Remedial Investigation Report

USG Interiors Highway 99 Site

Milton, Washington

Prepared for:
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Chicago, Illinois 60661-3676

June 23, 2016

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Section 1

Introduction

This report presents the results of a remedial investigation (RI) performed for USG Interiors (USG) at the former USG property located at 7110 Pacific Highway East in Milton, Washington. The site location is shown on **Figure 1.**

1.1 Agreed Order

The RI was performed to satisfy the requirements of Agreed Order DE 84-506 (Order) between the Washington Department of the Ecology (Ecology) and USG. A final RI Work Plan dated March 5, 2010 was submitted to Ecology, which addressed comments from Ecology on CDM's draft RI Work Plan. The RI was conducted in accordance with the final Work Plan.

1.2 Site Location and Description

The USG Highway 99 site is located between Pacific Highway East and Interstate 5 in Milton, Washington. **Figure 2A** shows the entire groundwater investigation area for the RI. For clarity, the extent of the exploration points shown on **Figure 2A** is referred to as the "site" throughout this report. The majority of RI fieldwork occurred in the core investigation area shown on **Figure 2B,** which is used to illustrate the RI results.

Freeway Trailer, Kanopy Kingdom, General Trailer, and Linwood Custom Homes currently operate at the site; their business locations are shown on **Figure 2A**. Chain link fence separates each business and the western property line along Pacific Highway East. Interstate 5 marks the eastern boundary of the site.

1.2.1 Climate

The site climate is typical of the Puget Sound Lowlands and other marine regions. Summers are typically cool and comparatively dry and winters are mild, wet, and cloudy. The climate information presented in this section was obtained from weather station KWAMILTO1 in Milton, Washington. The data was posted at http:// www.wunderground.com/weatherstation/ WXDailyHistory. asp?ID= KWAMILTO1

The warmest months are July and August, when the high temperatures average around 85 degrees Fahrenheit (°F). The coldest month is December, when the high averages around 45 ºF and lows average 30°F.

Based on local rainfall data, in 2009 the City of Milton received 32 inches of rain for the year and averaged 130 days of measurable precipitation. On average, winter months are wetter than summer months. The wettest month of the year was November, with a monthly rainfall total of approximately 7 inches.

The predominant wind direction is from the south.

1.2.2 Surface Water

The site is located in the watershed of Hylebos Creek. The two main branches of Hylebos Creek—known as East Hylebos Creek and West Hylebos Creek—originate in south King County and generally flow south. These two branches join in Milton at Porter Way (**Figure 1**), just north of the Highway 99 site on the east side of Interstate 5 (I-5).

As shown on **Figure 2B**, Hylebos Creek crosses under I-5 adjacent to the Highway 99 site. It continues flowing generally south and again crosses under Pacific Highway East before swinging to the northwest as it flows around the southern end of Fife Heights. Hylebos Creek then flows into the Hylebos Waterway, where it enters Commencement Bay as shown on **Figure 1**. The Hylebos Creek drainage basin as a whole is approximately 17 square miles. The average discharge of Hylebos Creek is approximately 20 cubic feet per second (TPCHD, 1993).

1.2.3 Geologic Setting

The site is situated in a north-trending valley that is the floodplain of Hylebos Creek and its tributaries. The valley is located just north of the lower Puyallup River valley. Alluvium associated with Hylebos Creek and the lower Puyallup River form the uppermost native soil at the property. This alluvium consists of predominantly overbank flood and slack water deposits. Glacially consolidated glacial drift and interglacial deposits hundreds to thousands of feet thick underlie the alluvial deposits. Fife Heights, the upland region northwest of the property, is largely comprised of glacial drift.

1.3 Site History

History of the Highway 99 site is poorly documented. The historical description that follows is based on CDM's interpretation of historical aerial photographs and a title search.

Industrial waste from USG's Tacoma plant was used to fill the Highway 99site. It is known that from about 1959 to 1973, the USG Tacoma plant used ASARCO slag as a raw material for mineral fiber production. Baghouse dust enriched in arsenic was reportedly used as fill at the Highway 99 site from 1971 through 1973 (Ecology, 1986). USG did not own the property during the period when this fill was placed on it.

In the early 1980s, USG became aware of the association between ASARCO slag and arsenic contamination. Subsequently, USG purchased the Highway 99 site from Partner's Financial Incorporated on August 18, 1982. That same year USG voluntarily approached Ecology to negotiate an administrative process to govern removal of fill from the property.

Cleanup of the Highway 99 site occurred between October 12, 1984 and January 25, 1985 (Ecology, 1986) under Agreed Order No. DE 84-506. The Order established an arsenic cleanup standard for soil of 5 milligrams per liter (mg/L) by the EP Toxicity (leaching) method, and required USG to conduct post-cleanup groundwater monitoring. Detailed records of the cleanup, termed the source removal action, have not been located. Ecology estimated that 20,000 to 30,000 cubic yards of material was excavated and disposed of off-site (Ecology, 1986). Native soil exceeding this cleanup standard was reportedly over-excavated in the southern portion of the property in the vicinity of monitoring well 99-1 (**Figure 2B**). This is referred to as the contaminant source area.

According to Ecology, approximately 10% of the total waste that was excavated and disposed of off-site was baghouse dust. We infer that the 20,000 to 30,000 cubic yards of waste included: 1) soil fill mixed with waste insulation; 2) baghouse dust; and 3) native soil exceeding the cleanup standard excavated from the vicinity of 99-1.

USG sold the property to Hebert Rendell in 1986. USG maintained responsibility for verification monitoring, as specified in Agreed Order No. DE 87-506.

A review of historical aerial photographs shows that the property was cleared and regraded before June 1985 (approximately 5 months after completion of the source removal action). With the exception of environmental monitoring, no remediation activities have occurred at the property since 1985.Used car, trailer, and truck canopy sales businesses currently occupy the property.

1.4 Sources of Contamination

Arsenic concentrations in site soil and groundwater exceed Model Toxics Control Act (MTCA) cleanup levels. This arsenic originated from industrial waste from the USG mineral fiber insulation manufacturing plant in Tacoma. The Tacoma plant used arsenic bearing ASARCO slag as a manufacturing feedstock. Waste and off-specification product generated from mineral fiber insulation manufacturing was used as fill at the site.

USG conducted cleanup in 1984 and 1985 to excavate and remove industrial waste fill from the Highway 99 site. Subsequent long-term groundwater sampling performed by USG showed that residual arsenic remained in groundwater at the site above the current MTCA Method A cleanup level.

1.5 Remedial Investigation Objectives

The RI was implemented to:

- Characterize arsenic in surface soil between the paved areas and Hylebos Creek.
- Characterize the extent of arsenic contamination in soil, groundwater, sediment, and surface water.
- Characterize the potential contaminant migration pathway of arsenic in soil and groundwater to Hylebos Creek.
- Gather additional environmental data affecting arsenic fate and transport to help select a cleanup action that will meet MTCA requirements.
- Evaluate exposure to terrestrial and ecological receptors.

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Section 2

Field Investigation

This section describes the field work and investigation methods completed during the RI. Field work included site preparation, underground utility location, soil investigation, groundwater investigation, sediment investigation, surface water investigation, and a site survey.

The scope of work for the RI field investigation is described in the RI Work Plan (CDM, 2010). The work was completed over 16 days in April, May, and July 2010. This first phase of field investigation, described in more detail below, focused on the contaminant source area and comprised the majority of RI field work. Subsequent field investigation phases were conducted to fully define the extent of contamination (primarily groundwater; soil to a lesser extent) beyond the core investigation area shown on **Figure 2B**. Subsequent field investigations included:

- <u>Groundwater Reconnaissance Borings:</u> Groundwater reconnaissance samples for arsenic were collected north and south of the core investigation area using direct-push technology (DPT) samples. These borings are shown on **Figure 2A** and have the prefix "GW." This work was completed in April 2011.

- <u>Characterize Arsenic Extent in Groundwater (East):</u> Groundwater monitoring wells MW-10 and MW-11were installed between the paved portion of Kanopy Kingdom and Interstate 5 to characterize arsenic concentrations east of the contaminant source. These monitoring wells, shown on **Figure 2A**, were completed and sampled in October 2011.

- <u>Characterize Arsenic Extent in Groundwater (West, South, and North):</u> Groundwater monitoring wells MW-12, MW-13, and MW-14 were drilled to characterize arsenic concentrations to the west, south, and north (respectively). These monitoring wells are shown on **Figure 2A**. In addition, two soil borings were drilled in the Pacific Highway East Highway 99 right-of-way (ROW) to delineate arsenic contamination in soil to the east.

2.1 Phase 1 RI Field Investigation

2.1.1 Site Preparation

On April 20, 2010, CDM located the planned soil boring and groundwater monitoring well locations using measuring tape and compass methods. Each location was marked on the ground using white marking paint. Arrangements were made with Kanopy Kingdom, Freeway Auto, and Freeway Trailer managements to gain access to the site and have them move vehicles and equipment away from the drilling locations during the investigation.

Utilities Underground Location Center (UULC) was notified 3 days prior to drilling, as required by state law. The entire site was checked for possible underground utility conflicts at boring locations. On April 26, 2010, each of the proposed boring and monitoring well locations were cleared for underground utilities by Applied Professional Services (APS).

2.1.2 Soil Investigation

The soil investigation consisted of collecting surface and subsurface soil samples. Samples were analyzed for total arsenic by field portable x-ray fluorescence (XRF) and laboratory methods. The purpose of the soil investigation was to delineate the lateral and vertical extent of arsenic in soil. The soil investigation was completed between April 26 and 29, 2010.

Surface Soil Sampling

Six surface soil samples were collected from the vegetated area between the west bank of the Hylebos Creek and the paved parking surfaces to characterize arsenic concentrations in surface soil. **Figure 2B** shows the location of the surface soil samples.

The samples were taken at 50-foot increments in a row parallel to the direction of river flow. Sample locations were identified with a measuring tape and marked with stakes. Vegetation was cleared at each sample location before soil was collected from the ground surface and placed directly in plastic XRF measurement cups or 4-ounce glass jars. Each sample was collected by hand with a new pair of nitrile gloves. The soil in the XRF measurement cup was used for field XRF analysis of total arsenic and the sample in the 4-ounce jar was retained for possible analysis of arsenic at the off-site analytical laboratory.

The samples were labeled and placed in a cooler on ice and transported back to CDM's Bellevue office. The samples were stored under refrigeration at the CDM office until selected samples were sent to the laboratory under chain of custody protocol.

Subsurface Sampling

Thirty soil borings arrayed on a 50-foot offset grid were advanced to depths ranging from 12 feet to 24 feet below ground surface (bgs) during the RI. The purpose of the borings was to characterize the lateral and vertical distribution of arsenic in soil and to characterize the geology of the site. CDM's subcontractor—Environmental Services Northwest (ESN) of Tacoma, Washington—completed the RI soil borings using direct push technology (DPT) sampling methods. A CDM geologist supervised the DPT sampling and was responsible for soil classification and soil sample collection.

The RI soil data supplements soil assessment data collected in June 2006. **Figure 2B** shows the soil boring locations. RI borings have alpha-numeric grid designations (e.g., C-6) and the 2006 assessment borings have a “GP” prefix.

The borings were advanced using truck-mounted DPT equipment. The soil samples were collected continuously using a 4-foot-long, 1.5-inch inside-diameter sampler fitted with acetate liners. The sampler was attached to the end of DPT drive rods and pneumatically driven into the ground. After each sampler drive, the acetate liners were removed from the sampler and split open to examine the soil and collect soil samples.

Soil types were classified according to the Unified Soil Classification System (USCS). Soil samples were also inspected for evidence of vitreous slag material or other evidence of contamination. Soil descriptions were recorded on boring logs, which are provided in **Appendix A**. The DPT sampler and rods were decontaminated between each sample drive using a three-bucket Alconox wash and distilled water rinse system.

At each boring, soil samples were collected at approximate 2-foot depth intervals from the ground surface to depths of between 16 and 24 feet bgs for field XRF analysis of arsenic. The soil was collected from soil cores and placed directly into plastic XRF measurement cups or 4-ounce glass jars. The soil in the XRF measurement cup was used for field XRF analysis of total arsenic and the sample in the 4-ounce jar was retained for possible analysis at the off-site analytical laboratory. Any borings with measurements above the 20 parts per million (ppm) limit for MTCA Method A cleanup levels at 16 feet bgs were advanced until readings were below 20 ppm or until a total depth of 24 feet bgs was reached.

Samples were labeled and placed in a cooler on ice and transported back to CDM's Bellevue office. The samples were stored under refrigeration at the CDM office until selected samples were sent to the laboratory under chain of custody protocol.

Following completion of sampling at each location, the DPT borings were abandoned by backfilling with bentonite. Hydrated bentonite chips were used at all locations to abandon borings.

Field XRF Analysis

Arsenic concentrations in soil samples were measured in the field using an Innova-X Alpha Series XRF following EPA Method 6200. CDM's Work Plan (CDM, 2010) describes the XRF sample preparation and analysis procedures followed during the RI in detail. Each soil sample was analyzed by covering the XRF sample cup with a Mylar covering, placing the sample cup directly below the XRF projector, and then scanning the sample for a 90-second interval. The displayed arsenic concentration was recorded on an XRF Test Result form.

2.1.3 Groundwater Investigation

The groundwater investigation included installing monitoring wells, collecting groundwater samples at new and existing monitoring wells, and measuring the depth to groundwater at each well.

Monitoring Well Installation

Nine new groundwater monitoring wells were installed at locations shown on **Figure 2B.** Six shallow wells (MW-1 through MW-6) were screened in fine to medium sand within the upper portion of the alluvial aquifer. Two intermediate wells (MW-7 and MW-8) were screened in coarser sand within the deeper portion of the alluvial aquifer. One deep well (MW-9) was screened within sand and gravel of the glacial aquifer that underlies the alluvial aquifer.

The purpose of the shallow monitoring wells was to evaluate the extent of arsenic dissolved in groundwater and determine the groundwater flow direction and horizontal hydraulic gradient. The purpose of the intermediate and deep monitoring wells (MW-7, MW-8, and MW-9) was to evaluate vertical hydraulic gradients at the site and the vertical extent of arsenic in groundwater.

CDM's subcontractor—Environmental Drilling, Inc. (EDI) of Snohomish, Washington—performed the monitoring well drilling and installation using a Mobile B-61 HD truck-mounted hollow-stem auger drill rig equipped with 7-5/8-inch-outside-diameter, 4-1/4-inch-inside diameter drilling augers. Soil samples were collected at 5-foot intervals during drilling.

Soil samples were collected using a Standard Penetration Test (SPT) split-spoon sampler. At each sample depth the sampler was driven 18 inches using a 140-pound auto-hammer. The soil was classified in general accordance with the USCS. Soil descriptions were recorded on a boring log, which is included in **Appendix A**.

Monitoring well construction details are summarized in **Table 1** and shown graphically on the well construction logs included in **Appendix A**. The monitoring wells were constructed using 2-inch-diameter, Schedule 40 PVC flush-threaded pipe and Schedule 40 PVC factory-slotted well screen. The well screens were 5 feet long with 0.010-inch-width milled slots. A filter pack consisting of #10-20 Colorado Silica Sand was placed in the annular space between the well screen and the borehole walls. The filter pack was extended approximately 3 feet above the top of the well screen.

A hydraulic seal was constructed of Pure Gold medium bentonite chips placed from the top of the filter pack to within 2 feet of ground surface. For the intermediate wells and the deep well, a 20 percent solids pumpable bentonite grout mix (Baroid Quik-Grout) was used instead of bentonite chips. The bentonite grout was pumped into the annulus using a tremmie pipe. The top of the annular space was sealed with concrete and an 8-inch-diameter, flush mount, traffic-rated monitoring well vault was installed at the ground surface. Locking well caps were installed at each monitoring well.

The new monitoring wells were developed prior to sampling through a combination of surging, bailing, and pumping. Initially, the screen interval was surged using a surge block and solids were bailed from the bottom of the well using a stainless steel bailer. After bailing the solids from the well, the well was developed by continuous pumping with a submersible pump (Whale pump). The pump was set within the screen interval and field water quality parameters (conductivity, pH, turbidity, and temperature) were measured at regular intervals and recorded on a well development log. A Horiba U-22 water quality meter was used to measure field water quality parameters.

Well development was considered complete after the field parameters had stabilized and a minimum of 10 well casing volumes were removed from the shallow wells (a minimum of 4 casing volumes was removed from each of the intermediate and deep wells). Well development water was contained in 55-gallon drums.

Groundwater Level Measurements

On May 25 and July 15, 2010, CDM performed comprehensive groundwater level monitoring rounds on all newly installed and existing monitoring wells. The purpose of the second monitoring round was to obtain groundwater levels under equilibrium conditions in dry weather conditions. All depth to groundwater measurements were made using a SINCO water level meter, which was decontaminated between wells. The depth to groundwater measurements are summarized in **Table 2**.

Groundwater Sampling

Groundwater monitoring wells were purged and sampled using a peristaltic pump and low-flow sampling methods. Discharge from the peristaltic pump was directed into a flow-through cell. A YSI Model 556 water quality meter was used to measure temperature, conductivity, pH, dissolved oxygen (DO), and oxidation/reduction potential (ORP) in the flow-through cell. A Lamotte 2020 turbidity meter was used to monitor turbidity.

The instruments were calibrated against standards for each field parameter during each day of sampling. The peristaltic pump controller was set to a purge rate of about 0.5 liter per minute and drawdown was generally limited to less than 0.3 foot. Water levels and field parameters were monitored at regular intervals and recorded on a groundwater sampling record.

Copies of the groundwater sampling records are included in **Appendix B**. Purging was continued until field parameters had stabilized for at least three consecutive readings within the following limits:

± 0.1 unit for pH

± 5 percent for conductivity

± 20 millivolts for ORP

± 10% for dissolved oxygen < 10 NTU for turbidity

The final stabilized parameters are provided in **Table 3**.

Groundwater samples were collected immediately after parameters stabilized and all indicator parameter readings were recorded. The flow cell was disconnected and sample containers were filled directly with discharge from the sampling pump. The dissolved metals samples were collected in unpreserved containers and filtered by the laboratory prior to analysis. Sample containers, preservatives, and holding times are described in CDM's Work Plan (CDM, 2010)**.**

Following submittal of the samples, the laboratory noted varying amounts of orange-brown precipitate (determined to be an iron precipitate) in the dissolved metals bottles. The laboratory also determined that arsenic was likely substituting for iron in the precipitate to varying degrees, potentially lowering dissolved arsenic and iron values in some of the samples.

Based on these observations and the varied relative percent differences (RPD) between total and dissolved arsenic values, wells MW3, MW4 (including a field duplicate, MW-0), and 99-1 were re-sampled on July 15, 2010 for dissolved arsenic and dissolved iron.

During re-sampling the wells were again purged with low-flow technology, with pH, conductivity, ORP, and DO parameters being measured in a flow-through cell. Once these four field parameters had stabilized, the sample tubing was disconnected from the flow through cell and connected to a dedicated, disposable 0.45-micrometer (μm) filter certified clean for metals. Water that had passed through the filter was transferred directly to a bottle with nitric acid preservative for the dissolved metals analysis. Only the results of the re-sampling, which were consistent with historical data for well 99-1 and showed a comparable RPD for MW4 and field duplicate MW0, were tabulated for the dissolved arsenic and iron analyses of groundwater from these three wells.

2.1.4 Surface Water Investigation

The surface water investigation included collecting surface water samples from Hylebos Creek from six locations between the east edge of I-5 and just downstream of the site as shown on **Figure 2B**. The surface water investigation was conducted to investigate the possibility of impacts to Hylebos Creek from site groundwater by characterizing the water quality in Hylebos Creek.

At each surface water sample location, a YSI Model 556 water quality meter was used to measure temperature, conductivity, pH, DO, and ORP by lowering the probe into the stream. Parameters readings were collected after approximately 2 minutes, when parameters had stabilized. The final stabilized parameters are listed in **Table 4**.

Surface water was collected from each sampling location by extending a sample bottle attached to a swing sampler into the creek from the west bank. Once the collection bottle was filled, water was transferred directly into the remaining bottles for each sample. The surface water investigation was completed on April 25, 2010.

2.1.5 Sediment Investigation

The sediment investigation consisted of collecting bank and center samples from Hylebos Creek. These samples were analyzed for total arsenic by field XRF and laboratory methods. The purpose of the sediment investigation was to characterize arsenic in the sediments of Hylebos Creek. The sediment investigation was initiated on April 29 and completed on April 30, 2010.

Topographic Survey

The bathymetric survey was completed on June 10, 2010. The survey was completed by CDM's subcontracted surveyor, WH Pacific. The surveyor used a TCRA 1101 total station instrument to establish the bathymetry and topography of Hylebos Creek. Horizontal coordinates were referenced to the North American Datum (NAD) 83/91, South Washington Zone. Vertical coordinates were referenced to North American Vertical Datum (NAVD) 88. The elevation contours are shown in the survey plan (**Appendix C**) and **Figure 2B**.

Sediment Sampling

Fourteen sediment samples were collected at the locations shown on **Figure 2B**. The samples were collected from the farthest downstream location first, moving to upstream locations successively each day. At each sediment sample location**,** a sample was collected from the west bank and bottom of the center of Hylebos Creek. The samples were collected using a 3-inch outside-diameter sampler equipped with a slide hammer. Bank samples were taken from 6 inches below the water level of the creek.

Samples were taken in the bank by angling the drive sampler approximately 45 degrees and driving it into the bank. At each location the sampler was driven approximately 6 inches into the creek bank or bottom and then retracted. The sediment was then transferred directly from the drive sampler into a plastic XRF measurement cup or a 4-ounce pre-cleaned glass jar.

Prior to collecting each sample, the driver sampler was decontaminated using a three-bucket Alconox and distilled water rinse system. The samples were labeled and placed in a cooler on ice and transported back to CDM's Bellevue office. The samples were stored under refrigeration at CDM's office until selected samples were sent to the laboratory under chain of custody protocol.

2.2 Supplemental RI Field Investigations

This section discusses supplemental field investigations conducted after the original RI investigation. These supplemental field investigations were conducted to fully define the extent of arsenic exceeding cleanup standards in groundwater and soil.

2.2.1 Groundwater Reconnaissance Borings

Phase 1 groundwater samples from the northernmost and southernmost monitoring wells (99-2 and MW-6, respectively) exceeded the groundwater cleanup standards. The groundwater reconnaissance borings were drilled to assist in locating future groundwater monitoring wells that would define the extent of arsenic exceeding the groundwater cleanup standard. The groundwater reconnaissance borings, shown on **Figure 2B**, are designated GW-1 through GW-9.

The groundwater reconnaissance borings were drilled on April 7, 2011 using a DPT drill rig equipped with a Hydropunch™ groundwater sampling device. Borings were advanced to a depth of approximately 10 to 15 feet bgs until groundwater was noted on the drill string. The casing on the Hydropunch™ was then retracted, exposing a stainless steel screen.

Groundwater samples were collected using a peristaltic pump, filtered in the field, and placed into 250-milliliter polyethylene bottles preserved with nitric acid. Borings were abandoned with bentonite chips capped with ready-mix concrete or cold asphalt pavement patch. The groundwater samples were analyzed for arsenic by EPA Method 6020 in ESN's laboratory in Olympia, Washington.

2.2.2 Arsenic Characterization in Groundwater (East)

The easternmost monitoring wells and DPT borings ranging from GW-8 in the north to MW-5 in the south had arsenic concentrations ranging from 340 to 1,060 micrograms per liter (ug/L). The topography drops off sharply east of the paved area where these borings and monitoring wells are located, sloping down to either Hylebos Creek or a roadside ditch as shown on **Figure 2B**. East of Hylebos Creek the topography slopes up where it matches the shoulder of southbound I-5. Because of these topographic limitations, there is no place to drill a conventional monitoring well except for the shoulder of I-5. Drilling and sampling monitoring wells on the shoulder of I-5 was ruled out by USG because of safety concerns.

The decision was made to collect groundwater samples east of the paved area by installing groundwater monitoring wells using hand-drilled methods. As shown on **Figure 2B**, MW-10 is located on the east bank of Hylebos Creek, east of MW-4 and MW-5. MW-11 is located east of a ditch that flows into Hylebos Creek, east of 99-2 and GW-8.

ESN personnel worked with CDM to install these monitoring wells on October 14, 2011. Solinst Model 615 drive-point well screens were used. The Solinst drive-point well screens are constructed of ¾" stainless steel tubing about 1.1 feet long. Groundwater enters the well screen through circular holes drilled in the tubing that are backed by a 50-mesh stainless steel screen. The top of the well screen is threaded with ¾ NPT thread so standard couplings and pipe can be used as risers. The well screens are designed to be driven to depth with a fence post driver.

The well drilling procedure consisted of advancing the well boring using a hand auger to a depth of about 5 feet bgs. The drive point well screen and riser pipe were then driven to depth using a fence post driver. Colorado silica sand was poured into the boring up to about 7 feet bgs. A surface seal was constructed of bentonite chips. The wells were completed with a flush-mounted protective monument.

Wells MW-10 and MW-11 were developed and sampled on October 18, 2011. Well development was accomplished by pumping with a peristaltic pump until the turbidity was reduced. Groundwater purging and sampling procedures were the same as for the Phase 1 RI.

2.2.3 Arsenic Characterization in Groundwater (West, South, and North)

The purpose of this field investigation was to define the limits of groundwater exceeding the groundwater protection standard to the west, south, and north. Elements and methods of the investigation are summarized below.

- MW-12 was located on the west side of Pacific Highway East.
- MW-13 was located based on data gathered during the groundwater reconnaissance borings. The arsenic concentration in GW-5 (located north of Freeway Trailer building) was 21 µg/L.

Consequently, MW-13 was located farther south (approximately 230 feet) of the Freeway Trailer building.

- MW-14 was located on the north end of the Kanopy Kingdom property. The arsenic concentration in reconnaissance boring GW-6 was 19 µg/L. CDM planned to drill MW-14 approximately 120 farther north on the General Trailer property. After access negotiations broke down, MW-14 was relocated to the GW-6 location at the north end of the Kanopy Kingdom property.

ESN drilled MW-12, MW-13, and MW-14 using a DPT drill rig on May 11, 2012. The wells were constructed with a pre-packed PVC well screen and completed with flush-mounted protective covers.

MW-12, MW-13, and MW-14 were developed and sampled on May 22, 2012. The wells were developed by pumping with a peristaltic pump until the turbidity was reduced. Groundwater purging and sampling procedures were the same as for the Phase 1 RI.

2.2.4 Arsenic Characterization in Soil

The purpose of this field investigation was to define the western limits of arsenic exceeding the cleanup level between 6 and 14 feet bgs. Two soil borings, AA-6 and AA-7, were drilled on the east side of the Pacific Highway East ROW, as shown on **Figure 2B**. In addition, 4 soil samples were collected from MW-12.

2.3 Land Survey

The location of each Phase 1 RI installed groundwater monitoring well, soil boring, surface soil sample, sediment sample, and surface water sample was surveyed on June 10, 2010. Pre-existing monitoring wells MW-99-1 and MW-99-2 were also surveyed. Supplemental RI groundwater monitoring wells, groundwater reconnaissance borings, and soil borings were surveyed on June 20, 2012. All survey work was completed by WH Pacific. A copy of the survey plan is included in **Appendix C**.

At each soil boring, surface sample, sediment sample, or surface water sample location, the northing and easting of the boring and the ground surface elevation were surveyed. At each surface water sample location, the northing and easting of the sample marking stake, the elevation of the top of the marker stake, and the elevation of the Hylebos Creek water surface were surveyed. At each monitoring well, the northing and easting of the well, the elevation of the top of the PVC well casing, and the elevation of ground surface adjacent to the well were surveyed. The location of site fence lines and creek bank topography were also surveyed.

Horizontal coordinates were referenced to NAD 83/91, South Washington Zone. Vertical coordinates were referenced to NAVD 88.

2.4 Investigation Derived Waste

Soil derived from DPT borings and monitoring well installation was placed in twelve 55-gallon drums, well development and decontamination water was placed in twelve 55-gallon drums, and soiled visqueen from the drilling spill containment pads was placed in one 55-gallon drum. All drums were labeled and placed along the fence line along the northern property boundary of Freeway Trailer for temporary storage pending waste profiling and disposal. The drums were removed from the site by Emerald Services for offsite disposal.

2.5 Deviations from the Sampling and Analysis Plan

This section summarizes deviations from the CDM's Work Plan that occurred during the RI.

- Additional soil borings A4, A5, A6, A8, A9, C9, C10, and D9 were drilled in order to fully delineate the lateral extent of arsenic in soil.
- Additional sediment samples from the SED-7 location (west bank and center channel) were collected downstream of SED-6 in order to confirm the downstream extent of arsenic in sediment.
- Boring C1 was not drilled because the northern extent of arsenic was delineated by boring C2.
- Groundwater reconnaissance borings were used to help locate groundwater monitoring wells during the supplemental RI field investigation.
- Drilling methods and construction materials for groundwater monitoring wells drilled and completed for the supplemental RI deviated from the work plan.

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Section 3

Site Geologic and Hydrogeologic Findings

The following subsections describe the geology and hydrogeology of the site based on data collected during the RI field investigation. **Section 4** provides the analytical results for soil, groundwater, surface water, and sediment samples collected during this investigation.

3.1 Site Geology

The site geology is summarized in geologic cross-sections A - A' and B – B', which are shown on **Figures 3** and **4**. Generalized stratigraphy consists of fill overlying alluvium, over glacial drift. These units are described below.

3.1.1 Fill

Fill at the site is differentiated into three units, described from youngest to oldest:

- Fill-3: excavation backfill
- Fill-2: residual fill containing waste from USG's Tacoma plant
- Fill-1: undifferentiated fill

Fill-3 was placed during backfilling of the remedial excavation in 1985. The soil consists of fine- to coarse-grained silty sand with gravel and silty sand (SM). The Fill-3 unit soil extends from the ground surface to maximum depths ranging from 4.5 to 14 feet bgs.

Fill-2 includes soil mixed with manmade materials. Fill-2 is likely residual fill representative of material not excavated in 1984/1985 during USG's removal action. These materials include what appears to be ASARCO slag, black and green glassy needle-like grains, glass-like gravel sized particles, and insulation debris. The ASARCO slag material does not appear to be processed like the other manmade materials. The material is associated with soil types that include poorly graded sand (SP) and sandy silt (ML). The Fill-2 material was encountered in borings A6, B6, B7, C7, and C8 at depths extending from 6 to 12.5 feet bgs.

Fill-1 includes soil that was placed during initial development of the site and consists of silt (ML), sandy silt (ML), organic silt (OH), and silty sand (SM) with traces of debris, including wood chips and gravel. The Fill-1 soil extends to a maximum depth of 9 feet bgs.

3.1.2 Alluvium

Alluvium underlies fill at the site. Alluvium pinches out to the west and was not encountered at MW-12. The alluvium can be subdivided into two units based on soil type and hydraulic properties, including:

- Upper Silt Unit
- Alluvial Aquifer

The Upper Silt Unit is the uppermost alluvial unit. Soil in this unit comprises dark brown to gray brown silt and sandy silt (ML), often with bedding laminations. Minor amounts of wood fragments and rootlets are typically present. The Upper Silt Unit ranges in thickness from 1 to 6 feet. The presence of silt and organic matter indicate deposition in a lower energy depositional environment, such as wetlands.

The Alluvial Aquifer extends from the bottom of the Upper Silt Unit to the top of the Lower Silt Aquitard, which is situated at an approximate depth of 38 feet bgs. Soil in the Alluvial Aquifer consists of fine-grained silty sand (SM), fine- to medium-grained sand (SP), and well-graded sand (SW). The soil includes minor silt (ML) interbeds, which are typically less than 0.25 inch thick. The total thickness of the Alluvial Aquifer is approximately 30 feet.

3.1.3 Glacial Units

Glacial sediments underlie the alluvium east of Pacific Highway East. At MW-12, glacial sediments occurred directly beneath fill.

The glacial sediments are subdivided into the following units based on hydraulic properties:

Lower Silt Aquitard

Glacial Aquifer

Lower Silt Aquitard

The Lower Silt Aquitard underlies the Alluvial Aquifer. Soil in this unit consists of greenish gray silt (MH or ML). The fine-grained nature of the soil indicates a low energy lacustrine (or possibly glacio-marine) depositional environment.

The total thickness of the Lower Silt Aquitard ranges from approximately 5 to 15 feet. The Alluvial Aquifer/Lower Silt Aquitard contact dips sharply to the west as shown on **Figure 4**, Section B-B'. This dipping upper surface to the Lower Silt Aquitard may be the result of erosion.

Glacial Aquifer

Water-bearing sand (SP), silty gravel (GM), and silty sand with gravel (SM) underlie the Lower Silt Aquitard. This soil is classified as glacial drift based on texture and low organic content. The upper 10 feet of this soil is not consolidated and may have been deposited in a glaciofluvial depositional environment (recessional outwash). Below 52.5 feet bgs at MW-9, the soil changes to very dense silty sand (SM) and silty gravel that has a till-like texture. This consolidated soil is interpreted as glacial till.

3.2 Site Hydrogeology

3.2.1 Alluvial Aquifer

Groundwater occurs under unconfined conditions within sand and silty sand of the Alluvial Aquifer. The low permeability soil of the Lower Silt Aquitard acts as a lower confining layer to the Alluvial Aquifer, limiting downward vertical flow. During the RI field investigation, groundwater was encountered at depths ranging from 8 to 14 feet bgs. Groundwater levels measured at each of the site monitoring wells are listed in **Table 2**.

A groundwater elevation contour map for the Alluvial Aquifer, based on the July 15, 2010 depth to groundwater measurements, is shown on **Figure 5**. The groundwater elevation contours were determined using mathematical interpolation between wells and professional judgment. The contours indicate that groundwater flows east toward Hylebos Creek and south parallel to the creek. The horizontal hydraulic gradient ranges from 0.003 foot/foot in the central area of the site, steepening to 0.03 foot/foot at the west bank of Hylebos Creek.

The vertical hydraulic gradient within the Alluvial Aquifer was calculated at the MW-5/MW-8 and MW-99-1/MW-7 well pairs. Wells in these pairs are completed within the shallow and deeper reaches of the Alluvial Aquifer, respectively. The vertical gradient was calculated by dividing the head differential between the shallow and deeper well by the vertical distance between screen midpoints. The results of the vertical hydraulic gradient calculations, summarized in **Table 5**, indicate upward vertical hydraulic gradients ranging from 0.022 to 0.035 foot/foot, based on the July 15, 2010 groundwater elevation measurements. The upward gradient indicates significant potential for groundwater flow from the deeper to shallow reaches of the aquifer.

The predominant soil types in the Alluvial Aquifer are fine-grained silty sand (SM) and sand (SP). The hydraulic conductivity these soils ranges from 0.3 to 30 feet/day, based on literature-derived hydraulic conductivity values for silty sand and fine sand (Anderson and Woessner, 1992).

Layers of coarser-grained sands (SP and SW) are also present within the Alluvial Aquifer. These sands have hydraulic conductivities ranging from 130 to 200 feet/day, based on an estimate using the Hazen (1911) method and the grain size distribution results for representative soil samples. A copy of the hydraulic calculations is included in **Appendix D** and the grain size distribution results are summarized in **Appendix E**.

The average linear velocity (seepage velocity) of groundwater flow in the Alluvial Aquifer is estimated to range from 2 feet/day in the central area of the site to 20 feet/day at the west bank of Hylebos Creek. This is considered to be a maximum seepage velocity estimate and is based on a hydraulic conductivity of 200 feet/day, which is the maximum hydraulic conductivity estimated for the layers of coarser-grained sand present within the deeper Alluvial Aquifer. The seepage velocity for the fine-grained silty sand (SM) and sand (SP), typical of the shallow Alluvial Aquifer, is expected to be much lower. A copy of the seepage velocity calculation is included in **Appendix D**.

3.2.2 Glacial Aquifer

The head differential between well pairs screened within the Alluvial Aquifer and the Glacial Aquifer (wells MW-99-1 and MW-9, respectively) was 6.58 feet based on the July 15, 2010 measurements. This large head differential indicates that the Glacial Aquifer is confined and exerting considerable hydraulic pressure on the overlying Lower Silt Aquitard. The different hydraulic and geochemical characteristics of the Glacial Aquifer and the Alluvial Aquifer indicate that the two aquifers are not in hydraulic communication.

The Glacial Aquifer comprises soil types ranging from silty sand (SM) to silty gravel (GM). Based on these soil types, the seepage velocity in the Glacial Aquifer is estimated to range from as low as 20 feet/day to as high as 70,000 feet/day. Typical hydraulic conductivity values for glacial aquifers in the site vicinity are at the lower end of this range. A copy of the hydraulic calculations is included in **Appendix D**.

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Section 4
Analytical Results

This section discusses the analytical results for soil, groundwater, surface water, and sediment samples collected during the RI investigation.

4.1 Soil Results

The following subsections present the analytical results for chemical and physical testing performed on soil samples collected during the RI.

4.1.1 Arsenic in Soil

Twenty of the soil samples collected during the RI soil investigation were selected for laboratory analysis of total arsenic to confirm the XRF arsenic results. The samples were analyzed for total arsenic by EPA Method 6010B at Analytical Resources Inc.'s (ARI) Tukwila, Washington laboratory. The analytical laboratory results are included in **Appendix E**. The samples selected for laboratory analysis were chosen to represent the complete range of arsenic values measured in the field by XRF. XRF results were compared to laboratory analyzed results following the U.S. Environmental Protection Agency (EPA) guidance for field portable XRF analysis of soil and sediment samples (EPA, 1998). The results of this evaluation, provided in **Appendix F**, indicate a high degree of comparability between the XRF and analytical laboratory data and support the use of the XRF data as definitive level data.

Correlation between the XRF and confirmatory laboratory data was defined by the trendline of the plot of the natural log (Ln) of the laboratory results (on a dry weight basis) (y-axis) versus Ln of the XRF results (on a wet weight basis) (x-axis), yielding the following equation:

$$\text{Ln (Laboratory Result)} = 1.039*(\text{Ln XRF Result}) + 0.102$$

The XRF results for those samples not analyzed by the analytical laboratory were corrected using the above equation. The corrected arsenic results are presented in **Table 6**.

Isocontour maps of arsenic in site soil (**Figures 6** through **13**) were prepared using computer software and krieging methods. **Figures 6** through **13** show arsenic contours in soil at depths of 0 to 2, 4 to 6, 6 to 8, 8 to 10, 10 to 12, 12 to 14, 14 to 16, and 16 to 18 feet bgs, respectively. Note that the arsenic values shown in **Figure 13** are from saturated soil samples collected below the water table.

4.1.2 Grain Size Distribution

To confirm the soil classifications assigned by the field geologist, selected soil samples were submitted for grain size distribution analysis in CDM's Bellevue, Washington geotechnical laboratory. Four samples were selected for analysis from the representative soil types encountered at borings A9 and MW9. The results of the grain size distribution analysis are included in **Appendix E** and have been incorporated into the soil description for the A9 and MW9 boring logs, included in **Appendix B**.

4.1.3 Analysis

In general, arsenic concentrations in near-surface soil are lower than at depth. This reflects the contaminant source removal action performed in 1984/1985, when fill containing arsenic bearing material was excavated, disposed of off-site, and replaced with imported fill.

The isocontour plots show elevated arsenic in soil occurring at 6 to 8 feet bgs (**Figure 8**) and continuing down to a depth of 14 to 16 feet bgs (**Figure 12**). Elevated arsenic concentrations at depth are most typically encountered in Fill-1 or alluvium underlying the base of the 1984/1985 contaminant source removal action. This arsenic is interpreted to have leached out of the Fill-2 unit and adsorbed onto the underlying soil. Residual Fill-2 was also encountered at depth as shown on **Figures 3** and **4**. Arsenic concentrations in the residual Fill-2 material are highly variable. Arsenic concentrations in soil attenuate rapidly below the water table as shown on **Figure 13**.

4.2 Groundwater Results

Groundwater samples were analyzed for arsenic and selected geochemical indicator parameters to evaluate fate and transport of arsenic in groundwater at the site. The results are summarized in **Table 7**, along with analytical methods, reporting limits, and cleanup levels for arsenic**.** Copies of complete laboratory reports are included in **Appendix E**.

4.2.1 Arsenic Distribution and Geochemical Indicator Parameters

Figure 14 is an isoconcentration map that shows the distribution of dissolved arsenic in groundwater at the site. **Figures 15** through **19** are isoconcentration maps showing dissolved iron, arsenic (+3), arsenic (+5), and ORP in groundwater.

4.2.2 Analysis

The highest arsenic concentrations were detected in the area bound by monitoring wells MW-4, MW-5, MW-99-1, MW-1, and MW-3. The dissolved arsenic concentrations in these wells ranged from 630 to 2,490 ug/L. Arsenic concentrations in monitoring well 99-1 are the highest found at the site. This corresponds to historical reports of the disposal of baghouse dust in this location and over-excavation of soil here during the 1984-85 source removal action.

Arsenic concentrations in the Alluvial Aquifer attenuate with distance from MW-99-1. Arsenic concentrations in all Alluvial Aquifer monitoring wells exceed the MTCA Method A cleanup level of 5 ug/L, including the southernmost (MW-13) and northernmost (MW-14) wells.

Arsenic concentrations in groundwater in the deeper Alluvial Aquifer (MW-7 and MW-8) are two orders of magnitude lower than arsenic concentrations in groundwater from the shallow Alluvial Aquifer and are just slightly above the MTCA Method A cleanup level, indicating that arsenic attenuates rapidly with depth within this aquifer.

Dissolved arsenic was detected at a concentration of 44 ug/L in groundwater from the Glacier Aquifer (MW-9). The arsenic detected in the Glacial Aquifer groundwater is considered to be naturally occurring rather than from an arsenic release at the site. This is based on the lower arsenic concentrations detected in the intermediate Alluvial Aquifer monitoring wells (MW-7 and MW-8) and the known natural occurrence of arsenic in nearby off-site wells that are completed in the Glacial Aquifer (e.g. the City of Fife public water supply wells and domestic wells located within the City of Milton).

4.3 Surface Water Results

Surface water samples were analyzed for arsenic and selected geochemical indicator parameters to evaluate impacts to surface water from site groundwater. The results are presented in **Table 8** and complete analytical reports are included in **Appendix E**.

Arsenic was detected in the surface water samples collected from Hylebos Creek at concentrations ranging from 2.9 to 3.1 ug/L. There was no significant variation in arsenic concentrations between the samples collected upriver, adjacent to, and downriver of the site. This indicates that arsenic originating at the site is not impacting the surface water of Hylebos Creek.

4.4 Sediment Results

The 14 samples collected from the center and south bank of Hylebos Creek were analyzed for total arsenic by ARI's Tukwila laboratory. The results are summarized in **Table 9** and complete analytical reports are included in **Appendix E**.

Elevated arsenic concentrations were detected in sediment at sample locations SED-3B, SED-4B, SED-5C, and SED-6B. The arsenic concentrations in sediment at these locations ranged from 30 to 205 milligrams per kilogram (mg/kg). These sample locations are downgradient of where the highest concentrations of arsenic were detected in groundwater, indicating that the elevated arsenic in sediment may be the result of arsenic-impacted groundwater discharging into to Hylebos Creek.

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Section 5

Evaluation of Quality Control Data

5.1 Quality Assurance/Quality Control Procedures

Section 5 describes RI quality assurance/quality control (QA/QC) methods and protocol, and our evaluation of QA/QC data usability.

5.1.1 Equipment Decontamination

Small sampling equipment—including the down-hole DPT tooling, groundwater pumps, sampling spoons, driver samplers, and water quality meters—were decontaminated between sample locations to prevent cross-contamination. Decontamination of small sampling equipment included washing the equipment with a brush in Alconox detergent solution followed by a double rinse with tap water and distilled water to remove soil and detergent. Large equipment such as the sonic drill rig drill pipe was decontaminated between well locations using a steam cleaner. All decontamination water was contained and stored in 55-gallon drums pending waste profiling and disposal.

5.1.2 Equipment Calibration

The XRF analyzer was "standardized" using the supplied standardization clip, which contained a mixture of metallic elements, including arsenic, at the beginning of the day and after each battery change. The measurement cup is placed in the XRF analyzer and a direct reading measurement for arsenic is made in accordance with EPA Method 6200.

The XRF was shipped with two NIST standards reference materials: 2702, Inorganics in Marine Sediment, and 2781, Domestic Sludge containing certified amounts of metals in sediment or dried sludge material. These standards were used for accuracy and performance checks of XRF analyses after each standardization, during active sample analyses, and at the end of each working day according to EPA Method 6200. The measured value for each check standard analyte was within ±20 percent (%D) of the true value for the calibration verification check to be acceptable.

The YSI 556 water quality meter and Lamotte 2020 turbidity meter were calibrated at the beginning of each day of groundwater sampling following the manufacturer's instructions and using the standards provided by the equipment supplier.

5.2 Field QA/QC Samples

5.2.1 Duplicate Samples

A minimum of one precision sample was run each day in accordance with EPA Method 6200. Precision samples were collected by re-analyzing one sample seven times with a relative standard deviation of less than 20%. One sample per day was analyzed as a precision sample and the results of the analyses were within the 20% relative standard deviation criteria.

One duplicate groundwater sample was collected during the RI investigation. The duplicate sample was collected at groundwater monitoring well MW4 and analyzed for all analytes. Results of the analysis indicated the relative percent difference (RPD) between the field sample (USGHWY99-MW4-05/10) and duplicate sample (USGHWY99-MW0-05/10) was less than 20%.

5.2.2 Blanks

The XRF was also shipped with a blank sample of "clean" quartz or silicon dioxide matrix that is free of any analytes at concentrations above the established lower limits of detection. The blank sample was analyzed once every 20 samples, according to EPA Method 6200, to monitor for cross-contamination and contamination introduced from non-sample sources.

5.3 Laboratory QA/QC and Data Evaluation

Although formal validation was not performed on data generated during this project, all laboratory analytical data were reviewed and evaluated to ensure that they were usable and met the project objectives. Laboratory data were reviewed for inclusion and frequency of QC supporting information. Supporting QC documentation evaluated for each analytical report included some or all of the following major data:

- Sample holding times
- Method blanks
- Matrix spike/matrix spike duplicate (MS/MSD) recoveries
- RPD between MS and MSD
- Laboratory control sample (LCS) and continuous calibration control (CCV) recoveries
- Surrogate spike recoveries (organic analyses)
- Data assessment/data usability

The review included chemical data generated by ARI's laboratory, which is certified under NELAP (National Environmental Laboratory Accreditation Program).

The following subsections summarize the data evaluation associated with soil and groundwater sample analyses.

5.3.1 Sample Holding Times

The sample holding times for soil and groundwater analysis are presented in the Work Plan (CDM, 2008). These holding times were met for all soil and groundwater analysis except the nitrate and nitrite analyses of sample USGHwy99-SW5-05-10, which was analyzed one day past the 48-hour holding time due to instrument failure. The nitrate and nitrite results for this sample have been qualified with a “J” qualifier, indicating that the numbers are an estimate due to the holding time exceedance.

5.3.2 Laboratory Method Blanks

Method blanks were analyzed along with the project samples at a frequency of one blank per analytical batch. An analytical batch is defined as a maximum of 20 samples of similar matrix from one project that are analyzed together. The method blank is processed through all procedures, materials, reagents, and labware used for sample preparation and analysis. Results from the method blank analyses are presented according to matrix type and discussed in the following subsections.

No concentrations of target analytes at concentrations greater than their respective reporting limits were reported in any of the soil/sediment or aqueous method blanks except the total arsenic method blank for the ICP-MS analysis.

5.3.3 Matrix Spike/Matrix Spike Duplicates

Sample matrix spikes (MS) are prepared by adding a known amount of the pure analyte to the sample before extraction. Matrix spike duplicate (MSD) samples are prepared from a second aliquot of the sample analyzed as the matrix spike. MS and MSD results are used to assess background and interferences that may affect the sample analyte. The laboratory, in accordance with the method requirements, established control limits for MS and MSD samples. Percent recoveries for MS and MSD were reported on a QC summary sheet, included as part of the analytical report. Also included with the QC summary sheets was the calculated RPD between the MS and MSD samples and the required RPD control limits.

Based on a review of the QC summary sheets, MS and MSD or sample duplicate (Dup) samples were analyzed for each analytical method. All MS/MSD and RPD results were within the control limits specified by the laboratory, with the following exceptions:

- The arsenic result for the MS performed on soil sample C4-10 showed a spike recovery that was 1.7% less than the control limit and was qualified with an "N." The Dup performed on this same sample showed an RPD that was 4.6% outside the control limits.
- The ICP/MS dissolved arsenic result for the MS performed on aqueous sample USGHwy99-MW5-05/10 showed 0.0% recovery and was qualified with an "H" because the level of the spike (25.0 µg/L) was too low relative to the dissolved arsenic in the native sample (1,280 µg/L) to yield meaningful recovery information.
- The total organic carbon (TOC) results for the MS and MSD performed on aqueous sample USGHwy99-MW6-05/10 showed recoveries of 67.2% and 70.2%, respectively, which are 7.8% and 4.8% (respectively) below the quality control limit of 75%. However, recovery of TOC in the associated standard reference material (SRM) was in control.

5.3.4 Laboratory Control Samples and Standard Reference Materials

Laboratory control samples (LCS), also referred to as blank spikes, are prepared by spiking a known amount of the pure analyte into a method blank, which is then carried along with the samples through the entire sample preparation/analysis sequence. LCS results are used to provide information on the accuracy of the analytical method and on the laboratory's performance.

SRMs are solutions or solid materials that contain known concentrations of target analytes purchased from a third party source. Like the LCS, the SRM results are used to provide information on the accuracy of the analytical method and on the laboratory's performance.

LCS or SRM samples were analyzed with all analyses of the soil/sediment and aqueous samples. The corresponding LCS/SRM recoveries were within acceptable control limits and demonstrate acceptable accuracy. Based on a review of the QC data for the soil samples, no data warranted qualification and the data can be used for the project's intended purposes.

5.3.5 Surrogate Recoveries

Laboratory performance on individual samples is established by means of spiking activities. Surrogates are only used in organic analyses. They are not applicable to the inorganic analyses performed on these soil/sediment and aqueous samples.

5.4 Overall Data Usability

Analytical reports and all available QC data were reviewed and evaluated to assess their overall quality and usability for soil and groundwater samples. Based on these evaluations, no QC issues encountered were significant enough to warrant analytical data qualification. All data were determined to be usable for the intended project purposes.

Section 6

Site Conceptual Model

6.1 Arsenic Geochemistry

Arsenic (As) occurs in two oxidation states in natural waters: +3 (arsenite) and +5 (arsenate). As (+5) exists predominantly as a negatively charged ion (anion) above a pH of about 2. As (+5) is predominantly monovalent (charge of -1) over the pH range of 2 to 7 (H_2AsO_4), divalent from pH 7 to 11.5 ($HAsO_4^{2-}$), and trivalent at pH values above 11.5 (AsO_4^{3-}), as shown on **Figure 20**.

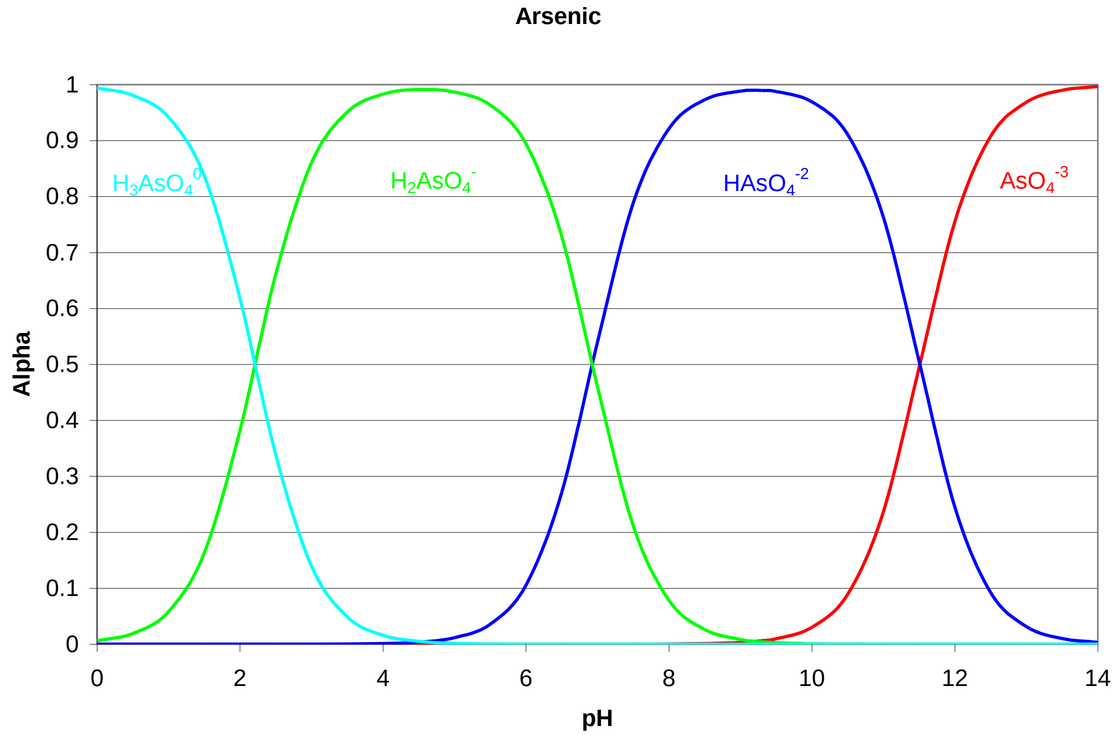

Figure 20 Arsenate Speciation as a Function of pH (alpha is the fraction of the total dissolved arsenate consisting of the given species)

The aqueous arsenate and arsenite species distribution with Eh and pH are shown on **Figure 21**.

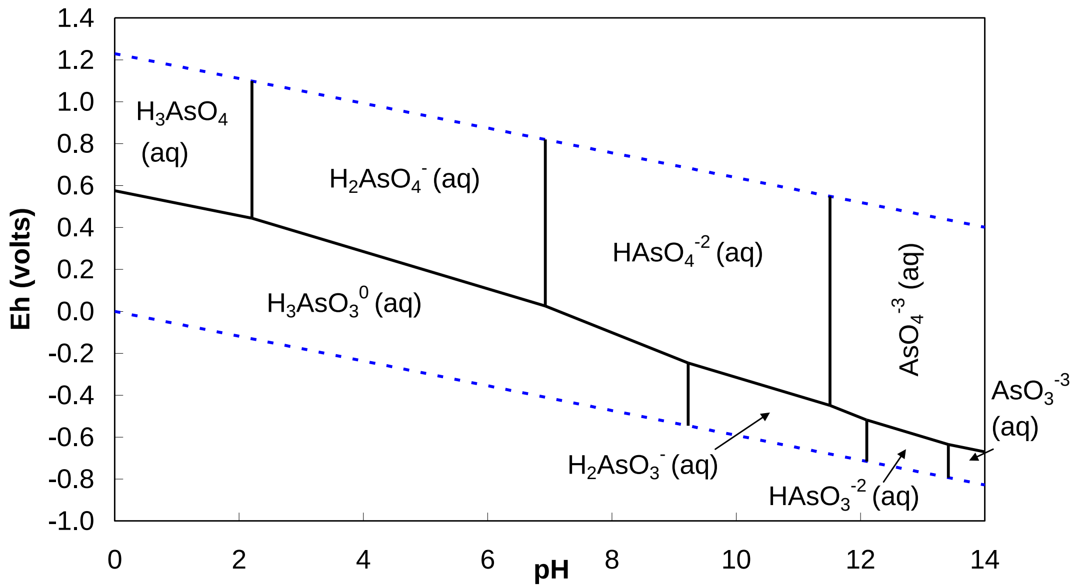

Figure 21 Eh-pH Diagram for the System As-O-H at 25º C and 1 atm

As (+3) is predominantly a neutral species ($H_3AsO_3^0$) below a pH of about 9. $H_2AsO_3^-$ and $HAsO_3^{-2}$ do not become important until the pH exceeds 9 su, which is higher than observed in the vast majority of natural waters.

6.1.1 Arsenic Pure-Phase Minerals

Pure-phase arsenic minerals such as orpiment (As_2S_3), realgar (AsS), and arsenopyrite (FeAsS) occur mainly in ore deposits formed from hydrothermal fluids within the earth's crust. A few pure-phase arsenic minerals occur under low temperature and low pressure conditions at the earth's surface, such as scorodite ($FeAsO_4 \cdot 2H_2O$ at low pH) and arsenic sulfides (under reducing conditions). However, the vast majority of pure-phase arsenic minerals are too soluble to be present in soils that are in contact with water.

6.1.2 Arsenic Solid-Solution Phases

Arsenic forms solid-solution phases with ferric hydroxide and iron hydroxysulfates such as jarosite ($HFe_3(OH)_6(SO_4)_2$) and schwertmannite ($Fe_8O_8(OH)_6SO_4$) and with amorphous silica. Arsenate, like silicate, has a tetrahedral form (a central atom coordinated with four oxygen atoms), which may facilitate the incorporation of arsenate into amorphous silica.

Amorphous phases such as ferric hydroxide or schwertmanite tend to substitute hydroxide or sulfate for arsenate. A reaction to form an iron-arsenic solid-solution is as follows:

$$Fe^{+3} + xAsO_4^{-3} + (3\text{-}3x)\ OH^- \rightarrow [FeAsO_4\ 2H_2O]_x[Fe(OH)_3]_{1-x} \qquad (1)$$

The amount of substitution of arsenic into ferric hydroxide is determined by the pH of the solution (more arsenic substitution occurs at lower pH values) and the concentration of arsenic in solution (higher arsenic concentrations result in more substitution).

6.1.3 Arsenic Adsorption

Arsenic adsorbs to solid surfaces due partly to interactions between the negatively charged ions and a positively charged surface. Therefore, arsenic adsorption tends to be favored for solid materials that are positively charged. The surface charge of the material depends on the type of solid, the pH of the water, and the concentration of other anions in solution.

At low pH values, the water and mineral surfaces have higher concentrations of hydronium ion (H_3O^+), which imparts a positive charge to the surface. As the pH increases, the hydronium ion concentration decreases relative to the hydroxide ion (OH^-) concentration in both the water and the solid materials within the water.

At a specific threshold pH value called the pH of the zero-point-of-charge (ZPC), the surface charge transitions from positive to neutral to negative. Once the surface charge becomes negative, adsorption of the negatively charged arsenate ions become less prevalent. The pH of the ZPC is different for different materials, as shown in **Table 10**.

Table 10. pH of the Zero-Point-of-Charge (pH_{ZPC}) for Various Minerals

Material	Formula	pH_{ZPC}
Magnetite	Fe_3O_4	6.5
Goethite	FeOOH	7.8
Hematite	Fe_2O_3	6.7
Amorphous Ferric Hydroxide	$Fe(OH)_3$	8.5
Aluminum Hydroxide	γ-AlOOH	8.2
Aluminum Hydroxide	Ά-$Al(OH)_3$	5.0
Amorphous Silica	SiO_2	2.0
Manganese Dioxide	δ-MnO_2	2.8
Montmorillonite Clay	$Na_{0.2}Ca_{0.1}Al_2Si_4O_{10}(OH)_2 \bullet 10\ H_2O$	2.5
Kaolinite Clay	$Al_2Si_2O_5(OH)_4$	4.6

a) Data from Stumm and Morgan (1981)

The materials with a higher pH_{ZPC} are able to maintain a positive charge at a higher pH than those with a lower pH_{ZPC}. Of the materials listed in **Table 10**, amorphous ferric hydroxide is the best anion adsorbent at higher pH values
(below 8.5).

Under typical Eh/pH conditions, As (+3) is a neutral ion and does not adsorb well to negatively or positively charged surfaces. Therefore, As (+3) is roughly 4 to 10 times more mobile than As (+5) (Duel and Swoboda, 1972). In addition, As (+3) is about 60 times more toxic to humans than arsenate (Hounslow, 1980).

Arsenic has a strong affinity for iron phases and minerals. Strong correlations between arsenic and iron have been found in soils (Woolsen et al., 1971; Duel and Swoboda, 1972), in ores (Shnyukov, 1963), within ferrihydrite impurities in phosphate pebbles (Stow, 1969), and in sediments impacted by arsenic-containing groundwaters (Whiting, 1992).

The solid material properties not only control the degree to which arsenic is adsorbed at a given pH, but also the amount of arsenic that can be adsorbed before the surface of the solid becomes saturated. The process is described mathematically by the Langmuir Isotherm, which is as follows:

$$C\ (solid) = Kl*Am*C(soln)/(1+Kl*C(soln)) \qquad (2)$$

Where,

C(solid)= concentration of arsenic adsorbed to the solid phase (mg/kg)

C(soln) = concentration of arsenic dissolved in the solution phase (mg/L)

Am = maximum adsorption capacity of the solid (mg/kg)

Kl = Langmuir adsorption constant

Examples of Langmuir Adsorption Isotherms for three different solid materials are illustrated on **Figure 22**.

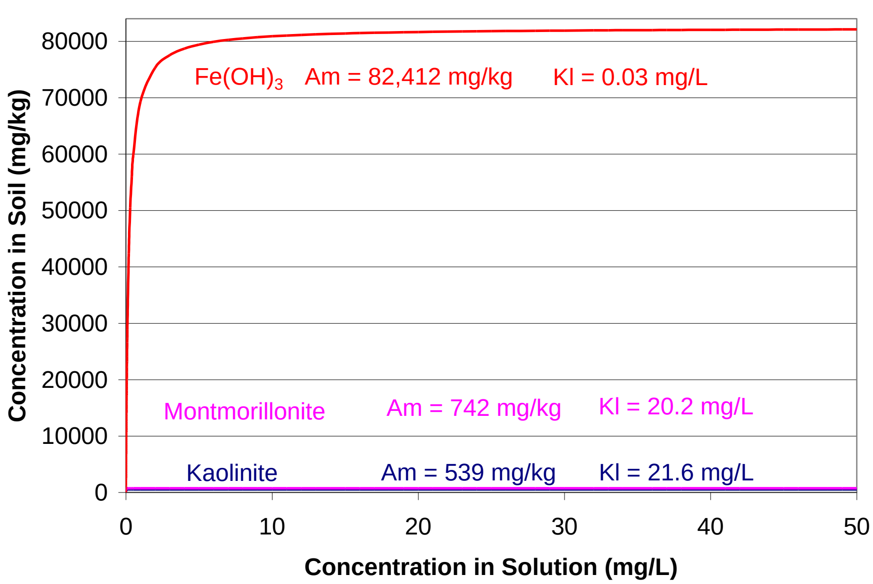

Figure 22 Langmuir Isotherms Illustrating Arsenate Adsorption Capacities of $Fe(OH)_3(s)$, Kaolinite, and Montmorillonite at a pH of 5 su.

Note: Langmuir adsorption constants (Kl and Am) are from Pierce and Moore (1982) for $Fe(OH)_3(s)$ and Frost and Griffin (1977) for kaolinite and montmorillonite.

As illustrated on **Figure 22,** the adsorption of arsenate can be understood by imagining a "clean" soil or sediment that is subjected to waters with increasing arsenate concentrations (such as with the expansion of an arsenate-bearing groundwater plume). As the solution arsenate concentrations increase, increasingly greater amounts of arsenate can be "forced" onto the solid surface. The steep part of the curve is where soils arsenate concentration increases rapidly. As the arsenate concentrations on the soil continue to increase, a point is eventually reached where the solid surfaces are completely saturated with arsenate and there is no more capacity for additional arsenate adsorption.

No matter how high the dissolved arsenate concentrations become, the solid arsenate concentration remains constant. The flat part of the curve describes the saturation point of the solid. The Langmuir Am constant is the adsorption capacity and determines the level of the flat portion of the curve, while the Kl constant determines the rate at which Am is reached (the steepness of the initial segment of the curve).

Figure 22 shows that at pH 5 su, iron hydroxide has a much higher arsenate adsorption capacity than montmorillonite or kaolinite clays. Theoretically, a sample of ferric hydroxide could be analyzed, and the concentration of arsenic could be compared to Am. If analysis of the solid shows that the arsenic concentration is significantly higher than Am, then arsenate is likely controlled by coprecipitation rather than adsorption.

In practice, soils and sediments are rarely composed of a single phase, but are instead heterogeneous mixtures of different minerals with varying amounts of iron hydroxide present. However, the affinity of arsenate for iron minerals such as iron hydroxide can be used to evaluate the fate and transport of arsenate when exposed to soils of varying iron contents.

In addition, pH has a significant effect on the adsorption capacity of arsenic, as shown in **Table 11**.

Table 11. Adsorption Capacity of Arsenate and Arsenite vs. pH

	Arsenate Adsorption Capacity (mg/kg)		Arsenite Adsorption Capacity (mg/kg)
pH	$Fe(OH)_3$ (s)[1]	$Al(OH)_3$ (s)[2]	$Fe(OH)_3$ (s)[1]
5	82,412	119,872	34,688
6	63,682	110,732	37,685
7	34,014	88,331	38,434
8	16,932	62,783	36,561
9	10,189	37,535	31,242

1. Pierce and Moore (1982)
2. Anderson et al. (1976)

The pH dependence is due to the speciation of arsenic and the surface charge of the solid at different pH values. Arsenate is a negatively charged ion (anion) at pH values greater than about 2 (**Figure 20**), while the aluminum and iron hydroxides tend to be positively charged. However, as the pH increases, the surfaces of the solids become less positive and the arsenate species become increasingly negative, resulting in fewer adsorption sites. Arsenite, being a neutral species below pH 9 (**Figure 21**), is relatively insensitive to changes in pH.

Phosphate competes with arsenate for adsorption sites, resulting in less arsenate adsorption and greater mobility. Other ions such as chloride, sulfate, and nitrate have little or no effect on arsenic adsorption at low concentrations.

6.1.4 Effect of Silica

Dissolved silica competes with arsenic for adsorption sites, and can affect both the effectiveness and the adsorption capacity of adsorption media such as Sorb33. As the pH of the solution increases (above about 8.5 su), two reactions occur: 1) the surface charge of the media becomes negative, which tends to repel negatively charged arsenic oxyanions, and 2) the dissolved silica species go from neutral species to predominantly charged anions, which compete with arsenic for specific adsorption sites (see **Figure 23).**

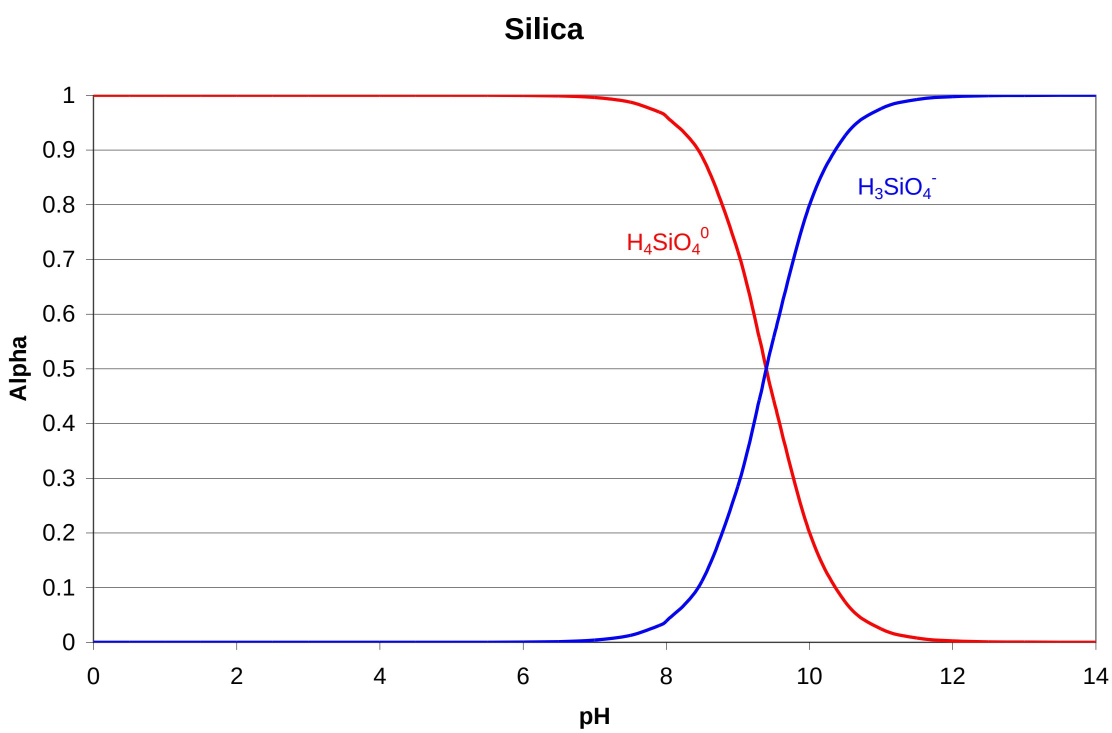

Figure 23 Silica Speciation as a Function of pH

Note: alpha is the fraction of the total dissolved silica consisting of the given species.

6.2 Arsenic Fate and Transport

6.2.1 Arsenic Speciation

As discussed previously, the fate and transport of arsenic strongly depend on the oxidation state and speciation of the ions. Arsenic speciation was determined both by direct measurement and from the Eh and pH data.

Measured Values

During the May 2010 sampling round, arsenic (3) and total arsenic were measured by the analytical laboratory, while As (5) was obtained by difference. **Table 12** compares the results of the arsenic speciation analyses with the Eh and pH data.

Table 12. Summary of Measured As (3) and As (5) Concentrations

Well	Date	As(III) (mg/L)	As(V) (mg/L)	%As(III)	pH	Eh (v)
MW-1	5/26/2010	0.46	0.03	93%	6.73	0.200
MW-2	5/25/2010	0.05	0.00	95%	6.79	0.175
MW-3	5/25/2010	0.27	0.02	93%	6.73	0.129
MW-3	7/15/2010	-	-	-	6.66	0.104
MW-4	5/26/2010	1.35	0.03	98%	6.48	0.211
MW-4	7/15/2010	-	-	-	6.61	0.119
MW-5	5/26/2010	1.41	0.04	97%	6.74	0.145
MW-6	5/26/2010	0.35	0.02	96%	6.68	0.157
MW-7	5/27/2010	-	-	-	6.99	0.202
MW-8	5/27/2010	-	-	-	7	0.228
MW-9	5/27/2010	-	-	-	7.72	0.279
99-1	5/26/2010	1.78	0.13	93%	6.92	0.152
99-1	7/15/2010	-	-	-	6.68	0.065
99-2	5/27/2010	0.31	0.04	89%	6.52	0.180
SW1	5/25/2010	0.00	0.00	16%	7.79	0.345
SW2	5/25/2010	-	-	-	7.66	0.362
SW3	5/25/2010	-	-	-	7.58	0.355
SW4	5/25/2010	0.00	0.00	17%	7.7	0.356
SW5	5/25/2010	0.00	0.00	19%	7.73	0.362
SW6	5/25/2010	-	-	-	7.76	0.372

Eh with respect to the Standard Hydrogen Electrode (SHE) in volts = (ORP in mv + (224 mv – Celsius temperature))/1000mv/v

The results indicate that, with the exception of the surface water locations, most of the arsenic is in the reduced arsenite form.

Predictions from Eh and pH

The Eh and pH data presented in **Table 12** were plotted on an Eh-pH diagram for arsenic (see **Figure 24**). These results are inconsistent with the measured arsenic speciation because the majority of the arsenic is predicted to be in the more oxidized arsenate form ($H_2AsO_4^{-1}$). Note that points that lie directly on a field boundary contain 50 percent of each of the species on either side of the line. The lack of agreement between the arsenic speciation and Eh-pH data indicates that the system is not in redox equilibrium with respect to arsenic.

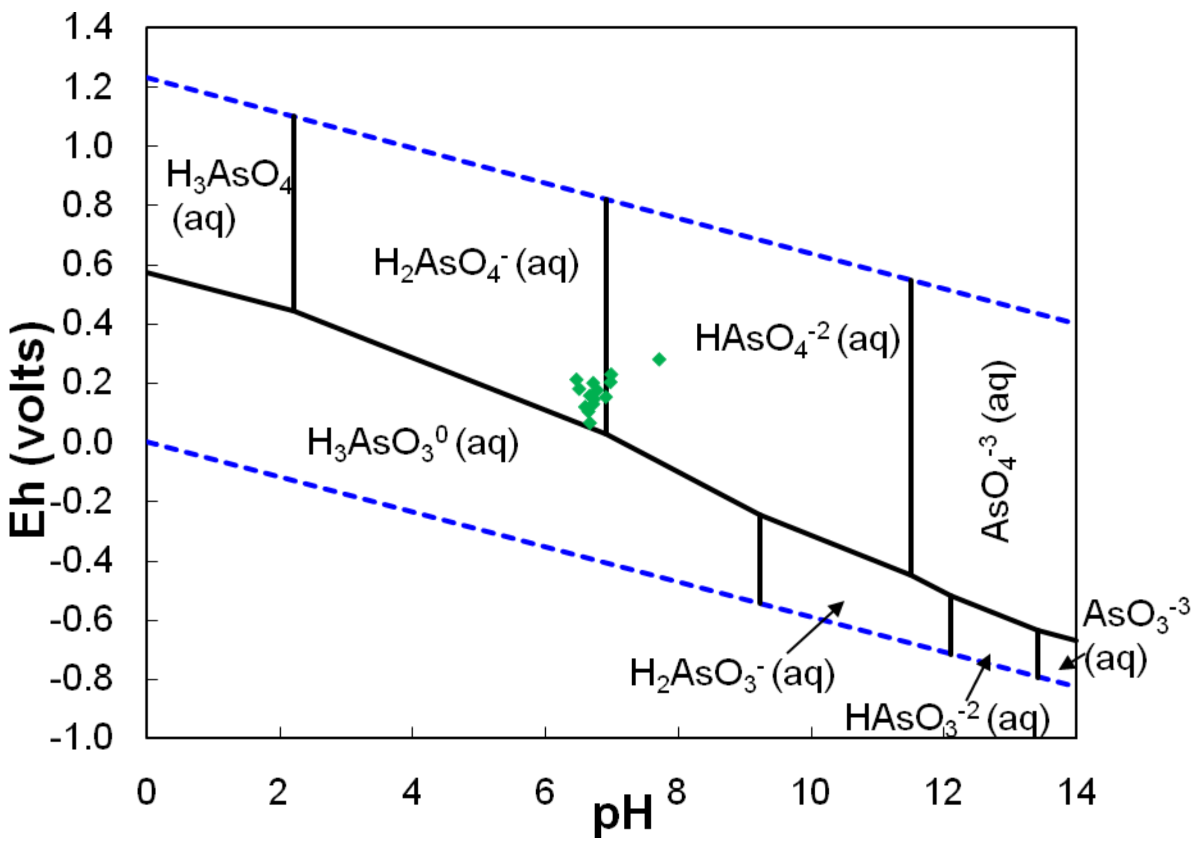

Figure 24 Arsenic Eh-pH Diagram Showing the Site Data (green diamonds)

6.3 Arsenic Attenuation

6.3.1 Coprecipitation with Iron Phases

Aqueous arsenic concentrations are often controlled by coprecipitation with iron oxyhydroxide phases. To determine if iron oxyhydroxides are forming at the site, the Eh and pH data for the wells were plotted on an Eh-pH diagram for the iron/sulfur system (see **Figure 25**). The fact that most of the points plot along the ferrous iron (Fe^{+2})/ amorphous $Fe(OH)_3$ boundary suggests that iron oxyhydroxide is forming within the aquifer.

The diagram also indicates that the redox conditions are not sulfate-reducing, and that sulfide minerals would not form within the aquifer except in microenvironments adjacent to or within organic matter.

