocks and brick debris			
									ML	Brown silt with fine sand (silt appears organic)			
55						7.3-7.7							
						7.8-8.3			BR	Brick			
						8.3-8.7			SM	Light brown silty fine sand			
	10		24						SM	Gray/brown mottled silty fine to medium sand with occasional fine gravel (moist to wet)			Rock in shoe
50													
	15		24						SM	Gray silty fine to medium sand with occasional coarse sand and fine gravel (weathered till)			

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-35

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-33
Sheet 1 of 2

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Elevation (feet) / Depth (feet)	FIELD DATA: Interval Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample / Sample Name Testing	FIELD DATA: Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-35 (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-33
Sheet 2 of 2

Drilled Start 4/30/2014 End 4/30/2014	Total Depth (ft) 15	Logged By PDR Checked By GRL	Driller Cascade Drilling	Drilling Method Direct Push
Surface Elevation (ft) 62 Vertical Datum NAVD88		Hammer Data Pneumatic		Drilling Equipment Truck-mounted Geoprobe
Easting (X) 1308466.101 Northing (Y) 371392.369		System Datum WA State Plane,North NAD 83/91		Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft): Not encountered

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	Asphalt			
								GP	Gray fine to coarse gravel (base course)			
60								SM	Brown silty fine to medium sand			
								ML	Gray silt with occasional fine sand			
								SM	Brown silty fine to medium sand			
	5		60					ML	Dark brown silt			
								SM	Gray silty fine sand			
								ML	Gray silt			
55									No recovery			
					7.3-7.7			OL	Dark brown organic silt			
								BR	Brick			
					8.0-8.7			OL	Dark brown organic silt with fine sand			
								SP-SM	Brown fine to medium sand with silt and occasional cobbles (crushed)			
	10		60					SM	Gray silty fine to coarse sand with occasional fine to coarse gravel			
					11.2-12.3							
50												
					12.4-15			SP-SM	Brown fine to medium sand with silt and occasional coarse sand and fine gravel (weathered till)			
									With decreased silt content			
	15								Refusal at 15 feet			

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-36

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-34
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate\LibTemplate\GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start 4/30/2014 End 4/30/2014	Total Depth (ft) 15	Logged By PDR Checked By GRL	Driller Cascade Drilling	Drilling Method Direct Push
Surface Elevation (ft) 62 Vertical Datum NAVD88		Hammer Data Pneumatic		Drilling Equipment Truck-mounted Geoprobe
Easting (X) 1308471.835 Northing (Y) 371374.471		System Datum WA State Plane,North NAD 83/91		Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft): Not encountered

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		48					AS	11 inches asphalt			Boring LLSB-37a drilled due to poor recovery in LLSB-37; combined into this one boring log
								GP	Gray fine to coarse gravel (base course)			
60								SM	Brown silty fine to medium sand with varying amounts of silt			
	5		60					SP	Gray fine to medium sand with trace silt			
								SM	Gray silty fine sand			
								SM	Brown silty fine sand with occasional medium to coarse sand			
55								ML	Black silt with fine to medium sand and occasional fine gravel			
					8.3-9.7							
								SM	Brown silty fine to medium sand with occasional coarse sand and fine gravel			
	10		48					ML	Black silt			
								SP-SM	Gray fine to coarse sand with silt			
								ML	Brown silt with fine to medium sand			
50								SM	Gray mottled silty fine to coarse sand with occasional gravel (weathered till)			
					12.2-12.7							
					12.8-15							
	15								Refusal at 15 feet			

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-37/LLSB-37a

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-35
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	4/30/2014	4/30/2014	15	PDR	GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) Northing (Y)	System Datum	Groundwater
1308480.154 371345.035	WA State Plane,North NAD 83/91	Date Measured: Not encountered; Depth to Water (ft): ; Elevation (ft):

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60						AS	12 inches asphalt concrete			
									GP	Gray fine to coarse gravel (base course)			
60									SP	Gray fine sand			
									SM	Gray silty fine to medium sand			
									GP	Gravel			
									ML	Gray silt			
	5		60						SP	Gray fine to medium sand			
									SM	Gray silty fine to medium sand			
55									SP-SM	Brown with mottling fine to coarse sand with silt			
									ML	Gray silt			
									ML	Brown silt with fine to medium sand (organic)			
						8.7-9.7			BR	Brick			
									ML	Brown silty fine to medium sand (organic)			
	10		60						SM	Brown silty fine to medium sand			
50									ML	Gray with mottling fine to medium sand with silt (weathered till)			
									GP	Gravel lense			
	15								SP-SM	Gray fine to medium sand with silt			

