Remedial Investigation Report
USG Interiors Puyallup Site
Puyallup, Washington

June 13, 2011

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CDM Project No. 19921-74559

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Introduction

This report presents the results of a remedial investigation (RI) conducted for USG Interiors (USG) at the property located at 925 River Road in Puyallup. The site location is shown in **Figure 1**.

1.1 Agreed Order

This RI was performed to satisfy the requirements of Agreed Order DE 5489 (Order) between the Washington Department of Ecology (Ecology) and USG. The effective date of the Order is June 17, 2008. Section 7.1 of the Order requires USG to perform an RI to determine the nature and extent of contamination present on the site in accordance with Washington Administrative Code (WAC) 173-340-350 (7).

The RI was performed in accordance with the final RI Work Plan (CDM, 2008) dated October 6, 2008 and approved by Ecology.

1.2 Site Location and Description

The USG Puyallup property (property) consists of 1.58 acres located adjacent to the Puyallup River. The southern (paved) portion of the property was formerly occupied by several buildings, but is currently vacant. The northern portion of the property is unpaved and prone to seasonal overbank flooding of the Puyallup River. A paved bike path runs along the top of the south bank of the Puyallup River.

Figure 2 shows the layout of property and adjacent properties, and the location of investigation points. The Inter-County River Improvement Right-of-Way (ICRI-ROW administered by Pierce County Public Works and Utilities) runs between the property and the Puyallup River.

USG's property is bordered to the east and west by used car dealerships: Market Place Auto and Bonney Lake Used Cars, respectively. River Road borders USG's property to the south. The extent of the exploration points shown on **Figure 2** are referred to as the "site" throughout this report, including portions of Bonney Lake Used Cars, the ICRI-ROW, Market Place Auto in addition to all of USG's property.

1.2.1 Climate

Puyallup's marine type climate consists of cool and comparatively dry summers and mild, wet, and cloudy winters. The warmest months are July and August, when the high temperatures average around 78 degrees Fahrenheit (^{o}F). The coldest month is December, when the high averages around 45 ^{o}F and lows average 34 ^{o}F.

Puyallup gets around 40 inches of rain per year and averages 130 days of measurable precipitation. On average, winter months are wetter than summer months. The wettest month of the year is November, with an average rainfall of 8 inches.

The predominant wind direction is from the west to southwest, with more variable wind directions in the winter and spring.

1.2.2 Surface Water

The Puyallup River extends 54 miles, flowing in a northwest direction from its glacial source on the southwestern slopes of Mt. Rainier and discharging into Commencement Bay adjacent to the city of Tacoma. The river and its tributaries drain an area of about 1,000 square miles in Pierce County and southern King County. The portion of the river adjacent to the site and near the city of Puyallup, approximately 8 miles upstream from Commencement Bay, is characterized by water flows that average 6,926 cubic feet per second (ft^3/s) and range from 597 to 40,700 ft^3/s; the median discharge is just under 3,000 ft^3/s (USGS, 2008). Three dams built in the early to mid-1900s are located upstream of the site, and discharge at the reach of the river adjacent to the site is largely controlled by their operation.

The site falls within the lower Puyallup River valley and the 500-year Lower Puyallup floodplain as determined by the Federal Emergency Management Agency in 2007. Recently, Pierce County commissioned a flood protection investigation of the Lower Puyallup River extending from the mouth of the river to the Meridian Street Bridge in Puyallup and upstream of the site. Levees run the entire length of both banks of the river in this study area (TetraTech, 2008). Despite the flood control levees located along the bank of the Puyallup River, occasional overbank flooding occurs during the winter months.

Sediment conditions of the Lower Puyallup River were characterized as part of a study commissioned by Pierce County (Tetra Tech, 2008). The study determined that a wide range of particle sizes are found in the Puyallup River. Coarser substrates (gravel and cobble) dominate the Puyallup River sediment upstream of its confluence with the White River and finer material (sands, silts, and clays) dominantly occur downstream of this confluence.

In the upper 3 miles of the study area, sediments collected from the river thalweg (the central, deepest part of the channel) are characterized as consisting of both poorly graded fine sand and poorly graded gravel (Tetra Tech, 2008). Most of the estimates of suspended sediment load at the USGS City of Puyallup gauge range from 100 to 1,000 tons/day (Tetra Tech, 2008). The area of the Puyallup River adjacent to the site is expected to have no or minimal sediment deposition (TetraTech, 2008).

1.2.3 Regional Geology

The site is located on the south bank of the lower Puyallup River within the Puyallup valley. Soils in the Puyallup valley consist of alluvium associated with the Puyallup River, underlain by glacial deposits of the Vashon glaciation. The Puyallup River alluvial deposits are consistent with alluvial deposits found worldwide and consist of three major types: overbank flood deposits, slack water deposits, and bar accretion deposits. It is important to note that these depositional processes have been at work since the end of the Vashon glaciation and are currently active.

1.3 Site History

The following description of property and site history is based on CDM's interpretation of historical aerial photographs and information provided to Ecology by USG. Historical aerial photographs (provided in **Appendix A)** were obtained from the Washington Department of Transportation and Aero Metrics.

Exactly when commercial activity began at the property is not documented, but aerial photographs show business-related activities on the property by 1961. What appears to be a used car sales business occupied the southern portion of the property. The northern portion of the site at that time contained junk cars. Site use appears to be consistent throughout the remainder of the 1960s.

A February 1971 aerial photograph clearly shows fill being placed on the northern portion of the site. The source of this fill is unknown. Aerial photographs taken in the early to mid-1970s show that the northern portion of the property continued to be used as a junk car lot following the filling of the property that occurred circa 1971.

Aerial photographs taken in 1979 show a fence around most the northern portion of the property; the area inside the fence was filled with junk cars. This fence arrangement is identical to that shown on an April 1982 topographic map of the property. An aerial photograph dated August 1982 shows the northern portion of the property still being used as a junk car lot, but there are noticeably fewer cars than seen in the 1979 aerial photograph.

Sometime prior to 1971 through the early 1970s, industrial waste from USG's Tacoma, Washington plant was used to fill the site. Because exact dates of these activities are not documented, their association with fill operations observed in the February 1971 aerial photograph cannot be determined.

It is known that from about 1959 to 1973, the USG Tacoma plant used ASARCO slag as a raw material for mineral fiber production. In the early 1980s, USG became aware of the association between ASARCO slag and arsenic contamination. Accordingly, USG purchased the Puyallup property in October 1982 to facilitate its cleanup. That same year, USG voluntarily approached Ecology to negotiate an administrative process to govern the removal of industrial waste fill from the site.

Ecology subsequently issued Order DE 84-506, requiring USG to decontaminate the site and conduct post-cleanup groundwater monitoring. The Order established an arsenic cleanup standard for soil of 5 milligrams per liter (mg/L) by the EP Toxicity (leaching) method.

Although detailed records have not been located, a March 1985 aerial photograph indicates cleanup occurred in the spring of 1985. This photograph shows all of the junk cars had been removed and the unpaved (northern) portion of the site appears to have been graded. According to information submitted by USG to Ecology, 25,536 tons of industrial waste fill and underlying soil were removed from the site for off-site disposal. Of this total, approximately 3,500 tons of native soil was removed from the northwest corner of the property because verification samples did not achieve the cleanup standard. The cleanup standard was not attained in the overexcavation area because caving conditions were encountered during excavation. An August 1985 aerial photograph shows that the site had undergone final grading.

With the exception of environmental monitoring, no activity has occurred on the northern portion of the property since 1985. Used car sales occur intermittently on the southern portion of the property. A fence currently separates the northern and southern portions of 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 fill derived from industrial waste from the USG mineral fiber insulation manufacturing plant in Tacoma. The Tacoma plant used ASARCO slag as a manufacturing feedstock.

USG conducted cleanup in 1985 to excavate and remove the fill from the site. Sampling data associated with that cleanup indicated that residual arsenic remained in soil and groundwater at the site.

1.5 Remedial Investigation Objectives

The RI is being implemented to:

- Characterize the extent of arsenic contamination in soil, groundwater, and sediment.
- Characterize the potential contaminant migration pathway of arsenic in soil and groundwater to the Puyallup River.
- Gather additional environmental data affecting arsenic fate and transport to help select a cleanup action that will meet MTCA requirements.

Section 2
Field Investigation

This section describes the RI field investigation and methods. Field work included site preparation, underground utility location, soil investigation, groundwater investigation, sediment investigation, and site survey. The scope of work for the RI field investigation is described in the RI Work Plan (CDM, 2008) and the RI Work Plan Addendum (CDM, 2010). The work was completed over 16 days in October and November 2009 and over 8 days in August and October 2010.

2.1 Site Preparation

Brush was cleared from the site by CDM's subcontractor—the WAKA Group—on October 9, 2009 to ensure access to boring, groundwater monitoring well, and surface soil sample locations. A Bobcat equipped with heavy brush-cutting equipment was used to clear brush from the investigation area. The planned boring, groundwater monitoring wells, and surface soil sample locations were determined and marked in the field by CDM employees on October 6 and 9, 2009, and on August 11 and October 13, 2010.

Utilities Underground Location Center (UULC) was notified 3 days prior to drilling, as required by state law. The entire site was cleared for possible underground utility conflicts at boring locations.

2.2 Soil Investigation

The soil investigation included collecting surface and subsurface soil samples and analyzing them for total arsenic by field portable x-ray fluorescence (XRF) and laboratory methods. The purpose of this investigation was to delineate the lateral and vertical extent of arsenic in soil. The soil investigation was completed between October 12 and 15, 2009 and between August 17 and October 26, 2010.

2.2.1 Surface Soil Sampling

CDM collected 45 surface soil samples arrayed on a roughly 50-foot offset grid to characterize arsenic concentrations in surface soil. Where applicable, vegetation was cleared at the sample location and soil samples were collected from the ground surface. Alternately, when asphalt was present at the ground surface, soil samples were collected directly from the top of soil cores from drilling. Upon collection, soil samples were placed directly in plastic XRF measurement cups and/or 4-ounce glass jars. Soil was collected either by hand with a new pair of nitrile gloves or with a decontaminated stainless steel spoon. **Figure 2** shows the locations of surface soil samples.

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 potential analysis of arsenic at the off-site analytical laboratory. The samples were labeled and placed in a cooler on ice and transported to the laboratory under chain-of-custody protocol.

2.2.2 Subsurface Sampling

CDM's subcontractor—Environmental Services Northwest (ESN) of Tacoma—advanced 26 soil borings arrayed on a roughly 100-foot offset grid to depths ranging from 16 to 68 feet below ground surface (bgs). The borings were completed using direct push technology (DPT) methods. A CDM geologist supervised the DPT operations, collected samples, and classified the soil. The purpose of the borings was to characterize the geology of the site and lateral and vertical distribution of arsenic in soil. **Figure 2** shows the soil boring locations.

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) and samples were inspected for evidence of vitreous slag material or other contamination. Soil descriptions were recorded on boring logs, which are provided in **Appendix B**. The DPT sampler and rods were decontaminated between each sample drive using a three-bucket Alconox wash and distilled water rinse.

At each boring drilled in 2009, soil samples were collected at approximate 2-foot depth intervals from the ground surface to approximately 16 feet bgs for field XRF analysis of arsenic. In 2010, soil samples were collected at approximate 2-foot intervals from the ground surface to a depth at which XRF results were less than 20 parts-per-million (ppm) total arsenic. The soil was collected from soil cores and placed directly into plastic XRF measurement cups and/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, where collected, was retained for potential analysis at the off-site analytical laboratory. The samples were labeled and placed in a cooler on ice and transported to the laboratory under chain-of-custody protocol.

In 2009, three of the borings—designated A4, C4, and E4—were extended to depths of up to 68 feet bgs to stratigraphic control at the site. Soil samples deeper than 16 feet bgs at these borings were only collected for geologic characterization. During the 2010 field investigation, seven borings that had been drilled in 2009– B5, C3, C4, C6, C8, D3 and E2 –were extended up to 36 feet bgs to characterize deeper arsenic contamination. The borings drilled in 2010 were appended with the letter D (i.e. B5D) to differentiate them from borings drilled in 2009.

Following sampling, the DPT borings were abandoned at each location by backfilling with bentonite.

2.2.3 Field XRF Analysis

Arsenic concentrations in the soil samples were measured in the field using an Innova-X Alpha Series XRF following EPA Method 6200. CDM's Work Plan (CDM, 2008) provides a detailed description of the XRF sample preparation and analysis procedures followed during the RI.

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.

2.3 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 of the monitoring wells. Each of these procedures is described in detail below.

2.3.1 Monitoring Well Installation

Six new groundwater monitoring wells were installed in 2009 and four new wells were installed in 2010 at locations shown on **Figure 2**. All new monitoring wells were screened near the water table except MW4D and MW6D, which were screened in a deeper gravel unit within the aquifer (Unit B). The purpose of the shallow monitoring wells was to evaluate the extent of arsenic dissolved in groundwater and determine groundwater flow direction and hydraulic gradient. The purpose of the deeper monitoring wells (MW4D and MW6D) was to evaluate the vertical extent of arsenic groundwater downgradient of the P3 well cluster at the far northwest corner of the property. The monitoring well screen intervals were determined after interpreting the geologic information gathered from the DPT stratigraphic control borings—A4, C4, and E4.

ESN drilled and installed MW7S using truck-mounted DPT equipment. 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. The DPT sampler and rods were decontaminated between each sample drive using a three-bucket Alconox wash and distilled water rinse.

Another CDM subcontractor—Boart Longyear of Fife, Washington—drilled and installed all other monitoring wells using a Model DB320 track-mounted sonic drill rig equipped with 6-inch outside diameter, 4-1/4-inch inside diameter drilling rods. The sonic drilling method consists of advancing a steel drill pipe into the ground by applying a high-frequency vibration to the top of the drill pipe. Down pressure and rotation are also used to advance the drill pipe. As the drill pipe is advanced, a core of soil enters a 4-inch outside diameter core barrel. After recovery, the sample rod is vibrated to discharge the soil into a tubular plastic bag and the sample recovery is measured. A steam cleaner was used to decontaminate the drill rod between monitoring well locations.

Geologic conditions encountered during drilling were characterized primarily by collecting and logging continuous soil samples in general accordance with the USCS. Soil descriptions were recorded on boring logs, which are included in **Appendix B**. Soil samples were placed directly into plastic XRF measurement cups and/or 4 ounce glass jars for subsequent XRF analysis.

Monitoring well construction details are summarized in **Table 1** and shown graphically on the well construction logs included in **Appendix B**. MW7S was constructed by ESN using 1-inch-diameter, Schedule 40 PVC flush-threaded pipe and a pre-packed well screen. All other monitoring wells were constructed using 2-inch-diameter, Schedule 40 PVC flush-threaded pipe and pre-packed well screens, constructed by Boart Longyear.

The pre-packed well screen installed in MW7S was 10 feet long, with 0.010-inch-diameter milled slots on the inner, 1-inch-diameter PVC pipe and the outer, 2-inch diameter PVC pipe. The pre-packed well screens installed on all other wells were 5 feet long, with 0.010-inch-diameter milled slots on the inner, 2-inch-diameter PVC pipe and the outer, 4-inch-diameter PVC pipe. The annulus between the inner and outer pipes was filled with #10-20 Colorado Silica Sand filter pack. The filter pack also consisted of #10-20 Colorado Silica Sand and was placed in the annular spaced between the pre-packed well screen and the borehole walls. The filter pack was extended approximately 2 feet above the top of the well screen.

A hydraulic seal constructed of hydrated bentonite chips was placed through the drill pipe from the top of the filter pack to within 2 feet of ground surface. The top of the annular space was sealed with concrete. Wells drilled in 2009 were completed in aboveground lockable steel-cased monuments protected by steel bollards, while wells drilled in 2010 were completed in steel, 8 inch diameter flush mount monuments.

The new monitoring wells were developed prior to sampling by a combination of surging with a steel bailer or submersible pump, bailing and steady pumping. Field parameters (conductivity, pH, turbidity, and temperature) were measured at regular intervals during pumping and recorded on a well development log. Once field parameters had stabilized and acceptable turbidity measurements were achieved (generally < 10 nephelometric turbidity units [NTU] for three consecutive readings), the submersible pump was set to shallower depth and the process repeated. Well development was considered complete after the entire monitoring well screen length had been developed by pumping. Well development water was contained in 55-gallon drums.

2.3.2 Groundwater Level Measurements

On November 10, 2009, CDM performed a comprehensive groundwater level monitoring round on all existing monitoring wells and wells installed in 2009. Subsequently, on October 20, 2010, CDM performed another groundwater level monitoring round on all monitoring wells installed in 2010. Depth to groundwater was measured using a SINCO water level meter that was decontaminated between wells. Depth to groundwater measurements are summarized in **Table 2**.

2.3.3 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 the flow-through cell. A YSI Model 556 water quality meter was used to measure temperature, conductivity, pH, dissolved oxygen, oxidation/reduction potential (ORP), and turbidity at the flow-through cell. A Lamotte 2020 turbidity meter was also used to monitor turbidity.

The instruments were calibrated against standards for each field parameter 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 C**. Purging was continued until the 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 listed 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. Sample containers, preservatives, and holding times are described in CDM's Work Plan (CDM, 2008).

2.4 Sediment Investigation

The sediment investigation consisted of two phases:

- **Phase 1** – Refining the conceptual site model (CSM) and a bathymetric survey of the Puyallup River adjacent to the site. The CSM is a geologic cross section showing the site, shallow aquifer, and the Puyallup River.

- **Phase 2** – Collecting soil/sediment samples from the bank of the Puyallup River and analyzing them for arsenic.

Phase 1 included preparing a north-south trending geologic cross section across the site extending to the Puyallup River. The geologic cross section (A-A') is shown in **Figure 3**. The geologic cross section and known groundwater flow direction were used to determine the area of groundwater discharge to the Puyallup River.

A bathymetric survey of the Puyallup River and bank adjacent to the site was conducted to refine the geologic cross section. The Phase 2 sediment samples were collected at locations within the groundwater discharge zone at the same elevations where high concentrations of arsenic were detected in groundwater at the far northwest corner of the property (e.g., monitoring well P3-1).

2.4.1 Bathymetric Survey

The bathymetric survey was completed on November 20 and 23, 2009. The survey was completed by CDM's subcontracted surveyor, WH Pacific. WH Pacific used a TCRA total station to establish the bathymetry and topography of the Puyallup River and adjacent bank. 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 **Figure 2** and the survey plan included in **Appendix D**.

2.4.2 Sediment Sample Collection

Four sediment samples **(**SED1, SED2, SED3, and SED4) were collected on November 12, 2009. Another five sediment samples (SED5, SED6, SED8 and SED9) were collected on August 19, 2010. Sample locations are shown on **Figure 2**. Samples SED1 through SED4 were collected from the river bank or river bottom at a depth of 2.5 feet below the surface of the Puyallup River. This depth was selected to correspond to the upper portion of the groundwater discharge zone, where the highest concentrations of arsenic were detected in groundwater at the P3 and P2 well clusters. Samples SED5 through SED9 were collected from the river bank or river bottom at varying depths. These sample locations were selected to further characterize arsenic concentrations on the bank and into the Puyallup River.

The samples were collected using either a 3-inch outside diameter AMS drive sampler equipped with a slide hammer or a PONAR-type grab sampler. The drive sampler was driven approximately 3 inches into the river bank or river bottom at each location and then retracted. The PONAR-type grab sampler was deployed from a boat and lowered to the river bottom at each location and then withdrawn. Soil was then transferred from the drive or PONAR-type sampler into a 4-ounce pre-cleaned glass jar. The sampler was decontaminated at each new sample location using a three-bucket Alconox and distilled water rinse. The 2009 samples were labeled and placed in a cooler on ice and transported to the laboratory under chain-of-custody protocol for analysis of total arsenic. Samples collected in 2010 were transferred into plastic XRF measurement cups for field analysis.

2.5 Land Survey

The location of each groundwater monitoring well, soil boring, surface soil sample, and sediment sample completed or collected during the RI was surveyed by WH Pacific over 5 days on November 20, November 23, December 7, 2009 and August 19 and November 17, 2010. The existing monitoring wells—RRS, RRN, P1-1, P2-1, P2-2, P2-3, P3-1, P3-2, and P3-3—were also surveyed. A copy of the survey plan is included in **Appendix D**.

The northing and easting of the boring and the ground surface elevation were surveyed at each soil boring or surface sample location. At each sediment sample location collected with the drive sampler, the northing and easting of the rebar sample marker, the elevation of the rebar marker, and the elevation of current Puyallup River water surface were surveyed. At each sediment sample location collected with the PONAR-type sampler, the northing, easting and the elevation of a survey prism held above the water at each sample location was 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 locations of the paved bike path and south river bank topography were also surveyed.

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

2.6 Investigation-Derived Waste

Soil derived from DPT borings and monitoring well installation was placed in six 55-gallon drums. Well development and purge water was placed in nine 55-gallon drums and decontamination water was placed in four 55-gallon drums. IDW was profiled and disposed off-site.

2.7 Deviations from the Sampling and Analysis Plan

This section summarizes deviations from the Work Plan (CDM, 2008) and Work Plan Addendum (CDM, 2010) that occurred during the RI. These deviations, described below, have not affected the objectives of the RI.

- Soil borings F1 and F2 and groundwater monitoring wells MW3 and MW5 were located south of their planned locations due to a berm. CDM could not access the planned locations from the bike path, nor did we have permission to level the intervening berm on the ICRI-ROW with a bulldozer.

- Due to equipment availability, sonic drilling rather than hollow-stem auger drilling methods were used to install the groundwater monitoring wells.

- Pre-packed well screens were used for the groundwater monitoring wells. Traditional slotted well screens and filter packs were proposed in the Work Plan. The pre-packed well screens were used to reduce well development time and costs.

- A surge block and bailer were not used in well development. Instead, the wells were developed with a submersible pump and/or stainless steel bailer using bailing, overpumping and surging methods.

Section 3
Site Geologic and Hydrogeologic Findings

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

3.1 Site Geology

Based on our RI field investigation, the site geology is summarized in geologic cross section A-A′ as shown in **Figure 3**. Soils consist of fill underlain by native alluvial deposits associated with the Puyallup River.

The fill includes backfill material associated with the former remedial excavation and fill associated with early site development, likely prior to commercial use of the site. The fill extends to depths ranging from 2 to 16 feet bgs and soil types include poorly graded sand with silt and gravel (SP-SM), poorly graded sand with gravel (SP), and poorly graded gravel (GP). Traces of man-made debris are present within the fill (paper, wood, plastic, metal, brick, and concrete fragments).

The fill is differentiated from alluvium by the presence of man-made debris and angular to subangular gravel. Minor quantities of recently deposited overbank flood deposits (poorly graded sand and silt) overly fill in the northern portion of the site. This material was deposited during flood events that occurred after the remedial excavation was completed in 1985.

As shown in **Figure 3**, alluvium underlies the site to the total depth explored. The alluvium is subdivided into four units based on depositional environment, including:

- **Unit A** – Overbank and point bar deposits
- **Unit B** – Channel and point bar deposits
- **Unit C** – Slack water deposits
- **Unit D** – Overbank deposits

These units are described below.

Unit A – Overbank and Point Bar Deposits

This unit extends from the ground surface, or bottom of fill, to an approximate depth of 40 feet bgs. Unit A includes interlayered, fine-grained, poorly graded sand (SP) and well graded sand (SW) with minor clay (CL) interbeds up to 6 inches in thickness. The soils were deposited by the Puyallup River and are exposed in the banks and bed of the river.

Unit B – Channel and Point Bar Deposits

This unit consists of gravel (GP, GW, and GW-GM), which represents higher energy deposition in an active river channel. The unit is less than 5 feet thick and underlies Unit B at a depth of approximately 40 feet bgs.

Unit C – Slack Water Deposits

Unit C consists of a sequence of silty sand (SM) containing wood fragments and organic matter. The presence of increased silt and organic matter indicates deposition in a lower energy slack water environment. The unit is approximately 15 feet thick and extends to total depths ranging from 54 to 61 feet bgs.

Unit D – Overbank Deposits

Unit D consists of dense, fine-grained silty sand (SM) and poorly graded sand with silt (SP-SM). The soil contains minor sub-horizontal laminations. The fine-grained sand and higher silt content indicate deposition in a lower energy environment such as overbank deposits distal to an active river channel. Unit D underlies Unit C and the total depth is not known.

3.2 Site Hydrogeology

Based on the results of our field investigation, groundwater occurs under unconfined conditions at the site. The sands and gravels of Units A and B form the primary aquifer at the site and the lower permeability soils of Units C and D may act as a local aquitard, limiting downward vertical flow. During RI drilling, groundwater was first encountered at depths ranging from 10 to 18 feet bgs. Groundwater levels measured at each of the off-site monitoring wells are listed in **Table 2**.

The hydraulic conductivity of the shallow aquifer (Unit A) ranges from 80 to 120 feet/day, based on an estimate using the Hazen (1911) method and the grain size distribution results for a representative soil sample collected from the shallow aquifer. A copy of the calculations is included in **Appendix E** and the grain size distribution results are included in **Appendix F**.

Based on the November 10, 2009 depth to groundwater measurements, a groundwater elevation contour map for the shallow aquifer is shown on **Figure 4**. The groundwater elevation contours were determined using mathematical interpolation between the shallow aquifer monitoring wells and professional judgment. The groundwater elevation contours indicate a groundwater flow direction toward the north. The horizontal hydraulic gradient ranges from 0.006 foot/foot in the south and central part of the site (between monitoring wells RRN and P3-1) shallowing to approximately 0.004 foot/foot in the northern part of the site between well P3-1 and the bank of the Puyallup River.

The vertical hydraulic gradient was calculated at the P2-1 to P2-3, P3-1 to P3-3, MW4S to MW4D and MW6S to MW6D well clusters. The vertical gradients were 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 are summarized in **Table 4**.

The results indicate an upward vertical hydraulic gradient of 0.005 foot/foot between wells MW4S and MW4D and 0.0006 foot/foot between MW6S and MW6D, indicating upward groundwater flow from the deeper portion of the aquifer (Unit B) toward the shallow portion of the aquifer near the discharge point at the Puyallup River. A slight downward vertical gradient in the uppermost portion of the aquifer (Unit A) was calculated at the P2-1 and P3-1 well clusters.

The average linear velocity (seepage velocity) of groundwater flow in the shallow aquifer is estimated to range from 1 to 2 feet/day based on the range of hydraulic conductivities and horizontal hydraulic gradients determined for the site. An effective porosity of 0.32 was assumed for the velocity measurement. A copy of the velocity calculations is included in **Appendix E**.

Section 4
Analytical Results

The following subsections describe the analytical results for soil, groundwater, and sediment samples collected during this investigation.

4.1 Soil Results

4.1.1 Arsenic in Soil

Thirty of the soil samples collected during the RI soil investigation were selected for laboratory analysis of total arsenic to confirm field 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 F**.

The samples submitted for laboratory analysis were selected to represent the complete range of arsenic values measured in the field by XRF. The comparability of field XRF to laboratory analyzed results evaluated following EPA guidance for field-portable XRF analysis of soil and sediment samples (EPA, 1998). Results of the evaluation are provided in **Appendix G**. The results 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 $\log_{10}$ plot of laboratory results (y-axis) versus XRF results (x-axis), yielding the following equation:

$$\mathrm{Log}_{10}\,(\text{Laboratory Result}) = 0.925*(\text{XRF Result}) + 0.165$$

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 5**.

Isocontour maps were prepared to show the extent of arsenic in soil at the site. The maps were generated using computer software and krieging methods. **Figure 5** shows an isocontour map of arsenic at the ground surface. **Figure 6** through **23** provide isocontours for arsenic in soil at elevations 32 to 30, 30 to 28, 28 to 26, 26 to 24, 24 to 22, 22 to 20, 20 to 18, 18 to 16 feet, 16 to 14 feet, 14 to 12 feet, 12 to 10 feet, 10 to 8 feet, 8 to 6 feet, 6 to 4 feet, 4 to 2 feet, 2 to 0 feet, 0 to -2 feet, and -2 to -4 feet, respectively.

How arsenic concentrations change with depth offers insight into the extent of USG's 1985 remedial action. As described in the RI Work Plan (CDM, 2008), USG removed all of the industrial waste fill and approximately 3,500 tons of underlying soil. The native soil was excavated because verification samples collected after removal of the fill did not achieve the cleanup standard. Soil overexcavation was reportedly concentrated in the northwest portion of USG's property, in the vicinity of the P3 well cluster.

Arsenic data shown in the isocontour plots show the effects of the historical remedial action. Arsenic concentrations are generally low—typically <20 milligrams per kilogram (mg/kg)—across the site at ground surface and in vicinity of the P3 well cluster at the 32 to 30 and 30 to 28 foot elevation intervals (**Figures 5, 6** and **7**). This likely represents low arsenic concentrations in fill imported and placed over a broad area after the remedial action, and recent (post-1985) deposition from overbank flooding. Between elevations 28 to 26 (**Figure 8**), arsenic concentrations are lower in the vicinity of the P3 well cluster than they are to the southwest. A similar picture emerges between elevations 26 to 24 (**Figure 9**), where arsenic concentrations are higher to the west and southwest than they are at the P3 well cluster.

Arsenic isocontours change dramatically in the 24 to 22 foot and 22 to 20 foot elevation intervals (**Figure 10** and **11**), where the highest arsenic concentrations are near the P3 well cluster. These data indicate that soil overexcavation in 1985 was focused on the northwest corner of property and that overexcavation reached approximately 8 to 10 feet below the current grade at its deepest.

Also note that the arsenic concentrations shown in **Figure 12** (elevations 20 to 18 feet), through **Figure 23** (elevations -2 to -4 feet) are from saturated soil samples collected below the water table. The shift of arsenic soil concentrations to the north of the P3 well cluster shown in **Figure 12** likely represents transport by groundwater. Also note that the soil sample with the highest arsenic concentration (D3 at 12′ bgs) is below the water table.

The two phases of RI field work fully characterized the vertical and lateral extent of contamination with two minor exceptions:

> <u>AA-0</u>: Several exceedences of MTCA Method A arsenic cleanup level. CDM was unable to drill a boring to the west of AA-0 because the City of Puyallup would not allow access.
>
> <u>F1 and A2</u>: These borings were drilled to a depth of 16 feet bgs during the first phase of the investigation. Arsenic concentrations in the bottom sample exceed MTCA Method A cleanup level. Deep borings were not drilled at these locations during the second phase of investigation due to an oversight.

4.1.2 Grain Size Distribution Analysis

To confirm the soil classifications assigned by the field geologist, selected soil samples were submitted for grain size distribution analysis in CDM's geotechnical laboratory in Bellevue, Washington. Four samples were selected for analysis from the representative soil types encountered in boring A-4. Results of the grain size distribution analysis are included in **Appendix F** and incorporated into the soil description for the A-4 boring log, included in **Appendix B**.

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 analytical results for groundwater are provided in **Table 6**.

An isoconcentration maps of dissolved total arsenic, arsenic (+3), arsenic (+5), dissolved iron, total organic carbon, and ORP in groundwater are shown in **Figures 24** though **29**. Arsenic fate and transport is analyzed in **Section 6**.

4.3 Sediment Results

Four of the samples collected from the south bank of the Puyallup River were analyzed for total arsenic by ARI. The other five samples collected from the river were analyzed for total arsenic by XRF. The results are shown on **Figure 30** and summarized in **Table 5**. Complete analytical reports are included in **Appendix F**.

Section 5
Evaluation of Quality Control Data

5.1 Quality Assurance/Quality Control (QA/QC) Procedures

The following subsections discuss CDM's evaluation of RI quality control data.

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 consisted of 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 made in accordance with EPA Method 6200.

The XRF was shipped with two NIST standards reference materials (including 2704, Buffalo River Sediment and 2709, San Joaquin Soil; and 2710 and 2711, Montana Soil) containing certified amounts of metals in soil or sediment. 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 the 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 percent. One sample per day was analyzed as a precision sample, and all results were within the 20 percent relative standard deviation criteria.

One duplicate groundwater sample was collected during the RI investigation. The duplicate sample was collected at groundwater monitoring well MW3 and analyzed for all analytes. Results for the analysis indicated the relative percent difference (RPD) between the field sample (USGPuy-MW3-11/09) and duplicate sample (USGPuy-MW0-11/09) was less than 20 percent.

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 limit of detection. These samples were analyzed once per every 20 samples, according to EPA Method 6200, to monitor for cross-contamination and laboratory-induced contaminants or interferences.

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 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 elements:

- 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 through Washington State’s Environmental Laboratory Accreditation Program (ELAP). The following subsections summarize laboratory QA/QC data evaluation protocol associated with soil and groundwater sample analyses.

5.3.1 Sample Holding Times

The sample holding times for soil and groundwater analysis are documented in the Work Plan (CDM, 2008). These holding times were met for all soil and groundwater analyses.

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 defined according to matrix type. No concentrations of target analytes at concentrations greater than their respective reporting limits were reported in any of the soil or aqueous method blanks.

5.3.3 Matrix Spike/Matrix Spike Duplicates

Sample matrix spikes are prepared by adding a known amount of the pure analyte to the sample before extraction. Matrix spike duplicate 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 have an effect on the sample analyte.

Percent recoveries for MS and MSD were reported on a QC summary sheet, included as part of the analytical report. The laboratory, in accordance with the method requirements, established control limits for MS and MSD samples. Also included with the QC summary sheets were calculated RPDs between the MS and MSD samples and the required RPD control

Based on a review of the QC summary sheets, MS and MSD 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 and iron results for the matrix duplicate were flagged with an ‘L’ for samples USGPuy-3-1-11/09 and USGPuy-P-2-11/09. The ‘L’ flag indicates that the RPD is invalid because the result was less than the detection limit.

- The arsenic and iron results for the matrix spike were flagged with an ‘H’ for samples USGPuy-MW2-11/09 and USGPuy-P2-2-11/09. The ‘H’ flag indicates that the percent recovery of the spike is not applicable because the concentration in the sample, relative to the spike amount, is too high.

- The matrix duplicate sample for arsenic in sediment sample USGPuy-SED3-2.5-11/09 exceeded the RPD control limit of ±20 percent. The RPD was 56.4 percent.

5.3.4 Laboratory Control Samples

Laboratory control samples, also referred to as blank spikes, are prepared by spiking a known amount of a 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. Laboratory control samples were analyzed with all soil gas samples.

The corresponding LCS recoveries were within acceptable control limits and demonstrate acceptable accuracy. Based on a review of QC data for the soil gas samples, no data warranted qualification and thus they 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 procedures. All aqueous and soil gas samples analyzed for organic compounds were spiked with surrogates just prior to sample extraction. All surrogate recoveries were within acceptable control limits.

5.4 Overall Data Usability

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

Section 6
Site Conceptual Model

This section discusses the site conceptual model for arsenic at the Puyallup site. Text and tables for this analysis are linked closely with the text and (with one exception) are embedded in the text to enhance readability. The exception is **Figure 31** which is included in the Figures tab. **Figure 31** shows arsenic concentrations for soil, groundwater, and sediment plotted on a cross section line that goes through the contaminant source area along the direction of groundwater flow.

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 in **Figure 6-1**.

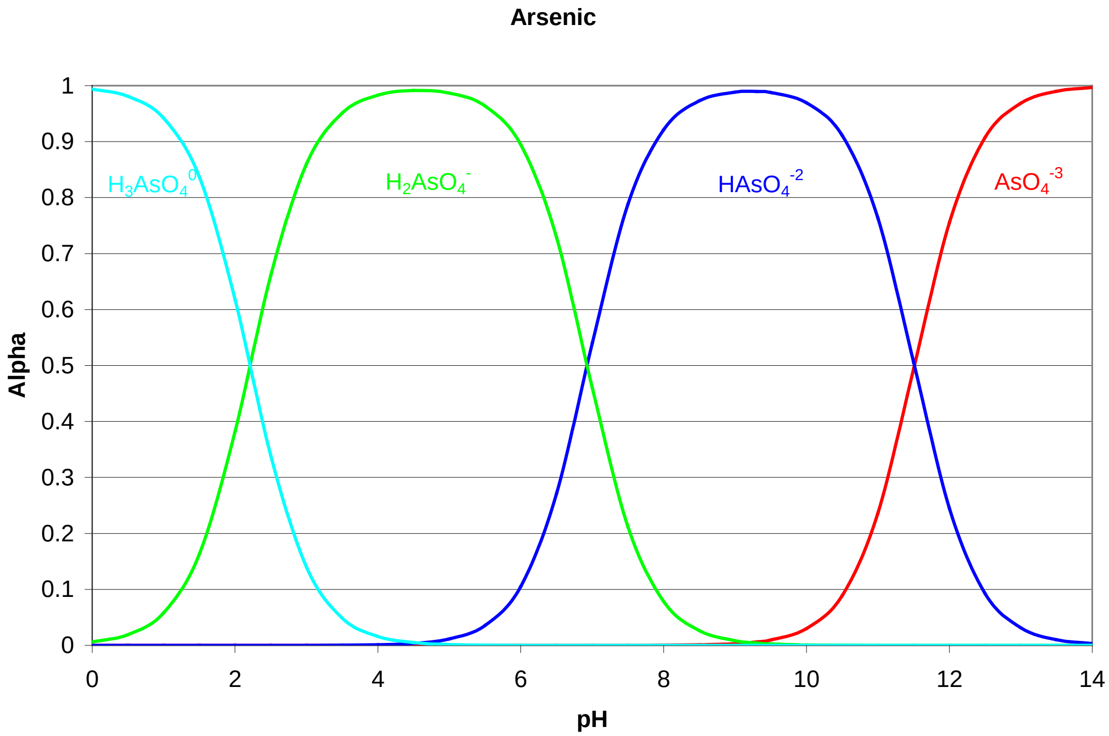

Figure 6-1 Arsenate speciation as a function of pH (alpha is the fraction of the total dissolved arsenate consisting of the given species)

The aqueous arsenate and arsenite species distribution with Eh and pH are shown in **Figure 6-2**.

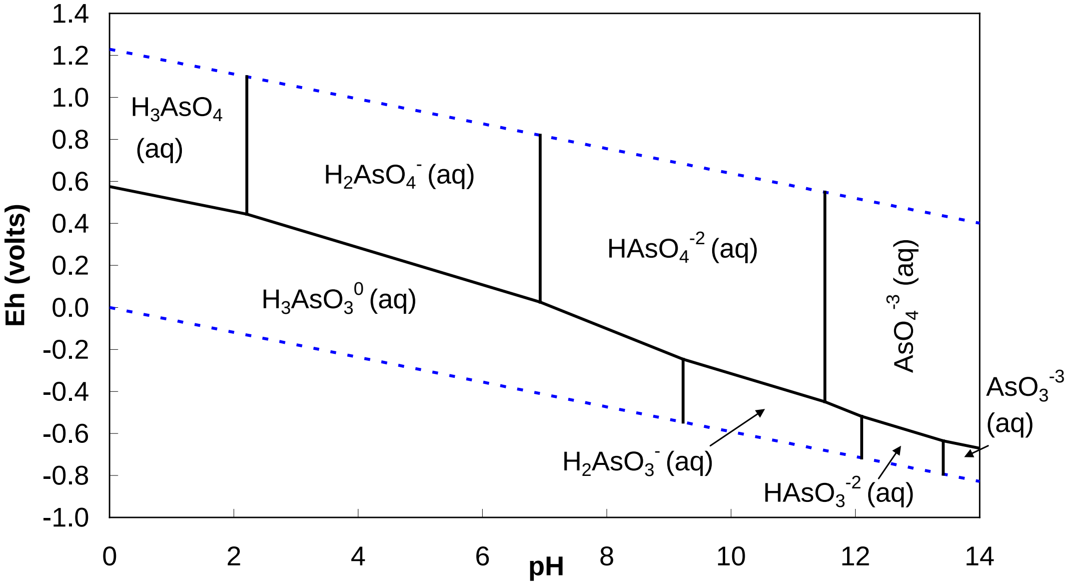

Figure 6-2 Eh-pH diagram for the system As-O-H at 25° C and 1 atm

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 6-1**.

Table 6-1 pH of the Zero-Point-of-Charge (pHZPC) for Various Minerals[a]

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 for materials with a lower pH_{ZPC}. Of the materials listed in **Table 6-1**, 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:

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

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 in **Figure 6-3**.

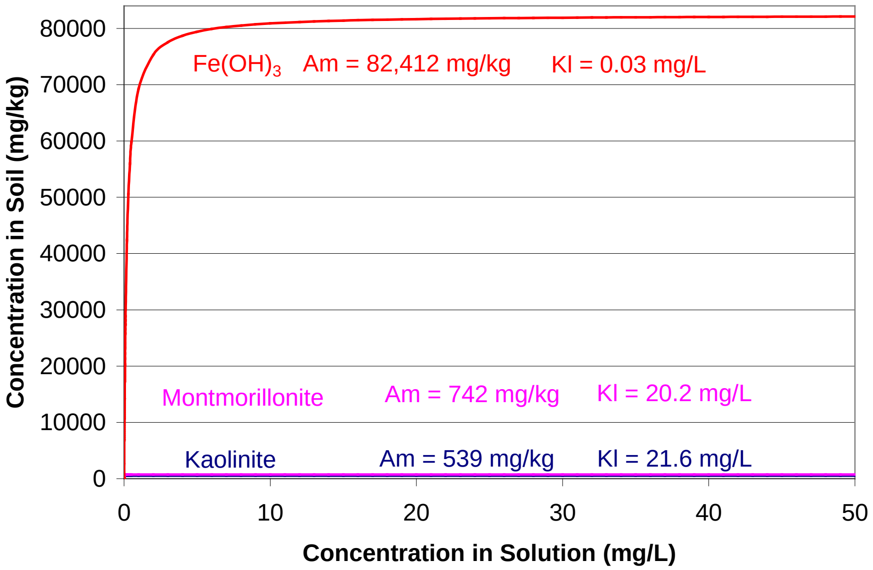

Figure 6-3 Langmuir Isotherms illustrating arsenate adsorption capacities of $Fe(OH)_3$(s), kaolinite, and montmorillonite at a pH of 5 su. Langmuir adsorption constants (Kl and Am) are from Pierce and Moore (1982) for $Fe(OH)_3$(s) and Frost and Griffin (1977) for kaolinite and montmorillonite

As illustrated in **Figure 6-3,** 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 6-3 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 6-2**.

Table 6-2 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 6-1**), 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 6-2**), 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 become 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 6-4).**

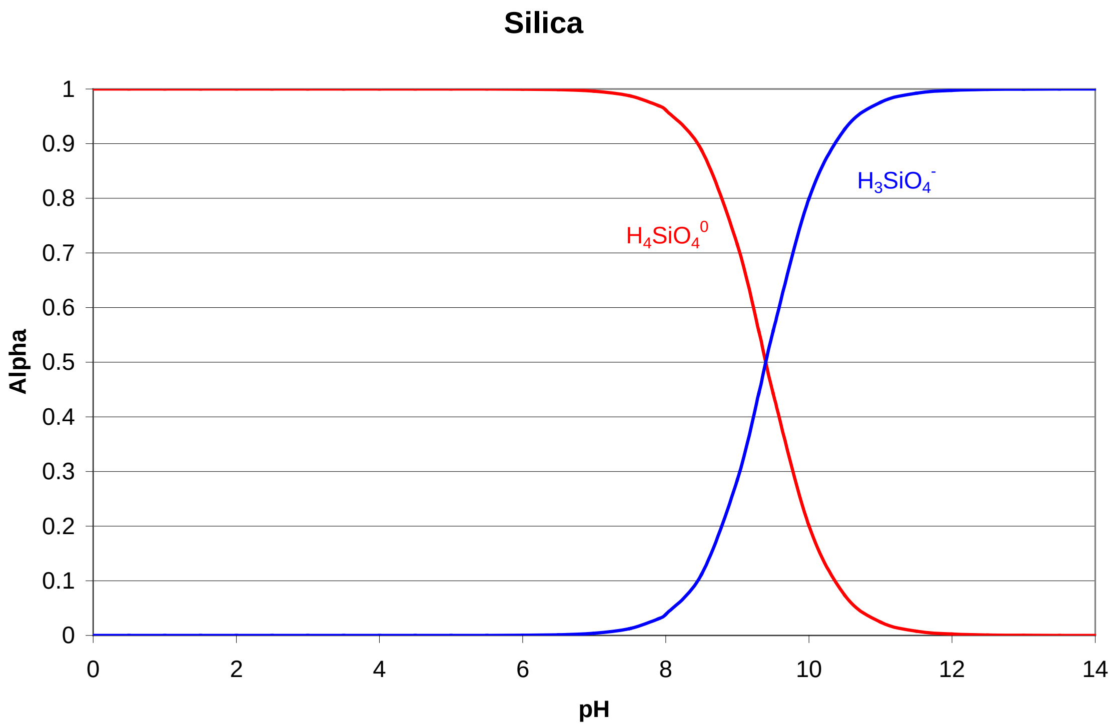

Figure 6-4 Silica speciation as a function of pH (alpha is the fraction of the total dissolved silica consisting of the given species)

6.2 Arsenic Fate and Transport at the Puyallup Site

6.2.1 Arsenic Speciation

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

6.2.1.1 Measured Values

During the November 2009 sampling round, arsenic (III) and total arsenic were measured by the analytical laboratory, while arsenic (V) was obtained by difference. **Table 6-3** compares the results of the arsenic speciation analyses with the Eh and pH data.

Table 6-3 Summary of Measured As(III) and As(V) Concentrations

Well	As(III) (µg/L)	As(V) (µg/L)	%As (III)	pH	ORP (mv)	Temp	Eh (v)
P1-1	-	-	-	6.3	-60.8	13.22	0.150
P2-1	1040	122	89.5%	6.33	-93.2	12.9	0.118
P2-2	1.8	0.63	74.1%	6.64	-108.6	12.3	0.103
P2-3	-	-	-	6.41	-120.9	12.26	0.091
P3-1	1.2	4640	0.03%	5.98	31	13.38	0.242
P3-2	0.12	296	0.04%	5.87	47.1	13.09	0.258
P3-3	0.798	0.431	64.9%	5.85	-25.4	12.84	0.186
MW-1	40	3.71	91.5%	5.62	65.1	12.8	0.276
MW-2	93.5	1310	6.7%	6.08	36.4	12.61	0.248
MW-3	357	296	54.7%	5.21	15	13.23	0.226
MW-4S	291	267	52.2%	5.09	-10.4	12.5	0.201
MW-4D	149	7.87	95.0%	6.59	-168.5	12.33	0.043
MW-5	464	47.5	90.7%	6.01	-131.4	12.59	0.080
MW-6S	388	219	63.9%	7.17	-102.3	13.20	0.109
MW-6D	9.78	1.77	84.7	7.56	-156.7	12.53	0.055
MW-7	<0.96	<0.95	50.3%	7.26	-110.8	13.35	0.100
MW-8	51	6.00	89.5%	7.24	-172	12.64	0.039
RRN	-	-	-	5.73	123	13.72	0.333
RRS	-	-	-	6.06	91.6	12.96	0.303

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 wells P3-1 and P3-2, most of the arsenic is in the reduced arsenite form.

6.2.1.2 Predictions from Eh and pH

The Eh and pH data presented in **Table 6-3** were plotted on an Eh-pH diagram for arsenic (see **Figure 6-5**). These results are inconsistent with the measured arsenic speciation in that the majority of the arsenic is in the more oxidized arsenate form ($H_2AsO_4^{-1}$). Wells MW-4S, MW-4D, and MW-5 are within the arsenite ($H_3AsO_3^0$) field, indicating that for these wells As (III) is the stable form of arsenic (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 indicate that the system is not in redox equilibrium with respect to arsenic.

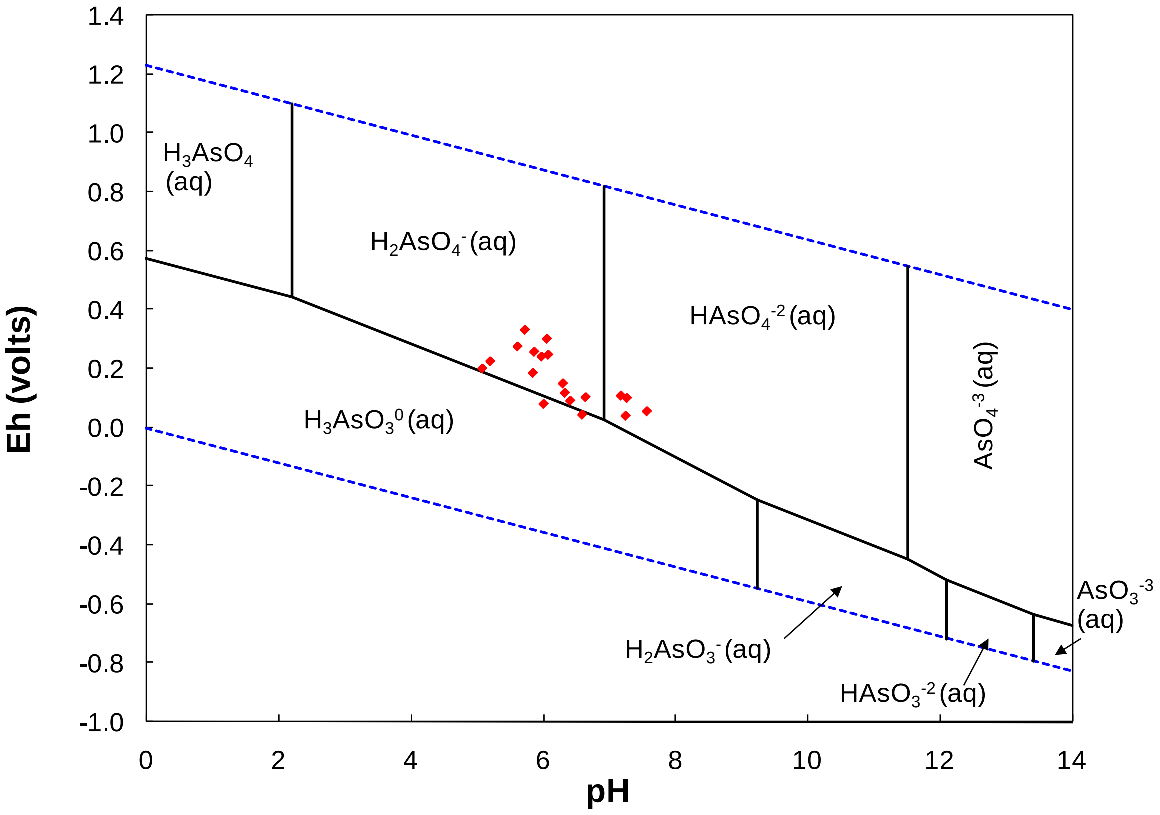

Figure 6-5 Arsenic Eh-pH diagram showing the site data (red diamonds)

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 6-6**). The fact that all of the points plot along the ferrous iron (Fe^{+2})/ amorphous $Fe(OH)_3$ boundary suggests that iron oxyhydroxide is forming within the aquifer.

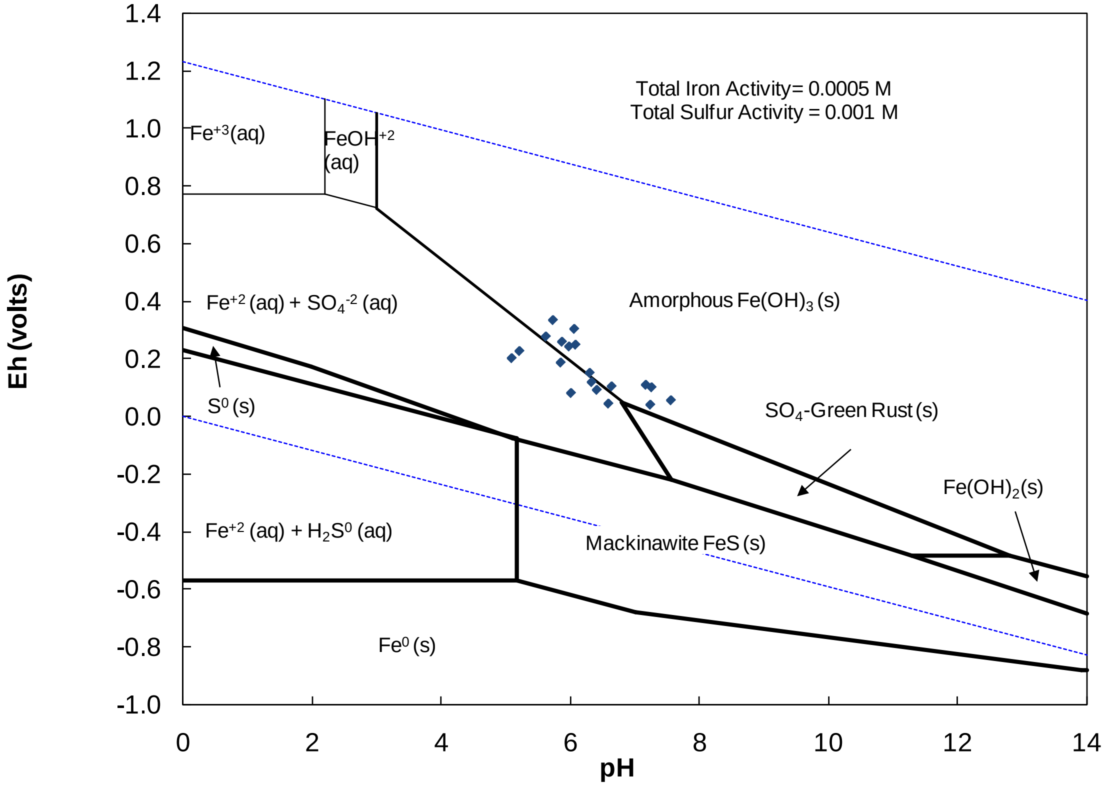

Figure 6-6 Iron/Sulfur Eh-pH diagram showing the site data (blue diamonds). Total iron = 28 mg/L

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.

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 6-4**.

Table 6-4 Results of PHREEQC Geochemical Modeling

	Saturation Index			
Well	**Lepidicrosite ($FeOOH$)**	**Amorphous $Fe(OH)_3$**	**Hydroxy-Green Rust ($Fe_2(OH)_5$)**	**Hydroxy-Green Rust ($Fe_3(OH)_7$)**
P1-1	0.99	-0.52	3.45	10.41
P2-1	0.71	-0.80	3.41	10.61
P2-2	0.98	-0.55	3.88	11.28
P2-3	-0.13	-1.65	2.11	8.83
P3-1	-1.40	-2.90	-2.55	0.79
P3-2	-1.26	-2.76	-2.43	0.88
P3-3	-0.39	-1.90	0.55	5.97
MW-1	-0.20	-1.71	-0.37	3.94
MW-2	0.07	-1.45	0.18	4.79
MW-3	-2.53	-4.03	-3.77	-0.53
MW-4S	-3.40	-4.92	-4.98	-2.06
MW-4D	-1.22	-2.75	0.54	6.8
MW-5	-0.95	-2.47	1.04	7.53
MW-6S	2.65	1.14	6.62	15.07
MW-6D	3.05	1.53	7.93	17.29
MW-7	2.47	0.97	6.30	14.62
MW-8	2.05	0.54	6.51	15.45
RRN	-0.39	-1.88	-1.84	1.21
RRS	0.05	-1.46	-0.75	2.93

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

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 lepidicrosite and/or a mixed ferrous/ferric hydroxide mineral called “green rust”. The green rusts form a continuum from pure ferrous hydroxide at one end to pure ferric hydroxide at the other. In the model, only a few of the infinite variety of green rust compositions were modeled. In cases where one composition is predicted to be oversaturated and another undersaturated, the system may in fact be at saturation with respect to an intermediate composition (i.e. wells P3-1, P3-2, RRN, and RRS).

6.3.2 Adsorption

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

Green rust has been shown to be an important sink for arsenic within zero-valent-iron treatment walls (Su and Puls, 2004) and within iron rich reservoir sediments (Root et al., 2007). Su and Puls (2004) also showed that arsenic (III) was oxidized to arsenic (V) on the surface of the green rust. The authors also suggested that arsenic (V) was adsorbed onto the surfaces of the green rust preferentially to arsenic (III).

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

6.3.3 Total Organic Carbon, Dissolved Oxygen, and Redox Potential

The Total Organic Carbon (TOC) and other data for comparison are presented in **Table 6-5**.

Table 6-5 Comparison of Groundwater TOC, DO, Iron, Arsenic, and Eh Data

Well	TOC [1] (mg/L)	Eh (v)	Total Dissolved Arsenic (mg/L)	Dissolved Oxygen (mg/L)	Total Dissolved Iron (mg/L)
P1-1	4.35	0.150	0.002	0.47	17.0
P2-1	8.07	0.118	0.900	1.55	26.2
P2-2	5.48	0.103	<0.002	1.32	9.54
P2-3	5.46	0.091	<0.002	0.52	5.86
P3-1	7.17	0.242	6.100	0.35	<0.05
P3-2	2.41	0.258	0.420	0.50	<0.05
P3-3	3.00	0.186	0.002	0.47	3.50
MW-1	2.26	0.276	0.044	1.22	0.76
MW-2	3.66	0.248	0.210	0.56	0.21
MW-3	2.48	0.226	0.710	0.51	0.43
MW-4S	2.53	0.201	0.650	0.47	035

Table 6-5 Comparison of Groundwater TOC, DO, Iron, Arsenic, and Eh Data (cont)

Well	TOC [1] (mg/L)	Eh (v)	Total Dissolved Arsenic (mg/L)	Dissolved Oxygen (mg/L)	Total Dissolved Iron (mg/L)
MW-4D	5.15	0.043	0.033	0.35	0.92
MW-5	5.19	0.080	0.430	0.36	20.3
MW-6S	2.99	0.109	0.700	0.76	9.79
MW-6D	4.30	0.055	0.016	0.69	14.3
MW-7	3.12	0.100	0.001	0.76	0.076
MW-8	4.34	0.039	0.076	0.99	21.6
RRN	2.21	0.333	<0.001	2.55	<0.05
RRS	2.15	0.303	0.001	0.93	<0.05

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(V) to As(III) 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 better, 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 groundwaters. 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 at the Site

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:

$$K_d = C_{soil}/C_{soln} \quad (4)$$

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 Puyallup site, an estimate using the 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 for the source area are presented in **Table 6-6**.

Table 6-6 - Calculated K_d Values for the Puyallup Site

Groundwater ID	Groundwater As (mg/L)	Soil Boring ID	Soil As Result (mg/kg)	Soil Depth (ft)	Screen Depth (ft)	K_d (L/kg)
MW5	0.43	F2	33	16	17.5	76.7
		F2	4	16		9.3
MW1	0.044	B5	930	16	18	21136
		A4	5	18-22		114
MW2	1.5	D1	442	14	13.4	295
			112	16		74.7
MW3	0.71	E2	284	14	14	400
MW4S	0.65	F1	304	14	13	468

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

Using an arsenic K_d of 9.3 L/kg (lowest value), a dry bulk density of 1.65 L/kg, a porosity of 0.2, and a groundwater velocity of 2.0 ft/day (highest value) results in an

R of 78 (1+[1.65/0.2]*9.3 = 78) and an arsenic velocity of 0.0256 ft/day (2.0/78 = 0.0256).

The time required for the groundwater to travel the approximately 160 feet from well P3-1 to the Puyallup River is approximately 17 years (160 ft/0.0256 ft/d = 6,240 days = 17 yrs). Note that the 17 yr travel time is based on the lowest Kd value and the highest groundwater velocity calculated for the site, such that the 17 yr travel time can be considered a minimum. Using the median K_d value of 204.5 L/kg results in an R value of 1688, an arsenic velocity of 0.00118 ft/day and a P3-1 to Puyallup River travel time of 370 years.

The area to the northeast has significantly lower redox conditions (see Figure 28). Although the source concentrations are lower, the arsenic mobility is greater compared to the area to the southwest (P3-1 area). Arsenic concentrations at well MW8 were 57 µg/L (0.057 mg/L) and 89% was in the form of the more mobile As(III). Using EPA Method 7060A/6010B a total dissolved arsenic concentration of 76 µg/L (0.076 mg/L) was obtained. As MW8 was outside of the source area, soil sampled were not collected or analyzed. Even if samples had been collected and analyzed for arsenic, it is likely that the concentrations would have been below the laboratory reporting limit for arsenic. However, it is probably safe to assume that the arsenic is more mobile in this area (lower K_d than above).

Well MW-6S is on the boundary between the oxidizing, relatively high arsenic area to the southwest and the reducing, relatively low arsenic concentration area to the northeast. The result is an increased arsenic mobility compared to the prediction above (travel time of 370 yrs). The result of the combination of the relatively low redox conditions and the proximity of MW-6S to the arsenic source area has resulted in enhanced arsenic mobility and concentrations at this well (700 µg/L for EPA Method 7060A/6010B). The arsenic speciation data indicate that 63.9% of the arsenic for MW6S is in the form of the more mobile As(III) (see Table 6-3). These data indicate that the arsenic travel times are significantly shorter than the 370 yrs which was predicted for the P3-1 area where essentially all of the arsenic was in the less mobile As(V) form.

6.5 Summary

The fate and transport of arsenic at the site are summarized below:

- Arsenic exists predominantly in the reduced arsenite form at the site, although over time the arsenic is predicted to oxidize to the less mobile arsenate form (based on the eh-pH diagram).

- Iron and arsenic concentrations are likely controlled by ferric oxyhydroxides and green rust phases at the site, based on the PHREEQC modeling results.

- Redox conditions at the site are not in equilibrium with arsenic, DO or TOC, due to the presence of a redox gradient.

- Despite being in the more mobile arsenite form, arsenic has low mobility at the site.

- Arsenic transport at the site is at least 78 times slower than the groundwater velocity, resulting in long travel times for arsenic to move downgradient (17 yrs from P3-1 to the Puyallup River using the minimum K_d and 370 yrs using the median K_d).

Section 7
Terrestrial and Ecological Evaluation

A terrestrial ecological evaluation (TEE) was conducted to assess the potential risk of exposure to wildlife from potential site contamination. The project area does not qualify for an exclusion from a TEE because of its size and it is not completely covered by buildings or pavement. A simplified TEE was conducted following the procedure outlined in WAC 173-340-7492(2)(ii).

The simplified TEE concluded that there is a risk of exposure to terrestrial wildlife. The full TEE report is included in **Appendix H**. The site is relatively disturbed and there is significantly less than 10 acres of native vegetation within the property boundaries and within 500 feet of the site. While the site is adjacent to a narrow band of public land at the top of the river bank, the area includes a paved public walking path and contains limited habitat values.

The FS will evaluate whether a site-specific TEE is warranted. If a site-specific TEE is not performed, the contaminant concentrations provided in Table 749-2 of WAC 173-340 may be used to provide cleanup levels for the remedial investigation and cleanup process. Pursuant to WAC 173-340-7492 and the values listed in Table 749-2, an arsenic (+3) cleanup level of 20 mg/kg to a depth of 6 feet with institutional controls or a depth of 15 feet without institutional controls would be protective of terrestrial wildlife.

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.
- The site is underlain by Puyallup River alluvium to a depth of at least 68 feet bgs.
- Groundwater occurs under water table conditions and generally flows northward, where it discharges in the Puyallup River.
- The estimated average linear groundwater flow velocity is estimated to range from 1 to 2 feet/day.
- The distribution of residual arsenic in soil at the site reflects the results of the 1985 contaminant source removal action. Arsenic concentrations are relatively low at ground surface because shallow soil excavation in 1985 was widespread and the site was restored with clean fill.
- Arsenic is widely disseminated in soil at the site, both in the vadose zone and below the water table. The RI data characterizes the vertical and lateral extent of arsenic sufficiently to select a cleanup alternative. Data gaps for arsenic in soil were identified that will need to be addressed at a later date.
- Residual arsenic soil and groundwater concentrations are greatest in the contaminant source areas centered on the D3 boring and the P3 well cluster, respectively. Arsenic concentrations attenuate downgradient of the contaminant source area, but still exceed MTCA groundwater cleanup levels in the farthest downgradient wells.
- Arsenic transport at the site is at least 78 times slower than the groundwater velocity, resulting in long travel times for arsenic to migrate downgradient from the contaminant source area.
- Puyallup River sediment downgradient of the contaminant source area has arsenic exceeding ecological screening criteria. The highest arsenic concentrations are centered around samples SED3, SED4 and SED5 on the south bank of the Puyallup River. Arsenic concentrations and attenuates to below the ecological screening criteria further downgradient.
- The simplified TEE concluded that there is a risk of exposure to terrestrial wildlife. The FS will evaluate whether completion of a site-specific TEE is warranted.

Section 9
References

Anderson, M.A., J.F. Ferguson and J. Gavis. 1976. Arsenate Adsorption on Amorphous Aluminum Hydroxides. *J. Colloid & Interface Sci.* v. 54 p. 391-399.

Camp Dresser & McKee, Inc. (CDM) 2008*. Remedial Investigation Work Plan, USG Interiors Puyallup Site, Puyallup, Washington.* Dated October 6, 2008.

Camp Dresser & McKee, Inc. (CDM) 2010*. Remedial Investigation Work Plan Addendum, USG Interiors Puyallup Site, Puyallup, Washington.* Dated May 27, 2010.

CDM, 2007*. Soil and Groundwater Quality Assessment, Source Evaluation Report, USG – Puyallup Site, 925 River Road, Puyallup, Washington*. Dated January 31, 2007.

Duel, L.E. and A. R. Swoboda. 1972. Arsenic Solubility in a Reduced Environment. Soil Sci. Soc. Am. Proc. 36:276-278.

Frost, R.R. and R.A. Griffin. 1977. Effect of pH on Adsorption of Arsenic and Selenium from landfill leachate by clay minerals. *Soil Sci. Soc. Am. J.* v. 41 p. 53-57.

Hem, J.D. 1971. Study and Interpretation of the Chemical Characteristics of Natural Water. Second Edition. USGS Water Supply Paper 1473.

Hounslow, A.W. 1980. Ground Water Geochemistry: Arsenic in Landfills. *Ground Water* v. 18 n. 4 p. 331-333.

Palmer, S.P. 1997. Holocene Geologic History and Sedimentology of the Duwamish and Puyallup Valleys, Washington. Washington Department of Natural Resources Geology and Earth Resources Division.

Parkhurst, D.L. and Appelo, C.A.J. 1999. User's Guide to PHREEQC (Version 2)- A Computer Program for Speciation, Batch-Reaction, One-Dimensional Transport, and Inverse Geochemical Calculations. USGS Water-Resources Investigations Report 99-4259.

Pierce, M.L. and C.B. Moore. 1982. Adsorption of Arsenite and Arsenate on Amorphous Iron Hydroxide. Water Res. 16:1247-1253.

Root, R.A., Dixit, S., Campbell, K.M., Jew, A.D., Hering, J.G. and P.A. O'Day. 2007. Arsenic Sequestration by Sorption Processes in High-Iron Sediments. *Geochimica et Cosmochimica Acta*. v. 71, p. 5782-5803.

Shnyukov, E.F. 1963. Arsenic in the Cimmerian Iron Ores of the Azov-Black Sea Region. Geochemistry (Geokhimiya), 87-93.

Stow, S.H. 1969. The Occurrence of Arsenic and the Color-Causing Components in Florida Land-Pebble Phosphate Rock. Economic Geology. V. 64, p. 667-671.

Stumm, W. and J.J. Morgan. 1981. Aquatic Chemistry: An Introduction Emphasizing Chemical Equilibria in Natural Waters. 2nd ed. John Wiley and Sons, NY.

Su, C. and R.W. Puls. 2004. Significance of Iron (II,III) Hydroxycarbonate Green Rust in Arsenic Remediation using Zerovalent Iron in Laboratory Column Tests. *Environ. Sci. Technol.* v. 38, p. 5224-5231.

TetraTech. 2008. *Pierce County Lower Puyallup River Flood Protection Investigation*. June 2007.

U.S. Environmental Protection Agency (EPA), 1998. *Method 6200, Field Portable X-Ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment.* January 1998.

USGS. 2008. *Streamflow Measurements Reported by the U.S. Geological Survey for Gauge Stantion Maintained by the City of Puyallup* (gauge station #12101500) based on data collected between 1937 and 2008.

Washington Department of Ecology (Ecology). 2008. *Agreed Order DE 5489 Between the Washington Department of the Ecology and USG.* June 17, 2008.

Whiting, K.S. 1992. The Thermodynamics and Geochemistry of Arsenic, with Application to Subsurface Waters at the Sharon Steel Superfund Site at Midvale, Utah. MS Thesis T-4128 Colorado School of Mines, Golden Colorado.

Woolsen, E.A., J.H. Axley, and P.C. Kearney. 1971. The Chemistry and Phytotoxicity of Arsenic in Soils: I Contaminated Field Soils. Soil Sci. Soc. Am. Proc. 35:938-943.

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Tables

Table 1
Well Construction Details
USG Interiors/Remedial Investigation
Puyallup, Washington

Well I.D.	Easting [a]	Northing [a]	TOC Elevation (ft AMSL) [b]	Boring Total Depth (ft)	Screen Depth Interval (ft)	Depth to Top of Filter Pack (ft)	Casing Diameter (in)	Slot Size (in)	Drilled Date
P1-1	1191456.74	686927.89	34.14	17.00	~15-20	~13.5	4	0.01	05/07/85
P1-2	--	--	34.27	22.50	~20-25	~19	4	0.01	05/08/85
P1-3	--	--	35.35	27.50	~25-30	~23.5	4	0.01	05/08/85
P2-1	1191354.58	686922.13	33.14	17.50	~15-20	~14.5	4	0.01	05/06/85
P2-2	1191363.34	686933.80	34.76	22.50	~25-30	~20.5	4	0.01	05/06/85
P2-3	1191348.89	686936.78	34.04	28.50	~30-35	~23.5	4	0.01	05/07/85
P3-1	1191242.19	686901.85	33.66	15.00	~15-20	~13	4	0.01	05/03/85
P3-2	1191250.35	686912.26	32.93	20.00	~20-25	~17.5	4	0.01	05/03/85
P3-3	119215.95	686721.62	32.92	25.00	~25-30	~17	4	0.01	05/03/85
MW-1	1191307.78	686798.34	42.25	25.50	17-22	18.00	2	0.01	10/28/09
MW-2	1191142.04	686958.00	35.11	20.00	15-20	13.40	2	0.01	10/28/09
MW-3	1191174.56	686994.06	33.70	20.00	15-20	14.00	2	0.01	10/29/09
MW-4S	1191231.30	686997.11	32.22	20.50	15.5-20.5	13.00	2	0.01	10/29/09
MW-4D	1191234.67	686990.98	32.77	45.50	40-45	38.00	2	0.01	10/30/09
MW-5	1191315.85	686956.00	37.36	25.00	20-25	17.50	2	0.01	10/29/09
MW-6S	1191215.11	687050.90	30.50	25.00	20-25	17.50	2	0.01	10/12/10
MW-6D	1191225.72	687049.07	30.72	45.00	38-43	36.00	2	0.01	10/12/10
MW7S	1191055.40	687054.77	30.90	25.00	15-25	13.00	1	0.01	08/20/10
MW8	1191373.66	687003.24	29.93	25.00	16-21	15.00	2	0.01	10/12/10
RRN	1191478.16	686605.75	45.07	28.00	~20-25	--	2	--	09/14/82
RRS	1191215.95	686721.62	44.72	28.00	~25-30	--	2	--	09/14/82

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.
~ approximately.
-- unknown.

Table 2
Summary of Groundwater Elevation Measurements

USG Interiors/Remedial Investigation
Puyallup, Washington

Date	Well I.D.	Measured Depth to Groundwater (ft) TOC	Well TOC Elevation (ft AMSL) [a]	Groundwater Elevation (ft AMSL) [a]
11/10/2009	P1-1	14.20	34.14	19.94
	P1-2 [b,c]	14.74	34.27	19.53
	P1-3 [b,c]	14.20	35.35	21.15
	P2-1	13.22	33.14	19.92
	P2-2	14.83	34.76	19.93
	P2-3	14.15	34.04	19.89
	P3-1	13.71	33.66	19.95
	P3-2	12.97	32.93	19.96
	P3-3	13.00	32.92	19.92
	MW-1	21.53	42.25	20.72
	MW-2	15.37	35.11	19.74
	MW-3	14.00	33.70	19.70
	MW-4S	12.60	32.22	19.62
	MW-4D	13.02	32.77	19.75
	MW-5	17.52	37.36	19.84
	RRN	23.32	45.07	21.75
	RRS	23.83	44.72	20.89
10/20/2010	MW-6S	12.35	30.50	18.15
	MW-6D	12.56	30.72	18.16
	MW-7S	12.78	30.90	18.12
	MW-8	11.51	29.93	18.42

Notes:

TOC - Top of Casing

a) ft AMSL - feet above mean sea level. Elevations based on North American Vertical Datum of 1988 (NAVD 88).

b) Estimated casing addition to P1-2 and P1-3 = P1-1 addition of 2.44 ft from historical data.

c) TOC elevation above MSL calculated from P1-1 difference from historical to recent survey data.

Table 3
Geochemical Indicator Parameters in Groundwater
USG Interiors/Remedial Investigation
Puyallup, Washington

Well I.D.	Date Sampled	pH	ORP (mV)	DO (mg/L)	Temperature (ºC)	Conductivity (µS/cm)
P1-1	11/12/2009	6.3	-60.8	0.47	13.22	365
P2-1	11/12/2009	6.33	-93.2	1.55	12.9	440
P2-2	11/12/2009	6.64	-108.6	1.32	12.3	349
P2-3	11/12/2009	6.41	-120.9	0.52	12.26	354
P3-1	11/11/2009	5.98	31	0.35	13.38	456
P3-2	11/11/2009	5.87	47.1	0.5	13.09	258
P3-3	11/11/2009	5.85	-25.4	0.47	12.84	225
MW-1	11/12/2009	5.62	65.1	1.22	12.8	225
MW-2	11/11/2009	6.08	36.4	0.56	12.61	355
MW-3	11/11/2009	5.21	15	0.51	13.23	211
MW-4S	11/10/2009	5.09	-10.4	0.47	12.5	147
MW-4D	11/10/2009	6.59	-168.5	0.35	12.33	270
MW-5	11/11/2009	6.01	-131.4	0.36	12.59	303
MW-6S	10/20/2010	7.17	-102.3	0.76	13.2	245
MW-6D	10/20/2010	7.56	-156.7	0.69	12.53	337
MW-7S	10/20/2010	7.26	-110.8	0.76	13.35	289
MW-8	10/20/2010	7.24	-172	0.99	12.64	386
RRN	11/10/2009	5.73	123	2.55	13.72	254
RRS	11/10/2009	6.06	91.6	0.93	12.96	275

Notes:
ORP - oxidation/reduction potential.
DO - dissolved oxygen.
mg/L - milligrams per liter.
mV - millivolts.

Table 4
Vertical Gradient Between Shallow and Deeper Groundwater Monitoring Points
USG Interiors/Remedial Investigation
Puyallup, Washington

Well I.D.	Well TOC Elevation MSL[a] (ft)	Screen Midpoint Elevation MSL[a] (ft)	Groundwater Elevation MSL[a] (ft)	Vertical Gradient Between Shallow and Deeper Groundwater Monitoring Points	
				Upward	Downward
P2-1	33.14	14.99	19.92		0.003
P2-2	34.76	8.36	19.93		
P2-3	34.04	3.89	19.89		
P3-1	33.66	15.91	19.95		0.003
P3-2	32.93	10.93	19.96		
P3-3	32.92	4.67	19.92		
MW-4S	32.22	14.22	19.62	0.005	
MW-4D	32.77	-13.57	19.75		
MW-6S	30.50	8.00	18.15	0.001	
MW-6D	30.72	-9.78	18.16		

Notes:

Based on groundwater level measurements collected on November 10, 2009 and October 20, 2010.

a) MSL - Mean Sea Level. Elevations based on North American Vertical Datum of 1988 (NAVD 88).

TOC - top of casing.

