



2017 Groundwater Monitoring and Product Recovery Report Pump Station 9 Mainline Turbine Sump

SLR Ref: 105.01288.17018

ADEC File Number: 330.38.065

March 2018





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ACRONYMS

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
Alyeska	Alyeska Pipeline Service Company
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
CSM	conceptual site model
DRO	diesel range organics
ft	feet
gal	gallon
LOD	limit of detection
LOQ	limit of quantitation
mg/L	milligrams per liter
MLT	mainline turbine
MSL	mean sea level
PAH	polynuclear aromatic hydrocarbon
PRC	product recovery canister
PS09	Pump Station 9
QA	quality assurance
QAR	quality assurance review
QC	quality control
SLR	SLR International Corporation
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compound

SUMMARY

SLR International Corporation (SLR) conducted one groundwater sampling event, multiple separate phase hydrocarbon (free product) recovery events, and product recovery well decommissioning at the Pump Station 9 Mainline Turbine Sump site in 2017 on behalf of Alyeska Pipeline Service Company (Alyeska). The work was performed to monitor groundwater quality from monitoring wells without free product and to remove free product from recovery wells.

Results of annual groundwater sampling indicated that no groundwater monitoring wells contained dissolved petroleum hydrocarbons in excess of Alaska Department of Environmental Conservation (ADEC) groundwater cleanup levels. Only diesel range organics and benzene were detected by historically-used analytical methods. Analysis of 16 petroleum hydrocarbon-derived volatile organic compounds by U.S. Environmental Protection Agency Method SW8260C was completed for one well as requested by ADEC; only benzene and sec-butylbenzene were detected, but at concentrations below applicable cleanup levels.

Free product recovery was conducted from recovery wells MW-1 and MW-5 seven times in six separate site visits throughout the 2017 construction season, including two consecutive days of product recovery from June 6 to 7. The initial product thickness in well MW-1 decreased significantly when compared to previous years and the largest volume of free product was recovered for this well since 2014. A lesser reduction in product thickness and recovery volume was observed at well MW-5 as compared to the previous year. Free product recovery and gauging results suggest the continuing decline of free product recovery from wells MW-1 and MW-5.

Product recovery well MW-6 was decommissioned on June 7, 2017 based on findings of reduced product recoverability as presented in the 2016 report.

It is estimated that approximately 14.3 gallons (gal) of free product was recovered in 2017. A total of approximately 1,199 gal of free product has been recovered from this site to date. This total accounts for about 60 percent of the estimated 2,000 gal of free product present at the site; however, only 114 gal of the total volume has been recovered since the shutdown of the active recovery system in 2009.

SLR recommends conducting annual product recovery activities in 2018. Additionally, based on the results of sampling between 2014 and 2017, SLR recommends that Alyeska request reduced monitoring frequency. The groundwater monitoring results indicate the persistence of low to below-detection hydrocarbon concentrations in groundwater. In the event of biennial sampling, groundwater monitoring would continue in early-summer (June) of 2019.

1. INTRODUCTION

SLR International Corporation (SLR) conducted groundwater sampling and recovery of separate phase hydrocarbons (hereafter referred to as free product) at the Mainline Turbine (MLT) Sump site at Pump Station 9 (PS09) for Alyeska Pipeline Service Company (Alyeska) in 2017. The annual groundwater sampling program included five monitoring wells. Recovery well product thicknesses were gauged during eight site visits, and product recovery was conducted seven times on six separate visits. This report summarizes the site activities including project approach, methodology, groundwater sampling analytical results, and product recovery.

1.1 PROJECT BACKGROUND

Alyeska encountered petroleum-contaminated soil during the removal of the PS09 MLT sump in October 1996 (Alyeska spill number 1996130). The site was excavated to the extent practical; however, diesel range organic (DRO)-contaminated soil remained in the subsurface at concentrations greater than the Alaska Department of Environmental Conservation (ADEC) soil cleanup level.

1.2 PHYSICAL SETTING

PS09 is located approximately 7 miles south of Delta Junction on the Richardson Highway in the Tanana-Kuskokwim lowlands region of interior Alaska (Figure 1). The pump station is situated in an area of relatively flat topography at an elevation of 1,500 feet (ft) above mean sea level (IMSL). The pump station is built upon a gravel pad and consists of several buildings, pipeline infrastructure, and a tank farm (Figure 2). Monitoring and free product recovery wells are situated around and hydraulically downgradient of the former MLT sump (Figure 3).

1.2.1 GEOLOGY

Soil and sediments at PS09 consist of glacial outwash and Pleistocene surficial deposits of the Tanana River drainage. During subsurface investigations and monitoring well installations conducted in 1998, the soil underlying PS09 was found to be predominantly poorly-sorted, well-rounded sand and gravel with cobbles and boulders consistent with glacial outwash deposits (EMCON, 1999).

The lithology description recorded on the PS09 drinking water well log indicates that the pump station is underlain by at least 420 ft of unconsolidated, coarse sediments consisting of sand, cobbles, and boulders also indicative of glacial outwash sediments.

1.2.2 HYDROGEOLOGY

Surface drainage on the PS09 pad is generally radial, away from the Control Building (Figure 2). The Delta River is located approximately 2 miles west-northwest of PS09 at an elevation of approximately 1,300 ft MSL. The Delta River flows north into the Tanana River, approximately 16 miles north of PS09 at the town of Big Delta. Jarvis Creek is approximately 4 miles east-northeast of PS09, and flows north to northwest into the Delta River.

During the 1998 investigation, groundwater was encountered at approximately 110 ft below ground surface (bgs). This aquifer appeared to be discontinuous and only a few feet thick, terminating in a dry, dense stratum of gravel and cobbles (EMCON, 1999). According to the PS09 drinking water well log, the top of the continuous aquifer used as a drinking water source at PS09 is at approximately 390 ft bgs.

The groundwater elevations and apparent flow direction cannot be determined with any accuracy at this site because the aquifer intersected by the wells is perched, discontinuous, and consists of an undulating surface with no consistent flow direction or gradient. In general, groundwater elevation measurements collected to date indicate that groundwater is shallowest in the vicinity of monitoring well MW-10 and the product recovery wells, and becomes deeper at monitoring wells to the north and west (Figure 3).

1.3 PREVIOUS SITE ACTIVITIES

Environmental investigations have been ongoing at this site since 1997, when an Alyeska contractor advanced three soil borings to assess the extent of subsurface contamination underlying the former MLT sump. The work that has occurred at this site since 1997 is described in the following sections.

1.3.1 SUBSURFACE INVESTIGATIONS AND MONITORING WELL INSTALLATION

A subsurface investigation conducted in July 1997 confirmed the presence of contamination to at least 65 ft bgs in the vicinity of the MLT sump. During this drilling, cobbles and boulders prevented boring advancement beyond 65 ft bgs; an additional boring was advanced through the source area using an air rotary drill rig later in 1997 and was completed as monitoring well MW-1. While drilling monitoring well MW-1, petroleum hydrocarbon-impacted soil was noted to extend to a depth of 110 ft bgs, where groundwater was encountered. A thin layer of free product was measured on the top of the groundwater table and was tentatively identified as weathered turbine fuel. Beginning in 1998, monitoring well MW-1 was used as a product recovery well (Figure 3; EMCON, 1998).

Two additional monitoring wells, MW-2 and MW-3, were installed to evaluate the direction of groundwater flow and the hydraulic gradient at the site. Monitoring well MW-2 was installed west of the MLT sump, and monitoring well MW-3 was installed approximately 200 ft southwest of the MLT sump (Figure 3; EMCON, 1998). In 1998, eight additional soil borings were advanced with seven converted into monitoring wells (MW-4 through MW-10). Soil and groundwater samples were also collected as part of the 1998 investigation. Monitoring well MW-9 was decommissioned and monitoring well MW-4 was destroyed, leaving the current total of eight monitoring and recovery wells on site (EMCON, 1998).

1.3.2 FREE PRODUCT RECOVERY

Free product recovery was initiated following the installation of monitoring wells MW-1, MW-5, and MW-6 in 1997 and has been performed each subsequent summer. Product recovery events and methods through 2015 are summarized below:

- **1997:** In an attempt to recover free product from monitoring well MW-1, a 2-inch passive product recovery canister (PRC) was placed in the well but failed to recovery any product (EMCON, 1998).
- **1998 to 2000:** approximately 52 gallons (gal) of free product were recovered using PRCs placed in monitoring wells MW-1, MW-5, and MW-6 (SLR, 2002).
- **1999:** A feasibility study was conducted to estimate aquifer parameters to evaluate free product recovery feasibility. The total volume of subsurface free product was estimated at 2,000 gal using baildown tests. It was also determined that adding oxygen would not increase biodegradation of hydrocarbons present in the soil. Based on aquifer characteristics, the amount of free product at the site, and site restraints, a skimmer pump system was determined to be the most favorable remedial strategy (EMCON, 2000).
- **2000:** An active recovery system comprised of product skimmers and pneumatically driven pumps was installed in the three monitoring wells (MW-1, MW-5, and MW-6) that contained free product; these three wells were reclassified as recovery wells (SLR, 2002).
- **2000 to 2008:** A total of 992.5 gal of free product was recovered with the active recovery system. Annual recovery from the active system was variable with peak recovery in 2001 (368 gal) and low recovery (10 gal) in 2008 (SLR, 2009).
- **2008:** SLR recommended that the operation of the active recovery system be discontinued following the 2008 operating season based on the declining free product recovery, groundwater petroleum hydrocarbon concentrations (described in Section 1.3.4), and the conceptual site model (CSM, Section 1.3.5). ADEC approved discontinuing operation of the active free product recovery system, but did not approve a status change for the site; however, ADEC stated they would consider a status change pending further data collection (ADEC, 2009).
- **2009:** The active free product recovery system was removed and no additional product recovery was performed. SLR recommended abandonment of recovery wells MW-1, MW-5, and MW-6 due to poor product recovery (SLR, 2010). ADEC did not concur with this recommendation and requested that work in 2010 address free product recovery. ADEC also denied the request to change the status of the site to "Cleanup Complete with Institutional Controls" and the site remained in active status (ADEC, 2010).
- **2010:** A total of approximately 14 gal of free product was recovered from the three recovery wells using polyethylene groundwater sampling bailers. A cumulative total of 1,085 gal of free product had been recovered to date from the three wells (SLR, 2011).
- **2011:** A total of 11.2 gal of free product was recovered using Keck-branded PRCs as active recovery systems during site visits and passive recovery systems between visits. Product recovery from each well began to be accounted for separately (SLR, 2012).
- **2012:** A total of 8.8 gal of free product was recovered using Keck PRCs and product bailers deployed as passive recovery systems (SLR, 2013).
- **2013:** Nine site visits were conducted, and free product recovery was performed on four separate occasions with a total recovery of 28.3 gal of product. Product recovery was

initially conducted using PRCs deployed as passive collection systems and 2-inch and 4-inch diameter Durham Geo Slope Indicator SoakEase™ sorbent socks were used as passive collection system between site visits and used exclusively for product recovery during the final site visits (SLR, 2013).

