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ACRONYMS AND ABBREVIATIONS

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
AK	Alaska Method
ASR	Alaska Soil Recycling
bgs	Below Ground Surface
BTEX	Aromatic Hydrocarbons
°C	Degree Celsius
CSM	Conceptual Site Model
DQO	Data Quality Objective
DRO	Diesel Range Organics
Discovery	Discovery Drilling of Anchorage, Alaska
EPA	Environmental Protection Agency
GRO	Gasoline Range Organics
LCS/LCSD	Laboratory Control Sample/Laboratory Control Sample Duplicate
LOQ	Limit of Quantitation
LRA	Limited Removal Action
MS/MSD	Matrix Spike/Matrix Spike Duplicate
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Liter
NTU	Nephelometric Turbidity Units
PAHs	Polynuclear Aromatic Hydrocarbons
PID	Photoionization Detector
ppm	Parts Per Million
PVC	Polyvinyl Chloride
QC	Quality Control
RPD	Relative Percent Difference
SGS	SGS Environmental Services of Anchorage, Alaska
UST	Underground Storage Tank

**SITE CHARACTERIZATION
WELLS FARGO DATA CENTER
6831 ARCTIC BOULEVARD
ANCHORAGE, ALASKA
ADEC FILE No. 2100.38.492**

1.0 INTRODUCTION

This report presents the results of Shannon & Wilson's site characterization activities conducted at Wells Fargo Data Center, 6831 Arctic Boulevard, Anchorage, Alaska (the site). The location of the site is shown in Figure 1. The project purpose was to install two new monitoring wells and evaluate the groundwater for petroleum hydrocarbon contamination associated with the former heating oil underground storage tank (UST).

The project tasks were conducted in material accordance with our August 25, 2010 work plan, and modifications requested by the Alaska Department of Environmental Conservation (ADEC) in a letter dated September 1, 2010. The ADEC provided conditional approval of the August 25, 2010 work plan in their September 1, 2010 letter.

2.0 SITE AND PROJECT DESCRIPTION

2.1 Site Location

The project site is located at 6831 Arctic Boulevard, Anchorage, Alaska in the northwest $\frac{1}{4}$ of the southwest $\frac{1}{4}$ of Section 6, Township 12 North, Range 3 West, Anchorage (A-8) NW Quadrangle, Seward Meridian. The site topography is flat, with a regional slope to the east and south towards Campbell Creek. A vicinity map showing the project site and surrounding area is included as Figure 1.

2.2 Background

In March 2003, Shannon & Wilson conducted a closure assessment for removal of a 1,000-gallon heating oil UST located north of the existing building. Details of the assessment activities are included in Shannon & Wilson's September 2003 *Underground Storage Tank Closure Assessment, 6831 Arctic Boulevard, Anchorage, Alaska*. Approximately 45 cubic yards of impacted soil were removed and treated at an off-site facility. Diesel range organics (DRO) and benzene concentrations exceeding the applicable cleanup levels were identified in the in-place soil at the former UST location.

A release investigation was performed in June 2004. As described in Shannon & Wilson's August 2004 report *Release Investigation and Groundwater Monitoring, 6831 Arctic Boulevard, Anchorage, Alaska*, the release investigation included installing three groundwater monitoring wells and collecting soil and groundwater samples. Analytical results indicated that DRO and benzene concentrations exceeding the applicable ADEC cleanup levels were present in water and soil samples from Boring B1/Monitoring Well B1MW. Target analytes were either not detected, or were detected at concentrations less than applicable cleanup levels, in soil and groundwater samples from the remaining two borings/monitoring wells.

In a September 28, 2004 letter, the ADEC requested that an annual groundwater monitoring program be developed and implemented at the site. Groundwater samples have been collected from the on-site monitoring wells on an annual basis.

In July 2008, Shannon & Wilson installed Monitoring Well B4MW in Boring B4, located about 16 feet from the existing building. Boring B4 was advanced to 12 feet below ground surface (bgs). One soil sample and a field duplicate were collected from a depth of 2 to 4 feet bgs based on highest headspace screening result, and one soil sample was collected from a depth of 8 to 10 feet bgs based on location immediately above the groundwater table. The soil samples were tested for DRO, gasoline range organics (GRO), and aromatic hydrocarbons (BTEX). The soil samples contained DRO at concentrations greater than the ADEC cleanup level, with greater concentrations at the shallower depth [5,910 milligrams per kilograms (mg/kg) in Sample B4S2]. The groundwater sample from Well B4MW contained 1.63 milligrams per liter (mg/L) DRO, which is greater than the ADEC cleanup level of 1.5 mg/L. Monitoring Wells B1MW and B3MW were not sampled due to apparent blockages.

During the May 2009 groundwater monitoring event, Shannon & Wilson sampled Monitoring Wells B2MW and B4MW. Monitoring Wells B1MW and B3MW contained blockages and could not be sampled. The results indicated that the groundwater south of the former UST excavation and within 20 feet of the site structure are impacted by DRO at concentrations greater the ADEC cleanup levels. In an August 6, 2009 letter, based on a review of Shannon & Wilson's report, the ADEC requested corrective action and further evaluation of the site's groundwater for petroleum hydrocarbon contamination associated with the former heating oil UST.

In November 2009, Shannon & Wilson installed Monitoring Wells B5MW and B6MW in Borings B5 and Boring B6, respectively. Well B5MW was placed near Well B1MW, but located outside the former UST excavation footprint. Well B6MW was placed adjacent to the building downgradient of the former UST to evaluate the southern extent of the contaminant plume.

Concentrations of DRO in the shallower soil samples from Boring B5 (Sample B5S1) and Boring B6 (Samples B6S1 and its duplicate B6S5) exceeded the ADEC cleanup level. Concentrations of DRO exceeded cleanup levels in groundwater samples from Wells B4MW and B5MW, the two wells adjacent to the former UST.

In a June 10, 2010 letter, the ADEC requested further groundwater sampling and monitoring at the site. In addition, the ADEC requested that groundwater elevations be measured quarterly to determine if seasonal variation exists at the site.

2.3 Purpose and Objectives

The project purpose was to provide the soil and groundwater characterization data requested by the ADEC in their June 2010 letter in the context of progressing towards a clean up complete designation. The specific data collection objectives were to install two new monitoring wells, perform groundwater monitoring, and evaluate groundwater flow direction and gradient to delineate the extent of contamination.

3.0 FIELD ACTIVITIES

Field activities for this project consisted of installing Monitoring Wells B7MW and B8MW, and collecting soil and groundwater samples. Field work was conducted by an ADEC-qualified person. Utility locates were requested prior to implementing field activities. The activities were conducted to fulfill the requirements outlined in 18 Alaska Administrative Code (AAC) 75 Oil and Other Hazardous Substance (October 2008) regulations (18 AAC 75.335).

3.1 Soil Boreholes and Sample Collection

On September 8, 2010, Discovery Drilling (Discovery) of Anchorage, Alaska advanced and completed two borings, designated B7MW and B8MW. Boring B7MW was placed approximately 13 feet east of Well B5MW to evaluate the eastern extent of the groundwater contamination. Boring B8MW was placed approximately 16 feet west of the former excavation to evaluate the western extent of the groundwater contamination. A site plan showing the locations of the borings and monitoring wells is provided as Figure 2, and site photographs are included in Appendix A.

Drilling was performed by Discovery using a truck-mounted CME 55 drill rig with a 4.25-inch inside diameter hollow-stem auger. Drilling depth was based on historic water level data that indicated water levels in the monitoring wells ranged between 2 feet to 6 feet bgs. To account for an increase in water level after drilling, drilling depth was estimated to be about 10 feet bgs. A representative from Shannon & Wilson was present during field activities to identify

the boring locations, log the materials encountered during drilling, and screen and sample subsurface soils. This information is presented on the individual boring logs, provided in Appendix B as Figures B-1 and B-2.

Soil sampling was conducted using a 3-inch outside diameter split-spoon sampler driven using a 340-lb hammer. Soil samples were collected on a continuous basis between the surface and final depth of each boring. The soil samples were "screened" for volatile organic vapors using a photoionization detector (PID) and an ADEC-approved headspace screening technique. The PID was calibrated before screening activities with 100 parts per million (ppm) isobutylene standard gas. The field screening samples were collected in re-sealable plastic bags, warmed in the truck cab, and tested within 60 minutes following collection.

Analytical samples were collected to provide quantitative data on hydrocarbon concentrations. One analytical sample was collected from directly above the soil/groundwater interface. A second analytical sample was collected based on field screening results and field observations. The field representative used clean stainless steel spoons and new nitrile gloves to collect soil from the auger and/or split spoons into laboratory-supplied containers. Samples for the analysis of volatile constituents were collected first and field extracted with methanol following Alaska Method (AK) 101 procedures. Table 1 presents a description of the soil sample locations, depths, headspace results, and sample classifications.

Drill cuttings were stored in labeled 55-gallon drums and left on site pending receipt of analytical results.

3.2 Monitoring Well Installation, Development, and Sampling

3.2.1 Monitoring Well Installation

Monitoring Wells B7MW and B8MW were constructed on September 8, 2010. The monitoring wells were constructed with 2-inch nominal I.D. schedule 40 polyvinyl chloride (PVC) pipe with threaded connections. The lower portion of each well consisted of a 5-foot section of 0.010-inch slotted well screen that was positioned such that the slots extended from the bottom of the borings to 1 to 2 feet above the anticipated static water table. A 20-40 silica sand pack was used to backfill around the well screen to at least 1 foot above the screened section. Bentonite chips were used to backfill around the PVC piping above the sand pack to about 1 to 2 feet below grade. Flush mount protective casings were used to protect the monitoring wells. Well construction details are included in Appendix B as Figures B-3 and B-4.

3.2.2 Monitoring Well Development

Monitoring Wells B7MW and B8MW were developed on September 14, 2010. Prior to development, water depth relative to the well casing was measured in each well with an electronic water level indicator. The monitoring wells were developed using alternating 3 to 5 minute periods of surging (using a PVC surge block) and purging (using a submersible pump and dedicated vinyl tubing). Water quality parameters, including pH, temperature, conductivity, and turbidity were measured with Hanna and Hach water quality instruments during well development. The water quality parameters were used to evaluate the effectiveness of the development. Approximately 17.5 gallons of water was purged from Monitoring Well B7MW and approximately 10 gallons of water was purged from Monitoring Well B8MW with final turbidity measurements of greater than 1,000 nephelometric turbidity units (NTU) and 67 NTU, respectively.

The development water was stored in labeled 55-gallon drums and left on site pending receipt of analytical results.

3.2.3 Monitoring Well Sampling

Groundwater samples were collected from Wells B2MW, B4MW, B5MW, B6MW, B7MW, and B8MW on September 15, 2010. Sampling from was initiated using a water level indicator to measure depth to water. Because sampling occurred within 24 hours of development, Wells B7MW and B8MW were not purged prior to sampling. Well B6MW was purged using a disposable bailer due to a small water column. Wells B4MW and B5MW were purged using a submersible pump. Groundwater within each monitoring well was allowed to recover to approximately 80 percent of pre-development/purging water volumes after development and prior to sample collection. Groundwater samples were collected from Wells B2MW, B4MW, B5MW, B7MW, and B8MW by submersible pump and tubing directly into laboratory supplied containers. Groundwater was collected from Monitoring Well B6MW using a disposable bailer due to the small water column. Water quality parameters (pH, temperature, turbidity, and conductivity) were measured after each well volume was purged and when the analytical sample was collected; the final measurements for each well are provided in Table 2.

The purgewater was stored in labeled 55-gallon drums and left on site pending receipt of analytical results.

3.3 Surveying and Groundwater Flow Direction

On October 14, 2010, two representatives from Shannon & Wilson surveyed the relative elevations for top of casings for each of the monitoring wells. The vertical elevations of the monitoring well casings were determined to an accuracy of 0.01 foot relative to a temporary benchmark that was assigned an arbitrary elevation of 100.00 feet. A water level indicator was used to measure the depth to water below the top of casing during an approximate 20-minute period. The well elevations and corresponding groundwater elevations are listed in Table 2. As shown on Figure 2, the apparent groundwater flow direction at the former UST area is to the southeast.

4.0 LABORATORY ANALYSES

Analytical samples were submitted to SGS Environmental Services (SGS) of Anchorage, Alaska on a standard 10 working-day turnaround. Five soil samples, including one duplicate were analyzed for GRO by AK 101, DRO by AK 102, and BTEX and naphthalene by Environmental Protection Agency (EPA) Method 8260B. One sample, based on highest screening result, was also analyzed for polynuclear aromatic hydrocarbons (PAHs) by EPA 8270D SIMS. A soil trip blank accompanied the samples and was analyzed for GRO and BTEX to evaluate potential cross contamination of volatile constituents.

Seven groundwater samples, including one duplicate, were analyzed by SGS for GRO by AK 101, DRO by AK 102, and BTEX and naphthalene by EPA Method 8260B. One sample, based on soil analytical results, was also analyzed for PAHs. A water trip blank accompanied the samples and was analyzed for GRO and BTEX to evaluate potential cross contamination of volatile constituents.

Under the sample numbering scheme used for this project, a typical analytical sample number is 16828-B7S1 for soil boring samples and 16828-B2MW for groundwater samples. The "16828" indicates the Shannon & Wilson job number, and the "B7S1" and "B2MW" designations represent the sample identification numbers. For brevity in the text of this report, the "16828" prefix is omitted.

5.0 SUBSURFACE CONDITIONS

The soil observed in the two borings generally consisted of gravelly sand with variable cobbles. Hydrocarbon odor was detected between 2.5 and 10 feet bgs in Boring B8.

During drilling, groundwater was observed at 7.0 feet and 7.3 feet bgs in Borings B7 and B8, respectively. Depth to water after well installation was to about 6 feet bgs in Well B7MW and about 4 feet bgs in Well B8MW.

6.0 DISCUSSION OF ANALYTICAL RESULTS

The soil and groundwater analytical results were compared with applicable cleanup levels listed in the Oil and Other Hazardous Substances Pollution Control Regulations (18 AAC 75, October 2008). The applicable soil and groundwater cleanup levels are also listed in Tables 3 and 4, respectively.

6.1 Soil Analytical Results

Five soil samples, including one duplicate sample, were submitted for laboratory analysis. Concentrations of DRO were detected in the soil samples from Boring B7 (Sample B7S3) and Boring B8 (Samples B8S2, and B8S3 and its duplicate B8S8). The DRO concentrations reported in Samples B8S2 (43,100 mg/kg), B8S3 (10,300 mg/kg) and its duplicate B8S8 (10,200 mg/kg) exceed the 250 mg/kg ADEC Method 2 cleanup level. According to the laboratory report, the results for Samples B7S3, B8S2, B8S3, and B8S8 are consistent with a weathered middle distillate. Concentrations of GRO were detected in the soil samples from Boring B8 (Samples B8S2, B8S3, and B8S8). The GRO concentration reported in Sample B8S2 (565 mg/kg) exceeds the 300 mg/kg ADEC Method 2 cleanup level.

Concentrations of ten PAHs, (1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, anthracene, chrysene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene) were detected in the deeper sample from Boring B8. The 1-methylnaphthalene concentration (25.3 mg/kg) and 2-methylnaphthalene concentration (43.0 mg/kg) are greater than their respective cleanup levels. The naphthalene concentration reported in Sample B8S2 exceeds the ADEC cleanup level.

6.2 Groundwater Analytical Results

DRO-impacted groundwater is present in the wells in the immediate vicinity south and west of the former UST (Wells B4MW and B8MW). The DRO concentrations in the September 2010 samples from Samples B4MW (3.24 mg/L), B8MW (29.1 mg/L), and its duplicate B9MW (3.19 mg/L) exceed the 1.5 mg/L ADEC Table C cleanup level. According to the laboratory report, the results for Sample B8MW and its duplicate B9MW are consistent with a weathered middle distillate. The laboratory commented that an unknown hydrocarbon with several peaks was present in Samples B4MW and B5MW. Hydrocarbons were not present in Samples B2MW,

B7MW, or B6MW representing the northern, eastern, and southern extents of the groundwater contamination plume, respectively. DRO was detected in Sample B5MW at a concentration less than the ADEC cleanup level. GRO and BTEX were not detected at concentrations greater than cleanup levels.

Concentrations of ten PAHs, (1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, anthracene, chrysene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene) were detected in the sample from Well B8MW. The 2-methylnaphthalene concentration (0.197 mg/L) exceeds the 0.15 mg/L ADEC Table C cleanup level. Of the detected PAHs, each PAH, with the exception of acenaphthene, were also detected in the soil sample from that well

The current analytical results are consistent with the fluctuations in the historical data and there are no noticeable trends in contaminant concentrations (see Table 5).

The static water level in Well B8MW was higher than the screened interval at the time of sample collection. Therefore, the analytical groundwater results may not be representative of the smear-zone and/or water. However, because the DRO results for Well B8MW are greater than the ADEC cleanup level, and the soil samples collected from 2 feet bgs to 6 feet bgs contained DRO concentrations greater than the ADEC cleanup level, it is likely that DRO concentrations greater than the ADEC cleanup level would be detected in a sample from the top of the water-bearing formation.

6.3 Quality Assurance Summary

The project laboratory follows on-going quality assurance/quality control procedures to evaluate conformance to applicable ADEC data quality objectives (DQO). Internal laboratory controls to assess data quality include method blanks, matrix spike/matrix spike duplicates (MS/MSD), laboratory control sample/laboratory control sample duplicates (LCS/LCSD), and surrogates to determine precision, accuracy, and matrix bias. If a DQO was not met, the project laboratory provides a report specific note identifying the problem in the Case Narrative section of their Laboratory Analysis Report (See Appendix C).