Table 5
Arsenic Concentrations in Soil
USG-Puyallup Site
Puyallup, Washington

Boring I.D.	Sample Depth (ft bgs)	Date Sampled	Total Arsenic-XRF [a]	Total Arsenic-Lab	TCLP Arsenic-Lab
			mg/kg	mg/kg	mg/kg
A1-0	0	10/12/09	24	--	--
A1-0.5	0.5	10/12/09	155	--	--
A1-2	2	10/12/09	5	--	--
A1-8	8	10/12/09	54	<60	--
A1-10	10	10/12/09	5	--	--
A1-12	12	10/12/09	11	--	--
A1-16	16	10/12/09	5	--	--
A1-18	18	10/12/09	9	--	--
A1-20	20	10/12/09	4	--	--
A2-0	0	10/12/09	5	--	--
A2-2	2	10/12/09	61	--	--
A2-4	4	10/12/09	9	--	--
A2-6	6	10/12/09	123	39	--
A2-8	8	10/14/09	401	--	--
A2-10	10	10/12/09	232	--	--
A2-12	12	10/12/09	177	--	--
A2-16	16	10/12/09	82	--	--
A3-0	3	10/14/09	16	--	--
A4-0	3	10/14/09	13	42	--
A4-2	2	10/14/09	10 [b]	17	--
A4-8	8	10/14/09	90	--	--
A4-10	10	10/14/09	5	--	--
A4-12	12	10/14/09	146	--	--
A4-14	14	10/14/09	5	--	--
A4-16	16	10/14/09	5	--	--
A4-18	18	10/14/09	5	--	--
A4-20	20	10/14/09	49	--	--
A4-22	22	10/14/09	5	--	--
A5-0	0	10/14/09	143	--	--
A6-0	0	10/14/09	554	--	--
A6-2	2	10/14/09	125	--	--
A6-6	6	10/14/09	70	48	--
A6-8	8	10/14/09	5	--	--
A6-10	10	10/14/09	5	--	--
A6-12	12	10/14/09	5	--	--
A6-14	14	10/14/09	5	--	--
A6-16	16	10/14/09	5	--	--
A7-0	0	10/15/09	28	--	--
A8-0	0	10/15/09	8	--	--
A8-2	2	10/15/09	12	<5	--
A8-4	4	10/15/09	22	--	--
A8-6	6	10/15/09	10	--	--
A8-8	8	10/15/09	5	--	--
A8-10	10	10/15/09	10	--	--

Table 5
Arsenic Concentrations in Soil
USG-Puyallup Site
Puyallup, Washington

Boring I.D.	Sample Depth (ft bgs)	Date Sampled	Total Arsenic-XRF [a]	Total Arsenic-Lab	TCLP Arsenic-Lab
			mg/kg	mg/kg	mg/kg
A8-12	12	10/15/09	5	--	--
A8-14	14	10/15/09	10	--	--
A8-16	16	10/15/09	5	<6	--
A8-18	18	10/15/09	5	--	--
A8-20	20	10/15/09	5	--	--
B2-0	0	10/15/09	13	--	--
B3-0	0	10/15/09	11	--	--
B3-2	2	10/15/09	98	--	--
B3-4	4	10/15/09	703	--	--
B3-6	6	10/15/09	468	--	--
B3-8	8	10/15/09	337	--	--
B3-10	10	10/15/09	235	--	--
B3-12	12	10/15/09	626	632	--
B3-14	14	10/15/09	56	--	--
B3-16	16	10/15/09	5	--	--
B4-0	0	10/15/09	4	--	--
B5-0	0	10/15/09	11	--	--
B5-2	2	10/16/09	15	--	--
B5-4	4	10/16/09	5	--	--
B5-6	6	10/16/09	5	--	--
B5-8	8	10/16/09	5	--	--
B5-10	10	10/15/09	514	--	--
B5-12	12	10/15/09	315	588	--
B5-14	14	10/15/09	513	--	--
B5-16	16	10/15/09	930	--	--
B5D-18	18	08/18/10	222	--	--
B5D-20	20	08/18/10	12	--	--
B5D-22	22	08/18/10	22	--	--
B5D-23	23	08/18/10	40	--	--
B5D-26	26	08/18/10	22	--	--
B5D-27.5	27.5	08/18/10	5	--	--
B6-0	0	10/16/09	5	--	--
B7-4	4	10/16/09	4	--	--
B7-6	6	10/16/09	11	6	--
B7-8	8	10/16/09	5	--	--
B7-10	10	10/16/09	4	--	--
B7-14	14	10/16/09	5	--	--
B7-16	16	10/16/09	5	--	--
B8-0	0	10/16/09	38	--	--
C1-0	0	10/14/09	4	--	--
C2-0	0	10/15/09	4	--	--
C2-2	2	10/12/09	1090	1110	--
C2-4	4	10/14/09	748	--	--
C2-6	6	10/14/09	1,060	--	--

Table 5
Arsenic Concentrations in Soil
USG-Puyallup Site
Puyallup, Washington

Boring I.D.	Sample Depth (ft bgs)	Date Sampled	Total Arsenic-XRF [a] mg/kg	Total Arsenic-Lab mg/kg	TCLP Arsenic-Lab mg/kg
C2-8	8	10/15/09	1,045	1,220	--
C2-10	10	10/15/09	237	314	--
C2-12	12	10/16/09	714	594	--
C2-14	14	10/12/09	39	--	--
C2-16	16	10/12/09	26	--	--
C3-0	0	10/15/09	5	--	--
C3D-18	18	08/17/10	72	--	--
C3D-19.5	19.5	08/17/10	149	--	--
C3D-24	24	08/17/10	12	--	--
C3D-26	26	08/17/10	9	--	--
C4-0	0	10/15/09	10	--	--
C4-2	2	10/14/09	5	--	--
C4-4	4	10/14/09	10	--	--
C4-6	6	10/14/09	767	--	--
C4-8	8	10/14/09	443	--	--
C4-10	10	10/16/09	496	633	--
C4-12	12	10/16/09	808	804	--
C4-14	14	10/16/09	184	--	--
C4-16	16	10/12/09	123	--	--
C4D-18	18	08/18/10	146	--	--
C4D-20	20	08/18/10	63	--	--
C4D-22.5	22.5	08/18/10	83	--	--
C4D-24	24	08/18/10	80	--	--
C4D-26.5	26.5	08/18/10	62	--	--
C4D-28	28	08/18/10	5 [b]	--	--
C4D-30	30	08/18/10	5	--	--
C4D-32	32	08/18/10	5	--	--
C5-0	0	10/15/09	12	--	--
C6-0	0	10/15/09	15	--	--
C6-2	2	10/14/09	4	--	--
C6-4	4	10/14/09	8	--	--
C6-8	8	10/15/09	5	--	--
C6-12	12	10/16/09	9	--	--
C6-14	14	10/12/09	4	--	--
C6-16	16	10/12/09	499	--	--
C6D-18	18	10/26/10	210	--	--
C6D-20	20	10/26/10	168	--	--
C6D-22	22	10/26/10	382	--	--
C6D-24	24	10/26/10	72	--	--
C6D-26	26	10/26/10	122	--	--
C6D-28	28	10/26/10	22	--	--
C6D-30	30	10/26/10	19	--	--
C7-0	0	10/15/09	28	--	--
C8-0	0	10/16/09	16	--	--

Table 5
Arsenic Concentrations in Soil
USG-Puyallup Site
Puyallup, Washington

Boring I.D.	Sample Depth (ft bgs)	Date Sampled	Total Arsenic-XRF [a]	Total Arsenic-Lab	TCLP Arsenic-Lab
			mg/kg	mg/kg	mg/kg
C8-2	2	10/12/09	5	--	--
C8-8	8	10/14/09	13	--	--
C8-10	10	10/16/09	33	87	--
C8-12	12	10/12/09	85	--	--
C8-14	14	10/12/09	20	--	--
C8D-16	16	10/26/10	4	--	--
C8D-18	18	10/26/10	3	--	--
C8D-24	24	10/26/10	13	--	--
C8D-26	26	10/26/10	4	--	--
C8D-28	28	10/26/10	4	--	--
C8D-29.5	29.5	10/26/10	4	--	--
C10-0	0	08/19/10	3	--	--
C10-2	2	08/19/10	5	--	--
C10-4	4	08/19/10	15	--	--
C10-6	6	08/19/10	4	--	--
C10-8	8	08/19/10	4	--	--
C10-10	10	08/19/10	4	--	--
C10-12	12	08/19/10	4	--	--
C10-14	14	08/19/10	3	--	--
C10-16	16	08/19/10	3	--	--
D1-0	0	10/16/09	5	--	--
D1-2	2	10/14/09	5	--	--
D1-4	4	10/14/09	28	--	--
D1-6	6	10/14/09	123	--	--
D1-8	8	10/15/09	92	74	--
D1-10	10	10/14/09	698	1,010	--
D1-12	12	10/15/09	122	--	--
D1-14	14	10/15/09	442	--	--
D1-16	16	10/12/09	112	--	--
D2-0	0	10/15/09	5	--	--
D3-0	0	10/15/09	4	--	--
D3-2	2	10/16/09	5	--	--
D3-4	4	10/12/09	19	--	--
D3-6	6	10/14/09	16	13	--
D3-10	10	10/16/09	5	--	--
D3-12	12	10/14/09	2540	2,900	--
D3-16	16	10/15/09	379	389	--
D3-20	20	10/16/09	326	--	--
D3D-18	18	08/17/10	81	--	--
D3D-22	22	08/17/10	923	--	--
D3D-24	24	8/17/10	888	--	--
D3D-26	26	08/17/10	709	--	--
D3D-28	28	08/17/10	525	--	--
D3D-30	30	08/17/10	5	--	--

Table 5
Arsenic Concentrations in Soil
USG-Puyallup Site
Puyallup, Washington

Boring I.D.	Sample Depth (ft bgs)	Date Sampled	Total Arsenic-XRF [a]	Total Arsenic-Lab	TCLP Arsenic-Lab
			mg/kg	mg/kg	mg/kg
D4-0	0	10/14/09	5	--	--
D5-0	0	10/15/09	9	--	--
D5-2	2	10/16/09	5	--	--
D5-4	4	10/16/09	10	--	--
D5-6	6	10/15/09	5	--	--
D5-8	8	10/16/09	10	--	--
D5-10	10	10/16/09	16	--	--
D5-12	12	10/15/09	29	--	--
D5-14	14	10/16/09	82	--	--
D5-16	16	10/15/09	37	36	--
D6-0	0	10/16/09	4	--	--
D7-0	0	10/16/09	19	--	--
D7-2	2	10/14/09	4	--	--
D7-2	2	10/14/09	12	--	--
D7-4	4	10/15/09	9	--	--
D7-8	8	10/14/09	24 [b]	9	--
D7-10	10	10/14/09	39	--	--
D7-14	14	10/15/09	9	--	--
D7-16	16	10/15/09	132 [b]	--	--
D8-0	0	10/14/09	23	--	--
D9-0	0	08/19/10	6	--	--
D9-2	2	08/19/10	4	--	--
D9-4	4	08/19/10	30	--	--
D9-6	6	08/19/10	9	--	--
D9-8	8	08/19/10	4	--	--
D9-12	12	08/19/10	13	--	--
D9-14	14	08/19/10	4	--	--
E0-0	0	08/20/10	30	--	--
E0-2	2	08/20/10	4	--	--
E0-4	4	08/20/10	12	--	--
E0-6	6	08/20/10	4	--	--
E0-8	8	08/20/10	4	--	--
E0-10	10	08/20/10	4	--	--
E0-12	12	08/20/10	4	--	--
E0-14	14	08/20/10	4	--	--
E0-16	16	08/20/10	10	--	--
E1-0	0	10/15/09	5	--	--
E2-0	0	10/14/09	5	--	--
E2-2	2	10/15/09	5	--	--
E2-6	6	10/16/09	75	69	--
E2-8	8	10/14/09	12	78	--
E2-10	10	10/14/09	745	--	--
E2-12	12	10/14/09	26	--	--
E2-14	14	10/14/09	284	--	--

Table 5
Arsenic Concentrations in Soil
USG-Puyallup Site
Puyallup, Washington

Boring I.D.	Sample Depth (ft bgs)	Date Sampled	Total Arsenic-XRF [a] mg/kg	Total Arsenic-Lab mg/kg	TCLP Arsenic-Lab mg/kg
E2D-16	16	08/17/10	373	--	--
E2D-18	18	08/17/10	1358	--	--
E2D-20	20	08/17/10	1990	--	--
E2D-23	23	08/17/10	37	--	--
E2D-24	24	08/17/10	167	--	--
E2D-26	26	08/17/10	95	--	--
E2D-28	28	08/17/10	146	--	--
E2D-30	30	08/17/10	408 [b]	--	--
E2D-32	32	08/17/10	57	--	--
E2D-34	34	08/17/10	11	--	--
E3-0	0	10/14/09	6	--	--
E4-0	0	10/12/09	5	--	--
E4-2	2	10/15/09	16	--	--
E4-4	4	10/14/09	5	--	--
E4-6	6	10/15/09	17	--	--
E4-8	8	10/15/09	12	--	--
E4-10	10	10/15/09	13	--	--
E4-12	12	10/16/09	104	--	--
E4-14	14	10/15/09	204	--	--
E4-16	16	10/15/09	147	58	--
E4-18	18	10/12/09	74	--	--
E4-20	20	10/15/09	40 [b]	26	--
E4-22	22	10/15/09	70	--	--
E4-24	24	10/15/09	37	--	--
E4-28	28	10/16/09	16	--	--
E6-0	0	10/14/09	5	--	--
E6-2	2	10/14/09	15	--	--
E6-4	4	10/15/09	5	--	--
E6-6	6	10/15/09	5	--	--
E6-8	8	10/16/09	5	--	--
E6-10	10	10/15/09	12	--	--
E6-12	12	10/14/09	5	--	--
E6-14	14	10/14/09	10	--	--
E6-16	16	10/14/09	22	19	--
F1-0	0	10/16/09	10	--	--
F1-2	2	10/15/09	5	--	--
F1-4	4	10/15/09	17	--	--
F1-6	6	10/15/09	127	--	--
F1-8	8	10/12/09	61	--	--
F1-10	10	10/12/09	605	--	--
F1-12	12	10/15/09	139	--	--
F1-14	14	10/15/09	304	--	--
F1-16	16	10/14/09	376	--	--
F2-0	0	10/15/09	11	--	--

Table 5
Arsenic Concentrations in Soil
USG-Puyallup Site
Puyallup, Washington

Boring I.D.	Sample Depth (ft bgs)	Date Sampled	Total Arsenic-XRF [a] mg/kg	Total Arsenic-Lab mg/kg	TCLP Arsenic-Lab mg/kg
F2-2	2	10/15/09	5	--	--
F2-4	4	10/15/09	5	<7	--
F2-6	6	10/15/09	11	--	--
F2-8	8	10/16/09	5	--	--
F2-10	10	10/15/09	17	--	--
F2-12	12	10/15/09	5	--	--
F2-14	14	10/15/09	5	--	--
F2-16	16	10/15/09	18	--	--
F2D-0	0	8/20/10	4	--	--
F2D-2	2	8/20/10	4	--	--
F2D-4	4	8/20/10	4	--	--
F2D-6	6	8/20/10	10	--	--
F2D-8	8	8/20/10	4	--	--
F2D-12	12	8/20/10	3	--	--
F2D-14	14	8/20/10	50 [b]	--	--
F2D-17	17	08/20/10	13	--	--
F2D-16	16	10/26/10	29	--	--
F2D-18	18	10/26/10	15	--	--
F2D-20	20	10/26/10	22	--	--
F2D-22	22	10/26/10	4	--	--
F2D-24	24	10/26/10	3	--	--
F2D-26	26	10/26/10	31	--	--
F2D-28	28	10/26/10	3	--	--
F2D-30	30	10/26/10	4	--	--
F2D-32	32	10/26/10	4	--	--
F2D-34	34	10/26/10	4 [b]	--	--
SED1	0	11/12/09	--	<7	--
SED2	0	11/12/09	--	<7	--
SED3	0	11/12/09	--	136	--
SED4	0	11/12/09	--	75	--
SED5	0	08/20/10	219	--	--
SED6	0	08/20/10	3	--	--
SED7	0	08/19/10	3	--	--
SED8	0	08/19/10	3	--	--
SED9	0	08/19/10	3	--	--
GP1@8.5	8.5	09/06/06	--	480	--
GP1@13	13	09/06/06	--	68	--
GP1@19 1/2	19.5	09/06/06	--	14	--
GP2@9	9	09/06/06	--	1,200	7.2
GP2@12	12	09/06/06	--	640	--
GP2@17 1/2	17.5	09/06/06	--	1,100	2.9
GP3@9 1/2	19.5	09/06/06	--	650	0.64
GP3@16	16	09/06/06	--	20	--
GP4@10	10	09/06/06	--	76	--

Table 5
Arsenic Concentrations in Soil
USG-Puyallup Site
Puyallup, Washington

Boring I.D.	Sample Depth (ft bgs)	Date Sampled	Total Arsenic-XRF [a]	Total Arsenic-Lab	TCLP Arsenic-Lab
			mg/kg	mg/kg	mg/kg
GP4@12	12	09/06/06	--	75	--
GP4@17	17	09/06/06	--	<12	--
GP5@10 1/2	10.5	09/06/06	--	1,700	6.5
GP5@12 1/2	12.5	09/06/06	--	870	--
GP5@17	17	09/06/06	--	120	--
GP6@9 1/2	9.5	09/06/06	--	830	--
GP6@12	12	09/06/06	--	390	--
GP6@17	17	09/06/06	--	83	--
GP7@5	5	09/06/06	--	670	--
GP7@9 1/2	9.5	09/06/06	--	2100	5.5
GP7@12 1/2	12.5	09/06/06	--	57	--
GP7@17 1/2	17.5	09/06/06	--	30	--
GP8@10 1/2	10.5	09/06/06	--	410	--
GP8@15	15	09/06/06	--	100	--
GP8@18	18	09/06/06	--	<13	--
GP9@8	8	09/06/06	--	560	--
GP9@10 1/2	10.5	09/06/06	--	750	3.5
GP9@17 1/2	17.5	09/06/06	--	300	--
GP10@10 1/2	10.5	09/06/06	--	470	<0.40
GP10@15	15	09/06/06	--	91	--
GP10@18 1/2	18.5	09/06/06	--	12	--
GP11@10	10	09/06/06	--	100	--
GP11@15	15	09/06/06	--	<13	--
GP11@17 1/2	17.5	09/06/06	--	<13	--
GP12@11 1/2	11.5	09/06/06	--	770	0.53
GP12@16 1/2	16.5	09/06/06	--	15	--
GP13@10	10	09/06/06	--	36	--
GP13@15	15	09/06/06	--	36	--
GP13@18 1/2	18.5	09/06/06	--	<12	--
GP14@10	10	09/06/06	--	18	--
GP14@15	15	09/06/06	--	59	--
GP14@18	18	09/06/06	--	<12	--
GP15@5 1/2	5.5	09/06/06	--	<12	--
GP15@10	10	09/06/06	--	76	--
GP15@15	15	09/06/06	--	81	--
GP15@17 1/2	17.5	09/06/06	--	38	--
MW6D-02	2	10/27/10	4	--	--
MW6D-04	4	10/27/10	4	--	--
MW6D-06	6	10/27/10	5	--	--
MW6D-09	9	10/27/10	5	--	--
MW6D-12	12	10/27/10	4	--	--
MW6D-14	14	10/27/10	121 [b]	--	--
MW6D-16	16	10/27/10	11	--	--
MW6D-18	18	10/27/10	12	--	--

Table 5
Arsenic Concentrations in Soil
USG-Puyallup Site
Puyallup, Washington

Boring I.D.	Sample Depth (ft bgs)	Date Sampled	Total Arsenic-XRF [a] mg/kg	Total Arsenic-Lab mg/kg	TCLP Arsenic-Lab mg/kg
MW6D-20	20	11/02/10	50 [b]	--	--
MW6D-22	22	11/02/10	140	--	--
MW6D-24	24	11/02/10	6	--	--
MW6D-26	26	11/02/10	3	--	--
MW6D-28	28	11/02/10	1	--	--
MW6D-30	30	11/02/10	4	--	--
MW6D-32	32	11/02/10	0	--	--
MW6D-34	34	11/02/10	2	--	--
MW6D-36	36	11/02/10	3	--	--
MW6D-38	38	11/02/10	3	--	--
MW6D-40	40	11/02/10	3	--	--
MW6D-42	42	11/02/10	6	--	--
MW6D-44	44	11/02/10	5	--	--
MW7S-0	0	08/20/10	4	--	--
MW7S-2	2	08/20/10	4	--	--
MW7S-4	4	08/20/10	4	--	--
MW7S-6	6	08/20/10	55	--	--
MW7S-8	8	08/20/10	21	--	--
MW7S-10	10	08/20/10	4	--	--
MW7S-12	12	08/20/10	3	--	--
MW7S-14	14	08/20/10	4	--	--
MW7S-16	16	08/20/10	3	--	--
MW7S-18	18	08/20/10	3	--	--
MW7S-20	20	08/20/10	11	--	--
MW7S-22	22	08/20/10	10	--	--
MW7S-24	24	08/20/10	3	--	--
Y2-0	0	08/18/10	7	--	--
Y2-2	2	08/18/10	12	--	--
Y2-4	4	08/18/10	16	--	--
Y2-6	6	08/18/10	15	--	--
Y2-8	8	08/18/10	10	--	--
Y2-10	10	08/18/10	5	--	--
Y2-12	12	08/18/10	5	--	--
Y2-14	14	08/18/10	9	--	--
Y2-15.5	15.5	08/18/10	5	--	--
Z5-0	0	08/18/10	5	--	--
Z5-2	2	08/18/10	5	--	--
Z5-4	4	08/18/10	5	--	--
Z5-6	6	08/18/10	10	--	--
Z5-8	8	08/18/10	13	--	--
Z5-10	10	08/18/10	10	--	--
Z5-12	12	08/18/10	9	--	--
Z5-14	14	08/18/10	12	--	--
Z5-16	16	08/18/10	5	--	--

Table 5
Arsenic Concentrations in Soil
USG-Puyallup Site
Puyallup, Washington

Boring I.D.	Sample Depth (ft bgs)	Date Sampled	Total Arsenic-XRF [a] mg/kg	Total Arsenic-Lab mg/kg	TCLP Arsenic-Lab mg/kg
AA0-0	0	10/26/10	13	--	--
AA0-2	2	10/26/10	12	--	--
AA0-4	4	10/26/10	51	--	--
AA0-6	6	10/26/10	9	--	--
AA0-8	8	10/26/10	6	--	--
AA0-10	10	10/26/10	39	--	--
AA0-12	12	10/26/10	12	--	--
AA0-14	14	10/26/10	20	--	--
AA0-16	16	10/26/10	37	--	--
AA0-18	18	10/26/10	12	--	--
AA0-20	20	10/26/10	4	--	--
AA0-24	24	10/26/10	6	--	--
AA0-26	26	10/26/10	3	--	--
AA0-28	28	10/26/10	4	--	--
AA0-30	30	10/26/10	3	--	--
AA0-33	33	10/26/10	3	--	--
AA0-34	34	10/26/10	4	--	--
Method A Cleanup Level [c]			20	20	NA
Dangerous Waste TCLP Threshold			NA	NA	5

Notes:

Shaded concentrations exceed Method A or TCLP cleanup levels.

a) Results from XRF corrected by statistical correlation with laboratory results. XRF samples containing arsenic below the detection limit have been set to half the detection limit.

b) Sample analyzed in replicate with the XRF. Result presented is average of replicate results.

c) Washington Administrative Code Chapter 173-340, Model Toxics Control Act Cleanup Regulation, Method A suggested soil cleanup level for unrestricted land uses/industrial properties; promulgated August 15, 2001.

mg/kg - milligrams per kilogram.

mg/L - milligrams per liter.

ft bgs - feet below ground surface.

NA - not applicable.

-- not analyzed.

< - analyte not detected at or greater than the listed concentration.

Table 6
Analytical Results - Groundwater
USG Interiors/Remedial Investigation
Puyallup, Washington

	Sample I.D. and Sample Date					
	USGPuy-RRS-11/09	USGPuy-RRN-11/09	USGPuy-MW1-11/09	USGPuy-MW2-11/09	USGPuy-MW3-11/09	USGPuy-MW0-11/09*
Analyte	11/10/2009	11/10/2009	11/12/2009	11/11/2009	11/11/2009	11/11/2009
Dissolved Metals (mg/L)						
EPA Methods 7060A/6010B)						
Arsenic	0.001	<0.001	0.044	1.5	0.71	0.67
Iron	<0.05	<0.05	0.76	0.21	0.43	0.40
Total Metals (mg/L)						
EPA Method 6010B						
Arsenic (EPA Method 7060A)	--	--	--	2.0	--	--
Calcium	31.2	19.8	15.1	34.1	16.2	14.3
Iron	<0.05	<0.05	0.91	0.66	0.65	0.57
Magnesium	6.02	9.91	6.67	13.7	8.48	7.47
Potassium	2.8	2.7	2.2	3.7	2.6	2.3
Sodium	12.2	13.9	13.0	14.8	10.3	9.2
Arsenic Speciation (µg/L)						
Arsenic (III)	--	--	40.0	93.5	357	477
Arsenic (V)	--	--	3.71	1,310	296	306
Conventionals						
Alkalinity (SM 2320; mg/L CaCO$_3$)	105	73.1	85.8	120	85.1	84.4
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$_3$)	105	73.1	85.8	120	85.1	84.4
Hydroxide (SM 2320; mg/L CaCO$_3$)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Suspended Solids (EPA 160.2; mg/L)	<1.1	<1.1	3.0	<1.0	<1.0	<1.0
Chloride (EPA 300.0; mg/L)	6.1	6.2	3.4	18.9	5.4	5.4
N-Nitrate (EPA 300.0; mg-N/L)	0.6	4.8	0.1	2.8	0.5	0.5
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)	25.5	20.2	20.7	20.0	15.0	15.0
Chemical Oxygen Demand (EPA 410.4; mg/L)	7.08	<5.00	8.31	9.55	6.46	8.62
Total Organic Carbon (EPA 415.1; mg/L)	2.15	2.21	2.26	3.66	2.48	2.46

Table 6
Analytical Results - Groundwater
USG Interiors/Remedial Investigation
Puyallup, Washington

	Sample I.D. and Sample Date					
	USGPuy-MW4S-11/09	USGPuy-MW4D-11/09	USGPuy-MW5-11/09	USGPuy-P1-1-11/09	USGPuy-P2-1-11/09	USGPuy-P2-2-11/09
Analyte	**11/10/2009**	**11/10/2009**	**11/11/2009**	**11/12/2009**	**11/12/2009**	**11/12/2009**
Dissolved Metals (mg/L)						
EPA Methods 7060A/6010B)						
Arsenic	0.65	0.033	0.43	0.002	0.90	<0.002
Iron	0.35	0.92	20.3	17.0	26.2	9.54
Total Metals (mg/L)						
EPA Method 6010B						
Arsenic (EPA Method 7060A)	--	--	--	--	--	0.004
Calcium	18.5	36.0	19.8	27.2	30.7	22.1
Iron	0.48	9.19	26.1	16.5	35.8	18.4
Magnesium	9.24	9.19	7.60	9.65	7.83	10.6
Potassium	2.9	4.9	3.2	3.3	4.3	3.6
Sodium	11.7	32.8	13.2	11.3	10.5	14.5
Arsenic Speciation (µg/L)						
Arsenic (III)	291	149	464	--	1,040	1.80
Arsenic (V)	267	7.87	47.5	--	122	0.63
Conventionals						
Alkalinity (SM 2320; mg/L $CaCO_3$)	87.3	170	136	182	198	167
Carbonate (SM 2320; mg/L $CaCO_3$)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bicarbonate (SM 2320; mg/L $CaCO_3$)	87.3	170	136	182	198	167
Hydroxide (SM 2320; mg/L $CaCO_3$)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Suspended Solids (EPA 160.2; mg/L)	<1.1	31.3	35.3	2.7	7.4	29.0
Chloride (EPA 300.0; mg/L)	4.9	6.7	5.6	8.0	4.8	4.9
N-Nitrate (EPA 300.0; mg-N/L)	0.7	<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)	17.6	42.2	0.7	3.2	0.5	<0.1
Chemical Oxygen Demand (EPA 410.4; mg/L)	7.08	9.86	14.5	14.5	24.4	17.3
Total Organic Carbon (EPA 415.1; mg/L)	2.53	5.15	5.19	4.35	8.07	5.48

Table 6

Analytical Results - Groundwater

USG Interiors/Remedial Investigation
Puyallup, Washington

Analyte	Sample I.D. and Sample Date					
	USGPuy-P2-3-11/09	USGPuy-P3-1-11/09	USGPuy-P3-2-11/09	USGPuy-P3-3-11/09	USGPuy-MW6D-10/10	USGPuy-MW6S-10/10
	11/12/2009	11/11/2009	11/11/2009	11/11/2009	10/20/2010	10/20/2010
Dissolved Metals (mg/L)						
EPA Methods 7060A/6010B)						
Arsenic	<0.002	6.1	0.42	0.002	0.016	0.70
Iron	5.86	<0.05	<0.05	3.50	14.3	9.79
Total Metals (mg/L)						
EPA Method 6010B						
Arsenic (EPA Method 7060A)	--	--	0.44	--	--	--
Calcium	25.7	55.1	22.6	14.4	20.4	13.6
Iron	15.6	<0.05	<0.05	6.02	13.0	8.77
Magnesium	9.60	14.2	10.5	11.0	7.60	9.31
Potassium	4.1	6.0	3.0	3.6	3.3	2.6
Sodium	15.5	11.3	12.8	10.1	17.2	8.7
Arsenic Speciation (µg/L)						
Arsenic (III)	--	<2.4	<0.24	0.798	9.78	388
Arsenic (V)	--	4,640	296	0.431	1.77	219
Conventionals						
Alkalinity (SM 2320; mg/L $CaCO_3$)	170	189	92.3	110	145	103
Carbonate (SM 2320; mg/L $CaCO_3$)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bicarbonate (SM 2320; mg/L $CaCO_3$)	170	189	92.3	110	145	103
Hydroxide (SM 2320; mg/L $CaCO_3$)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Suspended Solids (EPA 160.2; mg/L)	42.2	<1.0	<1.1	6.5	50.0	6.3
Chloride (EPA 300.0; mg/L)	5.3	7.1	5.8	3.4	5.9	3.8
N-Nitrate (EPA 300.0; mg-N/L)	<0.1	1.4	1.9	<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)	0.1	43.0	19.9	4.2	2.3	4.9
Chemical Oxygen Demand (EPA 410.4; mg/L)	10.8	12.3	7.69	9.24	9.51	7.56
Total Organic Carbon (EPA 415.1; mg/L)	5.46	7.17	2.41	3.00	4.30	2.99

Table 6
Analytical Results - Groundwater

USG Interiors/Remedial Investigation
Puyallup, Washington

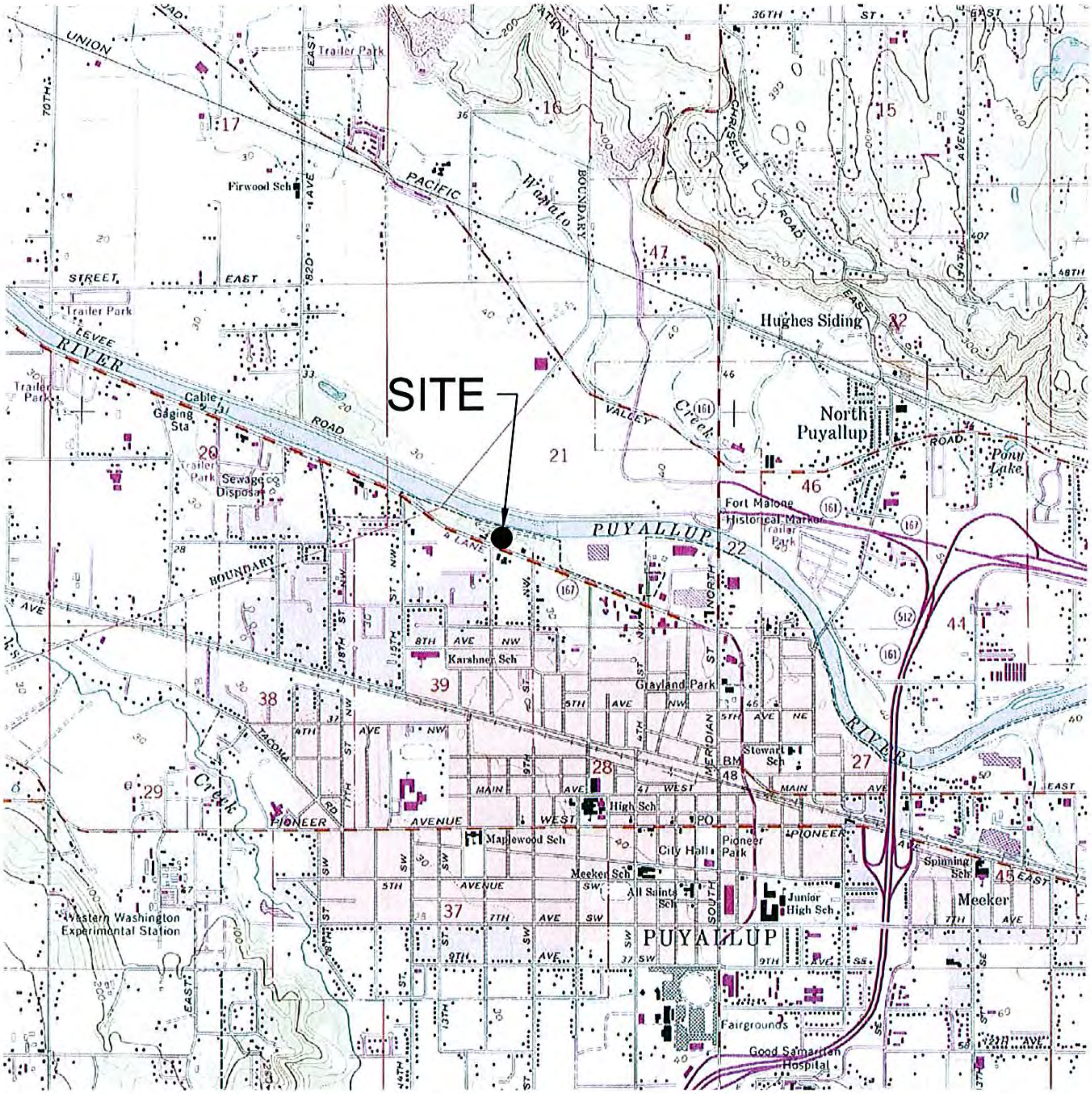
Analyte		Sample I.D. and Sample Date	
	USGPuy- MW0-10/10*	USGPuy-MW7-10/10	USGPuy-MW8-10/10
	10/20/2010	10/20/2010	10/20/2010
Dissolved Metals (mg/L)			
EPA Methods 7060A/6010B)			
Arsenic	0.72	0.001	0.076
Iron	--	4.43	21.6
Total Metals (mg/L)			
EPA Method 6010B			
Arsenic (EPA Method 7060A)	--	--	--
Calcium	--	31.4	24.1
Iron	--	4.05	19.4
Magnesium	--	4.16	9.82
Potassium	--	4.2	3.5
Sodium	--	10.8	12.8
Arsenic Speciation (µg/L)			
Arsenic (III)	--	<0.96	51.0
Arsenic (V)	--	<0.95	6.00
Conventionals			
Alkalinity (SM 2320; mg/L $CaCO_3$)	--	125	161
Carbonate (SM 2320; mg/L $CaCO_3$)	--	<1.0	<1.0
Bicarbonate (SM 2320; mg/L $CaCO_3$)	--	125	161
Hydroxide (SM 2320; mg/L $CaCO_3$)	--	<1.0	<1.0
Total Suspended Solids (EPA 160.2; mg/L)	--	<1.1	37.2
Chloride (EPA 300.0; mg/L)	--	4.9	6.9
N-Nitrate (EPA 300.0; mg-N/L)	--	<0.1	<0.1
N-Nitrite (EPA 300.0; mg-N/L)	--	<0.1	<0.1
Sulfate (EPA 300.0; mg/L)	--	10.3	<0.1
Chemical Oxygen Demand (EPA 410.4; mg/L)	--	8.21	9.83
Total Organic Carbon (EPA 415.1; mg/L)	--	3.12	4.34

Notes:

*USGPuy-MW0-11/09 is a duplicate of USGPuy-MW3-11/09.
USGPuy-MW0-10/10 is a duplicate of MW6S-10/10.
mg/L - milligrams per liter.
µg/L - micrograms per liter.
-- not analyzed.
< - analyte not detected at or greater than the listed concentration.

CDM

Figures



Source: USGS Puyallup, Wash. 7.5' Quadrangle, 1981

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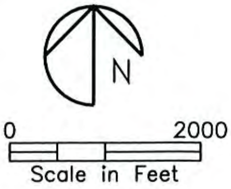

Washington

USG INTERIORS/REMEDIAL INVESTIGATION
PUYALLUP, WASHINGTON

Figure No. 1
Vicinity Map

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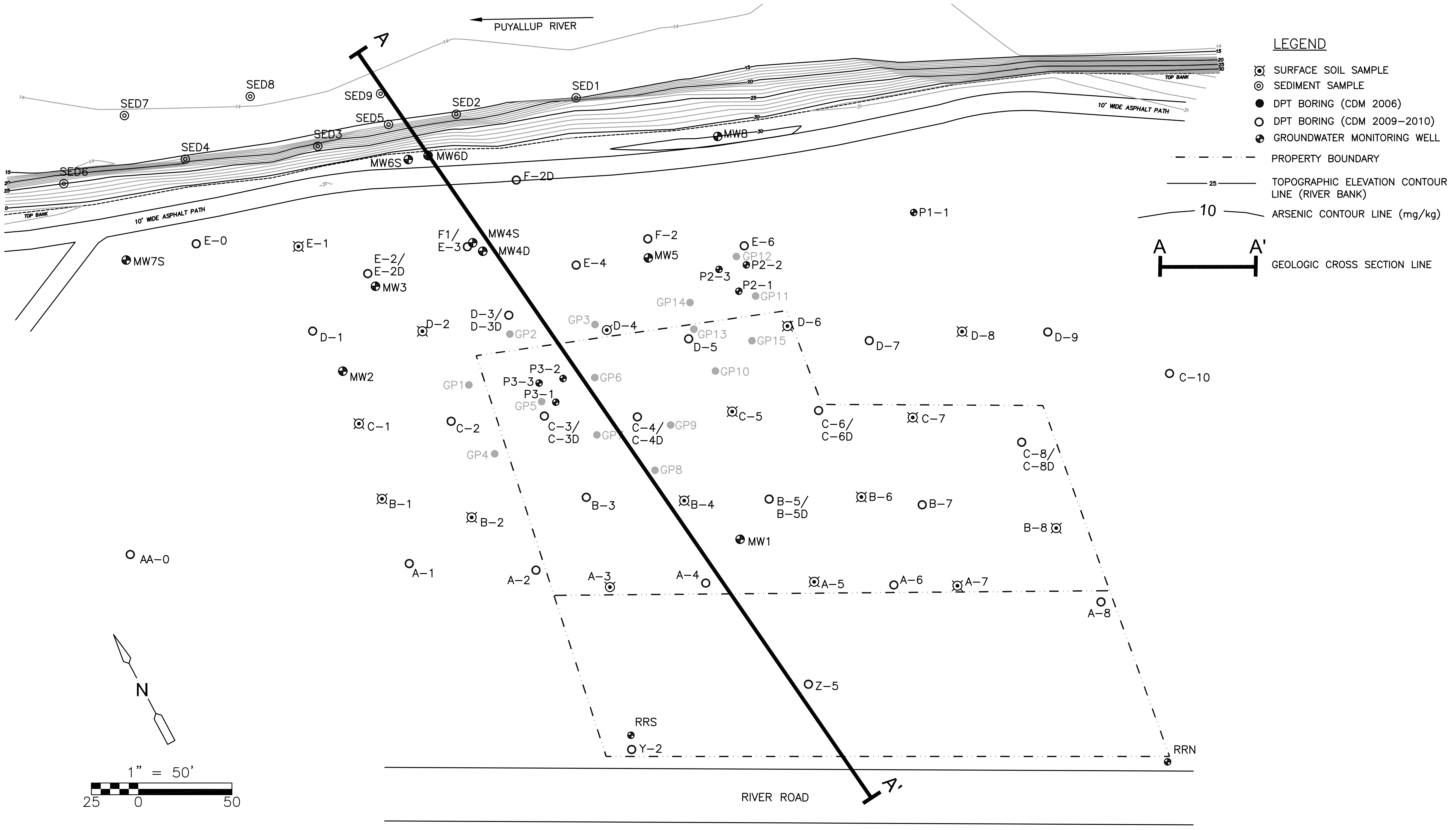

Figure No. 2
Site Map and Sample Locations

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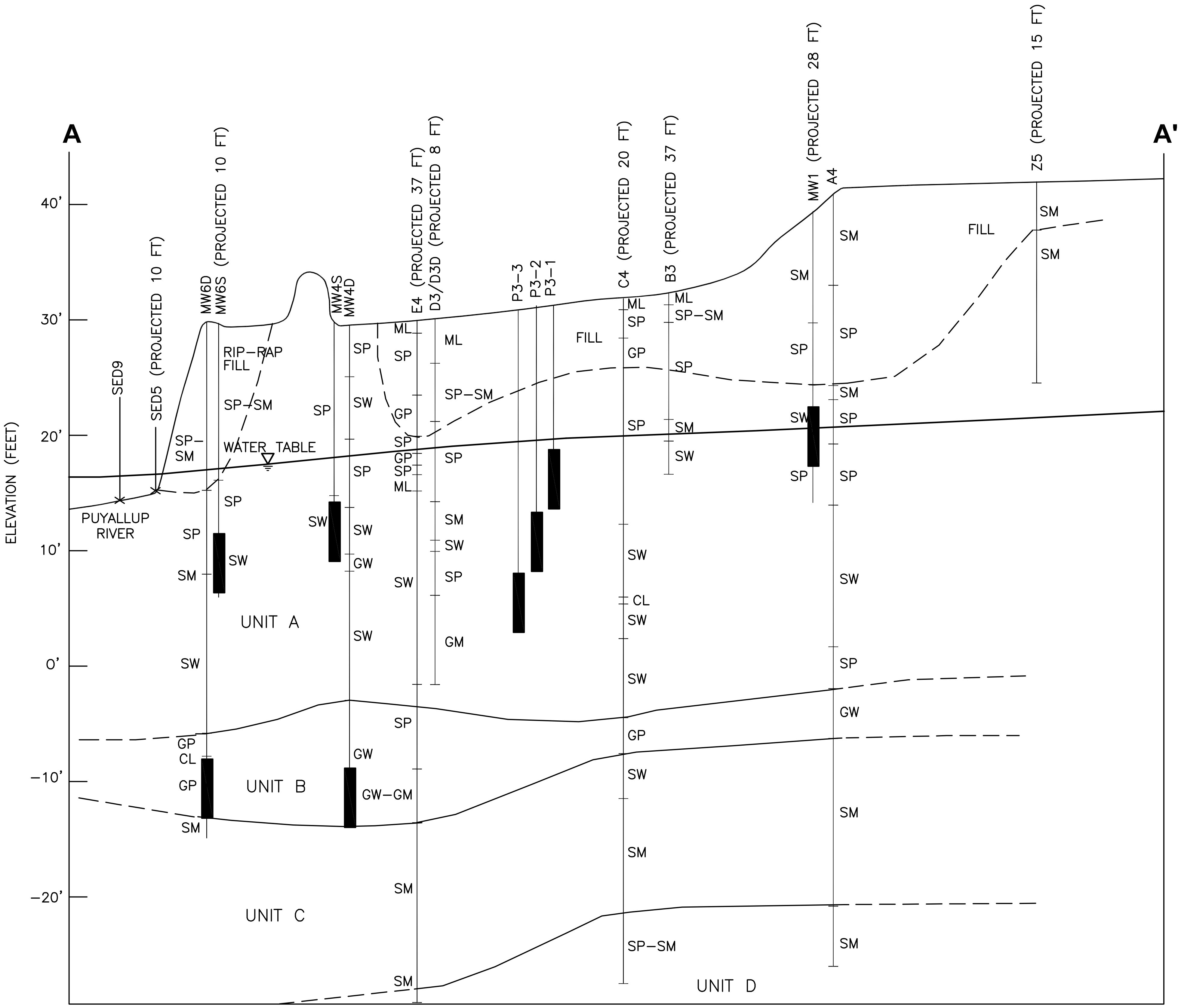


GENERALIZED HYDROGEOLOGIC UNITS

UNIT A – OVERBANK AND POINT BAR DEPOSITS HAVING MODERATE TO HIGH HYDRAULIC CONDUCTIVITY. INCLUDES POORLY GRADED SAND, FINE TO MEDIUM GRAINED AND WELL GRADED SAND, FINE TO COARSE GRAINED WITH TRACE TO SOME FINE TO MEDIUM GRAVEL.

UNIT B – CHANNEL AND POINT BAR DEPOSITS HAVING HIGH HYDRAULIC CONDUCTIVITY. INCLUDES WELL GRADED AND POORLY GRADED GRAVEL, WELL GRADED GRAVEL WITH SILT, AND POORLY GRADED SAND WITH GRAVEL.

UNIT C – SLACKWATER DEPOSITS HAVING LOW TO MODERATE HYDRAULIC CONDUCTIVITY. INCLUDES SILTY SAND, FINE TO MEDIUM GRAINED WITH TRACE GRAVEL AND WOOD FRAGMENTS.

UNIT D – OVERBANK DEPOSITS HAVING LOW HYDRAULIC CONDUCTIVITY. INCLUDES SILTY SAND AND POORLY GRADED SAND WITH SILT, DENSE, FINE GRAINED SAND, LAMINATED.

LEGEND

GEOLOGIC CONTACT, DASHED WHERE INFERRED

▽ WATER TABLE BASED ON DEPTH TO GROUNDWATER DURING DRILLING IN AUGUST AND OCTOBER 2010

MONITORING WELL

SW UNIFIED SOIL CLASSIFICATION SYSTEM (USCS) SOIL TYPE

1" = 50'

25 0 50

HORIZONTAL

VERTICAL EXHAGGERATION 2X

P:\19921\74559\ Fig-3-SECT A-A 05/02/11 15:41 riehlepj XREFS: 11X17BDR

Figure No. 3
Geologic Cross Section A–A'

N:\ACAD2008\19921-74559\Maps-May 2011\ Fig-04- 06/10/11 09:54 talbotwk XREFS: 11X17BDR, SITE-fig-2

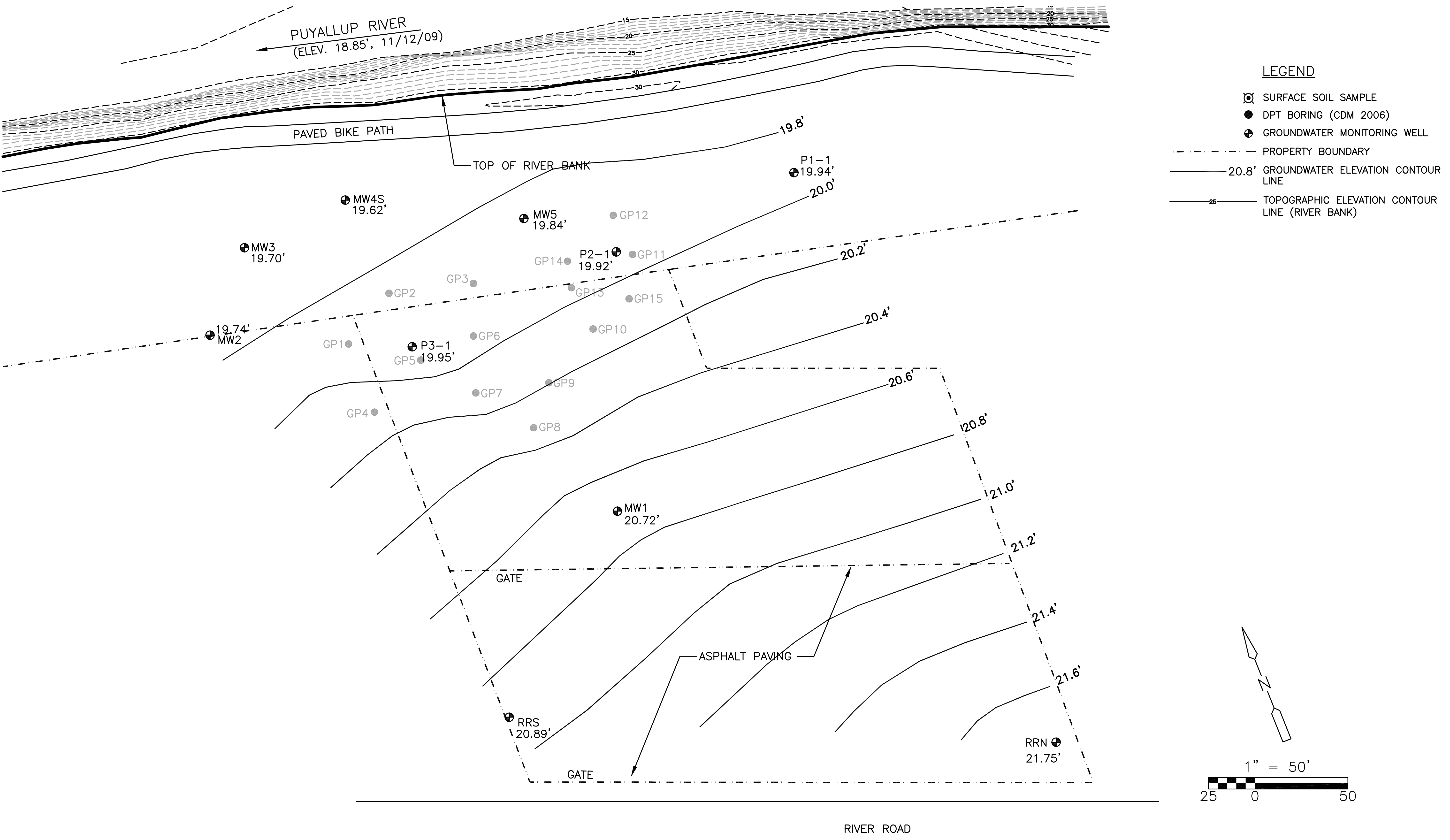
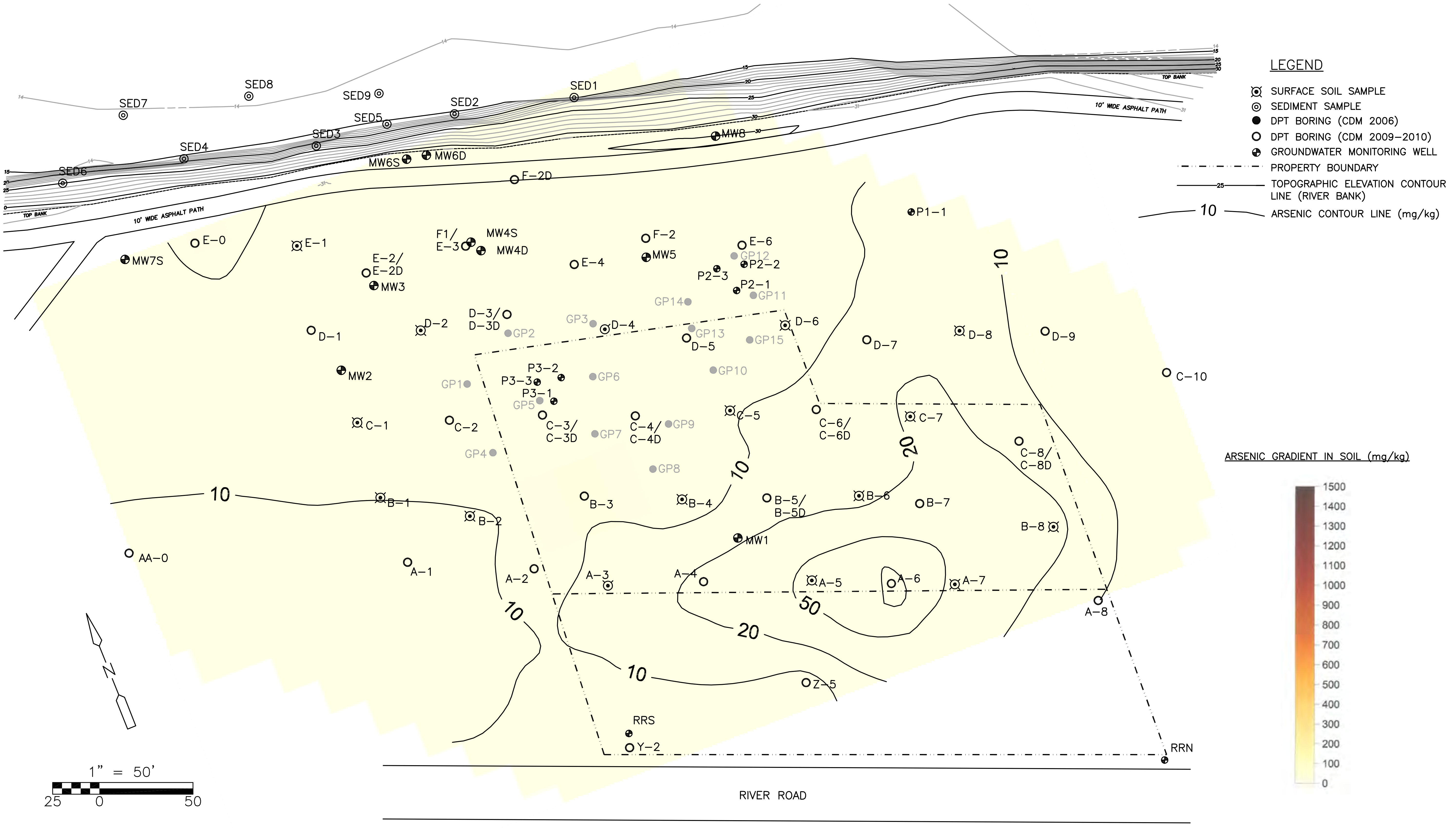


Figure No. 4
Groundwater Elevation Contours
Shallow Aquifer
November 10, 2009

CDM



P:\19921\74559\Maps-May 2011\ Fig-05 as_4_Surface 06/06/11 09:52 riehlepj XREFS: 11X17BDR, _CDM-SITE, 36130-SURV-TP02

Figure No. 5
Site Map
Arsenic in Soil at the Ground Surface

N:\ACAD2008\19921-74559\Maps-May 2011\ Fig-06 as_4_32_30 06/10/11 12:37 talbotwk XREFS: 11X17BDR, _CDM-SITE, 36130-SURV-TP02, Map_4_As_30_28_p

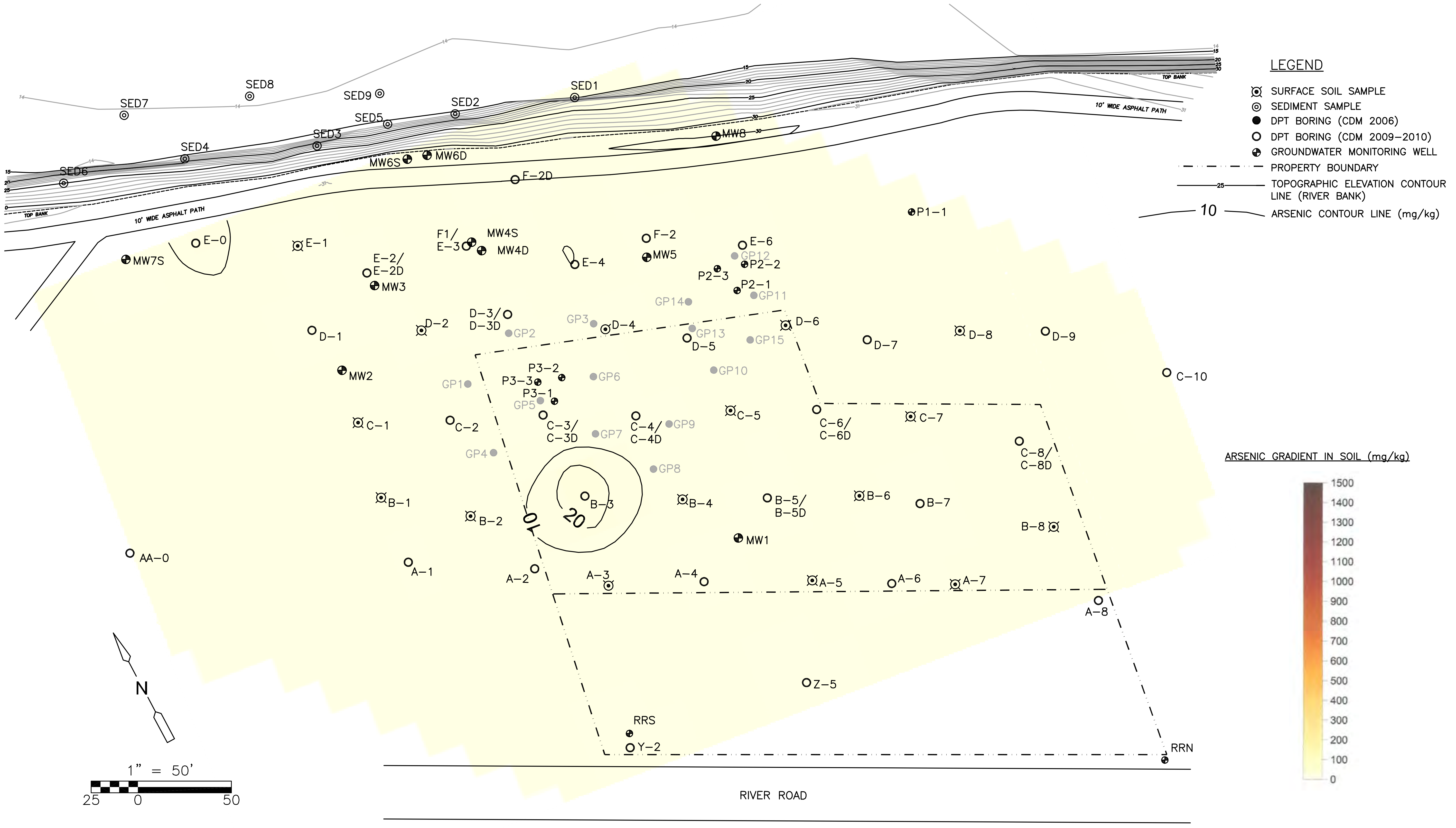
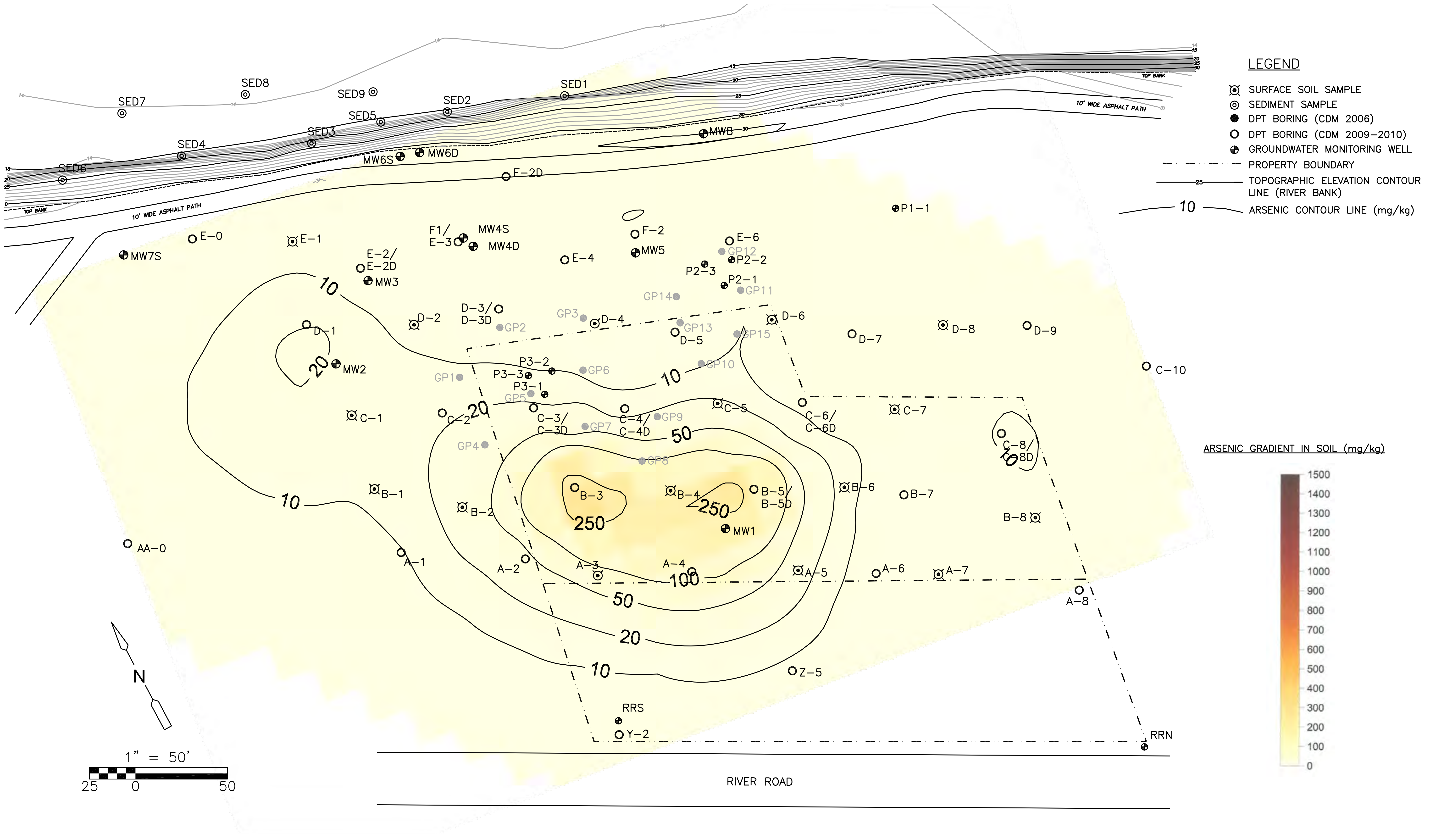


Figure No. 6
Site Map
Total Arsenic in Soil from EL. 32 to EL. 30



P:\19921\74559\Maps-May 2011\ Fig-7 as_4_30_28 XREFS: 11X17BDR, _CDM-SITE, 36130-SURV-TP02

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Figure No. 7
Site Map
Total Arsenic in Soil from EL. 30 to EL. 28

N:\ACAD2008\19921-74559\Maps-May 2011\ Fig-08 as_4_28_26 06/10/11 12:43 talbotwk XREFS: 11X17BDR, _CDM-SITE, 36130-SURV-TP02, Map_4_As_28_26_p

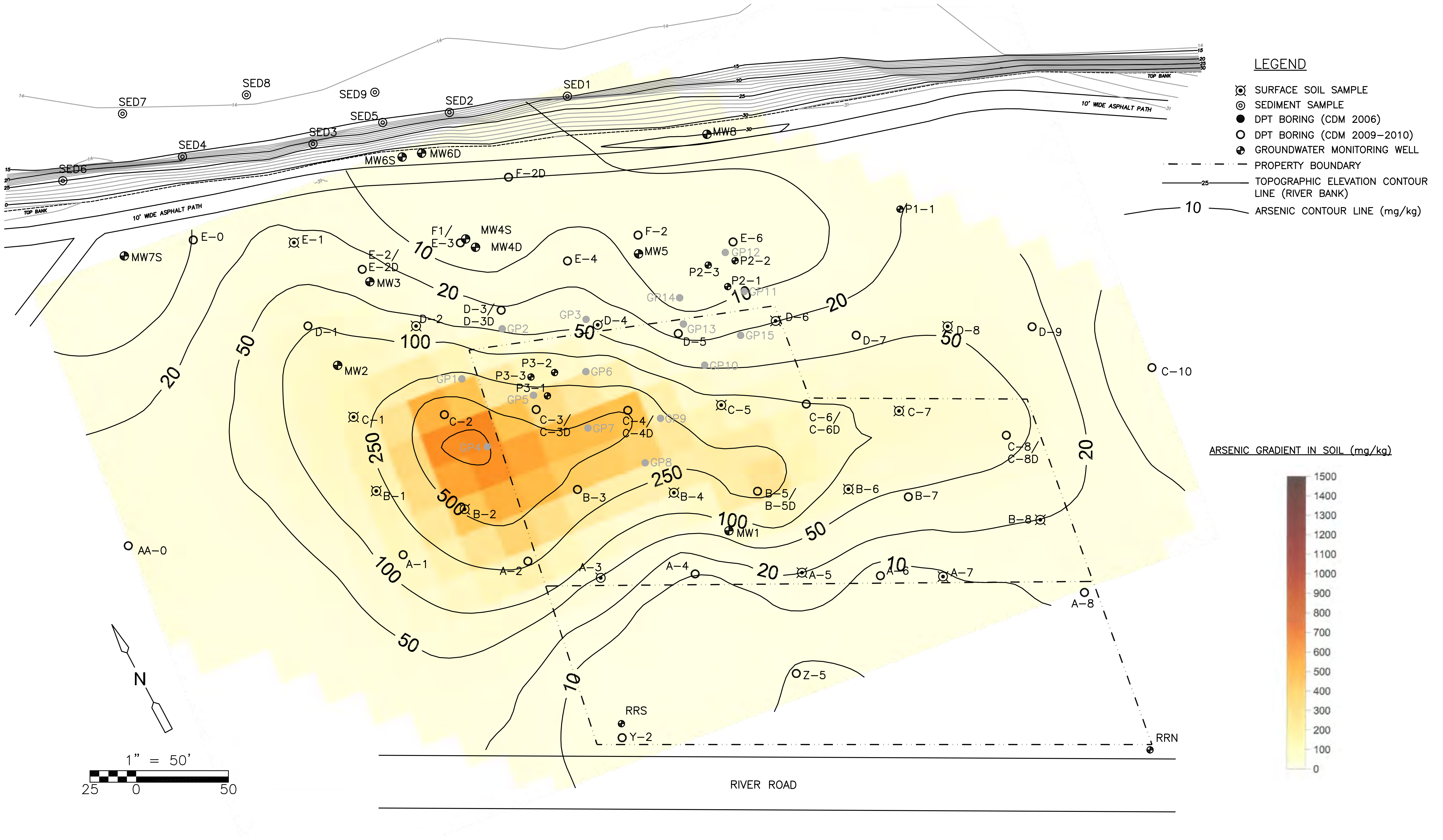

Figure No. 8
Site Map
Total Arsenic in Soil from EL. 28 to EL. 26

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N:\ACAD2008\19921-74559\Maps-May 2011\ Fig-09 as_4_26_24 06/10/11 12:49 talbotwk XREFS: 11X17BDR, _CDM-SITE, 36130-SURV-TP02, Map_4_As_26_24_p

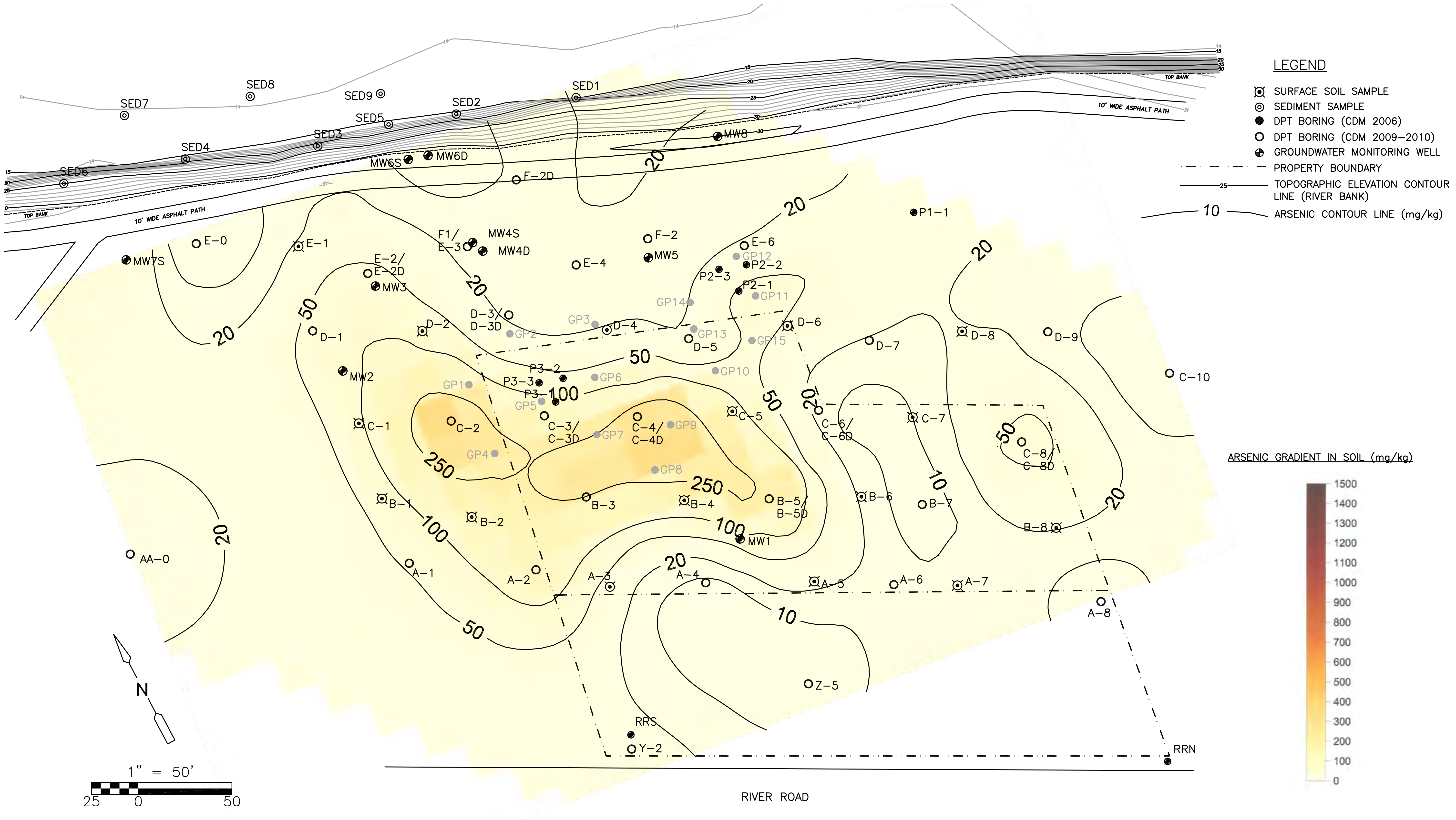


Figure No. 9
Site Map
Total Arsenic in Soil from EL. 26 to EL. 24

CDM

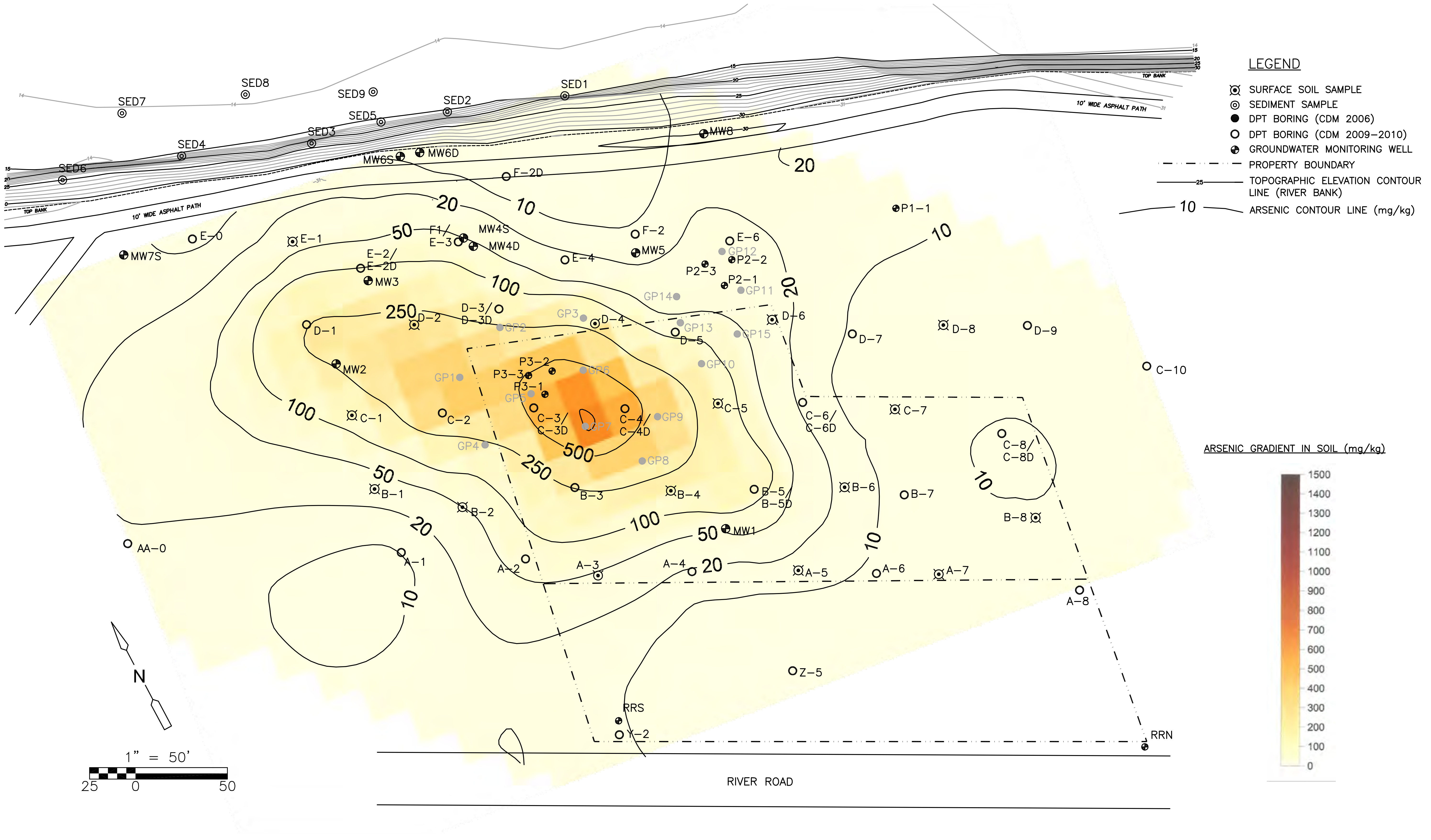


Figure No. 10
Site Map
Total Arsenic in Soil from EL. 24 to EL. 22

P:\19921\74559\Maps-May 2011\ Fig-10 as_4_24_22 XREFS: 11X17BDR, _CDM-SITE, 36130-SURV-TP02

N:\ACAD2008\19921-74559\Maps-May 2011\ Fig-11 as_4_22_20 06/10/11 12:51 talbotwk XREFS: 11X17BDR, _CDM-SITE, 36130-SURV-TP02, Map_4_As_22_20_p

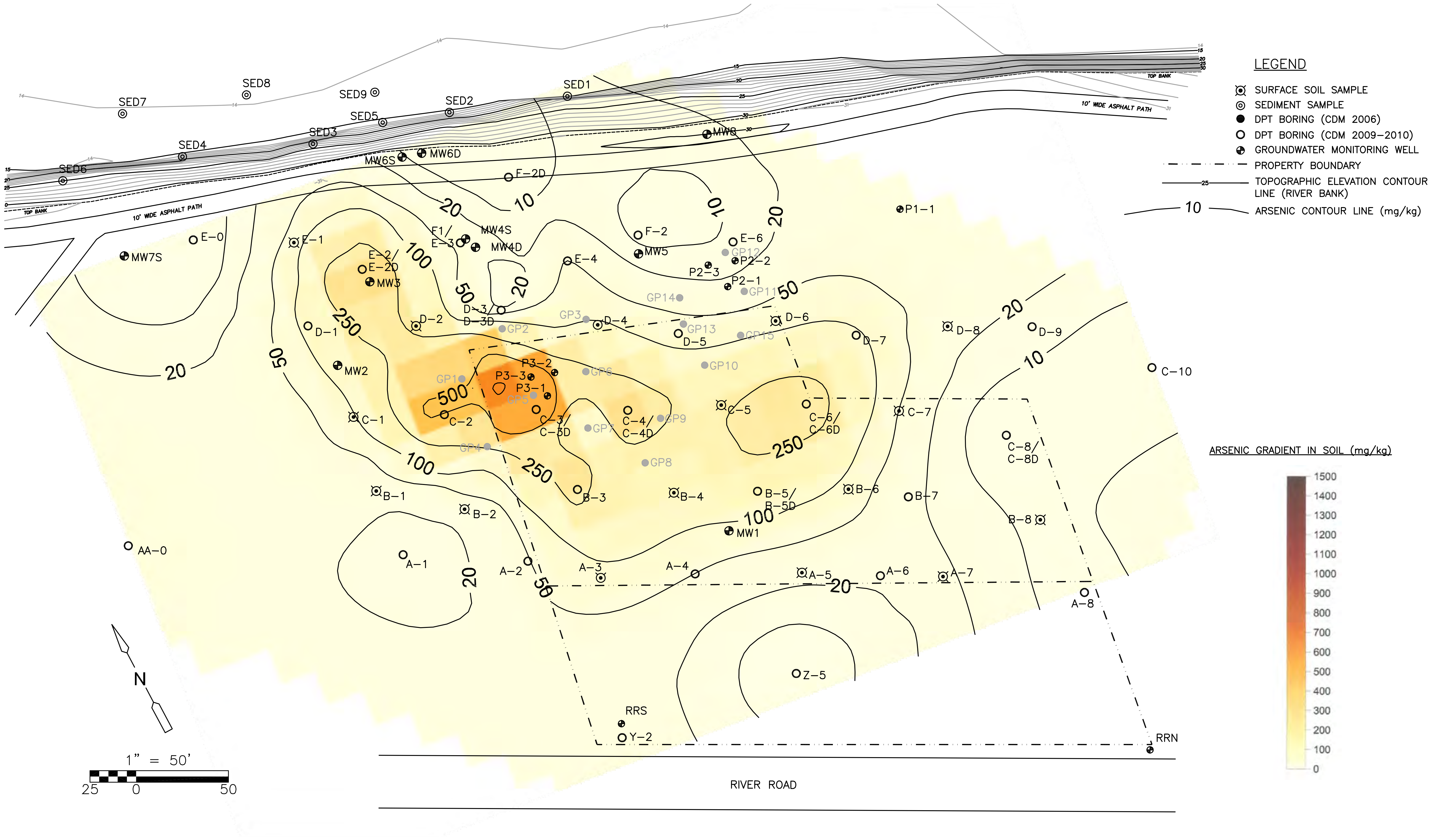


Figure No. 11
Site Map
Total Arsenic in Soil from EL. 22 to EL. 20

CDM

N:\ACAD2008\19921-74559\Maps-May 2011\ Fig-12 as_4_20_18 06/10/11 12:54 talbotwk XREFS: 11X17BDR, _CDM-SITE, 36130-SURV-TP02, Map_4_As_20_18_p

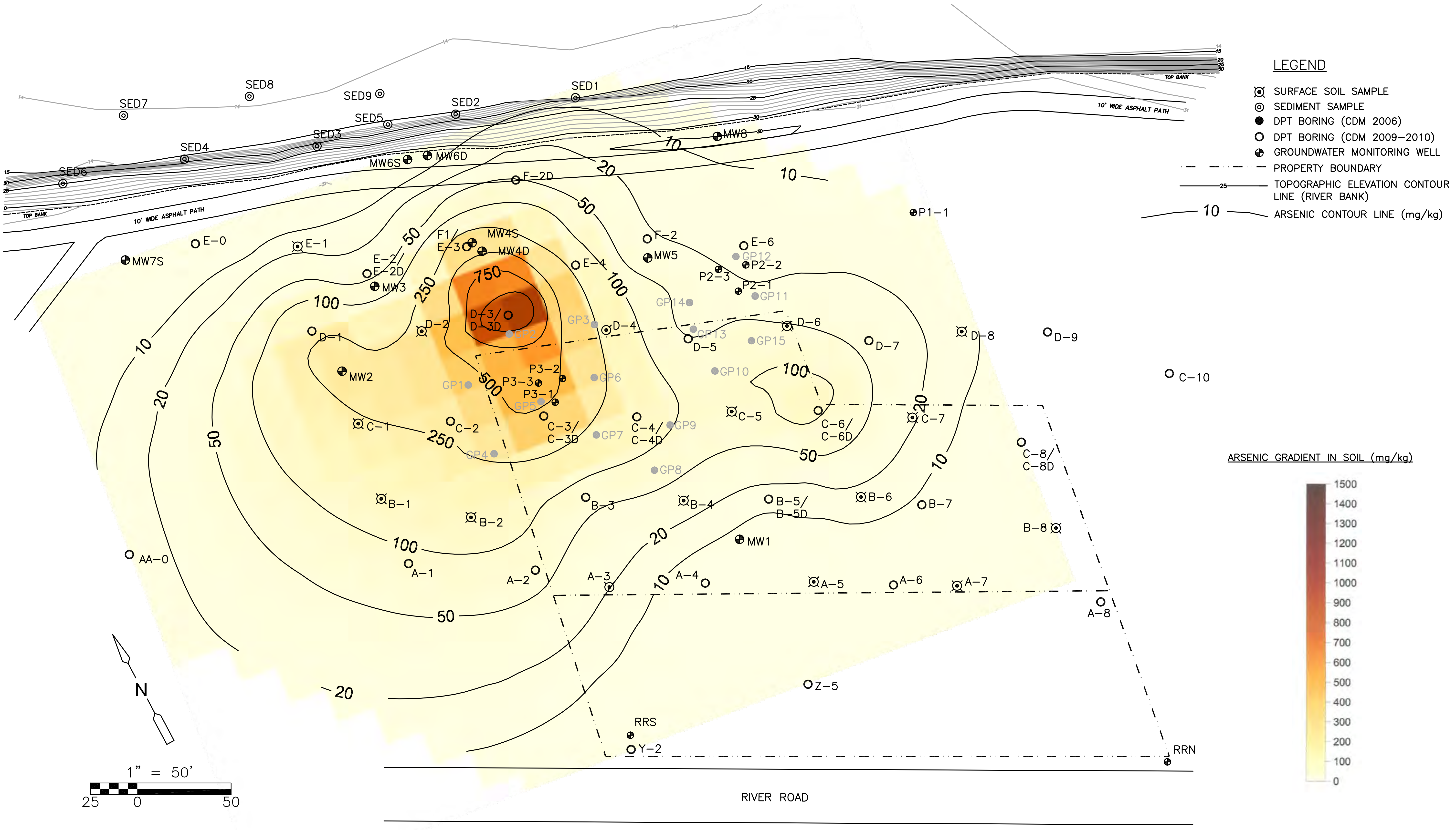


Figure No. 12
Site Map
Total Arsenic in Soil from EL. 20 to EL. 18

N:\ACAD2008\19921-74559\Maps-May 2011\ Fig-13 as_4_18_16 06/10/11 12:55 talbotwk XREFS: 11X17BDR, _CDM-SITE, 36130-SURV-TP02, Map_4_As_18_16_p

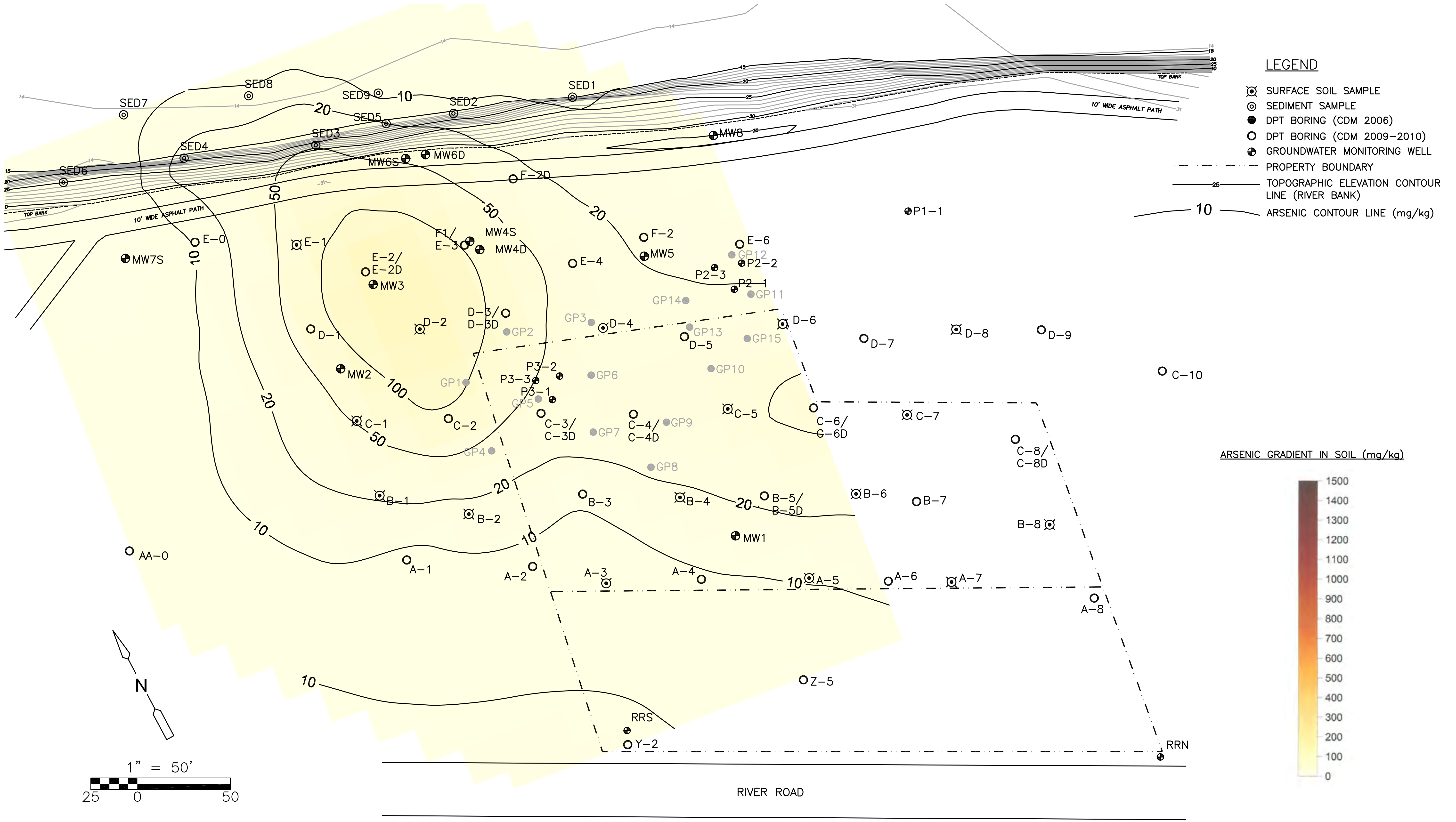
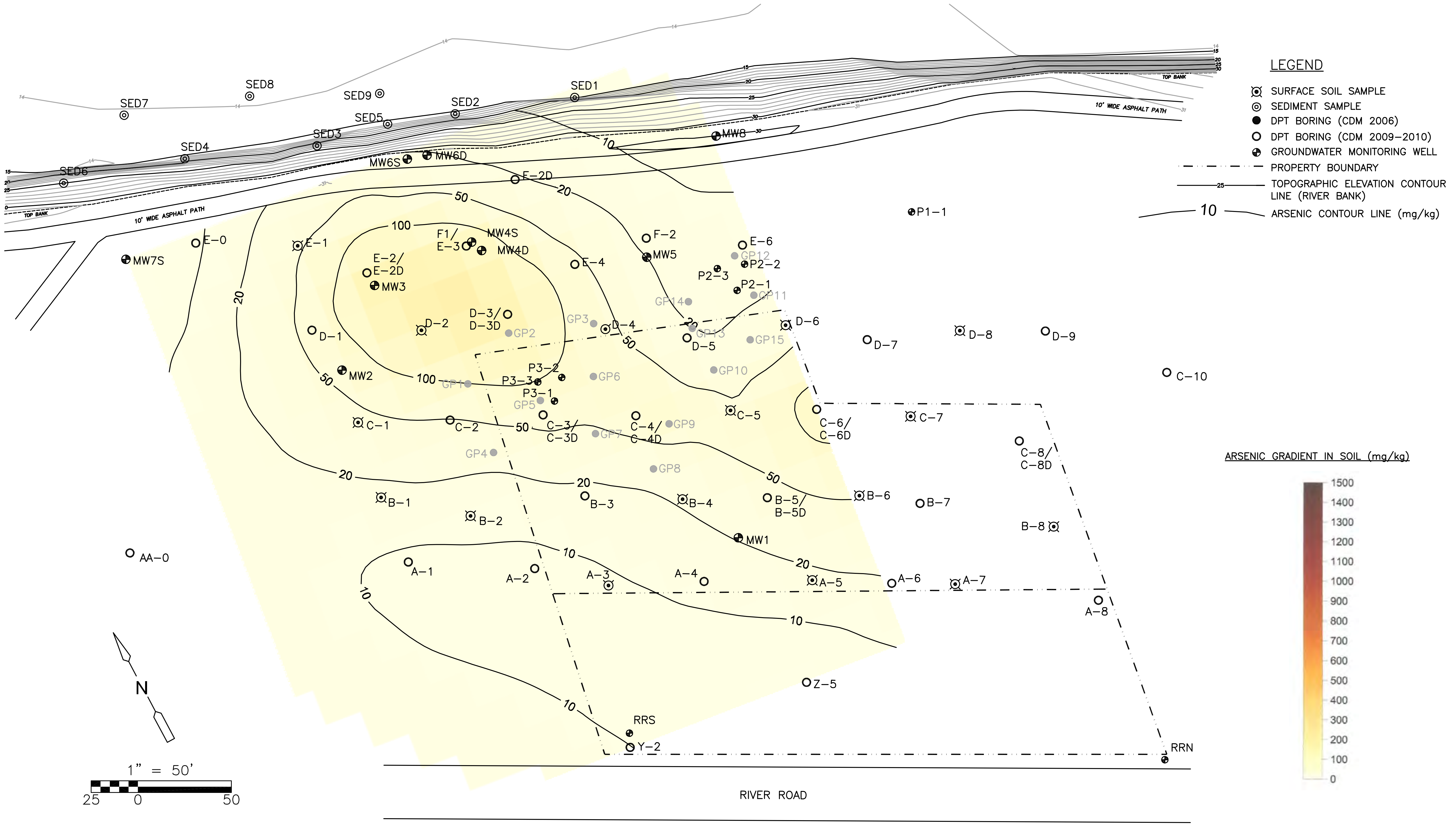