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-38

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-36
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate\GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled	Start 4/30/2014	End 4/30/2014	Total Depth (ft) 17.5	Logged By PDR / Checked By GRL	Driller Cascade Drilling	Drilling Method Direct Push
Surface Elevation (ft) / Vertical Datum	62 NAVD88		Hammer Data	Pneumatic	Drilling Equipment	Truck-mounted Geoprobe
Easting (X) / Northing (Y)	1308484.847 / 371395.162		System Datum	WA State Plane,North NAD 83/91	Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)	Not encountered

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	12 inches asphalt concrete			
								GP	Gray fine to coarse gravel (base course)			
60								SP-SM	Gray fine to coarse sand with silt			
								SM	Brown silty fine sand			
								ML	Gray silt with occasional fine gravel			
	5		60					ML	Brown silt with wood debris			
								SM	Gray silty fine sand			
55												
	10		54									
50					12.3-12.7			ML	Gray silt lense			
					12.8-13.2			SP-SM	Brown fine to coarse sand with silt and brick debris			
					13.3-14.2							
								SM	Red/brown silty fine to medium sand with occasional fine gravel			
	15		24					SP-SM	Gray fine to coarse sand with silt and fine to coarse gravel			
					15.8-17			SP	Brown fine sand			

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-39

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-37
Sheet 1 of 2

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample / Sample Name Testing	FIELD DATA: Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
45							SM	Gray silty fine to coarse sand with fine to coarse gravel (weathered till)			
								Refusal at 17.5 feet			

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-39 (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-37
Sheet 2 of 2

Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	4/30/2014	4/30/2014	21	PDR	GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308481.861 / 371406.893	WA State Plane,North NAD 83/91	Date Measured: Not encountered; Depth to Water (ft): ; Elevation (ft):

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	12 inches asphalt concrete			
								GP	Gray fine to coarse gravel (base course)			
60								SP-SM	Gray fine to coarse sand with silt and occasional fine gravel			
								SM	Brown silty fine to coarse sand with brick debris			
								ML	Gray silt			
								ML	Brown silt with fine to medium sand and occasional fine gravel			
	5		60					SP-SM	Brown fine to coarse sand with silt and occasional fine gravel with varying silt content			
55								SM	Gray silty fine sand with debris (slag)			
								SP-SM	Brown fine to coarse sand with silt and occasional fine to coarse gravel			
	10		60						Varying silt content			
50								SP-SM	Light brown fine to coarse sand with silt and occasional fine gravel			
								SM	Red/brown silty fine to medium sand			
								SP-SM	Brown fine to coarse sand with silt and occasional fine to coarse gravel			
	15		60		14.8-15.7				Becomes gray (weathered till)			

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-40

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-38
Sheet 1 of 2

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate\LibTemplate\GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
45								ML	Gray silt			
								SP-SM	Gray fine to coarse sand with silt and fine to coarse gravel			
	20		12					SP	Brown fine to medium sand with trace silt			
									Refusal at 21 feet			

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-40 (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-38
Sheet 2 of 2

Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	5/1/2014	5/1/2014	15	PDR	GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308460.193 / 371408.024	WA State Plane,North NAD 83/91	Date Measured: — Depth to Water (ft): — Elevation (ft): — Not encountered

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	20 inches asphalt			
60								GP	Gray fine to coarse gravel (base course)			
								SP	Brown fine to medium sand with trace silt			
								ML	Brown silt with brick debris			
								SM	Gray silty fine sand with occasional fine to coarse gravel			
	5		60									
								SP-SM	Gray fine to medium sand with silt and occasional fine to coarse gravel			
55								Cobble	Cobble			
					8.3-8.7			ML	Brown silt with brick fragments			
								SM	Gray silty fine to coarse sand with occasional fine to coarse gravel			
	10		60									
								GP	Slag			
					11.3-12.2			SM	Brown silty fine to coarse sand with occasional fine to coarse gravel			
50								SP-SM	Gray fine to coarse sand with silt and fine to coarse gravel (weathered till)			
	15											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-41