A soil and water trip blank accompanied the sample bottles from the laboratory to the site during sampling activities and back again to SGS. Naphthalene was detected in the soil trip blank. Low levels of naphthalene, similar to the concentration reported in the soil trip blank, were also reported in Samples B7S1 and B7S3; the concentrations in these samples may be biased high. However, the naphthalene concentrations reported in the remaining soil samples are at least an order of magnitude greater than the concentration reported in the trip blank sample. Therefore, the concentrations in the project samples are considered useable. In addition, with the

exception of Sample B8S2, the reported concentrations of naphthalene in the project samples are less than the ADEC Method 2 cleanup level. The groundwater trip blank did not contain detectable concentrations of GRO or BTEX, indicating that the groundwater samples were not cross contaminated or exposed to contamination from the sample handling, storage process, or testing.

Shannon & Wilson reviewed the SGS data deliverables and completed the ADEC's Laboratory Data Review Checklist for each SGS work order, which are included in Appendix C. No non-conformances that would adversely impact data usability were noted with the exception of the following:

- 5a-Androstane surrogate recovery does not meet quality control (QC) criteria due to sample dilution. DRO sample results for Samples B8S2, B8S3, and B8S8 may be biased high. However, the DRO concentration in these samples are nearly an order of magnitude greater than the ADEC Method 2 cleanup level, the project data are considered useable for its intended purpose. (Work Order 1104692)
- 4-Bromofluorobenzene surrogate recovery does not meet QC criteria due to matrix interference. GRO and/or BTEX sample results for Samples B8S2, B8S3, and B8S8 may be biased high. Project sample concentrations are less than the ADEC Method 2 cleanup level. The data is considered useable. (Work Order 1104692)
- PAH limits of quantitation (LOQ) are elevated in Sample B8S3 due to sample dilution. Several PAHs (1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene) are a factor of four times greater than the ADEC Method 2 cleanup level and the concentrations reported in the soil samples are similar to the concentrations reported in the groundwater samples. The data are considered representative of the groundwater characteristics. (Work Order 1104692)
- The DRO LOQ is elevated in Sample B7S1 due to sample dilution. Because the LOQs are less than the ADEC Method 2 cleanup level, the data is considered useable. (Work Order 1104692)
- The DRO result is biased high in Sample B7S3 due to heavier hydrocarbons contributing to the middle distillate range. The DRO concentration is less than

the ADEC Method 2 cleanup level; the sample results are considered useable for the intended purposes. (Work Order 1104692)

- The method blank surrogate recovery for toluene-D8 is biased high. BTEX analytes relative to this surrogate were not detected above the LOQ. (Work Order 1104692)
- The MS and MSD recoveries for several PAHs are outside QC criteria. PAH sample results for Sample B8S3 may be biased low. (Work Order 1104692)
- The MS recoveries for 2-chlorotoluene, 1,2,4-trimethylbenzene, and 1,4-dichlorobenzene and the MSD recoveries for 1,2,4-trimethylbenzene and 1,2,3-trichlorobenzene do not meet QC criteria. However, because these VOC's were not included in our list of parameters to be analyzed the data is considered useable. (Work Order 1104692)
- The instrument blank surrogate recovery for toluene-D8 and 4-bromofluorobenzene does not meet QC criteria. According to SGS Project Manager, Jennifer Serna, even though the surrogate recoveries are biased high, the project data impacted by these samples did not contain detectable concentrations of BTEX or naphthalene so the project data are considered useable. (Work Order 1104692)
- The continuing calibration verification recovery for vinyl chloride and 2-butanone does not meet QC criteria. However, these analytes were not sampled for in the project samples and the data is considered useable. (Work Order 1104692)
- The MS/MSD relative percent difference (RPD) does not meet laboratory QC criteria for chloroethane and trichlorofluoromethane. However, these analytes are not associated with the project samples; therefore the data is considered useable. (Work Order 1104692)
- The ethylbenzene, xylenes, and n-butylbenzene RPD's for Sample B8S3 and its duplicate B8S8 exceeded the goal of +/- 50 percent. The data are considered useable because the primary and duplicate concentrations are within a factor of two and do not exceed the cleanup level. (Work Order 1104692)
- The temperature blank accompanying the soil samples is outside the range, at a temperature of 6.5° C (degrees Celsius). The data is considered useable because the samples were submitted shortly after collection. (Work Order 1104692)

- The DRO RPD for Sample B8MW and its duplicate B9MW exceeded the goal of +/- 30 percent. The DRO data are considered usable because the concentrations are both greater than the ADEC Table C cleanup level. (Work Order 1104863)
- The LCS/LCSD and the LCS/LCSD RPD for several VOC analytes does not meet QC criteria. However, project samples were only analyzed for naphthalene. The naphthalene LCS/LCSD and LCS/LCSD RPD met QC criteria and the results are considered useable. (Work Order 1104863)

7.0 INVESTIGATION DERIVED WASTE

Soil cuttings and development/purgewater were placed in 55-gallon drums and temporarily stored onsite. The drummed drill cuttings and development/purgewater drum were disposed on October 20, 2010 by Emerald Alaska. A copy of the waste manifest is provided in Appendix D.

8.0 CONCEPTUAL SITE MODEL

A conceptual site model (CSM) was prepared to identify known and potential exposure pathways associated with petroleum hydrocarbons at the subject site. The CSM was developed using the ADEC's guidance CSM Scoping Form. The ADEC forms are included in Appendix E, with discussions of the potential exposure pathways provided below. The narrative includes descriptions of site-specific considerations that increase or decrease the viability of each pathway at this site.

8.1 Soil – Direct Contact

Petroleum hydrocarbons are the primary contaminants of potential concern that have potential to impact receptors through direct contact with soil through incidental ingestion and dermal absorption. The human receptors for these potentially complete exposure pathways include current and future on-site workers, site visitors and/or construction workers, and trespassers. The area is currently being used for commercial use (data center), and it is assumed that it will continue to be used for this purpose. Therefore, on-site residential exposure is not anticipated to be a potentially complete pathway now or in the future. Even though direct contact with surface soil is considered a potentially complete pathway, the potential exposure to impacted soil is reduced by the asphalt pavement that functions as a cap over the potentially impacted surface soil.

8.2 Groundwater

Ingestion, dermal absorption of contaminants, and inhalation of volatile compounds in groundwater are potentially complete exposure pathways for current and future commercial workers, site visitors and/or construction workers, and trespassers. ADEC guidance stipulates that ingestion of groundwater be considered a potentially complete exposure pathway. Specifically, the groundwater must be addressed as a potential drinking water source unless a groundwater use determination is conducted in accordance with 18 AAC 75.350, and that determination finds that the groundwater is not "a current or reasonably expected future source of drinking water."

A water well search was conducted in November 2008. At least two water wells exist on nearby properties. These include the Alaska Department of Fish and Game's well at 333 Raspberry Road, and Anchorage Water and Wastewater Utility's well at Raspberry Road and C Street. The two wells draw from deeper aquifers that are presumably not directly hydrologically connected to the shallow aquifer where contamination was found at the subject site. The two wells also appear to be upgradient of the subject site with respect to groundwater flow. Because the groundwater contamination is estimated to be contained on site, the exposure route to these wells does not appear to be complete.

8.3 Air

Inhalation of outdoor air and inhalation of indoor air are potentially complete exposure pathways for current and future commercial workers, site visitors, and trespassers. The pavement cap over the impacted area reduces the current likelihood of outdoor inhalation of hydrocarbon vapors.

Inhalation of indoor air is included as a pathway because impacted soil and groundwater has been determined to be present within 20 feet of the site building, and may possibly extend under the site building. The exposure pathway for benzene is potentially complete due to the 2004 benzene detection that exceeds the ADEC's migration to groundwater cleanup level. However, subsequent groundwater monitoring results indicate that benzene concentrations in groundwater have decreased to below cleanup levels. Existing gas and water utility conduits that run through the vicinity of the contamination into the building may comprise preferential vapor intrusion pathways.

8.4 Surface Water

Ingestion of surface water with contaminants of potential concern from 6831 Arctic Boulevard is not considered a complete exposure pathway.

8.5 Other

Other impacted media, including sediment, surface water, and biota, were not identified at the site.

8.6 CSM Summary

Multiple complete or potentially complete exposure pathways have been identified at the site. Exposures via on-site pathways are largely mitigated by the pavement and the site's commercial use. Based on our current understanding of contaminant distribution, it is our opinion that additional remedial action is not presently necessary to prevent unacceptable risk to on-site or off-site potential human receptors. However, it is also recognized that changes in the site use or other site conditions may affect the viability of potential exposure pathways. In particular, the CSM will need to be re-evaluated and revised as necessary if the asphalt pavement is removed, new buildings are constructed at the site, a change in land use occurs, and/or the impacted groundwater plume expands.

9.0 SUMMARY AND CONCLUSIONS

The site characterization activities at 6831 Arctic Boulevard, Anchorage, Alaska included installing two new monitoring wells and collecting soil and groundwater samples.

Concentrations of GRO and naphthalene in the soil sample from Boring B8 (Sample B8S2) exceed ADEC cleanup levels. Concentrations of DRO in the soil samples from Boring B8 (Samples B8S2, B8S3 and its duplicate B8S8) exceed the ADEC cleanup level. 1-methylnaphthalene and 2-methylnaphthalene concentrations in Samples B8S3 and its duplicate, B8S8 exceed cleanup levels. Based on these results and previous data, impacted soil remains within and immediately surrounding the former UST. The extent of contamination west of the former excavation area is unknown.

Concentrations of DRO exceed cleanup levels in groundwater samples from Wells B4MW and B8MW, the two wells adjacent south and west to the former UST, respectively. However, the DRO concentration in downgradient Well B6MW is less than the cleanup level, indicating that DRO has not migrated downgradient to or beneath the building structure.

Concentrations of 2-methylnaphthalene from groundwater Sample B8MW exceed the ADEC cleanup level. GRO and BTEX were not detected at concentrations greater than cleanup levels.

During groundwater sampling activities, Monitoring Well B2MW was observed to be damaged (Photo 2). We recommend replacing the protective well monument, cutting the well casing to below the ground surface, and re-surveying the top of casing during the next sampling event.

10.0 CLOSURE/LIMITATIONS

This report was prepared for the exclusive use of our client and their representatives. The findings we have presented within this report are based on the limited sampling and analyses that we conducted. They should not be construed as definite conclusions regarding the project site's soil or groundwater conditions. It is possible that our subsurface tests missed higher levels, although our intention was to sample areas likely to be impacted. As a result, the sampling and analyses performed can only provide you with our professional judgment as to the environmental characteristics of this site, and in no way guarantees that an agency or its staff will reach the same conclusions as Shannon & Wilson, Inc. The data presented in this report should be considered representative of the time of our site assessment. Changes in site conditions can occur over time, due to natural forces or human activity. In addition, changes in government codes, regulations, or laws may occur. Because of such changes beyond our control, our observations and interpretations may need to be revised. Shannon & Wilson has prepared the document in Appendix F, Important Information About Your Geotechnical/Environmental Report, to assist you and others in understanding the use and limitations of our reports.

You are advised that various state and federal agencies (ADEC, EPA, etc.) may require the reporting of this information. Shannon & Wilson does not assume the responsibility for reporting these findings and therefore, has not, and will not, disclose the results of this study unless specifically requested and authorized by you, or as required by law.

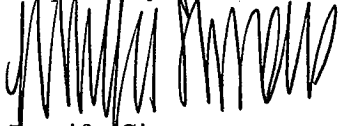
Copies of documents that may be relied upon by our client are limited to the printed copies (also known as hard copies) that are signed or sealed by Shannon & Wilson with a wet, blue ink signature. Files provided in electronic media format are furnished solely for the convenience of the client. Any conclusion or information obtained or derived from such electronic files shall be at the user's sole risk. If there is a discrepancy between the electronic files and hard copies, or you question the authenticity of the report, please contact the undersigned.

We appreciate this opportunity to be of service. Please contact Stafford Glashan, P.E. or the undersigned at (907) 561-2120 with questions or comments concerning the contents of this report.

Sincerely,

SHANNON & WILSON, INC.

Prepared by:



Jennifer Simmons
Environmental Scientist

Reviewed by:



Shayla Swedlund
Environmental Scientist IV

TABLE 1 - SAMPLE LOCATIONS AND DESCRIPTIONS

Sample Number	Date	Sample Location (See Figure 2)	Depth (feet bgs)	Headspace (ppm) ^	Sample Classification** (see Figures B-1 and B-3)
Soil Samples					
Boring B7					
* B7S1	9/8/2010	Boring B7, Sample S1	0-2	1.3	Loose, brown, gravelly SAND; moist
B7S2	9/8/2010	Boring B7, Sample S2	2-4	0.0	Loose, brown, gravelly SAND, trace cobbles; moist
* B7S3	9/8/2010	Boring B7, Sample S3	4-6	0.0	Dense, brown; gravelly SAND with cobbles; moist to wet
B7S4	9/8/2010	Boring B7, Sample S4	6-8	-	Loose, brown, gravelly SAND, trace cobbles; wet
B7S5	9/8/2010	Boring B7, Sample S5	8-10	-	Loose, brown, sandy GRAVEL; wet
Boring B8					
B8S1	9/8/2010	Boring B8, Sample S1	0-2	12	Medium dense, brown gravelly SAND; moist
* B8S2	9/8/2010	Boring B8, Sample S2	2-4	430	Loose, brown SAND; moist; hydrocarbon odor
* B8S3	9/8/2010	Boring B8, Sample S3	4-6	430	Loose, gray SAND; moist; hydrocarbon odor
B8S4	9/8/2010	Boring B8, Sample S4	6-8	200	Medium dense, gray, fine SAND; wet; hydrocarbon odor
B8S5	9/8/2010	Boring B8, Sample S5	8-10	-	Very loose, gray, fine SAND; wet; hydrocarbon odor
* B8S8	9/8/2010	Duplicate of Sample B8S3	4-6	430	Loose, gray SAND; moist; hydrocarbon odor
Groundwater Samples					
* B2MW	9/15/2010	Monitoring Well B2MW	4.67	-	Groundwater
* B4MW	9/15/2010	Monitoring Well B4MW	6.47	-	Groundwater; foamy
* B5MW	9/15/2010	Monitoring Well B5MW	6.14	-	Groundwater; sheen on purgewater; hydrocarbon odor
* B6MW	9/15/2010	Monitoring Well B6MW	6.95	-	Groundwater
* B7MW	9/15/2010	Monitoring Well B7MW	6.83	-	Groundwater
* B8MW	9/15/2010	Monitoring Well B8MW	5.38	-	Groundwater; hydrocarbon odor
* B9MW	9/15/2010	Duplicate of Sample B8MW	5.38	-	Groundwater; hydrocarbon odor
Quality Control Samples					
* STB	9/8/2010	Soil Trip Blank	-	-	Ottawa sand with methanol added in the laboratory
* WTB	9/15/2010	Water Trip Blank	-	-	Organic-free water blank prepared in the laboratory

KEY DESCRIPTION

- * Sample analyzed by the project laboratory (See Tables 3 and 4)
- ^ Field screening instrument was a ThermoInstruments 580B photoionization detector (PID)
- ** Sample classification applies to the portion of the specified sample interval from which the sample was collected
- Measurement not recorded or not applicable
- bgs Below ground surface
- ppm Parts per million

TABLE 2 - WELL SAMPLING LOG

WATER LEVEL MEASUREMENT DATA

Well Number	B2MW	B4MW	B5MW	B6MW	B7MW	B8MW
Date Water Level Measured	10/14/2010	10/14/2010	10/14/2010	10/14/2010	10/14/2010	10/14/2010
Time Water Level Measured	14:50	14:40	14:43	14:36	14:46	14:53
Surveyed TOC Elevation (ft)	99.89	100.54	100.45	100.45	100.39	99.91
Measured Depth to Water (ft below TOC)	4.50	6.07	5.62	6.60	6.14	4.72
Water Level Elevation (ft)	95.39	94.47	94.83	93.85	94.25	95.19

Survey conducted by Shannon & Wilson on October 14, 2010

DEVELOPMENT/SAMPLING DATA

Well Number	B2MW	B4MW	B5MW	B6MW	B7MW	B8MW
Date Sampled	9/15/2010	9/15/2010	9/15/2010	9/15/2010	9/15/2010	9/15/2010
Time Sampled	11:04	12:54	13:43	15:41	14:12	14:53
Measured Depth to Water (ft below TOC)	4.69	5.42	4.91	6.11	5.97	3.99
Total Depth of Well (ft below TOC)	6.24	11.75	8.18	8.25	9.94	10.10
Water Column in Well (ft)	1.55	6.33	3.27	2.14	3.97	6.11
Gallons per Foot	0.16	0.16	0.16	0.16	0.16	0.16
Water Column Volume (gallons)	0.250	1.01	0.52	0.34	0.64	0.98
Total Volume Pumped (gallons)	0.8	3.2	1.8	0.7	0.1	0.1
Purge Method	Proactive Pump	Proactive Pump	Proactive Pump	Proactive Pump	Proactive Pump	Proactive Pump
Sampling Method	Proactive Pump	Proactive Pump	Proactive Pump	Disposable Bailor	Proactive Pump	Proactive Pump
Diameter of Well Casing	2-inch	2-inch	2-inch	2-inch	2-inch	2-inch
Remarks		Foamy	Sheen, hydrocarbon odor			Hydrocarbon odor