Figure No. 13
Site Map
Total Arsenic in Soil from EL. 18 to EL. 16



P:\19921\74559\Maps–May 2011\ Fig–14 as_4_16_14 XREFS: 11X17BDR, _CDM–SITE, 36130–SURV–TP02

Figure No. 14
Site Map
Total Arsenic in Soil from EL. 16 to EL. 14

N:\ACAD2008\19921-74559\Maps-May 2011\ Fig-15 as_4_14_12 06/10/11 13:00 talbotwk XREFS: 11X17BDR, _CDM-SITE, 36130-SURV-TP02, Map_4_As_14_12_p

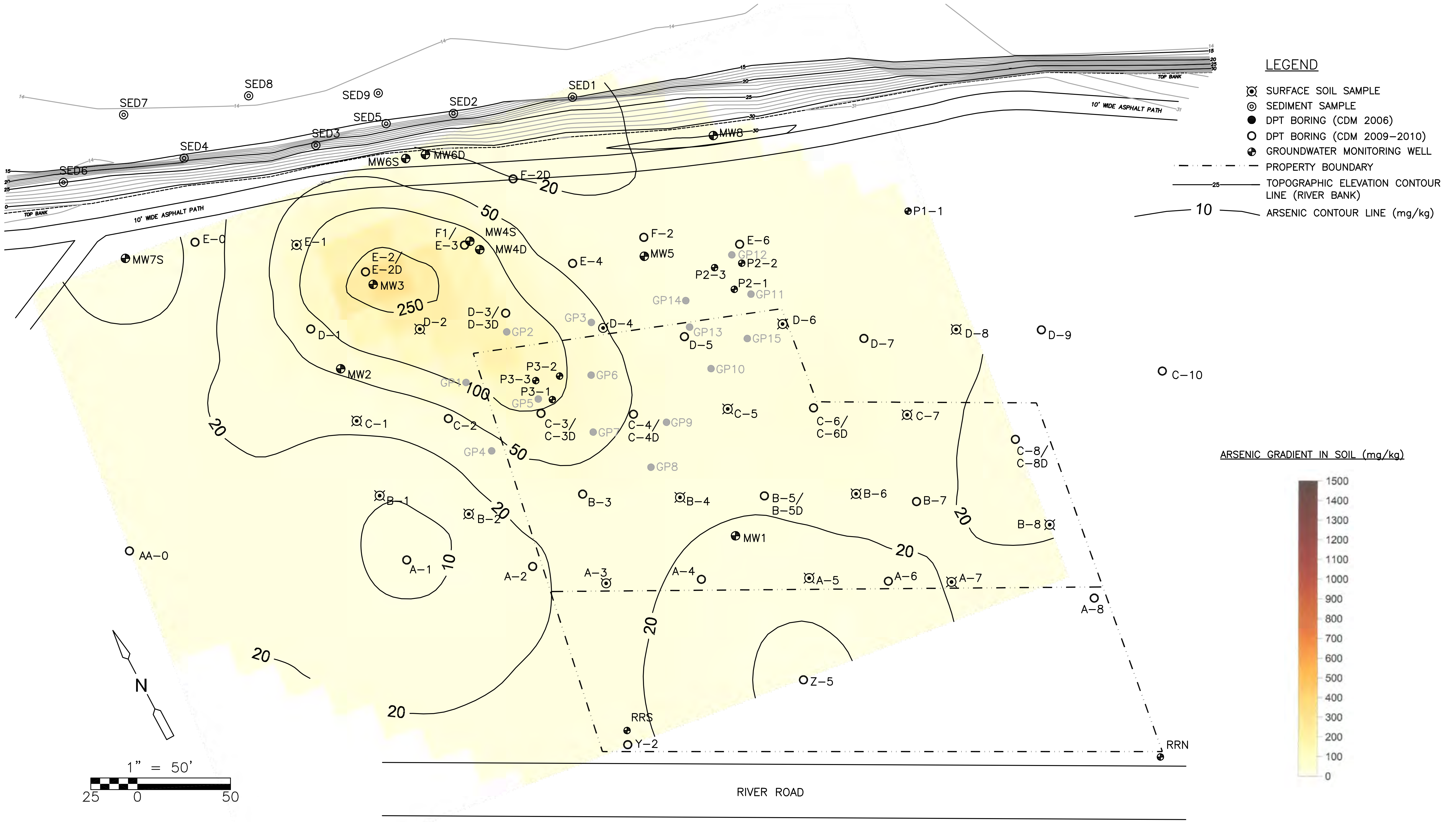


Figure No. 15
Site Map
Total Arsenic in Soil from EL. 14 to EL. 12

CDM

N:\ACAD2008\19921-74559\Maps-May 2011\ Fig-16 as_4_12_10 06/10/11 13:02 talbotwk XREFS: 11X17BDR, _CDM-SITE, 36130-SURV-TP02, Map_4_As_12_10_p

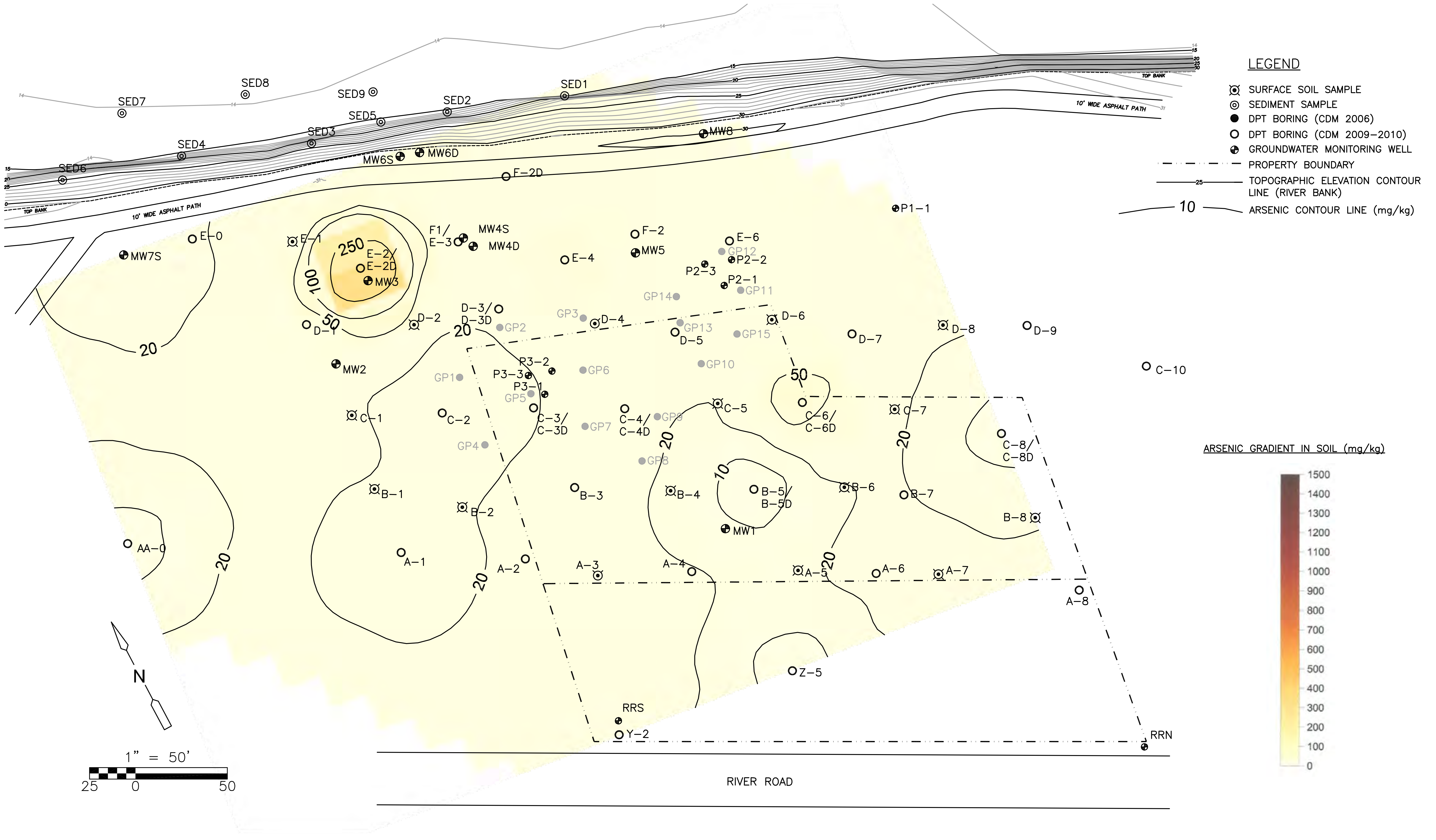


Figure No. 16
Site Map
Total Arsenic in Soil from EL. 12 to EL. 10

CDM

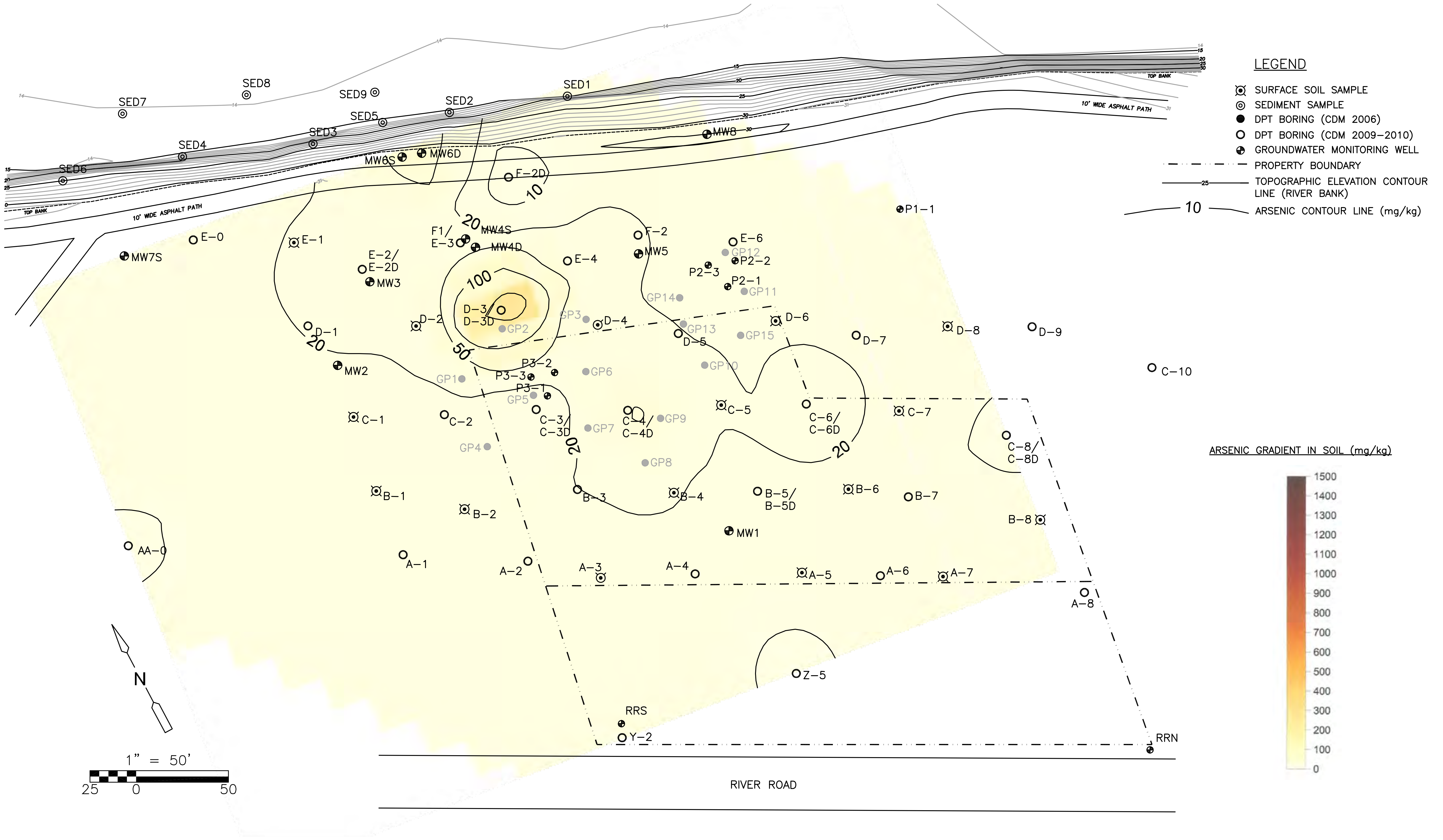
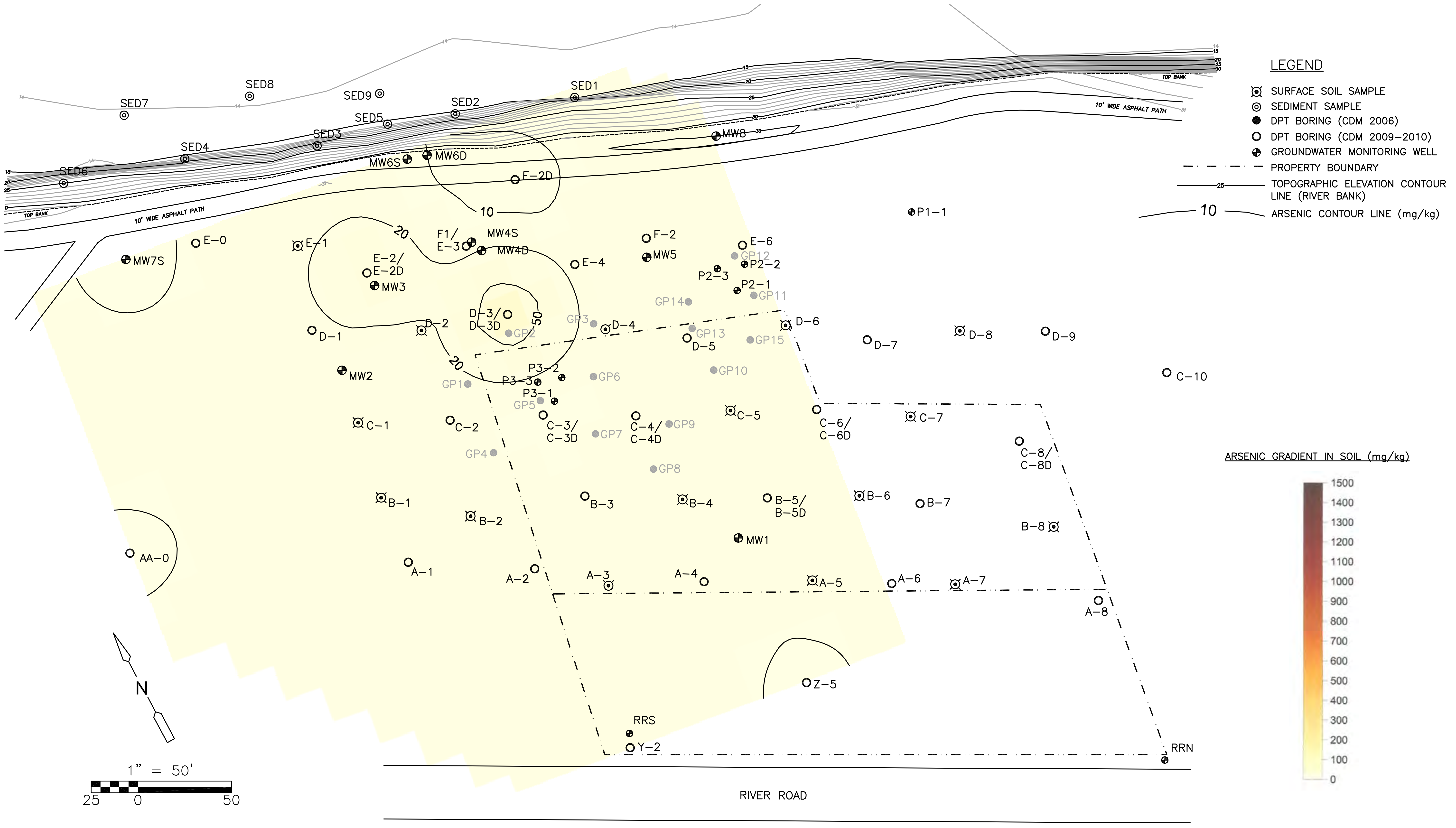


Figure No. 17
Site Map
Total Arsenic in Soil from EL. 10 to EL. 8

CDM

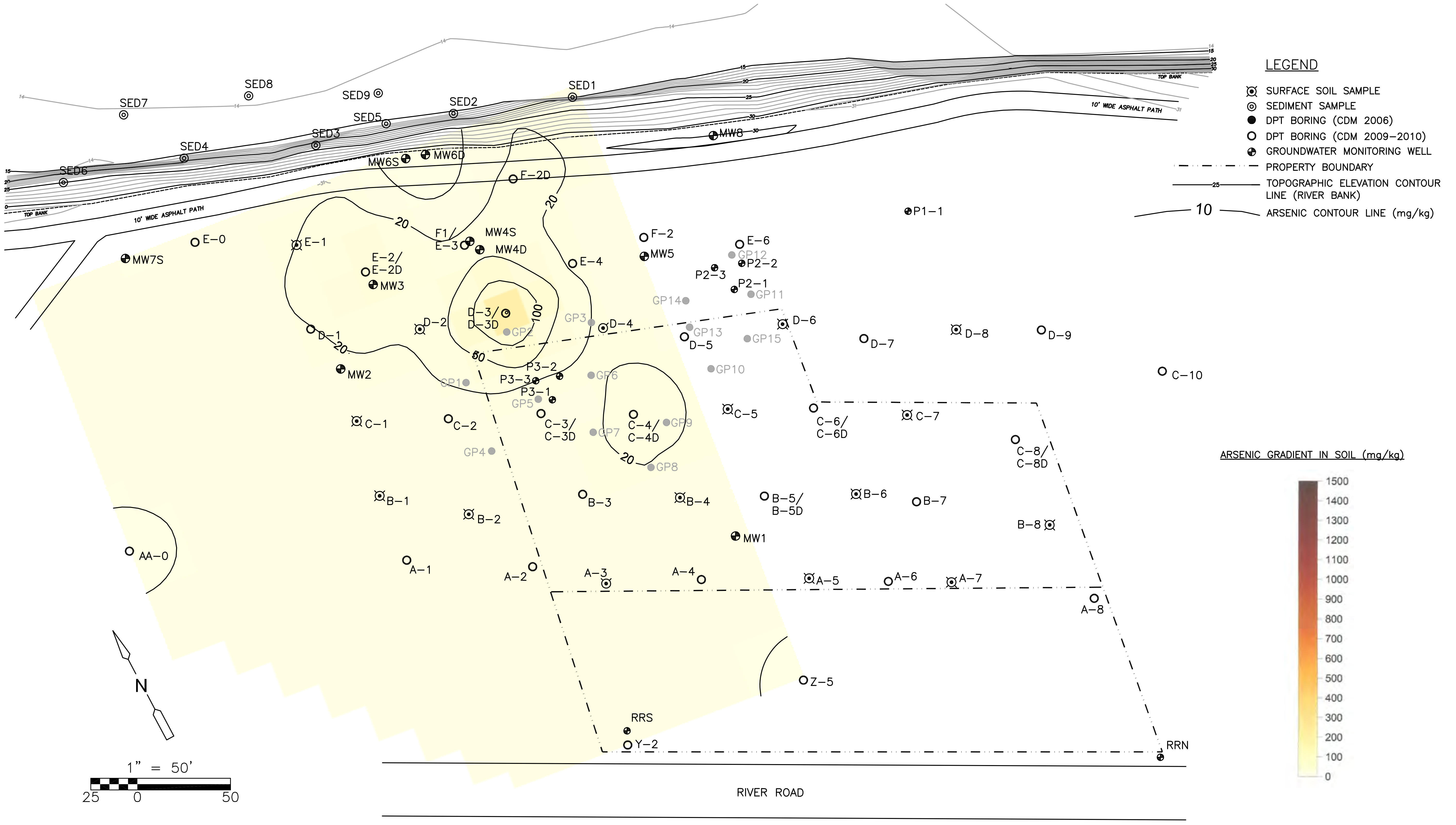
N:\ACAD2008\19921–74559\Maps–May 2011\ Fig–17 as_4_10_8 06/10/11 13:04 talbotwk XREFS: 11X17BDR, _CDM–SITE, 36130–SURV–TP02, Map_4_As_10_08_p



N:\ACAD2008\19921–74559\Maps–May 2011\ Fig–18 as_4_8_6 06/10/11 13:05 talbotwk XREFS: 11X17BDR, _CDM–SITE, 36130–SURV–TP02, Map_4_As_08_06_p

CDM

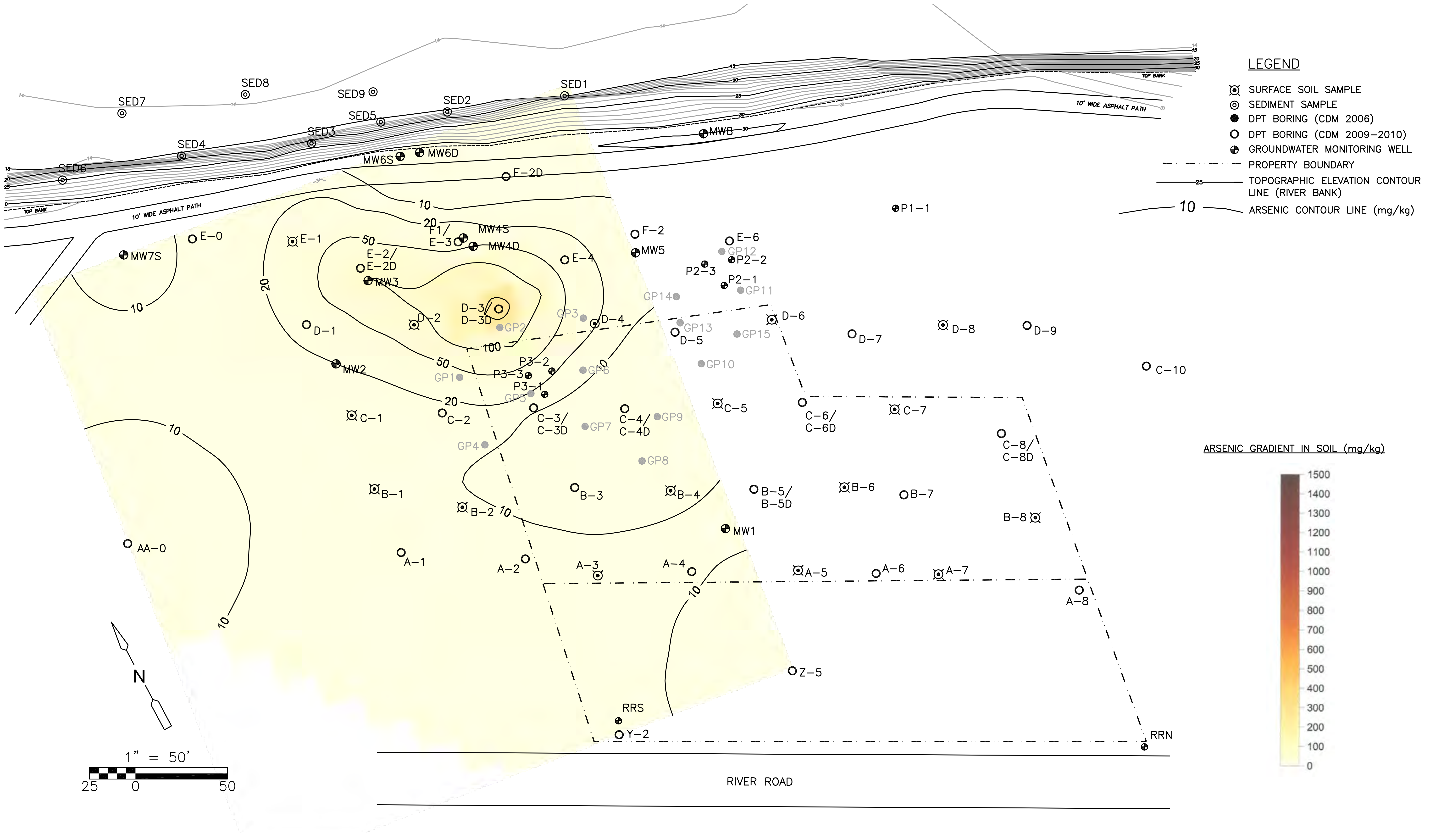
Figure No. 18
Site Map
Total Arsenic in Soil from EL. 8 to EL. 6



N:\ACAD2008\19921-74559\Maps-May 2011\ Fig-19 as_4_6_4 06/10/11 13:05 talbotwk XREFS: 11X17BDR, _CDM-SITE, 36130-SURV-TP02, Map_4_As_06_04_p

Figure No. 19
Site Map
Total Arsenic in Soil from EL. 6 to EL. 4

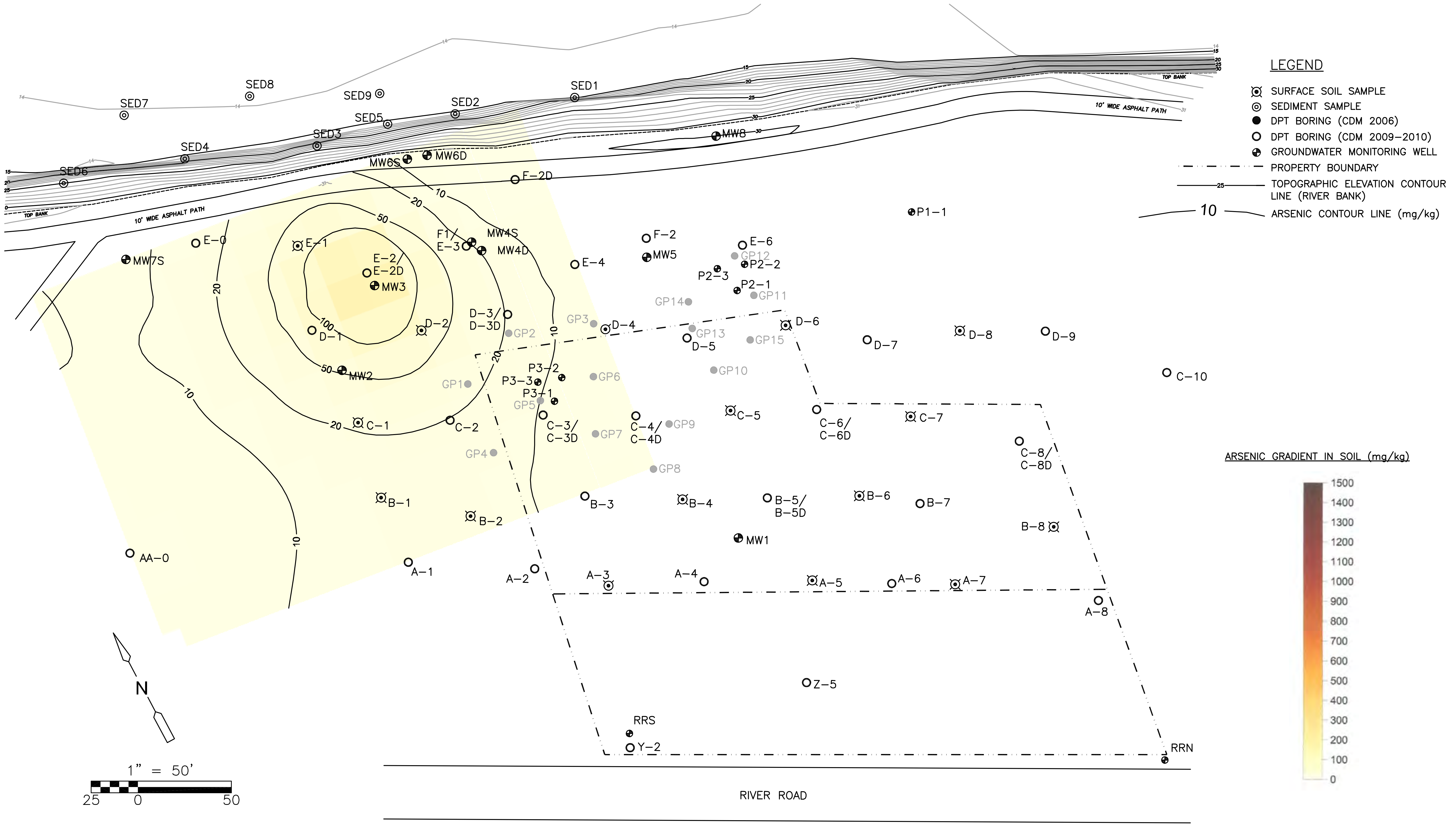
N:\ACAD2008\19921-74559\Maps-May 2011\ Fig-20 as_4_4_2 06/10/11 13:06 talbotwk XREFS: 11X17BDR, _CDM-SITE, 36130-SURV-TP02, Map_4_As_04_02_p



CDM

Figure No. 20
Site Map
Total Arsenic in Soil from EL. 4 to EL. 2

N:\ACAD2008\19921-74559\Maps-May 2011\ Fig-21 as_4_2_0 06/10/11 13:07 talbotwk XREFS: 11X17BDR, _CDM-SITE, 36130-SURV-TP02, Map_4_As_02_00_p



CDM

Figure No. 21
Site Map
Total Arsenic in Soil from EL. 2 to EL. 0

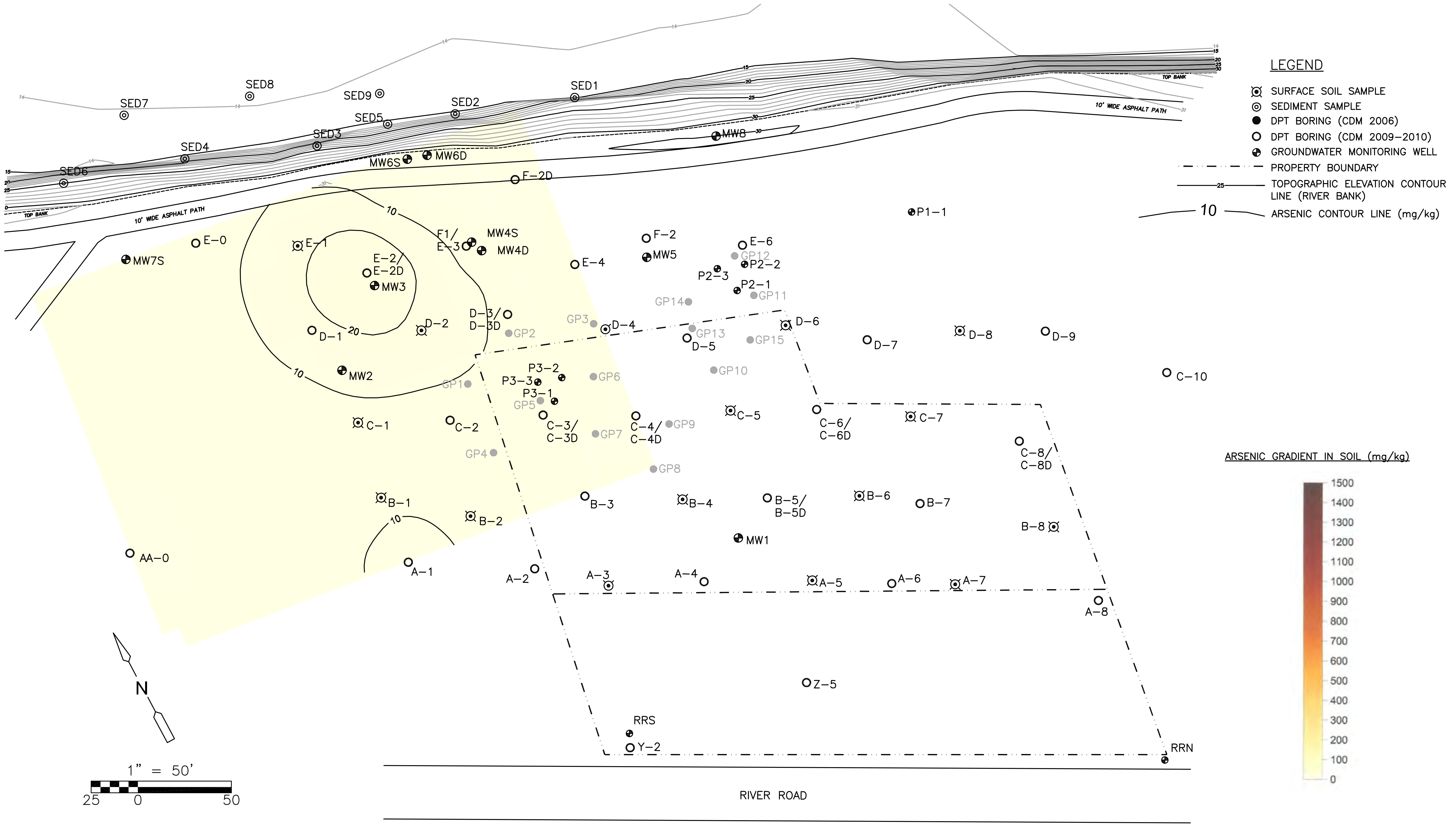


Figure No. 22
Site Map
Total Arsenic in Soil from EL. 0 to EL. -2

N:\ACAD2008\19921-74559\Maps-May 2011\ Fig-23 as_4_-2_-4 06/10/11 13:09 talbotwk XREFS: 11X17BDR, _CDM-SITE, 36130-SURV-TP02, Map_4_As_B2_B4_b,

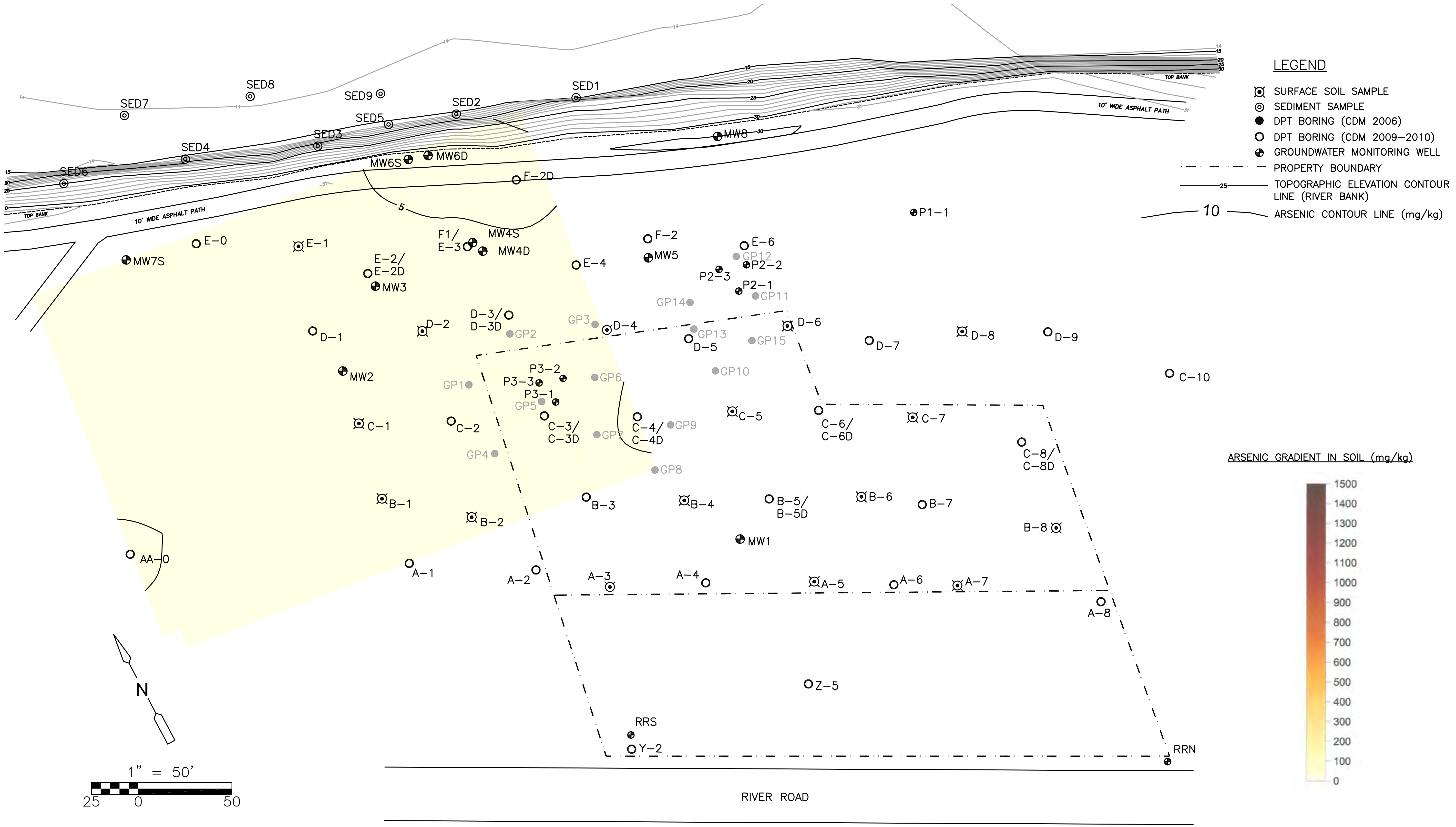


Figure No. 23
Site Map
Total Arsenic in Soil from EL. −2 to EL. −4

CDM

N:\ACAD2008\19921-74559\Maps-May 2011\ Fig-24 GW_AS 06/10/11 13:10 talbotwk XREFS: 11X17BDR, _CDM-SITE, 36130-SURV-TP02

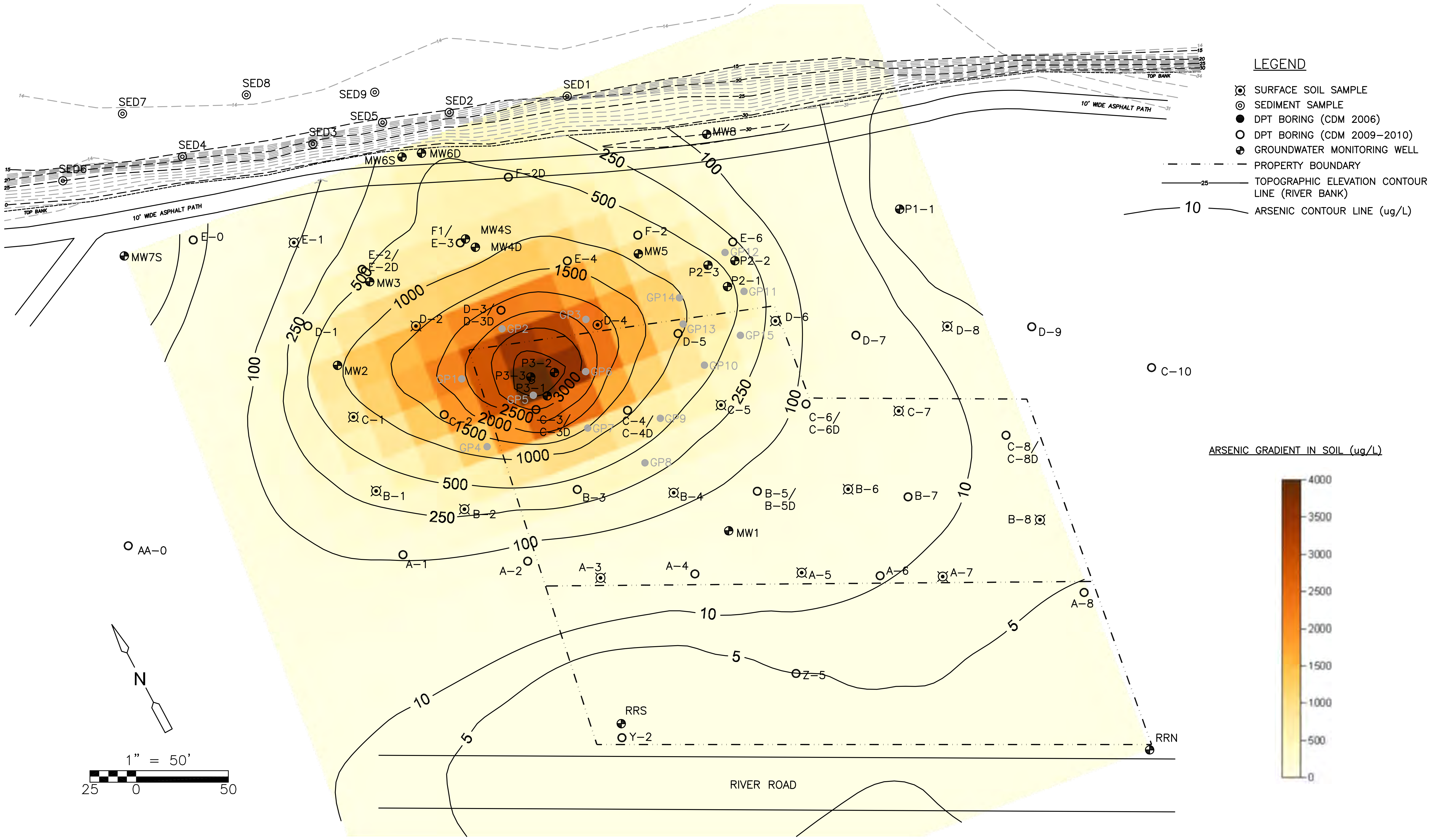


Figure No. 24
Site Map
Dissolved Arsenic in Groundwater

N:\ACAD2008\19921-74559\Maps-May 2011\ Fig-25 GW_AS3 06/10/11 13:10 talbotwk XREFS: 11X17BDR, _CDM-SITE, 36130-SURV-TP02

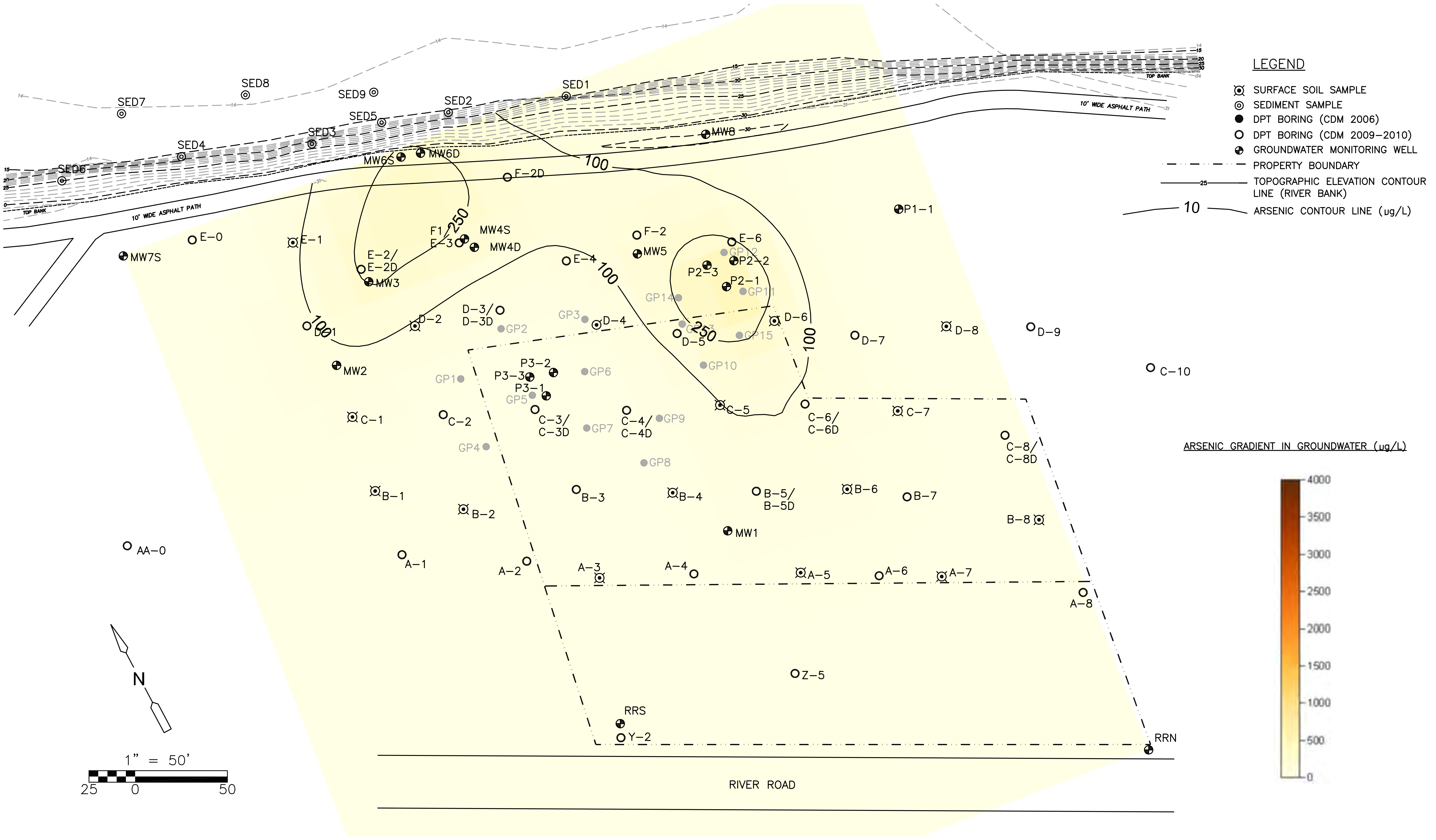


Figure No. 25
Site Map
Arsenic +3 in Groundwater

CDM

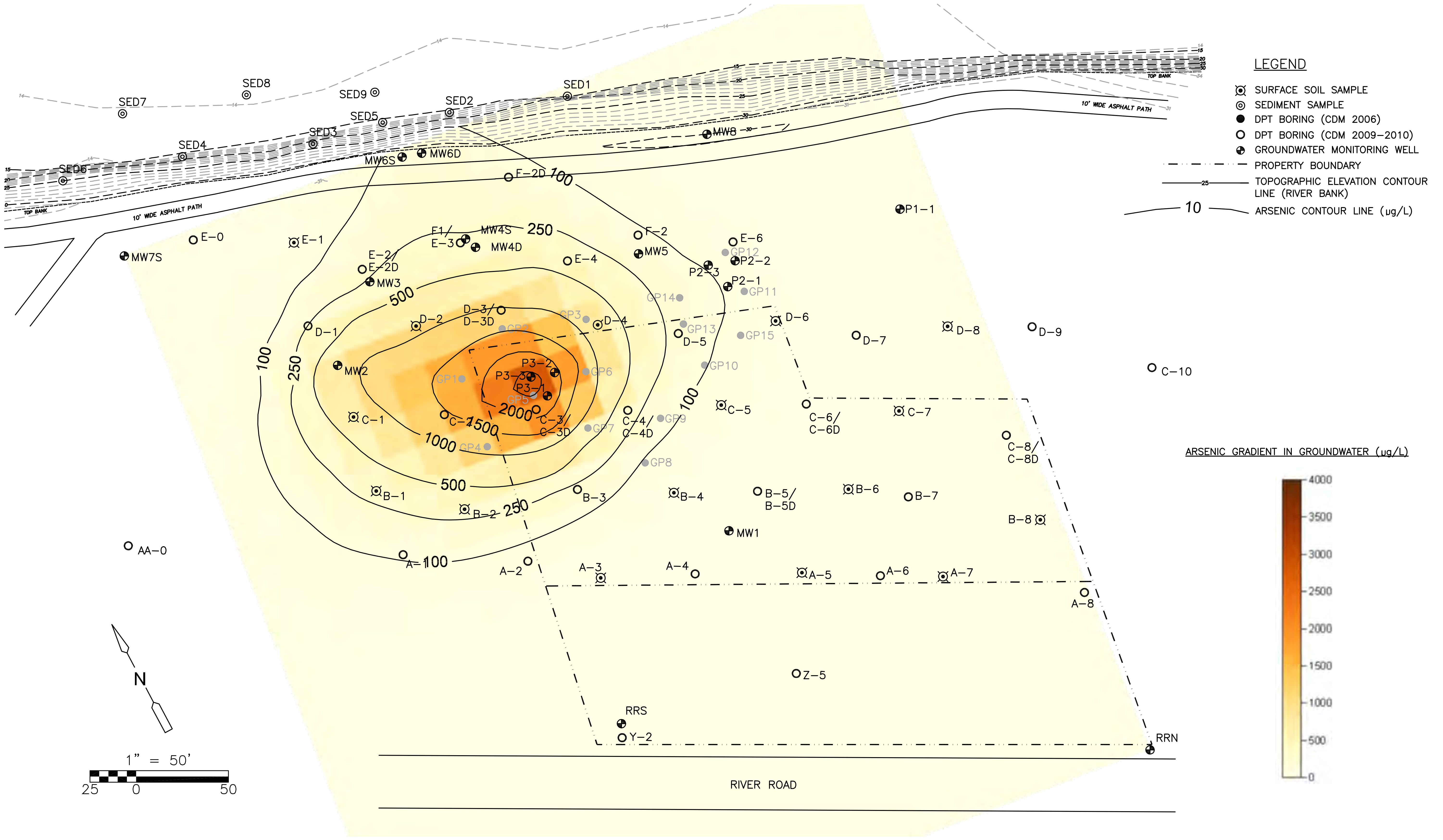


Figure No. 26
Site Map
Arsenic +5 in Groundwater

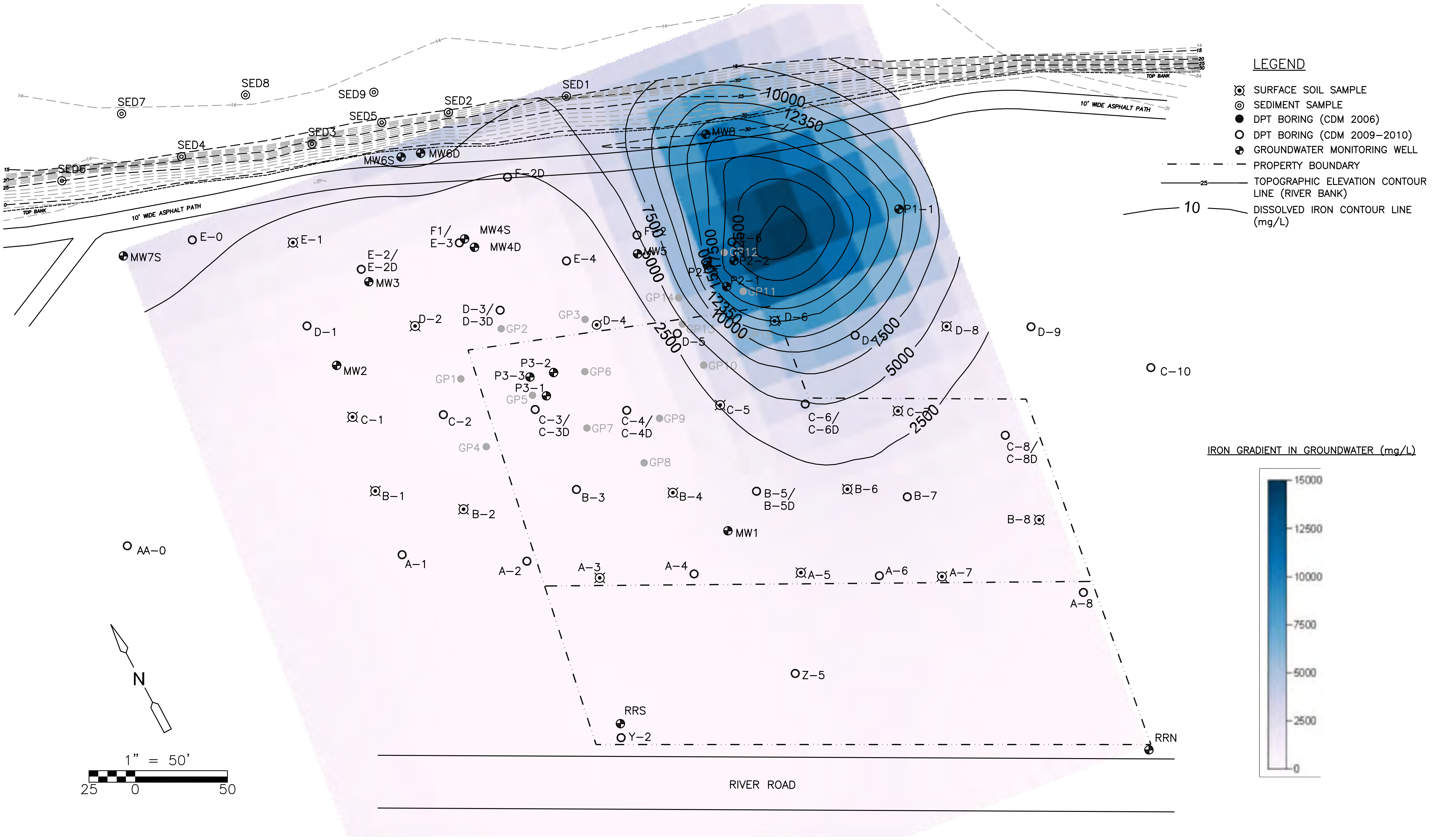


Figure No. 27
Site Map
Dissolved Iron in Groundwater

N:\ACAD2008\19921-74559\Maps-May 2011\ Fig-28_GW_ORP 06/10/11 13:13 talbotwk XREFS: 11X17BDR, _CDM-SITE, 36130-SURV-TP02

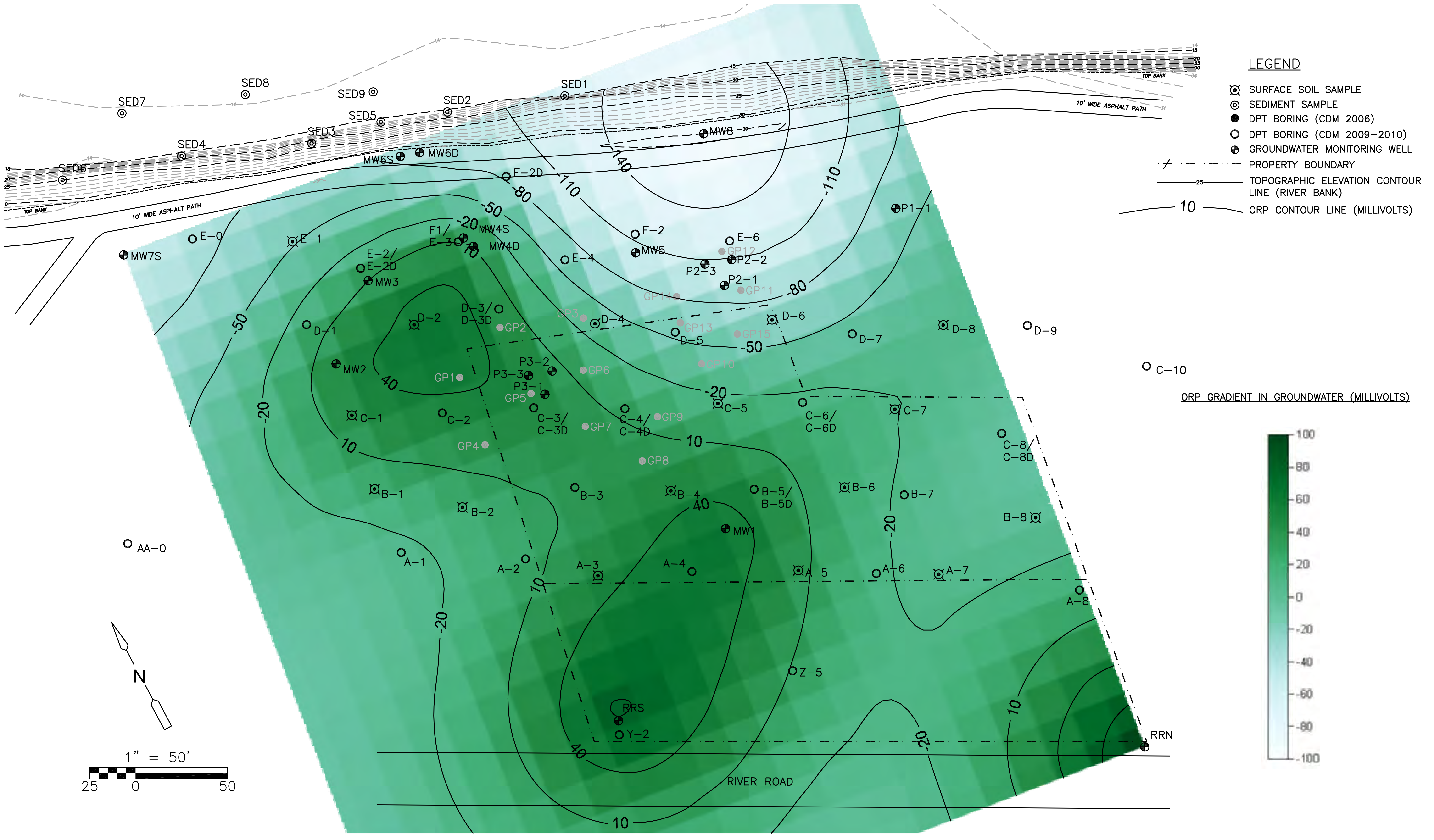


Figure No. 28
Site Map
Oxidation Reduction Potential in Groundwater

CDM

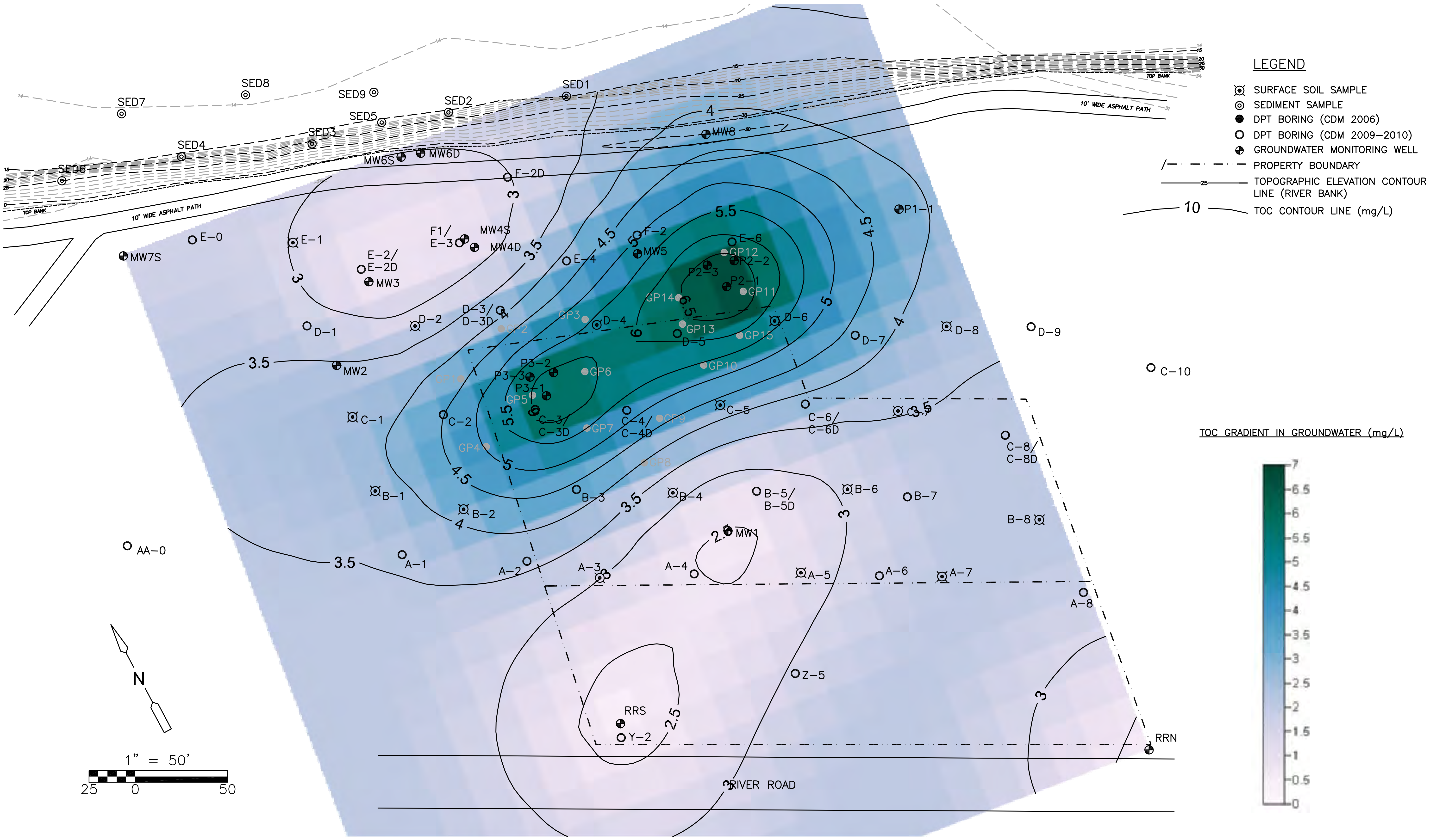


Figure No. 29
Site Map
Total Organic Carbon in Groundwater

N:\ACAD2008\19921-74559\Maps-May 2011\ Fig-30-Asenic in Sediment 06/10/11 13:16 talbotwk XREFS: _CDM-SITE, 11X17BDR, 36130-SURV-TP02

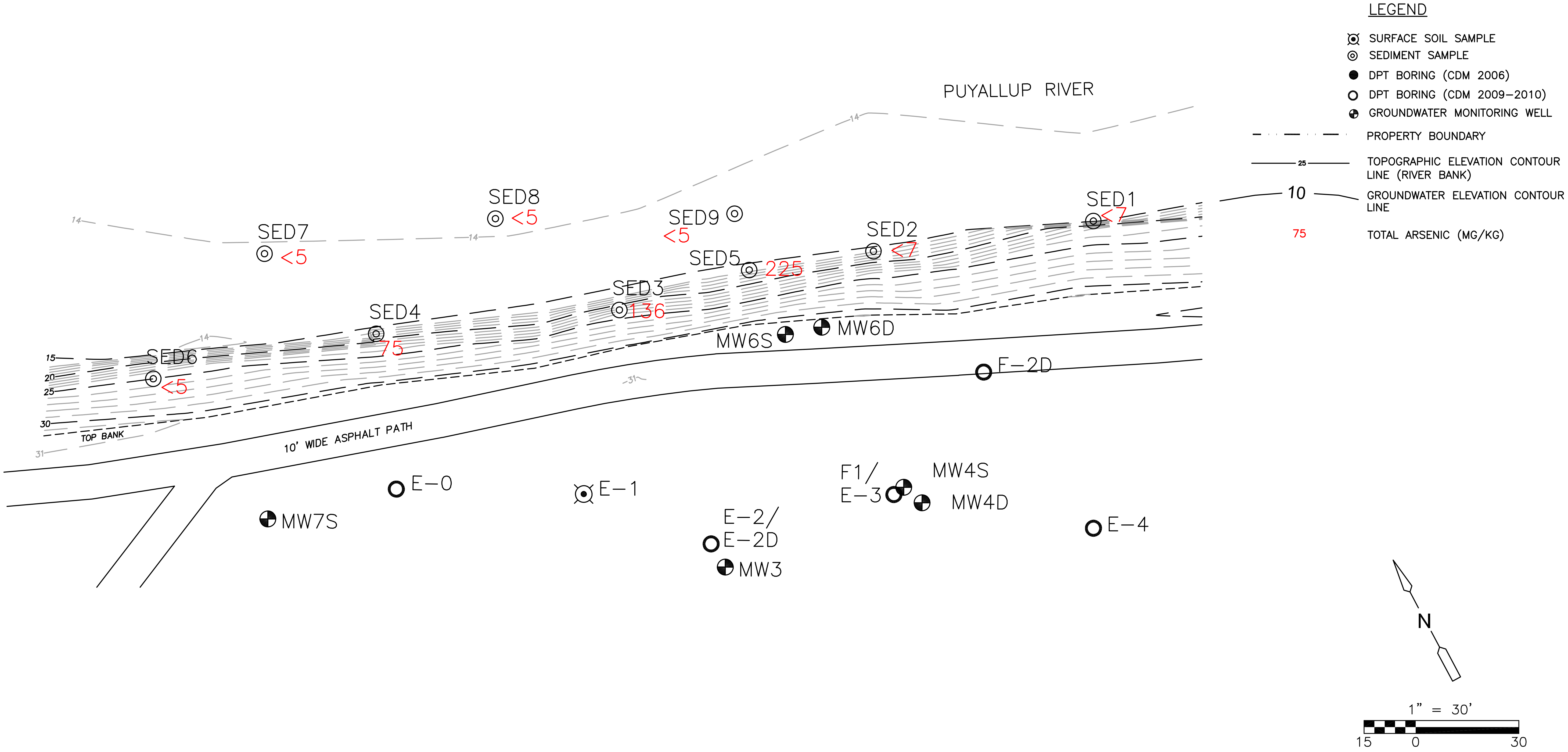
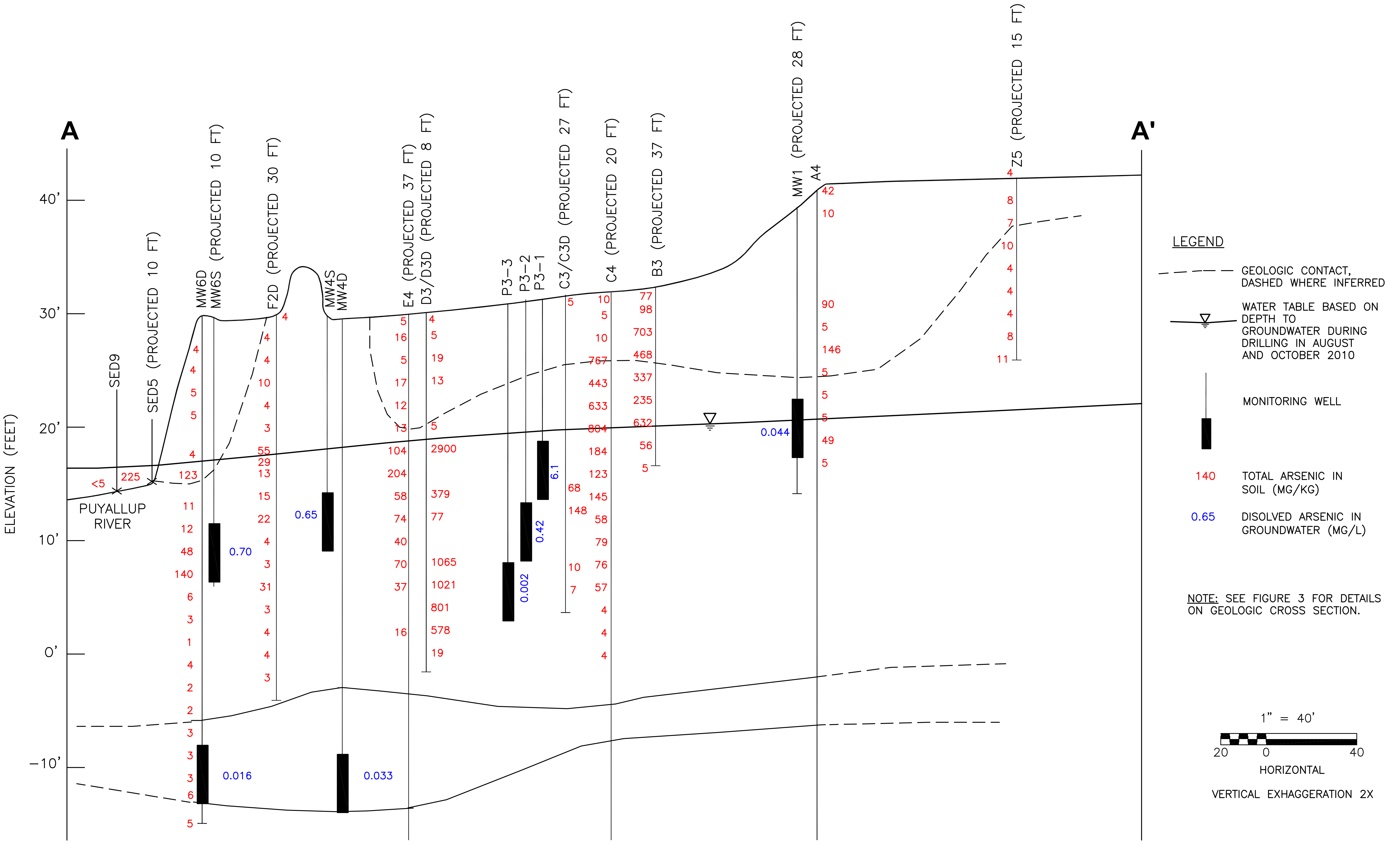


Figure No. 30
Asenic in Sediment



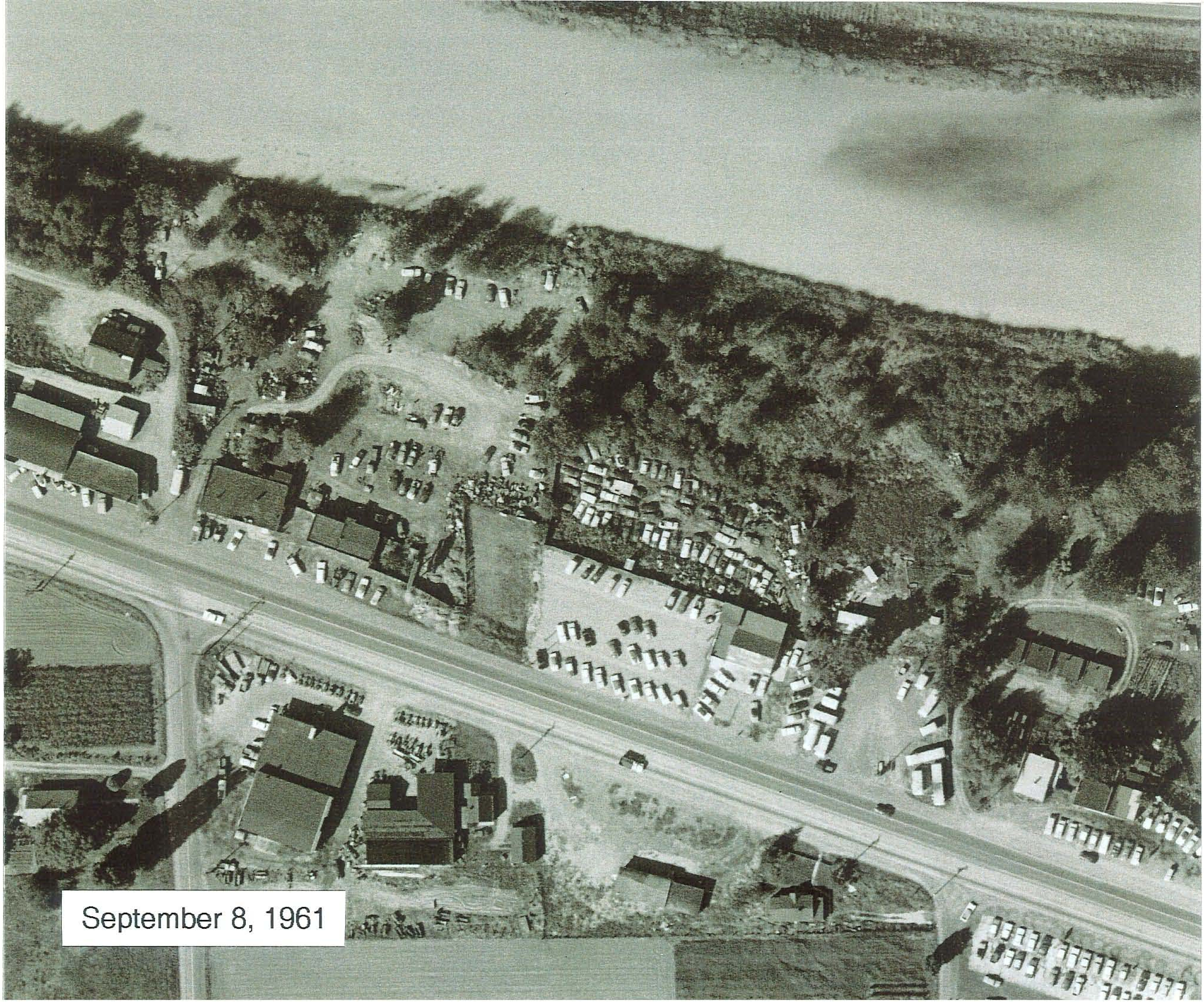
NOTE: SEE FIGURE 3 FOR DETAILS ON GEOLOGIC CROSS SECTION.

N:\ACAD2008\19921-74559\Maps-May 2011\ Fig-31 Arsenic in Soil 7 Groundwater A-A 06/10/11 09:05 talbotwk

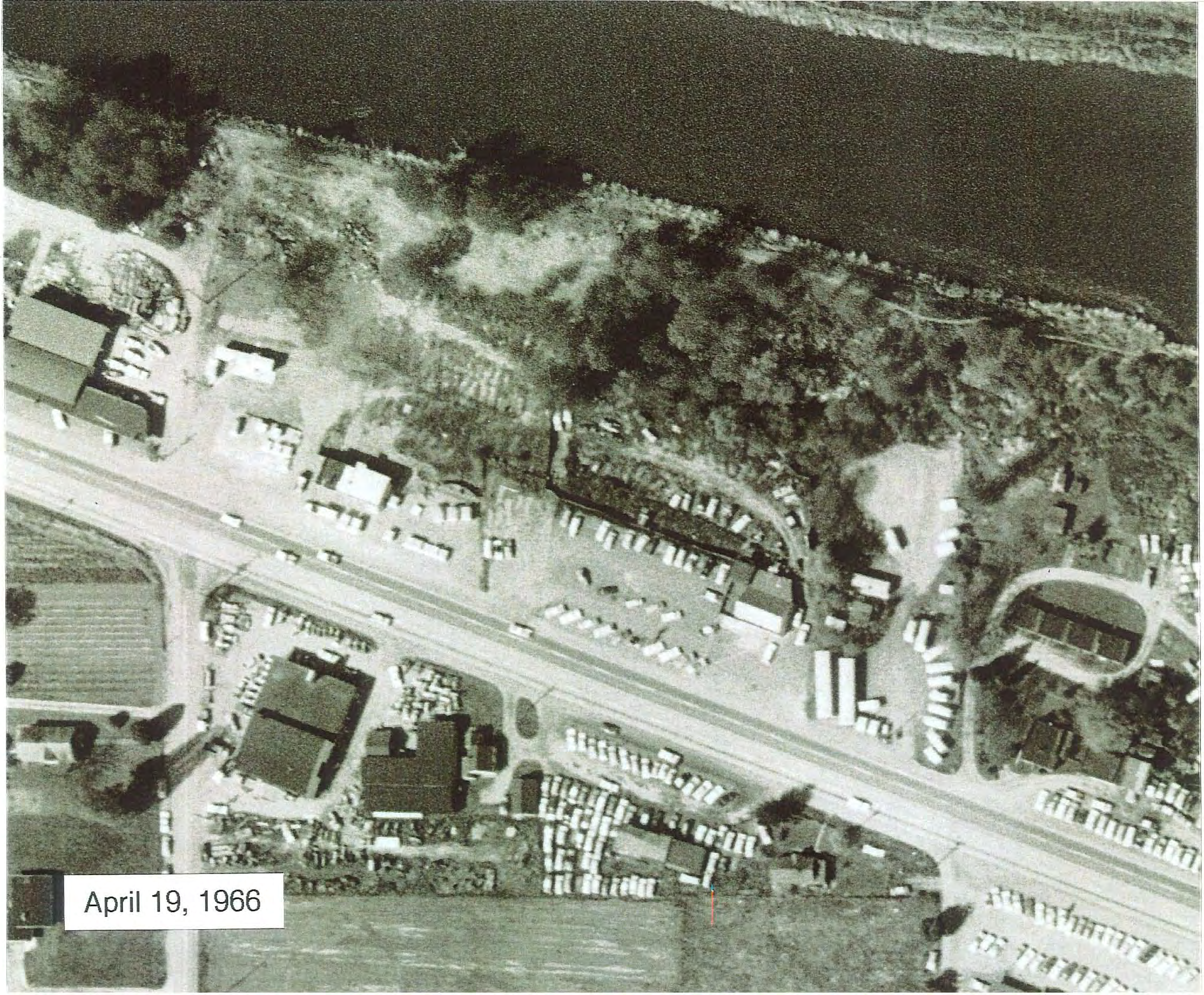
Figure No. 31
Arsenic in Soil & Groundwater A–A'

Appendix A

Historical Aerial Photographs

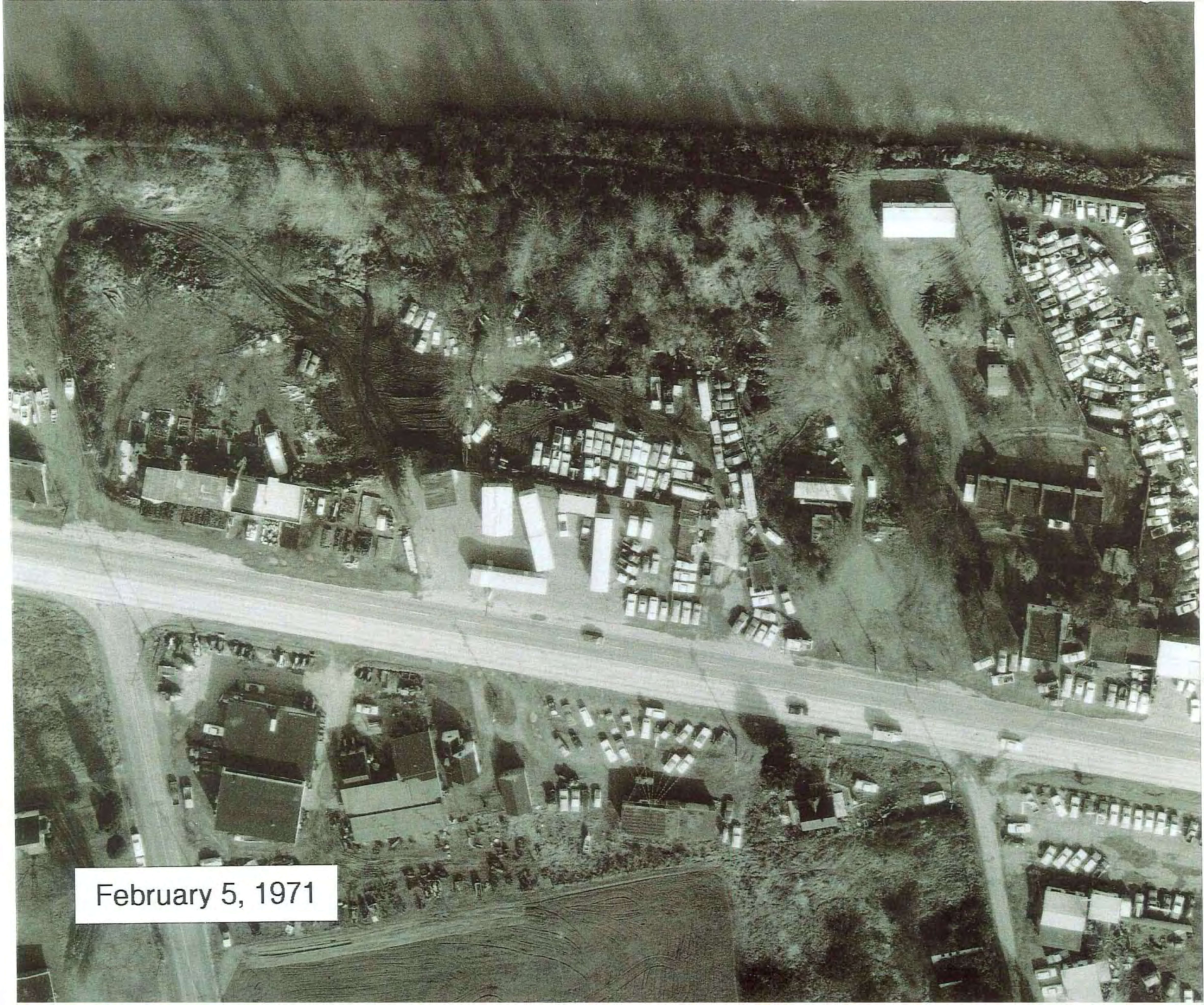


September 8, 1961

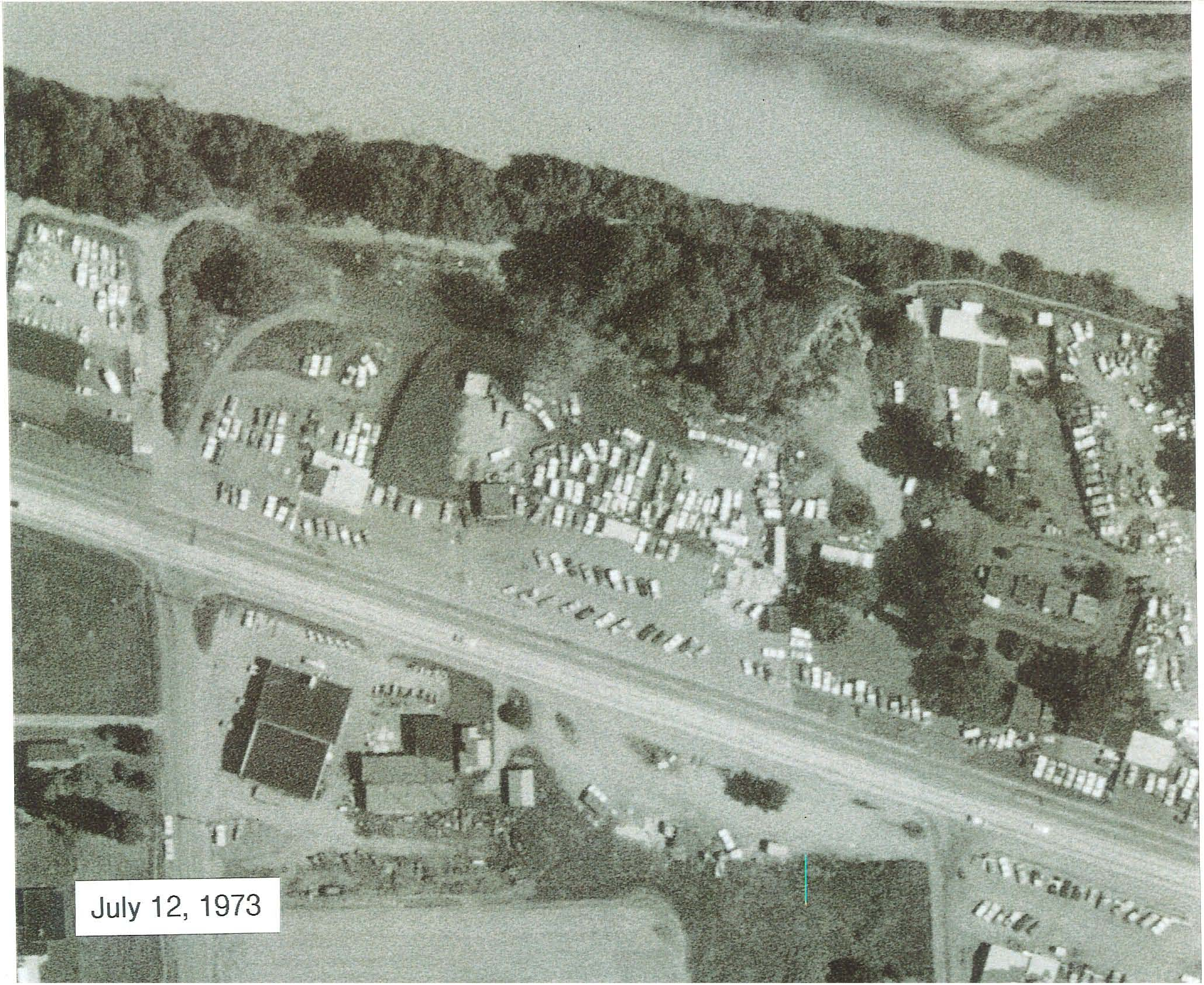


April 19, 1966

March 25, 1969

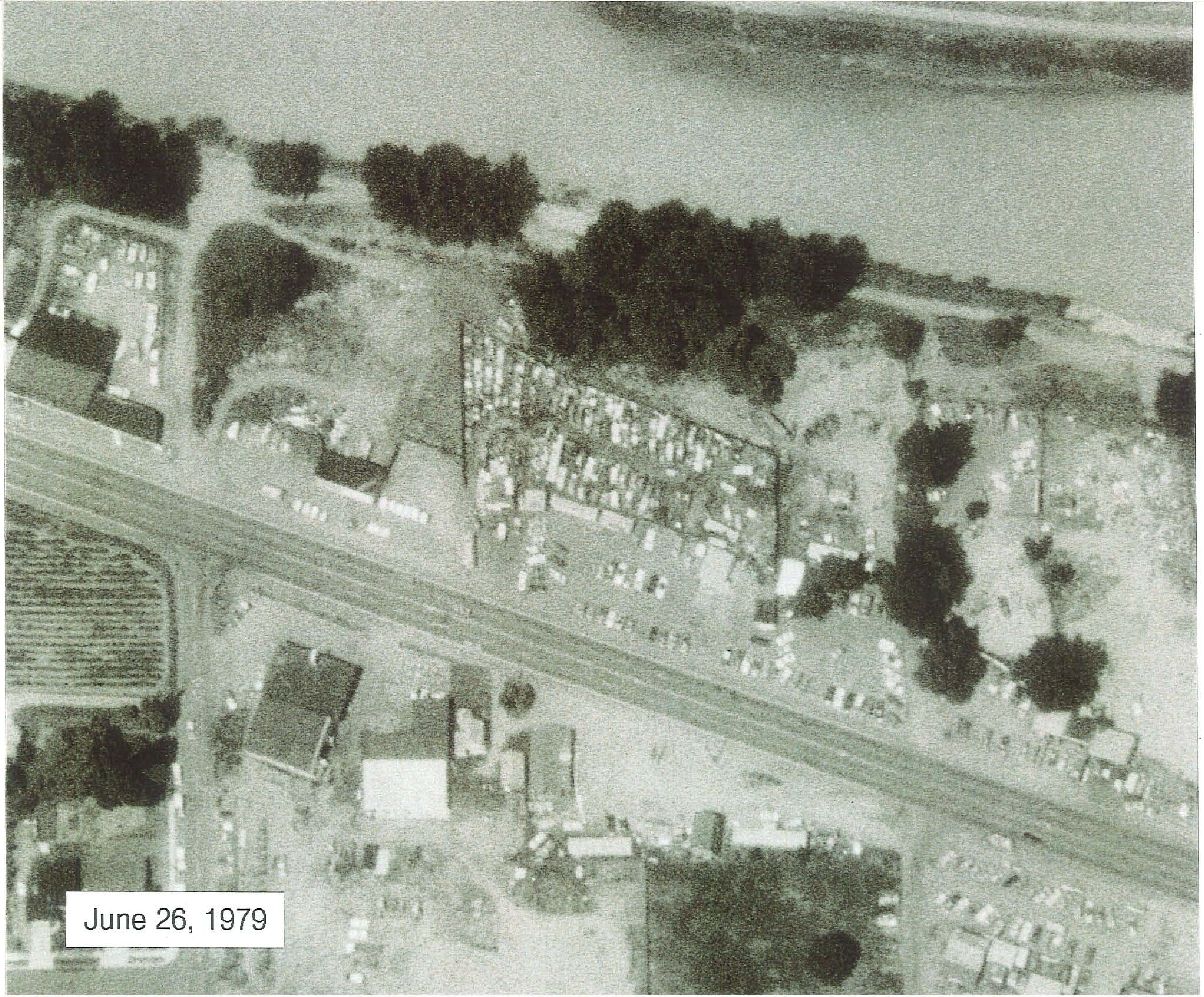


February 5, 1971

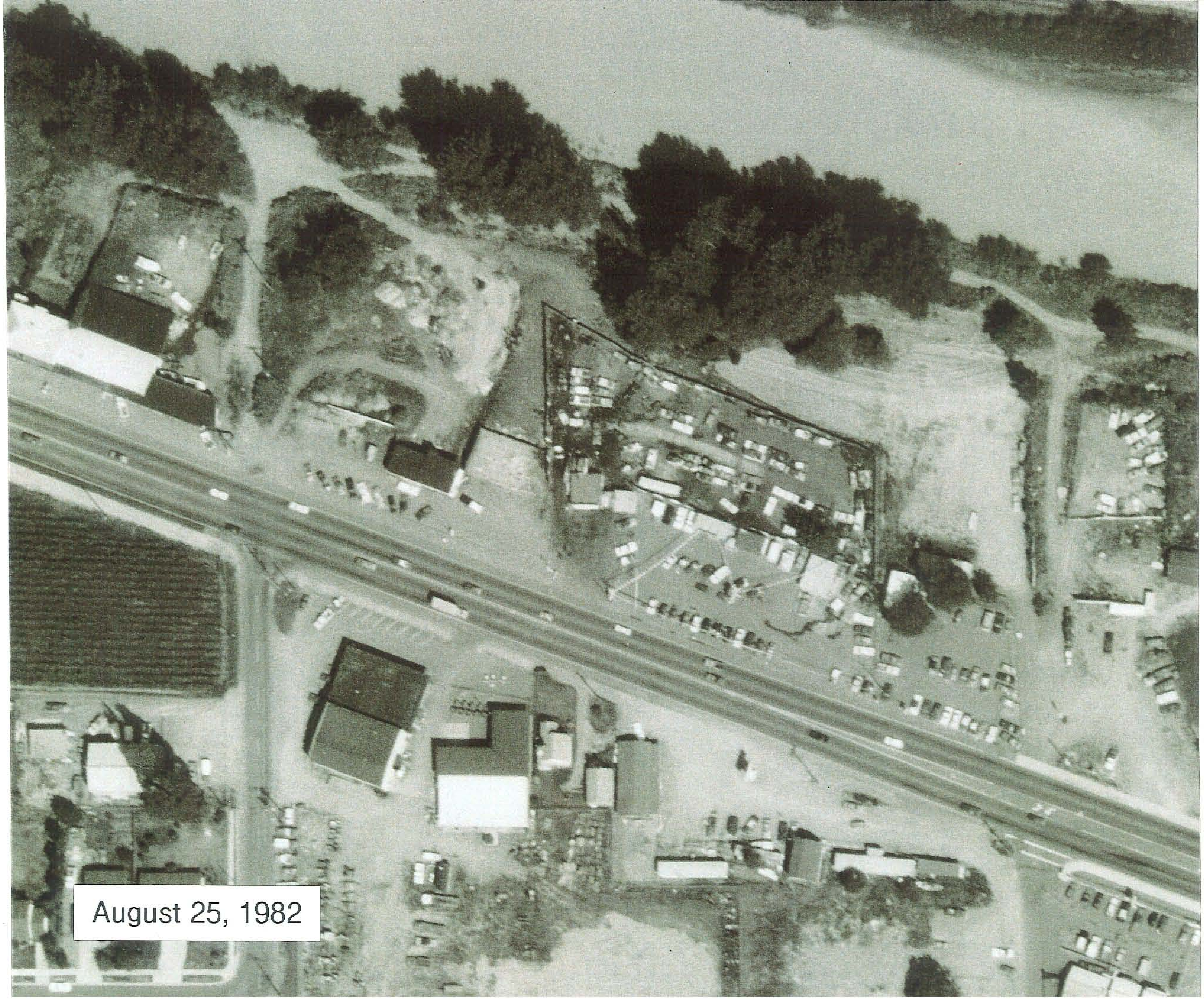

July 12, 1973

June 12, 1974

May 21, 1979



June 26, 1979



August 25, 1982

March 3, 1985

August 14, 1985

July 20, 1988

June 5, 2003

Appendix B

Boring Logs and Well Construction Records

SOIL CLASSIFICATION LEGEND

MAJOR DIVISIONS / TYPICAL NAMES

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

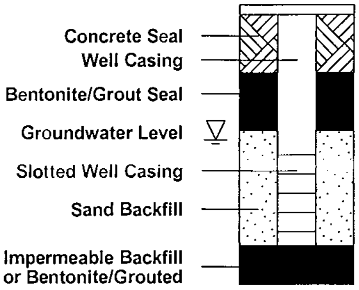
Moist - Damp but no visible free water

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.