- **2014:** Eight site visits were conducted, with seven product recovery events including baildown tests on recovery wells. A total of 17.3 gal of free product was recovered using product recovery bailers, SoakEase™ sorbent socks, and submersible electric pumps (SLR, 2014).
- **2015:** A total of 15.5 gal of free product was recovered during five recovery events using product recovery bailers and sorbent socks (SLR, 2016). Based on the findings of the annual report, ADEC stated that recovery well MW-6 may be considered for decommissioning following evaluation of product recovery and monitoring data collected in 2016 (SLR, 2016).
- **2016:** Twelve site visits were conducted including ten product recovery events for a total of 17.8 gal of free product recovered in 2016. The decommissioning of recovery well MW-6 was recommended based on the *de minimus* product thickness and volume of product recovered during 2016 (SLR, 2017a).

Overall, annual recovery from the free product recovery system declined steadily until 2013 when the estimated recovery volume may have increased as a result of the use of sorbent socks deployed during site visits rather than the PRCs. Recovery in 2016 increased only slightly from the previous year despite a greater number of product recovery events than during the previous year. The total volume of product recovered through 2016 was approximately 1,185 gal.

1.3.3 FREE PRODUCT BAILDOWN TESTS

Free product baildown tests were conducted on recovery wells MW-1, MW-5, and MW-6 in 1999, 2005, 2007, 2008, 2014, and 2015 to evaluate the remaining true free product thickness in each recovery well. The analysis method used (Testa and Paczkowski, 1989) requires the free product level to be monitored until an inflection (decrease) is observed in the depth to product following the initial increase in depth that occurs after pumping (removal) of product. The true product thickness is calculated from the depth to product at the inflection point.

The apparent free product thicknesses has varied from year to year but showed an overall declining trend for wells MW-1, MW-5, and MW-6. The true product thickness calculated from baildown tests data indicates similar true thicknesses for recovery wells MW-1 (0.27 to 0.30 ft) and MW-5 (0.21 ft to 0.31 ft) in 2015 as those determined during the previous baildown test in 2014. The true product thickness at recovery well MW-6 could not be determined in 2015 because less than the minimum thickness of 0.3 ft for a baildown test (ASTM, 2013) was present; this well has shown a persistently low, and generally declining true product thickness since the 1999 bail down test. Recovery well MW-6 was decommissioned in 2017 due to a low potential for product recovery as discussed in Section 3.2.

1.3.4 GROUNDWATER MONITORING

Groundwater sampling at this site has been conducted at various frequencies (quarterly to annually) since the initial sampling event in 1997. Analytical results show that for the wells sampled, concentrations of benzene, toluene, ethylbenzene, and xylenes (BTEX) and DRO have remained below ADEC groundwater cleanup levels in the monitoring wells since 2001, except for samples collected from monitoring wells MW-2 and MW-7. Exceedances were reported for DRO in monitoring well MW-2 in 2010 and for benzene in monitoring well MW-7 from 2004 to 2011 (SLR, 2014).

Only a single polynuclear aromatic hydrocarbon (PAH), naphthalene, has ever been detected at the site at a concentration approaching ADEC cleanup levels (EMCON, 1998). Following the 2003 sampling event, analysis for PAHs was discontinued with the exception of naphthalene. Samples continued to be analyzed for naphthalene through 2009. With no detections of naphthalene since 2006, analysis was discontinued after 2009 with ADEC approval (SLR, 2010).

Groundwater monitoring results for the five wells sampled in 2015 and 2016 found that analyte concentrations were below their respective laboratory detection limits at all except for well MW-7 where DRO and benzene concentrations were detected well below ADEC cleanup levels and 2014 concentrations. Detected analyte concentrations at monitoring well MW-7 have generally declined since 2011 (SLR, 2016).

1.3.5 CONCEPTUAL SITE MODEL

SLR prepared a CSM for the MLT sump site in 2008 to qualitatively assess the risk to potential human receptors from hydrocarbon contamination at the site. The CSM indicated the complete and potentially significant exposure pathways at the site are to commercial and construction receptors and include exposure from ingestion, dermal contact, and inhalation of residual petroleum hydrocarbons assumed to remain in soil and groundwater (SLR, 2009).

1.4 PROJECT OBJECTIVES

The objectives of the project activities completed in 2017 were to:

- Collect groundwater samples from existing monitoring wells MW-2, MW-3, MW-7, MW-8, and MW-10 to evaluate current contaminant concentrations in groundwater at the site;
- Decommission recovery well MW-6 due to its limited potential for product recovery;
- Continue free product recovery from recovery wells MW-1 and MW-5; and,
- Install heat trace in recovery wells MW-1 and MW-5 at the conclusion of product recovery activities to permit commencement of recovery activities in late spring 2018.

2. REGULATORY CRITERIA

The current ADEC groundwater cleanup levels for contaminated sites are specified in Title 18 of the Alaska Administrative Code (AAC), Chapter 75, Oil and Hazardous Substances Pollution Control Regulations as amended through October 1, 2017 (ADEC, 2017). A summary of the groundwater cleanup levels listed in the regulation for constituents detected at the site are provided below.

- DRO, 1.5 milligrams per liter (mg/L);
- Benzene, 0.0046 mg/L;
- Toluene, 1.1 mg/L;
- Ethylbenzene, 0.015 mg/L; and
- Xylenes (total), 0.19 mg/L.

Cleanup levels for additional petroleum hydrocarbon-related volatile organic compounds (VOCs) monitored in 2017 for one wells include:

- 1,2,4-Trimethylbenzene, 0.015 mg/L;
- 1,3,5-Trimethylbenzene, 0.12 mg/L;
- Isopropylbenzene (Cumene), 0.45 mg/L;
- Methyl-t-butyl ether, 0.14 mg/L;
- Naphthalene; 0.0017 mg/L;
- n-Butylbenzene, 1.0 mg/L;
- n-Propylbenzene, 0.66 mg/L;
- sec-Butylbenzene, 2.0 mg/L;
- Styrene, 1.2 mg/L; and
- tert-Butylbenzene, 0.69 mg/L.

Historical data collected prior to 2017 was not revaluated with respect to the revised 2017 cleanup levels, although no impact on historic data is expected for this site.

3. FIELD ACTIVITIES

SLR personnel conducted a single groundwater sampling event and multiple free product recovery events during the 2017 field season. All field activities were performed in accordance with Alyeska operating procedures and SLR's ADEC-approved Work Plan (SLR, 2017b). Groundwater sampling was conducted in accordance with ADEC's *Field Sampling Guidance* (ADEC, 2016). All field activities were documented in the photograph log and the project field notebook included as Appendices A and B, respectively.

3.1 GROUNDWATER SAMPLING

SLR conducted groundwater monitoring on June 7, 2017. The monitoring event included sampling of monitoring wells MW-2, MW-3, MW-7, MW-8, and MW-10. A duplicate sample was collected from monitoring well MW-7 and designated MW-27. Recovery wells MW-1 and MW-5 contained free product, and consequently were not sampled. Field activities conducted at the recovery wells are discussed further in Section 3.2 through 3.4.

3.1.1 PROCEDURES

The depth to water and total well depth were measured prior to sampling and measurements were used to calculate the volume of water within each well. The wells were purged with disposable polyethylene bailers and a water sample was collected after three well volumes were evacuated from the casing, or until the well casing was evacuated for low yield wells. Water quality parameters were monitored using a YSI® Model 556 multi-meter. Parameters were recorded at regular intervals during purging and included pH, temperature, specific conductance, dissolved oxygen, and oxidation-reduction potential. Well Sampling Calculation and Record Sheets and the YSI calibration log are provided in Appendix C.

3.1.2 SAMPLING METHODS

Groundwater sampling was conducted according to the Work Plan. Groundwater samples were collected directly into laboratory-supplied containers with the volatile samples collected first, followed by the non-volatile samples. Groundwater samples were stored and transported in chilled coolers under chain of custody documentation to SGS North America, Inc. in Fairbanks, Alaska, an ADEC-approved laboratory. Groundwater samples collected during the sampling event were analyzed by the following methods consistent with previous sampling events:

- DRO by Alaska Method 102; and
- BTEX by U.S. Environmental Protection Agency (USEPA) Method 8021B.

Additionally, a list of 16 petroleum hydrocarbon-related VOCs was added for sampling year 2017 at the request of ADEC to evaluate for the presence of petroleum hydrocarbon VOCs.

The list of 16 VOCs evaluated by USEPA Method SW8260C includes:

- 1,2,4-Trimethylbenzene;
- 1,3,5-Trimethylbenzene;
- Benzene;
- Ethylbenzene;
- Isopropylbenzene (Cumene);
- Methyl-t-butyl ether, 0.140 mg/L;
- Naphthalene;
- n-Butylbenzene;
- n-Propylbenzene;
- o-Xylene;
- p- & m-Xylene
- sec-Butylbenzene;
- Styrene, 1.200 mg/L;
- tert-Butylbenzene, 0.690 mg/L;
- Toluene; and
- Xylenes (total).

3.1.3 QUALITY ASSURANCE AND QUALITY CONTROL

Quality assurance/quality control (QA/QC) procedures were maintained throughout the sampling activities. QA procedures included the analysis of a field duplicate and trip blank, and a laboratory data Quality Assurance Review (QAR) by qualified SLR staff. The QAR included the completion of an ADEC Laboratory Data Review Checklist. QC procedures included adherence to appropriate sample collection methodology as described in the Work Plan. Any discrepancies associated with the samples collected from the site are identified in the QAR and are described in Section 4.1. The QAR and the completed ADEC Laboratory Data Review Checklist are presented in Appendix D.

3.2 WELL DECOMMISSIONING

Product recovery well MW-6 was decommissioned in accordance with ADEC Monitoring Well Guidance (ADEC, 2013). The well was decommissioned with the casing left in place as follows:

1. The monitoring well was filled with 3/8-inch diameter, coated bentonite pellets to 10 ft above the top of the screen and hydrated with potable water;
2. The well casing was then filled from 10 ft above the top of the screen to 10 ft bgs with clean fill soil;

3. Bentonite pellets were placed in the boring from 10 to 4 ft bgs and hydrated with potable water; and
4. The well casing was then cut to approximately 4 ft bgs and the well monument was removed. The resulting hole was then backfilled and compacted to grade.

Decommissioning of product recovery well MW-6 was completed in accordance with the Work Plan. The emplacement of bentonite chips and fill soil within the well casing was verified using a sounding tape. Well decommissioning was documented in the field notebook (Appendix B) and in photographs included in Appendix A.

3.3 APPARENT FREE PRODUCT THICKNESS

Recovery wells MW-1 and MW-5 were gauged for free product and depth to water using an oil/water interface probe. A separate water level indicator was used to gauge monitoring wells to avoid cross-contamination of analytical samples due to free product carry-over. The apparent product thickness in recovery wells was calculated by subtracting the depth to product from the depth to water. The interface probe was decontaminated using a non-ionic detergent solution following gauging activities.

3.4 PRODUCT RECOVERY ACTIVITIES

Product recovery activities were performed between June 6 and October 19, 2017 and included measurement of free product thicknesses and product recovery at wells MW-1 and MW-5. Product recovery activities are documented in the project field logbook (Appendix B).

3.4.1 FREE PRODUCT RECOVERY

SLR visited the site on six separate occasions in 2017 to thaw, gauge, or conduct product recovery from recovery wells MW-1 and MW-5. Wells were thawed during initial visits on May 25 and 26 and again on June 5. Free product recovery was first conducted on June 5 to 7 and on each subsequent visit. The seven separate product recovery visits were conducted on June 5 to 7, June 27, July 24, September 14, September 28, and October 19, 2017. Field measurements of depth to free product, depth to water, and free product thickness before and after recovery were recorded in the Field Logbook (Appendix B).