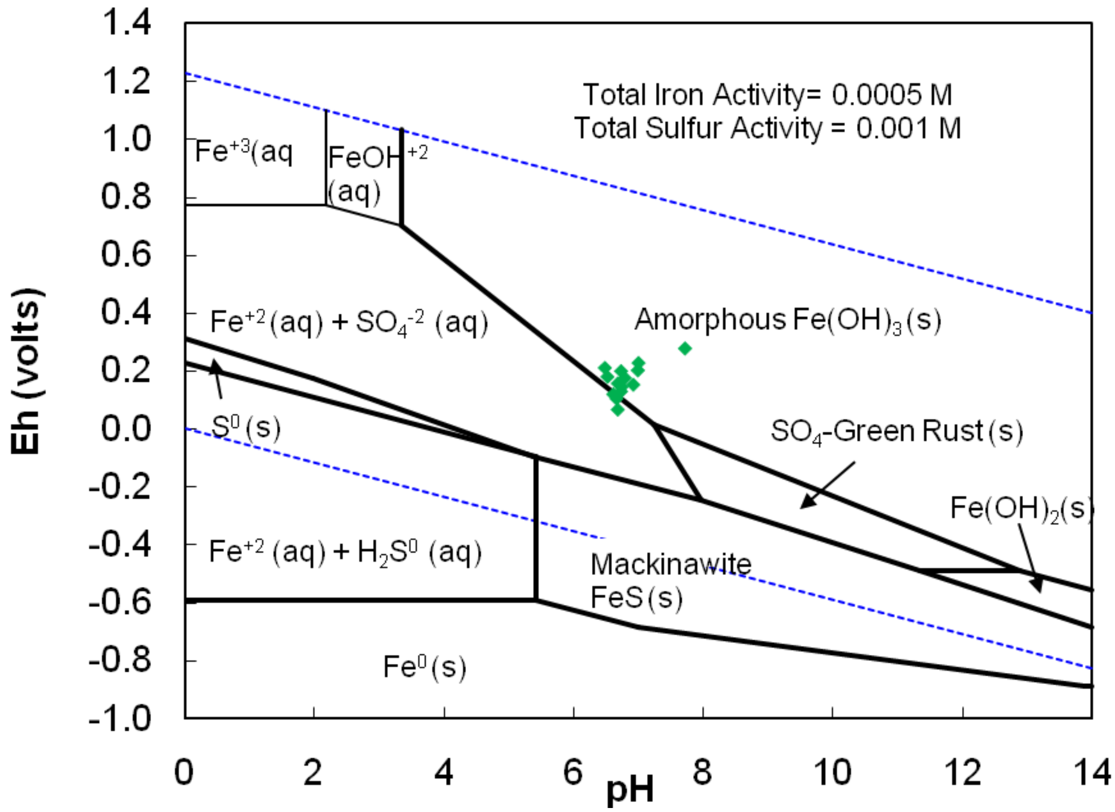

Figure 25 Iron/Sulfur Eh-pH Diagram Showing the Site Data (green diamonds) Total iron = 11 mg/L

In order to more accurately address the iron chemistry of the system, PHREEQC geochemical modeling was performed (Parkhurst and Appelo, 1999). PHREEQC is a thermodynamic equilibrium program designed to model chemical speciation in aqueous solutions, determine the saturation states of solutions with minerals and gases, and predict the results of various reactions, such as dissolution of minerals and oxidation.

The modeling shows which phases or minerals are saturated (if any) for each well. Generally, if a solution is at saturation with respect to a mineral, that mineral would be expected to be present within the aquifer matrix in which the water is in contact. Minerals which are undersaturated would dissolve when placed in contact with the solution, while minerals that are supersaturated would eventually precipitate the material (assuming the mineral forms at low temperature).

PHREEQC uses a term called the saturation index (SI) to quantify the degree of saturation of a mineral. SI is defined as follows:

$$SI = \text{Log}\ (IAP/Ksp) \qquad (3)$$

Where IAP is the ion activity product and Ksp is the solubility product constant for the phase in question.

For phases at saturation, IAP = Ksp and SI = 0. A negative SI indicates that the phase is unsaturated (IAP<Ksp) while a positive SI (IAP>Ksp) indicates the phase is supersaturated. In practice, a range of 0±0.5 SI units is considered saturated due to uncertainties in analytical and thermodynamic data (Hem, 1971).

The results of the modeling are presented in **Table 13**.

Table 13. Summary of PHREEQC Results for the Highway 99 Site

Well	Saturation Index				
	Calcite ($CaCO_3$)	pCO_2	Gypsum ($CaSO_4$)	Amorphous $Fe(OH)_3$	Siderite ($FeCO_3$)
MW-1	**1.51**	$10^{0.03}$	-0.84	**1.72**	**2.48**
MW-2	**1.45**	$10^{-0.04}$	-0.55	**1.10**	**2.13**
MW-3	**1.50**	$10^{0.02}$	-0.17	**1.37**	**3.32**
MW-4	**1.55**	$10^{0.45}$	-0.87	**1.88**	**3.12**
MW-5	**1.55**	$10^{0.08}$	-2.62	**0.81**	**2.53**
MW-6	**1.64**	$10^{0.20}$	-2.57	**0.92**	**2.62**
MW-7	**1.67**	$10^{-0.10}$	-2.79	**2.09**	**2.40**
MW-8	**1.76**	$10^{-0.10}$	-2.12	**2.25**	**2.12**
MW-9	**2.04**	$10^{-1.04}$	-0.70	**2.71**	**0.06**
99-1	**1.86**	$10^{-0.08}$	-1.05	**1.52**	**2.77**
99-2	**2.01**	$10^{0.72}$	-2.57	**1.37**	**3.36**
SW-1	**2.26**	$10^{-1.21}$	-0.42	**4.84**	**0.85**
SW-4	**2.15**	$10^{-1.11}$	-0.43	**4.81**	**0.84**
SW-5	**2.17**	$10^{-1.15}$	-0.44	**4.85**	**0.69**

Shading indicates phases at saturation according to the criteria of Hem (1971).

Bold indicates phases are supersaturated.

The most important phases to consider when evaluating arsenic fate and transport are the iron minerals, due to the high affinity of arsenic for iron-bearing phases. The modeling indicates that the iron phases that are likely forming include iron oxyhydroxides and siderite. The partial pressures for carbon dioxide (pCO_2) are elevated in the groundwater compared to the atmospheric value ($10^{-3.5}$ atm at sea level), indicating that carbon dioxide degassing is predicted to occur when the groundwaters are pumped to the surface and exposed to the atmosphere. Carbon dioxide degassing results in a pH increase, which can cause the precipitation of carbonate minerals such as calcite and siderite. The supersaturation of the carbonate minerals is likely due to the pH increase resulting from CO_2 degassing.

6.3.2 Adsorption

In addition to coprecipitation with iron oxyhydroxides, arsenic is also likely adsorbing to the surfaces of iron-bearing minerals within the aquifer such as magnetite, pyroxenes, amphiboles, and biotite.

The implication of the study for the Highway 99 site is that attenuation of arsenic within the aquifer begins with adsorption of arsenic (5), which results in the groundwater system re-equilibrating by oxidizing some of the arsenic (3) to arsenic (5).

6.3.3 Total Organic Carbon, Dissolved Oxygen, and Redox Potential

The total organic carbon and other data for comparison are presented in **Table 14**.

Table 14. Comparison of Groundwater TOC, DO, Iron, Arsenic, and Eh Data

Well	Date	TOC (mg/L)	Eh (v)	Total Dissolved Arsenic (mg/L)	Dissolved Oxygen (mg/L)	Dissolved Iron (mg/L)
MW-1	5/26/2010	12.4	0.200	0.63	0.25	4.29
MW-2	5/25/2010	2.71	0.175	0.034	0.22	1.56
MW-3	5/25/2010	19.9	0.129	0.78	0.2	29.9
MW-3	7/15/2010	-	0.104	-	0.13	-
MW-4	5/26/2010	11.1	0.211	1.03	0.26	31.5
MW-4	7/15/2010	-	0.119	-	0.15	-
MW-5	5/26/2010	5.05	0.145	1.09	0.3	5.07
MW-6	5/26/2010	9.27	0.157	0.31	0.39	6.2
MW-7	5/27/2010	4.17	0.202	0.01	0.21	1.8
MW-8	5/27/2010	3.83	0.228	0.013	0.27	0.98
MW-9	5/27/2010	<1.50	0.279	0.044	0.19	0.025
99-1	5/26/2010	4.83	0.152	2.49	0.32	6.34
99-1	7/15/2010	-	0.065	-	0.22	-
99-2	5/27/2010	25.3	0.180	0.41	0.29	45.7
SW1	5/25/2010	5.22	0.345	0.003	10.23	0.28
SW2	5/25/2010	-	0.362	0.0029	10	-
SW3	5/25/2010	-	0.355	0.003	9.36	-
SW4	5/25/2010	5.19	0.356	0.0031	9.56	0.27
SW5	5/25/2010	7.38	0.362	0.003	9.24	0.28
SW6	5/25/2010	-	0.372	0.003	9.18	-

The DOC concentrations do not appear to correlate (either positively or negatively) with ORP, total dissolved As, or DO, indicating that the system is not in equilibrium. For a system in complete equilibrium, the TOC would consume the DO in the water and the ORP would decrease. At equilibrium, TOC would also reduce As (5) to As (3) and dissolve iron minerals (both by reducing ferric iron to ferrous and by forming aqueous complexes with iron), which would tend to increase total dissolved arsenic concentrations. There is a rough correlation between TOC and total arsenic, although the highest TOC does not correspond to the highest total dissolved arsenic. The correlation between Eh and dissolved iron is closer, with Eh values in excess of 0.2 volts resulting in dissolved iron concentrations of less than 1 mg/L, and Eh values of less than 0.2 volts resulting in dissolved iron concentrations of greater than 1 mg/L.

The general lack of equilibrium with respect to redox, DO, TOC, arsenic, and iron is likely the result of a redox gradient in which more oxidizing infiltration water mixes with more reducing groundwater. At favorable locations along the gradient, iron oxidizes or partially oxidizes to form ferric oxyhydroxides or green rusts, respectively. The formation of these phases is the most likely control on dissolved arsenic concentrations.

6.3.4 Arsenic Transport Velocity

Arsenic attenuation is often described by the partition coefficient (Kd), which includes all attenuation, including adsorption, precipitation, and coprecipitation processes. The partition coefficient expression is as follows:

$$K_d = C_{soil}/C_{soln} \tag{4}$$

Where,

K_d = The partition coefficient (L/kg)

C_{soil} = The concentration of arsenic on the soil or aquifer sediment (mg/kg)

C_{soln} = The concentration of arsenic in solution (i.e., groundwater) (mg/L)

The K_d is useful because it can be used to calculate the retardation factor (R), which is a measure of the transport velocity of arsenic at the site relative to the groundwater. The retardation factor is calculated using the following:

$$R = 1 + (\rho/n)K_d = V/V_c \tag{5}$$

Where,

ρ = The dry bulk density of the aquifer matrix (L/kg)

n = The total porosity of the aquifer matrix (volume fraction)

V = The groundwater velocity (ft/day)

V_c = The velocity of the arsenic (ft/day)

Once R is known, the transport velocity of arsenic at the site can be determined.

The partition coefficient is typically determined by performing a bench-scale test using clean aquifer material and impacted groundwater from the site. K_d values for arsenic reported in literature vary by orders of magnitude, depending on the properties of the aquifer sediment or soil (iron content, grain size, mineralogy) and the nature of the groundwater (pH, Eh, concentration of competing ions).

Because a site-specific K_d value has not been determined for the Highway 99 site, an estimate using available site data was made. The calculations were made using equation 4, along with the groundwater data and the closest available soil data, both aerially and in terms of depth. The results are summarized in **Table 15**.

Table 15. Calculated K_d Values for the Highway 99 Site

Groundwater ID	Groundwater As (mg/L)	Soil Boring ID	Soil As Result (mg/kg)	Soil Depth (ft)	Well Screen Interval (ft)	K_d (L/kg)
MW-1	0.63	B5	7430	14	13-18	11,794
	0.63		64.5	16		102
	0.63		48.5	18		77
MW-2	0.034	A6	18.5	12	12-19	544
	0.034		12.1	14		356
	0.034		10.9	16		321
MW-3	0.78	D5	3.5	16	14.7-19.7	4.5
MW-4	1.03	D6	5.9	14	14-19	5.7
	1.03		7.1	16		6.9
MW-5	1.09	D7	7.1	14	14.5-19.5	6.5
	1.09		8.4	16		7.7
MW-6	0.31	C8	10.9	14	14.1-19.1	35
	0.31		3.5	16		11
99-2	0.41	D3	30.1	16	15-25	73
	0.41		51.1	18		125
	0.41		39.2	20		96
	0.41		37.9	20		92
	0.41		18.5	22		45
	0.41		12.1	24		30
	0.41	D2	8.4	16		20
	0.41	C2	9.6	16		23
Minimum*						**4**
Maximum*						**544**
Average*						**99**
Median*						**40**

* Excludes the K_d value of 11,794, which is a statistical outlier.

The K_d values are variable, but in general are quite high.

Using an arsenic K_d of 4 L/kg (the minimum), a dry bulk density of 1.65 L/kg, a porosity of 0.2, and a groundwater velocity of 2.0 ft/day results in an R of (1+[1.65/0.2]*4 = 34) and an arsenic velocity of 0.059 ft/day (2.0/34 = 0.059).

The time required for the groundwater to travel the approximately 50 feet from MW-99-1 to the groundwater beneath Hylebos Creek is approximately 17 years (50 ft/0.059 ft/d = 847 days = 2.3 yrs). Using the median K_d value of 44 L/kg results in an R value of 364, an arsenic velocity of 0.00549 ft/day, and an MW99-1 to Hylebos Creek travel time of 25 years. Given that the contaminant source was in place for about 10 years before removal in 1985, and the fact that the residual arsenic has been in place for about 37 years, it makes sense that the arsenic would have reached the groundwater beneath the Hylebos Creek by now, which is confirmed by the presence of arsenic in wells MW-5 (1,060 µg/L) and MW-10 (366 µg/L).

Section 7

Terrestrial Ecological Evaluation

A simplified terrestrial ecological evaluation (TEE) was conducted to assess the potential risk of exposure to wildlife from potential site contamination. The simplified TEE exposure analysis concluded that land use at the site and surrounding area makes substantial wildlife exposure unlikely (WAC 173-340-7492(2)(ii)).

Interstate 5, Pacific Highway East, and the site's paved surfaces and commercial land use form significant barriers to terrestrial wildlife movement and use (including birds) and would prevent most species from accessing the site. The site contamination is quite isolated from potential terrestrial wildlife use by highways and the risk to exposure is low. In addition, the habitats within 500 feet of the site are separated from the site by these major roadways. Species that would be expected in the forested hillside area to the west would not be attracted to the fields to the east or vice versa. Therefore, wildlife that might use the undeveloped lands to the west or east would not be expected to traverse the site.

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Section 8
Summary

Findings of the RI are summarized below.

- Based on our evaluation of the overall quality and usability of soil and groundwater samples, no QC issues encountered were significant enough to warrant analytical data of analytical reports and available QC data from the field investigation. All data were determined to be usable for the intended project purposes without qualification.

- Industrial waste containing arsenic was used as fill on the site from about 1971 to 1973. The majority of this fill was excavated and disposed off-site by USG in a 1984/1985 contaminant source removal action. Arsenic impacted native soil in the vicinity of 99-1 was also removed at this time.

- The site is underlain by fill, alluvium, and glacial deposits to a depth of at least 59 feet bgs.

- Two aquifers were identified at the site: the Alluvial Aquifer and Glacial Aquifer.

- The Alluvial Aquifer is the uppermost aquifer at the site and is impacted by arsenic. There is a strong upward hydraulic gradient from the underlying Glacial Aquifer.

- The estimated average linear groundwater flow velocity in the Alluvial Aquifer is estimated to range from 2 to 20 feet/day.

- The distribution of residual arsenic in soil at the site reflects the results of the 1984/1985 contaminant source removal action. Arsenic concentrations are relatively low at ground surface. Soil excavated in 1984/1985 was restored with clean fill. The RI fully defined the lateral and vertical extent of arsenic exceeding MTCA soil cleanup levels.

- Arsenic concentrations in Alluvial Aquifer groundwater are highest at monitoring well 99-1. This well was drilled where the highest arsenic concentrations were encountered in fill and native soil during the 1984/1985 contaminant source removal action.

- Arsenic concentrations in groundwater attenuate significantly to the north and south of 99-1. However, arsenic exceeds MTCA Method A groundwater cleanup levels at the north end of the Kanopy Kingdom property and the south end of the Freeway Trailer property.

- The Alluvial Aquifer pinches out to the west of Pacific Highway East. Arsenic in groundwater east of Hylebos Creek could not be defined because of the location of Interstate 5.

- Arsenic within the Alluvial Aquifer attenuates with depth. Arsenic in the underlying Glacial Aquifer exceeds MTCA Method A cleanup standards but this exceedence does not appear to be related site activities.

- Arsenic transport in the Alluvial Aquifer is at least 34 times slower than the groundwater velocity, resulting in long travel times for arsenic to migrate downgradient from the contaminant source area.

- Arsenic in the Alluvial Aquifer does not appear to be impacting Hylebos Creek water quality.
- Hylebos Creek sediment downgradient of the contaminant source area has arsenic exceeding ecological screening criteria
- The simplified TEE exposure analysis concluded that land use at the site and surrounding area makes substantial wildlife exposure unlikely.

Section 9
References

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Tables

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Table 1
Well Construction Details
Highway 99 Site
USG Interiors
Milton, Washington

Well I.D.	Northing [a]	Easting [a]	TOC Elevation (ft AMSL) [b]	Boring Total Depth (ft)	Screen Depth Interval (ft)	Casing Diameter (in)	Slot Size (in)	Screen Type	Drilled Date
MW-1	703059.65	1184681.28	23.02	19.0	13-18	2	0.01	PVC	05/05/10
MW-2	702999.60	1184652.77	22.37	19.0	12-19	2	0.01	PVC	05/04/10
MW-3	703045.13	1184763.71	20.22	21.0	14.7-19.7	2	0.01	PVC	05/07/10
MW-4	702987.85	1184749.40	20.40	20.0	14-19	2	0.01	PVC	05/05/10
MW-5	702934.84	1184745.18	19.07	20.0	14.5-19.5	2	0.01	PVC	05/06/10
MW-6	702883.36	1184710.13	19.89	20.0	14.1-19.1	2	0.01	PVC	05/06/10
MW-7	702969.79	1184715.93	21.06	39.0	25-30	2	0.01	PVC	05/05/10
MW-8	702924.45	1184744.14	19.12	40.0	34.9-40.1	2	0.01	PVC	05/06/10
MW-9	702988.01	1184715.80	20.87	59.0	43-48	2	0.01	PVC	05/04/10
MW-10	702958.17	1184783.51	14.15	12.6	10.4-11.5	3/4	0.01	Stainless Steel	10/14/11
MW-11	703185.90	1184844.31	15.41	10.5	9.3-10.5	3/4	0.01	Stainless Steel	10/14/11
MW-12	703065.01	1184585.80	21.54	20.0	14-19	1	0.01	Pre-pack PVC	05/11/12
MW-13	702495.10	1184478.55	22.16	16.0	10-15	1	0.01	Pre-pack PVC	05/11/12
MW-14	703437.40	1184781.81	30.30	20.0	13-18	1	0.01	Pre-pack PVC	05/11/12
99-1	702978.95	1184715.54	21.34	28.0	15-25	4	0.01	PVC	05/1985
99-2	703159.55	1184771.51	22.64	25.5	15-25	4	0.01	PVC	05/1985

Notes:
a) Washington State Plane North American Datum of 1983 (NAD 83), Zone 12, feet.
b) ft AMSL - feet above mean sea level. Elevations based on North American Vertical Datum of 1988 (NAVD 88).
TOC - top of casing.
PVC - Polyvinylchloride

Table 2
Summary of Groundwater Elevation Measurements
Hwy 99 Site
USG Interiors
Milton, Washington

Monitoring Well I.D.	Date Measured	Top of Casing Elevation [a] (feet)	Depth to Groundwater (ft below TOC)	Groundwater Elevation (feet)
MW1	05/25/10	23.02	10.19	12.83
	07/15/10		9.85	13.17
	05/22/12		9.04	13.98
MW2	05/25/10	22.37	8.42	13.95
	07/15/10		8.51	13.86
	05/22/12		7.71	14.66
MW3	05/25/10	20.22	7.22	13.00
	07/15/10		7.32	12.90
	05/22/12		6.28	13.94
MW4	05/25/10	20.40	7.41	12.99
	07/15/10		7.51	12.89
	05/22/12		6.63	13.77
MW5	05/25/10	19.07	6.17	12.90
	07/15/10		6.22	12.85
	05/22/12		5.32	13.75
MW6	05/25/10	19.89	7.08	12.81
	07/15/10		7.16	12.73
	05/22/12		6.19	13.70
MW7	05/25/10	21.06	7.81	13.25
	07/15/10		8.02	13.04
	05/22/12		8.15	12.91
MW8	05/25/10	19.12	5.34	13.78
	07/15/10		5.57	13.55
	05/22/12		4.59	14.53
MW9	05/25/10	20.87	1.72	19.15
	07/15/10		1.89	18.98
	05/22/12		0.63	20.25
MW10	05/22/12	14.15	0.79	13.36
MW11	05/22/12	15.41	6.90	8.51
MW12	05/22/12	21.54	0.00	21.54
MW13	05/22/12	22.16	8.27	13.89
MW14	05/22/12	30.30	10.60	19.70
99-1	05/25/10	21.34	8.22	13.12
	07/15/10		8.47	12.87
	05/22/12		7.60	13.74
99-2	05/25/10	22.64	9.62	13.02
	07/15/10		9.71	12.93
	05/22/12		8.89	13.75

Notes:

a) Datum used: NAD 83/91 Washington South Zone NAVD '88, US Feet.
ft bgs - Feet below ground surface.
TOC - top of casing.

Table 3
Groundwater General Parameters
Hwy 99 Site
USG Interiors
Milton, Washington

Monitoring Well	Date Sampled	Time Sampled	Temperature (^oC)	Specific Conductance ($\mu s/cm$)	pH	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)	Appearance/ Odor
MW1	05/26/10	1435	12.72	318	6.73	5.79	0.25	-11.7	Clear, colorless/no odor
MW2	05/25/10	1445	13.28	331	6.79	0.57	0.22	-35.4	Clear, colorless/no odor
MW3	05/25/10	1615	12.53	449	6.73	16.6	0.20	-82.8	Yellow tint, slight turbidity/no odor
	07/15/10	1430	13.01	460	6.66	3.3	0.13	-107.4	Slight yellowish color, clear, no odor
MW4	05/26/10	1310	12.22	633	6.48	5.68	0.26	-0.7	Clear, colorless/no odor
	07/15/10	1305	13.51	664	6.61	0.00	0.15	-91.5	Clear, colorless, broken organic sheen /no odor
MW5	05/26/10	1025	11.79	394	6.74	4.58	0.30	-67.1	Clear, colorless/no odor
MW6	05/26/10	0915	12.66	456	6.68	8.96	0.39	-54.5	Clear, colorless/no odor
MW7	05/27/10	1045	13.28	420	6.99	10.15	0.21	-8.3	Clear, colorless/no odor
MW8	05/27/10	0940	12.05	419	7.00	8.62	0.27	16.3	Clear, colorless/no odor
MW9	05/27/10	1200	13.35	265	7.72	9.86	0.19	68.2	Clear, colorless/no odor
MW10	10/18/11	1335	13.44	349	6.88	49.8	0.47	-94.0	Clear, colorless/no odor
MW11	10/18/11	1225	13.90	670	6.48	12.8	0.16	-129.9	Clear, colorless/no odor
MW12	05/22/12	0950	11.91	188	6.67	26.9	2.00	-75	Clear, colorless, odorless, slight turbidity observable in bucket
MW13	05/22/12	1220	13.24	1024	6.56	84	0.98	-102.1	Clear, colorless, odorless, little bit swirled organic sheen
MW14	05/22/12	1440	12.21	1249	6.54	863	0.71	-101.1	Colorless, odorless, water in bucket is slightly muddy
99-1	05/26/10	1200	12.90	415	6.92	5.62	0.32	-58.8	Clear, colorless/no odor
	07/15/10	1210	14.21	406	6.68	5.00	0.22	-144.6	Clear, slight yellowish color, odorless
99-2	05/27/10	1310	13.24	1201	6.52	17.6	0.29	-31	Clear, slight yellowish color, broken organic sheen /no odor

Notes:
^oC - degrees Celsius.
$\mu s/cm$ - microsiemens per centimeter.
mg/L - milligram per liter.
mV - millivolts.
NTU - nephelometric turbidity units.

Table 4
Surface Water General Parameters
Hwy 99 Site
USG Interiors
Milton, Washington

Monitoring Well	Date Sampled	Time Sampled	Temperature (^oC)	Specific Conductance (µs/cm)	pH	Dissolved Oxygen (mg/L)	ORP (mV)	Appearance/ Odor
SW1	05/25/10	1310	11.47	240	7.79	10.23	132.6	Clear/no odor, colorless
SW2	05/25/10	1250	11.35	242	7.66	10.00	149.0	Clear/no odor, colorless
SW3	05/25/10	1230	11.20	242	7.58	9.36	142.1	Clear/no odor, colorless
SW4	05/25/10	1205	11.20	241	7.70	9.56	142.8	Clear/no odor, colorless
SW5	05/25/10	1135	11.13	241	7.73	9.24	149.6	Clear/no odor, colorless
SW6	05/25/10	1110	11.11	241	7.76	9.18	158.7	Clear/no odor, colorless

Notes:
^oC - degrees Celsius.
µs/cm - microsiemens per centimeter.
mg/L - milligram per liter.
mV - millivolts.

Table 5
Vertical Hydraulic Gradient Between Shallow and Deeper Groundwater Monitoring Points
Alluvial Aquifer
USG Interiors/Remedial Investigation
Milton, Washington

Well Cluster	Date	Vertical Gradient Between Shallow and Deeper Groundwater Monitoring Points	
		Upward	Downward
99-1 / MW7	5/25/2010	0.017	
	7/15/2010	0.022	
MW5 / MW8	5/25/2010	0.044	
	7/15/2010	0.035	

Notes:
Vertical hydraulic gradient was calculated by dividing the head differential by the vertical distance between screen midpoint elevation for wells in each well cluster. Screen midpoint elevations used include: 99-1 = 1.3 feet; MW7 = -6.44 feet; MW5 = 1.57 feet; and MW8 = -18.38 feet.

Table 6
Arsenic in Soil
Highway 99 Site
USG Interiors
Milton, Washington

Boring I.D.	Sample Depth (ft bgs)	Date Sampled	Total Arsenic (mg/kg)	
A4-2	2	04/28/10	3.5	
A4-4	4	04/28/10	13.4	
A4-8	8	04/28/10	2.9	
A4-10	10	04/28/10	3.5	
A4-12	12	04/28/10	4.1	
A4-14	14	04/28/10	3.5	
A4-16	16	04/28/10	8.4	
A5-2	2	04/28/10	3.5	
A5-4	4	04/28/10	3.5	
A5-6	6	04/28/10	3.5	
A5-12	12	04/28/10	59.1	
A5-14	14	04/28/10	44.5	
A5-16	16	04/28/10	10.9	
A6-2	2	04/28/10	3.5	
A6-4	4	04/28/10	9.6	
A6-8	8	04/28/10	9.6	
A6-10	10	04/28/10	59.1	
A6-12	12	04/28/10	18.5	
A6-14	14	04/28/10	12.1	
A6-16	16	04/28/10	10.9	
A7-2	2	04/27/10	3.5	
A7-4	4	04/27/10	<5	**
A7-6	6	04/27/10	313.4	
A7-12	12	04/27/10	257	**
A7-14	14	04/27/10	75.2	
A7-16	16	04/27/10	142.2	
A7-18	18	04/27/10	31.4	
A7-20	20	04/27/10	8.4	
A8-2	2	04/28/10	3.5	
A8-4	4	04/28/10	157.4	
A8-6	6	04/28/10	160	
A8-8	8	04/28/10	47.2	
A8-8	8	04/28/10	35.3	
A8-8	8	04/28/10	51.1	
A8-8	8	04/28/10	53.8	
A8-8	8	04/28/10	49.8	
A8-8	8	04/28/10	52.5	
A8-8	8	04/28/10	48.5	
A8-8	8	04/28/10	48.5	
A8-8	8	04/28/10	49.8	
A8-10	10	04/28/10	3.5	
A8-12	12	04/28/10	3.5	
A8-14	14	04/28/10	3.5	
A8-16	16	04/28/10	3.5	

Table 6
Arsenic in Soil
Highway 99 Site
USG Interiors
Milton, Washington

Boring I.D.	Sample Depth (ft bgs)	Date Sampled	Total Arsenic (mg/kg)
A9-2	2	04/29/10	3.5
A9-4	4	04/29/10	32.7
A9-6	6	04/29/10	8.4
A9-8	8	04/29/10	3.5
A9-10	10	04/29/10	8.4
A9-12	12	04/29/10	7.1
A9-14	14	04/29/10	3.5
A9-16	16	04/29/10	3.5
AA6-6	6	05/11/12	<12 **
AA6-10	10	05/11/12	<15 **
AA6-12	12	05/11/12	<13 **
AA6-14	14	05/11/12	<13 **
AA7-10	10	05/11/12	<19 **
AA7-12	12	05/11/12	<13 **
B2-2	2	04/28/10	3.5
B2-4	4	04/28/10	14.6
B2-6	6	04/28/10	3.5
B2-8	8	04/28/10	3.5
B2-10	10	04/28/10	8.4
B2-12	12	04/28/10	12.1
B2-14	14	04/28/10	8.4
B2-16	16	04/28/10	17.2
B3-2	2	04/28/10	23.6
B3-4	4	04/28/10	101
B3-6	6	04/28/10	3.5
B3-8	8	04/28/10	10.9
B3-10	10	04/27/10	3.5
B3-14	14	04/27/10	3.5
B3-15	15	04/27/10	3.5
B4-2	2	04/26/10	3.5
B4-4	4	04/26/10	3.5
B4-8	8	04/26/10	3.5
B4-10	10	04/26/10	12 **
B4-14	14	04/26/10	1680 **
B4-16	16	04/26/10	80 **
B4-18	18	04/26/10	17.2
B4-20	20	04/26/10	7.1
B5-2	2	04/26/10	43 **
B5-4	4	04/26/10	2.9
B5-6	6	04/26/10	7.1
B5-8	8	04/26/10	3.5
B5-12	12	04/26/10	3.5
B5-14	14	04/26/10	7430 **
B5-16	16	04/26/10	64.5
B5-18	18	04/26/10	48.5
B5-20	20	04/26/10	14.6

Table 6
Arsenic in Soil
Highway 99 Site
USG Interiors
Milton, Washington

Boring I.D.	Sample Depth (ft bgs)	Date Sampled	Total Arsenic (mg/kg)
B6-2	2	04/27/10	20.0 **
B6-4	4	04/27/10	3.5
B6-6	6	04/27/10	8.4
B6-8	8	04/27/10	3.5
B6-10	10	04/27/10	13.4
B6-12	12	04/27/10	13086.3
B6-14	14	04/27/10	1920 **
B6-16	16	04/27/10	73 **
B6-18	18	04/27/10	35.3
B6-20	20	04/27/10	18.5
B6-20	20	04/27/10	21.0
B6-20	20	04/27/10	21.0
B6-20	20	04/27/10	17.2
B6-20	20	04/27/10	17.2
B6-20	20	04/27/10	21.0
B6-20	20	04/27/10	14.6
B7-2	2	04/27/10	8.4
B7-4	4	04/27/10	4.1
B7-4	4	04/27/10	3.5
B7-6	6	04/27/10	158.8
B7-8	8	04/27/10	49.8
B7-10	10	04/27/10	493 **
B7-12	12	04/27/10	63.2
B7-14	14	04/27/10	20.0 **
B7-16	16	04/27/10	15.9
B8-2	2	04/28/10	4.1
B8-4	4	04/28/10	9.6
B8-6	6	04/28/10	9.6
B8-8	8	04/28/10	21
B8-10	10	04/28/10	17.2
B8-12	12	04/28/10	21
B8-14	14	04/28/10	14.6
B8-16	16	04/28/10	10.9
C2-2	2	04/28/10	3.5
C2-4	4	04/28/10	10.9
C2-8	8	04/28/10	3.5
C2-10	10	04/28/10	30.1
C2-12	12	04/28/10	21
C2-14	14	04/28/10	15.9
C2-16	16	04/28/10	9.6
C3-2	2	04/27/10	3.5
C3-4	4	04/27/10	10.9
C3-6	6	04/27/10	5.9
C3-8	8	04/27/10	3.5
C3-12	12	04/27/10	188
C3-14	14	04/27/10	293.6

Table 6
Arsenic in Soil
Highway 99 Site
USG Interiors
Milton, Washington

Boring I.D.	Sample Depth (ft bgs)	Date Sampled	Total Arsenic (mg/kg)
C3-15	15	04/27/10	199.2
C3-16	16	04/27/10	249.7
C3-18	18	04/27/10	45 **
C3-20	20	04/27/10	36.6
C3-22	22	04/27/10	4.1
C3-24	24	04/27/10	10.9
C4-2	2	04/26/10	8.4
C4-4	4	04/26/10	12.1
C4-4	4	04/26/10	9.6
C4-6	6	04/26/10	8.4
C4-8	8	04/26/10	31.4
C4-10	10	04/26/10	228 **
C4-12	12	04/26/10	40.6
C4-14	14	04/26/10	52.5
C4-16	16	04/26/10	13.4
C5-2	2	04/26/10	9.6
C5-4	4	04/26/10	14.6
C5-6	6	04/26/10	2.9
C5-8	8	04/26/10	3.5
C5-10	10	04/26/10	113.3
C5-12	12	04/26/10	61.8
C5-14	14	04/26/10	24.9
C5-16	16	04/26/10	49.0 **
C5-18	18	04/26/10	14.6
C5-20	20	04/26/10	17.2
C7-4	4	04/27/10	3.5
C7-6	6	04/27/10	4.1
C7-8	8	04/27/10	170 **
C7-10	10	04/27/10	167.1
C7-12	12	04/27/10	28.8
C7-14	14	04/27/10	28.8
C7-16	16	04/27/10	22.3
C8-2	2	04/28/10	3.5
C8-4	4	04/28/10	3.5
C8-5	5	04/28/10	10450
C8-6	6	04/28/10	287.9
C8-8	8	04/28/10	332
C8-10	10	04/28/10	59.1
C8-12	12	04/28/10	57.8
C8-14	14	04/28/10	10.9
C8-16	16	04/28/10	3.5
C9-2	2	04/29/10	57 **
C9-4	4	04/29/10	154.6
C9-6	6	04/29/10	39.2
C9-8	8	04/29/10	15.9
C9-10	10	04/29/10	3.5
C9-12	12	04/29/10	3.5

Table 6
Arsenic in Soil
Highway 99 Site
USG Interiors
Milton, Washington

Boring I.D.	Sample Depth (ft bgs)	Date Sampled	Total Arsenic (mg/kg)
C9-14	14	04/29/10	3.5
C9-16	16	04/29/10	3.5
C10-2	2	04/29/10	69.9
C10-2	1	04/29/10	14.6 *
C10-4	4	04/29/10	15.9
C10-6	6	04/29/10	18.5
C10-8	8	04/29/10	14.6
C10-10	10	04/29/10	3.5
C10-12	12	04/29/10	3.5
D1-2	2	04/29/10	14.6
D1-4	4	04/29/10	3.5
D1-6	6	04/29/10	9.6
D1-8	8	04/29/10	13.4
D1-10	10	04/29/10	3.5
D1-12	12	04/29/10	10.9
D1-14	14	04/29/10	9.6
D2-2	2	04/28/10	3.5
D2-4	4	04/28/10	24.9
D2-8	8	04/28/10	36.6
D2-10	10	04/28/10	3.5
D2-12	12	04/28/10	3.5
D2-14	14	04/28/10	3.5
D2-16	16	04/28/10	8.4
D3-2	2	04/26/10	8.4
D3-4	4	04/26/10	24.9
D3-4	4	04/26/10	23.6
D3-6	6	04/26/10	36.6
D3-8	8	04/26/10	21 **
D3-10	10	04/26/10	3.5
D3-12	12	04/26/10	44.5
D3-16	16	04/26/10	30.1
D3-18	18	04/26/10	51.1
D3-20	20	04/26/10	39.2
D3-20	20	04/26/10	37.9
D3-22	22	04/26/10	18.5
D3-24	24	04/26/10	12.1
D4-2	2	04/26/10	8.4
D4-4	4	04/26/10	7 **
D4-8	8	04/26/10	3.5
D4-10	10	04/26/10	2.3
D4-12	12	04/26/10	17.2
D4-14	14	04/26/10	18.5
D4-16	16	04/26/10	13.4
D5-2	2	04/26/10	10.9
D5-4	4	04/26/10	9.6
D5-6	6	04/26/10	10.9
D5-8	8	04/26/10	8.4

Table 6
Arsenic in Soil
Highway 99 Site
USG Interiors
Milton, Washington

Boring I.D.	Sample Depth (ft bgs)	Date Sampled	Total Arsenic (mg/kg)
D5-10	10	04/26/10	4.7
D5-12	12	04/26/10	8.4
D5-14	14	04/26/10	3.5
D5-16	16	04/26/10	3.5
D6-2	2	04/27/10	9.6
D6-4	4	04/27/10	10.9
D6-6	6	04/27/10	56.5
D6-8	8	04/27/10	47.2
D6-10	10	04/27/10	2.3
D6-12	12	04/27/10	3.5
D6-14	14	04/27/10	5.9
D6-16	16	04/27/10	7.1
D7-4	4	04/27/10	3.5
D7-6	6	04/27/10	3.5
D7-8	8	04/27/10	3.5
D7-10	10	04/27/10	3.5
D7-12	12	04/27/10	4.1
D7-14	14	04/27/10	7.1
D7-16	16	04/27/10	8.4
D8-1.5	1.5	04/29/10	30.1
D8-5	5	04/29/10	53.8
D8-8	8	04/29/10	45.8
D8-8	8	04/29/10	41.9
D8-8	8	04/29/10	45.8
D8-8	8	04/29/10	48.5
D8-8	8	04/29/10	47.2
D8-8	8	04/29/10	53.8
D8-8	8	04/29/10	48.5
D8-10	10	04/29/10	43.2
D8-12	12	04/29/10	9.6
D8-14	14	04/29/10	4.1
D8-16	16	04/29/10	12.1
D9-1	1	04/29/10	28.8
D9-4.5	4.5	04/29/10	13.4
D9-6	6	04/29/10	8.4
D9-8	8	04/29/10	12.1
D9-10	10	04/29/10	3.5
D9-12	12	04/29/10	3.5
E3	0	04/29/10	4.7
E4	0	04/29/10	13.4
E5	0	04/29/10	13.4
E6	0	04/29/10	22.3
E7	0	04/29/10	3.5
E8	0	04/29/10	18.5
GP1-5	5	06/05/06	310
GP1-10	10	06/05/06	200
GP1-15	15	06/05/06	320

Table 6
Arsenic in Soil
Highway 99 Site
USG Interiors
Milton, Washington

Boring I.D.	Sample Depth (ft bgs)	Date Sampled	Total Arsenic (mg/kg)
GP2-15	15	06/05/06	1400
GP3-12	12	06/05/06	19
GP3-14	14	06/05/06	23
GP4-9.5	9.5	06/05/06	570
GP4-13	13	06/05/06	31
GP5-10	10	06/05/06	240
GP5-13	13	06/05/06	15
GP6-11	11	06/05/06	72
GP7-8	8	06/06/06	<11
GP8-9	9	06/06/06	870
GP8-13	13	06/06/06	160
GP9-9	9	06/06/06	310
GP9-14	14	06/06/06	36
MW12-6	6	05/11/12	<16 **
MW12-8	8	05/11/12	<12 **
MW12-12	12	05/11/12	<13 **
MW12-14	14	05/11/12	<12 **

Notes:
Shaded concentrations exceed Washington Administration Code Chapter 173-340, Model Toxics Control Act, Method A cleanup levels
* Result from a 2nd locaton for Boring C10; moved due to refusal.
** As results from lab data.

Table 7
Arsenic in Sediment
Highway 99 Site
USG Interiors
Milton, Washington

Boring I.D.	Sample Depth (ft bgs)	Date Sampled	Total Arsenic (mg/kg)
SED-1B	Surface	04/30/10	2.9
SED-1C	Surface	04/30/10	7 **
SED-2B	Surface	04/29/10	3.5
SED-2C	Surface	04/29/10	2.9
SED-3B	Surface	04/29/10	205 **
SED-3C	Surface	04/29/10	2.9
SED-4B	Surface	04/29/10	90 **
SED-4C	Surface	04/29/10	9.6
SED-5B	Surface	04/29/10	14.6
SED-5C	Surface	04/29/10	45.8
SED-6B	Surface	04/29/10	30 **
SED-6C	Surface	04/29/10	17 **
SED-7B	Surface	04/30/10	2.9
SED-7C	Surface	04/30/10	8.1

Note:
** As results from lab data.

Table 8
Analytical Results - Groundwater
Highway 99 Site
USG Interiors
Milton, Washington

Analyte	Sample I.D. and Sample Date					
	USGHWY99-MW1-05/10	USGHWY99-MW2-05/10	USGHWY99-MW3-05/10	USGHWY99-MW4-05/10	USGHWY99-MW0-05/10*	USGHWY99-MW5-05/10
	05/25/10	05/25/10	05/25/10	05/26/10	05/26/10	05/26/10
Dissolved Metals (µg/L)						
EPA Methods 200.8/7060A/6010B						
Arsenic (7060A)	630	34	780 **	1,030 **	1,060 **	1,090
Iron	4,290	1,560	29,900 **	31,500 **	32,000 **	5,070
Total Metals (µg/L)						
EPA Method 200.8/7090A/6010B						
Arsenic (200.8)	--	64.2	--	--	--	--
Arsenic (7060A)	--	79	--	--	--	--
Calcium	27,100	21,200	30,200	45,300	43,500	26,900
Iron	6,660	2,970	22,100	9,980	9,670	11,800
Magnesium	14,600	13,700	16,300	25,300	24,000	17,300
Potassium	2,830	3,120	4,910	6,240	5,840	3,860
Sodium	10,500	11,800	15,700	21,700	20,500	15,500
Arsenic Speciation (µg/L)						
Arsenic (III)	455	45.9	267	1,350	1,260	1,410
Arsenic (V)	33.5	2.27	19.2	29.8	24.9	36.6
Conventionals						
Alkalinity (SM 2320; mg/L $CaCO_3$)	152	142	175	264	269	178
Carbonate (SM 2320; mg/L $CaCO_3$)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bicarbonate (SM 2320; mg/L $CaCO_3$)	152	142	175	264	269	178
Hydroxide (SM 2320; mg/L $CaCO_3$)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Dissolved Solids (EPA 260.1; mg/L)	--	--	--			
Total Suspended Solids (EPA 160.2; mg/L)	2.7	5.7	24.4	11.6	10.3	28.5
Chloride (EPA 300.0; mg/L)	4.4	6.7	5.2	9.6	10.0	7.6
N-Nitrate (EPA 300.0; mg-N/L)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
N-Nitrite (EPA 300.0; mg-N/L)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sulfate (EPA 300.0; mg/L)	2.8	6.5	14.7	2.5	2.6	<0.1
Chemical Oxygen Demand (EPA 410.4; mg/L)	28.7	9.34	55.4	30.3	29.4	11.2
Total Organic Carbon (EPA 415.1; mg/L)	12.4	2.71	19.9	11.1	11.2	5.05

Table 8
Analytical Results - Groundwater
Highway 99 Site
USG Interiors
Milton, Washington

	Sample I.D. and Sample Date					
	USGHWY99-MW6-05/10	USGHWY99-MW7-05/10	USGHWY99-MW8-05/10	USGHWY99-MW9-05/10	USGHWY99-99-1-05/10	USGHWY99-99-2-05/10
Analyte	**05/26/10**	**05/27/10**	**05/27/10**	**05/27/10**	**05/26/10**	**05/27/10**
Dissolved Metals (µg/L)						
EPA Methods 200.8/7060A/6010B						
Arsenic (7060A)	310	10	13	44	2,490 **	410
Iron	6,200	1,800	980	<50	6,340 **	45,700
Total Metals (µg/L)						
EPA Method 200.8/7090A/6010B						
Arsenic (200.8)	--	--	14	--	2,220	--
Arsenic (7060A)	--	--	15	--	2,430	--
Calcium	35,300	17,600	21,400	11,000	35,600	86,900
Iron	14,400	7,400	4,870	290	4,840	57,200
Magnesium	20,200	14,400	12,900	8,230	16,900	53,900
Potassium	3,490	6,000	7,640	6,590	4,290	7,510
Sodium	14,300	36,400	35,300	28,500	17,900	31,700
Arsenic Speciation (µg/L)						
Arsenic (III)	351	--	--	--	1,780	310
Arsenic (V)	16.5	--	--	--	132	37.7
Conventionals						
Alkalinity (SM 2320; mg/L $CaCO_3$)	207	196	205	118	193	561
Carbonate (SM 2320; mg/L $CaCO_3$)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bicarbonate (SM 2320; mg/L $CaCO_3$)	207	196	205	118	193	561
Hydroxide (SM 2320; mg/L $CaCO_3$)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Dissolved Solids (EPA 260.1; mg/L)						
Total Suspended Solids (EPA 160.2; mg/L)	41.5	22.2	18.1	4.3	9.9	50
Chloride (EPA 300.0; mg/L)	7.3	5.6	6.3	5.4	7.4	9.6
N-Nitrate (EPA 300.0; mg-N/L)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
N-Nitrite (EPA 300.0; mg-N/L)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5
Sulfate (EPA 300.0; mg/L)	<0.1	<0.1	0.2	7.5	1.6	<0.1
Chemical Oxygen Demand (EPA 410.4; mg/L)	20.5	10.9	7.75	6.48	7.43	62.7
Total Organic Carbon (EPA 415.1; mg/L)	9.27	4.17	3.83	<1.50	4.83	25.3

Table 8
Analytical Results - Groundwater
Highway 99 Site
USG Interiors
Milton, Washington

	Sample I.D. and Sample Date													
	GW-1	**GW-2**	**GW-3**	**GW-4**	**GW-5**	**GW-6**	**GW-7**	**GW-8**	**GW-9**	**MW10-10/11**	**MW11-10/11**	**MW12-05/12**	**MW13-05/12**	**MW14-05/12**
Analyte	**04/07/11**	**04/07/11**	**04/07/11**	**04/07/11**	**04/07/11**	**04/07/11**	**04/07/11**	**04/07/11**	**04/07/11**	**10/18/11**	**10/18/11**	**05/22/12**	**05/22/12**	**05/22/12**
Dissolved Metals (µg/L)														
EPA Method 6020														
Arsenic	55	2.4	38	120	21	19	<2	340	2.1	366	23.5	2.1	14.3	10.3
Iron	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Metals (µg/L)														
EPA Method 200.8/7090A/6010B														
Arsenic (200.8)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic (7060A)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic Speciation (µg/L)														
Arsenic (III)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic (V)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conventionals														
Alkalinity (SM 2320; mg/L $CaCO_3$)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbonate (SM 2320; mg/L $CaCO_3$)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bicarbonate (SM 2320; mg/L $CaCO_3$)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hydroxide (SM 2320; mg/L $CaCO_3$)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Dissolved Solids (EPA 260.1; mg/L)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Suspended Solids (EPA 160.2; mg/L)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chloride (EPA 300.0; mg/L)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-Nitrate (EPA 300.0; mg-N/L)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-Nitrite (EPA 300.0; mg-N/L)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfate (EPA 300.0; mg/L)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand (EPA 410.4; mg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Organic Carbon (EPA 415.1; mg/L)	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:
*USGHWY-MW0-05/10 is a duplicate of USGHWY-MW4-05/10.
** Value from re-sampling on 7/15/10.
mg/L - milligrams per liter.
µg/L - micrograms per liter.
-- not analyzed.
< - analyte not detected at or greater than the listed concentration.

Table 9
Analytical Results - Surface Water
Highway 99 Site
USG Interiors
Milton, Washington

Analyte	USGHwy99-SW1-05/10 05/25/10	USGHwy99-SW2-05/10 05/25/10	USGHwy99-SW3-05/10 05/25/10	USGHwy99-SW4-05/10 05/25/10	USGHwy99-SW5-05/10 05/25/10	USGHwy99-SW6-05/10 05/25/10
	Sample I.D. and Sample Date					
Dissolved Metals (µg/L)						
EPA Methods 200.8/7060A/6010B						
Arsenic (200.8)	3.0	2.9	3.0	3.1	3.0	3.0
Arsenic (7060A)	4	4	4	3	4	4
Iron	280	--	--	270	280	
Total Metals (µg/L)						
EPA Method 200.8/7090A/6010B						
Arsenic (200.8)	3.4	--	--	3.4	3.5	--
Arsenic (7060A)	3	--	--	4	4	--
Calcium	19,000	--	--	17,900	18,100	--
Iron	410	--	--	390	420	--
Magnesium	13,100	--	--	12,200	12,400	--
Potassium	1,760	--	--	1,650	1,710	--
Sodium	7,500		--	7,040	7,120	--
Arsenic Speciation (µg/L)						
Arsenic (III)	0.403	--	--	0.444	0.539	--
Arsenic (V)	2.12	--	--	2.22	2.36	--
Conventionals						
Alkalinity (SM 2320; mg/L $CaCO_3$)	99.6	--	--	98.9	97.1	--
Carbonate (SM 2320; mg/L $CaCO_3$)	<1.0	--	--	<1.0	<1.0	--
Bicarbonate (SM 2320; mg/L $CaCO_3$)	99.6	--	--	98.9	97.1	--
Hydroxide (SM 2320; mg/L $CaCO_3$)	<1.0	--	--	<1.0	<1.0	--
Total Dissolved Solids (EPA 260.1; mg/L)	170	--	--	164	164	--
Total Suspended Solids (EPA 160.2; mg/L)	1.6	--	--	1.9	10.5	--
Chloride (EPA 300.0; mg/L)	8.0	--	--	8.0	7.8	--
N-Nitrate (EPA 300.0; mg-N/L)	0.7	--	--	0.7	0.7 J	--
N-Nitrite (EPA 300.0; mg-N/L)	<0.1	--	--	<0.1	<0.1 J	--
Sulfate (EPA 300.0; mg/L)	8.4	--	--	8.4	8.2	--
Chemical Oxygen Demand (EPA 410.4; mg/L)	14.7	--	--	16.0	11.9	--
Total Organic Carbon (EPA 415.1; mg/L)	5.22	--	--	5.19	7.38	--

Notes:
J - Value is estimated due to exceedance of holding time
µg/L - micrograms per liter.
-- not analyzed.
< - analyte not detected at or greater than the listed concentration.

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Figures

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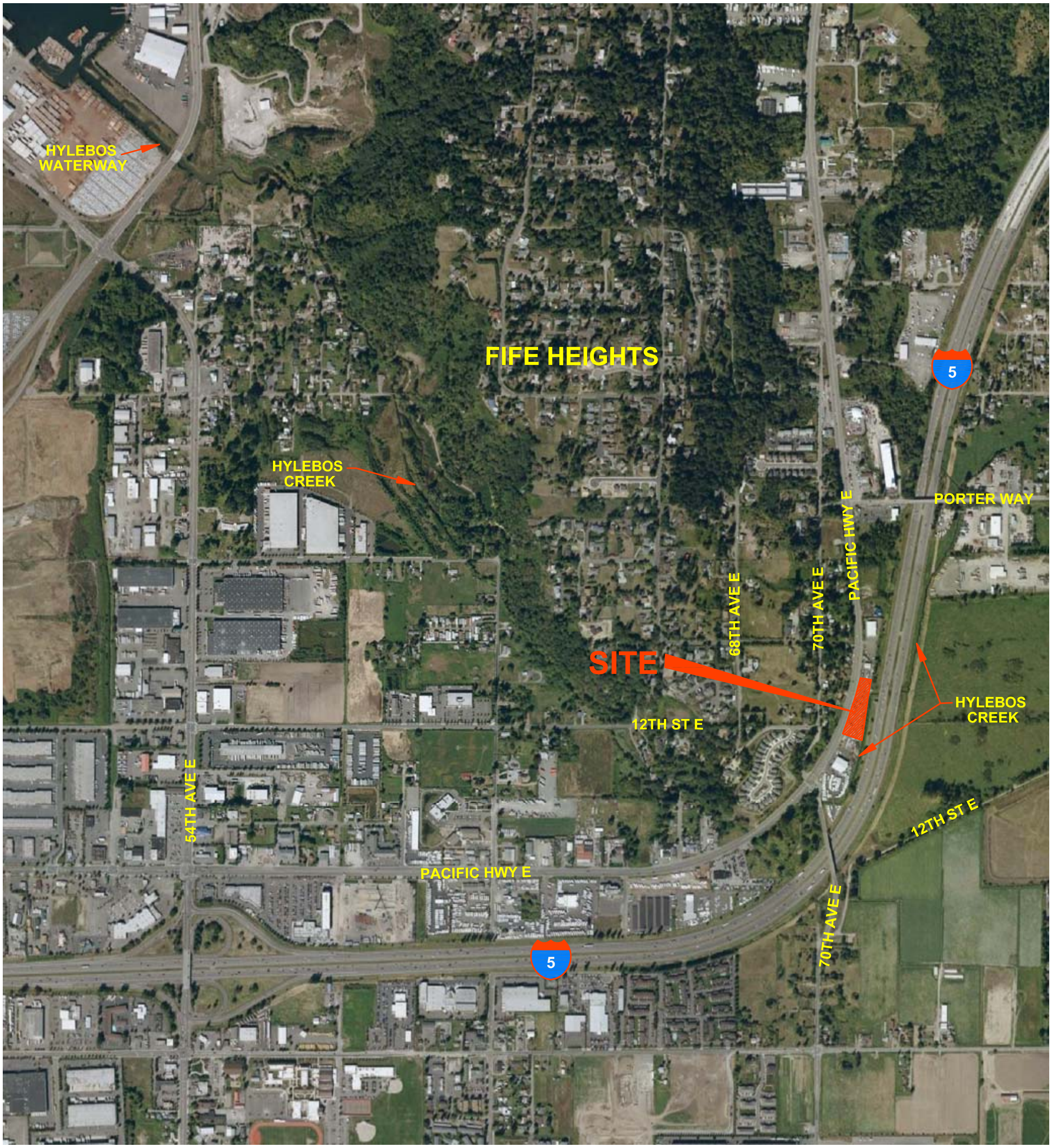

Source: GOOGLE EARTH PRO, 2009

N

0 1200
Scale in Feet

P:\19921\65021\ FIG-1 12/14/09 11:36 riehlepj

USG INTERIORS/HIGHWAY 99 SITE
MILTON, WASHINGTON

Figure No. 1
Vicinity Map

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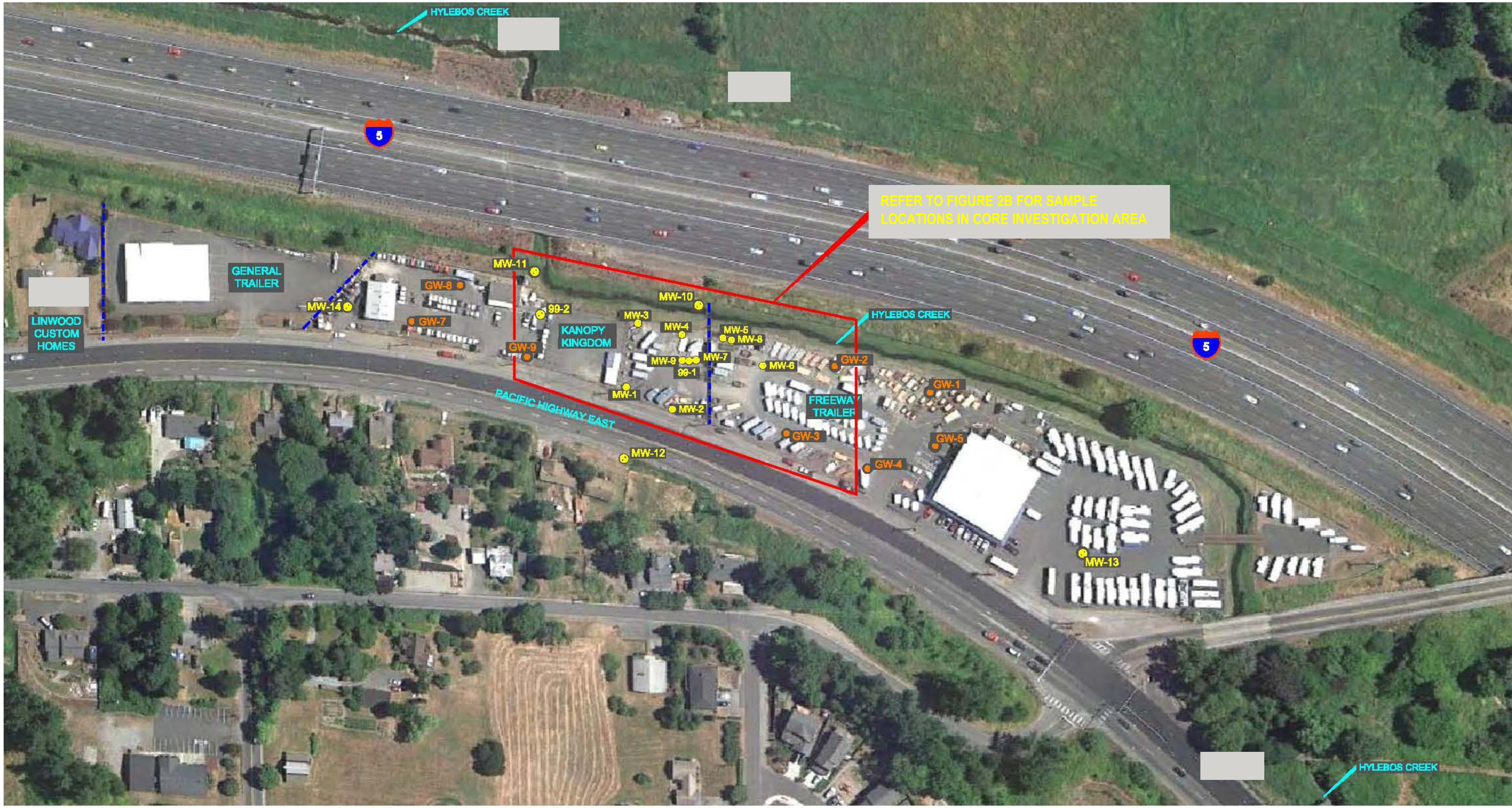

REFERENCE: GOOGLE EARTH PRO, 2012, IMAGE DATE AUGUST 20, 2011

LEGEND:

- MW-12 MONITORING WELL
- GW-3 PHASE 2 DPT BORING
- PROPERTY LINE

NOTE:

MONITORING WELL MW-14 WAS DRILLED AT THE LOCATION OF GW-6

N

1" = 120'

60 0 120

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USG INTERIORS
HIGHWAY 99 SITE
MILTON, WASHINGTON

Figure No. 2A
Site Plan

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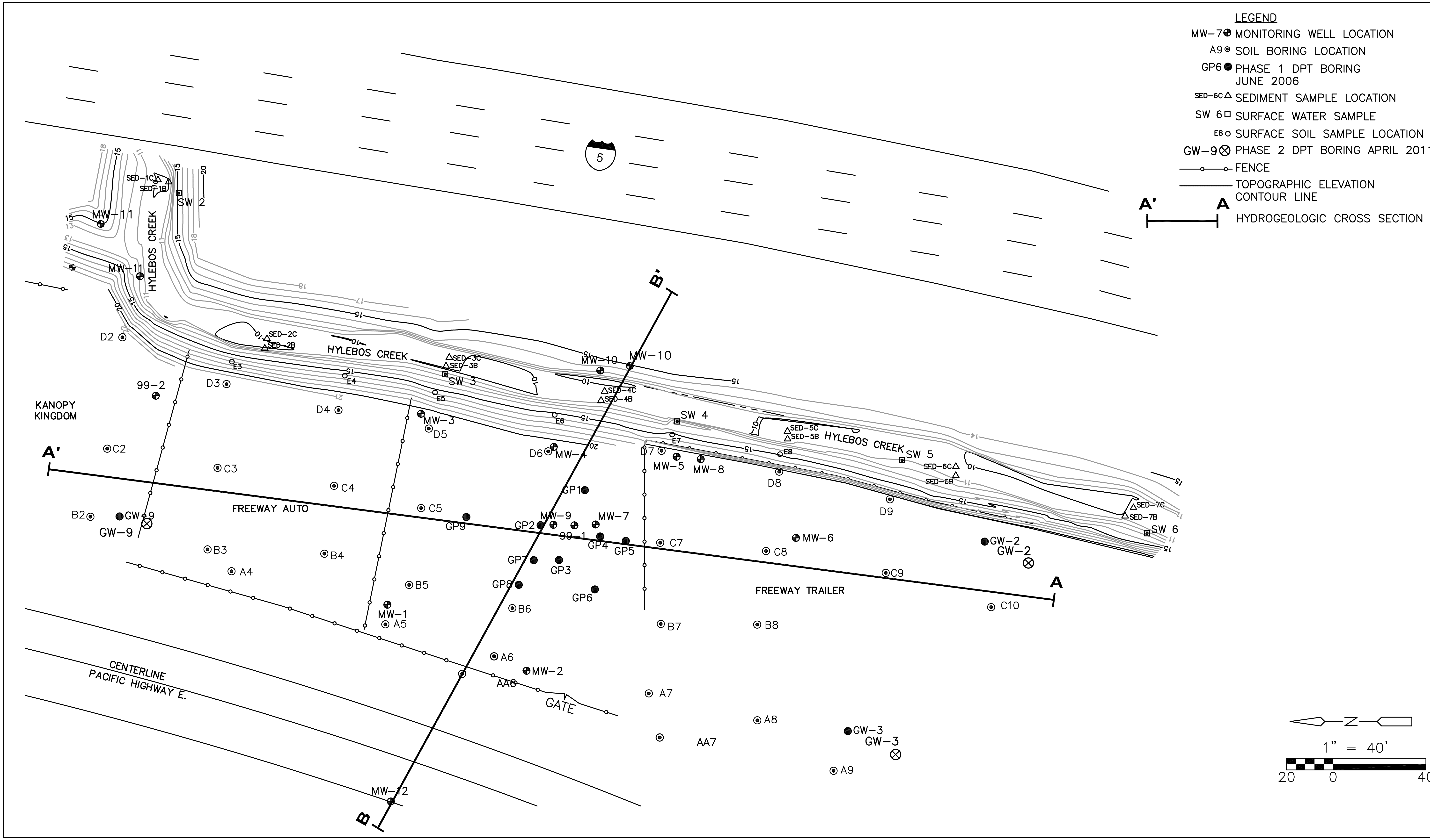

USG INTERIORS
HIGHWAY 99 SITE
MILTON, WASHINGTON

Figure No. 2B
Site Plan

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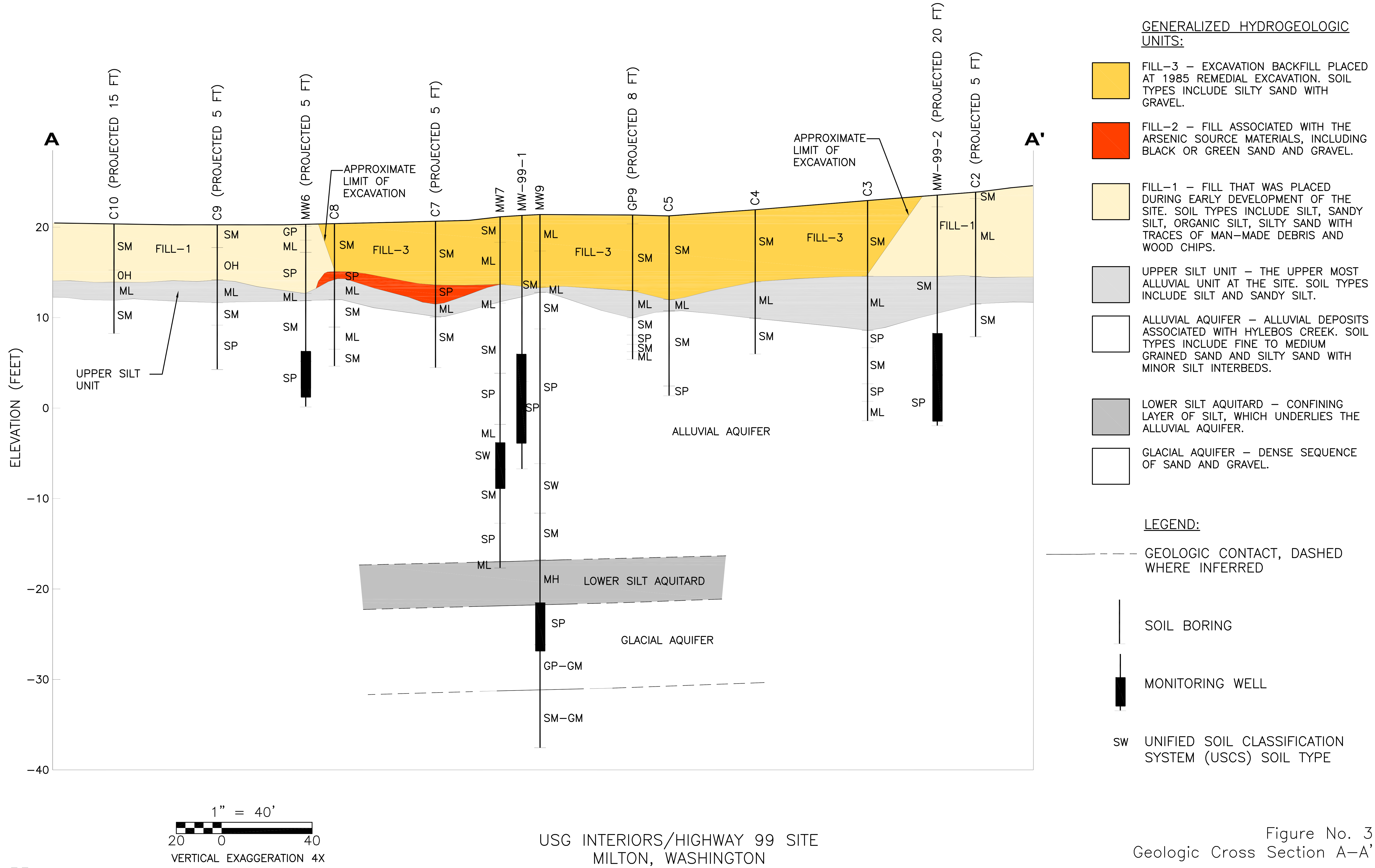

P:\19921\77628\Hylebros Creek\ FIG−3 09/08/10 07:47 riehlepj XREFS: HC−11X17BD

USG INTERIORS/HIGHWAY 99 SITE
MILTON, WASHINGTON

Figure No. 3
Geologic Cross Section A−A'

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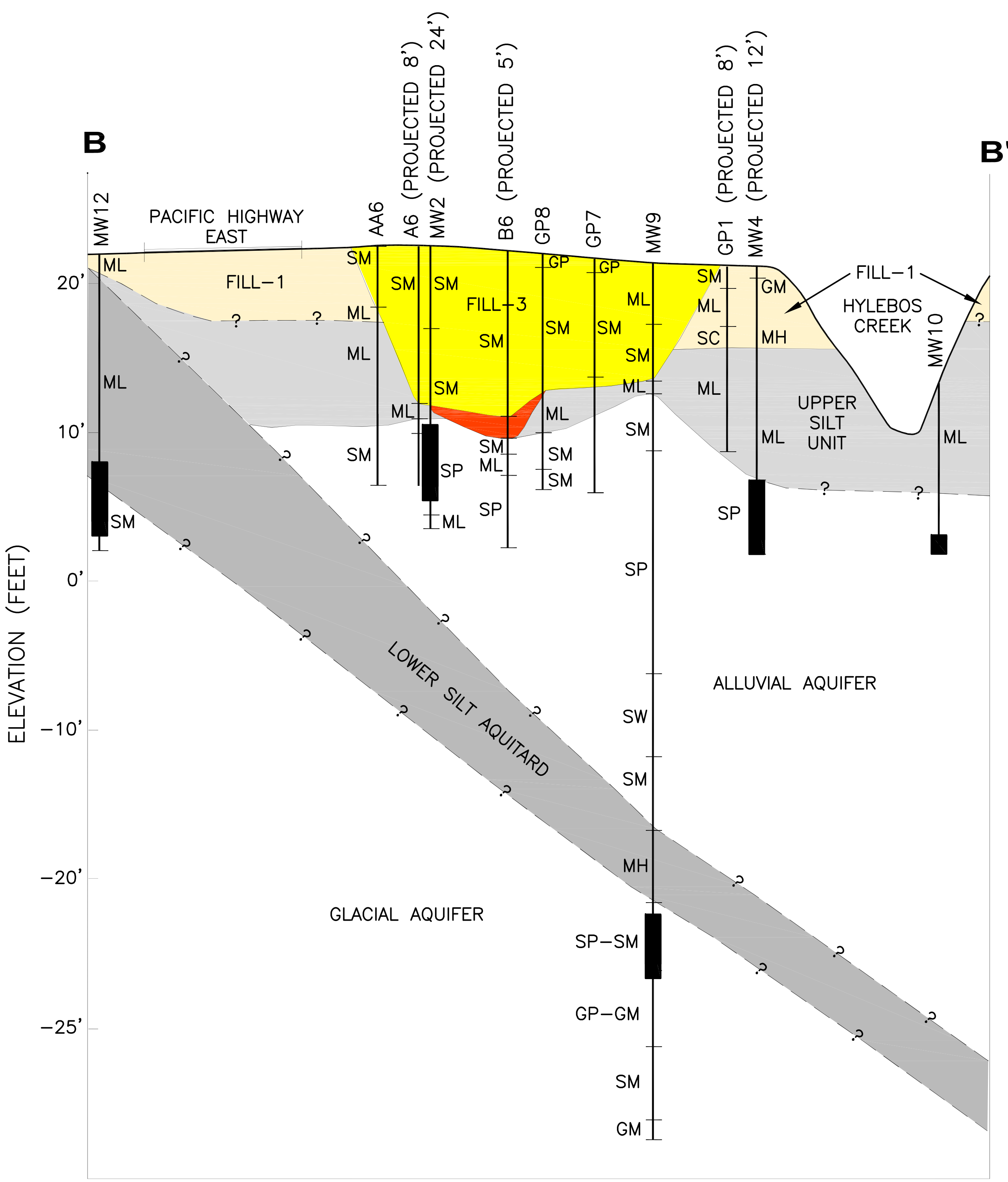

1" = 40'

20 0 40

VERTICAL EXAGGERATION 4X

GENERALIZED HYDROGEOLOGIC UNITS:

FILL–3 – EXCAVATION BACKFILL PLACED AT 1985 REMEDIAL EXCAVATION. SOIL TYPES INCLUDE SILTY SAND WITH GRAVEL.

FILL–2 – FILL ASSOCIATED WITH THE ARSENIC SOURCE MATERIALS, INCLUDING BLACK OR GREEN SAND AND GRAVEL.

FILL–1 – FILL THAT WAS PLACED DURING EARLY DEVELOPMENT OF THE SITE. SOIL TYPES INCLUDE SILT, SANDY SILT, ORGANIC SILT, SILTY SAND WITH TRACES OF MAN–MADE DEBRIS AND WOOD CHIPS.

UPPER SILT UNIT – THE UPPER MOST ALLUVIAL UNIT AT THE SITE. SOIL TYPES INCLUDE SILT AND SANDY SILT.

ALLUVIAL AQUIFER – ALLUVIAL DEPOSITS ASSOCIATED WITH HYLEBOS CREEK. SOIL TYPES INCLUDE FINE TO MEDIUM GRAINED SAND AND SILTY SAND WITH MINOR SILT INTERBEDS.

LOWER SILT AQUITARD – CONFINING LAYER OF SILT, WHICH UNDERLIES THE ALLUVIAL AQUIFER.

GLACIAL AQUIFER – DENSE SEQUENCE OF SAND AND GRAVEL.