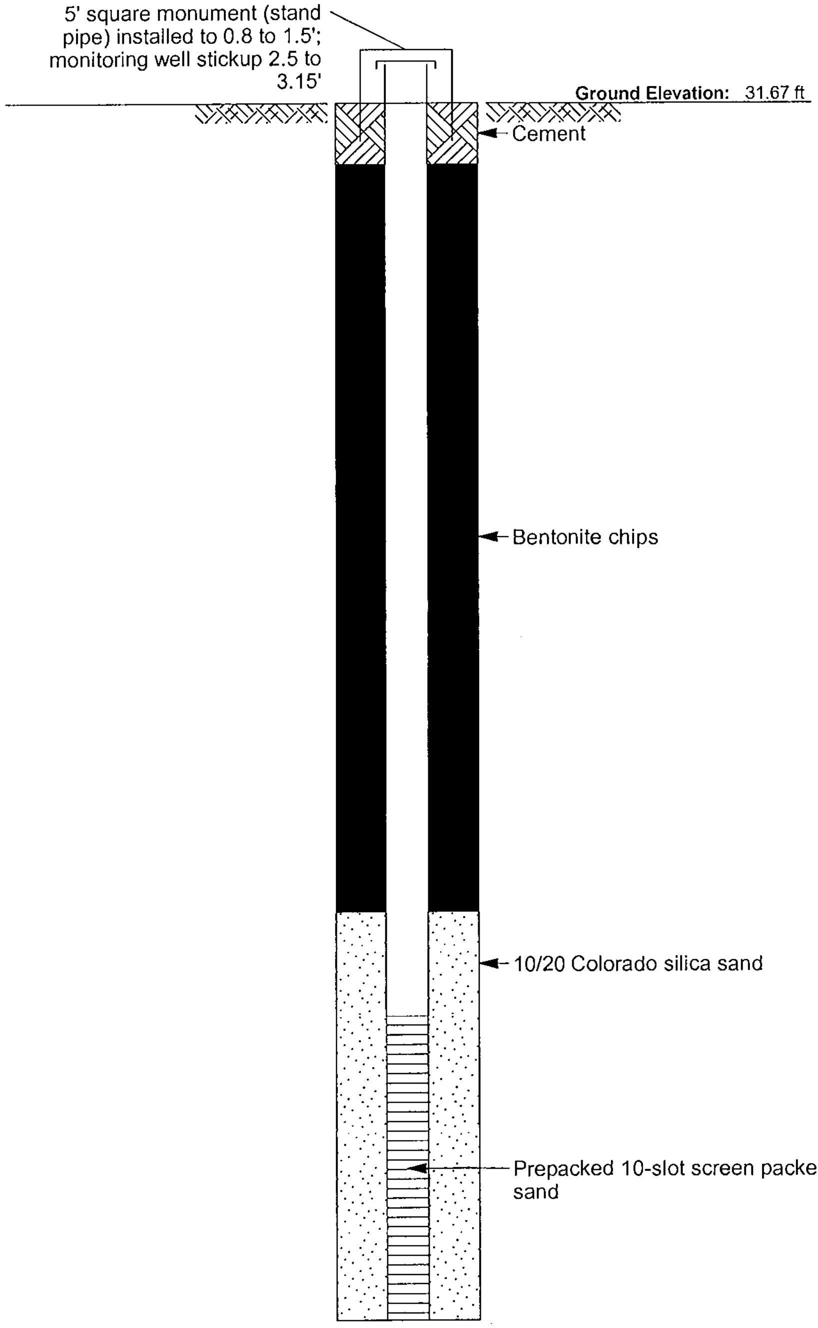
3. WOR = weight of rod.

USG Interiors
Remedial Investigation
Puyallup, Washington

Project No: 19921.64793.PLANNING Figure: 1

CDM

SOIL CLASSIFICATION/LEGEND 19921-64793 10-2009.GPJ CDM_BLLV.GDT 2/1/10 REV.



TYPICAL MONITORING WELL CONSTRUCTION

USG Interiors
Remedial Investigation
Puyallup, Washington

Project No: 19921.64793.PLANNING

Figure: 2
1 of 1

CDM

Boring Log A1

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
								SM		Silty SAND (SM), dark brown, moist, with fine to medium gravel, angular to subrounded sand and gravel, with orange and black fragments.	
										SAND (SP), dark brown, moist, poorly graded, fined grained.	30
						5		SP		Increased silt content at ~4 ft bgs (~10%), limited recovery from 4 to 8 ft bgs.	
								SW		SAND (SW), dark gray, moist, well graded, with brick and ceramic fragments. Cobble encountered at ~8.25 bgs.	25
						10		SP		SAND (SP), dark brown, moist, fine grained, with minor laminations/bedding. Well graded sand (as above) sluffing into hole.	
						∇				Silty SAND (SM), gray, wet, fine grained, with iron mottling. Cobble encountered at ~13 ft bgs, limited recovery from 12 to 16 ft bgs.	20
						15		SM		Cobble and ceramic pieces encountered at ~17 ft bgs.	
								SW		SAND (SW), dark gray, well graded, with trace fine to coarse gravel, with red, white and black lithics.	15
						20				Boring terminated at 20 ft bgs. Groundwater encountered at ~12 ft bgs.	
						25					10

Location:
Surface Elevation: 33.09'
Logged By: A. Lopez

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 10-15-09

USG Interiors
Remedial Investigation
Puyallup, Washington

CDM

Boring Log A1
Project No: 19921.64793.PLANNING
Figure: 3
1 of 1

Boring Log A2

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	USG-Puy-A2-2-10/09 USG-Puy-A2-4-10/09							SP-SM		SAND (SP-SM), tan to light gray, moist, poorly graded, with gravel and silt, sand is fine to medium, 40% gravel, fine to medium, dark gray angular clasts with concoidal fractures (Fill).	35
	USG-Puy-A2-6-10/09 USG-Puy-A2-8-10/09 USG-Puy-A2-10-10/09					5 10		SP		SAND (SP), gray-brown, moist, poorly graded, fine grained, subrounded to subangular (Alluvium). Subhorizontal oxidized orange-brown bedding features at 7-8 ft bgs.	30 25
	USG-Puy-A2-12-10/09					15		SW		SAND (SW), gray-brown, well graded, fine to coarse, mostly fine to medium, subrounded to subangular, red, black and white grains, moderate orange-brown oxidation (Alluvium).	
	USG-Puy-A2-16-10/09					∇ 20 25				Boring terminated at 16 ft bgs. Groundwater encountered at ~16 ft bgs.	20 15 10

Location:
Surface Elevation: 35.97'
Logged By: H. Young

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 10-13-09

USG Interiors
Remedial Investigation
Puyallup, Washington

Boring Log A2
Project No: 19921.64793.PLANNING

Figure: 4
1 of 1

Boring Log A4

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
								SM		Silty SAND (SM), dark brown, moist, abundant organics, wood fragments.	
	USGPuy-A4-2-10/09									Becomes brown, dry, with gravel, fine to medium sand, 30% gravel to 1", well rounded (Alluvium).	40
						5					
											35
	USGPuy-A4-8-10/09							SP		SAND (SP), gray-brown, poorly graded, fine grained, angular 2" gravel clast at 8.5 ft bgs (Fill).	
	USGPuy-A4-10-10/09					10					
											30
	USGPuy-A4-12-10/09									Becomes moist at 12 ft bgs, trace dark gray angular rock fragments, slag at 12.5 ft bgs, trace paper debris, minor orange-brown iron oxide from 12.5 to 16 ft bgs (Fill).	
	USGPuy-A4-14-10/09					15					
	USGPuy-A4-16-10/09										25
								SM		Silty SAND (SM), gray, moist, occasional orange-brown iron oxide (Fill).	
	USGPuy-A4-18-10/09							SP		SAND (SP), gray-brown, poorly graded, medium to coarse sand, trace fine to medium gravel (0.5"-1"), well rounded, subangular, abundant orange-brown iron oxide (Alluvium).	
	USGPuy-A4-20-10/09					20					
						∇					20
	USGPuy-A4-22-10/09	24.7								Color changes to gray, wet, fine grained. First groundwater at 22 ft bgs.	
								SP		SAND with GRAVEL (SP), gray-brown, wet, 77.3% fine to coarse sand; 20.8% fine gravel, subrounded; 2.0% silt.	
						25					

Location:

Surface Elevation: 41.72'

Logged By: H. Young

Drill Rig: Direct Push Technology

Equipment/Hammer: Acetate Liner/

Date Completed: 10-12-09

USG Interiors
Remedial Investigation
Puyallup, Washington

Boring Log A4 Figure: 5
Project No: 19921.64793.PLANNING 1 of 3

CDM

Boring Log A4

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
											15
		13.9						SW		SAND (SW), gray, wet, well graded, fine to coarse, subrounded to subangular.	
								CL		4" CLAY (CL) layer, light gray, moist, moderate plasticity, firm.	
						30				SAND (SW), dark gray, wet, well graded, fine to coarse grained, subrounded to subangular, trace fine gravel.	
											10
										3" clay layer, light gray, moist, moderate plasticity, firm.	
						35		SW		As above, dark gray, wet, fine to coarse sand, mostly fine to medium.	
											5
										Light gray subhorizontal bedding structures, 2 mm thick.	
						40				SAND (SP), dark gray, wet, poorly graded, fine to medium grained, subangular to subrounded.	
								SP		2" clay layer, light gray, moist, moderate plasticity, firm.	0
		6.3								GRAVEL with SAND (GW), dark gray, wet, well graded, 69.3% fine to coarse well rounded gravel, black and green clasts; 29.5% fine to coarse sand, subangular to subrounded.	
						45		GW			-5
		15.4								Silty SAND with GRAVEL (SM), gray, wet, 50.4% sand, fine to coarse grained, subangular to subrounded; 26.7% gravel, fine grained, well rounded; 22.9% silt, trace wood fragments and roots.	
						50					
										As above.	-10

Location:__________
Surface Elevation: 41.72'
Logged By: H. Young

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 10-12-09

USG Interiors
Remedial Investigation
Puyallup, Washington

Boring Log A4
Project No: 19921.64793.PLANNING

Figure: 5
2 of 3

CDM

Boring Log A4

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
						55		SM		As above.	-15
						60				As above, silty sand, gray, wet, fine to coarse sand, subangular to subrounded, 40% silt, 10% gravel, fine, well rounded, trace wood fragments and organics (Alluvium).	-20
		26.65								Silty SAND (SP), dark gray, wet, 56.3% sand, fine grained, subhorizontal laminations; 42.7% silt, trace clay at 67.5 ft bgs; much more dense than at 60 ft bgs.	
						65		SM			-25
										Boring terminated at 68 ft bgs.	
						70					-30
						75					-35

Location:
Surface Elevation: 41.72'
Logged By: H. Young

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 10-12-09

USG Interiors
Remedial Investigation
Puyallup, Washington

CDM

Boring Log A4
Project No: 19921.64793.PLANNING

Figure: 5
3 of 3

Boring Log A4

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
						55		SM		As above.	-15
						60				As above, silty sand, gray, wet, fine to coarse sand, subangular to subrounded, 40% silt, 10% gravel, fine, well rounded, trace wood fragments and organics (Alluvium).	-20
		26.65				65		SM		Silty SAND (SP), dark gray, wet, 56.3% sand, fine grained, subhorizontal laminations; 42.7% silt, trace clay at 67.5 ft bgs; much more dense than at 60 ft bgs.	-25
						70				Boring terminated at 68 ft bgs.	-30
						75					-35

Location:
Surface Elevation: 41.72'
Logged By: H. Young

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 10-12-09

USG Interiors
Remedial Investigation
Puyallup, Washington

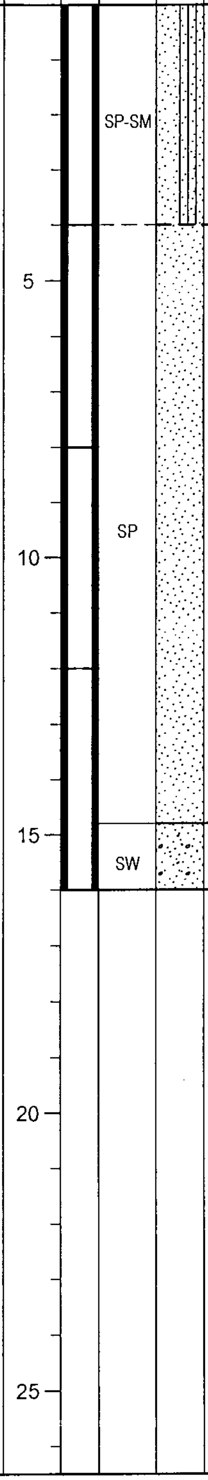
Boring Log A4
Project No: 19921.64793.PLANNING
Figure: 5
3 of 3

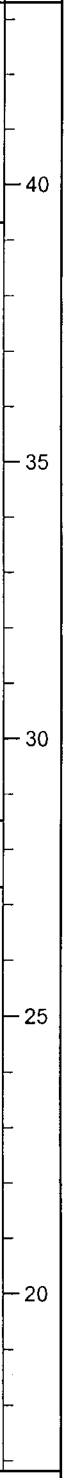
CDM

LOG OF BORING WITH WELL 19921-64793 10-2009.GPJ CDM_BLLV.GDT 2/1/10 REV

Boring Log A6

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	USCS	DESCRIPTION
	USGPuy-A6-2-10/09					SP-SM	SAND (SP), light brown, dry, poorly graded with gravel and silt, 40% fine to medium gravel, dark clasts (Fill).
	USGPuy-A6-6-10/09 USGPuy-A6-8-10/09 USGPuy-A6-10-10/09 USGPuy-A6-12-10/09 USGPuy-A6-14-10/09					SP	SAND (SP), light gray-brown, poorly graded, fine to medium, mostly fine, trace rootlets (Alluvium). Occasional orange-brown oxidation along bedding plane, occasional 1/4" silt layers from 11-14.8 ft bgs.
						SW	SAND (SW), dark gray-brown, moist, well graded, fine to coarse, red, black and white lithics.
							Boring terminated at 16 ft bgs. No groundwater encountered.





Location:
Surface Elevation: 43.31'
Logged By: H. Young

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 10-13-09

USG Interiors
Remedial Investigation
Puyallup, Washington

CDM

Boring Log A6 Figure: 6
Project No: 19921.64793.PLANNING 1 of 1

Boring Log A8

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
										SAND (SP), gray-brown, moist, poorly graded, fine grained, with trace fine to coarse gravel and organics (rootlets and wood). ~2-inch thick lens of medium grained black and white sand.	
											40
										As above, no gravel below ~2 ft bgs.	
						5					
											35
										Minor laminations/beddings and iron mottling and trace gravel from 8 to 18 ft bgs.	
								SP			
						10					
											30
						15					
											25
										Becomes wet, increased silt content (~20%) at ~17.5 ft bgs. Becomes moist at ~18 ft bgs.	
								SW		SAND (SP), dark gray, moist, well graded, with fine to coarse gravel, angular to subrounded sand and gravel, with orange, white and black lithics.	
						20				Boring completed at 20 ft bgs. No groundwater encountered.	
											20
						25					

Location:
Surface Elevation: 41.72'
Logged By: A. Lopez

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 10-15-09

USG Interiors
Remedial Investigation
Puyallup, Washington

CDM

Boring Log A8
Project No: 19921.64793.PLANNING

Figure: 7
1 of 1

Boring Log B3

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
								ML		Sandy SILT (ML), brown, dry, fine sand, abundant rootlets.	
								SP-SM		SAND (SP-SM), tan to light gray, moist, poorly graded, with gravel and silt, 40% angular gravel, fine to medium, black clasts (Fill).	
						5 10		SP		SAND (SP), gray-brown, moist, poorly graded, fine grained, subangular to subrounded, occasional dark brown bedding 1/4" thick (Alluvium).	30 25
								SM		Silty SAND (SM), dark gray-brown, moist, fine sand, trace rootlets (Alluvium).	20
						∇ 15		SW		SAND (SW), dark gray-brown, moist, well graded, fine to coarse, subangular to subrounded. Orange-brown oxidation between 13 and 14 ft bgs. Becomes wet at 14 ft bgs.	
						20 25				Boring terminated at 16 ft bgs. Groundwater encountered at 14 ft bgs.	15 10

Location:
Surface Elevation: 32.73'
Logged By: H. Young

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 10-13-09

USG Interiors
Remedial Investigation
Puyallup, Washington

Boring Log B3 Figure: 8
Project No: 19921.64793.PLANNING 1 of 1

CDM

LOG OF BORING WITH WELL 19921-64793 10-2009.GPJ CDM_BLLV.GDT 2/1/10 REV.

Boring Log B5

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
								ML		Sandy SILT (ML), brown, moist, abundant grass and rootlets.	
	USG-PUY-B5-2-10/09 USG-PUY-B5-4-10/09 USG-PUY-B5-6-10/09 USG-PUY-B5-8-10/09					5		SP-SM		SAND (SP-SM), light brown, dry, poorly graded, with gravel and silt, fine to medium sand, 30% angular gravel, fine to medium, dark gray angular clasts (Fill).	35 30
	USG-PUY-B5-10-10/09 USG-PUY-B5-12-10/09 USG-PUY-B5-14-10/09					10 15		SP		SAND (SP), gray-brown, moist, poorly graded, fine grained, subangular to subrounded, occasional 2-4 mm bedding defined by darker layers (Alluvium). Very dark gray-brown sand with higher silt content from 14-14.5 ft bgs. Moisture content increasing at 16 ft bgs.	25
	USG-PUY-B5-16-10/09					20 25				Boring terminated at 16 ft bgs. No groundwater encountered.	20 15

Location:
Surface Elevation: 38.98'
Logged By: H. Young

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 10-13-09

USG Interiors
Remedial Investigation
Puyallup, Washington

Boring Log B5
Figure: 9
Project No: 19921.64793.PLANNING
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CDM

Boring Log B7

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
								ML		Sandy SILT (ML), brown, moist, nonplastic, minor gravel, fine grained, rounded, minor grass and roots.	
	USG-PUY-B7-2-10/09							SP-SM		SAND (SP-SM), light brown to orange, dry, with gravel and silt, fine to medium sand, 40% medium gravel, angular to subangular, dark gray rock (Fill).	
	USG-PUY-B7-4-10/09 USG-PUY-B7-6-10/09					5		ML		Sandy SILT (ML), light greenish-gray, moist, nonplastic, minor fine to medium gravel, black angular clasts (Fill).	35
	USG-PUY-B7-8-10/09 USG-PUY-B7-10-10/09					10		SM		Silty SAND (SM), light gray-brown, moist, fine grained, occasional bedding laminations (Alluvium).	30
	USG-PUY-B7-14-10/09					15		SP		SAND (SP), gray-brown, moist, poorly graded, fine to medium grained, subrounded grains (Alluvium).	25
	USG-PUY-B7-16-10/09							SW		SAND (SW), dark gray, moist, well graded, fine to coarse grains, mostly fine to medium, subangular to subrounded.	
										Boring terminated at 16 ft bgs. No groundwater encountered.	
						20					20
						25					15

Location:
Surface Elevation: 39.83'
Logged By: H. Young

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 10-13-09

USG Interiors
Remedial Investigation
Puyallup, Washington

Boring Log B7
Project No: 19921.64793.PLANNING

Figure: 10
1 of 1

CDM

Boring Log C2

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev (feet)
								ML		Sandy SILT (ML), brown, moist, nonplastic, abundant organics and grass.	
								SP		SAND (SP), gray-brown, moist, poorly graded, fine grained, medium gravel from 1 to 3 ft bgs (Fill).	
	USG-PUY-C2-2-10/09										
	USG-PUY-C2-4-10/09										25
						5					
	USG-PUY-C2-6-10/09										
	USG-PUY-C2-8-10/09							ML		Sandy SILT (ML), dark brown, moist, nonplastic, trace gray laminations (Alluvium).	20
								SP		SAND (SP), dark gray, moist, poorly graded, fine to medium grained, subangular to subrounded grains, trace silt, gray, black, red and white grains, trace silt.	
	USG-PUY-C2-10-10/09					10					
	USG-PUY-C2-12-10/09					▽				Becomes wet at 12.3 ft bgs.	
	USG-PUY-C2-14-10/09										15
						15					
	USG-PUY-C2-16-10/09									Boring terminated at 16 ft bgs. Groundwater encountered at 12.3 ft bgs.	
											10
						20					
											5
						25					

Location:

Surface Elevation: 29.32'

Logged By: H. Young

Drill Rig: Direct Push Technology

Equipment/Hammer: Acetate Liner/

Date Completed: 10-13-09

USG Interiors
Remedial Investigation
Puyallup, Washington

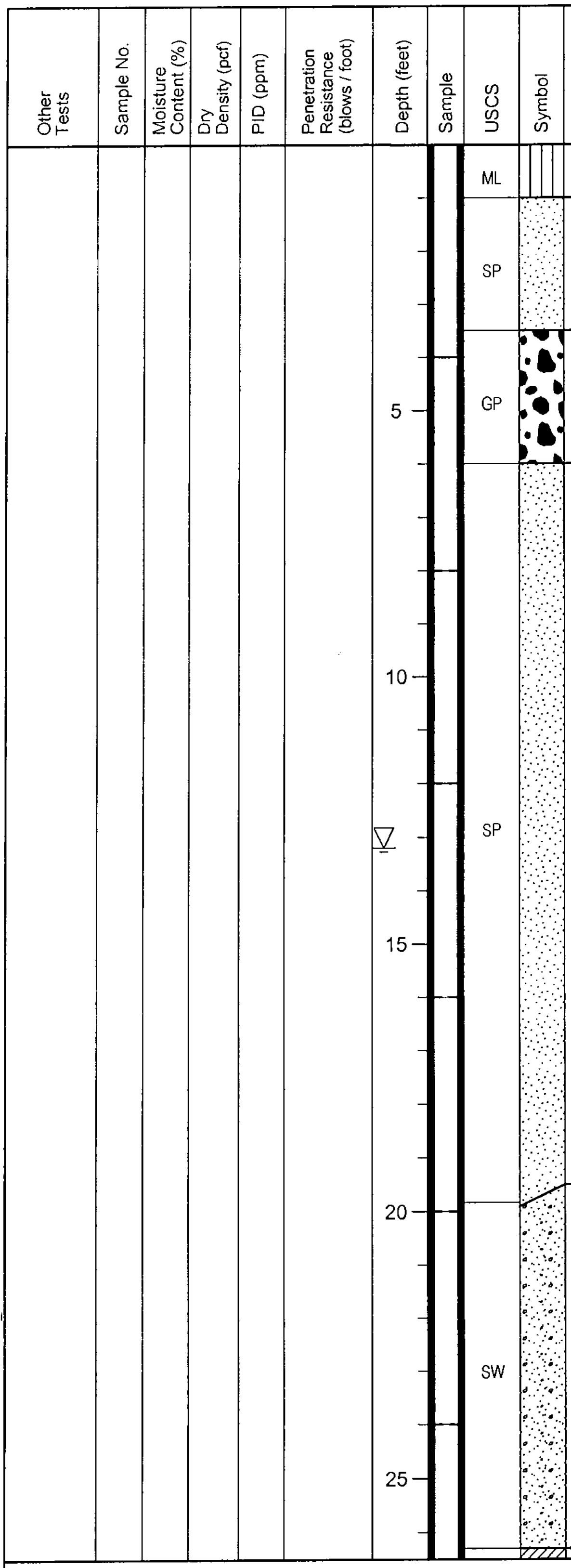
Boring Log C2
Project No: 19921.64793.PLANNING

Figure: 11
1 of 1

CDM

LOG OF BORING WITH WELL 19921-64793 10-2009.GPJ CDM_BLLV.GDT 2/1/10 REV.

Boring Log C4



DESCRIPTION

Sandy SILT (ML), brown, nonplastic, sand, abundant rootlets.

Sand (SP), light gray-brown, poorly graded, fine grained, subangular to subrounded grains, trace silt, minor orange-brown oxidation (Fill).

GRAVEL (GP), light brown, dry, poorly graded, fine to medium grained, angular to subangular, 30% sand, fine to medium grained (Fill).

SAND (SP), gray-brown, moist, poorly graded, fine to medium grained, mostly fine, subangular to subrounded grains, minor dark brown laminations-subhorizontal defined by coarser sand, trace silt (Alluvium).

Higher silt content between 11-12 ft bgs.

As above, becomes wet at 12 ft bgs.

As above.

SAND (SW), dark gray, wet, well graded, fine to coarse sand, subrounded to subangular, trace fine gravel, well rounded, sand and gravel grains are red, black, and white (Alluvium).

Elev. (feet): 30, 25, 20, 15, 10

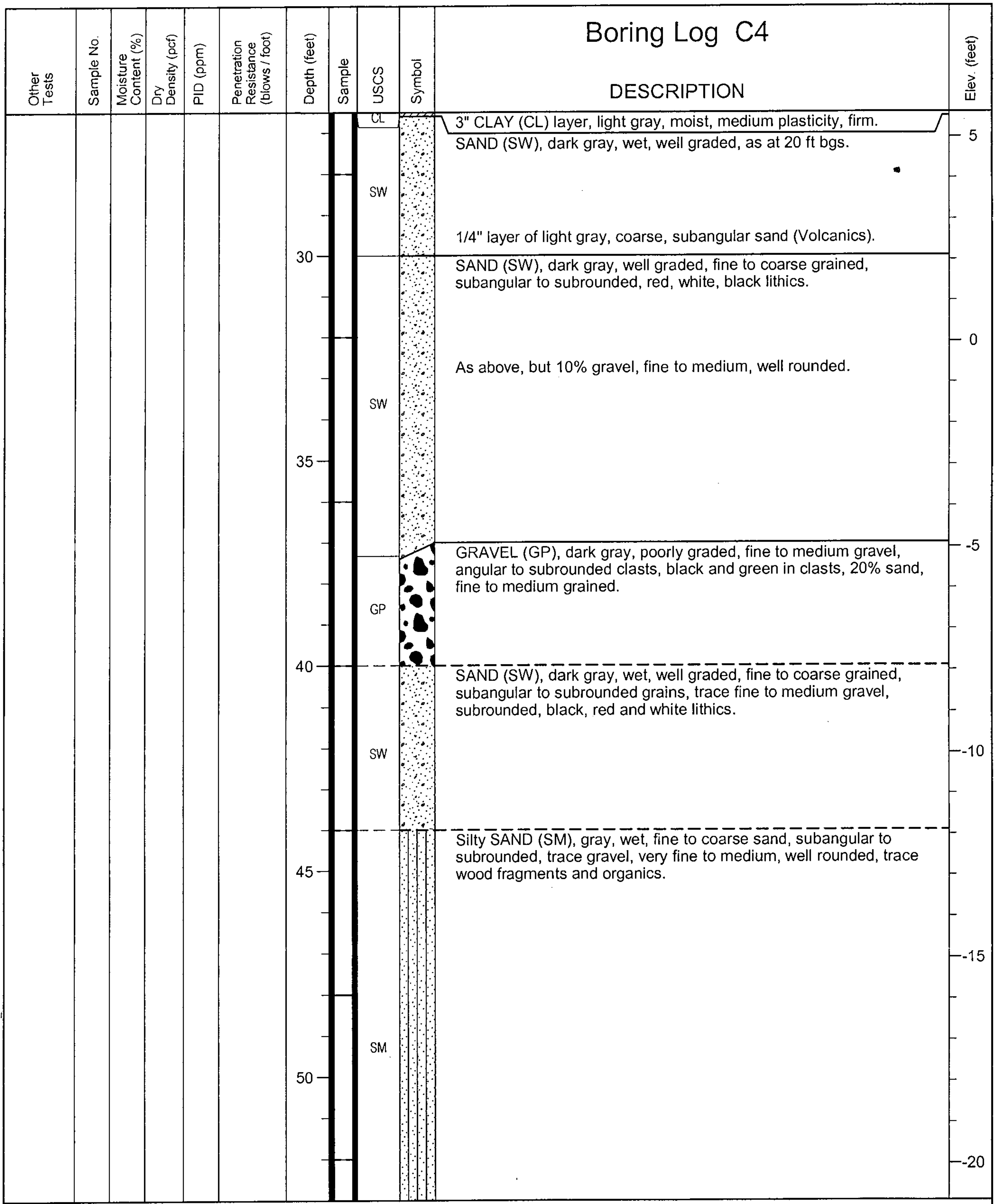
Location:
Surface Elevation: 32.11'
Logged By: H. Young

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 10-12-09

USG Interiors
Remedial Investigation
Puyallup, Washington

Boring Log C4
Project No: 19921.64793.PLANNING
Figure: 12
1 of 3

Boring Log C4



3" CLAY (CL) layer, light gray, moist, medium plasticity, firm.

SAND (SW), dark gray, wet, well graded, as at 20 ft bgs.

1/4" layer of light gray, coarse, subangular sand (Volcanics).

SAND (SW), dark gray, well graded, fine to coarse grained, subangular to subrounded, red, white, black lithics.

As above, but 10% gravel, fine to medium, well rounded.

GRAVEL (GP), dark gray, poorly graded, fine to medium gravel, angular to subrounded clasts, black and green in clasts, 20% sand, fine to medium grained.

SAND (SW), dark gray, wet, well graded, fine to coarse grained, subangular to subrounded grains, trace fine to medium gravel, subrounded, black, red and white lithics.

Silty SAND (SM), gray, wet, fine to coarse sand, subangular to subrounded, trace gravel, very fine to medium, well rounded, trace wood fragments and organics.

Location:
Surface Elevation: 32.11'
Logged By: H. Young

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 10-12-09

USG Interiors
Remedial Investigation
Puyallup, Washington

CDM

Boring Log C4
Project No: 19921.64793.PLANNING
Figure: 12
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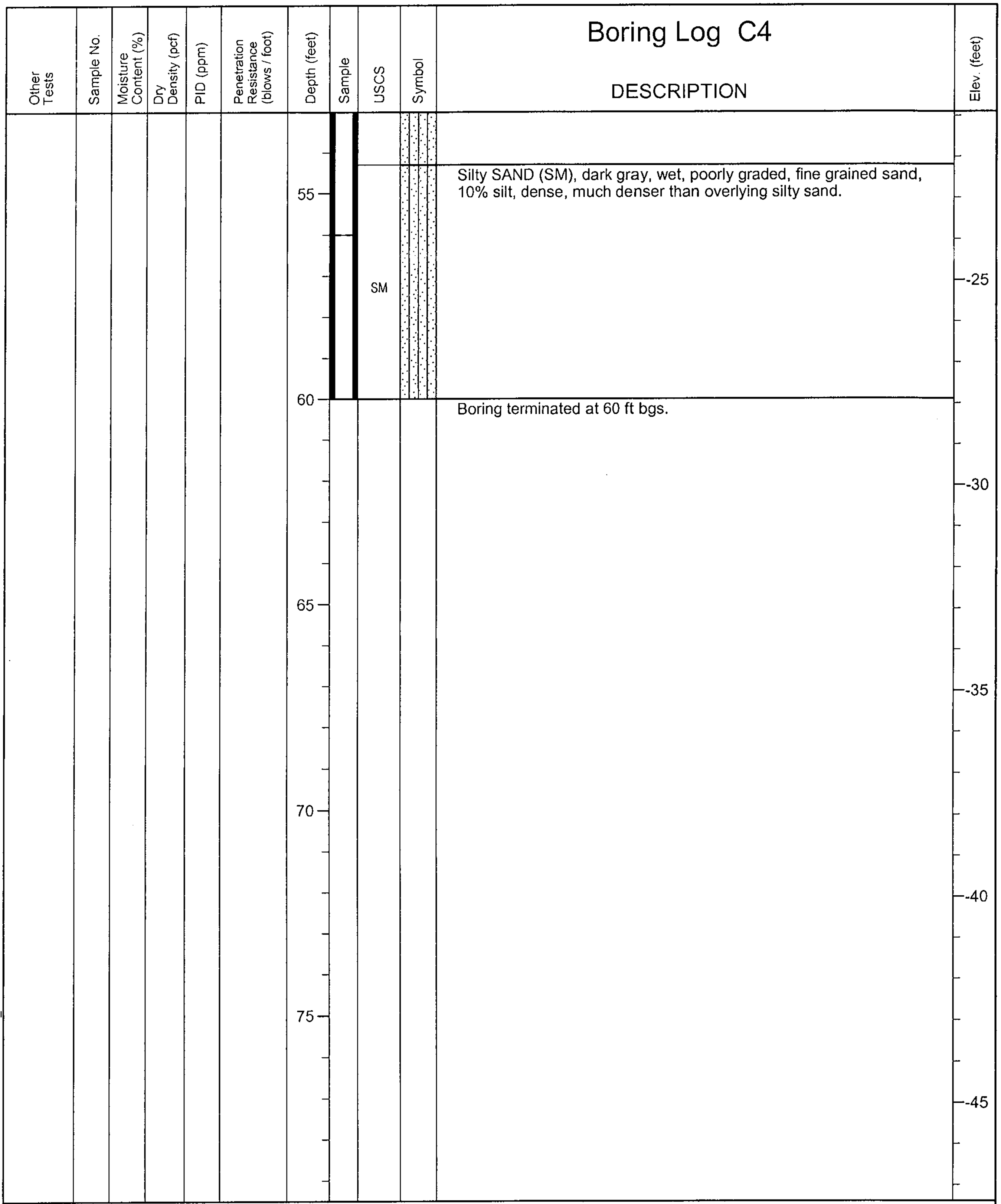
Boring Log C4



Silty SAND (SM), dark gray, wet, poorly graded, fine grained sand, 10% silt, dense, much denser than overlying silty sand.

Boring terminated at 60 ft bgs.

Location:

Surface Elevation: 32.11'

Logged By: H. Young

Drill Rig: Direct Push Technology

Equipment/Hammer: Acetate Liner/

Date Completed: 10-12-09

USG Interiors
Remedial Investigation
Puyallup, Washington

CDM

Boring Log C4 Figure: 12
Project No: 19921.64793.PLANNING 3 of 3

Boring Log C6

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	USG-PUY-C6-2-10/09 USG-PUY-C6-4-10/09					5		SP-SM		SAND (SP-SM), light brown, dry, poorly graded, with gravel and silt, medium grained gravel, angular, trace wood fragments, dark gray (Fill).	35
	USG-PUY-C6-8-10/09 USG-PUY-C6-10-10/09					10		ML		Sandy SILT (ML), olive-brown, moist, low plasticity, 10% gravel to 1", trace rootlets (Fill).	30 25
						15		SP		SAND (SP), dark gray, moist, poorly sorted, fine to medium grained, trace fine gravel (Alluvium).	
						20 25				Boring terminated at 16 ft bgs. No groundwater encountered.	20 15

Location:

Surface Elevation: 37.20'

Logged By: H. Young

Drill Rig: Direct Push Technology

Equipment/Hammer: Acetate Liner/

Date Completed: 10-13-09

USG Interiors
Remedial Investigation
Puyallup, Washington

Boring Log C6 Figure: 13
Project No: 19921.64793.PLANNING 1 of 1

CDM

LOG OF BORING WITH WELL 19921-64793 10-2009.GPJ CDM_BLLV.GDT 2/1/10 REV.

Boring Log C8

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
								SM		Silty SAND (SM), brown, wet, well graded, with gravel, angular to subrounded sand and gravel. Decreased silt content at ~1 ft bgs, becomes moist.	
						∇		ML		Sandy SILT (ML), yellow-red, wet, with angular to subrounded gravel. Becomes moist at ~1.5 ft bgs.	35
						5		SM		Silty SAND (SM), brown, wet, with ~20% gravel, fine to coarse sand and gravel, subangular to subrounded. Only 2" recovery from 4 to 8 ft bgs.	30
						10 15		SP		SAND (SP), dark gray, moist, dense, poorly graded, fine grained, with minor bedding/laminations, ~10% silt. Decreased silt content at ~10.5 ft bgs. Increased silt content (10%), with trace organics (rootlets) at ~12.5 ft bgs. No recovery from 14 to 16 ft bgs.	25
						20 25				Boring terminated at 16 ft bgs. Groundwater encountered at ~4 ft bgs.	20 15

Location:

Surface Elevation: 37.97'

Logged By: A. Lopez

Drill Rig: Direct Push Technology

Equipment/Hammer: Acetate Liner/

Date Completed: 10-15-09

USG Interiors
Remedial Investigation
Puyallup, Washington

Boring Log C8 Figure: 14

Project No: 19921.64793.PLANNING 1 of 1

CDM

Boring Log D1

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
								SP		SAND (SP), light gray-brown, dry, poorly graded, fine to medium grained, trace rootlets and leaves (Fill).	
	USG-PUY-D1-2-10/09							GP		GRAVEL (GP), dark gray-brown, dry, fine to medium gravel, rounded, 40% fine to medium sand (Fill).	30
	USG-PUY-D1-4-10/09					5		SM		Silty SAND (SM), medium to dark brown, moist, with gravel, fine sand, subangular to subrounded, 20% gravel, fine to medium, subangular (Fill). 1" wood fragments from 5 to 6 ft bgs.	
	USG-PUY-D1-6-10/09										
											25
	USG-PUY-D1-8-10/09							SP		SAND (SP), gray-brown, moist, poorly graded, fine to medium, subangular to subrounded, trace fine gravel. 3" piece of concrete (Fill).	
	USG-PUY-D1-10-10/09					10					
	USG-PUY-D1-12-10/09										20
	USG-PUY-D1-14-10/09					15				As above, becomes wet at 15 ft bgs (Fill?).	
	USG-PUY-D1-16-10/09									Boring terminated at 16 ft bgs. Groundwater first encountered at 15 ft bgs.	
											15
						20					
											10
						25					

Location:
Surface Elevation: 33.07'
Logged By: H. Young

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 10-13-09

USG Interiors
Remedial Investigation
Puyallup, Washington

Boring Log D1
Project No: 19921.64793.PLANNING

Figure: 15
1 of 1

CDM

Boring Log D3

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	USG-PUY-D3-2-10/09							ML		Sandy SILT (ML), brown, dry, nonplastic, 30% fine sand, trace grass and wood fragments (Fill).	30
	USG-PUY-D3-4-10/09 USG-PUY-D3-6-10/09					5		SP-SM		SAND (SP-SM), light gray, moist, poorly graded, with gravel and silt, fine to medium sand, with 40% angular, fine to medium gravel, black clasts (slag?) (Fill).	25
	USG-PUY-D3-8-10/09 USG-PUY-D3-12-10/09					10 15 ▽		SP		SAND (SP), gray-brown, moist, poorly graded, fine to medium grained, mostly fine, subangular to subrounded grains, trace gravel. 2" piece of sponge and fabric at 9.5 ft bgs (Fill).	20 15
	USG-PUY-D3-16-10/09 USG-PUY-D3-18-10/09							SM		Silty SAND (SM), very dark gray, wet, fine sand, trace gravel, trace organics (Alluvium).	
	USG-PUY-D3-20-10/09					20		SW		SAND (SW), dark gray, wet, well graded, fine to coarse, mostly fine to medium, subangular to subrounded grains, trace gravel (Alluvium).	10
						25				Boring terminated at 20 ft bgs. Groundwater encountered at 16 ft bgs.	5

Location:
Surface Elevation: 30.57'
Logged By: H. Young

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 10-13-09

CDM

USG Interiors
Remedial Investigation
Puyallup, Washington

Boring Log D3 Figure: 16
Project No: 19921.64793.PLANNING 1 of 1

Boring Log D5

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
						5		SP		SAND (SP), gray-brown, dry, poorly graded, fine grained, with organics (rootlets and wood) and minor iron mottling.	30
								GW		GRAVEL (GW), gray-brown, dry, well graded, fine to coarse grained sand and gravel, subangular to subrounded sand and gravel.	
								SM		SAND (SM), gray-brown, dry, poorly graded, fine grained.	
								GW		GRAVEL (GW), gray-brown, dry, well graded, fine to coarse grained, subangular to subrounded sand and gravel.	25
						10		SM		SAND (SM), brown-yellow, dry, poorly graded, fine grained with ~10% silt.	
								ML		Sandy SILT (ML), gray, moist, with iron mottling, with organics, becomes gray-brown, wet at 11.5 ft bgs.	
						▽		SP		SAND (SP), gray-brown, dry, poorly graded, fine grained.	
						15		SM		Silty SAND (SM), gray, wet, fine grained sand, with trace organics (rootlets).	20
						20 25				Boring completed at 16 ft bgs. Groundwater encountered at ~14 ft bgs. Backfilled with bentonite chips.	15 10

Location:

Surface Elevation: 34.05'

Logged By: A. Lopez

Drill Rig: Direct Push Technology

Equipment/Hammer: Acetate Liner/

Date Completed: 10-14-09

USG Interiors
Remedial Investigation
Puyallup, Washington

Boring Log D5 Figure: 17
Project No: 19921.64793.PLANNING 1 of 1

LOG OF BORING WITH WELL 19921-64793 10-2009.GPJ CDM_BLLV.GDT 2/1/10 REV.

Boring Log D7

USCS	DESCRIPTION
SM	Silty SAND (SM), brown, wet, with gravel, subangular to subrounded sand and gravel, fine to coarse gravel, becomes moist, decreased silt content at ~0.5 ft bgs.
ML	Sandy SILT (ML), yellow-red, moist, with angular to subrounded gravel, fine to coarse gravel. Becomes gray at ~2 ft bgs. Limited recovery from 4 to 8 ft bgs.
SM	Silty SAND (SM), gray, moist, fine to coarse sand and gravel. Becomes brown at ~9 ft bgs. Becomes wet at ~12.5 ft bgs. Lens of dark gray gravel at ~14 ft bgs.
SP	SAND (SP), dark gray, wet, poorly graded, fine grained, with fine to coarse gravel, silt (~10%), minor laminations/bedding and trace organics (wood and rootlets).
	Boring terminated at 16 ft bgs. Groundwater encountered s 23.5 ft bgs.

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

Elev. (feet): 35, 30, 25, 20, 15

Location:

Surface Elevation: 36.39'

Logged By: A. Lopez

Drill Rig: Direct Push Technology

Equipment/Hammer: Acetate Liner/

Date Completed: 10-15-09

USG Interiors
Remedial Investigation
Puyallup, Washington

CDM

Boring Log D7 Figure: 18
Project No: 19921.64793.PLANNING 1 of 1

Boring Log E2

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
								ML		Sandy SILT (ML), light gray, dry, 40% fine sand.	30
								SP		SAND (SP), gray-brown, dry, fine, subangular to subrounded (Fill).	
	USG-PUY-E2-2-10/09									SAND (SP), gray-brown, dry, poorly graded, with 50% fine to medium gravel, subangular to angular, 40% fine to medium sand, trace red brick fragments (Fill).	
	USG-PUY-E2-4-10/09					5				Becomes fine grained at ~4 ft bgs.	
	USG-PUY-E2-6-10/09							SP			25
	USG-PUY-E2-8-10/09									Becomes moist at 9 ft bgs.	
	USG-PUY-E2-10-10/09					10				Orange-brown oxidation at 10 to 10.5 ft bgs.	
										Silty SAND (SM), dark gray-brown, moist, fine to medium sand, abundant rootlets and wood fragments.	20
	USG-PUY-E2-12-10/09					▽		SM		Becomes wet at 12 ft bgs.	
	USG-PUY-E2-14-10/09					15					
								SW		SAND (SW), very dark gray, wet, well graded, fine to coarse, subangular grains, red, black and white color, trace silt, trace fine gravel.	15
	USG-PUY-E2-16-10/09									Boring terminated at 16 ft bgs. Groundwater encountered at 12 ft bgs.	
						20					10
						25					5

Location:
Surface Elevation: 31.02'
Logged By: H. Young

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 10-13-09

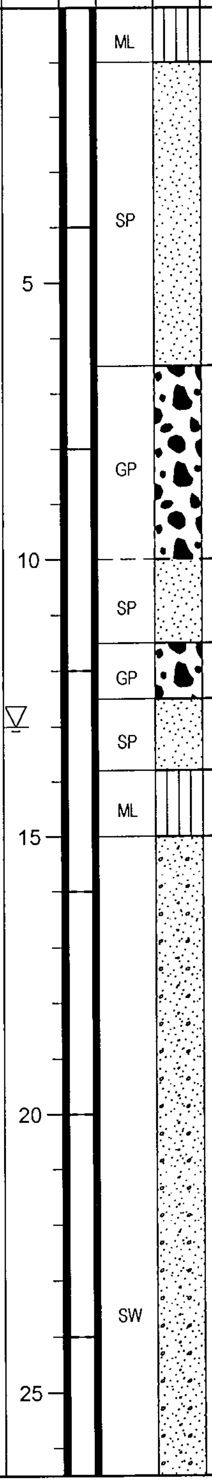
USG Interiors
Remedial Investigation
Puyallup, Washington

CDM

Boring Log E2 Figure: 19
Project No: 19921.64793.PLANNING 1 of 1

Boring Log E4

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)



Elev. (feet): 30, 25, 20, 15, 10

USCS	DESCRIPTION
ML	Sandy SILT (ML), brown, dry, nonplastic, fine sand.
SP	SAND (SP), light gray-brown, poorly graded, fine grained, trace silt, with organic rootlets. Minor orange-brown oxidation.
GP	GRAVEL (GP), gray-brown, dry, poorly graded, medium to coarse grained, with 20% sand, fine to medium grained, gravel is subangular to angular.
SP	SAND (SP), gray-brown, moist, poorly graded, fine to medium grained.
GP	GRAVEL (GP), gray-brown, poorly graded, medium to coarse, subangular to angular.
SP	SAND (SP), gray-brown, moist, poorly graded, fine to medium. Becomes brown, wet at 13 ft bgs.
ML	Sandy SILT (ML), dark gray, wet, with fine sand (~30%), and organics (rootlets).
SW	SAND (SW), dark gray, wet, well graded, fine to coarse, trace fine gravel, grains are red, black and white. Gravel lens at ~15.5 ft bgs, fine to medium, subangular to subrounded. Lense of abundant gravel up to 1" dia. at ~24.5 ft bgs.

Location:
Surface Elevation: 32.97'
Logged By: A. Lopez

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 10-14-09

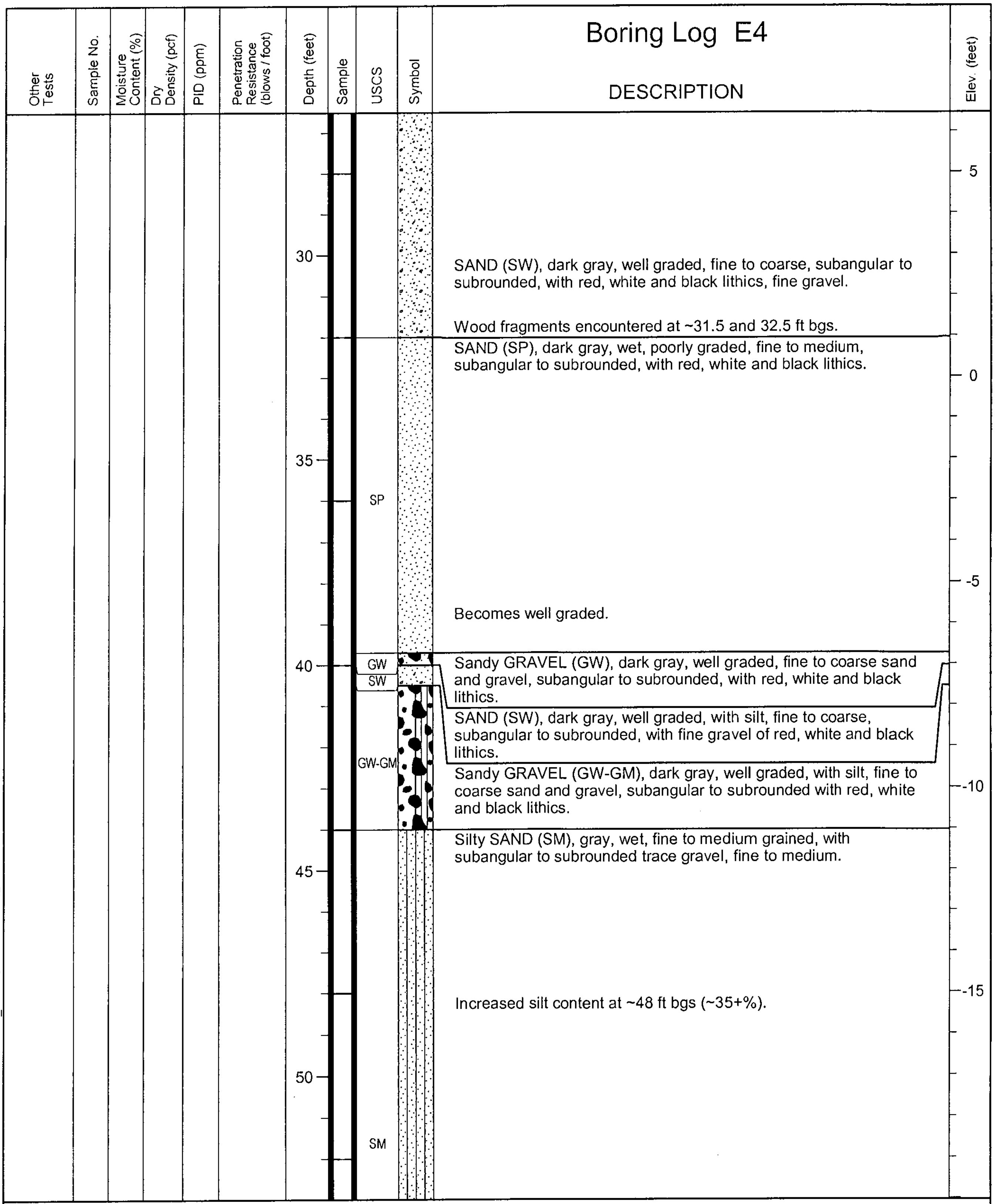
USG Interiors
Remedial Investigation
Puyallup, Washington

CDM

Boring Log E4
Project No: 19921.64793.PLANNING

Figure: 20
1 of 3

Boring Log E4



SAND (SW), dark gray, well graded, fine to coarse, subangular to subrounded, with red, white and black lithics, fine gravel.

Wood fragments encountered at ~31.5 and 32.5 ft bgs.

SAND (SP), dark gray, wet, poorly graded, fine to medium, subangular to subrounded, with red, white and black lithics.

Becomes well graded.

Sandy GRAVEL (GW), dark gray, well graded, fine to coarse sand and gravel, subangular to subrounded, with red, white and black lithics.

SAND (SW), dark gray, well graded, with silt, fine to coarse, subangular to subrounded, with fine gravel of red, white and black lithics.

Sandy GRAVEL (GW-GM), dark gray, well graded, with silt, fine to coarse sand and gravel, subangular to subrounded with red, white and black lithics.

Silty SAND (SM), gray, wet, fine to medium grained, with subangular to subrounded trace gravel, fine to medium.

Increased silt content at ~48 ft bgs (~35+%).

Location:
Surface Elevation: 32.97'
Logged By: A. Lopez

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 10-14-09

USG Interiors
Remedial Investigation
Puyallup, Washington

CDM

Boring Log E4

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
										As above.	
						55					
											-25
								SM		Silty SAND (SM), dark gray, wet, very dense, poorly graded, fine grained sand, with some minor laminations.	
						60				Boring terminated at 60 ft bgs. Groundwater encountered at 13 ft bgs during drilling.	
											-30
						65					
											-35
						70					
											-40
						75					
											-45

Location:

Surface Elevation: 32.97'

Logged By: A. Lopez

Drill Rig: Direct Push Technology

Equipment/Hammer: Acetate Liner/

Date Completed: 10-14-09

USG Interiors
Remedial Investigation
Puyallup, Washington

CDM

Boring Log E4 Figure: 20
Project No: 19921.64793.PLANNING 3 of 3

Boring Log E6

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
										SAND (SP), gray-brown, dry, poorly graded, fine grained, with organics/rootlets and wood.	
											30
						5					
										~1" lenses of silt from 6 to 6.5 ft bgs.	
								SP			
											25
						10				Increased silt content (~10"%) at ~10 ft bgs.	
										Wood fragments at ~11 ft bgs.	
						▽				Becomes brown-yellow, wet, with increased silt content (~15%) at ~14 ft bgs.	20
						15				Becomes dark gray with no silt at ~14.5 ft bgs.	
								SM		Silty SAND (SM), gray, wet, fine grained sand.	
										Boring completed at 16 ft bgs. Groundwater encountered at ~14 ft bgs.	
											15
						20					
											10
						25					

Location:

Surface Elevation: 34.68'

Logged By: A. Lopez

Drill Rig: Direct Push Technology

Equipment/Hammer: Acetate Liner/

Date Completed: 10-14-09

USG Interiors
Remedial Investigation
Puyallup, Washington

Boring Log E6 Figure: 21
Project No: 19921.64793.PLANNING 1 of 1

CDM

LOG OF BORING WITH WELL 19921-64793 10-2009.GPJ CDM_BLLV.GDT 2/1/10 REV.

Boring Log F1

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	USG-PUY-F1-2-10/09							SP-SM		SAND (SP-SM), brown, moist, poorly graded, with silt, fine grained, subrounded grains, minor medium gravel from 1.5 to 2.5 ft bgs, subangular (Fill).	30
	USG-PUY-F1-4-10/09							SP		SAND (SP), gray-brown, fine to medium, mostly fine, subangular, trace angular gravel (Fill).	
	USG-PUY-F1-6-10/09 USG-PUY-F1-8-10/09					5		SP		SAND (SP), light gray-brown, dry, poorly graded, fine grained, subangular to subrounded grains, 1/4" brown silt layers at 9.8 to 10.8 ft bgs (Alluvium).	25
	USG-PUY-F1-10-10/09 USG-PUY-F1-12-10/09 USG-PUY-F1-14-10/09					10 ▽		SM		Silty SAND (SM), dark gray-brown, moist, fine to medium sand, subangular to subrounded, minor organics up to 0.5" including rootlets, wood fragments. Becomes wet and very dark gray at 11 ft bgs.	20
	USG-PUY-F1-16-10/09					15		SW		SAND (SW), very dark gray, wet, well graded, fine to coarse sand, subangular to subrounded grains, red, black and white, trace fine gravel.	15
										Boring terminated at 16 ft bgs. Groundwater encountered at 11 ft bgs.	
						20					10
						25					5

Location:
Surface Elevation: 31.02'
Logged By: H. Young

Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 10-13-09

USG Interiors
Remedial Investigation
Puyallup, Washington

Boring Log F1
Project No: 19921.64793.PLANNING

Figure: 22
1 of 1

Boring Log F2

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
										SAND (SP), gray-brown, dry, poorly graded, fine grained, with organics (rootlets).	
						5					30
								SP			
						10				Increased silt content (~10%), becomes brown at 10 ft bgs.	25
										Iron mottling from 14 to 15 ft bgs.	
						▽ 15		SM		Silty SAND (SM), gray, wet, fine grained sand, with iron mottling.	20
										Boring terminated at 16 ft bgs. Groundwater encountered at ~15 ft bgs.	
						20					15
						25					10

Location:
Surface Elevation: 34.92'
Logged By: A. Lopez

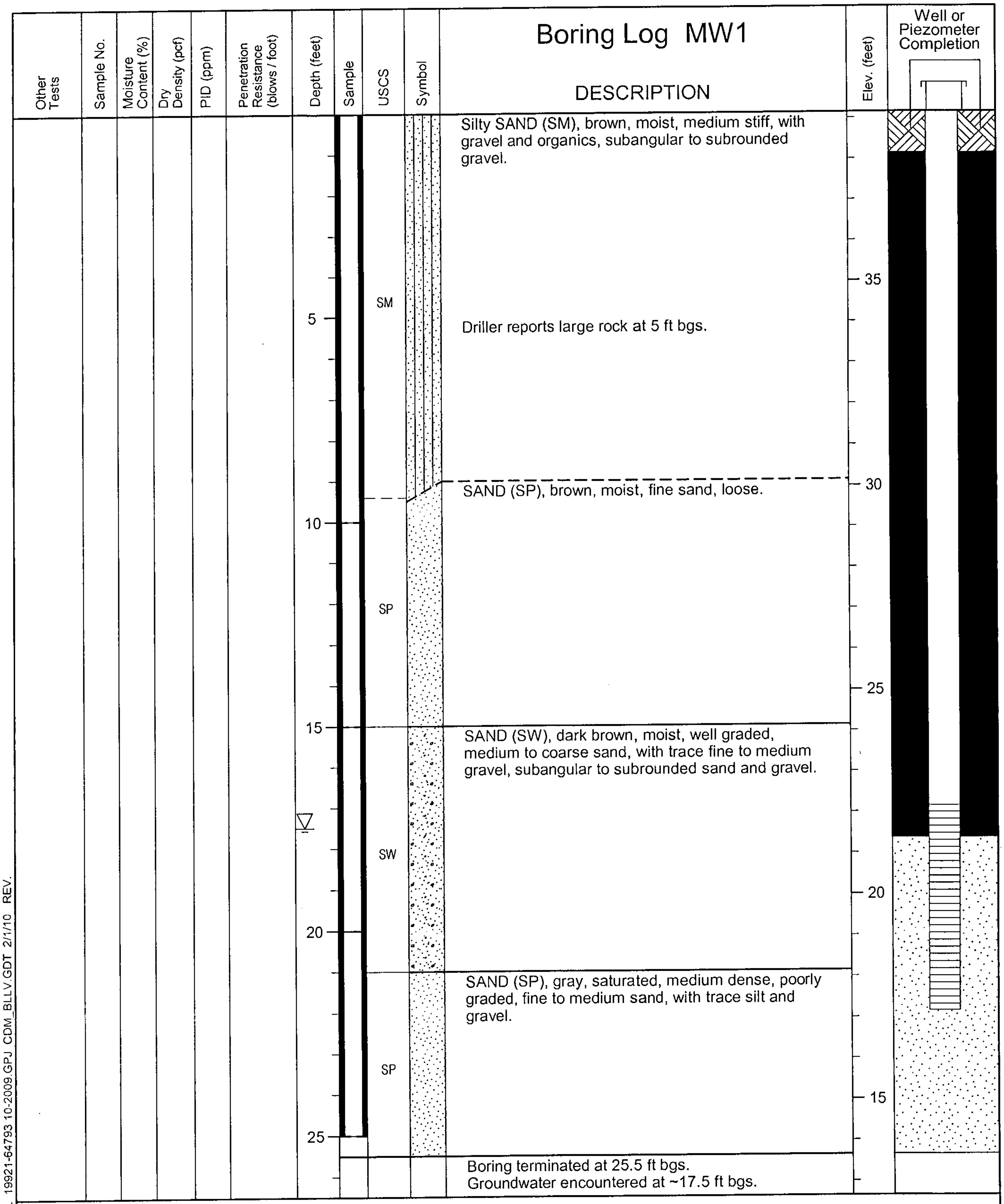
Drill Rig: Direct Push Technology
Equipment/Hammer: Acetate Liner/
Date Completed: 10-14-09

USG Interiors
Remedial Investigation
Puyallup, Washington

Boring Log F2
Project No: 19921.64793.PLANNING

Figure: 23
1 of 1

Boring Log MW1



Silty SAND (SM), brown, moist, medium stiff, with gravel and organics, subangular to subrounded gravel.

Driller reports large rock at 5 ft bgs.

SAND (SP), brown, moist, fine sand, loose.

SAND (SW), dark brown, moist, well graded, medium to coarse sand, with trace fine to medium gravel, subangular to subrounded sand and gravel.

SAND (SP), gray, saturated, medium dense, poorly graded, fine to medium sand, with trace silt and gravel.

Boring terminated at 25.5 ft bgs.
Groundwater encountered at ~17.5 ft bgs.

Location:
Surface Elevation: 39.15'
Logged By: A. Lopez

Drill Rig: Sonic
Equipment/Hammer: Bagged Samples/
Date Completed: 10-28-09

USG Interiors
Remedial Investigation
Puyallup, Washington

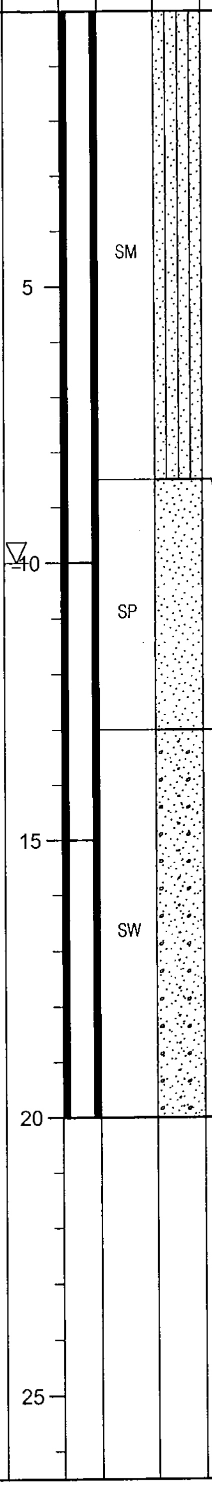
CDM

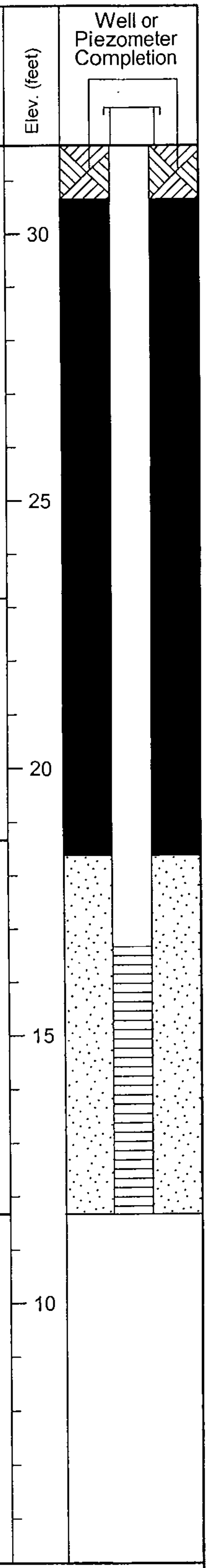
Boring Log MW1
Project No: 19921.64793.PLANNING

Figure: 24
1 of 1

Boring Log MW2

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	USCS	DESCRIPTION
						0–8.5	SM	Silty SAND (SM), brown, wet, medium dense, with organics, gravel and trace cobbles, very fine sand. Becomes dark brown with increased gravel content (~15%), moist at ~1 ft bgs. Large cobble encountered at ~3 ft bgs. Becomes gray at 5.5 ft bgs. Some small pieces of ceramic and painted wood at ~8.5 ft bgs (Fill).
						8.5–13	SP	SAND (SP), gray-brown, moist, poorly graded, fine to medium, with trace silt and gravel. Becomes wet at ~10 ft bgs. Iron mottling from 11 to 12 ft bgs.
						13–20	SW	SAND (SW), dark brown, wet, well graded, medium to coarse, with trace fine gravel and silt, subangular to subrounded sand and gravel. Increased gravel content, becomes medium grained at 15 ft bgs.
						20		Boring terminated at 20 ft bgs. Groundwater encountered at ~10 ft bgs.





Location:
Surface Elevation: 31.67'
Logged By: A. Lopez

Drill Rig: Sonic
Equipment/Hammer: Bagged Samples/
Date Completed: 10-28-09

USG Interiors
Remedial Investigation
Puyallup, Washington

CDM

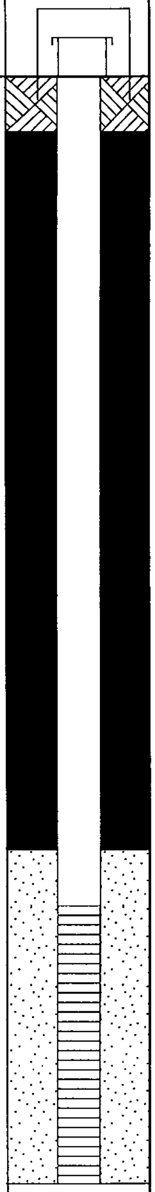
Boring Log MW2
Project No: 19921.64793.PLANNING

Figure: 25
1 of 1

Boring Log MW3

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
								SP		SAND (SP), gray, moist, loose, poorly graded, fine to medium, with organics (rootlets), trace silt.	30
						5		SW		SAND with GRAVEL (SW), gray-brown, moist, loose, well graded, 50% fine to coarse gravel, subangular to subrounded, sand is fine to medium, with trace silt. Becomes gray at ~7.5 ft bgs. Decreased moisture content @ ~8 ft bgs.	25
						∇ 10 15		SP		SAND (SP), brown, moist, loose, poorly graded, fine to medium, with trace silt. No recovery from 10 to 15 ft bgs, driller reports soft drilling conditions at 10 ft bgs.	20
								SW		SAND (SW), dark gray, wet, medium dense, well graded, with ~25% fine to medium gravel, subangular to subrounded, sand is fine to coarse, subangular to rounded. Decreased gravel content (~10%) and grain size (fine) at ~19 ft bgs. Driller says it becomes more dense with decreased gravel at 20 ft bgs.	15
						20				Boring terminated at 20 ft bgs. Groundwater encountered at ~10 ft bgs.	10
						25					5

Well or Piezometer Completion



Location:
Surface Elevation: 30.53'
Logged By: A. Lopez

Drill Rig: Sonic
Equipment/Hammer: Bagged Samples/
Date Completed: 10-29-09

USG Interiors
Remedial Investigation
Puyallup, Washington

Boring Log MW3
Project No: 19921.64793.PLANNING

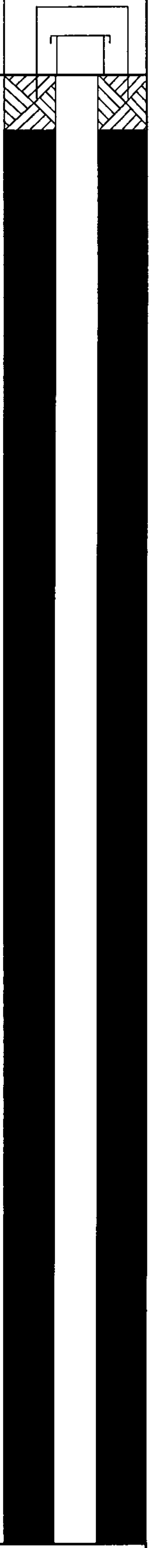
Figure: 26
1 of 1

CDM

Boring Log MW4D

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
								SP		SAND (SP), brown, moist, loose, poorly graded, with organics, trace gravel and silt. Becomes gray at ~4 ft bgs.	
						5		SW		SAND (SW), gray, moist, loose, well graded, with gravel, ~30% subangular to subrounded gravel. Becomes gray-brown with decreased moisture content at ~6 ft bgs.	25
						▽ 10 15		SP		SAND (SP), brown, wet, dense, poorly graded.	20 15
								SW		SAND (SW), dark gray, wet, medium dense, well graded, with ~40% fine to coarse gravel, subangular to subrounded sand and gravel. Decreased gravel content (~10%), at ~18 ft bgs.	
						20		GW		Sandy GRAVEL (GW), brown-gray, wet, loose, fine to coarse, subangular to subrounded sand and gravel, with trace silt.	10
						25				SAND (SW), dark gray, wet, medium dense, well graded, subangular to subrounded sand, with trace gravel. 6" layer of increased fine to medium gravel (~50%) at ~22.5 ft bgs.	5

Well or Piezometer Completion



Location:
Surface Elevation: 29.79'
Logged By: A. Lopez

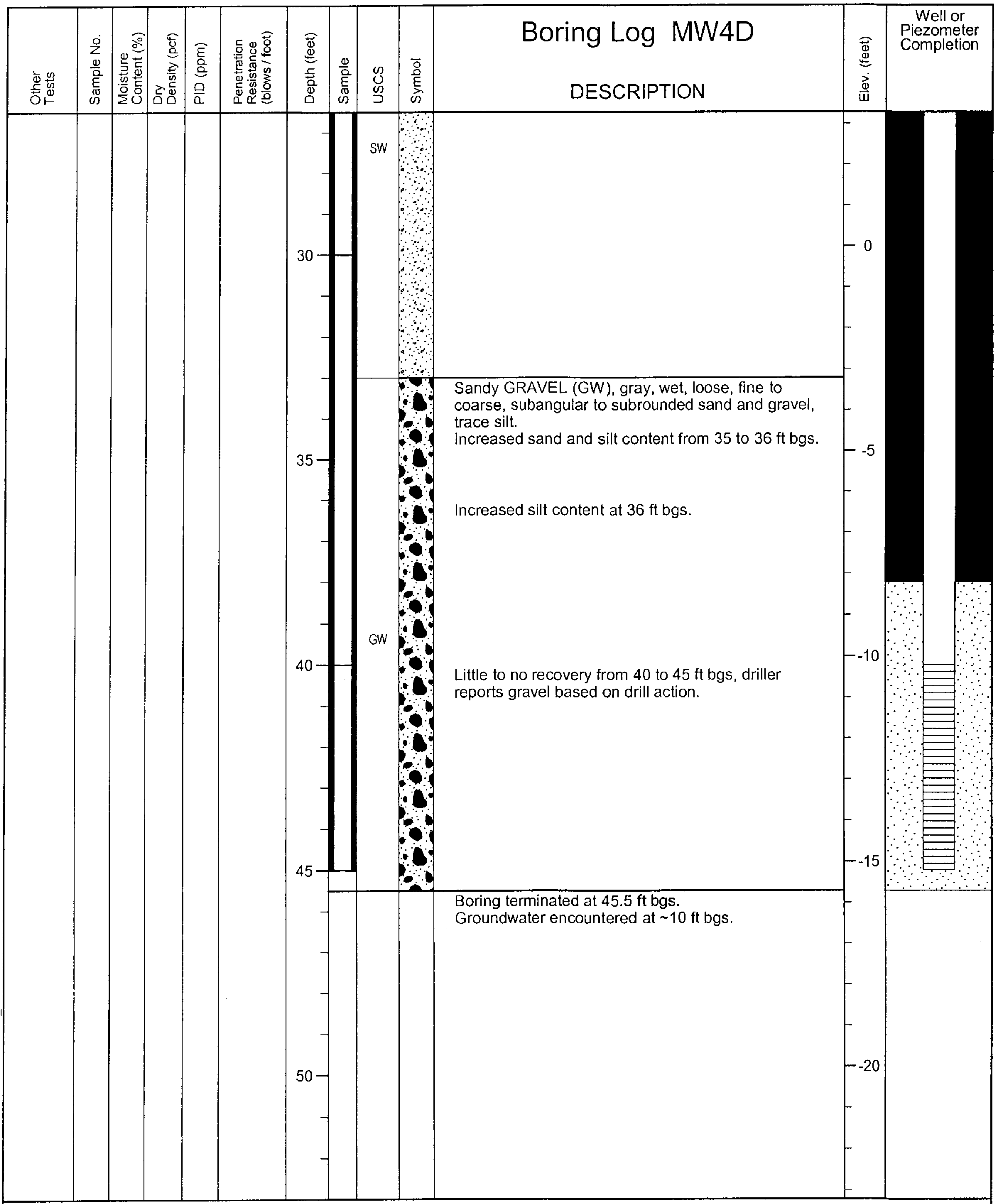
Drill Rig: Sonic
Equipment/Hammer: Bagged Samples/
Date Completed: 10-30-09

USG Interiors
Remedial Investigation
Puyallup, Washington

CDM

Boring Log MW4D
Project No: 19921.64793.PLANNING
Figure: 27

Boring Log MW4D



Sandy GRAVEL (GW), gray, wet, loose, fine to coarse, subangular to subrounded sand and gravel, trace silt.
Increased sand and silt content from 35 to 36 ft bgs.

Increased silt content at 36 ft bgs.

Little to no recovery from 40 to 45 ft bgs, driller reports gravel based on drill action.

Boring terminated at 45.5 ft bgs.
Groundwater encountered at ~10 ft bgs.

Location:
Surface Elevation: 29.79'
Logged By: A. Lopez

Drill Rig: Sonic
Equipment/Hammer: Bagged Samples/
Date Completed: 10-30-09

USG Interiors
Remedial Investigation
Puyallup, Washington

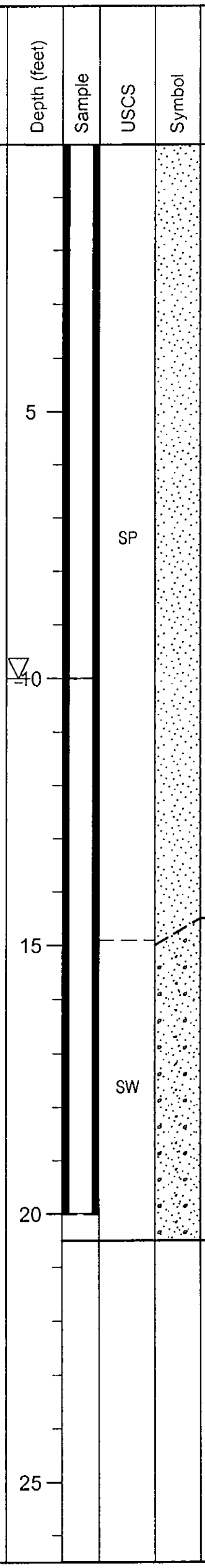
CDM

Boring Log MW4D
Project No: 19921.64793.PLANNING

Figure: 27
2 of 2

Boring Log MW4S

Other Tests | Sample No. | Moisture Content (%) | Dry Density (pcf) | PID (ppm) | Penetration Resistance (blows / foot)



DESCRIPTION

SAND (SP), brown, moist, loose, poorly graded, with organics and gravel, fine to medium, subangular to subrounded gravel, with trace silt, fine to medium sand.

Increased silt and gravel content at ~2 ft bgs.

No gravel, sand becomes fine, decreased moisture content at ~4 ft bgs.

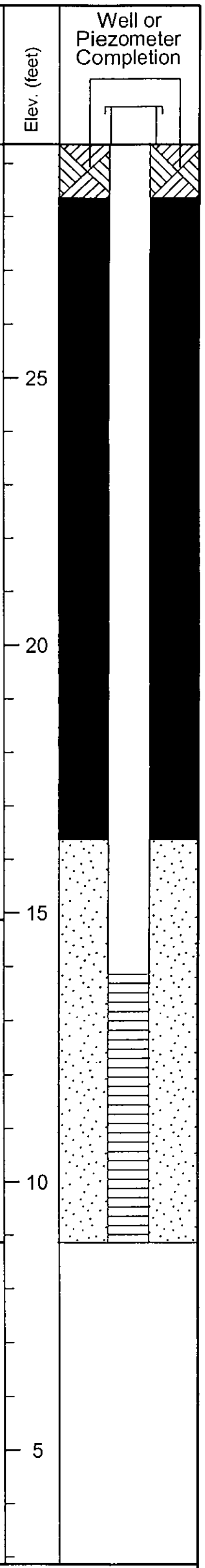
Becomes dark gray with trace gravel and fine to medium sand, with increased moisture at ~7 ft bgs.