Heat trace wire installed the previous fall was used to thaw ice in the upper casing of recovery wells MW-1 and MW-5 during the May 25 to 26 and June 5 visits in 2017. Thawing of ice in recovery wells was necessary to facilitate product measurements, and product recovery. This is a significant improvement over waiting for natural thawing to occur, which occurred as late as August in previous years.

Product recovery was primarily accomplished using product recovery bailers (product bailer) followed by deployment of product-selective sorbent socks (sorbents). The product bailers used were Clear-View™ Hydro-Bailer, model CV153H (for 2" well) and CV333H (for 4" well), and the sorbent socks were used from 2013 to 2016 (Durham Geo Slope Indicator SoakEase 2-inch and 4-inch) were also used in 2017. The product bailers used were designed to selectively remove

product, collecting very little groundwater with each deployment, and were found to be effective for product thicknesses greater than 0.3 ft. Additionally, product bailers allowed for repeated, rapid deployment and accurate measurement of recovered product volumes. Sorbent socks were used as bailers when product thickness was below 0.3 ft and typically reduced product thickness to less than 0.05 ft after one to three deployments.

The volume of free product recovered using the product-selective sorbent socks was estimated using a qualitative percentage measurement of free product absorbed and estimating a product volume using vendor specifications. The assumption was made that all absorption that occurred was composed entirely of free product. A water and turbine fuel mix was observed in the oily waste bags containing the spent socks; therefore, the calculated volume of free product recovered with product-selective sorbent socks is biased high.

Recovered free product and used product-selective sorbent socks were disposed of as described in Section 3.6.

3.4.2 HEAT TRACE EMPLACEMENT

SLR placed heat trace wire in the two recovery wells at the conclusion of the product recovery event on October 19, 2017. The heat trace wires were first installed following the product recovery event in October 2013 to enable thawing of the shallow ice plugs that typically form between 8 ft and 14 ft bgs in the zone of seasonal frost. The heat traces extend to approximately 20 ft bgs in each well and are powered by a portable gasoline-powered generator placed in a rubber drip containment mat.

3.5 WORK PLAN DEVIATIONS

No deviations to the Work Plan were noted.

3.6 WASTE MANAGEMENT

Solid and liquid wastes generated during field activities were managed as follows:

- Disposable sampling material was disposed of as non-oily waste and placed in the appropriate garbage receptacle at PS09.
- Used product-selective sorbent socks and product bailers were placed in doubled bagged oily-waste bags and left in the appropriate oily-waste receptacle at PS09 for offsite disposal.
- Purge water collected during sampling activities and recovered free product was transferred to a pipeline sump for re-injection into the pipeline.

Disposal of waste materials was discussed with the PS09 Waste Single Point of Contact and/or Operations and Maintenance Supervisor prior to each field event.

4. ANALYTICAL RESULTS

This section describes key findings of groundwater sampling analytical results and SLR's QAR. Groundwater analytical results for the five monitoring wells sampled in 2017 are presented on Table 3 and historic results on Table 4. The laboratory QAR, completed ADEC Laboratory Data Review Checklist, and laboratory analytical report are included as Appendix D.

4.1 ANALYTICAL DATA QUALITY

Although a few issues were noted within SLR's QAR with respect to data packages, the data met all precision, accuracy, representativeness, comparability, completeness, and sensitivity goals. The data were deemed acceptable for use without qualification as described in Appendix D.

4.2 GROUNDWATER ANALYTICAL RESULTS

Analytical results indicate that petroleum hydrocarbon impacts are limited to low-level detections of DRO and benzene well below applicable cleanup levels. Detections of DRO and benzene, above the laboratory limit of quantitation (LOQ) using historical analytical methods were only reported in well MW-7; the remaining wells (MW-2, MW-3, MW-8, and MW-10) had values reported as estimated concentrations below the LOQ or as non-detect values below the limit of detection (LOD). Of the 16 petroleum hydrocarbon VOC list, only benzene and sec-butylbenzene were detected by analytical method SW8260C.

DRO was reported above the LOQ only in well MW-7 where the concentration of 1.07 mg/L for the associated duplicate sample was similar to the value of 0.987 mg/L reported in 2016 and less than the recent high of 1.47 mg/L in 2011. The concentration of DRO in well MW-7 remains well below the cleanup level of 1.5 mg/L. DRO was also reported at estimated concentrations below the LOQ in wells MW-2 and MW-8, which is consistent with historical values from 2011 through 2016.

Benzene was only detected in monitoring well MW-7 and its associated duplicate sample by both USEPA Methods SW8021B and SW8260B. The duplicate sample for Method SW8021B had the highest reported concentration, but at a value of 0.00160 mg/L, the result was below the cleanup level of 0.0046 mg/L. The benzene concentration in well MW-7 has generally decreased each year from a historic high of 0.0643 mg/L in 2009. Benzene concentrations remained below the LOD in the remaining monitoring wells; exceedances have never been reported in these wells.

Sec-butylbenzene was the only petroleum hydrocarbon VOC other than benzene to be detected by USEPA Method SW8260B. The concentration of sec-butylbenzene of 0.00119 mg/L was four orders of magnitude below the applicable cleanup level.

5. RESULTS OF FIELD ACTIVITIES

This section describes the results of field activities completed in 2017 which included measurement of groundwater elevations, measurement of free product thickness, and free product recovery. Measurements of groundwater elevations and product thickness at recovery wells are presented on Table 1. The maximum gauged free product thicknesses from 1998 through 2010 and recovery volumes and product thicknesses for 2011 through 2017 for wells MW-1 and MW-5 are presented on Tables 4 and 5, respectively. Field activities are documented in the photograph log (Appendix A), field logbook (Appendix B), and on groundwater sampling forms (Appendix C).

5.1 GROUNDWATER ELEVATIONS

Groundwater elevations measured during the sampling event in June 2017 were variable compared to the previous year, ranging from 1 ft above to 5 ft below elevations measured on the same day in 2016 (Table 1). With the exception of monitoring well MW-7, groundwater elevations have typically remained constant or decreased over the last five years. The elevations collected over the life of the project suggest a general north-northwest flow direction; however, the aquifer is perched and discontinuous, therefore the assumed gradient is subject to uncertainty.

5.2 APPARENT FREE PRODUCT THICKNESS

Apparent product thickness in recovery wells MW-1 and MW-5 were variable during the construction season due to the greater period of time between recovery events; however, the magnitude of product thickness decrease achieved in each well was similar to results from previous years. In general, initial product thicknesses in recovery wells have decreased each year and following each consecutive recovery event. Initial product thicknesses show an overall decrease since the recent high in 2014 at all wells. Minor variations in product thickness between years may be the result of a combination of ice plug melt water in the beginning of each season, continued product recovery, and year-to-year changes in groundwater elevations. Overall, the apparent free product thicknesses have decreased since gauging of recovery wells began in 1997.

Historical product gauging results for MW-1 and MW-5 are shown on Tables 4 and 5, respectively, and are summarized as follows:

- **MW-1:** The apparent pre-recovery product thicknesses of 1.41 ft in 2017 was greater than 0.76 ft measured in 2016, but was below the recent high of 2.06 ft in 2014. Additionally, the final product thickness of 0.19 ft achieved after six recovery events was similar to the final measurement of 0.17 ft in 2016. The final product thickness was also less than the true product thickness of 0.27 to 0.30 ft determined from the 2015 baildown test.
- **MW-5:** The apparent pre-recovery product thickness of 1.33 ft was slightly less than the 1.48 ft pre-recovery thickness in 2016. A smaller apparent product thickness reduction

was achieved in 2017 (1.13 to 0.43 ft) as compared to 2016 (1.48 to 0.21 ft). The final product thickness was similar to the 0.21 to 0.31 ft true thickness determined from the 2015 baildown test.

5.3 FREE PRODUCT RECOVERY

The volume of product recovered from the each of the two recovery wells, in the six visits between June 5 and October 19, represents an increase in recovered product for well MW-1 and a decrease for well MW-5 as compared to the previous two years. The results of annual product recovery events completed for wells MW-1 and MW-5 are presented in Tables 4 and 5, respectively and a comparison of product recovery periods is provided on Table 6. Results of 2017 product recovery activities are summarized as follows:

- **MW-1:** The total free product recovered from well MW-1 was approximately 4.2 gal, an increase of 1.6 gal from 2016 and the largest volume of product recovered since 2014 (4.7 gal). The volume recovered in 2017 accounts for 18 percent of the 23.5 gal of product recovered from this well since 2011.
- **MW-5:** The total free product recovered from well MW-5 was approximately 10.1 gal, a decrease of 4.5 gal compared to 2016 and the smallest volume of product recovered since 2014 (10.8 gal). The volume recovered represents 12 percent of the 81.8 gal of product recovered from this well since 2011.

The variable product recovery volumes for wells MW-1 and MW-5 indicate that the volume of product recovered does not correlate directly to the number of recovery events and that the effectiveness of recovery events varies from year to year. For example, 17.8 gal was recovered in ten events in 2017 whereas nearly the same volume (15.1 gal) was recovered in five events in 2015 using similar methods (Table 6). Historical data for wells MW-1 and MW-5 since 2011 also shows a variable period of peak product recovery each year.

The total volume of recovered product to date of approximately 1,199 gal represents a substantial portion (60 percent) of the approximately 2000 gal thought to have been released. The product recovered in 2017 represents only 1.2 percent of the total of approximately 1,199 gal of free product that have been recovered by all methods since discovery of the contamination in 1996 (Table 6). Additionally, the 114 gal of product recovered between 2011 and 2017 represents only a small fraction (9.5 percent) of the total volume of product recovered since 1996.

6. CONCLUSIONS AND RECOMMENDATIONS

The results of groundwater monitoring at the PS09 MLT Sump site show that petroleum hydrocarbons concentrations remain low and well below ADEC cleanup levels for all wells.

Free product recovery and product gauging results suggest seasonal variation in product recovery and thicknesses as compared to 2016 with the overall continuation of declining product recovery rates and free product thicknesses. The total volume of product recovered from wells MW-1 and MW-5 decreased by 3.5 gal from the 2016 despite the largest volume of product recovered from well MW-1 since 2014.

Recovery well MW-6 is was successfully decommissioned to mitigate potential impacts to the deeper aquifer.

Based on the above findings, SLR recommends the following activities for 2018:

- Thaw recovery wells MW-1 and MW-5 as soon as feasible to continue product recovery if apparent product thicknesses exceed the minimum of 0.1 ft.
- Discontinue analysis of 16 petroleum hydrocarbon VOCs by USEPA Method SW8260C.

Additionally, SLR recommends that Alyeska pursue reduced, biennial groundwater water monitoring sampling event frequency with the next sampling event in 2019 based on the persistence of very low to non-detect concentrations of hydrocarbons in groundwater monitoring locations.

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LIMITATIONS

The services described in this work product were performed in accordance with generally accepted professional consulting principles and practices. No other representations or warranties, expressed or implied, are made. These services were performed consistent with our agreement with our client. This work product is intended solely for the use and information of our client unless otherwise noted. Any reliance on this work product by a third party is at such party's sole risk.