LEGEND:

GEOLOGIC CONTACT, DASHED WHERE INFERRED

SOIL BORING

MONITORING WELL

SW UNIFIED SOIL CLASSIFICATION SYSTEM (USCS) SOIL TYPE

P:\19921\77628\Hylebros Creek\ FIG–4 REVISED 07/12/12 08:59 riehlepj XREFS: HC–11X17BD

CDM

USG INTERIORS/HIGHWAY 99 SITE
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Figure No. 4
Geologic Cross Section B–B'

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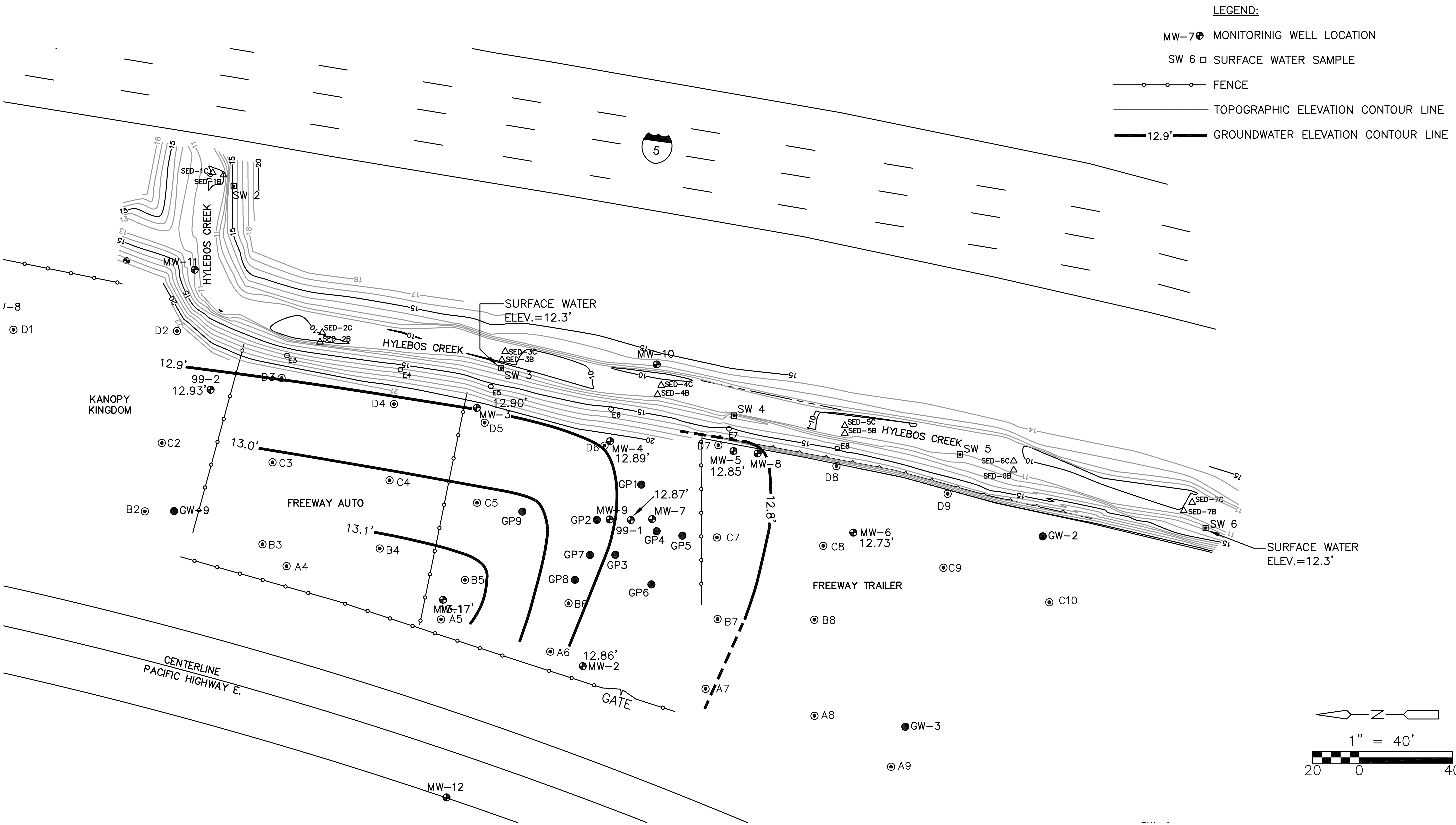

P:\19921\77628\Hylebros Creek\ FIG-5 07/12/12 09:17 riehlepj XREFS: HC-11X17BD, HC-SITEBASE

CDM

USG INTERIORS/HIGHWAY 99 SITE
MILTON, WASHINGTON

Figure No. 5
Groundwater Elevation Contour Map
Alluvial Aquifer
July 15, 2010

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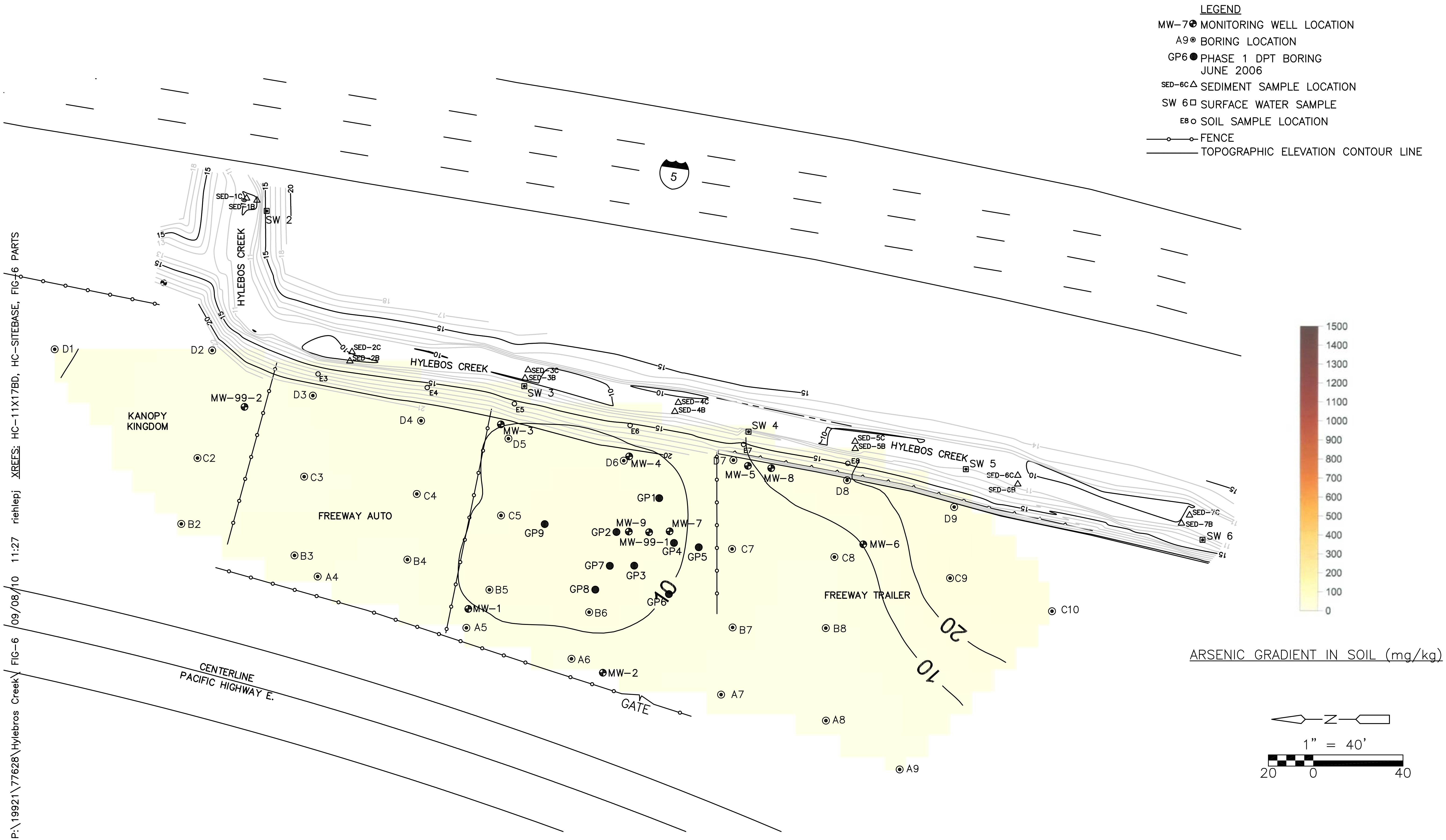

USG INTERIORS/HIGHWAY 99 SITE
MILTON, WASHINGTON

Figure No. 6
Arsenic From 0–2 Feet bgs

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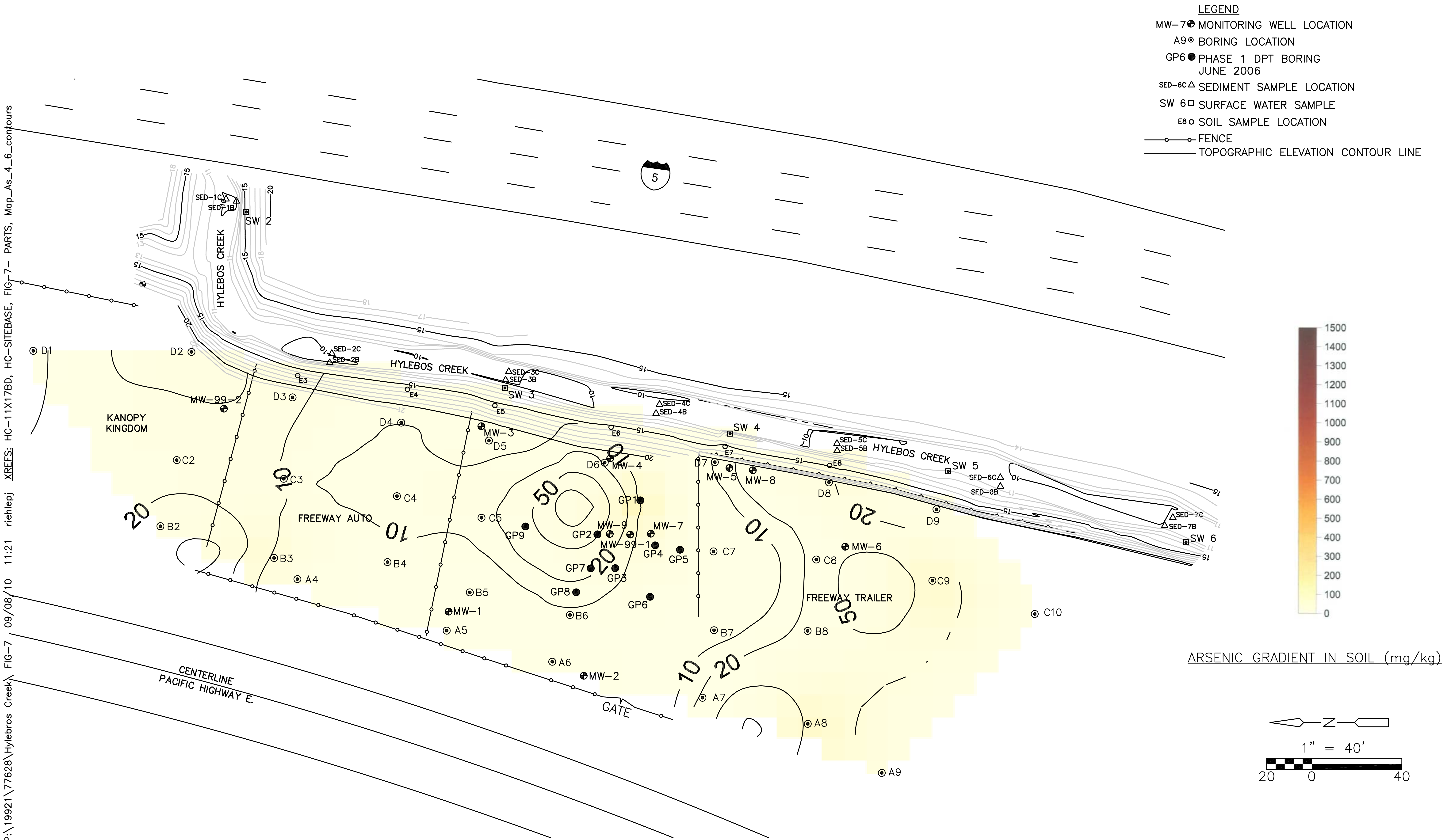

P:\19921\77628\Hylebros Creek\ FIG-7 09/08/10 11:21 riehlepj XREFS: HC-11X17BD, HC-SITEBASE, FIG-7- PARTS, Map_As_4_6_contours

USG INTERIORS/HIGHWAY 99 SITE
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Figure No. 7
Arsenic From 4–6 Feet bgs

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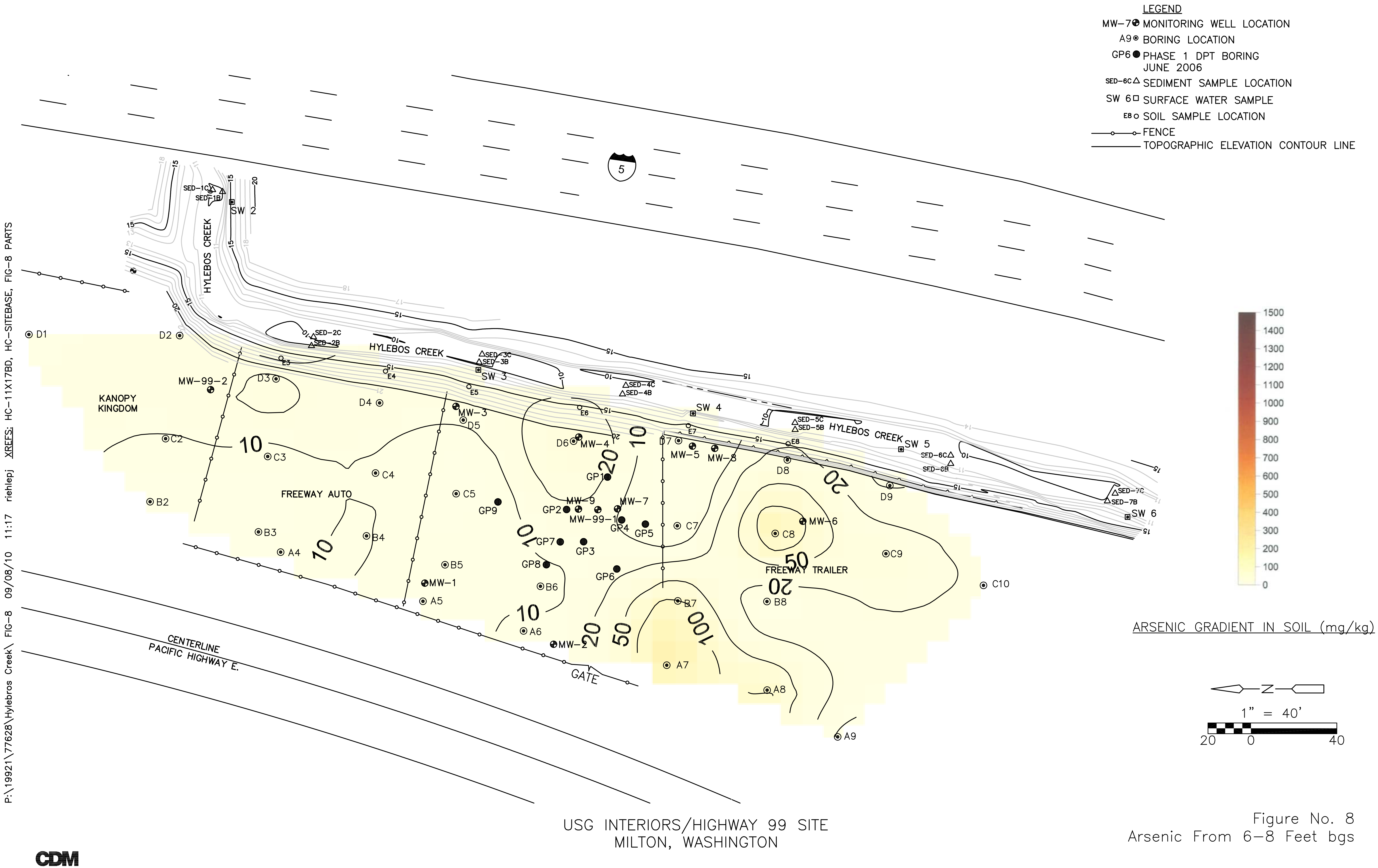

USG INTERIORS/HIGHWAY 99 SITE
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Figure No. 8
Arsenic From 6–8 Feet bgs

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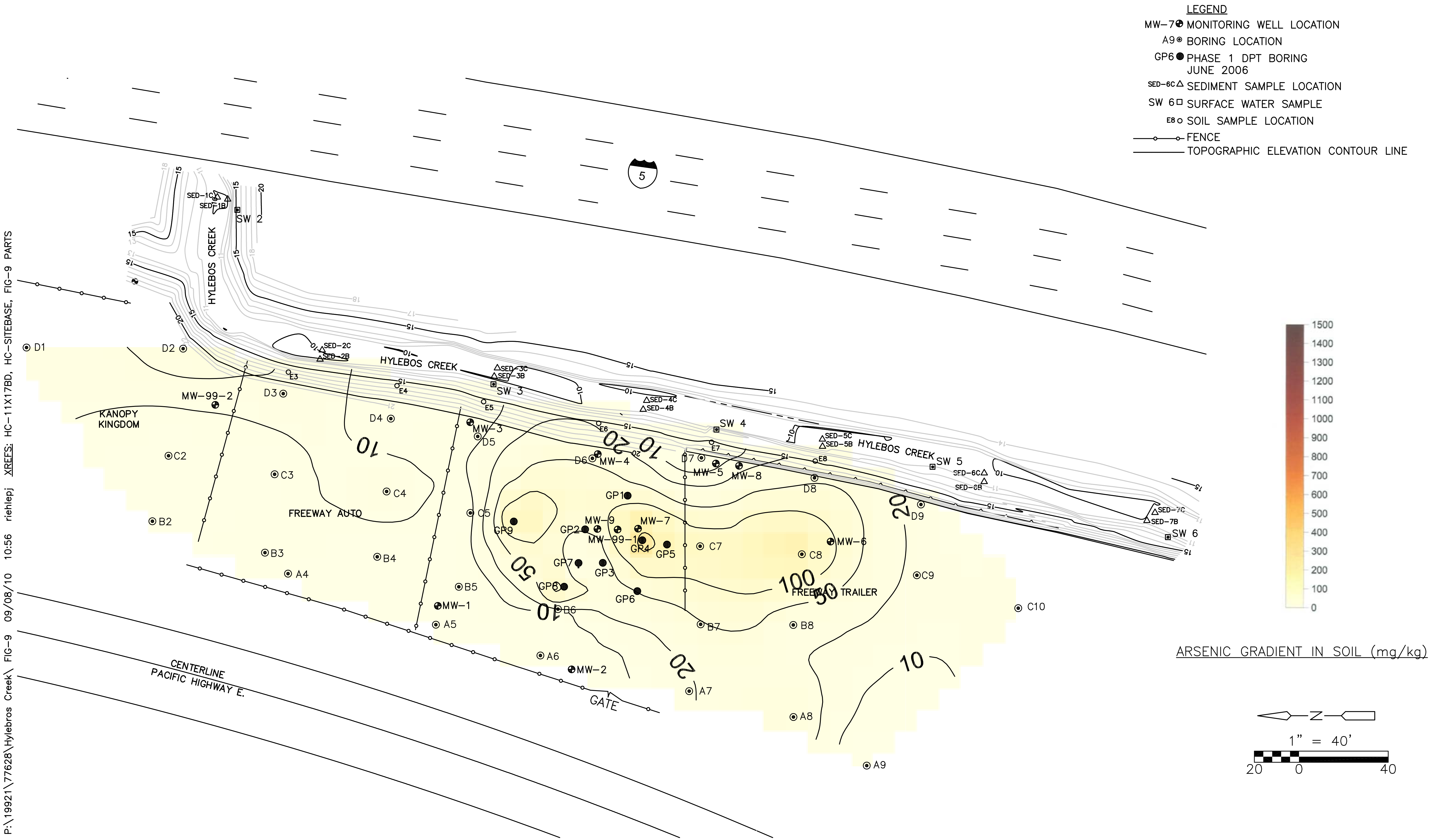

P:\19921\77628\Hylebros Creek\ FIG-9 09/08/10 10:56 riehlepj XREFS: HC-11X17BD, HC-SITEBASE, FIG-9 PARTS

USG INTERIORS/HIGHWAY 99 SITE
MILTON, WASHINGTON

Figure No. 9
Arsenic From 8–10 Feet bgs

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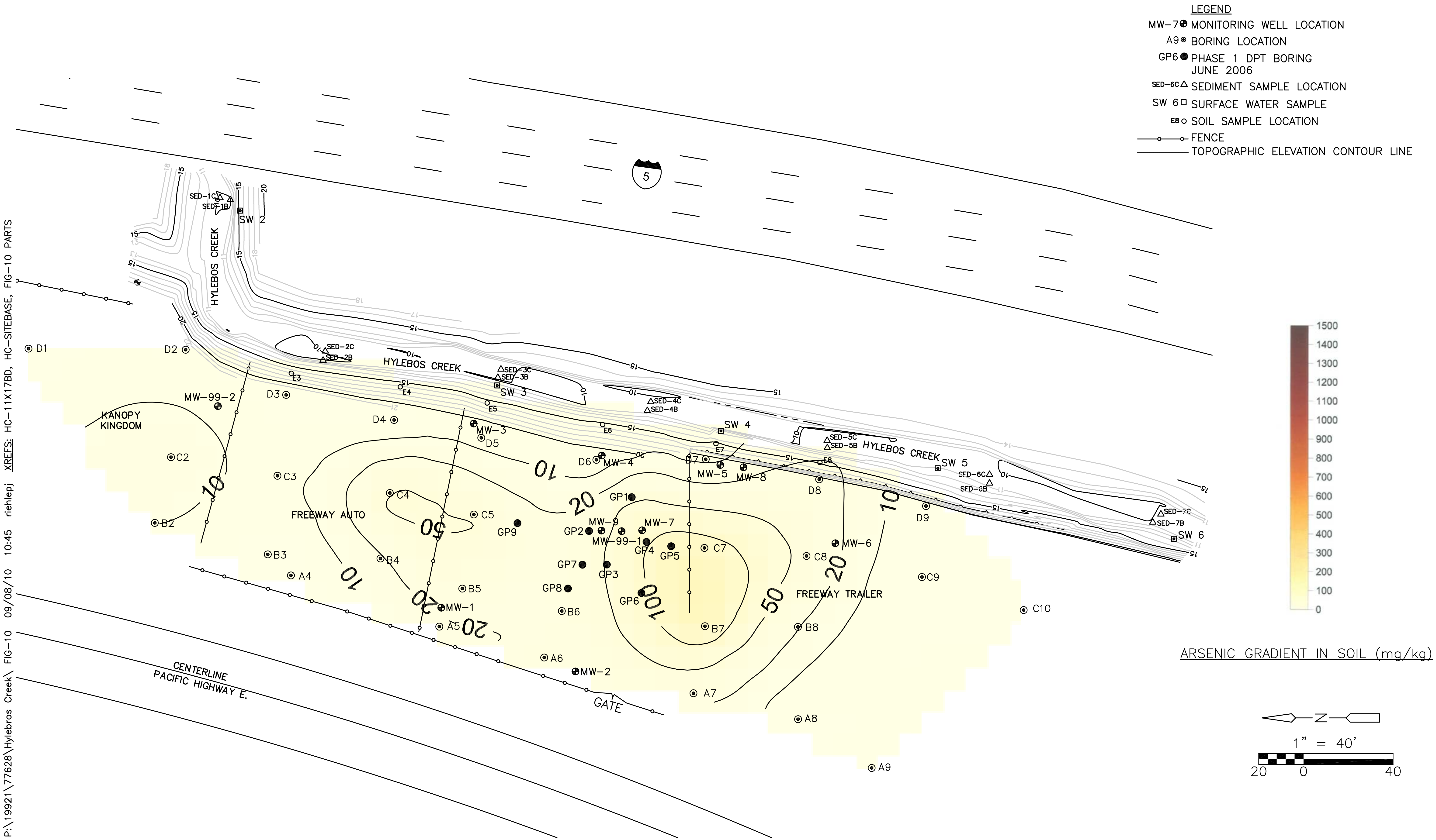

P:\19921\77628\Hylebros Creek\ FIG-10 09/08/10 10:45 riehlepj XREFS: HC-11X17BD, HC-SITEBASE, FIG-10 PARTS

USG INTERIORS/HIGHWAY 99 SITE
MILTON, WASHINGTON

Figure No. 10
Arsenic From 10-12 Feet bgs

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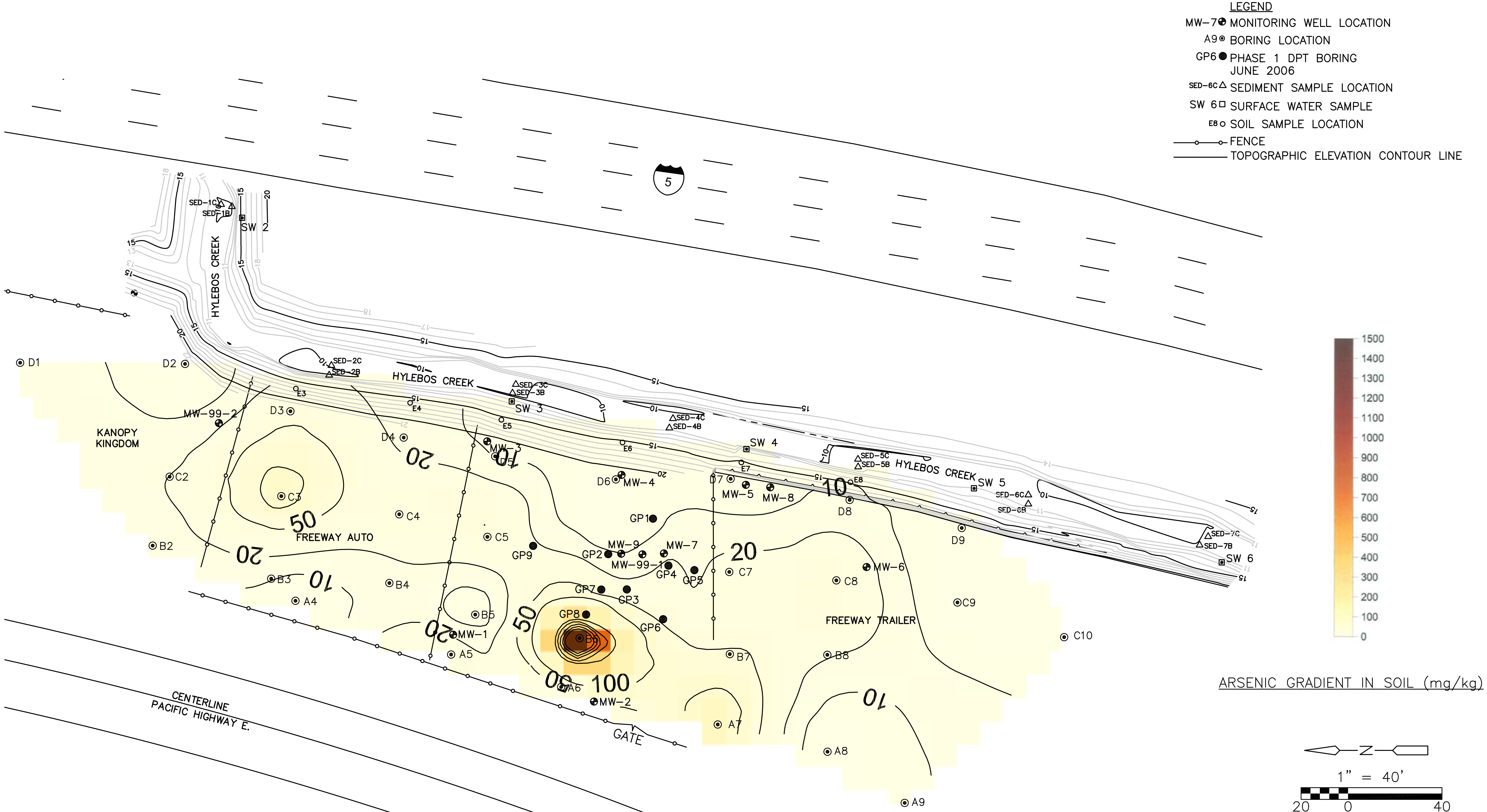

P:\19921\77628\Hylebros Creek\ FIG-11 09/08/10 10:32 riehlepj XREFS: HC-11X17BD, HC-SITEBASE, FIG-11 PARTS

USG INTERIORS/HIGHWAY 99 SITE
MILTON, WASHINGTON

Figure No. 11
Arsenic From 12–14 Feet bgs

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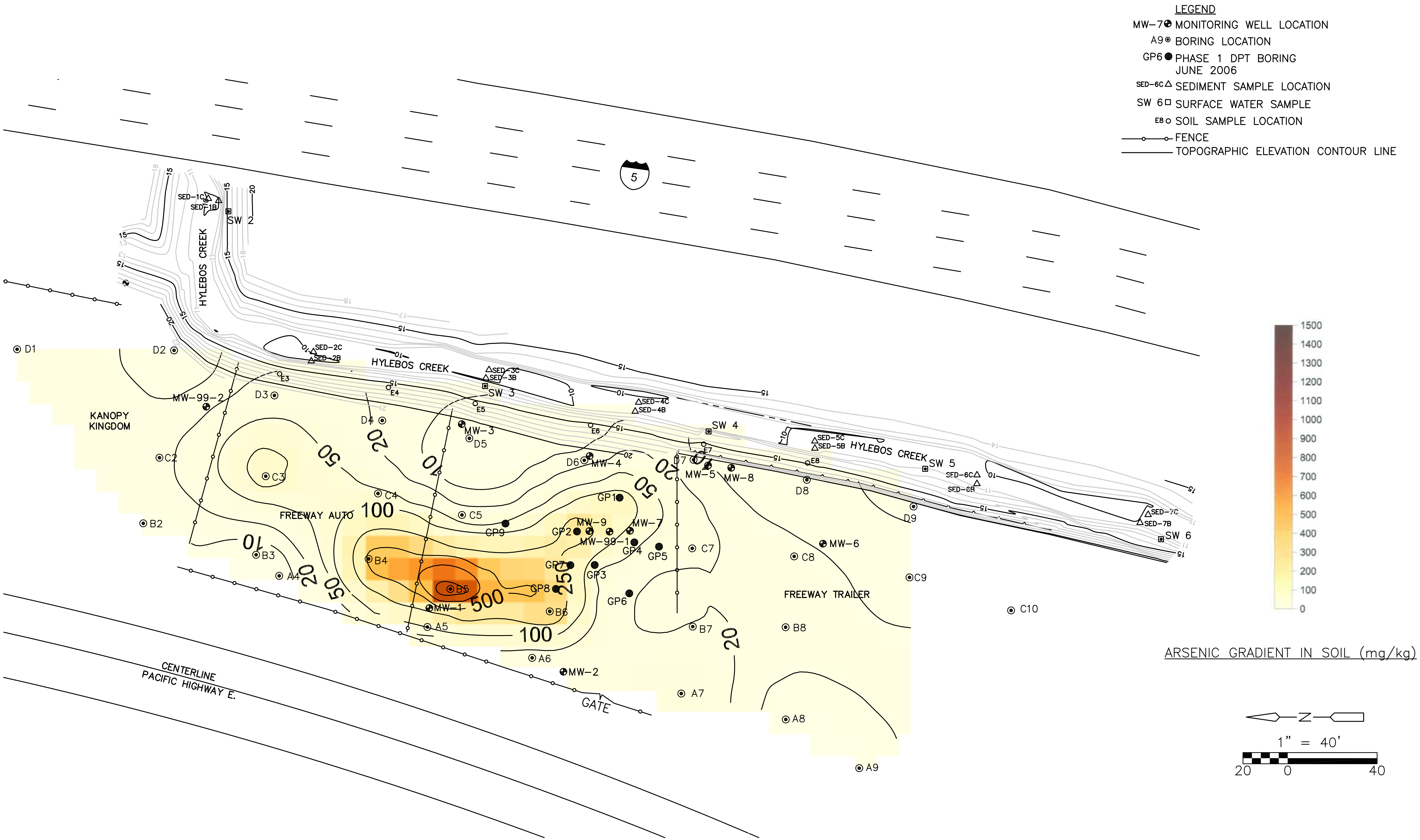

USG INTERIORS/HIGHWAY 99 SITE
MILTON, WASHINGTON

Figure No. 12
Arsenic From 14–16 Feet bgs

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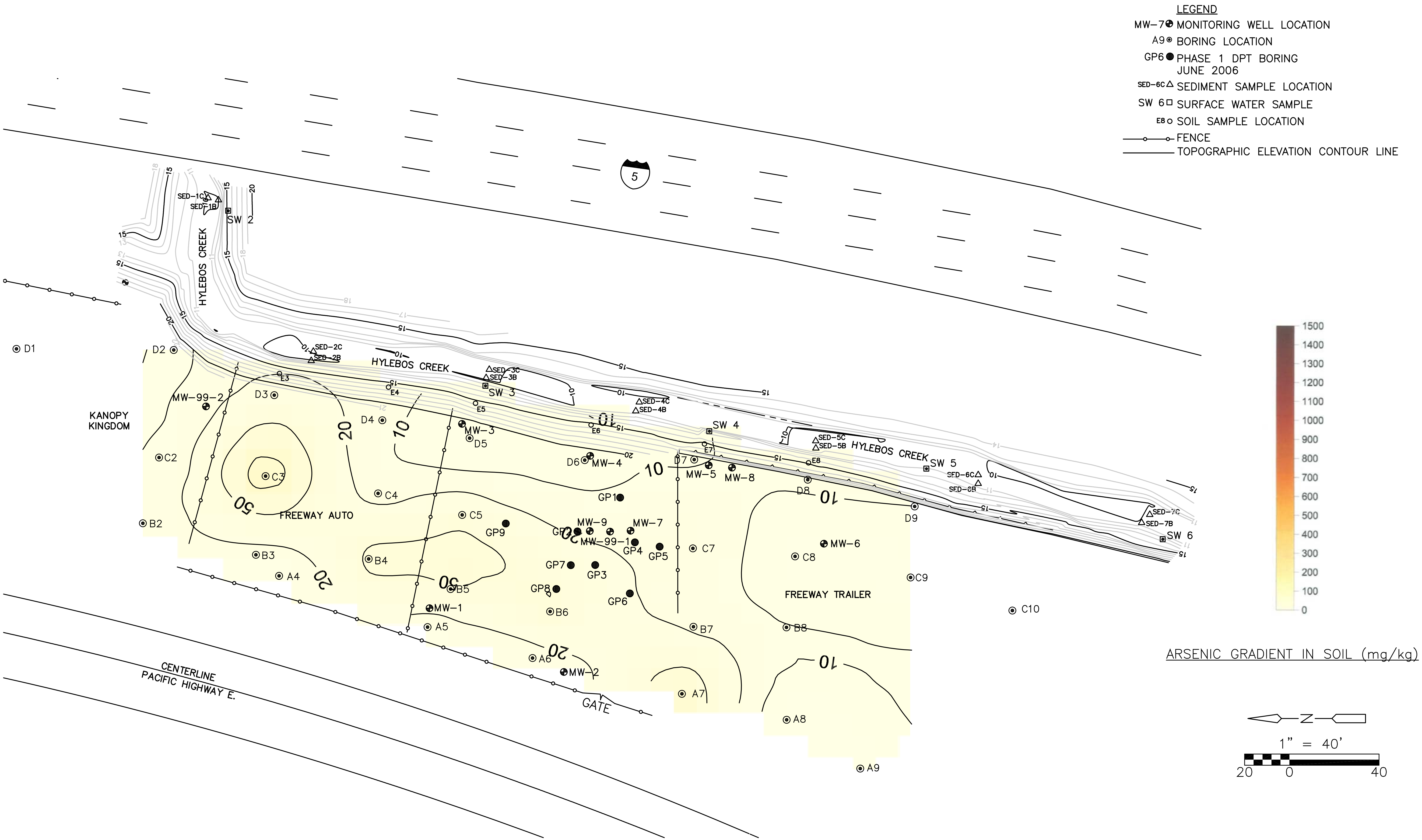

USG INTERIORS/HIGHWAY 99 SITE
MILTON, WASHINGTON

Figure No. 13
Arsenic From 16–18 Feet bgs

CDM

P:\19921\77628\Hylebros Creek\ FIG-13 09/08/10 10:14 riehlepj XREFS: HC-11X17BD, HC-SITEBASE, FIG-13 PARTS

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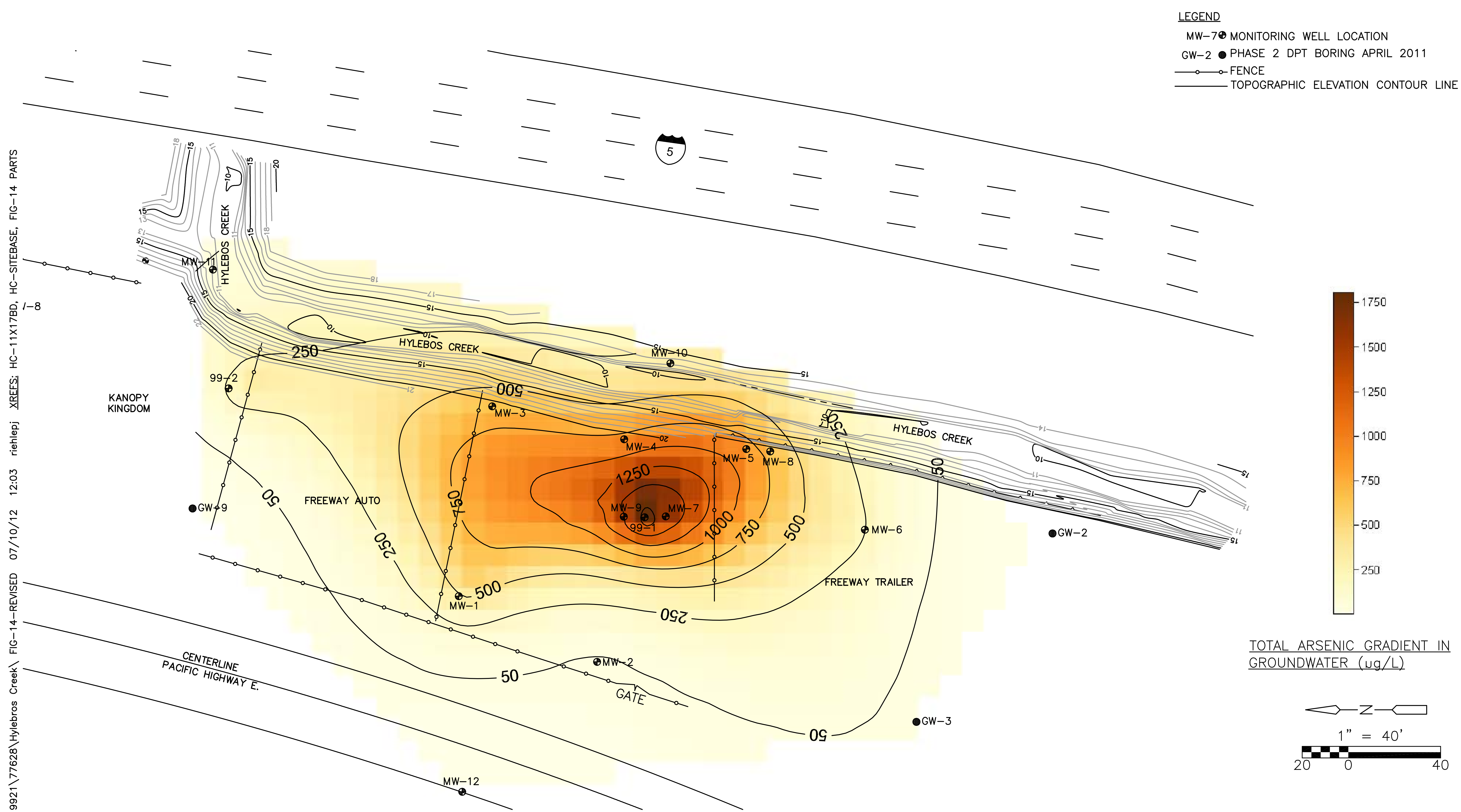

USG INTERIORS/HIGHWAY 99 SITE
MILTON, WASHINGTON

Figure No. 14
Dissolved Total Arsenic in Groundwater

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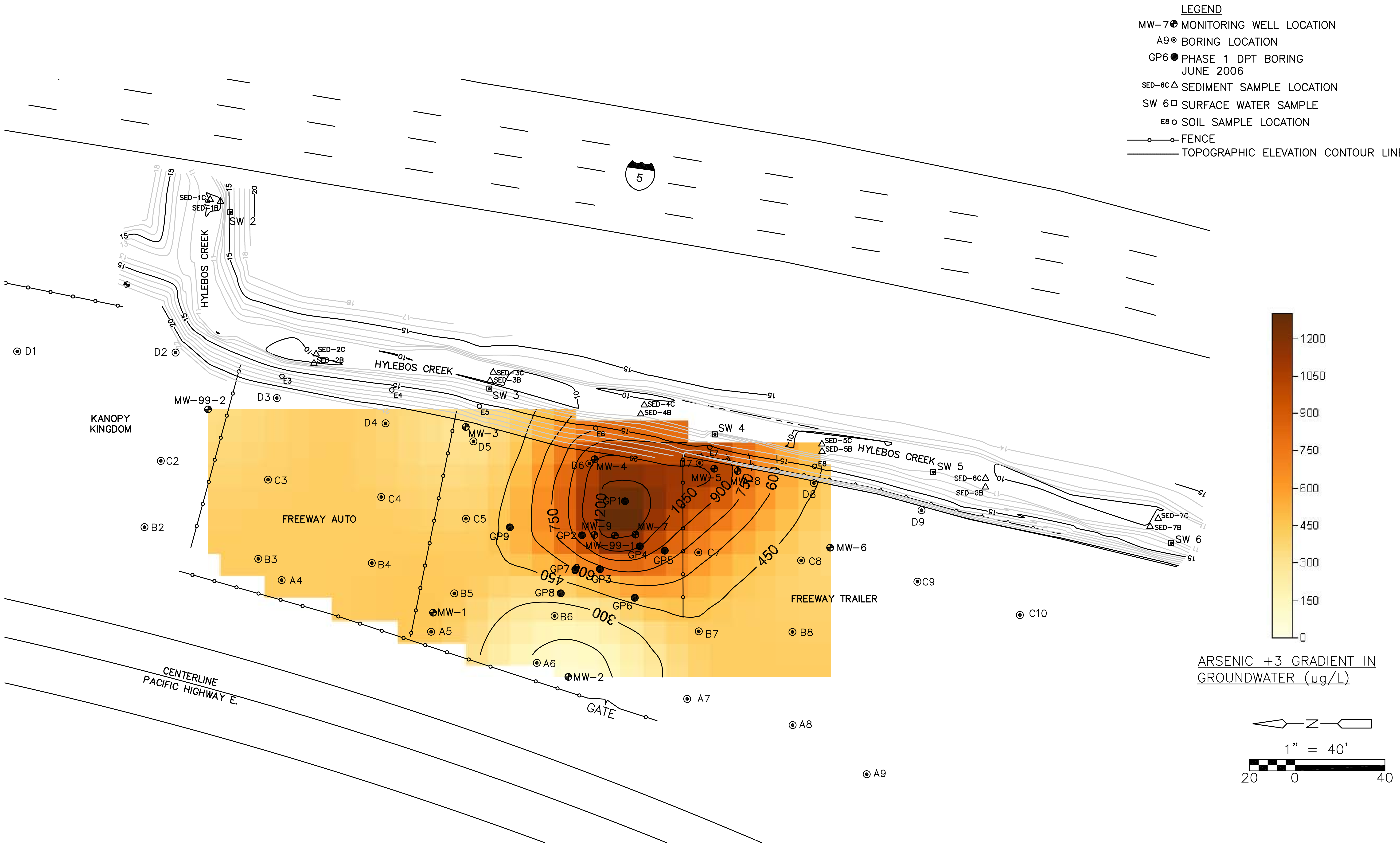

P:\19921\77628\Hylebros Creek\ FIG-15 09/08/10 09:54 riehlepj XREFS: HC-11X17BD, HC-SITEBASE, FIG-15 PARTS

USG INTERIORS/HIGHWAY 99 SITE
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Figure No. 15
Arsenic +3 in Groundwater

CDM

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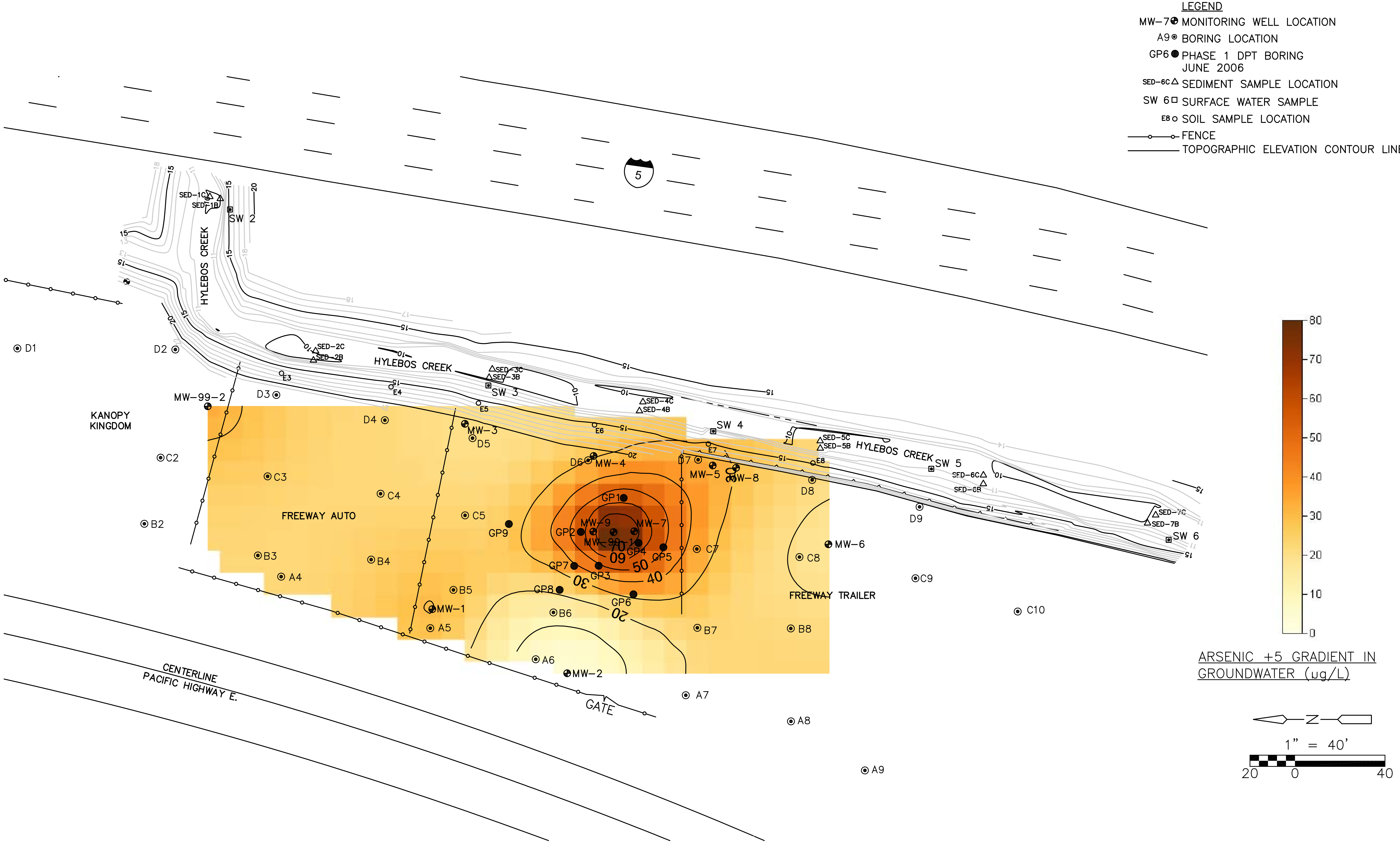
P:\19921\77628\Hylebros Creek\ FIG-16 09/08/10 09:46 riehlepj XREFS: HC-11X17BD, HC-SITEBASE, FIG-16 PARTS



USG INTERIORS/HIGHWAY 99 SITE
MILTON, WASHINGTON

Figure No. 16
Arsenic +5 in Groundwater

CDM

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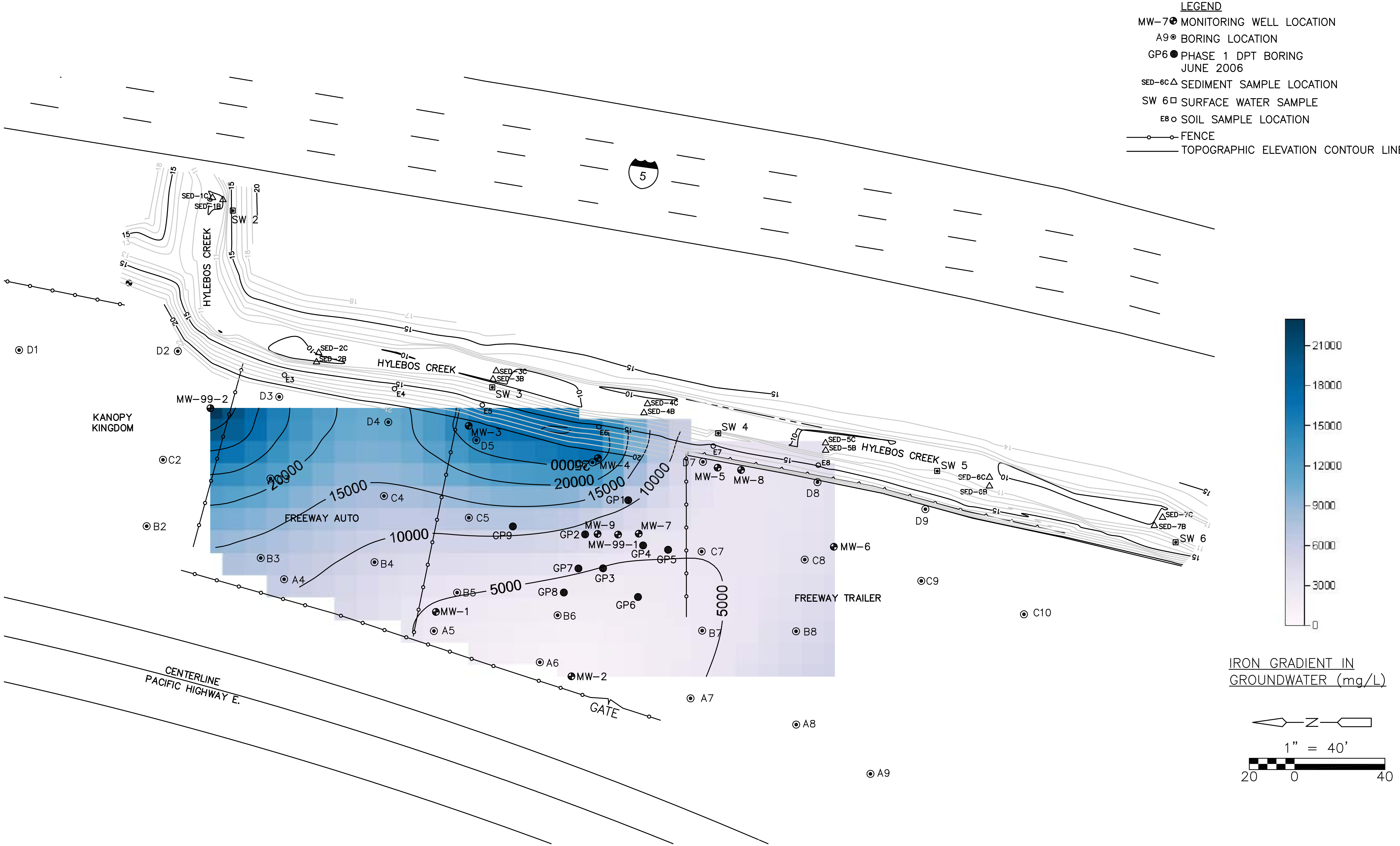
P:\19921\77628\Hylebros Creek\ FIG-17 09/08/10 09:35 riehlepj XREFS: HC-11X17BD, HC-SITEBASE, FIG-17 PARTS



USG INTERIORS/HIGHWAY 99 SITE
MILTON, WASHINGTON

Figure No. 17
Dissolved Iron in Groundwater

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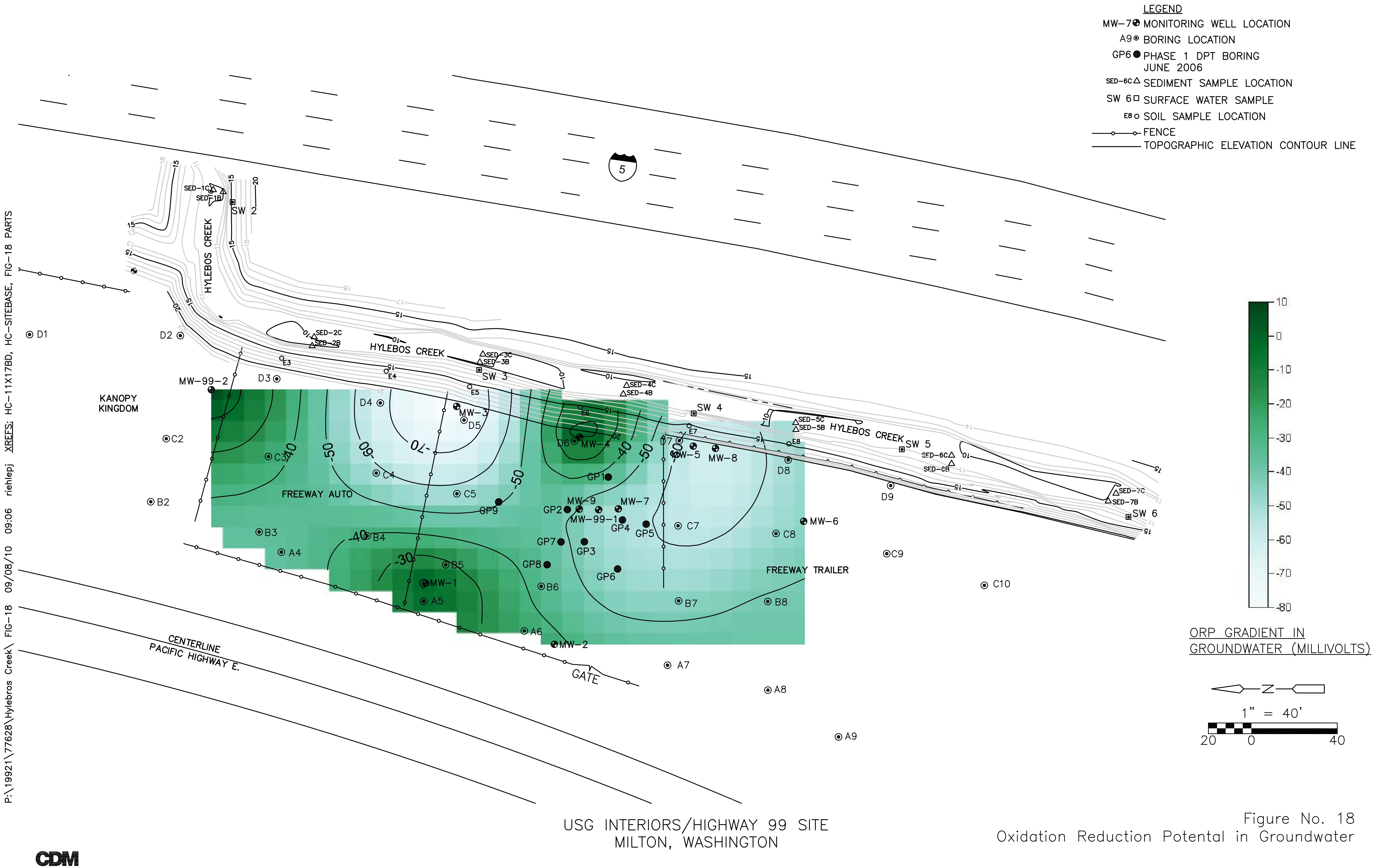

USG INTERIORS/HIGHWAY 99 SITE
MILTON, WASHINGTON

Figure No. 18
Oxidation Reduction Potential in Groundwater

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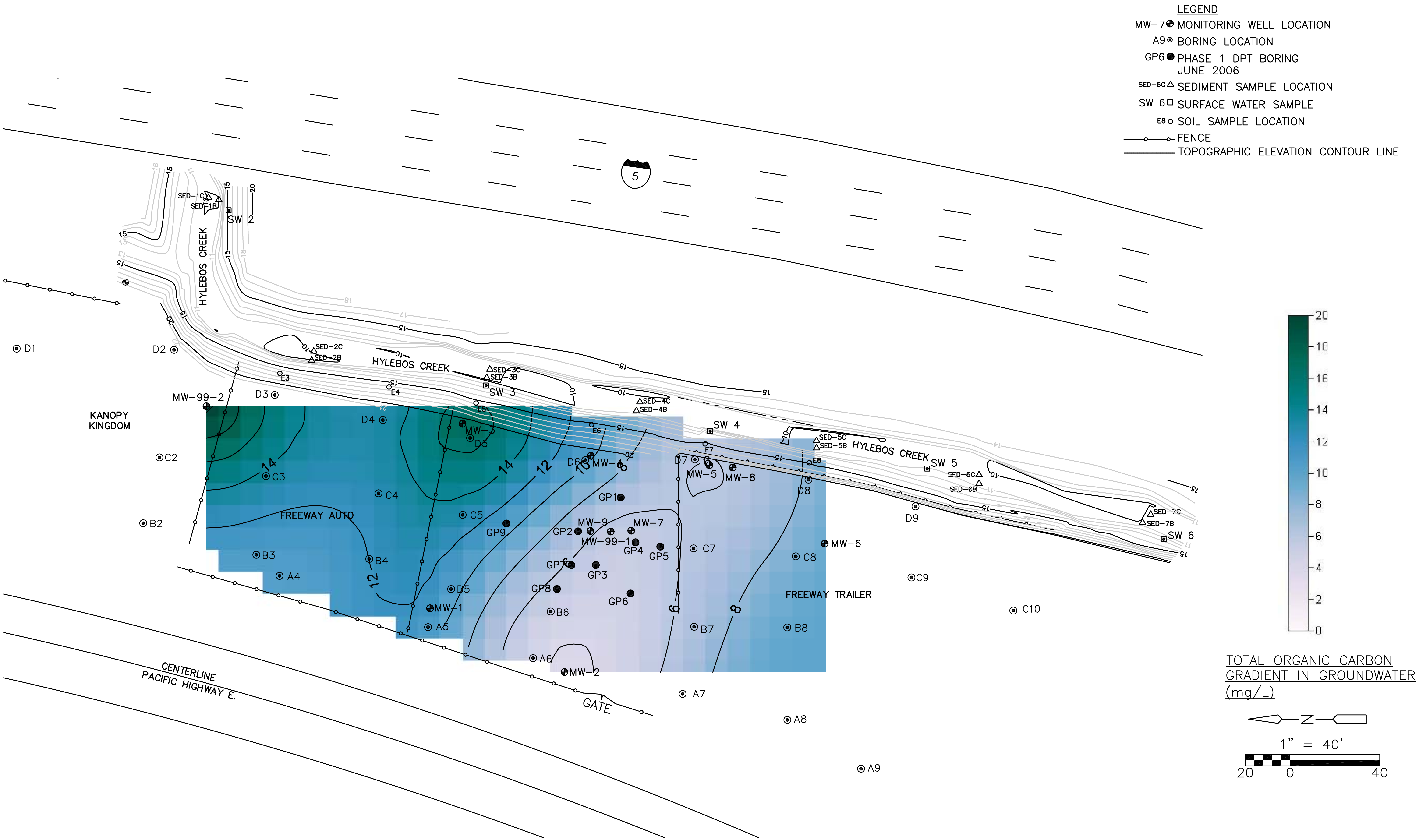

USG INTERIORS/HIGHWAY 99 SITE
MILTON, WASHINGTON

Figure No. 19
Total Organic Carbon in Groundwater

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Appendix A
Boring Logs and Well Construction Logs

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SOIL CLASSIFICATION LEGEND

MAJOR DIVISIONS				TYPICAL NAMES
COARSE GRAINED SOILS More than half is larger than No. 200 sieve	GRAVELS More than half coarse fraction is larger than No. 4 sieve size	Clean gravels with little or no fines	GW	Well graded gravels, gravel-sand mixtures
			GP	Poorly graded gravels, gravel-sand mixtures
		Gravel with over 12% fines	GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS More than half coarse fraction is smaller than No. 4 sieve size	Clean sands with little or no fines	SW	Well graded sands, gravelly sands
			SP	Poorly graded sands, gravelly sands
		Sands with over 12% fines	SM	Silty sand, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS More than half is smaller than No. 200 sieve	SILTS AND CLAYS Liquid limit less than 50		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic clays and organic silty clays of low plasticity
	SILTS AND CLAYS Liquid limit greater than 50		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils

SAMPLE TYPE SYMBOLS

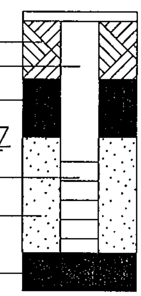
- Disturbed bag or jar sample
- Std. Penetration Test (2.0" OD)
- Type U Ring Sampler (3.25" OD)
- California Sampler (3.0" OD)
- Undisturbed Tube Sample
- Grab Sample
- Core Run
- Non-standard Penetration Test (with split spoon sampler)
- Bulk Sample

CONTACT BETWEEN UNITS

- Well-defined change in unit
- Gradational change in unit which was clearly noted in the exploration
- Change in unit which was not clearly defined

WELL COMPLETIONS

Concrete Seal
Well Casing
Bentonite/Grout Seal
Groundwater Level
Slotted Well Casing
Sand Backfill
Impermeable Backfill or Bentonite/Grouted



DESCRIPTORS FOR SOIL STRATA AND STRUCTURE (ENGLISH/METRIC)

General Thickness or Spacing		Structure		General Attitude	
Parting:	less than 1/16 in. (1/6 cm)	Pocket:	Erratic, discontinous deposit of limited extent	Near horizontal:	0 to 10 deg.
Seam:	1/16 to 1/2 in. (1/6 to 1 1/4 cm)	Lens:	Lenticular deposit	Low angle:	10 to 45 deg.
Layer:	1/2 to 12 in. (1 1/4 to 30 1/2 cm)	Varved:	Alternating seams of silt and clay	High angle:	45 to 80 deg.
Stratum:	> 12 in. (30 1/2 cm)	Laminated:	Alternating seams	Near Vertical:	80 to 90 deg.
Scattered:	< 1 per ft. (30 1/2 cm)	Stratified:	Alternating layers		
Frequent:	> 1 per ft. (30 1/2 cm)				

STRUCTURE DESCRIPTION (cont.)

Fractured	Breaks easily along definite fractured planes
Slickensided	Polished, glossy, fractured planes
Blocky, Diced	Breaks easily into small angular lumps
Sheared	Disturbed texture, mix of strengths
Homogeneous	Same color and appearance throughout

MOISTURE DESCRIPTION

- Dry - Free of moisture, dusty
- Moist - Damp but no visible free water
- Wet - Visible free water

MODIFIERS

Trace	Particles present at levels estimated < 5%
Slightly (Clayey, Silty, Sandy, Gravelly)	Particles present at levels estimated at 5 to 12%
Clayey, Silty, Sandy, Gravelly	Particles present at levels estimated at 12 to 30%
Very (Clayey, Silty, Sandy, Gravelly)	Percentage of minor constituents estimated > 30%

RELATIVE DENSITY OR CONSISTENCY VS. SPT N-VALUE

COARSE GRAINED			FINE GRAINED		
Density	N (blows/ft)	Approx. Relative Density (%)	Consistency	N (blows/ft)	Approx. Undrained Shear Str. (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

PHYSICAL PROPERTY TEST

- AL - Atterberg Limits
- FC - Fines Content
- GSD - Grain Size Distribution
- MC - Moisture Content
- MD - Moisture Content/Dry Density
- SG - Specific Gravity
- Perm - Permeability
- TXP - Triaxial Permeability
- Cons - Consolidation
- Chem - Analytical Chemical Analysis
- Corr - Corrosion
- VS - Vane Shear
- DS - Direct Shear
- UC - Unconfined Compression
- TX - Triaxial Compression
- UU - Unconsolidated, Undrained
- CU - Consolidated, Undrained
- CD - Consolidated, Drained

Notes:

1. Sample descriptions in this report are 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 or laboratory testing unless presented herein. Visual-manual classification methods in accordance with ASTM D 2488 were used as an identification guide. Where laboratory data are available, soil classifications are in general accordance with ASTM D 2487.

2. Dual symbols are used to indicate gravel and sand units with 5 to 12 percent fines and fine-grained units that plot in the CL-ML area of the plasticity chart.

3. WOR = weight of rod, WOH = weight of hammer.

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Project No: 19921.38072 Figure: B1

SOIL CLASSIFICATION/LEGEND FIFE GP LOGS 6-06.GPJ CDM_BLLV.GDT 11/6/06 REV.

Boring Log GP-1

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
						0	SP	Gravelly SAND (SP), brown.	
							SM	Silty SAND (SM), brown, with gravel, moist.	
							ML	Silt (ML), brown-gray, with clay, moist.	
						4	SC	Clayey SAND (SC), gray, with gravel, moist to wet.	
							SM	Silty SAND (SM), black, moist.	
							ML	Gravelly SILT (ML), gray, trace organics, moist.	
								Becomes dark brown, less gravelly, moist to wet.	
								Becomes light brown, moist.	
						10 ▽		Becomes gray, wet to saturated.	
								Becomes brown.	
							SP	Sand (SP), dark brown, with organics, saturated.	
						16		Boring terminated at 16 ft bgs. Goundwater encountered at 10 ft bgs.	

Station:
Surface Elevation:
Logged By: AEM

Drill Rig: Power Probe 9630 Pro
Equipment/Hammer: Continuous/
Date Completed: 6-5-06

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Boring Log GP-1
Project No: 19921.38072

Figure: B2
1 of 1

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NEIS_BORING_LOG_FIFE GP LOGS 6-06.GPJ CDM_BLLV.GDT 11/6/06 REV.

Boring Log GP-2

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
						0		2 inches Concrete.	
							SM	Silty SAND (SM), brown, with gravel, moist (Fill).	
						2	ML	SILT (ML), gray, with organics, moist (Fill).	
						4		Trace organics.	
							SM	Silty SAND (SM), gray, with gravel, moist (Fill).	
						8		No recovery from 8 to 12 ft bgs.	
						12	SM	Silty SAND (SM), gray, with gravel, saturated in shoe.	
						14	ML	SILT (ML), dark gray, saturated.	
							SP	SAND (SP), dark gray, trace silt, saturated, sand is interbedded with silt and silty sand.	
						16		Boring terminated at 16 ft bgs. Groundwater encountered at 13.5 ft bgs.	

Station:
Surface Elevation:
Logged By: AEM

Drill Rig: Power Probe 9630 Pro
Equipment/Hammer: Continuous/
Date Completed: 6-5-06

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Boring Log GP-2
Project No: 19921.38072

Figure: B3
1 of 1

Boring Log GP-3

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
						0				2 inches Concrete.	
								SM		Silty SAND (SM), brown-gray, with gravel, moist (Fill).	
						4		ML		SILT (ML), gray, with gravel, moist.	
								SM		Silty SAND (SM), gray, with gravel, moist (Fill).	
						8				Becomes wet.	
						10				Becomes wet to saturated.	
								SM		Silty SAND (SM), brown, wet to saturated, interbedded with sand.	
								SP		SAND (SP), brown/black/red, fine grained, saturated, interbedded with silty sand and silt.	
								ML		SILT (ML), brown-gray, moist.	
						16				Boring terminated at 16 ft bgs. Groundwater encountered at 9.9 ft bgs.	

Station:
Surface Elevation:
Logged By: AEM

Drill Rig: Power Probe 9630 Pro
Equipment/Hammer: Continuous/
Date Completed: 6-5-06

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Boring Log GP-3
Project No: 19921.38072

Figure: B4
1 of 1

Boring Log GP-4

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
								GP		Base Course Gravel.	
								SM		Silty SAND (SM), brown, with gravel, moist.	
						2					
										Becomes gray, moist to wet (Fill).	
						4					
						6					
						8				Becomes wet.	
						10		ML		Silt (ML), gray, wet to saturated.	
						12		SP		SAND (SP), brown-gray, with organics, saturated, interbedded with silt and silty sand.	
						14					
						16				Boring terminated at 16 ft bgs. Groundwater encountered at 9.3 ft bgs.	

Station:
Surface Elevation:
Logged By: AEM

Drill Rig: Power Probe 9630 Pro
Equipment/Hammer: Continuous/
Date Completed: 6-5-06

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Boring Log GP-4
Project No: 19921.38072

Figure: B5
1 of 1

NEIS_BORING_LOG FIFE GP LOGS 6-06.GPJ CDM_BLLV.GDT 11/6/06 REV.

Boring Log GP-5

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
								GP		Base Course Gravel.	
								SM		Silty SAND (SM), brown, with gravel, wet (Fill).	
						2					
						4				Becomes gray.	
						6					
						8					
						▽				Becomes wet.	
						10		ML		SILT (ML), gray, with black sand, moist to wet, interbedded with brown silt and silty sand.	
						12					
								SP		SAND (SP), brown-gray, fine grained, saturated.	
						14					
								ML		SILT (ML), brown-gray, interbedded with silty sand, moist to wet.	
						16				Boring terminated at 16 ft bgs. Groundwater encountered at 9.3 ft bgs.	

Station: ____________

Surface Elevation: ____________

Logged By: AEM

Drill Rig: Power Probe 9630 Pro

Equipment/Hammer: Continuous/

Date Completed: 6-5-06

NEIS_BORING_LOG FIFE GP LOGS 6-06.GPJ CDM_BLLV.GDT 11/6/06 REV.

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Boring Log GP-5 Figure: B6
Project No: 19921.38072 1 of 1

Boring Log GP-6

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
										Asphalt.	
								SM		Silty SAND (SM), brown, with gravel, moist (Fill).	
						2				Becomes gray.	
						4					
						6					
						8				Becomes wet.	
						10					
								ML		SILT (ML), brown-gray, interbedded with silty sand, saturated.	
						12				No recovery from 12 to 16 ft bgs.	
						14					
						16				Boring terminated at 16 ft bgs. Groundwater encountered at 10.95 ft bgs.	

Station:
Surface Elevation:
Logged By: AEM

Drill Rig: Power Probe 9630 Pro
Equipment/Hammer: Continuous/
Date Completed: 6-5-06

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Boring Log GP-6
Project No: 19921.38072

Figure: B7
1 of 1

Boring Log GP-7

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
						0				Asphalt.	
								GP		Base Course.	
								SM		Silty SAND (SM), brown, with gravel, moist (Fill).	
						2				Becomes gray.	
						8				Becomes wet. No recovery from 8 to 12 ft bgs.	
						12				No recovery from 12 to 16 ft bgs.	
						16				Boring terminated at 16 ft bgs. Groundwater encountered at 9.0 ft bgs.	

Station:
Surface Elevation:
Logged By: AEM

Drill Rig: Power Probe 9630 Pro
Equipment/Hammer: Continuous/
Date Completed: 6-6-06

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Fife, Washington

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Boring Log GP-7
Project No: 19921.38072

Figure: B8

Boring Log GP-8

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
						0		GP		3 inches Asphalt.	
										Base Course.	
								SM		Silty SAND (SM), brown, with gravel, moist (Fill).	
						2				Becomes gray.	
						4					
						6					
						8				Becomes wet.	
						9 ∇		ML		SILT (ML), brown-black, with organics, trace gravel and sand, wet.	
						10					
						12		SM		Silty SAND (SM), dark brown, interbedded with sand and silt, saturated.	
						14		ML		SILT (ML), dark brown, moist to wet.	
						16				Boring terminated at 16 ft bgs. Groundwater encountered at 9 ft bgs.	

Station: ______

Surface Elevation: ______

Logged By: AEM

Drill Rig: Power Probe 9630 Pro

Equipment/Hammer: Continuous/

Date Completed: 6-6-06

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USG Interiors
Fife
Fife, Washington

Boring Log GP-8
Project No: 19921.38072

Figure: B9
1 of 1

Boring Log GP-9

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
								GP		2-1/2 inches Asphalt.	
										Base Course.	
								SM		Silty SAND (SM), brown, with gravel, moist (Fill).	
						2				Becomes gray.	
						4					
						6					
						8				Becomes wet.	
								ML		SILT (ML), dark brown, with organics, trace sand and gravel, moist.	
						10				Becomes gray, trace organics.	
								SM		Silty SAND (SM), dark brown, moist.	
						12				Becomes gray.	
								SP		SAND (SP), dark brown, saturated.	
						14					
								ML		SILT (ML), dark brown, moist to wet.	
								SM		Silty SAND (SM), dark brown, moist.	
								ML		SILT (ML), dark brown, moist.	
						16				Boring terminated at 16 ft bgs. Groundwater encountered at 10 ft bgs.	

Station:
Surface Elevation:
Logged By: AEM

Drill Rig: Power Probe 9630 Pro
Equipment/Hammer: Continuous/
Date Completed: 6-6-06

USG Interiors
Fife
Fife, Washington

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Boring Log GP-9 Figure: B10
Project No: 19921.38072 1 of 1

SOIL CLASSIFICATION LEGEND

MAJOR DIVISIONS				TYPICAL NAMES
COARSE GRAINED SOILS More than half is larger than No. 200 sieve	GRAVELS More than half coarse fraction is larger than No. 4 sieve size	Clean gravels with little or no fines	GW	Well graded gravels, gravel-sand mixtures
			GP	Poorly graded gravels, gravel-sand mixtures
		Gravel with over 12% fines	GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS More than half coarse fraction is smaller than No. 4 sieve size	Clean sands with little or no fines	SW	Well graded sands, gravelly sands
			SP	Poorly graded sands, gravelly sands
		Sands with over 12% fines	SM	Silty sand, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS More than half is smaller than No. 200 sieve	SILTS AND CLAYS Liquid limit less than 50		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic clays and organic silty clays of low plasticity
	SILTS AND CLAYS Liquid limit greater than 50		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils

SAMPLE TYPE SYMBOLS

- Disturbed bag or jar sample
- Std. Penetration Test (2.0" OD)
- Type U Ring Sampler (3.25" OD)
- California Sampler (3.0" OD)
- Undisturbed Tube Sample
- Grab Sample
- Core Run
- Non-standard Penetration Test (with split spoon sampler)

CONTACT BETWEEN UNITS

- Change in geologic unit
- Soil type change within geologic unit
- Obscure or gradational change

DESCRIPTORS FOR SOIL STRATA AND STRUCTURE (ENGLISH/METRIC)

General Thickness or Spacing		Structure		General Attitude	
Parting:	less than 1/16 in. (1/6 cm)	Pocket:	Erratic, discontinuous deposit of limited extent	Near horizontal:	0 to 10 deg.
Seam:	1/16 to 1/2 in. (1/6 to 1 1/4 cm)	Lens:	Lenticular deposit	Low angle:	10 to 45 deg.
Layer:	1/2 to 12 in. (1 1/4 to 30 1/2 cm)	Varved:	Alternating seams of silt and clay	High angle:	45 to 80 deg.
Stratum:	> 12 in. (30 1/2 cm)	Laminated:	Alternating seams	Near Vertical:	80 to 90 deg.
Scattered:	< 1 per ft. (30 1/2 cm)	Interbedded:	Alternating layers		
Numerous:	> 1 per ft. (30 1/2 cm)				

STRUCTURE DESCRIPTION (cont.)

Fractured	Breaks easily along definite fractured planes
Slickensided	Polished, glossy, fractured planes
Blocky, Diced	Breaks easily into small angular lumps
Sheared	Disturbed texture, mix of strengths
Homogeneous	Same color and appearance throughout

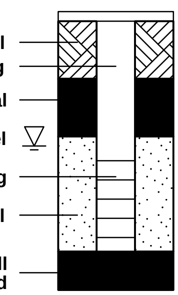
MOISTURE DESCRIPTION

Dry - Free of moisture, dusty

Moist - Damp but no visible free water

Wet - Visible free water, saturated

WELL COMPLETIONS



RELATIVE DENSITY OR CONSISTENCY VS. SPT N-VALUE

COARSE GRAINED			FINE GRAINED		
Density	N (blows/ft)	Approx. Relative Density (%)	Consistency	N (blows/ft)	Approx. Undrained Shear Str. (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

PHYSICAL PROPERTY TEST

AL - Atterberg Limits
FC - Fines Content
GSD - Grain Size Distribution
MC - Moisture Content
MD - Moisture Content/Dry Density
Comp - Compaction Test (Proctor)
SG - Specific Gravity
CBR - California Bearing Ratio
RM - Resilient Modulus
Perm - Permeability
TXP - Triaxial Permeability
Cons - Consolidation
Chem - Analytical Chemical Analysis
Corr - Corrosion
VS - Vane Shear
DS - Direct Shear
UC - Unconfined Compression
TX - Triaxial Compression
UU - Unconsolidated, Undrained
CU - Consolidated, Undrained
CD - Consolidated, Drained

Notes:

1. Sample descriptions in this report are 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 or laboratory testing unless presented herein. Visual-manual classification methods in accordance with ASTM D 2488 were used as an identification guide. Where laboratory data are available, soil classifications are in general accordance with ASTM D 2487.

2. Dual symbols are used to indicate gravel and sand units with 5 to 12 percent fines.

3. WOR = weight of rod.

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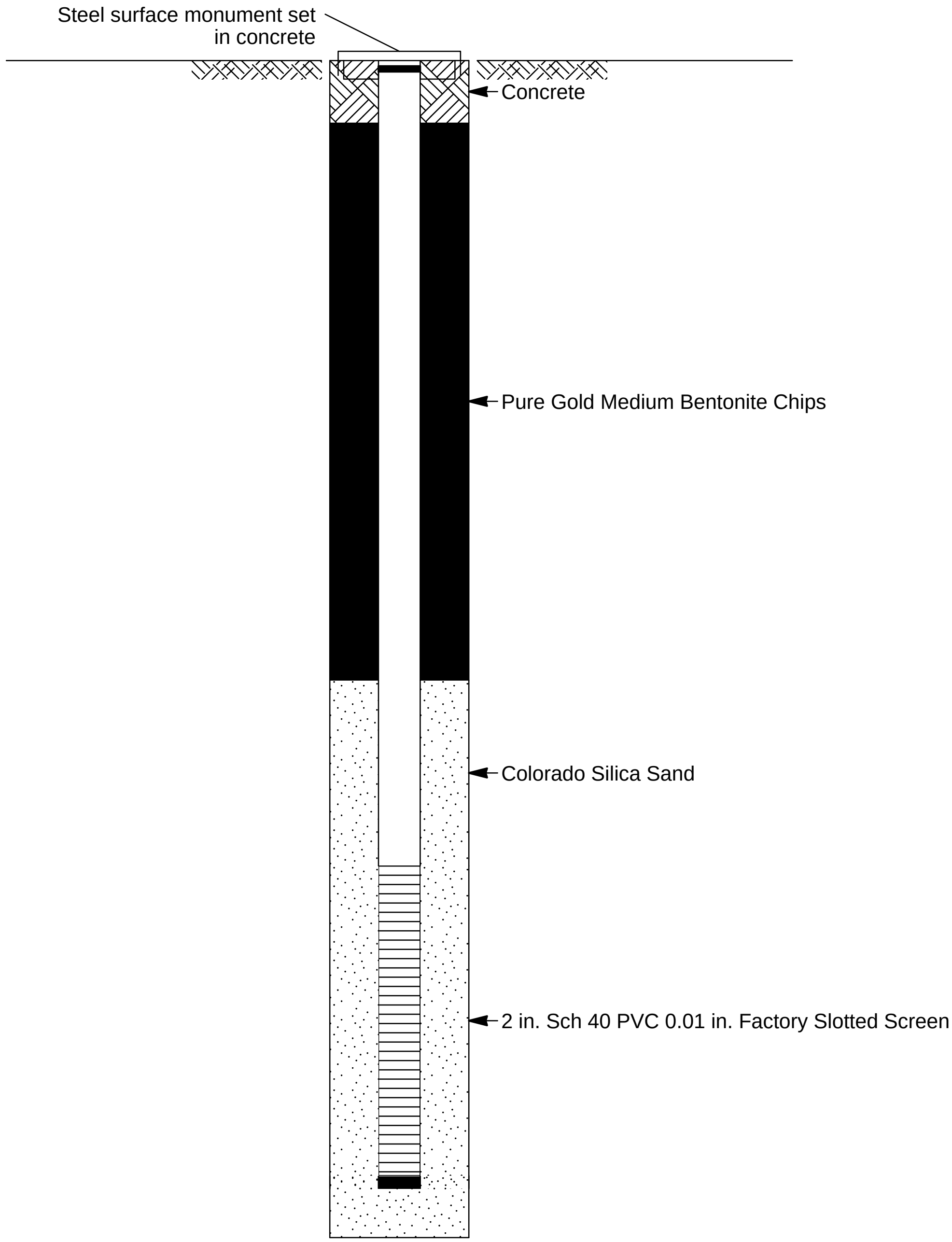
Tacoma, Washington

Project No: 19921.65021 Figure: 1



MONITORING WELL CONSTRUCTION 19921-65021-APR 26-28 2010.GPJ CDM_BLLV.GDT 7/12/12 REV.