Becomes wet at ~10 ft bgs.
Very easy drilling, wet from 10 to 15 ft bgs.

SAND with GRAVEL (SW), dark gray, wet, medium dense, well graded, fine to coarse sand, subangular to subrounded, with fine to medium gravel, subangular to subrounded (~25% gravel).

Decreased gravel content (~10%) at ~18 ft bgs.

Boring terminated at 20.5 ft bgs.
Groundwater encountered at ~10 ft bgs.



Location:
Surface Elevation: 29.37'
Logged By: A. Lopez

Drill Rig: Sonic
Equipment/Hammer: Bagged Samples/
Date Completed: 10-29-09

USG Interiors
Remedial Investigation
Puyallup, Washington

CDM

Boring Log MW4S
Project No: 19921.64793.PLANNING

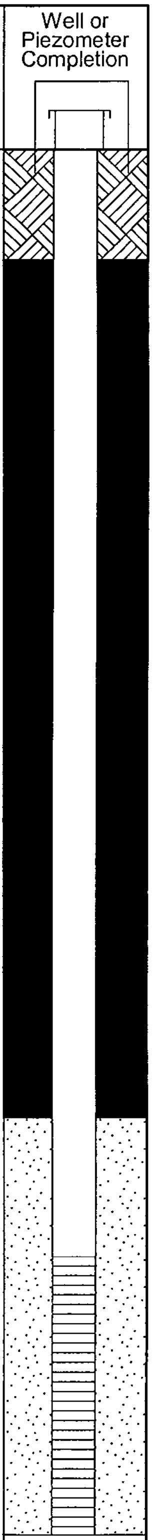
Figure: 28
1 of 1

Boring Log MW5

Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
				SAND (SP), brown, moist, loose, poorly graded, with trace organics and silt, fine sand.	
				As above, but decreased moisture, becomes gray-brown at ~2 ft bgs.	
				Becomes dry, and fine grained at ~4 ft bgs.	30
5					
		SP			
					25
10				No recovery from 10 to 15 ft bgs.	
					20
15				SAND (SP), light brown, fine grained, poorly graded.	
▽				Color changes to gray, wet, fine to medium sand.	
		SP			
					15
20				Color changes to gray-brown.	
				SAND with GRAVEL (SW), dark gray, wet, medium dense, well graded, with ~25 to 50% fine to medium gravel, subangular to subrounded sand and gravel.	
		SW			
					10
25				Boring terminated at ~25 ft bgs. Groundwater encountered at ~17 ft bgs.	

Other Tests | Sample No. | Moisture Content (%) | Dry Density (pcf) | PID (ppm) | Penetration Resistance (blows / foot)

Well or Piezometer Completion



Location:

Surface Elevation: 34.02'

Logged By: A. Lopez

Drill Rig: Sonic

Equipment/Hammer: Bagged Samples/

Date Completed: 10-29-09

USG Interiors
Remedial Investigation
Puyallup, Washington

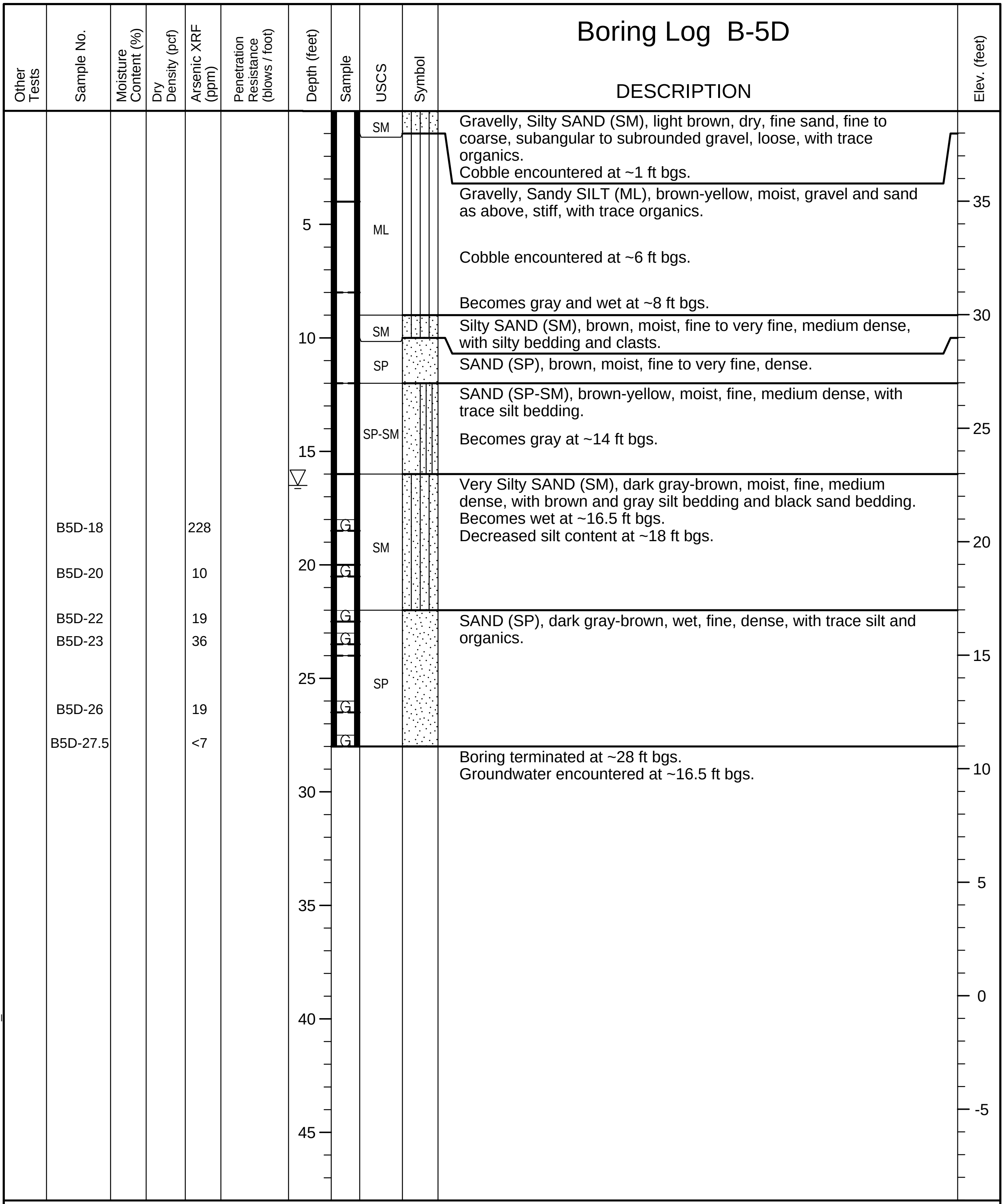
Boring Log MW5
Project No: 19921.64793.PLANNING

Figure: 29
1 of 1

CDM

LOG OF BORING WITH WELL 19921-64793 10-2009.GPJ CDM_BLLV.GDT 2/1/10 REV.

Boring Log B-5D



Sample No.	Arsenic XRF (ppm)
B5D-18	228
B5D-20	10
B5D-22	19
B5D-23	36
B5D-26	19
B5D-27.5	<7

USCS	DESCRIPTION
SM	Gravelly, Silty SAND (SM), light brown, dry, fine sand, fine to coarse, subangular to subrounded gravel, loose, with trace organics. Cobble encountered at ~1 ft bgs.
ML	Gravelly, Sandy SILT (ML), brown-yellow, moist, gravel and sand as above, stiff, with trace organics. Cobble encountered at ~6 ft bgs. Becomes gray and wet at ~8 ft bgs.
SM	Silty SAND (SM), brown, moist, fine to very fine, medium dense, with silty bedding and clasts.
SP	SAND (SP), brown, moist, fine to very fine, dense.
SP-SM	SAND (SP-SM), brown-yellow, moist, fine, medium dense, with trace silt bedding. Becomes gray at ~14 ft bgs.
SM	Very Silty SAND (SM), dark gray-brown, moist, fine, medium dense, with brown and gray silt bedding and black sand bedding. Becomes wet at ~16.5 ft bgs. Decreased silt content at ~18 ft bgs.
SP	SAND (SP), dark gray-brown, wet, fine, dense, with trace silt and organics.

Boring terminated at ~28 ft bgs.
Groundwater encountered at ~16.5 ft bgs.

Location:
Surface Elevation: 38.98'
Logged By: A. Lopez

Drill Rig: Direct Push
Equipment/Hammer: Acetate Liner/
Date Completed: 8-18-10

CDM

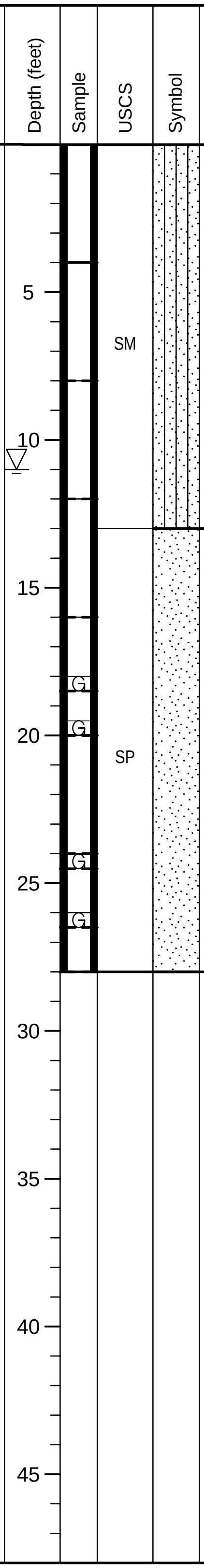
USG Interiors
Remedial Investigation
Puyallup, Washington

Boring Log B-5D
Project No: 19921-74559

Figure: 3
1 of 1

Boring Log C-3D

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	USCS	DESCRIPTION
						SM	Silty SAND (SM), brown, dry, fine to very fine, medium dense, with organics (rootlets). Becomes moist at 1.5 ft bgs. Increased silt content from ~1.6-1.8 ft bgs. Cobble encountered at ~2 ft bgs, becomes gray-brown with decreased silt content and decreased organics. Gravel encountered at ~3.5 ft bgs. Cobble and gravel encountered at ~4.5 ft bgs. Becomes dense, yellow-red at ~8 ft bgs. Trace wood debris and rootlets encountered from ~9 to ~12 ft bgs, becomes dark brown. Becomes wet with increased silt content at ~11 ft bgs.
						SP	Poorly Graded SAND (SP), gray, moist, fine to medium, subangular to subrounded sand, medium dense, with black, white, and red lithics.
	C3D-18			68			
	C3D-19.5			148			Becomes medium to coarse, dark gray, and wet at ~19 ft bgs. Very limited recovery from 20-24 ft bgs.
	C3D-24			10			
	C3D-26			7			As above.
							Boring terminated at ~28 ft bgs. Groundwater encountered at 11 ft bgs.



Elev. (feet): 30, 25, 20, 15, 10, 5, 0, -5, -10, -15

Location:
Surface Elevation: 32.15'
Logged By: A. Lopez

Drill Rig: Direct Push
Equipment/Hammer: Acetate Liner/
Date Completed: 8-17-10

USG Interiors
Remedial Investigation
Puyallup, Washington

Boring Log C-3D
Project No: 19921-74559

Figure: 4
1 of 1

CDM

Boring Log C-4D

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	Arsenic XRF (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
								SM		Silty SAND (SM), light brown, dry, fine to very fine, loose, with numerous organics (rootlets).	
										Decreased silt content at ~2 ft bgs, becomes brown-yellow. Layers of salt & pepper, brown-yellow, and gray-brown from 2.5 to 3 ft bgs. Becomes gravelly at ~3 ft bgs. Granite cobble encountered at ~4.5 ft bgs.	30
						5					
								SP-SM		Slightly Silty SAND (SP-SM), dark brown, moist, fine grained, medium dense, with trace silty bedding.	25
						10					
						▽				Becomes dark gray at 11.5 ft bgs. Becomes wet with gray silt, black sand, and brown sand layers and trace organics at ~12 ft bgs.	20
						15				Decreased silt content at ~15 ft bgs.	
											15
	C4D-18			145			G	SP		SAND (SP), dark gray-brown, moist, fine to coarse, medium dense, with trace fine to medium gravel, with white, black, and red lithics.	
	C4D-20			58		20	G				
											10
	C4D-22.5			79			G				
	C4D-24			76			G			Becomes yellow-red at ~24 ft bgs.	
						25					
	C4D-26.5			57			G				5
	C4D-28			<7			G			Becomes dark gray and fine to medium, with decreased gravel content at ~28 ft bgs.	
	C4D-30			<8		30	G				
	C4D-32			<7			G			Boring terminated at ~32 ft bgs. Groundwater encountered at ~12 ft bgs.	0
						35					
											-5
						40					
											-10
						45					
											-15

Location:
Surface Elevation: 32.11'
Logged By: A. Lopez

Drill Rig: Direct Push
Equipment/Hammer: Acetate Liner/
Date Completed: 8-18-10

USG Interiors
Remedial Investigation
Puyallup, Washington

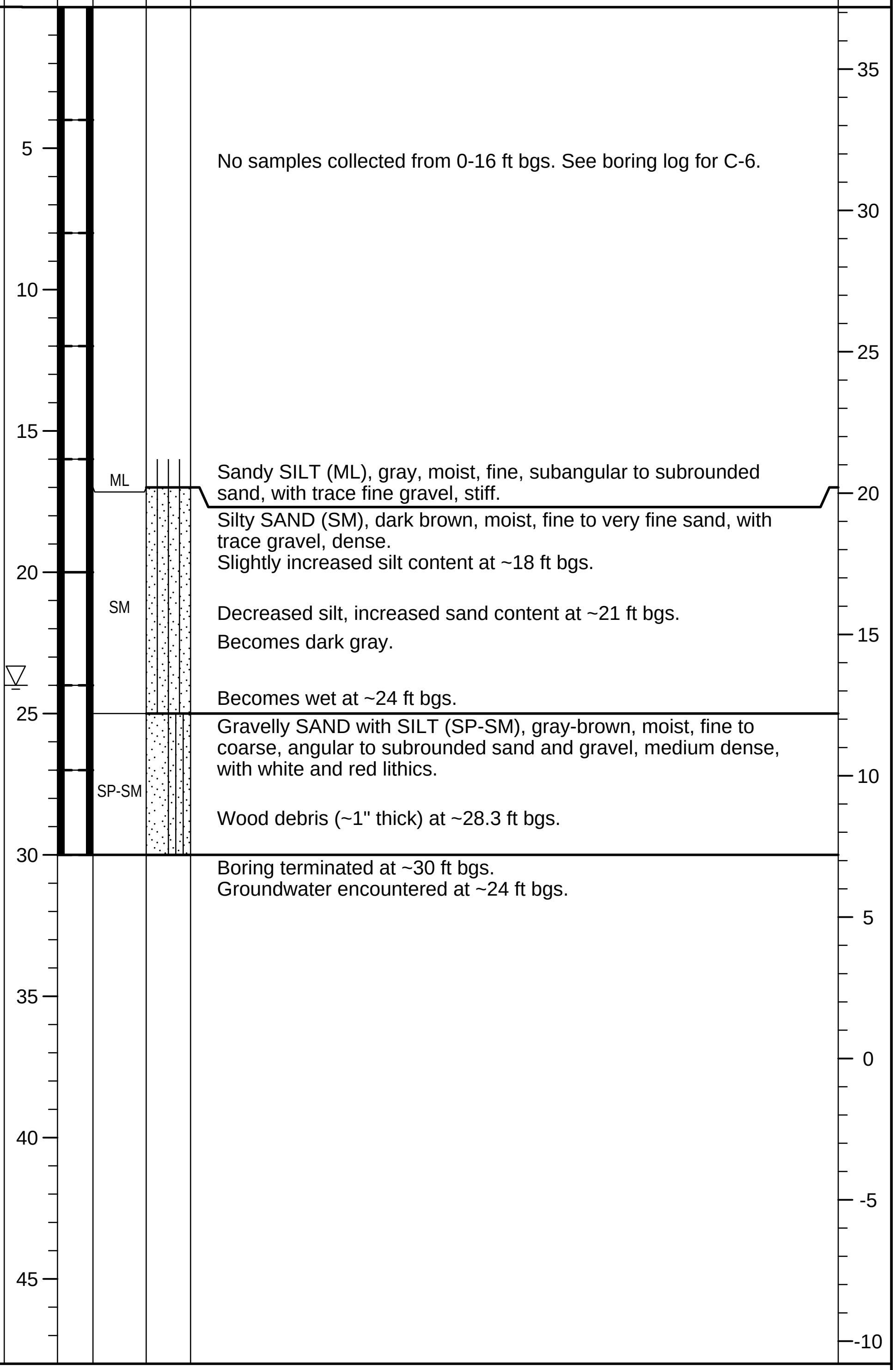
Boring Log C-4D
Project No: 19921-74559

Figure: 5
1 of 1

LOG OF BORING WITH WELL 19921-74559-8-2010.GPJ CDM_BLLV.GDT 1/5/11 REV.

Boring Log C-6D

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)



No samples collected from 0-16 ft bgs. See boring log for C-6.

Sandy SILT (ML), gray, moist, fine, subangular to subrounded sand, with trace fine gravel, stiff.

Silty SAND (SM), dark brown, moist, fine to very fine sand, with trace gravel, dense.
Slightly increased silt content at ~18 ft bgs.

Decreased silt, increased sand content at ~21 ft bgs.
Becomes dark gray.

Becomes wet at ~24 ft bgs.

Gravelly SAND with SILT (SP-SM), gray-brown, moist, fine to coarse, angular to subrounded sand and gravel, medium dense, with white and red lithics.

Wood debris (~1" thick) at ~28.3 ft bgs.

Boring terminated at ~30 ft bgs.
Groundwater encountered at ~24 ft bgs.

Location:
Surface Elevation: 37.2'
Logged By: A. Lopez

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

USG Interiors
Remedial Investigation
Puyallup, Washington

Boring Log C-6D
Project No: 19921-74559

Figure: 6
1 of 1

CDM

Boring Log C-8D

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
											35
						5				No samples collected from 0-16 ft bgs. Refer to boring log for C-8.	
											30
						10					
											25
						▽					
						15					
										SAND with SILT (SP-SM), dark gray, wet, fine to very fine sand, with trace organics, dense.	
											20
						20		SP-SM		No recovery from 20 to 24 ft bgs.	
											15
						25		SP-SM		Gravelly SAND with SILT (SP-SM), gray-brown, moist, fine to coarse sand, fine to medium, angular to subrounded gravel, medium dense, with white and red lithics. Decreased gravel content, becomes dark gray at ~26 ft bgs.	10
						30				Boring terminated at ~30 ft bgs. Groundwater encountered at ~14 ft bgs.	
											5
						35					
											0
						40					
											-5
						45					

Location:
Surface Elevation: 37.97'
Logged By: A. Lopez

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

USG Interiors
Remedial Investigation
Puyallup, Washington

Boring Log C-8D
Project No: 19921-74559

Figure: 7
1 of 1

Boring Log C-10

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	Arsenic XRF (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	C10-0			<5			G	SM		Gravelly, Silty SAND (SM), brown-yellow, moist, fine to medium sand and gravel, medium dense. Cobble encountered at ~1.8 ft bgs, becomes wet.	
	C10-2			<7			G			Silty SAND (SM), gray, moist, fine to very fine gravel, dense, with trace fine to medium gravel and silt bedding.	
	C10-4			12		5	G				
	C10-6			<6			G	SM			
	C10-8			<6			G			Glass encountered at ~8.5 ft bgs.	
	C10-10			<6		10	G				
	C10-12			<6			G			Sandy SILT (ML), dark gray-brown, wet, fine to very fine sand, soft, with trace organics.	
	C10-14			<5		15	G	ML			
	C10-16			<5			G			Boring terminated at ~16 ft bgs. Groundwater encountered at ~12 ft bgs.	
						20					
						25					
						30					
						35					
						40					
						45					

Location:
Surface Elevation:
Logged By: A. Lopez

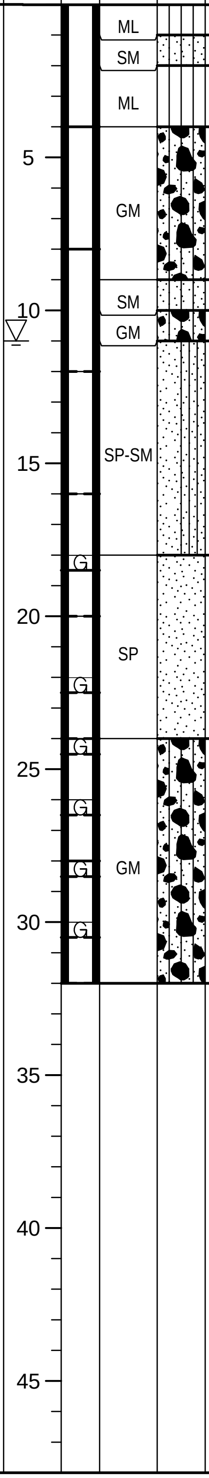
Drill Rig: Direct Push
Equipment/Hammer: Acetate Liner/
Date Completed: 8-18-10

USG Interiors
Remedial Investigation
Puyallup, Washington

Boring Log C-10 Figure: 8
Project No: 19921-74559 1 of 1

CDM

Boring Log D-3D



Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	Arsenic XRF (ppm)	Penetration Resistance (blows / foot)	USCS	DESCRIPTION
						ML	Sandy SILT (ML), brown, wet, fine to very fine, medium stiff, with numerous organics.
						SM	Silty SAND (SM), light brown, moist, fine to very fine, medium dense, with organics.
						ML	Sandy SILT (ML), dark brown, moist, fine to very fine, medium stiff, with organics. Becomes very stiff at ~3 ft bgs.
						GM	Silty, Sandy GRAVEL (GM), gray, moist, fine to coarse sand and gravel, subangular to subrounded, dense. Becomes brown-gray with increasing silt content at ~7 ft bgs. Becomes gray, saturated at ~8 ft bgs, glass encountered at ~9 ft bgs.
						SM	Silty SAND (SM), gray-brown, moist, fine to very fine, medium dense, with trace organics.
						GM	Sandy GRAVEL with SILT (GM), gray, moist to wet, angular to subangular, medium dense. Yellow discolored wood debris from 11.1 to 11.3 ft bgs.
						SP-SM	SAND with SILT (SP-SM), gray-brown, moist, fine to very fine, medium dense, with trace organics. Decreased silt content at ~13 ft bgs. Wood debris encountered at ~18 ft bgs.
	D3D-18 D3D-22			77 1065		SP	SAND (SP), dark gray, moist, fine to medium, dense, with red, white, and black lithics. Becomes fine to coarse at ~22 ft bgs.
	D3D-24 D3D-26 D3D-28 D3D-30			1021 801 578 19		GM	Silty, Sandy GRAVEL (GM), gray-red and brown, wet, fine to coarse, subangular to rounded, medium dense. Becomes dark gray at ~29 ft bgs.

Boring terminated at ~32 ft bgs.
Groundwater encountered at ~11 ft bgs.

Elev. (feet)
30
25
20
15
10
5
0
-5
-10
-15

Location:
Surface Elevation: 30.57'
Logged By: A. Lopez

Drill Rig: Direct Push
Equipment/Hammer: Acetate Liner/
Date Completed: 8-17-10

USG Interiors
Remedial Investigation
Puyallup, Washington

Boring Log D-3D
Project No: 19921-74559

Figure: 9
1 of 1

CDM

Boring Log D-9

DESCRIPTION

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	Arsenic XRF (ppm)	Penetration Resistance (blows / foot)	Sample	USCS
	D9-0			<10		G	
	D9-2			<6		G	
	D9-4			26		G	SM
	D9-6			7		G	
	D9-8			<6		G	
	D9-12			11		G	SM
	D9-14			<6		G	

Gravelly, Silty SAND (SM), brown, dry, fine to coarse sand and gravel, loose.
Becomes moist at ~0.5 ft bgs.
Cobble encountered at ~1 ft bgs.
Becomes dense with trace gravel and increased silt content at ~2.2 ft bgs.
Becomes gray at ~4 ft bgs.
~3" thick gray silt layer at ~5 ft bgs.

Silty SAND (SM), dark brown, moist, fine, medium dense, with occasional layers of wood debris (1/4 to 4" thick).

Cobble encountered at ~9.5 ft bgs.

Boring terminated at ~16 ft bgs.
No groundwater encountered.

Depth (feet): 5, 10, 15, 20, 25, 30, 35, 40, 45

Elev. (feet): 35, 30, 25, 20, 15, 10, 5, 0, -5, -10

Location:
Surface Elevation: 37'
Logged By: A. Lopez

Drill Rig: Direct Push
Equipment/Hammer: Acetate Liner/
Date Completed: 8-18-10

USG Interiors
Remedial Investigation
Puyallup, Washington

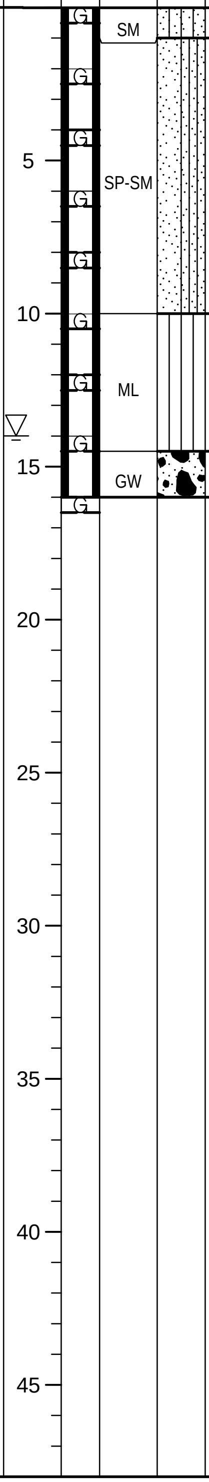
CDM

Boring Log D-9
Project No: 19921-74559

Figure: 10
1 of 1

Boring Log E-0

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	Arsenic XRF (ppm)	Penetration Resistance (blows / foot)
	E0-0			26	
	E0-2			<6	
	E0-4			10	
	E0-6			<6	
	E0-8			<6	
	E0-10			<6	
	E0-12			<6	
	E0-14			<6	
	E0-16			8	



DESCRIPTION

Silty SAND (SM), brown, moist, fine, loose, moist, with trace gravel and organics.

SAND with SILT (SP-SM), gray/salt & pepper, moist, fine, loose, with scattered organics.
Becomes brown at ~2.8 ft bgs.
Becomes gray at ~3.3 ft bgs.
Alternating light brown and brown layers from 4 to 8 ft bgs.

Gray/salt & pepper layer from ~9 to 9.5 ft bgs.

Very Sandy SILT (ML), dark brown, moist, fine to very fine sand, stiff, with trace organics and sand layers.
Alternating gray and red-brown layers from ~10.5 ft bgs.

Becomes wet at ~14 ft bgs.

Silty, Sandy GRAVEL (GW), wet, fine to coarse sand and gravel, angular to subrounded, medium dense.

Boring terminated at ~16 ft bgs.
Groundwater encountered at ~14 ft bgs.

Elev. (feet)

Location:
Surface Elevation:
Logged By: A. Lopez

Drill Rig: Direct Push
Equipment/Hammer: Acetate Liner/
Date Completed: 8-20-10

USG Interiors
Remedial Investigation
Puyallup, Washington

Boring Log E-0
Project No: 19921-74559

Figure: 11
1 of 1

CDM

LOG OF BORING WITH WELL 19921-74559-8-2010.GPJ CDM_BLLV.GDT 1/5/11 REV.

Boring Log E-2D

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	Arsenic XRF (ppm0	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
								SM		Silty SAND (SM), light brown, dry, fine to very fine, loose. Becomes light gray/salt & pepper at 0.5 ft bgs. Becomes moist with brown silty layers at ~1 ft bgs.	30
								GM		Silty, Sandy GRAVEL (GM), gray-brown, moist, fine to coarse, angular to subrounded, medium dense.	
						5		SM		Gravelly, Silty SAND (SM), brown-yellow, moist, fine to coarse, subangular to subrounded sand and gravel, loose.	25
								SP-SM		SAND with SILT (SP-SM), brown, moist, fine to very fine, loose. Glass shards encountered at ~6.7 ft bgs.	
						▽ 10		SM		Silty SAND (SM), dark gray-brown, wet, fine, medium dense.	20
										Layer of increased silt content from 13 to 13.25 ft bgs. Discolored red (oxidized iron) seam (~1 cm thick) at ~13.5 ft bgs.	
						15		SP		Very Gravelly SAND (SP), dark gray, moist, fine to medium sand and gravel, medium dense. Decreased gravel content from 16 to 17 ft bgs, becomes wet at 16 ft bgs.	15
	E2D-16			400			G				
	E2D-18			1660			G				
	E2D-20			2443		20	G			Becomes brown-yellow at ~20 ft bgs.	10
										Decreased gravel content at ~22 ft bgs.	
	E2D-23			33			G				
	E2D-24			168			G	GW		Sandy GRAVEL (GW), dark gray, red and brown, moist, fine to coarse, subrounded to rounded, medium dense.	
						25					5
	E2D-26			91			G	SP		Gravelly SAND (SP), dark gray, moist, fine to medium sand and gravel, subrounded to rounded, medium dense, with white, red, and black lithics.	
	E2D-28			145			G				
	E2D-30			467		30	G			Increased gravel content, becomes fine to coarse.	0
	E2D-32						G				
	E2D-34			9		35	G				
										Boring terminated at ~36 ft bgs. Groundwater encountered at ~9.5 ft bgs.	-5
						40					-10
						45					-15

Location:

Surface Elevation: 31.02'

Logged By: A. Lopez

Drill Rig: Direct Push

Equipment/Hammer: Acetate Liner/

Date Completed: 8-17-10

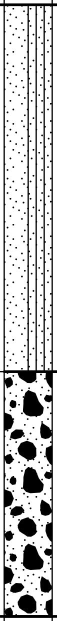
USG Interiors
Remedial Investigation
Puyallup, Washington

Boring Log E-2D
Project No: 19921-74559

Figure: 12
1 of 1

Boring Log F-2

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	Arsenic XRF (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	F2-0			<6			G			SAND with SILT (SP-SM), gray-brown, moist, fine, medium dense, with trace organics.	
	F2-2			<6			G				
	F2-4			<6			G				
						5					
	F2-6			8			G	SP-SM		Wood debris (roots) encountered at ~6, ~6.25, and ~8 ft bgs.	
	F2-8			<6		▽	G			Cobble encountered at ~8.5 ft bgs. Becomes wet with trace gravel and silt bedding at ~9 ft bgs.	
						10					
	F2-12			<5			G			Silty, Sandy GRAVEL (GW), dark gray, wet, fine to coarse sand and gravel, loose.	
	F2-14			50			G				
						15					
								GW			
	F2-17			11			G				
						20				Boring terminated at ~20 ft bgs. Groundwater encountered at ~9 ft bgs.	
						25					
						30					
						35					
						40					
						45					



Location:
Surface Elevation:
Logged By: A. Lopez

Drill Rig: Direct Push
Equipment/Hammer: Acetate Liner/
Date Completed: 8-20-10

CDM

USG Interiors
Remedial Investigation
Puyallup, Washington

Boring Log F-2
Project No: 19921-74559

Figure: 13
1 of 1

Boring Log F2D

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
						5				No samples collected from 0-16 ft bgs. Refer to boring log for F-2.	
						10					
						∇					
						15					
								SP-SM		SAND with SILT (SP-SM), gray-brown, moist, fine, medium dense, with trace organics. Becomes very gravelly with fine to coarse sand at ~16.5 ft bgs.	
						20 25 30		SP-SM		SAND with SILT and GRAVEL (SP-SM), dark gray, wet, fine to very fine, loose, with white and red lithics. Gravel decreases to trace at ~20.5 ft bgs, increased white and red lithics, sand becomes fine to coarse. Wood (~3" thick) encountered at 23 ft bgs. Rock encountered at 23.5 ft bgs. Wood encountered at 24 and 25 ft bgs. Lens of clay (~1" dia.) at ~25 ft bgs. Layer of dark brown very silty sand (~4") at ~25.5 ft bgs. Liner very full from 26 to 28 ft bgs. Increased gravel content from 26 to 26.5 ft bgs, sand becomes fine to coarse. Wood debris encountered at ~27 ft bgs. Sand becomes fine to very fine at ~29 ft bgs. No sample recovered from 32 to 34 ft bgs.	
						35				Boring terminated at ~34 ft bgs. Groundwater encountered at ~13 ft bgs.	
						40					
						45					

Location:
Surface Elevation:
Logged By: A. Lopez

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

USG Interiors
Remedial Investigation
Puyallup, Washington

Boring Log F2D
Project No: 19921-74559

Figure: 14
1 of 1

CDM

Boring Log Y2

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	Arsenic XRF (ppm)	Penetration Resistance (blows / foot)	Sample
	Y2-0			<11		G
	Y2-2			10		G
	Y2-4			13		G
	Y2-6			12		G
	Y2-8			8		G
	Y2-10			<7		G
	Y2-12			ND		G
	Y2-14			7		G
	Y2-15.5			<8		G

USCS	DESCRIPTION
SM	Asphalt on surface. Gravelly, Silty SAND (SM), brown-yellow, moist, fine to coarse sand and gravel, loose.
SM	Silty SAND (SM), brown, moist, fine, medium dense, with trace organics and silt bedding. Becomes dense at ~6 ft bgs.
SP	SAND (SP), gray, moist, fine to medium, medium dense, with trace fine sand layers and organics. ~2" thick silt layer at 15 ft bgs.
	Boring terminated at 16 ft bgs. No groundwater encountered.

Depth (feet): 5, 10, 15, 20, 25, 30, 35, 40, 45

Elev. (feet): 40, 35, 30, 25, 20, 15, 10, 5, 0, -5

Location:
Surface Elevation: 42'
Logged By: A. Lopez

Drill Rig: Direct Push
Equipment/Hammer: Acetate Liner/
Date Completed: 8-18-10

USG Interiors
Remedial Investigation
Puyallup, Washington

CDM

Boring Log Y2
Project No: 19921-74559

Figure: 15
1 of 1

Boring Log Z-5

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	Arsenic XRF (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	Z5-0			<8			G			Gravelly, Silty SAND (SM), brown-yellow, moist, fine to coarse sand and gravel, loose. ~2" thick gray silt layer at ~1 ft bgs. Sand becomes fine at ~2 ft bgs.	
	Z5-2			8			G	SM			40
	Z5-4			7		5	G			Silty SAND (SM), brown, moist, fine, dense, moist, with trace silt bedding and iron oxide red seams. Cobble encountered at ~4 ft bgs.	
	Z5-6			10			G				35
	Z5-8			<7			G				
	Z5-10			<7		10	G	SM			
	Z5-12			<7			G				30
	Z5-14			8		15	G			Becomes gray-brown at ~12.5 ft bgs. Becomes gray from ~13 to 15 ft bgs, with slightly decreased silt content.	
	Z5-16			11			G			Boring terminated at ~16 ft bgs. No groundwater encountered.	25
						20					20
						25					15
						30					10
						35					5
						40					0
						45					-5

Location:
Surface Elevation: 42'
Logged By: A. Lopez

Drill Rig: Direct Push
Equipment/Hammer: Acetate Liner/
Date Completed: 8-18-10

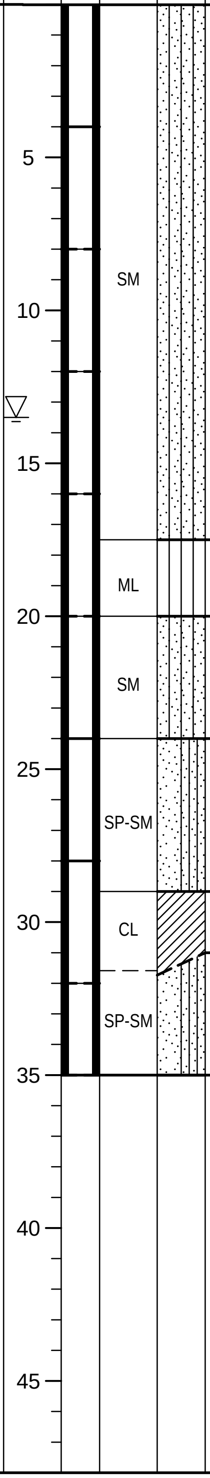
USG Interiors
Remedial Investigation
Puyallup, Washington

Boring Log Z-5
Project No: 19921-74559

Figure: 16
1 of 1

Boring Log AA0

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)



USCS	DESCRIPTION
SM	Gravelly, Silty SAND (SM), dark brown, moist, fine to medium sand and gravel, with trace organics, dense. Brick debris encountered at ~2 ft bgs. Becomes wet at ~3 ft bgs. Becomes moist with brown-yellow and slightly decreased silt content at ~4.5 ft bgs. Becomes dark brown with increased silt content at 10 ft bgs. Pink grout encountered at ~13 ft bgs. Becomes light brown with orange lithics, white and black wood debris and wet at 13.5 ft bgs. Becomes brown at ~16.5 ft bgs.
ML	Sandy SILT (ML), brown, moist, fine to medium sand, with numerous wood organics and trace gravel, stiff.
SM	Silty SAND (SM), dark gray, wet, fine sand, with trace silt bedding, medium dense. Poor recovery from 22 to 24 ft bgs.
SP-SM	Gravelly SAND with SILT (SP-SM), gray-brown, wet, fine to medium, angular to subrounded sand and gravel, medium dense, with white and red lithics.
CL	CLAY with SAND (CL), gray, moist, fine sand, medium stiff. Decreased gravel content, becomes dark gray at ~30 ft bgs. Layer of silty, gravelly SAND with SILT (~3" thick) at ~30 ft bgs.
SP-SM	SAND with SILT (SP-SM), dark gray, wet, fine sand, medium dense, with white and red lithics.
	Boring terminated at ~35 ft bgs. Groundwater encountered at 13.5 ft bgs.

Location:
Surface Elevation:
Logged By: A. Lopez

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

USG Interiors
Remedial Investigation
Puyallup, Washington

Boring Log AA0
Project No: 19921-74559

Figure: 17
1 of 1

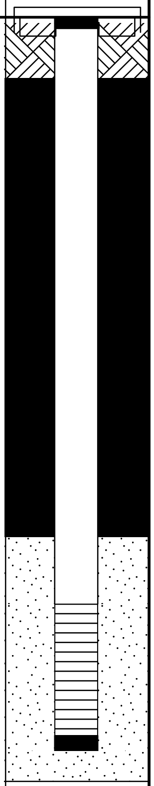
CDM

Boring Log MW-6S

USCS	DESCRIPTION
SP-SM	SAND with SILT (SP-SM), light gray-brown, moist, poorly graded, fine grained sand, trace fine gravel, common rootlets. Becomes dry, trace angular cobbles at 8 ft bgs (Levee Fill). Becomes wet at 10 ft bgs. Common orange-brown iron oxide, abundant fine rootlets from 11 to 14 ft bgs.
SP	SAND (SP), gray, wet, poorly graded, medium subangular to subrounded grains, trace orange-brown iron oxide at 14' to 15' bgs, sand grains comprise red, gray, and black lithics, faint subhorizontal bedding laminations in places (Alluvium).
SW	SAND (SW), dark gray, wet, well graded, fine to coarse subangular to subrounded grains, grains comprise black, gray, and red lithic fragments.
	Boring terminated at 25 ft bgs. Groundwater encountered at 10 ft bgs.

Depth (feet): 5, 10, 15, 20, 25, 30, 35, 40, 45

Well or Piezometer Completion



Location:
Surface Elevation:
Logged By: H. Young

Drill Rig: Rotosonic
Equipment/Hammer: Continuous Core/
Date Completed: 10-12-10

USG Interiors
Remedial Investigation
Puyallup, Washington

Boring Log MW-6S
Project No: 19921-74559

Figure: 18
1 of 1

CDM

Boring Log MW-6D

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
										SAND (SP-SM), light gray-brown, moist, poorly graded, fine subangular to subrounded grains, common rootlets 0' to 2' bgs.		
	MW5D-2						G					
										Becomes dry.		
	MW5D-4						G					
						5						
	MW5D-6						G					
								SP-SM				
	MW5D-9						G			12" boulder, granitic composition at 8 ft bgs. Cobbles from 8 to 13 ft bgs.		
						10						
	MW5D-12					∇	G			Common orange-brown iron oxide from 12 to 13 ft bgs. Becomes wet, color changes to gray-brown, trace 4" cobbles at 13 ft bgs (Levee Fill).		
	MW5D-14						G					
						15				SAND (SP), gray, wet, poorly graded, medium grained, subangular to subrounded sand, trace 0.25" oxidized gravel, sand comprises black, gray, and red lithics (Alluvium).		
	MW5D-16						G					
	MW5D-18						G	SP				
						20						
	MW5D-20						G					
	MW5D-22						G	SM		Silty SAND (SM), olive-brown, wet, fine subangular to subrounded grains, trace rootlets.		
	MW5D-24						G			SAND (SW), gray, wet, well graded, fine to coarse subrounded grains, red, black, gray lithics, trace fine to coarse, well rounded gravel.		
						25						
	MW5D-26						G					
	MW5D-28						G					
						30		SW				
	MW5D-30						G					
	MW5D-32						G					
	MW5D-34						G					
						35						
	MW5D-36						G	GP		GRAVEL (GP), dark gray, wet, poorly graded, fine to coarse gravel, trace cobbles, well rounded grains, 30% SAND (SW), trace silt, gravel, and sand comprises red, gray, green lithics.		
	MW5D-38						G	CL				
						40				Sandy CLAY (CL), olive-brown, wet, trace gravel, medium stiff, medium plasticity.		
	MW5D-40						G	GP		GRAVEL (GP), as at 36 ft bgs.		
	MW5D-42						G					
	MW5D-44						G	SM		Silty SAND with GRAVEL (SM), dark gray, wet, fine to coarse, subangular to subrounded sand grains, 30% silt, trace well rounded gravel and cobbles.		
						45				Boring terminated at 45 ft bgs. Groundwater encountered at 13 ft bgs.		

Location:
Surface Elevation:
Logged By: H. Young

Drill Rig: Rotosonic
Equipment/Hammer: Continuous Core/
Date Completed: 10-12-10

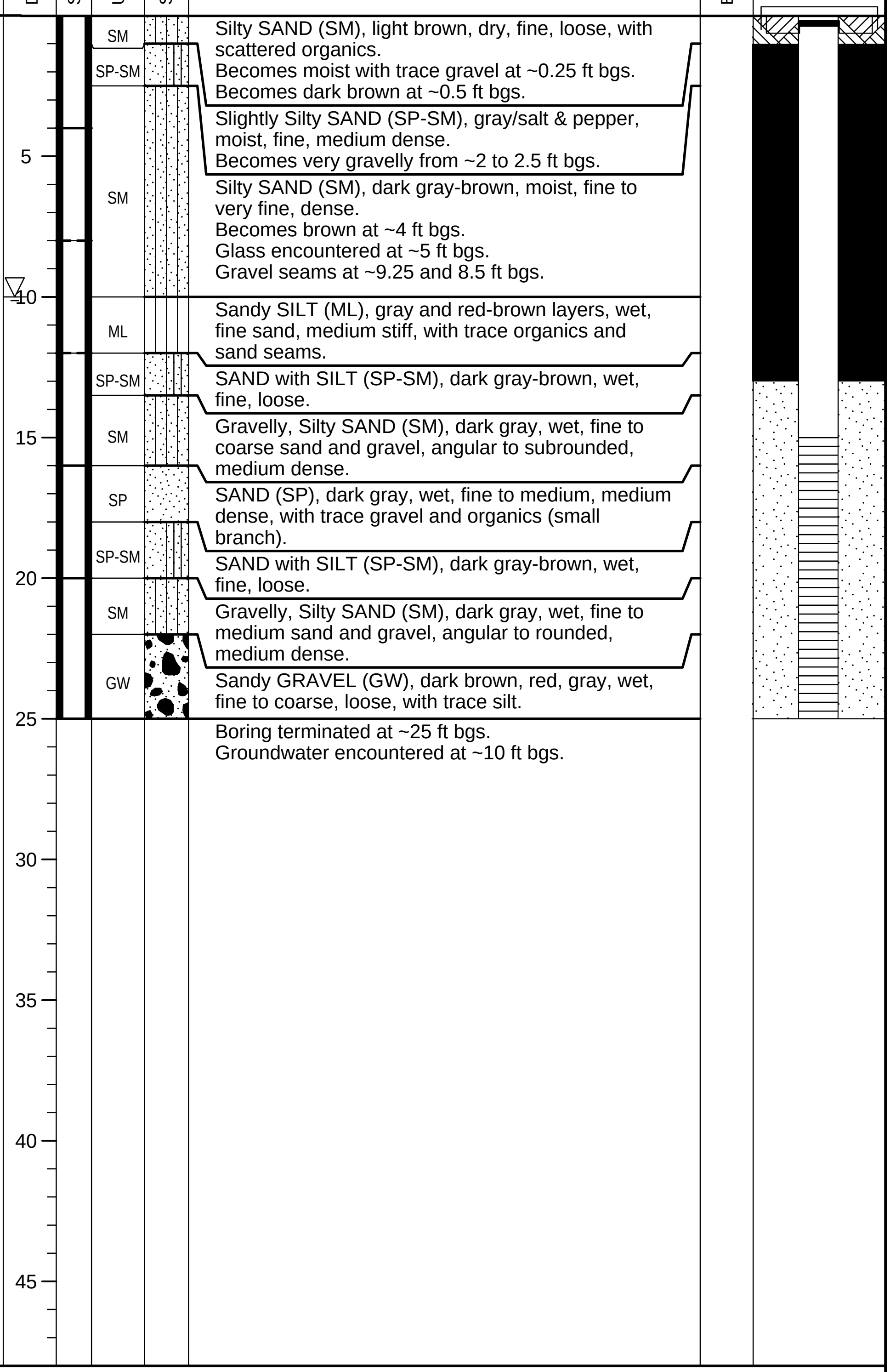
USG Interiors
Remedial Investigation
Puyallup, Washington

Boring Log MW-6D
Project No: 19921-74559

Figure: 19
1 of 1

Boring Log MW-7S

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	Arsenic XRF (ppm)	Penetration Resistance (blows / foot)
				<6	
				<6	
				<6	
				50	
				18	
				<6	
				<5	
				<6	
				<5	
				<5	
				9	
				8	
				<5	



USCS	DESCRIPTION
SM	Silty SAND (SM), light brown, dry, fine, loose, with scattered organics.
SP-SM	Becomes moist with trace gravel at ~0.25 ft bgs. Becomes dark brown at ~0.5 ft bgs. Slightly Silty SAND (SP-SM), gray/salt & pepper, moist, fine, medium dense. Becomes very gravelly from ~2 to 2.5 ft bgs.
SM	Silty SAND (SM), dark gray-brown, moist, fine to very fine, dense. Becomes brown at ~4 ft bgs. Glass encountered at ~5 ft bgs. Gravel seams at ~9.25 and 8.5 ft bgs.
ML	Sandy SILT (ML), gray and red-brown layers, wet, fine sand, medium stiff, with trace organics and sand seams.
SP-SM	SAND with SILT (SP-SM), dark gray-brown, wet, fine, loose.
SM	Gravelly, Silty SAND (SM), dark gray, wet, fine to coarse sand and gravel, angular to subrounded, medium dense.
SP	SAND (SP), dark gray, wet, fine to medium, medium dense, with trace gravel and organics (small branch).
SP-SM	SAND with SILT (SP-SM), dark gray-brown, wet, fine, loose.
SM	Gravelly, Silty SAND (SM), dark gray, wet, fine to medium sand and gravel, angular to rounded, medium dense.
GW	Sandy GRAVEL (GW), dark brown, red, gray, wet, fine to coarse, loose, with trace silt.
	Boring terminated at ~25 ft bgs. Groundwater encountered at ~10 ft bgs.

Location:

Surface Elevation:

Logged By: A. Lopez

Drill Rig: Direct Push

Equipment/Hammer: Acetate Liner/

Date Completed: 8-20-10

USG Interiors
Remedial Investigation
Puyallup, Washington

Boring Log MW-7S
Project No: 19921-74559

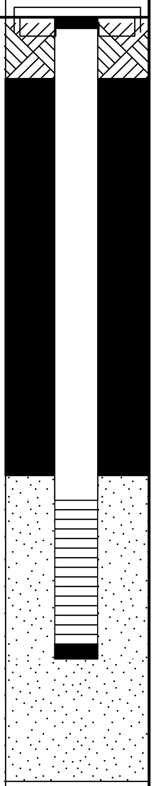
Figure: 20
1 of 1

CDM

Boring Log MW8

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	MW8-2						G	SP		SAND (SP), gray-brown, moist, poorly graded, fine subangular to subrounded sand, trace silt, common fine rootlets (Alluvium).	
						5		GP		BOULDER, 16" dia., light gray, granitic composition (Levee Fill).	
	MW8-6						G	SM		Silty SAND with GRAVEL and COBBLES (SM), light gray-brown, moist, fine to medium subangular to subrounded sand grains, 30% gravel and cobbles to 6" dia., trace rootlets.	
								GP		BOULDER, 12+" dia., subangular (Levee Fill).	
	MW8-10					10	G	SM		As at 5 ft bgs.	
						∇		GP		BOULDER, 1.5' dia., light gray, dry, subangular, granitic composition (Levee Fill).	
	MW8-14					15	G	GC		Clayey GRAVEL (GC), light greenish-gray, wet, fine to coarse subrounded gravel, trace cobbles to 6" dia., clay component is stiff, trace orange-brown iron oxide, medium plasticity (Levee Fill).	
	MW8-16 MW8-18 MW8-20 MW8-22 MW8-24					20	G G G G G	SW		SAND with GRAVEL (SW), dark gray, wet, well graded, fine to coarse subangular sand grains, 30% gravel, fine to coarse well rounded, sand and gravel grains comprise red, black, and gray lithics (Alluvium).	
						25				Boring terminated at 25 ft bgs. Groundwater encountered at 12.5 ft bgs.	
						30					
						35					
						40					
						45					

Well or Piezometer Completion



Location:
Surface Elevation:
Logged By: H. Young

Drill Rig: Rotosonic
Equipment/Hammer: Continuous Core/
Date Completed: 10-13-10

USG Interiors
Remedial Investigation
Puyallup, Washington

CDM

Boring Log MW8
Project No: 19921-74559

Figure: 21
1 of 1

Appendix C

Groundwater Sampling Records

CDM

GROUNDWATER SAMPLING RECORD

Sample ID USGPuy - RRS - 11/09

Well No. RRS

Project: USG Puyallup
Date: 11/10/09
Project No.: 19921-67793
Sampled By: MLF & SLS
Weather: Sunny, breezy, 50's
Reviewed By:

PURGING

Depth to water (TOC) 23.83
Time 1037
Comments
Water Volume in Casing
Total Well Depth (TOC) 30.71
Volume Purged Before Sampling 11.7L
Screened Interval (TOC) 5' of screen
Purging Method peristaltic pump
Purge Volume Measurement Method beaker

Time	Flow Rate mL/min	Cumulative Volume (Ltr)	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	Comments ORP	DTW (btoc)
1039	~450	Initial	12.95	301	6.14		8.73	105.9	24.16
1043	↓	2.7	12.90	293	6.09	3.55	2.99	112.0	24.19
1047		4.5	12.93	272	6.12		1.73	104.2	24.22
1051		6.3	12.92	272	6.12		1.32	97.9	24.21
1055		8.1	12.91	273	6.10	2.21	1.15	95.0	24.20
1059		9.9	12.98	273	6.05		0.94	92.5	24.19
1103		11.7	12.96	275	6.06		0.93	91.6	24.19
									23.85

SAMPLING

Sampling Method peristaltic pump
Analytical Matrix JS 11/10/09 ☒ Yes ☒ No ☐ Attached
Time Sampled 1110

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
250mL Amber Glass (2)	H_2SO_4	<2	—	ICE
500mL plastic ~~(2)~~ ~~(4)~~ (3) JS 11/10/09	—	— 6.06	–	ICE
500mL plastic (1)	HNO_3	<2	–	ICE
1 L plastic	—	6.06	–	ICE

SAMPLE DATA

Appearance / Odor clear, colorless, odorless
pH (last stabilized) 6.06
Temperature (°C) 12.96
Eh (millivolts) 91.6
Specific Conductance (microsiemens/cm) 275
OVM-PID Headspace (ppm) —
Comments

Disposition

Chain-of-Custody ☒ Yes ☐ No
Chain-of-Custody ID
Duplicate Sample ID N/A
Replicate Sample Nos. N/A

ANALYTICAL LAB
Lab Name ARI
Date Sent to Lab 11/10/09
Shipment Method hand delivery

SPLIT WITH
Name (s)
Organization (s)

Other Tubing set ~25' ~~bts~~ MLF bgs

REV. 2002

forms\groundwater sampling record

CDM

GROUNDWATER SAMPLING RECORD

Sample ID PogUSGPuy-RRN-11/09

Well No. RRN

Project: USG Puyallup

Date: 11/10/09

Project No.: 19921-64793

Sampled By: MLF & JLS

Weather: cloudy, breezy, 50's

Reviewed By:

PURGING

Depth to water (TOC) 23.32	**Time** 1205	**Comments**	
Water Volume in Casing	**Total Well Depth (TOC)** 26.20'		
Volume Purged Before Sampling 10L	**Screened Interval (TOC)** 5' of screen		
Purging Method peristaltic pump	**Purge Volume Measurement Method** beaker		

Time	Flow Rate mL/min	Cumulative Volume Ltr.	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	Comments ORP	DTW
1208	500	Initial	14.11	283	5.91	4.04	7.52	118.7	23.33
1212	↓	2	13.80	258	5.86		6.39	114.8	23.32
1216		4	13.77	255	5.81	1.78	5.73	122.4	23.33
1220		6	13.74	253	5.78	2.82	4.25	121.9	23.32
1224		8	13.76	251	5.76	2.26	2.58	121.6	23.32
1228	↓	10	13.72	254	5.73	2.02	2.55	123.0	23.32

SAMPLING

Sampling Method peristaltic pump

Analytical Matrix JS 11/10/09 ☒ Yes ☒ No ☐ Attached Time Sampled 1235

Sample Container JS 11/10/09	Preserved By	At What pH	Filter Type	Cooled By
500ml plastic ~~(3)~~ ~~(4)~~ (3)	—	5.73	—	ICE
250 mL AG (2)	H_2SO_4	<2	—	ICE
500 mL plastic (1)	HNO_3	<2	—	ICE
1 L plastic	—	5.73	—	ICE

SAMPLE DATA

Appearance / Odor clear, colorless, odorless

pH (last stabilized) 5.73

Temperature (°C) 13.72

Eh (millivolts) 123.0

Specific Conductance (microsiemens/cm) 254

OVM-PID Headspace (ppm) —

Comments

Disposition

Chain-of-Custody ☒ Yes ☐ No

Chain-of-Custody ID

Duplicate Sample ID N/A

Replicate Sample Nos. N/A

ANALYTICAL LAB	Lab Name ARI	Date Sent to Lab 11/10/09
	Shipment Method hand delivered	
SPLIT WITH	Name (s)	
	Organization (s)	

Other Tubing intake set at 24.8' btc.

REV. 2002

forms\groundwater sampling record

CDM

GROUNDWATER SAMPLING RECORD

Sample ID USGPuy-MW4S-11/09

Well No. MW4S

Project: USG Puyallup

Date: 11/10/09

Project No.: 19921-64793

Sampled By: J.Smith/M.Fox

Weather: 50s partially cloudy/rain

Reviewed By:

PURGING

Depth to water (TOC) 12.60

Time 1337

Comments See back side of page for more purging data

Water Volume in Casing

Total Well Depth (TOC)

Volume Purged Before Sampling 19.0

Screened Interval (TOC) 5' of screen

Purging Method peristaltic

Purge Volume Measurement Method beaker

Time	Flow Rate (mL/min)	Cumulative Volume (L)	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	Comments ORP	Comments Depth to Water (btoc)
1343	500	Initial	12.99	231	5.68	9.69	6.98	54.9	12.59
1347		~~1.0~~ 5.0	12.70	233	5.41	6.70	5.21	16.0	12.62
1351		7.0	12.68	185	5.35	4.42	4.62	12.0	12.62
1355		9.0	12.66	131	5.31	3.73	3.64	-19.5	12.61
1359		11.0	12.65	132	5.14	6.35	1.87	-36.2	12.62
1405		14.0	12.65	130	5.15	3.47	0.52	-39.2	12.62
1410		16.5	12.54	140	5.08	6.20	0.49	-26.5	12.62

SAMPLING

Sampling Method peristaltic pump

Analytical Matrix ☒ Yes ☒ No ☐ Attached

Time Sampled 1430

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
250 ml Amber (2)	H_2SO_4	<2	–	ICE
500 ml plastic ~~(4)~~ (3)	–	5.09	–	ICE
500 ml plastic (1)	HNO_3	<2	–	ICE
250 ml plastic (1)	EDTA	5.09	–	ICE
1 L plastic (1)	–	5.09	–	ICE

SAMPLE DATA

Appearance / Odor clear, colorless, odorless

pH (last stabilized) 5.09

Temperature (°C) 12.51

Eh (millivolts) -26.5

Specific Conductance (microsiemens/cm) 147

OVM-PID Headspace (ppm) –

Comments

Disposition

Chain-of-Custody ☒ Yes ☐ No

Chain-of-Custody ID

Duplicate Sample ID N/A

Replicate Sample Nos. N/A

ANALYTICAL LAB

Lab Name ARI

Date Sent to Lab 11/10/09

Shipment Method hand delivered

SPLIT WITH

Name (s)

Organization (s)

Other

Time	Flow Rate (mL/min)	Cumulative Vol (L)	Temp (°C)	Specific Conductance (mS/cm)	pH	Turbidity	DO	ORP	Depth to Water (btoc)
1415	500	19.0	12.5	147	5.09	5.29	0.47	-10.4	12.62

CDM

GROUNDWATER SAMPLING RECORD

Sample ID USGPuy-MW4D-11/09

Well No. MW4D

Project: USG Puyallup

Date: 11/10/09

Project No.: 19921-64793

Sampled By: J. Smith/M. Fox

Weather: 50s partially cloudy/rain

Reviewed By:

PURGING

Depth to water (TOC) 14.55

Time 1520

Comments See back page for more purging data

Water Volume in Casing

Total Well Depth (TOC) 48.84

Volume Purged Before Sampling 25 L

Screened Interval (TOC) 5' of screen

Purging Method peristaltic

Purge Volume Measurement Method beaker

Time	**Flow** Rate mL/min	**Cumulative** Volume L	**Temp** (°C)	**Specific** Conductance (microsiemens/cm)	**pH**	**Turbidity**	**Dissolved** Oxygen	**Comments** ORP DTW (btoc)
1522	500	initial	12.42	355	9.71	39.2	3.93	-78.2 14.55
1526	↓	3	12.40	356	9.56	33.3	3.57	-79.9 15.05
1535		7.5	12.36	371	8.89	25.3	1.52	-238.4 15.55
1540		10.0	12.35	371	7.98	19.8	1.24	-220.5 15.57
1545		12.5	12.32	368	7.00	17.9	0.68	-138.8 15.60
1550		15.0	12.32	365	6.86	16.8	0.61	-136.8 15.61
1554		17.0	12.34	369	6.73	14.3	0.50	-167.0 15.61

SAMPLING

Sampling Method peristaltic

Analytical Matrix JS 11/10/09 ☒Yes ☒No ☐Attached

Time Sampled 1615

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
250 ml Amber (2)	H_2SO_4	<2	—	ICE
500 ml plastic ~~(4)~~ (3) JS 11/10/09	—	6.59	—	ICE
500 ml plastic (1)	HNO_3	<2	—	ICE
250 ml plastic (1)	EDTA	6.59	—	ICE
1 L plastic (1)	—	6.59	—	ICE

SAMPLE DATA

Appearance / Odor clear, colorless, odorless

pH (last stabilized) 6.59

Temperature (°C) 12.33

Eh (millivolts) ~~2~~ JS 11/10/09 -167.0

Specific Conductance (microsiemens/cm) 270

OVM-PID Headspace (ppm) —

Comments

Disposition

Chain-of-Custody ☒ Yes ☐ No

Chain-of-Custody ID

Duplicate Sample ID N/A

Replicate Sample Nos.

ANALYTICAL LAB

Lab Name ARI

Date Sent to Lab 11/10/09

Shipment Method hand delivered

SPLIT WITH

Name (s) N/A

Organization (s) N/A

Other Sampled at 46.44 ft below top of casing (btoc)

Time	Flow Rate (mL/min)	cumulative volume (L)	Temp (°C)	Specific Cond. (mS/cm)	pH	Turbidity	DO	ORP	Depth to Water (btoc)
1557	500	18.5	12.32	360	6.71	15.30	0.43	-169.3	15.60
1604	↓	22.0	12.32	244	6.62	12.90	0.39	-174.4	15.60
1610		25.0	12.33	270	6.59	7.53	0.35	-168.5	15.57

CDM

GROUNDWATER SAMPLING RECORD

Sample ID USGPG MW-2-11/09

Well No. MW-2

Project: USG Pyrodup

Date: 11/11/09

Project No.: 19921-64793

Sampled By: MF & JLS

Weather: cool, sunny, calm 50s

Reviewed By:

PURGING

Depth to water (TOC) 15.36

Time 0829

Comments

Water Volume in Casing

Total Well Depth (TOC) 23 btoc

Volume Purged Before Sampling 13

Screened Interval (TOC) 5' of Screen

Purging Method peristaltic pump

Purge Volume Measurement Method beaker

Time	Flow Rate ml/min	Cumulative Volume (Liter)	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	Comments	
								ORP	DTW
0831	500	Initial	12.34	368	6.52	.95	6.66	74.9	15.38
0835	↓	2 Ltr.	12.61	339	6.01	.94	5.12	70.1	15.41
0839		4	12.61	345	6.02	1.02	5.24	57.1	15.42
0845		~~6~~ 7	12.69	347	6.01	0.93	2.63	50.5	15.41
0849		9	12.68	351	6.05	0.94	0.93	44.4	15.41
0853		11	12.62	354	6.10	0.94	0.62	39.1	15.41
0857	↓	13	12.61	355	6.08	0.94	0.56	36.4	15.4

SAMPLING

Sampling Method peristaltic pump

Analytical Matrix ☐ Yes ☒ No ☐ Attached

Time Sampled 0900

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
500mL plastic (4)(3)	—	—		
250mL AG (2)	H_2SO_4	<2		
1 Ltr. plastic	—	—		
500 mL plastic	HNO_3	<2		
125 mL plastic	EDTA	—		

SAMPLE DATA

Appearance / Odor clear colorless, odorless

pH (last stabilized) 6.08

Temperature (°C) 12.61

Eh (millivolts) 36.4

Specific Conductance (microsiemens/cm) 355

OVM-PID Headspace (ppm) —

Comments

Disposition

Chain-of-Custody ☒ Yes ☐ No

Chain-of-Custody ID

Duplicate Sample ID N/A

Replicate Sample Nos. N/A

ANALYTICAL LAB

Lab Name ART

Date Sent to Lab 11/11/09

Shipment Method Hand delivered

SPLIT WITH

Name (s)

Organization (s)

Other tubing intake set at ~20.48' btc

CDM

GROUNDWATER SAMPLING RECORD

Sample ID USGPuy-MW-3-11/09

Well No. MW-3

Project: USG Puyallup

Date: 11/11/09

Project No.: 19921-64793

Sampled By: MLF & JLS

Weather: sunny calm 50's

Reviewed By:

PURGING

Depth to water (TOC) 14.01

Time 0937

Comments

Water Volume in Casing

Total Well Depth (TOC) 22.6' btoc

Volume Purged Before Sampling 12 L

Screened Interval (TOC) 5' of screen

Purging Method peristaltic pump

Purge Volume Measurement Method beaker

Time	Flow Rate mL/min	Cumulative Volume (Liter)	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity *	Dissolved Oxygen	Comments ORP	DTW
0940	~500	~~0~~ Initial	13.06	222	5.48	0.93	8.49	45.7	14.04
0944	↓	MLF 11/10/09 ~~4~~ 2	13.10	215	5.37	0.93	5.22	40.2	14.00
0948		~~6~~ 4	13.16	214	5.23	0.94	2.46	40.3	14.03
0952		6	13.21	211	5.25	0.93	1.08	35.7	14.04
0956		8	13.27	212	5.28	0.94	0.65	38.7	14.04
1000		10	13.26	199	5.04	0.93	0.59	31.6	14.04
1004	↓	12	13.27	211	5.29	0.93	0.52	22.0	14.04

SAMPLING

Sampling Method peristaltic pump

Analytical Matrix ☐ Yes ☒ No ☐ Attached

Time Sampled 1015

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
500mL plastic (6)	—	—	—	ice
250mL AG (2)	H_2SO_4	<2	—	↓
~~500mL plastic~~ ~~1L plastic~~	~~HNO_3~~	~~<2~~	—	↓
125mL plastic	EDTA	5.21	—	

SAMPLE DATA

Appearance / Odor clear, colorless, odorless

pH (last stabilized) 5.21

Temperature (°C) 13.23

Eh (millivolts) 150

Specific Conductance (microsiemens/cm) 211

OVM-PID Headspace (ppm) —

Comments

Disposition

Chain-of-Custody ☒ Yes ☐ No

Chain-of-Custody ID

Duplicate Sample ID USGPuy-MW-0-11/09 (1025)

Replicate Sample Nos.

ANALYTICAL LAB

Lab Name ARI

Date Sent to Lab 11/11/09

Shipment Method Hand-delivered

SPLIT WITH

Name (s)

Organization (s)

Other Tubing intake set at ~20.1' btc

Duplicate time of 1025

REV. 2002 Turb. values MLF meter believed to be malfunctioning

Temp	Cond	Diss O_2	ORP	pH
1323	—*	0.51	15.0	5.21

* Cond readings jumping erratically

CDM

GROUNDWATER SAMPLING RECORD

Sample ID USGPuy-MW5-11/09

Well No. MW5

Project: USG Puyallup

Project No.: 19921-64793

Date: 11/11/09

Weather: ~50s, sunny

Sampled By: J. Smith + M. Fox

Reviewed By:

PURGING

Depth to water (TOC) 17.47

Time 1100

Water Volume in Casing

Comments

Volume Purged Before Sampling 16L

Total Well Depth (TOC) 19.97

Purging Method peristaltic

Screened Interval (TOC) 5' of screen

Purge Volume Measurement Method beaker

Time	Flow Rate mL/min	Cumulative Volume Ltr.	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity ¥	Dissolved Oxygen	Comments ORP	DTW
1103	500	Initial	12.63	339	6.73	0.94	5.35	-52.3	18.26
1107	↓	2	12.65	340	6.69	0.93	3.93	-110.0	18.30
1111		4	12.62	329	6.56	0.93	3.11	-113.3	18.30
1115		6	12.61	322	6.39	0.93	2.31	-113.4	18.30
1119		8	12.60	312	6.11	0.94	1.33	-116.1	18.30
1123		10	12.61	312	6.01	0.93	0.72	-119.7	18.30
1127		12	12.59	298	5.94	0.94	0.46	-125.7	18.30

SAMPLING

Sampling Method peristaltic

Analytical Matrix ☐ Yes ☒ No ☐ Attached

Time Sampled 1145

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
500mL plastic (3)	—	— 6.02	—	
250 ml AG (2)	H_2SO_4	<2	—	ice
~~Ltr plastic~~ ~~500ml plastic~~	~~— HNO_3~~	6.02 ~~<2~~	~~—~~	ice
125mL plastic	EDTA	6.02		ice

SAMPLE DATA

Appearance / Odor clear, colorless, odorless

pH (last stabilized) 6.02

Eh (millivolts) -131.4

Temperature (°C) 12.59

OVM-PID Headspace (ppm) —

Specific Conductance (microsiemens/cm) 303

Comments

Disposition

Chain-of-Custody ☒ Yes ☐ No

Chain-of-Custody ID

Duplicate Sample ID N/A

Replicate Sample Nos. N/A

ANALYTICAL LAB

Lab Name ARI

Shipment Method hand delivery

Date Sent to Lab 11/11/09

SPLIT WITH

Name (s)

Organization (s)

Other Tubing intake set at ~26.25' btc + Turbidity meter believed to be malfunctioning. Water is very clear.

DTW	pH	Cond	Diss O2	pH	ORP	Time 1131	Vol Ltr.	Flow Rate ml/min 500	Turb
8.30	5.95	305	0.38	6.10	-130.5	1134	14		0.93
8.30	6.02	303	0.36	6.01	-131.4	1138	16		0.93

GROUNDWATER SAMPLING RECORD

Sample ID USGPuy-P3-1-11l09 | Well No. P3-1

ct: USG Puyallup — Date: 11/11/09

ject No.: 19921-64793 — Sampled By: J. Smith + M. Fox

Weather: 50s, sunny — Reviewed By:

PURGING

Depth to water (TOC) 13.65	**Time** 1209
Water Volume in Casing	**Total Well Depth (TOC)** JS 11/11/09 ~~16.05~~ ~~16.75~~ 20.25'
Volume Purged Before Sampling 10L	**Screened Interval (TOC)** 5' of screen
Purging Method peristaltic	**Purge Volume Measurement Method** beaker

Comments

Time	Flow Rate (mL/min)	Cumulative Volume (L)	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity *	Dissolved Oxygen	Comments	
								ORP	DTW
1213	500	JS 11/11/09 ~~5~~ Initial	13.44	450	6.03	0.93	6.38	37.7	13.70
1217	↓	2	13.43	465	6.00	0.94	3.87	36.3	13.79
1221		4	13.39	464	6.00	0.93	1.45	34.2	13.76
1225		6	13.39	457	5.99	0.95	0.42	31.2	13.69
1229		8	13.38	454	5.99	0.97	0.37	29.9	13.73
1233		10	13.38	456	5.98	0.93	0.35	31.0	13.70

SAMPLING

Sampling Method peristaltic

Analytical Matrix ☐ Yes ☒ No ☐ Attached — Time Sampled 1240

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
500 ml plastic (3)	—	5.98	—	ICE
JS 11/11/09 125 ~~250~~ ml plastic (1)	EDTA	5.98	—	ICE
~~500 ml plastic (2)~~	~~HNO_3~~	~~<2~~	~~—~~	~~ICE~~
250 ml Amber	H_2SO_4	<2	—	ICE

SAMPLE DATA

Appearance / Odor clear, odorless, colorless

pH (last stabilized) 5.98 — Temperature (°C) 13.38

Eh (millivolts) 31.0 — — Specific Conductance (microsiemens/cm) 456

OVM-PID Headspace (ppm) — — Comments

Disposition

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

Duplicate Sample ID N/A — Replicate Sample Nos. N/A

ANALYTICAL LAB — Lab Name ARI — Date Sent to Lab 11/11/09

Shipment Method hand delivered

SPLIT WITH — Name (s)

Organization (s)

Other tubing ~~ste~~ set at 14.25' btoc

*turbidimeter believed to be malfunctioning. Water is very clear

CDM

GROUNDWATER SAMPLING RECORD

Sample ID USGPuy-P3-3-11/09

Well No. P3 3

Project: USG Puyallup
Date: 11/11/09
Project No.: 19921-69793
Sampled By: J. Smith and M. Fox
Weather: ~50's sunny
Reviewed By:

PURGING

Depth to water (TOC) 12.91'
Time 1347
Comments
Water Volume in Casing
Total Well Depth (TOC) 30.75'
Volume Purged Before Sampling 12L
Screened Interval (TOC) 5' of screen
Purging Method peristaltic
Purge Volume Measurement Method beaker

Time	Flow Rate (mL/min)	Cumulative Volume L	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	Comments ORP	DTW
1349	500	JS 11/11/09 ~~5~~ Initial	13.29	222	6.05	—	8.80	3.1	12.91'
1354	↓	2	12.87	221	5.89	—	3.41	-12.7	12.91'
1359		4	12.87	220	5.89	1.19	2.10	-16.0	12.99'
1406		7.5	12.86	223	5.86	1.11	0.70	-21.5	12.96'
1411		10	12.82	227	5.85	1.05	0.52	-23.4	12.98'
1415		12	12.84	225	5.85	1.02	0.47	-25.4	12.98'

SAMPLING

Sampling Method peristaltic
Analytical Matrix JS 11/11/09 ☒ Yes ☒ No ☐ Attached
Time Sampled 1425

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
500 ml plastic (3)	—	5.85	—	ICE
1 L plastic (1)	—	5.85	—	ICE
250 ml plastic (1)	EDTA	5.85	—	ICE
250 ml Amber (2)	H_2SO_4	<2	—	ICE
500 ml plastic	HNO_3	<2	—	ICE

SAMPLE DATA

Appearance / Odor clear, colorless, odorless
pH (last stabilized) 5.85
Temperature (°C) 12.84
Eh (millivolts) -25.4
Specific Conductance (microsiemens/cm) 225
OVM-PID Headspace (ppm) —
Comments

Disposition

Chain-of-Custody ☒ Yes ☐ No
Chain-of-Custody ID
Duplicate Sample ID N/A
Replicate Sample Nos. N/A
ANALYTICAL LAB
Lab Name ARI
Date Sent to Lab 11/11/09
Shipment Method hand delivery
SPLIT WITH
Name (s)
Organization (s)
Other initially some brown biomass present in purge water, became clear after few minutes. tubing was placed at 28.25 ft btoc

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CDM

GROUNDWATER SAMPLING RECORD

Sample ID USGPuy-P3-2-11/09

Well No. P3-2

Project: USG Puyallup

Date: 11/11/09

Project No.: 19921-64793

Sampled By: J. Smith/M. Fox

Weather: sunny, breezy, warm, 50's

Reviewed By:

PURGING

Depth to water (TOC) 12.95

Time 1527

Comments

Water Volume in Casing

Total Well Depth (TOC) 24.5'

Volume Purged Before Sampling 12

Screened Interval (TOC) 5' of screen

Purging Method peristaltic pump

Purge Volume Measurement Method beaker

Time	Flow Rate	Cumulative Volume Ltr	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity *	Dissolved Oxygen mg/L	Comments ORP	DTW
1531	500	50 mL initial	13.17	262	5.91		3.06	53.8	12.95
1534	↓	2	13.12	266	5.94		2.30	47.1	12.95
1538		4	13.11	264	5.93	0.94	2.02	47.0	12.95
1542		6	13.11	263	5.90		1.31	49.0	12.95
1546		8	13.11	262	5.92		0.96	48.9	12.95
1550		10	13.09	260	5.89	0.95	0.51	47.9	12.95
1554		12	13.09	258	5.87		0.50	47.1	12.95

SAMPLING

Sampling Method peristaltic pump

Analytical Matrix ☐ Yes ☒ No ☐ Attached

Time Sampled 1600

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
500mL plastic (3)	—	—	—	ice
250mL AG (2)	H_2SO_4	<2	—	ice
~~Ltr plastic~~ 500 mL plastic	~~—~~ HNO_3	~~—~~ <2	—	ice
125mL plastic	EDTA	—	—	ice

SAMPLE DATA

Appearance / Odor clear colorless

pH (last stabilized) 5.87

Temperature (°C) 13.09

Eh (millivolts) 47.1

Specific Conductance (microsiemens/cm) 258

OVM-PID Headspace (ppm) —

Comments

Disposition

Chain-of-Custody ☒ Yes ☐ No

Chain-of-Custody ID

Duplicate Sample ID N/A

Replicate Sample Nos. N/A

ANALYTICAL LAB

Lab Name ARI

Date Sent to Lab 11/11/09

Shipment Method hand delivery

SPLIT WITH

Name (s)

Organization (s)

Other Bottom of well measured with Sinco meter at ~ mis ~~25.5~~ 24.5' (from TOC). Tubing intake set at ~22' btoc.

REV. 2002

* Turbidity meter reading believed to be ve incorrect Water is very clear

CDM

GROUNDWATER SAMPLING RECORD

Sample ID USG Puy-P2-3-11/09

Well No. P2-3

Project: USG Puyallup

Date: 11/12/09

Project No.: 19921-64793

Sampled By: J.Smith/M.Fox

Weather: ~50s cloudy

Reviewed By:

PURGING

Depth to water (TOC) 14.20'

Time 0800

Comments

Water Volume in Casing

Total Well Depth (TOC) 32.65'

Volume Purged Before Sampling 12L ~~3.5L~~

Screened Interval (TOC) 5' of screen

Purging Method peristaltic pump

Purge Volume Measurement Method beaker

Time	Flow Rate (mL/min)	Cumulative Volume L	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	Comments	
								ORP	DTW (ft)
0843	500	initial	11.16	340	6.92	11.0	10.03	-116.1	14.20
0847	↓	JS 11/12/09 ~~1~~ 2	12.02	355	6.88	8.14	3.33	-130.7	14.32
0851		~~1.5~~ 4	12.21	359	6.88	6.03	1.01	-133.7	14.31
0855		~~2~~ 6	12.23	354	6.81	7.29	0.71	-131.9	14.30
0859		~~2.5~~ 8	12.23	355	6.72	2.50	0.59	-130.9	14.31
0903		~~3~~ 10	12.25	353	6.49	1.70	0.54	-122.9	14.32
0907		~~3.5~~ 12	12.26	354	6.41	1.82	0.52	-120.9	14.31

SAMPLING

Sampling Method peristaltic pump, low flow

Analytical Matrix ☐ Yes ☒ No ☐ Attached

Time Sampled 0910

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
500 mL plastic (3)	—	6.41	—	ICE
250 mL amber (2)	H_2SO_4	<2	—	ICE
1 L plastic (1)	—	6.41	—	ICE
500 ml plastic (1)	HNO_3	<2	—	ICE

SAMPLE DATA

Appearance / Odor clear, colorless, odorless

pH (last stabilized) 6.41

Temperature (°C) 12.26

Eh (millivolts) -120.9

Specific Conductance (microsiemens/cm) 354

OVM-PID Headspace (ppm) —

Comments

Disposition

Chain-of-Custody ☒ Yes ☐ No

Chain-of-Custody ID

Duplicate Sample ID N/A

Replicate Sample Nos. N/A

ANALYTICAL LAB

Lab Name ARI

Date Sent to Lab 11/12/09

Shipment Method hand delivered

SPLIT WITH

Name (s)

Organization (s)

Other installed tubing to 30.05 ft ~~bgs~~ JS 11/12/09 btoc

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GROUNDWATER SAMPLING RECORD

Sample ID USGPuy-P2-2-11/09
Well No. P2-2

Project: USGPuy-P2-2-11/09
Date: 11/12/09
Project No.: USG Puyallup
Sampled By: MLF & SLS
Weather: overcast, cool - low 40's
Reviewed By:

PURGING

Depth to water (TOC) 14.99	**Time** 1012	**Comments**	
Water Volume in Casing	**Total Well Depth (TOC)** 28.90		
Volume Purged Before Sampling 8L	**Screened Interval (TOC)** 5' of screen		
Purging Method peristaltic pump	**Purge Volume Measurement Method** beaker		

Time	**Flow** Rate ml/min	**Cumulative** Volume Ltr.	**Temp** (°C)	**Specific** Conductance (microsiemens/cm)	**pH**	**Turbidity**	**Dissolved** Oxygen	**Comments** ORP	DTW
1014	500	Initial	12.06	374	6.84	63.6	4.60	98.2	15.03
1018	500	2	12.24	355	6.71	2.32	1.92	-105.9	15.02
1022	500	4	12.26	354	6.54	1.09	1.89	-109.3	15.02
1026	500	6	12.29	349	6.67	1.34	1.57	-109.7	15.02
1030	500	8	12.30	349	6.64	0.97	1.32	-108.6	15.02

SAMPLING

Sampling Method peristaltic pump

Analytical Matrix ☐Yes ☒No ☐Attached **Time Sampled** 1040

Sample Container	**Preserved By**	**At What pH**	**Filter Type**	**Cooled By**
500ml plastic (3)	—	6.64	–	ICE
250ml AG (2)	H_2SO_4	<2	–	ICE
Ltr. plastic	–	6.64	–	ICE
500ml plastic	HNO_3	<2	–	ICE
125ml plastic	EDTA	6.64	–	ICE

SAMPLE DATA

Appearance / Odor clear, colorless, odorless

pH (last stabilized) 6.64 **Temperature (°C)** 12.30

Eh (millivolts) -108.6 **Specific Conductance (microsiemens/cm)** 349

OVM-PID Headspace (ppm) – **Comments**

Disposition

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

Duplicate Sample ID N/A **Replicate Sample Nos.** N/A

ANALYTICAL LAB Lab Name ARI Date Sent to Lab 11/12/09

Shipment Method hand delivered

SPLIT WITH Name (s)

Organization (s)

Other Well depth measured at 28.90 ft btc
Tubing intake set ~ 26.4 ft btc

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CDM

GROUNDWATER SAMPLING RECORD

Sample ID USGPuy-P21-1109

Well No. P2-1

Project: USG Puyallup
Date: 11/12/09
Project No.: 19921-64793
Sampled By: J. Smith/M. Fox
Weather: ~40s partially cloudy
Reviewed By:

PURGING

Depth to water (TOC) 13.34
Time 1100
Comments
Water Volume in Casing
Total Well Depth (TOC) 20.65
Volume Purged Before Sampling 6L
Screened Interval (TOC) 5' of screen
Purging Method peristaltic pump
Purge Volume Measurement Method beaker

Time	Flow Rate (mL/min)	Cumulative Volume (L)	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	Comments ORP	DTW(ft)
1106	500	initial	12.58	440	6.31	~~0.00~~ 8.95	3.03	-84.3	13.39
1110	↓	2	12.82	448	6.32	0.00	2.06	-90.4	13.39
1114		4	12.82	443	6.41	0.00	1.65	-92.8	13.39
1118		6	12.90	440	6.33	0.00	1.55	-93.2	13.39

SAMPLING

Sampling Method peristaltic pump, low flow
Analytical Matrix ☐ Yes ☒ No ☐ Attached
Time Sampled 1130

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
500 mL plastic (3)	—		—	ICE
250 ml Amber (2)	H_2SO_4	<2	—	ICE
1 L plastic (1)	—		—	ICE
125 ml plastic (1)	EDTA		—	ICE
500 ml plastic (1)	HNO_3	<2	—	ICE

SAMPLE DATA

Appearance / Odor clear, colorless, odorless
pH (last stabilized) 6.33
Temperature (°C) 12.90
Eh (millivolts) -93.2
Specific Conductance (microsiemens/cm) 440
OVM-PID Headspace (ppm) —
Comments

Disposition

Chain-of-Custody ☒ Yes ☐ No
Chain-of-Custody ID
Duplicate Sample ID N/A
Replicate Sample Nos. N/A

ANALYTICAL LAB
Lab Name ARI
Date Sent to Lab 11/12/09
Shipment Method hand delivered

SPLIT WITH
Name (s)
Organization (s)

Other well depth measured as 20.65'
tubing installed at 18.10'

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CDM

GROUNDWATER SAMPLING RECORD

Sample ID USGPuy-P1-1-11/09

Well No. P1-1

Project: USG Puyallup
Date: 11/12/09
Project No.: 19921-64793
Sampled By: JLS & MLF
Weather: sunny, cool, hi 40's
Reviewed By:

PURGING

Depth to water (TOC) 14.32'	**Time** 1200	**Comments**
Water Volume in Casing	**Total Well Depth (TOC)** 20.17 ft	
Volume Purged Before Sampling	**Screened Interval (TOC)** 5' of screen	
Purging Method peristaltic pump	**Purge Volume Measurement Method** beaker	

Time	**Flow** Rate (mL/min)	**Cumulative** Volume (L)	**Temp** (°C)	**Specific** Conductance (microsiemens/cm)	**pH**	**Turbidity**	**Dissolved** Oxygen	**Comments** ORP	DTW
1204	500	Initial	13.16	359	6.36	5.7	2.70	-44.9	14.32
1208	↓	2	14.24		6.23		2.61	-21.8	
1217		6	13.15	357	6.31	2.0	2.21	-46.1	14.40
1221		8	13.20	359	6.30	0.95	1.67	-51.3	14.39
1225		10	13.20	364	6.30		0.84	-55.9	14.40
1229		12	13.19	365	6.29	1.1	0.51	-59.1	14.39
1233		14	13.22	365	6.30	1.0	0.47	-60.8	14.40

SAMPLING

Sampling Method peristaltic pump

Analytical Matrix ☐ Yes ☒ No ☐ Attached   Time Sampled 1240

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
250ml Amber (2)	H_2SO_4	<2	—	ICE
500 ml Plastic (1)	HNO_3	<2	—	ICE
500 ml Plastic (3)	—	6.30	—	ICE
1 L Plastic (1)	—	6.30	—	ICE

SAMPLE DATA

Appearance / Odor clear, colorless, ~~odorless~~ JS 11/12/09 rotton egg odor (sulfur)

pH (last stabilized) 6.30	Temperature (°C) 13.22
Eh (millivolts) -60.8	Specific Conductance (microsiemens/cm) 365
OVM-PID Headspace (ppm) —	Comments

Disposition

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

Duplicate Sample ID   Replicate Sample Nos.