Opinions and recommendations contained in this work product are based on conditions that existed at the time the services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. The data reported and the findings, observations, and conclusions expressed are limited by the scope of work. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this work product.

The purpose of an environmental assessment is to reasonably evaluate the potential for, or true impact of, past practices on a given site area. In performing an environmental assessment, it is understood that a balance must be struck between a reasonable inquiry into the environmental issues and an appropriate level of analysis for each conceivable issue of potential concern. The following paragraphs discuss the assumptions and parameters under which such an opinion is rendered.

No investigation can be thorough enough to exclude the presence of hazardous materials at a given site. If hazardous conditions have not been identified during the assessment, such a finding should not therefore be construed as a guarantee of the absence of such materials on the site, but rather as the result of the services performed within the scope, practical limitations, and cost of the work performed.

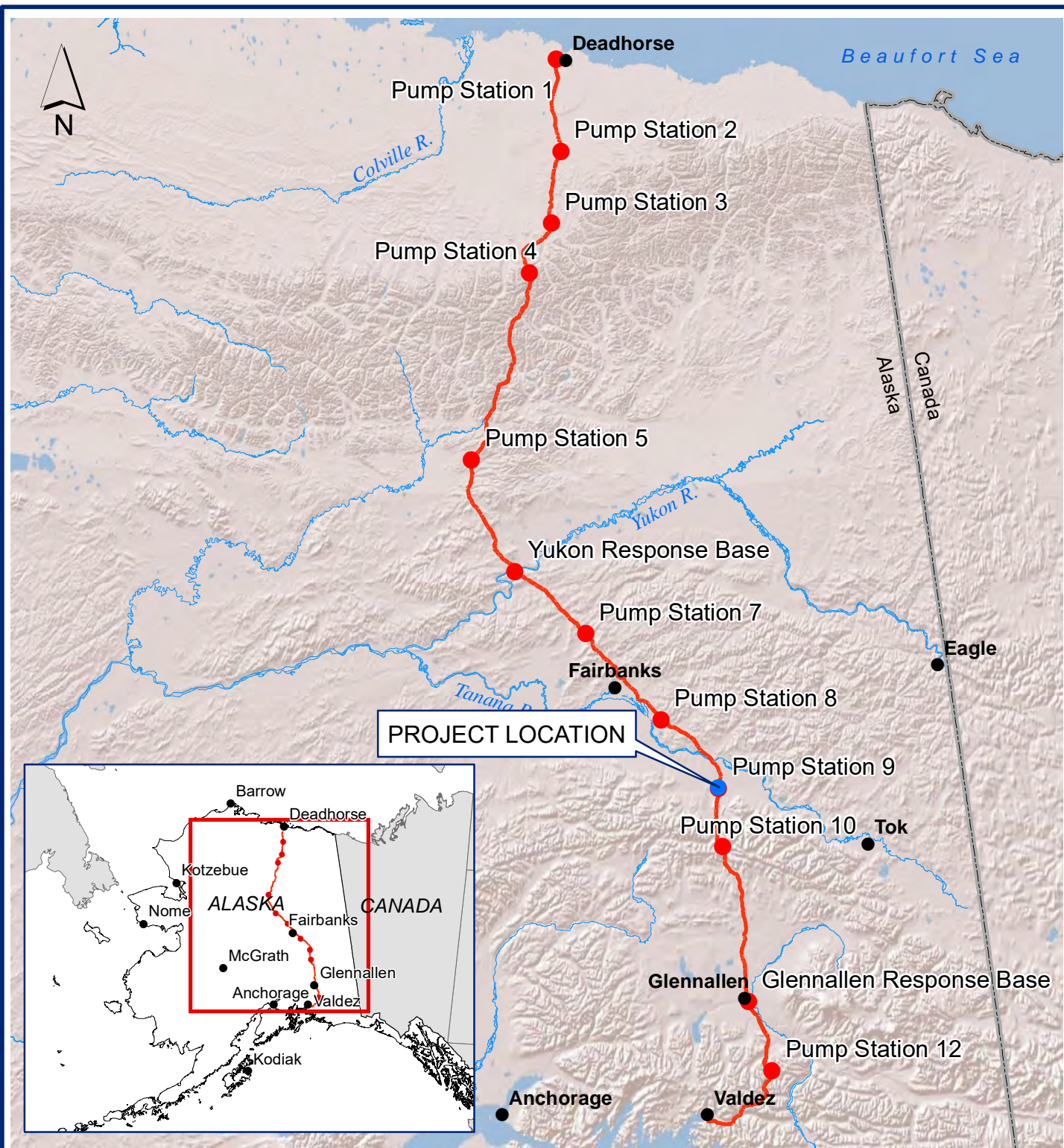
Environmental conditions that are not apparent may exist at the site. Our professional opinions are based in part on interpretation of data from a limited number of discrete sampling locations and therefore may not be representative of the true overall site environmental conditions.

The passage of time, manifestation of latent conditions, or occurrence of future events may require further study at the site, analysis of the data, and/or reevaluation of the findings, observations, and conclusions in the work product.

This work product presents professional opinions and findings of a scientific and technical nature. The work product shall not be construed to offer legal opinion or representations as to the requirements of, nor the compliance with, environmental laws rules, regulations, or policies of federal, state or local governmental agencies.

FIGURES

- | | |
|----------|--|
| Figure 1 | Site Location Map |
| Figure 2 | Site Vicinity Map |
| Figure 3 | Groundwater Monitoring Well Locations and Analytical Results |



Legend

- City
- Pump Station
- Trans Alaska Pipeline

0 20 40 80 120 160 Miles

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY.
ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.



Site

ALYESKA PIPELINE SERVICE COMPANY
PUMP STATION 9
PIPELINE MILEPOST 548.7

Report

2017 GROUNDWATER MONITORING AND
PRODUCT RECOVERY REPORT
PUMP STATION 9 MAINLINE TURBINE SUMP

Drawing

SITE LOCATION MAP

Drawing	March 2018
File Name	F1 PS09 MLT RPT_17.mxd

Scale	As Shown
Project No.	105.01288.17018

Fig. No.

1

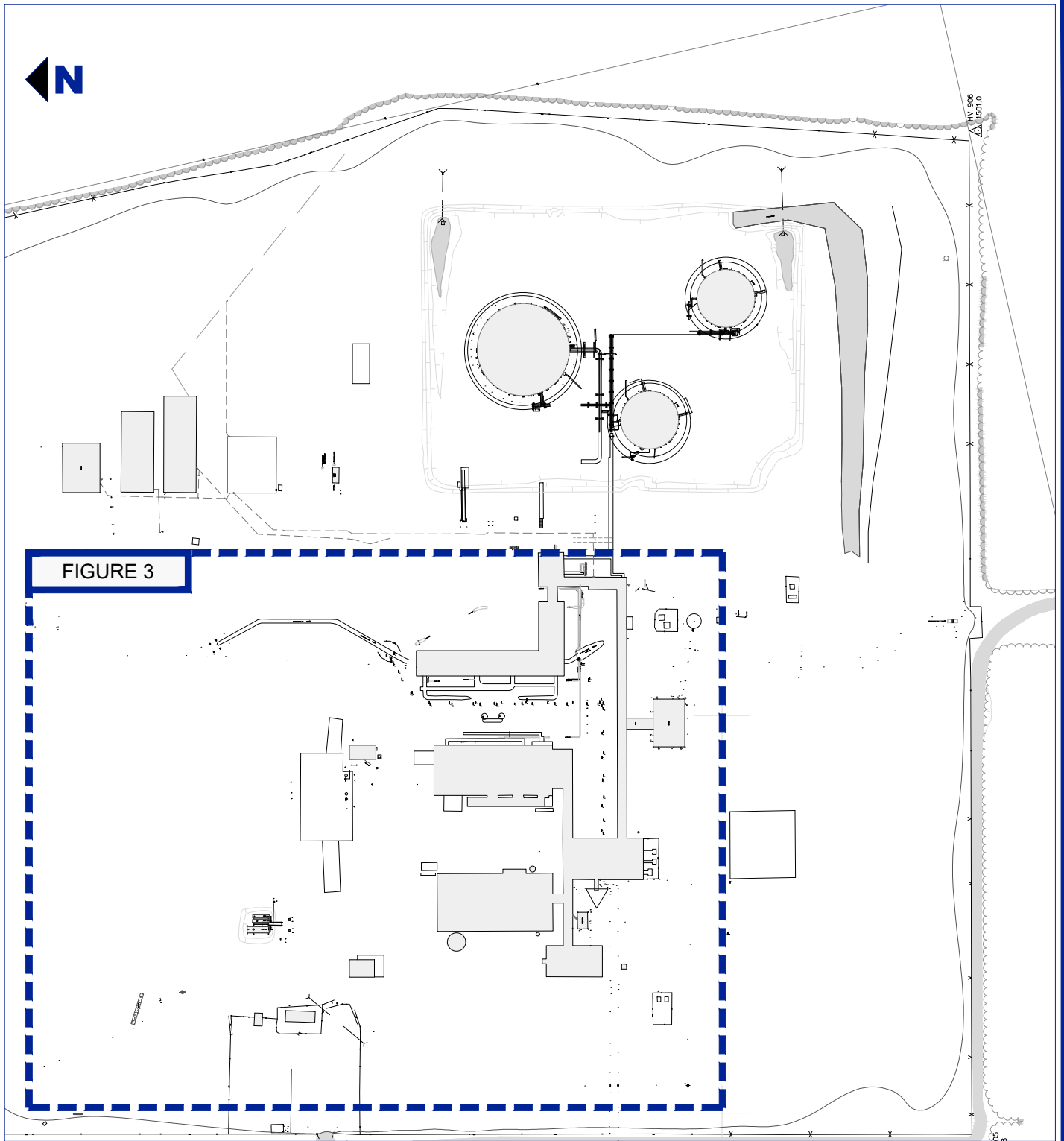


FIGURE 3

SCALE: 1" = 100 FEET
WHEN PLOTTED AT 8.5 x 11 PAGE SIZE
0 100 200 300 FEET

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL
LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.



Site

ALYESKA PIPELINE SERVICE COMPANY
PUMP STATION 9
PIPELINE MILEPOST 548.7

Report

2017 GROUNDWATER MONITORING AND
PRODUCT RECOVERY REPORT
PUMP STATION 9 MAINLINE TURBINE SUMP

Drawing

SITE VICINITY MAP

Date

March 2018

Scale

1" = 100 Feet

Fig. No.