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-39
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate\LibTemplate\GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	5/1/2014	5/1/2014	14	PDR	GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308455.982 / 371420.605	WA State Plane,North NAD 83/91	Date Measured: — Depth to Water (ft): — Elevation (ft): Not encountered

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	10 inches asphalt			
								GP	Gray fine to coarse gravel (base course)			
								SP	Light brown fine to coarse sand with fine to coarse gravel and trace silt			
60								SP-SM	Brown fine to coarse sand with silt			
								SM	Light brown silty fine sand			
	5		60					GM	Black fine to coarse gravel with silt and fine to coarse sand (some gravel shiny (heat) (no odor) (likely slag)			
								SP-SM	Gray fine to medium sand with silt and occasional fine gravel (some gravel is glassy) (likely slag)			
55								SM	Gray silty fine to medium sand			
					9.3-9.6			BR/SM	Brick fragments with brown silty fine to medium sand (organic)			
	10		48		9.6-10.0				No recovery			
								SM	Gray silty fine to coarse sand with fine to coarse gravel (weathered till)			
50					12.2-12.6							
									Refusal at 14 feet			

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-42

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-40
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	5/1/2014	5/1/2014	15	PDR	GRL	Cascade Drilling	Direct Push

Surface Elevation (ft)	62	Hammer Data	Pneumatic	Drilling Equipment	Truck-mounted Geoprobe
Vertical Datum	NAVD88				
Easting (X)	1308448.436	System Datum	WA State Plane,North	Groundwater	
Northing (Y)	371400.192		NAD 83/91	Date Measured: Not encountered	Depth to Water (ft) / Elevation (ft)

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	8 inches asphalt			
								SP-SM	Brown fine to coarse sand with silt and fine to coarse gravel			
60								SM	Gray silty fine sand			
								ML	Gray silt			
								SM	Gray silty fine to medium sand with occasional coarse sand and fine gravel, brick and mortar			
					3.8-6.2							
								SP	Light brown fine to medium sand			
	5		60					BR	Bricks and brick fragments, mortar			
55												
					7.5-7.8			SM	Brown silty fine to medium sand with occasional fine gravel			
					7.8-8.7							
					9.3-11.6							
	10		60					SM	Gray silty fine sand with occasional medium to coarse sand and fine to coarse gravel (weathered till)			
									Some mottled coloring			
50												
	15											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-43

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-41
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start 5/1/2014 End 5/1/2014	Total Depth (ft) 15	Logged By PDR Checked By GRL	Driller Cascade Drilling	Drilling Method Direct Push	
Surface Elevation (ft) 62 Vertical Datum NAVD88		Hammer Data Pneumatic		Drilling Equipment Truck-mounted Geoprobe	
Easting (X) 1308442.851 Northing (Y) 371414.349		System Datum WA State Plane,North NAD 83/91		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft): Not encountered	

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	12 inches asphalt			
								SP-SM	Gray fine to coarse sand with silt and occasional fine gravel			
60					3.3-4.2			GP	Dark gray fine to coarse gravel with fine to coarse sand and trace silt			
								ML	Light gray silt with fine sand			
	5		60		4.8-5.2			BR	Brick fragments Bricks, mortar, some brown fine to coarse sand with silt			
55					5.8-7.7			WD	Wood fragments			
								SP-SM	Brown fine to coarse sand with fine to coarse gravel and silt			
								WD	Wood fragments			
					8.7-9.2			SM	Gray silty fine to coarse sand with occasional fine gravel			
					9.3-10.7			SP-SM	Gray fine to coarse sand wth silt and occasional fine gravel (weathered till)			
	10		60									
50												
	15											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-44

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-42
Sheet 1 of 1

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	5/1/2014	5/1/2014	15	PDR	GRL	Cascade Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
62 NAVD88	Pneumatic	Truck-mounted Geoprobe

Easting (X) / Northing (Y)	System Datum	Groundwater
1308438.118 / 371427.763	WA State Plane,North NAD 83/91	Date Measured: — Depth to Water (ft): — Elevation (ft): — Not encountered