ANALYTICAL LAB	Lab Name ARI	Date Sent to Lab 11/12/09
	Shipment Method Hand-delivered	
SPLIT WITH	Name (s)	
	Organization (s)	

Other

CDM

GROUNDWATER SAMPLING RECORD

Sample ID USGPuy-MW-1-11/09

Well No. MW-1

Project: USG Puyallup
Date: 11/12/09
Project No.: 19921-64793
Sampled By: MCF
Weather: sunny, warm, 50's
Reviewed By:

PURGING

Depth to water (TOC) 21.57
Time 1337
Comments
Water Volume in Casing
Total Well Depth (TOC)
Volume Purged Before Sampling
Screened Interval (TOC)
Purging Method peristaltic pump
Purge Volume Measurement Method

Time	Flow Rate mL/min	Cumulative Volume Ltr.	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity *	Dissolved Oxygen	Comments ORP	DTW
1339	500	Initial	12.62	230	6.13	Err	2.97	53.1	21.93
1343	↓	2	12.83	230	5.85		1.92	70.4	22.13
1347		4	12.83	230	5.64		1.73	71.7	22.14
1351		6	12.81	238	5.69		1.19	66.6	22.21
1355		8	12.81	221	5.62		1.23	65.7	22.27
1359		10	12.80	225	5.62		1.22	65.1	22.26

SAMPLING

Sampling Method peristaltic pump
Analytical Matrix ☐Yes ☐No ☐Attached
Time Sampled 1405

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
500mL plastic (3)	—	—	—	ice
250mL AG (2)	H_2SO_4	<2	—	↓
~~Ltr. plastic~~ 500mL plastic	HNO_3	<2	—	
125mL plastic	EDTA	—	—	

SAMPLE DATA

Appearance / Odor clear, colorless, odorless
pH (last stabilized) 5.62
Temperature (°C) 12.80
Eh (millivolts) 65.1
Specific Conductance (microsiemens/cm) 225
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 11/12/09
Shipment Method Hand-delivered

SPLIT WITH
Name (s)
Organization (s)

Other Tubing intake set at ~22.5' btc
Error reading on turbidity meter or very erratic values with +BATA message
Water was very clear

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CDM

GROUNDWATER SAMPLING RECORD

Sample ID MW8 - 10/10

Well No. MW 8

Project USG Puyallup
Date 10/20/2010
Project No. 19921 - 74559
Sampled By MLF
Weather overcast, some fog, cool, 50s
Reviewed By

PURGING

Depth to Water (TOC) 11.51
Time 0958
Comments
Water Volume in Casing
Total Well Depth (TOC) 25'
Volume Purged Before Sampling
Screened Interval (TOC) meas. cup with cale ? 16.2 - 20.5
Purging Method peristaltic pump
Purge Volume Measurement Method

Time	(mL/min) Flow Rate	(Ltr) Cumulative Volume	Temp (□C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	(mg/L) Dissolved Oxygen	ORP Comments	DTW
1002	~150	Initial	12.68	294	7.26	8.56	2.48	-160.4	11.51
1006	~200	1.6	12.74	389	7.26	6.60	1.72	-164.7	11.51
1010	↓	2.4	12.70	389	7.26	6.06	1.93	-168.6	11.51
1014		3	12.70	384	7.25	6.37	1.63	-170.7	11.51
1018		3.8	12.71	387	7.25	6.32	1.30	-170.5	11.51
1022		4.6	12.65	386	7.24	5.52	1.11	-173.6	11.51
1026	—	5.4	12.64	386	7.24	6.38	0.99	-172.0	11.51
						6.21			

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	HNO3 HNO3	<2 <2	0.45µ —	ice
Ltr. plastic 500mL plastic (2)	—	—	—	ice
250mL AG 250mL AG	H2SO4 H2SO4	<2 <2	—	ice
250mL plastic	EDTA	—	—	ice

SAMPLE DATA

Appearance/Odor very slight yellowish color clear, some sulfur odor
pH (last stabilized) 7.24
Temperature (□C) 12.64
Eh (millivolts) -172.0
Specific Conductance (microsiemens/cm) 386
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 10/20/10
Shipment Method Hand-delivered

SPLIT WITH
Name (s)
Organization (s)

Other Tubing intake set at ~18.5' btoc.

CDM

GROUNDWATER SAMPLING RECORD

Sample ID mW7-10/10

Well No. mW7

Project USG Puyallup

Date 10/20/2010

Project No. 19921-~~64793~~ 74559

Sampled By MLF

Weather Sunny, warm, 60's

Reviewed By

PURGING

Depth to Water (TOC) 12.78	Time 1458
Water Volume in Casing	Total Well Depth (TOC) 45 mu
Volume Purged Before Sampling	Screened Interval (TOC)
Purging Method peristaltic pump	Purge Volume Measurement Method meas. cup with scale

Comments

Time	mL/min Flow Rate	(Ltr) Cumulative Volume	Temp (□C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	mg/L Dissolved Oxygen	ORP Comments	DTW
1503	~300	Initial	14.09	293	7.21	11.8	3.66	-56.3	12.78
1507	↓	2.7	13.53	291	7.28	8.09	1.52	-87.3	12.78
1511		3.9	13.42	289	7.30		1.39	-96.3	12.78
1515		5.1	13.42	289	7.30	5.46	1.18	-101.6	12.78
1519		6.3	13.41	289	7.30	4.58	1.09	-104.2	12.78
1523		7.5	13.34	289	7.30	4.26	0.97	-105.5	12.79
1527		8.7	13.37	288	7.29	4.39	0.89	-106.5	12.79

SAMPLING

Sampling Method peristaltic pump

Analytical Matrix ☐ Yes ☐ No ☐ Attached

Time Sampled 1545

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
Ltr HDPE 500mL HDPE	HNO3 HNO3	<2 <2	~~0.45µ~~	ice
Ltr plastic 500mL plastic (2)	=	=	=	ice
250mL AG (2)	H_2SO_4	<2	—	ice
125mL plastic	EDTA	—	—	ice

SAMPLE DATA

Appearance/Odor some metal brown biomass, clear, colorless, odorless

pH (last stabilized) 7.26

Temperature (□C) 13.35

Eh (millivolts) -110.8

Specific Conductance (microsiemens/cm) 289

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 10/20/10

Shipment Method Hand delivered

SPLIT WITH

Name (s)

Organization (s)

Other Tubing intake set at ~22.5' btc

...e	Flow Rate	Vol	Temp	Sp Cond	pH	Turb	D.O.	ORP	DTW
1531	~300	9.9	13.34	289	7.27	4.61	0.81	-106.5	12.79
1535	↓	~~10.1~~ 11.1 mu	13.36	286	7.26	5.65	0.77	-109.1	12.79
1539		12.3	13.35	289	7.26	4.38	0.76	-110.8	12.79
						6.42			

CDM

GROUNDWATER SAMPLING RECORD

Sample ID MW6D-10/10

Well No MW6D

Project USG Puyallup

Project No. 19921-~~64773~~ 74559 MLF

Weather sunny, cool, high 50's

Date 10/20/2010

Sampled By MLF

Reviewed By

PURGING

Depth to Water (TOC) 12.56

Time 1130

Comments

Water Volume in Casing

Total Well Depth (TOC) 45'

Volume Purged Before Sampling

Screened Interval (TOC) 38-43'

Purging Method MLF ~~bladder~~ peristaltic pump

Purge Volume Measurement Method meas cup with ozl.

Time	mL/min Flow Rate	(Ltr.) Cumulative Volume	Temp (□C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	(mg/L) Dissolved Oxygen	ORP Comments	DTW
1135	~300	Initial	12.65	343	7.42	13.4	5.74	-120.3	12.89
1139		2.7	12.56	348	7.54	22.4	0.85	-147.3	12.90
1143		3.69 MLF	12.58	349	7.54	19.8	1.02	-148.9	12.90
1147		5.14~~5~~	12.57	348	7.52	13.6	1.06	-148.7	12.90
1151		6.3	12.61	345	7.51	11.7	0.94	-153.2	12.90
1155		7.5	12.59	343	7.55	12.0	0.85	-154.8	12.90
1159		8.7	12.55	340	7.57	11.8	0.77	-155.3	12.90

SAMPLING

Sampling Method MLF ~~bladder~~ pump - peristaltic

Analytical Matrix ☐ Yes ☐ No ☐ Attached

Time Sampled 1225

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
Ltr. HDPE 500mL HDPE	HNO3 HNO3	<2 <2	0.45u —	ice
Ltr. plastic 500mL plastic	—	— —	— —	ice
250mL AG (2)	H_2SO_4	<2	—	ice
125mL plastic	EDTA	—	—	ice

SAMPLE DATA

Appearance/Odor clear, colorless odorless, very small amount swirled organic sheen

pH (last stabilized) 7.56

Temperature (□C) 12.53

Eh (millivolts) -156.7

Specific Conductance (microsiemens/cm) 337

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 10/20/10

Shipment Method hand-delivered

SPLIT WITH

Name (s)

Organization (s)

Other Tubing intake set at ~ 40.5' btc

Time	Flow Rate	Vol.	Temp	Spec Cond	pH	Turb.	D.O	ORP	DTW
1204	~300	9.9	12.54	338	7.56	10.54	0.72	-156.2	12.90
1208	↓	11.1	12.53	337	7.56	12.4	0.69	-156.7	12.90
						14.4			

CDM

GROUNDWATER SAMPLING RECORD

Sample ID MW6S - 10/10

Well No. MW6S

Project USG Puyallup
Date 10/20/2010
Project No. 19921 - ~~64743~~ mlf 74559
Sampled By MLF
Weather Sunny, warm, low 60's
Reviewed By

PURGING

Depth to Water (TOC) 12.35'
Time 1327
Comments
Water Volume in Casing
Total Well Depth (TOC) 25'
Volume Purged Before Sampling
Screened Interval (TOC) 19.2 - 23.5
Purging Method peristaltic pump
Purge Volume Measurement Method meas. cup with calc.

Time	Flow Rate	Cumulative Volume	Temp (□C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	(mg/L) Dissolved Oxygen	ORP Comments	DTW
1330	~300	Initial	13.97	256	7.40	9.14	6.14	-96.0	12.38
1334		2.1	13.20	249	7.24	14.6	1.29	-101.2	12.37
1338		3.3	13.18	248	7.22	6.28	1.29	-101.5	12.37
1342		4.5	13.27	247	7.21	7.38	1.20	-103.0	12.37
1346		5.7	13.18	247	7.20	7.36	1.04	-102.3	12.37
1350		6.9	13.21	246	7.19	10.73	0.91	-103.7	12.37
1354		8.1	13.12	245	7.19	6.21	0.85	-100.4	12.37

SAMPLING

Sampling Method peristaltic pump
Analytical Matrix ☐ Yes ☒ No ☐ Attached
Time Sampled 1425

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
Ltr HDPE 500 mL HDPE	HNO3 HNO3	<2 <2	0.45μ	ice
Ltr plastic 500mL plastic (2)	—	—	—	ice
250 mL AG (2)	H_2SO_4	<2	—	ice
125 mL plastic	EDTA	—	—	ice

SAMPLE DATA

Appearance/Odor clear colorless, odorless
pH (last stabilized) 7.17
Temperature (□C) 13.20
Eh (millivolts) -102.3
Specific Conductance (microsiemens/cm) 245
OVM-PID Headspace (ppm)
Comments

DISPOSITION

Chain-of-Custody ☒ Yes ☐ No
Chain of Custody ID
Duplicate Sample ID MWD-10/10
Replicate Sample Nos.
ANALYTICAL LAB
Lab Name ARI
Date Sent to Lab 10/20/10
Shipment Method Hand delivered
SPLIT WITH
Name (s)
Organization (s)
Other Tubing intake set at ~ 21.75' btc
Duplicate for diss. As only

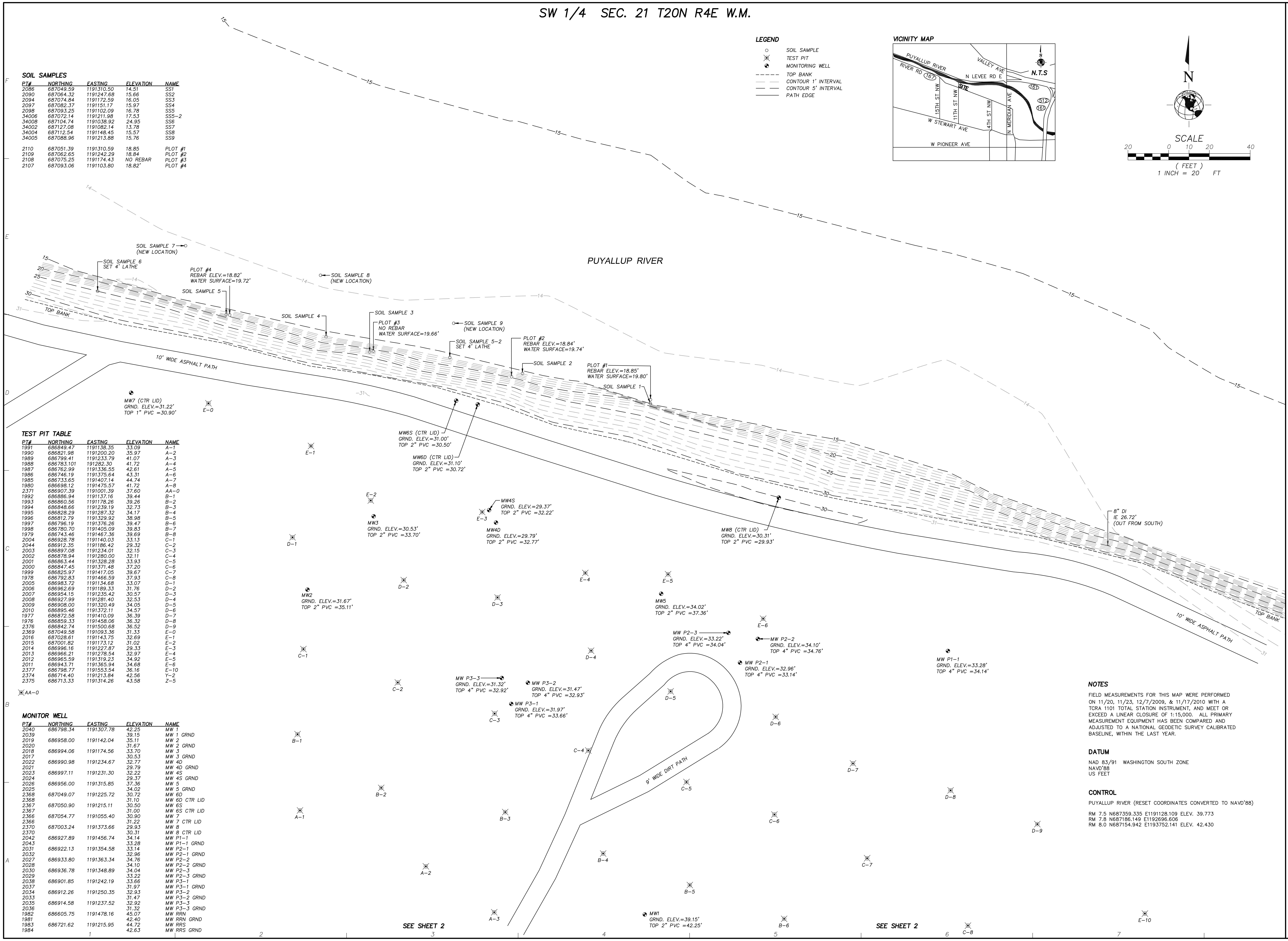
Time	Flow Rate	Vol.	Temp	Sp. Cond	pH	Turb.	D.O.	ORP	DTW
1358	~300	10.3	13.22	245	7.17	6.70	0.79	-98.7	12.37
1402	↓	11.5	13.20	245	7.17	7.28	0.76	-102.3	12.37
						6.82			

Appendix D

Bathymetric and Land Survey Report

DWG INDEX:

SW 1/4 SEC. 21 T20N R4E W.M.



SOIL SAMPLES

PT#	NORTHING	EASTING	ELEVATION	NAME
2086	687049.59	1191310.50	14.51	SS1
2090	687064.32	1191247.68	15.66	SS2
2094	687074.84	1191172.59	16.05	SS3
2097	687082.37	1191151.17	15.97	SS4
2098	687093.25	1191102.09	16.78	SS5
34006	687072.14	1191211.98	17.53	SS5-2
34008	687104.74	1191038.92	24.95	SS6
34002	687127.08	1191082.14	13.78	SS7
34004	687112.54	1191148.45	15.57	SS8
34005	687088.96	1191213.88	15.76	SS9
2110	687051.39	1191310.59	18.85	PLOT #1
2109	687062.65	1191242.29	18.84	PLOT #2
2108	687075.25	1191174.43	NO REBAR	PLOT #3
2107	687093.06	1191103.80	18.82'	PLOT #4

TEST PIT TABLE

PT#	NORTHING	EASTING	ELEVATION	NAME
1991	686849.47	1191138.35	33.09	A-1
1990	686821.98	1191200.20	35.97	A-2
1989	686799.41	1191233.79	41.07	A-3
1988	686783.101	191282.30	41.72	A-4
1987	686762.99	1191336.55	42.61	A-5
1986	686746.19	1191375.64	43.31	A-6
1985	686733.65	1191407.14	44.74	A-7
1980	686698.12	1191475.57	41.72	A-8
2371	686907.39	1191001.39	37.60	AA-0
1992	686886.94	1191137.16	39.44	B-1
1993	686860.56	1191178.26	39.26	B-2
1994	686848.66	1191239.19	32.73	B-3
1995	686828.29	1191287.32	34.17	B-4
1996	686812.79	1191329.92	38.98	B-5
1997	686796.19	1191376.26	39.47	B-6
1998	686780.70	1191405.09	39.83	B-7
1979	686743.46	1191467.36	39.69	B-8
2004	686928.78	1191140.03	33.13	C-1
2044	686912.35	1191186.42	29.32	C-2
2003	686897.08	1191234.01	32.15	C-3
2002	686878.94	1191280.00	32.11	C-4
2001	686863.44	1191328.28	33.93	C-5
2000	686847.45	1191371.48	37.20	C-6
1999	686825.97	1191417.05	39.67	C-7
1978	686792.83	1191466.59	37.93	C-8
2005	686983.72	1191134.68	33.07	D-1
2006	686962.69	1191189.33	31.76	D-2
2007	686954.15	1191235.42	30.57	D-3
2008	686927.99	1191281.40	32.53	D-4
2009	686908.00	1191320.49	34.05	D-5
2010	686895.46	1191372.11	34.57	D-6
1977	686872.58	1191410.09	36.39	D-7
1976	686859.33	1191458.06	36.32	D-8
2376	686842.74	1191500.68	36.52	D-9
2369	687049.58	1191093.36	31.33	E-0
2016	687028.61	1191143.75	32.69	E-1
2015	687001.82	1191173.12	31.02	E-2
2014	686996.16	1191227.87	29.33	E-3
2013	686966.21	1191278.54	32.97	E-4
2012	686965.59	1191319.23	34.92	E-5
2011	686943.71	1191365.94	34.68	E-6
2377	686798.77	1191553.54	36.16	E-10
2374	686714.40	1191213.84	42.56	Y-2
2375	686713.33	1191314.26	43.58	Z-5

MONITOR WELL

PT#	NORTHING	EASTING	ELEVATION	NAME
2040	686798.34	1191307.78	42.25	MW 1
2039			39.15	MW 1 GRND
2019	686958.00	1191142.04	35.11	MW 2
2020			31.67	MW 2 GRND
2018	686994.06	1191174.56	33.70	MW 3
2017			30.53	MW 3 GRND
2022	686990.98	1191234.67	32.77	MW 4D
2021			29.79	MW 4D GRND
2023	686997.11	1191231.30	32.22	MW 4S
2024			29.37	MW 4S GRND
2026	686956.00	1191315.85	37.36	MW 5
2025			34.02	MW 5 GRND
2368	687049.07	1191225.72	30.72	MW 6D
2368			31.10	MW 6D CTR LID
2367	687050.90	1191215.11	30.50	MW 6S
2367			31.00	MW 6S CTR LID
2366	687054.77	1191055.40	30.90	MW 7
2366			31.22	MW 7 CTR LID
2370	687003.24	1191373.66	29.93	MW 8
2370			30.31	MW 8 CTR LID
2042	686927.89	1191456.74	34.14	MW P1-1
2043			33.28	MW P1-1 GRND
2031	686922.13	1191354.58	33.14	MW P2-1
2032			32.96	MW P2-1 GRND
2027	686933.80	1191363.34	34.76	MW P2-2
2028			34.10	MW P2-2 GRND
2030	686936.78	1191348.89	34.04	MW P2-3
2029			33.22	MW P2-3 GRND
2038	686901.85	1191242.19	33.66	MW P3-1
2037			31.97	MW P3-1 GRND
2034	686912.26	1191250.35	32.93	MW P3-2
2033			31.47	MW P3-2 GRND
2035	686914.58	1191237.52	32.92	MW P3-3
2036			31.32	MW P3-3 GRND
1982	686605.75	1191478.16	45.07	MW RRN
1981			42.40	MW RRN GRND
1983	686721.62	1191215.95	44.72	MW RRS
1984			42.63	MW RRS GRND

NOTES

FIELD MEASUREMENTS FOR THIS MAP WERE PERFORMED ON 11/20, 11/23, 12/7/2009, & 11/17/2010 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

PUYALLUP RIVER (RESET COORDINATES CONVERTED TO NAVD'88)

RM 7.5 N687359.335 E1191128.109 ELEV. 39.773
RM 7.8 N687186.149 E1192696.606
RM 8.0 N687154.942 E1193752.141 ELEV. 42.430

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

CAMP DRESSER & MCKEE INC.
PUYALLUP RIVER
MONITOR WELL LOCATES & SOIL SAMPLES

PUYALLUP WA

SCALE: 1" = 20'
PROJECT NO. 36130
DRAWING FILE NAME: 36130-SURV-TP02

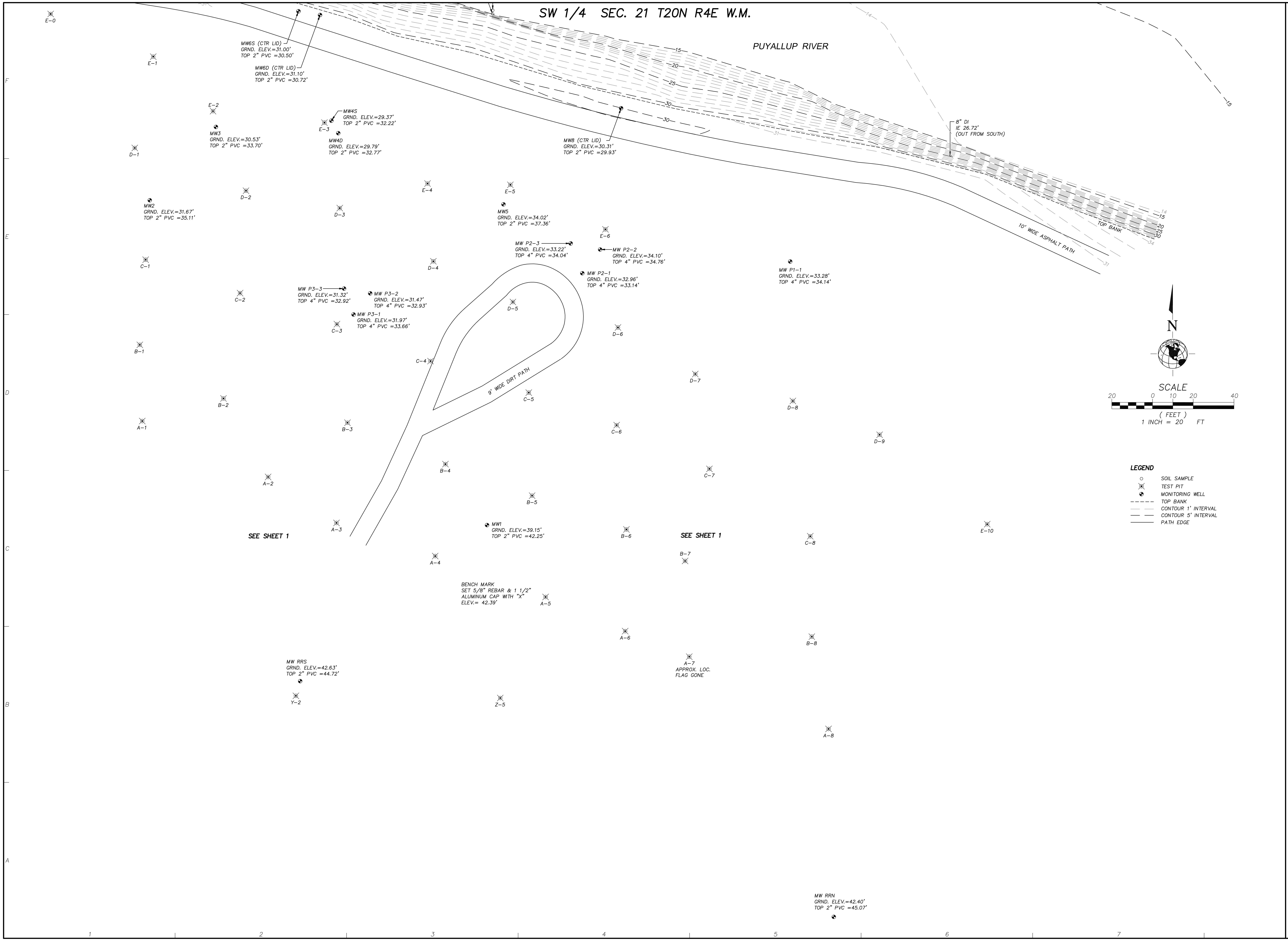
11422
EXPIRES

SURVEYED BY: MBE/KMK
CHECKED BY:
DRAWN BY: MAD
APPROVED BY:
LAST EDIT: 6/7/2011
PLOT DATE: 12/08/09

DATE	BY	REV#	REVISION	CK'D	APPR.
8/20/10			ADDITIONAL SOIL SAMPLES		

SHEET
1/2

DWG INDEX:



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PUYALLUP WA

SCALE: 1" = 20'

PROJECT NO. 36130

DRAWING FILE NAME: 36130-SURV-TP02

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

SURVEYED BY: MBE/KMK
DRAWN BY: MAD
LAST EDIT: 6/7/2011
CHECKED BY: ____
APPROVED BY: ____
PLOT DATE: 12/08/09

DATE	BY	REV#	REVISION	CK'D	APPR.

SHEET
2/2

Appendix E

Hydrogeologic Calculations

CDM

CLIENT USG
PROJECT USG PUYALLUP RI
DETAIL SEEPAGE VELOCITY EST.
JOB NO. 1142-74557
DATE CHECKED
CHECKED BY
COMPUTED BY H. YOUNG
DATE 3/16/2010
PAGE NO. 1 OF 2

USG PUYALLUP SITE GROUNDWATER VELOCITY CALCULATION

OBJECTIVE: DETERMINE THE GROUNDWATER SEEPAGE VELOCITY (AVERAGE LINEAR VELOCITY) OF SHALLOW GROUNDWATER AT THE SITE.

CALCULATION APPROACH: ESTIMATE THE HYDRAULIC CONDUCTIVITY OF SOIL IN THE SHALLOW AQUIFER USING THE HAZEN (1911) METHOD AND GRAIN SIZE DISTRIBUTION DATA FROM REMEDIAL INVESTIGATION. CALCULATE SEEPAGE VELOCITY USING THIS HYDRAULIC CONDUCTIVITY ESTIMATE, HORIZONTAL HYDRAULIC GRADIENT FROM NOVEMBER 2009 GROUNDWATER ELEVATION CONTOURS, AND TEXTBOOK POROSITY VALUE FOR POORLY GRADED SAND.

HYDRAULIC CONDUCTIVITY BY HAZEN (1911) METHOD

ASSUME SOIL SAMPLE A4-27.5 IS REPRESENTATIVE - POORLY GRADED SAND W/ GRAVEL (SP)

UNIFORMITY COEFFICIENT = $C_u = \frac{d_{60}}{d_{10}} = \frac{1.09}{0.19} = 5.74$ POORLY GRADED (WELL SORTED)

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

C = HAZEN COEFFICIENT ⟶ BASED ON DEGREE OF SORTING AND GRAIN SIZE

FROM TABLE 3.7, CHOOSE "MODERATELY TO WELL SORTED = MEDIUM SAND" $C = 80 - 120$

$$K_{LOW} = \left(80 \frac{1}{cm \cdot s}\right)(0.019\,cm)^2 = 0.02889\,cm/s = 80\ FT/DAY$$

$$K_{HIGH} = \left(120 \frac{1}{cm\,s}\right)(0.019\,cm)^2 = 0.04332\,cm/s = 120$$

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

$$\boxed{K = 80\ TO\ 120\ FT/DAY}$$

EFFECTIVE POROSITY

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

$n_e = 0.32$

SEEPAGE VELOCITY ESTMATE

NOTE THAT THE HYDRAULIC GRADIENT (I) VARIES ACROSS THE SITE AND IS STEEPEST TOWARDS THE SOUTH AND SHALLOWEST NEAR THE PUYALLUP RIVER, THEREFORE THE HYDRAULIC GRADIENT WILL BE CALCULATE AT EACH OF THESE AREAS.

SOUTHERN AREA (BETWEEN MW1 AND P3-1)

SEEPAGE VELOCITY = $V_s = \frac{KI}{n_e} = \frac{(80\,FT/DAY)(0.006\,FT/FT)}{0.32} = \boxed{2\ FT/DAY}$ (LOW)

$V_s = \frac{KI}{n_e} = \frac{(120\,FT/DAY)(0.006\,FT/FT)}{0.32} = \boxed{2\ FT/DAY}$ (HIGH)

PROJECT USG PUYALLUP RI
DETAIL SEEPAGE VELOCITY EST.
DATE CHECKED
CHECKED BY
DATE 3/16/2010
PAGE NO. 2 OF 2

SEEPAGE VELOCITY ESTIMATE (CONTINUED)

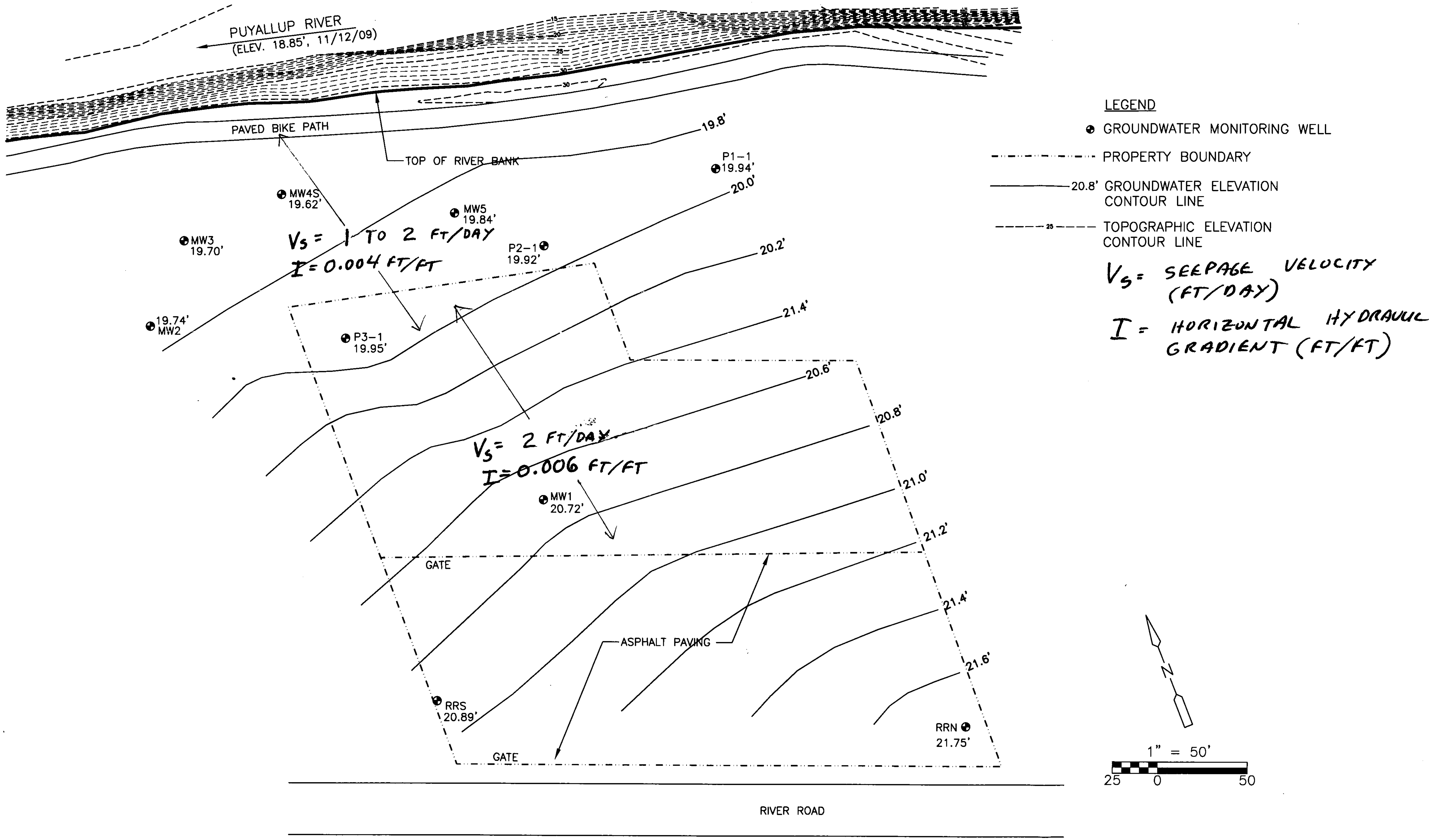
NORTHERN AREA (P3-1 TO THE PUYALLUP RIVER)

SEEPAGE VELOCITY = $V_S = \frac{KI}{ne} = \frac{(80\ FT/DAY)(0.004\ FT/FT)}{0.32} = \boxed{1\ FT/DAY}$ (LOW)

$$V_S = \frac{KI}{ne} = \frac{(120\ FT/DAY)(0.004\ FT/FT)}{0.32} = \boxed{2\ FT/DAY}\ (HIGH)$$

CONCLUSION

THE GROUNDWATER SEEPAGE VELOCITY IS 2 FT/DAY IN THE SOUTHERN PORTION OF THE SITE AND RANGES FROM 1 TO 2 FT/DAY IN THE NORTHERN PORTION OF THE SITE, NEAR THE PUYALLUP RIVER.

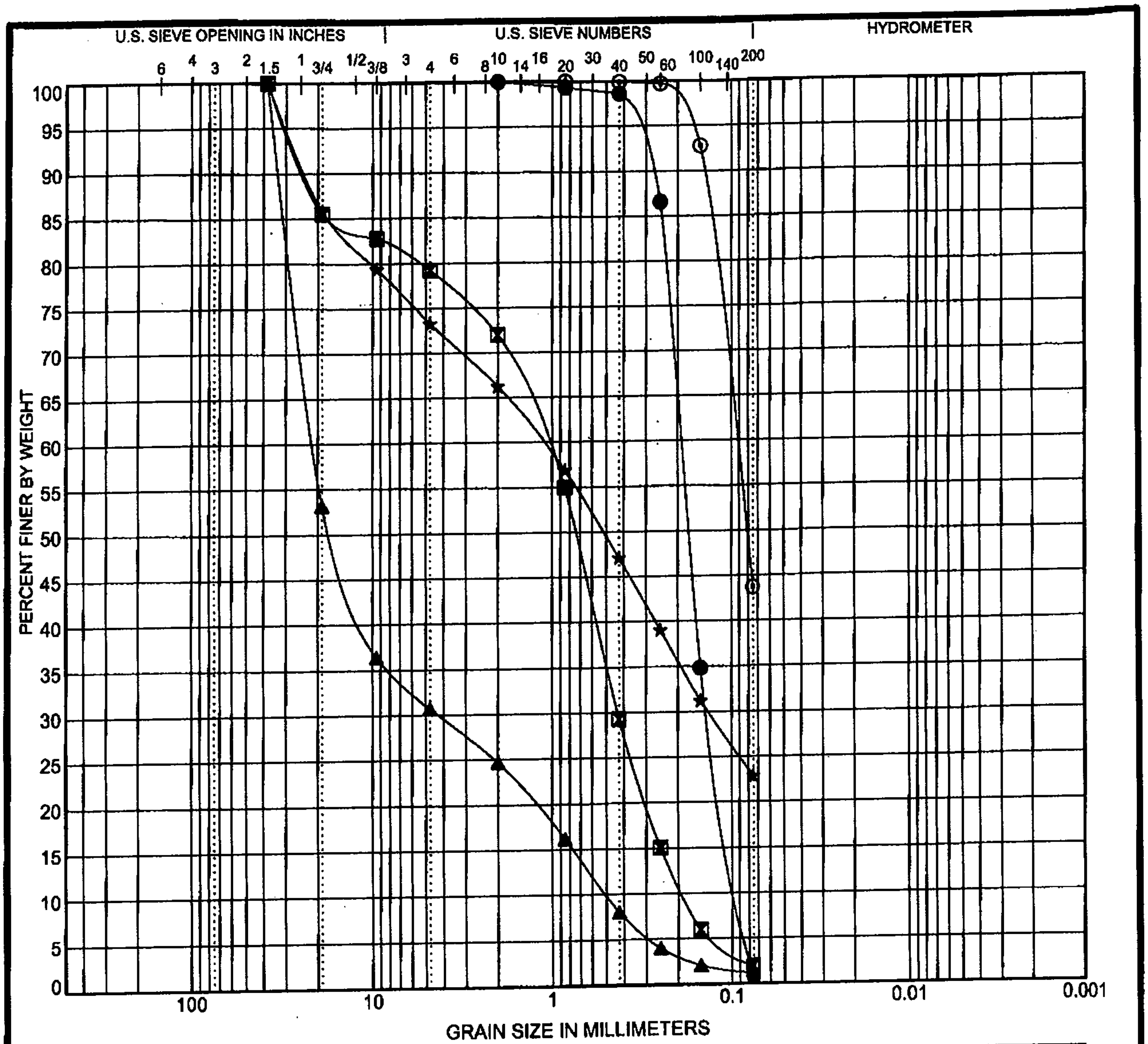


P:\19921\74559\ARSENIC\ Fig-4- 02/12/10 13:09 riehlepj XREFS: 11X17BDR, SITE-fig-2

USG INTERIORS/REMEDIAL INVESTIGATION
PUYALLUP, WASHINGTON

CDM

Figure No. 4
Groundwater Elevation Contours
Shallow Aquifer
November 10, 2009



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification				Classification	LL	PL	PI	Cc	Cu
●	A4S -	USGP	uy-22	Poorly graded SAND (SP)				1.06	2.13
⊠	A4	S -	27.5	Poorly graded SAND with GRAVEL (SP)				0.91	5.82
▲	A4	S -	43.5	Well-graded GRAVEL with SAND (GW)				1.76	41.87
★	A4	S -	48	Silty SAND with GRAVEL (SM)					
⊙	A4	S -	63.3	Silty SAND (SM)					

Specimen Identification				D60	D30	D10	%Gravel	%Sand	%Fines
●	A4S -	USGP	uy-22	0.19	0.14	0.09		99.2	0.8
⊠	A4	S -	27.5	1.09	0.43	0.19	20.8	77.3	2.0
▲	A4	S -	43.5	21.03	4.31	0.50	69.3	29.5	1.2
★	A4	S -	48	1.13	0.14		26.7	50.4	22.9
⊙	A4	S -	63.3	0.09				56.3	43.7

GRAIN SIZE DISTRIBUTION

USG Interiors
Remedial Investigation
Puyallup, Washington

Project No: 19921.64793.PLANNING Figure:

CDM

GSD ORIGINAL 19921-64793 10-2009.GPJ CDM BLLV.GDT 12/29/09 REV.

because your calculator gives a ɔonsibility as a hydrogeologist is ·ou feel is justified. Typically this ant figures (Table 3.6).

a variety of different units in the ydrogeologist needs to be able to tem to another through unit con- ɔnversion factors (Appendix B). It ɔnly your field book and a calcula- ;ed upon some numbers.

ivity Values for Various Earth Schwartz (1990)]

	Hydraulic Conductivity cm/sec
ine clay	$8 \times 10^{-11} - 2 \times 10^{-7}$
	$1 \times 10^{-11} - 4.7 \times 10^{-7}$
	$1 \times 10^{-7} - 2 \times 10^{-3}$
	$2 \times 10^{-5} - 2 \times 10^{-2}$
	$9 \times 10^{-5} - 5 \times 10^{-2}$
	$9 \times 10^{-5} - 6 \times 10^{-1}$
	$3 \times 10^{-2} - 3$
	$8 \times 10^{-10} - 2 \times 10^{-4}$
	$1 \times 10^{-11} - 2 \times 10^{-7}$
	$1 \times 10^{-9} - 1.4 \times 10^{-6}$
	$3 \times 10^{-8} - 6 \times 10^{-4}$
omite	$1 \times 10^{-7} - 6 \times 10^{-4}$
limestone	$1 \times 10^{-4} - 2$
	$4 \times 10^{-11} - 2 \times 10^{-6}$
	$1 \times 10^{-10} - 1 \times 10^{-8}$
›asalt	$2 \times 10^{-9} - 4.2 \times 10^{-5}$
salt	$4 \times 10^{-5} - 2$
·anite	$3.3 \times 10^{-4} - 5.2 \times 10^{-3}$
abbro	$5.5 \times 10^{-5} - 3.8 \times 10^{-4}$
neous & c rocks	$8 \times 10^{-7} - 3 \times 10^{-2}$
igneous& ic rocks	$3 \times 10^{-12} - 2 \times 10^{-8}$

Example 3.5

An estimate of hydraulic conductivity at 2×10^{-4} cm/sec was estimated for a sandy material. The number needed to be converted into ft/day to perform a calculation for average linear velocity during a tracer test (Chapter 13). The only resources you have are a writing utensil, a field book, and a calculator.

$$K = 2 \times 10^{-4}\,\frac{\text{cm}}{\text{sec}} \times \left(\frac{1\text{in.}}{2.54\,\text{cm}}\right) \times \left(\frac{1\,\text{ft}}{12\,\text{in.}}\right) \times \left(\frac{60\,\text{sec}}{1\,\text{min}}\right) \times \left(\frac{1440\,\text{min}}{1\,\text{day}}\right) = 0.6\,\text{ft/day}$$

The average linear velocity was estimated to be:

$$V_{ave} = \frac{K}{\eta_e} \times \frac{\partial h}{\partial l} = \frac{0.57\,\text{ft/day}}{0.26} \times \frac{3\,\text{ft}}{145\,\text{ft}} = 0.045\,\text{ft/day}$$

The hydraulic conductivity can be estimated for sandy materials where he **effective grain size** (d_{10}) is between 0.1 mm and 3.0 mm (Hazen 1911), ere d_{10} represents the smallest 10% of the sample. (It is important to pay ention to the limits over which this is applicable). The effective grain size etermined from a grain-size distribution plot (see Chapter 8 and Exam- le 3.6). Grain size plots are helpful in determining the sorting. The sorting stimated with the **uniformity coefficient** (C_u) expressed in Equation

$$Cu = \frac{d_{60}}{d_{10}} \qquad [3.9]$$

lues less than 4 are well sorted, and values greater than 6 are consid- be poorly sorted (Fetter 1994). The Hazen equation (1911) relating lic conductivity to effective grain size and a sorting coefficient is n Equation 3.10. The most common error made by users of this is to forget to convert the grain-size parameters from millimeters meters.

$$K = C(d_{10})^2 \qquad [3.10]$$

hydraulic conductivity in (cm/sec)
effective grain size (cm)
sorting and grain-size coefficient in (1/cm/sec)

ient C is assigned according to sorting *and* grain size (Table size is determined by evaluating the median grain size (d_{50}) ze distribution curve (Example 3.6). Values that are poorly

WEIGHT, W.D., AND
SONDEREGGER, J.L. 2001. MANUAL
OF APPLIED HYDROGEOLOGY.

sorted and finer grained receive smaller coefficient numbers. We recommend that the coefficients in Table 3.7 only be estimated to the nearest value of 10.

Table 3.7 Hazen Equation Coefficients in $(\text{cm-sec})^{-1}$ Based on Sorting and Grain Size

Description	Coefficient
Poorly sorted to well-sorted very fine sand	40–80
Poorly sorted to moderately sorted fine sand	40–80
Moderately sorted to well-sorted medium sand	80–120
Poorly to moderately sorted coarse sand	80–120
Moderately sorted to well-sorted coarse sand	120–150

Shepard (1989) evaluated the data from published studies relating grain-size to hydraulic conductivity by plotting hydraulic conductivity (in ft/day) verses median grain size (d_{50}) on log-log paper. Various plots were made based upon sediments from different depositional environments (Chapter 2), each forming a straight-line plot. The slope of the plot was related to an exponent (Equation 3.11). The values of the exponent range between 2.0 and 1.5 for glass spheres of equal size to poorly sorted unconsolidated materials. Example C values and exponents are shown in Table 3.8.

$$K = C_F \times d_{50}{}^{i} \qquad [3.11]$$

Where:

K = hydraulic conductivity (ft/day)
C_F = shape factor, (based upon depositional environment) in units which convert mm^2 to ft/day
d_{50} = median grain size in mm
i = exponent (between 2.0 and 1.5) = slope on log-log plot

WEIGHT, W.D. AND SONDEREGGER, J.L. 2001.
MANUAL OF APPLIED HYDROGEOLOGY.

5 g/cm^3

the porosity can be estimated using

$\Big] = 30.2\%$

valuating the volume occupied by the
ht.

$\cdot\ 148\ g = 24\ g$

$^3) = 24.02\ cm^3$

$= 30.0\%$

ributed to an assumed particle
ume errors. The above example
ncept of porosity. In reality, the
e laboratory. During the tapping
field conditions being lost. It is
container of equal volume.

ogical Survey laboratory reported
earth materials were tested and
logic properties. Anderson and
of their findings for specific yield
eans of unconsolidated materials
6. When the reported arithmetic
oint of the range values, this ind
otice also that the differences be
aterials, such as fine and medium
terparts, fine and medium sand
me occupied by cementing agents
ays less than the total porosity.

is and Johnson (1967) illustra
d sandy materials and their phy

---

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

WEIGHT, W.D. AND SONDEREGGER. 2001.
MANUAL OF APPLIED HYDROGEOLOGY.

Appendix F

Laboratory Reports

Analytical Resources, Incorporated
Analytical Chemists and Consultants

November 9, 2009

Mary Lou Fox
CDM
11811 NE 1st, Suite 201
Bellevue, WA 98009

RE: Project ID: USG Puyallup – 19921-64793
ARI Job No: PU27

Dear Mary Lou:

Please find enclosed the Chain-of-Custody (COC) records, sample receipt documentation, and the final results for the samples from the project referenced above. Analytical Resources Inc. (ARI) accepted fifteen soil samples, as part of a larger shipment on October 16, 2009. For details regarding sample receipt, please refer to the enclosed Cooler Receipt Form.

The samples were analyzed for 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: PU27

PAGE 1 OF 34

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: PU27	Turn-around Requested: Standard	Date: 10/16/09
ARI Client Company: CDM	Phone: 425-453-8383	Page: 9 of 21
Client Contact: Alan Carey		No. of Coolers: Cooler Temps:
Client Project Name: USG Puyallup		
Client Project #: 19921-64793	Samplers: A.L., H.C, M.L.F., H.Y.	

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested Hold								Notes/Comments
USGPuy-B3-14-10/09	10/13/2009	1341	Soil	1	x								Requests for analyses will be made the week of 10-19-2009. Do not dispose of samples without prior approval. Contact Mary Lou Fox, CDM, (425-519-8398) for approval to discard samples.
USGPuy-B3-16-10/09	10/13/2009	1345	Soil	1	x								
USGPuy-A2-0-10/09	10/13/2009	1348	Soil	1	x								
USGPuy-B3-0-10/09	10/13/2009	1351	Soil	1	x								
USGPuy-D1-0-10/09	10/13/2009	1405	Soil	1	x								
USGPuy-B5-2-10/09	10/13/2009	1416	Soil	1	x								
USGPuy-B5-4-10/09	10/13/2009	1440	Soil	1	x								
USGPuy-B5-6-10/09	10/13/2009	1422	Soil	1	x								
USGPuy-B5-8-10/09	10/13/2009	1425	Soil	1	x								
USGPuy-B5-10-10/09	10/13/2009	1427	Soil	1	x								

Comments/Special Instructions	Relinqushed by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
	Printed Name:	Printed Name:	Printed Name:	Printed Name:
	Company:	Company:	Company:	Company:
	Date & Time:	Date & Time:	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.

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number:

Turn-around Requested: Standard

Date: 10/16/09

ARI Client Company: CDM

Phone: 425-453-8383

Page: 10 of 21

Client Contact: Alan Carey

No. of Coolers:

Cooler Temps:

Client Project Name: USG Puyallup

Client Project #: 19921-64793

Samplers: A.L., H.C, M.L.F., H.Y.

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	Analysis Requested: Hold								Notes/Comments
USGPuy-B5-12-10/09	10/13/2009	1432	Soil	1	x								Requests for analyses will be made the week of 10-19-2009. Do not dispose of samples without prior approval. Contact Mary Lou Fox, CDM, (425-519-8398) for approval to discard samples.
USGPuy-B5-14-10/09	10/13/2009	1435	Soil	1	x								
USGPuy-B5-16-10/09	10/13/2009	1440	Soil	1	x								
USGPuy-B5-0-10/09	10/13/2009	1455	Soil	1	x								
USGPuy-A6-2-10/09	10/13/2009	1502	Soil	1	x								
USGPuy-A6-6-10/09	10/13/2009	1505	Soil	1	x								
USGPuy-A6-8-10/09	10/13/2009	1507	Soil	1	x								
USGPuy-A6-10-10/09	10/13/2009	1509	Soil	1	x								
USGPuy-A6-12-10/09	10/13/2009	1511	Soil	1	x								
USGPuy-A6-14-10/09	10/13/2009	1513	Soil	1	x								

Comments/Special Instructions	Relinqushed by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
	Printed Name:	Printed Name:	Printed Name:	Printed Name:
	Company:	Company:	Company:	Company:
	Date & Time:	Date & Time:	Date & Time:	Date & Time:

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Client Project #: 19921-64793	Samplers: A.L., H.C, M.L.F., H.Y.

Date: 10/16/09

Page: 11 of 21

No. of Coolers:

Cooler Temps:

Analytical Resources, Incorporated
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Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested								Notes/Comments
					Hold								
USGPuy-A6-16-10/09	10/13/2009	1515	Soil	1	x								Requests for analyses will be made the week of 10-19-2009. Do not dispose of samples without prior approval. Contact Mary Lou Fox, CDM, (425-519-8398) for approval to discard samples.
USGPuy-A6-0-10/09	10/13/2009	1517	Soil	1	x								
USGPuy-B7-2-10/09	10/13/2009	1540	Soil	1	x								
USGPuy-B7-4-10/09	10/13/2009	1542	Soil	1	x								
USGPuy-B7-6-10/09	10/13/2009	1544	Soil	1	x								
USGPuy-B7-8-10/09	10/13/2009	1546	Soil	1	x								
USGPuy-B7-10-10/09	10/13/2009	1548	Soil	1	x								
USGPuy-B7-14-10/09	10/13/2009	1552	Soil	1	x								
USGPuy-B7-16-10/09	10/13/2009	1554	Soil	1	x								
USGPuy-B7-0-10/09	10/13/2009	1558	Soil	1	x								

Comments/Special Instructions	Relinqushed by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
	Printed Name:	Printed Name:	Printed Name:	Printed Name:
	Company:	Company:	Company:	Company:
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206-695-6200 206-695-6201 (fax)

					Analysis Requested							
Sample ID	Date	Time	Matrix	No. Containers	Hold							Notes/Comments
USGPuy-C6-2-10/09	10/13/2009	1632	Soil	1	x							Requests for analyses will be made the week of 10-19-2009. Do not dispose of samples without prior approval. Contact Mary Lou Fox, CDM, (425-519-8398) for approval to discard samples.
USGPuy-C6-4-10/09	10/13/2009	1635	Soil	1	x							
USGPuy-C6-8-10/09	10/13/2009	1637	Soil	1	x							
USGPuy-C6-12-10/09	10/13/2009	1640	Soil	1	x							
USGPuy-C6-14-10/09	10/13/2009	1642	Soil	1	x							
USGPuy-C6-16-10/09	10/13/2009	1644	Soil	1	x							
USGPuy-C6-0-10/09	10/13/2009	1648	Soil	1	x							
USGPuy-E4-2-10/09	10/14/2009	0835	Soil	1	x							
USGPuy-E4-4-10/09	10/14/2009	0839	Soil	1	x							
USGPuy-E4-6-10/09	10/14/2009	0842	Soil	1	x							

Comments/Special Instructions	Relinqushed by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
	Printed Name:	Printed Name:	Printed Name:	Printed Name:
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Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested									Notes/Comments
					Hold									
USGPuy-E4-12-10/09	10/14/2009	0852	Soil	1	x									Requests for analyses will be made the week of 10-19-2009. Do not dispose of samples without prior approval. Contact Mary Lou Fox, CDM, (425-519-8398) for approval to discard samples.
USGPuy-E4-14-10/09	10/14/2009	0855	Soil	1	x									
USGPuy-E4-16-10/09	10/14/2009	0900	Soil	1	x									
USGPuy-E4-18-10/09	10/14/2009	0903	Soil	1	x									
USGPuy-E4-20-10/09	10/14/2009	0907	Soil	1	x									
USGPuy-E4-22-10/09	10/14/2009	1055	Soil	1	x									
USGPuy-E4-24-10/09	10/14/2009	1100	Soil	1	x									
USGPuy-E4-28-10/09	10/14/2009	1110	Soil	1	x									
USGPuy-D5-2-10/09	10/14/2009	1320	Soil	1	x									
USGPuy-D5-4-10/09	10/14/2009	1323	Soil	1	x									

Comments/Special Instructions	Relinqushed by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
	Printed Name:	Printed Name:	Printed Name:	Printed Name:
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206-695-6200 206-695-6201 (fax)

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested									Notes/Comments
					Hold									
USGPuy-D5-6-10/09	10/14/2009	1325	Soil	1	x									Requests for analyses will be made the week of 10-19-2009. Do not dispose of samples without prior approval. Contact Mary Lou Fox, CDM, (425-519-8398) for approval to discard samples.
USGPuy-D5-8-10/09	10/14/2009	1329	Soil	1	x									
USGPuy-D5-10-10/09	10/14/2009	1333	Soil	1	x									
USGPuy-D5-12-10/09	10/14/2009	1336	Soil	1	x									
USGPuy-D5-14-10/09	10/14/2009	1339	Soil	1	x									
USGPuy-D5-16-10/09	10/14/2009	1342	Soil	1	x									
USGPuy-E6-2-10/09	10/14/2009	1435	Soil	1	x									
USGPuy-E6-6-10/09	10/14/2009	1441	Soil	1	x									
USGPuy-E6-8-10/09	10/14/2009	1444	Soil	1	x									
USGPuy-E6-10-10/09	10/14/2009	1447	Soil	1	x									

Comments/Special Instructions	Relinquished by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
	Printed Name:	Printed Name:	Printed Name:	Printed Name:
	Company:	Company:	Company:	Company:
	Date & Time:	Date & Time:	Date & Time:	Date & Time:

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Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number:

Turn-around Requested: Standard

ARI Client Company: CDM

Phone: 425-453-8383

Client Contact: Alan Carey

Client Project Name: USG Puyallup

Client Project #: 19921-64793

Samplers: A.L., H.C, M.L.F., H.Y.

Date: 10/16/09

Page: 15 of 21

No. of Coolers:

Cooler Temps:

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

					Analysis Requested								Notes/Comments
Sample ID	Date	Time	Matrix	No. Containers	Hold								
USGPuy-E6-12-10/09	10/14/2009	1450	Soil	1	x								Requests for analyses will be made the week of 10-19-2009. Do not dispose of samples without prior approval. Contact Mary Lou Fox, CDM, (425-519-8398) for approval to discard samples.
USGPuy-E6-14-10/09	10/14/2009	1450	Soil	1	x								
USGPuy-E6-16-10/09	10/14/2009	1453	Soil	1	x								
USGPuy-F2-2-10/09	10/14/2009	1505	Soil	1	x								
USGPuy-F2-4-10/09	10/14/2009	1508	Soil	1	x								
USGPuy-F2-6-10/09	10/14/2009	1510	Soil	1	x								
USGPuy-F2-8-10/09	10/14/2009	1513	Soil	1	x								
USGPuy-F2-10-10/09	10/14/2009	1516	Soil	1	x								
USGPuy-F2-12-10/09	10/14/2009	1520	Soil	1	x								
USGPuy-F2-14-10/09	10/14/2009	1518	Soil	1	x								

Comments/Special Instructions	Relinqushed by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
	Printed Name:	Printed Name:	Printed Name:	Printed Name:
	Company:	Company:	Company:	Company:
	Date & Time:	Date & Time:	Date & Time:	Date & Time:

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

ARI Assigned Number:
Turn-around Requested: Standard
Date: 10/16/09
ARI Client Company: CDM
Phone: 425-453-8383
Page: 16 of 21
Client Contact: Alan Carey
No. of Coolers:
Cooler Temps:
Client Project Name: USG Puyallup
Client Project #: 19921-64793
Samplers: A.L., H.C, M.L.F., H.Y.

					Analysis Requested									Notes/Comments
Sample ID	Date	Time	Matrix	No. Containers	Hold									
USGPuy-F2-16-10/09	10/14/2009	1523	Soil	1	x									Requests for analyses will be made the week of 10-19-2009. Do not dispose of samples without prior approval. Contact Mary Lou Fox, CDM, (425-519-8398) for approval to discard samples.
USGPuy-C8-2-10/09	10/15/2009	0930	Soil	1	x									
USGPuy-C8-8-10/09	10/15/2009	0935	Soil	1	x									
USGPuy-C8-10-10/09	10/15/2009	0936	Soil	1	x									
USGPuy-C8-12-10/09	10/15/2009	0938	Soil	1	x									
USGPuy-C8-14-10/09	10/15/2009	0842	Soil	1	x									
USGPuy-D7-2-10/09	10/15/2009	1004	Soil	1	x									
USGPuy-D7-4-10/09	10/15/2009	1007	Soil	1	x									
USGPuy-D7-8-10/09	10/15/2009	1012	Soil	1	x									
USGPuy-D7-10-10/09	10/15/2009	1014	Soil	1	x									

Comments/Special Instructions	Relinqushed by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
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	Company:	Company:	Company:	Company:
	Date & Time:	Date & Time:	Date & Time:	Date & Time:

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Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number:

Turn-around Requested: Standard

Date: 10/16/09

ARI Client Company: CDM Phone: 425-453-8383

Page: 17 of 21

Client Contact: Alan Carey

No. of Coolers: Cooler Temps:

Client Project Name: USG Puyallup

Client Project #: 19921-64793

Samplers: A.L., H.C, M.L.F., H.Y.

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

					Analysis Requested								Notes/Comments
Sample ID	Date	Time	Matrix	No. Containers	Hold								
USGPuy-D7-14-10/09	10/15/2009	1021	Soil	1	x								Requests for analyses will be made the week of 10-19-2009. Do not dispose of samples without prior approval. Contact Mary Lou Fox, CDM, (425-519-8398) for approval to discard samples.
USGPuy-D7-16-10/09	10/15/2009	1023	Soil	1	x								
USGPuy-A8-2-10/09	10/15/2009	1052	Soil	1	x								
USGPuy-A8-4-10/09	10/15/2009	1053	Soil	1	x								
USGPuy-A8-8-10/09	10/15/2009	1056	Soil	1	x								
USGPuy-A8-10-10/09	10/15/2009	1057	Soil	1	x								
USGPuy-A8-12-10/09	10/15/2009	1059	Soil	1	x								
USGPuy-A8-14-10/09	10/15/2009	1103	Soil	1	x								
USGPuy-A8-16-10/09	10/15/2009	1105	Soil	1	x								
USGPuy-A8-18-10/09	10/15/2009	1128	Soil	1	x								

Comments/Special Instructions	Relinqushed by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
	Printed Name:	Printed Name:	Printed Name:	Printed Name:
	Company:	Company:	Company:	Company:
	Date & Time:	Date & Time:	Date & Time:	Date & Time:

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Chain of Custody Record & Laboratory Analysis Request

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Analytical Chemists and Consultants
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Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

ARI Assigned Number:	Turn-around Requested: Standard
ARI Client Company: CDM	Phone: 425-453-8383
Client Contact: Alan Carey	
Client Project Name: USG Puyallup	
Client Project #: 19921-64793	Samplers: A.L., H.C, M.L.F., H.Y.

Date: 10/16/09

Page: 18 of 21

No. of Coolers:
Cooler Temps:

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested Hold								Notes/Comments
USGPuy-A8-20-10/09	10/15/2009	1130	Soil	1	x								Requests for analyses will be made the week of 10-19-2009. Do not dispose of samples without prior approval. Contact Mary Lou Fox, CDM, (425-519-8398) for approval to discard samples.
USGPuy-A1-0-10/09	10/15/2009	1250	Soil	1	x								
USGPuy-A1-6"-10/09	10/15/2009	1235	Soil	1	x								
USGPuy-A1-2-10/09	10/15/2009	1155	Soil	1	x								
USGPuy-A1-8-10/09	10/15/2009	1208	Soil	1	x								
USGPuy-A1-10-10/09	10/15/2009	1210	Soil	1	x								
USGPuy-A1-12-10/09	10/15/2009	1221	Soil	1	x								
USGPuy-A1-20-10/09	10/15/2009	1230	Soil	1	x								
USGPuy-A3-0-10/09	10/15/2009	1500	Soil	1	x								
USGPuy-E6-0-10/09	10/15/2009	1520	Soil	1	x								

Comments/Special Instructions	Relinqushed by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
	Printed Name:	Printed Name:	Printed Name:	Printed Name:
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	Date & Time:	Date & Time:	Date & Time:	Date & Time:

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Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number:
Turn-around Requested: Standard
Date: 10/16/09
Page: 19 of 21
ARI Client Company: CDM
Phone: 425-453-8383
Client Contact: Alan Carey
No. of Coolers:
Cooler Temps:
Client Project Name: USG Puyallup
Client Project #: 19921-64793
Samplers: A.L., H.C, M.L.F., H.Y.

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

					Analysis Requested								Notes/Comments
Sample ID	Date	Time	Matrix	No. Containers	Hold								
USGPuy-C5-0-10/09	10/15/2009	1525	Soil	1	x								Requests for analyses will be made the week of 10-19-2009. Do not dispose of samples without prior approval. Contact Mary Lou Fox, CDM, (425-519-8398) for approval to discard samples.
USGPuy-B6-0-10/09	10/15/2009	1525	Soil	1	x								
USGPuy-D8-0-10/09	10/15/2009	1440	Soil	1	x								
USGPuy-C7-0-10/09	10/15/2009	1530	Soil	1	x								
USGPuy-D5-0-10/09	10/15/2009	1515	Soil	1	x								
USGPuy-D6-0-10/09	10/15/2009	1520	Soil	1	x								
USGPuy-A7-0-10/09	10/15/2009	1555	Soil	1	x								
USGPuy-A5-0-10/09	10/15/2009	1540	Soil	1	x								
USGPuy-A8-0-10/09	10/15/2009	1430	Soil	1	x								
USGPuy-D7-0-10/09	10/15/2009	1445	Soil	1	x								

Comments/Special Instructions

Relinqushed by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
Printed Name:	Printed Name:	Printed Name:	Printed Name:
Company:	Company:	Company:	Company:
Date & Time:	Date & Time:	Date & Time:	Date & Time:

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206-695-6200 206-695-6201 (fax)

ARI Assigned Number:
Turn-around Requested: Standard
Date: 10/16/09
ARI Client Company: CDM
Phone: 425-453-8383
Page: 20 of 21
Client Contact: Alan Carey
No. of Coolers:
Cooler Temps:
Client Project Name: USG Puyallup
Client Project #: 19921-64793
Samplers: A.L., H.C, M.L.F., H.Y.

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested Hold								Notes/Comments
USGPuy-C8-0-10/09	10/15/2009	1440	Soil	1	x								Requests for analyses will be made the week of 10-19-2009. Do not dispose of samples without prior approval. Contact Mary Lou Fox, CDM, (425-519-8398) for approval to discard samples.
USGPuy-B8-0-10/09	10/15/2009	1435	Soil	1	x								
USGPuy-F2-0-10/09	10/15/2009	1515	Soil	1	x								
USGPuy-E4-0-10/09	10/15/2009	1510	Soil	1	x								
USGPuy-D4-0-10/09	10/15/2009	1505	Soil	1	x								
USGPuy-B4-0-10/09	10/15/2009	1500	Soil	1	x								
USGPuy-A1-16-10/09	10/15/2009	1225	Soil	1	x								
USGPuy-A1-18-10/09	10/15/2009	1227	Soil	1	x								
USGPuy-A8-6-10/09	10/15/2009	1055	Soil	1	x								
USGPuy-E4-8-10/09	10/14/2009	0846	Soil	1	x								

Comments/Special Instructions	Relinqushed by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
	Printed Name:	Printed Name:	Printed Name:	Printed Name:
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206-695-6200 206-695-6201 (fax)

ARI Assigned Number:	Turn-around Requested: Standard	Date: 10/16/09	
ARI Client Company: CDM	Phone: 425-453-8383	Page: 21	of 21
Client Contact: Alan Carey		No. of Coolers:	Cooler Temps:
Client Project Name: USG Puyallup			
Client Project #: 19921-64793	Samplers: A.L., H.C, M.L.F., H.Y.		

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested									Notes/Comments
					Hold									
USG-Puy-E4-10-10/09	10/14/2009	0849	Soil	1	x									Requests for analyses will be made the week of 10-19-2009. Do not dispose of samples without prior approval. Contact Mary Lou Fox, CDM, (425-519-8398) for approval to discard samples.
USG-Puy-E6-4-10/09	10/14/2009	1438	Soil	1	x									

Comments/Special Instructions	Relinqushed by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
	Printed Name:	Printed Name:	Printed Name:	Printed Name:
	Company:	Company:	Company:	Company:
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Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: CDM

COC No(s): [✓ NA]

Assigned ARI Job No: PU27

Project Name: USG Puyallup

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)........ 3.8 4.4 2.3

If cooler temperature is out of compliance fill out form 00070F Temp Gun ID#: 90941609

Cooler Accepted by: JP Date: 10/16/09 Time: 1800

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

Samples Logged by: AV Date: 10/27/09 Time: 1152

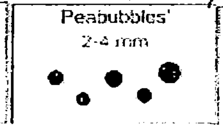
***** Notify Project Manager of discrepancies or concerns *****

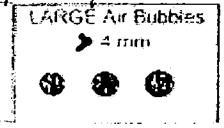
Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

USGPuy-A4-0-10/09 not on C.O.C
USGPUY-C4-12-10/09 not on C.OC

By: AV Date: 10/27/09





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

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-B5-12-10/09
SAMPLE

Lab Sample ID: PU27A
LIMS ID: 09-25062
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU27-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/13/09
Date Received: 10/19/09

Percent Total Solids: 92.9%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	10/27/09	6010B	11/04/09	**7440-38-2**	**Arsenic**	5	588	

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-A6-6-10/09
SAMPLE

Lab Sample ID: PU27B
LIMS ID: 09-25063
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU27-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/13/09
Date Received: 10/19/09

Percent Total Solids: 92.4%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	10/27/09	6010B	11/04/09	**7440-38-2**	**Arsenic**	5	**48**	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-B7-6-10/09
SAMPLE

Lab Sample ID: PU27C
LIMS ID: 09-25064
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU27-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/13/09
Date Received: 10/19/09

Percent Total Solids: 85.7%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	10/27/09	6010B	11/04/09	**7440-38-2**	**Arsenic**	5	**6**	

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-E4-16-10/09
SAMPLE

Lab Sample ID: PU27D
LIMS ID: 09-25065
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU27-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/14/09
Date Received: 10/19/09

Percent Total Solids: 81.3%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	10/27/09	6010B	11/04/09	7440-38-2	Arsenic	6	58	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-E4-20-10/09
SAMPLE

Lab Sample ID: PU27E
LIMS ID: 09-25066
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU27-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/14/09
Date Received: 10/19/09

Percent Total Solids: 82.8%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	10/27/09	6010B	11/04/09	**7440-38-2**	**Arsenic**	6	**26**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL
RESOURCES
INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-D5-16-10/09
SAMPLE

Lab Sample ID: PU27F
LIMS ID: 09-25067
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU27-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/14/09
Date Received: 10/19/09

Percent Total Solids: 72.1%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	10/27/09	6010B	11/04/09	**7440-38-2**	**Arsenic**	7	**36**	

U-Analyte undetected at given RL
RL-Reporting Limit

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INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-E6-16-10/09
SAMPLE

Lab Sample ID: PU27G
LIMS ID: 09-25068
Matrix: Soil
Data Release Authorized
Reported: 11/05/09

QC Report No: PU27-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/14/09
Date Received: 10/19/09

Percent Total Solids: 77.6%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	10/27/09	6010B	11/04/09	**7440-38-2**	**Arsenic**	6	**19**	

U-Analyte undetected at given RL
RL-Reporting Limit

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INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-F2-4-10/09
SAMPLE

Lab Sample ID: PU27H
LIMS ID: 09-25069
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU27-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/14/09
Date Received: 10/19/09

Percent Total Solids: 67.2%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	10/27/09	6010B	11/04/09	7440-38-2	Arsenic	7	7	U

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-C8-10-10/09
SAMPLE

Lab Sample ID: PU27I
LIMS ID: 09-25070
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU27-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/15/09
Date Received: 10/19/09

Percent Total Solids: 83.6%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	10/27/09	6010B	11/04/09	**7440-38-2**	**Arsenic**	6	87	

U-Analyte undetected at given RL
RL-Reporting Limit

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INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-D7-8-10/09
SAMPLE

Lab Sample ID: PU27J
LIMS ID: 09-25071
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU27-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/15/09
Date Received: 10/19/09

Percent Total Solids: 84.3%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	10/27/09	6010B	11/04/09	**7440-38-2**	**Arsenic**	6	**9**	

U-Analyte undetected at given RL
RL-Reporting Limit

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INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-A8-2-10/09
SAMPLE

Lab Sample ID: PU27K
LIMS ID: 09-25072
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU27-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/15/09
Date Received: 10/19/09

Percent Total Solids: 95.5%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	10/27/09	6010B	11/04/09	7440-38-2	Arsenic	5	5	U

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: **USGPuy-A8-16-10/09**
SAMPLE

Lab Sample ID: PU27L
LIMS ID: 09-25073
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU27-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/15/09
Date Received: 10/19/09

Percent Total Solids: 75.3%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	10/27/09	6010B	11/04/09	7440-38-2	Arsenic	6	6	U

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-A1-8-10/09
SAMPLE

Lab Sample ID: PU27M
LIMS ID: 09-25074
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU27-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/15/09
Date Received: 10/19/09

Percent Total Solids: 83.4%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	10/27/09	6010B	11/04/09	7440-38-2	Arsenic	60	60	U

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-A4-0-10/09
SAMPLE

Lab Sample ID: PU27N
LIMS ID: 09-25075
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU27-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/12/09
Date Received: 10/19/09

Percent Total Solids: 79.7%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	10/27/09	6010B	11/04/09	**7440-38-2**	**Arsenic**	6	**42**	

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-C4-12-10/09
SAMPLE

Lab Sample ID: PU27O
LIMS ID: 09-25076
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU27-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/12/09
Date Received: 10/19/09

Percent Total Solids: 80.0%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	10/27/09	6010B	11/04/09	**7440-38-2**	**Arsenic**	6	**804**	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-B5-12-10/09
MATRIX SPIKE

Lab Sample ID: PU27A
LIMS ID: 09-25062
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU27-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/13/09
Date Received: 10/19/09

MATRIX SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Spike	Spike Added	% Recovery	Q
Arsenic	6010B	588	781	208	92.8%	

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%

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-B5-12-10/09
DUPLICATE

Lab Sample ID: PU27A
LIMS ID: 09-25062
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU27-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/13/09
Date Received: 10/19/09

MATRIX DUPLICATE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Duplicate	RPD	Control Limit	Q
Arsenic	6010B	588	586	0.3%	+/- 20%	

Reported in mg/kg-dry

*-Control Limit Not Met
L-RPD Invalid, Limit = Detection Limit

FORM-VI

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: LAB CONTROL

Lab Sample ID: PU27LCS
LIMS ID: 09-25063
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU27-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: NA
Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Arsenic	6010B	193	200	96.5%	

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: PU27MB
LIMS ID: 09-25063
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU27-CDM, Inc.
Project: USG Puyallup
19921-64793
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	10/27/09	6010B	11/04/09	7440-38-2	Arsenic	5	5	U

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

Analytical Resources, Incorporated
Analytical Chemists and Consultants

November 9, 2009

Mary Lou Fox
CDM
11811 NE 1st, Suite 201
Bellevue, WA 98009

RE: Project ID: USG Puyallup – 19921-64793
ARI Job No: PU26

Dear Mary Lou:

Please find enclosed the Chain-of-Custody (COC) records, sample receipt documentation, and the final results for the samples from the project referenced above. Analytical Resources Inc. (ARI) accepted fifteen soil samples, as part of a larger shipment on October 16, 2009 and October 23, 2009. For details regarding sample receipt, please refer to the enclosed Cooler Receipt Form.

The samples were analyzed for 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: PU26

PAGE 1 OF 33

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: PU26
Turn-around Requested: Standard
Date: 10/16/09
ARI Client Company: CDM
Phone: 425-453-8383
Page: 1 of 21
Client Contact: Alan Carey
No. of Coolers:
Cooler Temps:
Client Project Name: USG Puyallup
Client Project #: 19921-64793
Samplers: A.L., H.C, M.L.F., H.Y.

					Analysis Requested									Notes/Comments
Sample ID	Date	Time	Matrix	No. Containers	Hold									
USGPuy-A4-2-10/09	10/12/2009	0845	Soil	1	x									Requests for analyses will be made the week of 10-19-2009. Do not dispose of samples without prior approval. Contact Mary Lou Fox, CDM, (425-519-8398) for approval to discard samples.
USGPuy-A4-8-10/09	10/12/2009	0850	Soil	1	x									
USGPuy-A4-10-10/09	10/12/2009	0850	Soil	1	x									
USGPuy-A4-12-10/09	10/12/2009	0855	Soil	1	x									
USGPuy-A4-14-10/09	10/12/2009	0900	Soil	1	x									
USGPuy-A4-16-10/09	10/12/2009	0900	Soil	1	x									
USGPuy-A4-18-10/09	10/12/2009	0905	Soil	1	x									
USGPuy-A4-20-10/09	10/12/2009	0910	Soil	1	x									
USGPuy-A4-22-10/09	10/12/2009	0910	Soil	1	x									
USGPuy-C4-2-10/09	10/12/2009	1330	Soil	1	x									

Comments/Special Instructions	Relinqushed by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
	Printed Name:	Printed Name:	Printed Name:	Printed Name:
	Company:	Company:	Company:	Company:
	Date & Time:	Date & Time:	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.

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
Date: 10/16/09
ARI Client Company: CDM
Phone: 425-453-8383
Page: 2 of 21
Client Contact: Alan Carey
No. of Coolers:
Cooler Temps:
Client Project Name: USG Puyallup
Client Project #: 19921-64793
Samplers: A.L., H,C, M.L.F., H.Y.

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested							Notes/Comments
					Hold							
USGPuy-C4-4-10/09	10/12/2009	1330	Soil	1	x							Requests for analyses will be made the week of 10-19-2009. Do not dispose of samples without prior approval. Contact Mary Lou Fox, CDM, (425-519-8398) for approval to discard samples.
USGPuy-C4-6-10/09	10/12/2009	1335	Soil	1	x							
USGPuy-C4-8-10/09	10/12/2009	1340	Soil	1	x							
USGPuy-C4-10-10/09	10/12/2009	1345	Soil	1	x							
USGPuy-C4-14-10/09	10/12/2009	1355	Soil	1	x							
USGPuy-C4-16-10/09	10/12/2009	1400	Soil	1	x							
USGPuy-C4-0-10/09	10/12/2009	1500	Soil	1	x							
USGPuy-C3-0-10/09	10/12/2009	1555	Soil	1	x							
USGPuy-E1-0-10/09	10/12/2009	1530	Soil	1	x							
USGPuy-C1-0-10/09	10/12/2009	1520	Soil	1	x							

Comments/Special Instructions	Relinqushed by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
	Printed Name:	Printed Name:	Printed Name:	Printed Name:
	Company:	Company:	Company:	Company:
	Date & Time:	Date & Time:	Date & Time:	Date & Time:

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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
Date: 10/16/09
Page: 3 of 21
ARI Client Company: CDM
Phone: 425-453-8383
Client Contact: Alan Carey
No. of Coolers:
Cooler Temps:
Client Project Name: USG Puyallup
Client Project #: 19921-64793
Samplers: A.L., H.C, M.L.F., H.Y.

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested Hold								Notes/Comments
USGPuy-D2-0-10/09	10/12/2009	1530	Soil	1	x								Requests for analyses will be made the week of 10-19-2009. Do not dispose of samples without prior approval. Contact Mary Lou Fox, CDM, (425-519-8398) for approval to discard samples.
USGPuy-B2-0-10/09	10/12/2009	1600	Soil	1	x								
USGPuy-E3-0-10/09	10/12/2009	1545	Soil	1	x								
USGPuy-C2-2-10/09	10/13/2009	0826	Soil	1	x								
USGPuy-C2-410/09	10/13/2009	0830	Soil	1	x								
USGPuy-C2-6-10/09	10/13/2009	0833	Soil	1	x								
USGPuy-C2-8-10/09	10/13/2009	0836	Soil	1	x								
USGPuy-C2-10-10/09	10/13/2009	0838	Soil	1	x								
USGPuy-C2-12-10/09	10/13/2009	0841	Soil	1	x								
USGPuy-C2-14-10/09	10/13/2009	0843	Soil	1	x								

Comments/Special Instructions	Relinqushed by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
	Printed Name:	Printed Name:	Printed Name:	Printed Name:
	Company:	Company:	Company:	Company:
	Date & Time:	Date & Time:	Date & Time:	Date & Time:

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Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number:
Turn-around Requested: Standard
ARI Client Company: CDM
Phone: 425-453-8383
Client Contact: Alan Carey
Client Project Name: USG Puyallup
Client Project #: 19921-64793
Samplers: A.L., H.C, M.L.F., H.Y.

Date: 10/16/09
Page: 4 of 21
No. of Coolers:
Cooler Temps:

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	Analysis Requested Hold								Notes/Comments
USGPuy-C2-16-10/09	10/13/2009	0846	Soil	1	x								Requests for analyses will be made the week of 10-19-2009. Do not dispose of samples without prior approval. Contact Mary Lou Fox, CDM, (425-519-8398) for approval to discard samples.
USGPuy-D1-2-10/09	10/13/2009	0904	Soil	1	x								
USGPuy-D1-4-10/09	10/13/2009	0908	Soil	1	x								
USGPuy-D1-6-10/09	10/13/2009	0911	Soil	1	x								
USGPuy-D1-8-10/09	10/13/2009	0915	Soil	1	x								
USGPuy-D1-10-10/09	10/13/2009	0918	Soil	1	x								
USGPuy-D1-12-10/09	10/13/2009	0921	Soil	1	x								
USGPuy-D1-14-10/09	10/13/2009	0927	Soil	1	x								
USGPuy-D1-16-10/09	10/13/2009	0930	Soil	1	x								
USGPuy-C1 - 0-10/09	10/13/2009	0958	Soil	1	x								

Comments/Special Instructions	Relinqushed by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
	Printed Name:	Printed Name:	Printed Name:	Printed Name:
	Company:	Company:	Company:	Company:
	Date & Time:	Date & Time:	Date & Time:	Date & Time:

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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

ARI Assigned Number:
Turn-around Requested: Standard
ARI Client Company: CDM
Phone: 425-453-8383
Client Contact: Alan Carey
Client Project Name: USG Puyallup
Client Project #: 19921-64793
Samplers: A.L., H.C, M.L.F., H.Y.