TYPICAL MONITORING WELL CONSTRUCTION

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Project No: 19921.65021 Figure: 2

Boring Log A4

Recovery/ Sample Length (in)	Sample No.	XRF Arsenic (ppm)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
							SM	Gravelly, Silty SAND (SM), brown-yellow, fine to medium sand, medium dense, moist.	
							SW	SAND (SW), gray, fine to coarse, loose, moist.	
24/48	A4-2	<6					ML	Gravelly, Sandy SILT (ML), brown-gray, fine sand, fine to coarse gravel, very stiff, moist.	
	A4-4	11				5		Becomes wet with increased fine to medium sand content at ~4 ft bgs.	
12/48									
	A4-8	<5							
24/48	A4-10	<6				10	SM	Gravelly, Silty SAND (SM), brown-gray, fine sand, fine to coarse gravel, dense, moist.	
	A4-12	<7					ML	Sandy SILT (ML), dark gray-brown, with trace organics (wood and rootlets) and gravel, medium stiff, wet.	
42/48	A4-14	<6				15	SM	Silty SAND (SM), dark gray-brown, fine sand, trace organics, wet, with some silt bedding.	
	A4-16	7						Boring terminated at 16 ft bgs. Groundwater encountered at 13 ft bgs. Borehole backfilled with bentonite chips.	
						20			
						25			

Location:

Surface Elevation:

Logged By: AAL

Drill Rig: Direct Push Technology

Equipment/Hammer: Acetate Liner/

Date Completed: 4-28-10

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Hwy 99
Tacoma, Washington

Boring Log A4
Project No: 19921.65021

Figure: 3
1 of 1

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Boring Log A5

Recovery/ Sample Length (in)	Sample No.	XRF Arsenic (ppm)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
										Gravelly, Silty SAND (SM), dark brown, fine to coarse sand, fine to coarse gravel, medium dense, moist.	
										Cobbles encountered at ~1.5 ft bgs.	
33/48	A5-2	<6								Decreased silt content at ~2 ft bgs.	
	A5-4	<6								Increased silt content at ~4 ft bgs.	
						5				Becomes gray-brown, wet at ~5 ft bgs.	
								SM			
30/48	A5-6	<6									
						10					
<6/18											
										Silty SAND (SM), dark brown, fine, trace organics (wood), dense, wet, with occasional bedding and sand seams.	
	A5-12	46									
								SM			
48/48	A5-14	35									
						15					
	A5-16	9								Boring terminated at 16 ft bgs. Groundwater encountered at ~12 ft bgs. Borehole backfilled with bentonite chips.	
						20					
						25					

Location:
Surface Elevation:
Logged By: AAL

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 4-28-10

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Boring Log A5 Figure: 4
Project No: 19921.65021 1 of 1

Boring Log A6

Recovery/ Sample Length (in)	Sample No.	XRF Arsenic (ppm)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
								SM		Gravelly, Silty SAND (SM), dark brown, fine to coarse sand, medium dense, moist. Brick debris encountered at ~0.5 ft bgs. Becomes brown at ~0.8 ft bgs.	
24/18	A6-2	<6									
	A6-4	8									
						5					
6/48											
	A6-8	8								At 8 ft bgs, color changes to gray, wet, with increased silt content.	
								ML		Sandy SILT (ML), dark gray, stiff, moist	
48/48	A6-10	46				10		ML		Layer of black slag with solid waste debris up to 3 in. at 9.5 and 10 ft bgs. SILT (ML), dark brown, stiff, moist, with occasional organics. At 10 ft bgs, color changes to gray-brown, trace organics.	
	A6-12	15						SM		Silty SAND (SM), dark brown, fine, trace organics, dense, wet, with trace silt bedding.	
48/48	A6-14	14									
						15					
	A6-16	9								Boring terminated at 16 ft bgs. Groundwater encountered at 11 ft bgs. Borehole backfilled with bentonite chips.	
						20					
						25					

Location:
Surface Elevation:
Logged By: AAL

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 4-28-10

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Boring Log A6 Figure: 5
Project No: 19921.65021 1 of 1

Boring Log A7

Recovery/ Sample Length (in)	Sample No.	XRF Arsenic (ppm)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
										Gravelly, Silty SAND (SM), dark brown, fine to coarse, medium dense, wet. Becomes brown-yellow, fine sand at 0.5 ft bgs.	
30/48	A7-2	<6								Becomes gray, increased silt content at 2 ft bgs.	
	A7-4	<6									
										Becomes brown at 4.5 ft bgs.	
						5		SM		Increased fine to medium sand content, color changes to gray, wet at 5 ft bgs.	
24/48	A7-6	229								Becomes dark brown, wet, fine sand, trace organics at 6 ft bgs.	
0/48						10					
										SAND (SP), dark brown, fine to medium sand, with trace gravel, medium dense, wet.	
	A7-12	232				∇		SP			
										Silty SAND (SM), dark brown, fine sand, dense, wet, with trace silt bedding and white lithics.	
42/48	A7-14	58						SM			
						15				SAND (SP), dark brown, fine to medium sand, dense, wet, with trace white and red lithics.	
	A7-16	107									
48/48	A7-18	25						SP			
	A7-20	7				20				Boring terminated at 20 ft bgs. Groundwater encountered at 12 ft bgs. Borehole backfilled with bentonite chips.	
						25					

Location:

Surface Elevation:

Logged By: AAL

Drill Rig: Direct Push Technology

Equipment/Hammer: Acetate Liner/

Date Completed: 4-27-10

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Tacoma, Washington

Boring Log A7
Project No: 19921.65021

Figure: 6
1 of 1

Boring Log A7 Abandoned

Recovery/ Sample Length (in)	Sample No.	XRF Arsenic (ppm)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
36/48						0–3	SM	Gravelly, Silty SAND (SM), dark brown, fine to coarse, dense, moist. Becomes yellow-brown and 0.5 ft bgs. Becomes gray at 1 ft bgs. Increased silt content and decreased gravel at 2 ft bgs.	
						3–4	ML	Sandy SILT (ML), gray, fine sand, with trace fine to coarse gravel, stiff, moist.	
18/48						4–12	SM	Silty SAND (SM), gray-brown, with some gravel, dense, moist.	
<6/48									
						12		Boring abandoned at 12 ft bgs. Moved south ~2 ft to start over. Borehole backfilled with bentonite chips.	

Depth scale: 5, 10, 15, 20, 25

Location:
Surface Elevation:
Logged By: AAL

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 4-27-10

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Hwy 99
Tacoma, Washington

Boring Log A7 Abandoned
Project No: 19921.65021

Figure: 7
1 of 1

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Boring Log A8

Recovery/ Sample Length (in)	Sample No.	XRF Arsenic (ppm)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
						0	SM	Gravelly, Silty SAND (SM), brown-yellow, fine to medium sand, medium dense, moist. Becomes gray-brown at 0.5 ft bgs.	
48/48	A8-2	<6							
	A8-4	118						Becomes very dark brown, with fine sand and trace gravel, also trace solid waste at 3.5 ft bgs.	
						5			
48/48	A8-6	136						4 in. layer of slag at 6 ft bgs. At 6.5 ft bgs, color changes to gray-brown.	
							ML	Sandy SILT (ML), brown, fine sand with some organics (rootlets) and trace gravel, medium stiff, wet.	
	A8-8	28						At 8 ft bgs, color changes to gray-brown.	
								2 in. sand layer at 9 ft bgs.	
							ML	Sandy SILT (ML), dark brown, fine sand, with some organics, medium stiff, moist.	
21/48	A8-10	<6				10			
							SP	SAND (SP), gray, fine to medium sand, loose, wet.	
	A8-12	<6							
							ML	Sandy SILT (ML), dark brown, fine sand with some organics, medium stiff, moist.	
42/48	A8-14	<6				▽	SM	Silty SAND (SM), dark brown, fine, with some fine to medium sand seams, dense, wet.	
						15			
	A8-16	<6						Boring terminated at 16 ft bgs. Groundwater encountered at 14 ft bgs. Borehole backfilled with bentonite chips.	
						20			
						25			

Location:
Surface Elevation:
Logged By: AAL

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 4-28-10

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Tacoma, Washington

Boring Log A8 | Figure: 8
Project No: 19921.65021 | 1 of 1

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Boring Log A9

Recovery/ Sample Length (in)	Sample No.	XRF Arsenic (ppm)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
								SM		Silty SAND (SM), light gray, fine to coarse sand, some coarse gravel, rounded, loose, moist.	
24/48	A9-2	<6									
	A9-4	26									
						5		ML		SILT (ML), gray-brown, trace sand, abundant rootlets, medium stiff, moist, low plasticity.	
40/48	A9-6	7									
	A9-8	<6						SM		Silty SAND (SM), gray, fine sand, medium dense, moist, some silt interbeds (1/4 in. thick).	
48/48	A9-10	7				10		ML		SILT (ML), gray-brown, abundant rootlets and organic material, trace fine sand, moist, low plasticity.	
	A9-12	6				∇		SW		SAND (SW), dark gray, well graded, fine to coarse sand, subangular to subrounded, medium dense, wet.	
48/48	A9-14	<6				15		SM		Silty SAND (SM), gray-brown, fine sand, subangular to subrounded grains, medium dense, wet.	
	A9-16	<6								Boring terminated at 16 ft bgs. Groundwater encountered at 11.5 ft bgs. Borehole backfilled with bentonite chips.	
						20					
						25					

Location:
Surface Elevation:
Logged By: HY

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 4-29-10

USG Corporation
Hwy 99
Tacoma, Washington

CDM

Boring Log A9
Project No: 19921.65021

Figure: 9
1 of 1

Boring Log B2

Recovery/ Sample Length (in)	Sample No.	XRF Arsenic (ppm)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
										Gravelly, Silty SAND (SM), brown-yellow, fine to medium sand, fine to coarse gravel, dense, moist.	
										Becomes gray-brown at 1 ft bgs.	
36/48	B2-2	<6						SM			
	B2-4	12									
						5				Gravelly, Sandy SILT (ML), gray, fine sand, fine to coarse gravel, medium stiff.	
36/48	B2-6	<6						ML		Becomes gray-brown at 5.5 ft bgs.	
	B2-8	<6								Sand becomes fine to coarse at 8 ft bgs.	
										Sandy SILT (ML), dark brown, with some organics, medium stiff, moist.	
30/48	B2-10	7				10		ML		Becomes gray with trace organics at 10 ft bgs.	
	B2-12	10				∇				Becomes wet at 12 ft bgs.	
										SILT (ML), gray, with occasional iron mottling, very stiff, moist.	
42/48	B2-14	7				15		ML			
										Becomes light gray (2 in. layer) then light brown at 15.5 ft bgs.	
	B2-16	14								Boring terminated at 16 ft bgs. Groundwater encountered at 12 ft bgs. Borehole backfilled with bentonite chips.	
						20					
						25					

Location:
Surface Elevation:
Logged By: AAL

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 4-29-10

LOG OF BORING WITH WELL 19921-65021-APR 26-28 2010.GPJ CDM_BLLV.GDT 5/21/10 REV.

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Boring Log B2
Project No: 19921.65021

Figure: 10
1 of 1

Boring Log B3

Recovery/ Sample Length (in)	Sample No.	XRF Arsenic (ppm)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
							SM	Gravelly, Silty SAND (SM), dark brown, fine to coarse sand, medium dense, moist. Becomes brown-yellow at 0.5 ft bgs.	
36/48	B3-2	19						Becomes gray-brown at 2 ft bgs.	
	B3-4	77							
						5		Becomes brown, with decreased gravel content at 5 ft bgs.	
24/48	B3-6	<6							
	B3-8	9							
								Layer of dark brown, gravelly, silty sand (3 in. thick) with metal pieces, at 8.5 ft bgs.	
36/48	B3-10	<6				10	ML	Sandy SILT (ML), gray-brown, with some gravel, medium stiff, moist. Becomes gray and wet, with increased sand content at 10 ft bgs.	
							SM	Gravelly, Silty SAND (SM), gray, fine to coarse sand, medium dense, wet.	
								4 in. layer of sawdust at 12.3 ft bgs.	
							SM	Silty SAND (SM), dark brown, fine sand, dense, wet, with occasional silt bedding.	
36/48	B3-14	<6							
	B3-15	<6				15			
								Boring terminated at 16 ft bgs. Groundwater encountered at 10 ft bgs. Borehole backfilled with bentonite chips.	
						20			
						25			

Location:
Surface Elevation:
Logged By: AAL

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 4-27-10

USG Corporation
Hwy 99
Tacoma, Washington

Boring Log B3
Project No: 19921.65021

Figure: 11
1 of 1

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Boring Log B4

Recovery/ Sample Length (in)	Sample No.	XRF Arsenic (ppm)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
						0	SM	Gravelly, Silty SAND (SM), dark brown, fine to coarse, medium dense, moist. Becomes gray-brown at 1 ft bgs.	
36/48	B4-2	<6							
								Increased silt content at 3 ft bgs.	
	B4-4	<6							
						5			
12/48									
	B4-8	<6							
							ML	Sandy SILT (ML), gray, with some gravel, stiff, moist. Wet from 9 to 9.5 ft bgs. Significant wood debris (sawdust?) from 9.5 to 10 ft bgs.	
30/48	B4-10	10				10	SM	Silty SAND (SM), gray, with some gravel, moist, dense.	
24/48	B4-14	604					SM	Silty SAND (SM), dark brown, fine, with organics, dense, moist.	
						15		3 in. layer of sand at 15 ft bgs. Becomes brown, with silt bedding and white lithics, trace organics at 15.3 ft bgs.	
	B4-16	84							
48/48	B4-18	14							
	B4-20	6				20		Boring terminated at 20 ft bgs. Groundwater encountered at 9.5 ft bgs. Borehole backfilled with bentonite chips.	
						25			

Location:

Surface Elevation:

Logged By: AAL

Drill Rig: Direct Push Technology

Equipment/Hammer: Acetate Liner/

Date Completed: 4-26-10

USG Corporation
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Tacoma, Washington

CDM

Boring Log B4
Project No: 19921.65021

Figure: 12

Boring Log B5

Recovery/ Sample Length (in)	Sample No.	XRF Arsenic (ppm)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
								GP		Sandy GRAVEL (GP), very dark brown, loose, moist.	
										Gravelly, Silty SAND (SM), brown, fine to coarse sand and gravel, medium dense, moist.	
										Becomes gray with fine to medium sand at 1.5 ft bgs.	
30/48	B5-2	35									
	B5-4	<5									
						5				Becomes brown-gray at 5 ft bgs.	
36/48	B5-6	6									
								SM		Gravel becomes fine to medium at 7 ft bgs.	
	B5-8	<6									
										Becomes wet at 8.5 ft bgs.	
24/48						10					
	B5-12	<6								Becomes loose at 12 ft bgs.	
48/48	B5-14	3140								Sandy SILT (ML), dark brown, with trace organics and bedding features, very stiff, wet, with layers of medium sand and gravelly, silty sand and organics to 0.25 in.	
						15		ML			
										Silty SAND (SM), dark gray-brown, fine, dense, wet, bedding features (6 in. thick).	
	B5-16	50									
								SM			
48/48	B5-18	38									
								SP		SAND (SP), dark gray, fine to medium sand, medium dense, wet, with white and red lithics.	
	B5-20	12				20				Boring terminated at 20 ft bgs. Groundwater encountered at 15.5 ft bgs. Borehole backfilled with bentonite chips.	
						25					

Location:
Surface Elevation:
Logged By: AAL

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 4-26-10

USG Corporation
Hwy 99
Tacoma, Washington

Boring Log B5
Project No: 19921.65021

Figure: 13
1 of 1

CDM

Boring Log B6

Recovery/ Sample Length (in)	Sample No.	XRF Arsenic (ppm)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
								SM		Gravelly, Silty SAND (SM), dark brown, fine to coarse sand and gravel, medium dense, moist. Becomes brown-yellow at 1 ft bgs. Becomes gray-brown, fine to medium sand at 1.3 ft bgs.	
30/48	B6-2	24									
	B6-4	<6									
						5				Layer of fine to coarse sand with fine to coarse gravel (3 in. diameter) at 4.5 ft bgs. Increased silt content, cobble encountered at 4.8 ft bgs.	
30/48	B6-6	7									
	B6-8	<6									
										At 9 ft bgs, becomes wet, 2 in. brick fragment.	
36/48	B6-10	11				10				At 10 ft bgs, decreased silt content, becomes dark brown.	
								SP		SAND (SP), very dark brown-black, fine to medium sand, well rounded sand, with glass-like gravel, loose, wet.	
	B6-12	8311								3 in. layer of sandy silt at 12.5 ft bgs.	
								SP		SAND (SP), gray, medium grained sand, medium dense, wet.	
45/48	B6-14	1123						ML		Sandy SILT (ML), dark brown, very fine sand, with trace organics, medium stiff, wet. Wood debris (1 in.) at 14.4 ft bgs.	
						15		SM		Silty SAND (SM), dark brown, with silt bedding features, dense, wet.	
	B6-16	65						SP		SAND (SP), dark gray, fine to medium, dense, wet, with trace white lithics and silt bedding features. Small wood fragment at 17 ft bgs.	
48/48	B6-18	28									
										Increased white grains and some red lithics at 19 ft bgs.	
	B6-20	15				20				Boring terminated at 20 ft bgs. Groundwater encountered at 13.75 ft bgs. Borehole backfilled with bentonite chips.	
						25					

Location:
Surface Elevation:
Logged By: AAL

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 4-27-10

USG Corporation
Hwy 99
Tacoma, Washington

Boring Log B6
Project No: 19921.65021

Figure: 14
1 of 1

CDM

Boring Log B7

Recovery/ Sample Length (in)	Sample No.	XRF Arsenic (ppm)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
						0	SM	Gravelly, Silty SAND (SM), fine to coarse sand, medium dense, dry.	
								Becomes moist with increased silt content, yellow-red at 1 ft bgs.	
								Becomes gray-brown at 1.5 ft bgs.	
36/48	B7-2	7							
								Filter fabric encountered at 2.5 ft bgs.	
								Rock encountered at 3 ft bgs.	
	B7-4	<7							
						5	SP	SAND (SP), dark brown, fine to medium sand, with some gravel and vitreous, needle-like grains, medium dense, moist. Layers of insulation-like material at 5 and 7.5 ft bgs. Also particles of the insulation-like material dispersed throughout.	
42/48	B7-6	119							
								Possible hydrogen sulfide odor at 7.5 ft bgs.	
	B7-8	39							
45/48	B7-10	270				10	ML	Sandy SILT (ML), dark brown, fine sand, with some organics, medium stiff, wet.	
						11 (▽)	SM	Silty SAND (SM), dark brown, fine sand, dense, wet, with some silt bedding features and trace white lithics.	
	B7-12	49							
48/48	B7-14	28							
						15			
	B7-16	13						Becomes fine to medium grained at 15.5 ft bgs.	
						16		Boring terminated at 16 ft bgs. Groundwater encountered at 11 ft bgs. Borehole backfilled with bentonite chips.	
						20			
						25			

Location:
Surface Elevation:
Logged By: AAL

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 4-27-10

USG Corporation
Hwy 99
Tacoma, Washington

CDM

Boring Log B7
Project No: 19921.65021

Figure: 15
1 of 1

Boring Log B8

Recovery/ Sample Length (in)	Sample No.	XRF Arsenic (ppm)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / foot)
24/48	B8-2	8			
	B8-4	<7			
48/48	B8-6	8			
	B8-8	17			
45/48	B8-10	14			
	B8-12	17			
48/48	B8-14	12			
	B8-16	9			

Depth (feet)	USCS	DESCRIPTION
0–4.5	SM	Gravelly, Silty SAND (SM), dark brown, fine to coarse sand, wet. Becomes yellow-brown at 0.5 ft bgs. Cobble encountered at 3 ft bgs, becomes gray.
4.5–6.5	ML	Sandy SILT (ML), gray-brown, fine sand, with trace fine gravel and sand seams, stiff, moist.
6.5–9.5	ML	Sandy SILT (ML), dark brown, fine sand, with numerous organics, stiff, moist. Becomes gray-brown, with decreased organics at 7.5 ft bgs. Becomes mottled gray-brown and light brown at 8.5 ft bgs.
9.5–16	SM	Silty SAND (SM), dark brown, with trace silt bedding and sand layers, dense, wet. 2 in. brown organic-rich layer at 10.3 ft bgs.
16		Boring terminated at 16 ft bgs. Groundwater encountered at 9.5 ft bgs. Borehole backfilled with bentonite chips.

Elev. (feet)

Location:
Surface Elevation:
Logged By: AAL

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 4-28-10

USG Corporation
Hwy 99
Tacoma, Washington

Boring Log B8
Project No: 19921.65021

Figure: 16
1 of 1

CDM

Boring Log C2

Recovery/ Sample Length (in)	Sample No.	XRF Arsenic (ppm)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
							SM	Gravelly, Silty SAND (SM), brown-yellow, fine to medium sand, medium dense, moist.	
36/48	C2-2	<6					ML	Sandy SILT (ML), gray-brown, fine sand, very stiff, moist, with occasional iron mottling. Becomes gray with increased fine to medium sand at 2.5 ft bgs.	
	C2-4	9				5		Increased gravel content at 4 ft bgs. 2 in. layer of gravelly , silty sand at 4.5 ft bgs.	
18/48									
	C2-9	<6						Decreased sand content at 9.3 ft bgs.	
24/48	C2-10	24				10	ML	Sandy SILT (ML), dark brown, with some organics, fine sand, medium stiff, moist.	
	C2-12	17				▽		Becomes gray and brown mottled at 12 ft bgs.	
42/48	C2-14	13					SM	Silty SAND (SM), dark gray-brown, fine, dense, wet, with some silt bedding and trace organics.	
	C2-16	8				15			
						20		Boring terminated at 16 ft bgs. Groundwater encountered at 12.5 ft bgs. Borehole backfilled with bentonite chips.	
						25			

Location:
Surface Elevation:
Logged By: AAL

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 4-28-10

CDM

USG Corporation
Hwy 99
Tacoma, Washington

Boring Log C2
Project No: 19921.65021

Figure: 17

Boring Log C3

Recovery/ Sample Length (in)	Sample No.	XRF Arsenic (ppm)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
								SM		Gravelly, Silty SAND (SM), dark brown, fine to coarse sand and gravel, medium dense, moist. Becomes brown-yellow at 0.5 ft bgs.	
36/48	C3-2	<6								Increased silt, decreased gravel, sand is fine grained from 1.5 to 2 ft bgs. Becomes gray at 2 ft bgs.	
	C3-4	9								Becomes gray-brown at 4 ft bgs.	
						5					
36/48	C3-6	5								Filter fabric encountered at 6 ft bgs.	
	C3-8	<6						ML		Sandy SILT (ML), gray, fine sand, with trace gravel, mottling and organics, medium stiff.	
						10					
12/48											
	C3-12	140									
										Becomes dark brown at 13 ft bgs. Wood debris from 13.3 to 13.5 ft bgs.	
36/48	C3-14	215				∇		SP		SAND (SP), gray, fine to medium sand, medium dense, wet. 2 in. brown silty sand layer at 14.5 ft bgs.	
	C3-15	148				15					
	C3-16	184						SM		Silty SAND (SM), dark brown, fine sand, dense, wet, with trace white lithics and silt bedding.	
										2 in. yellow discoloration at 17.5 ft bgs.	
48/48	C3-18	64									
	C3-20	29				20		SP		SAND (SP), dark gray, with trace organics (wood fragments) and white and red lithics, dense, wet.	
42/48	C3-22	7						ML		SILT (ML), gray-brown, with some bedding features, stiff, wet.	
										Becomes dark gray at 23 ft bgs. Becomes gray with iron mottling at 23.5 ft bgs.	
	C3-24	9								Boring terminated at 24 ft bgs. Groundwater encountered at 14 ft bgs. Borehole backfilled with bentonite chips.	
						25					

Location:
Surface Elevation:
Logged By: AAL

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 4-27-10

USG Corporation
Hwy 99
Tacoma, Washington

CDM

Boring Log C3
Project No: 19921.65021

Figure: 18

Boring Log C4

Recovery/ Sample Length (in)	Sample No.	XRF Arsenic (ppm)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
								SM		Gravelly, Silty SAND (SM), dark brown, fine to coarse, loose, moist. Becomes brown at 1 ft bgs.	
36/48	C4-2	7						ML		Sandy SILT (ML), brown-gray, stiff, moist, with some iron mottling and gravel.	
								SM		Gravelly, Silty SAND (SM), gray, dense, moist.	
	C4-4	10						ML		Sandy SILT (ML), brown, stiff, moist.	
42/48	C4-6	7				5		SM		Gravelly, Silty SAND (SM), gray, fine sand, fine to coarse gravel, dense, moist. Becomes wet with increased silt content at 7 ft bgs.	
	C4-8	25						ML		Sandy SILT (ML), brown-light brown, trace organics and sand layers and mottling, stiff, moist.	
36/48	C4-10					10				Becomes dark brown-gray mottled at 10.5 ft bgs.	
	C4-12					∇		SM		Silty SAND (SM), dark brown, fine, trace organics and white lithics, wet, with occasional silt bedding.	
	C4-14					15					
	C4-16	11								Boring terminated at 16 ft bgs. Groundwater encountered at 12 ft bgs. Borehole backfilled with bentonite chips.	
						20					
						25					

Location:
Surface Elevation:
Logged By: AAL

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 4-26-10

USG Corporation
Hwy 99
Tacoma, Washington

Boring Log C4
Project No: 19921.65021

Figure: 19
1 of 1

CDM

Boring Log C5

Recovery/ Sample Length (in)	Sample No.	XRF Arsenic (ppm)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
36/48	C5-2	8						SM		Gravelly, Silty SAND (SM), very dark brown, fine to coarse sand and gravel, loose, moist. Becomes brown-yellow at 0.5 ft bgs. Becomes brown with fine to medium sand at 2 ft bgs. Becomes gray at 2.5 ft bgs.	
	C5-4	12				5		SM		Gravelly, Silty SAND (SM), dark brown, fine to medium sand and gravel, medium dense, moist. Becomes gray, with fine sand and fine to coarse gravel. Trace wood debris encountered at 4.8 ft bgs. Becomes brown at 5 ft bgs. Becomes gray at 5.5 ft bgs.	
30/48	C5-6	<5									
	C5-8	<6									
48/48	C5-10	86				10		ML		Sandy SILT (ML), dark brown, with trace organics and bedding features, stiff, moist. Becomes gray at 10 ft bgs. 2 in. brown layer at 10.5 ft bgs.	
	C5-12	48						SM		Silty SAND (SM), dark brown, fine sand, dense, wet, with occasional silt bedding features.	
48/48	C5-14	20				15					
	C5-16	90									
48/48	C5-18	12						SP		SAND (SP), dark gray, fine to medium, medium dense, wet, with white and red lithics.	
	C5-20	14				20				Boring terminated at 20 ft bgs. Groundwater encountered at 10.5 ft bgs. Borehole backfilled with bentonite chips.	
						25					

Location:
Surface Elevation:
Logged By: AAL

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 4-26-10

USG Corporation
Hwy 99
Tacoma, Washington

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Boring Log C5
Project No: 19921.65021

Figure: 20
1 of 1

Boring Log C7

Recovery/ Sample Length (in)	Sample No.	XRF Arsenic (ppm)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / foot)
12/48					
	C7-4	<6			
42/48	C7-6	<7			
	C7-8	231			
48/48	C7-10	125			
	C7-12	23			
48/48	C7-14	23			
	C7-16	18			

USCS	DESCRIPTION	Elev. (feet)
SM	Gravelly, Silty SAND (SM), dark brown, fine to medium sand, fine to coarse gravel, medium dense, moist. Sand becomes fine grained at 0.5 ft bgs. Becomes yellow-brown at 4 ft bgs. Becomes gray at 4.5 ft bgs.	
SP	SAND (SP), dark brown, fine to medium, with some gravel and green vitreous, needle-like grains, medium dense, moist, insulation-like material distributed throughout. Becomes wet at 8 ft bgs.	
ML	Sandy SILT (ML), dark brown, fine sand, with some organics, stiff, wet. 4 in. wood debris encountered at 9.3 ft bgs. Becomes brown at 9.5 ft bgs.	
SM	Silty SAND (SM), dark brown, fine, with trace white lithics and silt bedding features, dense, wet. Trace seams (~0.4 in.) of sand from 12 to 16 ft bgs. Wood debris encountered at 15 ft bgs.	
	Boring terminated at 16 ft bgs. Groundwater encountered at 10.8 ft bgs. Borehole backfilled with bentonite chips.	

Depth (feet): 5, 10, 15, 20, 25

Location:
Surface Elevation:
Logged By: AAL

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 4-27-10

USG Corporation
Hwy 99
Tacoma, Washington

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Boring Log C7
Project No: 19921.65021

Figure: 21
1 of 1

Boring Log C8

Recovery/ Sample Length (in)	Sample No.	XRF Arsenic (ppm)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / foot)
24/48	C8-2	<6			
	C8-4	<6			
	C8-5.5	6693			
27/48	C8-6	211			
	C8-8	242			
45/48	C8-10	46			
	C8-12	45			
48/48	C8-14	9			
	C8-16	<6			

Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
0–5.5	SM	Gravelly, Silty SAND (SM), brown-yellow, fine to coarse, medium dense, moist. Becomes gray-brown with decreased silt and gravel content at 0.5 ft bgs.	
5.5–6	SP	Gravelly SAND (SP), black, fine to medium, with angular, vitreous gravel, medium dense, moist. Becomes wet at 6 ft bgs.	
6–8.5	ML	Sandy SILT (ML), dark brown, with some organics (rootlets) and trace silt bedding, stiff, moist. Becomes brown to light brown mottled at 6.3 ft bgs.	
8.5–11.5	SM	Silty SAND (SM), dark gray-brown, with some silt bedding and layers and trace organics, dense, wet.	
11.5–14	ML	Sandy SILT (ML), dark brown, with some organics and trace silt bedding, medium stiff, moist.	
14–16	SM	Silty SAND (SM), dark gray-brown, with trace silt bedding and some sand layers, dense, wet.	

Boring terminated at 16 ft bgs.
Groundwater encountered at 8.5 ft bgs.
Borehole backfilled with bentonite chips.

Location:
Surface Elevation:
Logged By: AAL

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 4-28-10

USG Corporation
Hwy 99
Tacoma, Washington

CDM

Boring Log C8
Project No: 19921.65021

Figure: 22
1 of 1

Boring Log C9

Recovery/ Sample Length (in)	Sample No.	XRF Arsenic (ppm)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
						0–2.5	SM	Silty SAND (SM), gray, fine to coarse, some coarse gravel and concrete debris, loose, moist.	
24/48	C9-2	59							
						2.5–6	OH	Organic SILT (OH), dark brown,soft, moist, abundant wood chips and decomposed wood.	
	C9-4	116							
						5			
46/48	C9-6	31				6–8.5	ML	SILT (ML), brown mottled with pale green, trace fine sand, medium stiff, moist, low plasticity, abundant rootlets and wood fragments.	
	C9-8	13							
						8.5–11	SM	Silty SAND (SM), gray-brown, fine sand, subangular to subrounded, medium dense, wet, abundant interlayers of gray silt up to 1/4 in. thick.	
48/48	C9-10	<6				10			
						11–11.5	SP	SAND (SP), gray, poorly graded, medium grained, subangular to subrounded, moist.	
						11.5–12	SM	Silty SAND (SM), as at 8.5 ft bgs.	
	C9-12	<6				12–16	SP	SAND (SP), gray, poorly graded, fine sand, subangular to subrounded, trace silt, medium dense, wet.	
48/48	C9-14	<6						2 in. fragment of wood.	
						15			
	C9-16	<6				16		Boring terminated at 16 ft bgs. Groundwater encountered at 12 ft bgs. Borehole backfilled with medium bentonite chips.	
						20			
						25			

Location:

Surface Elevation:

Logged By: HY

Drill Rig: Direct Push Technology

Equipment/Hammer: Acetate Liner/

Date Completed: 4-29-10

USG Corporation
Hwy 99
Tacoma, Washington

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Boring Log C9 — Figure: 23
Project No: 19921.65021 — 1 of 1

Boring Log C10

Recovery/ Sample Length (in)	Sample No.	XRF Arsenic (ppm)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
								SM		Silty SAND (SM), brown, fine to coarse, some coarse gravel, well rounded, loose, dry, concrete debris.	
36/48	C10-2	12									
	C10-4	13									
						5		OH		Organic SILT (OH), dark brown, soft, moist, abundant wood chips.	
48/48	C10-6	15									
								ML		SILT (ML), gray-brown, trace sand, medium stiff, moist, low plasticity, abundant rootlets.	
	C10-8	12									
								SM		Silty SAND (SM), gray-brown mottled with light gray, fine grained sand, subangular to subrounded, moist, minor interlayers of light gray silt up to 1/4 in. thick.	
48/48	C10-10	<6				10					
	C10-12	<6								Boring terminated at 12 ft bgs. Borehole backfilled with medium bentonite chips.	
						15					
						20					
						25					

Location:
Surface Elevation:
Logged By: HY

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 4-29-10

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Tacoma, Washington

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Boring Log C10
Project No: 19921.65021

Figure: 24
1 of 1

Boring Log D1

Recovery/ Sample Length (in)	Sample No.	XRF Arsenic (ppm)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
						0	GP	Asphalt over gravel base, asphalt is 2 in. thick. GRAVEL (GP), gray-brown, some sand, gravel is coarse, dry.	
							ML	SILT (ML), gray-brown, medium stiff, moist, low plasticity.	
42/48	D1-2	12					SM	Silty SAND (SM), gray-brown, some gravel, loose, moist.	
	D1-4	<6				5	ML	Sandy SILT (ML), some fine to coarse sand, some coarse gravel, medium stiff, moist, low plasticity, some asphalt and concrete debris.	
24/48	D1-6	8							
	D1-8	11				▽	SM	Silty SAND (SM), light gray, fine to coarse sand, some gravel, well rounded, coarse gravel, loose, wet.	
40/48	D1-10	<6				10			
								Wood debris at 11.5 ft bgs.	
	D1-12	9					ML	SILT (ML), dark brown, some sand, soft, moist, low plasticity, abundant organic material. 1 in. layer of medium sand at 13 ft bgs. 1 in. long wood fragment at 13.5 ft bgs.	
36/48									
	D1-14	8				15		Boring terminated at 15 ft bgs. Groundwater encountered at 8 ft bgs. Borehole backfilled with bentonite chips.	
						20			
						25			

Location:
Surface Elevation:
Logged By: HY

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 4-29-10

USG Corporation
Hwy 99
Tacoma, Washington

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Boring Log D1
Project No: 19921.65021

Figure: 25
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Boring Log D2

Recovery/ Sample Length (in)	Sample No.	XRF Arsenic (ppm)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
										Gravelly, Sandy SILT (ML), gray-brown, fine sand, very dense, moist.	
36/48	D2-2	<6								Becomes brown at 2 ft bgs.	
	D2-4	20						ML			
						5					
30/48											
	D2-8	29								Becomes gray-brown, wet with increased fine to medium sand content at 8 ft bgs.	
								SM		Gravelly, Silty SAND (SM), gray, fine to coarse, loose, wet.	
33/48	D2-10	<6				10					
	D2-12	<6				▽		ML		Sandy SILT (ML), dark brown, fine sand, with some organics, soft, moist to wet.	
								SM		Silty SAND (SM), dark gray to brown, fine, with trace silt bedding and organics, dense, wet, trace white lithics.	
48/48	D2-14	<6									
						15					
	D2-16	7								Boring terminated at 16 ft bgs. Groundwater encountered at 12.5 ft bgs. Borehole backfilled with bentonite chips.	
						20					
						25					

Location:
Surface Elevation:
Logged By: AAL

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 4-28-10

USG Corporation
Hwy 99
Tacoma, Washington

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Boring Log D2
Project No: 19921.65021

Figure: 26
1 of 1

Boring Log D3

Recovery/ Sample Length (in)	Sample No.	XRF Arsenic (ppm)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
								SM		Gravelly, Silty SAND (SM), dark brown, fine to medium sand, medium dense, moist.	
										Sandy SILT (ML), brown, with some gravel, very stiff, moist.	
36/48	D3-2	7								Becomes gray from 2 to 2.5 ft bgs.	
										Becomes brown and mottled from 2.5 to 3 ft bgs.	
	D3-4	20						ML			
						5					
36/48	D3-6	29								4 in. layer of silty sand at 6 ft bgs.	
										Becomes gray with silt bedding at 6.5 ft bgs.	
	D3-8	17								5 in. layer of silty sand at 8 ft bgs.	
										Sandy SILT (ML), dark gray, trace gravel, with organics, medium stiff, moist, silt bedding.	
48/48	D3-10	<6				10		ML			
						∇				Silty SAND (SM), dark brown, fine sand, dense, wet, with occasional silt bedding features.	
	D3-12	35									
36/48											
						15					
	D3-16	24						SM			
48/48	D3-18	40									
										With white lithics at 19.5 ft bgs.	
	D3-20	31				20					
48/48	D3-22	15								Sandy SILT (ML), gray-brown, very stiff, wet, with occasional bedding and organics.	
								ML			
	D3-24	10								Boring terminated at 24 ft bgs. Groundwater encountered at 11 ft bgs. Borehole backfilled with bentonite chips.	
						25					

Location:
Surface Elevation:
Logged By: AAL

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 4-26-10

CDM

USG Corporation
Hwy 99
Tacoma, Washington

Boring Log D3
Project No: 19921.65021

Boring Log D4

Recovery/ Sample Length (in)	Sample No.	XRF Arsenic (ppm)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
								SM		Gravelly, Silty SAND (SM), very dark brown, fine to medium sand, loose, moist. Becomes brown at 0.5 ft bgs.	
6/48	D4-2	7						ML		Sandy SILT (ML), gray-brown, medium stiff, moist. 2 in. layer of dark gray gravel at 2.5 ft bgs. Increased sand content from 3 to 3.5 ft bgs.	
	D4-4	<5				5		ML		Sandy SILT (ML), gray, fine sand, with trace gravel, stiff, moist.	
24/48											
	D4-8	<5						ML		Sandy SILT (ML), brown, stiff, moist. Trace organics, mottling and bedding features from 8 to 10.5 ft bgs.	
42/48	D4-10	<4				10					
	D4-12	14				▽		SM		Silty SAND (SM), dark brown, fine, with trace organics, dense, wet, occasional silt bedding features.	
48/48	D4-14	15				15				4 in. wood fragment at 15.5 ft bgs.	
	D4-16	11								Boring terminated at 16 ft bgs. Groundwater encountered at 11 ft bgs. Borehole backfilled with bentonite chips.	
						20					
						25					

Location:
Surface Elevation:
Logged By: AAL

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 4-26-10

USG Corporation
Hwy 99
Tacoma, Washington

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Boring Log D4
Project No: 19921.65021

Boring Log D5

Recovery/ Sample Length (in)	Sample No.	XRF Arsenic (ppm)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
								SM		Gravelly, Silty SAND (SM), very dark brown, fine to medium sand, medium dense, moist, with brick fragments.	
36/48	D5-2	9								Becomes gray-brown and moist at 2 ft bgs.	
								SM		Silty SAND (SM), brown, fine, dense, moist. Becomes gray at 2.5 ft bgs.	
								ML		SILT (ML), gray, very stiff, moist.	
	D5-4	8						SM		Gravelly, Silty SAND (SM), brown, fine to coarse, medium dense, moist.	
						5		ML		Sandy SILT (ML), gray-brown, stiff, moist, with some iron mottling. Becomes dark brown at 5 ft bgs.	
36/48	D5-6	9									
								ML		Sandy SILT (ML), very dark brown, with trace organics.	
	D5-8	7								Becomes mottled, with some bedding features at 8 ft bgs.	
42/48	D5-10	4				10				Becomes brown at 10 ft bgs.	
	D5-12	7								Becomes wet, mottled with bedding features and trace organics at 12 ft bgs.	
48/48	D5-14	<6						SP		SAND (SP), dark gray, fine, medium dense, wet, with bedding features (mainly silt bedding), with white and red lithics.	
						15		SM		Silty SAND (SM), gray, fine, dense, wet, with bedding features.	
	D5-16	<6								Boring terminated at 16 ft bgs. Groundwater encountered at 12 ft bgs. Borehole backfilled with bentonite chips.	
						20					
						25					

Location:
Surface Elevation:
Logged By: AAL

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 4-26-10

CDM

USG Corporation
Hwy 99
Tacoma, Washington

Boring Log D5
Project No: 19921.65021

Figure: 29
1 of 1

Boring Log D6

Recovery/ Sample Length (in)	Sample No.	XRF Arsenic (ppm)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
						0	SM	Gravelly, Silty SAND (SM), dark brown, fine to medium sand, loose, moist. Cobble encountered at 0.5 ft bgs.	
36/48	D6-2	8					ML	Sandy SILT (ML), brown, fine sand, with trace organics, very stiff, moist.	
	D6-4	6						3 in. silty sandy gravel layer at 4 ft bgs. Becomes gravelly, fine to coarse, wet at 4.5 ft bgs.	
						5			
30/48	D6-6	44							
	D6-8	37				8	SM	Gravelly, Silty SAND (SM), gray-brown, fine to coarse gravel, fine to coarse sand, loose, wet.	
						9	ML	Sandy SILT (ML), dark brown, fine sand, with some organics, stiff, moist. Becomes light brown at 9.5 ft bgs. Becomes gray at 10 ft bgs. Becomes dark gray-brown at 10.5 ft bgs.	
48/48	D6-10	<4				10			
	D6-12	<6						<1 in. layers of organics from 12.5 to 15 ft bgs. Becomes dark brown at 13 ft bgs.	
42/48	D6-14	5							
						14.5	SM	Silty SAND (SM), dark gray-brown, fine to medium sand, dense, moist, with <1 in. organic layers. Becomes gray-brown, fine at 15 ft bgs.	
						15			
	D6-16	6				16		Boring terminated at 16 ft bgs. Groundwater encountered at 8 ft bgs. Borehole backfilled with bentonite chips.	
						20			
						25			

Location:
Surface Elevation:
Logged By: AAL

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 4-27-10

USG Corporation
Hwy 99
Tacoma, Washington

CDM

Boring Log D6
Project No: 19921.65021

Figure: 30
1 of 1

Boring Log D7

Recovery/ Sample Length (in)	Sample No.	XRF Arsenic (ppm)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
						0	ML	Gravelly, Sandy SILT (ML), gray-brown, fine sand, medium stiff to stiff, moist.	
12/48									
	D7-4	<6						Becomes brown, no gravel at 4 ft bgs.	
						5		Becomes gray, with trace organics at 5 ft bgs.	
30/48	D7-6	<6							
							ML	Sandy SILT (ML), gray-brown, fine sand, stiff, wet, with some mottling.	
	D7-8	<6							
						9 (▽)	SM	Silty SAND (SM), dark brown, fine sand, dense, wet.	
42/48	D7-10	<6				10			
	D7-12	<7						Wood fragments encountered at 12.5 ft bgs.	
42/48	D7-14	6							
						15			
	D7-16	7						Boring terminated at 16 ft bgs. Groundwater encountered at 9 ft bgs. Borehole backfilled with bentonite chips.	
						20			
						25			

Location:
Surface Elevation:
Logged By: AAL

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 4-27-10

LOG OF BORING WITH WELL 19921-65021-APR 26-28 2010.GPJ CDM_BLLV.GDT 5/24/10 REV.

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Hwy 99
Tacoma, Washington

Boring Log D7
Project No: 19921.65021

Figure: 31
1 of 1

Boring Log D8

Recovery/ Sample Length (in)	Sample No.	XRF Arsenic (ppm)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
						0	SM	Silty SAND (SM), medium brown, fine to coarse sand, some coarse gravel, subangular, medium dense, wet.	
18/48	D8-1.5	24						Concrete debris from 2 to 5 ft bgs, trace wood fragments to 2 in.	
18/48	D8-5	42				5			
	D8-8	36				8	ML	SILT (ML), gray-brown, medium stiff, moist, low plasticity, minor subhorizontal bedding laminations.	
48/48	D8-10	34				10	SM	Silty SAND (SM), gray, fine sand, subangular to subrounded, medium dense, wet, occasional silt layer up to 1/4 in. thick, bedding laminations.	
	D8-12	8							
36/48	D8-14	<9							
						15	SP	SAND (SP), dark gray, poorly graded, medium sand, subangular to subrounded, medium dense, wet.	
	D8-16	10					SM	Silty SAND (SM), gray, fine sand, subangular to subrounded, medium dense, wet.	
						16		Boring terminated at 16 ft bgs. Groundwater encountered at 10 ft bgs. Borehole backfilled with bentonite chips (Hydroplug 3/8 in.).	
						20			
						25			

Location:
Surface Elevation:
Logged By: HY

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 4-29-10

CDM

USG Corporation
Hwy 99
Tacoma, Washington

Boring Log D8 Figure: 32
Project No: 19921.65021 1 of 1

Boring Log D9

Recovery/ Sample Length (in)	Sample No.	XRF Arsenic (ppm)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
13/48	D9-1	23				0–4.5	SM	Silty SAND (SM), medium brown, fine to coarse, subangular to subrounded, some well rounded gravel, loose, moist.	
24/48	D9-4.5	11				4.5–10	ML	Silt (ML), gray-brown, trace fine sand, medium stiff, moist, low plasticity, occasional silty sand interbed.	
	D9-6	7							
	D9-8	10							
48/48	D9-10	<6				10–12	SM	Silty SAND (SM), gray, fine sand, subangular to subrounded, medium dense, wet, minor interbeds of light gray silt 1/4 in. thick.	
	D9-12	<6				12		Boring terminated at 12 ft bgs. Groundwater encountered at 10 ft bgs. Borehole backfilled with bentonite chips.	

Location:
Surface Elevation:
Logged By: HY

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 4-29-10

USG Corporation
Hwy 99
Tacoma, Washington

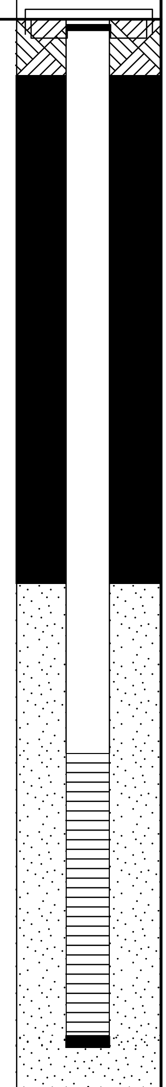
CDM

Boring Log D9
Project No: 19921.65021

Figure: 33

Boring Log MW1

Recovery/ Sample Length (in)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)	Well or Piezometer Completion
						0				3 in. Asphalt at surface.		
								SM		Silty SAND (SM), brown, fine to medium sand, some coarse gravel and cobbles, well rounded, medium dene, dry, trace brick fragments (Fill).		
6"/18"					9 11 12							
						5						
18"/18"					3 3 5					As above, color changes to light gray-brown (Fill).		
						10		ML		SILT (ML), gray-brown, trace fine sand, medium stiff, moist, low plasticity, trace wood fragments (Alluvium).		
18"/18"					1 3 20	▽				At 12 ft bgs, a 12 in. long wood fragment with grain oriented vertically was captured by the sampler.		
						15		SP		SAND (SP), dark gray, poorly graded sand, fine grained sand, subrounded grains, trace silt, medium dense, wet, trace wood fragments.		
14"/18"					3 5 7					At 18 - 19 ft bgs, numerous 1/2 in. thick gray silt interbeds.		
						20				Boring terminated at 19 ft bgs. Monitoring well installed in borehole.		
						25						



Location:
Surface Elevation:
Logged By: HY

Drill Rig: Hollow Stem Auber (Mobile B61)
Equipment/Hammer: SPT - Autohammer/
Date Completed: 5-5-10

USG Corporation
Hwy 99
Tacoma, Washington

CDM

Boring Log MW1
Project No: 19921.65021

Figure: 34
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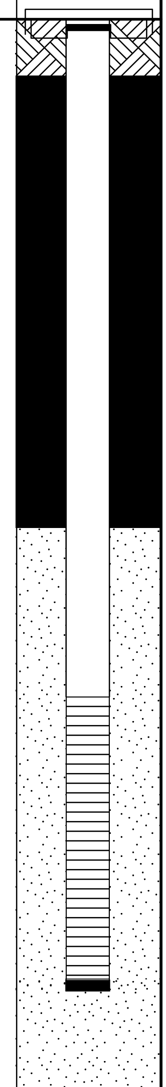
LOG OF BORING WITH WELL 19921-65021-APR 26-28 2010.GPJ CDM_BLLV.GDT 5/24/10 REV.

Boring Log MW2

Recovery/ Sample Length (in)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)	Well or Piezometer Completion
						0		SM		Silty SAND (SM), gray, with some coarse gravel and cobbles up to 3 in. diameter, well rounded, medium dense, moist.		
12"/18"					10 14 11							
						5						
								SM		Silty SAND (SM), dark gray-brown, fine to coarse sand, trace fine gravel, loose, moist (Fill).		
18"/18"					2 3 2					As above, loose, moist (Fill).		
						10						
18"/18"					2 4 6			SP		SAND (SP), dark gray, poorly graded, fine to medium grained, subangular to subrounded grains, black, white and red grains, medium dense, wet.		
						15						
18"/18"					2 2 3					As above, loose, wet.		
								ML		SILT (ML), dark brown, medium stiff, moist, low plasticity, trace brown organics.		
										Boring terminated at 19 ft bgs. Monitoring well installed in borehole.		
						20						
						25						



Location:
Surface Elevation:
Logged By: HY

Drill Rig: Hollow Stem Auber (Mobile B61)
Equipment/Hammer: SPT - Autohammer/
Date Completed: 5-4-10

USG Corporation
Hwy 99
Tacoma, Washington

CDM

Boring Log MW2
Project No: 19921.65021

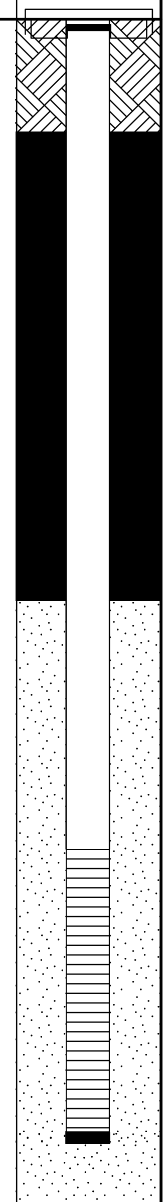
Figure: 35
1 of 1

LOG OF BORING WITH WELL 19921-65021-APR 26-28 2010.GPJ CDM_BLLV.GDT 5/24/10 REV.

Boring Log MW3

Recovery/ Sample Length (in)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / 6 in.)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
						0	GM	Silty GRAVEL (GM), gray, fine gravel, angular, loose, moist (Fill).	
					4 2 2	3–4.5	ML	SILT (ML), light gray-brown, soft, moist, low plasticity, some fine sand, trace rootlets (Fill).	
					2 2 5	7.5–9	ML	SILT (ML), brown mottled and interlayered with light gray-brown, medium stiff, moist, low plasticity, some laminations, some rootlets (Alluvium).	
					1 2 5	12.5–14		At 13 ft bgs, silt is interlayered with fine, wet silty sand, 1/2 in. layers.	
					2 5 7	17.5–19	SP	SAND (SP), dark gray, poorly graded, fine subrounded grains, red, black, and white grains, medium dense, wet. Sand is heaving at 19 ft bgs.	
						19		Boring terminated at 19 ft bgs. Monitoring well installed in borehole.	

Well or Piezometer Completion



Location:
Surface Elevation:
Logged By: HY

Drill Rig: Hollow Stem Auber (Mobile B61)
Equipment/Hammer: SPT - Autohammer/
Date Completed: 5-7-10

USG Corporation
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Tacoma, Washington

Boring Log MW3
Project No: 19921.65021

Figure: 36
1 of 1

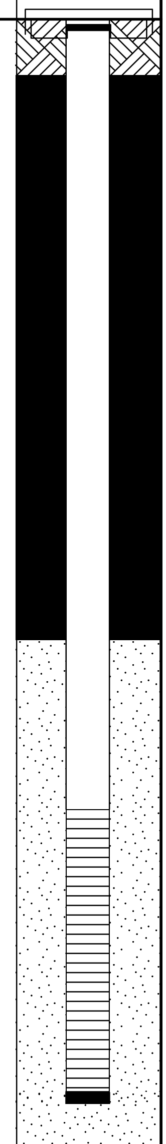
CDM

LOG OF BORING WITH WELL 19921-65021-APR 26-28 2010.GPJ CDM_BLLV.GDT 5/24/10 REV.

Boring Log MW4

Recovery/ Sample Length (in)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
								GM		Silty GRAVEL (GM), gray, angular, loose, moist.	
								MH		SILT (MH), light gray-brown, medium stiff, moist, medium plasticity, trace brown oxidation, trace rootlets.	
12"/18"					1 2 3						
						5					
18"/18"					2 2 3						
								ML		SILT (ML), brown mottled with gray, medium stiff, moist, low plasticity, trace gray laminations, trace rootlets (Alluvium).	
						10					
18"/18"					1 2 3					At 13 ft bgs, trace SAND (SP) layers, <1/4 in. thick.	
						∇		SP		SAND (SP), dark gray, poorly graded, fine grained sand, subrounded grains, very loose, wet, trace organics, red, whit, & black grains.	
						15					
18"/18"					0 0 1					As above, very loose, wet.	
						20				Boring terminated at 20 ft bgs. Monitoring well installed in borehole.	
						25					

Well or Piezometer Completion



Location:
Surface Elevation:
Logged By: HY

Drill Rig: Hollow Stem Auber (Mobile B61)
Equipment/Hammer: SPT - Autohammer/
Date Completed: 5-5-10

USG Corporation
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Tacoma, Washington

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Boring Log MW4
Project No: 19921.65021

Figure: 37
1 of 1

LOG OF BORING WITH WELL 19921-65021-APR 26-28 2010.GPJ CDM_BLLV.GDT 5/24/10 REV.

Boring Log MW5

Recovery/ Sample Length (in)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)	Well or Piezometer Completion
								GP		GRAVEL (GP), light gray, coarse, angular, loose, dry (Fill).		
12"/18"					3 5 7			SM		Silty SAND (SM), gray-brown, fine to medium sand, subangular, trace gravel, loose, wet (Fill).		
						5		ML		SILT (ML), brown, firm, moist, low plasticity, some orange-brown oxidation, trace concrete fragments.		
18"/18"					2 2 5	10		ML		SILT (ML), gray-brown, trace sand, soft, moist, low plasticity, trace organics, some subhorizontal laminations (Alluvium).		
14"/14"					1 1 2							
16"/18"					3 3 5	15		SP		SAND (SP), dark gray, poorly graded, fine to medium grained, mostly fine, subrounded grains, red, black and white colored grains, loose, wet, trace wood fragments.		
						20				Boring terminated at 20 ft bgs. Monitoring well installed in borehole.		
						25						

Location:
Surface Elevation:
Logged By: HY

Drill Rig: Hollow Stem Auber (Mobile B61)
Equipment/Hammer: SPT - Autohammer/
Date Completed: 5-6-10

USG Corporation
Hwy 99
Tacoma, Washington

CDM

Boring Log MW5
Project No: 19921.65021

Figure: 38
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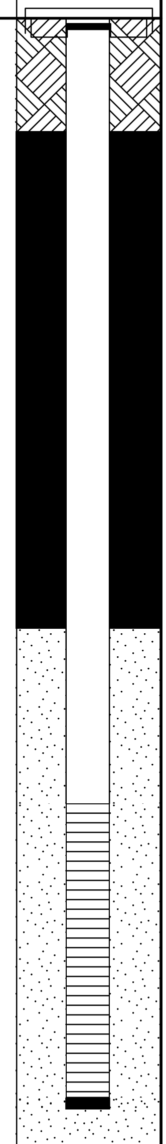
LOG OF BORING WITH WELL 19921-65021-APR 26-28 2010.GPJ CDM_BLLV.GDT 5/24/10 REV.

Boring Log MW6

Recovery/ Sample Length (in)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / 6 in.)	Depth (feet)	USCS	DESCRIPTION
						0–1.5	GP	GRAVELLY (GP), light gray, coarse grained, angular, loose, dry (Fill).
12"/18"					4 3 3	1.5–3	ML	Sandy SILT (ML), dark brown, trace gravel, medium stiff, moist, low plasticity.
						3–7.5	SP	SAND (SP), gray, poorly graded, medium grained sand, subangular to subrounded, trace fine gravel, loose, dry, trace wood debris (Fill).
2"/18"					8 12 8	7.5–12.5	ML	Sandy SILT (ML), dark brown, trace gravel, very stiff, moist, low plasticity (Fill).
18"/18"					7 9 10	12.5–15	SM	Silty SAND (SM), gray-brown, fine grained sand, some gray silt interbeds, medium dense, wet (Alluvium).
0"/18"					7 10 12	15–20	SP	SAND (SP), dark gray, poorly graded, fine to medium subrounded grains, medium dense, wet, heaving at 20 ft bgs (description based on auger cuttings).
						20		Boring terminated at 20 ft bgs. Monitoring well installed in borehole.

Depth (feet): 5, 10, 15, 20, 25

Sample | Symbol | Elev. (feet) | Well or Piezometer Completion



Location:
Surface Elevation:
Logged By: HY

Drill Rig: Hollow Stem Auber (Mobile B61)
Equipment/Hammer: SPT - Autohammer/
Date Completed: 5-6-10

USG Corporation
Hwy 99
Tacoma, Washington

CDM

Boring Log MW6
Project No: 19921.65021

Figure: 39
1 of 1

LOG OF BORING WITH WELL 19921-65021-APR 26-28 2010.GPJ CDM_BLLV.GDT 5/24/10 REV.

Boring Log MW7

Recovery/ Sample Length (in)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / 6 in.)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)	Well or Piezometer Completion
							SM	Silty SAND (SM), light brown, fine to medium sand, some fine to coarse gravel and cobbles, loose, moist (Fill).		
6"/18"					3 2 4					
						5	ML	Sandy SILT (ML), light gray, fine to coarse sand, trace coarse rounded gravel, medium stiff, moist, low plasticity.		
12"/18"					1 7 11			As above, but medium stiff, wet.		
						10	ML	SILT (ML), brown, very stiff, moist, low plasticity, trace light gray laminations, trace brown wod fragments (Alluvium).		
14"/18"					2 3 6	15	SM	Silty SAND (SM), gray-brown, fine grained sand, subangular to subrounded grains, loose, moist, some gray silt layers, subhorizontal, trace brown wood fragments.		
18"/18"					1 1 3	20	SP	SAND (SP), gray, poorly graded, fine grained, subangular to subrounded grains, trace silt, red, black, and white grains, loose, wet.		
18"/18"					6 6 10			As above, but fine to medium grained sand.		
							ML	SILT (ML), light gray, trace organics, trace gravel, very stiff, moist, low plasticity.		
						25		SAND (SW), dark gray, well graded, fine to coarse, subangular to subrounded, red, black, and white		

Location:

Surface Elevation:

Logged By: HY

Drill Rig: Hollow Stem Auber (Mobile B61)

Equipment/Hammer: SPT - Autohammer/

Date Completed: 5-5-10

LOG OF BORING WITH WELL 19921-65021-APR 26-28 2010.GPJ CDM_BLLV.GDT 5/24/10 REV.

USG Corporation
Hwy 99
Tacoma, Washington

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Boring Log MW7
Project No: 19921.65021

Figure: 40

Boring Log MW7

Recovery/ Sample Length (in)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / 6 in.)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
							SW	lithics, medium dense, wet, heaving sand.	
18"/18"					1 1 2		SM	Silty SAND (SM), gray-brown, fine grained sand, subangular to subrounded, very loose, wet, some 1/4 in. horizontal silt layers.	
						30	SM	Silty SAND (SM), gray-brown, fine grained sand, subangular to subrounded, medium dense, wet, some 1/4" gray silt layers, subhorizontal.	
						35	SP	SAND (SP), dark gray, poorly graded, fine to medium grained, subrounded grains, trace silt, medium dense, wet.	
							ML	SILT (ML), gray-brown, some fine sand, very stiff, moist, low plasticity.	
						40		Boring terminated at 39 ft bgs. Monitoring well installed in borehole.	
						45			
						50			

Location:
Surface Elevation:
Logged By: HY

Drill Rig: Hollow Stem Auber (Mobile B61)
Equipment/Hammer: SPT - Autohammer/
Date Completed: 5-5-10

USG Corporation
Hwy 99
Tacoma, Washington

CDM

Boring Log MW7
Project No: 19921.65021

Figure: 40

Boring Log MW8

Recovery/ Sample Length (in)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / 6 in.)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)	Well or Piezometer Completion
							GP	GRAVEL (GP), light gray, coarse, angular, loose, dry, some concrete debris.		
12"/18"					1 1 1		SM	Silty SAND (SM), fine to medium sand, some fine gravel, very loose, moist.		
						5	ML	Sandy SILT (ML), brown, fine to medium sand, soft, moist, low plasticity (Fill).		
18"/18"					2 2 1	10	ML	SILT (ML), light gray-brown, interlayered with gray, fine silty sand at 7.5 to 8.5 ft bgs, soft, moist, low plasticity, subhorizontal laminations.		
14"/18"					3 3 4					
						15	SP	SAND (SP), dark gray, poorly graded, fine to medium grained sand, subrounded grains, trace brown organics, red, black, and white grains, loose, wet.		
18"/18"					2 10 12	20	ML	SILT (ML), light gray-brown, very stiff, moist, low plasticity, subhorizontal laminations of gray fine sand.		
18"/18"					2 3 4		SP	SAND (SP), dark gray, poorly graded, fine to medium sand, subrounded grains, loose, wet, trace wood fragments.		
						25		SILT (ML), gray, medium stiff, moist, low plasticity, some subhorizontal laminations and interbeds of fine SAND (SP).		

Location:
Surface Elevation:
Logged By: HY

Drill Rig: Hollow Stem Auber (Mobile B61)
Equipment/Hammer: SPT - Autohammer/
Date Completed: 5-6-10

USG Corporation
Hwy 99
Tacoma, Washington

CDM

Boring Log MW8
Project No: 19921.65021

Figure: 41

Boring Log MW8

Recovery/ Sample Length (in)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / 6 in.)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
							ML		
18"/18"					5 7 7		SP	SAND (SP), dark gray, poorly graded, fine grained, subrounded grains, red, black and white grains, medium dense, wet, some silt.	
18"/18"					2 3 7	30	SP-SM	SAND with SILT (SP-SM), dark gray, fine grained, subrounded grains, black, white and red grains, some silt, medium dense, wet.	
12"/18"					2 9 11	35	SP	SAND (SP), dark gray, poorly graded, fine to medium grained, subrounded grains, trace silt, red, black and whit grains, medium dense, wet. At 39 ft bgs, some fine GRAVEL (GP), subrounded grains. At 40 ft bgs, the sand is heaving.	
						40		Boring terminated at 40 ft bgs. Monitoring well installed in borehole.	
						45			
						50			

Well or Piezometer Completion

Location:
Surface Elevation:
Logged By: HY

Drill Rig: Hollow Stem Auber (Mobile B61)
Equipment/Hammer: SPT - Autohammer/
Date Completed: 5-6-10

USG Corporation
Hwy 99
Tacoma, Washington

CDM

Boring Log MW8
Project No: 19921.65021

Figure: 41

Boring Log MW9

Recovery/ Sample Length (in)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / 6 in.)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
						0–4	ML	SILT (ML), greenish-gray, trace gravel, stiff, moist, low plasticity, trace concrete rubble (Fill) 2 in. asphalt layer at depth of 6 in..	
6"/18"					7 5 5				
						4–8	SM	Silty SAND (SM), light gray-brown, fine to medium sand, some fine gravel, loose, moist (Fill).	
16"/18"					1 1 1				
						8	ML	SILT (ML), brown, trace sand, soft, moist, low plasticity, laminated.	
						8.5–12.5	SM	Silty SAND (SM), gray-brown, fine grained, subangular to subrounded grains, very loose, moist, trace silt layers and laminations.	
18"/18"					0 6 6	12.5	SP	SAND (SP), gray, poorly graded, fine grained sand, subangular to subrounded grains, trace silt, medium dense, wet.	
16"/18"					0 4 4	17.5	SP	At 17.5 ft bgs, as above, medium dense, wet. At 18.5 ft bgs, 2 in. wood fragment.	
18"/18"					4 5 10	22.5	SP	SAND (SP), dark gray, poorly graded, fine to medium grained, subangular to subrounded grains, whit, red, and black lithics, medium dense, wet.	
						25	SP		

Well or Piezometer Completion

Location:
Surface Elevation:
Logged By: HY

Drill Rig: Hollow Stem Auber (Mobile B61)
Equipment/Hammer: SPT - Autohammer/
Date Completed: 5-4-10

LOG OF BORING WITH WELL 19921-65021-APR 26-28 2010.GPJ CDM_BLLV.GDT 5/24/10 REV.

CDM

USG Corporation
Hwy 99
Tacoma, Washington

Boring Log MW9

Recovery/ Sample Recovery (in)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / 6 in.)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
12"/18"					2 5 5		SW	SAND (SW), dark gray, well graded, fine to coarse grains, subangular to subrounded grains, white, red and black lithics, medium dense, wet. At 29 ft bgs, 1 in. wood fragment, heaving sand.	
						30			
18"/18"					6 35 54/3"		SM	Silty SAND (SM), gray-brown, fine grained, very dense, wet, some 1/4 in. gray silt layers, laminated, trace brown organics.	
						35			
18"/18"					4 3 4		MH	SILT (MH), greenish gray, medium stiff, moist, medium plasticity, trace dark brown organics. At 38.5 ft bgs, 3 in. silty sand layer.	
						40			
16"/18"					0 3 6		SP	SAND (SP), dark yellow-brown, poorly graded, fine to medium grained, mostly medium, subrounded grains, loose, wet.	
						45			
12"/18"					12 20 14		GM	Silty GRAVEL (GM), dark yellow-brown, fine to coarse gravel, some sand, fine to coarse, well rounded grains, dense, wet.	
						50			

Well or Piezometer Completion

Location:
Surface Elevation:
Logged By: HY

Drill Rig: Hollow Stem Auber (Mobile B61)
Equipment/Hammer: SPT - Autohammer/
Date Completed: 5-4-10

USG Corporation
Hwy 99
Tacoma, Washington

CDM

Boring Log MW9
Project No: 19921.65021

Figure: 42

Boring Log MW9

Recovery/ Sample Length (in)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVA (ppm)	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)	Well or Piezometer Completion
12"/18"					24 49 50/3"					Silty SAND with GRAVEL (SM), fine to coarse gravel, well rounded, very dense, wet, till-like.		
						55		SM				
/16"					14 34 50/4"			GM		Silty GRAVEL (GM), gray, fine gravel, subangular to subrounded, very dense, wet, till-like.		
						60				Boring terminated at 59 ft bgs. Monitoring well installed in borehole.		
						65						
						70						
						75						

Location:
Surface Elevation:
Logged By: HY

Drill Rig: Hollow Stem Auber (Mobile B61)
Equipment/Hammer: SPT - Autohammer/
Date Completed: 5-4-10

USG Corporation
Hwy 99
Tacoma, Washington

CDM

Boring Log MW9
Project No: 19921.65021

Figure: 42
3 of 3

LOG OF BORING WITH WELL 19921-65021-APR 26-28 2010.GPJ CDM_BLLV.GDT 5/24/10 REV.

SOIL CLASSIFICATION LEGEND

MAJOR DIVISIONS				TYPICAL NAMES
COARSE GRAINED SOILS More than half is larger than No. 200 sieve	GRAVELS More than half coarse fraction is larger than No. 4 sieve size	Clean gravels with little or no fines	GW	Well graded gravels, gravel-sand mixtures
			GP	Poorly graded gravels, gravel-sand mixtures
		Gravel with over 12% fines	GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS More than half coarse fraction is smaller than No. 4 sieve size	Clean sands with little or no fines	SW	Well graded sands, gravelly sands
			SP	Poorly graded sands, gravelly sands
		Sands with over 12% fines	SM	Silty sand, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS More than half is smaller than No. 200 sieve	SILTS AND CLAYS Liquid limit less than 50		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic clays and organic silty clays of low plasticity
	SILTS AND CLAYS Liquid limit greater than 50		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils

SAMPLE TYPE SYMBOLS

- Disturbed bag or jar sample
- Std. Penetration Test (2.0" OD)
- Type U Ring Sampler (3.25" OD)
- California Sampler (3.0" OD)
- Undisturbed Tube Sample
- Grab Sample
- Core Run
- Non-standard Penetration Test (with split spoon sampler)

CONTACT BETWEEN UNITS

- Change in geologic unit
- Soil type change within geologic unit
- Obscure or gradational change

DESCRIPTORS FOR SOIL STRATA AND STRUCTURE (ENGLISH/METRIC)

General Thickness or Spacing

Parting:	less than 1/16 in. (1/6 cm)
Seam:	1/16 to 1/2 in. (1/6 to 1 1/4 cm)
Layer:	1/2 to 12 in. (1 1/4 to 30 1/2 cm)
Stratum:	> 12 in. (30 1/2 cm)
Scattered:	< 1 per ft. (30 1/2 cm)
Numerous:	> 1 per ft. (30 1/2 cm)

Structure

Pocket:	Erratic, discontinuous deposit of limited extent
Lens:	Lenticular deposit
Varved:	Alternating seams of silt and clay
Laminated:	Alternating seams
Interbedded:	Alternating layers

General Attitude

Near horizontal:	0 to 10 deg.
Low angle:	10 to 45 deg.
High angle:	45 to 80 deg.
Near Vertical:	80 to 90 deg.

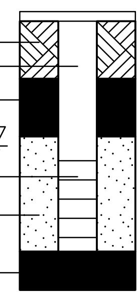
MOISTURE DESCRIPTION

- Dry - Free of moisture, dusty
- Moist - Damp but no visible free water
- Wet - Visible free water, saturated

STRUCTURE DESCRIPTION (cont.)

Fractured	Breaks easily along definite fractured planes
Slickensided	Polished, glossy, fractured planes
Blocky, Diced	Breaks easily into small angular lumps
Sheared	Disturbed texture, mix of strengths
Homogeneous	Same color and appearance throughout

WELL COMPLETIONS



RELATIVE DENSITY OR CONSISTENCY VS. SPT N-VALUE

COARSE GRAINED			FINE GRAINED		
Density	N (blows/ft)	Approx. Relative Density (%)	Consistency	N (blows/ft)	Approx. Undrained Shear Str. (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

PHYSICAL PROPERTY TEST

- AL - Atterberg Limits
- FC - Fines Content
- GSD - Grain Size Distribution
- MC - Moisture Content
- MD - Moisture Content/Dry Density
- Comp - Compaction Test (Proctor)
- SG - Specific Gravity
- CBR - California Bearing Ratio
- RM - Resilient Modulus
- Perm - Permeability
- TXP - Triaxial Permeability
- Cons - Consolidation
- Chem - Analytical Chemical Analysis
- Corr - Corrosion
- VS - Vane Shear
- DS - Direct Shear
- UC - Unconfined Compression
- TX - Triaxial Compression
- UU - Unconsolidated, Undrained
- CU - Consolidated, Undrained
- CD - Consolidated, Drained

Notes:

1. Sample descriptions in this report are 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 or laboratory testing unless presented herein. Visual-manual classification methods in accordance with ASTM D 2488 were used as an identification guide. Where laboratory data are available, soil classifications are in general accordance with ASTM D 2487.

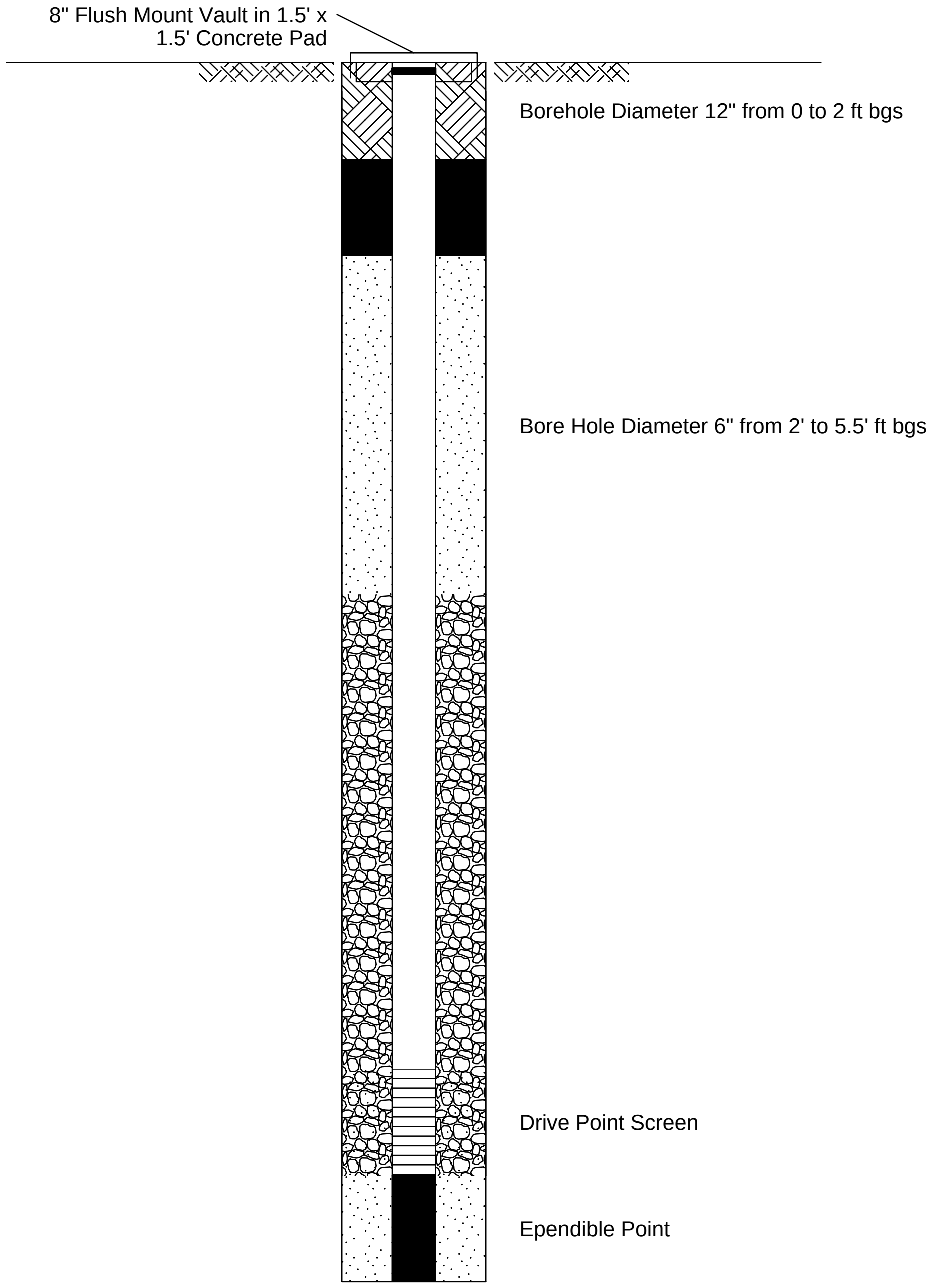
2. Dual symbols are used to indicate gravel and sand units with 5 to 12 percent fines.