WATER QUALITY DATA

Well Number	B2MW	B4MW	B5MW	B6MW	B7MW	B8MW
Temperature (°C)	12.6	11.1	11.6	13.2	11.1	10.4
Specific Conductance (µS/cm)	46	181	188	186	268	293
pH (Standard Units)	6.86	6.85	6.31	6.36	5.93	6.30
Turbidity (NTU)	94	23	68	>1,000	>1,000	69

Note: Water quality parameters were measured with a Hanna field water quality instrument and Hach Turbidimeter

KEY DESCRIPTION

- TOC Top of casing
- °C Degrees celsius
- ft Feet
- µS/cm Microsiemens per centimeter
- mg/L Milligrams per liter
- NTU Nephelometric turbidity units

TABLE 3 - SUMMARY OF SOIL SAMPLE ANALYTICAL RESULTS

Parameter Tested	Method*	Cleanup Level (mg/kg)**	Sample ID Number [^] , and Collection Depth in Feet (See Table 1, Figure 2, and Appendix C)					QC
			Soil Boring B7		Soil Boring B8			
			B7S1 0-2	B7S3 4-6	B8S2 2-4	B8S3 4-6	B8S8~ 4-6	
PID Headspace Reading - ppm	580B PID	-	1.3	0.0	430	430	430	-
Percent Solids	SM20 2540G	-	91.5	91.4	91.6	84.8	85.3	-
Gasoline Range Organics (GRO) - mg/kg	AK 101	300	<2.34	<2.87	565	74.5	51.3	<2.48
Diesel Range Organics (DRO) - mg/kg	AK 102	250	<108	177	43,100	10,300	10,200	-
Aromatic Volatile Organics (BTEX)								
Benzene - mg/kg	EPA 8260B	0.025	<0.0117	<0.0144	<0.424	<0.185	<0.0215	<0.0124
Toluene - mg/kg	EPA 8260B	6.5	<0.0468	<0.0574	<1.70	<0.739	<0.0859	<0.0496
Ethylbenzene - mg/kg	EPA 8260B	6.9	<0.0234	<0.0287	4.59	1.19	0.652	<0.0248
Xylenes (total) - mg/kg	EPA 8260B	63	<0.0937	<0.115	13.4	4.65	2.65	<0.0991
Volatile Organic Compounds (VOCs)								
4-Isopropyltoluene - mg/kg	EPA 8260B	-	-	-	3.77	1.34	0.997	-
Naphthalene - mg/kg	EPA 8260B	20	0.129 B	0.145 B	32.1 B	9.18 B	9.83 B	0.122
n-Butylbenzene - mg/kg	EPA 8260B	15	-	-	-	1.31	0.775	-
Polynuclear Aromatic Hydrocarbons (PAHs)								
1-Methylnaphthalene - mg/kg	EPA 8270D SIMS	6.2	-	-	-	25.3	-	-
2-Methylnaphthalene - mg/kg	EPA 8270D SIMS	6.1	-	-	-	43.0	-	-
Acenaphthene - mg/kg	EPA 8270D SIMS	180	-	-	-	1.32	-	-
Anthracene - mg/kg	EPA 8270D SIMS	3,000	-	-	-	0.665	-	-
Chrysene - mg/kg	EPA 8270D SIMS	360	-	-	-	0.0186	-	-
Fluoranthene - mg/kg	EPA 8270D SIMS	1,400	-	-	-	0.341	-	-
Fluorene - mg/kg	EPA 8270D SIMS	220	-	-	-	6.42	-	-
Naphthalene - mg/kg	EPA 8270D SIMS	20	-	-	-	1.52	-	-
Phenanthrene - mg/kg	EPA 8270D SIMS	3,000	-	-	-	18.0	-	-
Pyrene - mg/kg	EPA 8270D SIMS	1,000	-	-	-	1.08	-	-
Other PAHs - mg/kg	EPA 8270D SIMS	various	-	-	-	ND	-	-

KEY DESCRIPTION

[^]	Sample ID No. preceded by "16828-" on the chain of custody form
QC	Quality control
~	Duplicate of Sample B8S3
*	See Appendix C for compounds tested, methods, and laboratory reporting limits
**	Soil cleanup level is the most stringent standard listed in Table B1 or B2, 18 AAC 75.341 (October 9, 2008)
ppm	Parts per million
mg/kg	Milligrams per kilogram
<2.34	Analyte not detected; laboratory reporting limit of 2.34 mg/kg
<0.424	Reporting limit is greater than the ADEC Table B1 or B2 Cleanup Level
ND	Individual analytes not detected
565	Reported concentration exceeds the regulated cleanup level
STB	Trip blank - soil
-	Not applicable or sample not tested for this analyte
B	Reported in the trip blank at a concentration greater than the project sample reporting limit

TABLE 4 - SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

Parameter Tested	Method*	Sample ID Number^ and Water Depth in Feet BTOC (See Table 1, Figure 2, and Appendix C)										QC
		Monitoring Wells										
	Cleanup Level (mg/L)**	B2MW	B4MW	B5MW	B6MW	B7MW	B8MW	B9MW~			WTB	
Gasoline Range Organics (GRO) - mg/L	AK 101	<0.100	<0.100	<0.100	<0.100	<0.100	0.558	3.99	<0.100	<0.100	<0.100	
Diesel Range Organics (DRO) - mg/L	AK 102	<0.769	3.24	1.19	<0.714	<0.769	29.1	0.523	3.19	<0.100		
Aromatic Volatile Organics (BTEX)												
Benzene - mg/L	EPA 8021B	<0.000500	0.00216	<0.000500	<0.000500	<0.000500	0.00217	0.00262	<0.000500	<0.000500		
Toluene - mg/L	EPA 8021B	<0.00200	<0.00200	<0.00200	<0.00200	<0.00200	0.00251	<0.00200	<0.00200	<0.00200		
Ethylbenzene - mg/L	EPA 8021B	<0.00200	<0.00200	<0.00200	<0.00200	<0.00200	0.0246	0.0240	<0.00200	<0.00200		
Xylenes (total) - mg/L	EPA 8021B	<0.00200	<0.00200	<0.00200	<0.00200	<0.00200	0.0939	0.0901	<0.00200	<0.00200		
Volatile Organic Compounds (VOCs)												
Naphthalene - mg/L	SW 8260B	<0.00200	<0.00200	<0.00200	<0.00200	<0.00200	0.0746	0.0706	<0.00200	<0.00200		
Polynuclear Aromatic Hydrocarbons (PAHs)												
1-Methylnaphthalene - mg/L	8270D SIMS	-	-	-	-	-	0.137	-	-	-		
2-Methylnaphthalene - mg/L	8270D SIMS	-	-	-	-	-	0.197	-	-	-		
Acenaphthene - mg/L	8270D SIMS	-	-	-	-	-	0.00719	-	-	-		
Acenaphthylene - mg/L	8270D SIMS	-	-	-	-	-	0.00159	-	-	-		
Anthracene - mg/L	8270D SIMS	-	-	-	-	-	0.00188	-	-	-		
Fluoranthene - mg/L	8270D SIMS	-	-	-	-	-	0.000231	-	-	-		
Fluorene - mg/L	8270D SIMS	-	-	-	-	-	0.0125	-	-	-		
Naphthalene - mg/L	8270D SIMS	-	-	-	-	-	0.0354	-	-	-		
Phenanthrene - mg/L	8270D SIMS	-	-	-	-	-	0.0201	-	-	-		
Pyrene - mg/L	8270D SIMS	-	-	-	-	-	0.000664	-	-	-		
Other PAHs - mg/L	8270D SIMS	-	-	-	-	-	ND	-	-	-		

KEY DESCRIPTION

- ^ Sample ID No. preceded by "16828-" on the chain of custody form
- QC Quality control
- * See Appendix C for compounds tested, methods, and laboratory reporting limits
- ** Groundwater cleanup levels are listed in Table C, 18 AAC 75.345 (October 9, 2008)
- ~ Duplicate of B8MW
- WTB Trip blank - water
- mg/L Milligrams per liter
- <0.100 Analyte not detected; laboratory reporting limit of 0.100 mg/L
- Not applicable or sample not tested for this analyte
- 3.24 Reported concentration exceeds the regulated cleanup level
- BTOC Below top of casing
- ND Not detected

TABLE 5 - SUMMARY OF HISTORICAL GROUNDWATER DATA

Monitoring Well	Date	Water Depth (Feet) BTOC	Parameter Tested and Cleanup Level (in mg/L)					
			GRO 1.3	DRO 1.5	Benzene 0.005	Toluene 1.0	Ethylbenzene 0.7	Xylenes 10.0
B1MW	6/6/2004	3.92	0.243	1.65	0.00616	<0.00200	0.0132	0.0340
	5/13/2005	3.78	0.239	13.2	0.000531	<0.00200	0.00340	0.00428
	6/12/2006^	5.14	-	782	0.0118	<0.00200	0.00834	0.01014
	6/28/2007	4.79	-	8.11	0.00196	<0.00200	<0.00200	0.00253
	7/17/2008	-	No water, well possibly damaged					
	5/21/2009	-	Blockage in well					
	-	-	Well decommissioned November 2, 2009					
B2MW	6/6/2004	3.81	<0.0900	<0.337	<0.000500	<0.00200	<0.00200	<0.00200
	5/13/2005	3.67	<0.0900	<0.330	<0.000500	<0.00200	<0.00200	<0.00200
	6/12/2006^	5.22	-	0.451	<0.000500	<0.00200	<0.00200	<0.00200
	6/28/2007^	5.04	-	0.505	<0.000500	<0.00200	<0.00200	<0.00200
	7/17/2008	4.87	-	1.39	-	-	-	-
	5/21/2009	4.80	-	<0.714	-	-	-	-
	11/4/2009	5.25	-	1.16	-	-	-	-
	9/15/2010	4.69	<0.100	<0.769	<0.000500	<0.00200	<0.00200	<0.00200
B3MW	6/6/2004	4.67	<0.0900	0.504	<0.000500	<0.00200	<0.00200	<0.00200
	5/13/2005	3.68	<0.0900	0.922	<0.000500	<0.00200	<0.00200	<0.00200
	6/12/2006^	5.56	-	0.481	<0.000500	<0.00200	<0.00200	<0.00200
	6/29/2007	5.26	-	0.410	<0.000500	<0.00200	<0.00200	<0.00200
	7/17/2008	5.46	Insufficient water volume for sample collection					
	5/21/2009	-	Blockage in well					
	-	-	Well decommissioned November 2, 2009					
B4MW	7/17/2008^	5.80	0.121	1.63	<0.000500	0.00287	<0.00200	0.00259
	5/22/2009^	5.91	<0.100	3.93	<0.00113	<0.00200	<0.00200	0.00512 J
	11/4/2009^	5.84	<0.100	2.22	0.00143	<0.00200	<0.00200	<0.00200
	9/15/2010	5.42	<0.100	3.24	0.00216	<0.00200	<0.00200	<0.00200
B5MW	11/5/2009	5.51	<0.100	2.23	<0.000500	<0.00200	<0.00200	<0.00200
	9/15/2010	4.91	<0.100	1.19	<0.000500	<0.00200	<0.00200	<0.00200
B6MW	11/5/2009	6.39	<0.100	<0.952	<0.000500	<0.00200	<0.00200	<0.00200
	9/15/2010	6.11	<0.100	<0.714	<0.000500	<0.00200	<0.00200	<0.00200
B7MW	9/15/2010	5.97	<0.100	<0.769	<0.000500	<0.00200	<0.00200	<0.00200
B8MW	9/15/2010^	3.99	0.558	29.1	0.00262	0.00251	0.0246	0.0939

KEY DESCRIPTION

mg/L Milligrams per liter

<0.00200 Analyte not detected; laboratory reporting limit was 0.00200 mg/L

^ Higher analytical result of the sample and duplicate

- Not analyzed for this parameter

0.243 Analyte detected

1.65 Reported concentration exceeds the regulated cleanup level

BTOC Below top of casing

TABLE 6 - QUALITY CONTROL DATA

Boring B8 Soil Samples

Parameter	Primary Sample (Sample B8S3)	Duplicate Sample (Sample B8S8)	Precision (RPD)	Precision DQO
Gasoline Range Organics (GRO) - mg/kg	74.5	51.3	37%	50%
Diesel Range Organics (DRO) - mg/kg	10,300	10,200	1%	
Aromatic Volatile Organics (BTEX)				
Benzene - mg/kg	0.00461	<0.0215	NA	50%
Toluene - mg/kg	<0.739	<0.0859	NA	50%
Ethylbenzene - mg/kg	1.19	0.652	58%	50%
Xylenes - mg/kg	4.65	2.65	55%	50%
Volatile Organic Compounds (VOCs)				
4-Isopropyltoluene - mg/kg	1.34	0.997	29%	50%
Naphthalene - mg/kg	9.18	9.83	7%	50%
n-Butylbenzene - mg/kg	1.31	0.775	51%	50%

Monitoring Well B8MW Goundwater Samples

Parameter	Primary Sample (Sample B8MW)	Duplicate Sample (Sample B9MW)	Precision (RPD)	Precision DQO
Gasoline Range Organics (GRO) - mg/L	0.558	0.523	6%	30%
Diesel Range Organics (DRO) - mg/L	29.1	3.19	160%	30%
Aromatic Volatile Organics (BTEX)				
Benzene - mg/L	0.00217	0.00262	19%	30%
Toluene - mg/L	0.00251	<0.00200	NA	30%
Ethylbenzene - mg/L	0.0246	0.0240	2%	30%
Xylenes - mg/L	0.0939	0.0901	4%	30%
Volatile Organic Compounds (VOCs)				
Naphthalene -mg/L	0.0746	0.0706	6%	30%

KEY DESCRIPTION

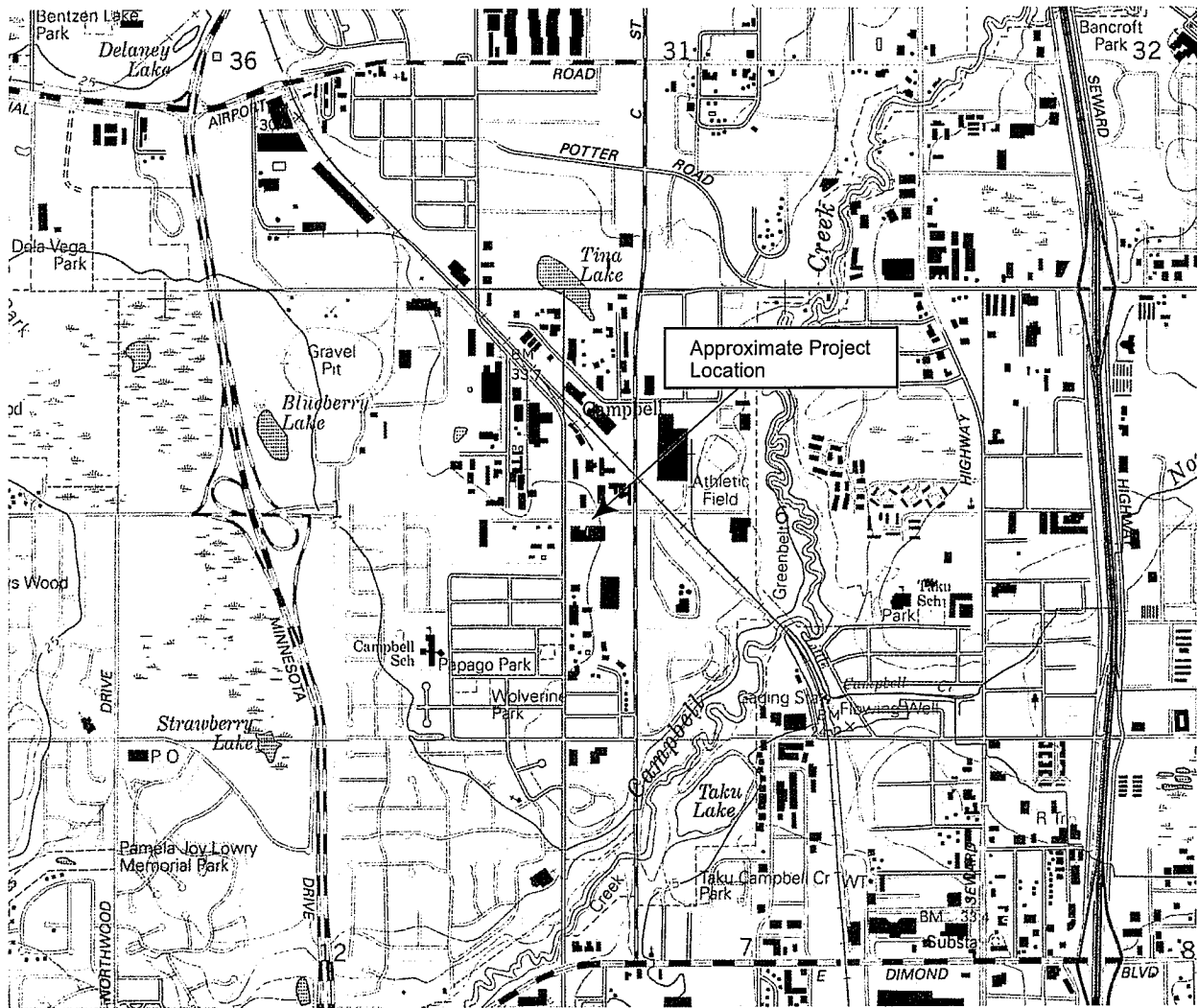
58% Exceeds Relative Percent Difference (RPD) DQO

mg/kg Milligrams per kilogram

mg/L Milligrams per liter

NA RPDs were not calculated due to non-detect or below laboratory reporting limits results