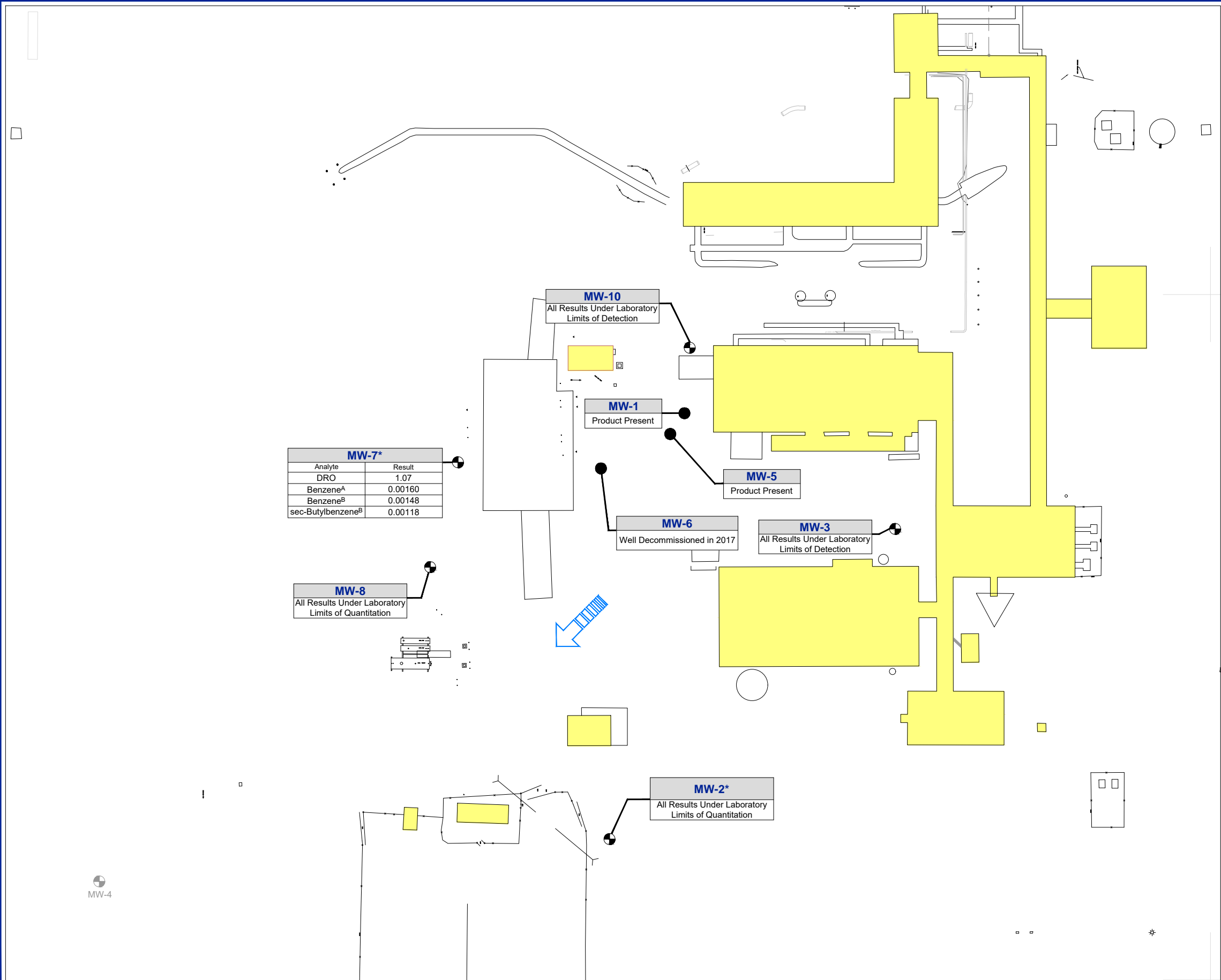
File Name

F2 PS09 MLT RPT_17

Project No.

105.01288.17018

2



LEGEND

- MW-3 MONITORING WELL LOCATION
- MW-4 DESTROYED MONITORING WELL
- MW-1 RECOVERY WELL LOCATION
- ← APPARENT GROUNDWATER FLOW DIRECTION

SAMPLING RESULTS GUIDELINES

ABBREVIATIONS:

ADEC ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION
BTEX BENZENE, TOLUENE, ETHYLBENZENE, AND XYLENES
DRO DIESEL RANGE ORGANICS
J ESTIMATED VALUE
mg/L MILLIGRAMS PER LITER
VOC VOLATILE ORGANIC COMPOUND

NOTES:

GROUNDWATER SAMPLES COLLECTED FROM ALL MONITORING WELLS WERE ANALYZED FOR ANALYTES OF DRO AND BTEX CONSTITUENTS. WELL MW-7 WAS ALSO ANALYZED FOR PETROLEUM VOCs^B.

ALL RESULTS ARE SHOWN IN MILLIGRAMS PER LITER (mg/L)

ONLY RESULTS ABOVE THE LABORATORY LIMIT OF QUANTITATION ARE PRESENTED ON THIS FIGURE

BOLD TEXT IN THE RESULT COLUMN INDICATES THE ANALYTE CONCENTRATION IS ABOVE ADEC CLEANUP LEVELS FOR DRO (1.5 mg/L) OR BENZENE (0.005 mg/L)

* DUPLICATE SAMPLE MW-29 COLLECTED AT THIS LOCATION, THE HIGHEST ANALYTE CONCENTRATIONS FOR THE PRIMARY / DUPLICATE SAMPLE PAIR ARE SHOWN.

A. U.S. ENVIRONMENTAL PROTECTION AGENCY ANALYTICAL METHOD SW8021B.
B. U.S. ENVIRONMENTAL PROTECTION AGENCY ANALYTICAL METHOD SW8260B.

Site	ALYESKA PIPELINE SERVICE COMPANY PUMP STATION 9 PIPELINE MILEPOST 548.7		
Report	2017 GROUNDWATER MONITORING AND PRODUCT RECOVERY REPORT PUMP STATION 9 MAINLINE TURBINE SUMP		
Drawing	GROUNDWATER MONITORING WELL LOCATIONS AND ANALYTICAL RESULTS		
Date	March 2018	Scale	1" = 75 Feet
File Name	F3 PS09 MLT RPT_17	Project No.	105.01288.17018
Fig. No.	3		

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

SCALE: 1" = 75'
WHEN PLOTTED AT 11 x 17 PAGE SIZE
0 75' 150' 225'



TABLES

Table 1	Groundwater and Free Product Elevations
Table 2	2017 Groundwater Analytical Results
Table 3	Historical Groundwater Analytical Results
Table 4	1998-2017 MW-1 Summary of Product Gauging and Recovery
Table 5	1998-2017 MW-5 Summary of Product Gauging and Recovery
Table 6	1998-2017 Annual Product Recovery Summary

**Table 1 - Groundwater and Free Product Elevations
PS09 Mainline Turbine Sump**

Well Name	Date	Well Elevation (feet above MSL) ^A	Depth to Groundwater (feet)	Groundwater Elevation ^B (feet above MSL)	Depth to Free Product (feet)	Free Product Elevation (feet above MSL)	Free Product Thickness (feet)
MW-1	11/7/1997	1504.98	114.77	1390.21	NM	NM	NM
	4/1/1998	1504.98	114.61	1390.37	NM	NM	NM
	11/22/1998	1504.98	114.73	1390.25	114.54	1390.44	0.19
	12/1/1998	1504.98	114.78	1390.20	114.59	1390.39	0.19
	6/8/1999	1504.98	116.03	1388.95	115.13	1389.85	0.90
	9/16/1999	1504.98	115.93	1389.05	115.58	1389.40	0.35
	10/7/1999	1504.98	116.71	1388.27	115.48	1389.50	1.23
	11/11/1999	1504.98	116.66	1388.32	115.51	1389.47	1.15
	5/17/2000	1504.98	115.52	1389.46	114.52	1390.46	1.00
	12/28/2000	1504.98	112.00	1392.98	104.80	1400.18	7.20
	7/19/2001	1501.23	106.40	1394.83	101.92	1399.31	4.48
	9/19/2001	1501.23	104.25	1396.98	103.65	1397.58	0.60
	6/10/2002	1501.23	108.90	1392.33	108.56	1392.67	0.34
	10/2/2002	1501.23	109.58	1391.65	109.37	1391.86	0.21
	6/3/2003	1501.23	111.07	1390.16	110.12	1391.11	0.95
	6/23/2003	1501.23	110.52	1390.71	110.20	1391.03	0.32
	7/24/2003	1501.23	110.88	1390.35	110.41	1390.82	0.47
	8/28/2003	1501.23	111.36	1389.87	110.71	1390.52	0.65
	9/15/2003	1501.23	111.56	1389.67	110.89	1390.34	0.67
	10/3/2003	1501.23	111.37	1389.86	110.72	1390.51	0.65
	6/2/2004	1501.23	111.89	1389.34	110.99	1390.24	0.90
	6/3/2004	1501.23	111.44	1389.79	111.15	1390.08	0.29
	6/10/2004	1501.23	110.90	1390.33	110.81	1390.42	0.09
	7/8/2004	1501.23	110.46	1390.77	110.44	1390.79	0.02
	7/20/2004	1501.23	110.22	1391.01	110.22	1391.01	0.00
	8/12/2004	1501.23	110.14	1391.09	110.08	1391.15	0.06
	9/2/2004	1501.23	109.83	1391.40	109.82	1391.41	0.01
	10/19/2004	1501.23	109.88	1391.35	109.84	1391.39	0.04
	6/20/2005	1501.23	110.74	1390.49	110.74	1390.49	0.00
	6/28/2005	1501.23	109.52	1391.71	109.52	1391.71	0.00
	10/17/2005	1501.23	109.19	1392.04	109.19	1392.04	0.00
	11/3/2005	1501.23	109.18	1392.05	109.15	1392.08	0.03
	5/31/2006	1501.23	111.41	1389.82	110.70	1390.53	0.71
	7/13/2006	1501.23	111.02	1390.21	110.79	1390.44	0.23
	10/5/2006	1501.23	108.54	1392.69	108.02	1393.21	0.52
	5/30/2007	1501.23	109.54	1391.69	108.78	1392.45	0.76
	7/18/2007	1501.23	109.74	1391.49	109.32	1391.91	0.42
	8/3/2007	1501.23	110.05	1391.18	109.57	1391.66	0.48
	8/17/2007	1501.23	109.51	1391.72	N/A	N/A	0.00
	9/13/2007	1501.23	109.69	1391.54	109.685	1391.55	0.005
	9/21/2007	1501.23	109.67	1391.56	N/A	N/A	0.00
	10/5/2007	1501.23	109.29	1391.94	N/A	N/A	0.00
	10/12/2007	1501.23	109.33	1391.90	N/A	N/A	0.00
	11/2/2007	1501.23	109.25	1391.98	N/A	N/A	0.00
	6/2/2008	1501.23	110.22	1391.01	109.80	1391.43	0.42
	7/1/2008	1501.23	110.35	1390.88	N/A	N/A	0.00
	7/18/2008	1501.23	110.43	1390.80	110.38	1390.85	0.05
	7/23/2008	1501.23	110.59	1390.64	110.50	1390.73	0.09
	7/25/2008	1501.23	110.60	1390.63	110.54	1390.69	0.06
	8/12/2008	1501.23	110.41	1390.82	110.40	1390.83	0.01
	9/3/2008	1501.23	109.70	1391.53	N/A	N/A	0.00
	9/12/2008	1501.23	109.33	1391.90	109.19	1392.04	0.14
	10/8/2008	1501.23	107.67	1393.56	106.68	1394.55	0.99
	7/17/2009	1501.23	108.36	1392.87	104.48	1396.75	3.88
	8/7/2010	1501.23	110.27	1390.96	109.95	1391.28	0.32
	9/25/2010	1501.23	108.28	1392.95	107.63	1393.60	0.65
	10/8/2010	1501.23	108.25	1392.98	107.43	1393.80	0.82
	10/12/2010	1501.23	107.88	1393.35	107.28	1393.95	0.60
	6/24/2011	1501.23	108.94	1392.29	107.94	1393.29	1.00
	7/18/2011	1501.23	109.02	1392.21	108.34	1392.89	0.68
	7/26/2011	1501.23	108.64	1392.59	108.45	1392.78	0.19
	8/8/2011	1501.23	108.75	1392.48	108.69	1392.54	0.06
	8/22/2011	1501.23	108.54	1392.69	108.53	1392.70	0.01
	9/9/2011	1501.23	108.86	1392.37	108.84	1392.39	0.02
	9/19/2011	1501.23	108.61	1392.62	108.6	1392.63	0.01
	10/6/2011	1501.23	108.52	1392.71	108.51	1392.72	0.01
	10/26/2011	1501.23	108.57	1392.66	108.56	1392.67	0.01
	6/5/2012	1501.23	NM	NM	NM	NM	NM