3. WOR = weight of rod.

CDM Smith

USG Interiors Inc.
Highway 99
Milton, Washington

Project No: 19921.77628 Figure: 1



MONITORING WELL CONSTRUCTION 19921-77628-ML-10-14-11.GPJ CDM_BLLV.GDT 7/12/12 REV.

TYPICAL MONITORING WELL CONSTRUCTION

Gull Industries, Inc.
Highway 99
Milton, Washington

CDM Smith

Project No: 19921.77628 Figure: 2

1 of 1

Boring Log MW10

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)	Well or Piezometer Completion
						0		ML		SILT (ML), gray-brown, firm, moist, trace rootlets, low plasticity.		
						2						
						4						
						5.5				Soil not logged below 5.5 ft bgs.		
						▽6						
						8						
						10				At 10 ft bgs driller notes harder to drive the well point.		
						12						
						12.6				Boring terminated at 12.6 ft bgs. Groundwater first encountered at 6 ft bgs.		
						14						

Location:
Surface Elevation:
Logged By: HY

Drill Rig:
Equipment/Hammer: Hand Auger & Drive/
Date Completed: 10-14-11

USG Interiors Inc.
Highway 99
Milton, Washington

CDM Smith

Boring Log MW10
Project No: 19921.77628

Figure: 3
1 of 1

Boring Log MW11

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)	Well or Piezometer Completion
								ML		SILT (ML).		
						2		SP		SAND with GRAVEL (SP), light yellowish-brown, poorly graded, fine to medium sand, 20% fine to coarse gravel, subrounded grains, well rounded, trace cobbles, medium dense, wet.		
						4						
						6		ML		SILT (ML), very dark brown, firm, moist, trace wood debris, trace rootlets, medium plasticity.		
						8		SM		Silty SAND (SM), gray, fine grained, subangular to subrounded, medium dense, wet.		
						10		SW		SAND (SW), gray, well graded, fine to coarse grained, subangular to subrounded, medium dense, wet, black, white, and red grains.		
										Boring terminated at 10.5 ft bgs. Groundwater first encountered at 4.01 ft bgs.		
						12						
						14						

Location:
Surface Elevation:
Logged By: HY

Drill Rig:
Equipment/Hammer: Hand Auger/
Date Completed: 10-14-11

USG Interiors Inc.
Highway 99
Milton, Washington

Boring Log MW11
Project No: 19921.77628

Figure: 4
1 of 1

LOG OF BORING WITH WELL 19921-77628-MW-10 AND MW-11.GPJ CDM_BLLV.GDT 7/12/12 REV.

SOIL CLASSIFICATION LEGEND

MAJOR DIVISIONS					TYPICAL NAMES
COARSE GRAINED SOILS More than half is larger than No. 200 sieve	GRAVELS More than half coarse fraction is larger than No. 4 sieve size	Clean gravels with little or no fines	GW		Well graded gravels, gravel-sand mixtures
			GP		Poorly graded gravels, gravel-sand mixtures
		Gravel with over 12% fines	GM		Silty gravels, gravel-sand-silt mixtures
			GC		Clayey gravels, gravel-sand-clay mixtures
	SANDS More than half coarse fraction is smaller than No. 4 sieve size	Clean sands with little or no fines	SW		Well graded sands, gravelly sands
			SP		Poorly graded sands, gravelly sands
		Sands with over 12% fines	SM		Silty sand, sand-silt mixtures
			SC		Clayey sands, sand-clay mixtures
FINE GRAINED SOILS More than half is smaller than No. 200 sieve	SILTS AND CLAYS Liquid limit less than 50		ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity
			CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL		Organic clays and organic silty clays of low plasticity
	SILTS AND CLAYS Liquid limit greater than 50		MH		Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
			CH		Inorganic clays of high plasticity, fat clays
			OH		Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			PT		Peat and other highly organic soils

SAMPLE TYPE SYMBOLS

- Disturbed bag or jar sample
- Std. Penetration Test (2.0" OD)
- Type U Ring Sampler (3.25" OD)
- California Sampler (3.0" OD)
- Undisturbed Tube Sample
- Grab Sample
- Core Run
- Non-standard Penetration Test (with split spoon sampler)

CONTACT BETWEEN UNITS

- Change in geologic unit
- Soil type change within geologic unit
- Obscure or gradational change

DESCRIPTORS FOR SOIL STRATA AND STRUCTURE (ENGLISH/METRIC)

General Thickness or Spacing

Parting:	less than 1/16 in. (1/6 cm)
Seam:	1/16 to 1/2 in. (1/6 to 1 1/4 cm)
Layer:	1/2 to 12 in. (1 1/4 to 30 1/2 cm)
Stratum:	> 12 in. (30 1/2 cm)
Scattered:	< 1 per ft. (30 1/2 cm)
Numerous:	> 1 per ft. (30 1/2 cm)

Structure

Pocket:	Erratic, discontinuous deposit of limited extent
Lens:	Lenticular deposit
Varved:	Alternating seams of silt and clay
Laminated:	Alternating seams
Interbedded:	Alternating layers

General Attitude

Near horizontal:	0 to 10 deg.
Low angle:	10 to 45 deg.
High angle:	45 to 80 deg.
Near Vertical:	80 to 90 deg.

MOISTURE DESCRIPTION

Dry - Free of moisture, dusty

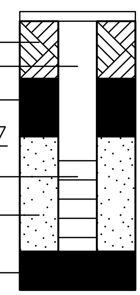
Moist - Damp but no visible free water

Wet - Visible free water, saturated

STRUCTURE DESCRIPTION (cont.)

Fractured	Breaks easily along definite fractured planes
Slickensided	Polished, glossy, fractured planes
Blocky, Diced	Breaks easily into small angular lumps
Sheared	Disturbed texture, mix of strengths
Homogeneous	Same color and appearance throughout

WELL COMPLETIONS



RELATIVE DENSITY OR CONSISTENCY VS. SPT N-VALUE

COARSE GRAINED			FINE GRAINED		
Density	N (blows/ft)	Approx. Relative Density (%)	Consistency	N (blows/ft)	Approx. Undrained Shear Str. (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

PHYSICAL PROPERTY TEST

AL - Atterberg Limits
FC - Fines Content
GSD - Grain Size Distribution
MC - Moisture Content
MD - Moisture Content/Dry Density
Comp - Compaction Test (Proctor)
SG - Specific Gravity
CBR - California Bearing Ratio
RM - Resilient Modulus
Perm - Permeability
TXP - Triaxial Permeability
Cons - Consolidation
Chem - Analytical Chemical Analysis
Corr - Corrosion
VS - Vane Shear
DS - Direct Shear
UC - Unconfined Compression
TX - Triaxial Compression
UU - Unconsolidated, Undrained
CU - Consolidated, Undrained
CD - Consolidated, Drained

Notes:

1. Sample descriptions in this report are 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 or laboratory testing unless presented herein. Visual-manual classification methods in accordance with ASTM D 2488 were used as an identification guide. Where laboratory data are available, soil classifications are in general accordance with ASTM D 2487.

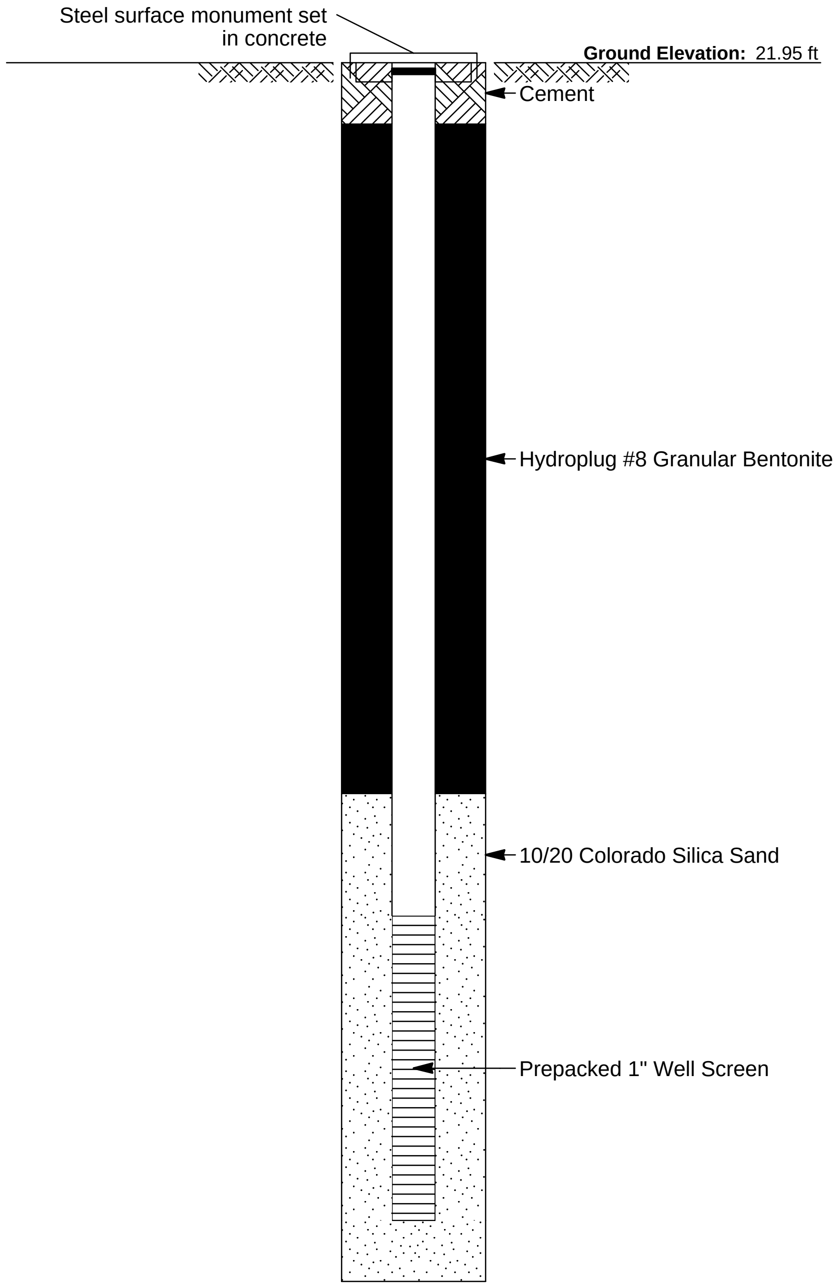
2. Dual symbols are used to indicate gravel and sand units with 5 to 12 percent fines.

3. WOR = weight of rod.

CDM Smith

USG Interiors Inc.
Highway 99
Milton, Washington

Project No: 19921.77628.TK3 GW Figure: 1



MONITORING WELL CONSTRUCTION 19921-77628-MW12-MW14 5-11-12.GPJ CDM_BLLV.GDT 7/12/12 REV.

TYPICAL MONITORING WELL CONSTRUCTION

USG Interiors Inc.
Highway 99
Milton, Washington

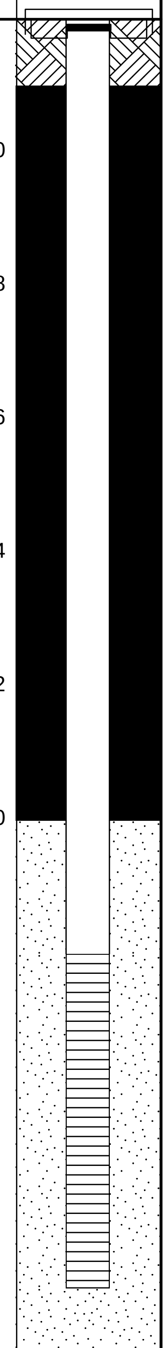
CDM Smith

Project No: 19921.77628.TK3 GW

Figure: 2
1 of 1

Boring Log MW-12

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)	Well or Piezometer Completion
								SM		Slightly Gravelly SAND (SM), brown, fine to coarse sand and gravel, with trace organics (rootlets), loose, moist (FILL).		
								GW		~2" thick layer of black gravel with white sand at ~1 ft bgs.		
						2		ML		Sandy SILT (ML), gray-olive, fine to medium sand, with trace fine to coarse gravel, stiff, moist. Becomes gray and orange mottled at ~2.5 ft bgs.	20	
						4				Becomes gray @ 4 ft bgs. Becomes light gray and orange mottled with increased clay content and increased plasticity at ~4.5 ft bgs.	18	
						6					16	
						8					14	
						10				Increased moisture, sand and gravel at 10.5 ft bgs, becomes medium stiff.	12	
						12				Becomes light red-brown with occasional medium sand lenses at 12 ft bgs.	10	
						14				Becomes saturated at 14 ft bgs.	8	
						16		SM		Silty SAND (SM), brown, fine, loose, saturated.	6	
						18				Becomes wet from 19 to 20 ft bgs.	4	
						20				Boring terminated at 20 ft bgs. Groundwater encountered at 14 ft bgs.	2	



Location:
Surface Elevation: 21.95'
Logged By: A. Lopez

Drill Rig: DPT
Equipment/Hammer: Acetate Liner/NA
Date Completed: 5-11-12

USG Interiors Inc.
Highway 99
Milton, Washington

CDM Smith

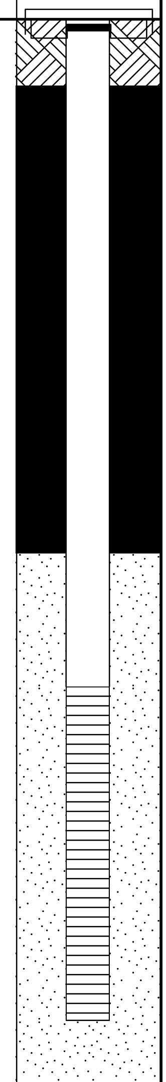
Boring Log MW-12
Project No: 19921.77628.TK3 GW

Figure: 3
1 of 1

Boring Log MW-13

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)	Well or Piezometer Completion
						0–3		SM		Gravelly, Silty SAND (SM), brown, fine to coarse sand and gravel, loose, moist (FILL). Becomes gray-green with deceased silt and gravel at ~6", moist to wet. Cobble encountered at 2 ft bgs.		
						3–9		ML		Sandy SILT (ML), dark brown, with trace gravel and trace organics (wood), stiff, moist. Cobble encountered at 3.5 ft bgs. Becomes gray-olive at 5 ft bgs. Increased plasticity and clay content from 6.5 to 7 ft bgs, underlain by a layer of organics (grass). Becomes brown with increased fine sand at 7 ft bgs.		
						9–16		SM		Grades to Silty SAND (SM), dark brown, fine sand, medium dense, saturated (0, 70, 30). Wood fragment encountered at 14 ft bgs.		
						16				Boring terminated at 16 ft bgs. Groundwater encountered at 9.5 ft bgs.		

Depth scale: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20



Location:
Surface Elevation:
Logged By: A. Lopez

Drill Rig: DPT
Equipment/Hammer: Acetate Liner/NA
Date Completed: 5-11-12

LOG OF BORING WITH WELL 19921-77628-MW12-MW14 5-11-12.GPJ CDM_BLLV.GDT 7/12/12 REV.

CDM Smith

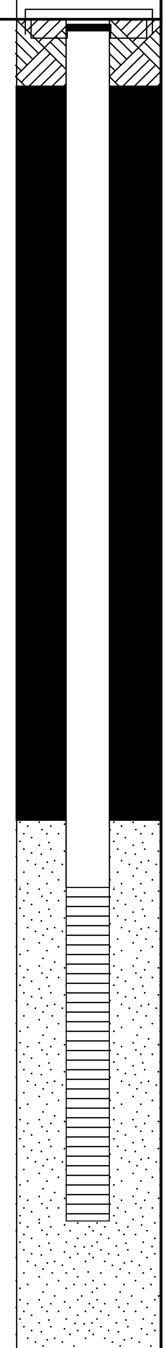
USG Interiors Inc.
Highway 99
Milton, Washington

Boring Log MW-13 Figure: 4
Project No: 19921.77628.TK3 GW 1 of 1

Boring Log MW-14

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
						0	SM	Gravelly, Silty SAND (SM), brown, fine to coarse sand and gravel, loose, moist (FILL).	
						1	ML	Grades to Sandy SILT (ML), red-brown, with gravel, medium stiff, moist.	
						2.7	OH	SILT (OH), dark gray, with rootlets and wood, soft, moist.	
						3.3	ML	Sandy SILT (ML), gray, fine sand, stiff, moist.	
						3.9	SM	Grades to Gravelly, Silty SAND (SM), gray, fine to coarse sand and gravel, dense, moist.	
						10		Becomes brown at 10 ft bgs.	
								As above, limited recovery from 8 to 12 ft bgs.	
						14		Layer of organics (marsh grass) encountered at 14.5 ft bgs.	
						14.5	ML	Clayey, Sandy SILT (ML), dark gray, fine sand, numerous organics, soft, moist, plastic. Thin sand (SP), lens (~1" thick) at 15 ft bgs, wet. Becomes gray with decreased organics and decreased plasticity at 15.5 ft bgs. Numerous sand lenses (saturated) from 16 to 16.5 ft bgs.	
						18		Decreased plasticity, becomes gray-brown mixed at 18 ft bgs.	
						20		Boring terminated at 20 ft bgs. Groundwater encountered at ~15 ft bgs.	

Well or Piezometer Completion



Location:
Surface Elevation:
Logged By: A. Lopez

Drill Rig: DPT
Equipment/Hammer: Acetate Liner/NA
Date Completed: 5-11-12

USG Interiors Inc.
Highway 99
Milton, Washington

CDM Smith

Boring Log MW-14
Project No: 19921.77628.TK3 GW

Figure: 5
1 of 1

SOIL CLASSIFICATION LEGEND

MAJOR DIVISIONS				TYPICAL NAMES
COARSE GRAINED SOILS More than half is larger than No. 200 sieve	**GRAVELS** More than half coarse fraction is larger than No. 4 sieve size	Clean gravels with little or no fines	**GW**	Well graded gravels, gravel-sand mixtures
			GP	Poorly graded gravels, gravel-sand mixtures
		Gravel with over 12% fines	**GM**	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS More than half coarse fraction is smaller than No. 4 sieve size	Clean sands with little or no fines	**SW**	Well graded sands, gravelly sands
			SP	Poorly graded sands, gravelly sands
		Sands with over 12% fines	**SM**	Silty sand, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS More than half is smaller than No. 200 sieve	**SILTS AND CLAYS** Liquid limit less than 50		**ML**	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic clays and organic silty clays of low plasticity
	SILTS AND CLAYS Liquid limit greater than 50		**MH**	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			**PT**	Peat and other highly organic soils

SAMPLE TYPE SYMBOLS

- Disturbed bag or jar sample
- Std. Penetration Test (2.0" OD)
- Type U Ring Sampler (3.25" OD)
- California Sampler (3.0" OD)
- Undisturbed Tube Sample
- Grab Sample
- Core Run
- Non-standard Penetration Test (with split spoon sampler)

CONTACT BETWEEN UNITS

- Change in geologic unit
- Soil type change within geologic unit
- Obscure or gradational change

DESCRIPTORS FOR SOIL STRATA AND STRUCTURE (ENGLISH/METRIC)

General Thickness or Spacing

Parting:	less than 1/16 in. (1/6 cm)
Seam:	1/16 to 1/2 in. (1/6 to 1 1/4 cm)
Layer:	1/2 to 12 in. (1 1/4 to 30 1/2 cm)
Stratum:	> 12 in. (30 1/2 cm)
Scattered:	< 1 per ft. (30 1/2 cm)
Numerous:	> 1 per ft. (30 1/2 cm)

Structure

Pocket:	Erratic, discontinuous deposit of limited extent
Lens:	Lenticular deposit
Varved:	Alternating seams of silt and clay
Laminated:	Alternating seams
Interbedded:	Alternating layers

General Attitude

Near horizontal:	0 to 10 deg.
Low angle:	10 to 45 deg.
High angle:	45 to 80 deg.
Near Vertical:	80 to 90 deg.

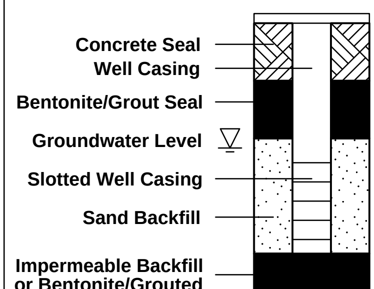
MOISTURE DESCRIPTION

Dry - Free of moisture, dusty

Moist - Damp but no visible free water

Wet - Visible free water, saturated

WELL COMPLETIONS



STRUCTURE DESCRIPTION (cont.)

Fractured	Breaks easily along definite fractured planes
Slickensided	Polished, glossy, fractured planes
Blocky, Diced	Breaks easily into small angular lumps
Sheared	Disturbed texture, mix of strengths
Homogeneous	Same color and appearance throughout

RELATIVE DENSITY OR CONSISTENCY VS. SPT N-VALUE

COARSE GRAINED			FINE GRAINED		
Density	N (blows/ft)	Approx. Relative Density (%)	Consistency	N (blows/ft)	Approx. Undrained Shear Str. (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

PHYSICAL PROPERTY TEST

AL - Atterberg Limits
FC - Fines Content
GSD - Grain Size Distribution
MC - Moisture Content
MD - Moisture Content/Dry Density
Comp - Compaction Test (Proctor)
SG - Specific Gravity
CBR - California Bearing Ratio
RM - Resilient Modulus
Perm - Permeability
TXP - Triaxial Permeability
Cons - Consolidation
Chem - Analytical Chemical Analysis
Corr - Corrosion
VS - Vane Shear
DS - Direct Shear
UC - Unconfined Compression
TX - Triaxial Compression
UU - Unconsolidated, Undrained
CU - Consolidated, Undrained
CD - Consolidated, Drained

Notes:

1. Sample descriptions in this report are 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 or laboratory testing unless presented herein. Visual-manual classification methods in accordance with ASTM D 2488 were used as an identification guide. Where laboratory data are available, soil classifications are in general accordance with ASTM D 2487.

2. Dual symbols are used to indicate gravel and sand units with 5 to 12 percent fines.

3. WOR = weight of rod.

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Highway 99
Milton, Washington

Project No: 11921.77628.TK2 Soil Figure: 1

SOIL CLASSIFICATION/LEGEND 19921-77628-AA6-AA7 5-11-12.GPJ CDM_BLLV.GDT 7/11/12 REV.

Boring Log AA-6

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
						0–4	SM	Gravelly, Silty SAND (SM), brown, fine to coarse, loose, moist (Fill).	
						4	ML	Sandy SILT (ML), dark gray, fine sand, fine to coarse gravel, medium stiff, moist.	
	AA6-6					6			
	AA6-8					8			
	AA6-10					10		Note organic-rich layer at 10 ft bgs.	
	AA6-12					12	SM	Silty SAND (SM), brown, fine sand, medium dense, wet.	
	AA6-14					14			
	AA6-16					16		Boring terminated at 16 ft bgs. Groundwater encountered at 12 ft bgs. Backfilled with bentonite chips.	

Depth scale (feet): 2, 4, 6, 8, 10, 12, 14, 16
Elevation scale (feet): 22, 20, 18, 16, 14, 12, 10, 8, 6

Location:
Surface Elevation: 23.16'
Logged By: AAL

Drill Rig: DPT
Equipment/Hammer: Acetate Liner/NA
Date Completed: 5-11-12

USG Interiors Inc.
Highway 99
Milton, Washington

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Boring Log AA-6
Project No: 11921.77628.TK2 Soil

Figure: 2

Boring Log AA-7

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
	AA7-3					0–4.7	SM	Gravelly, Silty SAND (SM), brown, fine to coarse, loose, moist (Fill).	
	AA7-6 AA7-8 AA7-10					4.7–12	ML	Gravelly, Sandy SILT (ML), gray-olive, fine sand, stiff, moist. Becomes saturated at 5.5 ft bgs.	
	AA7-12 AA7-14					12–16	SM	Silty SAND (SM), brown, fine sand, medium dense, wet.	
	AA7-16					16		Boring terminated at 16 ft bgs. Groundwater encountered at 5.5 ft bgs. Backfilled with bentonite chips.	

Depth scale (feet): 2, 4, 6, 8, 10, 12, 14, 16

Elevation scale (feet): 20, 18, 16, 14, 12, 10, 8, 6, 4

Location:
Surface Elevation: 21.76'
Logged By: AAL

Drill Rig: DPT
Equipment/Hammer: Acetate Liner/NA
Date Completed: 5-11-12

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USG Interiors Inc.
Highway 99
Milton, Washington

Boring Log AA-7
Project No: 11921.77628.TK2 Soil

Figure: 3
1 of 1

Appendix B
Groundwater Purge and Sampling Logs

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CDM

WATER LEVEL MEASUREMENTS

Project USG Hwy 99 Project No. 19921-65021

Weather Conditions cool, calm, cloudy, 50's Date 5/25/2010

Site Conditions ______ Measured By ______

Measurement Device ______ Calculations By ______

Elevation Datum ______

Well	Time	Depth to Water	Reference	Reference Elevation	Water Elevation	Comments
MW-1	0842	10.19	TOC	23.02	12.83	
MW2	0846	8.42	TOC	21.37	12.95	
MW3	0854	7.22	TOC	20.22	13.00	
MW4	0857	7.41	TOC	20.40	12.99	
MW9	0903	1.72	TOC	20.87	19.15	
99-1	0905	8.22	TOC	21.34	13.12	
MW7	0908	7.81	TOC	21.06	13.25	
MW5	0912	6.17	TOC	19.07	12.90	
MW8	0914	5.34	TOC	19.12	13.78	
~~MW6~~	~~0917~~	~~7.08~~				
MW6	0917	7.08	TOC	19.89	12.81	
99-2	0923	9.62	TOC	22.64	13.02	

Additional Comments ______

CDM

GROUNDWATER SAMPLING RECORD

Sample ID MW2-05/10 | Well No. MW2

Project **USG Hwy 99**	Date 5/25/2010
Project No. **19921-65021**	Sampled By MLF & KL
Weather Scattered Showers ~60°F	Reviewed By

PURGING

Depth to Water (TOC) 8.42 ft	Time 1350	Comments
Water Volume in Casing	Total Well Depth (TOC) 17.37	
Volume Purged Before Sampling	Screened Interval (TOC) 12.5-17.5	
Purging Method **Peristaltic Pump**	Purge Volume Measurement Method **measuring cup with calc**	

Time	Flow Rate (mL/min)	Cumulative Volume (L)	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	**ORP**	**DTW**
1355	200	initial	13.75	~~X~~369	7.23		8.32	24.3	9.12
1359	200	0.8	13.37	366	7.09	1.41	6.28	0.7	9.27
1403	200	1.2	13.30	360	6.93	1.40	4.58	-12.9	9.39
1407	200	1.6	13.32	354	6.98	0.83	3.03	-20.7	9.44
1411	200	2.0	13.34	346	6.89	1.15	1.90	-24.1	9.47
1415	200	2.4	13.21	340	6.88	0.84	0.98	-27.4	9.48
1419	200	2.8	13.29	337	6.84	0.63	0.50	-27.5	9.48

SAMPLING

Sampling Method **Peristaltic Pump**

Analytical Matrix ☐ Yes ☐ No ☐ Attached Time Sampled 1445

Sample Container	Preserved By	At What pH	Filter Type	Cooled By ice
~~1Lt. HDPE (2)~~ 500mL HDPE 1	~~HNO3/cup~~ HNO3	<2	-	ice
~~1Lt. plastic~~ 500ml plastic (2)	~~HNO3~~	—	—	ice
250mL Amber glass (2)	H_2SO_4	<2	—	ice
125mL plastic	EDTA	—	—	ice

SAMPLE DATA

Appearance/Odor clear, colorless, odorless	
pH (last stabilized) 6.79	Temperature (°C) 13.28
Eh (millivolts) -35.4	Specific Conductance (microsiemens/cm) 331
OVM-PID Headspace (ppm)	Comments

DISPOSITION

Chain-of-Custody ☒ Yes ☐ No   Chain of Custody ID

Duplicate Sample ID   Replicate Sample Nos.

ANALYTICAL LAB	Lab Name **ARI & Applied Speciation** Date Sent to Lab 5/25/10
	Shipment Method **Hand-delivered to ARI**
SPLIT WITH	Name (s)
	Organization (s)

Other Tubing intake set at 15' btoc

Time	flow rate	Cum. Vol.	Temp	Spec. con.	pH	turbid.	D.O.	ORP	DTW
1423	200	3.2	13.28	335	6.84	1.30	0.32	-30.5	9.50
1427	200	3.6	13.27	333	6.85	0.99	0.25	-32.2	9.50
1431	200	4.0	13.29	~~0~~ 332	6.81	0.70	0.23	-33.8	9.51
1435	200		13.28	331	6.79	0.57	0.22	-35.4	9.51
						0.57			

[illegible]

CDM

GROUNDWATER SAMPLING RECORD

Sample ID MW3-05/10

Well No. MW-3

Project **USG Hwy 99**	Date 5/25/10
Project No. **19921-65021**	Sampled By MLF & LL
Weather warm, cloudy, 60	Reviewed By

PURGING

Depth to Water (TOC) 7.22	Time 1525	Comments	
Water Volume in Casing	Total Well Depth (TOC) 19.44'		
Volume Purged Before Sampling	Screened Interval (TOC) 14.5-19.5'		
Purging Method **Peristaltic Pump**	Purge Volume Measurement Method **measuring cup with calc**		

Time	ml/min Flow Rate	L Cumulative Volume	Temp (oC)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	ORP	DTW
1530	190	initial	13.21	446	7.05	8.04	8.50	-79.1	7.27
1534	190	760(mL)	12.94	442	6.94	7.17	5.50	-85.6	7.27
1538	300	1.96(L)	12.62	442	6.83	8.52	4.00	-81.7	7.29
1542	300	3.16	12.57	442	6.79		2.81	-91.1	7.29
1546	400	4.76	12.37	444	6.75	14.2	1.83	-97.3	7.32
1550	400	6.36	12.35	446	6.73	28.2	0.96	-107.0	7.32
1554	300	~~6~~ 7.56	12.43	447	6.73	29.0	0.55	-108.0	7.29

SAMPLING

Sampling Method **Peristaltic Pump**

Analytical Matrix ☐ Yes ☐ No ☐ Attached Time Sampled 1615

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
~~1L HDPE~~ 1L plastic	~~UNP~~ UNP	—	—	ice
500mL HDPE (2) 500mL plastic 2	HNO3/UNP UNP	<2 / —	—	ice
250mL AG (2)	H_2SO_4	<2	—	ice
125mL plastic	EDTA	—	—	ice

SAMPLE DATA

Appearance/Odor Yellow tint, no odor slight turbidity	
pH (last stabilized) 6.73	Temperature (oC) 12.53
Eh (millivolts) -108.0	Specific Conductance (microsiemens/cm) 449
OVM-PID Headspace (ppm) —	Comments

DISPOSITION

Chain-of-Custody ☒ Yes ☐ No	Chain of Custody ID	
Duplicate Sample ID —	Replicate Sample Nos.	
ANALYTICAL LAB	Lab Name **ARI & Applied Speciation**	Date Sent to Lab 5/25/10
	Shipment Method **Hand-delivered to ARI**	
SPLIT WITH	Name (s)	
	Organization (s)	
Other Tubing intake set at 17' btoc		

Version 10/2007

Groundwater Sampling Record.pmd

Time	Flowrate (mL/min)	Cum. Volume (L)	Temp	Spec. Con	pH	turbidity	DO	ORP	DTW
1558	300	8.76	12.53	447	6.73	24.1	0.36	-102.6	7.29
1602	300	9.96	12.54	448	6.73	22.9	0.25	-94.0	7.29
1606	300	11.16	12.56	449	6.73	20.4	0.21	-88.4	7.29
1610	300	12.36	12.53	449	6.73	16.4	0.20	-82.8	7.29
						16.6			

CDM

GROUNDWATER SAMPLING RECORD

Sample ID MW6-05/10 | Well No. MW6

Project **USG Hwy 99**	Date 5/26/10
Project No. **19921-65021**	Sampled By MLF & LL
Weather cool, raining, 50's	Reviewed By

PURGING

Depth to Water (TOC) 7.08	Time 0843	Comments
Water Volume in Casing	Total Well Depth (TOC) 18.87'	
Volume Purged Before Sampling	Screened Interval (TOC) 14-19'	
Purging Method **Peristaltic Pump**	Purge Volume Measurement Method **measuring cup with calc**	

Time	ml/min Flow Rate	Ltr. Cumulative Volume	Temp (□C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	ORP	DTW
0846	200	Initial	12.89	722	6.73	15.4	7.20	130.2	7.13
0850	300	1.4	12.85	503	6.68	16.5	1.15	3.3	7.13
0854	300	2.1	12.75	466	6.67	14.2	0.89	-21.7	7.17
0858	300	4.5	12.69	458	6.66	13.0	0.72	-31.6	7.18
0902	300	5.7	12.67	457	6.66	10.36	0.56	-40.7	7.17
0906	300	6.9	12.67	456	6.68	9.83	0.42	-49.2	7.18
0910	30	8.1	12.66	456	6.68	9.99	0.39	-54.5	7.18

8.96

SAMPLING

Sampling Method **Peristaltic Pump**

Analytical Matrix ☑ Yes ☐ No ☐ Attached   Time Sampled 0915

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
~~Ltr. HDPE~~ 500mL HDPE (2)	~~—~~ HNO3 & unp	~~—~~ <2 & —	—	ice
~~Ltr. plastic~~ 500mL plastic (2)	unp	—	—	ice
250mL amber glass (2)	H_2SO_4	<2	—	ice
125mL plastic	EDTA	—	—	ice

SAMPLE DATA

Appearance/Odor clear, odorless, colorless	
pH (last stabilized) 6.68	Temperature (□C) 12.66
Eh (millivolts) -54.5	Specific Conductance (microsiemens/cm) 456
OVM-PID Headspace (ppm) —	Comments —

DISPOSITION

Chain-of-Custody ☒ Yes ☐ No		Chain of Custody ID
Duplicate Sample ID —		Replicate Sample Nos.
ANALYTICAL LAB	Lab Name **ARI & Applied Speciation**	Date Sent to Lab 5/26/10
	Shipment Method **Hand-delivered to ARI**	
SPLIT WITH	Name (s)	
	Organization (s)	
Other tubing intake set at 16.5' btoc		

CDM

GROUNDWATER SAMPLING RECORD

Sample ID MW5-05/10 | Well No. MW5

Project	USG Hwy 99	Date	5/26/10
Project No.	19921-65021	Sampled By	KL & MLF
Weather	cool, raining, 50's	Reviewed By	

PURGING

Depth to Water (TOC)	6.17	Time 0952	Comments Extra volume for Diss As matrix QC collected
Water Volume in Casing		Total Well Depth (TOC) 19.17'	
Volume Purged Before Sampling		Screened Interval (TOC) 14-19	
Purging Method	**Peristaltic Pump**	Purge Volume Measurement Method **measuring cup with calc**	

Time	mL/min Flow Rate	Ltr. Cumulative Volume	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	ORP	DTW
0954	350	Initial	11.83	411	6.98	8.66	6.59	-2.7	6.18
0958	350	2.1	11.72	408	6.83	8.53	1.05	-35.1	6.22
1002		3.5	11.68	401	6.75	10.07	0.55	-51.9	6.23
1006		4.9	11.67	398	6.74	9.12	0.52	-59.4	6.22
1010		6.3	11.70	398	6.74	6.56	0.40	-65.4	6.23
1014		7.7	11.71	396	6.74	5.63	0.31	-65.9	6.24
1018		9.1	11.79	394	6.74	5.05	0.30	-67.1	6.24

SAMPLING

Sampling Method **Peristaltic Pump** 4.58

Analytical Matrix ☒ Yes ☐ No ☐ Attached Time Sampled 1025

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
Ltr HDPE (2) 500mL HDPE (2)	unp ~~unp~~ HNO_3	- < 2	—	ice
Ltr. plastic 500mL plastic	unp	—	—	ice
250mL amber glass	H_2SO_4	< 2	—	ice
125mL plastic	EDTA	—	—	ice

SAMPLE DATA

Appearance/Odor	clear, colorless, odorless		
pH (last stabilized)	6.74	Temperature (°C)	11.79
Eh (millivolts)	-67.1	Specific Conductance (microsiemens/cm)	394
OVM-PID Headspace (ppm)		Comments	

DISPOSITION

Chain-of-Custody ☒ Yes ☐ No		Chain of Custody ID	—
Duplicate Sample ID	—	Replicate Sample Nos.	—
ANALYTICAL LAB	Lab Name **ARI & Applied Speciation**	Date Sent to Lab	5/26/10
	Shipment Method **Hand-delivered to ARI**		
SPLIT WITH	Name (s)		
	Organization (s)		
Other	Tubing intake set at 16.5' btoc		

CDM

GROUNDWATER SAMPLING RECORD

Sample ID 99-1-05/10 | Well No. 99-1

Project	**USG Hwy 99**	Date	5/26/10
Project No.	**19921-65021**	Sampled By	McFall
Weather	cool, ~~drizzling~~ 50's, overcast, sun	Reviewed By	

PURGING

Depth to Water (TOC) 8.22	Time 1110	Comments	
Water Volume in Casing	Total Well Depth (TOC)		
Volume Purged Before Sampling	Screened Interval (TOC)		
Purging Method **Peristaltic Pump**	Purge Volume Measurement Method **measuring cup with calc**		

Time	(mL/min) Flow Rate	(Ltr.) Cumulative Volume	Temp (□C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	ORP	DTW
1112	300	Initial	13.09	459	7.14	8.26	5.72	58.2	8.24
1116		1.8	12.90	460	7.03	3.87	3.70	12.0	8.24
1120		3	12.88	459	6.98	36.03	3.11	-15.1	8.25
1124		4.2	12.84	453	6.89	3.63	2.55	-31.4	8.35
1128		5.4	12.83	443	6.91	4.20	2.00	-42.6	8.24
1132		6.6	12.86	435	6.92	3.57	1.60	-47.8	8.27
1136	—	7.8	12.88	422	6.94	4.53	1.10	-51.7	8.25

SAMPLING

Sampling Method **Peristaltic Pump**

Analytical Matrix ☒ Yes ☐ No ☐ Attached   Time Sampled 1200

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
~~Ltr. HDPE (2)~~ 500mL HDPE	unp & HNO_3 unp	<2	—	ice
~~Ltr. plastic~~ 500mL plastic (2)	unp.	—	—	ice
250mL amber plas (2)	H_2SO_4	<2	—	ice
125mL plastic	EDTA	—	—	

SAMPLE DATA

Appearance/Odor	clear, colorless, odorless		
pH (last stabilized)	6.94	Temperature (□C)	12.88
Eh (millivolts)	-51.7	Specific Conductance (microsiemens/cm)	422
OVM-PID Headspace (ppm)		Comments	

DISPOSITION

Chain-of-Custody ☒ Yes ☐ No		Chain of Custody ID	
Duplicate Sample ID		Replicate Sample Nos.	
ANALYTICAL LAB	Lab Name **ARI & Applied Speciation**	Date Sent to Lab	5/26/10
	Shipment Method **Hand-delivered to ARI**		
SPLIT WITH	Name (s)		
	Organization (s)		
Other	Tubing intake set at 16' btoc		

Time	Flow Rate (mL/min)	Cum. Volume (Ltr)	Temp	Sp. Cond.	pH	Turb	Diss O_2	ORP	DTW
1140	300	9	12.88	423	6.94	4.36	0.58	-52.7	8.25
1144	↓	10.2	12.88	421	6.95	5.51	0.42	-54.9	8.25
1148		11.4	12.91	419	6.95	7.56	0.33	-57.3	8.25
1152		12.6	12.90	415	6.92	7.21	0.32	-58.8	8.25
						5.62			

CDM

GROUNDWATER SAMPLING RECORD

Sample ID mw4-05/10 | Well No. mw-4-05/10

Project **USG Hwy 99**	Date 5/26/10
Project No. **19921-65021**	Sampled By MLF/KLL
Weather warm, weak sun, 50's	Reviewed By

PURGING

Depth to Water (TOC) 7.41	Time 1232	Comments Duplicate collected MWD @ 1545	
Water Volume in Casing	Total Well Depth (TOC) 18.79'		
Volume Purged Before Sampling	Screened Interval (TOC) 14-19'		
Purging Method **Peristaltic Pump**	Purge Volume Measurement Method **measuring cup with calc**		

Time	Flow Rate	Cumulative Volume	Temp (□C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	ORP	DTW
1234	400	~~400~~	12.48	695	6.81	14.4	5.08	82.7	8.17
1238	↓	2.4	12.10	695	6.54	15.5	3.81	47.4	8.64
1242	400	4.8	12.12	695	6.48	11.1	3.87	32.5	8.83
1246		5.6	12.20	691	6.48	9.42	2.81	21.6	8.83
1250		7.2	12.19	683	6.47	17.9	0.58	13.3	8.85
1254	↓	8.8	12.21	677	6.47 ~~6.44~~	10.78	0.38	7.5	8.83
1258		10.4	12.21	660	6.45	5.32	0.32	2.7	8.83

SAMPLING

Sampling Method **Peristaltic Pump**

Analytical Matrix ☒ Yes ☐ No ☐ Attached Time Sampled 1310

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
~~1L HDPE (2)~~ 500mL HDPE (4)	~~unp~~ unp CHNO3	~~<2~~ —	—	ice
~~1L plastic (2)~~ 500mL plastic (4)	unp	—	—	ice
250mL amber glass (4)	H_2SO_4	<2	—	ice
125mL plastic (2)	EDTA	—	—	ice

SAMPLE DATA

Appearance/Odor clear, colorless, odorless	
pH (last stabilized) 6.48	Temperature (□C) 12.22
Eh (millivolts) -0.7	Specific Conductance (microsiemens/cm) 633
OVM-PID Headspace (ppm)	Comments

DISPOSITION

Chain-of-Custody ☒ Yes ☐ No	Chain of Custody ID	
Duplicate Sample ID MWD-05/10	Replicate Sample Nos.	
ANALYTICAL LAB	Lab Name **ARI & Applied Speciation**	Date Sent to Lab 5/26/10
	Shipment Method **Hand-delivered to ARI**	
SPLIT WITH	Name (s)	
	Organization (s)	
Other tubing intake set at 16.5' btoc		

Time	Flow Rate	Cum. Vol.	Temp	Sp. Cond	pH	Turb.	Diss O2	ORP	DTW
1302	400	11.4	12.20	650	6.46	6.80	0.27	6.9	8.84
1306	↓	13.6	12.22	633	6.48	5.19	0.26	-0.7	8.87
						5.68			

CDM

GROUNDWATER SAMPLING RECORD

Sample ID MW1-05/10

Well No. MW1

Project **USG Hwy 99**
Date 5/26/10
Project No. **19921-65021**
Sampled By
Weather raining, cold, 50's
Reviewed By

PURGING

Depth to Water (TOC) 10.19		Time 1401	Comments
Water Volume in Casing		Total Well Depth (TOC) 17.94'	
Volume Purged Before Sampling		Screened Interval (TOC) 14-18'	
Purging Method **Peristaltic Pump**		Purge Volume Measurement Method **measuring cup with calc**	

Time	Flow Rate (mL/min)	Cumulative Volume (Ltr)	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	**ORP**	**DTW**
1405	200	Initial	12.95	291	7.18	6.91	4.56	47.8	10.14
1409	↓	1.6	12.82	292	6.93	8.0	0.95	25.5	10.41
1413		2.2	12.78	296	6.84	7.74	0.45	12.9	10.51
1417		3.4	12.76	301	6.80	6.38	0.32	2.6	10.51
1421		4	12.74	308	6.77	6.40	0.28	-2.6	10.62
1425		4.8	12.74	313	6.75	5.07	0.24	-6.6	10.67
1429		5.6	12.72	318	6.73	4.80	0.25	-11.7	10.68

5.79

SAMPLING

Sampling Method **Peristaltic Pump**

Analytical Matrix ☐ Yes ☐ No ☐ Attached Time Sampled 1435

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
~~1L HDPE~~ 500mL HDPE (2)	~~unp.~~ unp & HNO_3	— <2	—	ice
~~1L plastic~~ 500mL plastic (2)	~~unp~~ unp	—	—	ice
250mL amber glass (2)	H_2SO_4	<2	—	ice
125mL plastic	EDTA	—	—	

SAMPLE DATA

Appearance/Odor clear, colorless, odorless	
pH (last stabilized) 6.73	Temperature (°C) 12.72
Eh (millivolts) -11.7	Specific Conductance (microsiemens/cm) 318
OVM-PID Headspace (ppm)	Comments

DISPOSITION

Chain-of-Custody ☒ Yes ☐ No
Chain of Custody ID

Duplicate Sample ID
Replicate Sample Nos.

ANALYTICAL LAB
Lab Name **ARI & Applied Speciation** Date Sent to Lab 5/26/10
Shipment Method **Hand-delivered to ARI**

SPLIT WITH
Name (s)
Organization (s)

Other Tubing intake set at 15.5' btoc

CDM

GROUNDWATER SAMPLING RECORD

Sample ID MW9-05/10 | Well No. MW9

Project **USG Hwy 99**	Date 5/27/10
Project No. **19921-65021**	Sampled By MLF &KL
Weather warm, partly sunny	Reviewed By

PURGING

Depth to Water (TOC) 1.60'	Time 1125	Comments	
Water Volume in Casing	Total Well Depth (TOC) 48.25'		
Volume Purged Before Sampling	Screened Interval (TOC) 43-48'		
Purging Method **Peristaltic Pump**	Purge Volume Measurement Method **measuring cup with calc**		

Time	Flow Rate (ml/min)	Cumulative Volume (L/btw)	Temp (□C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	ORP	DTW
1130	200	Initial	14.48	270	7.77	11.9	4.91	82.4	1.70
1134	350	3.2	13.83	267	7.81	10.00	0.55	73.4	1.70
1138		4.5	13.48	266	7.81	12.8	0.34	72.1	1.72
1142		5.9	13.45	265	7.78	10.89	0.27	70.5	1.73
1146		7.3	13.42	265	7.74	11.54	0.24	69.7	1.73
1150		8.7	13.36	265	7.73	10.42	0.19	71.1	1.73
1154		10.1	13.35	265	7.72	9.57 9.86	0.19	68.2	1.73

SAMPLING

Sampling Method **Peristaltic Pump**

Analytical Matrix ☒ Yes ☐ No ☐ Attached | Time Sampled 1200

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
~~Ltr HDPE~~ 500mL HDPE (2)	~~unp~~ unp (HNO₃)	— <2	—	ice
Ltr. plastic	unp	—	—	ice
500mL plastic (2)	unp	—	—	ice
250mL amber glass (2)	H_2SO_4	<2	—	ice

SAMPLE DATA

Appearance/Odor clear, colorless, odorless	
pH (last stabilized) 7.72	Temperature (□C) 13.35
Eh (millivolts) 68.2	Specific Conductance (microsiemens/cm) 265
OVM-PID Headspace (ppm)	Comments

DISPOSITION

Chain-of-Custody ☒ Yes ☐ No	Chain of Custody ID
Duplicate Sample ID	Replicate Sample Nos.
ANALYTICAL LAB: Lab Name **ARI**	Date Sent to Lab 5/27/10
Shipment Method **Hand-delivered to ARI**	
SPLIT WITH: Name (s)	
Organization (s)	
Other Tubing intake set at 45.5' btoc	

CDM

GROUNDWATER SAMPLING RECORD

Sample ID MW8-05/10

Well No. MW8

Project **USG Hwy 99**	Date 5/27/10
Project No. **19921-65021**	Sampled By MLF & KL
Weather warm, calm, cloudy, low 50's	Reviewed By

PURGING

Depth to Water (TOC) 5.08'		Time 0903	Comments
Water Volume in Casing		Total Well Depth (TOC) 39.8'	
Volume Purged Before Sampling		Screened Interval (TOC) 35-40'	
Purging Method **Peristaltic Pump**		Purge Volume Measurement Method **measuring cup with calc**	

Time	ml/min Flow Rate	Cumulative Volume	Temp (□C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	**ORP**	**DTW**
0905	300	Initial	12.18	714	7.26	32.0	8.08	167.6	5.11
0909		1.8	12.04	433	7.07	19.6	1.08	132.3	5.12
0913		3	12.01	425	7.09	16.7	0.74	92.4	5.12
0917		4.2	12.06	419	7.00	13.4	0.55	54.9	5.12
0921		5.4	12.02	420	7.06	11.3	0.33	37.4	5.12
0925		6.6	12.03	419	7.12	10.49	0.30	26.1	5.13
0929		7.8	12.03	419	7.08	10.10	0.26	20.7	5.13

SAMPLING

Sampling Method **Peristaltic Pump**

Analytical Matrix ☒ Yes ☐ No ☐ Attached — Time Sampled 0940

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
Lr. HDPE (2) / 500ml HDPE	unp / HNO3 / unp	<2 / —	—	ice
1L plastic / 500ml plastic	unp / unp	—	—	ice
250ml amber glass (2)	H_2SO_4	—	—	ice

SAMPLE DATA

Appearance/Odor colorless, clear, odorless	
pH (last stabilized) ~~7.08~~ 7.00	Temperature (□C) 12.05
Eh (millivolts) 16.3	Specific Conductance (microsiemens/cm) 419
OVM-PID Headspace (ppm)	Comments

DISPOSITION

Chain-of-Custody ☒ Yes ☐ No		Chain of Custody ID
Duplicate Sample ID		Replicate Sample Nos.
ANALYTICAL LAB	Lab Name **ARI ~~& Applied Speciation~~** MLF	Date Sent to Lab 5/27/10
	Shipment Method **Hand-delivered to ARI**	
SPLIT WITH	Name (s)	
	Organization (s)	
Other Tubing intake set at 37.5' btc.		

Time	Flow Rate	Cum. Vol	Temp	Sp. Cond	pH	Turb	Diss O2	ORP	DTW
0933	300	9	12.05	419	7.00	8.32	0.27	16.3	5.13
						9.46			
						8.62			

CDM

GROUNDWATER SAMPLING RECORD

Sample ID MW7-05/10 | Well No. MW7

Project **USG Hwy 99**	Date 5/27/10
Project No. **19921-65021**	Sampled By MCF & KL
Weather warm, overcast, slight breeze, 50's	Reviewed By

PURGING

Depth to Water (TOC) 7.54'	Time 1012	Comments	
Water Volume in Casing	Total Well Depth (TOC) 24.91'		
Volume Purged Before Sampling	Screened Interval (TOC) 25-30'		
Purging Method **Peristaltic Pump**	Purge Volume Measurement Method **measuring cup with calc**		

Time	Flow Rate (mL/min)	Cumulative Volume (Ltr)	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	ORP	DTW
1014	300	Initial	13.15	419	7.21	10.57	6.04	96.1	8.26
1018	250	1.5	13.05	419	7.05	9.15	0.88	48.3	9.06
1022	↓	2.5	13.24	418	6.98	~~9.22~~	0.46	16.2	9.22
1026		3.5	13.39	419	6.95	~~10.53~~ 9.03	0.34	0.2	9.35
1030		4.5	13.58	419	7.05	9.56	0.29	-4.7	9.21
1034		6.5	13.33	421	7.02	9.37	0.23	-7.7	9.14
1038		6.5	13.27	421	7.04		0.21	-7.6	9.10

SAMPLING

Sampling Method **Peristaltic Pump**

Analytical Matrix ☒ Yes ☐ No ☐ Attached — Time Sampled 1045

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
~~Ltr HDPE~~ 500mL HDPE (2)	~~unp~~ unp & HNO_3	— & <2	—	ice
Ltr. plastic (1)	—	—	—	ice
500mL plastic (2)	unp'd	—	—	ice
250mL amber glass (2)	H_2SO_4	<2	—	ice

SAMPLE DATA

Appearance/Odor clear, colorless, odorless	
pH (last stabilized) 6.99	Temperature (°C) 13.28
Eh (millivolts) -8.3	Specific Conductance (microsiemens/cm) 420
OVM-PID Headspace (ppm)	Comments

DISPOSITION

Chain-of-Custody ☒ Yes ☐ No — Chain of Custody ID

Duplicate Sample ID — Replicate Sample Nos.

ANALYTICAL LAB	Lab Name **ARI** — Date Sent to Lab 5/27/10
	Shipment Method **Hand-delivered to ARI**
SPLIT WITH	Name (s)
	Organization (s)

Other Tubing intake set at 27.5' btoc

Time	Flow Rate	Cum Volume	Temp	Sp Cond	pH	Turb.	Diss O_2	ORP	DTW
1042	250	7.5	13.28	420	6.99	10.15	0.21	-8.3	9.10

CDM

GROUNDWATER SAMPLING RECORD

Sample ID 99-2-05/10 | Well No. 99-2

Project **USG Hwy 99**	Date 5/27/10
Project No. **19921-65021**	Sampled By MLF & JLL
Weather sunny, warm, slight breeze, 50's	Reviewed By

PURGING

Depth to Water (TOC) 9.34	Time 1234	Comments
Water Volume in Casing	Total Well Depth (TOC)	
Volume Purged Before Sampling	Screened Interval (TOC)	
Purging Method **Peristaltic Pump**	Purge Volume Measurement Method **measuring cup with calc**	

Time	Flow Rate (mL/min)	Cumulative Volume (Ltr)	Temp (□C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	ORP	DTW
1237	200	Initial	14.00	1185	6.68	22.8	4.67	105.7	9.40
1241		1.4	13.40	1213	6.70	15.4	4.83	34.3	9.39
1245		2.2	13.45	1208	6.59	024.1	0.60	11.8	9.39
1249		3	13.31	1205	6.57	7.57	0.40	6.1	9.39
1253		3.8	13.32	1203	6.54	14.3	0.32	3.0	9.40
1257		4.6	13.28	1201	6.54	23.9	0.29	-1.0	9.40
1301		5.4	13.24	1201	6.52	27.9	0.29	-31	9.40

17.6

SAMPLING

Sampling Method **Peristaltic Pump**

Analytical Matrix ☒ Yes ☐ No ☐ Attached — Time Sampled 1310

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
~~Ltr HDPE~~ 500mL HDPE (2)	~~unp~~ / HNO_3	< 2	—	ice
Ltr plastic	—	—	—	ice
500mL plastic	—	—	—	ice
250mL amber	H_2SO_4	< 2	—	ice

EDTA 125mL plastic

SAMPLE DATA

Appearance/Odor clear, ~~colorless~~ odorless, slight yellowish tinge, broken greasy sheen	
pH (last stabilized)	Temperature (□C)
Eh (millivolts)	Specific Conductance (microsiemens/cm)
OVM-PID Headspace (ppm)	Comments

DISPOSITION

Chain-of-Custody ☒ Yes ☐ No	Chain of Custody ID
Duplicate Sample ID	Replicate Sample Nos.
ANALYTICAL LAB: Lab Name **ARI & Applied Speciation**	Date Sent to Lab
Shipment Method **Hand-delivered to ARI**	
SPLIT WITH: Name (s)	
Organization (s)	
Other Tubing set at 16' btoc.	

CDM

SURFACE WATER SAMPLING RECORDS

Sheet 1 of 2

Project: USG Hwy 99 Date: 5/25/10

Project No.: 19921-65021 Sampled by: KL & MLP

Location: Mutton Reviewed by:

NO.	Sample No.:	SW6	SW5	SW4
	Time collected:	1110	1135	1205
LOCATION	Location:	SW6		
	Depth: (feet)			
	Ref. Elev.: (feet)			
	Depth to water: (feet)			
	Water elevation: (feet)			
SAMPLING	Sampling method:	swing sampler →		
	Container (s):	5	9	9
	Composited: (Yes / No)	No	No	No
	Acidified by? What pH?		HNO_3 total metals (<2) H_2SO_4 for COD <2	HNO_3 total metals (<2) H_2SO_4 for COD <2
	Cooled by:	ice	ice	ice
	Filter type size	—	—	—
DESCRIPTION	Sample appearance:	3.27 NTU (clear)	Clear	Clear
	Sample odor:	No odor	No odor	No odor
	pH:	7.76	7.73	7.70
	Eh: (ORP)	158.7	149.6	142.8
	Sp. Cond. Conductivity: (micromhos)	241	241	241
	Temperature: (°C)	11.11	11.13	11.20
	Other Diss O_2	9.18	9.24	9.56
DISPOSITION	Split Name:	—	—	—
	Split Organization:	—	—	—
	Duplicate No:	—	—	—
	Archive: (Yes / No)	No	No	No
	CDM Lab: (Yes / No)	No	No	No
	Other: (Describe)			
	Name of analytic lab:	ARI	ARI & Applied Spec	ARI & Applied Spec.
	Date sent:	5/25/10	5/25/10	5/25/10
	Delivery method	Hand delivered →		
	Chain of Custody No.:			

COMMENTS: turbidity: 3.27 3.71 1.21

CDM

SURFACE WATER SAMPLING RECORDS

Project: USG Hwy 99 Date: 5/25/10
Project No.: 19924-65021 Sampled by: MLF & KL
Location: Milton Reviewed by:

NO.	Sample No.:	SW3	SW2	SW1
	Time collected:	1230	1250	1310
LOCATION	Location:	SW3	SW2	SW1
	Depth: (feet)			
	Ref. Elev.: (feet)			
	Depth to water: (feet)			
	Water elevation: (feet)			
SAMPLING	Sampling method:	swing sampler		
	Container (s):	1	1	9
	Composited: (Yes / No)	No	No	No
	Acidified by? What pH?			total metals / TOC / COD
	Cooled by:	ice	ice	ice
	Filter type size			
DESCRIPTION	Sample appearance:	clear, colorless, odorless	clear, no odor	clear
	Sample odor:	no odor		no odor
	pH:	7.58	7.66	7.79
	~~Eh:~~ ORP	142.1	149.0	132.6
	~~Conductivity~~ Sp. Cond.: (micromhos)	242	242	240
	Temperature: (°C)	11.20	11.35	11.47
	Other Diss O2	9.36	10.00	10.23
DISPOSITION	Split Name:	—	—	—
	Split Organization:	—	—	—
	Duplicate No:	—	—	—
	Archive: (Yes / No)	No	No	No
	CDM Lab: (Yes / No)	No	No	No
	Other: (Describe)			
	Name of analytic lab:	ARI	ARI	ARI & Applied Spec.
	Date sent:	5/25/10	5/25/10	5/25/10
	Delivery method	Hand delivered		
	Chain of Custody No.:			

COMMENTS:

Turbidity: 1.43 1.08 1.10

CDM

WATER LEVEL MEASUREMENTS

Project USG Hwy 99

Weather Conditions [illegible] sun fog, high 40's

Site Conditions [illegible]

Measurement Device Sinco #3

Elevation Datum

Project No. 19921-77628

Date 10/18/2011

Measured By MLF

Calculations By

Well	Time	Depth to Water	Reference	Reference Elevation	Water Elevation	Comments
MW1	0937	9.89'	TOC			
MW2	0933	8.91'	TOC			
MW3	0957	7.36	TOC			
MW4	0952	7.92'	TOC			
MW5	0907	6.22'	TOC			
MW6	0900	1.10'	TOC			
MW7	1004	8.05'	TOC			
MW8	—	N.M	TOC			NM not measured *
MW9	0941	1.20'	TOC			
MW10	1043	1.10'	TOC			
99-1	0946	8.44'	TOC			
99-2	1012	9.78'	TOC			

Additional Comments * wheel of flatbed trailer is on monument lid of MW8

CDM

LOW FLOW GROUNDWATER SAMPLING RECORD

Sample ID MW10-10/11 | Well No. MW 10

Project: USG Hwy 99	Date: 10/18/2011
Project No.: 19921-77628	Sampled By: MLF
Weather: Sunny, warm 60's	Reviewed By:

PURGING

Static Water Level (TOC) 1.10	Time 1057	Comments
Water Volume in Casing	Total Well Depth (TOC) 11.2'	
Volume Purged Before Sampling	Screened Interval (TOC) 10.2 - 11.2'	
Purging Method Peristaltic Pump	Stabilized Flow Rate	

drawing monthly (1030) Begin purging

Time	DTW	Cumulative Volume	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	mg/L Dissolved Oxygen	Oxidation-Reduction Potential
			12.81	416	7.48		1.61	-84.8
1103	9.89		12.54	368	7.40	59.3	8.23	119.3
	Well	pumped	dry -	will return later		51.5		
1322	1.08'		13.96	358	6.96		1.39	-84.3
1326	4.07'	4.0 tmp	13.53	354	6.92	155	0.68	-97.2
1328	6.38'		13.44	349	6.88		0.47	-94.0

SAMPLING

Sampling Method Peristaltic Pump 49.8

Analytical Matrix ☐ Yes ☒ No ☐ Attached Time Sampled 1335

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
500 mL HDPE	HNO3	<2	0.45 micron	Ice

SAMPLE DATA

Appearance / Odor clear, colorless, odorless	
pH (last stabilized) 6.88	Temperature (°C) 13.41
Eh (millivolts)	Specific Conductance (microsiemens/cm) 349
OVM-PID Headspace (ppm)	ORP -94.0

DISPOSITION

Chain-of-Custody ☒ Yes ☐ No	Chain-of-Custody ID	
Duplicate Sample ID	Replicate Sample Nos.	
Analytical Lab	Lab Name Analytical Resources	Date Sent to Lab 10/18/2011
	Shipment Method Hand-delivered	
Split with	Name (s)	
	Organization (s)	
Other Tubing intake set at ~ 10.7' btoc		
Comments		

CDM

LOW FLOW GROUNDWATER SAMPLING RECORD

Sample ID MW11 - 10/11

Well No. MW11

Project: USG Hwy 99 | Date: 10/18/2011

Project No.: 19921-77628 | Sampled By: MLF

Weather: Sunny, warm, 50's | Reviewed By:

PURGING

Static Water Level (TOC) —	Time 1137	Comments	
Water Volume in Casing	Total Well Depth (TOC) 10.5'		
Volume Purged Before Sampling	Screened Interval (TOC) 9.5-10.5'		
Purging Method Peristaltic Pump	Stabilized Flow Rate ~175 mL/min		

Time	DTW	Cumulative Volume	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	Oxidation-Reduction Potential
1139	—	Initial	13.88	727	7.23	528	4.49	-72.3
1142			13.60	702	6.68	270	~0.25	-115.7
1145			13.65	681	6.56	667	0.22	-113.9
1148			13.67	672	6.51	415	0.37	-114.3
1151			13.74	671	6.50	215	0.42	-115.5
1154			13.67	669	6.49	101.0	0.30	-117.5
1157			13.66	670	6.49		0.26	-119.2

SAMPLING

Sampling Method Peristaltic Pump

Analytical Matrix ☐Yes ☒No ☐Attached Time Sampled 1225

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
500 mL HDPE	HNO3	<2	0.45 micron	Ice

SAMPLE DATA

Appearance / Odor clear, colorless, odorless	
pH (last stabilized) 6.48	Temperature (°C) 13.90
Eh (millivolts)	Specific Conductance (microsiemens/cm) 670
OVM-PID Headspace (ppm)	ORP -129.9

DISPOSITION

Chain-of-Custody ☒Yes ☐No	Chain-of-Custody ID	
Duplicate Sample ID	Replicate Sample Nos.	
Analytical Lab	Lab Name Analytical Resources	Date Sent to Lab 10/18/2011
	Shipment Method Hand-delivered	
Split with	Name (s)	
	Organization (s)	

Other ~~Tubing intake set at ~9.75' btoc.~~ MLF 10/18/11

Comments Tubing is permanently set in well

REV. 2007

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Time	DTW	Cum Vol	Temp	Spec Cond	pH	Turbidity	D.O.	ORP
1200	—		13.71	668	6.49	47.3	0.37	-123.2
1203	—		13.79	668	6.49	30.4	0.32	-124.3
1207	—		13.81	668	6.49	28.1	0.28	-124.4
1210	—		13.78	668	6.48	21.2	0.25	-125.8
1213	—		13.82	669	6.48	18.9	0.22	-127.2
1216			13.86	669	6.48		0.17	-129.2
1219			13.90	670	6.48		0.16	-129.9
						12.8		

CDM

LOW FLOW GROUNDWATER SAMPLING RECORD

Sample ID MW12 -05/12 | Well No. MW12

Project: USG Hwy 99 | Date: 5/22/2012
Project No.: 19921-77628 | Sampled By: MLF
Weather: Sunny, cool, 50's, breezy | Reviewed By:

PURGING

Static Water Level (TOC) ~~0855~~	Time 0853	Comments	
Water Volume in Casing	Total Well Depth (TOC) 20'		
Volume Purged Before Sampling	Screened Interval (TOC) 14' to 19'		
Purging Method peristaltic pump	Stabilized Flow Rate ~200 mL/min		

Time	DTW	Initial Cumulative Volume Ltr.	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	Oxidation-Reduction Potential
0855	2.27	Initial	12.51	203	8.16	83.2	0.82	-86.3
0859	5.26	1.2	12.29	193	7.45	49.4	0.61	-85.2
0903	7.41	2	12.15	188	7.09	100.7	0.80	-82.5
0907	8.25	2.8	12.06	189	6.95	130	0.83	-84
0911	9.20	3.6	11.99	187	6.86	133	1.05	-83.4
0915	9.98		11.96	186	6.81	119	1.32	-81.1
0919	10.33		11.95	185	6.78	89.4	1.45	-80.1

→ over

SAMPLING

Sampling Method peristaltic pump
Analytical Matrix ☐Yes ☐No ☐Attached | Time Sampled 0950

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
500 mL HDPE	HNO3	<2	0.45 micron	ice

SAMPLE DATA

Appearance / Odor clear, colorless, odorless slight ~~turbidity~~ turbidity observable in bucket
pH (last stabilized) 6.67 | Temperature (°C) 11.91
Eh (millivolts) | Specific Conductance (microsiemens/cm) 188
OVM-PID Headspace (ppm) | ORP -75.0

DISPOSITION

Chain-of-Custody ☑Yes ☐ No | Chain-of-Custody ID
Duplicate Sample ID | Replicate Sample Nos.

Analytical Lab	Lab Name Analytical Resources	Date Sent to Lab 5/22/2012
	Shipment Method Hand-delivered	
Split with	Name (s)	
	Organization (s)	

Other Tubing set at ~15.5' btoc
Comments

Time	DTW	Cum Vol	Temp	Sp Cond	pH	Turb.	D.O.	ORP
0923	10.62		11.95	187	6.72	75.5	1.64	-79.1
0927	10.89		11.93	189	6.72	59.2	1.73	-77.5
0931	11.20		11.92	187	6.70	47.1	1.87	-76.6
0935	11.34		11.89	189	6.70	34.8	1.92	-76.2
0939	11.37		11.89	188	6.69	29.6	1.96	-75.7
0943	11.40		11.91	188	6.67	26.9	2.00	-75.0
						24.0		

CDM

LOW FLOW GROUNDWATER SAMPLING RECORD

Sample ID MW13-05/12 | Well No. MW13

Project:	USG Hwy 99	Date:	5/22/2012
Project No.:	19921-77628	Sampled By:	MLF
Weather:	cloudy, light rain, breezy, 50s	Reviewed By:	

PURGING

Static Water Level (TOC)	8.27	Time 1122	Comments
Water Volume in Casing		Total Well Depth (TOC)	16'
Volume Purged Before Sampling		Screened Interval (TOC)	10'-15'
Purging Method	peristaltic pump	Stabilized Flow Rate	~200 mL/min

Time	DTW	Cumulative Volume	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	Oxidation-Reduction Potential
1125	9.41	Initial	13.49	1128	6.61	118	3.72	-86.2
1129	10.34		13.05	1034	6.48	64.3	1.26	-88.7
1134	11.67		13.06	1159	6.49	38.1	0.61	-101.1
1138			13.17	1081	6.52		0.99	-102.8
Pump drawing air bubbles lower tubing to just above bottom of well								
1145			13.24	1024	6.56	84	0.98	-102.1
Pump drawing air, well is dry								

SAMPLING

Sampling Method peristaltic pump

Analytical Matrix ☐Yes ☒No ☐Attached Time Sampled 1220

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
500 mL HDPE	HNO3	<2	0.45 micron	ice

SAMPLE DATA

Appearance / Odor colorless, odorless, little bit swirled sheen organic, clear

pH (last stabilized)	6.56	Temperature (°C)	13.24
Eh (millivolts)		Specific Conductance (microsiemens/cm)	1024
OVM-PID Headspace (ppm)		ORP	-102.1

DISPOSITION

Chain-of-Custody ☒Yes ☐No Chain-of-Custody ID

Duplicate Sample ID Replicate Sample Nos.

Analytical Lab	Lab Name Analytical Resources	Date Sent to Lab 5/22/2012
	Shipment Method Hand-delivered	
Split with	Name (s)	
	Organization (s)	

Other Tubing intake set at ~12.5' btoc

Comments

REV. 2007

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CDM

LOW FLOW GROUNDWATER SAMPLING RECORD

Sample ID: MW14-05/12 | Well No. MW14

Project: USG Hwy 99	Date: 5/22/2012
Project No.: 19921-77628	Sampled By: MLF
Weather: cloudy, light rain, breezy	Reviewed By:

PURGING

Static Water Level (TOC) 10.60	Time 1035	Comments
Water Volume in Casing	Total Well Depth (TOC) 20'	
Volume Purged Before Sampling	Screened Interval (TOC) 13'-18'	
Purging Method peristaltic pump	Stabilized Flow Rate ~200 mL/min	

Time	DTW	Ltr. Cumulative Volume	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	Oxidation-Reduction Potential
1042	13.25	Initial	12.43	1280	6.40	74.7	4.47	-75.9
1046			12.07	1405	6.41	303	1.20	-103.9
1050	15.62		11.98	1479	6.39		1.11	-132.6
drawing air bubbles - lower tubing to just off bottom of well								-
1055	16.61		12.48	1439	6.48	863	1.57	-117.2
1059			12.21	1249	6.54		0.71	-101.1
Pump drawing air - well is dry								

SAMPLING

Sampling Method peristaltic pump

Analytical Matrix ☐ Yes ☐ No ☐ Attached | Time Sampled 1440

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
500 mL HDPE	HNO3	<2	0.45 micron	ice

SAMPLE DATA

Appearance / Odor colorless water in bucket is a bit muddy odorless

pH (last stabilized) 6.54	Temperature (°C) 12.21
Eh (millivolts)	Specific Conductance (microsiemens/cm) 1249
OVM-PID Headspace (ppm)	ORP ~~-101~~ -101.1

DISPOSITION

Chain-of-Custody ☒ Yes ☐ No		Chain-of-Custody ID
Duplicate Sample ID		Replicate Sample Nos.
Analytical Lab	Lab Name Analytical Resources	Date Sent to Lab 5/22/2012
	Shipment Method Hand-delivered	
Split with	Name (s)	
	Organization (s)	

Other Comments Tubing intake set at ~15.5' btc

CDM

WATER LEVEL MEASUREMENTS

Project USG Hwy 99 — Project No. 19921-77628

Weather Conditions rainy, breezy, 50's — Date 5/22/2012

Site Conditions good — Measured By MLF

Measurement Device Sinco # 15 — Calculations By

Elevation Datum

Well	Time	Depth to Water (ft)	Reference	Reference Elevation	Water Elevation	Comments
MW1	1323	9.04	TOC			
MW2	1327	7.71	TOC			
MW3	1320	6.28	TOC			
MW4	1317	6.63	TOC			
MW5	1253	5.32	TOC			
MW6	1247	6.19	TOC			
MW7	1337	8.15	TOC			
MW8	1249	4.59	TOC			
MW9	1336	0.625	TOC			
MW10	1350	0.79	TOC			
MW11	1425	6.90	TOC			
99-1	1335	7.60	TOC			
99-2	1417	8.89	TOC			
mw14	1440	10.60	TOC			
mw13	1122	8.27	TOC			
mw12	0853	0'	TOC			

mw-9

Additional Comments

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Appendix C
Land Survey Report

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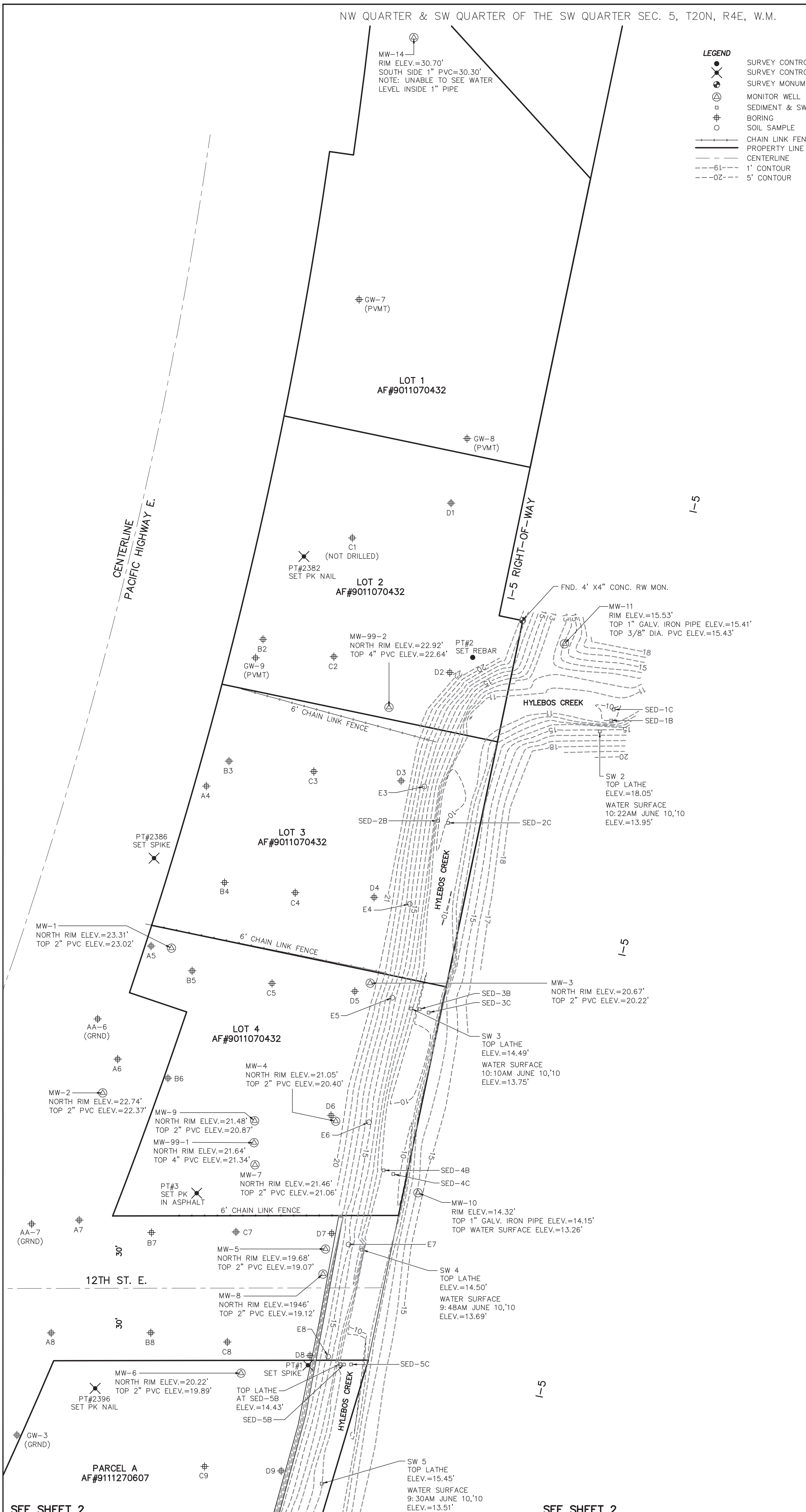
NW QUARTER & SW QUARTER OF THE SW QUARTER SEC. 5, T20N, R4E, W.M.



N

SCALE
20 0 10 20 40
(FEET)
1 INCH = 20 FT

SW 1
TOP LATHE
ELEV.=16.11'
WATER SURFACE
10:31AM JUNE 10,'10
ELEV.=14.41'

MONITOR WELL TABLE

NOTE: ALL MONITOR WELLS ARE LOCATED AT THE NORTH RIM OF 8" DIA. CASING.