DQO Data quality objective

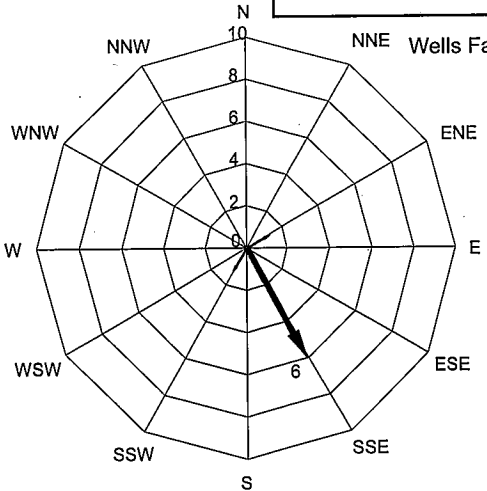
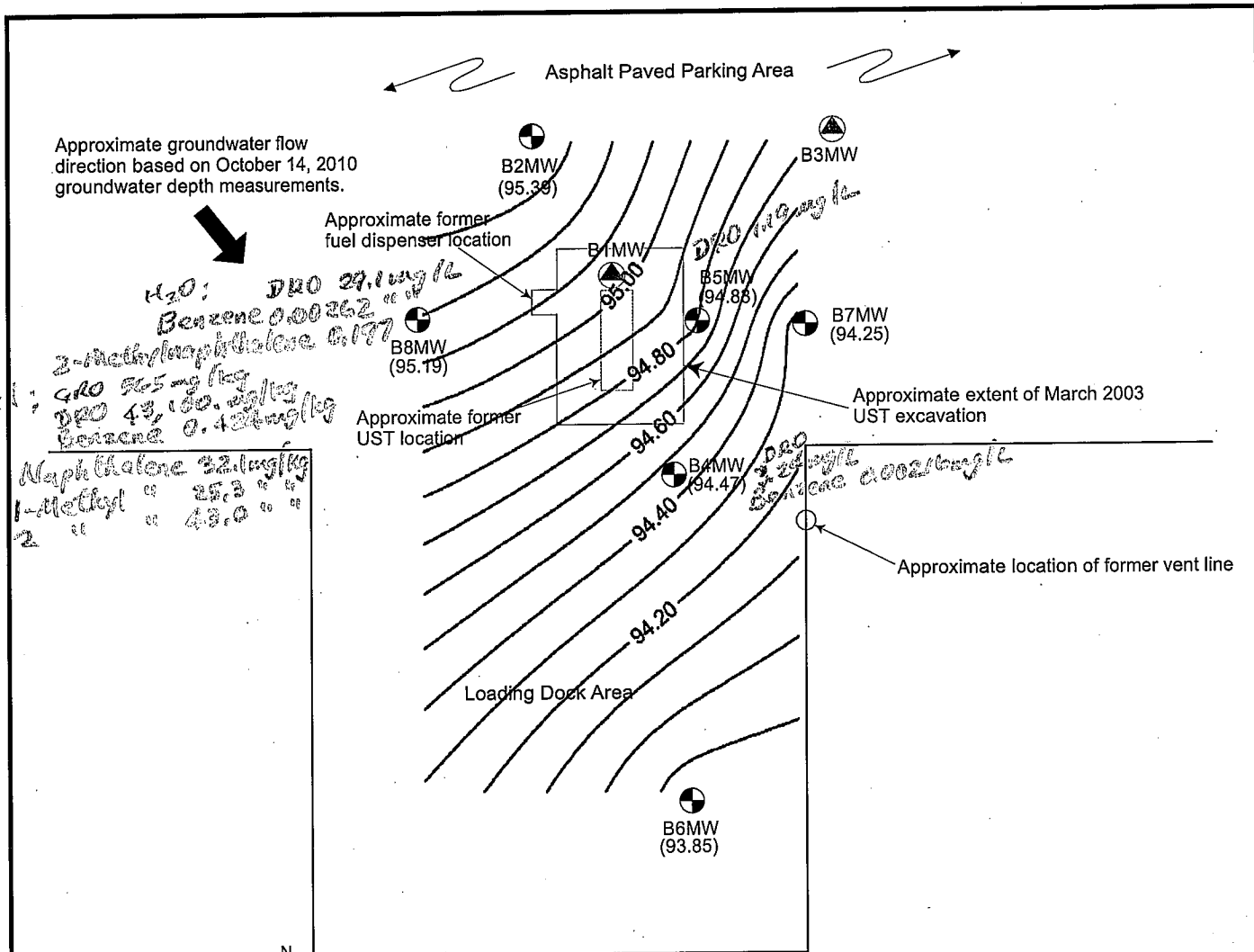


Elevation in Meters
 Contour Interval 5 Meters
 Taken from Anchorage A-8 NW
 U.S. Geological Survey Quadrangle

0 0.5
 APPROXIMATE SCALE IN MILES



6831 Arctic Boulevard Anchorage, Alaska	
VICINITY MAP	
December 2010	32-1-16828-008
 SHANNON & WILSON, INC. Geotechnical & Environmental Consultants	Fig. 1

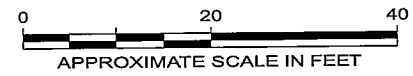


Rose/Star Groundwater Flow Diagram

Number of times groundwater has flowed in a particular direction during six monitoring events since 2004. Groundwater flow direction could not be determined for the May 2009 monitoring event because only two water elevations were collected.

LEGEND

- B2MW (95.39) Approximate location of existing Monitoring Well B2MW
- Groundwater elevation in feet, measured on October 14, 2010
- B3MW Approximate location of well that was decommissioned November 2, 2009
- 94.40- Estimated Location of Equipotential Line of Potentiometric Surface with Elevation of 94.4 Feet based on October 14, 2010 depth-to-water measurements (relative to an arbitrary benchmark of 100 ft.)



6831 Arctic Boulevard Anchorage, Alaska	
SITE PLAN	
December 2010	32-1-16828-008
SHANNON & WILSON, INC. Geotechnical & Environmental Consultants	
Fig. 2	



APPENDIX A
SITE PHOTOGRAPHS

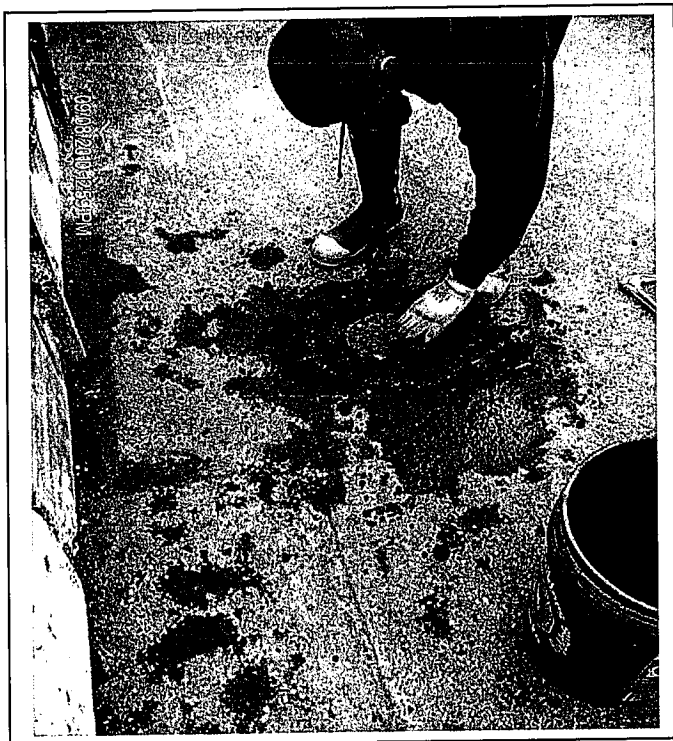


Photo 1: Monitoring wells were installed in each of the borings. Protective monuments were placed around the PVC casing and set in place with a cold-patch; Monitoring Well B7MW looking south. (September 8, 2010)

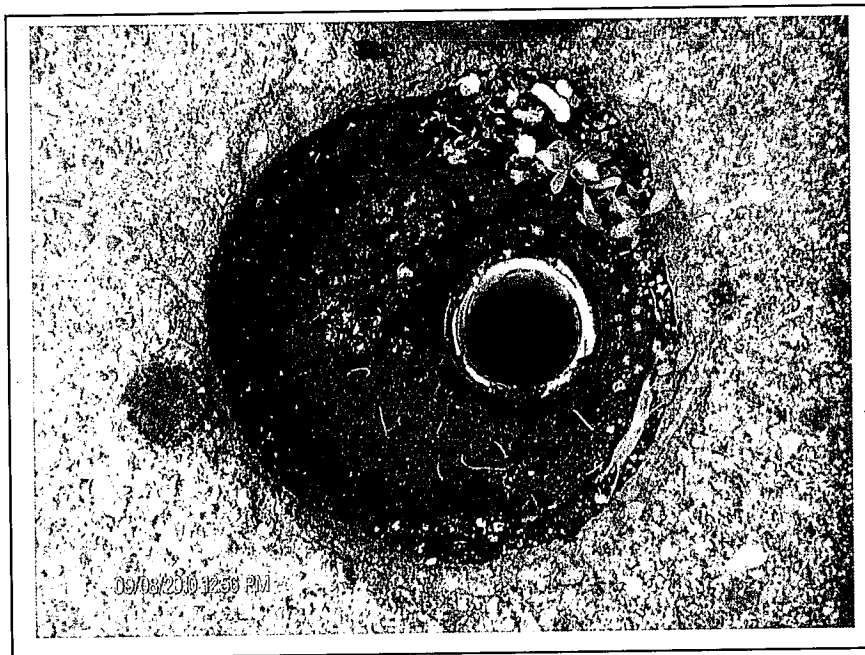


Photo 2: Monitoring Well B2MW was found to be damaged. Note the cracked PVC well casing, debris inside the well casing, and damaged monument. (September 8, 2010)

6831 Arctic Boulevard
Anchorage, Alaska

PHOTOS 1 AND 2

December 2010

32-1-16828-008



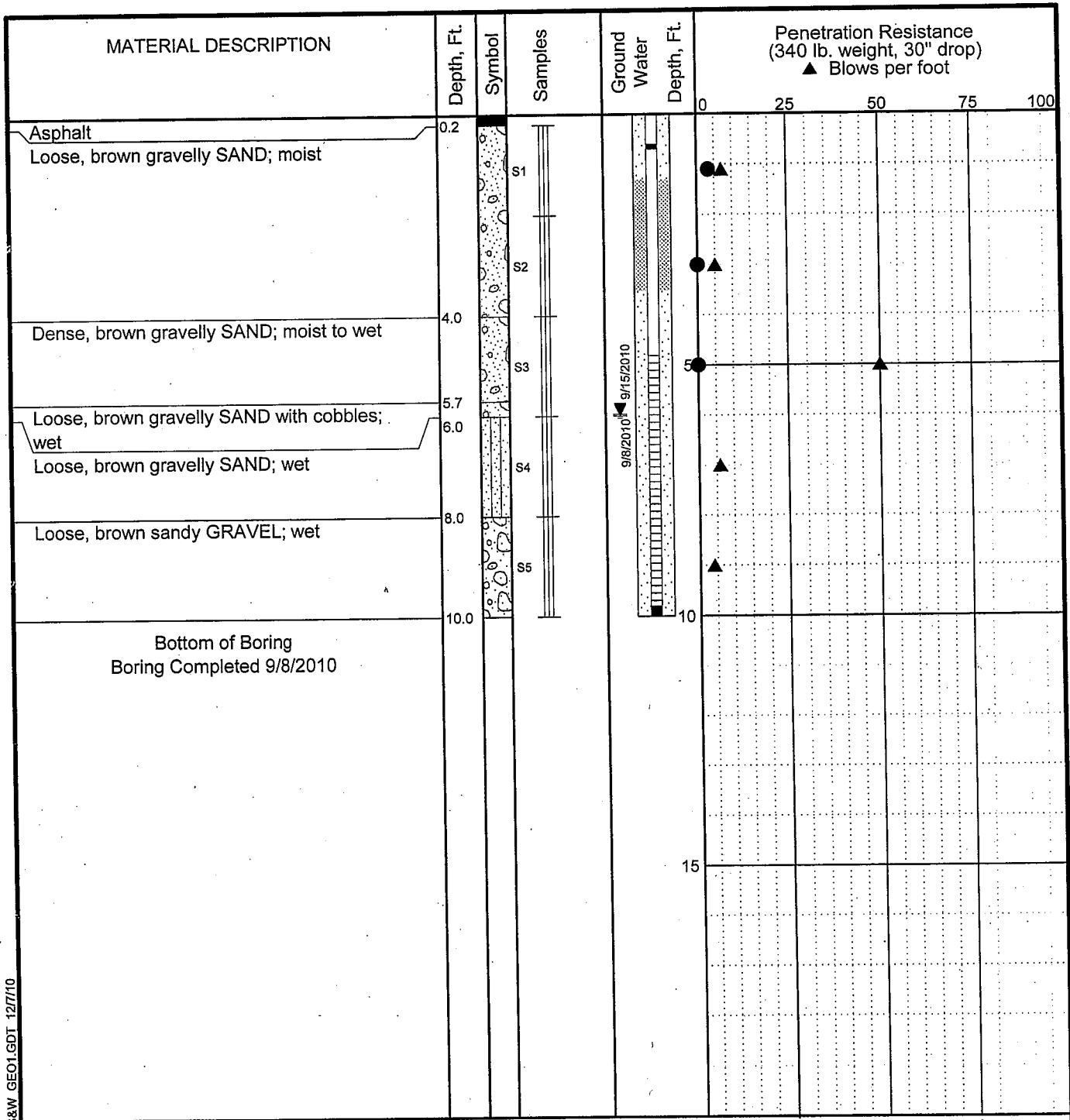
SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

A-1

APPENDIX B

BORING LOGS AND MONITORING WELL DETAILS

ENVIRONMENTAL LOG 16828-B BORING AND WELL LOGS.GPJ S&W GEO1.GDT 12/7/10



LEGEND

- * Sample Not Recovered
- III 3" O.D. Split Spoon Sample
- Surface Seal
- Solid Casing and Annular Seal
- Well Casing and Filter Sand
- Cuttings Backfill
- ▽ Ground Water Level At Time Of Drilling
- ▼ Static Water Level

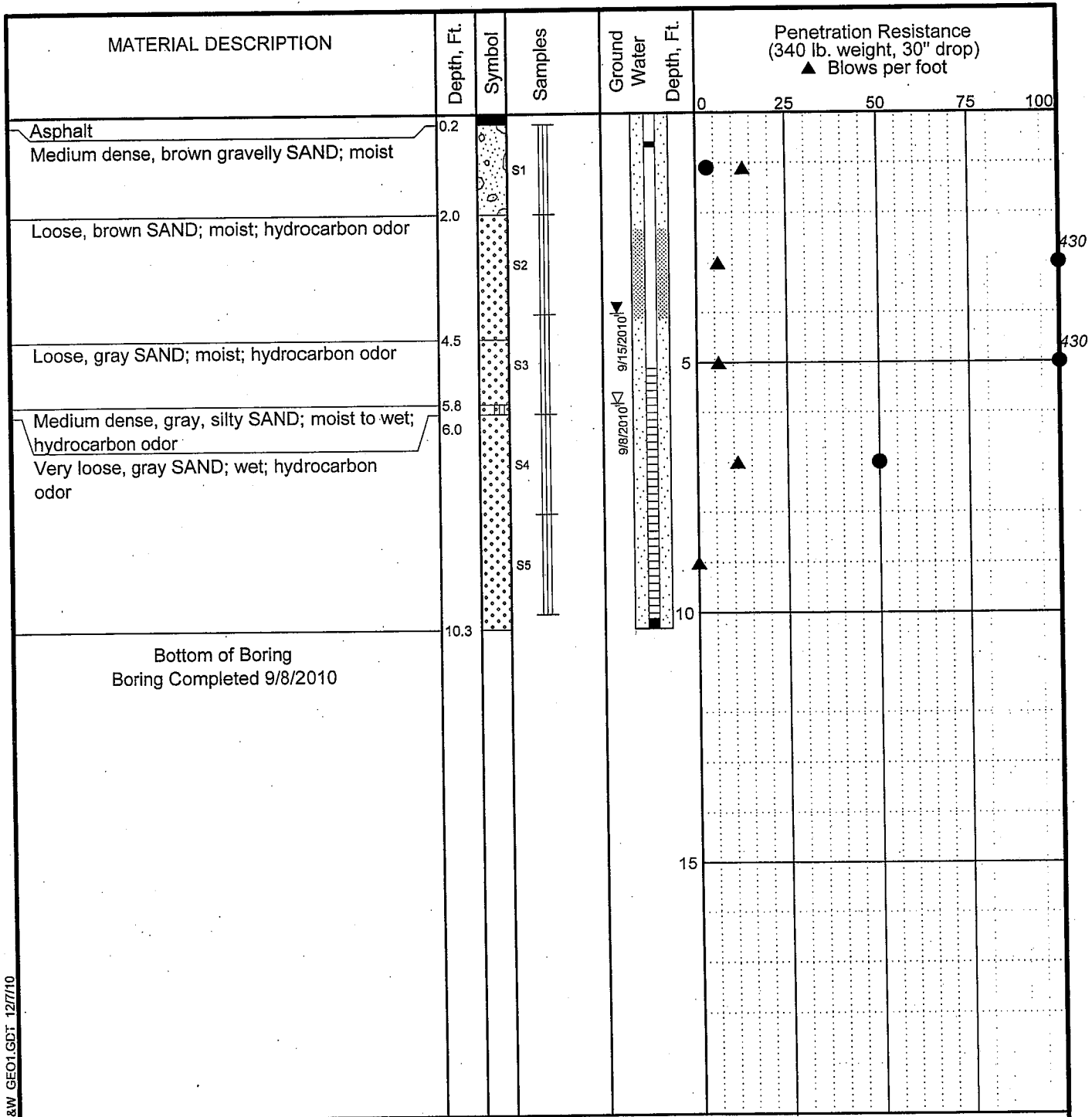
● PID Reading (ppm)

NOTES

- The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
- The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
- Water level, if indicated above, is for the date specified and may vary.
- USC letter symbol based on visual classification.