**Table 1 - Groundwater and Free Product Elevations
PS09 Mainline Turbine Sump**

Well Name	Date	Well Elevation (feet above MSL) ^A	Depth to Groundwater (feet)	Groundwater Elevation ^B (feet above MSL)	Depth to Free Product (feet)	Free Product Elevation (feet above MSL)	Free Product Thickness (feet)
MW-1 Continued	6/20/2012	1501.23	NM	NM	NM	NM	NM
	7/5/2012	1501.23	NM	NM	NM	NM	NM
	7/20/2012	1501.23	NM	NM	NM	NM	NM
	8/3/2012	1501.23	NM	NM	NM	NM	NM
	8/9/2012	1501.23	110.06	1391.17	109.70	1391.53	0.36
	8/23/2012	1501.23	109.78	1391.45	109.58	1391.65	0.20
	9/6/2012	1501.23	109.90	1391.33	109.75	1391.48	0.15
	9/21/2012	1501.23	109.83	1391.40	109.69	1391.54	0.14
	10/8/2012	1501.23	109.88	1391.35	109.75	1391.48	0.13
	10/22/2012	1501.23	109.89	1391.34	109.78	1391.45	0.11
	6/19/2013	1501.23	NM	NM	NM	NM	NM
	6/27/2013	1501.23	NM	NM	NM	NM	NM
	7/19/2013	1501.23	NM	NM	NM	NM	NM
	8/2/2013	1501.23	NM	NM	NM	NM	NM
	8/14/2013	1501.23	NM	NM	NM	NM	NM
	8/29/2013	1501.23	112.62	1388.61	111.41	1389.82	1.21
	9/12/2013	1501.23	112.39	1388.84	111.60	1389.63	0.79
	10/4/2013	1501.23	112.43	1388.80	111.69	1389.54	0.74
	10/17/2013	1501.23	112.01	1389.22	111.68	1389.55	0.33
	6/3/2014	1501.23	114.28	1386.95	112.57	1388.66	1.71
	7/9/2014	1501.23	114.67	1386.56	112.61	1388.62	2.06
	7/28/2014	1501.23	113.63	1387.60	112.85	1388.38	0.78
	8/7/2014	1501.23	113.35	1387.88	112.74	1388.49	0.61
	8/26/2014	1501.23	113.48	1387.75	112.53	1388.70	0.95
	9/23/2014	1501.23	112.97	1388.26	112.29	1388.94	0.68
	10/9/2014	1501.23	112.43	1388.80	112.00	1389.23	0.43
	7/3/2015	1501.23	111.60	1389.63	111.11	1390.12	0.49
	7/14/2015	1501.23	112.06	1389.17	111.48	1389.75	0.58
	7/21/2015	1501.23	112.00	1389.23	111.51	1389.72	0.49
	8/12/2015	1501.23	112.14	1389.09	111.72	1389.51	0.42
	8/25/2015	1501.23	112.11	1389.12	111.82	1389.41	0.29
	9/13/2015	1501.23	112.09	1389.14	111.86	1389.37	0.23
	10/1/2015	1501.23	112.28	1388.95	112.08	1389.15	0.20
	6/1/2016	1501.23	NM	NM	NM	NM	NM
	6/2/2016	1501.23	112.23	1389.00	111.64	1389.59	0.59
	6/7/2016	1501.23	112.54	1388.69	111.78	1389.45	0.76
	6/11/2016	1501.23	112.27	1388.96	111.78	1389.45	0.49
	6/27/2016	1501.23	112.25	1388.98	111.93	1389.30	0.32
	7/10/2016	1501.23	112.24	1388.99	112.03	1389.20	0.21
	8/5/2016	1501.23	112.26	1388.97	112.19	1389.04	0.07
	8/18/2016	1501.23	112.34	1388.89	112.24	1388.99	0.10
	9/5/2016	1501.23	112.29	1388.94	112.18	1389.05	0.11
	9/16/2016	1501.23	112.33	1388.90	112.22	1389.01	0.11
	10/3/2016	1501.23	112.59	1388.64	112.33	1388.90	0.26
	10/13/2016	1501.23	112.42	1388.81	112.25	1388.98	0.17
	5/25/2017	1501.23	NM	NM	NM	NM	NM
	5/26/2017	1501.23	114.03	1387.20	112.78	1388.45	1.25
	6/5/17 to 6/7/17	1501.23	114.17	1387.06	112.76	1388.47	1.41
	6/27/2017	1501.23	113.33	1387.90	112.99	1388.24	0.34
	7/24/2017	1501.23	113.43	1387.80	113.14	1388.09	0.29
	9/14/2017	1501.23	113.61	1387.62	113.20	1388.03	0.41
	9/28/2017	1501.23	113.45	1387.78	113.16	1388.07	0.29
	10/19/2017	1501.23	113.35	1387.88	113.16	1388.07	0.19
MW-2	11/7/1997	1504.59	NM	NM	N/A	N/A	N/A
	4/1/1998	1504.59	114.76	1389.83	N/A	N/A	0.00
	11/22/1998	1504.59	113.90	1390.69	N/A	N/A	0.00
	12/1/1998	1504.59	114.32	1390.27	N/A	N/A	0.00
	6/9/1999	1504.59	115.40	1389.19	N/A	N/A	0.00
	9/17/1999	1504.59	113.28	1391.31	N/A	N/A	0.00
	11/11/1999	1504.59	114.00	1390.59	N/A	N/A	0.00
	5/17/2000	1504.59	115.31	1389.28	N/A	N/A	0.00
	7/14/2000	1504.59	115.09	1389.50	N/A	N/A	0.00
	10/13/2000	1504.59	112.16	1392.43	N/A	N/A	0.00
	3/27/2001	1504.58	105.95	1398.63	N/A	N/A	0.00
	7/12/2001	1504.58	105.49	1399.09	N/A	N/A	0.00
	9/20/2001	1504.58	106.49	1398.09	N/A	N/A	0.00
	11/16/2001	1504.58	107.48	1397.10	N/A	N/A	0.00

**Table 1 - Groundwater and Free Product Elevations
PS09 Mainline Turbine Sump**

Well Name	Date	Well Elevation (feet above MSL) ^A	Depth to Groundwater (feet)	Groundwater Elevation ^B (feet above MSL)	Depth to Free Product (feet)	Free Product Elevation (feet above MSL)	Free Product Thickness (feet)
MW-2 Continued	6/11/2002	1504.58	111.70	1392.88	N/A	N/A	0.00
	10/4/2002	1504.58	112.26	1392.32	N/A	N/A	0.00
	6/24/2003	1504.58	115.46	1389.12	N/A	N/A	0.00
	10/1/2003	1504.58	114.38	1390.20	N/A	N/A	0.00
	6/10/2004	1504.58	115.78	1388.80	N/A	N/A	0.00
	10/18/2004	1504.58	114.87	1389.71	N/A	N/A	0.00
	6/27/2005	1504.58	113.44	1391.14	N/A	N/A	0.00
	10/16/2005	1504.58	113.98	1390.60	N/A	N/A	0.00
	6/1/2006	1504.58	113.36	1391.22	N/A	N/A	0.00
	10/5/2006	1504.58	103.40	1401.18	N/A	N/A	0.00
	7/17/2006	1504.58	114.44	1390.14	N/A	N/A	0.00
	10/4/2007	1504.58	112.82	1391.76	N/A	N/A	0.00
	7/25/2008	1504.58	116.78	1387.80	N/A	N/A	0.00
	7/18/2009	1504.58	107.60	1396.98	N/A	N/A	0.00
	8/11/2010	1504.58	111.89	1392.69	N/A	N/A	0.00
	9/8/2011	1504.58	113.22	1391.36	N/A	N/A	0.00
	7/20/2012	1504.58	113.56	1391.02	N/A	N/A	0.00
	8/22/2013	1504.58	116.18	1388.40	N/A	N/A	0.00
	9/19/2013	1504.58	116.30	1388.28	N/A	N/A	0.00
	6/5/2014	1504.58	116.79	1387.79	N/A	N/A	0.00
	7/15/2015	1504.58	116.51	1388.07	N/A	N/A	0.00
MW-3	6/6/2016	1504.58	116.68	1387.90	N/A	N/A	0.00
	6/7/2017	1504.58	121.90	1382.68	N/A	N/A	0.00
	11/7/1997	1508.38	117.94	1390.44	N/A	N/A	0.00
	4/1/1998	1508.38	117.83	1390.55	N/A	N/A	0.00
	11/21/1998	1508.38	117.89	1390.49	N/A	N/A	0.00
	12/1/1998	1508.38	118.04	1390.34	N/A	N/A	0.00
	6/9/1999	1508.38	116.49	1391.89	N/A	N/A	0.00
	9/16/1999	1508.38	116.88	1391.50	N/A	N/A	0.00
	11/11/1999	1508.38	116.93	1391.45	N/A	N/A	0.00
	5/16/2000	1508.38	115.90	1392.48	N/A	N/A	0.00
	7/16/2000	1508.38	115.54	1392.84	N/A	N/A	0.00
	10/11/2000	1508.38	113.85	1394.53	N/A	N/A	0.00
	3/27/2001	1506.36	106.30	1400.06	N/A	N/A	0.00
	7/11/2001	1506.36	107.87	1398.49	N/A	N/A	0.00
	9/20/2001	1506.36	108.94	1397.42	N/A	N/A	0.00
	11/16/2001	1506.36	110.21	1396.15	N/A	N/A	0.00
	6/10/2002	1506.36	113.63	1392.73	N/A	N/A	0.00
	10/3/2002	1506.36	114.19	1392.17	N/A	N/A	0.00
	6/24/2003	1506.36	115.07	1391.29	N/A	N/A	0.00
	10/2/2003	1506.36	115.73	1390.63	N/A	N/A	0.00
	6/11/2004	1506.36	115.61	1390.75	N/A	N/A	0.00
	10/19/2004	1506.36	114.64	1391.72	N/A	N/A	0.00
	6/28/2005	1506.36	114.32	1392.04	N/A	N/A	0.00
	10/17/2005	1506.36	114.04	1392.32	N/A	N/A	0.00
	6/1/2006	1506.36	115.73	1390.63	N/A	N/A	0.00
	10/5/2006	1506.36	112.82	1393.54	N/A	N/A	0.00
	7/18/2007	1506.36	114.23	1392.13	N/A	N/A	0.00
	10/4/2007	1506.36	114.42	1391.94	N/A	N/A	0.00
	7/24/2008	1506.36	115.54	1390.82	N/A	N/A	0.00
	7/18/2009	1506.36	110.21	1396.15	N/A	N/A	0.00
	8/12/2010	1506.36	114.87	1391.49	N/A	N/A	0.00
	9/8/2011	1506.36	114.04	1392.32	N/A	N/A	0.00
	7/20/2012	1506.36	114.59	1391.77	N/A	N/A	0.00
	8/22/2013	1506.36	116.51	1389.85	N/A	N/A	0.00
	9/19/2013	1506.36	116.63	1389.73	N/A	N/A	0.00
	6/3/2014	1506.36	117.82	1388.54	N/A	N/A	0.00
	7/15/2015	1506.36	112.89	1393.47	N/A	N/A	0.00
	6/7/2016	1506.36	113.16	1393.20	N/A	N/A	0.00
	6/7/2017	1506.36	114.54	1391.82	N/A	N/A	0.00
MW-4	11/21/1998	1497.70	109.38	1388.32	N/A	N/A	0.00
	12/1/1998	1497.70	109.52	1388.18	N/A	N/A	0.00
	6/9/1999	1497.70	110.68	1387.02	N/A	N/A	0.00
	9/16/1999	1497.70	111.24	1386.46	N/A	N/A	0.00
	11/11/1999	1497.70	111.42	1386.28	N/A	N/A	0.00
	5/16/2000	1497.70	111.66	1386.04	N/A	N/A	0.00
	7/14/2000	1497.70	111.59	1386.11	N/A	N/A	0.00