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					AS	12 inches asphalt concrete			
60								SP-SM SM	Brown fine to coarse sand with fine to coarse gravel, silt and brick fragments Brown silty fine to medium sand with occasional coarse sand and fine gravel			
	5		60					SP-SM	Gray fine to coarse sand with silt			
								ML	Gray silt (very hard)			
					6.3-6.7			OL	Dark brown organic silt			
55					6.8-8.2			BR	Brick fragments			
								SP-SM	Brown/gray fine sand with silt			
								WD	Large wood debris with brown silt			
								ML	Gray silt with fine sand and occasional fine gravel			
	10		60		9.8-10.2			SM	Gray/brown silty fine to medium sand			
					10.3-11.2							
50								SP-SM	Gray/brown fine to coarse sand with silt and fine to coarse gravel (weathered till)			
	15											

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-45

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-43
Sheet 1 of 1

Drilled	Start 5/1/2014	End 5/1/2014	Total Depth (ft) 17.5	Logged By PDR / Checked By GRL	Driller Cascade Drilling	Drilling Method Direct Push
Surface Elevation (ft) 62.5 / Vertical Datum NAVD88			Hammer Data Pneumatic		Drilling Equipment Truck-mounted Geoprobe	
Easting (X) 1308493.935 / Northing (Y) 371364.431			System Datum WA State Plane,North NAD 83/91		Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft): Not encountered	

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		60					CC	6 inches concrete			
								GP	Gray fine to coarse gravel (base course)			
								SP-SM	Brown fine to medium sand with silt			
								AC	Black asphalt			
60								SM	Gray silty fine sand			
								SP-SM	Brown fine to coarse sand with silt			
								ML	Gray/brown silt with fine to medium sand and occasional fine gravel			
	5		60									
55								SP-SM	Gray fine to coarse sand with silt			
								SM	Dark gray silty fine sand with occasional fine to coarse gravel			
								SP-SM	Brown fine to coarse sand with silt, gravel and brick fragments			
	10		60		9.8-10.2			SP-SM	Gray fine to coarse sand with silt			
								SM	Brown silty fine to medium sand			
50					12.3-13.2			SP-SM	Gray fine to coarse sand with silt and fine to coarse gravel			
					13.3-13.7							
								ML	Dark brown silt			
	15		24		14.8-17			SM	Gray silty fine to coarse sand with fine to coarse gravel (weathered till)			

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-46

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample / Sample Name Testing	FIELD DATA: Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	45										

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-46 (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-44
Sheet 2 of 2

Drilled: Start 5/1/2014 End 5/1/2014	Total Depth (ft): 19	Logged By: PDR Checked By: GRL	Driller: Cascade Drilling	Drilling Method: Direct Push	
Surface Elevation (ft): 62.5 Vertical Datum: NAVD88		Hammer Data: Pneumatic		Drilling Equipment: Truck-mounted Geoprobe	
Easting (X): 1308491.886 Northing (Y): 371380.23		System Datum: WA State Plane,North NAD 83/91		Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft): Not encountered	

Notes: Borings not surveyed. Boring elevation is approximated based on nearby surveyed monitoring wells. Arsenic and lead concentrations measured in the field with an XRF analyzer.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
	0		42					CC	6 inches concrete			
									No recovery			
								SP-SM	Brown fine to coarse sand with silt			
60								SP-SM	Brown fine to coarse sand with silt and fine to coarse gravel			
								ML	Gray silt			
								ML	Brown silt with fine sand			
	5		60					SM	Brown/gray silty fine sand			
55												
								SP-SM	Gray fine to coarse sand with silt and fine to coarse gravel			
	10		60					SM	Brown/gray silty fine to medium sand with occasional fine gravel			
								OL	Dark brown organic silt with fine sand			
50					12.3-12.7			BR	Brick			
					12.8-13.7			ML	Brown silt with fine to medium sand			
								SP-SM	Brown fine sand with silt and occasional fine gravel			
					14.3-15.2							
					15.3-15.7							
	15		48					SM	Brown/gray silty fine to medium sand			
					15.8-16.3							
					16.3-18.2							

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-47

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-45
Sheet 1 of 2

Seattle: Date:6/23/14 Path:C:\USERS\KJANC\DESKTOP\050406801.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, (pcf)	REMARKS
-45								SM	Gray silty fine sand with occasional medium to coarse sand with fine gravel (weathered till)			
									Refusal at 19 feet			

Note: Please see Figure A-1 for explanation of symbols.