6831 Arctic Boulevard Anchorage, Alaska	
LOG OF BORING B7	
December 2010	32-1-16828-008
SHANNON & WILSON, INC. Geotechnical and Environmental Consultants	B-1

ENVIRONMENTAL LOG 16828-8 BORING AND WELL LOGS.GPJ S&W GEOT.GDT 12/7/10



LEGEND

- * Sample Not Recovered
- III 3" O.D. Split Spoon Sample
- Surface Seal
- Solid Casing and Annular Seal
- Well Casing and Filter Sand
- Cuttings Backfill
- Ground Water Level At Time Of Drilling
- Static Water Level

● PID Reading (ppm)

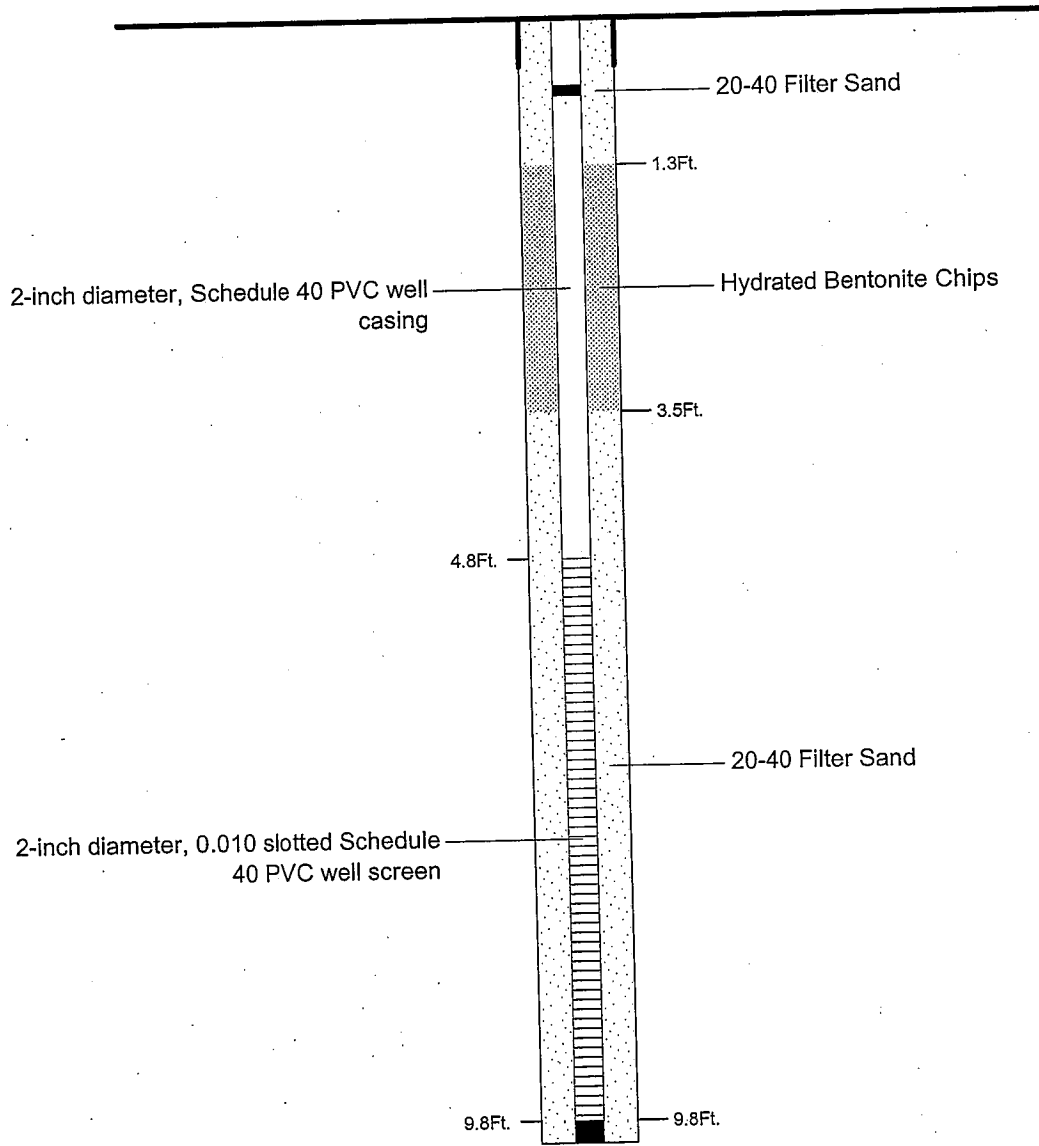
NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. USC letter symbol based on visual classification.

6831 Arctic Boulevard Anchorage, Alaska	
LOG OF BORING B8	
December 2010	32-1-16828-008
SHANNON & WILSON, INC. Geotechnical and Environmental Consultants	B-2

Casing Description

Backfill Description




9/8/2010 9/15/2010

LEGEND

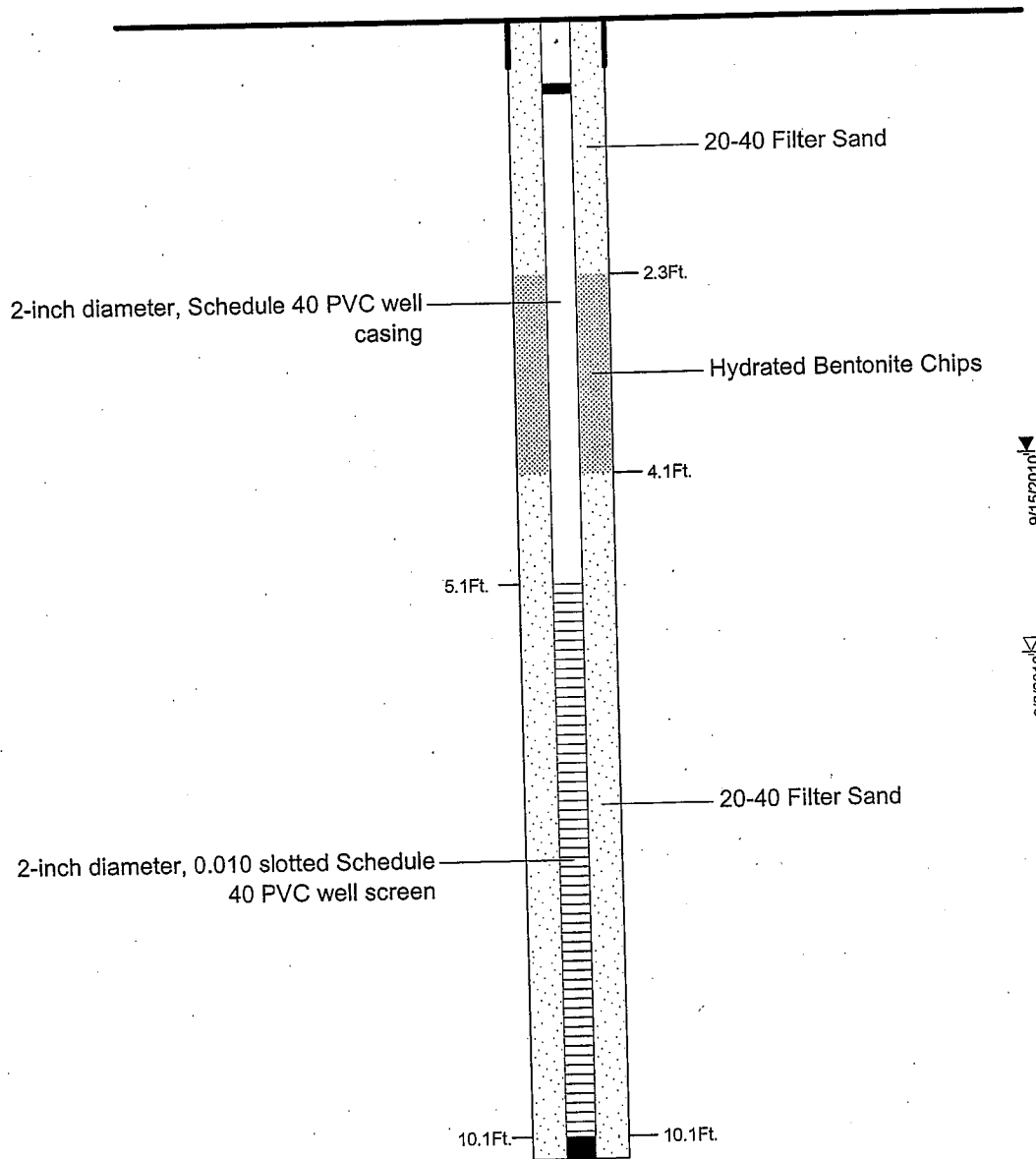
- ∇ Ground Water Level ATD
- ∇ Static Ground Water Level

NOTE: All joints use threaded connections.

6831 Arctic Boulevard Anchorage, Alaska	
MONITORING WELL B7MW CONSTRUCTION DETAIL	
December 2010	32-1-16828-008
 SHANNON & WILSON, INC. Geotechnical and Environmental Consultants	B-3

Casing Description


Backfill Description



LEGEND

- ▽ Ground Water Level ATD
- ▼ Static Ground Water Level

NOTE: All joints use threaded connections.

6831 Arctic Boulevard Anchorage, Alaska	
MONITORING WELL B8MW CONSTRUCTION DETAIL	
December 2010	32-1-16828-008
 SHANNON & WILSON, INC. Geotechnical and Environmental Consultants	B-4

APPENDIX C

RESULTS OF ANALYTICAL TESTING BY

SGS ENVIRONMENTAL SERVICES

OF ANCHORAGE, ALASKA

AND

ADEC LABORATORY DATA REVIEW CHECKLISTS



SGS North America Inc.
Alaska Division
Level II Laboratory Data Report

Project: 16828-008 Wells Fargo
Client: Shannon & Wilson, Inc.
SGS Work Order: 1104692

Released by:

SGS North America
Alaska Division Project Manager

Jennifer Serna
2010.09.22
10:52:45
-08'00'

Contents (Bookmarked in PDF):

- Cover Page
- Case Narrative
- Sample Results Forms
- Quality Control Summary Forms
- Chain of Custody/Sample Receipt Forms
- Attachments (if applicable)



Case Narrative

Client SHANNOT Shannon & Wilson, Inc.
Workorder 1104692 16828-008 Wells Fargo

Printed Date/Time 9/22/2010 10:36

Sample ID Client Sample ID

990606 *CCV CCV for HBN 820683 [VMS/11604]
8260B - CCV recovery for vinyl chloride and 2-butanone does not meet QC criteria (biased high). These analytes were not detected in the associated samples.

990941 *MSD Upstream-Com...(1104752001MSD)
8260B - MS/MSD RPD does not meet laboratory QC criteria for chloroethane and trichlorofluormethane. These analytes were not detected in the associated samples.

* QC comments may be associated with the field samples found in this report. When applicable, comments will be applied to associated field samples.



Detectable Results Summary

Print Date: 9/22/2010 10:36 am

Client Sample ID: 16828-B8S2

SGS Ref. #: 1104692001

Volatile Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Gasoline Range Organics	565	mg/Kg

Semivolatile Organic Fuels Department

Diesel Range Organics	43100	mg/Kg
-----------------------	-------	-------

Volatile Gas Chromatography/Mass Spectroscopy

Ethylbenzene	4590	ug/Kg
4-Isopropyltoluene	3770	ug/Kg
P & M -Xylene	8690	ug/Kg
Naphthalene	32100	ug/Kg
o-Xylene	4730	ug/Kg
Xylenes (total)	13400	ug/Kg

Client Sample ID: 16828-B8S3

SGS Ref. #: 1104692002

Volatile Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Gasoline Range Organics	74.5	mg/Kg

Semivolatile Organic Fuels Department

Diesel Range Organics	10300	mg/Kg
-----------------------	-------	-------

Volatile Gas Chromatography/Mass Spectroscopy

Ethylbenzene	1190	ug/Kg
n-Butylbenzene	1310	ug/Kg
4-Isopropyltoluene	1340	ug/Kg
P & M -Xylene	3200	ug/Kg
Naphthalene	9180	ug/Kg
o-Xylene	1460	ug/Kg
Xylenes (total)	4650	ug/Kg

Polynuclear Aromatics GC/MS

Naphthalene	1520	ug/Kg
2-Methylnaphthalene	43000	ug/Kg
1-Methylnaphthalene	25300	ug/Kg
Acenaphthene	1320	ug/Kg
Fluorene	6420	ug/Kg
Phenanthrene	18000	ug/Kg
Anthracene	665	ug/Kg
Fluoranthene	341	ug/Kg
Pyrene	1080	ug/Kg
Chrysene	18.6	ug/Kg



SGS Ref.# 1104692001
Client Name Shannon & Wilson, Inc.
Project Name/# 16828-008 Wells Fargo
Client Sample ID 16828-B8S2
Matrix Soil/Solid (dry weight).

Printed Date/Time 09/22/2010 10:36
Collected Date/Time 09/08/2010 10:12
Received Date/Time 09/08/2010 14:52
Technical Director Stephen C. Ede

Sample Remarks:

AK102 - 5a-Androstane (surrogate) recovery is outside QC criteria due to sample dilution.
AK102 - The pattern is consistent with a weathered middle distillate.
AK101 - BFB (surrogate) recovery does not meet QC criteria (biased high) due to matrix interference.

Parameter	Results	LOQ	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
<u>Volatile Fuels Department</u>									
Gasoline Range Organics	565	212	mg/Kg	AK101	B			09/15/10	EAB
Surrogates									
4-Bromofluorobenzene <surr>	2080	!	%	AK101	B	50-150		09/15/10	EAB
<u>Semivolatile Organic Fuels Department</u>									
Diesel Range Organics	43100	2830	mg/Kg	AK102	A		09/12/10	09/13/10	LCE
Surrogates									
5a Androstane <surr>	0	!	%	AK102	A	50-150	09/12/10	09/13/10	LCE
<u>Volatile Gas Chromatography/Mass Spectroscopy</u>									
4-Isopropyltoluene	3770	848	ug/Kg	SW8260B	B			09/16/10	JDB
Benzene	424 U	424	ug/Kg	SW8260B	B			09/16/10	JDB
Ethylbenzene	4590	848	ug/Kg	SW8260B	B			09/16/10	JDB
Naphthalene	32100	1700	ug/Kg	SW8260B	B			09/16/10	JDB
o-Xylene	4730	1700	ug/Kg	SW8260B	B			09/16/10	JDB
P & M -Xylene	8690	1700	ug/Kg	SW8260B	B			09/16/10	JDB
Toluene	1700 U	1700	ug/Kg	SW8260B	B			09/16/10	JDB
Xylenes (total)	13400	3390	ug/Kg	SW8260B	B			09/16/10	JDB
Surrogates									
1,2-Dichloroethane-D4 <surr>	88.9		%	SW8260B	B	69-132		09/16/10	JDB
4-Bromofluorobenzene <surr>	121		%	SW8260B	B	65-144		09/16/10	JDB
Toluene-d8 <surr>	102		%	SW8260B	B	84-124		09/16/10	JDB



SGS Ref.# 1104692002
Client Name Shannon & Wilson, Inc.
Project Name/# 16828-008 Wells Fargo
Client Sample ID 16828-B8S3
Matrix Soil/Solid (dry weight)

Printed Date/Time 09/22/2010 10:36
Collected Date/Time 09/08/2010 10:19
Received Date/Time 09/08/2010 14:52
Technical Director Stephen C. Ede

Sample Remarks:

8270D SIM - LOQs are elevated due to sample dilution. Sample analyzed at a dilution due to matrix interference with internal standards.
 AK102 - The pattern is consistent with a weathered middle distillate.
 AK102 - 5a-Androstane (surrogate) recovery is outside QC criteria due to sample dilution.
 AK101 - BFB (surrogate) recovery does not meet QC criteria (biased high) due to matrix interference.