Date: 10/16/09
Page: 5 of 21
No. of Coolers:
Cooler Temps:

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

					Analysis Requested									Notes/Comments
Sample ID	Date	Time	Matrix	No. Containers	Hold									
USGPuy-F1-2-10/09	10/13/2009	1000	Soil	1	x									Requests for analyses will be made the week of 10-19-2009. Do not dispose of samples without prior approval. Contact Mary Lou Fox, CDM, (425-519-8398) for approval to discard samples.
USGPuy-F1-4-10/09	10/13/2009	1003	Soil	1	x									
USGPuy-F1-6-10/09	10/13/2009	1006	Soil	1	x									
USGPuy-F1-8-10/09	10/13/2009	1016	Soil	1	x									
USGPuy-F1-10-10/09	10/13/2009	1018	Soil	1	x									
USGPuy-F1-12-10/09	10/13/2009	1022	Soil	1	x									
USGPuy-F1-14-10/09	10/13/2009	1024	Soil	1	x									
USGPuy-F1-16-10/09	10/13/2009	1026	Soil	1	x									
USGPuy-F1-0-10/09	10/13/2009	1040	Soil	1	x									
USGPuy-E2-2-10/09	10/13/2009	1051	Soil	1	x									

Comments/Special Instructions	Relinqushed by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
	Printed Name:	Printed Name:	Printed Name:	Printed Name:
	Company:	Company:	Company:	Company:
	Date & Time:	Date & Time:	Date & Time:	Date & Time:

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Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number:
Turn-around Requested: Standard
Date: 10/16/09
ARI Client Company: CDM
Phone: 425-453-8383
Page: 6 of 21
Client Contact: Alan Carey
No. of Coolers:
Cooler Temps:
Client Project Name: USG Puyallup
Client Project #: 19921-64793
Samplers: A.L., H.C, M.L.F., H.Y.

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

					Analysis Requested								Notes/Comments
Sample ID	Date	Time	Matrix	No. Containers	Hold								
USGPuy-E2-4-10/09	10/13/2009	1053	Soil	1	x								Requests for analyses will be made the week of 10-19-2009. Do not dispose of samples without prior approval. Contact Mary Lou Fox, CDM, (425-519-8398) for approval to discard samples.
USGPuy-E2-6-10/09	10/13/2009	1055	Soil	1	x								
USGPuy-E2-8-10/09	10/13/2009	1057	Soil	1	x								
USGPuy-E2-10-10/09	10/13/2009	1100	Soil	1	x								
USGPuy-E2-12-10/09	10/13/2009	1103	Soil	1	x								
USGPuy-E2-14-10/09	10/13/2009	1105	Soil	1	x								
USGPuy-E2-16-10/09	10/13/2009	1107	Soil	1	x								
USGPuy-E2-0-10/09	10/13/2009	1109	Soil	1	x								
USGPuy-D3-2-10/09	10/13/2009	1141	Soil	1	x								
USGPuy-D3-4-10/09	10/13/2009	1144	Soil	1	x								

Comments/Special Instructions	Relinqushed by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
	Printed Name:	Printed Name:	Printed Name:	Printed Name:
	Company:	Company:	Company:	Company:
	Date & Time:	Date & Time:	Date & Time:	Date & Time:

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Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number:
Turn-around Requested: Standard
ARI Client Company: CDM
Phone: 425-453-8383
Client Contact: Alan Carey
Client Project Name: USG Puyallup
Client Project #: 19921-64793
Samplers: A.L., H.C, M.L.F., H.Y.

Date: 10/16/09
Page: 7 of 21
No. of Coolers:
Cooler Temps:

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	Analysis Requested								Notes/Comments
					Hold								
USGPuy-D3-6-10/09	10/13/2009	1145	Soil	1	x								Requests for analyses will be made the week of 10-19-2009. Do not dispose of samples without prior approval. Contact Mary Lou Fox, CDM, (425-519-8398) for approval to discard samples.
USGPuy-D3-10-10/09	10/13/2009	1148	Soil	1	x								
USGPuy-D3-12-10/09	10/13/2009	1152	Soil	1	x								
USGPuy-D3-16-10/09	10/13/2009	1151	Soil	1	x								
USGPuy-D3-20-10/09	10/13/2009	1201	Soil	1	x								
USGPuy-D3-18-10/09	10/13/2009	1210	Soil	1	x								
USGPuy-D3-0-10/09	10/13/2009	1215	Soil	1	x								
USGPuy-A2-2-10/09	10/13/2009	1242	Soil	1	x								
USGPuy-A2-4-10/09	10/13/2009	1245	Soil	1	x								
USGPuy-A2-6-10/09	10/13/2009	1250	Soil	1	x								

Comments/Special Instructions	Relinqushed by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
	Printed Name:	Printed Name:	Printed Name:	Printed Name:
	Company:	Company:	Company:	Company:
	Date & Time:	Date & Time:	Date & Time:	Date & Time:

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Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number:	Turn-around Requested: Standard	Date: 10/16/09	
ARI Client Company: CDM	Phone: 425-453-8383	Page: 8 of 21	
Client Contact: Alan Carey		No. of Coolers:	Cooler Temps:
Client Project Name: USG Puyallup			
Client Project #: 19921-64793	Samplers: A.L., H.C, M.L.F., H.Y.		

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	Analysis Requested Hold								Notes/Comments
USGPuy-A2-8-10/09	10/13/2009	1255	Soil	1	x								Requests for analyses will be made the week of 10-19-2009. Do not dispose of samples without prior approval. Contact Mary Lou Fox, CDM, (425-519-8398) for approval to discard samples.
USGPuy-B3-2-10/09	10/13/2009	1320	Soil	1	x								
USGPuy-B3-4-10/09	10/13/2009	1322	Soil	1	x								
USGPuy-B3-6-10/09	10/13/2009	1325	Soil	1	x								
USGPuy-A2-10-10/09	10/13/2009	1301	Soil	1	x								
USGPuy-A2-12-10/09	10/13/2009	1303	Soil	1	x								
USGPuy-A2-16-10/09	10/13/2009	1306	Soil	1	x								
USGPuy-B3-8-10/09	10/13/2009	1334	Soil	1	x								
USGPuy-B3-10-10/09	10/13/2009	1335	Soil	1	x								
USGPuy-B3-12-10/09	10/13/2009	1338	Soil	1	x								

Comments/Special Instructions	Relinqushed by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
	Printed Name:	Printed Name:	Printed Name:	Printed Name:
	Company:	Company:	Company:	Company:
	Date & Time:	Date & Time:	Date & Time:	Date & Time:

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Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: CDM

COC No(s): [✓ NA]

Assigned ARI Job No: PU26

Project Name: USG Puyallup

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) 3.8 4.4 2.3

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

Temp Gun ID#: 90941619

Cooler Accepted by: JP Date: 10/16/09 Time: 1800

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

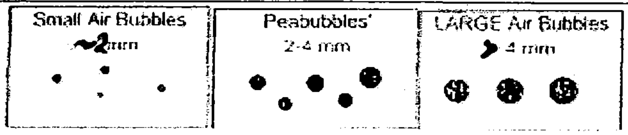
Samples Logged by: AV Date: 10/27/09 Time: 1151

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

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: Alan Carey
Client Project Name: USG Puyallup
Client Project #: 19921-64793
Samplers: A.L., H.C, M.L.F., H.Y.

Date: 10/23/09 [illegible]
Page: 1 of 3
No. of Coolers:
Cooler Temps:

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested Hold								Notes/Comments
USGPuy-A4-2-10/09	10/12/2009	0845	Soil	1	x								Requests for analyses will be made the week of 10-19-2009. Do not dispose of samples without prior approval. Contact Mary Lou Fox, CDM, (425-519-8398) for approval to discard samples.
USGPuy-A4-8-10/09	10/12/2009	0850	Soil	1	x								
USGPuy-A4-10-10/09	10/12/2009	0850	Soil	1	x								
USGPuy-A4-12-10/09	10/12/2009	0855	Soil	1	x								
USGPuy-A4-14-10/09	10/12/2009	0900	Soil	1	x								
USGPuy-A4-16-10/09	10/12/2009	0900	Soil	1	x								
USGPuy-A4-18-10/09	10/12/2009	0905	Soil	1	x								
USGPuy-A4-20-10/09	10/12/2009	0910	Soil	1	x								
USGPuy-A4-22-10/09	10/12/2009	0910	Soil	1	x								
USGPuy-C4-2-10/09	10/12/2009	1330	Soil	1	x								

Comments/Special Instructions	Relinquished by:	Received by:	Relinquished by:	Received by:
	(Signature)	(Signature)	(Signature)	(Signature)
	Printed Name: Alexis López	Printed Name: Rich Hudson	Printed Name:	Printed Name:
	Company: CDM	Company: ARI	Company:	Company:
	Date & Time: 10/23/09 1400	Date & Time: 10/23/09 1700	Date & Time:	Date & Time:

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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
Date: 10/23/09 ~~10/08/09~~ af
Page: 2 of 3
ARI Client Company: CDM
Phone: 425-453-8383
No. of Coolers:
Cooler Temps:
Client Contact: Alan Carey
Client Project Name: USG Puyallup
Client Project #: 19921-64793
Samplers: A.L., H.C, M.L.F., H.Y.

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested Hold								Notes/Comments
USGPuy-C4-4-10/09	10/12/2009	1330	Soil	1	x								Requests for analyses will be made the week of 10-19-2009. Do not dispose of samples without prior approval. Contact Mary Lou Fox, CDM, (425-519-8398) for approval to discard samples.
USGPuy-C4-6-10/09	10/12/2009	1335	Soil	1	x								
USGPuy-C4-8-10/09	10/12/2009	1340	Soil	1	x								
USGPuy-C4-10-10/09	10/12/2009	1345	Soil	1	x								
USGPuy-C4-14-10/09	10/12/2009	1355	Soil	1	x								
USGPuy-C4-16-10/09	10/12/2009	1400	Soil	1	x								
USGPuy-C4-0-10/09	10/12/2009	1500	Soil	1	x								
USGPuy-C3-0-10/09	10/12/2009	1555	Soil	1	x								
USGPuy-E1-0-10/09	10/12/2009	1530	Soil	1	x								
USGPuy-C1-0-10/09	10/12/2009	1520	Soil	1	x								

Comments/Special Instructions	Relinquished by:	Received by:	Relinquished by:	Received by:
	(Signature)	(Signature)	(Signature)	(Signature)
	Printed Name: Alexis López	Printed Name: Rich Hudson	Printed Name:	Printed Name:
	Company: CDM	Company: ARI	Company:	Company:
	Date & Time: 10/23/09 1400	Date & Time: 10/23/09 1700	Date & Time:	Date & Time:

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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
Date: 10/23/09 ~~10/16/09~~ ay
Page: 3 of 3
ARI Client Company: CDM
Phone: 425-453-8383
No. of Coolers:
Cooler Temps:
Client Contact: Alan Carey
Client Project Name: USG Puyallup
Client Project #: 19921-64793
Samplers: A.L., H.C, M.L.F., H.Y.

Sample ID	Date	Time	Matrix	No. Containers	Hold
USGPuy-D2-0-10/09	10/12/2009	1530	Soil	1	x
USGPuy-B2-0-10/09	10/12/2009	1600	Soil	1	x
USGPuy-E3-0-10/09	10/12/2009	1545	Soil	1	x

Analysis Requested

Notes/Comments: Requests for analyses will be made the week of 10-19-2009. Do not dispose of samples without prior approval. Contact Mary Lou Fox, CDM, (425-519-8398) for approval to discard samples.

Comments/Special Instructions

Relinquished by:	Received by:	Relinquished by:	Received by:
(Signature)	(Signature)	(Signature)	(Signature)
Printed Name: Alexis Lopez	Printed Name: Rich Hudson	Printed Name:	Printed Name:
Company: CDM	Company: ARI	Company:	Company:
Date & Time: 10/23/09 1400	Date & Time: 10/23/09 1700	Date & Time:	Date & Time:

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Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: CDM

COC No(s): [✓ NA]

Assigned ARI Job No: PU26

Project Name: USG Puyallup

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)........ 7.6

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

Temp Gun ID#: 90941619

Cooler Accepted by: Date: 10/23/09 Time: 1700

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

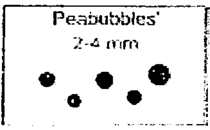
Samples Logged by: AV Date: 10/27/09 Time: 1153

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

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-A4-2-10/09
SAMPLE

Lab Sample ID: PU26A
LIMS ID: 09-25047
Matrix: Soil
Data Release Authorized
Reported: 11/05/09

QC Report No: PU26-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/12/09
Date Received: 10/23/09

Percent Total Solids: 89.2%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	10/27/09	6010B	11/04/09	**7440-38-2**	**Arsenic**	5	**17**	

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-C4-10-10/09
SAMPLE

Lab Sample ID: PU26B
LIMS ID: 09-25048
Matrix: Soil
Data Release Authorized
Reported: 11/05/09

QC Report No: PU26-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/12/09
Date Received: 10/23/09

Percent Total Solids: 88.4%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	10/27/09	6010B	11/04/09	**7440-38-2**	**Arsenic**	6	633	

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-C2-2-10/09
SAMPLE

Lab Sample ID: PU26C
LIMS ID: 09-25049
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU26-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/13/09
Date Received: 10/16/09

Percent Total Solids: 90.9%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	10/27/09	6010B	11/04/09	**7440-38-2**	**Arsenic**	5	1,110	

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-C2-8-10/09
SAMPLE

Lab Sample ID: PU26D
LIMS ID: 09-25050
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU26-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/13/09
Date Received: 10/16/09

Percent Total Solids: 85.8%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	10/27/09	6010B	11/04/09	**7440-38-2**	**Arsenic**	6	1,220	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-C2-10-10/09
SAMPLE

Lab Sample ID: PU26E
LIMS ID: 09-25051
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU26-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/13/09
Date Received: 10/16/09

Percent Total Solids: 92.7%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	10/27/09	6010B	11/04/09	**7440-38-2**	**Arsenic**	5	**314**	

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-C2-12-10/09
SAMPLE

Lab Sample ID: PU26F
LIMS ID: 09-25052
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU26-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/13/09
Date Received: 10/16/09

Percent Total Solids: 87.2%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	10/27/09	6010B	11/04/09	**7440-38-2**	**Arsenic**	5	**594**	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-D1-8-10/09
SAMPLE

Lab Sample ID: PU26G
LIMS ID: 09-25053
Matrix: Soil
Data Release Authorized
Reported: 11/05/09

QC Report No: PU26-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/13/09
Date Received: 10/16/09

Percent Total Solids: 94.6%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	10/27/09	6010B	11/04/09	**7440-38-2**	**Arsenic**	5	**74**	

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-D1-10-10/09
SAMPLE

Lab Sample ID: PU26H
LIMS ID: 09-25054
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU26-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/13/09
Date Received: 10/16/09

Percent Total Solids: 85.1%

Prep Meth	**Prep Date**	**Analysis Method**	**Analysis Date**	**CAS Number**	**Analyte**	**RL**	**mg/kg-dry**	**Q**
3050B	10/27/09	6010B	11/04/09	**7440-38-2**	**Arsenic**	6	1,010	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-E2-6-10/09
SAMPLE

Lab Sample ID: PU26I
LIMS ID: 09-25055
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU26-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/13/09
Date Received: 10/16/09

Percent Total Solids: 96.1%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	10/27/09	6010B	11/04/09	**7440-38-2**	**Arsenic**	5	**69**	

U-Analyte undetected at given RL
RL-Reporting Limit

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ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
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Sample ID: USGPuy-E2-8-10/09
SAMPLE

Lab Sample ID: PU26J
LIMS ID: 09-25056
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU26-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/13/09
Date Received: 10/16/09

Percent Total Solids: 95.5%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	10/27/09	6010B	11/04/09	**7440-38-2**	**Arsenic**	5	**78**	

U-Analyte undetected at given RL
RL-Reporting Limit

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ANALYTICAL
RESOURCES
INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-D3-6-10/09
SAMPLE

Lab Sample ID: PU26K
LIMS ID: 09-25057
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU26-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/13/09
Date Received: 10/16/09

Percent Total Solids: 87.4%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	10/27/09	6010B	11/04/09	**7440-38-2**	**Arsenic**	6	**13**	

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

ANALYTICAL
RESOURCES
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INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-D3-12-10/09
SAMPLE

Lab Sample ID: PU26L
LIMS ID: 09-25058
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU26-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/13/09
Date Received: 10/16/09

Percent Total Solids: 84.4%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	10/27/09	6010B	11/04/09	**7440-38-2**	**Arsenic**	6	2,900	

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-D3-16-10/09
SAMPLE

Lab Sample ID: PU26M
LIMS ID: 09-25059
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU26-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/13/09
Date Received: 10/16/09

Percent Total Solids: 77.1%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	10/27/09	6010B	11/04/09	**7440-38-2**	**Arsenic**	6	389	

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-A2-6-10/09
SAMPLE

Lab Sample ID: PU26N
LIMS ID: 09-25060
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU26-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/13/09
Date Received: 10/16/09

Percent Total Solids: 89.2%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	10/27/09	6010B	11/04/09	**7440-38-2**	**Arsenic**	5	39	

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-B3-12-10/09
SAMPLE

Lab Sample ID: PU26O
LIMS ID: 09-25061
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU26-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/13/09
Date Received: 10/16/09

Percent Total Solids: 89.2%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	10/27/09	6010B	11/04/09	**7440-38-2**	**Arsenic**	5	**632**	

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-A4-2-10/09
MATRIX SPIKE

Lab Sample ID: PU26A
LIMS ID: 09-25047
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU26-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/12/09
Date Received: 10/23/09

MATRIX SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Spike	Spike Added	% Recovery	Q
Arsenic	6010B	17	224	219	94.5%	

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%

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-A4-2-10/09
DUPLICATE

Lab Sample ID: PU26A
LIMS ID: 09-25047
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU26-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: 10/12/09
Date Received: 10/23/09

MATRIX DUPLICATE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Duplicate	RPD	Control Limit	Q
Arsenic	6010B	17	22	25.6%	+/- 5	L

Reported in mg/kg-dry

*-Control Limit Not Met
L-RPD Invalid, Limit = Detection Limit

FORM-VI

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: LAB CONTROL

Lab Sample ID: PU26LCS
LIMS ID: 09-25048
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU26-CDM, Inc.
Project: USG Puyallup
19921-64793
Date Sampled: NA
Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Arsenic	6010B	194	200	97.0%	

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: PU26MB
LIMS ID: 09-25048
Matrix: Soil
Data Release Authorized:
Reported: 11/05/09

QC Report No: PU26-CDM, Inc.
Project: USG Puyallup
19921-64793
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	10/27/09	6010B	11/04/09	7440-38-2	Arsenic	5	5	U

U-Analyte undetected at given RL
RL-Reporting Limit

Analytical Resources, Incorporated
Analytical Chemists and Consultants

December 7, 2009

Alan Carey
CDM
11811 NE 1st, Suite 201
Bellevue, WA 98009

RE: Project ID: USG Puyallup – 19921-64793
ARI Job No: PX07

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 four water samples on November 10, 2009. For details regarding sample receipt, please refer to the enclosed Cooler Receipt Form.

The samples were analyzed for Total and Dissolved Metals, Arsenic Speciation, TSS, Alkalinity, TOC, COD, and Anions, as requested. Please note that sample volume for Arsenic Speciation was transferred to Applied Speciation in Bothell, WA. All data have been included in this report.

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: PX07

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: 425-453-8383
Client Contact: Al Carey	
Client Project Name: USG Puyallup	
Client Project #: 19921-64793	Samplers: M. Fox/J. Smith

Page: 1	of 1
Date: 11/10/09	Ice Present? Yes
No. of Coolers: 2	Cooler Temps: 2.6, 5.6

MCF 11/10/09

Sample ID	Date	Time	Matrix	No. Containers	Dissolved As 7060A	As Speciation IC-ICP-MS	TSS SM2540D	Alkalinity 310.1 /CO3/HCO3	TOC 415.2	COD 410.4	Cl/nitrite/nitrate sulfate 300.0	~~Dissolved Iron 6010B~~	Notes/Comments: Total Metals 6010B (Ca, Fe, Mg, K, Na)
USGPuy-RRS-11/09	11/10/09	1110	Water	7	X		X	X	X	X	X	X	x
USGPuy-RRN-11/09	11/10/09	1235	Water	7	X		X	X	X	X	X	X	x
USGPuy-MW4S-11/09	11/10/09	1430	Water	8	X	X	X	X	X	X	X	X	x
USGPuy-MW4D-11/09	11/10/09	1615	Water	8	X	X	X	X	X	X	X	X	x

Comments/Special Instructions
Diss. metals are not field-filtered.

Relinquished by:	Received by:	Relinquished by:	Received by:
(Signature) Jennifer Smith	(Signature) J. Peterson	(Signature)	(Signature)
Printed Name: Jennifer Smith	Printed Name: J. Peterson	Printed Name:	Printed Name:
Company: CDM	Company: ARI	Company:	Company:
Date & Time: 11/10/09 1810	Date & Time: 11/10/09 1810	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: PX07

Project Name: USG Puyallup

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)........ 2.6 5.6 ____ ____ ____ ____

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

Temp Gun ID#: 90941669

Cooler Accepted by: JP Date: 11/10/09 Time: 1810

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

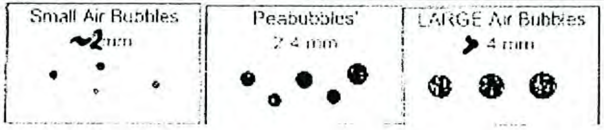
Samples Logged by: MM Date: 11/11/09 Time: 740

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

PRESERVATION VERIFICATION 11/11/09
Page 1 of 1

ANALYTICAL RESOURCES INCORPORATED

ARI Job No: **PX07**
PC: ~~Kelly~~ Cheronne
VTSR: 11/10/09

Inquiry Number: NONE
Analysis Requested: 11/11/09
Contact: Carey, Alan
Client: CDM
Logged by: MM
Sample Set Used: Yes-498
Validatable Package: No
Deliverables:

Project #: 19921-64793
Project: USG Puyallup
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
09-27642 **PX07A**	USGPuy-RRS-11/09				Pass		DIS Fail					Pass				N						
09-27643 **PX07B**	USGPuy-RRN-11/09				Pass		DIS					Pass				N						
09-27644 **PX07C**	USGPuy-MW4S-11/09				Pass		DIS					Pass				N						
09-27645 **PX07D**	USGPuy-MW4D-11/09				Pass		DIS					Pass				N						
09-27646 **PX07E**	USGPuy-RRS-11/09						TOT Pass															
09-27647 **PX07F**	USGPuy-RRN-11/09						TOT															
09-27648 **PX07G**	USGPuy-MW4S-11/09						TOT															
09-27649 **PX07H**	USGPuy-MW4D-11/09						TOT															

Checked By MM Date 11/11/09

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGPuy-RRS-11/09
SAMPLE

Lab Sample ID: PX07A
LIMS ID: 09-27642
Matrix: Water
Data Release Authorized:
Reported: 11/18/09

QC Report No: PX07-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/10/09
Date Received: 11/10/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
7000A	11/13/09	7060A	11/17/09	**7440-38-2**	**Arsenic**	0.001	**0.001**	
6010B	11/13/09	6010B	11/16/09	7439-89-6	Iron	0.05	0.05	U

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGPuy-RRN-11/09
SAMPLE

Lab Sample ID: PX07B
LIMS ID: 09-27643
Matrix: Water
Data Release Authorized:
Reported: 11/18/09

QC Report No: PX07-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/10/09
Date Received: 11/10/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
7000A	11/13/09	7060A	11/17/09	7440-38-2	Arsenic	0.001	0.001	U
6010B	11/13/09	6010B	11/16/09	7439-89-6	Iron	0.05	0.05	U

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGPuy-MW4S-11/09
SAMPLE

Lab Sample ID: PX07C
LIMS ID: 09-27644
Matrix: Water
Data Release Authorized:
Reported: 11/18/09

QC Report No: PX07-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/10/09
Date Received: 11/10/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
7000A	11/13/09	7060A	11/17/09	**7440-38-2**	**Arsenic**	0.04	**0.65**	
6010B	11/13/09	6010B	11/16/09	**7439-89-6**	**Iron**	0.05	**0.35**	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGPuy-MW4D-11/09
SAMPLE

Lab Sample ID: PX07D
LIMS ID: 09-27645
Matrix: Water
Data Release Authorized:
Reported: 11/18/09

QC Report No: PX07-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/10/09
Date Received: 11/10/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
7000A	11/13/09	7060A	11/17/09	**7440-38-2**	**Arsenic**	0.005	**0.033**	
6010B	11/13/09	6010B	11/16/09	**7439-89-6**	**Iron**	0.05	**0.92**	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: LAB CONTROL

Lab Sample ID: PX07LCS
LIMS ID: 09-27642
Matrix: Water
Data Release Authorized
Reported: 11/18/09

QC Report No: PX07-CDM
Project: USG Puyallup
19921-64793
Date Sampled: NA
Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Arsenic	7060A	0.022	0.020	110%	
Iron	6010B	2.14	2.00	107%	

Reported in mg/L

N-Control limit not met
Control Limits: 80-120%

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: METHOD BLANK

Lab Sample ID: PX07MB
LIMS ID: 09-27642
Matrix: Water
Data Release Authorized:
Reported: 11/18/09

QC Report No: PX07-CDM
Project: USG Puyallup
19921-64793
Date Sampled: NA
Date Received: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
7000A	11/13/09	7060A	11/17/09	7440-38-2	Arsenic	0.001	0.001	U
6010B	11/13/09	6010B	11/16/09	7439-89-6	Iron	0.05	0.05	U

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-RRS-11/09
SAMPLE

Lab Sample ID: PX07E
LIMS ID: 09-27646
Matrix: Water
Data Release Authorized:
Reported: 11/18/09

QC Report No: PX07-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/10/09
Date Received: 11/10/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
3010A	11/12/09	6010B	11/16/09	**7440-70-2**	**Calcium**	0.05	**31.2**	
3010A	11/12/09	6010B	11/16/09	7439-89-6	Iron	0.05	0.05	U
3010A	11/12/09	6010B	11/16/09	**7439-95-4**	**Magnesium**	0.05	**6.02**	
3010A	11/12/09	6010B	11/16/09	**7440-09-7**	**Potassium**	0.5	**2.8**	
3010A	11/12/09	6010B	11/16/09	**7440-23-5**	**Sodium**	0.5	**12.2**	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-RRN-11/09
SAMPLE

Lab Sample ID: PX07F
LIMS ID: 09-27647
Matrix: Water
Data Release Authorized:
Reported: 11/18/09

QC Report No: PX07-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/10/09
Date Received: 11/10/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
3010A	11/12/09	6010B	11/16/09	**7440-70-2**	**Calcium**	0.05	**19.8**	
3010A	11/12/09	6010B	11/16/09	7439-89-6	Iron	0.05	0.05	U
3010A	11/12/09	6010B	11/16/09	**7439-95-4**	**Magnesium**	0.05	**9.91**	
3010A	11/12/09	6010B	11/16/09	**7440-09-7**	**Potassium**	0.5	**2.7**	
3010A	11/12/09	6010B	11/16/09	**7440-23-5**	**Sodium**	0.5	**13.9**	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-MW4S-11/09
SAMPLE

Lab Sample ID: PX07G
LIMS ID: 09-27648
Matrix: Water
Data Release Authorized:
Reported: 11/18/09

QC Report No: PX07-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/10/09
Date Received: 11/10/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
3010A	11/12/09	6010B	11/16/09	7440-70-2	Calcium	0.05	18.5	
3010A	11/12/09	6010B	11/16/09	7439-89-6	Iron	0.05	0.48	
3010A	11/12/09	6010B	11/16/09	7439-95-4	Magnesium	0.05	9.24	
3010A	11/12/09	6010B	11/16/09	7440-09-7	Potassium	0.5	2.9	
3010A	11/12/09	6010B	11/16/09	7440-23-5	Sodium	0.5	11.7	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-MW4D-11/09
SAMPLE

Lab Sample ID: PX07H
LIMS ID: 09-27649
Matrix: Water
Data Release Authorized:
Reported: 11/18/09

QC Report No: PX07-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/10/09
Date Received: 11/10/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
3010A	11/12/09	6010B	11/16/09	**7440-70-2**	**Calcium**	0.05	**36.0**	
3010A	11/12/09	6010B	11/16/09	**7439-89-6**	**Iron**	0.05	**9.19**	
3010A	11/12/09	6010B	11/16/09	**7439-95-4**	**Magnesium**	0.05	**9.19**	
3010A	11/12/09	6010B	11/16/09	**7440-09-7**	**Potassium**	0.5	**4.9**	
3010A	11/12/09	6010B	11/16/09	**7440-23-5**	**Sodium**	0.5	**32.8**	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: LAB CONTROL

Lab Sample ID: PX07LCS
LIMS ID: 09-27646
Matrix: Water
Data Release Authorized:
Reported: 11/18/09

QC Report No: PX07-CDM
Project: USG Puyallup
19921-64793
Date Sampled: NA
Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Calcium	6010B	9.70	10.0	97.0%	
Iron	6010B	2.03	2.00	102%	
Magnesium	6010B	9.79	10.0	97.9%	
Potassium	6010B	10.1	10.0	101%	
Sodium	6010B	9.9	10.0	99.0%	

Reported in mg/L

N-Control limit not met
Control Limits: 80-120%

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: METHOD BLANK

Lab Sample ID: PX07MB
LIMS ID: 09-27646
Matrix: Water
Data Release Authorized:
Reported: 11/18/09

QC Report No: PX07-CDM
Project: USG Puyallup
19921-64793
Date Sampled: NA
Date Received: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
3010A	11/12/09	6010B	11/16/09	7440-70-2	Calcium	0.05	0.05	U
3010A	11/12/09	6010B	11/16/09	7439-89-6	Iron	0.05	0.05	U
3010A	11/12/09	6010B	11/16/09	7439-95-4	Magnesium	0.05	0.05	U
3010A	11/12/09	6010B	11/16/09	7440-09-7	Potassium	0.5	0.5	U
3010A	11/12/09	6010B	11/16/09	7440-23-5	Sodium	0.5	0.5	U

U-Analyte undetected at given RL
RL-Reporting Limit

SAMPLE RESULTS-CONVENTIONALS
PX07-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 11/19/09

Project: USG Puyallup
Event: 19921-64793
Date Sampled: 11/10/09
Date Received: 11/10/09

Client ID: USGPuy-RRS-11/09
ARI ID: 09-27642 PX07A

Analyte	Date Batch	Method	Units	RL	Sample
Alkalinity	11/12/09 111209#1	SM 2320	mg/L CaCO3	1.0	105
Carbonate	11/12/09	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Bicarbonate	11/12/09	SM 2320	mg/L CaCO3	1.0	105
Hydroxide	11/12/09	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Total Suspended Solids	11/13/09 111309#1	EPA 160.2	mg/L	1.1	< 1.1 U
Chloride	11/12/09 111209#1	EPA 300.0	mg/L	1.0	6.1
N-Nitrate	11/11/09 111109#1	EPA 300.0	mg-N/L	0.1	0.6
N-Nitrite	11/11/09 111109#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
Sulfate	11/12/09 111209#1	EPA 300.0	mg/L	1.0	25.5
Chemical Oxygen Demand	11/16/09 111609#1	EPA 410.4	mg/L	5.00	7.08
Total Organic Carbon	11/12/09 111209#1	EPA 415.1	mg/L	1.50	2.15

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
PX07-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 11/19/09

Project: USG Puyallup
Event: 19921-64793
Date Sampled: 11/10/09
Date Received: 11/10/09

Client ID: USGPuy-RRN-11/09
ARI ID: 09-27643 PX07B

Analyte	**Date Batch**	**Method**	**Units**	**RL**	**Sample**
Alkalinity	11/12/09 111209#1	SM 2320	mg/L CaCO3	1.0	73.1
Carbonate	11/12/09	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Bicarbonate	11/12/09	SM 2320	mg/L CaCO3	1.0	73.1
Hydroxide	11/12/09	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Total Suspended Solids	11/13/09 111309#1	EPA 160.2	mg/L	1.1	< 1.1 U
Chloride	11/12/09 111209#1	EPA 300.0	mg/L	1.0	6.2
N-Nitrate	11/12/09 111209#1	EPA 300.0	mg-N/L	1.0	4.8
N-Nitrite	11/11/09 111109#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
Sulfate	11/12/09 111209#1	EPA 300.0	mg/L	1.0	20.2
Chemical Oxygen Demand	11/16/09 111609#1	EPA 410.4	mg/L	5.00	< 5.00 U
Total Organic Carbon	11/12/09 111209#1	EPA 415.1	mg/L	1.50	2.21

RL	Analytical reporting limit
U	Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
PX07-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 11/19/09

Project: USG Puyallup
Event: 19921-64793
Date Sampled: 11/10/09
Date Received: 11/10/09

Client ID: USGPuy-MW4S-11/09
ARI ID: 09-27644 PX07C

Analyte	Date Batch	Method	Units	RL	Sample
Alkalinity	11/12/09 111209#1	SM 2320	mg/L CaCO3	1.0	87.3
Carbonate	11/12/09	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Bicarbonate	11/12/09	SM 2320	mg/L CaCO3	1.0	87.3
Hydroxide	11/12/09	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Total Suspended Solids	11/13/09 111309#1	EPA 160.2	mg/L	1.1	< 1.1 U
Chloride	11/12/09 111209#1	EPA 300.0	mg/L	1.0	4.9
N-Nitrate	11/11/09 111109#1	EPA 300.0	mg-N/L	0.1	0.7
N-Nitrite	11/11/09 111109#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
Sulfate	11/12/09 111209#1	EPA 300.0	mg/L	1.0	17.6
Chemical Oxygen Demand	11/16/09 111609#1	EPA 410.4	mg/L	5.00	7.08
Total Organic Carbon	11/12/09 111209#1	EPA 415.1	mg/L	1.50	2.53

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
PX07-CDM

Matrix: Water
Data Release Authorized:
Reported: 11/19/09

Project: USG Puyallup
Event: 19921-64793
Date Sampled: 11/10/09
Date Received: 11/10/09

Client ID: USGPuy-MW4D-11/09
ARI ID: 09-27645 PX07D

Analyte	**Date Batch**	**Method**	**Units**	**RL**	**Sample**
Alkalinity	11/12/09 111209#1	SM 2320	mg/L CaCO3	1.0	170
Carbonate	11/12/09	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Bicarbonate	11/12/09	SM 2320	mg/L CaCO3	1.0	170
Hydroxide	11/12/09	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Total Suspended Solids	11/13/09 111309#1	EPA 160.2	mg/L	2.2	31.3
Chloride	11/12/09 111209#1	EPA 300.0	mg/L	5.0	6.7
N-Nitrate	11/11/09 111109#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
N-Nitrite	11/11/09 111109#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
Sulfate	11/12/09 111209#1	EPA 300.0	mg/L	5.0	42.2
Chemical Oxygen Demand	11/16/09 111609#1	EPA 410.4	mg/L	5.00	9.86
Total Organic Carbon	11/12/09 111209#1	EPA 415.1	mg/L	1.50	5.15

RL	Analytical reporting limit
U	Undetected at reported detection limit

MS/MSD RESULTS-CONVENTIONALS
PX07-CDM

Matrix: Water
Data Release Authorized:
Reported: 11/19/09

Project: USG Puyallup
Event: 19921-64793
Date Sampled: 11/10/09
Date Received: 11/10/09

Analyte	Method	Date	Units	Sample	Spike	Spike Added	Recovery
ARI ID: PX07A Client ID: USGPuy-RRS-11/09							
Chemical Oxygen Demand	EPA 410.4	11/16/09	mg/L	7.08	51.2	48.0	91.9%
Total Organic Carbon	EPA 415.1	11/12/09	mg/L	2.15	25.0	20.0	114.2%
ARI ID: PX07C Client ID: USGPuy-MW4S-11/09							
Chloride	EPA 300.0	11/12/09	mg/L	4.9	23.2	20.0	91.5%
N-Nitrate	EPA 300.0	11/11/09	mg-N/L	0.7	2.7	2.0	100.0%
N-Nitrite	EPA 300.0	11/11/09	mg-N/L	< 0.1	2.1	2.0	105.0%
Sulfate	EPA 300.0	11/12/09	mg/L	17.6	36.9	20.0	96.5%

REPLICATE RESULTS-CONVENTIONALS
PX07-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 11/19/09

Project: USG Puyallup
Event: 19921-64793
Date Sampled: 11/10/09
Date Received: 11/10/09

Analyte	Method	Date	Units	Sample	Replicate(s)	RPD/RSD
ARI ID: PX07A	**Client ID: USGPuy-RRS-11/09**					
Alkalinity	SM 2320	11/12/09	mg/L CaCO3	105	104	1.0%
Carbonate	SM 2320	11/12/09	mg/L CaCO3	< 1.0	< 1.0	NA
Bicarbonate	SM 2320	11/12/09	mg/L CaCO3	105	104	1.0%
Hydroxide	SM 2320	11/12/09	mg/L CaCO3	< 1.0	< 1.0	NA
Chemical Oxygen Demand	EPA 410.4	11/16/09	mg/L	7.08	< 5.00	NA
Total Organic Carbon	EPA 415.1	11/12/09	mg/L	2.15	2.09	2.8%
ARI ID: PX07C	**Client ID: USGPuy-MW4S-11/09**					
Chloride	EPA 300.0	11/12/09	mg/L	4.9	4.8	2.1%
N-Nitrate	EPA 300.0	11/11/09	mg-N/L	0.7	0.7	0.0%
N-Nitrite	EPA 300.0	11/11/09	mg-N/L	< 0.1	< 0.1	NA
Sulfate	EPA 300.0	11/12/09	mg/L	17.6	17.9	1.7%
ARI ID: PX07D	**Client ID: USGPuy-MW4D-11/09**					
Total Suspended Solids	EPA 160.2	11/13/09	mg/L	31.3	32.0	2.2%

LAB CONTROL RESULTS-CONVENTIONALS
PX07-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 11/19/09

Project: USG Puyallup
Event: 19921-64793
Date Sampled: NA
Date Received: NA

Analyte/Method	QC ID	Date	Units	LCS	Spike Added	Recovery
Total Suspended Solids EPA 160.2	ICVL	11/13/09	mg/L	49.5	50.0	99.0%

METHOD BLANK RESULTS-CONVENTIONALS
PX07-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 11/19/09

Project: USG Puyallup
Event: 19921-64793
Date Sampled: NA
Date Received: NA

Analyte	**Method**	**Date**	**Units**	**Blank**
Total Suspended Solids	EPA 160.2	11/13/09	mg/L	< 1.0 U
Chloride	EPA 300.0	11/12/09	mg/L	< 0.1 U
N-Nitrate	EPA 300.0	11/11/09	mg-N/L	< 0.1 U
		11/12/09		< 0.1 U
N-Nitrite	EPA 300.0	11/11/09	mg-N/L	< 0.1 U
Sulfate	EPA 300.0	11/12/09	mg/L	< 0.1 U
Chemical Oxygen Demand	EPA 410.4	11/16/09	mg/L	< 5.00 U
Total Organic Carbon	EPA 415.1	11/12/09	mg/L	< 1.50 U

STANDARD REFERENCE RESULTS-CONVENTIONALS
PX07-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 11/19/09

Project: USG Puyallup
Event: 19921-64793
Date Sampled: NA
Date Received: NA

Analyte/SRM ID	Method	Date	Units	SRM	True Value	Recovery
Alkalinity ERA #P114506	SM 2320	11/12/09	mg/L CaCO3	60.3	61.1	98.7%
Chloride ERA #230109	EPA 300.0	11/12/09	mg/L	2.9	3.0	96.7%
N-Nitrate ERA #09127	EPA 300.0	11/11/09	mg-N/L	3.0	3.0	100.0%
		11/12/09		3.0	3.0	100.0%
N-Nitrite ERA #030309	EPA 300.0	11/11/09	mg-N/L	3.1	3.0	103.3%
Sulfate ERA #220109	EPA 300.0	11/12/09	mg/L	3.0	3.0	100.0%
Chemical Oxygen Demand Thermo Orion #I01	EPA 410.4	11/16/09	mg/L	87.3	90.0	97.0%
Total Organic Carbon ERA 0506-09-01	EPA 415.1	11/12/09	mg/L	21.5	20.0	107.5%

**APPLIED SPECIATION
AND CONSULTING, LLC**

18804 Northcreek Parkway Bothell, WA, 98011
Tel: (425) 483-3300 Fax: (425) 483-9818
www.appliedspeciation.com

December 4, 2009

Cheronne Oreiro
Analytical Resources Inc.
4611 S. 134th Place Suite 100
Tukwila, WA 98168
(206) 695-6200

Re: USG Puyallup

Ms. Oreiro,

Attached is the report associated with twelve (12) aqueous samples submitted for arsenite and arsenate quantitation on November 11, 12, and 13, 2009. Each set of samples was received the same day as the submittal date in sealed coolers at ambient temperature, ambient temperature, and 0.1°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 Puyallup

December 4, 2009

1. Sample Reception

Twelve (12) aqueous samples were submitted for arsenite and arsenate quantitation on November 11, 12, and 13, 2009. 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 ambient temperature, ambient temperature, and 0.1°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 November 18, 2009 (designated as Batch 1) or December 2, 2009 (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 two of the submitted samples during the speciation analyses. While the identities of these species cannot be determined with certainty at this time, the concentration of arsenic associated with them is estimated to be 23.9µg/L for 09-27995-PX41C and 7.4µg/L for 09-27758-PX19C. 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 Puyallup
Contact: Cheronne Oreiro

Report Date: December 4, 2009
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Sample Results

Sample ID	Date Sampled	Batch	Dilution	As(III)	As(V)
09-27644-PX07C	11/10/09	1	20	291	267
09-27645-PX07D	11/10/09	1	20	149	7.87
09-27756-PX19A	11/11/09	1	250	93.5	1310
09-27757-PX19B	11/11/09	1	100	357	296
09-27758-PX19C	11/11/09	1	100	464	47.5
09-27759-PX19D	11/11/09	1	1000	ND (<2.4)	4640
09-27760-PX19E	11/11/09	1	2	0.798	0.431
09-27761-PX19F	11/11/09	1	100	ND (<0.24)	296
09-27762-PX19G	11/11/09	1	250	477	306
09-27994-PX41B	11/12/09	2	50	1.80	0.63
09-27995-PX41C	11/12/09	2	250	1040	122
09-27997-PX41E	11/12/09	2	50	40.0	3.71

All results reflect the applied dilution and are reported in µg/L
ND = Not detected at the applied dilution

Arsenic Speciation Results for ARI
Project Name: USG Puyallup
Contact: Cheronne Oreiro

Report Date: December 4, 2009
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Sample Results

	Sample ID	Date Sampled	Batch	Dilution	As(III)	As(V)
mw4S	09-27644-PX07C	11/10/09	1	20	291	267
mw4D	09-27645-PX07D	11/10/09	1	20	149	7.87
mw2	09-27756-PX19A	11/11/09	1	250	93.5	1310
mw3	09-27757-PX19B	11/11/09	1	100	357	296
mw5	09-27758-PX19C	11/11/09	1	100	464	47.5
P3-1	09-27759-PX19D	11/11/09	1	1000	ND (<2.4)	4640
P3-3	09-27760-PX19E	11/11/09	1	2	0.798	0.431
P3-2	09-27761-PX19F	11/11/09	1	100	ND (<0.24)	296
mw 0	09-27762-PX19G	11/11/09	1	250	477	306
USG Puy-P2-2	09-27994-PX41B	11/12/09	2	50	1.80	0.63
P2-1	09-27995-PX41C	11/12/09	2	250	1040	122
mw 1	09-27997-PX41E	11/12/09	2	50	40.0	3.71

All results reflect the applied dilution and are reported in µg/L
ND = Not detected at the applied dilution

Arsenic Speciation Results for ARI
Project Name: USG Puyallup
Contact: Cheronne Oreiro

Report Date: December 4, 2009
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
As(III)	1	0.000	0.000	0.000	0.000	0.000	0.000	0.002
As(V)	1	-0.009	-0.016	-0.021	-0.025	-0.018	0.007	0.020
As(III)	2	0.000	0.000	0.000	0.000	0.000	0.000	0.010
As(V)	2	-0.001	-0.005	0.005	0.002	0.000	0.004	0.012

eMDL = Estimated Method Detection 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	10.34	103.4
As(V)	1	ICV	10.00	9.23	92.3
As(III)	2	ICV	10.00	9.95	99.5
As(V)	2	ICV	10.00	10.07	100.7

Arsenic Speciation Results for ARI
Project Name: USG Puyallup
Contact: Cheronne Oreiro

Report Date: December 4, 2009
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	09-27756-PX19A	93.49	104.8	99.17	11.4
As(V)	1	09-27756-PX19A	1314	1461	1387	10.6
As(III)	2	09-27997-PX41E	40.05	40.22	40.14	0.4
As(V)	2	09-27997-PX41E	3.71	3.85	3.78	3.7

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	09-27756-PX19A	500.0	553.9	90.9	500.0	555.8	91.3	0.3
As(V)	1	09-27756-PX19A	500.0	1902.8	103.1	500.0	1892.6	101.1	0.5
As(III)	2	09-27997-PX41E	100.0	134.1	93.9	100.0	134.8	94.7	0.5
As(V)	2	09-27997-PX41E	100.0	100.7	96.9	100.0	102.2	98.4	1.5

SUBCONTRACTOR ANALYSIS REQUEST
CUSTODY TRANSFER 11/11/09

ANALYTICAL RESOURCES INCORPORATED

ARI Project: PX07

Laboratory: Applied Speciation & Consulting
Lab Contact: Russell Gerads
Lab Address: ~~853 INDUSTRY DRIVE~~ 18804 N. Creek Parkway
~~Tukwila, WA 98188~~ Bothell
Phone: 206-219-3779
Fax: 206-388-5481

ARI Client: CDM
Project ID: USG Puyallup
ARI PM: Cheronne Oreiro
Phone: 206-695-6214
Fax: 206-695-6201

Analytical Protocol: In-house
Special Instructions:

Requested Turn Around: 11/24/09
Fax 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/ ARI ID	Sampled	Matrix	Bottles	Analyses
● 09-17844-PX07C	USGPuy-MW4S-11/09	11/10/09 14:10	Water	1	Metals (Sub)

Special Instructions: As Speciation IC-ICP-MS

ARI ID	Client ID/ ARI ID	Sampled	Matrix	Bottles	Analyses
● 09-17844-PX07D	USGPuy-MW4D-11/09	11/10/09 14:15	Water	1	Metals (Sub)

Special Instructions: As Speciation IC-ICP-MS

Relinquished by: RC Company: ARI Date: 11/11/09 Time: 1050
Received by: Ayton Lem Company: ASC Date: 11/11/09 Time: 1050

Subcontractor Custody Form - **PX07**
Page 1 of 1

SUBCONTRACTOR ANALYSIS REQUEST
CUSTODY TRANSFER 11/12/09

ANALYTICAL RESOURCES INCORPORATED

ARI Project: PX19

Laboratory: Applied Speciation & Consulting
Lab Contact: Russell Gerads
Lab Address: ~~953 Industry Drive~~
~~Tukwila, WA 98188~~
18804 Northcreek Parkway
Bothell, WA
Phone: 206-219-3779
Fax: 206-388-3485

ARI Client: CDM
Project ID: USG Puyallup
ARI PM: Cheronne Oreiro
Phone: 206-695-6214
Fax: 206-695-6201

Analytical Protocol: In-house
Special Instructions:

Requested Turn Around: **11/26/09**
Fax 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
● 09-27756-PX19A	USGPuy-MW2-11/09	11/11/09 09:00	Water	1	Metals (Sub)
Special Instructions: As Speciation					
● 09-27757-PX19B	USGPuy-MW3-11/09	11/11/09 10:15	Water	1	Metals (Sub)
Special Instructions: As Speciation					
● 09-27758-PX19C	USGPuy-MW9-11/09	11/11/09 11:45	Water	1	Metals (Sub)
Special Instructions: As Speciation					
● 09-27759-PX19D	USGPuy-P3-1-11/09	11/11/09 12:40	Water	1	Metals (Sub)
Special Instructions: As Speciation					
● 09-27760-PX19E	USGPuy-P3-3-11/09	11/11/09 14:25	Water	1	Metals (Sub)
Special Instructions: As Speciation					
● 09-27761-PX19F	USGPuy-P3-2-11/09	11/11/09 16:00	Water	1	Metals (Sub)
Special Instructions: As Speciation					
● 09-27762-PX19G	USGPuy-MW-0-11/09	11/11/09 16:25	Water	1	Metals (Sub)
Special Instructions: As Speciation					

Carrier
Airbill
Date

Relinquished by
Company ARI
Date 11/12/09
Time 1035

Received by Nancy Currier
Company ASC
Date 11/12/09
Time 10:38

Subcontractor Custody Form - **PX19**

SUBCONTRACTOR ANALYSIS REQUEST
CUSTODY TRANSFER 11/13/09

ANALYTICAL RESOURCES INCORPORATED

ARI Project: PX41

Laboratory: Applied Speciation & Consulting
Lab Contact: Russell Gerads
Lab Address: ~~954 Industry Drive~~
~~Tukwila, WA 98188~~ 18804 Northcreek Parkway
Bothell WA .
Phone: 206-219-3779
Fax: 206-[illegible]

ARI Client: [illegible]
Project ID: [illegible]
ARI PM: [illegible]
Phone: [illegible]
Fax: 206-695-[illegible]

Analytical Protocol: In-house
Special Instructions:

Requested Turn Around: 11/27/09
Send Results Via: 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 successors, 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
09-27[illegible]-PX41B	[illegible]-11/09	11/12/09 [illegible]	Water	1	Metals (Sub)
Special Instructions: As Speciation					
09-27[illegible]-PX41C	[illegible]-11/09	11/12/09 [illegible]	Water	1	[illegible] (Sub)
Special Instructions: As Speciation					
09-[illegible]-PX41[illegible]	[illegible]	[illegible]	Water	[illegible]	[illegible]
Special Instructions: As Speciation					

Carrier | Airbill | Date

Relinquished by: | Company: ARI | Date: 11/13/09 | Time: 1200
Received by: | Company: ASC | Date: 11/13/09 | Time: 12:22 pm

Subcontractor Custody Form - **PX41**
Page 1 of 1

Analytical Resources, Incorporated
Analytical Chemists and Consultants

December 7, 2009

Alan Carey
CDM
11811 NE 1st, Suite 201
Bellevue, WA 98009

RE: Project ID: USG Puyallup – 19921-64793
ARI Job No: PX19

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 seven water samples on November 11, 2009. For details regarding sample receipt, please refer to the enclosed Cooler Receipt Form.

The samples were analyzed for Total and Dissolved Metals, Arsenic Speciation, TSS, Alkalinity, TOC, COD, and Anions, as requested. Please note that sample volume for Arsenic Speciation was transferred to Applied Speciation in Bothell, WA. All data have been included in this report.

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: PX19

CDM

CHAIN-OF-CUSTODY

Date 11/11/09 Page 1 of 1

PROJECT INFORMATION

Project Manager: Al Carey

Project Name: USG Puyallup

Project Number: 19921-64793

Site Location: Puyallup Sampled By: JS/MF

DISPOSAL INFORMATION

☐ Lab Disposal (return if not indicated)

Disposal Method:

Disposed by: Disposal Date:

QC INFORMATION (check one)

☐ SW-846 ☐ CLP ☐ Screening ☐ CDM Std. ☐ Special

Laboratory Number:

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
USGPuy-MW2-11/09	11/11/09	0900	water	
USGPuy-MW3-11/09	11/11/09	1015	water	
USGPuy-MW5-11/09	11/11/09	1145	water	
USGPuy-P3-1-11/09	11/11/09	1240	water	
USGPuy-P3-3-11/09	11/11/09	1425	water	
USGPuy-P3-2-11/09	11/11/09	1600	water	
USGPuy-MW-0-11/09	11/11/09	1025	water	

SAMPLE ID	PETROLEUM HYDROCARBONS						ORGANIC COMPOUNDS								PESTS/PCBs				
	TPH-HCID State:	TPH-G State:	TPH-D State:	TPH-418.1 State:	8015M Fuel Hydrocarbon	TPH Special Instructions	8010 Halogenated VOCs	8020 Aromatic VOCs	8020M - BETX only	8240 GC/MS Volatiles	8270 GC/MS Semivolatiles	8310 PAHs	8040 Phenols	DWS - Volatiles and Semivolatiles	8080 OC Pest/PCBs	8080M PCBs only	8140 OP Pesticides	8150 OC Herbicides	DWS - Herb/Pest
USGPuy-MW2-11/09																			
USGPuy-MW3-11/09																			
USGPuy-MW5-11/09																			
USGPuy-P3-1-11/09																			
USGPuy-P3-3-11/09																			
USGPuy-P3-2-11/09																			
USGPuy-MW-0-11/09																			

SAMPLE ID	METALS						LEACHING TESTS				OTHER					
	Selected Metals: list Total (Ca,Fe,Mg, K,Na)	~~Organic Lead (Ga)~~ As Speciation	~~TCL Metals (23)~~ Dissolved As	~~Priority Poll. Metals (13)~~ Total As	~~DWS - Metals~~ Dissolved Iron	MFSP - Metals (Wa)	TCLP - Volatiles (ZHE)	TCLP - Semivolatiles	TCLP - Pesticides	TCLP - Metals	TSS-SM2540D	Alkalinity 310.1 (CaHCO3)	TOC 415.2	COD 410.4	Cl/NO3/NO2/SO4	NUMBER OF CONTAINERS
USGPuy-MW2-11/09	X	X	X	X	X						X	X	X	X	X	7
USGPuy-MW3-11/09	X	X	X		X						X	X	X	X	X	8
USGPuy-MW5-11/09	X	X	X		X						X	X	X	X	X	8
USGPuy-P3-1-11/09	X	X	X		X						X	X	X	X	X	8
USGPuy-P3-3-11/09	X	X	X		X						X	X	X	X	X	9
USGPuy-P3-2-11/09	X	X	X	X	X						X	X	X	X	X	8
USGPuy-MW-0-11/09	X	X	X		X						X	X	X	X	X	8

LAB INFORMATION

Lab Name: ARI

Lab Address: 4611 S 134th Pl. Ste 100
Tukwila, WA 98168

Via: hand delivered

SAMPLE RECEIPT

Total Number of Containers:

Chain-of-Custody Seals: Y/N/NA

Intact?: Y/N/NA

Received in Good Condition/Cold:

Turn Around Time: ☒ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions: MS/MSD on USGPuy-P3-1-11/09 for dissolved Arsenic

Diss. As not field filtered

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Jennifer Smith Time: 1745	Signature: Time:	Signature: Time:
Printed Name: Jennifer Smith Date: 11/11/09	Printed Name: Date:	Printed Name: Date:
Company: CDM	Company:	Company:

RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: 3.
Signature: J. Peterson Time: 1745	Signature: Time:	Signature: Time:
Printed Name: J. Peterson Date: 11/11/09	Printed Name: Date:	Printed Name: Date:
Company: ARI	Company:	Company:

CDM OFFICES: Bellevue: (206) 453-8383
Portland: (503) 232-1800

rev. 2/02

DISTRIBUTION: White, Canary to Analytical Laboratory; Pink to CDM Project Files; Gold to CDM Disposal Files

forms\field\chainofcustody.p65

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: CDM

COC No(s): [✓ NA]

Assigned ARI Job No:

Project Name: USG Puyallup

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)........ 3.6 10.4 6.6 2.9

If cooler temperature is out of compliance fill out form 00070F Temp Gun ID#: 90877952

Cooler Accepted by: JP Date: 11/11/09 Time: 1745

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

Samples Logged by: MM Date: 11/12/09 Time: 845.

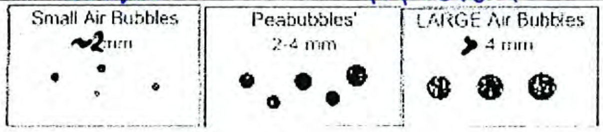
***** Notify Project Manager of discrepancies or concerns *****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC
USGPuy-MW0-11/09	USGPuy-MW-0-11/09		

Additional Notes, Discrepancies, & Resolutions:

- 1 bottle read USGPuy-MW2-11/09 but was supposed to read USGPuy-MW3-11/09.
- COC reads that 7 containers were provided for USGPuy-MW2-11/09 but 8 containers were recieved

By: MM Date: 11/12/09



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

Analytical Chemists and Consultants

Compliance Form

Cooler#: 1 Temperature(°C): 6.6

Sample ID	Bottle Count	Bottle Type
USG Puy P3-1-11/09	9	8oz Ag 500ml HDPE, Sm OJ, Lrg OJ
P3-3	8	''

Cooler#: 2 Temperature(°C): 10.4

Sample ID	Bottle Count	Bottle Type
USG Puy P3-2-11/09	8	8oz Ag 1500ml HDPE, Sm OJ Lrg OJ

Cooler#: Temperature(°C):

Sample ID	Bottle Count	Bottle Type

Cooler#: Temperature(°C):

Sample ID	Bottle Count	Bottle Type

Completed by: Date: 11/12/09 Time: 800

PRESERVATION VERIFICATION 11/12/09
Page 1 of 2

ANALYTICAL RESOURCES INCORPORATED

ARI Job No: **PX19**

Inquiry Number: NONE
Analysis Requested: 11/12/09
Contact: Carey, Alan
Client: CDM
Logged by: MM
Sample Set Used: Yes-498
Validatable Package: No
Deliverables:

PC: Cheronne
VTSR: 11/11/09

Project #: 19921-64793
Project: USG Puyallup
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
09-27756 **PX19A**	USGPuy-MW2-11/09				Pass		DIS fail					Pass				N						
09-27757 **PX19B**	USGPuy-MW3-11/09						DIS									N						
09-27758 **PX19C**	USGPuy-MW5-11/09						DIS									N						
09-27759 **PX19D**	USGPuy-P3-1-11/09						DIS									N						
09-27760 **PX19E**	USGPuy-P3-3-11/09						DIS									N						
09-27761 **PX19F**	USGPuy-P3-2-11/09						DIS									N						
09-27762 **PX19G**	USGPuy-MW-0-11/09						DIS									N						
09-27763 **PX19H**	USGPuy-MW2-11/09						TOT Pass															
09-27764 **PX19I**	USGPuy-MW3-11/09						TOT															
09-27765 **PX19J**	USGPuy-MW5-11/09						TOT															
09-27766 **PX19K**	USGPuy-P3-1-11/09						TOT															
09-27767 **PX19L**	USGPuy-P3-3-11/09						TOT															
09-27768 **PX19M**	USGPuy-P3-2-11/09						TOT															
09-27769 **PX19N**	USGPuy-MW-0-11/09						TOT															

Checked By UN Date 11/12/09

PRESERVATION VERIFICATION 11/12/09
Page 2 of 2

ANALYTICAL
RESOURCES
INCORPORATED

ARI Job No: **PX19**

Client: CDM

Project #: 19921-64793
Project: USG Puyallup

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

Checked By Date 11/12/09

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGPuy-MW2-11/09
SAMPLE

Lab Sample ID: PX19A
LIMS ID: 09-27756
Matrix: Water
Data Release Authorized:
Reported: 11/18/09

QC Report No: PX19-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/11/09
Date Received: 11/11/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
7000A	11/13/09	7060A	11/17/09	**7440-38-2**	**Arsenic**	0.1	**1.5**	
6010B	11/13/09	6010B	11/16/09	**7439-89-6**	**Iron**	0.05	**0.21**	

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGPuy-MW3-11/09
SAMPLE

Lab Sample ID: PX19B
LIMS ID: 09-27757
Matrix: Water
Data Release Authorized:
Reported: 11/18/09

QC Report No: PX19-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/11/09
Date Received: 11/11/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
7000A	11/13/09	7060A	11/17/09	**7440-38-2**	**Arsenic**	0.04	**0.71**	
6010B	11/13/09	6010B	11/16/09	**7439-89-6**	**Iron**	0.05	**0.43**	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGPuy-MW5-11/09
SAMPLE

Lab Sample ID: PX19C
LIMS ID: 09-27758
Matrix: Water
Data Release Authorized:
Reported: 11/18/09

QC Report No: PX19-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/11/09
Date Received: 11/11/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
7000A	11/13/09	7060A	11/17/09	7440-38-2	Arsenic	0.02	0.43	
6010B	11/13/09	6010B	11/16/09	7439-89-6	Iron	0.05	20.3	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGPuy-P3-1-11/09
SAMPLE

Lab Sample ID: PX19D
LIMS ID: 09-27759
Matrix: Water
Data Release Authorized:
Reported: 11/18/09

QC Report No: PX19-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/11/09
Date Received: 11/11/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
7000A	11/13/09	7060A	11/17/09	**7440-38-2**	**Arsenic**	0.5	**6.1**	
6010B	11/13/09	6010B	11/16/09	7439-89-6	Iron	0.05	0.05	U

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGPuy-P3-3-11/09
SAMPLE

Lab Sample ID: PX19E
LIMS ID: 09-27760
Matrix: Water
Data Release Authorized:
Reported: 11/18/09

QC Report No: PX19-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/11/09
Date Received: 11/11/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
7000A	11/13/09	7060A	11/17/09	**7440-38-2**	**Arsenic**	0.001	**0.002**	
6010B	11/13/09	6010B	11/16/09	**7439-89-6**	**Iron**	0.05	**3.50**	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGPuy-P3-2-11/09
SAMPLE

Lab Sample ID: PX19F
LIMS ID: 09-27761
Matrix: Water
Data Release Authorized:
Reported: 11/18/09

QC Report No: PX19-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/11/09
Date Received: 11/11/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
7000A	11/13/09	7060A	11/17/09	**7440-38-2**	**Arsenic**	0.04	**0.42**	
6010B	11/13/09	6010B	11/16/09	7439-89-6	Iron	0.05	0.05	U

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
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Sample ID: USGPuy-MW-0-11/09
SAMPLE

Lab Sample ID: PX19G
LIMS ID: 09-27762
Matrix: Water
Data Release Authorized:
Reported: 11/18/09

QC Report No: PX19-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/11/09
Date Received: 11/11/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
7000A	11/13/09	7060A	11/17/09	**7440-38-2**	**Arsenic**	0.04	**0.67**	
6010B	11/13/09	6010B	11/16/09	**7439-89-6**	**Iron**	0.05	**0.40**	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGPuy-P3-1-11/09
MATRIX SPIKE

Lab Sample ID: PX19D
LIMS ID: 09-27759
Matrix: Water
Data Release Authorized
Reported: 11/18/09

QC Report No: PX19-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/11/09
Date Received: 11/11/09

MATRIX SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Spike	Spike Added	% Recovery	Q
Arsenic	7060A	6.1	17.7	10.0	116%	
Iron	6010B	0.05 U	2.09	2.00	104%	

Reported in mg/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%

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGPuy-P3-1-11/09
DUPLICATE

Lab Sample ID: PX19D
LIMS ID: 09-27759
Matrix: Water
Data Release Authorized:
Reported: 11/18/09

QC Report No: PX19-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/11/09
Date Received: 11/11/09

MATRIX DUPLICATE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Duplicate	RPD	Control Limit	Q
Arsenic	7060A	6.1	6.4	4.8%	+/- 20%	
Iron	6010B	0.05 U	0.05 U	0.0%	+/- 0.05	L

Reported in mg/L

*-Control Limit Not Met
L-RPD Invalid, Limit = Detection Limit

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
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Sample ID: LAB CONTROL

Lab Sample ID: PX19LCS
LIMS ID: 09-27760
Matrix: Water
Data Release Authorized:
Reported: 11/18/09

QC Report No: PX19-CDM
Project: USG Puyallup
19921-64793
Date Sampled: NA
Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Arsenic	7060A	0.022	0.020	110%	
Iron	6010B	2.13	2.00	106%	

Reported in mg/L

N-Control limit not met
Control Limits: 80-120%

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: METHOD BLANK

Lab Sample ID: PX19MB
LIMS ID: 09-27760
Matrix: Water
Data Release Authorized:
Reported: 11/18/09

QC Report No: PX19-CDM
Project: USG Puyallup
19921-64793
Date Sampled: NA
Date Received: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
7000A	11/13/09	7060A	11/17/09	7440-38-2	Arsenic	0.001	0.001	U
6010B	11/13/09	6010B	11/16/09	7439-89-6	Iron	0.05	0.05	U

U-Analyte undetected at given RL
RL-Reporting Limit

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INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
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Sample ID: USGPuy-MW2-11/09
SAMPLE

Lab Sample ID: PX19H
LIMS ID: 09-27763
Matrix: Water
Data Release Authorized:
Reported: 11/18/09

QC Report No: PX19-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/11/09
Date Received: 11/11/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
7060A	11/12/09	7060A	11/17/09	**7440-38-2**	**Arsenic**	0.1	**2.0**	
3010A	11/12/09	6010B	11/16/09	**7440-70-2**	**Calcium**	0.05	**34.1**	
3010A	11/12/09	6010B	11/16/09	**7439-89-6**	**Iron**	0.05	**0.66**	
3010A	11/12/09	6010B	11/16/09	**7439-95-4**	**Magnesium**	0.05	**13.7**	
3010A	11/12/09	6010B	11/16/09	**7440-09-7**	**Potassium**	0.5	**3.7**	
3010A	11/12/09	6010B	11/16/09	**7440-23-5**	**Sodium**	0.5	**14.8**	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-MW3-11/09
SAMPLE

Lab Sample ID: PX19I
LIMS ID: 09-27764
Matrix: Water
Data Release Authorized:
Reported: 11/18/09

QC Report No: PX19-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/11/09
Date Received: 11/11/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
3010A	11/12/09	6010B	11/16/09	7440-70-2	Calcium	0.05	16.2	
3010A	11/12/09	6010B	11/16/09	7439-89-6	Iron	0.05	0.65	
3010A	11/12/09	6010B	11/16/09	7439-95-4	Magnesium	0.05	8.48	
3010A	11/12/09	6010B	11/16/09	7440-09-7	Potassium	0.5	2.6	
3010A	11/12/09	6010B	11/16/09	7440-23-5	Sodium	0.5	10.3	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-MW5-11/09
SAMPLE

Lab Sample ID: PX19J
LIMS ID: 09-27765
Matrix: Water
Data Release Authorized:
Reported: 11/18/09

QC Report No: PX19-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/11/09
Date Received: 11/11/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
3010A	11/12/09	6010B	11/16/09	7440-70-2	Calcium	0.05	19.8	
3010A	11/12/09	6010B	11/16/09	7439-89-6	Iron	0.05	26.1	
3010A	11/12/09	6010B	11/16/09	7439-95-4	Magnesium	0.05	7.60	
3010A	11/12/09	6010B	11/16/09	7440-09-7	Potassium	0.5	3.2	
3010A	11/12/09	6010B	11/16/09	7440-23-5	Sodium	0.5	13.2	

U-Analyte undetected at given RL
RL-Reporting Limit

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INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
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Sample ID: USGPuy-P3-1-11/09
SAMPLE

Lab Sample ID: PX19K
LIMS ID: 09-27766
Matrix: Water
Data Release Authorized:
Reported: 11/18/09

QC Report No: PX19-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/11/09
Date Received: 11/11/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
3010A	11/12/09	6010B	11/16/09	**7440-70-2**	**Calcium**	0.05	**55.1**	
3010A	11/12/09	6010B	11/16/09	7439-89-6	Iron	0.05	0.05	U
3010A	11/12/09	6010B	11/16/09	**7439-95-4**	**Magnesium**	0.05	**14.2**	
3010A	11/12/09	6010B	11/16/09	**7440-09-7**	**Potassium**	0.5	**6.0**	
3010A	11/12/09	6010B	11/16/09	**7440-23-5**	**Sodium**	0.5	**11.3**	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
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Sample ID: USGPuy-P3-3-11/09
SAMPLE

Lab Sample ID: PX19L
LIMS ID: 09-27767
Matrix: Water
Data Release Authorized:
Reported: 11/18/09

QC Report No: PX19-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/11/09
Date Received: 11/11/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
3010A	11/12/09	6010B	11/16/09	**7440-70-2**	**Calcium**	0.05	**14.4**	
3010A	11/12/09	6010B	11/16/09	**7439-89-6**	**Iron**	0.05	**6.02**	
3010A	11/12/09	6010B	11/16/09	**7439-95-4**	**Magnesium**	0.05	**11.0**	
3010A	11/12/09	6010B	11/16/09	**7440-09-7**	**Potassium**	0.5	**3.6**	
3010A	11/12/09	6010B	11/16/09	**7440-23-5**	**Sodium**	0.5	**10.1**	

U-Analyte undetected at given RL
RL-Reporting Limit

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INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
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Sample ID: USGPuy-P3-2-11/09
SAMPLE

Lab Sample ID: PX19M
LIMS ID: 09-27768
Matrix: Water
Data Release Authorized:
Reported: 11/18/09

QC Report No: PX19-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/11/09
Date Received: 11/11/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
7060A	11/12/09	7060A	11/17/09	**7440-38-2**	**Arsenic**	0.02	**0.44**	
3010A	11/12/09	6010B	11/16/09	**7440-70-2**	**Calcium**	0.05	**22.6**	
3010A	11/12/09	6010B	11/16/09	7439-89-6	Iron	0.05	0.05	U
3010A	11/12/09	6010B	11/16/09	**7439-95-4**	**Magnesium**	0.05	**10.5**	
3010A	11/12/09	6010B	11/16/09	**7440-09-7**	**Potassium**	0.5	**3.0**	
3010A	11/12/09	6010B	11/16/09	**7440-23-5**	**Sodium**	0.5	**12.8**	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-MW-0-11/09
SAMPLE

Lab Sample ID: PX19N
LIMS ID: 09-27769
Matrix: Water
Data Release Authorized:
Reported: 11/18/09

QC Report No: PX19-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/11/09
Date Received: 11/11/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
3010A	11/12/09	6010B	11/16/09	**7440-70-2**	**Calcium**	0.05	**14.3**	
3010A	11/12/09	6010B	11/16/09	**7439-89-6**	**Iron**	0.05	**0.57**	
3010A	11/12/09	6010B	11/16/09	**7439-95-4**	**Magnesium**	0.05	**7.47**	
3010A	11/12/09	6010B	11/16/09	**7440-09-7**	**Potassium**	0.5	**2.3**	
3010A	11/12/09	6010B	11/16/09	**7440-23-5**	**Sodium**	0.5	**9.2**	

U-Analyte undetected at given RL
RL-Reporting Limit

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INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
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Sample ID: USGPuy-MW2-11/09
MATRIX SPIKE

Lab Sample ID: PX19H
LIMS ID: 09-27763
Matrix: Water
Data Release Authorized:
Reported: 11/18/09

QC Report No: PX19-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/11/09
Date Received: 11/11/09

MATRIX SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Spike	Spike Added	% Recovery	Q
Arsenic	7060A	2.0	2.1	0.1	100%	H
Calcium	6010B	34.1	43.2	10.0	91.0%	
Iron	6010B	0.66	2.65	2.00	99.5%	
Magnesium	6010B	13.7	23.2	10.0	95.0%	
Potassium	6010B	3.7	13.7	10.0	100%	
Sodium	6010B	14.8	24.6	10.0	98.0%	

Reported in mg/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
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-MW2-11/09
DUPLICATE

Lab Sample ID: PX19H
LIMS ID: 09-27763
Matrix: Water
Data Release Authorized:
Reported: 11/18/09

QC Report No: PX19-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/11/09
Date Received: 11/11/09

MATRIX DUPLICATE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Duplicate	RPD	Control Limit	Q
Arsenic	7060A	2.0	2.0	0.0%	+/- 20%	
Calcium	6010B	34.1	32.1	6.0%	+/- 20%	
Iron	6010B	0.66	0.62	6.2%	+/- 20%	
Magnesium	6010B	13.7	13.0	5.2%	+/- 20%	
Potassium	6010B	3.7	3.5	5.6%	+/- 20%	
Sodium	6010B	14.8	14.0	5.6%	+/- 20%	

Reported in mg/L

*-Control Limit Not Met
L-RPD Invalid, Limit = Detection Limit

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INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
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Sample ID: LAB CONTROL

Lab Sample ID: PX19LCS
LIMS ID: 09-27768
Matrix: Water
Data Release Authorized
Reported: 11/18/09

QC Report No: PX19-CDM
Project: USG Puyallup
19921-64793
Date Sampled: NA
Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Arsenic	7060A	0.107	0.100	107%	
Calcium	6010B	9.15	10.0	91.5%	
Iron	6010B	1.92	2.00	96.0%	
Magnesium	6010B	9.23	10.0	92.3%	
Potassium	6010B	9.5	10.0	95.0%	
Sodium	6010B	9.4	10.0	94.0%	

Reported in mg/L

N-Control limit not met
Control Limits: 80-120%

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: METHOD BLANK

Lab Sample ID: PX19MB
LIMS ID: 09-27768
Matrix: Water
Data Release Authorized:
Reported: 11/18/09

QC Report No: PX19-CDM
Project: USG Puyallup
19921-64793
Date Sampled: NA
Date Received: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
7060A	11/12/09	7060A	11/17/09	7440-38-2	Arsenic	0.001	0.001	U
3010A	11/12/09	6010B	11/16/09	7440-70-2	Calcium	0.05	0.05	U
3010A	11/12/09	6010B	11/16/09	7439-89-6	Iron	0.05	0.05	U
3010A	11/12/09	6010B	11/16/09	7439-95-4	Magnesium	0.05	0.05	U
3010A	11/12/09	6010B	11/16/09	7440-09-7	Potassium	0.5	0.5	U
3010A	11/12/09	6010B	11/16/09	7440-23-5	Sodium	0.5	0.5	U

U-Analyte undetected at given RL
RL-Reporting Limit

SAMPLE RESULTS-CONVENTIONALS
PX19-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 11/20/09

Project: USG Puyallup
Event: 19921-64793
Date Sampled: 11/11/09
Date Received: 11/11/09

Client ID: USGPuy-MW2-11/09
ARI ID: 09-27756 PX19A

Analyte	Date Batch	Method	Units	RL	Sample
Alkalinity	11/12/09 111209#1	SM 2320	mg/L CaCO3	1.0	120
Carbonate	11/12/09	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Bicarbonate	11/12/09	SM 2320	mg/L CaCO3	1.0	120
Hydroxide	11/12/09	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Total Suspended Solids	11/13/09 111309#1	EPA 160.2	mg/L	1.0	< 1.0 U
Chloride	11/13/09 111309#1	EPA 300.0	mg/L	1.0	18.9
N-Nitrate	11/12/09 111209#1	EPA 300.0	mg-N/L	0.1	2.8
N-Nitrite	11/12/09 111209#1	EPA 300.0	mg-N/L	0.1	0.1
Sulfate	11/13/09 111309#1	EPA 300.0	mg/L	1.0	20.0
Chemical Oxygen Demand	11/16/09 111609#1	EPA 410.4	mg/L	5.00	9.55
Total Organic Carbon	11/13/09 111309#1	EPA 415.1	mg/L	1.50	3.66

RL	Analytical reporting limit
U	Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
PX19-CDM

Matrix: Water
Data Release Authorized:
Reported: 11/20/09

Project: USG Puyallup
Event: 19921-64793
Date Sampled: 11/11/09
Date Received: 11/11/09

Client ID: USGPuy-MW3-11/09
ARI ID: 09-27757 PX19B

Analyte	**Date Batch**	**Method**	**Units**	**RL**	**Sample**
Alkalinity	11/12/09 111209#1	SM 2320	mg/L CaCO3	1.0	85.1
Carbonate	11/12/09	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Bicarbonate	11/12/09	SM 2320	mg/L CaCO3	1.0	85.1
Hydroxide	11/12/09	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Total Suspended Solids	11/13/09 111309#1	EPA 160.2	mg/L	1.0	< 1.0 U
Chloride	11/13/09 111309#1	EPA 300.0	mg/L	1.0	5.4
N-Nitrate	11/12/09 111209#1	EPA 300.0	mg-N/L	0.1	0.5
N-Nitrite	11/12/09 111209#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
Sulfate	11/13/09 111309#1	EPA 300.0	mg/L	1.0	15.0
Chemical Oxygen Demand	11/16/09 111609#1	EPA 410.4	mg/L	5.00	6.46
Total Organic Carbon	11/13/09 111309#1	EPA 415.1	mg/L	1.50	2.48

RL	Analytical reporting limit
U	Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
PX19-CDM

Matrix: Water
Data Release Authorized:
Reported: 11/20/09

Project: USG Puyallup
Event: 19921-64793
Date Sampled: 11/11/09
Date Received: 11/11/09

Client ID: USGPuy-MW5-11/09
ARI ID: 09-27758 PX19C

Analyte	**Date Batch**	**Method**	**Units**	**RL**	**Sample**
Alkalinity	11/12/09 111209#1	SM 2320	mg/L CaCO3	1.0	136
Carbonate	11/12/09	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Bicarbonate	11/12/09	SM 2320	mg/L CaCO3	1.0	136
Hydroxide	11/12/09	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Total Suspended Solids	11/13/09 111309#1	EPA 160.2	mg/L	1.0	35.3
Chloride	11/17/09 111709#1	EPA 300.0	mg/L	1.0	5.6
N-Nitrate	11/12/09 111209#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
N-Nitrite	11/12/09 111209#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
Sulfate	11/12/09 111209#1	EPA 300.0	mg/L	0.1	0.7
Chemical Oxygen Demand	11/16/09 111609#1	EPA 410.4	mg/L	5.00	14.5
Total Organic Carbon	11/13/09 111309#1	EPA 415.1	mg/L	1.50	5.19

RL	Analytical reporting limit
U	Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
PX19-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 11/20/09

Project: USG Puyallup
Event: 19921-64793
Date Sampled: 11/11/09
Date Received: 11/11/09

Client ID: USGPuy-P3-1-11/09
ARI ID: 09-27759 PX19D

Analyte	Date Batch	Method	Units	RL	Sample
Alkalinity	11/12/09 111209#1	SM 2320	mg/L CaCO3	1.0	189
Carbonate	11/12/09	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Bicarbonate	11/12/09	SM 2320	mg/L CaCO3	1.0	189
Hydroxide	11/12/09	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Total Suspended Solids	11/13/09 111309#1	EPA 160.2	mg/L	1.0	< 1.0 U
Chloride	11/13/09 111309#1	EPA 300.0	mg/L	5.0	7.1
N-Nitrate	11/12/09 111209#1	EPA 300.0	mg-N/L	0.1	1.4
N-Nitrite	11/12/09 111209#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
Sulfate	11/13/09 111309#1	EPA 300.0	mg/L	5.0	43.0
Chemical Oxygen Demand	11/16/09 111609#1	EPA 410.4	mg/L	5.00	12.3
Total Organic Carbon	11/13/09 111309#1	EPA 415.1	mg/L	1.50	7.17

RL	Analytical reporting limit
U	Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
PX19-CDM

ANALYTICAL
RESOURCES
INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 11/20/09

Project: USG Puyallup
Event: 19921-64793
Date Sampled: 11/11/09
Date Received: 11/11/09

Client ID: USGPuy-P3-3-11/09
ARI ID: 09-27760 PX19E

Analyte	Date Batch	Method	Units	RL	Sample
Alkalinity	11/12/09 111209#1	SM 2320	mg/L CaCO3	1.0	110
Carbonate	11/12/09	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Bicarbonate	11/12/09	SM 2320	mg/L CaCO3	1.0	110
Hydroxide	11/12/09	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Total Suspended Solids	11/13/09 111309#1	EPA 160.2	mg/L	1.0	6.5
Chloride	11/17/09 111709#1	EPA 300.0	mg/L	1.0	3.4
N-Nitrate	11/12/09 111209#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
N-Nitrite	11/12/09 111209#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
Sulfate	11/12/09 111209#1	EPA 300.0	mg/L	0.1	4.2
Chemical Oxygen Demand	11/16/09 111609#1	EPA 410.4	mg/L	5.00	9.24
Total Organic Carbon	11/13/09 111309#1	EPA 415.1	mg/L	1.50	3.00

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
PX19-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 11/20/09

Project: USG Puyallup
Event: 19921-64793
Date Sampled: 11/11/09
Date Received: 11/11/09

Client ID: USGPuy-P3-2-11/09
ARI ID: 09-27761 PX19F

Analyte	Date Batch	Method	Units	RL	Sample
Alkalinity	11/12/09 111209#1	SM 2320	mg/L CaCO3	1.0	92.3
Carbonate	11/12/09	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Bicarbonate	11/12/09	SM 2320	mg/L CaCO3	1.0	92.3
Hydroxide	11/12/09	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Total Suspended Solids	11/13/09 111309#1	EPA 160.2	mg/L	1.1	< 1.1 U
Chloride	11/13/09 111309#1	EPA 300.0	mg/L	1.0	5.8
N-Nitrate	11/12/09 111209#1	EPA 300.0	mg-N/L	0.1	1.9
N-Nitrite	11/12/09 111209#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
Sulfate	11/13/09 111309#1	EPA 300.0	mg/L	1.0	19.9
Chemical Oxygen Demand	11/16/09 111609#1	EPA 410.4	mg/L	5.00	7.69
Total Organic Carbon	11/13/09 111309#1	EPA 415.1	mg/L	1.50	2.41

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
PX19-CDM

ANALYTICAL
RESOURCES
INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 11/20/09

Project: USG Puyallup
Event: 19921-64793
Date Sampled: 11/11/09
Date Received: 11/11/09

Client ID: USGPuy-MW-0-11/09
ARI ID: 09-27762 PX19G

Analyte	**Date Batch**	**Method**	**Units**	**RL**	**Sample**
Alkalinity	11/12/09 111209#1	SM 2320	mg/L CaCO3	1.0	84.4
Carbonate	11/12/09	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Bicarbonate	11/12/09	SM 2320	mg/L CaCO3	1.0	84.4
Hydroxide	11/12/09	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Total Suspended Solids	11/13/09 111309#1	EPA 160.2	mg/L	1.0	< 1.0 U
Chloride	11/13/09 111309#1	EPA 300.0	mg/L	1.0	5.4
N-Nitrate	11/12/09 111209#1	EPA 300.0	mg-N/L	0.1	0.5
N-Nitrite	11/12/09 111209#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
Sulfate	11/13/09 111309#1	EPA 300.0	mg/L	1.0	15.0
Chemical Oxygen Demand	11/16/09 111609#1	EPA 410.4	mg/L	5.00	8.62
Total Organic Carbon	11/13/09 111309#1	EPA 415.1	mg/L	1.50	2.46

RL	Analytical reporting limit
U	Undetected at reported detection limit

MS/MSD RESULTS-CONVENTIONALS
PX19-CDM

**ANALYTICAL
RESOURCES
INCORPORATED**

Matrix: Water
Data Release Authorized:
Reported: 11/20/09

Project: USG Puyallup
Event: 19921-64793
Date Sampled: 11/11/09
Date Received: 11/11/09

Analyte	**Method**	**Date**	**Units**	**Sample**	**Spike**	**Spike Added**	**Recovery**
ARI ID: PX19A Client ID: USGPuy-MW2-11/09							
Total Organic Carbon	EPA 415.1	11/13/09	mg/L	3.66	25.2	20.0	107.7%
ARI ID: PX19G Client ID: USGPuy-MW-0-11/09							
Chloride	EPA 300.0	11/13/09	mg/L	5.4	24.1	20.0	93.5%
N-Nitrate	EPA 300.0	11/12/09	mg-N/L	0.5	2.4	2.0	95.0%
N-Nitrite	EPA 300.0	11/12/09	mg-N/L	< 0.1	2.0	2.0	100.0%
Sulfate	EPA 300.0	11/13/09	mg/L	15.0	35.4	20.0	102.0%

REPLICATE RESULTS-CONVENTIONALS
PX19-CDM

Matrix: Water
Data Release Authorized:
Reported: 11/20/09

Project: USG Puyallup
Event: 19921-64793
Date Sampled: 11/11/09
Date Received: 11/11/09

Analyte	Method	Date	Units	Sample	Replicate(s)	RPD/RSD
ARI ID: PX19A Client ID: USGPuy-MW2-11/09						
Total Organic Carbon	EPA 415.1	11/13/09	mg/L	3.66	3.73	1.9%
ARI ID: PX19G Client ID: USGPuy-MW-0-11/09						
Chloride	EPA 300.0	11/13/09	mg/L	5.4	5.3	1.9%
N-Nitrate	EPA 300.0	11/12/09	mg-N/L	0.5	0.5	0.0%
N-Nitrite	EPA 300.0	11/12/09	mg-N/L	< 0.1	< 0.1	NA
Sulfate	EPA 300.0	11/13/09	mg/L	15.0	15.2	1.3%

LAB CONTROL RESULTS-CONVENTIONALS
PX19-CDM

Matrix: Water
Data Release Authorized:
Reported: 11/20/09

Project: USG Puyallup
Event: 19921-64793
Date Sampled: NA
Date Received: NA

Analyte/Method	**QC ID**	**Date**	**Units**	**LCS**	**Spike Added**	**Recovery**
Total Suspended Solids EPA 160.2	ICVL	11/13/09	mg/L	49.5	50.0	99.0%

METHOD BLANK RESULTS-CONVENTIONALS
PX19-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 11/20/09

Project: USG Puyallup
Event: 19921-64793
Date Sampled: NA
Date Received: NA

Analyte	**Method**	**Date**	**Units**	**Blank**
Total Suspended Solids	EPA 160.2	11/13/09	mg/L	< 1.0 U
Chloride	EPA 300.0	11/13/09 11/17/09	mg/L	< 0.1 U < 0.1 U
N-Nitrate	EPA 300.0	11/12/09	mg-N/L	< 0.1 U
N-Nitrite	EPA 300.0	11/12/09	mg-N/L	< 0.1 U
Sulfate	EPA 300.0	11/12/09 11/13/09	mg/L	< 0.1 U < 0.1 U
Chemical Oxygen Demand	EPA 410.4	11/16/09	mg/L	< 5.00 U
Total Organic Carbon	EPA 415.1	11/13/09	mg/L	< 1.50 U

STANDARD REFERENCE RESULTS-CONVENTIONALS
PX19-CDM

Matrix: Water
Data Release Authorized:
Reported: 11/20/09

Project: USG Puyallup
Event: 19921-64793
Date Sampled: NA
Date Received: NA

Analyte/SRM ID	Method	Date	Units	SRM	True Value	Recovery
Alkalinity ERA #P114506	SM 2320	11/12/09	mg/L CaCO3	60.3	61.1	98.7%
Chloride ERA #230109	EPA 300.0	11/13/09 11/17/09	mg/L	2.8 2.8	3.0 3.0	93.3% 93.3%
N-Nitrate ERA #09127	EPA 300.0	11/12/09	mg-N/L	3.0	3.0	100.0%
N-Nitrite ERA #030309	EPA 300.0	11/12/09	mg-N/L	3.1	3.0	103.3%
Sulfate ERA #220109	EPA 300.0	11/12/09 11/13/09	mg/L	3.0 3.1	3.0 3.0	100.0% 103.3%
Chemical Oxygen Demand Thermo Orion #I01	EPA 410.4	11/16/09	mg/L	87.3	90.0	97.0%
Total Organic Carbon ERA 0506-09-01	EPA 415.1	11/13/09	mg/L	20.0	20.0	100.0%

APPLIED SPECIATION
AND CONSULTING, LLC

18804 Northcreek Parkway Bothell, WA. 98011
Tel: (425) 483-3300 Fax: (425) 483-9818
www.appliedspeciation.com

December 4, 2009

Cheronne Oreiro
Analytical Resources Inc.
4611 S. 134th Place Suite 100
Tukwila, WA 98168
(206) 695-6200

Re: USG Puyallup

Ms. Oreiro,

Attached is the report associated with twelve (12) aqueous samples submitted for arsenite and arsenate quantitation on November 11, 12, and 13, 2009. Each set of samples was received the same day as the submittal date in sealed coolers at ambient temperature, ambient temperature, and 0.1°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 Woznick

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 Puyallup

December 4, 2009

1. Sample Reception

Twelve (12) aqueous samples were submitted for arsenite and arsenate quantitation on November 11, 12, and 13, 2009. 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 ambient temperature, ambient temperature, and 0.1°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 November 18, 2009 (designated as Batch 1) or December 2, 2009 (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 two of the submitted samples during the speciation analyses. While the identities of these species cannot be determined with certainty at this time, the concentration of arsenic associated with them is estimated to be 23.9µg/L for 09-27995-PX41C and 7.4µg/L for 09-27758-PX19C. 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 Puyallup
Contact: Cheronne Oreiro

Report Date: December 4, 2009
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Sample Results

Sample ID	Date Sampled	Batch	Dilution	As(III)	As(V)
09-27644-PX07C	11/10/09	1	20	291	267
09-27645-PX07D	11/10/09	1	20	149	7.87
09-27756-PX19A	11/11/09	1	250	93.5	1310
09-27757-PX19B	11/11/09	1	100	357	296
09-27758-PX19C	11/11/09	1	100	464	47.5
09-27759-PX19D	11/11/09	1	1000	ND (<2.4)	4640
09-27760-PX19E	11/11/09	1	2	0.798	0.431
09-27761-PX19F	11/11/09	1	100	ND (<0.24)	296
09-27762-PX19G	11/11/09	1	250	477	306
09-27994-PX41B	11/12/09	2	50	1.80	0.63
09-27995-PX41C	11/12/09	2	250	1040	122
09-27997-PX41E	11/12/09	2	50	40.0	3.71

All results reflect the applied dilution and are reported in µg/L

ND = Not detected at the applied dilution

Arsenic Speciation Results for ARI
Project Name: USG Puyallup
Contact: Cheronne Oreiro

Report Date: December 4, 2009
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
As(III)	1	0.000	0.000	0.000	0.000	0.000	0.000	0.002
As(V)	1	-0.009	-0.016	-0.021	-0.025	-0.018	0.007	0.020
As(III)	2	0.000	0.000	0.000	0.000	0.000	0.000	0.010
As(V)	2	-0.001	-0.005	0.005	0.002	0.000	0.004	0.012

eMDL = Estimated Method Detection 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	10.34	103.4
As(V)	1	ICV	10.00	9.23	92.3
As(III)	2	ICV	10.00	9.95	99.5
As(V)	2	ICV	10.00	10.07	100.7

Arsenic Speciation Results for ARI
Project Name: USG Puyallup
Contact: Cheronne Oreiro

Report Date: December 4, 2009
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	09-27756-PX19A	93.49	104.8	99.17	11.4
As(V)	1	09-27756-PX19A	1314	1461	1387	10.6
As(III)	2	09-27997-PX41E	40.05	40.22	40.14	0.4
As(V)	2	09-27997-PX41E	3.71	3.85	3.78	3.7

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	09-27756-PX19A	500.0	553.9	90.9	500.0	555.8	91.3	0.3
As(V)	1	09-27756-PX19A	500.0	1902.8	103.1	500.0	1892.6	101.1	0.5
As(III)	2	09-27997-PX41E	100.0	134.1	93.9	100.0	134.8	94.7	0.5
As(V)	2	09-27997-PX41E	100.0	100.7	96.9	100.0	102.2	98.4	1.5

SUBCONTRACTOR ANALYSIS REQUEST
CUSTODY TRANSFER 11/11/09

ANALYTICAL RESOURCES INCORPORATED

ARI Project: PX07

Laboratory: Applied Speciation & Consulting
Lab Contact: Russell Gerads
Lab Address: ~~933 INDUSTRY DRIVE~~ 18804 North Creek Parkway
~~Tukwila, WA 98188~~ Bothell
Phone: 206-219-3779
Fax: 206-388-3465

ARI Client: CDM
Project ID: USG Puyallup
ARI PM: Cheronne Oreiro
Phone: 206-695-6214
Fax: 206-695-6201

Analytical Protocol: In-house
Special Instructions:

Requested Turn Around: 11/24/09
Fax 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' ID	Sampled	Matrix	Bottles	Analyses
09-[illegible]-PX07C	USGPuy-MW4S-11/09	11/10/09 [illegible]	Water	1	Metals (Sub)
Special Instructions: As Speciation IC-ICP-MS					
09-[illegible]-PX07D	USGPuy-MW4D-11/09	11/10/09 [illegible]	Water	1	Metals (Sub)
Special Instructions: As Speciation IC-ICP-MS					

	ARI	11/11/09	1050
Aften Lem	ASC	11/11/09	1050

SUBCONTRACTOR ANALYSIS REQUEST
CUSTODY TRANSFER 11/12/09

ANALYTICAL RESOURCES INCORPORATED

ARI Project: PX19

Laboratory: Applied Speciation & Consulting
Lab Contact: Russell Gerads
Lab Address: ~~953 Industry Drive~~
~~Tukwila, WA 98188~~
18804 Northcreek Parkway
Bothell, WA
Phone: 206-219-3779
Fax: 206-388-3485

ARI Client: CDM
Project ID: USG Puyallup
ARI PM: Cheronne Oreiro
Phone: 206-695-6214
Fax: 206-695-6201

Analytical Protocol: In-house
Special Instructions:

Requested Turn Around: **11/26/09**
Fax 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	Analytes
● 09-27756-PX19A	USGPuy-MW2-11/09	11/11/09 [illegible]	Water	1	Metals (Sub)
Special Instructions: As Speciation					
● 09-27757-PX19B	USGPuy-MW3-11/09	11/11/09 10:15	Water	1	Metals (Sub)
Special Instructions: As Speciation					
● 09-27758-PX19C	USGPuy-MW5-11/09	11/11/09 11:45	Water	1	Metals (Sub)
Special Instructions: As Speciation					
● 09-27759-PX19D	USGPuy-P3-1-11/09	11/11/09 12:40	Water	1	Metals (Sub)
Special Instructions: As Speciation					
● 09-27760-PX19E	USGPuy-P3-3-11/09	11/11/09 14:25	Water	1	Metals (Sub)
Special Instructions: As Speciation					
● 09-27761-PX19F	USGPuy-P3-2-11/09	11/11/09 16:00	Water	1	Metals (Sub)
Special Instructions: As Speciation					
● 09-27762-PX19G	USGPuy-MW-0-11/09	11/11/09 16:25	Water	1	Metals (Sub)
Special Instructions: As Speciation					

Carrier ______ Airbill ______ Date ______

Relinquished by	Company ARI	Date 11/12/09	Time 1035
Received by Nancy Cinnamon	Company ASC	Date 11/12/09	Time 10:38

Subcontractor Custody Form - **PX19**
Page 1 of 1

SUBCONTRACTOR ANALYSIS REQUEST
CUSTODY TRANSFER 11/13/09

ANALYTICAL RESOURCES INCORPORATED

ARI Project: PX41

Subcontractor: Applied Speciation and Consulting
Lab Contact: Russell Gerads
Lab Address: ~~954 Industry Drive~~
~~Tukwila, WA 98168~~ 18804 North Creek Parkway
Bothell WA
Phone: 206-219-3779
Fax: 206-388-3483

ARI Client: [illegible]
Project: [illegible]
ARI PM: [illegible]
Phone: [illegible]
Fax: 206-695-6201

Analytical Protocol: In-house
Special Instructions:

Requested Turn Around: **11/27/09**
Send Results to ARI: **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 successors, 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 / Ana'l ID	Sampled	Matrix	Bottles	Analyses
[illegible]	[illegible]	11/12/09 [illegible]	Water	1	Metals (Sub)
Special Instructions: [illegible]					
[illegible]	[illegible]	[illegible]	Water	[illegible]	[illegible]
Special Instructions: [illegible]					
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Special Instructions: [illegible]					

Carrier: Airbill: Date:

ARI 11/13/09 1200
ASC 11/13/09 12:22 pm

Subcontractor Custody Form - **PX41**
Page 1 of 1

Analytical Resources, Incorporated
Analytical Chemists and Consultants

December 7, 2009

Alan Carey
CDM
11811 NE 1st, Suite 201
Bellevue, WA 98009

RE: Project ID: USG Puyallup – 19921-64793
ARI Job No: PX41

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 water samples on November 12, 2009. For details regarding sample receipt, please refer to the enclosed Cooler Receipt Form.