Log of Boring LLSB-47 (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-01

Figure A-45
Sheet 2 of 2

APPENDIX C
Historical Sampling Results: Sediment, and Outfall Water and Outfall Sediment Sampling

Landau 2012 Riverside Pond sediment sampling results, including figure and City of Everett Environmental Laboratory metals results


Riverside Pond X-Sections
2/8/12
X– sections
#1
#2
#3
★ = sample locations, 2/14/12
12 " PVC
1998
12 " PE
2001

CITY OF EVERETT
ENVIRONMENTAL LABORATORY

PROJECT #
00037120

Client:	CITY OF EVERETT - SWM	Date Received:	02/14/12
Program:	COE - SWM	Data Release:	CK
Contact:	JULIE SKLARE	Date Reported:	2/21/2012

Department	Analysis	Units	DL	Method	PQL	BE68423 PT RIVERSIDE 1 2/14/2012	BE68424 PT RIVERSIDE 2 2/14/2012
METALS	Mercury mg/kg	mg/kg dry	0.026	7471	0.104		0.083 J
			0.060	7471	0.240	0.123 J	
	Arsenic (mg/kg)	mg/Kg dry	0.764	6020	3.060		40.1
			1.119	6020	4.48	336	
	Cadmium (mg/kg)	mg/Kg dry	0.306	6020	1.220		0.325 J
			0.448	6020	1.790	0.945 J	
	Chromium (mg/kg)	mg/Kg dry	0.764	6020	3.060		58.4
			1.119	6020	4.48	68.7	
	Copper (mg/kg)	mg/Kg dry	0.764	6020	3.060		46.0
			1.119	6020	4.48	102	
	Lead (mg/kg)	mg/Kg dry	0.764	6020	3.060		40.6
			1.119	6020	4.48	93.0	
	Nickel (mg/kg)	mg/Kg dry	0.764	6020	3.060		45.2
			1.119	6020	4.48	48.7	
	Zinc (mg/kg)	mg/Kg dry	11.19	6020	44	737	
			7.64	6020	30.56		159

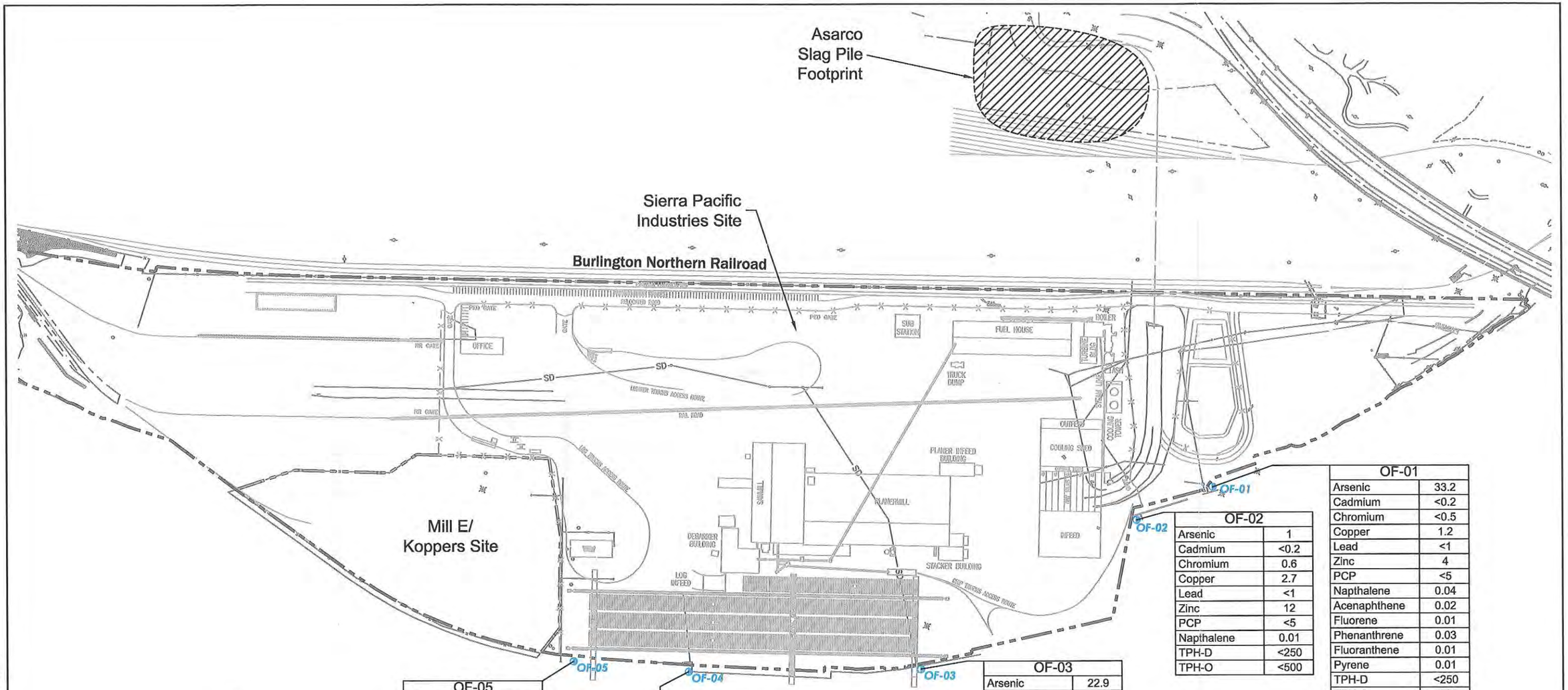
Department	Analysis	Units	DL	Method	PQL	BE68425 PT RIVERSIDE 3 2/14/2012
METALS	Mercury mg/kg	mg/kg dry	0.038	7471	0.152	0.060 J
	Arsenic (mg/kg)	mg/Kg dry	0.834	6020	3.340	16.1
	Cadmium (mg/kg)	mg/Kg dry	0.334	6020	1.340	< 0.334
	Chromium (mg/kg)	mg/Kg dry	0.834	6020	3.340	62.1
	Copper (mg/kg)	mg/Kg dry	0.834	6020	3.340	42.9
	Lead (mg/kg)	mg/Kg dry	0.834	6020	3.340	22.1
	Nickel (mg/kg)	mg/Kg dry	0.834	6020	3.340	48.0
	Zinc (mg/kg)	mg/Kg dry	8.34	6020	33.36	112