Parameter	Results	LOQ	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
<u>Volatile Fuels Department</u>									
Gasoline Range Organics	74.5	18.5	mg/Kg	AK101	B			09/16/10	EAB
Surrogates									
4-Bromofluorobenzene <surr>	364	!	%	AK101	B	50-150		09/16/10	EAB
<u>Semivolatile Organic Fuels Department</u>									
Diesel Range Organics	10300	466	mg/Kg	AK102	A		09/12/10	09/13/10	LCE
Surrogates									
5a Androstane <surr>	0	!	%	AK102	A	50-150	09/12/10	09/13/10	LCE
<u>Volatile Gas Chromatography/Mass Spectroscopy</u>									
4-Isopropyltoluene	1340	370	ug/Kg	SW8260B	B			09/16/10	JDB
Benzene	185 U	185	ug/Kg	SW8260B	B			09/16/10	JDB
Ethylbenzene	1190	370	ug/Kg	SW8260B	B			09/16/10	JDB
Naphthalene	9180	739	ug/Kg	SW8260B	B			09/16/10	JDB
n-Butylbenzene	1310	370	ug/Kg	SW8260B	B			09/16/10	JDB
o-Xylene	1460	739	ug/Kg	SW8260B	B			09/16/10	JDB
P & M -Xylene	3200	739	ug/Kg	SW8260B	B			09/16/10	JDB
Toluene	739 U	739	ug/Kg	SW8260B	B			09/16/10	JDB
Xylenes (total)	4650	1480	ug/Kg	SW8260B	B			09/16/10	JDB
Surrogates									
1,2-Dichloroethane-D4 <surr>	89.4		%	SW8260B	B	69-132		09/16/10	JDB



SGS Ref.# 1104692002
Client Name Shannon & Wilson, Inc.
Project Name/# 16828-008 Wells Fargo
Client Sample ID 16828-B8S3
Matrix Soil/Solid (dry weight)

Printed Date/Time 09/22/2010 10:36
Collected Date/Time 09/08/2010 10:19
Received Date/Time 09/08/2010 14:52
Technical Director: Stephen C. Ede



SGS Ref.# 1104692003
Client Name Shannon & Wilson, Inc.
Project Name/# 16828-008 Wells Fargo
Client Sample ID 16828-B8S8
Matrix Soil/Solid (dry weight)

Printed Date/Time 09/22/2010 10:36
Collected Date/Time 09/08/2010 10:24
Received Date/Time 09/08/2010 14:52
Technical Director Stephen C. Ede

Parameter	Results	LOQ	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
<u>Volatile Gas Chromatography/Mass Spectroscopy</u>									
Toluene-d8 <sur>	110		%	SW8260B	B	84-124		09/16/10	JDB
<u>Solids</u>									
Total Solids	85.3		%	SM20 2540G	A			09/08/10	SLD



SGS Ref.# 1104692004
Client Name Shannon & Wilson, Inc.
Project Name/# 16828-008 Wells Fargo
Client Sample ID 16828-B7S1
Matrix Soil/Solid (dry weight)

Printed Date/Time 09/22/2010 10:36
Collected Date/Time 09/08/2010 11:25
Received Date/Time 09/08/2010 14:52
Technical Director Stephen C. Ede

Parameter	Results	LOQ	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
Solids									
Total Solids	91.5		%	SM20 2540G	A			09/08/10	SLD



SGS Ref.# 1104692005
Client Name Shannon & Wilson, Inc.
Project Name/# 16828-008 Wells Fargo
Client Sample ID 16828-B7S3
Matrix Soil/Solid (dry weight)

Printed Date/Time 09/22/2010 10:36
Collected Date/Time 09/08/2010 11:52
Received Date/Time 09/08/2010 14:52
Technical Director Stephen C. Ede

Parameter	Results	LOQ	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
Solids									
Total Solids	91.4		%	SM20 2540G	A			09/08/10	SLD



SGS Ref.# 988144 Method Blank
Client Name Shannon & Wilson, Inc.
Project Name/# 16828-008 Wells Fargo
Matrix Soil/Solid (dry weight)

Printed Date/Time 09/22/2010 10:36
Prep Batch
Method
Date

QC results affect the following production samples:

1104692001, 1104692002, 1104692003, 1104692004, 1104692005

Parameter	Results	LOQ/CL	DL	Units	Analysis Date
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Solids

Total Solids	100			%	09/08/10
--------------	-----	--	--	---	----------

Batch SPT8236
Method SM20 2540G
Instrument



SGS Ref.# 988898 Method Blank
Client Name Shannon & Wilson, Inc.
Project Name/# 16828-008 Wells Fargo
Matrix Soil/Solid (dry weight)

Printed Date/Time 09/22/2010 10:36
Prep Batch XXXX23614
Method SW3550C
Date 09/12/2010

QC results affect the following production samples:

1104692001, 1104692002, 1104692003, 1104692004, 1104692005

Parameter	Results	LOQ/CL	DL	Units	Analysis Date
<u>Semivolatile Organic Fuels Department</u>					
Diesel Range Organics	12.4 U	20.0	6.20	mg/Kg	09/12/10
<u>Surrogates</u>					
5a Androstane <surr>	80.7	60-120		%	09/12/10
Batch	XFC9500				
Method	AK102				
Instrument	HP 7890A FID SV E R				



SGS Ref.# 989674 Method Blank
Client Name Shannon & Wilson, Inc.
Project Name/# 16828-008 Wells Fargo
Matrix Soil/Solid (dry weight)

Printed Date/Time 09/22/2010 10:36
Prep Batch
Method
Date

QC results affect the following production samples:
1104692004, 1104692005

Parameter	Results	LOQ/CL	DL	Units	Analysis Date
<u>Volatile Fuels Department</u>					
Gasoline Range Organics	1.50 U	2.50	0.750	mg/Kg	09/15/10
Surrogates					
4-Bromofluorobenzene <surr>	85.3	50-150		%	09/15/10
Batch	VFC10158				
Method	AK101				
Instrument	HP 5890 Series II PID+HECD VBA				



SGS Ref.# 990598 Method Blank
Client Name Shannon & Wilson, Inc.
Project Name/# 16828-008 Wells Fargo
Matrix Soil/Solid (dry weight)

Printed Date/Time 09/22/2010 10:36
Prep Batch
Method
Date

QC results affect the following production samples:
1104692001, 1104692002, 1104692003, 1104692004, 1104692005, 1104692006

Parameter	Results	LOQ/CL	DL	Units	Analysis Date
<u>Volatile Gas Chromatography/Mass Spectroscopy</u>					
4-Isopropyltoluene	15.6 U	25.0	7.80	ug/Kg	09/16/10
Benzene	7.80 U	12.5	3.90	ug/Kg	09/16/10
Ethylbenzene	15.6 U	25.0	7.80	ug/Kg	09/16/10
Naphthalene	30.0 U	50.0	15.0	ug/Kg	09/16/10
n-Butylbenzene	15.6 U	25.0	7.80	ug/Kg	09/16/10
o-Xylene	30.0 U	50.0	15.0	ug/Kg	09/16/10
P & M -Xylene	30.0 U	50.0	15.0	ug/Kg	09/16/10
Toluene	30.0 U	50.0	15.0	ug/Kg	09/16/10
Xylenes (total)	62.0 U	100	31.0	ug/Kg	09/16/10
Surrogates					
1,2-Dichloroethane-D4 <surr>	112	69-132		%	09/16/10
4-Bromofluorobenzene <surr>	121	65-144		%	09/16/10
Toluene-d8 <surr>	131	* 84-124		%	09/16/10
Batch	VMS11604				
Method	SW8260B				
Instrument	HP 5890 Series II MS5 VLA				



SGS Ref.# 988145 Duplicate
Client Name Shannon & Wilson, Inc.
Project Name/# 16828-008 Wells Fargo
Original 1104645061
Matrix Soil/Solid (dry weight)

Printed Date/Time 09/22/2010 10:36
Prep Batch
Method
Date

QC results affect the following production samples:
1104692001, 1104692002, 1104692003, 1104692004, 1104692005

Parameter	Original Result	QC Result	Units	RPD	RPD Limits	Analysis Date
Solids						
Total Solids	88.6	88.7	%	0	(< 15)	09/08/2010

Batch SPT8236
Method SM20 2540G
Instrument



SGS Ref# 988357 Lab Control Sample

Printed Date/Time 09/22/2010 10:36
Prep Batch XXX23595
Method SW3550C
Date 09/09/2010

Client Name Shannon & Wilson, Inc.
Project Name/# 16828-008 Wells Fargo
Matrix Soil/Solid (dry weight)

Parameter	QC Results	Pct Recov	LCS/LCSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date
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Polynuclear Aromatics GC/MS

Batch XMS5659
Method 8270D SIMS
Instrument HP 6890/5973 MS SVQA



SGS Ref.# 989664 Lab Control Sample
989665 Lab Control Sample Duplicate
Client Name Shannon & Wilson, Inc.
Project Name/# 16828-008 Wells Fargo
Matrix Soil/Solid (dry weight)

Printed Date/Time 09/22/2010 10:36
Prep Batch
Method
Date

QC results affect the following production samples:

1104692001, 1104692006

Parameter	QC Results	Pct Recov	LCS/LCSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date
Volatile Fuels Department							
Gasoline Range Organics	LCS	10.6	94	(60-120)		11.3 mg/Kg	09/14/2010
	LCSD	10.4	93		2	(<20)	11.3 mg/Kg 09/14/2010
Surrogates							
4-Bromofluorobenzene <surr>	LCS		86	(50-150)			09/14/2010
	LCSD		87		0		09/14/2010

Batch VFC10158
Method AK101
Instrument HP 5890 Series II PID+HECD VBA



SGS Ref.# 990040 Lab Control Sample
990041 Lab Control Sample Duplicate
Client Name Shannon & Wilson, Inc.
Project Name/# 16828-008 Wells Fargo
Matrix Soil/Solid (dry weight)

Printed Date/Time 09/22/2010 10:36
Prep Batch
Method
Date

QC results affect the following production samples:

1104692002, 1104692003

Parameter	QC Results	Pct Recov	LCS/LCSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date
<u>Volatile Fuels Department</u>							
Gasoline Range Organics	LCS	10.8	(60-120)	1	(<20)	11.3 mg/Kg	09/15/2010
	LCSD	10.9					97
<u>Surrogates</u>							
4-Bromofluorobenzene <surr>	LCS		(50-150)	0			09/15/2010
	LCSD						91

Batch VFC10162
Method AK101
Instrument HP 5890 Series II PID+HECD VBA



SGS Ref.# 990939 Lab Control Sample

Printed Date/Time 09/22/2010 10:36
Prep Batch

Client Name Shannon & Wilson, Inc.
Project Name/# 16828-008 Wells Fargo
Matrix Soil/Solid (dry weight)

Method
Date

QC results affect the following production samples:

1104692003

Parameter	QC Results	Pct Recov	LCS/LCSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date
<u>Volatile Gas Chromatography/Mass Spectroscopy</u>							
Naphthalene	LCS	807	108	(73-131)		750 ug/Kg	09/17/2010
<u>Surrogates</u>							
1,2-Dichloroethane-D4 <surr>	LCS		105	(69-132)			09/17/2010
4-Bromofluorobenzene <surr>	LCS		116	(65-144)			09/17/2010
Toluene-d8 <surr>	LCS		111	(84-124)			09/17/2010

Batch VMS11607
Method SW8260B
Instrument HP 5890 Series II MS5 VLA



SGS Ref.# 988359 Matrix Spike
988360 Matrix Spike Duplicate

Printed Date/Time 09/22/2010 10:36
Prep Batch XXX23595
Method Sonication Extraction Soil 8270
Date 09/09/2010

Original 1104653001
Matrix Soil/Solid (dry weight)

Parameter	Qualifiers	Original Result	QC Result	Pct Recov	MS/MSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date
Polynuclear Aromatics GC/MS									
Terphenyl-d14 <sur>	MS		23.2	98	(30-125)				09/10/2010
	MSD		22.3	95		4			09/10/2010

Batch XMS5659
Method 8270D SIMS
Instrument HP 6890/5973 MS SVQA



SGS Ref.# 990940 Matrix Spike
990941 Matrix Spike Duplicate

Printed Date/Time 09/22/2010 10:36
Prep Batch
Method
Date

Original 1104752001
Matrix Soil/Solid (dry weight)

QC results affect the following production samples:
1104692003

Parameter	Qualifiers	Original Result	QC Result	Pct Recov	MS/MSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date
<u>Volatile Gas Chromatography/Mass Spectroscopy</u>									
<u>Surrogates</u>									
1,2-Dichloroethane-D4 <surr>	MS	648		101	(69-132)				09/17/2010
	MSD	615		96		5			09/17/2010
4-Bromofluorobenzene <surr>	MS	848		81	(65-144)				09/17/2010
	MSD	880		84		4			09/17/2010
Toluene-d8 <surr>	MS	644		100	(84-124)				09/17/2010
	MSD	628		98		3			09/17/2010

Batch VMS11607
Method SW8260B
Instrument HP 5890 Series II MS5 VLA



SAMPLE RECEIPT FORM

Review Criteria:	Condition:	Comments/Action Taken:
Were custody seals intact? Note # & location, if applicable. COC accompanied samples?	Yes No <u>N/A</u> <u>Yes</u> No <u>N/A</u>	
Temperature blank compliant* (i.e., 0-6°C after correction factor)? <i>* Note: Exemption permitted for chilled samples collected less than 8 hours ago.</i> Cooler ID: <u>1</u> @ <u>6.5</u> w/ Therm.ID: <u>3501</u> Cooler ID: _____ @ _____ w/ Therm.ID: _____ Cooler ID: _____ @ _____ w/ Therm.ID: _____ Cooler ID: _____ @ _____ w/ Therm.ID: _____ Cooler ID: _____ @ _____ w/ Therm.ID: _____ <i>Note: If non-compliant, use form FS-0029 to document affected samples/analyses.</i> If samples are received <u>without</u> a temperature blank, the "cooler temperature" will be documented in lieu of the temperature blank & "COOLER TEMP" will be noted to the right. In cases where neither a temp blank <u>nor</u> cooler temp can be obtained, note "ambient" or "chilled." If temperature(s) <0°C, were all sample containers ice free?	<u>Yes</u> <u>No</u> <u>N/A</u> <u>Yes</u> <u>No</u> <u>N/A</u> <i>9/29/08, 2010</i> COOLER TEMP Client is aware of high temp and would like to proceed with analysis	
Delivery method (specify all that apply): USPS Alert Courier Road Runner AK Air Lynden Carlisle ERA PenAir FedEx UPS NAC Other:	Note airbill/tracking # See Attached or <u>N/A</u>	
→ For samples received with payment, note amount (\$) and cash / check / CC (circle one). → For samples received in FBKS, ANCH staff will verify all criteria are reviewed.		<u>N/A</u> <u>N/A</u> SRF Initiated by:
Do samples match COC* (i.e., sample IDs, dates/times collected)? <i>* Note: Exemption permitted if collection times differ by less than an hour; in which case, the times on the COC will be used.</i>	<u>Yes</u> No N/A	
Are analyses requested unambiguous?	<u>Yes</u> No N/A	
Were samples in good condition (no leaks/cracks/breakage)? Packing material used (specify all that apply): <u>Bubble Wrap</u> Separate plastic bags Vermiculite Other:	<u>Yes</u> No N/A <u>Yes</u> No N/A	
Were all VOA vials free of headspace (i.e., bubbles ≤6 mm)? Were all soil VOAs field extracted with MeOH+BFB? Were the bottles provided by SGS? (Note apparent exceptions.)	Yes No <u>N/A</u> <u>Yes</u> No <u>N/A</u>	
Were proper containers (type/mass/volume/preservative*) used? <i>* Note: Exemption permitted for waters to be analyzed for metals.</i> Were Trip Blanks (i.e., VOAs, LL-Hg) in cooler with samples?	<u>Yes</u> No N/A <u>Yes</u> No N/A	
For preserved waters (other than VOA vials, LL-Mercury or microbiological analyses), was pH verified and compliant? If pH was adjusted, were bottles flagged (i.e., stickers)? <i>Refer to attached bottle sheet (form F066) for documentation.</i>	Yes No <u>N/A</u> Yes No <u>N/A</u>	
For RUSH or SHORT HOLD TIME samples, were the COC & this SRF flagged, bottles flagged (e.g., stickers) and lab notified?	Yes No <u>N/A</u>	
For client requested, site-specific QC (e.g., MS/MSD/DUP), were bottles flagged (e.g., stickers) and numbered accordingly?	Yes No <u>N/A</u>	
For special handling (e.g., "MI" or foreign soils, lab filter, limited volume, Ref Lab), were bottles/paperwork flagged (e.g., sticker)?	Yes No <u>N/A</u>	
Was the WO# recorded in Front Counter/Sample Receiving log? For any question answered "No," has the PM been notified and the problem resolved (or paperwork put in their bin)?	<u>Yes</u> No N/A Yes No <u>N/A</u>	SRF Completed by: <u>[Signature]</u> Bottle Sheet by: <u>[Signature]</u> PM = Jennifer Serna <u>N/A</u>
Was PEER REVIEW of sample numbering completed (i.e., compare WO# on containers to COC, container ID on containers to COC, unique lab ID on each container)?	Yes No N/A	Peer Reviewed by: <u>[Signature]</u> Metrics: <u>16305</u> <u>9/29/08</u>
Additional notes (if applicable): <u>5 - 4oz soil septa jars (containing samples) accompanied the samples for disposal</u>		

LABORATORY DATA REVIEW CHECKLIST

CS Report Name: 6831 Arctic Boulevard

Date: December 2010

Laboratory Report Date: September 22, 2010

Consultant Firm: Shannon & Wilson, Inc.

Completed by: Jennifer Simmons

Title: Environmental Scientist

Laboratory Name: SGS Environmental Services, Inc.

Work Order Number: 1104692

ADEC File Number: 2100.38.492

1. Laboratory

- a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses? Yes / No

Comments:

- b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CS-approved?

NA / Yes / No

Comments:

2. Chain of Custody (COC)

- a. COC information completed, signed, and dated (including released/received by)?

Yes / No

Comments:

- b. Correct analyses requested? Yes / No

Comments:

3. Laboratory Sample Receipt Documentation

- a. Sample/cooler temperature documented and within range at receipt ($4^{\circ} \pm 2^{\circ} \text{C}$)?