**Table 1 - Groundwater and Free Product Elevations
PS09 Mainline Turbine Sump**

Well Name	Date	Well Elevation (feet above MSL) ^A	Depth to Groundwater (feet)	Groundwater Elevation ^B (feet above MSL)	Depth to Free Product (feet)	Free Product Elevation (feet above MSL)	Free Product Thickness (feet)
MW-4 Continued	10/13/2000	1497.70	110.10	1387.60	N/A	N/A	0.00
	3/27/2001	1497.69	107.30	1390.39	N/A	N/A	0.00
	7/12/2001	1497.69	106.58	1391.11	N/A	N/A	0.00
	9/20/2001	1497.69	105.61	1392.08	N/A	N/A	0.00
	11/16/2001	1497.69	105.62	1392.07	N/A	N/A	0.00
	6/10/2002	1497.69	107.48	1390.21	N/A	N/A	0.00
	10/4/2002	1497.69	107.69	1390.00	N/A	N/A	0.00
	6/24/2003	1497.69	110.74	1386.95	N/A	N/A	0.00
	10/2/2003	1497.69	111.90	1385.79	N/A	N/A	0.00
	6/11/2004	1497.69	113.15	1384.54	N/A	N/A	0.00
	10/18/2004	1497.69	112.47	1385.22	N/A	N/A	0.00
	Well Destroyed in 2005		N/A	N/A	N/A	N/A	N/A
MW-5	11/21/1998	1501.22	111.31	1389.91	110.78	1390.44	0.53
	12/11/1998	1501.22	111.62	1389.60	110.83	1390.39	0.79
	9/16/1999	1501.22	113.56	1387.66	111.51	1389.71	2.05
	10/7/1999	1501.22	113.23	1387.99	111.44	1389.78	1.79
	11/11/1999	1501.22	113.52	1387.70	111.55	1389.67	1.97
	5/17/2000	1501.22	111.78	1389.44	111.69	1389.53	0.09
	7/16/2000	1501.22	111.37	1389.85	110.36	1390.86	1.01
	12/29/2000	1501.22	109.20	1392.02	100.90	1400.32	8.30
	7/19/2001	1501.22	109.30	1391.92	101.30	1399.92	8.00
	9/20/2001	1501.22	104.75	1396.47	103.47	1397.75	1.28
	6/10/2002	1501.22	109.60	1391.62	108.53	1392.69	1.07
	10/2/2002	1501.22	109.57	1391.65	109.29	1391.93	0.28
	6/3/2003	1501.22	110.85	1390.37	110.10	1391.12	0.75
	6/23/2003	1501.22	110.40	1390.82	110.14	1391.08	0.26
	7/24/2003	1501.22	110.48	1390.74	110.42	1390.80	0.06
	8/28/2003	1501.22	110.99	1390.23	110.72	1390.50	0.27
	9/15/2003	1501.22	111.12	1390.10	110.92	1390.30	0.20
	10/3/2003	1501.22	110.84	1390.38	110.78	1390.44	0.06
	6/2/2004	1501.22	111.72	1389.50	110.94	1390.28	0.78
	6/3/2004	1501.22	111.34	1389.88	111.09	1390.13	0.25
	6/10/2004	1501.22	110.89	1390.33	110.78	1390.44	0.11
	7/8/2004	1501.22	110.60	1390.62	110.36	1390.86	0.24
	7/20/2004	1501.22	110.26	1390.96	110.16	1391.06	0.10
	8/12/2004	1501.22	110.04	1391.18	110.00	1391.22	0.04
	9/2/2004	1501.22	109.79	1391.43	109.75	1391.47	0.04
	10/19/2004	1501.22	109.85	1391.37	109.76	1391.46	0.09
	6/20/2005	1501.22	111.65	1389.57	109.40	1391.82	2.25
	6/28/2005	1501.22	109.47	1391.75	109.47	1391.75	0.00
	10/17/2005	1501.22	109.12	1392.10	109.12	1392.10	0.00
	11/3/2005	1501.22	109.21	1392.01	109.15	1392.07	0.06
	5/31/2006	1501.22	111.15	1390.07	110.64	1390.58	0.51
	7/13/2006	1501.22	111.02	1390.20	110.70	1390.52	0.32
	10/5/2006	1501.22	108.35	1392.87	107.98	1393.24	0.37
	5/30/2007	1501.22	108.94	1392.28	108.72	1392.50	0.22
	7/18/2007	1501.22	109.52	1391.70	109.30	1391.92	0.22
	8/3/2007	1501.22	109.57	1391.65	109.56	1391.66	0.01
	8/17/2007	1501.22	109.61	1391.61	109.46	1391.76	0.15
	8/24/2007	1501.22	109.63	1391.59	109.51	1391.71	0.12
	9/13/2007	1501.22	109.70	1391.52	109.64	1391.58	0.06
	9/21/2007	1501.22	109.56	1391.66	109.53	1391.69	0.03
	10/5/2007	1501.22	109.25	1391.97	N/A	N/A	0.00
	10/12/2007	1501.22	109.33	1391.89	109.30	1391.92	0.03
	11/2/2007	1501.22	109.20	1392.02	109.14	1392.08	0.06
	6/2/2008	1501.22	109.86	1391.36	109.77	1391.45	0.09
	7/1/2008	1501.22	110.49	1390.73	110.27	1390.95	0.22
	7/18/2008	1501.22	110.49	1390.73	110.31	1390.91	0.18
	7/23/2008	1501.22	110.63	1390.59	110.43	1390.79	0.20
	7/25/2008	1501.22	110.50	1390.72	110.49	1390.73	0.01
	8/12/2008	1501.22	110.49	1390.73	110.37	1390.85	0.12
	9/3/2008	1501.22	109.63	1391.59	109.61	1391.61	0.02
	9/12/2008	1501.22	109.14	1392.08	109.12	1392.10	0.02
	10/8/2008	1501.22	106.58	1394.64	106.56	1394.66	0.02
	7/18/2009	1501.22	108.25	1392.97	104.42	1396.80	3.83
	8/6/2010	1501.22	110.17	1391.05	109.83	1391.39	0.34

**Table 1 - Groundwater and Free Product Elevations
PS09 Mainline Turbine Sump**

Well Name	Date	Well Elevation (feet above MSL) ^A	Depth to Groundwater (feet)	Groundwater Elevation ^B (feet above MSL)	Depth to Free Product (feet)	Free Product Elevation (feet above MSL)	Free Product Thickness (feet)
MW-5 Continued	9/25/2010	1501.22	108.20	1393.02	107.57	1393.65	0.63
	10/8/2010	1501.22	108.20	1393.02	107.32	1393.90	0.88
	10/12/2010	1501.22	108.12	1393.10	107.12	1394.10	1.00
	6/24/2011	1501.22	NM	NM	NM	NM	NM
	7/18/2011	1501.22	NM	NM	NM	NM	NM
	7/26/2011	1501.22	NM	NM	NM	NM	NM
	8/8/2011	1501.22	108.80	1392.42	108.61	1392.61	0.19
	8/22/2011	1501.22	108.60	1392.62	108.42	1392.80	0.18
	9/9/2011	1501.22	108.86	1392.36	108.80	1392.42	0.06
	9/19/2011	1501.22	108.61	1392.61	108.54	1392.68	0.07
	10/6/2011	1501.22	108.46	1392.76	108.44	1392.78	0.02
	10/26/2011	1501.22	108.43	1392.79	108.40	1392.82	0.03
	6/5/2012	1501.22	110.05	1391.17	109.68	1391.54	0.37
	6/20/2012	1501.22	110.13	1391.09	109.77	1391.45	0.36
	7/5/2012	1501.22	110.04	1391.18	109.70	1391.52	0.34
	7/20/2012	1501.22	109.94	1391.28	109.67	1391.55	0.27
	8/3/2012	1501.22	110.03	1391.19	109.71	1391.51	0.32
	8/9/2012	1501.22	109.92	1391.30	109.68	1391.54	0.24
	8/23/2012	1501.22	109.71	1391.51	109.51	1391.71	0.20
	9/6/2012	1501.22	109.87	1391.35	109.67	1391.55	0.20
	9/21/2012	1501.22	109.79	1391.43	109.59	1391.63	0.20
	10/8/2012	1501.22	109.85	1391.37	109.66	1391.56	0.19
	10/22/2012	1501.22	109.85	1391.37	109.75	1391.47	0.10
	6/19/2013	1501.22	111.66	1389.56	111.00	1390.22	0.66
	6/27/2013	1501.22	112.07	1389.15	111.10	1390.12	0.97
	7/19/2013	1501.22	NM	NM	NM	NM	NM
	8/2/2013	1501.22	111.94	1389.28	111.22	1390.00	0.72
	8/14/2013	1501.22	112.38	1388.84	111.52	1389.70	0.86
	8/29/2013	1501.22	112.50	1388.72	111.62	1389.60	0.88
	9/12/2013	1501.22	112.48	1388.74	111.55	1389.67	0.93
	10/4/2013	1501.22	112.50	1388.72	111.61	1389.61	0.89
	10/17/2013	1501.22	112.40	1388.82	111.68	1389.54	0.72
	6/3/2014	1501.22	114.43	1386.79	112.48	1388.74	1.95
	7/9/2014	1501.22	114.67	1386.55	112.61	1388.61	2.06
	7/28/2014	1501.22	114.21	1387.01	112.64	1388.58	1.57
	8/7/2014	1501.22	113.87	1387.35	112.59	1388.63	1.28
	8/26/2014	1501.22	113.02	1388.20	112.52	1388.70	0.50
	9/23/2014	1501.22	112.54	1388.68	112.29	1388.93	0.25
	10/9/2014	1501.22	112.23	1388.99	111.94	1389.28	0.29
	6/4/2015	1501.22	NM	NM	NM	NM	NM
	7/3/2015	1501.22	NM	NM	NM	NM	NM
	7/14/2015	1501.22	112.44	1388.78	111.31	1389.91	1.13
	7/21/2015	1501.22	112.26	1388.96	111.38	1389.84	0.88
	8/12/2015	1501.22	112.82	1388.40	111.60	1389.62	1.22
	8/25/2015	1501.22	111.68	1389.54	111.57	1389.65	0.11
	9/13/2015	1501.22	112.98	1388.24	111.58	1389.64	1.40
	10/1/2015	1501.22	113.22	1388.00	111.79	1389.43	1.43
	6/1/2016	1501.22	112.20	1389.02	111.46	1389.76	0.74
	6/2/2016	1501.22	112.23	1388.99	111.64	1389.58	0.59
	6/7/2016	1501.22	113.06	1388.16	111.58	1389.64	1.48
	6/11/2016	1501.22	112.85	1388.37	111.60	1389.62	1.25
	6/27/2016	1501.22	113.05	1388.17	111.81	1389.41	1.24
	7/10/2016	1501.22	113.00	1388.22	111.89	1389.33	1.11
	8/5/2016	1501.22	112.93	1388.29	111.97	1389.25	0.96
	8/18/2016	1501.22	113.09	1388.13	112.12	1389.10	0.97
	9/5/2016	1501.22	112.62	1388.60	112.10	1389.12	0.52
	9/16/2016	1501.22	112.49	1388.73	112.09	1389.13	0.40
	10/3/2016	1501.22	112.56	1388.66	112.25	1388.97	0.31
	10/13/2016	1501.22	112.38	1388.84	112.17	1389.05	0.21
	5/25/2017	1501.22	NM	NM	NM	NM	NM
	5/26/2017	1501.22	113.83	1387.39	112.72	1388.50	1.11
	6/5/17 to 6/7/17	1501.22	114.03	1387.19	112.70	1388.52	1.33
	6/27/2017	1501.22	113.75	1387.47	112.84	1388.38	0.91
	7/24/2017	1501.22	113.86	1387.36	113.05	1388.17	0.81
	9/14/2017	1501.22	114.02	1387.20	113.12	1388.10	0.90
	9/28/2017	1501.22	113.38	1387.84	112.93	1388.29	0.45
	10/19/2017	1501.22	113.48	1387.74	113.05	1388.17	0.43