PT#	NORTHING	EASTING	ELEV.	DESC.
2350	703059.65	1184681.28	23.31	MW 1
2349	702999.60	1184652.77	22.74	MW 2
2347	703045.13	1184763.71	20.67	MW 3
2348	702987.85	1184749.40	21.05	MW 4
2318	702934.84	1184745.18	19.68	MW 5
2321	702883.36	1184710.13	20.22	MW 6
2345	702969.79	1184715.93	21.46	MW 7
2319	702924.45	1184744.14	19.46	MW 8
2346	702988.01	1184715.80	21.48	MW 9
2344	702978.95	1184715.54	21.64	MW 99–1
2328	703159.55	1184771.51	22.92	MW 99–2
2379	702958.17	1184783.51	14.32	MW 10
2380	703185.90	1184844.31	15.53	MW 11
2387	703065.01	1184585.80	21.95	MW 12
2391	702495.10	1184478.55	22.59	MW 13
2385	703437.40	1184781.81	30.70	MW 14

SAMPLE TABLE

PT#	NORTHING	EASTING	ELEV.	DESC.
2191	703175.33	1185049.80	14.41	SW 1
2188	703149.53	1184858.95	18.05	SW 2
2183	703034.59	1184780.71	14.49	SW 3
2170	702934.51	1184760.33	14.50	SW 4
2163	702837.51	1184743.62	15.45	SW 5
2162	702731.91	1184712.08	15.20	SW 6
2189	703154.05	1184863.70	9.87	SED–1B
2179	703112.47	1184791.84	10.27	SED–2B
2181	703034.30	1184784.20	10.40	SED–3B
2185	702967.47	1184769.28	10.43	SED–4B
2165	702886.92	1184752.82	10.68	SED–5B
2174	702814.34	1184740.87	10.13	SED–6B
2171	702741.35	1184719.54	10.22	SED–7B
2190	703158.64	1184864.70	9.79	SED–1C
2180	703111.61	1184796.00	10.06	SED–2C
2182	703032.92	1184787.96	10.41	SED–3C
2186	702965.93	1184773.30	10.53	SED–4C
2166	702886.97	1184755.82	10.69	SED–5C
2174	702814.34	1184740.87	10.13	SED–6C
2172	702737.65	1184723.10	10.20	SED–7C
2178	703126.72	1184786.20	17.05	E3
2177	703077.98	1184780.15	16.22	E4
2176	703039.09	1184772.91	15.67	E5
2175	702987.44	1184763.24	15.40	E6
2168	702936.77	1184754.72	15.37	E7
2167	702890.25	1184746.28	14.63	E8

NOTES

FIELD MEASUREMENTS FOR THIS MAP WERE TAKEN ON JUNE 10, 2010 AND JUNE 20, 2012 WITH A TCRA 1101 TOTAL STATION INSTRUMENT, AND MEET OR EXCEED A LINEAR CLOSURE OF 1:15,000. ALL PRIMARY MEASUREMENT EQUIPMENT HAS BEEN COMPARED AND ADJUSTED TO A NATIONAL GEODETIC SURVEY CALIBRATED BASELINE, WITHIN THE LAST YEAR.

DATUM

NAD 83/91 WASHINGTON SOUTH ZONE
NAVD'88
US FEET

CONTROL

PIERCE COUNTY PUBLIC WORKS POINT 490
WEST QUARTER CORNER SEC. 5, T20N, R4E, W.M.
FD. 3" BRASS DISK IN 4" X 4" CONCRETE MON.

PIERCE COUNTY PUBLIC WORKS POINT 89
SOUTH QUARTER CORNER SEC. 6, T20N, R4E, W.M.
FD. 3" BRASS SURFACE MON.

REFERENCES

MILTON SHORT PLAT, AF#9011070432
A.H.R. ENGINEERS, INC.
RECORDS OF PIERCE COUNTY, WA.
NOV. 7, 1990

CITY OF MILTON LOT LINE ADJUSTMENT AF#9111270607
BASELINE
RECORDS OF PIERCE COUNTY, WA.
NOV. 27, 1991

SHEET NUMBER: 1 OF 2

USG HWY 99 REMEDIAL INVESTIGATION SURVEY

CAMP DRESSER & MCKEE INC.

PROJECT NUMBER	DRAWING FILE NAME	SCALE
36146.0010	36146-SURV-TP01	1" = 20'

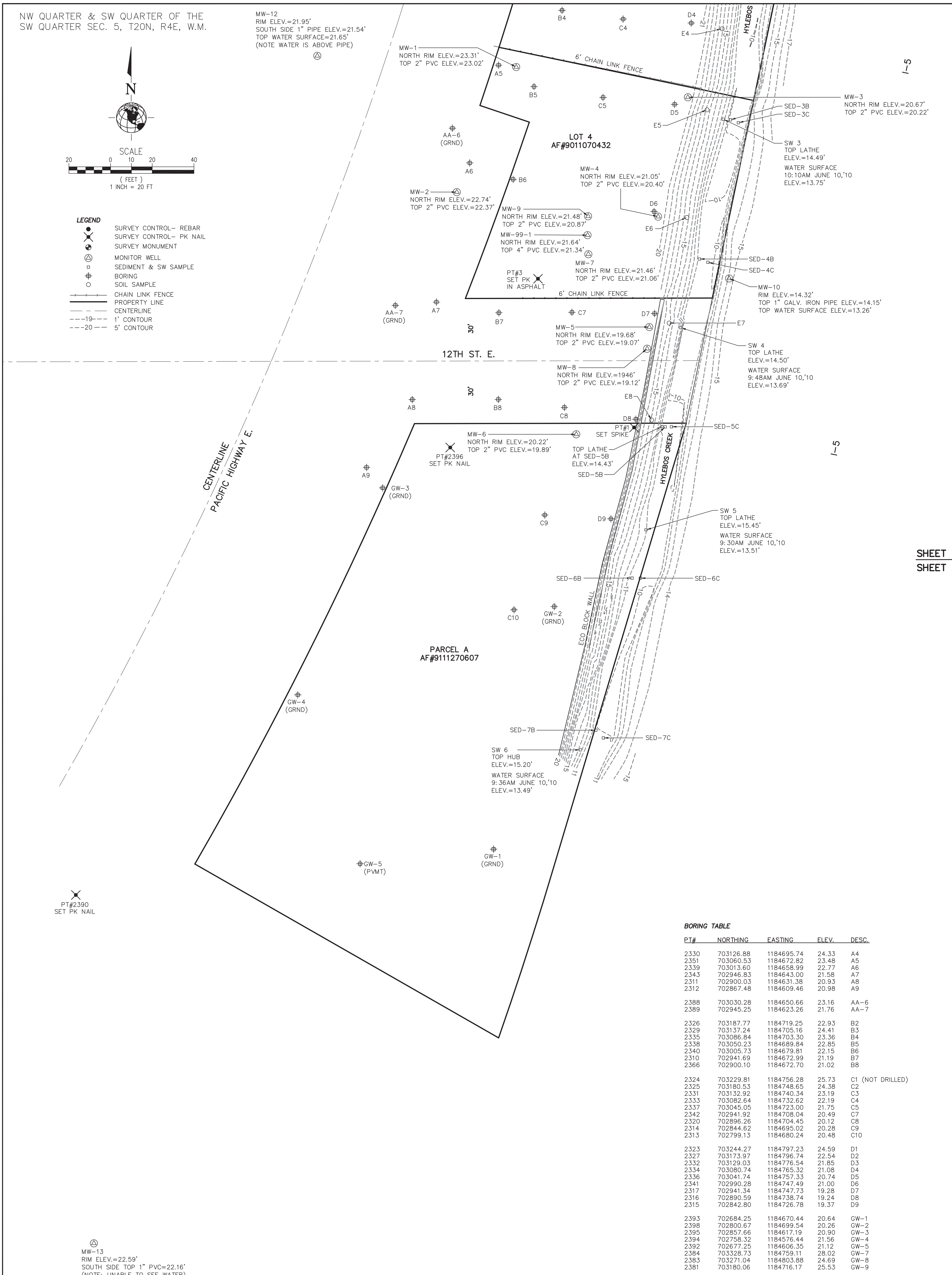
SHEET INFO	
SURVEYED	MBE
DRAWN	MAD
CHECKED	
APPROVED	
LAST EDIT	6/25/2012
PLOT DATE	6/25/2012
SUBMITTAL	

REVISIONS

NO.	BY	DATE	REMARKS

LAWRENCE A. SIGNANI
STATE OF WASHINGTON
11422
REGISTERED
PROFESSIONAL LAND SURVEYOR

WHPacific
12100 NE 195th St, Ste 300
Bothell, WA 98011
425-951-4800 Fax 425-951-4808
www.whpacific.com



BORING TABLE

PT#	NORTHING	EASTING	ELEV.	DESC.
2330	703126.88	1184695.74	24.33	A4
2351	703060.53	1184672.82	23.48	A5
2339	703013.60	1184658.99	22.77	A6
2343	702946.83	1184643.00	21.58	A7
2311	702900.03	1184631.38	20.93	A8
2312	702867.48	1184609.46	20.98	A9
2388	703030.28	1184650.66	23.16	AA–6
2389	702945.25	1184623.26	21.76	AA–7
2326	703187.77	1184719.25	22.93	B2
2329	703137.24	1184705.16	24.41	B3
2335	703086.84	1184703.30	23.36	B4
2338	703050.23	1184689.84	22.85	B5
2340	703005.73	1184679.81	22.15	B6
2310	702941.69	1184672.99	21.19	B7
2366	702900.10	1184672.70	21.02	B8
2324	703229.81	1184756.28	25.73	C1 (NOT DRILLED)
2325	703180.53	1184748.65	24.38	C2
2331	703132.92	1184740.34	23.19	C3
2333	703082.64	1184732.62	22.19	C4
2337	703045.05	1184723.00	21.75	C5
2342	702941.92	1184708.04	20.49	C7
2320	702896.26	1184704.45	20.12	C8
2314	702844.62	1184695.02	20.28	C9
2313	702799.13	1184680.24	20.48	C10
2323	703244.27	1184797.23	24.59	D1
2327	703173.97	1184796.74	22.54	D2
2332	703129.03	1184776.54	21.85	D3
2334	703080.74	1184765.32	21.08	D4
2336	703041.74	1184757.33	20.74	D5
2341	702990.28	1184747.49	21.00	D6
2317	702941.34	1184747.73	19.28	D7
2316	702890.59	1184738.74	19.24	D8
2315	702842.80	1184726.78	19.37	D9
2393	702684.25	1184670.44	20.64	GW–1
2398	702800.67	1184699.54	20.26	GW–2
2395	702857.66	1184617.19	20.90	GW–3
2394	702758.32	1184576.44	21.56	GW–4
2392	702677.25	1184606.35	21.12	GW–5
2384	703328.73	1184759.11	28.02	GW–7
2383	703271.04	1184803.88	24.69	GW–8
2381	703180.06	1184716.17	25.53	GW–9

SHEET NUMBER 2 OF 2

USG HWY 99 REMEDIAL INVESTIGATION SURVEY

CAMP DRESSER & MCKEE INC.

PROJECT NUMBER	DRAWING FILE NAME	SCALE
36146.0010	36146-SURV-TP01	1" = 20'

SHEET INFO	
SURVEYED	MBE
DRAWN	MAD
CHECKED	
APPROVED	
LAST EDIT	6/25/2012
PLOT DATE	6/25/2012
SUBMITTAL	

REVISIONS

NO.	BY	DATE	REMARKS

LAWRENCE A. SIGNANI
STATE OF WASHINGTON
11422
REGISTERED
PROFESSIONAL LAND SURVEYOR

WHPacific
12100 NE 195th St, Ste 300
Bothell, WA 98011
425-951-4800 Fax 425-951-4808
www.whpacific.com

Appendix D
Hydrogeologic Calculations

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OBJECTIVE: DETERMINE THE HYDRAULIC CONDUCTIVITY OF THE: ① SHALLOW ALLUVIAL AQUIFER ② DEEPER ALLUVIAL AQUIFER AND ③ GLACIAL AQUIFER.

APPROACH: ESTIMATE THE HYDRAULIC CONDUCTIVITY OF SOIL IN EACH ZONE USING THE HAZEN (1911) METHOD AND GRAIN SIZE DISTRIBUTION DATA ACQUIRED DURING REMEDIAL INVESTIGATION.

HYDRAULIC CONDUCTIVITY $= K = C(d_{10})^2$

WHERE:

d_{10} = EFFECTIVE GRAIN SIZE (10% OF SAMPLE LESS THAN THIS GRAIN SIZE)

C = HAZEN COEFFICIENT → NUMBER BASED ON DEGREE OF SORTING AND GRAIN SIZE (TABLE 3.7)

SHALLOW ALLUVIAL AQUIFER

ASSUME SOIL SAMPLE A9-16 IS REPRESENTATIVE OF SHALLOW AQUIFER. BECAUSE THIS IS SILTY SAND (SM), WITH 49.9% SILT AND CLAY THE HAZEN (1911) IS NOT APPLICABLE. INSTEAD USE THE LITERATURE DERIVED K VALUES FOR SILTY SAND FROM ANDERSON AND WOESSNER (1992) FIGURE 3.8

$$\boxed{\begin{aligned} K_{LOW} &= 0.3 \text{ FT/DAY} \\ K_{HIGH} &= 30 \text{ FT/DAY} \end{aligned}}$$

DEEPER ALLUVIAL AQUIFER

ASSUME SOIL SAMPLE MW9-27.5 IS REPRESENTATIVE OF THE DEEPER ALLUVIAL AQUIFER

$d_{10} = 0.24$ mm

HAZEN COEFFICIENT $= C = 80$ TO $120 \frac{1}{\text{cm-s}}$ BASED ON TABLE 3.7 FOR "MODERATELY SORTED TO WELL SORTED MEDIUM SAND"

UNIFORMITY COEFFICIENT $= C_u = \frac{d_{60}}{d_{10}} = \frac{0.74}{0.24} = 3.1$ (INDICATES WELL SORTED BECAUSE $C_u < 4$)

$K_{LOW} = (80 \frac{1}{\text{cm s}}) \times (0.024 \text{cm})^2 = 0.046 \text{cm/SEC} = 130$ FT/DAY

$K_{HIGH} = (120 \frac{1}{\text{cm s}}) \times (0.024 \text{cm})^2 = 0.069 \text{cm/SEC} = 200$ FT/DAY

UNIT CONVERSION: 1 cm/s = 2835 FT/DAY

$$\boxed{K = 130 \text{ TO } 200 \text{ FT/DAY}}$$

GLACIAL AQUIFER

SOIL IN THE GLACIAL AQUIFER CONSISTED OF POORLY GRADED SAND (SP) AND POORLY GRADED GRAVEL WITH SILT (GP-GM) ASSUME SAMPLES MW9-42.5 AND MW9-47.5 ARE REPRESENTATIVE OF SOIL IN THE GLACIAL AQUIFER.

POORLY GRADED SAND (SP) - SAMPLE MW9-42.5

$d_{10} = 0.09\ mm$

UNIFORMITY COEFFICIENT $= C_u = \frac{d_{60}}{d_{10}} = 3.1$ (INDICATES WELL SORTED BECAUSE $C_u < 4$)

HAZEN COEFFICIENT $= C = 80$ TO $120 \frac{1}{cm\,s}$ BASED ON TABLE 3.7 "MODERATELY TO WELL SORTED MEDIUM SAND"

$K_{LOW} = \left(80 \frac{1}{cm\text{-}sec}\right) \times (0.009)^2 = 0.0065\ cm/sec = \boxed{20\ FT/DAY}$

$K_{HIGH} = \left(120 \frac{1}{cm\text{-}sec}\right) \times (0.009)^2 = 0.0097\ cm/sec = \boxed{30\ FT/DAY}$

POORLY GRADED GRAVEL WITH SILT (GP-GM) - SAMPLE MW9-47.5

BECAUSE THE HAZEN METHOD IS NOT APPLICABLE TO GRAVELS, A LITERATURE DERIVED K VALUE FOR GRAVEL WILL BE SELECTED FROM ANDERSON AND WOESSNER (1992) FIGURE 3.8

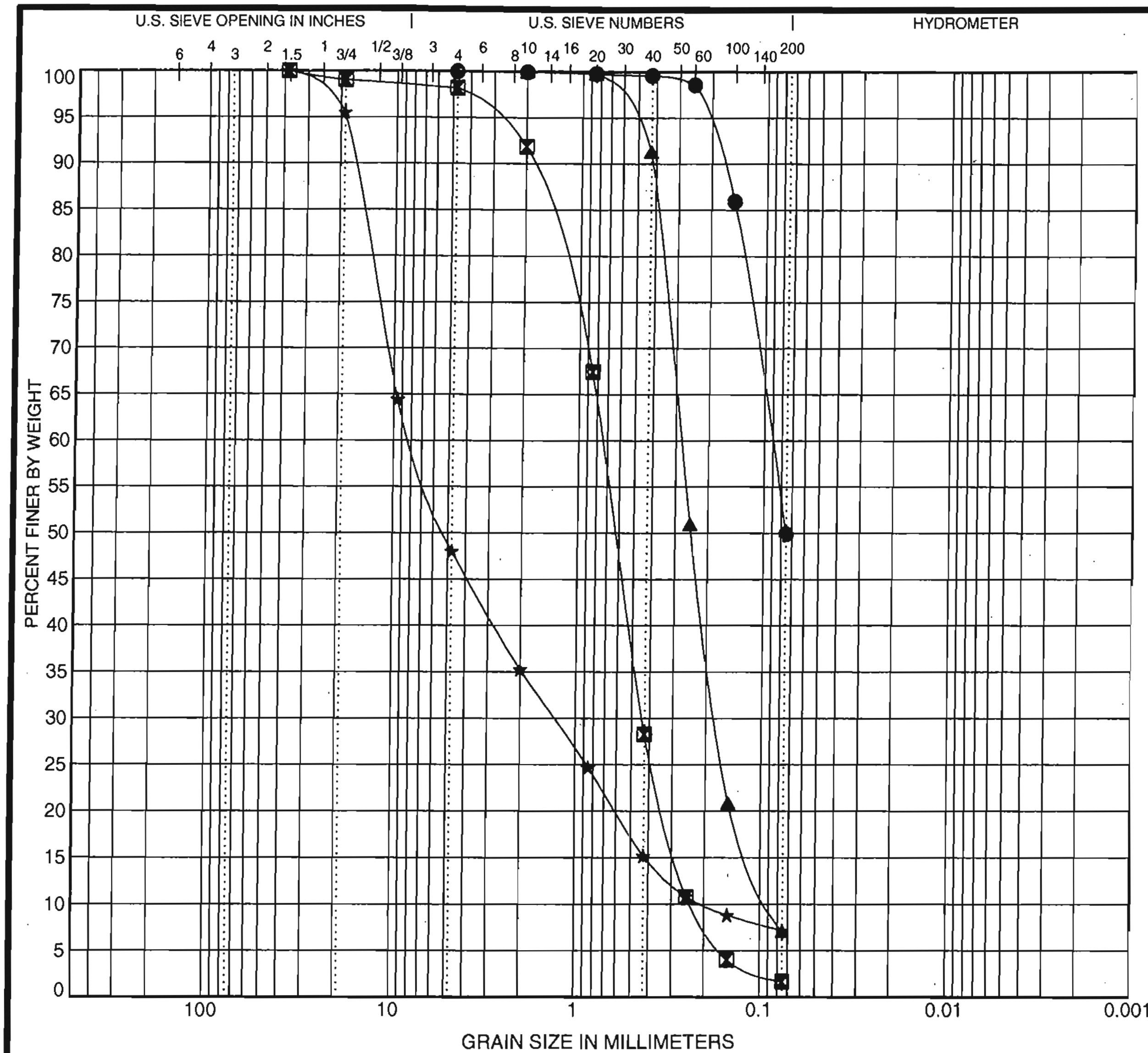
$K_{LOW} = 400$ FT/DAY
$K_{HIGH} = 70{,}000$ FT/DAY

CONCLUSION

HYDRAULIC CONDUCTIVITIES OF THE SHALLOW ALLUVIAL AQUIFER RANGE FROM 0.3 TO 30 FT/DAY.

CLEANER SAND LAYERS IN THE DEEPER ALLUVIAL AQUIFER HAVE HYDRAULIC CONDUCTIVITIES RANGING FROM 130 TO 200 FT/DAY.

THE GLACIAL AQUIFER HAS HYDRAULIC CONDUCTIVITIES RANGING FROM 20 FT/DAY TO AS HIGH AS 70,000 FT/DAY IN GRAVEL. TYPICAL GLACIAL AQUIFERS IN THIS AREA HAVE K VALUES IN THE LOWER END OF THIS RANGE.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Symbol	Specimen Identification			Classification	LL	PL	PI	Cc	Cu
●	A9	A9-16	16	Silty SAND (SM)					
⊠	MW9	MW9-27.5	27.5	SAND (SP), trace silt				1.09	3.16
▲	MW9	MW9-42.5	42.5	Slightly silty, SAND (SP-SM)				1.25	3.24
★	MW9	MW9-47.5	47.5	Slighlty silty, sandy GRAVEL (GP-GM)				1.07	38.94

Symbol	Specimen Identification			D60	D30	D10	%Gravel	%Sand	%Fines
●	A9	A9-16	16	0.09				50.1	49.9
⊠	MW9	MW9-27.5	27.5	0.74	0.44	0.24	1.8	96.5	1.7
▲	MW9	MW9-42.5	42.5	0.28	0.18	0.09		92.9	7.1
★	MW9	MW9-47.5	47.5	7.87	1.30	0.20	52.0	40.9	7.2

A9-16 → SHALLOW ALLUVIAL AQUIFER
MW9-27.5 → DEEPER ALLUVIAL AQUIFER
MW9-42.5 → GLACIAL AQUIFER (SAND)
MW9-47.5 → GLACIAL AQUIFER (GRAVEL)

CDM

GRAIN SIZE DISTRIBUTION

USG Corporation
Hwy 99
Tacoma, Washington

Project No: 19921.65021 Figure: 1

GSD LONGER SAMPLE # 19921-65021-APR 26-28 2010.GPJ CDM_BLLV.GDT 7/7/10 REV.

dia aquifers ($n > 0.03$). When evalu-
ılated storativities from a software
ible in real life.

.t about storativities between 0.001
nfined or semiconfined range. The
semiconfining the aquifer is and
ısted to this, storativities nearer to
ter 10).

ough Earth Materials

y of earth materials to store water,
lity of fluids to move through them.
ulic conductivity. It encompasses
ds under a *unit* hydraulic gradient
ıits of length over time (L/*t*) (Fetter
cates the resistence of fluid to flow.
ters squared (N-sec/m^2). Thick flu-
iscosity, where alcohol is an exam-
· is another term commonly used to
ough earth materials and oft times
ability are used interchangeably in
l not be done. This needs an expla-

are related to the **specific weight**
e fluid. The specific weight repre-
e fluid. The ability of fluids to move
stence of fluids to shearing (Fetter
3.

$$= k_i \frac{\rho g}{\mu} \quad [3.8]$$

ırcy (9.87×10^{-9} cm^2)
× gravity

esents the physical flow properties
y a function of the pore size open-
arger the pore opening, the larger

the intrinsic permeability. This relationship can be in Tables 3.4a and 3.4b. The specific weight (γ) indicates how a fluid of a given density will move from gravity. The dynamic viscosity (μ) indicates that the less resistive the fluid, the more conductive the earth material is. Those that equate hydraulic conductivity to intrinsic permeability consider most fresh groundwater to have insignificant changes in specific weight and dynamic viscosity; therefore, the ability of groundwater to move is mainly proportional to the intrinsic permeability alone. This should not be done because the hydraulic conductivity will change by a factor of 3 just by changing the water temperature between 2°C and 30°C. This is also not true when contaminants interact with groundwater with different fluid properties, such as nonaqueous phase liquids (NAPLs) or with saline waters.

Hydraulic conductivity values for earth materials range over 12 orders of magnitude (Figure 3.8). The distribution of hydraulic conductivity is log-normally distributed, so averaged values should be geometric means or some other transformation. Obtaining precise or accurate values for hydraulic conductivity is unlikely, so when they are reported as such they should be viewed with a jaundiced eye. This leads to caution for those who

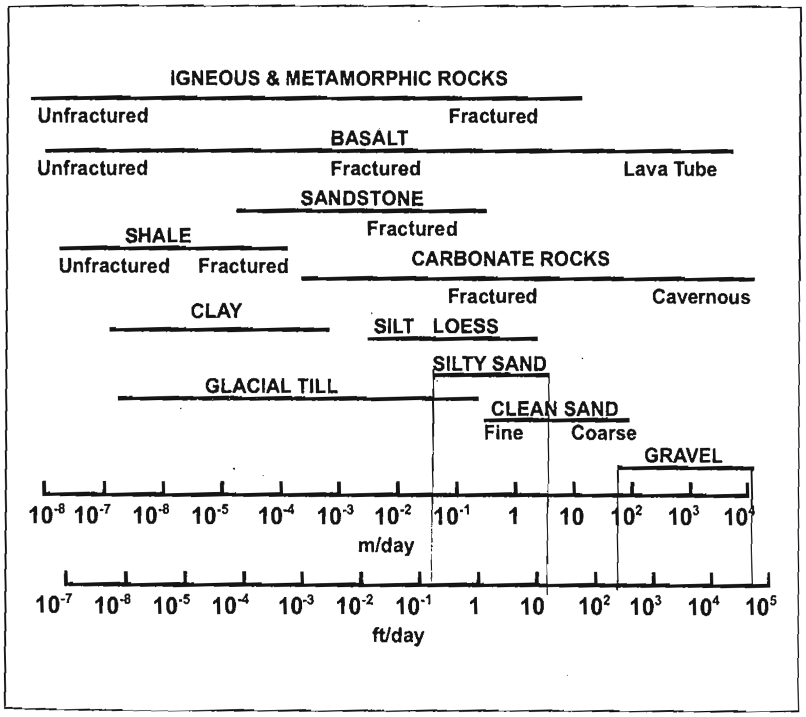


Figure 3.8 Ranges of hydraulic conductivity values for earth materials. [Adapted from Anderson and Woessner (1992).]

USG HIGHWAY 99 SITE ~~HYDR~~ GROUNDWATER VELOCITY CALCULATION

HSX

OBJECTIVE: DETERMINE THE SEEPAGE VELOCITY ~~(LIN~~ HSX (AVERAGE LINEAR VELOCITY) IN THE ALLUVIAL AQUIFER.

CALCULATION APPROACH: ESTIMATE THE SEEPAGE VELOCITY USING HYDRAULIC CONDUCTIVITY VALUES CALCULATED FOR THE ALLUVIAL AQUIFER AND HORIZONTAL HYDRAULIC GRADIENT ESTIMATED FROM JULY 2010 GROUNDWATER ELEVATION CONTOURS AND TEXTBOOK POROSITY VALUES.

~~CALCULATION APPROACH: E~~ HSX

HYDRAULIC CONDUCTIVITY

ASSUME HYDRAULIC CONDUCTIVITY = K = 200 FT/DAY BASED ON MAXIMUM K DETERMINED FOR COARSER SAND LAYERS IN THE ALLUVIAL AQUIFER.

EFFECTIVE POROSITY

ASSUME LITERATURE DERIVED VALUE FOR FINE SAND (ANDERSON AND WOESSNER 1992)

$n_e = 0.33$

SEEPAGE VELOCITY CALCULATION

SEEPAGE VELOCITY = $V_s = \frac{KI}{n_e} =$

NOTE THAT THE HORIZONTAL HYDRAULIC GRADIENT VARIES ACROSS THE SITE. THE GRADIENT RANGES FROM 0.003 FT/FT IN THE CENTRAL AREA OF THE SITE TO 0.03 FT/FT AT THE WEST BANK OF HYLEBOS CREEK. ~~FOR A~~ HSX

CENTRAL AREA OF THE SITE

SEEPAGE VELOCITY = $V_s = \frac{KI}{n_e} = \frac{(200\ FT/DAY)(0.003\ FT/FT)}{0.33} = \boxed{2\ FT/DAY}$

AT WEST BANK OF HYLEBOS CREEK

SEEPAGE VELOCITY = $V_s = \frac{KI}{n_e} = \frac{(200\ FT/DAY)(0.03\ FT/FT)}{0.33} = \boxed{20\ FT/DAY}$

CONCLUSION

THE GROUNDWATER SEEPAGE VELOCITY RANGES FROM 2 FT/DAY IN THE CENTRAL AREA OF THE SITE TO 20 FT/DAY AT THE WEST BANK OF HYLEBOS CREEK.

= 1.85 g/cm³

/cm³, the porosity can be estimated using

$\frac{/\,cm^3}{/\,cm^3}\Big] = 30.2\%$

s by evaluating the volume occupied by the
y weight.

72 g − 148 g = 24 g

9 g/cm³) = 24.02 cm³

$\frac{02\,cm^3}{.0\,cm^3} = 30.0\%$

be attributed to an assumed particle
of volume errors. The above example
the concept of porosity. In reality, the
:r in the laboratory. During the tapping
ults in field conditions being lost. It is
into a container of equal volume.

3. Geological Survey laboratory reported
ffering earth materials were tested and
hydrologic properties. Anderson and
results of their findings for specific yield
the means of unconsolidated materials
gure 3.6. When the reported arithmetic
e midpoint of the range values, this ind
wed. Notice also that the differences b
ntary materials, such as fine and medium sand
d counterparts, fine and medium sand
he volume occupied by cementing agents
d is always less than the total porosity.

m Morris and Johnson (1967) illustrat
ater-laid sandy materials and their ph

cal and hydrologic properties are shown in Tables 3.4a and 3.4b. It is interesting to note the similarities of specific gravity regardless of the grain-size distribution and the range of grain-size distributions, dry bulk densities, and hydraulic conductivities. It is apparent from the grain-size distributions that there is a correlation between grain-size and hydraulic conductivity.

Table 3.3 Ranges of Values of Specific Yield [Adapted from Anderson and Woessner (1992)]

Material Class	Material	No. of Analysis	Range	Arithmetic Mean
Sedimentary	Clay	27	0.01–0.18	0.06
	Silt	299	0.01–0.39	0.20
	Sand (fine)	287	0.01–0.46	0.33
	Sand (Med)	297	0.16–0.46	0.32
	Sand (Coarse)	143	0.18–0.43	0.30
	Gravel (fine)	33	0.13.–-0.40	0.28
	Gravel (med)	13	0.17–0.44	0.24
	Gravel (coarse)	9	0.13–0.25	0.21
	Siltstone	13	0.01–0.33	0.12
	Sandstone (fine)	47	0.02–0.40	0.21
	Sandstone (med)	10	0.12–0.41	0.27
	Limestone	32	0–0.36	0.14
Wind Deposits	Loess	5	0.14–0.22	0.18
	Eolian Sand	14	0.32–0.47	0.38
Metamorphic	Schist	11	0.022–0.033	0.026
Igneous	Tuff	90	0.02–0.47	0.21

Appendix E
Analytical Laboratory Reports

Please see attached CD

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Analytical Resources, Incorporated
Analytical Chemists and Consultants

July 23, 2010

Alan Carey
CDM
14432 SE Eastgate Way, Suite 100
Bellevue, WA 98007

RE: Project: USG Hwy 99, 19921-77628
ARI Job No: RE46

Dear Mr. Carey:

Please find enclosed the Chain-of-Custody (COC) record, sample receipt documentation, and the final results for samples from the project referenced above. Analytical Resources Inc. (ARI) accepted four water samples on July 15, 2010. For further details regarding sample receipt, please refer to the enclosed Cooler Receipt Form.

The samples were analyzed for Dissolved Iron and Arsenic, as requested.

There were no anomalies associated with the analysis of these samples.

An electronic copy of this report as well as all supporting raw data will remain on file with ARI. If you have any questions or require additional information, please contact me at your convenience.

Sincerely,
ANALYTICAL RESOURCES, INC.

Cheronne Oreiro
Project Manager
(206) 695-6214
cheronneo@arilabs.com
www.arilabs.com

Enclosures

cc: eFile: RE46

4611 South 134th Place, Suite 100 • Tukwila WA 98168 • **206-695-6200** • **206-695-6201** fax

Chain of Custody Record & Laboratory Analysis Request

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

ARI Assigned Number: RE46	Turn-around Requested: 1 week
ARI Client Company: CDM	Phone: 425-519-8300
Client Contact: Alan Carey	
Client Project Name: USG Hwy 99	
Client Project #: 19921-77628	Samplers: MLF

Page: 1	of 1
Date: 7/15/2010	Ice Present? Y
No. of Coolers: 1	Cooler Temps: 9.8

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested: Dissolved As by GFA								Notes/Comments
MW3-07/10	7/15/10	1430	Water	1	✓								
MW4-07/10	7/15/10	1305		1	✓								
99-1-07/10	7/15/10	1210		1	✓								
MW0-07/10	7/15/10	1500		1	✓								

Comments/Special Instructions	Relinquished by:	Received by:	Relinquished by:	Received by:
Dissolved metals are field-filtered.	(Signature) Mary Lou Fox	(Signature) [signature]	(Signature)	(Signature)
	Printed Name: Mary Lou Fox	Printed Name: A. Volgardsen	Printed Name:	Printed Name:
	Company: CDM	Company: ARI	Company:	Company:
	Date & Time: 7/15/10 1540	Date & Time: 7/15/10 1540	Date & Time:	Date & Time:

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.

RE46 : 00002

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: ADM

Project Name: USG Hwy 99

COC No(s): ______ NA

Delivered by: Fed-Ex UPS Courier Hand Delivered Other: ______

Assigned ARI Job No: RE46

Tracking No: ______ NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler? YES NO

Were custody papers included with the cooler? .... YES NO

Were custody papers properly filled out (ink, signed, etc.) .... YES NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry)........ 9.8

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: 90877952

Cooler Accepted by: AV Date: 7/15/10 Time: 1540

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? .... YES NO

What kind of packing material was used? ... Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other: ______

Was sufficient ice used (if appropriate)? .... NA YES NO

Were all bottles sealed in individual plastic bags? .... YES NO

Did all bottles arrive in good condition (unbroken)? .... YES NO

Were all bottle labels complete and legible? .... YES NO

Did the number of containers listed on COC match with the number of containers received? .... YES NO

Did all bottle labels and tags agree with custody papers? .... YES NO

Were all bottles used correct for the requested analyses? .... YES NO

Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)... NA YES NO

Were all VOC vials free of air bubbles? .... NA YES NO

Was sufficient amount of sample sent in each bottle? .... YES NO

Date VOC Trip Blank was made at ARI........ NA ______

Was Sample Split by ARI: NA YES Date/Time: ______ Equipment: ______ Split by: ______

Samples Logged by: JM Date: 7/15/10 Time: 1555

*** Notify Project Manager of discrepancies or concerns ***

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: Date:

Small Air Bubbles ~2mm	Peabubbles' 2-4 mm	LARGE Air Bubbles > 4 mm

Small → "sm"
Peabubbles → "pb"
Large → "lg"
Headspace → "hs"

PRESERVATION VERIFICATION 07/15/10
Page 1 of 1

ANALYTICAL RESOURCES INCORPORATED

ARI Job No: **RE46**

Inquiry Number: NONE
Analysis Requested: 07/16/10
Contact: Carey, Alan
Client: CDM
Logged by: JM
Sample Set Used: Yes-498
Validatable Package: No
Deliverables:

PC: Cheronne
VTSR: 07/15/10

Project #: 19921-77628
Project: USG Hwy 99
Sample Site:
SDG No:
Analytical Protocol: In-house

LOGNUM ARI ID	CLIENT ID	CN >12	WAD >12	NH3 <2	COD <2	FOG <2	MET <2	PHEN <2	PHOS <2	TKN <2	NO23 <2	TOC <2	S2 >9	AK102 <2	Fe2+ <2	DMET FLT	DOC FLT	PARAMETER	ADJUSTED TO	LOT NUMBER	AMOUNT ADDED	DATE/BY
10-16705 **RE46A**	MW3-07/10						DIS Pass									Y						
10-16706 **RE46B**	MW4-07/10						DIS									Y						
10-16707 **RE46C**	99-1-07/10						DIS									Y						
10-16708 **RE46D**	MW0-07/10						DIS									Y						

Checked By JM Date 7/15/10

Subject: RE: USG Hwy 99 Samples Received 7/15/10
From: "Carey, Alan" <CareyAD@cdm.com>
Date: Fri, 16 Jul 2010 13:22:24 -0400
To: "Cheronne Oreiro" <cheronneo@arilabs.com>

Yes, analyze samples for dissolved iron by ICP also.
Thanks
Alan Carey

-----Original Message-----
From: Cheronne Oreiro [mailto:cheronneo@arilabs.com]
Sent: Friday, July 16, 2010 9:45 AM
To: Carey, Alan
Subject: USG Hwy 99 Samples Received 7/15/10

Hello Alan,

Mary Lou left me a message last night regarding the USG Hwy 99 samples she dropped off yesterday. Currently the samples are only logged for Dissolved Arsenic by GFA. Mary Lou said that you may also need Dissolved

Iron by ICP but she would confirm that with you. Please let me know if you would like to make this change.
Thanks!
-Cheronne

--
Cheronne Oreiro
Project Manager
Analytical Resources, Inc.
4611 S. 134th Place, Suite 100
Tukwila, WA 98168-3240
cheronneo@arilabs.com
(206)-695-6214

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Sample ID: MW3-07/10
SAMPLE

Lab Sample ID: RE46A
LIMS ID: 10-16705
Matrix: Water
Data Release Authorized:
Reported: 07/23/10

QC Report No: RE46-CDM
Project: USG Hwy 99
19921-77628
Date Sampled: 07/15/10
Date Received: 07/15/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7000A	07/20/10	7060A	07/22/10	**7440-38-2**	**Arsenic**	100	**780**	
6010B	07/20/10	6010B	07/20/10	**7439-89-6**	**Iron**	50	**29,900**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: MW4-07/10
SAMPLE

Lab Sample ID: RE46B
LIMS ID: 10-16706
Matrix: Water
Data Release Authorized:
Reported: 07/23/10

QC Report No: RE46-CDM
Project: USG Hwy 99
19921-77628
Date Sampled: 07/15/10
Date Received: 07/15/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7000A	07/20/10	7060A	07/22/10	7440-38-2	Arsenic	100	1,030	
6010B	07/20/10	6010B	07/20/10	7439-89-6	Iron	50	31,500	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Sample ID: 99-1-07/10
SAMPLE

Lab Sample ID: RE46C
LIMS ID: 10-16707
Matrix: Water
Data Release Authorized:
Reported: 07/23/10

QC Report No: RE46-CDM
Project: USG Hwy 99
19921-77628
Date Sampled: 07/15/10
Date Received: 07/15/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7000A	07/20/10	7060A	07/22/10	7440-38-2	Arsenic	200	2,490	
6010B	07/20/10	6010B	07/20/10	7439-89-6	Iron	50	6,340	

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: MW0-07/10
SAMPLE

Lab Sample ID: RE46D
LIMS ID: 10-16708
Matrix: Water
Data Release Authorized:
Reported: 07/23/10

QC Report No: RE46-CDM
Project: USG Hwy 99
19921-77628
Date Sampled: 07/15/10
Date Received: 07/15/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7000A	07/20/10	7060A	07/22/10	7440-38-2	Arsenic	100	1,060	
6010B	07/20/10	6010B	07/20/10	7439-89-6	Iron	50	32,000	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: LAB CONTROL

Lab Sample ID: RE46LCS
LIMS ID: 10-16705
Matrix: Water
Data Release Authorized:
Reported: 07/23/10

QC Report No: RE46-CDM
Project: USG Hwy 99
19921-77628
Date Sampled: NA
Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Arsenic	7060A	21	20	105%	
Iron	6010B	2240	2000	112%	

Reported in µg/L

N-Control limit not met
Control Limits: 80-120%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Sample ID: METHOD BLANK

Lab Sample ID: RE46MB
LIMS ID: 10-16705
Matrix: Water
Data Release Authorized:
Reported: 07/23/10

QC Report No: RE46-CDM
Project: USG Hwy 99
19921-77628
Date Sampled: NA
Date Received: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7000A	07/20/10	7060A	07/22/10	7440-38-2	Arsenic	1	1	U
6010B	07/20/10	6010B	07/20/10	7439-89-6	Iron	50	50	U

U-Analyte undetected at given RL
RL-Reporting Limit

Analytical Resources, Incorporated
Analytical Chemists and Consultants

June 14, 2010

Alan Carey
CDM
14432 SE Eastgate Way, Suite 100
Bellevue, WA 98007

RE: Project ID: USG-Hwy-99, 19921-65021
ARI Job No: QY33

Dear Mr. Carey:

Please find enclosed the Chain-of-Custody (COC) record, sample receipt documentation, and the final results for samples from the project referenced above. Analytical Resources Inc. (ARI) accepted four water samples on May 27, 2010. For further details regarding sample receipt, please refer to the enclosed Cooler Receipt Form.

The samples were analyzed for various conventional parameters and total/dissolved metals, as requested on the COC. Note all samples requesting Arsenic were analyzed by both ICP-MS and Graphite Furnace. The Arsenic Speciation analyses were subcontracted to Applied Speciation in Bothell, WA. All data have been included.

There were no anomalies associated with the analyses of these samples.

An electronic copy of this report as well as all supporting raw data will remain on file with ARI. If you have any questions or require additional information, please contact me at your convenience.

Sincerely,
ANALYTICAL RESOURCES, INC.

Cheronne Oreiro
Project Manager
(206) 695-6214
cheronneo@arilabs.com
www.arilabs.com

Enclosures

cc: eFile: QY33

4611 South 134th Place, Suite 100 • Tukwila WA 98168 • **206-695-6200** • **206-695-6201** fax

Chain of Custody Record & Laboratory Analysis Request

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

ARI Assigned Number: QY33
Turn-around Requested: Std
Page: 1 of 1
ARI Client Company: CDM
Phone: 425-519-8300
Date: 5/27/10
Ice Present? Y
Client Contact: Alan Czrey
No. of Coolers: 2
Cooler Temps: 6.4, 6.3
Client Project Name: US6 Hwy 99
Client Project #: 1921-65021
Samplers: MLF & LL

Sample ID	Date	Time	Matrix	No. Containers	Dissolved As ICPMS SE 6020A diss Fe/6010	As Speciation As+3, As+5	Total As ICPMS 6020A + Cations + Fe 6010	Cations + Fe 6010	TOC/COD	Anions Cl, NO2, NO3, SO4	Alkalinity CO3/HCO3	TSS	Notes/Comments
US6 Hwy 99-MW08-05/10	5/27/10	0940	Water	8	✓		✓		✓	✓	✓	✓	
US6 Hwy 99-MW07-05/10	↓	1045	↓	8	✓			✓	✓	✓	✓	✓	
US6 Hwy 99-MW9-05/10	↓	1200	↓	8	✓			✓	✓	✓	✓	✓	
US6 Hwy 99-99-2-05/10	↓	1310	↓	9	✓	✓		✓	✓	✓	✓	✓	

Comments/Special Instructions: Dissolved Metals not field filtered

	Relinquished by	Received by	Relinquished by	Received by
(Signature)	Mary Lou Fox	[signature]		
Printed Name	Mary Lou Fox	C. OREIRO		
Company	CDM	ARI		
Date & Time	5/27/10 1450	5/27/10 1450		

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: CDM

COC No(s): ______ NA

Assigned ARI Job No: QY33

Project Name: USG Hwy 99

Delivered by: Fed-Ex UPS Courier Hand Delivered Other: ______

Tracking No: ______ NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler? YES NO

Were custody papers included with the cooler? .... YES NO

Were custody papers properly filled out (ink, signed, etc.) .... YES NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry)........ 6.4 6.3

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: 90877952

Cooler Accepted by: NO Date: 5/27/10 Time: 1450

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? .... YES NO

What kind of packing material was used? ... Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other: ______

Was sufficient ice used (if appropriate)? .... NA YES NO

Were all bottles sealed in individual plastic bags? .... YES NO

Did all bottles arrive in good condition (unbroken)? .... YES NO

Were all bottle labels complete and legible? .... YES NO

Did the number of containers listed on COC match with the number of containers received? .... YES NO

Did all bottle labels and tags agree with custody papers? .... YES NO

Were all bottles used correct for the requested analyses? .... YES NO

Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)... NA YES NO

Were all VOC vials free of air bubbles? .... NA YES NO

Was sufficient amount of sample sent in each bottle? .... YES NO

Date VOC Trip Blank was made at ARI........ NA ______

Was Sample Split by ARI : NA YES Date/Time: ______ Equipment: ______ Split by: ______

Samples Logged by: AV Date: 5/27/10 Time: 1606

***** Notify Project Manager of discrepancies or concerns *****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

* All label ID's missing USGHwy99 - before ID.

By: AV Date: 5/27/10

Small Air Bubbles ~2mm	Peabubbles 2-4 mm	LARGE Air Bubbles > 4 mm

Small → "sm"
Peabubbles → "pb"
Large → "lg"
Headspace → "hs"

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Temperature Compliance Form

Cooler#: 1 & 2 **Temperature(°C):** 6.4, 6.3

Sample ID	Bottle Count	Bottle Type
USGHwy99-MW8-05/10	8	2 250ml Ag, 2 5ml (?), 1 Lg (?), 2 1L HDPE, 1 500ml HDP
USGHwy99-MW7-05/10	8	" " " " "
USGHwy99-MW9-05/10	8	" " " " "
USGHwy99-99-2-05/10	9	" " " " " 1 ml: com

Cooler#: ______ **Temperature(°C):** ______

Sample ID	Bottle Count	Bottle Type

Cooler#: ______ **Temperature(°C):** ______

Sample ID	Bottle Count	Bottle Type

Cooler#: ______ **Temperature(°C):** ______

Sample ID	Bottle Count	Bottle Type

Completed by: AV Date: 5/27/10 Time: 1609

PRESERVATION VERIFICATION 05/27/10
Page 1 of 1

ANALYTICAL RESOURCES INCORPORATED

Inquiry Number: NONE
Analysis Requested: 05/27/10
Contact: Carey, Alan
Client: CDM
Logged by: AV
Sample Set Used: Yes-481
Validatable Package: YES
Deliverables:

ARI Job No: **QY33**

PC: Cheronne
VTSR: 05/27/10

Project #: 19921-65021
Project: USG Hwy 99
Sample Site:
SDG No:
Analytical Protocol: In-house

LOGNUM ARI ID	CLIENT ID	CN >12	WAD >12	NH3 <2	COD <2	FOG <2	MET <2	PHEN <2	PHOS <2	TKN <2	NO23 <2	TOC <2	S2 >9	AK102 <2	Fe2+ <2	DMET FLT	DOC FLT	PARAMETER	ADJUSTED TO	LOT NUMBER	AMOUNT ADDED	DATE/BY
10-12701 **QY33A**	USGHwy99-MW8-05/10				Pass		TOT Pass				NP	Pass										
10-12702 **QY33B**	USGHwy99-MW8-05/10						TOT															
10-12703 **QY33C**	USGHwy99-MW7-05/10				Pass		TOT				NP	Pass										
10-12704 **QY33D**	USGHwy99-MW9-05/10						TOT															
10-12705 **QY33E**	USGHwy99-99-2-05/10						TOT															
10-12706 **QY33F**	USGHwy99-MW8-05/10						DIS NP									N						
10-12707 **QY33G**	USGHwy99-MW8-05/10						DIS									N						
10-12708 **QY33H**	USGHwy99-MW7-05/10						DIS									N						
10-12709 **QY33I**	USGHwy99-MW7-05/10						DIS									N						
10-12710 **QY33J**	USGHwy99-MW9-05/10						DIS									N						
10-12711 **QY33K**	USGHwy99-MW9-05/10						DIS									N						
10-12712 **QY33L**	USGHwy99-99-2-05/10						DIS									N						
10-12713 **QY33M**	USGHwy99-99-2-05/10						DIS									N						

NP= Not preserved
Diss metals = unfiltered

Checked By AV Date 5/27/10

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: USGHwy99-MW8-05/10
SAMPLE

Lab Sample ID: QY33A
LIMS ID: 10-12701
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QY33-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/27/10
Date Received: 05/27/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	06/01/10	200.8	06/03/10	7440-38-2	Arsenic	0.2	14.0	
3010A	05/28/10	6010B	06/03/10	7440-70-2	Calcium	50	21,400	
3010A	05/28/10	6010B	06/03/10	7439-89-6	Iron	50	4,870	
3010A	05/28/10	6010B	06/03/10	7439-95-4	Magnesium	50	12,900	
3010A	05/28/10	6010B	06/03/10	7440-09-7	Potassium	500	7,640	
3010A	05/28/10	6010B	06/03/10	7440-23-5	Sodium	500	35,300	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGHwy99-MW8-05/10
SAMPLE

Lab Sample ID: QY33B
LIMS ID: 10-12702
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QY33-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/27/10
Date Received: 05/27/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7060A	05/28/10	7060A	06/04/10	**7440-38-2**	**Arsenic**	1	15	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGHwy99-MW7-05/10
SAMPLE

Lab Sample ID: QY33C
LIMS ID: 10-12703
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QY33-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/27/10
Date Received: 05/27/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
3010A	05/28/10	6010B	06/04/10	**7440-70-2**	**Calcium**	50	**17,600**	
3010A	05/28/10	6010B	06/04/10	**7439-89-6**	**Iron**	50	**7,400**	
3010A	05/28/10	6010B	06/04/10	**7439-95-4**	**Magnesium**	50	**14,400**	
3010A	05/28/10	6010B	06/04/10	**7440-09-7**	**Potassium**	500	**6,000**	
3010A	05/28/10	6010B	06/04/10	**7440-23-5**	**Sodium**	500	**36,400**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: USGHwy99-MW9-05/10
SAMPLE

Lab Sample ID: QY33D
LIMS ID: 10-12704
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QY33-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/27/10
Date Received: 05/27/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
3010A	05/28/10	6010B	06/04/10	**7440-70-2**	**Calcium**	50	**11,000**	
3010A	05/28/10	6010B	06/04/10	**7439-89-6**	**Iron**	50	**290**	
3010A	05/28/10	6010B	06/04/10	**7439-95-4**	**Magnesium**	50	**8,230**	
3010A	05/28/10	6010B	06/04/10	**7440-09-7**	**Potassium**	500	**6,590**	
3010A	05/28/10	6010B	06/04/10	**7440-23-5**	**Sodium**	500	**28,500**	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: USGHwy99-99-2-05/10
SAMPLE

Lab Sample ID: QY33E
LIMS ID: 10-12705
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QY33-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/27/10
Date Received: 05/27/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
3010A	05/28/10	6010B	06/03/10	**7440-70-2**	**Calcium**	50	**86,900**	
3010A	05/28/10	6010B	06/03/10	**7439-89-6**	**Iron**	50	**57,200**	
3010A	05/28/10	6010B	06/03/10	**7439-95-4**	**Magnesium**	50	**53,900**	
3010A	05/28/10	6010B	06/03/10	**7440-09-7**	**Potassium**	500	**7,510**	
3010A	05/28/10	6010B	06/03/10	**7440-23-5**	**Sodium**	500	**31,700**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Sample ID: USGHwy99-MW8-05/10
SAMPLE

Lab Sample ID: QY33F
LIMS ID: 10-12706
Matrix: Water
Data Release Authorized
Reported: 06/07/10

QC Report No: QY33-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/27/10
Date Received: 05/27/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	06/01/10	200.8	06/03/10	**7440-38-2**	**Arsenic**	0.2	**12.9**	
6010B	05/28/10	6010B	06/03/10	**7439-89-6**	**Iron**	50	**980**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Sample ID: USGHwy99-MW8-05/10
SAMPLE

Lab Sample ID: QY33G
LIMS ID: 10-12707
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QY33-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/27/10
Date Received: 05/27/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7000A	05/28/10	7060A	06/04/10	**7440-38-2**	**Arsenic**	1	**13**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGHwy99-MW7-05/10
SAMPLE

Lab Sample ID: QY33H
LIMS ID: 10-12708
Matrix: Water
Data Release Authorized
Reported: 06/07/10

QC Report No: QY33-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/27/10
Date Received: 05/27/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	06/01/10	200.8	06/03/10	**7440-38-2**	**Arsenic**	0.2	**9.2**	
6010B	05/28/10	6010B	06/03/10	**7439-89-6**	**Iron**	50	**1,800**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGHwy99-MW7-05/10
SAMPLE

Lab Sample ID: QY33I
LIMS ID: 10-12709
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QY33-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/27/10
Date Received: 05/27/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7000A	05/28/10	7060A	06/04/10	**7440-38-2**	**Arsenic**	1	**10**	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGHwy99-MW9-05/10
SAMPLE

Lab Sample ID: QY33J
LIMS ID: 10-12710
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QY33-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/27/10
Date Received: 05/27/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	06/01/10	200.8	06/03/10	**7440-38-2**	**Arsenic**	0.2	**39.4**	
6010B	05/28/10	6010B	06/03/10	7439-89-6	Iron	50	50	U

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGHwy99-MW9-05/10
SAMPLE

Lab Sample ID: QY33K
LIMS ID: 10-12711
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QY33-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/27/10
Date Received: 05/27/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7000A	05/28/10	7060A	06/04/10	**7440-38-2**	**Arsenic**	5	**44**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Sample ID: USGHwy99-99-2-05/10
SAMPLE

Lab Sample ID: QY33L
LIMS ID: 10-12712
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QY33-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/27/10
Date Received: 05/27/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	06/01/10	200.8	06/04/10	**7440-38-2**	**Arsenic**	1	**352**	
6010B	05/28/10	6010B	06/03/10	**7439-89-6**	**Iron**	50	**45,700**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGHwy99-99-2-05/10
SAMPLE

Lab Sample ID: QY33M
LIMS ID: 10-12713
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QY33-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/27/10
Date Received: 05/27/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7000A	05/28/10	7060A	06/04/10	**7440-38-2**	**Arsenic**	20	**410**	

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: LAB CONTROL

Lab Sample ID: QY33LCS
LIMS ID: 10-12701
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QY33-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: NA
Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Arsenic	200.8	25.1	25.0	100%	
Calcium	6010B	9870	10000	98.7%	
Iron	6010B	2110	2000	106%	
Magnesium	6010B	10100	10000	101%	
Potassium	6010B	10200	10000	102%	
Sodium	6010B	9720	10000	97.2%	

Reported in µg/L

N-Control limit not met
Control Limits: 80-120%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: METHOD BLANK

Lab Sample ID: QY33MB
LIMS ID: 10-12701
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QY33-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: NA
Date Received: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	06/01/10	200.8	06/03/10	7440-38-2	Arsenic	0.2	0.2	U
3010A	05/28/10	6010B	06/03/10	7440-70-2	Calcium	50	50	U
3010A	05/28/10	6010B	06/03/10	7439-89-6	Iron	50	50	U
3010A	05/28/10	6010B	06/03/10	7439-95-4	Magnesium	50	50	U
3010A	05/28/10	6010B	06/03/10	7440-09-7	Potassium	500	500	U
3010A	05/28/10	6010B	06/03/10	7440-23-5	Sodium	500	500	U

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: LAB CONTROL

Lab Sample ID: QY33LCS
LIMS ID: 10-12702
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QY33-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: NA
Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Arsenic	7060A	105	100	105%	

Reported in µg/L

N-Control limit not met
Control Limits: 80-120%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: METHOD BLANK

Lab Sample ID: QY33MB
LIMS ID: 10-12702
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QY33-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: NA
Date Received: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7060A	05/28/10	7060A	06/04/10	7440-38-2	Arsenic	1	1	U

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: LAB CONTROL

Lab Sample ID: QY33LCS
LIMS ID: 10-12706
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QY33-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: NA
Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Arsenic	200.8	24.7	25.0	98.8%	
Iron	6010B	2030	2000	102%	

Reported in µg/L

N-Control limit not met
Control Limits: 80-120%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Sample ID: METHOD BLANK

Lab Sample ID: QY33MB
LIMS ID: 10-12706
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QY33-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: NA
Date Received: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	06/01/10	200.8	06/03/10	7440-38-2	Arsenic	0.2	0.2	U
6010B	05/28/10	6010B	06/03/10	7439-89-6	Iron	50	50	U

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: LAB CONTROL

Lab Sample ID: QY33LCS
LIMS ID: 10-12707
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QY33-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: NA
Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Arsenic	7060A	21	20	105%	

Reported in µg/L

N-Control limit not met
Control Limits: 80-120%

FORM-VII

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Sample ID: METHOD BLANK

Lab Sample ID: QY33MB
LIMS ID: 10-12707
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QY33-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: NA
Date Received: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7000A	05/28/10	7060A	06/04/10	7440-38-2	Arsenic	1	1	U

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

SAMPLE RESULTS-CONVENTIONALS
QY33-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 06/10/10

Project: USG Hwy 99
Event: 19921-65021
Date Sampled: 05/27/10
Date Received: 05/27/10

Client ID: USGHwy99-MW8-05/10
ARI ID: 10-12701 QY33A

Analyte	Date Batch	Method	Units	RL	Sample
Alkalinity	06/08/10 060810#1	SM 2320	mg/L CaCO3	1.0	205
Carbonate	06/08/10	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Bicarbonate	06/08/10	SM 2320	mg/L CaCO3	1.0	205
Hydroxide	06/08/10	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Total Suspended Solids	05/27/10 052710#1	EPA 160.2	mg/L	1.0	18.1
Chloride	05/28/10 052810#1	EPA 300.0	mg/L	0.5	6.3
N-Nitrate	05/27/10 052710#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
N-Nitrite	05/27/10 052710#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
Sulfate	05/27/10 052710#1	EPA 300.0	mg/L	0.1	0.2
Chemical Oxygen Demand	06/03/10 060310#1	EPA 410.4	mg/L	5.00	7.75
Total Organic Carbon	05/27/10 052710#1	EPA 415.1	mg/L	1.50	3.83

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QY33-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 06/10/10

Project: USG Hwy 99
Event: 19921-65021
Date Sampled: 05/27/10
Date Received: 05/27/10

Client ID: USGHwy99-MW7-05/10
ARI ID: 10-12703 QY33C

Analyte	Date Batch	Method	Units	RL	Sample
Alkalinity	06/08/10 060810#1	SM 2320	mg/L CaCO3	1.0	196
Carbonate	06/08/10	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Bicarbonate	06/08/10	SM 2320	mg/L CaCO3	1.0	196
Hydroxide	06/08/10	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Total Suspended Solids	05/27/10 052710#1	EPA 160.2	mg/L	1.6	22.2
Chloride	05/28/10 052810#1	EPA 300.0	mg/L	0.5	5.6
N-Nitrate	05/27/10 052710#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
N-Nitrite	05/27/10 052710#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
Sulfate	05/27/10 052710#1	EPA 300.0	mg/L	0.1	< 0.1 U
Chemical Oxygen Demand	06/03/10 060310#1	EPA 410.4	mg/L	5.00	10.9
Total Organic Carbon	05/27/10 052710#1	EPA 415.1	mg/L	1.50	4.17

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QY33-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 06/10/10

Project: USG Hwy 99
Event: 19921-65021
Date Sampled: 05/27/10
Date Received: 05/27/10

Client ID: USGHwy99-MW9-05/10
ARI ID: 10-12704 QY33D

Analyte	**Date Batch**	**Method**	**Units**	**RL**	**Sample**
Alkalinity	06/08/10 060810#1	SM 2320	mg/L CaCO3	1.0	118
Carbonate	06/08/10	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Bicarbonate	06/08/10	SM 2320	mg/L CaCO3	1.0	118
Hydroxide	06/08/10	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Total Suspended Solids	05/27/10 052710#1	EPA 160.2	mg/L	1.0	4.3
Chloride	05/28/10 052810#1	EPA 300.0	mg/L	0.5	5.4
N-Nitrate	05/27/10 052710#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
N-Nitrite	05/27/10 052710#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
Sulfate	05/28/10 052810#1	EPA 300.0	mg/L	0.5	7.5
Chemical Oxygen Demand	06/03/10 060310#1	EPA 410.4	mg/L	5.00	6.48
Total Organic Carbon	05/27/10 052710#1	EPA 415.1	mg/L	1.50	< 1.50 U

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QY33-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 06/10/10

Project: USG Hwy 99
Event: 19921-65021
Date Sampled: 05/27/10
Date Received: 05/27/10

Client ID: USGHwy99-99-2-05/10
ARI ID: 10-12705 QY33E

Analyte	**Date Batch**	**Method**	**Units**	**RL**	**Sample**
Alkalinity	06/08/10 060810#1	SM 2320	mg/L CaCO3	1.0	561
Carbonate	06/08/10	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Bicarbonate	06/08/10	SM 2320	mg/L CaCO3	1.0	561
Hydroxide	06/08/10	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Total Suspended Solids	05/27/10 052710#1	EPA 160.2	mg/L	2.9	50.0
Chloride	06/01/10 060110#1	EPA 300.0	mg/L	1.0	9.6
N-Nitrate	05/27/10 052710#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
N-Nitrite	05/28/10 052810#1	EPA 300.0	mg-N/L	0.5	< 0.5 U
Sulfate	05/27/10 052710#1	EPA 300.0	mg/L	0.1	< 0.1 U
Chemical Oxygen Demand	06/03/10 060310#1	EPA 410.4	mg/L	5.00	62.7
Total Organic Carbon	05/27/10 052710#1	EPA 415.1	mg/L	1.50	25.3

RL Analytical reporting limit
U Undetected at reported detection limit

MS/MSD RESULTS-CONVENTIONALS
QY33-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 06/10/10

Project: USG Hwy 99
Event: 19921-65021
Date Sampled: 05/27/10
Date Received: 05/27/10

Analyte	Method	Date	Units	Sample	Spike	Spike Added	Recovery
ARI ID: QY33A Client ID: USGHwy99-MW8-05/10							
Chloride	EPA 300.0	05/28/10	mg/L	6.3	15.5	10.0	92.0%
N-Nitrate	EPA 300.0	05/27/10	mg-N/L	< 0.1	2.0	2.0	100.0%
N-Nitrite	EPA 300.0	05/27/10	mg-N/L	< 0.1	1.9	2.0	95.0%
Sulfate	EPA 300.0	05/27/10	mg/L	0.2	2.3	2.0	105.0%
Total Organic Carbon	EPA 415.1	05/27/10	mg/L	3.83	21.2	20.0	86.8%

REPLICATE RESULTS-CONVENTIONALS
QY33-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 06/10/10

Project: USG Hwy 99
Event: 19921-65021
Date Sampled: 05/27/10
Date Received: 05/27/10

Analyte	Method	Date	Units	Sample	Replicate(s)	RPD/RSD
ARI ID: QY33A Client ID: USGHwy99-MW8-05/10						
Chloride	EPA 300.0	05/28/10	mg/L	6.3	6.2	1.6%
N-Nitrate	EPA 300.0	05/27/10	mg-N/L	< 0.1	< 0.1	NA
N-Nitrite	EPA 300.0	05/27/10	mg-N/L	< 0.1	< 0.1	NA
Sulfate	EPA 300.0	05/27/10	mg/L	0.2	0.2	0.0%
Total Organic Carbon	EPA 415.1	05/27/10	mg/L	3.83	3.56	7.3%
ARI ID: QY33E Client ID: USGHwy99-99-2-05/10						
Total Suspended Solids	EPA 160.2	05/27/10	mg/L	50.0	50.3	0.6%

LAB CONTROL RESULTS-CONVENTIONALS
QY33-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 06/10/10

Project: USG Hwy 99
Event: 19921-65021
Date Sampled: NA
Date Received: NA

Analyte/Method	QC ID	Date	Units	LCS	Spike Added	Recovery
Total Suspended Solids EPA 160.2	ICVL	05/27/10	mg/L	49.4	50.0	98.8%

METHOD BLANK RESULTS-CONVENTIONALS
QY33-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 06/10/10

Project: USG Hwy 99
Event: 19921-65021
Date Sampled: NA
Date Received: NA

Analyte	Method	Date	Units	Blank	ID
Total Suspended Solids	EPA 160.2	05/27/10	mg/L	< 1.0 U	
Chloride	EPA 300.0	05/28/10 06/01/10	mg/L	< 0.1 U < 0.1 U	
N-Nitrate	EPA 300.0	05/27/10	mg-N/L	< 0.1 U	
N-Nitrite	EPA 300.0	05/27/10 05/28/10	mg-N/L	< 0.1 U < 0.1 U	
Sulfate	EPA 300.0	05/27/10 05/28/10	mg/L	< 0.1 U < 0.1 U	
Chemical Oxygen Demand	EPA 410.4	06/03/10	mg/L	< 5.00 U	
Total Organic Carbon	EPA 415.1	05/27/10	mg/L	< 1.50 U	

STANDARD REFERENCE RESULTS-CONVENTIONALS
QY33-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 06/10/10

Project: USG Hwy 99
Event: 19921-65021
Date Sampled: NA
Date Received: NA

Analyte/SRM ID	Method	Date	Units	SRM	True Value	Recovery
Alkalinity ERA #P114506	SM 2320	06/08/10	mg/L CaCO3	50.3	50.4	99.8%
Chloride ERA #230109	EPA 300.0	05/28/10 06/01/10	mg/L	2.8 2.8	3.0 3.0	93.3% 93.3%
N-Nitrate ERA #09127	EPA 300.0	05/27/10	mg-N/L	2.8	3.0	93.3%
N-Nitrite ERA #030309	EPA 300.0	05/27/10 05/28/10	mg-N/L	2.9 2.9	3.0 3.0	96.7% 96.7%
Sulfate ERA #220109	EPA 300.0	05/27/10 05/28/10	mg/L	2.9 2.9	3.0 3.0	96.7% 96.7%
Chemical Oxygen Demand Thermo Orion #I01	EPA 410.4	06/03/10	mg/L	85.0	90.0	94.4%
Total Organic Carbon ERA 0506-09-01	EPA 415.1	05/27/10	mg/L	22.0	20.0	110.0%

APPLIED SPECIATION AND CONSULTING, LLC

18804 Northcreek Parkway Bothell, WA, 98011
Tel: (425) 483-3300 Fax: (425) 483-9818
www.appliedspeciation.com

June 4, 2010

Cheronne Oreiro
Analytical Resources Inc.
4611 S. 134th Place Suite 100
Tukwila, WA 98168
(206) 695-6200

Re: USG Hwy 99

Ms. Oreiro,

Attached is the report associated with twelve (12) aqueous samples submitted for arsenite and arsenate quantitation on May 26, 27, and 28, 2010. Each set of samples was received the same day as the submittal date in sealed coolers at 0.1°C, -0.7°C, and 5.6°C, respectively. Arsenite and arsenate speciation analysis was performed via ion chromatography inductively coupled plasma dynamic reaction cell mass spectrometry (IC-ICP-DRC-MS). Any issues associated with the analyses are addressed in the following report.

If you have any questions, please feel free to contact me at your convenience.

Sincerely,

Ben Wozniak

Ben Wozniak
Project Manager
Applied Speciation and Consulting, LLC

Applied Speciation and Consulting, LLC

Report Prepared for:

Cheronne Oreiro
Analytical Resources Inc.
4611 S. 134th Place Suite 100
Tukwila, WA 98168

Project ID: USG Hwy 99

June 4, 2010

1. Sample Reception

Twelve (12) aqueous samples were submitted for arsenite and arsenate quantitation on May 26, 27, and 28, 2010. Each set of samples was received the same day as the submittal date, as indicated on the attached chain of custody (COC) forms, in sealed coolers at 0.1°C, -0.7°C, and 5.6°C, respectively.

The samples were received in a laminar flow clean hood, void of trace metals contamination and ultra-violet radiation, and assigned discrete sample identifiers. Immediately upon reception an aliquot of each sample was filtered (0.45μm) into a polypropylene centrifuge tube, and all filtrates and original sample bottles were then stored in a secure, monitored refrigerator (maintained at a temperature of 4°C) until the analyses could occur.

2. Sample Preparation

All sample preparation is performed in laminar flow clean hoods known to be free from trace metals contamination. All applied water for dilutions and sample preservatives are also monitored for contamination to account for any biases associated with the sample results.

Arsenic Speciation Analysis by IC-ICP-DRC-MS Immediately upon sample reception, an aliquot of each sample was filtered with a syringe filter (0.45μm) and injected directly into a sealed autosampler vial. No further sample preparation was performed as a buffered EDTA solution was provided by Applied Speciation and Consulting for field-preservation of the submitted samples.

3. Sample Analysis

All sample analysis is preceded by a minimum of a five-point calibration curve spanning the entire concentration range of interest. Calibration curves are performed at the beginning of each analytical day. All calibration curves, associated with each species of interest, are standardized by linear regression resulting in a response factor. All sample results are **instrument blank corrected** to account for any operational biases.

Prior to sample analysis, all calibration curves are verified using second source standards which are identified as initial calibration verification standards (ICV).

Ongoing instrument performance is identified by the analysis of continuing calibration verification standards (CCV) and continuing calibration blanks (CCB) at a minimal interval of every ten analytical runs.

Arsenic Speciation Analysis by IC-ICP-DRC-MS All samples for arsenite and arsenate quantitation were analyzed by ion chromatography inductively coupled plasma dynamic reaction cell mass spectrometry (IC-ICP-DRC-MS) either on June 1, 2010 (designated as Batch 1) or June 2, 2010 (designated as Batch 2). Aliquots of each sample are injected onto an anion exchange column and are mobilized by an alkaline (pH > 7) gradient. The eluting arsenic species are then introduced into a radio frequency (RF) plasma where energy-transfer processes cause desolvation, atomization, and ionization. The ions are extracted from the plasma through a differentially-pumped vacuum interface and travel through a pressurized chamber (DRC) containing a specific reactive gas which preferentially reacts with arsenic, producing an entirely different mass to charge ratio (m/z) which can then be differentiated from the initial isobaric interferences. A solid-state detector detects ions transmitted through the mass analyzer on the basis of their mass-to-charge ratio (m/z), and the resulting current is processed by a data handling system.

Retention times for each eluting species are compared to known standards for species identification.

4. Analytical Issues

The overall analyses went well and no significant analytical issues were encountered. All quality control parameters associated with these samples were within acceptance limits.

It should be noted that an additional arsenic species was detected in most of the submitted samples during the speciation analyses. While the identity of this species cannot be determined with certainty at this time, the concentration of arsenic associated it is estimated to be 0.88µg/L for 10-12491-QX92E, 1.07µg/L for 10-12630-QY17A, 5.99µg/L for 10-12633-QY17D, 25.2µg/L for 10-12636-QY17G, 3.80µg/L for 10-12640-QY17K, 0.72µg/L for 10-12643-QY17N, 3.36µg/L for 10-12646-QY17Q, and 1.03µg/L for 10-12705-QY33E. Traces of two additional species were also detected in the samples identified as 10-12487-QX92A, 10-12488-QX92B, and 10-12489-QX92C; the concentration of the sum of these additional species is estimated to be 0.079µg/L, 0.072µg/L, and 0.074µg/L, respectively, for these three samples. Applied Speciation and Consulting can pursue additional research to identify these species upon client request.