DATA REPORTING QUALIFIES

L = Detection Limit
QL = Practical Quantitation Limit (= 4xDL)
= Analyte concentration less than PQL
A = See Attached
D = No Data

When Dissolved Metals > Total Metals note possible filtering process contamintion
P/A (used for Total Coliform results) P= Coliforms present, A = Coliforms absent
Y/N (used for E. Coli Results) Y= E. Coli present, N=E. Coli absent
E = Estimated Value. Count from plates not within ideal range.
R = Sample was re-analyzed after holding time.
CG = Confluent Growth

Geomatrix 2005 outfall water sample results (Figure 5)
and outfall sediment sample results (Figure 6)



OF-01	
Arsenic	33.2
Cadmium	<0.2
Chromium	<0.5
Copper	1.2
Lead	<1
Zinc	4
PCP	<5
Napthalene	0.04
Acenaphthene	0.02
Fluorene	0.01
Phenanthrene	0.03
Fluoranthene	0.01
Pyrene	0.01
TPH-D	<250
TPH-O	<500

OF-02	
Arsenic	1
Cadmium	<0.2
Chromium	0.6
Copper	2.7
Lead	<1
Zinc	12
PCP	<5
Napthalene	0.01
TPH-D	<250
TPH-O	<500

OF-03	
Arsenic	22.9
Cadmium	<0.2
Chromium	1.2
Copper	2.9
Lead	<1
Zinc	8
PCP	1
Napthalene	0.13
Acenaphthene	0.06
Fluorene	0.03
TPH-D	<250
TPH-O	<500

OF-04	
Arsenic	2.3
Cadmium	<0.2
Chromium	0.7
Copper	1.9
Lead	<1
Zinc	<4
PCP	<5
Napthalene	0.01
TPH-D	<250
TPH-O	<500

OF-05	
Arsenic	35.8
Cadmium	<0.2
Chromium	0.6
Copper	1.5
Lead	<1
Zinc	<4
PCP	<5
Napthalene	0.01
Acenaphthene	0.01
TPH-D	<250
TPH-O	<500

Notes:

1. Outfall sampling conducted by Geomatrix in May, 2005.
2. All concentrations are in µg/L.

LEGEND

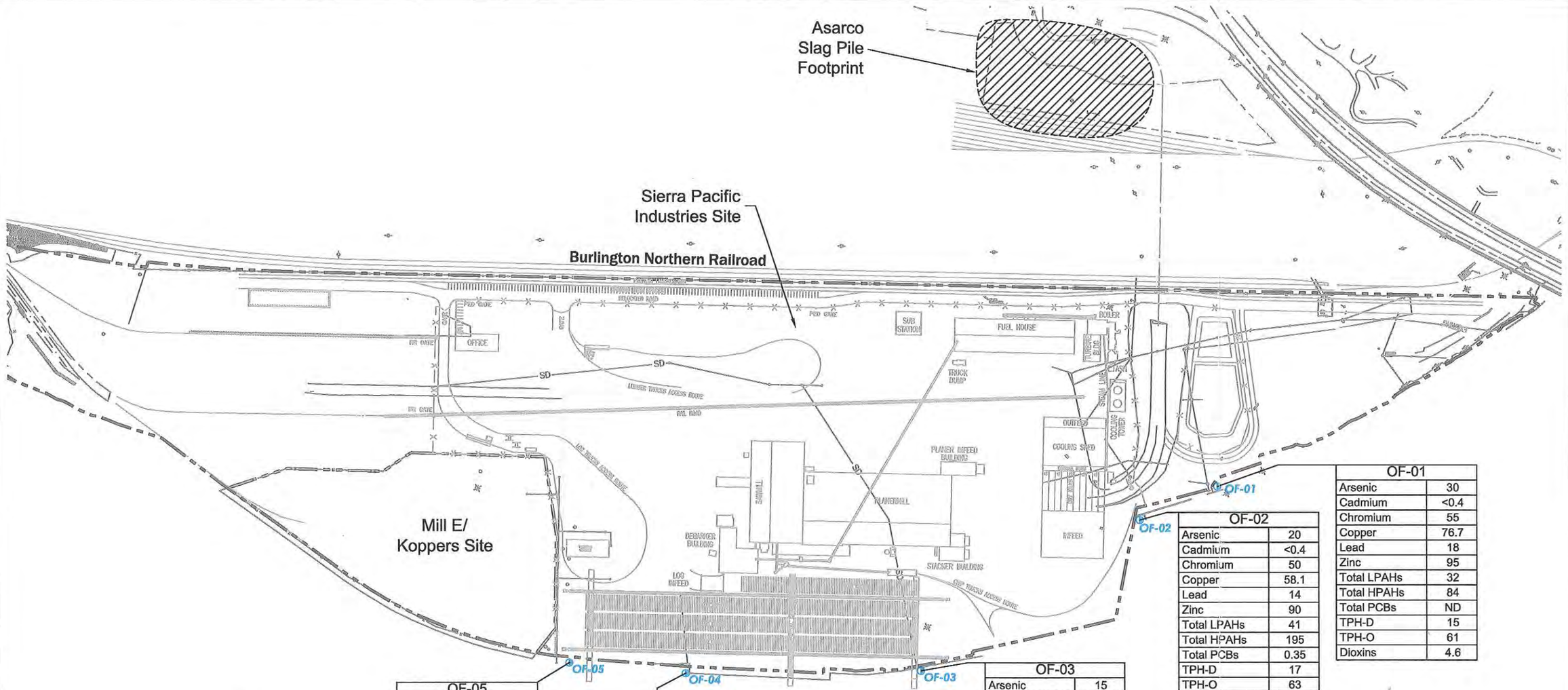
OF-01 Outfall Water and Sediment Sample Location

0 300
FEET

OUTFALL WATER SAMPLE RESULTS
Sierra Pacific Industries
Everett, Washington
DRAFT

GEOMATRIX | Project No. 10360 | Figure 5

DWG NAME: G:\project\Clients\Geomatrix\SPI Everett\bts10360_005 (Fig5).dwg
DATE: 06/08/05 2:35pm



OF-01	
Arsenic	30
Cadmium	<0.4
Chromium	55
Copper	76.7
Lead	18
Zinc	95
Total LPAHs	32
Total HPAHs	84
Total PCBs	ND
TPH-D	15
TPH-O	61
Dioxins	4.6

OF-02	
Arsenic	20
Cadmium	<0.4
Chromium	50
Copper	58.1
Lead	14
Zinc	90
Total LPAHs	41
Total HPAHs	195
Total PCBs	0.35
TPH-D	17
TPH-O	63
Dioxins	7.6