The samples were analyzed for Total and Dissolved Metals, Arsenic Speciation, TSS, Alkalinity, TOC, COD, and Anions, as requested. Please note that sample volume for Arsenic Speciation was transferred to Applied Speciation in Bothell, WA. All data have been included in this report.

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: PX41

CDM

CHAIN-OF-CUSTODY

Date 11/12/09 Page 1 of 1

PROJECT INFORMATION

Project Manager: Al Carey

Project Name: USG Puallup

Project Number: 19921-64793

Site Location: Puallup Sampled By: JS/MF

DISPOSAL INFORMATION

☐ Lab Disposal (return if not indicated)

Disposal Method:

Disposed by: Disposal Date:

QC INFORMATION (check one)

☐ SW-846 ☐ CLP ☐ Screening ☐ CDM Std. ☐ Special

Laboratory Number:

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
USGPuy-P2-3-11/09	11/12/09	0910	Water	
USGPuy-P2-2-11/09	11/12/09	1040	Water	
USGPuy-P2-1-11/09	11/12/09	1130	Water	
USGPuy-P1-1-11/09	11/12/09	1240	Water	
USGPuy-MW1-11/09	11/12/09	1405	Water	

SAMPLE ID	PETROLEUM HYDROCARBONS						ORGANIC COMPOUNDS								PESTS/PCBs				
	TPH-HCID State:	TPH-G State:	TPH-D State:	TPH-418.1 State:	8015M Fuel Hydrocarbon	TPH Special Instructions	8010 Halogenated VOCs	8020 Aromatic VOCs	8020M - BETX only	8240 GC/MS Volatiles	8270 GC/MS Semivolatiles	8310 PAHs	8040 Phenols	DWS - Volatiles and Semivolatiles	8080 OC Pest/PCBs	8080M PCBs only	8140 OP Pesticides	8150 OC Herbicides	DWS - Herb/Pest (Ca, Fe, Mg, K, Na)
USGPuy-P2-3-11/09																			
USGPuy-P2-2-11/09																			
USGPuy-P2-1-11/09																			
USGPuy-P1-1-11/09																			
USGPuy-MW1-11/09																			

SAMPLE ID	METALS						LEACHING TESTS				OTHER					
	~~Selected Metals: list~~ Total Metals	~~Organic Lead (Ga)~~ As Speciation	~~TCL Metals (23)~~ Dissolved As	~~Priority Poll. Metals (13)~~ Total As	~~DWS - Metals~~ Dissolved Fe	MFSP - Metals (Wa)	TCLP - Volatiles (ZHE)	TCLP - Semivolatiles	TCLP - Pesticides	TCLP - Metals	TSS SM2540D	Alkalinity 301.1 CO3/HCO3	TOC 415.2	COD 410.4	Cl/NO3/NO4/SO4	NUMBER OF CONTAINERS
USGPuy-P2-3-11/09	X		X		X						X	X	X	X	X	
USGPuy-P2-2-11/09	X	X	X	X	X						X	X	X	X	X	
USGPuy-P2-1-11/09	X	X	X		X						X	X	X	X	X	
USGPuy-P1-1-11/09	X		X		X						X	X	X	X	X	
USGPuy-MW1-11/09	X	X	X		X						X	X	X	X	X	

LAB INFORMATION

Lab Name: ARI

Lab Address: 4611 S 134th Pl Ste. 100
Tukwila, WA 98168

Via: hand delivered

SAMPLE RECEIPT

Total Number of Containers:

Chain-of-Custody Seals: Y/N/NA

Intact?: Y/N/NA

Received in Good Condition/Cold:

Turn Around Time: ☒ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions: Dissolved As not field filtered

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Jennifer Smith Time: 1715	Signature: Time:	Signature: Time:
Printed Name: Jennifer Smith Date: 11/12/09	Printed Name: Date:	Printed Name: Date:
Company: CDM	Company:	Company:

RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: 3.
Signature: Time: 1715	Signature: Time:	Signature: Time:
Printed Name: C. OREIRO Date: 11/12/09	Printed Name: Date:	Printed Name: Date:
Company: ARI	Company:	Company:

CDM OFFICES: Bellevue: (206) 453-8383
Portland: (503) 232-1800

rev. 2/02

DISTRIBUTION: White, Canary to Analytical Laboratory; Pink to CDM Project Files; Gold to CDM Disposal Files

forms\field\chain of custody.p65

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: CDM

COC No(s): ______ [✓ NA]

Assigned ARI Job No: PX41

Project Name: USG Puyallup

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)........ 2.5 1.9 ____ ____ ____ ____

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

Temp Gun ID#: 90877952

Cooler Accepted by: DO Date: 11/12/09 Time: 1715

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

Samples Logged by: MM Date: 11/13/09 Time: 806

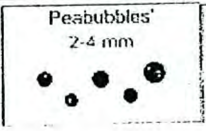
***** Notify Project Manager of discrepancies or concerns *****

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


Peabubbles'


LARGE Air Bubbles

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

PRESERVATION VERIFICATION 11/13/09
Page 1 of 1

ANALYTICAL RESOURCES INCORPORATED

ARI Job No: **PX41**

PC: Cheronne
VTSR: 11/12/09

Inquiry Number: NONE
Analysis Requested: 11/13/09
Contact: Carey, Alan
Client: CDM
Logged by: MM
Sample Set Used: Yes-498
Validatable Package: No
Deliverables:

Project #: 19921-64793
Project: USG Puyallup
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
09-27993 **PX41A**	USGPuy-P2-3-11/09				Pass		DIS Fail					Pass				N						
09-27994 **PX41B**	USGPuy-P2-2-11/09				↓		DIS					↓				N						
09-27995 **PX41C**	USGPuy-P2-1-11/09				↓		DIS					↓				N						
09-27996 **PX41D**	USGPuy-P1-1-11/09				↓		DIS					↓				N						
09-27997 **PX41E**	USGPuy-MW1-11/09				↓		DIS					↓				N						
09-27998 **PX41F**	USGPuy-P2-3-11/09						TOT Pass															
09-27999 **PX41G**	USGPuy-P2-2-11/09						TOT															
09-28000 **PX41H**	USGPuy-P2-1-11/09						TOT															
09-28001 **PX41I**	USGPuy-P1-1-11/09						TOT															
09-28002 **PX41J**	USGPuy-MW1-11/09						TOT															

Checked By MM Date 11/13/09

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGPuy-P2-3-11/09
SAMPLE

Lab Sample ID: PX41A
LIMS ID: 09-27993
Matrix: Water
Data Release Authorized:
Reported: 11/19/09

QC Report No: PX41-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/12/09
Date Received: 11/12/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
7000A	11/13/09	7060A	11/18/09	7440-38-2	Arsenic	0.002	0.002	U
6010B	11/13/09	6010B	11/17/09	**7439-89-6**	**Iron**	0.05	**5.86**	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGPuy-P2-2-11/09
SAMPLE

Lab Sample ID: PX41B
LIMS ID: 09-27994
Matrix: Water
Data Release Authorized
Reported: 11/19/09

QC Report No: PX41-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/12/09
Date Received: 11/12/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
7000A	11/13/09	7060A	11/18/09	7440-38-2	Arsenic	0.002	0.002	U
6010B	11/13/09	6010B	11/17/09	**7439-89-6**	**Iron**	0.05	**9.54**	

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGPuy-P2-1-11/09
SAMPLE

Lab Sample ID: PX41C
LIMS ID: 09-27995
Matrix: Water
Data Release Authorized:
Reported: 11/19/09

QC Report No: PX41-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/12/09
Date Received: 11/12/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
7000A	11/13/09	7060A	11/18/09	**7440-38-2**	**Arsenic**	0.05	**0.90**	
6010B	11/13/09	6010B	11/17/09	**7439-89-6**	**Iron**	0.05	**26.2**	

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGPuy-P1-1-11/09
SAMPLE

Lab Sample ID: PX41D
LIMS ID: 09-27996
Matrix: Water
Data Release Authorized:
Reported: 11/19/09

QC Report No: PX41-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/12/09
Date Received: 11/12/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
7000A	11/13/09	7060A	11/18/09	**7440-38-2**	**Arsenic**	0.001	**0.002**	
6010B	11/13/09	6010B	11/17/09	**7439-89-6**	**Iron**	0.05	**17.0**	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGPuy-MW1-11/09
SAMPLE

Lab Sample ID: PX41E
LIMS ID: 09-27997
Matrix: Water
Data Release Authorized:
Reported: 11/19/09

QC Report No: PX41-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/12/09
Date Received: 11/12/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
7000A	11/13/09	7060A	11/18/09	**7440-38-2**	**Arsenic**	0.005	**0.044**	
6010B	11/13/09	6010B	11/17/09	**7439-89-6**	**Iron**	0.05	**0.76**	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: USGPuy-P2-3-11/09
MATRIX SPIKE

Lab Sample ID: PX41A
LIMS ID: 09-27993
Matrix: Water
Data Release Authorized:
Reported: 11/19/09

QC Report No: PX41-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/12/09
Date Received: 11/12/09

MATRIX SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Spike	Spike Added	% Recovery	Q
Arsenic	7060A	0.002 U	0.046	0.040	115%	
Iron	6010B	5.86	7.66	2.00	90.0%	

Reported in mg/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
Page 1 of 1

Sample ID: USGPuy-P2-3-11/09
DUPLICATE

Lab Sample ID: PX41A
LIMS ID: 09-27993
Matrix: Water
Data Release Authorized:
Reported: 11/19/09

QC Report No: PX41-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/12/09
Date Received: 11/12/09

MATRIX DUPLICATE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Duplicate	RPD	Control Limit	Q
Arsenic	7060A	0.002 U	0.002 U	0.0%	+/- 0.002	L
Iron	6010B	5.86	5.79	1.2%	+/- 20%	

Reported in mg/L

*-Control Limit Not Met
L-RPD Invalid, Limit = Detection Limit

ANALYTICAL
RESOURCES
INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: LAB CONTROL

Lab Sample ID: PX41LCS
LIMS ID: 09-27994
Matrix: Water
Data Release Authorized:
Reported: 11/19/09

QC Report No: PX41-CDM
Project: USG Puyallup
19921-64793
Date Sampled: NA
Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Arsenic	7060A	0.021	0.020	105%	
Iron	6010B	2.07	2.00	104%	

Reported in mg/L

N-Control limit not met
Control Limits: 80-120%

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS

Page 1 of 1

Sample ID: METHOD BLANK

Lab Sample ID: PX41MB
LIMS ID: 09-27994
Matrix: Water
Data Release Authorized:
Reported: 11/19/09

QC Report No: PX41-CDM
Project: USG Puyallup
19921-64793
Date Sampled: NA
Date Received: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
7000A	11/13/09	7060A	11/18/09	7440-38-2	Arsenic	0.001	0.001	U
6010B	11/13/09	6010B	11/17/09	7439-89-6	Iron	0.05	0.05	U

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-P2-3-11/09
SAMPLE

Lab Sample ID: PX41F
LIMS ID: 09-27998
Matrix: Water
Data Release Authorized:
Reported: 11/19/09

QC Report No: PX41-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/12/09
Date Received: 11/12/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
3010A	11/13/09	6010B	11/17/09	7440-70-2	Calcium	0.05	25.7	
3010A	11/13/09	6010B	11/17/09	7439-89-6	Iron	0.05	15.6	
3010A	11/13/09	6010B	11/17/09	7439-95-4	Magnesium	0.05	9.60	
3010A	11/13/09	6010B	11/17/09	7440-09-7	Potassium	0.5	4.1	
3010A	11/13/09	6010B	11/17/09	7440-23-5	Sodium	0.5	15.5	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-P2-2-11/09
SAMPLE

Lab Sample ID: PX41G
LIMS ID: 09-27999
Matrix: Water
Data Release Authorized:
Reported: 11/19/09

QC Report No: PX41-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/12/09
Date Received: 11/12/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
7060A	11/13/09	7060A	11/18/09	7440-38-2	Arsenic	0.001	0.004	
3010A	11/13/09	6010B	11/17/09	7440-70-2	Calcium	0.05	22.1	
3010A	11/13/09	6010B	11/17/09	7439-89-6	Iron	0.05	18.4	
3010A	11/13/09	6010B	11/17/09	7439-95-4	Magnesium	0.05	10.6	
3010A	11/13/09	6010B	11/17/09	7440-09-7	Potassium	0.5	3.6	
3010A	11/13/09	6010B	11/17/09	7440-23-5	Sodium	0.5	14.5	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-P2-1-11/09
SAMPLE

Lab Sample ID: PX41H
LIMS ID: 09-28000
Matrix: Water
Data Release Authorized:
Reported: 11/19/09

QC Report No: PX41-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/12/09
Date Received: 11/12/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
3010A	11/13/09	6010B	11/17/09	7440-70-2	Calcium	0.05	30.7	
3010A	11/13/09	6010B	11/17/09	7439-89-6	Iron	0.05	35.8	
3010A	11/13/09	6010B	11/17/09	7439-95-4	Magnesium	0.05	7.83	
3010A	11/13/09	6010B	11/17/09	7440-09-7	Potassium	0.5	4.3	
3010A	11/13/09	6010B	11/17/09	7440-23-5	Sodium	0.5	10.5	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-P1-1-11/09
SAMPLE

Lab Sample ID: PX41I
LIMS ID: 09-28001
Matrix: Water
Data Release Authorized:
Reported: 11/19/09

QC Report No: PX41-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/12/09
Date Received: 11/12/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
3010A	11/13/09	6010B	11/17/09	7440-70-2	Calcium	0.05	27.2	
3010A	11/13/09	6010B	11/17/09	7439-89-6	Iron	0.05	16.5	
3010A	11/13/09	6010B	11/17/09	7439-95-4	Magnesium	0.05	9.65	
3010A	11/13/09	6010B	11/17/09	7440-09-7	Potassium	0.5	3.3	
3010A	11/13/09	6010B	11/17/09	7440-23-5	Sodium	0.5	11.3	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-MW1-11/09
SAMPLE

Lab Sample ID: PX41J
LIMS ID: 09-28002
Matrix: Water
Data Release Authorized:
Reported: 11/19/09

QC Report No: PX41-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/12/09
Date Received: 11/12/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
3010A	11/13/09	6010B	11/17/09	**7440-70-2**	**Calcium**	0.05	**15.1**	
3010A	11/13/09	6010B	11/17/09	**7439-89-6**	**Iron**	0.05	**0.91**	
3010A	11/13/09	6010B	11/17/09	**7439-95-4**	**Magnesium**	0.05	**6.67**	
3010A	11/13/09	6010B	11/17/09	**7440-09-7**	**Potassium**	0.5	**2.2**	
3010A	11/13/09	6010B	11/17/09	**7440-23-5**	**Sodium**	0.5	**13.0**	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-P2-2-11/09
MATRIX SPIKE

Lab Sample ID: PX41G
LIMS ID: 09-27999
Matrix: Water
Data Release Authorized:
Reported: 11/19/09

QC Report No: PX41-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/12/09
Date Received: 11/12/09

MATRIX SPIKE QUALITY CONTROL REPORT

Analyte	**Analysis Method**	**Sample**	**Spike**	**Spike Added**	**% Recovery**	**Q**
Arsenic	7060A	0.004	0.109	0.100	105%	
Calcium	6010B	22.1	32.7	10.0	106%	
Iron	6010B	18.4	20.9	2.00	125%	H
Magnesium	6010B	10.6	20.5	10.0	99.0%	
Potassium	6010B	3.6	13.7	10.0	101%	
Sodium	6010B	14.5	24.9	10.0	104%	

Reported in mg/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%

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPuy-P2-2-11/09
DUPLICATE

Lab Sample ID: PX41G
LIMS ID: 09-27999
Matrix: Water
Data Release Authorized:
Reported: 11/19/09

QC Report No: PX41-CDM
Project: USG Puyallup
19921-64793
Date Sampled: 11/12/09
Date Received: 11/12/09

MATRIX DUPLICATE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Duplicate	RPD	Control Limit	Q
Arsenic	7060A	0.004	0.004	0.0%	+/- 0.001	L
Calcium	6010B	22.1	21.6	2.3%	+/- 20%	
Iron	6010B	18.4	18.1	1.6%	+/- 20%	
Magnesium	6010B	10.6	10.4	1.9%	+/- 20%	
Potassium	6010B	3.6	3.5	2.8%	+/- 20%	
Sodium	6010B	14.5	14.2	2.1%	+/- 20%	

Reported in mg/L

*-Control Limit Not Met
L-RPD Invalid, Limit = Detection Limit

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: LAB CONTROL

Lab Sample ID: PX41LCS
LIMS ID: 09-27999
Matrix: Water
Data Release Authorized:
Reported: 11/19/09

QC Report No: PX41-CDM
Project: USG Puyallup
19921-64793
Date Sampled: NA
Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Arsenic	7060A	0.099	0.100	99.0%	
Calcium	6010B	9.56	10.0	95.6%	
Iron	6010B	2.01	2.00	100%	
Magnesium	6010B	9.76	10.0	97.6%	
Potassium	6010B	10.0	10.0	100%	
Sodium	6010B	9.6	10.0	96.0%	

Reported in mg/L

N-Control limit not met
Control Limits: 80-120%

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: METHOD BLANK

Lab Sample ID: PX41MB
LIMS ID: 09-27999
Matrix: Water
Data Release Authorized:
Reported: 11/19/09

QC Report No: PX41-CDM
Project: USG Puyallup
19921-64793
Date Sampled: NA
Date Received: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
7060A	11/13/09	7060A	11/18/09	7440-38-2	Arsenic	0.001	0.001	U
3010A	11/13/09	6010B	11/17/09	7440-70-2	Calcium	0.05	0.05	U
3010A	11/13/09	6010B	11/17/09	7439-89-6	Iron	0.05	0.05	U
3010A	11/13/09	6010B	11/17/09	7439-95-4	Magnesium	0.05	0.05	U
3010A	11/13/09	6010B	11/17/09	7440-09-7	Potassium	0.5	0.5	U
3010A	11/13/09	6010B	11/17/09	7440-23-5	Sodium	0.5	0.5	U

U-Analyte undetected at given RL
RL-Reporting Limit

SAMPLE RESULTS-CONVENTIONALS
PX41-CDM

Matrix: Water
Data Release Authorized:
Reported: 11/20/09

Project: USG Puyallup
Event: 19921-64793
Date Sampled: 11/12/09
Date Received: 11/12/09

Client ID: USGPuy-P2-3-11/09
ARI ID: 09-27993 PX41A

Analyte	**Date Batch**	**Method**	**Units**	**RL**	**Sample**
Alkalinity	11/13/09 111309#1	SM 2320	mg/L CaCO3	1.0	170
Carbonate	11/13/09	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Bicarbonate	11/13/09	SM 2320	mg/L CaCO3	1.0	170
Hydroxide	11/13/09	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Total Suspended Solids	11/13/09 111309#1	EPA 160.2	mg/L	2.8	42.2
Chloride	11/17/09 111709#1	EPA 300.0	mg/L	1.0	5.3
N-Nitrate	11/12/09 111209#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
N-Nitrite	11/12/09 111209#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
Sulfate	11/12/09 111209#1	EPA 300.0	mg/L	0.1	0.1
Chemical Oxygen Demand	11/16/09 111609#1	EPA 410.4	mg/L	5.00	10.8
Total Organic Carbon	11/16/09 111609#1	EPA 415.1	mg/L	1.50	5.46

RL	Analytical reporting limit
U	Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
PX41-CDM

Matrix: Water
Data Release Authorized:
Reported: 11/20/09

Project: USG Puyallup
Event: 19921-64793
Date Sampled: 11/12/09
Date Received: 11/12/09

Client ID: USGPuy-P2-2-11/09
ARI ID: 09-27994 PX41B

Analyte	**Date Batch**	**Method**	**Units**	**RL**	**Sample**
Alkalinity	11/13/09 111309#1	SM 2320	mg/L CaCO3	1.0	167
Carbonate	11/13/09	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Bicarbonate	11/13/09	SM 2320	mg/L CaCO3	1.0	167
Hydroxide	11/13/09	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Total Suspended Solids	11/13/09 111309#1	EPA 160.2	mg/L	2.5	29.0
Chloride	11/17/09 111709#1	EPA 300.0	mg/L	1.0	4.9
N-Nitrate	11/12/09 111209#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
N-Nitrite	11/12/09 111209#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
Sulfate	11/12/09 111209#1	EPA 300.0	mg/L	0.1	< 0.1 U
Chemical Oxygen Demand	11/16/09 111609#1	EPA 410.4	mg/L	5.00	17.3
Total Organic Carbon	11/16/09 111609#1	EPA 415.1	mg/L	1.50	5.48

RL	Analytical reporting limit
U	Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
PX41-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 11/20/09

Project: USG Puyallup
Event: 19921-64793
Date Sampled: 11/12/09
Date Received: 11/12/09

Client ID: USGPuy-P2-1-11/09
ARI ID: 09-27995 PX41C

Analyte	Date Batch	Method	Units	RL	Sample
Alkalinity	11/13/09 111309#1	SM 2320	mg/L CaCO3	1.0	198
Carbonate	11/13/09	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Bicarbonate	11/13/09	SM 2320	mg/L CaCO3	1.0	198
Hydroxide	11/13/09	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Total Suspended Solids	11/13/09 111309#1	EPA 160.2	mg/L	1.1	7.4
Chloride	11/17/09 111709#1	EPA 300.0	mg/L	1.0	4.8
N-Nitrate	11/12/09 111209#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
N-Nitrite	11/12/09 111209#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
Sulfate	11/12/09 111209#1	EPA 300.0	mg/L	0.1	0.5
Chemical Oxygen Demand	11/16/09 111609#1	EPA 410.4	mg/L	5.00	24.4
Total Organic Carbon	11/16/09 111609#1	EPA 415.1	mg/L	1.50	8.07

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
PX41-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 11/20/09

Project: USG Puyallup
Event: 19921-64793
Date Sampled: 11/12/09
Date Received: 11/12/09

Client ID: USGPuy-P1-1-11/09
ARI ID: 09-27996 PX41D

Analyte	Date Batch	Method	Units	RL	Sample
Alkalinity	11/13/09 111309#1	SM 2320	mg/L CaCO3	1.0	182
Carbonate	11/13/09	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Bicarbonate	11/13/09	SM 2320	mg/L CaCO3	1.0	182
Hydroxide	11/13/09	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Total Suspended Solids	11/13/09 111309#1	EPA 160.2	mg/L	1.0	2.7
Chloride	11/17/09 111709#1	EPA 300.0	mg/L	1.0	8.0
N-Nitrate	11/12/09 111209#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
N-Nitrite	11/12/09 111209#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
Sulfate	11/12/09 111209#1	EPA 300.0	mg/L	0.1	3.2
Chemical Oxygen Demand	11/16/09 111609#1	EPA 410.4	mg/L	5.00	14.5
Total Organic Carbon	11/16/09 111609#1	EPA 415.1	mg/L	1.50	4.35

RL	Analytical reporting limit
U	Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
PX41-CDM

Matrix: Water
Data Release Authorized:
Reported: 11/20/09

Project: USG Puyallup
Event: 19921-64793
Date Sampled: 11/12/09
Date Received: 11/12/09

Client ID: USGPuy-MW1-11/09
ARI ID: 09-27997 PX41E

Analyte	**Date Batch**	**Method**	**Units**	**RL**	**Sample**
Alkalinity	11/13/09 111309#1	SM 2320	mg/L CaCO3	1.0	85.8
Carbonate	11/13/09	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Bicarbonate	11/13/09	SM 2320	mg/L CaCO3	1.0	85.8
Hydroxide	11/13/09	SM 2320	mg/L CaCO3	1.0	< 1.0 U
Total Suspended Solids	11/13/09 111309#1	EPA 160.2	mg/L	1.0	3.0
Chloride	11/17/09 111709#1	EPA 300.0	mg/L	1.0	3.4
N-Nitrate	11/12/09 111209#1	EPA 300.0	mg-N/L	0.1	0.1
N-Nitrite	11/12/09 111209#1	EPA 300.0	mg-N/L	0.1	< 0.1 U
Sulfate	11/13/09 111309#1	EPA 300.0	mg/L	1.0	20.7
Chemical Oxygen Demand	11/16/09 111609#1	EPA 410.4	mg/L	5.00	8.31
Total Organic Carbon	11/16/09 111609#1	EPA 415.1	mg/L	1.50	2.26

RL	Analytical reporting limit
U	Undetected at reported detection limit

MS/MSD RESULTS-CONVENTIONALS
PX41-CDM

Matrix: Water
Data Release Authorized:
Reported: 11/20/09

Project: USG Puyallup
Event: 19921-64793
Date Sampled: 11/12/09
Date Received: 11/12/09

Analyte	**Method**	**Date**	**Units**	**Sample**	**Spike**	**Spike Added**	**Recovery**
ARI ID: PX41A Client ID: USGPuy-P2-3-11/09							
Total Organic Carbon	EPA 415.1	11/16/09	mg/L	5.46	24.9	20.0	97.2%
ARI ID: PX41E Client ID: USGPuy-MW1-11/09							
Chloride	EPA 300.0	11/17/09	mg/L	3.4	20.9	20.0	87.5%
N-Nitrate	EPA 300.0	11/12/09	mg-N/L	0.1	2.0	2.0	95.0%
N-Nitrite	EPA 300.0	11/12/09	mg-N/L	< 0.1	2.0	2.0	100.0%
Sulfate	EPA 300.0	11/13/09	mg/L	20.7	40.1	20.0	97.0%

REPLICATE RESULTS-CONVENTIONALS
PX41-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 11/20/09

Project: USG Puyallup
Event: 19921-64793
Date Sampled: 11/12/09
Date Received: 11/12/09

Analyte	**Method**	**Date**	**Units**	**Sample**	**Replicate(s)**	**RPD/RSD**
ARI ID: PX41A Client ID: USGPuy-P2-3-11/09						
Alkalinity	SM 2320	11/13/09	mg/L CaCO3	170	170	0.0%
Carbonate	SM 2320	11/13/09	mg/L CaCO3	< 1.0	< 1.0	NA
Bicarbonate	SM 2320	11/13/09	mg/L CaCO3	170	170	0.0%
Hydroxide	SM 2320	11/13/09	mg/L CaCO3	< 1.0	< 1.0	NA
Total Organic Carbon	EPA 415.1	11/16/09	mg/L	5.46	5.48	0.4%
ARI ID: PX41E Client ID: USGPuy-MW1-11/09						
Chloride	EPA 300.0	11/17/09	mg/L	3.4	3.3	3.0%
N-Nitrate	EPA 300.0	11/12/09	mg-N/L	0.1	0.1	0.0%
N-Nitrite	EPA 300.0	11/12/09	mg-N/L	< 0.1	< 0.1	NA
Sulfate	EPA 300.0	11/13/09	mg/L	20.7	20.5	1.0%

LAB CONTROL RESULTS-CONVENTIONALS
PX41-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 11/20/09

Project: USG Puyallup
Event: 19921-64793
Date Sampled: NA
Date Received: NA

Analyte/Method	**QC ID**	**Date**	**Units**	**LCS**	**Spike Added**	**Recovery**
Total Suspended Solids EPA 160.2	ICVL	11/13/09	mg/L	49.5	50.0	99.0%

METHOD BLANK RESULTS-CONVENTIONALS
PX41-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 11/20/09

Project: USG Puyallup
Event: 19921-64793
Date Sampled: NA
Date Received: NA

Analyte	Method	Date	Units	Blank
Total Suspended Solids	EPA 160.2	11/13/09	mg/L	< 1.0 U
Chloride	EPA 300.0	11/17/09	mg/L	< 0.1 U
N-Nitrate	EPA 300.0	11/12/09	mg-N/L	< 0.1 U
N-Nitrite	EPA 300.0	11/12/09	mg-N/L	< 0.1 U
Sulfate	EPA 300.0	11/12/09 11/13/09	mg/L	< 0.1 U < 0.1 U
Chemical Oxygen Demand	EPA 410.4	11/16/09	mg/L	< 5.00 U
Total Organic Carbon	EPA 415.1	11/16/09	mg/L	< 1.50 U

STANDARD REFERENCE RESULTS-CONVENTIONALS
PX41-CDM

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 11/20/09

Project: USG Puyallup
Event: 19921-64793
Date Sampled: NA
Date Received: NA

Analyte/SRM ID	Method	Date	Units	SRM	True Value	Recovery
Alkalinity ERA #P114506	SM 2320	11/13/09	mg/L CaCO3	59.8	61.1	97.9%
Chloride ERA #230109	EPA 300.0	11/17/09	mg/L	2.8	3.0	93.3%
N-Nitrate ERA #09127	EPA 300.0	11/12/09	mg-N/L	3.0	3.0	100.0%
N-Nitrite ERA #030309	EPA 300.0	11/12/09	mg-N/L	3.1	3.0	103.3%
Sulfate ERA #220109	EPA 300.0	11/12/09 11/13/09	mg/L	3.0 3.1	3.0 3.0	100.0% 103.3%
Chemical Oxygen Demand Thermo Orion #I01	EPA 410.4	11/16/09	mg/L	87.3	90.0	97.0%
Total Organic Carbon ERA 0506-09-01	EPA 415.1	11/16/09	mg/L	20.6	20.0	103.0%

APPLIED SPECIATION
AND CONSULTING, LLC

18804 Northcreek Parkway Bothell, WA, 98011
Tel: (425) 483-3100 Fax: (425) 483-9818
www.appliedspeciation.com

December 4, 2009

Cheronne Oreiro
Analytical Resources Inc.
4611 S. 134th Place Suite 100
Tukwila, WA 98168
(206) 695-6200

Re: USG Puyallup

Ms. Oreiro,

Attached is the report associated with twelve (12) aqueous samples submitted for arsenite and arsenate quantitation on November 11, 12, and 13, 2009. Each set of samples was received the same day as the submittal date in sealed coolers at ambient temperature, ambient temperature, and 0.1°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 Puyallup

December 4, 2009

1. Sample Reception

Twelve (12) aqueous samples were submitted for arsenite and arsenate quantitation on November 11, 12, and 13, 2009. 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 ambient temperature, ambient temperature, and 0.1°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 November 18, 2009 (designated as Batch 1) or December 2, 2009 (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 two of the submitted samples during the speciation analyses. While the identities of these species cannot be determined with certainty at this time, the concentration of arsenic associated with them is estimated to be 23.9µg/L for 09-27995-PX41C and 7.4µg/L for 09-27758-PX19C. 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 Puyallup
Contact: Cheronne Oreiro

Report Date: December 4, 2009
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Sample Results

Sample ID	Date Sampled	Batch	Dilution	As(III)	As(V)
09-27644-PX07C	11/10/09	1	20	291	267
09-27645-PX07D	11/10/09	1	20	149	7.87
09-27756-PX19A	11/11/09	1	250	93.5	1310
09-27757-PX19B	11/11/09	1	100	357	296
09-27758-PX19C	11/11/09	1	100	464	47.5
09-27759-PX19D	11/11/09	1	1000	ND (<2.4)	4640
09-27760-PX19E	11/11/09	1	2	0.798	0.431
09-27761-PX19F	11/11/09	1	100	ND (<0.24)	296
09-27762-PX19G	11/11/09	1	250	477	306
09-27994-PX41B	11/12/09	2	50	1.80	0.63
09-27995-PX41C	11/12/09	2	250	1040	122
09-27997-PX41E	11/12/09	2	50	40.0	3.71

All results reflect the applied dilution and are reported in µg/L
ND = Not detected at the applied dilution

Arsenic Speciation Results for ARI
Project Name: USG Puyallup
Contact: Cheronne Oreiro

Report Date: December 4, 2009
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
As(III)	1	0.000	0.000	0.000	0.000	0.000	0.000	0.002
As(V)	1	-0.009	-0.016	-0.021	-0.025	-0.018	0.007	0.020
As(III)	2	0.000	0.000	0.000	0.000	0.000	0.000	0.010
As(V)	2	-0.001	-0.005	0.005	0.002	0.000	0.004	0.012

eMDL = Estimated Method Detection 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	10.34	103.4
As(V)	1	ICV	10.00	9.23	92.3
As(III)	2	ICV	10.00	9.95	99.5
As(V)	2	ICV	10.00	10.07	100.7

Arsenic Speciation Results for ARI
Project Name: USG Puyallup
Contact: Cheronne Oreiro

Report Date: December 4, 2009
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	09-27756-PX19A	93.49	104.8	99.17	11.4
As(V)	1	09-27756-PX19A	1314	1461	1387	10.6
As(III)	2	09-27997-PX41E	40.05	40.22	40.14	0.4
As(V)	2	09-27997-PX41E	3.71	3.85	3.78	3.7

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	09-27756-PX19A	500.0	553.9	90.9	500.0	555.8	91.3	0.3
As(V)	1	09-27756-PX19A	500.0	1902.8	103.1	500.0	1892.6	101.1	0.5
As(III)	2	09-27997-PX41E	100.0	134.1	93.9	100.0	134.8	94.7	0.5
As(V)	2	09-27997-PX41E	100.0	100.7	96.9	100.0	102.2	98.4	1.5

SUBCONTRACTOR ANALYSIS REQUEST
CUSTODY TRANSFER 11/11/09

ANALYTICAL RESOURCES INCORPORATED

ARI Project: PX07

Laboratory: Applied Speciation & Consulting
Lab Contact: Russell Gerads
Lab Address: ~~433 INDUSTRY DRIVE~~ 18804 No. Creek Parkway
~~Tukwila, WA 98188~~ Bothell
Phone: 206-219-3779
Fax: 206-388-3465

ARI Client: CDM
Project ID: USG Puyallup
ARI PM: Cheronne Oreiro
Phone: 206-695-6214
Fax: 206-695-6201

Analytical Protocol: In-house
Special Instructions:

Requested Turn Around: 11/24/09
Fax 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/ ARI ID	Sampled	Matrix	Bottles	Analyses
● 09-17844-PX07C	USGPuy-MW4S-11/09	11/10/09 [illegible]	Water	1	Metals (Sub)
Special Instructions: As Speciation II ICP-MS					
● 09-17841-PX07D	USGPuy-MW4D-11/09	11/10/09 [illegible]	Water	1	Metals (Sub)
Special Instructions: As Speciation II ICP-MS					

R	ARI	11/11/09	1050
Afm Lem	ASC	11/11/09	1050

Subcontractor Custody Form - **PX07**
Page 1 of 1

SUBCONTRACTOR ANALYSIS REQUEST
CUSTODY TRANSFER 11/12/09

ANALYTICAL RESOURCES INCORPORATED

ARI Project: PX19

Laboratory: Applied Speciation & Consulting
Lab Contact: Russell Gerads
Lab Address: ~~953 Industry Drive~~
~~Tukwila, WA 98188~~
18804 North Creek Parkway
Bothell, WA
Phone: 206-219-3779
Fax: 206-388-3465

ARI Client: CDM
Project ID: USG Puyallup
ARI PM: Cheronne Oreiro
Phone: 206-695-6214
Fax: 206-695-6201

Analytical Protocol: In-house
Special Instructions:

Requested Turn Around: **11/26/09**
Fax 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	Analytes
● 09-27756-PX19A	USGPuy-MW2-11/09	11/11/09 [illegible]	Water	1	Metals (Sub)
Special Instructions: As Speciation					
● 09-27757-PX19B	USGPuy-MW3-11/09	11/11/09 10:15	Water	1	Metals (Sub)
Special Instructions: As Speciation					
● 09-27758-PX19C	USGPuy-MW5-11/09	11/11/09 11:15	Water	1	Metals (Sub)
Special Instructions: As Speciation					
● 09-27759-PX19D	USGPuy-B3-1-11/09	11/11/09 12:40	Water	1	Metals (Sub)
Special Instructions: As Speciation					
● 09-27760-PX19E	USGPuy-B3-3-11/09	11/11/09 14:25	Water	1	Metals (Sub)
Special Instructions: As Speciation					
● 09-27761-PX19F	USGPuy-B3-2-11/09	11/11/09 16:00	Water	1	Metals (Sub)
Special Instructions: As Speciation					
● 09-27762-PX19G	USGPuy-MW-0-11/09	11/11/09 16:25	Water	1	Metals (Sub)
Special Instructions: As Speciation					

Carrier ______ Airbill ______ Date ______

Relinquished by: ______ Company: ARI Date: 11/12/09 Time: 1035

Received by: Nancy Cuisinier Company: ASC Date: 11/12/09 Time: 10:38

Subcontractor Custody Form - **PX19**
Page 1 of 1

SUBCONTRACTOR ANALYSIS REQUEST

CUSTODY TRANSFER 11/13/09

ANALYTICAL RESOURCES INCORPORATED

ARI Project: PX41

Subcontractor: Applied Speciation & Consulting
Lab Contact: Russell Gerads
Lab Address: ~~954 Industry Drive~~
~~Tukwila, WA 98188~~ 18804 Northcreek Parkway Bothell WA.
Phone: 206-219-3779
Fax: 206-[illegible]-3489

ARI Client: [illegible]
Project ID: [illegible]
ARI PM: [illegible]
Phone: [illegible]
Fax: 206-695-6201

Analytical Protocol: In-house
Special Instructions:

Requested Date Results Due: 11/27/09
[illegible]: **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 successors, 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 / Acc't ID	Sampled	Matrix	Bottles	Analyses
[illegible] PX41B	[illegible]	11/12/09 [illegible]:40	Water	1	Metals (Sub)
Special Instructions: As Speciation					
[illegible] PX41C	[illegible]	[illegible]	Water	1	Metals (Sub)
Special Instructions: As Speciation					
[illegible] PX41D	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] (Sub)
Special Instructions: As Speciation					

Relinquished | Received | Date

Company: ARI | Date: 11/13/09 | Time: 1200
Company: ASC | Date: 11/13/09 | Time: 12:22 pm

Subcontractor Custody Form - **PX41**
Page 1 of 1

Analytical Resources, Incorporated
Analytical Chemists and Consultants

November 30, 2009

Howard Young
CDM
11811 NE 1st, Suite 201
Bellevue, WA 98009

RE: Project ID: USG Puyallup – 19921-64793
ARI Job No: PX43

Dear Mr. Young:

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 four soil samples on November 12, 2009. 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 duplicate RPD of arsenic was outside the control limit high for sample **USGPUY-SED4-2.5-11/09**. All other quality control parameters were met for arsenic. No corrective action was required.

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: PX43

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number:
Turn-around Requested: STANDARD
Page: 1 of 1

ARI Client Company: CDM
Phone: 425-453-8~~3~~383
Date: 11/12/09
Ice Present?

Client Contact: HOWARD YOUNG
No. of Coolers:
Cooler Temps:

Client Project Name: USG PUYUALLUP REMEDIAL INVESTIGATION

Client Project #: 19921-64793
Samplers: HOWARD YOUNG

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

					Analysis Requested								Notes/Comments
Sample ID	Date	Time	Matrix	No. Containers	TOTAL ARSENIC (EPA 6010)								
USGPUY-SED4-2.5-11/09	11/12/09	12:32	SOIL	1	X								
USGPUY-SED3-2.5-11/09	11/12/09	13:30	SOIL	1	X								
USGPUY-SED2-2.5-11/09	11/12/09	14:15	SOIL	1	X								
USGPUY-SED1-2.5-11/09	11/12/09	15:00	SOIL	1	X								

Comments/Special Instructions	Relinquished by:	Received by:	Relinquished by:	Received by:
	(Signature)	(Signature)	(Signature)	(Signature)
	Printed Name: HOWARD YOUNG	Printed Name: C. OREIRO	Printed Name:	Printed Name:
	Company: CDM	Company: ARI	Company:	Company:
	Date & Time: 11/12/09 16:00	Date & Time: 11/13/09 1715	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 Puyallup

COC No(s): [✓ NA]

Delivered by: Fed-Ex UPS Courier [✓ Hand Delivered] Other:

Assigned ARI Job No: PX43

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) 3.9

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

Temp Gun ID#:

Cooler Accepted by: OD Date: 11/12/09 Time: 1715

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

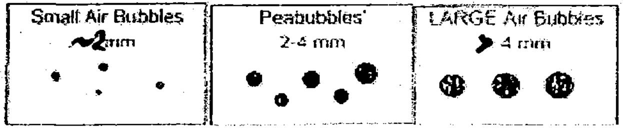
Samples Logged by: Date: 11/13/09 Time: 727

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

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPUY-SED4-2.5-11/09
SAMPLE

Lab Sample ID: PX43A
LIMS ID: 09-27989
Matrix: Soil
Data Release Authorized:
Reported: 11/25/09

QC Report No: PX43-CDM
Project: USG PUYALLUP REMEDIAL INVESTIGATION
19921-64793
Date Sampled: 11/12/09
Date Received: 11/12/09

Percent Total Solids: 73.4%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	11/19/09	6010B	11/24/09	**7440-38-2**	**Arsenic**	6	75	

U-Analyte undetected at given RL
RL-Reporting Limit

FORM-I

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPUY-SED3-2.5-11/09
SAMPLE

Lab Sample ID: PX43B
LIMS ID: 09-27990
Matrix: Soil
Data Release Authorized:
Reported: 11/25/09

QC Report No: PX43-CDM
Project: USG PUYALLUP REMEDIAL INVESTIGATION
19921-64793
Date Sampled: 11/12/09
Date Received: 11/12/09

Percent Total Solids: 79.1%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	11/19/09	6010B	11/24/09	**7440-38-2**	**Arsenic**	6	**136**	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPUY-SED2-2.5-11/09
SAMPLE

Lab Sample ID: PX43C
LIMS ID: 09-27991
Matrix: Soil
Data Release Authorized:
Reported: 11/25/09

QC Report No: PX43-CDM
Project: USG PUYALLUP REMEDIAL INVESTIGATION
19921-64793
Date Sampled: 11/12/09
Date Received: 11/12/09

Percent Total Solids: 72.9%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	11/19/09	6010B	11/24/09	7440-38-2	Arsenic	7	7	U

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPUY-SED1-2.5-11/09
SAMPLE

Lab Sample ID: PX43D
LIMS ID: 09-27992
Matrix: Soil
Data Release Authorized:
Reported: 11/25/09

QC Report No: PX43-CDM
Project: USG PUYALLUP REMEDIAL INVESTIGATION
19921-64793
Date Sampled: 11/12/09
Date Received: 11/12/09

Percent Total Solids: 70.7%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	11/19/09	6010B	11/24/09	7440-38-2	Arsenic	7	7	U

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPUY-SED4-2.5-11/09
MATRIX SPIKE

Lab Sample ID: PX43A
LIMS ID: 09-27989
Matrix: Soil
Data Release Authorized:
Reported: 11/25/09

QC Report No: PX43-CDM
Project: USG PUYALLUP REMEDIAL INVESTIGATION
19921-64793
Date Sampled: 11/12/09
Date Received: 11/12/09

MATRIX SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Spike	Spike Added	% Recovery	Q
Arsenic	6010B	75	306	257	89.9%	

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%

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: USGPUY-SED4-2.5-11/09
DUPLICATE

Lab Sample ID: PX43A
LIMS ID: 09-27989
Matrix: Soil
Data Release Authorized:
Reported: 11/25/09

QC Report No: PX43-CDM
Project: USG PUYALLUP REMEDIAL INVESTIGATION
19921-64793
Date Sampled: 11/12/09
Date Received: 11/12/09

MATRIX DUPLICATE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Duplicate	RPD	Control Limit	Q
Arsenic	6010B	75	42	56.4%	+/- 20%	*

Reported in mg/kg-dry

*-Control Limit Not Met
L-RPD Invalid, Limit = Detection Limit

FORM-VI

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: LAB CONTROL

Lab Sample ID: PX43LCS
LIMS ID: 09-27990
Matrix: Soil
Data Release Authorized:
Reported: 11/25/09

QC Report No: PX43-CDM
Project: USG PUYALLUP REMEDIAL INVESTIGATION
19921-64793
Date Sampled: NA
Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Arsenic	6010B	203	200	102%	

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

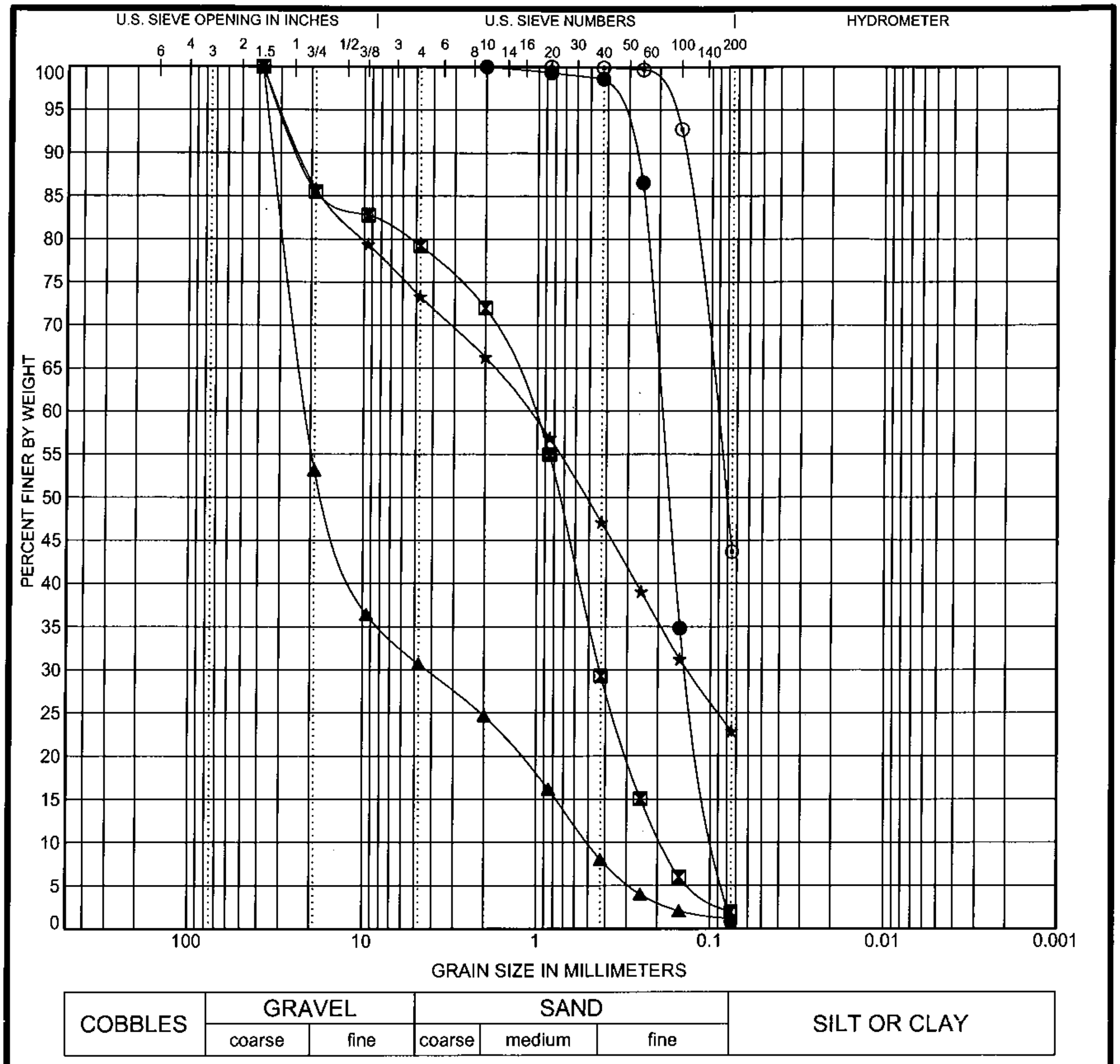
Lab Sample ID: PX43MB
LIMS ID: 09-27990
Matrix: Soil
Data Release Authorized
Reported: 11/25/09

QC Report No: PX43-CDM
Project: USG PUYALLUP REMEDIAL INVESTIGATION
19921-64793
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	11/19/09	6010B	11/24/09	7440-38-2	Arsenic	5	5	U

U-Analyte undetected at given RL
RL-Reporting Limit



	Specimen Identification			Classification	LL	PL	PI	Cc	Cu
●	A4S - USGPuy-22			Poorly graded SAND (SP)				1.06	2.13
⊠	A4	S -	27.5	Poorly graded SAND with GRAVEL (SP)				0.91	5.82
▲	A4	S -	43.5	Well-graded GRAVEL with SAND (GW)				1.76	41.87
★	A4	S -	48	Silty SAND with GRAVEL (SM)					
⊙	A4	S -	63.3	Silty SAND (SM)					

	Specimen Identification			D60	D30	D10	%Gravel	%Sand	%Fines
●	A4S - USGPuy-22			0.19	0.14	0.09		99.2	0.8
⊠	A4	S -	27.5	1.09	0.43	0.19	20.8	77.3	2.0
▲	A4	S -	43.5	21.03	4.31	0.50	69.3	29.5	1.2
★	A4	S -	48	1.13	0.14		26.7	50.4	22.9
⊙	A4	S -	63.3	0.09				56.3	43.7

GRAIN SIZE DISTRIBUTION

USG Interiors
Remedial Investigation
Puyallup, Washington

Project No: 19921.64793.PLANNING Figure:

CDM

GSD ORIGINAL 19921-64793 10-2009.GPJ CDM BLLV.GDT 12/29/09 REV.

CDM

CHAIN-OF-CUSTODY

Date 12/17/09 Page 1 of 1

PROJECT INFORMATION

Project Manager: ALAN CAREY
Project Name: USG PUYALLUP REMEDIAL INVEST.
Project Number: 19921.64793.PLANNING
Site Location: PUYALLUP, WA Sampled By: HSY

DISPOSAL INFORMATION

☐ Lab Disposal (return if not indicated)
Disposal Method:
Disposed by: Disposal Date:

QC INFORMATION (check one)

☐ SW-846 ☐ CLP ☐ Screening ☐ CDM Std. ☐ Special

Laboratory Number:

ANALYSIS REQUEST

					PETROLEUM HYDROCARBONS						ORGANIC COMPOUNDS								PESTS/PCBs					METALS						LEACHING TESTS				OTHER					
SAMPLE ID	DATE	TIME	MATRIX	LAB ID	TPH-HCID State:	TPH-G State:	TPH-D State:	TPH-418.1 State:	8015M Fuel Hydrocarbon	TPH Special Instructions	8010 Halogenated VOCs	8020 Aromatic VOCs	8020M - BETX only	8240 GC/MS Volatiles	8270 GC/MS Semivolatiles	8310 PAHs	8040 Phenols	DWS - Volatiles and Semivolatiles	8080 OC Pest/PCBs	8080M PCBs only	8140 OP Pesticides	8150 OC Herbicides	DWS - Herb/Pest	Selected Metals: list	Organic Lead (Ca)	TCL Metals (23)	Priority Poll. Metals (13)	DWS - Metals	MFSP - Metals (Wa)	TCLP - Volatiles (ZHE)	TCLP - Semivolatiles	TCLP - Pesticides	TCLP - Metals	GRAIN SIZE DISTRIBUTION					NUMBER OF CONTAINERS
✓ A4-22	10/12/09	9:00	SOIL																															X					1
✓ A4-27.5	10/12/09	9:15	SOIL																															X					1
✓ A4-43.5	10/12/09	9:55	SOIL																															X					1
✓ A4-48	10/12/09	11:00	SOIL																															X					1
✓ A4-63.3	10/12/09	11:50	SOIL																															X					1

LAB INFORMATION

Lab Name:
Lab Address:

Via:

SAMPLE RECEIPT

Total Number of Containers:
Chain-of-Custody Seals: Y/N/NA
Intact?: Y/N/NA
Received in Good Condition/Cold:

Turn Around Time: ☐ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions:

RELINQUISHED BY: 1.

Signature: Time:
Printed Name: HOWARD YOUNG Date: 12/17/09
Company: CDM

RELINQUISHED BY: 2.

Signature: Time:
Printed Name: Date:
Company:

RELINQUISHED BY: 3.

Signature: Time:
Printed Name: Date:
Company:

RECEIVED BY: 1.

Signature: Karen Irby-Smith Time:
Printed Name: KAREN IRBY-SMITH Date: 12/18/09
Company: CDM

RECEIVED BY: 2.

Signature: Time:
Printed Name: Date:
Company:

RECEIVED BY: 3.

Signature: Time:
Printed Name: Date:
Company:

CDM OFFICES: Bellevue: (206) 453-8383
Portland: (503) 232-1800
rev. 2/02

DISTRIBUTION: White, Canary to Analytical Laboratory; Pink to CDM Project Files; Gold to CDM Disposal Files

Appendix G

XRF Data Confirmation

CONFIRMATORY ANALYSES

The USEPA provides guidance for field portable X-Ray Fluorescence (XRF) analysis of soil and sediment samples (USEPA 1998). Section 9.7 of the guidance ("Confirmatory Samples") recommends evaluating confirmatory data (samples analyzed by both XRF and by conventional laboratory methods) using (1) least squares regression analysis and (2) if appropriate, statistical comparison tests of the XRF and laboratory data groups. The objective of the confirmatory analysis is to assess the comparability of the XRF data and to assign a level of data quality.

Regression Analyses

In the Puyallup investigation, 30 soil samples were analyzed by both XRF and conventional laboratory methods. The measured arsenic concentration ranges were: <5 to 3,181 mg/kg (XRF) and <5 to 2,900 mg/kg (Laboratory). The confirmatory sample results are provided in Table 1. Of note is that only a small number of samples were measured at below method detection limits; two samples in the case of XRF and four samples in the case of the conventional laboratory. Nevertheless, two different methods for handling the nondetects in the confirmatory data set were evaluated: (1) substituting the actual value of the detection limit and (2) substituting one-half the detection limit value.

Since the measured concentrations (Table 1) spanned more than one order of magnitude, they were log-transformed (per USEPA guidance). Figure 1 shows the scatter plot for the case of using the actual detection limits (DL) for the nondetects (NDs). The Pearson correlation coefficient in this case is r = 0.944. Figure 2 shows the scatter plot for the case of using one-half of the DL for the NDs. The Pearson correlation coefficient in this case is r = 0.943. These results indicate a very high degree of comparability with negligible influence of the nondetects.

Group Comparison

Per USEPA guidance, confirmatory data with correlation coefficients between 0.7 and 0.9 indicate that the XRF data should be considered acceptable as screening level data, whereas confirmatory data with correlation coefficients greater than 0.9 and that exhibit no statistically significant difference between the XRF and laboratory groups could potentially meet definitive level data criteria (i.e., usable for remedial investigation, feasibility study, and human/ecological risk assessment). Therefore, since the measured correlation coefficients (r = 0.944 and r = 0.943) exceeded the 0.9 criteria, additional parametric, equal variance t-test comparisons were conducted. The results of the comparison testing conducted on the log-transformed data are provided in Table 2.

In both cases (Table 2), no statistically significant differences between the XRF and laboratory data groups were indicated: two-sided p-values ranged between 0.924 and 0.963. These results strongly support use of the XRF data as definitive level data.

References

USEPA, 1998. Method 6200, Field Portable X-Ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment. January 1998.

Table 1
Confirmatory Data

Sample ID	As (mg/kg) - XRF	As (mg/kg) - Lab
USGPUY-A1-8-10/09	49	<60
USGPUY-A2-6-10/09	120	39
USGPUY-A4-0-10/09	11	42
USGPUY-A4-2-10/09	11	17
USGPUY-A6-6-10/09	65	48
USGPUY-A8-16-10/09	<5	<6
USGPUY-A8-2-10/09	10	<5
USGPUY-B3-12-10/09	700	632
USGPUY-B5-12-10/09	333	588
USGPUY-B7-6-10/09	9	6
USGPUY-C2-10-10/09	245	314
USGPUY-C2-12-10/09	807	594
USGPUY-C2-2-10/09	1,274	1,110
USGPUY-C2-8-10/09	1,217	1,220
USGPUY-C4-10-10/09	544	633
USGPUY-C4-12-10/09	922	804
USGPUY-C8-10-10/09	29	87
USGPUY-D1-10-10/09	787	1,010
USGPUY-D1-8-10/09	88	74
USGPUY-D3-12-10/09	3,181	2,900
USGPUY-D3-16-10/09	407	389
USGPUY-D5-16-10/09	33	36
USGPUY-D7-8-10/09	19	9
USGPUY-E2-6-10/09	71	69
USGPUY-E2-8-10/09	10	78
USGPUY-E4-16-10/09	146	58
USGPUY-E4-20-10/09	36	26
USGPUY-E6-16-10/09	19	19
USGPUY-F2-4-10/09	<5	<7
USGPUY-D3-6-10/09	13	13

Table 2
Confirmatory Data – Group Comparison Statistics

Two-Group Comparison Parametric: Equal Variances	Log10 As - XRF	Log10 As - Lab
Count	30	30
NDs = DL		
Mean	1.924950732	1.945389529
Standard Deviation	0.833452909	0.816555004
Delta		0.020438796
df		58
Student t Statistic		0.095944954
p-value (1-sided)		0.461947517
p-value (2-sided)		0.923895035
NDs = DL/2		
Mean	1.904882066	1.915286529
Standard Deviation	0.866822422	0.864957243
Delta		0.010404463
df		58
Student t Statistic		0.046537432
p-value (1-sided)		0.481520885
p-value (2-sided)		0.963041769

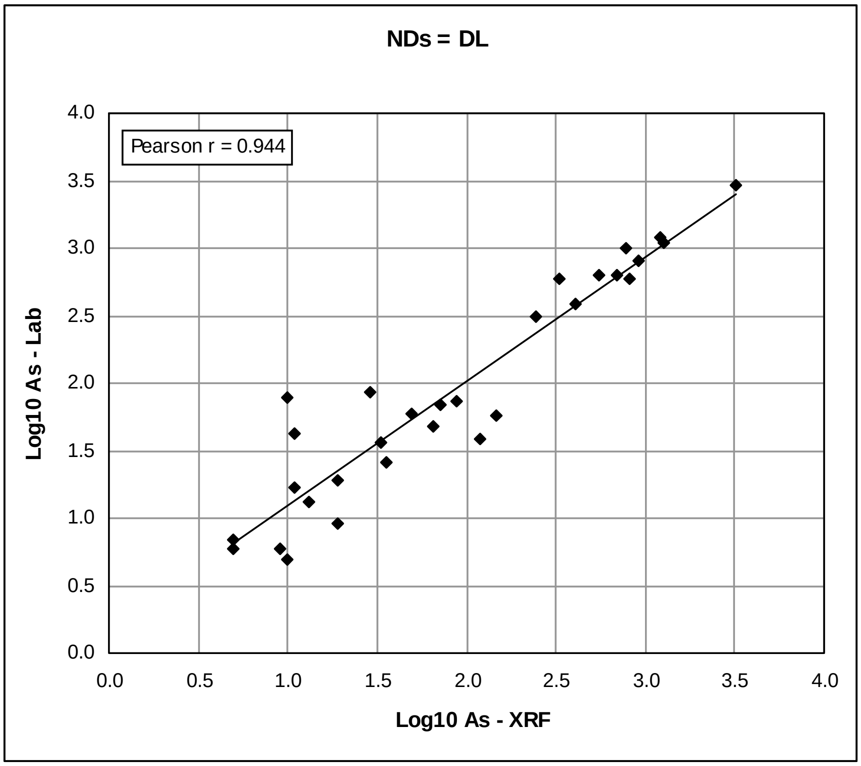


Figure 1 – Scatter plot of confirmatory data (NDs = DL).

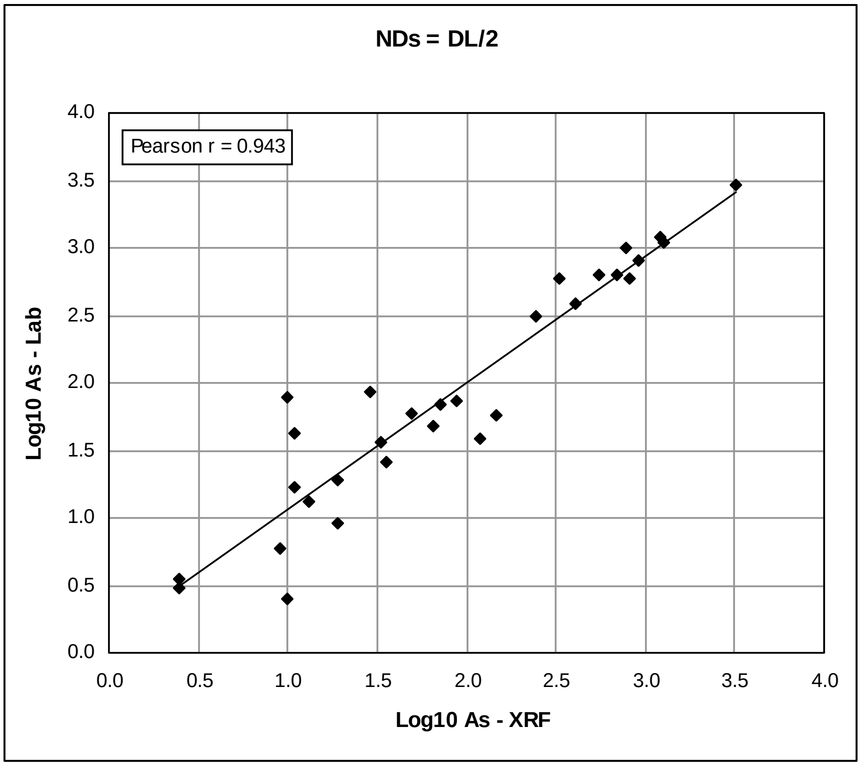


Figure 2 – Scatter plot of confirmatory data (NDs = DL/2).

Appendix H

Terrestrial and Ecological Evaluation

Appendix H

Simplified Terrestrial Ecological Evaluation

USG Interiors Puyallup Site
Puyallup

This document presents the results of a terrestrial ecological evaluation (TEE) performed on the USG Interiors Puyallup site by Kate Stenberg, PhD. an experienced wildlife biologist working for CDM. Ms. Stenberg reviewed existing information and conducted field visit was conducted on February 28, 2010 to evaluate the habitat quality of the site and the surrounding area. Based on the information provided and data from recent aerial photography and the field visit, a simplified terrestrial ecological evaluation (TEE) was conducted in accordance with WAC 173-340-7492. This information was used to complete Table 749-1 (attached).

The project area does not qualify for an exclusion from a terrestrial ecological evaluation. The site is approximately one acre in size and is not completely covered by buildings or pavement. The project site is located along the Puyallup River and both the north and south sides of the river in the immediate vicinity of the site support a fringe of riparian vegetation. The undeveloped contiguous area within 500 feet of the project area is approximately 5 acres. The site is a commercial site and so the TEE is focused on terrestrial wildlife and not on plants or soil biota. A simplified TEE was conducted following the procedure outlined in Table 749-1.

Exposure Analysis

Table 749-1 has 6 items to be scored. The following paragraphs provide the rationale for each line item in the table.

1. Estimate the area of contiguous undeveloped land on the site or within 500 feet of the site to the nearest ½ acre.

The USG Interiors Puyallup River site located within four parcels owned by USG Interiors that total about 1.6 acres (parcel numbers 0420213022, 0420213033, 4920200020, 4920200050). The contaminated area is located near the northern boundary adjacent to public land that includes a walking path along the top of the river bank. Within 500 feet of the contaminated area are the riparian areas on the north and south sides of the Puyallup River. The river banks are steep and support a mix of native and non-native plant species.

The northern river bank supports a narrow band of vegetation on the steep bank that is sandwiched between the river and North Levee Road East, a four lane road that fronts large industrial buildings. The north side riparian vegetation is composed primarily of medium sized alder with an understory dominated by Himalayan blackberry.

The riparian fringe on the south side of the river is much wider and extends up the steep banks onto the top of the river bank. There is a row of large (up to 30" dbh) cottonwood trees south of the public walking trail and fronting the site. On the steep river banks, the canopy is dominated by medium sized alder and cottonwood trees. The understory is composed of a mix of native and non-native shrubs including snowberry, Indian plum, salmonberry, Japanese knotweed, Himalayan blackberry and English ivy.

While the Puyallup River is not included in the calculation of terrestrial habitat area, it does not reduce the potential for wildlife to use the area and therefore does not disconnect the north and south riparian areas from each other (WAC 173-340-7491). Therefore, both the north and south areas are combined in calculating the area of continuous habitat within 500 feet of the contaminated area.

North of N. Levee Road East are several landscaped areas between the road and the industrial buildings. South of the site, south of River Road is an area of residential landscaping. These landscaped areas are discontinuous and per WAC 173-340-7491 are not included in the area considered "contiguous undeveloped land". In addition, WAC 173-340-7491 clarifies that areas planted for ornamental or landscaping purposes are not considered areas of native vegetation even if they include native species.

A conservative estimate of the contiguous undeveloped land within 500 feet of the site is 5 acres. Therefore, item 1 on Table 749-1 was given a score of 12.

2. Is this an industrial or commercial property?

The USG Interiors parcels are all zoned commercial and are in commercial uses. Therefore, the site receives a score of 3 for this criterion.

3. Enter a score for habitat quality.

Ms. Stenberg is an experienced field biologist with a specialty in urban wildlife and am trained to recognize wildlife habitats in non-traditional settings. Based on her professional judgment as a wildlife biologist, the habitat quality of the adjacent undeveloped land is "intermediate." The riparian vegetation along the Puyallup River is narrow and highly disturbed. The understory includes significant proportions of non-native species. Despite the size of the cottonwoods along the south side, they represent a single row of trees occurring at regular intervals with a high level of human activity on the walking path at their base. At the same time, the River provides a significant habitat feature for wildlife that may be using the area. There is a protected wetland to the west of the site that provides additional habitat complexity. Therefore, the area is ranked "intermediate" in habitat quality and receives a score of 2.

4. Is the undeveloped land likely to attract wildlife?

Despite the intermediate habitat quality, the presence of the Puyallup River and the large cottonwoods provide features that are likely to attract wildlife. In fact, there were signs of beaver observed and songbirds typical of disturbed urban areas present. Therefore, the site receives a score of 1 for this criterion.

5. Are there any of the specified soil contaminants present?

Based on information provided to me, the only contaminant present in detectable levels is arsenic in the soil and ground water. None of the soil contaminants specified in Table 749-1 are present, therefore, this criterion receives a score of 4.

6. Add the scores of items 2 through 5. If this number is larger than the score for item 1, the simplified terrestrial ecological evaluation may be ended.

The sum of the scores for criteria 2 through 5 is 10. Since the score for criterion 1 was 12, the simplified terrestrial ecological evaluation concludes that there is a potential risk of exposure to terrestrial wildlife.

Conclusion

Since the simplified TEE concluded that there is a risk of exposure to terrestrial wildlife, the contaminant concentrations provided in Table 749-2 may be used to provide clean up levels for the remedial investigation and cleanup process. Footnote c on Table 749-2 notes that in soils that alternate between saturated, anaerobic conditions and unsaturated, aerobic conditions, the value for arsenic III should be used.

Pursuant to WAC 173-340-7492 and the values listed in Table 749-2, an arsenic III cleanup level of 20 mg/kg to a depth of 6 feet with institutional controls or a depth of 15 feet without institutional controls would be protective of terrestrial wildlife.

Attachment: Table 749-1

Table 749-1

Simplified Terrestrial Ecological Evaluation – Exposure Analysis Procedure under WAC 173-340-7492 (2)(a)(ii).[a]

USG Interiors Puyallup Site, Puyallup, WA

Estimate the area of contiguous (connected) undeveloped land on the site or within 500 feet of any area of the site to the nearest 1/2 acre (1/4 acre if the area is less than 0.5 acre). "Undeveloped land" means land that is not covered by existing buildings, roads, paved areas or other barriers that will prevent wildlife from feeding on plants, earthworms, insects or other food in or on the soil.			
1) From the table below, find the number of points corresponding to the area and enter this number in the box to the right.			
	Area (acres)	Points	
	0.25 or less	4	
	0.5	5	
	1.0	6	
	1.5	7	
	2.0	8	
	2.5	9	
	3.0	10	
	3.5	11	
	4.0 or more	12	**12**
2) Is this an industrial or commercial property? See WAC 173-340-7490 (3)(c). If yes, enter a score of 3 in the box to the right. If no, enter a score of 1.			**3**
3) Enter a score in the box to the right for the habitat quality of the site, using the rating system shown below[b]. (High = 1, Intermediate = 2, Low = 3)			**2**
4) Is the undeveloped land likely to attract wildlife? If yes,			**1**

enter a score of 1 in the box to the right. If no, enter a score of 2. See footnote c.	
5) Are there any of the following soil contaminants present: Chlorinated dibenzo-p-dioxins/dibenzofurans, PCB mixtures, DDT, DDE, DDD, aldrin, chlordane, dieldrin, endosulfan, endrin, heptachlor, benzene hexachloride, toxaphene, hexachlorobenzene, pentachlorophenol, pentachlorobenzene? If yes, enter a score of 1 in the box to the right. If no, enter a score of 4.	**4**
6) Add the numbers in the boxes on lines 2 through 5 and enter this number in the box to the right. If this number is larger than the number in the box on line 1, the simplified terrestrial ecological evaluation may be ended under WAC 173-340-7492 (2)(a)(ii).	**10**

Footnotes:

a It is expected that this habitat evaluation will be undertaken by an experienced field biologist. If this is not the case, enter a conservative score (1) for questions 3 and 4.

b Habitat rating system. Rate the quality of the habitat as high, intermediate or low based on your professional judgment as a field biologist. The following are suggested factors to consider in making this evaluation:

Low: Early successional vegetative stands; vegetation predominantly noxious, nonnative, exotic plant species or weeds. Areas severely disturbed by human activity, including intensively cultivated croplands. Areas isolated from other habitat used by wildlife.

High: Area is ecologically significant for one or more of the following reasons: Late-successional native plant communities present; relatively high species diversity; used by an uncommon or rare species; priority habitat (as defined by the Washington department of fish and wildlife); part of a larger area of habitat where size or fragmentation may be important for the retention of some species.

Intermediate: Area does not rate as either high or low.

c Indicate "yes" if the area attracts wildlife or is likely to do so. Examples: Birds frequently visit the area to feed; evidence of high use by mammals (tracks, scat, etc.); habitat "island" in an industrial area; unusual features of an area that make it important for feeding animals; heavy use during seasonal migrations.

Field XRF and Corrected Arsenic concentrations

USG Interiors/Remedial Investigation
Puyallup, Washington

		Field XRF concentrations	Corrected concentrations		
Sample I.D. and Date		Total Arsenic (mg/kg)	Log_{10}(XRF-As result)	Log_{10}(Lab-As result)	Total Arsenic (mg/kg)
A1-0	10/12/09	21	1.32	1.39	24
F1-16	10/14/09	403	2.61	2.57	376
F1-2	10/15/09	<7	0.54	0.67	5
F1-4	10/15/09	14	1.15	1.23	17
F1-6	10/15/09	125	2.10	2.10	127
F1-8	10/12/09	56	1.75	1.78	61
F2-0	10/15/09	9	0.95	1.05	11
F2-10	10/15/09	13	1.11	1.20	16
F2-10	10/14/09	15	1.18	1.25	18
F2-12	10/15/09	<8	0.60	0.72	5
F2-14	10/15/09	<7	0.54	0.67	5
F2-16	10/15/09	<6	0.48	0.61	4
F2-16	10/15/09	29	1.46	1.52	33
F2-2	10/15/09	<8	0.60	0.72	5
F2-4	10/15/09	<8	0.60	0.72	5
F2-6	10/15/09	9	0.95	1.05	11
F2-8	10/16/09	<8	0.60	0.72	5
F2-8	10/12/09	8	0.90	1.00	10

Notes:

mg/kg - milligrams per kilogram