The estimated method detection limit (eMDL) for arsenite is generated from replicate analyses of the lowest standard in the calibration curve. Not all arsenic species are present in preparation blanks; therefore, eMDL calculations based on preparation blanks may be artificially biased low for this species. Due to traces of arsenate in the reagents used for the

speciation analysis, the eMDL for arsenate has been calculated using the standard deviation of the associated preparation blanks.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Ben Wozniak

Ben Wozniak
Project Manager
Applied Speciation and Consulting, LLC

Arsenic Speciation Results for ARI
Project Name: USG Hwy 99
Contact: Cheronne Oreiro

Report Date: June 4, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Sample Results

Sample ID	Date Sampled	Batch	Dilution	As(III)	As(V)
10-12487-QX92A	5/25/10	2	5	0.539	2.36
10-12488-QX92B	5/25/10	2	5	0.444	2.22
10-12489-QX92C	5/25/10	2	5	0.403	2.12
10-12490-QX92D	5/25/10	1	50	45.9	2.27
10-12491-QX92E	5/25/10	1	50	267	19.2
10-12630-QY17A	5/26/10	1	50	351	16.5
10-12633-QY17D	5/26/10	1	1000	1410	36.6
10-12636-QY17G	5/26/10	1	1000	1780	132
10-12640-QY17K	5/26/10	1	1000	1350	29.8
10-12643-QY17N	5/26/10	1	50	455	33.5
10-12646-QY17Q	5/26/10	1	1000	1260	24.9
10-12705-QY33E	5/27/10	1	50	310	37.7

All results reflect the applied dilution and are reported in µg/L
U = Sample concentration is less than the estimated Method Detection Limit (eMDL)
J = Sample concentration is between the eMDL and the Reporting Limit (RL)

Arsenic Speciation Results for ARI
Project Name: USG Hwy 99
Contact: Cheronne Oreiro

Report Date: June 4, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Preparation Blank Summary

Analyte (µg/L)	Batch	PBW1	PBW2	PBW3	PBW4	Mean	StdDev	eMDL* at 1x	RL at 1x
As(III)	1	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.020
As(V)	1	-0.014	-0.017	-0.017	-0.017	-0.016	0.002	0.006	0.020
As(III)	2	0.004	0.002	0.003	0.000	0.002	0.002	0.004	0.020
As(V)	2	0.019	0.012	0.009	0.012	0.013	0.005	0.014	0.020

eMDL = Estimated Method Detection Limit; RL = Reporting Limit
*Please see narrative regarding eMDL calculations

Quality Control Summary - Certified Reference Materials

Analyte (µg/L)	Batch	CRM	True Value	Result	Recovery
As(III)	1	ICV	10.00	10.10	101.0
As(V)	1	ICV	10.00	9.51	95.1
As(III)	2	ICV	10.00	9.53	95.3
As(V)	2	ICV	10.00	9.16	91.6

Arsenic Speciation Results for ARI
Project Name: USG Hwy 99
Contact: Cheronne Oreiro

Report Date: June 4, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Matrix Duplicates

Analyte (µg/L)	Batch	Sample ID	Rep 1	Rep 2	Mean	RPD
As(III)	1	Batch QC	0.40 J	0.34 J	0.37 J	17.4
As(V)	1	Batch QC	1.07	0.91 J	0.99 J	16.6
As(III)	2	10-12489-QX92C	0.403	0.418	0.410	3.6
As(V)	2	10-12489-QX92C	2.122	2.144	2.133	1.0

NC = Value was not calculated due to one or more concentrations below the eMDL

Quality Control Summary - Matrix Spike/ Matrix Spike Duplicate

Analyte (µg/L)	Batch	Sample ID	Spike Conc	MS Result	Recovery	Spike Conc	MSD Result	Recovery	RPD
As(III)	1	Batch QC	100.0	85.47	85.1	100.0	85.29	84.9	0.2
As(V)	1	Batch QC	100.0	80.65	79.7	100.0	80.36	79.4	0.4
As(III)	2	10-12489-QX92C	10.00	9.236	88.3	10.00	9.238	88.3	0.0
As(V)	2	10-12489-QX92C	10.00	11.03	89.0	10.00	11.09	89.6	0.5

SUBCONTRACTOR ANALYSIS REQUEST
CUSTODY TRANSFER 05/26/10

ANALYTICAL RESOURCES INCORPORATED

ARI Project: QX92

Laboratory: Applied Speciation & Consulting
Lab Contact: Russell Gerads
Lab Address: 18804 Northcreek Parkway
Bothell, WA 98011
Phone: 425-483-3300
Fax: 425-483-9818

ARI Client: CDM
Project ID: USG Hwy 99
ARI PM: Cheronne Oreiro
Phone: 206-695-6214
Fax: 206-695-6201

Analytical Protocol: In-house
Special Instructions:

Requested Turn Around: **06/09/10**
Email Results (Y/N): **email**

Limits of Liability. *Subcontractor is expected to perform all requested services in accordance with appropriate methodology following Standard Operating Procedures that meet standards for the industry. The total liability of ARI, its officers, agents, employees, or sucessors, arising out of or in connection with the requested services, shall not exceed the negotiated amount for said services. The agreement by the Subcontractor to perform services requested by ARI releases ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Subcontractor.*

ARI ID	Client ID/ Add'l ID	Sampled	Matrix	Bottles	Analyses
10-12487-QX92A	USGHwy99-SW5-05/10	05/25/10 11:35	Water	1	Metals (Sub)
Special Instructions: AS speciation (As+3& As+5)					
10-12488-QX92B	USGHwy99-SW4-05/10	05/25/10 12:05	Water	1	Metals (Sub)
Special Instructions: AS speciation (As+3& As+5)					
10-12489-QX92C	USGHwy99-SW1-05/10	05/25/10 13:10	Water	1	Metals (Sub)
Special Instructions: AS speciation (As+3& As+5)					
10-12490-QX92D	USGHwy99-MW2-05/10	05/25/10 14:45	Water	1	Metals (Sub)
Special Instructions: AS speciation (As+3& As+5)					
10-12491-QX92E	USGHwy99-MW3-05/10	05/25/10 16:15	Water	1	Metals (Sub)
Special Instructions: AS speciation (As+3& As+5)					

Carrier		Airbill		Date	
Relinquished by		Company ARI	Date 5/26/10	Time 1040	
Received by		Company ASC	Date 5/26/10	Time 1040	

Temp = 0.1°C

Subcontractor Custody Form - **QX92**

SUBCONTRACTOR ANALYSIS REQUEST
CUSTODY TRANSFER 05/27/10

ANALYTICAL RESOURCES INCORPORATED

ARI Project: QY17

Laboratory: Applied Speciation & Consulting
Lab Contact: Russell Gerads
Lab Address: 18804 Northcreek Parkway
Bothell, WA 98011
Phone: 425-483-3300
Fax: 425-483-9818

ARI Client: CDM
Project ID: USG Highway 99
ARI PM: Cheronne Oreiro
Phone: 206-695-6214
Fax: 206-695-6201

Analytical Protocol: In-house
Special Instructions:

Requested Turn Around: **06/11/10**
Email Results (Y/N): **email**

Limits of Liability. *Subcontractor is expected to perform all requested services in accordance with appropriate methodology following Standard Operating Procedures that meet standards for the industry. The total liability of ARI, its officers, agents, employees, or sucessors, arising out of or in connection with the requested services, shall not exceed the negotiated amount for said services. The agreement by the Subcontractor to perform services requested by ARI releases ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Subcontractor.*

ARI ID	Client ID/ Add'l ID	Sampled	Matrix	Bottles	Analyses
10-12630-QY17A	USGHWY99-MW6-05/10	05/26/10 09:15	Water	1	Metals (Sub)
Special Instructions: As+3 & As+5					
10-12633-QY17D	USGHWY99-MW5-05/10	05/26/10 10:25	Water	1	Metals (Sub)
Special Instructions: As+3 & As+5					
10-12636-QY17G	USGHWY99-99-1-05/10	05/26/10 12:00	Water	1	Metals (Sub)
Special Instructions: As+3 & As+5					
10-12640-QY17K	USGHWY99-MW4-05/10	05/26/10 13:10	Water	1	Metals (Sub)
Special Instructions: As+3 & As+5					
10-12643-QY17N	USGHWY99-MW1-05/10	05/26/10 14:35	Water	1	Metals (Sub)
Special Instructions: As+3 & As+5					
10-12646-QY17Q	USGHWY99-MW0-05/10	05/26/10 15:45	Water	1	Metals (Sub)
Special Instructions: As+3 & As+5					

Carrier	Airbill		Date
Relinquished by [signature]	Company ARI	Date 5/27/10	Time 1050
Received by [signature]	Company ASC	Date 5/29/10	Time 1050

-0.7°C

SUBCONTRACTOR ANALYSIS REQUEST
CUSTODY TRANSFER 05/28/10

ANALYTICAL RESOURCES INCORPORATED

ARI Project: QY33

Laboratory: Applied Speciation & Consulting
Lab Contact: Russell Gerads
Lab Address: 18804 Northcreek Parkway
Bothell, WA 98011
Phone: 425-483-3300
Fax: 425-483-9818

ARI Client: CDM
Project ID: USG Hwy 99
ARI PM: Cheronne Oreiro
Phone: 206-695-6214
Fax: 206-695-6201

Analytical Protocol: In-house
Special Instructions:

Requested Turn Around: **05/30/08**
Email Results (Y/N): **email**

Limits of Liability. *Subcontractor is expected to perform all requested services in accordance with appropriate methodology following Standard Operating Procedures that meet standards for the industry. The total liability of ARI, its officers, agents, employees, or sucessors, arising out of or in connection with the requested services, shall not exceed the negotiated amount for said services. The agreement by the Subcontractor to perform services requested by ARI releases ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Subcontractor.*

ARI ID	Client ID/ Add'l ID	Sampled	Matrix	Bottles	Analyses
10-12705-QY33E	USGHwy99-99-2-05/10	05/27/10 13:10	Water	1	Metals (Sub)

Special Instructions: Speciated As (As+3 & As+5)

Carrier		Airbill		Date	
Relinquished by		Company ARI	Date 5/28/10	Time 1120	
Received by		Company ASC	Date 5/28/10	Time 1120	

Subcontractor Custody Form - **QY33**
Page 1 of 1

5.6°C

QY33:00045

Analytical Resources, Incorporated
Analytical Chemists and Consultants

June 14, 2010

Alan Carey
CDM
14432 SE Eastgate Way, Suite 100
Bellevue, WA 98007

RE: Project ID: USG-Hwy-99, 19921-65021
ARI Job No: QY17

Dear Mr. Carey:

Please find enclosed the Chain-of-Custody (COC) record, sample receipt documentation, and the final results for samples from the project referenced above. Analytical Resources Inc. (ARI) accepted six water samples on May 26, 2010. For further details regarding sample receipt, please refer to the enclosed Cooler Receipt Form.

The samples were analyzed for various conventional parameters and total/dissolved metals, as requested on the COC. Note all samples requesting Arsenic were analyzed by both ICP-MS and Graphite Furnace. The Arsenic Speciation analyses were subcontracted to Applied Speciation in Bothell, WA. All data have been included.

Total arsenic was present in the ICP-MS method blank at a level that was greater than the reporting limit. The associated sample contained a concentration of arsenic greater than ten times the level found in the method blank. No corrective action was required.

The dissolved matrix spike percent recovery of arsenic fell outside the control limits low for sample **USGHWY99-MW-05/10**. The sample concentration exceeded the spike concentration by a factor of four or more. No corrective action was required.

The matrix spike percent recovery of TOC fell outside the control limits low for sample **USGHWY99-MW6-05/10**. The matrix spike was re-analyzed with comparable results. All other quality control parameters were within limits. No corrective action was required.

An electronic copy of this report as well as all supporting raw data will remain on file with ARI. If you have any questions or require additional information, please contact me at your convenience.

Sincerely,
ANALYTICAL RESOURCES, INC.

Cheronne Oreiro
Project Manager
(206) 695-6214
cheronneo@arilabs.com
www.arilabs.com

Enclosures

cc: eFile: QY17

4611 South 134th Place, Suite 100 • Tukwila WA 98168 • **206-695-6200** • **206-695-6201** fax

Chain of Custody Record & Laboratory Analysis Request

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

ARI Assigned Number:	Turn-around Requested: Standard
ARI Client Company: CDM	Phone:
Client Contact: Allan Carey	
Client Project Name: USG Highway 99	
Client Project #: 19921-65021	Samplers: KL & MLF

Page: 1	of 1		
Date: 5/26/10	Ice Present? Y		
No. of Coolers: 3	Cooler Temps: 5.3, 5.9, 5.5		

Sample ID	Date	Time	Matrix	No. Containers	Diss As (TLPMS & GFA) & Fe (6010)	Total Cations plus Fe (6010)	Total Cations plus Fe & (6010) As (TLPMS & GFA)	As Speciation As+3 & As+5	TOC/COD	Anions	Alkalinity CO3/HCO3	TSS	Notes/Comments
USGHWY99-MW6-05/10	5/26/10	0915	Water	9	✓	✓		✓	✓	✓	✓	✓	
USG HWY99-MW5-05/10	5/26/10	1025		10	✓	✓		✓	✓	✓	✓	✓	
USG HWY99-99-1-05/10		1200		9	✓		✓	✓	✓	✓	✓	✓	
USG HWY99-MW4-05/10		1310		9	✓	✓		✓	✓	✓	✓	✓	
USG HWY99-MW1-05/10		1435		9	✓	✓		✓	✓	✓	✓	✓	
USG HWY99-MW0-05/10		1545		9	✓	✓		✓	✓	✓	✓	✓	

Comments/Special Instructions	Relinquished by:	Received by:	Relinquished by:	Received by:
Dissolved metals not field filtered. Extra volume for dissolved As on MW5 for matrix QC	(Signature) Mary Lou Fox	(Signature) [signature]	(Signature)	(Signature)
	Printed Name: Mary Lou Fox	Printed Name: A-Volgardsen	Printed Name:	Printed Name:
	Company: CDM	Company: ARI	Company:	Company:
	Date & Time: 5/26/10 1628	Date & Time: 5/26/10 1628	Date & Time:	Date & Time:

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: CDM

COC No(s): ______ NA

Assigned ARI Job No: QY17

Project Name: USG Hwy 99

Delivered by: Fed-Ex UPS Courier Hand Delivered Other: ______

Tracking No: ______ NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler? YES NO

Were custody papers included with the cooler? .... YES NO

Were custody papers properly filled out (ink, signed, etc.) .... YES NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry)........ 5.3 5.9 5.5

If cooler temperature is out of compliance fill out form 00070F   Temp Gun ID#: 90941619

Cooler Accepted by: AV   Date: 5/26/10   Time: 1628

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? .... YES NO

What kind of packing material was used? ... Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other: ______

Was sufficient ice used (if appropriate)? .... NA YES NO

Were all bottles sealed in individual plastic bags? .... YES NO

Did all bottles arrive in good condition (unbroken)? .... YES NO

Were all bottle labels complete and legible? .... YES NO

Did the number of containers listed on COC match with the number of containers received? .... YES NO

Did all bottle labels and tags agree with custody papers? .... YES NO

Were all bottles used correct for the requested analyses? .... YES NO

Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)... NA YES NO

Were all VOC vials free of air bubbles? .... NA YES NO

Was sufficient amount of sample sent in each bottle? .... YES NO

Date VOC Trip Blank was made at ARI........ NA ______

Was Sample Split by ARI : NA YES Date/Time: ______ Equipment: ______ Split by: ______

Samples Logged by: [signature]   Date: 5/27/10   Time: 1025

***** Notify Project Manager of discrepancies or concerns *****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: Date:

Small Air Bubbles ~2mm	Peabubbles' 2-4 mm	LARGE Air Bubbles > 4 mm	Small → "sm" Peabubbles → "pb" Large → "lg" Headspace → "hs"

PRESERVATION VERIFICATION 05/27/10

ANALYTICAL RESOURCES INCORPORATED

ARI Job No: **QY17**

PC: Cheronne
VTSR: 05/26/10

Inquiry Number: NONE
Analysis Requested: 05/27/10
Contact: Carey, Alan
Client: CDM
Logged by: MM
Sample Set Used: Yes-481
Validatable Package: No
Deliverables:

Project #: 19921-65021
Project: USG Highway 99
Sample Site:
SDG No:
Analytical Protocol: In-house

LOGNUM ARI ID	CLIENT ID	CN >12	WAD >12	NH3 <2	COD <2	FOG <2	MET <2	PHEN <2	PHOS <2	TKN <2	NO23 <2	TOC <2	S2 >9	AK102 <2	Fe2+ <2	DMET FLT	DOC FLT	PARAMETER	ADJUSTED TO	LOT NUMBER	AMOUNT ADDED	DATE/BY
10-12630 **QY17A**	USGHWY99-MW6-05/10				Pass		TOT Pass					Pass										
10-12631 **QY17B**	USGHWY99-MW6-05/10						DIS fail									N						
10-12632 **QY17C**	USGHWY99-MW6-05/10						DIS fail									N						
10-12633 **QY17D**	USGHWY99-MW5-05/10				Pass		TOT Pass					Pass										
10-12634 **QY17E**	USGHWY99-MW5-05/10						DIS fail									N						
10-12635 **QY17F**	USGHWY99-MW5-05/10						DIS fail									N						
10-12636 **QY17G**	USGHWY99-99-1-05/10				Pass		TOT Pass					Pass										
10-12637 **QY17H**	USGHWY99-99-1-05/10						TOT Pass															
10-12638 **QY17I**	USGHWY99-99-1-05/10						DIS fail									N						
10-12639 **QY17J**	USGHWY99-99-1-05/10						DIS fail									N						
10-12640 **QY17K**	USGHWY99-MW4-05/10				Pass		TOT Pass					Pass										
10-12641 **QY17L**	USGHWY99-MW4-05/10						DIS fail									N						
10-12642 **QY17M**	USGHWY99-MW4-05/10						DIS fail									N						
10-12643 **QY17N**	USGHWY99-MW1-05/10				Pass		TOT Pass					Pass										

Checked By MM Date 5/27/10

PRESERVATION VERIFICATION 05/27/10
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ANALYTICAL RESOURCES INCORPORATED

ARI Job No: **QY17**

Client: CDM

Project #: 19921-65021
Project: USG Highway 99

LOGNUM ARI ID	CLIENT ID	CN >12	WAD >12	NH3 <2	COD <2	FOG <2	MET <2	PHEN <2	PHOS <2	TKN <2	NO23 <2	TOC <2	S2 >9	AK102 <2	Fe2+ <2	DMET FLT	DOC FLT	PARAMETER	ADJUSTED TO	LOT NUMBER	AMOUNT ADDED	DATE/BY
10-12644 **QY17O**	USGHWY99-MW1-05/10						DIS fail									N						
10-12645 **QY17P**	USGHWY99-MW1-05/10						DIS fail									N						
10-12646 **QY17Q**	USGHWY99-MW0-05/10				Pass		TOT Pass					Pass										
10-12647 **QY17R**	USGHWY99-MW0-05/10						DIS fail									N						
10-12648 **QY17S**	USGHWY99-MW0-05/10						DIS fail									N						

Checked By [illegible] Date 5/27/10

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGHWY99-MW6-05/10
SAMPLE

Lab Sample ID: QY17A
LIMS ID: 10-12630
Matrix: Water
Data Release Authorized:
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: 05/26/10
Date Received: 05/26/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
3010A	05/28/10	6010B	06/03/10	**7440-70-2**	**Calcium**	50	**35,300**	
3010A	05/28/10	6010B	06/03/10	**7439-89-6**	**Iron**	50	**14,400**	
3010A	05/28/10	6010B	06/03/10	**7439-95-4**	**Magnesium**	50	**20,200**	
3010A	05/28/10	6010B	06/03/10	**7440-09-7**	**Potassium**	500	**3,490**	
3010A	05/28/10	6010B	06/03/10	**7440-23-5**	**Sodium**	500	**14,300**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGHWY99-MW6-05/10
SAMPLE

Lab Sample ID: QY17B
LIMS ID: 10-12631
Matrix: Water
Data Release Authorized:
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: 05/26/10
Date Received: 05/26/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	06/01/10	200.8	06/02/10	**7440-38-2**	**Arsenic**	0.2	**279**	
6010B	05/28/10	6010B	06/03/10	**7439-89-6**	**Iron**	50	**6,200**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGHWY99-MW6-05/10
SAMPLE

Lab Sample ID: QY17C
LIMS ID: 10-12632
Matrix: Water
Data Release Authorized:
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: 05/26/10
Date Received: 05/26/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7000A	05/28/10	7060A	06/04/10	**7440-38-2**	**Arsenic**	10	**310**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGHWY99-MW5-05/10
SAMPLE

Lab Sample ID: QY17D
LIMS ID: 10-12633
Matrix: Water
Data Release Authorized:
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: 05/26/10
Date Received: 05/26/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
3010A	05/28/10	6010B	06/03/10	**7440-70-2**	**Calcium**	50	**26,900**	
3010A	05/28/10	6010B	06/03/10	**7439-89-6**	**Iron**	50	**11,800**	
3010A	05/28/10	6010B	06/03/10	**7439-95-4**	**Magnesium**	50	**17,300**	
3010A	05/28/10	6010B	06/03/10	**7440-09-7**	**Potassium**	500	**3,860**	
3010A	05/28/10	6010B	06/03/10	**7440-23-5**	**Sodium**	500	**15,500**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Sample ID: USGHWY99-MW5-05/10
SAMPLE

Lab Sample ID: QY17E
LIMS ID: 10-12634
Matrix: Water
Data Release Authorized:
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: 05/26/10
Date Received: 05/26/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	06/01/10	200.8	06/03/10	**7440-38-2**	**Arsenic**	5	**1,280**	
6010B	05/28/10	6010B	06/03/10	**7439-89-6**	**Iron**	50	**5,070**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Sample ID: USGHWY99-MW5-05/10
SAMPLE

Lab Sample ID: QY17F
LIMS ID: 10-12635
Matrix: Water
Data Release Authorized
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: 05/26/10
Date Received: 05/26/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7000A	05/28/10	7060A	06/04/10	**7440-38-2**	**Arsenic**	100	**1,090**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: USGHWY99-99-1-05/10
SAMPLE

Lab Sample ID: QY17G
LIMS ID: 10-12636
Matrix: Water
Data Release Authorized:
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: 05/26/10
Date Received: 05/26/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	06/01/10	200.8	06/03/10	**7440-38-2**	**Arsenic**	2	**2,220**	
3010A	05/28/10	6010B	06/03/10	**7440-70-2**	**Calcium**	50	**35,600**	
3010A	05/28/10	6010B	06/03/10	**7439-89-6**	**Iron**	50	**4,840**	
3010A	05/28/10	6010B	06/03/10	**7439-95-4**	**Magnesium**	50	**16,900**	
3010A	05/28/10	6010B	06/03/10	**7440-09-7**	**Potassium**	500	**4,290**	
3010A	05/28/10	6010B	06/03/10	**7440-23-5**	**Sodium**	500	**17,900**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGHWY99-99-1-05/10
SAMPLE

Lab Sample ID: QY17H
LIMS ID: 10-12637
Matrix: Water
Data Release Authorized:
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: 05/26/10
Date Received: 05/26/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7060A	05/28/10	7060A	06/04/10	**7440-38-2**	**Arsenic**	100	**2,430**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Sample ID: USGHWY99-99-1-05/10
SAMPLE

Lab Sample ID: QY17I
LIMS ID: 10-12638
Matrix: Water
Data Release Authorized:
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: 05/26/10
Date Received: 05/26/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	06/01/10	200.8	06/03/10	**7440-38-2**	**Arsenic**	2	**1,080**	
6010B	05/28/10	6010B	06/03/10	7439-89-6	Iron	50	50	U

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Sample ID: USGHWY99-99-1-05/10
SAMPLE

Lab Sample ID: QY17J
LIMS ID: 10-12639
Matrix: Water
Data Release Authorized:
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: 05/26/10
Date Received: 05/26/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7000A	05/28/10	7060A	06/04/10	**7440-38-2**	**Arsenic**	100	**1,020**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: USGHWY99-MW4-05/10
SAMPLE

Lab Sample ID: QY17K
LIMS ID: 10-12640
Matrix: Water
Data Release Authorized:
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: 05/26/10
Date Received: 05/26/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
3010A	05/28/10	6010B	06/03/10	**7440-70-2**	**Calcium**	50	**45,300**	
3010A	05/28/10	6010B	06/03/10	**7439-89-6**	**Iron**	50	**9,980**	
3010A	05/28/10	6010B	06/03/10	**7439-95-4**	**Magnesium**	50	**25,300**	
3010A	05/28/10	6010B	06/03/10	**7440-09-7**	**Potassium**	500	**6,240**	
3010A	05/28/10	6010B	06/03/10	**7440-23-5**	**Sodium**	500	**21,700**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Sample ID: USGHWY99-MW4-05/10
SAMPLE

Lab Sample ID: QY17L
LIMS ID: 10-12641
Matrix: Water
Data Release Authorized:
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: 05/26/10
Date Received: 05/26/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	06/01/10	200.8	06/02/10	**7440-38-2**	**Arsenic**	0.2	**42.7**	
6010B	05/28/10	6010B	06/03/10	**7439-89-6**	**Iron**	50	**3,710**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Sample ID: USGHWY99-MW4-05/10
SAMPLE

Lab Sample ID: QY17M
LIMS ID: 10-12642
Matrix: Water
Data Release Authorized:
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: 05/26/10
Date Received: 05/26/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7000A	05/28/10	7060A	06/07/10	**7440-38-2**	**Arsenic**	20	530	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: USGHWY99-MW1-05/10
SAMPLE

Lab Sample ID: QY17N
LIMS ID: 10-12643
Matrix: Water
Data Release Authorized:
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: 05/26/10
Date Received: 05/26/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
3010A	05/28/10	6010B	06/03/10	**7440-70-2**	**Calcium**	50	**27,100**	
3010A	05/28/10	6010B	06/03/10	**7439-89-6**	**Iron**	50	**6,660**	
3010A	05/28/10	6010B	06/03/10	**7439-95-4**	**Magnesium**	50	**14,600**	
3010A	05/28/10	6010B	06/03/10	**7440-09-7**	**Potassium**	500	**2,830**	
3010A	05/28/10	6010B	06/03/10	**7440-23-5**	**Sodium**	500	**10,500**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Sample ID: USGHWY99-MW1-05/10
SAMPLE

Lab Sample ID: QY17O
LIMS ID: 10-12644
Matrix: Water
Data Release Authorized:
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: 05/26/10
Date Received: 05/26/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	06/01/10	200.8	06/03/10	**7440-38-2**	**Arsenic**	1	**506**	
6010B	05/28/10	6010B	06/03/10	**7439-89-6**	**Iron**	50	**4,290**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Sample ID: USGHWY99-MW1-05/10
SAMPLE

Lab Sample ID: QY17P
LIMS ID: 10-12645
Matrix: Water
Data Release Authorized:
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: 05/26/10
Date Received: 05/26/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7000A	05/28/10	7060A	06/04/10	**7440-38-2**	**Arsenic**	100	**630**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGHWY99-MW0-05/10
SAMPLE

Lab Sample ID: QY17Q
LIMS ID: 10-12646
Matrix: Water
Data Release Authorized:
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: 05/26/10
Date Received: 05/26/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
3010A	05/28/10	6010B	06/03/10	**7440-70-2**	**Calcium**	50	**43,500**	
3010A	05/28/10	6010B	06/03/10	**7439-89-6**	**Iron**	50	**9,670**	
3010A	05/28/10	6010B	06/03/10	**7439-95-4**	**Magnesium**	50	**24,000**	
3010A	05/28/10	6010B	06/03/10	**7440-09-7**	**Potassium**	500	**5,840**	
3010A	05/28/10	6010B	06/03/10	**7440-23-5**	**Sodium**	500	**20,500**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGHWY99-MW0-05/10
SAMPLE

Lab Sample ID: QY17R
LIMS ID: 10-12647
Matrix: Water
Data Release Authorized:
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: 05/26/10
Date Received: 05/26/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	06/01/10	200.8	06/02/10	**7440-38-2**	**Arsenic**	0.2	**70.0**	
6010B	05/28/10	6010B	06/03/10	**7439-89-6**	**Iron**	50	**3,620**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Sample ID: USGHWY99-MW0-05/10
SAMPLE

Lab Sample ID: QY17S
LIMS ID: 10-12648
Matrix: Water
Data Release Authorized:
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: 05/26/10
Date Received: 05/26/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7000A	05/28/10	7060A	06/07/10	**7440-38-2**	**Arsenic**	20	**370**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Sample ID: USGHWY99-MW5-05/10
MATRIX SPIKE

Lab Sample ID: QY17E
LIMS ID: 10-12634
Matrix: Water
Data Release Authorized
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: 05/26/10
Date Received: 05/26/10

MATRIX SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Spike	Spike Added	% Recovery	Q
Arsenic	200.8	1,280	1,280	25.0	0.0%	H
Iron	6010B	5,070	7,160	2,000	104%	

Reported in µg/L

N-Control Limit Not Met
H-% Recovery Not Applicable, Sample Concentration Too High
NA-Not Applicable, Analyte Not Spiked

Percent Recovery Limits: 75-125%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Sample ID: USGHWY99-MW5-05/10
DUPLICATE

Lab Sample ID: QY17E
LIMS ID: 10-12634
Matrix: Water
Data Release Authorized:
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: 05/26/10
Date Received: 05/26/10

MATRIX DUPLICATE QUALITY CONTROL REPORT

Analyte	**Analysis Method**	**Sample**	**Duplicate**	**RPD**	**Control Limit**	**Q**
Arsenic	200.8	1,280	1,140	11.6%	+/- 20%	
Iron	6010B	5,070	5,200	2.5%	+/- 20%	

Reported in µg/L

*-Control Limit Not Met
L-RPD Invalid, Limit = Detection Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Sample ID: USGHWY99-MW5-05/10
MATRIX SPIKE

Lab Sample ID: QY17F
LIMS ID: 10-12635
Matrix: Water
Data Release Authorized:
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: 05/26/10
Date Received: 05/26/10

MATRIX SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Spike	Spike Added	% Recovery	Q
Arsenic	7060A	1,090	3,110	2,000	101%	

Reported in µg/L

N-Control Limit Not Met
H-% Recovery Not Applicable, Sample Concentration Too High
NA-Not Applicable, Analyte Not Spiked

Percent Recovery Limits: 75-125%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Sample ID: USGHWY99-MW5-05/10
DUPLICATE

Lab Sample ID: QY17F
LIMS ID: 10-12635
Matrix: Water
Data Release Authorized:
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: 05/26/10
Date Received: 05/26/10

MATRIX DUPLICATE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Duplicate	RPD	Control Limit	Q
Arsenic	7060A	1,090	1,090	0.0%	+/- 20%	

Reported in µg/L

*-Control Limit Not Met
L-RPD Invalid, Limit = Detection Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: LAB CONTROL

Lab Sample ID: QY17LCS
LIMS ID: 10-12630
Matrix: Water
Data Release Authorized:
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: NA
Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Calcium	6010B	9730	10000	97.3%	
Iron	6010B	2070	2000	104%	
Magnesium	6010B	10000	10000	100%	
Potassium	6010B	10100	10000	101%	
Sodium	6010B	9680	10000	96.8%	

Reported in µg/L

N-Control limit not met
Control Limits: 80-120%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: METHOD BLANK

Lab Sample ID: QY17MB
LIMS ID: 10-12630
Matrix: Water
Data Release Authorized:
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: NA
Date Received: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
3010A	05/28/10	6010B	06/03/10	7440-70-2	Calcium	50	50	U
3010A	05/28/10	6010B	06/03/10	7439-89-6	Iron	50	50	U
3010A	05/28/10	6010B	06/03/10	7439-95-4	Magnesium	50	50	U
3010A	05/28/10	6010B	06/03/10	7440-09-7	Potassium	500	500	U
3010A	05/28/10	6010B	06/03/10	7440-23-5	Sodium	500	500	U

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: LAB CONTROL

Lab Sample ID: QY17LCS
LIMS ID: 10-12636
Matrix: Water
Data Release Authorized:
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: NA
Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	**Analysis Method**	**Spike Found**	**Spike Added**	**% Recovery**	**Q**
Arsenic	200.8	27.3	25.0	109%	

Reported in µg/L

N-Control limit not met
Control Limits: 80-120%

FORM-VII

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: METHOD BLANK

Lab Sample ID: QY17MB
LIMS ID: 10-12636
Matrix: Water
Data Release Authorized:
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: NA
Date Received: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	06/01/10	200.8	06/02/10	**7440-38-2**	**Arsenic**	0.2	**1.0**	

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: LAB CONTROL

Lab Sample ID: QY17LCS
LIMS ID: 10-12637
Matrix: Water
Data Release Authorized:
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: NA
Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Arsenic	7060A	108	100	108%	

Reported in µg/L

N-Control limit not met
Control Limits: 80-120%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: METHOD BLANK

Lab Sample ID: QY17MB
LIMS ID: 10-12637
Matrix: Water
Data Release Authorized:
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: NA
Date Received: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7060A	05/28/10	7060A	06/04/10	7440-38-2	Arsenic	1	1	U

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Sample ID: LAB CONTROL

Lab Sample ID: QY17LCS
LIMS ID: 10-12631
Matrix: Water
Data Release Authorized:
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: NA
Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Arsenic	200.8	25.8	25.0	103%	
Iron	6010B	2070	2000	104%	

Reported in µg/L

N-Control limit not met
Control Limits: 80-120%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: METHOD BLANK

Lab Sample ID: QY17MB
LIMS ID: 10-12631
Matrix: Water
Data Release Authorized:
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: NA
Date Received: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	06/01/10	200.8	06/02/10	7440-38-2	Arsenic	0.2	0.2	U
6010B	05/28/10	6010B	06/03/10	7439-89-6	Iron	50	50	U

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Sample ID: LAB CONTROL

Lab Sample ID: QY17LCS
LIMS ID: 10-12632
Matrix: Water
Data Release Authorized:
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: NA
Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Arsenic	7060A	21	20	105%	

Reported in µg/L

N-Control limit not met
Control Limits: 80-120%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: METHOD BLANK

Lab Sample ID: QY17MB
LIMS ID: 10-12632
Matrix: Water
Data Release Authorized:
Reported: 06/08/10

QC Report No: QY17-CDM
Project: USG Highway 99
19921-65021
Date Sampled: NA
Date Received: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7000A	05/28/10	7060A	06/04/10	7440-38-2	Arsenic	1	1	U

U-Analyte undetected at given RL
RL-Reporting Limit

SAMPLE RESULTS-CONVENTIONALS
QY17-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized
Reported: 06/10/10

Project: USG Highway 99
Event: 19921-65021
Date Sampled: 05/26/10
Date Received: 05/26/10

Client ID: USGHWY99-MW6-05/10
ARI ID: 10-12630 QY17A

Analyte	**Date Batch**	**Method**	**Units**	**RL**	**Sample**
Alkalinity	06/08/10 060810#1	SM 2320	mg/L CaCO3	1.0	207
Carbonate	06/08/10	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Bicarbonate	06/08/10	SM 2320	mg/L CaCO3	1.0	207
Hydroxide	06/08/10	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Total Suspended Solids	05/27/10 052710#1	EPA 160.2	mg/L	2.1	41.5
Chloride	05/27/10 052710#1	EPA 300.0	mg/L	0.5	7.3
N-Nitrate	05/27/10 052710#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
N-Nitrite	05/27/10 052710#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
Sulfate	05/27/10 052710#1	EPA 300.0	mg/L	0.1	< 0.1 U
Chemical Oxygen Demand	06/03/10 060310#1	EPA 410.4	mg/L	5.00	20.5
Total Organic Carbon	05/27/10 052710#1	EPA 415.1	mg/L	1.50	9.27

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QY17-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 06/10/10

Project: USG Highway 99
Event: 19921-65021
Date Sampled: 05/26/10
Date Received: 05/26/10

Client ID: USGHWY99-MW5-05/10
ARI ID: 10-12633 QY17D

Analyte	Date Batch	Method	Units	RL	Sample
Alkalinity	06/08/10 060810#1	SM 2320	mg/L CaCO3	1.0	178
Carbonate	06/08/10	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Bicarbonate	06/08/10	SM 2320	mg/L CaCO3	1.0	178
Hydroxide	06/08/10	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Total Suspended Solids	05/27/10 052710#1	EPA 160.2	mg/L	1.5	28.5
Chloride	05/27/10 052710#1	EPA 300.0	mg/L	0.5	7.6
N-Nitrate	05/27/10 052710#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
N-Nitrite	05/27/10 052710#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
Sulfate	05/27/10 052710#1	EPA 300.0	mg/L	0.1	< 0.1 U
Chemical Oxygen Demand	06/03/10 060310#1	EPA 410.4	mg/L	5.00	11.2
Total Organic Carbon	05/27/10 052710#1	EPA 415.1	mg/L	1.50	5.05

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QY17-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 06/10/10

Project: USG Highway 99
Event: 19921-65021
Date Sampled: 05/26/10
Date Received: 05/26/10

Client ID: USGHWY99-99-1-05/10
ARI ID: 10-12636 QY17G

Analyte	**Date Batch**	**Method**	**Units**	**RL**	**Sample**
Alkalinity	06/08/10 060810#1	SM 2320	mg/L CaCO3	1.0	193
Carbonate	06/08/10	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Bicarbonate	06/08/10	SM 2320	mg/L CaCO3	1.0	193
Hydroxide	06/08/10	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Total Suspended Solids	05/27/10 052710#1	EPA 160.2	mg/L	1.0	9.9
Chloride	05/27/10 052710#1	EPA 300.0	mg/L	0.5	7.4
N-Nitrate	05/27/10 052710#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
N-Nitrite	05/27/10 052710#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
Sulfate	05/27/10 052710#1	EPA 300.0	mg/L	0.1	1.6
Chemical Oxygen Demand	06/03/10 060310#1	EPA 410.4	mg/L	5.00	7.43
Total Organic Carbon	05/27/10 052710#1	EPA 415.1	mg/L	1.50	4.83

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QY17-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 06/10/10

Project: USG Highway 99
Event: 19921-65021
Date Sampled: 05/26/10
Date Received: 05/26/10

Client ID: USGHWY99-MW4-05/10
ARI ID: 10-12640 QY17K

Analyte	**Date Batch**	**Method**	**Units**	**RL**	**Sample**
Alkalinity	06/08/10 060810#1	SM 2320	mg/L CaCO3	1.0	264
Carbonate	06/08/10	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Bicarbonate	06/08/10	SM 2320	mg/L CaCO3	1.0	264
Hydroxide	06/08/10	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Total Suspended Solids	05/27/10 052710#1	EPA 160.2	mg/L	1.0	11.6
Chloride	05/27/10 052710#1	EPA 300.0	mg/L	0.5	9.6
N-Nitrate	05/27/10 052710#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
N-Nitrite	05/27/10 052710#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
Sulfate	05/27/10 052710#1	EPA 300.0	mg/L	0.1	2.5
Chemical Oxygen Demand	06/03/10 060310#1	EPA 410.4	mg/L	5.00	30.3
Total Organic Carbon	05/27/10 052710#1	EPA 415.1	mg/L	1.50	11.1

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QY17-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 06/10/10

Project: USG Highway 99
Event: 19921-65021
Date Sampled: 05/26/10
Date Received: 05/26/10

Client ID: USGHWY99-MW1-05/10
ARI ID: 10-12643 QY17N

Analyte	Date Batch	Method	Units	RL	Sample
Alkalinity	06/08/10 060810#1	SM 2320	mg/L CaCO3	1.0	152
Carbonate	06/08/10	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Bicarbonate	06/08/10	SM 2320	mg/L CaCO3	1.0	152
Hydroxide	06/08/10	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Total Suspended Solids	05/27/10 052710#1	EPA 160.2	mg/L	1.1	2.7
Chloride	05/27/10 052710#1	EPA 300.0	mg/L	0.5	4.4
N-Nitrate	05/27/10 052710#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
N-Nitrite	05/27/10 052710#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
Sulfate	05/27/10 052710#1	EPA 300.0	mg/L	0.1	2.8
Chemical Oxygen Demand	06/03/10 060310#1	EPA 410.4	mg/L	5.00	28.7
Total Organic Carbon	05/27/10 052710#1	EPA 415.1	mg/L	1.50	12.4

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QY17-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 06/10/10

Project: USG Highway 99
Event: 19921-65021
Date Sampled: 05/26/10
Date Received: 05/26/10

Client ID: USGHWY99-MW0-05/10
ARI ID: 10-12646 QY17Q

Analyte	Date Batch	Method	Units	RL	Sample
Alkalinity	06/08/10 060810#1	SM 2320	mg/L CaCO3	1.0	269
Carbonate	06/08/10	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Bicarbonate	06/08/10	SM 2320	mg/L CaCO3	1.0	269
Hydroxide	06/08/10	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Total Suspended Solids	05/27/10 052710#1	EPA 160.2	mg/L	1.0	10.3
Chloride	05/27/10 052710#1	EPA 300.0	mg/L	0.5	10.0
N-Nitrate	05/27/10 052710#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
N-Nitrite	05/27/10 052710#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
Sulfate	05/27/10 052710#1	EPA 300.0	mg/L	0.1	2.6
Chemical Oxygen Demand	06/03/10 060310#1	EPA 410.4	mg/L	5.00	29.4
Total Organic Carbon	05/27/10 052710#1	EPA 415.1	mg/L	1.50	11.2

RL Analytical reporting limit
U Undetected at reported detection limit

MS/MSD RESULTS-CONVENTIONALS
QY17-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 06/10/10

Project: USG Highway 99
Event: 19921-65021
Date Sampled: 05/26/10
Date Received: 05/26/10

Analyte	Method	Date	Units	Sample	Spike	Spike Added	Recovery
ARI ID: QY17A Client ID: USGHWY99-MW6-05/10							
Chloride	EPA 300.0	05/27/10	mg/L	7.3	16.6	10.0	93.0%
N-Nitrate	EPA 300.0	05/27/10	mg-N/L	< 0.1	1.9	2.0	95.0%
N-Nitrite	EPA 300.0	05/27/10	mg-N/L	< 0.1	1.9	2.0	95.0%
Sulfate	EPA 300.0	05/27/10	mg/L	< 0.1	2.2	2.0	110.0%
Total Organic Carbon	EPA 415.1	05/27/10	mg/L	9.27	22.7	20.0	67.2%
Total Organic Carbon	EPA 415.1	05/27/10	mg/L	9.27	23.3	20.0	70.2%

REPLICATE RESULTS-CONVENTIONALS
QY17-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 06/10/10

Project: USG Highway 99
Event: 19921-65021
Date Sampled: 05/26/10
Date Received: 05/26/10

Analyte	Method	Date	Units	Sample	Replicate(s)	RPD/RSD
ARI ID: QY17A Client ID: USGHWY99-MW6-05/10						
Alkalinity	SM 2320	06/08/10	mg/L CaCO3	207	207	0.0%
Carbonate	SM 2320	06/08/10	mg/L CaCO3	< 1.0	< 1.0	NA
Bicarbonate	SM 2320	06/08/10	mg/L CaCO3	207	207	0.0%
Hydroxide	SM 2320	06/08/10	mg/L CaCO3	< 1.0	< 1.0	NA
Total Suspended Solids	EPA 160.2	05/27/10	mg/L	41.5	41.7	0.5%
Chloride	EPA 300.0	05/27/10	mg/L	7.3	7.3	0.0%
N-Nitrate	EPA 300.0	05/27/10	mg-N/L	< 0.1	< 0.1	NA
N-Nitrite	EPA 300.0	05/27/10	mg-N/L	< 0.1	< 0.1	NA
Sulfate	EPA 300.0	05/27/10	mg/L	< 0.1	< 0.1	NA
Total Organic Carbon	EPA 415.1	05/27/10	mg/L	9.27	9.17	1.1%

LAB CONTROL RESULTS-CONVENTIONALS
QY17-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized
Reported: 06/10/10

Project: USG Highway 99
Event: 19921-65021
Date Sampled: NA
Date Received: NA

Analyte/Method	QC ID	Date	Units	LCS	Spike Added	Recovery
Total Suspended Solids EPA 160.2	ICVL	05/27/10	mg/L	49.4	50.0	98.8%

METHOD BLANK RESULTS-CONVENTIONALS
QY17-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 06/10/10

Project: USG Highway 99
Event: 19921-65021
Date Sampled: NA
Date Received: NA

Analyte	Method	Date	Units	Blank	ID
Total Suspended Solids	EPA 160.2	05/27/10	mg/L	< 1.0 U	
Chloride	EPA 300.0	05/27/10	mg/L	< 0.1 U	
N-Nitrate	EPA 300.0	05/27/10	mg-N/L	< 0.1 U	
N-Nitrite	EPA 300.0	05/27/10	mg-N/L	< 0.1 U	
Sulfate	EPA 300.0	05/27/10	mg/L	< 0.1 U	
Chemical Oxygen Demand	EPA 410.4	06/03/10	mg/L	< 5.00 U	
Total Organic Carbon	EPA 415.1	05/27/10	mg/L	< 1.50 U	

STANDARD REFERENCE RESULTS-CONVENTIONALS
QY17-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 06/10/10

Project: USG Highway 99
Event: 19921-65021
Date Sampled: NA
Date Received: NA

Analyte/SRM ID	Method	Date	Units	SRM	True Value	Recovery
Alkalinity ERA #P114506	SM 2320	06/08/10	mg/L CaCO3	50.3	50.4	99.8%
Chloride ERA #230109	EPA 300.0	05/27/10	mg/L	2.8	3.0	93.3%
N-Nitrate ERA #09127	EPA 300.0	05/27/10	mg-N/L	2.8	3.0	93.3%
N-Nitrite ERA #030309	EPA 300.0	05/27/10	mg-N/L	2.9	3.0	96.7%
Sulfate ERA #220109	EPA 300.0	05/27/10	mg/L	2.9	3.0	96.7%
Chemical Oxygen Demand Thermo Orion #I01	EPA 410.4	06/03/10	mg/L	85.0	90.0	94.4%
Total Organic Carbon ERA 0506-09-01	EPA 415.1	05/27/10	mg/L	22.0	20.0	110.0%

APPLIED SPECIATION AND CONSULTING, LLC

18804 Northcreek Parkway Bothell, WA, 98011
Tel: (425) 483-3300 Fax: (425) 483-9818
www.appliedspeciation.com

June 4, 2010

Cheronne Oreiro
Analytical Resources Inc.
4611 S. 134th Place Suite 100
Tukwila, WA 98168
(206) 695-6200

Re: USG Hwy 99

Ms. Oreiro,

Attached is the report associated with twelve (12) aqueous samples submitted for arsenite and arsenate quantitation on May 26, 27, and 28, 2010. Each set of samples was received the same day as the submittal date in sealed coolers at 0.1˚C, -0.7˚C, and 5.6˚C, respectively. Arsenite and arsenate speciation analysis was performed via ion chromatography inductively coupled plasma dynamic reaction cell mass spectrometry (IC-ICP-DRC-MS). Any issues associated with the analyses are addressed in the following report.

If you have any questions, please feel free to contact me at your convenience.

Sincerely,

Ben Wozniak
Project Manager
Applied Speciation and Consulting, LLC

Applied Speciation and Consulting, LLC

Report Prepared for:

Cheronne Oreiro
Analytical Resources Inc.
4611 S. 134th Place Suite 100
Tukwila, WA 98168

Project ID: USG Hwy 99

June 4, 2010

1. Sample Reception

Twelve (12) aqueous samples were submitted for arsenite and arsenate quantitation on May 26, 27, and 28, 2010. Each set of samples was received the same day as the submittal date, as indicated on the attached chain of custody (COC) forms, in sealed coolers at 0.1°C, -0.7°C, and 5.6°C, respectively.

The samples were received in a laminar flow clean hood, void of trace metals contamination and ultra-violet radiation, and assigned discrete sample identifiers. Immediately upon reception an aliquot of each sample was filtered (0.45µm) into a polypropylene centrifuge tube, and all filtrates and original sample bottles were then stored in a secure, monitored refrigerator (maintained at a temperature of 4°C) until the analyses could occur.

2. Sample Preparation

All sample preparation is performed in laminar flow clean hoods known to be free from trace metals contamination. All applied water for dilutions and sample preservatives are also monitored for contamination to account for any biases associated with the sample results.

Arsenic Speciation Analysis by IC-ICP-DRC-MS Immediately upon sample reception, an aliquot of each sample was filtered with a syringe filter (0.45µm) and injected directly into a sealed autosampler vial. No further sample preparation was performed as a buffered EDTA solution was provided by Applied Speciation and Consulting for field-preservation of the submitted samples.

3. Sample Analysis

All sample analysis is preceded by a minimum of a five-point calibration curve spanning the entire concentration range of interest. Calibration curves are performed at the beginning of each analytical day. All calibration curves, associated with each species of interest, are standardized by linear regression resulting in a response factor. All sample results are **instrument blank corrected** to account for any operational biases.

Prior to sample analysis, all calibration curves are verified using second source standards which are identified as initial calibration verification standards (ICV).

Ongoing instrument performance is identified by the analysis of continuing calibration verification standards (CCV) and continuing calibration blanks (CCB) at a minimal interval of every ten analytical runs.

Arsenic Speciation Analysis by IC-ICP-DRC-MS All samples for arsenite and arsenate quantitation were analyzed by ion chromatography inductively coupled plasma dynamic reaction cell mass spectrometry (IC-ICP-DRC-MS) either on June 1, 2010 (designated as Batch 1) or June 2, 2010 (designated as Batch 2). Aliquots of each sample are injected onto an anion exchange column and are mobilized by an alkaline (pH > 7) gradient. The eluting arsenic species are then introduced into a radio frequency (RF) plasma where energy-transfer processes cause desolvation, atomization, and ionization. The ions are extracted from the plasma through a differentially-pumped vacuum interface and travel through a pressurized chamber (DRC) containing a specific reactive gas which preferentially reacts with arsenic, producing an entirely different mass to charge ratio (m/z) which can then be differentiated from the initial isobaric interferences. A solid-state detector detects ions transmitted through the mass analyzer on the basis of their mass-to-charge ratio (m/z), and the resulting current is processed by a data handling system.

Retention times for each eluting species are compared to known standards for species identification.

4. Analytical Issues

The overall analyses went well and no significant analytical issues were encountered. All quality control parameters associated with these samples were within acceptance limits.

It should be noted that an additional arsenic species was detected in most of the submitted samples during the speciation analyses. While the identity of this species cannot be determined with certainty at this time, the concentration of arsenic associated it is estimated to be 0.88µg/L for 10-12491-QX92E, 1.07µg/L for 10-12630-QY17A, 5.99µg/L for 10-12633-QY17D, 25.2µg/L for 10-12636-QY17G, 3.80µg/L for 10-12640-QY17K, 0.72µg/L for 10-12643-QY17N, 3.36µg/L for 10-12646-QY17Q, and 1.03µg/L for 10-12705-QY33E. Traces of two additional species were also detected in the samples identified as 10-12487-QX92A, 10-12488-QX92B, and 10-12489-QX92C; the concentration of the sum of these additional species is estimated to be 0.079µg/L, 0.072µg/L, and 0.074µg/L, respectively, for these three samples. Applied Speciation and Consulting can pursue additional research to identify these species upon client request.

The estimated method detection limit (eMDL) for arsenite is generated from replicate analyses of the lowest standard in the calibration curve. Not all arsenic species are present in preparation blanks; therefore, eMDL calculations based on preparation blanks may be artificially biased low for this species. Due to traces of arsenate in the reagents used for the

speciation analysis, the eMDL for arsenate has been calculated using the standard deviation of the associated preparation blanks.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Ben Wozniak
Project Manager
Applied Speciation and Consulting, LLC

Arsenic Speciation Results for ARI
Project Name: USG Hwy 99
Contact: Cheronne Oreiro

Report Date: June 4, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Sample Results

Sample ID	Date Sampled	Batch	Dilution	As(III)	As(V)
10-12487-QX92A	5/25/10	2	5	0.539	2.36
10-12488-QX92B	5/25/10	2	5	0.444	2.22
10-12489-QX92C	5/25/10	2	5	0.403	2.12
10-12490-QX92D	5/25/10	1	50	45.9	2.27
10-12491-QX92E	5/25/10	1	50	267	19.2
10-12630-QY17A	5/26/10	1	50	351	16.5
10-12633-QY17D	5/26/10	1	1000	1410	36.6
10-12636-QY17G	5/26/10	1	1000	1780	132
10-12640-QY17K	5/26/10	1	1000	1350	29.8
10-12643-QY17N	5/26/10	1	50	455	33.5
10-12646-QY17Q	5/26/10	1	1000	1260	24.9
10-12705-QY33E	5/27/10	1	50	310	37.7

All results reflect the applied dilution and are reported in µg/L
U = Sample concentration is less than the estimated Method Detection Limit (eMDL)
J = Sample concentration is between the eMDL and the Reporting Limit (RL)

Arsenic Speciation Results for ARI
Project Name: USG Hwy 99
Contact: Cheronne Oreiro

Report Date: June 4, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Preparation Blank Summary

Analyte (µg/L)	Batch	PBW1	PBW2	PBW3	PBW4	Mean	StdDev	eMDL* at 1x	RL at 1x
As(III)	1	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.020
As(V)	1	-0.014	-0.017	-0.017	-0.017	-0.016	0.002	0.006	0.020
As(III)	2	0.004	0.002	0.003	0.000	0.002	0.002	0.004	0.020
As(V)	2	0.019	0.012	0.009	0.012	0.013	0.005	0.014	0.020

eMDL = Estimated Method Detection Limit; RL = Reporting Limit
*Please see narrative regarding eMDL calculations

Quality Control Summary - Certified Reference Materials

Analyte (µg/L)	Batch	CRM	True Value	Result	Recovery
As(III)	1	ICV	10.00	10.10	101.0
As(V)	1	ICV	10.00	9.51	95.1
As(III)	2	ICV	10.00	9.53	95.3
As(V)	2	ICV	10.00	9.16	91.6

Arsenic Speciation Results for ARI
Project Name: USG Hwy 99
Contact: Cheronne Oreiro

Report Date: June 4, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Matrix Duplicates

Analyte (µg/L)	Batch	Sample ID	Rep 1	Rep 2	Mean	RPD
As(III)	1	Batch QC	0.40 J	0.34 J	0.37 J	17.4
As(V)	1	Batch QC	1.07	0.91 J	0.99 J	16.6
As(III)	2	10-12489-QX92C	0.403	0.418	0.410	3.6
As(V)	2	10-12489-QX92C	2.122	2.144	2.133	1.0

NC = Value was not calculated due to one or more concentrations below the eMDL

Quality Control Summary - Matrix Spike/ Matrix Spike Duplicate

Analyte (µg/L)	Batch	Sample ID	Spike Conc	MS Result	Recovery	Spike Conc	MSD Result	Recovery	RPD
As(III)	1	Batch QC	100.0	85.47	85.1	100.0	85.29	84.9	0.2
As(V)	1	Batch QC	100.0	80.65	79.7	100.0	80.36	79.4	0.4
As(III)	2	10-12489-QX92C	10.00	9.236	88.3	10.00	9.238	88.3	0.0
As(V)	2	10-12489-QX92C	10.00	11.03	89.0	10.00	11.09	89.6	0.5

QY17:00056

SUBCONTRACTOR ANALYSIS REQUEST
CUSTODY TRANSFER 05/26/10

ANALYTICAL RESOURCES INCORPORATED

ARI Project: QX92

Laboratory: Applied Speciation & Consulting
Lab Contact: Russell Gerads
Lab Address: 18804 Northcreek Parkway
Bothell, WA 98011
Phone: 425-483-3300
Fax: 425-483-9818

ARI Client: CDM
Project ID: USG Hwy 99
ARI PM: Cheronne Oreiro
Phone: 206-695-6214
Fax: 206-695-6201

Analytical Protocol: In-house
Special Instructions:

Requested Turn Around: **06/09/10**
Email Results (Y/N): **email**

Limits of Liability. *Subcontractor is expected to perform all requested services in accordance with appropriate methodology following Standard Operating Procedures that meet standards for the industry. The total liability of ARI, its officers, agents, employees, or sucessors, arising out of or in connection with the requested services, shall not exceed the negotiated amount for said services. The agreement by the Subcontractor to perform services requested by ARI releases ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Subcontractor.*

ARI ID	Client ID/ Add'l ID	Sampled	Matrix	Bottles	Analyses
● 10-12487-QX92A	USGHwy99-SW5-05/10	05/25/10 11:35	Water	1	Metals (Sub)
Special Instructions: AS speciation (As+3& As+5)					
● 10-12488-QX92B	USGHwy99-SW4-05/10	05/25/10 12:05	Water	1	Metals (Sub)
Special Instructions: AS speciation (As+3& As+5)					
● 10-12489-QX92C	USGHwy99-SW1-05/10	05/25/10 13:10	Water	1	Metals (Sub)
Special Instructions: AS speciation (As+3& As+5)					
● 10-12490-QX92D	USGHwy99-MW2-05/10	05/25/10 14:45	Water	1	Metals (Sub)
Special Instructions: AS speciation (As+3& As+5)					
● 10-12491-QX92E	USGHwy99-MW3-05/10	05/25/10 16:15	Water	1	Metals (Sub)
Special Instructions: AS speciation (As+3& As+5)					

Carrier	Airbill		Date
Relinquished by	Company ARI	Date 5/26/10	Time 1040
Received by	Company ASC	Date 5/26/10	Time 1040

Temp= 0.1°C

QY17:00057

SUBCONTRACTOR ANALYSIS REQUEST
CUSTODY TRANSFER 05/27/10

ANALYTICAL RESOURCES INCORPORATED

ARI Project: QY17

Laboratory: Applied Speciation & Consulting
Lab Contact: Russell Gerads
Lab Address: 18804 Northcreek Parkway
Bothell, WA 98011
Phone: 425-483-3300
Fax: 425-483-9818

ARI Client: CDM
Project ID: USG Highway 99
ARI PM: Cheronne Oreiro
Phone: 206-695-6214
Fax: 206-695-6201

Analytical Protocol: In-house
Special Instructions:

Requested Turn Around: **06/11/10**
Email Results (Y/N): **email**

Limits of Liability. *Subcontractor is expected to perform all requested services in accordance with appropriate methodology following Standard Operating Procedures that meet standards for the industry. The total liability of ARI, its officers, agents, employees, or sucessors, arising out of or in connection with the requested services, shall not exceed the negotiated amount for said services. The agreement by the Subcontractor to perform services requested by ARI releases ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Subcontractor.*

ARI ID	Client ID/ Add'l ID	Sampled	Matrix	Bottles	Analyses
10-12630-QY17A	USGHWY99-MW6-05/10	05/26/10 09:15	Water	1	Metals (Sub)
Special Instructions: As+3 & As+5					
10-12633-QY17D	USGHWY99-MW5-05/10	05/26/10 10:25	Water	1	Metals (Sub)
Special Instructions: As+3 & As+5					
10-12636-QY17G	USGHWY99-99-1-05/10	05/26/10 12:00	Water	1	Metals (Sub)
Special Instructions: As+3 & As+5					
10-12640-QY17K	USGHWY99-MW4-05/10	05/26/10 13:10	Water	1	Metals (Sub)
Special Instructions: As+3 & As+5					
10-12643-QY17N	USGHWY99-MW1-05/10	05/26/10 14:35	Water	1	Metals (Sub)
Special Instructions: As+3 & As+5					
10-12646-QY17Q	USGHWY99-MW0-05/10	05/26/10 15:45	Water	1	Metals (Sub)
Special Instructions: As+3 & As+5					

Carrier	Airbill		Date
Relinquished by	Company ARI	Date 5/27/10	Time 1050
Received by	Company ASC	Date 5/27/10	Time 1050

-0.7°C

QY17:00058

SUBCONTRACTOR ANALYSIS REQUEST
CUSTODY TRANSFER 05/28/10

ANALYTICAL RESOURCES INCORPORATED

ARI Project: QY33

Laboratory: Applied Speciation & Consulting
Lab Contact: Russell Gerads
Lab Address: 18804 Northcreek Parkway
Bothell, WA 98011
Phone: 425-483-3300
Fax: 425-483-9818

ARI Client: CDM
Project ID: USG Hwy 99
ARI PM: Cheronne Oreiro
Phone: 206-695-6214
Fax: 206-695-6201

Analytical Protocol: In-house
Special Instructions:

Requested Turn Around: **05/30/08**
Email Results (Y/N): **email**

Limits of Liability. *Subcontractor is expected to perform all requested services in accordance with appropriate methodology following Standard Operating Procedures that meet standards for the industry. The total liability of ARI, its officers, agents, employees, or sucessors, arising out of or in connection with the requested services, shall not exceed the negotiated amount for said services. The agreement by the Subcontractor to perform services requested by ARI releases ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Subcontractor.*

ARI ID	Client ID/ Add'l ID	Sampled	Matrix	Bottles	Analyses
10-12705-QY33E	USGHwy99-99-2-05/10	05/27/10 13:10	Water	1	Metals (Sub)

Special Instructions: Speciated As (As+3 & As+5)

Carrier		Airbill		Date	
Relinquished by		Company ARI	Date 5/28/10	Time 1120	
Received by		Company ASC	Date 5/28/10	Time 1120	

Subcontractor Custody Form - **QY33** 5.6°C

Analytical Resources, Incorporated
Analytical Chemists and Consultants

June 8, 2010

Alan Carey
CDM
14432 SE Eastgate Way, Suite 100
Bellevue, WA 98007

RE: Project ID: USG-Hwy-99, 19921-65021
ARI Job No: QX91 & QX92

Dear Mr. Carey:

Please find enclosed the Chain-of-Custody (COC) record, sample receipt documentation, and the final results for samples from the project referenced above. Analytical Resources Inc. (ARI) accepted eight water samples on May 25, 2010. For further details regarding sample receipt, please refer to the enclosed Cooler Receipt Form.

The samples were analyzed for various conventional parameters and total/dissolved metals, as requested on the COC. Note all samples requesting Arsenic were analyzed by both ICP-MS and Graphite Furnace. The Arsenic Speciation analyses were subcontracted to Applied Speciation in Bothell, WA. All data have been included.

Sample **USGHwy99-SW5-05-10** was analyzed outside the method recommended holding time for Nitrate and Nitrite due to instrument failure. The sample was re-analyzed for Nitrate and Nitrite on May 28, 2010, one day outside the method recommended holding time.

There were no other anomalies associated with the analyses of these samples.

An electronic copy of this report as well as all supporting raw data will remain on file with ARI. If you have any questions or require additional information, please contact me at your convenience.

Sincerely,
ANALYTICAL RESOURCES, INC.

Cheronne Oreiro
Project Manager
(206) 695-6214
cheronneo@arilabs.com
www.arilabs.com

Enclosures

cc: eFile: QX91/QX92

4611 South 134th Place, Suite 100 • Tukwila WA 98168 • **206-695-6200** • **206-695-6201** fax

Chain of Custody Record & Laboratory Analysis Request

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

ARI Assigned Number: QX91	Turn-around Requested: Std	Page: 1 of 1	
ARI Client Company: CDM	Phone: 425-519-8300	Date: 5/25/10	Ice Present? Y
Client Contact: Alan Carey		No. of Coolers: 3	Cooler Temps: 3.2, 7.3, 5.6
Client Project Name: USG Hwy 99			
Client Project #: 19921-65021	Samplers: MLF & KL		

Sample ID	Date	Time	Matrix	No. Containers	Diss As ICP-MS GFA	Diss As ICP-MS GFA diss Fe 6010	Total As plus cations + Fe	Anions Cl, NO2, NO3, SO4	Alkalinity CO3/HCO3	TSS	TDS	As speciation As^{+3}, As^{+5}	Total cations + Fe	TOC	COD
USG Hwy 99-SW6-05/10	6/25/10	1110	Water	1	✓										
USG Hwy 99-SW5-05/10		1135		9		✓	✓	✓	✓	✓	✓	✓		✓	✓
USG Hwy 99-SW4-05/10		1205		9		✓	✓	✓	✓	✓	✓	✓		✓	✓
USG Hwy 99-SW3-05/10		1230		1	✓		~~✓~~ mu								
USG Hwy 99-SW2-05/10		1250		1	✓										
USG Hwy 99-SW1-05/10		1310		9		✓	✓	✓	✓	✓	✓	✓		✓	✓
USG Hwy 99-MW2-05/10		1445		9		✓	✓	✓	✓	✓		✓		✓	✓
USG Hwy 99-MW3-05/10		1615		9		✓		✓	✓	✓		✓	✓	✓	✓

Comments/Special Instructions	Relinquished by:	Received by:	Relinquished by:	Received by:
Diss metals not field filtered	(Signature) [signature]	(Signature) [signature]	(Signature)	(Signature)
	Printed Name: Kevin Lee	Printed Name: Jonathon Walter	Printed Name:	Printed Name:
	Company: CDM	Company: ARI	Company:	Company:
	Date & Time: 5/25/2010/1730	Date & Time: 5/25/10 1730	Date & Time:	Date & Time:

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: CDM

Project Name: USG Hwy 99

COC No(s): NA

Delivered by: Fed-Ex UPS Courier Hand Delivered Other:

Assigned ARI Job No: QX91

Tracking No: NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler? YES NO

Were custody papers included with the cooler? .... YES NO

Were custody papers properly filled out (ink, signed, etc.) .... YES NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry)........ 3.2 7.3 5.6

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: 90941619

Cooler Accepted by: JW Date: 5/25/10 Time: 1730

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? .... YES NO

What kind of packing material was used? ... Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other:

Was sufficient ice used (if appropriate)? .... NA YES NO

Were all bottles sealed in individual plastic bags? .... YES NO

Did all bottles arrive in good condition (unbroken)? .... YES NO

Were all bottle labels complete and legible? .... YES NO

Did the number of containers listed on COC match with the number of containers received? .... YES NO

Did all bottle labels and tags agree with custody papers? .... YES NO

Were all bottles used correct for the requested analyses? .... YES NO

Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)... NA YES NO

Were all VOC vials free of air bubbles? .... NA YES NO

Was sufficient amount of sample sent in each bottle? .... YES NO

Date VOC Trip Blank was made at ARI........ NA

Was Sample Split by ARI : NA YES Date/Time: Equipment: Split by:

Samples Logged by: AV Date: 5/26/10 Time: 955

***** Notify Project Manager of discrepancies or concerns *****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

* speciated Arsenic on diff. Job.
- All ID's on bottles missing USGHwy99- before individual Id's

By: AV Date: 5/26/10

Small Air Bubbles ~2mm	Peabubbles' 2-4 mm	LARGE Air Bubbles > 4 mm

Small → "sm"
Peabubbles → "pb"
Large → "lg"
Headspace → "hs"

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Temperature Compliance Form

Cooler#: 1 **Temperature(°C):** 7.3

Sample ID	Bottle Count	Bottle Type
USGHWY99-SW2-05/10	1	1 1L HDPE
USGHWY99-MW3-05/10	9	2 250ml Ag, 1 misc, 2 5mO), 1 lrg O), 2 500ml HDPE, 1L HDPE

Cooler#: ______ **Temperature(°C):** ______

Sample ID	Bottle Count	Bottle Type

Cooler#: ______ **Temperature(°C):** ______

Sample ID	Bottle Count	Bottle Type

Cooler#: ______ **Temperature(°C):** ______

Sample ID	Bottle Count	Bottle Type

Completed by: AV Date: 5/26/10 Time: 835

PRESERVATION VERIFICATION 05/26/10
Page 1 of 2

ANALYTICAL RESOURCES INCORPORATED

ARI Job No: **QX91**

PC: Cheronne
VTSR: 05/25/10

Inquiry Number: NONE
Analysis Requested: 05/26/10
Contact: Carey, Alan
Client: CDM
Logged by: AV
Sample Set Used: Yes-481
Validatable Package: No
Deliverables:

Project #: 19921-65021
Project: USG Hwy 99
Sample Site:
SDG No:
Analytical Protocol: In-house

LOGNUM ARI ID	CLIENT ID	CN >12	WAD >12	NH3 <2	COD <2	FOG <2	MET <2	PHEN <2	PHOS <2	TKN <2	NO23 <2	TOC <2	S2 >9	AK102 <2	Fe2+ <2	DMET FLT	DOC FLT	PARAMETER	ADJUSTED TO	LOT NUMBER	AMOUNT ADDED	DATE/BY
10-12492 **QX91A**	USGHwy99-SW6-05/10						DIS NP									N						
10-12493 **QX91B**	USGHwy99-SW6-05/10						DIS									N						
10-12494 **QX91C**	USGHwy99-SW5-05/10				pass		TOT pass					pass										
10-12495 **QX91D**	USGHwy99-SW5-05/10						TOT															
10-12496 **QX91E**	USGHwy99-SW4-05/10				pass		TOT					pass										
10-12497 **QX91F**	USGHwy99-SW4-05/10						TOT															
10-12498 **QX91G**	USGHwy99-SW3-05/10						DIS NP									N						
10-12499 **QX91H**	USGHwy99-SW3-05/10						DIS									N						
10-12500 **QX91I**	USGHwy99-SW2-05/10						DIS									N						
10-12501 **QX91J**	USGHwy99-SW2-05/10						DIS									N						
10-12502 **QX91K**	USGHwy99-SW1-05/10				pass		TOT pass					pass										
10-12503 **QX91L**	USGHwy99-SW1-05/10						TOT															
10-12504 **QX91M**	USGHwy99-MW2-05/10				pass		TOT					pass										
10-12505 **QX91N**	USGHwy99-MW2-05/10						TOT															

NP=Not preserved
Diss metals = not preserved or filtered

Checked By AV Date 5/26/10

PRESERVATION VERIFICATION 05/26/10
Page 2 of 2

ANALYTICAL RESOURCES INCORPORATED

ARI Job No: **QX91**

Client: CDM

Project #: 19921-65021
Project: USG Hwy 99

LOGNUM ARI ID	CLIENT ID	CN >12	WAD >12	NH3 <2	COD <2	FOG <2	MET <2	PHEN <2	PHOS <2	TKN <2	NO23 <2	TOC <2	S2 >9	AK102 <2	Fe2+ <2	DMET FLT	DOC FLT	PARAMETER	ADJUSTED TO	LOT NUMBER	AMOUNT ADDED	DATE/BY
10-12506 **QX91O**	USGHwy99-MW3-05/10				pass		TOT pass					pass										
10-12507 **QX91P**	USGHwy99-SW5-05/10						DIS NP									N						
10-12508 **QX91Q**	USGHwy99-SW5-05/10						DIS									N						
10-12509 **QX91R**	USGHwy99-SW4-05/10						DIS									N						
10-12510 **QX91S**	USGHwy99-SW4-05/10						DIS									N						
10-12511 **QX91T**	USGHwy99-SW1-05/10						DIS									N						
10-12512 **QX91U**	USGHwy99-MW2-05/10						DIS									N						
10-12513 **QX91V**	USGHwy99-MW2-05/10						DIS									N						
10-12514 **QX91W**	USGHwy99-MW3-05/10						DIS									N						
10-12515 **QX91X**	USGHwy99-MW3-05/10						DIS									N						
10-12534 **QX91Y**	USGHwy99-SW1-05/10						DIS									N						

Checked By AN Date 5/26/10

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: CDM

Project Name: USG Hwy 99

COC No(s): NA

Delivered by: Fed-Ex UPS Courier Hand Delivered Other:

Assigned ARI Job No: QX92

Tracking No: NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler?	YES	NO
Were custody papers included with the cooler?	YES	NO
Were custody papers properly filled out (ink, signed, etc.)	YES	NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry)........ 3.2 7.3 5.6

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: 90941619

Cooler Accepted by: JW Date: 5/25/10 Time: 1730

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? .... YES NO

What kind of packing material was used? ... Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other:

Was sufficient ice used (if appropriate)?	NA	YES	NO
Were all bottles sealed in individual plastic bags?		YES	NO
Did all bottles arrive in good condition (unbroken)?		YES	NO
Were all bottle labels complete and legible?		YES	NO
Did the number of containers listed on COC match with the number of containers received?		YES	NO
Did all bottle labels and tags agree with custody papers?		~~YES~~ AV	NO
Were all bottles used correct for the requested analyses?		YES	NO
Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)...	NA	YES	NO
Were all VOC vials free of air bubbles?	NA	YES	NO
Was sufficient amount of sample sent in each bottle?		YES	NO
Date VOC Trip Blank was made at ARI	NA		

Was Sample Split by ARI : NA YES Date/Time: Equipment: Split by:

Samples Logged by: AV Date: 5/26/10 Time: 925

***** Notify Project Manager of discrepancies or concerns *****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

All labels are missing USGHwy99 before the ID.