OF-03	
Arsenic	15
Cadmium	<0.3
Chromium	43.2
Copper	45.5
Lead	11
Zinc	71.6
Total LPAHs	35
Total HPAHs	58
Total PCBs	ND
TPH-D	<8.6
TPH-O	<17
Dioxins	3.1

OF-04	
Arsenic	14
Cadmium	<0.2
Chromium	30.5
Copper	32.7
Lead	36
Zinc	57.6
Total LPAHs	14
Total HPAHs	38
Total PCBs	ND
TPH-D	8.9
TPH-O	39
Dioxins	16

OF-05	
Arsenic	22
Cadmium	<0.3
Chromium	43.4
Copper	51.1
Lead	13
Zinc	73
Total LPAHs	26
Total HPAHs	46
Total PCBs	ND
TPH-D	<8.6
TPH-O	<17
Dioxins	7.4

Notes:

1. Outfall sampling conducted by Geomatrix in May, 2005.
2. Metals and TPH concentrations are in mg/kg. PAH and PCB concentrations are in mg/kg organic carbon. Dioxin concentrations are in ng/kg.

LEGEND

OF-01● Outfall Water and Sediment Sample Location

0 300
FEET

OUTFALL SEDIMENT SAMPLE RESULTS
Sierra Pacific Industries
Everett, Washington
DRAFT

GEOMATRIX | Project No. 10360 | Figure 6

DWG NAME: G:\project\Clients\Geomatrix\SPI Everett\bts10360_006 (Fig6).dwg
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APPENDIX D
Report Limitations and Guidelines for Use

APPENDIX D
REPORT LIMITATIONS AND GUIDELINES FOR USE[2]

This appendix provides information to help you manage your risks with respect to the use of this report.

Environmental Services are Performed for Specific Purposes, Persons and Projects

GeoEngineers has performed this investigation of the Everett Smelter – Lowland Area in general accordance with the contract (Contract No.: C1100145AA) and scope and limitations of associated project proposals. This report has been prepared for the exclusive use of Washington State Department of Ecology, and their authorized agents. This report is not intended for use by others, and the information contained herein is not applicable to other properties.

GeoEngineers structures our services to meet the specific needs of our clients. For example, an ESA study conducted for a property owner may not fulfill the needs of a prospective purchaser of the same property. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and property. No one except Washington State Department of Ecology should rely on this environmental report without first conferring with GeoEngineers. Use of this report is not recommended for any purpose or project except the one originally contemplated.

This Environmental Report is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the Everett Smelter – Lowland Area. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, it is important not to rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

If important changes are made to the project or property after the date of this report, we recommend that GeoEngineers be given the opportunity to review our interpretations and recommendations. Based on that review, we can provide written modifications or confirmation, as appropriate.

Reliance Conditions for Third Parties

Our report was prepared for the exclusive use of our Client. No other party may rely on the product of our services unless we agree to such reliance in advance and in writing. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions. Within the limitations of scope, schedule and

2 Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

budget, our services have been executed in accordance with our Agreement with the Client and generally accepted environmental practices in this area at the time this report was prepared.

Environmental Regulations are Always Evolving

Some substances may be present in the vicinity of the subject property in quantities or under conditions that may have led, or may lead, to contamination of the subject property, but are not included in current local, state or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards for appropriate inquiry, or regulatory definitions of hazardous substances, change or if more stringent environmental standards are developed in the future.

Conditions Can Change

This environmental report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by man-made events such as construction on or adjacent to the subject property, by new releases of hazardous substances, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Please contact GeoEngineers before applying this report for its intended purpose so that GeoEngineers may evaluate whether changed conditions affect the continued applicability of the report.

Most Environmental Findings are Professional Opinions

Our interpretations of site conditions are based on field observations and analytical data from widely spaced sampling locations at the subject property. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an informed opinion about subsurface conditions throughout the property. Actual subsurface conditions may differ, sometimes significantly, from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Read These Provisions Closely

It is important to recognize that the geoscience practices (geotechnical engineering, geology and environmental science) are less exact than other engineering and natural science disciplines. Without this understanding, there may be expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory "limitations" provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you need to know more about how these "Report Limitations and Guidelines for Use" apply to your project or property.