Yes No

Comments: Temperature blank was 6.5°C .

- b. Sample preservation acceptable - acidified waters, Methanol-preserved VOC soil (GRO, BTEX, VOCs, etc.)? NA / Yes / No

Comments:

d. What is the effect on data quality/usability, according to the case narrative?

Comments:

- DRO sample results for Samples B8S2, B8S3, and B8S8 may be biased high. However, the DRO concentration in these samples are nearly an order of magnitude greater than the ADEC Method 2 cleanup level, the project data are considered useable for its intended purpose.
- GRO and/or BTEX sample results for Samples B8S2, B8S3, and B8S8 may be biased high. Project sample concentrations are greater than the ADEC Method 2 cleanup level for GRO, DRO, naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene. The LOQ for benzene was greater than the ADEC Method 2 cleanup level.
- Because several PAHs are a factor of four times greater than the ADEC Method 2 cleanup level and the concentrations reported in the soil samples are similar to the concentrations reported in the groundwater samples, the data are considered representative of the site characteristics.
- Because the DRO LOQ is less than the ADEC Method 2 cleanup levels for Sample B7S1, the data is considered useable.
- The DRO result is biased high in Sample B7S3 due to heavier hydrocarbons contributing to the middle distillate range. The DRO concentration is less than the ADEC Method 2 cleanup level; the sample results are considered useable for the intended purposes
- Analytes relative to the toluene-D8 surrogate were not detected above the LOQ.
- PAH sample results for Sample B8S3 may be biased low.
- The MS recoveries for 2-chlorotoluene, 1,2,4-trimethylbenzene, and 1,4-dichlorobenzene and the MSD recoveries for 1,2,4-trimethylbenzene and 1,2,3-trichlorobenzene were not associated with project samples and the data is considered useable.
- The instrument surrogate recovery for toluene-D8 and 4-bromofluorobenzene were not associated Level 2 data packages like this work order and therefore the data is considered useable.
- The continuing calibration verification recovery for vinyl chloride and 2-butanon was not associated with project samples and therefore the results are considered useable.
- The MS/MSD RPD for chloroethene and trichlorofluoromethane were not associated with project samples and the results are considered useable.

5. Sample Results

- a. Correct analyses performed/reported as requested on COC? Yes / No

Comments:

- b. All applicable holding times met? Yes / No

Comments:

- c. All soils reported on a dry-weight basis? NA Yes / No

Comments:

Work Order Number: 1104692

limits? And project specified DQOs, if applicable. (AK petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages) Yes / No
Comments:

iv. Precision – All relative percent differences (RPDs) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages) Yes / No
Comments:

v. If %R or RPD is outside of acceptable limits, what samples are affected? NA

vi. Do the affected samples(s) have data flags? NA / Yes / No
Comments:

If so, are the data flags clearly defined? NA / Yes / No

vii. Data quality or usability affected? Explain. NA
Comments:

c. Surrogates - Organics Only

i. Are surrogate recoveries reported for organic analyses, field, QC and laboratory samples? NA / Yes / No
Comments:

ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages) NA / Yes / No
Comments:

iii. Do the sample results with failed surrogate recoveries have data flags? NA / Yes / No
Comments:

If so, are the data flags clearly defined? NA / Yes / No
Comments:

iv. Data quality or usability affected? Explain. NA
Comments:

Analytes relative to failed surrogates were not detected above LOQs.

d. Trip Blank - Volatile analyses only (GRO, BTEX, VOCs, etc.) [soil and water]


i. One trip blank reported per matrix, analysis and cooler? NA / Yes / No
Comments:



SGS North America Inc.
Alaska Division
Level II Laboratory Data Report

Project: 16828-008 6831 Arctic Blvd
Client: Shannon & Wilson, Inc.
SGS Work Order: 1104863

Released by:


SGS North America
Alaska Division Project Manager

Jennifer
Serna
2010.09.2
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Contents (Bookmarked in PDF):

Cover Page
Case Narrative
Sample Results Forms
Quality Control Summary Forms
Chain of Custody/Sample Receipt Forms
Attachments (if applicable)



Laboratory Analysis Report

Shayla Swedlund
Shannon & Wilson Inc.
5430 Fairbanks St Ste 3
Anchorage, AK 99518

Work Order: 1104863
16828-008 6831 Arctic Blvd
Client: Shannon & Wilson, Inc.
Report Date: September 28, 2010

Enclosed are the analytical results associated with the above work order. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. If you have any questions regarding this report, or if we can be of any other assistance, please contact your SGS Project Manager at 907-562-2343. All work is provided under SGS general terms and conditions (http://www.sgs.com/terms_and_conditions.htm), unless other written agreements have been accepted by both parties.

SGS maintains a formal Quality Assurance/Quality Control (QA/QC) program. A copy of our Quality Assurance Plan (QAP), which outlines this program, is available at your request. The laboratory certification numbers are AK00971 (DW Chemistry & Microbiology) & UST-005 (CS) for ADEC and AK100001 for NELAP (RCRA methods: 1020A, 1311, 3010A, 3050B, 3520C, 3550C, 5030B, 5035B, 6010B, 6020, 7470A, 7471B, 8021B, 8081B, 8082A, 8260B, 8270D, 8270D-SIM, 9040B, 9045C, 9056A, 9060A, AK101 and AK102/103). Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth by the SGS QAP and, when applicable, the National Environmental Laboratory Accreditation Program and other regulatory authorities. The following descriptors or qualifiers may be found in your report:

- * The analyte has exceeded allowable regulatory or control limits.
- ! Surrogate out of control limits.
- B Indicates the analyte is found in a blank associated with the sample.
- CCV Continuing Calibration Verification
- CL Control Limit
- D The analyte concentration is the result of a dilution.
- DF Dilution Factor
- DL Detection Limit (i.e., maximum method detection limit)
- E The analyte result is above the calibrated range.
- F Indicates value that is greater than or equal to the DL
- GT Greater Than
- ICV Initial Calibration Verification
- J The quantitation is an estimation.
- JL The analyte was positively identified, but the quantitation is a low estimation.
- LCS(D) Laboratory Control Spike (Duplicate)
- LOD Limit of Detection (i.e., 2xDL)
- LOQ Limit of Quantitation (i.e., reporting or practical quantitation limit)
- LT Less Than
- M A matrix effect was present.
- MB Method Blank
- MS(D) Matrix Spike (Duplicate)
- ND Indicates the analyte is not detected.
- Q QC parameter out of acceptance range.
- R Rejected
- RPD Relative Percent Difference
- U Indicates the analyte was analyzed for but not detected.

Note: Sample summaries which include a result for "Total Solids" have already been adjusted for moisture content.
All DRO/RRO analyses are integrated per SOP.



Detectable Results Summary

Print Date: 9/28/2010 12:29 pm

Client Sample ID: 16828-B9MW

SGS Ref. #: 1104863006

Volatile Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Gasoline Range Organics	0.523	mg/L
Benzene	2.62	ug/L
Ethylbenzene	24.0	ug/L
o-Xylene	29.4	ug/L
P & M -Xylene	60.7	ug/L

90.1

Semivolatile Organic Fuels Department

Diesel Range Organics	3.19	mg/L
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Volatile Gas Chromatography/Mass Spectroscopy

Naphthalene	70.6	ug/L
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SGS Ref.# 1104863002
Client Name Shannon & Wilson, Inc.
Project Name/# 16828-008 6831 Arctic Blvd
Client Sample ID 16828-B4MW
Matrix Water (Surface, Eff., Ground)

Printed Date/Time 09/28/2010 12:29
Collected Date/Time 09/15/2010 12:54
Received Date/Time 09/15/2010 16:32
Technical Director Stephen C. Ede

Sample Remarks:

AK102 - Unknown hydrocarbon with several peaks is present.

Parameter	Results	LOQ	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
<u>Volatile Fuels Department</u>									
Benzene	2.16	0.500	ug/L	SW8021B	A		09/17/10	09/17/10	HM
Ethylbenzene	2.00 U	2.00	ug/L	SW8021B	A		09/17/10	09/17/10	HM
Gasoline Range Organics	0.100 U	0.100	mg/L	AK101	A		09/17/10	09/17/10	HM
o-Xylene	2.00 U	2.00	ug/L	SW8021B	A		09/17/10	09/17/10	HM
P & M -Xylene	2.00 U	2.00	ug/L	SW8021B	A		09/17/10	09/17/10	HM
Toluene	2.00 U	2.00	ug/L	SW8021B	A		09/17/10	09/17/10	HM
<u>Surrogates</u>									
1,4-Difluorobenzene <surr>	89.9		%	SW8021B	A	80-120	09/17/10	09/17/10	HM
4-Bromofluorobenzene <surr>	97.8		%	AK101	A	50-150	09/17/10	09/17/10	HM
<u>Semivolatile Organic Fuels Department</u>									
Diesel Range Organics	3.24	0.769	mg/L	AK102	G		09/16/10	09/19/10	LCE
<u>Surrogates</u>									
5a Androstane <surr>	71.7		%	AK102	G	50-150	09/16/10	09/19/10	LCE
<u>Volatile Gas Chromatography/Mass Spectroscopy</u>									
Naphthalene	2.00 U	2.00	ug/L	SW8260B	B		09/17/10	09/17/10	JPI
<u>Surrogates</u>									
1,2-Dichloroethane-D4 <surr>	103		%	SW8260B	B	73-120	09/17/10	09/17/10	JPI
4-Bromofluorobenzene <surr>	102		%	SW8260B	B	76-120	09/17/10	09/17/10	JPI
Toluene-d8 <surr>	99		%	SW8260B	B	80-120	09/17/10	09/17/10	JPI



SGS Ref.# 1104863004
Client Name Shannon & Wilson, Inc.
Project Name/# 16828-008 6831 Arctic Blvd
Client Sample ID 16828-B7MW
Matrix Water (Surface, Eff., Ground)

Printed Date/Time 09/28/2010 12:29
Collected Date/Time 09/15/2010 14:12
Received Date/Time 09/15/2010 16:32
Technical Director Stephen C. Ede

Sample Remarks:

Parameter	Results	LOQ	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
<u>Volatile Fuels Department</u>									
Benzene	0.500 U	0.500	ug/L	SW8021B	A		09/17/10	09/17/10	HM
Ethylbenzene	2.00 U	2.00	ug/L	SW8021B	A		09/17/10	09/17/10	HM
Gasoline Range Organics	0.100 U	0.100	mg/L	AK101	A		09/17/10	09/17/10	HM
o-Xylene	2.00 U	2.00	ug/L	SW8021B	A		09/17/10	09/17/10	HM
P & M -Xylene	2.00 U	2.00	ug/L	SW8021B	A		09/17/10	09/17/10	HM
Toluene	2.00 U	2.00	ug/L	SW8021B	A		09/17/10	09/17/10	HM
<u>Surrogates</u>									
1,4-Difluorobenzene <surr>	88.9		%	SW8021B	A	80-120	09/17/10	09/17/10	HM
4-Bromofluorobenzene <surr>	97.6		%	AK101	A	50-150	09/17/10	09/17/10	HM
<u>Semivolatile Organic Fuels Department</u>									
Diesel Range Organics	0.769 U	0.769	mg/L	AK102	G		09/16/10	09/19/10	LCE
<u>Surrogates</u>									
5a Androstane <surr>	61.2		%	AK102	G	50-150	09/16/10	09/19/10	LCE
<u>Volatile Gas Chromatography/Mass Spectroscopy</u>									
Naphthalene	2.00 U	2.00	ug/L	SW8260B	B		09/17/10	09/17/10	JPI
<u>Surrogates</u>									
1,2-Dichloroethane-D4 <surr>	111		%	SW8260B	B	73-120	09/17/10	09/17/10	JPI
4-Bromofluorobenzene <surr>	103		%	SW8260B	B	76-120	09/17/10	09/17/10	JPI
Toluene-d8 <surr>	96.3		%	SW8260B	B	80-120	09/17/10	09/17/10	JPI



SGS Ref.# 1104863005
Client Name Shannon & Wilson, Inc.
Project Name/# 16828-008 6831 Arctic Blvd
Client Sample ID 16828-B8MW
Matrix Water (Surface, Eff., Ground)

Printed Date/Time 09/28/2010 12:29
Collected Date/Time 09/15/2010 14:53
Received Date/Time 09/15/2010 16:32
Technical Director Stephen C. Ede

Parameter	Results	LOQ	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
Polynuclear Aromatics GC/MS									
1-Methylnaphthalene	137	20.2	ug/L	8270D SIMS	I		09/22/10	09/24/10	CDE
2-Methylnaphthalene	197	20.2	ug/L	8270D SIMS	I		09/22/10	09/24/10	CDE
Acenaphthene	7.19	1.01	ug/L	8270D SIMS	I		09/22/10	09/24/10	CDE
Acenaphthylene	1.59	1.01	ug/L	8270D SIMS	I		09/22/10	09/24/10	CDE
Anthracene	1.88	1.01	ug/L	8270D SIMS	I		09/22/10	09/24/10	CDE
Benzo(a)Anthracene	0.0505 U	0.0505	ug/L	8270D SIMS	I		09/22/10	09/23/10	CDE
Benzo[a]pyrene	0.0505 U	0.0505	ug/L	8270D SIMS	I		09/22/10	09/23/10	CDE
Benzo[b]Fluoranthene	0.0505 U	0.0505	ug/L	8270D SIMS	I		09/22/10	09/23/10	CDE
Benzo[g,h,i]perylene	0.0505 U	0.0505	ug/L	8270D SIMS	I		09/22/10	09/23/10	CDE
Benzo[k]fluoranthene	0.0505 U	0.0505	ug/L	8270D SIMS	I		09/22/10	09/23/10	CDE
Chrysene	0.0505 U	0.0505	ug/L	8270D SIMS	I		09/22/10	09/23/10	CDE
Dibenzo[a,h]anthracene	0.0505 U	0.0505	ug/L	8270D SIMS	I		09/22/10	09/23/10	CDE
Fluoranthene	0.231	0.0505	ug/L	8270D SIMS	I		09/22/10	09/23/10	CDE
Fluorene	12.5	1.01	ug/L	8270D SIMS	I		09/22/10	09/24/10	CDE
Indeno[1,2,3-c,d] pyrene	0.0505 U	0.0505	ug/L	8270D SIMS	I		09/22/10	09/23/10	CDE
Naphthalene	35.4	2.02	ug/L	8270D SIMS	I		09/22/10	09/24/10	CDE
Phenanthrene	20.1	1.01	ug/L	8270D SIMS	I		09/22/10	09/24/10	CDE
Pyrene	0.664	0.0505	ug/L	8270D SIMS	I		09/22/10	09/23/10	CDE
Surrogates									
Terphenyl-d14 <surr>	134		%	8270D SIMS	I	50-135	09/22/10	09/23/10	CDE



SGS Ref.# 1104863007
Client Name Shannon & Wilson, Inc.
Project Name/# 16828-008 6831 Arctic Blvd
Client Sample ID 16828-B6MW
Matrix Water (Surface, Eff., Ground)

Printed Date/Time 09/28/2010 12:29
Collected Date/Time 09/15/2010 15:41
Received Date/Time 09/15/2010 16:32
Technical Director Stephen C. Ede

Sample Remarks:

Parameter	Results	LOQ	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
<u>Volatile Fuels Department</u>									
Benzene	0.500 U	0.500	ug/L	SW8021B	A		09/17/10	09/17/10	HM
Ethylbenzene	2.00 U	2.00	ug/L	SW8021B	A		09/17/10	09/17/10	HM
Gasoline Range Organics	0.100 U	0.100	mg/L	AK101	A		09/17/10	09/17/10	HM
o-Xylene	2.00 U	2.00	ug/L	SW8021B	A		09/17/10	09/17/10	HM
P & M -Xylene	2.00 U	2.00	ug/L	SW8021B	A		09/17/10	09/17/10	HM
Toluene	2.00 U	2.00	ug/L	SW8021B	A		09/17/10	09/17/10	HM
<u>Surrogates</u>									
1,4-Difluorobenzene <surr>	88.9		%	SW8021B	A	80-120	09/17/10	09/17/10	HM
4-Bromofluorobenzene <surr>	103		%	AK101	A	50-150	09/17/10	09/17/10	HM
<u>Semivolatile Organic Fuels Department</u>									
Diesel Range Organics	0.714 U	0.714	mg/L	AK102	G		09/17/10	09/19/10	LCE
<u>Surrogates</u>									
5a Androstane <surr>	72.5		%	AK102	G	50-150	09/17/10	09/19/10	LCE
<u>Volatile Gas Chromatography/Mass Spectroscopy</u>									
Naphthalene	2.00 U	2.00	ug/L	SW8260B	B		09/17/10	09/17/10	JPI
<u>Surrogates</u>									
1,2-Dichloroethane-D4 <surr>	102		%	SW8260B	B	73-120	09/17/10	09/17/10	JPI
4-Bromofluorobenzene <surr>	105		%	SW8260B	B	76-120	09/17/10	09/17/10	JPI
Toluene-d8 <surr>	102		%	SW8260B	B	80-120	09/17/10	09/17/10	JPI



SGS Ref.# 990107 Method Blank
Client Name Shannon & Wilson, Inc.
Project Name/# 16828-008 6831 Arctic Blvd
Matrix Water (Surface, Eff., Ground)

Printed Date/Time 09/28/2010 12:29
Prep Batch XXXX23654
Method SW3520C
Date 09/16/2010

QC results affect the following production samples:

1104863001, 1104863002, 1104863003, 1104863004, 1104863005

Parameter	Results	LOQ/CL	DL	Units	Analysis Date
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Semivolatile Organic Fuels Department

Diesel Range Organics	0.500 U	0.800	0.250	mg/L	09/18/10
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Surrogates

5a Androstane <surrogate>	81.6	60-120		%	09/18/10
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Batch XFC9512
Method AK102
Instrument HP 7890A FID SV E F



SGS Ref.# 990773 Method Blank
Client Name Shannon & Wilson, Inc.
Project Name/# 16828-008 6831 Arctic Blvd
Matrix Water (Surface, Eff., Ground)

Printed Date/Time 09/28/2010 12:29
Prep Batch VXX21344
Method SW5030B
Date 09/17/2010

QC results affect the following production samples:

1104863001, 1104863002, 1104863003, 1104863004, 1104863005, 1104863006, 1104863007, 1104863008

Parameter	Results	LOQ/CL	DL	Units	Analysis Date
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Volatile Fuels Department

Gasoline Range Organics	0.0620 U	0.100	0.0310	mg/L	09/17/10
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Surrogates

4-Bromofluorobenzene <surr>	106	50-150		%	09/17/10
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Batch VFC10170

Method AK101

Instrument HP 5890 Series II PID+FID VCA

Benzene	0.300 U	0.500	0.150	ug/L	09/17/10
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Ethylbenzene	1.24 U	2.00	0.620	ug/L	09/17/10
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o-Xylene	1.24 U	2.00	0.620	ug/L	09/17/10
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P & M -Xylene	1.24 U	2.00	0.620	ug/L	09/17/10
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Toluene	1.24 U	2.00	0.620	ug/L	09/17/10
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Surrogates

1,4-Difluorobenzene <surr>	89	80-120		%	09/17/10
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Batch VFC10170

Method SW8021B

Instrument HP 5890 Series II PID+FID VCA



SGS Ref.# 991506 Method Blank
Client Name Shannon & Wilson, Inc.
Project Name/# 16828-008 6831 Arctic Blvd
Matrix Water (Surface, Eff., Ground)

Printed Date/Time 09/28/2010 12:29
Prep Batch VXX21358
Method SW5030B
Date 09/20/2010

QC results affect the following production samples:

1104863005, 1104863006

Parameter	Results	LOQ/CL	DL	Units	Analysis Date
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Volatile Gas Chromatography/Mass Spectroscopy

Naphthalene	1.24 U	2.00	0.620	ug/L	09/20/10
Surrogates					
1,2-Dichloroethane-D4 <surr>	120	73-120		%	09/20/10
4-Bromofluorobenzene <surr>	97.5	76-120		%	09/20/10
Toluene-d8 <surr>	95.6	80-120		%	09/20/10

Batch VMS11612
Method SW8260B
Instrument HP 5890 Series II MS3 VNA



SGS Ref.# 990108 Lab Control Sample
990109 Lab Control Sample Duplicate
Client Name Shannon & Wilson, Inc.
Project Name/# 16828-008 6831 Arctic Blvd
Matrix Water (Surface, Eff., Ground)

Printed Date/Time 09/28/2010 12:29
Prep Batch XXX23654
Method SW3520C
Date 09/16/2010

QC results affect the following production samples:

1104863001, 1104863002, 1104863003, 1104863004, 1104863005

Parameter	QC Results	Pct Recov	LCS/LCSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date
Semivolatile Organic Fuels Department							
Diesel Range Organics	LCS	17.5	(75-125)	9	(< 20.)	20 mg/L	09/19/2010
	LCSD	19.2				20 mg/L	09/19/2010
Surrogates							
5a Androstane <surr>	LCS	86	(60-120)	10		09/19/2010	
	LCSD	95			09/19/2010		

Batch XFC9512
Method AK102
Instrument HP 7890A FID SVE F



SGS Ref.# 990774 Lab Control Sample
990776 Lab Control Sample Duplicate
Client Name Shannon & Wilson, Inc.
Project Name/# 16828-008 6831 Arctic Blvd
Matrix Water (Surface, Eff., Ground)

Printed Date/Time 09/28/2010 12:29
Prep Batch VXX21344
Method SW5030B
Date 09/17/2010

QC results affect the following production samples:

1104863001, 1104863002, 1104863003, 1104863004, 1104863005, 1104863006, 1104863007, 1104863008

Parameter	QC Results	Pct Recov	LCS/LCSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date
Volatile Fuels Department							
Benzene	LCS	108	108	(80-120)		100 ug/L	09/17/2010
	LCSD	112	112		4	(< 20)	100 ug/L 09/17/2010
Ethylbenzene	LCS	103	103	(87-125)		100 ug/L	09/17/2010
	LCSD	107	107		3	(< 20)	100 ug/L 09/17/2010
o-Xylene	LCS	105	105	(85-120)		100 ug/L	09/17/2010
	LCSD	109	109		3	(< 20)	100 ug/L 09/17/2010
P & M -Xylene	LCS	208	104	(87-125)		200 ug/L	09/17/2010
	LCSD	215	108		3	(< 20)	200 ug/L 09/17/2010
Toluene	LCS	104	104	(80-120)		100 ug/L	09/17/2010
	LCSD	107	107		3	(< 20)	100 ug/L 09/17/2010
Surrogates							
1,4-Difluorobenzene <sur>	LCS		100	(80-120)			09/17/2010
	LCSD		100		0		09/17/2010

Batch VFC10170
Method SW8021B
Instrument HP 5890 Series II PID+FID VCA



SGS Ref.# 990944 Lab Control Sample
990945 Lab Control Sample Duplicate
Client Name Shannon & Wilson, Inc.
Project Name/# 16828-008 6831 Arctic Blvd
Matrix Water (Surface, Eff., Ground)

Printed Date/Time 09/28/2010 12:29
Prep Batch VXX21349
Method SW5030B
Date 09/17/2010

QC results affect the following production samples:

1104863001, 1104863002, 1104863003, 1104863004, 1104863007

Parameter	QC Results	Pct Recov	LCS/LCSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date
Volatile Gas Chromatography/Mass Spectroscopy							
Naphthalene	LCS	30.6	(75-120)	4	(< 20)	30 ug/L	09/17/2010
	LCSD	31.9					106
Surrogates							
1,2-Dichloroethane-D4 <surr>	LCS	101	(73-120)	1			09/17/2010
	LCSD	101					101
4-Bromofluorobenzene <surr>	LCS	102	(76-120)	1			09/17/2010
	LCSD	101					101
Toluene-d8 <surr>	LCS	98	(80-120)	3			09/17/2010
	LCSD	95					95

Batch VMS11608
Method SW8260B
Instrument HP 5890 Series II MS1 VJA



SGS Ref.# 991717 Lab Control Sample
991718 Lab Control Sample Duplicate
Client Name Shannon & Wilson, Inc.
Project Name/# 16828-008 6831 Arctic Blvd
Matrix Water (Surface, Eff., Ground)

Printed Date/Time 09/28/2010 12:29
Prep Batch XXX23705
Method SW3520C
Date 09/22/2010

QC results affect the following production samples:

1104863005

Parameter	QC Results	Pct Recov	LCS/LCSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date
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Polynuclear Aromatics GC/MS



SGS Ref.# 991717 Lab Control Sample
991718 Lab Control Sample Duplicate
Client Name Shannon & Wilson, Inc.
Project Name/# 16828-008 6831 Arctic Blvd
Matrix Water (Surface, Eff., Ground)

Printed Date/Time 09/28/2010 12:29
Prep Batch XXX23705
Method SW3520C
Date 09/22/2010

Parameter		QC Results	Pct Recov	LCS/LCSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date
Polynuclear Aromatics GC/MS								
Indeno[1,2,3-c,d] pyrene	LCS	0.559	112	(59-125)			0.5 ug/L	09/23/2010
	LCSD	0.540	108		3	(< 30)	0.5 ug/L	09/23/2010
Naphthalene	LCS	0.451	90	(56-108)			0.5 ug/L	09/23/2010
	LCSD	0.369	74		20	(< 30)	0.5 ug/L	09/23/2010
Phenanthrene	LCS	0.519	104	(60-115)			0.5 ug/L	09/23/2010
	LCSD	0.451	90		14	(< 30)	0.5 ug/L	09/23/2010
Pyrene	LCS	0.535	107	(62-130)			0.5 ug/L	09/23/2010
	LCSD	0.511	102		5	(< 30)	0.5 ug/L	09/23/2010
Surrogates								
Terphenyl-d14 <surr>	LCS		126	(50-135)				09/23/2010
	LCSD		123		2			09/23/2010

Batch XMS5686
Method 8270D SIMS
Instrument HP 6890/5973 MS SVQA

1104863



Laboratory SGS Page 1 of 1
 Attn: SHANNON & WILSON

CHAIN-OF-CUSTODY

SHANNON & WILSON, INC.

Geotechnical and Environmental Consultants
 400 N. 34th Street, Suite 100
 Seattle, WA 98103
 (206) 632-8020
 2055 Hill Road
 Fairbanks, AK 99709
 (907) 479-0600
 2255 S.W. Canyon Road
 Portland, OR 97201-2498
 (503) 223-6147

303 Wellesian Way
 Richland, WA 99352
 (509) 946-6308

5430 Fairbanks Street, Suite 3
 Anchorage, AK 99518
 (907) 561-2120

Analysis Parameters/Sample Container Description
 (include preservative if used)

DRD	GRAB	GRAB/STK	NONVOLATILE	PH	TK 8260B	TK 8270 SIMS	Total Number of Containers
KK 102	+	+	+	+	+	+	6
+	+	+	+	+	+	+	9
+	+	+	+	+	+	+	8
+	+	+	+	+	+	+	9
+	+	+	+	+	+	+	10
+	+	+	+	+	+	+	10
+	+	+	+	+	+	+	8
+	+	+	+	+	+	+	3

Remarks/Matrix

Sample Identity	Lab No.	Time	Date Sampled	Comp	Grab	Relinquished By	Relinquished By	Relinquished By
16828-B2MN	① A-H	1104	9/15/10	+	+	Signature: [Signature]	Signature: [Signature]	Signature: [Signature]
16828-B1MN	② ↓	1254		+	+	Signature: [Signature]	Signature: [Signature]	Signature: [Signature]
16828-B5MN	③ ↓	1343		+	+	Signature: [Signature]	Signature: [Signature]	Signature: [Signature]
16828-B7MN	④ A-J	1412		+	+	Signature: [Signature]	Signature: [Signature]	Signature: [Signature]
16828-B8MN	⑤ A-J	1453		+	+	Signature: [Signature]	Signature: [Signature]	Signature: [Signature]
16828-B9MN	⑥ A-J	1500		+	+	Signature: [Signature]	Signature: [Signature]	Signature: [Signature]
16828-B6MN	⑦ A-H	1541		+	+	Signature: [Signature]	Signature: [Signature]	Signature: [Signature]
WORKY TRIP BLANK	⑧ A-C	1100		+	+	Signature: [Signature]	Signature: [Signature]	Signature: [Signature]

Project Information

Project Number: 16828-008
 Project Name: 6831 HILLS BND
 Contact: SHANNON & WILSON
 Ongoing Project? Yes No
 Sampler: SHANNON & WILSON (attach shipping bill, if any)

Sample Receipt

Total Number of Containers
 COC Seals/Intact? Y/N/NA
 Received Good Cond./Cold
 Delivery Method:

Instructions

Requested Turnaround Time: WONDERA
 Special Instructions:
 * ANALYZE HOLD

Distribution: White - w/shipment - returned to Shannon & Wilson w/ laboratory report
 Yellow - w/shipment - for consignee files
 Pink - Shannon & Wilson - Job File

Relinquished By 1
 Signature: [Signature]
 Printed Name: [Name]
 Company: [Company]
 Time: 14:31
 Date: 9/15/10

Relinquished By 2
 Signature: [Signature]
 Printed Name: [Name]
 Company: [Company]
 Time: [Time]
 Date: [Date]

Relinquished By 3
 Signature: [Signature]
 Printed Name: [Name]
 Company: [Company]
 Time: [Time]
 Date: [Date]

WO# (7 digits)	Sample #	Sample #	Container ID	Container ID	Matrix	QC	Preservative (CHECKED)	TEST GROUP	PRINT LABELS	Notes: ANOMALIES - e.g., preservative added or SPECIAL HANDLING - e.g., Multi-Incremental (MI), Field Filter (FF), Lab Filter (LF), use "same jar as" (SJA) for QC, 2xMeOH, bubbles, etc.
SAMPLE ID			TYPE		CONTAINERS		ANALYSIS		Type comments below:	
1104863	001	003	A	C	1 Water		HCl * VOA or LL-Hg *	W_GRO/VOA	GRO/BTEX	
1104863	001	003	D	F	1 Water		HCl * VOA or LL-Hg *	W_GRO/VOA	8021B	
1104863	001	003	G	H	1 Water		HCl (pH <2)	W_DRO_LowVolume		
1104863	004	006	A	C	1 Water		HCl * VOA or LL-Hg *	W_GRO/VOA	GRO/BTEX	
1104863	004	006	D	F	1 Water		HCl * VOA or LL-Hg *	W_GRO/VOA	8021B	
1104863	004	006	G	H	1 Water		HCl (pH <2)	W_DRO_LowVolume		
1104863	004	006	I	J	1 Water		N/A	W_PAH/TAqH	ON HOLD <i>by SOP 15, 2010</i>	
1104863	007	007	A	C	1 Water		HCl * VOA or LL-Hg *	W_GRO/VOA	GRO/BTEX	
1104863	007	007	D	F	1 Water		HCl * VOA or LL-Hg *	W_GRO/VOA	8021B	
1104863	007	007	G	H	1 Water		HCl (pH <2)	W_DRO_LowVolume		
1104863	008	008	A	C	1 Water	Trip Blank	HCl * VOA or LL-Hg *	W_GRO/VOA	GRO/BTEX	

LABORATORY DATA REVIEW CHECKLIST

CS Report Name: 6831 Arctic Boulevard

Date: December 2010

Laboratory Report Date: September 29, 2010

Consultant Firm: Shannon & Wilson, Inc.

Completed by: Jennifer Simmons

Title: Environmental Scientist

Laboratory Name: SGS Environmental Services, Inc.

Work Order Number: 1104863

ADEC File Number: 2100.38.492

1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses? Yes / No
Comments:

b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CS-approved?
 NA / Yes / No
Comments:

2. Chain of Custody (COC)

a. COC information completed, signed, and dated (including released/received by)?
 Yes / No
Comments:

b. Correct analyses requested? Yes / No
Comments:

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt ($4^{\circ} \pm 2^{\circ} \text{C}$)?
 Yes / No
Comments:

b. Sample preservation acceptable - acidified waters, Methanol-preserved VOC soil (GRO, BTEX, VOCs, etc.)? NA / Yes / No
Comments:

Work Order Number: 1104863

- b. All applicable holding times met? Yes / No
Comments:
- c. All soils reported on a dry-weight basis? NA / Yes / No
Comments:
- d. Are the reported LOQs less than the Cleanup Level or the minimum required detection level for the project? Yes / No
Comments:
- e. Data quality or usability affected? Explain.
Comments:

6. QC Samples

a. Method Blank

- i. One method blank reported per matrix, analysis, and 20 samples?
 Yes / No
Comments:
- ii. All method blank results less than LOQ? Yes / No
Comments:
- iii. If above LOQ, what samples are affected? NA
Comments:
- iv. Do the affected sample(s) have data flags? NA / Yes / No
Comments:

If so, are the data flags clearly defined? NA Yes / No
Comments:
- v. Data quality or usability affected? Explain. NA
Comments:

b. Laboratory Control Sample/Duplicate (LCS/LCSD)

- i. Organics - One LCS/LCSD reported per matrix, analysis, and 20 samples?
(LCS/LCSD required per AK methods, LCS required per SW846) N/A / Yes / No
Comments:
- ii. Metals/Inorganics - One LCS and one sample duplicate reported per matrix, analysis and 20 samples? NA / Yes / No
Comments:

d. Trip Blank - Volatile analyses only (GRO, BTEX, VOCs, etc.) [soil and water]

i. One trip blank reported per matrix, analysis and cooler? *NA* / **Yes** / No
Comments:

ii. Is the cooler used to transport the trip blank and volatile samples clearly indicated on the COC? *NA* / Yes **No** (if no explain):

iii. All results less than LOQ? *NA* **Yes** / No

iv. If above LOQ, what samples are affected? **NA**
Comments:

v. Data quality or usability affected? Explain. **NA**
Comments:

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?
 Yes / No
Comments: Samples B8MW and B9MW are project's sample/duplicate pair.

ii. Were the field duplicates submitted blind to the lab? *NA* / **Yes** / No
Comments:

iii. Precision – All relative percent differences (RPDs) less than specified DQOs?
(Recommended: 30% for water, 50% for soil) *NA* / Yes **No**
Comments: The DRO RPD was greater than 30 percent.

iv. Data quality or usability affected? Explain.
Comments: The DRO RPD for Sample B8MW and its duplicate B9MW exceeded the goal of +/- 30 percent. The DRO data are considered useable because the concentrations are both greater than the ADEC Table C cleanup level.

f. Decontamination or Equipment Blank (if not applicable, a comment stating why must be entered below)

No decontamination/equipment blank submitted due to use of disposable sampling equipment and limited scope of sampling.

i. All results less than LOQ? *NA* / Yes **No**
Comments:

ii. If results are above LOQ, what samples are affected? **NA**
Comments:

iii. Data quality or usability affected? Explain. **NA**