By: AV Date: 5/26/10

Small Air Bubbles ~2mm	Peabubbles' 2-4 mm	LARGE Air Bubbles > 4 mm

Small → "sm"
Peabubbles → "pb"
Large → "lg"
Headspace → "hs"

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Temperature Compliance Form

Cooler#: 1 **Temperature(°C):** 7.3

Sample ID	Bottle Count	Bottle Type
USGHWY99-SW2-05/10	1	1 1L HDPE
USGHWY99-MW3-05/10	9	2 250ml Ag, 1 misc, 2 5mL, 1 Ag 0), 2 500ml HDPE, 1L HDPE

Cooler#: **Temperature(°C):**

Sample ID	Bottle Count	Bottle Type

Cooler#: **Temperature(°C):**

Sample ID	Bottle Count	Bottle Type

Cooler#: **Temperature(°C):**

Sample ID	Bottle Count	Bottle Type

Completed by: AV Date: 5/26/10 Time: 835

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Sample ID: USGHwy99-SW6-05/10
SAMPLE

Lab Sample ID: QX91A
LIMS ID: 10-12492
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	05/28/10	200.8	06/02/10	**7440-38-2**	**Arsenic**	0.2	**3.0**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGHwy99-SW6-05/10
SAMPLE

Lab Sample ID: QX91B
LIMS ID: 10-12493
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7000A	05/27/10	7060A	06/04/10	7440-38-2	Arsenic	1	4	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: USGHwy99-SW5-05/10
SAMPLE

Lab Sample ID: QX91C
LIMS ID: 10-12494
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	05/28/10	200.8	06/02/10	7440-38-2	Arsenic	0.2	3.5	
3010A	05/27/10	6010B	06/01/10	7440-70-2	Calcium	50	18,100	
3010A	05/27/10	6010B	06/01/10	7439-89-6	Iron	50	420	
3010A	05/27/10	6010B	06/01/10	7439-95-4	Magnesium	50	12,400	
3010A	05/27/10	6010B	06/01/10	7440-09-7	Potassium	500	1,710	
3010A	05/27/10	6010B	06/01/10	7440-23-5	Sodium	500	7,120	

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGHwy99-SW5-05/10
SAMPLE

Lab Sample ID: QX91D
LIMS ID: 10-12495
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7060A	05/27/10	7060A	06/04/10	**7440-38-2**	**Arsenic**	1	**4**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGHwy99-SW4-05/10
SAMPLE

Lab Sample ID: QX91E
LIMS ID: 10-12496
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	05/28/10	200.8	06/02/10	**7440-38-2**	**Arsenic**	0.2	**3.4**	
3010A	05/27/10	6010B	06/01/10	**7440-70-2**	**Calcium**	50	**17,900**	
3010A	05/27/10	6010B	06/01/10	**7439-89-6**	**Iron**	50	**390**	
3010A	05/27/10	6010B	06/01/10	**7439-95-4**	**Magnesium**	50	**12,200**	
3010A	05/27/10	6010B	06/01/10	**7440-09-7**	**Potassium**	500	**1,650**	
3010A	05/27/10	6010B	06/01/10	**7440-23-5**	**Sodium**	500	**7,040**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGHwy99-SW4-05/10
SAMPLE

Lab Sample ID: QX91F
LIMS ID: 10-12497
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7060A	05/27/10	7060A	06/04/10	**7440-38-2**	**Arsenic**	1	**4**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGHwy99-SW3-05/10
SAMPLE

Lab Sample ID: QX91G
LIMS ID: 10-12498
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	05/28/10	200.8	06/02/10	**7440-38-2**	**Arsenic**	0.2	3.0	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGHwy99-SW3-05/10
SAMPLE

Lab Sample ID: QX91H
LIMS ID: 10-12499
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7000A	05/27/10	7060A	06/04/10	**7440-38-2**	**Arsenic**	1	**4**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGHwy99-SW2-05/10
SAMPLE

Lab Sample ID: QX91I
LIMS ID: 10-12500
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	05/28/10	200.8	06/02/10	**7440-38-2**	**Arsenic**	0.2	**2.9**	

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGHwy99-SW2-05/10
SAMPLE

Lab Sample ID: QX91J
LIMS ID: 10-12501
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7000A	05/27/10	7060A	06/04/10	**7440-38-2**	**Arsenic**	1	**4**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGHwy99-SW1-05/10
SAMPLE

Lab Sample ID: QX91K
LIMS ID: 10-12502
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	05/28/10	200.8	06/02/10	7440-38-2	Arsenic	0.2	3.4	
3010A	05/27/10	6010B	06/01/10	7440-70-2	Calcium	50	19,000	
3010A	05/27/10	6010B	06/01/10	7439-89-6	Iron	50	410	
3010A	05/27/10	6010B	06/01/10	7439-95-4	Magnesium	50	13,100	
3010A	05/27/10	6010B	06/01/10	7440-09-7	Potassium	500	1,760	
3010A	05/27/10	6010B	06/01/10	7440-23-5	Sodium	500	7,500	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: USGHwy99-SW1-05/10
SAMPLE

Lab Sample ID: QX91L
LIMS ID: 10-12503
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7060A	05/27/10	7060A	06/04/10	**7440-38-2**	**Arsenic**	1	**3**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: USGHwy99-MW2-05/10
SAMPLE

Lab Sample ID: QX91M
LIMS ID: 10-12504
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	05/28/10	200.8	06/02/10	**7440-38-2**	**Arsenic**	0.2	**64.2**	
3010A	05/27/10	6010B	06/01/10	**7440-70-2**	**Calcium**	50	**21,200**	
3010A	05/27/10	6010B	06/01/10	**7439-89-6**	**Iron**	50	**2,970**	
3010A	05/27/10	6010B	06/01/10	**7439-95-4**	**Magnesium**	50	**13,700**	
3010A	05/27/10	6010B	06/01/10	**7440-09-7**	**Potassium**	500	**3,120**	
3010A	05/27/10	6010B	06/01/10	**7440-23-5**	**Sodium**	500	**11,800**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: USGHwy99-MW2-05/10
SAMPLE

Lab Sample ID: QX91N
LIMS ID: 10-12505
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7060A	05/27/10	7060A	06/04/10	**7440-38-2**	**Arsenic**	5	**79**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGHwy99-MW3-05/10
SAMPLE

Lab Sample ID: QX91O
LIMS ID: 10-12506
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
3010A	05/27/10	6010B	06/01/10	**7440-70-2**	**Calcium**	50	**30,200**	
3010A	05/27/10	6010B	06/01/10	**7439-89-6**	**Iron**	50	**22,100**	
3010A	05/27/10	6010B	06/01/10	**7439-95-4**	**Magnesium**	50	**16,300**	
3010A	05/27/10	6010B	06/01/10	**7440-09-7**	**Potassium**	500	**4,910**	
3010A	05/27/10	6010B	06/01/10	**7440-23-5**	**Sodium**	500	**15,700**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGHwy99-SW5-05/10
SAMPLE

Lab Sample ID: QX91P
LIMS ID: 10-12507
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	05/28/10	200.8	06/02/10	7440-38-2	Arsenic	0.2	3.0	
6010B	05/27/10	6010B	06/01/10	7439-89-6	Iron	50	280	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

ANALYTICAL RESOURCES INCORPORATED

Sample ID: USGHwy99-SW5-05/10
SAMPLE

Lab Sample ID: QX91Q
LIMS ID: 10-12508
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7000A	05/27/10	7060A	06/04/10	**7440-38-2**	**Arsenic**	1	**4**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGHwy99-SW4-05/10
SAMPLE

Lab Sample ID: QX91R
LIMS ID: 10-12509
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	05/28/10	200.8	06/02/10	**7440-38-2**	**Arsenic**	0.2	**3.1**	
6010B	05/27/10	6010B	06/01/10	**7439-89-6**	**Iron**	50	**270**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGHwy99-SW4-05/10
SAMPLE

Lab Sample ID: QX91S
LIMS ID: 10-12510
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7000A	05/27/10	7060A	06/04/10	**7440-38-2**	**Arsenic**	1	**3**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Sample ID: USGHwy99-SW1-05/10
SAMPLE

Lab Sample ID: QX91T
LIMS ID: 10-12511
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	05/28/10	200.8	06/02/10	**7440-38-2**	**Arsenic**	0.2	**3.0**	
6010B	05/27/10	6010B	06/01/10	**7439-89-6**	**Iron**	50	**280**	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGHwy99-MW2-05/10
SAMPLE

Lab Sample ID: QX91U
LIMS ID: 10-12512
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	05/28/10	200.8	06/02/10	**7440-38-2**	**Arsenic**	0.2	**35.4**	
6010B	05/27/10	6010B	06/01/10	**7439-89-6**	**Iron**	50	**1,560**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGHwy99-MW2-05/10
SAMPLE

Lab Sample ID: QX91V
LIMS ID: 10-12513
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7000A	05/27/10	7060A	06/04/10	**7440-38-2**	**Arsenic**	2	**34**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGHwy99-MW3-05/10
SAMPLE

Lab Sample ID: QX91W
LIMS ID: 10-12514
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	05/28/10	200.8	06/02/10	**7440-38-2**	**Arsenic**	0.2	**135**	
6010B	05/27/10	6010B	06/01/10	**7439-89-6**	**Iron**	50	**7,470**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGHwy99-MW3-05/10
SAMPLE

Lab Sample ID: QX91X
LIMS ID: 10-12515
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7000A	05/27/10	7060A	06/04/10	**7440-38-2**	**Arsenic**	10	**150**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Sample ID: USGHwy99-SW1-05/10
SAMPLE

Lab Sample ID: QX91Y
LIMS ID: 10-12534
Matrix: Water
Data Release Authorized
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7000A	05/27/10	7060A	06/04/10	**7440-38-2**	**Arsenic**	1	**4**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Sample ID: USGHwy99-SW6-05/10
MATRIX SPIKE

Lab Sample ID: QX91B
LIMS ID: 10-12493
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

MATRIX SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Spike	Spike Added	% Recovery	Q
Arsenic	7060A	4.09	26.0	20.0	110%	

Reported in µg/L

N-Control Limit Not Met
H-% Recovery Not Applicable, Sample Concentration Too High
NA-Not Applicable, Analyte Not Spiked

Percent Recovery Limits: 75-125%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Sample ID: USGHwy99-SW6-05/10
DUPLICATE

Lab Sample ID: QX91B
LIMS ID: 10-12493
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

MATRIX DUPLICATE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Duplicate	RPD	Control Limit	Q
Arsenic	7060A	4	4	0.0%	+/- 1	L

Reported in µg/L

*-Control Limit Not Met
L-RPD Invalid, Limit = Detection Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: USGHwy99-SW5-05/10
MATRIX SPIKE

Lab Sample ID: QX91C
LIMS ID: 10-12494
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

MATRIX SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Spike	Spike Added	% Recovery	Q
Arsenic	200.8	3.50	31.2	25.0	111%	
Calcium	6010B	18,100	26,200	10,000	81.0%	
Iron	6010B	417	2,250	2,000	91.6%	
Magnesium	6010B	12,400	21,000	10,000	86.0%	
Potassium	6010B	1,710	11,200	10,000	94.9%	
Sodium	6010B	7,120	15,900	10,000	87.8%	

Reported in µg/L

N-Control Limit Not Met
H-% Recovery Not Applicable, Sample Concentration Too High
NA-Not Applicable, Analyte Not Spiked
NR-Not Recovered

Percent Recovery Limits: 75-125%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: USGHwy99-SW5-05/10
DUPLICATE

Lab Sample ID: QX91C
LIMS ID: 10-12494
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

MATRIX DUPLICATE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Duplicate	RPD	Control Limit	Q
Arsenic	200.8	3.5	3.5	0.0%	+/- 20%	
Calcium	6010B	18,100	16,600	8.6%	+/- 20%	
Iron	6010B	420	390	7.4%	+/- 20%	
Magnesium	6010B	12,400	11,400	8.4%	+/- 20%	
Potassium	6010B	1,710	1,560	9.2%	+/- 500	L
Sodium	6010B	7,120	6,570	8.0%	+/- 20%	

Reported in µg/L

*-Control Limit Not Met
L-RPD Invalid, Limit = Detection Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: USGHwy99-SW5-05/10
MATRIX SPIKE

Lab Sample ID: QX91D
LIMS ID: 10-12495
Matrix: Water
Data Release Authorized
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

MATRIX SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Spike	Spike Added	% Recovery	Q
Arsenic	7060A	3.88	115	100	111%	

Reported in µg/L

N-Control Limit Not Met
H-% Recovery Not Applicable, Sample Concentration Too High
NA-Not Applicable, Analyte Not Spiked
NR-Not Recovered

Percent Recovery Limits: 75-125%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: USGHwy99-SW5-05/10
DUPLICATE

Lab Sample ID: QX91D
LIMS ID: 10-12495
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

MATRIX DUPLICATE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Duplicate	RPD	Control Limit	Q
Arsenic	7060A	4	4	0.0%	+/- 1	L

Reported in µg/L

*-Control Limit Not Met
L-RPD Invalid, Limit = Detection Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Sample ID: USGHwy99-SW5-05/10
MATRIX SPIKE

Lab Sample ID: QX91P
LIMS ID: 10-12507
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

MATRIX SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Spike	Spike Added	% Recovery	Q
Arsenic	200.8	3.00	30.5	25.0	110%	
Iron	6010B	279	2,330	2,000	103%	

Reported in µg/L

N-Control Limit Not Met
H-% Recovery Not Applicable, Sample Concentration Too High
NA-Not Applicable, Analyte Not Spiked

Percent Recovery Limits: 75-125%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Sample ID: USGHwy99-SW5-05/10
DUPLICATE

Lab Sample ID: QX91P
LIMS ID: 10-12507
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

MATRIX DUPLICATE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Duplicate	RPD	Control Limit	Q
Arsenic	200.8	3.0	3.0	0.0%	+/- 20%	
Iron	6010B	280	280	0.0%	+/- 20%	

Reported in µg/L

*-Control Limit Not Met
L-RPD Invalid, Limit = Detection Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: LAB CONTROL

Lab Sample ID: QX91LCS
LIMS ID: 10-12496
Matrix: Water
Data Release Authorized
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: NA
Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Arsenic	200.8	27.3	25.0	109%	
Calcium	6010B	8880	10000	88.8%	
Iron	6010B	1880	2000	94.0%	
Magnesium	6010B	9120	10000	91.2%	
Potassium	6010B	9420	10000	94.2%	
Sodium	6010B	8920	10000	89.2%	

Reported in µg/L

N-Control limit not met
Control Limits: 80-120%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: METHOD BLANK

Lab Sample ID: QX91MB
LIMS ID: 10-12496
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: NA
Date Received: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	05/28/10	200.8	06/02/10	7440-38-2	Arsenic	0.2	0.2	U
3010A	05/27/10	6010B	06/01/10	7440-70-2	Calcium	50	50	U
3010A	05/27/10	6010B	06/01/10	7439-89-6	Iron	50	50	U
3010A	05/27/10	6010B	06/01/10	7439-95-4	Magnesium	50	50	U
3010A	05/27/10	6010B	06/01/10	7440-09-7	Potassium	500	500	U
3010A	05/27/10	6010B	06/01/10	7440-23-5	Sodium	500	500	U

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: LAB CONTROL

Lab Sample ID: QX91LCS
LIMS ID: 10-12497
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: NA
Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Arsenic	7060A	115	100	115%	

Reported in µg/L

N-Control limit not met
Control Limits: 80-120%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: METHOD BLANK

Lab Sample ID: QX91MB
LIMS ID: 10-12497
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: NA
Date Received: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7060A	05/27/10	7060A	06/04/10	7440-38-2	Arsenic	1	1	U

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Sample ID: LAB CONTROL

Lab Sample ID: QX91LCS
LIMS ID: 10-12499
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: NA
Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Arsenic	7060A	21	20	105%	

Reported in µg/L

N-Control limit not met
Control Limits: 80-120%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: METHOD BLANK

Lab Sample ID: QX91MB
LIMS ID: 10-12499
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: NA
Date Received: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
7000A	05/27/10	7060A	06/04/10	7440-38-2	Arsenic	1	1	U

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: LAB CONTROL

Lab Sample ID: QX91LCS
LIMS ID: 10-12509
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: NA
Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Arsenic	200.8	25.6	25.0	102%	
Iron	6010B	2060	2000	103%	

Reported in µg/L

N-Control limit not met
Control Limits: 80-120%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Sample ID: METHOD BLANK

Lab Sample ID: QX91MB
LIMS ID: 10-12509
Matrix: Water
Data Release Authorized:
Reported: 06/07/10

QC Report No: QX91-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: NA
Date Received: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	05/28/10	200.8	06/02/10	7440-38-2	Arsenic	0.2	0.2	U
6010B	05/27/10	6010B	06/01/10	7439-89-6	Iron	50	50	U

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

SAMPLE RESULTS-CONVENTIONALS
QX91-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 06/08/10

Project: USG Hwy 99
Event: 19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

Client ID: USGHwy99-SW5-05/10
ARI ID: 10-12494 QX91C

Analyte	Date Batch	Method	Units	RL	Sample
Alkalinity	06/01/10 060110#1	SM 2320	mg/L CaCO3	1.0	97.1
Carbonate	06/01/10	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Bicarbonate	06/01/10	SM 2320	mg/L CaCO3	1.0	97.1
Hydroxide	06/01/10	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Total Dissolved Solids	05/26/10 052610#1	EPA 160.1	mg/L	5.0	164
Total Suspended Solids	05/26/10 052610#1	EPA 160.2	mg/L	1.1	10.5
Chloride	05/28/10 052810#1	EPA 300.0	mg/L	0.5	7.8
N-Nitrate	05/28/10 052810#1	EPA 300.0	mg-N/L	0.1	0.7
N-Nitrite	05/28/10 052810#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
Sulfate	05/28/10 052810#1	EPA 300.0	mg/L	0.5	8.2
Chemical Oxygen Demand	06/03/10 060310#1	EPA 410.4	mg/L	5.00	11.9
Total Organic Carbon	05/26/10 052610#1	EPA 415.1	mg/L	1.50	7.38

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QX91-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 06/08/10

Project: USG Hwy 99
Event: 19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

Client ID: USGHwy99-SW4-05/10
ARI ID: 10-12496 QX91E

Analyte	Date Batch	Method	Units	RL	Sample
Alkalinity	06/01/10 060110#1	SM 2320	mg/L CaCO3	1.0	98.9
Carbonate	06/01/10	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Bicarbonate	06/01/10	SM 2320	mg/L CaCO3	1.0	98.9
Hydroxide	06/01/10	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Total Dissolved Solids	05/26/10 052610#1	EPA 160.1	mg/L	5.0	164
Total Suspended Solids	05/26/10 052610#1	EPA 160.2	mg/L	1.0	1.9
Chloride	05/28/10 052810#1	EPA 300.0	mg/L	0.5	8.0
N-Nitrate	05/26/10 052610#1	EPA 300.0	mg-N/L	0.1	0.7
N-Nitrite	05/26/10 052610#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
Sulfate	05/28/10 052810#1	EPA 300.0	mg/L	0.5	8.4
Chemical Oxygen Demand	06/03/10 060310#1	EPA 410.4	mg/L	5.00	16.0
Total Organic Carbon	05/27/10 052710#1	EPA 415.1	mg/L	1.50	5.19

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QX91-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 06/08/10

Project: USG Hwy 99
Event: 19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

Client ID: USGHwy99-SW1-05/10
ARI ID: 10-12502 QX91K

Analyte	Date Batch	Method	Units	RL	Sample
Alkalinity	06/01/10 060110#1	SM 2320	mg/L CaCO3	1.0	99.6
Carbonate	06/01/10	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Bicarbonate	06/01/10	SM 2320	mg/L CaCO3	1.0	99.6
Hydroxide	06/01/10	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Total Dissolved Solids	05/26/10 052610#1	EPA 160.1	mg/L	5.0	170
Total Suspended Solids	05/26/10 052610#1	EPA 160.2	mg/L	1.1	1.6
Chloride	05/28/10 052810#1	EPA 300.0	mg/L	0.5	8.0
N-Nitrate	05/26/10 052610#1	EPA 300.0	mg-N/L	0.1	0.7
N-Nitrite	05/26/10 052610#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
Sulfate	05/28/10 052810#1	EPA 300.0	mg/L	0.5	8.4
Chemical Oxygen Demand	06/03/10 060310#1	EPA 410.4	mg/L	5.00	14.7
Total Organic Carbon	05/27/10 052710#1	EPA 415.1	mg/L	1.50	5.22

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QX91-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 06/08/10

Project: USG Hwy 99
Event: 19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

Client ID: USGHwy99-MW2-05/10
ARI ID: 10-12504 QX91M

Analyte	**Date Batch**	**Method**	**Units**	**RL**	**Sample**
Alkalinity	06/01/10 060110#1	SM 2320	mg/L CaCO3	1.0	142
Carbonate	06/01/10	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Bicarbonate	06/01/10	SM 2320	mg/L CaCO3	1.0	142
Hydroxide	06/01/10	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Total Suspended Solids	05/26/10 052610#1	EPA 160.2	mg/L	1.0	5.7
Chloride	05/28/10 052810#1	EPA 300.0	mg/L	0.5	6.7
N-Nitrate	05/26/10 052610#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
N-Nitrite	05/26/10 052610#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
Sulfate	05/28/10 052810#1	EPA 300.0	mg/L	0.5	6.5
Chemical Oxygen Demand	06/03/10 060310#1	EPA 410.4	mg/L	5.00	9.34
Total Organic Carbon	05/27/10 052710#1	EPA 415.1	mg/L	1.50	2.71

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 06/08/10

Project: USG Hwy 99
Event: 19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

Client ID: USGHwy99-MW3-05/10
ARI ID: 10-12506 QX91O

Analyte	Date Batch	Method	Units	RL	Sample
Alkalinity	06/01/10 060110#1	SM 2320	mg/L CaCO3	1.0	175
Carbonate	06/01/10	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Bicarbonate	06/01/10	SM 2320	mg/L CaCO3	1.0	175
Hydroxide	06/01/10	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Total Suspended Solids	05/26/10 052610#1	EPA 160.2	mg/L	2.1	24.4
Chloride	05/28/10 052810#1	EPA 300.0	mg/L	0.5	5.2
N-Nitrate	05/26/10 052610#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
N-Nitrite	05/26/10 052610#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
Sulfate	05/28/10 052810#1	EPA 300.0	mg/L	0.5	14.7
Chemical Oxygen Demand	06/03/10 060310#1	EPA 410.4	mg/L	5.00	55.4
Total Organic Carbon	05/27/10 052710#1	EPA 415.1	mg/L	1.50	19.9

RL Analytical reporting limit
U Undetected at reported detection limit

MS/MSD RESULTS-CONVENTIONALS
QX91-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 06/08/10

Project: USG Hwy 99
Event: 19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

Analyte	Method	Date	Units	Sample	Spike	Spike Added	Recovery
ARI ID: QX91C Client ID: USGHwy99-SW5-05/10							
Chloride	EPA 300.0	05/28/10	mg/L	7.8	17.4	10.0	96.0%
N-Nitrate	EPA 300.0	05/28/10	mg-N/L	0.7	2.8	2.0	105.0%
N-Nitrite	EPA 300.0	05/28/10	mg-N/L	< 0.1	1.8	2.0	90.0%
Sulfate	EPA 300.0	05/28/10	mg/L	8.2	17.9	10.0	97.0%
Chemical Oxygen Demand	EPA 410.4	06/03/10	mg/L	11.9	77.3	65.0	100.6%
Total Organic Carbon	EPA 415.1	05/26/10	mg/L	7.38	25.1	20.0	88.6%

REPLICATE RESULTS-CONVENTIONALS
QX91-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 06/08/10

Project: USG Hwy 99
Event: 19921-65021
Date Sampled: 05/25/10
Date Received: 05/25/10

Analyte	Method	Date	Units	Sample	Replicate(s)	RPD/RSD
ARI ID: QX91C Client ID: USGHwy99-SW5-05/10						
Alkalinity	SM 2320	06/01/10	mg/L CaCO3	97.1	97.5	0.4%
Carbonate	SM 2320	06/01/10	mg/L CaCO3	< 1.0	< 1.0	NA
Bicarbonate	SM 2320	06/01/10	mg/L CaCO3	97.1	97.5	0.4%
Hydroxide	SM 2320	06/01/10	mg/L CaCO3	< 1.0	< 1.0	NA
Total Dissolved Solids	EPA 160.1	05/26/10	mg/L	164	162	1.2%
Chloride	EPA 300.0	05/28/10	mg/L	7.8	7.8	0.0%
N-Nitrate	EPA 300.0	05/28/10	mg-N/L	0.7	0.7	0.0%
N-Nitrite	EPA 300.0	05/28/10	mg-N/L	< 0.1	< 0.1	NA
Sulfate	EPA 300.0	05/28/10	mg/L	8.2	7.8	5.0%
Chemical Oxygen Demand	EPA 410.4	06/03/10	mg/L	11.9	11.6	2.6%
Total Organic Carbon	EPA 415.1	05/26/10	mg/L	7.38	6.05	19.8%
ARI ID: QX91O Client ID: USGHwy99-MW3-05/10						
Total Suspended Solids	EPA 160.2	05/26/10	mg/L	24.4	24.6	0.8%

LAB CONTROL RESULTS-CONVENTIONALS
QX91-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 06/08/10

Project: USG Hwy 99
Event: 19921-65021
Date Sampled: NA
Date Received: NA

Analyte/Method	QC ID	Date	Units	LCS	Spike Added	Recovery
Total Dissolved Solids EPA 160.1	ICVL	05/26/10	mg/L	475	500	95.0%
Total Suspended Solids EPA 160.2	ICVL	05/26/10	mg/L	49.7	50.0	99.4%

METHOD BLANK RESULTS-CONVENTIONALS
QX91-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 06/08/10

Project: USG Hwy 99
Event: 19921-65021
Date Sampled: NA
Date Received: NA

Analyte	Method	Date	Units	Blank	ID
Total Dissolved Solids	EPA 160.1	05/26/10	mg/L	< 5.0 U	
Total Suspended Solids	EPA 160.2	05/26/10	mg/L	< 1.0 U	
Chloride	EPA 300.0	05/28/10	mg/L	< 0.1 U	
N-Nitrate	EPA 300.0	05/26/10	mg-N/L	< 0.1 U	
		05/28/10		< 0.1 U	
N-Nitrite	EPA 300.0	05/26/10	mg-N/L	< 0.1 U	
		05/28/10		< 0.1 U	
Sulfate	EPA 300.0	05/28/10	mg/L	< 0.1 U	
Chemical Oxygen Demand	EPA 410.4	06/03/10	mg/L	< 5.00 U	
Total Organic Carbon	EPA 415.1	05/26/10	mg/L	< 1.50 U	
		05/27/10		< 1.50 U	

STANDARD REFERENCE RESULTS-CONVENTIONALS
QX91-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 06/08/10

Project: USG Hwy 99
Event: 19921-65021
Date Sampled: NA
Date Received: NA

Analyte/SRM ID	Method	Date	Units	SRM	True Value	Recovery
Alkalinity ERA #P114506	SM 2320	06/01/10	mg/L CaCO3	33.7	35.0	96.3%
Chloride ERA #230109	EPA 300.0	05/28/10	mg/L	2.8	3.0	93.3%
N-Nitrate ERA #09127	EPA 300.0	05/26/10 05/28/10	mg-N/L	2.8 2.8	3.0 3.0	93.3% 93.3%
N-Nitrite ERA #030309	EPA 300.0	05/26/10 05/28/10	mg-N/L	2.9 2.9	3.0 3.0	96.7% 96.7%
Sulfate ERA #220109	EPA 300.0	05/28/10	mg/L	2.9	3.0	96.7%
Chemical Oxygen Demand Thermo Orion #I01	EPA 410.4	06/03/10	mg/L	85.0	90.0	94.4%
Total Organic Carbon ERA 0506-09-01	EPA 415.1	05/26/10 05/27/10	mg/L	20.6 22.0	20.0 20.0	103.0% 110.0%

APPLIED SPECIATION AND CONSULTING, LLC

18804 Northcreek Parkway Bothell, WA, 98011
Tel: (425) 483-3300 Fax: (425) 483-9818
www.appliedspeciation.com

June 4, 2010

Cheronne Oreiro
Analytical Resources Inc.
4611 S. 134th Place Suite 100
Tukwila, WA 98168
(206) 695-6200

Re: USG Hwy 99

Ms. Oreiro,

Attached is the report associated with twelve (12) aqueous samples submitted for arsenite and arsenate quantitation on May 26, 27, and 28, 2010. Each set of samples was received the same day as the submittal date in sealed coolers at 0.1°C, -0.7°C, and 5.6°C, respectively. Arsenite and arsenate speciation analysis was performed via ion chromatography inductively coupled plasma dynamic reaction cell mass spectrometry (IC-ICP-DRC-MS). Any issues associated with the analyses are addressed in the following report.

If you have any questions, please feel free to contact me at your convenience.

Sincerely,

Ben Wozniak

Ben Wozniak
Project Manager
Applied Speciation and Consulting, LLC

Applied Speciation and Consulting, LLC

Report Prepared for:

Cheronne Oreiro
Analytical Resources Inc.
4611 S. 134th Place Suite 100
Tukwila, WA 98168

Project ID: USG Hwy 99

June 4, 2010

1. Sample Reception

Twelve (12) aqueous samples were submitted for arsenite and arsenate quantitation on May 26, 27, and 28, 2010. Each set of samples was received the same day as the submittal date, as indicated on the attached chain of custody (COC) forms, in sealed coolers at 0.1°C, -0.7°C, and 5.6°C, respectively.

The samples were received in a laminar flow clean hood, void of trace metals contamination and ultra-violet radiation, and assigned discrete sample identifiers. Immediately upon reception an aliquot of each sample was filtered (0.45µm) into a polypropylene centrifuge tube, and all filtrates and original sample bottles were then stored in a secure, monitored refrigerator (maintained at a temperature of 4°C) until the analyses could occur.

2. Sample Preparation

All sample preparation is performed in laminar flow clean hoods known to be free from trace metals contamination. All applied water for dilutions and sample preservatives are also monitored for contamination to account for any biases associated with the sample results.

Arsenic Speciation Analysis by IC-ICP-DRC-MS Immediately upon sample reception, an aliquot of each sample was filtered with a syringe filter (0.45µm) and injected directly into a sealed autosampler vial. No further sample preparation was performed as a buffered EDTA solution was provided by Applied Speciation and Consulting for field-preservation of the submitted samples.

3. Sample Analysis

All sample analysis is preceded by a minimum of a five-point calibration curve spanning the entire concentration range of interest. Calibration curves are performed at the beginning of each analytical day. All calibration curves, associated with each species of interest, are standardized by linear regression resulting in a response factor. All sample results are **instrument blank corrected** to account for any operational biases.

Prior to sample analysis, all calibration curves are verified using second source standards which are identified as initial calibration verification standards (ICV).

Ongoing instrument performance is identified by the analysis of continuing calibration verification standards (CCV) and continuing calibration blanks (CCB) at a minimal interval of every ten analytical runs.

Arsenic Speciation Analysis by IC-ICP-DRC-MS All samples for arsenite and arsenate quantitation were analyzed by ion chromatography inductively coupled plasma dynamic reaction cell mass spectrometry (IC-ICP-DRC-MS) either on June 1, 2010 (designated as Batch 1) or June 2, 2010 (designated as Batch 2). Aliquots of each sample are injected onto an anion exchange column and are mobilized by an alkaline (pH > 7) gradient. The eluting arsenic species are then introduced into a radio frequency (RF) plasma where energy-transfer processes cause desolvation, atomization, and ionization. The ions are extracted from the plasma through a differentially-pumped vacuum interface and travel through a pressurized chamber (DRC) containing a specific reactive gas which preferentially reacts with arsenic, producing an entirely different mass to charge ratio (m/z) which can then be differentiated from the initial isobaric interferences. A solid-state detector detects ions transmitted through the mass analyzer on the basis of their mass-to-charge ratio (m/z), and the resulting current is processed by a data handling system.

Retention times for each eluting species are compared to known standards for species identification.

4. Analytical Issues

The overall analyses went well and no significant analytical issues were encountered. All quality control parameters associated with these samples were within acceptance limits.

It should be noted that an additional arsenic species was detected in most of the submitted samples during the speciation analyses. While the identity of this species cannot be determined with certainty at this time, the concentration of arsenic associated it is estimated to be 0.88µg/L for 10-12491-QX92E, 1.07µg/L for 10-12630-QY17A, 5.99µg/L for 10-12633-QY17D, 25.2µg/L for 10-12636-QY17G, 3.80µg/L for 10-12640-QY17K, 0.72µg/L for 10-12643-QY17N, 3.36µg/L for 10-12646-QY17Q, and 1.03µg/L for 10-12705-QY33E. Traces of two additional species were also detected in the samples identified as 10-12487-QX92A, 10-12488-QX92B, and 10-12489-QX92C; the concentration of the sum of these additional species is estimated to be 0.079µg/L, 0.072µg/L, and 0.074µg/L, respectively, for these three samples. Applied Speciation and Consulting can pursue additional research to identify these species upon client request.

The estimated method detection limit (eMDL) for arsenite is generated from replicate analyses of the lowest standard in the calibration curve. Not all arsenic species are present in preparation blanks; therefore, eMDL calculations based on preparation blanks may be artificially biased low for this species. Due to traces of arsenate in the reagents used for the

speciation analysis, the eMDL for arsenate has been calculated using the standard deviation of the associated preparation blanks.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Ben Wozniak

Ben Wozniak
Project Manager
Applied Speciation and Consulting, LLC

Arsenic Speciation Results for ARI
Project Name: USG Hwy 99
Contact: Cheronne Oreiro

Report Date: June 4, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Sample Results

Sample ID	Date Sampled	Batch	Dilution	As(III)	As(V)
10-12487-QX92A	5/25/10	2	5	0.539	2.36
10-12488-QX92B	5/25/10	2	5	0.444	2.22
10-12489-QX92C	5/25/10	2	5	0.403	2.12
10-12490-QX92D	5/25/10	1	50	45.9	2.27
10-12491-QX92E	5/25/10	1	50	267	19.2
10-12630-QY17A	5/26/10	1	50	351	16.5
10-12633-QY17D	5/26/10	1	1000	1410	36.6
10-12636-QY17G	5/26/10	1	1000	1780	132
10-12640-QY17K	5/26/10	1	1000	1350	29.8
10-12643-QY17N	5/26/10	1	50	455	33.5
10-12646-QY17Q	5/26/10	1	1000	1260	24.9
10-12705-QY33E	5/27/10	1	50	310	37.7

All results reflect the applied dilution and are reported in µg/L
U = Sample concentration is less than the estimated Method Detection Limit (eMDL)
J = Sample concentration is between the eMDL and the Reporting Limit (RL)

Arsenic Speciation Results for ARI
Project Name: USG Hwy 99
Contact: Cheronne Oreiro

Report Date: June 4, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Preparation Blank Summary

Analyte (µg/L)	Batch	PBW1	PBW2	PBW3	PBW4	Mean	StdDev	eMDL* at 1x	RL at 1x
As(III)	1	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.020
As(V)	1	-0.014	-0.017	-0.017	-0.017	-0.016	0.002	0.006	0.020
As(III)	2	0.004	0.002	0.003	0.000	0.002	0.002	0.004	0.020
As(V)	2	0.019	0.012	0.009	0.012	0.013	0.005	0.014	0.020

eMDL = Estimated Method Detection Limit; RL = Reporting Limit
*Please see narrative regarding eMDL calculations

Quality Control Summary - Certified Reference Materials

Analyte (µg/L)	Batch	CRM	True Value	Result	Recovery
As(III)	1	ICV	10.00	10.10	101.0
As(V)	1	ICV	10.00	9.51	95.1
As(III)	2	ICV	10.00	9.53	95.3
As(V)	2	ICV	10.00	9.16	91.6

GX51:00065

Arsenic Speciation Results for ARI
Project Name: USG Hwy 99
Contact: Cheronne Oreiro

Report Date: June 4, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Matrix Duplicates

Analyte (µg/L)	Batch	Sample ID	Rep 1	Rep 2	Mean	RPD
As(III)	1	Batch QC	0.40 J	0.34 J	0.37 J	17.4
As(V)	1	Batch QC	1.07	0.91 J	0.99 J	16.6
As(III)	2	10-12489-QX92C	0.403	0.418	0.410	3.6
As(V)	2	10-12489-QX92C	2.122	2.144	2.133	1.0

NC = Value was not calculated due to one or more concentrations below the eMDL

Quality Control Summary - Matrix Spike/ Matrix Spike Duplicate

Analyte (µg/L)	Batch	Sample ID	Spike Conc	MS Result	Recovery	Spike Conc	MSD Result	Recovery	RPD
As(III)	1	Batch QC	100.0	85.47	85.1	100.0	85.29	84.9	0.2
As(V)	1	Batch QC	100.0	80.65	79.7	100.0	80.36	79.4	0.4
As(III)	2	10-12489-QX92C	10.00	9.236	88.3	10.00	9.238	88.3	0.0
As(V)	2	10-12489-QX92C	10.00	11.03	89.0	10.00	11.09	89.6	0.5

QX91 : 00055

SUBCONTRACTOR ANALYSIS REQUEST
CUSTODY TRANSFER 05/26/10

ANALYTICAL RESOURCES INCORPORATED

ARI Project: QX92

Laboratory: Applied Speciation & Consulting
Lab Contact: Russell Gerads
Lab Address: 18804 Northcreek Parkway
Bothell, WA 98011
Phone: 425-483-3300
Fax: 425-483-9818

ARI Client: CDM
Project ID: USG Hwy 99
ARI PM: Cheronne Oreiro
Phone: 206-695-6214
Fax: 206-695-6201

Analytical Protocol: In-house
Special Instructions:

Requested Turn Around: **06/09/10**
Email Results (Y/N): **email**

Limits of Liability. *Subcontractor is expected to perform all requested services in accordance with appropriate methodology following Standard Operating Procedures that meet standards for the industry. The total liability of ARI, its officers, agents, employees, or sucessors, arising out of or in connection with the requested services, shall not exceed the negotiated amount for said services. The agreement by the Subcontractor to perform services requested by ARI releases ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Subcontractor.*

ARI ID	Client ID/ Add'l ID	Sampled	Matrix	Bottles	Analyses
10-12487-QX92A	USGHwy99-SW5-05/10	05/25/10 11:35	Water	1	Metals (Sub)
Special Instructions: AS speciation (As+3& As+5)					
10-12488-QX92B	USGHwy99-SW4-05/10	05/25/10 12:05	Water	1	Metals (Sub)
Special Instructions: AS speciation (As+3& As+5)					
10-12489-QX92C	USGHwy99-SW1-05/10	05/25/10 13:10	Water	1	Metals (Sub)
Special Instructions: AS speciation (As+3& As+5)					
10-12490-QX92D	USGHwy99-MW2-05/10	05/25/10 14:45	Water	1	Metals (Sub)
Special Instructions: AS speciation (As+3& As+5)					
10-12491-QX92E	USGHwy99-MW3-05/10	05/25/10 16:15	Water	1	Metals (Sub)
Special Instructions: AS speciation (As+3& As+5)					

Carrier		Airbill		Date	
Relinquished by	Company ARI	Date 5/26/10		Time 1040	
Received by	Company ASC	Date 5/26/10		Time 1040	

Temp = 0.1°C

QX91 : 00067

SUBCONTRACTOR ANALYSIS REQUEST
CUSTODY TRANSFER 05/27/10

ANALYTICAL RESOURCES INCORPORATED

ARI Project: QY17

Laboratory: Applied Speciation & Consulting
Lab Contact: Russell Gerads
Lab Address: 18804 Northcreek Parkway
Bothell, WA 98011
Phone: 425-483-3300
Fax: 425-483-9818

ARI Client: CDM
Project ID: USG Highway 99
ARI PM: Cheronne Oreiro
Phone: 206-695-6214
Fax: 206-695-6201

Analytical Protocol: In-house
Special Instructions:

Requested Turn Around: **06/11/10**
Email Results (Y/N): **email**

Limits of Liability. *Subcontractor is expected to perform all requested services in accordance with appropriate methodology following Standard Operating Procedures that meet standards for the industry. The total liability of ARI, its officers, agents, employees, or sucessors, arising out of or in connection with the requested services, shall not exceed the negotiated amount for said services. The agreement by the Subcontractor to perform services requested by ARI releases ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Subcontractor.*

ARI ID	Client ID/ Add'l ID	Sampled	Matrix	Bottles	Analyses
10-12630-QY17A	USGHWY99-MW6-05/10	05/26/10 09:15	Water	1	Metals (Sub)
Special Instructions: As+3 & As+5					
10-12633-QY17D	USGHWY99-MW5-05/10	05/26/10 10:25	Water	1	Metals (Sub)
Special Instructions: As+3 & As+5					
10-12636-QY17G	USGHWY99-99-1-05/10	05/26/10 12:00	Water	1	Metals (Sub)
Special Instructions: As+3 & As+5					
10-12640-QY17K	USGHWY99-MW4-05/10	05/26/10 13:10	Water	1	Metals (Sub)
Special Instructions: As+3 & As+5					
10-12643-QY17N	USGHWY99-MW1-05/10	05/26/10 14:35	Water	1	Metals (Sub)
Special Instructions: As+3 & As+5					
10-12646-QY17Q	USGHWY99-MW0-05/10	05/26/10 15:45	Water	1	Metals (Sub)
Special Instructions: As+3 & As+5					

Carrier	Airbill		Date
Relinquished by [signature]	Company ARI	Date 5/27/10	Time 1050
Received by [signature]	Company ASC	Date 5/27/10	Time 1050

-0.7°C

QX81 : 00066

SUBCONTRACTOR ANALYSIS REQUEST
CUSTODY TRANSFER 05/28/10

ANALYTICAL RESOURCES INCORPORATED

ARI Project: QY33

Laboratory: Applied Speciation & Consulting
Lab Contact: Russell Gerads
Lab Address: 18804 Northcreek Parkway
Bothell, WA 98011
Phone: 425-483-3300
Fax: 425-483-9818

ARI Client: CDM
Project ID: USG Hwy 99
ARI PM: Cheronne Oreiro
Phone: 206-695-6214
Fax: 206-695-6201

Analytical Protocol: In-house
Special Instructions:

Requested Turn Around: **05/30/08**
Email Results (Y/N): **email**

Limits of Liability. *Subcontractor is expected to perform all requested services in accordance with appropriate methodology following Standard Operating Procedures that meet standards for the industry. The total liability of ARI, its officers, agents, employees, or sucessors, arising out of or in connection with the requested services, shall not exceed the negotiated amount for said services. The agreement by the Subcontractor to perform services requested by ARI releases ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Subcontractor.*

ARI ID	Client ID/ Add'l ID	Sampled	Matrix	Bottles	Analyses
10-12705-QY33E	USGHwy99-99-2-05/10	05/27/10 13:10	Water	1	Metals (Sub)

Special Instructions: Speciated As (As+3 & As+5)

Carrier		Airbill	Date
Relinquished by	Company ARI	Date 5/28/10	Time 1120
Received by	Company ASC	Date 5/28/10	Time 1120

Subcontractor Custody Form - **QY33**   5.6°C
Page 1 of 1

QX81 : 00069

Analytical Resources, Incorporated
Analytical Chemists and Consultants

May 11, 2010

Alan Carey
CDM
14432 SE Eastgate Way, Suite 100
Bellevue, WA 98007

RE: Project ID: USG Hwy 99 – 19921-65021
ARI Job No: QV18

Dear Mr. Carey:

Please find enclosed the Chain-of-Custody (COC) record, sample receipt documentation, and the final results for the samples from the project referenced above. Analytical Resources Inc. (ARI) accepted twenty soil samples on May 4, 2010. For details regarding sample receipt, please refer to the enclosed Cooler Receipt Form.

The samples were analyzed for Total Arsenic, as requested on the COC.

The matrix spike percent recovery of Arsenic fell outside the control limits low for sample **C4-10**. The matrix spike result was flagged with an "N" qualifier on the Form V. No further corrective action was required.

The duplicate RPD of Arsenic was outside the control limits high for sample **C4-10**. The duplicate results was flagged with an "*" qualifier on the Form VI. No further corrective action was required.

There were no other anomalies associated with the analysis of these samples.

An electronic copy of this report as well as all supporting raw data will remain on file with ARI. If you have any questions or require additional information, please contact me at your convenience.

Sincerely,
ANALYTICAL RESOURCES, INC.

Cheronne Oreiro
Project Manager
(206) 695-6214
cheronneo@arilabs.com
www.arilabs.com

Enclosures

cc: eFile: QV18

4611 South 134th Place, Suite 100 • Tukwila WA 98168 • **206-695-6200** • **206-695-6201** fax

Chain of Custody Record & Laboratory Analysis Request

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

ARI Assigned Number: QV18	Turn-around Requested: Std
ARI Client Company: CDM	Phone: 425-519-8300
Client Contact: Alan Carey	
Client Project Name: USG Hwy 99	
Client Project #: 19921-65021	Samplers: AAL, KL, MLF

Date: 5/4/10
Page: 1 of 2
No. of Coolers:
Cooler Temps:

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested: As by EPA 6010B								Notes/Comments
C4-10	4/26/2010	1320	Soil	2	X								
B7-10	4/27/2010	1117	Soil	2	X								
B6-14	4/27/2010	959	Soil	2	X								
A8-6	4/28/2010	1147	Soil	2	X								
B7-14	4/27/2010	1130	Soil	2	X								
C9-2	4/29/2010	922	Soil	2	X								
B5-14	4/26/2010	1016	Soil	2	X								
C5-16	4/26/2010	1124	Soil	2	X								
B5-2	4/26/2010	955	Soil	2	X								
B6-2	4/27/2010	930	Soil	2	X								

Please run analysis on soil in small XRF cups.

	Relinquished by	Received by	Relinquished by	Received by
(Signature)	Mary Lou Fox	[signature]		
Printed Name	Mary Lou Fox	Rich Hudson		
Company	CDM	ARI		
Date & Time	5/4/2010 / 0820	5/4/10 1410		

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: Unless specified by workorder or contract, all water/soil samples submitted to ARI will be discarded or returned, no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer. Sediment samples submitted under PSDDA/PSEP/SMS protocol will be stored frozen for up to one year and then discarded.

Chain of Custody Record & Laboratory Analysis Request

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

ARI Assigned Number: QV18	Turn-around Requested: Std	Date: 5/4/10	
ARI Client Company: CDM	Phone: 425-519-8300	Page: 2	of 2
Client Contact: Alan Carey		No. of Coolers:	Cooler Temps:
Client Project Name: USG Hwy 99			
Client Project #: 19921-65021	Samplers: AAL, KL, MLF		

Sample ID	Date	Time	Matrix	No. Containers	As by EPA 6010B								Notes/Comments
B4-16	4/26/2010	1416	Soil	2	X								
B4-14	4/26/2010	1421	Soil	2	X								
D3-8	4/26/2010	1523	Soil	2	X								
B4-10	4/26/2010	1410	Soil	2	X								
D4-4	4/26/2010	1225	Soil	2	X								
B6-16	4/27/2010	949	Soil	2	X								
A7-4	4/27/2010	1204	Soil	2	X								
C3-18	4/27/2010	1523	Soil	2	X								
A7-12	4/27/2010	1228	Soil	2	X								
C7-8	4/27/2010	1417	Soil	2	X								

Please run analysis on soil in small XRF cups.

Relinquished by:	Received by:	Relinquished by:	Received by:
(Signature) Mary Lou Fox	(Signature) [signature]	(Signature)	(Signature)
Printed Name: Mary Lou Fox	Printed Name: Rich Hudson	Printed Name:	Printed Name:
Company: CDM	Company: ARI	Company:	Company:
Date & Time: 5/4/2010 / 0820	Date & Time: 5/4/10 1410	Date & Time:	Date & Time:

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: Unless specified by workorder or contract, all water/soil samples submitted to ARI will be discarded or returned, no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer. Sediment samples submitted under PSDDA/PSEP/SMS protocol will be stored frozen for up to one year and then discarded.

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: CDM

COC No(s): NA

Assigned ARI Job No: QV18

Project Name: USG Hwy99

Delivered by: Fed-Ex UPS Courier Hand Delivered Other:

Tracking No: NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler? YES NO

Were custody papers included with the cooler? .... YES NO

Were custody papers properly filled out (ink, signed, etc.) .... YES NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry)........ 4.6

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: 90941619

Cooler Accepted by: [signature] Date: 5/4/10 Time: 1410

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? .... YES NO

What kind of packing material was used? ... Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other:

Was sufficient ice used (if appropriate)? .... NA YES NO

Were all bottles sealed in individual plastic bags? .... YES NO

Did all bottles arrive in good condition (unbroken)? .... YES NO

Were all bottle labels complete and legible? .... YES NO

Did the number of containers listed on COC match with the number of containers received? .... YES NO

Did all bottle labels and tags agree with custody papers? .... YES NO

Were all bottles used correct for the requested analyses? .... YES NO

Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)... NA YES NO

Were all VOC vials free of air bubbles? .... NA YES NO

Was sufficient amount of sample sent in each bottle? .... YES NO

Date VOC Trip Blank was made at ARI........ NA

Was Sample Split by ARI : NA YES Date/Time: Equipment: Split by:

Samples Logged by: JP Date: 5/4/10 Time: 1515

***** Notify Project Manager of discrepancies or concerns *****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

Some of the plastic wrap on the tiny soil containers tore.
I put the samples w/ torn plastic into individual zip lock bags.
9 of 20 torn + put in new bags.

By: JP Date: 5/4/10

Small Air Bubbles ~2mm	Peabubbles 2-4 mm	LARGE Air Bubbles > 4 mm

Small → "sm"
Peabubbles → "pb"
Large → "lg"
Headspace → "hs"

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: C4-10
SAMPLE

Lab Sample ID: QV18A
LIMS ID: 10-10909
Matrix: Soil
Data Release Authorized:
Reported: 05/11/10

QC Report No: QV18-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 04/26/10
Date Received: 05/04/10

Percent Total Solids: 76.3%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	05/05/10	6010B	05/10/10	7440-38-2	Arsenic	6	228	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: B7-10
SAMPLE

Lab Sample ID: QV18B
LIMS ID: 10-10910
Matrix: Soil
Data Release Authorized:
Reported: 05/11/10

QC Report No: QV18-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 04/27/10
Date Received: 05/04/10

Percent Total Solids: 54.0%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	05/05/10	6010B	05/10/10	**7440-38-2**	**Arsenic**	9	**493**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: B6-14
SAMPLE

Lab Sample ID: QV18C
LIMS ID: 10-10911
Matrix: Soil
Data Release Authorized:
Reported: 05/11/10

QC Report No: QV18-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 04/27/10
Date Received: 05/04/10

Percent Total Solids: 46.9%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	05/05/10	6010B	05/10/10	**7440-38-2**	**Arsenic**	10	**1,920**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: A8-6
SAMPLE

Lab Sample ID: QV18D
LIMS ID: 10-10912
Matrix: Soil
Data Release Authorized:
Reported: 05/11/10

QC Report No: QV18-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 04/28/10
Date Received: 05/04/10

Percent Total Solids: 90.2%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	05/05/10	6010B	05/10/10	**7440-38-2**	**Arsenic**	30	**160**	

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: B7-14
SAMPLE

Lab Sample ID: QV18E
LIMS ID: 10-10913
Matrix: Soil
Data Release Authorized:
Reported: 05/11/10

QC Report No: QV18-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 04/27/10
Date Received: 05/04/10

Percent Total Solids: 76.9%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	05/05/10	6010B	05/10/10	**7440-38-2**	**Arsenic**	6	**20**	

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: C9-2
SAMPLE

Lab Sample ID: QV18F
LIMS ID: 10-10914
Matrix: Soil
Data Release Authorized:
Reported: 05/11/10

QC Report No: QV18-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 04/29/10
Date Received: 05/04/10

Percent Total Solids: 85.6%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	05/05/10	6010B	05/10/10	**7440-38-2**	**Arsenic**	6	57	

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: B5-14
SAMPLE

Lab Sample ID: QV18G
LIMS ID: 10-10915
Matrix: Soil
Data Release Authorized:
Reported: 05/11/10

QC Report No: QV18-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 04/26/10
Date Received: 05/04/10

Percent Total Solids: 69.8%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	05/05/10	6010B	05/10/10	**7440-38-2**	**Arsenic**	20	**7,430**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: C5-16
SAMPLE

Lab Sample ID: QV18H
LIMS ID: 10-10916
Matrix: Soil
Data Release Authorized:
Reported: 05/11/10

QC Report No: QV18-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 04/26/10
Date Received: 05/04/10

Percent Total Solids: 75.5%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	05/05/10	6010B	05/10/10	**7440-38-2**	**Arsenic**	6	**49**	

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: B5-2
SAMPLE

Lab Sample ID: QV18I
LIMS ID: 10-10917
Matrix: Soil
Data Release Authorized:
Reported: 05/11/10

QC Report No: QV18-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 04/26/10
Date Received: 05/04/10

Percent Total Solids: 90.1%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	05/05/10	6010B	05/10/10	**7440-38-2**	**Arsenic**	5	**43**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: B6-2
SAMPLE

Lab Sample ID: QV18J
LIMS ID: 10-10918
Matrix: Soil
Data Release Authorized:
Reported: 05/11/10

QC Report No: QV18-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 04/27/10
Date Received: 05/04/10

Percent Total Solids: 90.2%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	05/05/10	6010B	05/10/10	**7440-38-2**	**Arsenic**	5	**20**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: B4-16
SAMPLE

Lab Sample ID: QV18K
LIMS ID: 10-10919
Matrix: Soil
Data Release Authorized
Reported: 05/11/10

QC Report No: QV18-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 04/26/10
Date Received: 05/04/10

Percent Total Solids: 79.2%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	05/05/10	6010B	05/10/10	**7440-38-2**	**Arsenic**	6	**80**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: B4-14
SAMPLE

Lab Sample ID: QV18L
LIMS ID: 10-10920
Matrix: Soil
Data Release Authorized:
Reported: 05/11/10

QC Report No: QV18-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 04/26/10
Date Received: 05/04/10

Percent Total Solids: 60.8%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	05/05/10	6010B	05/10/10	**7440-38-2**	**Arsenic**	8	**1,680**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: D3-8
SAMPLE

Lab Sample ID: QV18M
LIMS ID: 10-10921
Matrix: Soil
Data Release Authorized:
Reported: 05/11/10

QC Report No: QV18-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 04/26/10
Date Received: 05/04/10

Percent Total Solids: 84.7%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	05/05/10	6010B	05/10/10	**7440-38-2**	**Arsenic**	5	**21**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: B4-10
SAMPLE

Lab Sample ID: QV18N
LIMS ID: 10-10922
Matrix: Soil
Data Release Authorized:
Reported: 05/11/10

QC Report No: QV18-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 04/26/10
Date Received: 05/04/10

Percent Total Solids: 90.0%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	05/05/10	6010B	05/10/10	**7440-38-2**	**Arsenic**	5	12	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: D4-4
SAMPLE

Lab Sample ID: QV18O
LIMS ID: 10-10923
Matrix: Soil
Data Release Authorized:
Reported: 05/11/10

QC Report No: QV18-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 04/26/10
Date Received: 05/04/10

Percent Total Solids: 68.5%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	05/05/10	6010B	05/10/10	**7440-38-2**	**Arsenic**	7	**7**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: B6-16
SAMPLE

Lab Sample ID: QV18P
LIMS ID: 10-10924
Matrix: Soil
Data Release Authorized:
Reported: 05/11/10

QC Report No: QV18-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 04/27/10
Date Received: 05/04/10

Percent Total Solids: 81.2%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	05/05/10	6010B	05/10/10	**7440-38-2**	**Arsenic**	6	**73**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: A7-4
SAMPLE

Lab Sample ID: QV18Q
LIMS ID: 10-10925
Matrix: Soil
Data Release Authorized:
Reported: 05/11/10

QC Report No: QV18-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 04/27/10
Date Received: 05/04/10

Percent Total Solids: 90.2%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	05/05/10	6010B	05/10/10	7440-38-2	Arsenic	5	5	U

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: C3-18
SAMPLE

Lab Sample ID: QV18R
LIMS ID: 10-10926
Matrix: Soil
Data Release Authorized:
Reported: 05/11/10

QC Report No: QV18-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 04/27/10
Date Received: 05/04/10

Percent Total Solids: 74.5%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	05/05/10	6010B	05/10/10	**7440-38-2**	**Arsenic**	7	**45**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: A7-12
SAMPLE

Lab Sample ID: QV18S
LIMS ID: 10-10927
Matrix: Soil
Data Release Authorized:
Reported: 05/11/10

QC Report No: QV18-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 04/27/10
Date Received: 05/04/10

Percent Total Solids: 80.4%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	05/05/10	6010B	05/10/10	**7440-38-2**	**Arsenic**	6	**257**	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: C7-8
SAMPLE

ANALYTICAL RESOURCES INCORPORATED

Lab Sample ID: QV18T
LIMS ID: 10-10928
Matrix: Soil
Data Release Authorized:
Reported: 05/11/10

QC Report No: QV18-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 04/27/10
Date Received: 05/04/10

Percent Total Solids: 83.2%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	05/05/10	6010B	05/10/10	**7440-38-2**	**Arsenic**	30	**170**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: C4-10
MATRIX SPIKE

Lab Sample ID: QV18A
LIMS ID: 10-10909
Matrix: Soil
Data Release Authorized:
Reported: 05/11/10

QC Report No: QV18-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 04/26/10
Date Received: 05/04/10

MATRIX SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Spike	Spike Added	% Recovery	Q
Arsenic	6010B	228	409	247	73.3%	N

Reported in mg/kg-dry

N-Control Limit Not Met
H-% Recovery Not Applicable, Sample Concentration Too High
NA-Not Applicable, Analyte Not Spiked

Percent Recovery Limits: 75-125%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: C4-10
DUPLICATE

Lab Sample ID: QV18A
LIMS ID: 10-10909
Matrix: Soil
Data Release Authorized:
Reported: 05/11/10

QC Report No: QV18-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 04/26/10
Date Received: 05/04/10

MATRIX DUPLICATE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Duplicate	RPD	Control Limit	Q
Arsenic	6010B	228	178	24.6%	+/- 20%	*

Reported in mg/kg-dry

*-Control Limit Not Met
L-RPD Invalid, Limit = Detection Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: LAB CONTROL

Lab Sample ID: QV18LCS
LIMS ID: 10-10910
Matrix: Soil
Data Release Authorized:
Reported: 05/11/10

QC Report No: QV18-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: NA
Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Arsenic	6010B	196	200	98.0%	

Reported in mg/kg-dry

N-Control limit not met
NA-Not Applicable, Analyte Not Spiked
Control Limits: 80-120%

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: METHOD BLANK

Lab Sample ID: QV18MB
LIMS ID: 10-10910
Matrix: Soil
Data Release Authorized:
Reported: 05/11/10

QC Report No: QV18-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: NA
Date Received: NA

Percent Total Solids: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	05/05/10	6010B	05/10/10	7440-38-2	Arsenic	5	5	U

U-Analyte undetected at given RL
RL-Reporting Limit

Analytical Resources, Incorporated
Analytical Chemists and Consultants

May 11, 2010

Alan Carey
CDM
14432 SE Eastgate Way, Suite 100
Bellevue, WA 98007

RE: Project ID: USG Hwy 99 – 19921-65021
ARI Job No: QV17

Dear Mr. Carey:

Please find enclosed the Chain-of-Custody (COC) record, sample receipt documentation, and the final results for the samples from the project referenced above. Analytical Resources Inc. (ARI) accepted five sediment samples on May 4, 2010. For details regarding sample receipt, please refer to the enclosed Cooler Receipt Form.

The samples were analyzed for Total Arsenic, as requested on the COC.

There were no anomalies associated with the analysis of these samples.

An electronic copy of this report as well as all supporting raw data will remain on file with ARI. If you have any questions or require additional information, please contact me at your convenience.

Sincerely,
ANALYTICAL RESOURCES, INC.

Cheronne Oreiro
Project Manager
(206) 695-6214
cheronneo@arilabs.com
www.arilabs.com

Enclosures

cc: eFile: QV17

4611 South 134th Place, Suite 100 • Tukwila WA 98168 • **206-695-6200** • **206-695-6201** fax

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: QV17	Turn-around Requested: Std	Date: 5/4/10	
ARI Client Company: CDM	Phone: 425-519-8300	Page: 1 of 1	
Client Contact: Alan Carey		No. of Coolers:	Cooler Temps:
Client Project Name: USG Hwy 99			
Client Project #: 19921-65021	Samplers: KL, MLF		

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

Sample ID	Date	Time	Matrix	No. Containers	As by EPA 6010B								Notes/Comments
SED1 Center	4/30/2010	925	Sediment	2	X								
SED3 West Bank	4/29/2010	1610	Sediment	2	X								
SED4 West Bank	4/29/2010	1545	Sediment	2	X								
SED6 West Bank	4/29/2010	1450	Sediment	2	X								
SED6 Center	4/29/2010	1440	Sediment	2	X								

	Relinquished by	Received by	Relinquished by	Received by
Please run analysis on soil in small XRF cups.	(Signature) [signature]	(Signature) [signature]	(Signature)	(Signature)
	Printed Name: KEVIN LEE	Printed Name: Rich Hudson	Printed Name:	Printed Name:
	Company: CDM	Company: ARI	Company:	Company:
	Date & Time: 5/4/2010 / 0820	Date & Time: 5/4/10 1410	Date & Time:	Date & Time:

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: Unless specified by workorder or contract, all water/soil samples submitted to ARI will be discarded or returned, no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer. Sediment samples submitted under PSDDA/PSEP/SMS protocol will be stored frozen for up to one year and then discarded.

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: CDM

COC No(s): NA

Assigned ARI Job No: QV17

Project Name: USG #WY99

Delivered by: Fed-Ex UPS Courier Hand Delivered Other:

Tracking No: NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler?	YES	NO
Were custody papers included with the cooler?	YES	NO
Were custody papers properly filled out (ink, signed, etc.)	YES	NO
Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry)	4.6	

If cooler temperature is out of compliance fill out form 00070F — Temp Gun ID#: 90941619

Cooler Accepted by: [signature] Date: 5/4/10 Time: 1410

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? YES NO

What kind of packing material was used? ... Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other:

Was sufficient ice used (if appropriate)?	NA	YES	NO
Were all bottles sealed in individual plastic bags?		YES	NO
Did all bottles arrive in good condition (unbroken)?		YES	NO
Were all bottle labels complete and legible?		YES	NO
Did the number of containers listed on COC match with the number of containers received?		YES	NO
Did all bottle labels and tags agree with custody papers?		YES	NO
Were all bottles used correct for the requested analyses?		YES	NO
Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)...	NA	YES	NO
Were all VOC vials free of air bubbles?	NA	YES	NO
Was sufficient amount of sample sent in each bottle?		YES	NO
Date VOC Trip Blank was made at ARI	NA		

Was Sample Split by ARI : NA YES Date/Time: Equipment: Split by:

Samples Logged by: [signature] Date: 5/4/10 Time: 1513

***** Notify Project Manager of discrepancies or concerns *****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: Date:

Small Air Bubbles ~2mm	Small → "sm"
Peabubbles 2-4 mm	Peabubbles → "pb"
LARGE Air Bubbles > 4 mm	Large → "lg"
	Headspace → "hs"

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: SED1 Center
SAMPLE

Lab Sample ID: QV17A
LIMS ID: 10-10904
Matrix: Sediment
Data Release Authorized:
Reported: 05/11/10

QC Report No: QV17-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 04/30/10
Date Received: 05/04/10

Percent Total Solids: 79.8%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	05/05/10	6010B	05/10/10	**7440-38-2**	**Arsenic**	6	**7**	

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: SED3 West Bank
SAMPLE

Lab Sample ID: QV17B
LIMS ID: 10-10905
Matrix: Sediment
Data Release Authorized:
Reported: 05/11/10

QC Report No: QV17-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 04/29/10
Date Received: 05/04/10

Percent Total Solids: 57.0%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	05/05/10	6010B	05/10/10	**7440-38-2**	**Arsenic**	8	**205**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: SED4 West Bank
SAMPLE

Lab Sample ID: QV17C
LIMS ID: 10-10906
Matrix: Sediment
Data Release Authorized:
Reported: 05/11/10

QC Report No: QV17-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 04/29/10
Date Received: 05/04/10

Percent Total Solids: 40.1%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	05/05/10	6010B	05/10/10	**7440-38-2**	**Arsenic**	10	**90**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: SED6 West Bank
SAMPLE

Lab Sample ID: QV17D
LIMS ID: 10-10907
Matrix: Sediment
Data Release Authorized:
Reported: 05/11/10

QC Report No: QV17-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 04/29/10
Date Received: 05/04/10

Percent Total Solids: 36.3%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	05/05/10	6010B	05/10/10	**7440-38-2**	**Arsenic**	10	**30**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: SED6 Center
SAMPLE

Lab Sample ID: QV17E
LIMS ID: 10-10908
Matrix: Sediment
Data Release Authorized:
Reported: 05/11/10

QC Report No: QV17-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: 04/29/10
Date Received: 05/04/10

Percent Total Solids: 78.6%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	05/05/10	6010B	05/10/10	**7440-38-2**	**Arsenic**	6	**17**	

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: LAB CONTROL

Lab Sample ID: QV17LCS
LIMS ID: 10-10904
Matrix: Sediment
Data Release Authorized:
Reported: 05/11/10

QC Report No: QV17-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: NA
Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Arsenic	6010B	197	200	98.5%	

Reported in mg/kg-dry

N-Control limit not met
NA-Not Applicable, Analyte Not Spiked
Control Limits: 80-120%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: METHOD BLANK

Lab Sample ID: QV17MB
LIMS ID: 10-10904
Matrix: Sediment
Data Release Authorized:
Reported: 05/11/10

Percent Total Solids: NA

QC Report No: QV17-CDM
Project: USG Hwy 99
19921-65021
Date Sampled: NA
Date Received: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	05/05/10	6010B	05/10/10	7440-38-2	Arsenic	5	5	U

U-Analyte undetected at given RL
RL-Reporting Limit

Appendix F
XRF Data Confirmation

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Comparison of XRF Field and Laboratory Results for Total Arsenic in Soil
USG HWY 99 Site April 2010

Soil Samples

Sample ID	XRF As Result (mg/kg)	Lab As Result 6010B (mg/kg)	Relative Percent Difference (RPD)	Percent Moisture	XRF As WW	Lab As DW	Ln XRF As WW	Ln Lab As DW
USG Hwy 99-B5-2-04/10	35	43	21	9.9	35	43	3.555348061	3.761200116
USG HWY99-B5-14-04/10	3140	7,430	81	30.2	3140	7430	8.051978079	8.913281138
USG HWY 99-C5-16-04/10	70*	49	35	24.5	70	49	4.248495242	3.891820298
USG HWY 99-D4-4-04/10	<5	7	NA	31.5	5	7	1.609437912	1.945910149
USG HWY 99-C4-10-04/10	140	228	48	23.7	140	228	4.941642423	5.429345629
USG HWY 99-B4-10-04/10	10	12	18	10.0	10	12	2.302585093	2.48490665
USG HWY 99-B4-16-04/10	84	80	4.9	20.8	84	80	4.430816799	4.382026635
USG HWY 99-B4-14-04/10	604	1,680	94	39.2	604	1680	6.403574198	7.426549072
USG HWY 99-D3-8-04/10	17	21	21	15.3	17	21	2.833213344	3.044522438
USG HWY 99-B6-2-04/10	24	20	18	9.8	24	20	3.17805383	2.995732274
USG HWY 99-B6-16-04/10	65	73	12	18.8	65	73	4.17438727	4.290459441
USG HWY 99-B6-14-04/10	1123	1,920	52	53.1	1123	1920	7.023758955	7.560080465
USG HWY 99-B7-10-04/10	270	493	58	46.0	270	493	5.598421959	6.200509174
USG HWY 99-B7-14-04/10	28	20	33	23.1	28	20	3.33220451	2.995732274
USG HWY 99-A7-4-04/10	<6	<5	NA	9.8	6	5	1.791759469	1.609437912
USG HWY 99-A7-12-04/10	232	257	10	19.6	232	257	5.446737372	5.549076085
USG HWY 99-C7-8-04/10	231	170	30	16.8	231	170	5.442417711	5.135798437
USG HWY 99-C3-18-04/10	64	45	35	25.5	64	45	4.158883083	3.80666249
USG HWY 99-A8-6-04/10	136	160	16	9.8	136	160	4.912654886	5.075173815
USG HWY 99-C9-2-04/10	59	57	3.4	14.4	59	57	4.077537444	4.043051268

* Value is average of eight replicates.

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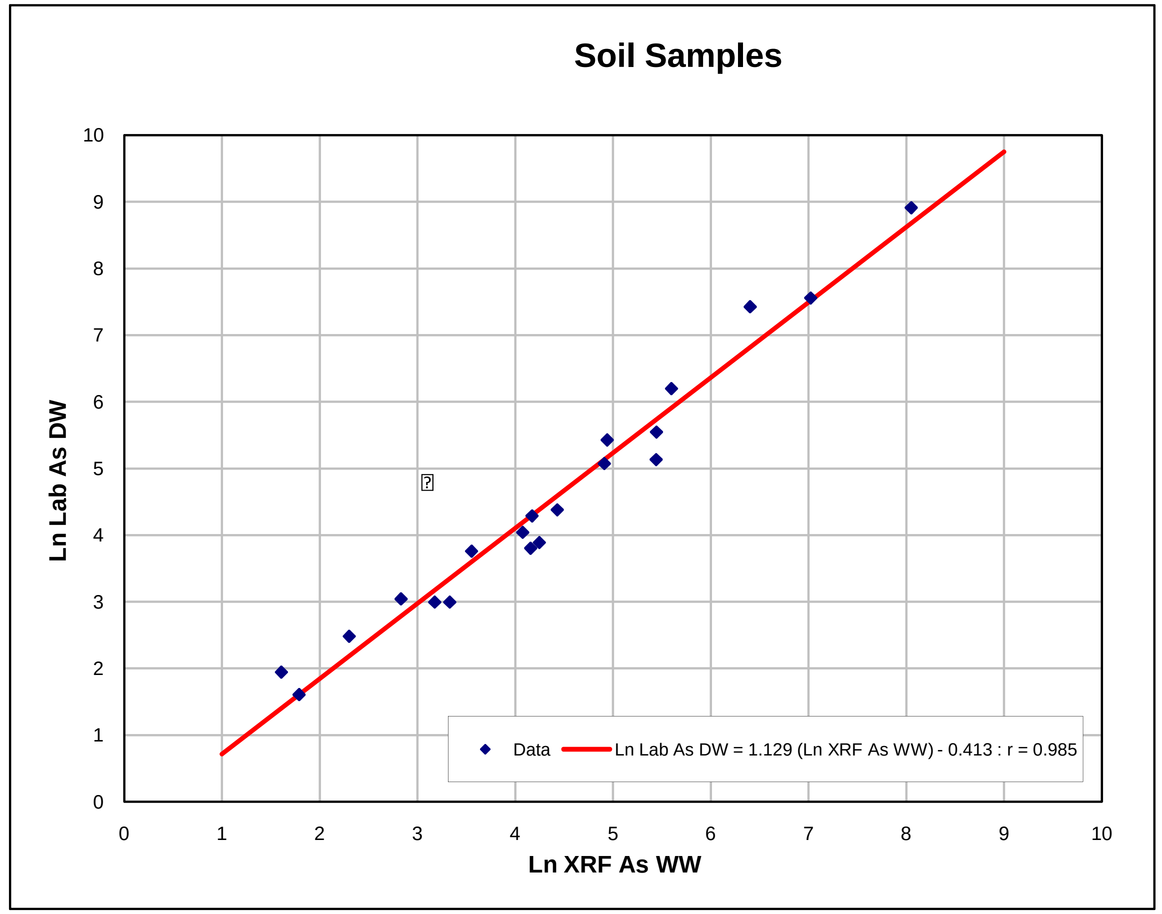
Intercept	-0.41261
Slope	1.128889

Ln Lab As DW = 1.129 (Ln XRF As WW) - 0.413 : r = 0.985

Line x	Line y
1	0.716277
9	9.747392



Two-Group Comparison	Ln XRF As WW	Ln Lab As DW
Parametric: Unequal Variances		
Count	20	20
Mean	4.375695382	4.527063788
Standard Deviation	1.676871718	1.922562137
Delta		0.151368406
df		37.31108068
Student t Statistic		0.26535157
p-value (1-sided)		0.396105756
p-value (2-sided)		0.792211512

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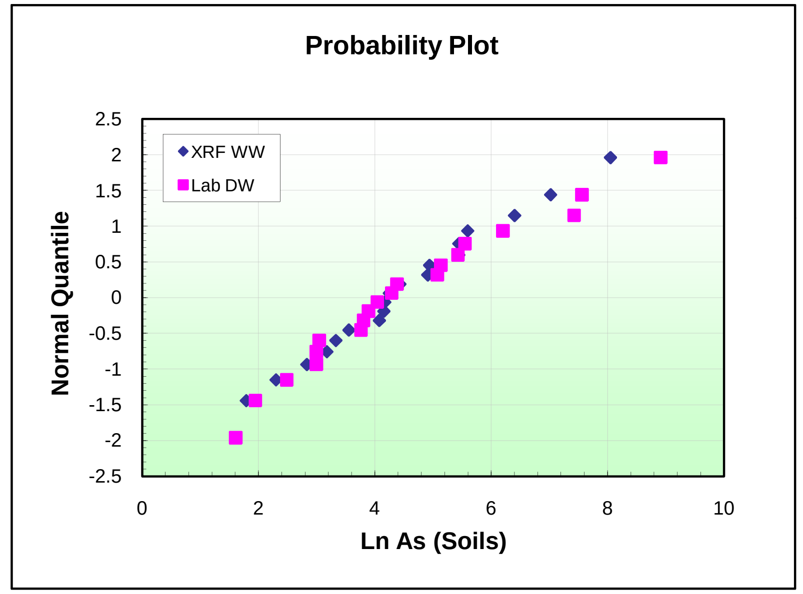
Probability Plot	Normal a = 0.5			
Ln As (Soils)	None			
Normal Quantile	XRF WW		Lab DW	
1	1.609437912	-1.959963985	1.609437912	-1.959963985
2	1.791759469	-1.439531471	1.945910149	-1.439531471
3	2.302585093	-1.15034938	2.48490665	-1.15034938
4	2.833213344	-0.934589291	2.995732274	-0.934589291
5	3.17805383	-0.755415026	2.995732274	-0.755415026
6	3.33220451	-0.597760126	3.044522438	-0.597760126
7	3.555348061	-0.45376219	3.761200116	-0.45376219
8	4.077537444	-0.318639364	3.80666249	-0.318639364
9	4.158883083	-0.189118426	3.891820298	-0.189118426
10	4.17438727	-0.062706778	4.043051268	-0.062706778
11	4.248495242	0.062706778	4.290459441	0.062706778
12	4.430816799	0.189118426	4.382026635	0.189118426
13	4.912654886	0.318639364	5.075173815	0.318639364
14	4.941642423	0.45376219	5.135798437	0.45376219
15	5.442417711	0.597760126	5.429345629	0.597760126
16	5.446737372	0.755415026	5.549076085	0.755415026
17	5.598421959	0.934589291	6.200509174	0.934589291
18	6.403574198	1.15034938	7.426549072	1.15034938
19	7.023758955	1.439531471	7.560080465	1.439531471
20	8.051978079	1.959963985	8.913281138	1.959963985



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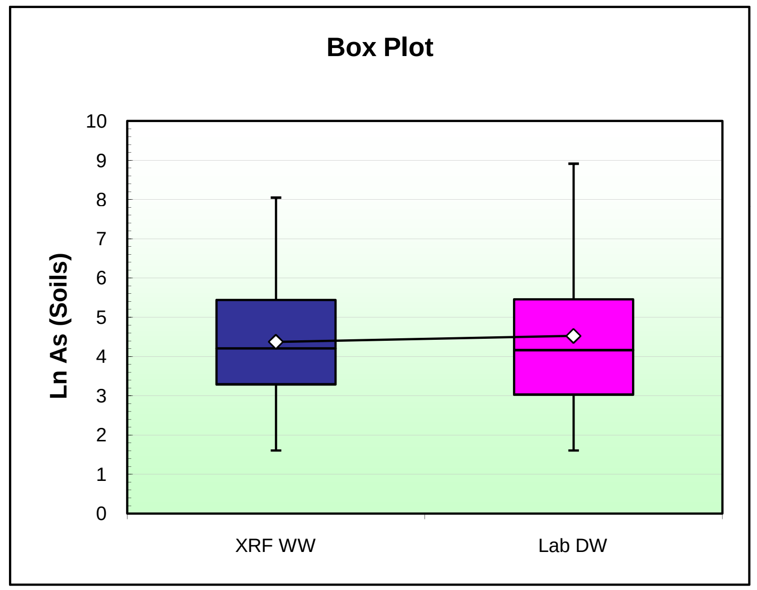
Box Plot	Inner Fences	
Ln As (Soils)	None	None
Group Axis Title	XRF WW	Lab DW
Mean	4.375695382	4.527063788
Q1 = 1st Quartile	3.29366684	3.032324897
Q2 = 2nd Quartile	4.211441256	4.166755354
Q3 = 3rd Quartile	5.443497626	5.459278243
Min (Inner Fences)	1.609437912	1.609437912
Max (Inner Fences)	8.051978079	8.913281138
Q2 - Q1	0.917774416	1.134430458
Q3 - Q2	1.23205637	1.292522888
Q1 - Min	1.684228928	1.422886984
Max - Q3	2.608480453	3.454002895



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Comparison of XRF Field and Laboratory Results for Total Arsenic in Sediment
USG HWY 99 Site April 2010

Sample ID	XRF As Result (mg/kg)	Lab As Result 6010B (mg/kg)	Relative Percent Difference (RPD)	Percent Moisture
USG HWY 99-SED6 CENTER-04/10	11	17	43	21.4
USG HWY 99-SED6 WEST BANK-04/10	6	30	133	63.7
USG HWY 99-SED4 WEST BANK-04/10	33	90	93	59.9
USG HWY 99-SED3 WEST BANK-04/10	146	205	34	43.0
USG HWY 99-SED1-CENTER-04/10	<6	7	NA	20.2

Sediment Samples

XRF As WW	Lab As DW	Ln XRF As WW	Ln Lab As DW
11	17	2.397895273	2.833213344
6	30	1.791759469	3.401197382
33	90	3.496507561	4.49980967
146	205	4.983606622	5.323009979
6	7	1.791759469	1.945910149

Intercept	1.036453
Slope	0.88655

Ln Lab As DW = 0.887 (Ln XRF As WW) + 1.036 : r = 0.903

Line x	Line y
1	1.923004
6	6.355756

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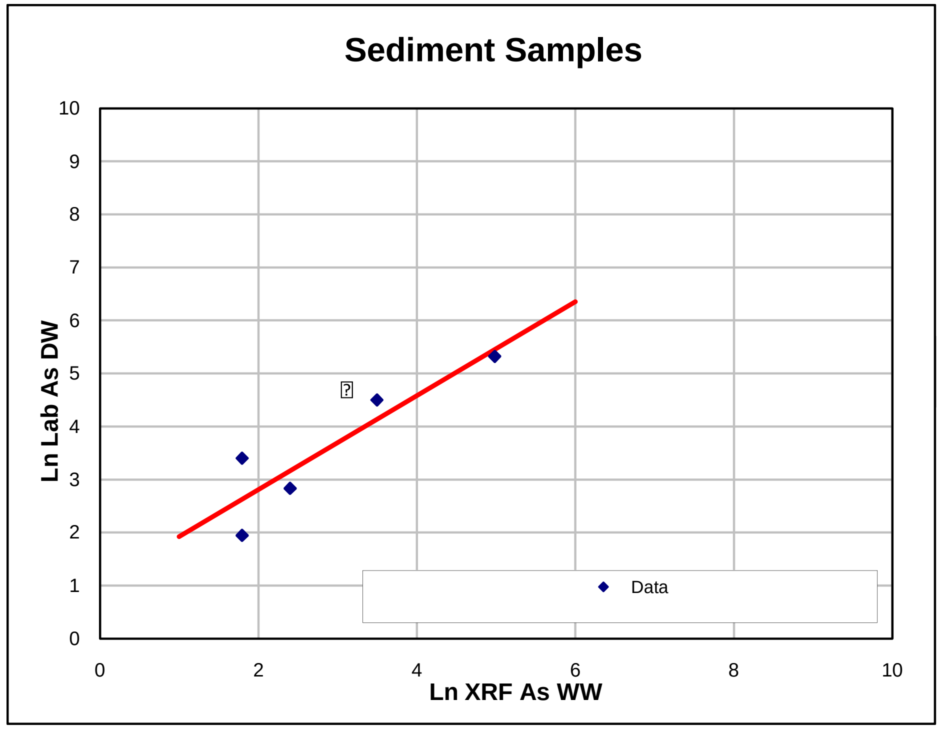

Two-Group Comparison	Ln XRF As WW	Ln Lab As DW
Parametric: Unequal Variances		
Count	5	5
Mean	2.892305679	3.600628105
Standard Deviation	1.360647375	1.336218204
Delta		0.708322426
df		7.997375569
Student t Statistic		0.830527228
p-value (1-sided)		0.21682503
p-value (2-sided)		0.433650059

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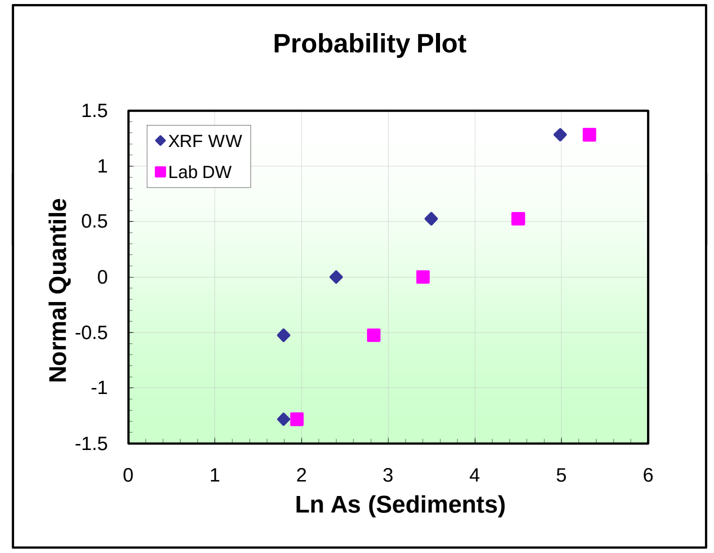
Probability Plot	Normal a = 0.5				
Ln As (Sediments)	None				
Normal Quantile	XRF WW		Lab DW		
1	1.791759469	-1.281551566	1.945910149	-1.281551566	
2	1.791759469	-0.524400513	2.833213344	-0.524400513	
3	2.397895273	-1.39214E-16	3.401197382	-1.39214E-16	
4	3.496507561	0.524400513	4.49980967	0.524400513	
5	4.983606622	1.281551566	5.323009979	1.281551566	



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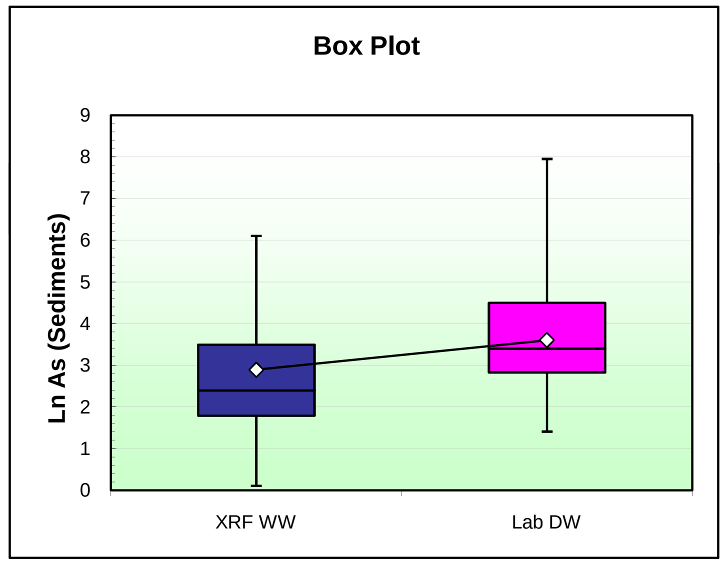
Box Plot	Inner Fences	
Ln As (Sediments)	None	None
Group Axis Title	XRF WW	Lab DW
Mean	2.892305679	3.600628105
Q1 = 1st Quartile	1.791759469	2.833213344
Q2 = 2nd Quartile	2.397895273	3.401197382
Q3 = 3rd Quartile	3.496507561	4.49980967
Min (Inner Fences)	1.791759469	1.945910149
Max (Inner Fences)	4.983606622	5.323009979
Q2 - Q1	0.606135804	0.567984038
Q3 - Q2	1.098612289	1.098612289
Q1 - Min	0	0.887303195
Max - Q3	1.48709906	0.823200309



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