**Table 1 - Groundwater and Free Product Elevations
PS09 Mainline Turbine Sump**

Well Name	Date	Well Elevation (feet above MSL) ^A	Depth to Groundwater (feet)	Groundwater Elevation ^B (feet above MSL)	Depth to Free Product (feet)	Free Product Elevation (feet above MSL)	Free Product Thickness (feet)
MW-6	11/21/1998	1501.21	112.66	1388.55	110.52	1390.69	2.14
	12/1/1998	1501.21	113.55	1387.66	110.45	1390.76	3.10
	6/9/1999	1501.21	115.92	1385.29	110.59	1390.62	5.33
	9/16/1999	1501.21	111.82	1389.39	111.79	1389.42	0.03
	10/7/1999	1501.21	111.97	1389.24	111.69	1389.52	0.28
	11/11/1999	1501.21	112.53	1388.68	111.73	1389.48	0.80
	5/17/2000	1501.21	110.85	1390.36	NM	NM	NM
	12/29/2000	1501.21	103.00	1398.21	102.15	1399.06	0.85
	7/19/2001	1501.32	104.50	1396.82	102.23	1399.09	2.27
	9/20/2001	1501.32	106.10	1395.22	103.20	1398.12	2.90
	6/11/2002	1501.32	110.49	1390.83	108.45	1392.87	2.04
	10/2/2002	1501.32	109.56	1391.76	109.38	1391.94	0.18
	6/4/2003	1501.32	116.13	1385.19	109.19	1392.13	6.94
	6/23/2003	1501.32	110.33	1390.99	110.18	1391.14	0.15
	7/24/2003	1501.32	110.53	1390.79	110.42	1390.90	0.11
	8/28/2003	1501.32	110.92	1390.40	110.78	1390.54	0.14
	9/15/2003	1501.32	111.12	1390.20	110.97	1390.35	0.15
	10/3/2003	1501.32	110.96	1390.36	110.81	1390.51	0.15
	6/2/2004	1501.32	111.87	1389.45	110.99	1390.33	0.88
	6/3/2004	1501.32	111.20	1390.12	111.18	1390.14	0.02
	6/10/2004	1501.32	110.86	1390.46	NM	NM	NM
	7/8/2004	1501.32	110.47	1390.85	110.43	1390.89	0.04
	7/20/2004	1501.32	110.30	1391.02	110.22	1391.10	0.08
	8/12/2004	1501.32	110.03	1391.29	109.96	1391.36	0.07
	9/2/2004	1501.32	109.94	1391.38	109.86	1391.46	0.08
	10/19/2004	1501.32	110.16	1391.16	109.80	1391.52	0.36
	6/20/2005	1501.32	111.65	1389.67	109.40	1391.92	2.25
	6/28/2005	1501.32	109.51	1391.81	109.51	1391.81	0.00
	10/17/2005	1501.32	109.22	1392.10	109.21	1392.11	0.01
	5/31/2006	1501.32	113.28	1388.04	110.36	1390.96	2.92
	7/13/2006	1501.32	111.23	1390.09	110.77	1390.55	0.46
	10/5/2006	1501.32	110.02	1391.30	107.72	1393.60	2.30
	5/30/2007	1501.32	112.79	1388.53	108.09	1393.23	4.70
	7/18/2007	1501.32	109.81	1391.51	109.28	1392.04	0.53
	8/3/2007	1501.32	109.64	1391.68	109.62	1391.70	0.02
	8/17/2007	1501.32	109.53	1391.79	N/A	N/A	0.00
	9/13/2007	1501.32	109.71	1391.61	N/A	N/A	0.00
	9/21/2007	1501.32	109.65	1391.67	N/A	N/A	0.00
	10/5/2007	1501.32	109.71	1391.61	N/A	N/A	0.00
	10/12/2007	1501.32	109.38	1391.94	109.32	1392.00	0.06
	11/2/2007	1501.32	109.56	1391.76	109.20	1392.12	0.36
	4/16/2008	1501.32	111.79	1389.53	109.10	1392.22	2.69
	6/2/2008	1501.32	112.23	1389.09	109.39	1391.93	2.84
	7/1/2008	1501.32	110.36	1390.96	110.30	1391.02	0.06
	7/18/2008	1501.32	110.42	1390.90	110.38	1390.94	0.04
	7/23/2008	1501.32	110.54	1390.78	110.51	1390.81	0.03
	8/12/2008	1501.32	110.10	1391.22	N/A	N/A	0.00
	9/3/2008	1501.32	110.00	1391.32	109.65	1391.67	0.35
	9/12/2008	1501.32	109.55	1391.77	109.15	1392.17	0.40
	10/8/2008	1501.32	108.43	1392.89	106.25	1395.07	2.18
	7/17/2009	1501.32	108.12	1393.20	104.46	1396.86	3.66
	8/7/2010	1501.32	112.59	1388.73	109.48	1391.84	3.11
	8/23/2010	1501.32	110.10	1391.22	109.44	1391.88	0.66
	9/25/2010	1501.32	108.49	1392.83	107.59	1393.73	0.90
	10/8/2010	1501.32	108.30	1393.02	107.40	1393.92	0.90
	10/12/2010	1501.32	107.78	1393.54	107.29	1394.03	0.49
	6/24/2011	1501.32	NM	NM	N/A	N/A	N/A
	7/18/2011	1501.32	NM	NM	N/A	N/A	N/A
	7/26/2011	1501.32	NM	NM	N/A	N/A	N/A
	8/8/2011	1501.32	NM	NM	N/A	N/A	N/A
	8/22/2011	1501.32	110.90	1390.42	108.09	1393.23	2.81
	9/9/2011	1501.32	108.91	1392.41	108.90	1392.42	0.01
	9/19/2011	1501.32	108.62	1392.70	108.61	1392.71	0.01
	10/6/2011	1501.32	108.53	1392.79	108.52	1392.80	0.01
	10/26/2011	1501.32	108.53	1392.79	108.52	1392.80	0.01
	6/5/2012	1501.32	110.09	1391.23	109.71	1391.61	0.38
	6/20/2012	1501.32	110.20	1391.12	109.82	1391.50	0.38

**Table 1 - Groundwater and Free Product Elevations
PS09 Mainline Turbine Sump**

Well Name	Date	Well Elevation (feet above MSL) ^A	Depth to Groundwater (feet)	Groundwater Elevation ^B (feet above MSL)	Depth to Free Product (feet)	Free Product Elevation (feet above MSL)	Free Product Thickness (feet)
MW-6 Continued	7/5/2012	1501.32	110.12	1391.20	109.75	1391.57	0.37
	7/20/2012	1501.32	110.10	1391.22	109.62	1391.70	0.48
	8/3/2012	1501.32	110.15	1391.17	109.77	1391.55	0.38
	8/9/2012	1501.32	110.05	1391.27	109.69	1391.63	0.36
	8/23/2012	1501.32	109.62	1391.70	109.59	1391.73	0.03
	9/6/2012	1501.32	109.77	1391.55	109.75	1391.57	0.02
	9/21/2012	1501.32	109.71	1391.61	109.70	1391.62	0.01
	10/8/2012	1501.32	109.79	1391.53	109.78	1391.54	0.01
	10/22/2012	1501.32	109.83	1391.49	109.82	1391.50	0.01
	6/19/2013	1501.32	112.26	1389.06	110.96	1390.36	1.30
	6/27/2013	1501.32	112.41	1388.91	111.12	1390.20	1.29
	7/19/2013	1501.32	112.51	1388.81	111.20	1390.12	1.31
	8/2/2013	1501.32	111.41	1389.91	111.40	1389.92	0.01
	8/14/2013	1501.32	111.55	1389.77	111.55	1389.77	0.00
	8/29/2013	1501.32	111.62	1389.70	111.60	1389.72	0.02
	9/12/2013	1501.32	111.73	1389.59	111.72	1389.60	0.01
	10/4/2013	1501.32	111.77	1389.55	111.76	1389.56	0.01
	10/17/2013	1501.32	111.79	1389.53	111.78	1389.54	0.01
	6/3/2014	1501.32	113.11	1388.21	112.80	1388.52	0.31
	7/9/2014	1501.32	113.14	1388.18	112.90	1388.42	0.24
	7/28/2014	1501.32	113.07	1388.25	112.94	1388.38	0.13
	8/7/2014	1501.32	112.89	1388.43	112.80	1388.52	0.09
	8/26/2014	1501.32	112.68	1388.64	112.64	1388.68	0.04
	9/23/2014	1501.32	112.41	1388.91	112.40	1388.92	0.01
	10/9/2014	1501.32	112.01	1389.31	N/A	N/A	0.00
	6/4/2015	1501.32	NM	NM	NM	NM	NM
	7/3/2015	1501.32	NM	NM	NM	NM	NM
	7/14/2015	1501.32	111.65	1389.67	111.54	1389.78	0.11
	7/21/2015	1501.32	111.65	1389.67	111.56	1389.76	0.09
	8/12/2015	1501.32	111.94	1389.38	N/A	N/A	0.00
	8/25/2015	1501.32	111.85	1389.47	N/A	N/A	0.00
	9/13/2015	1501.32	111.91	1389.41	N/A	N/A	0.00
	10/1/2015	1501.32	112.07	1389.25	N/A	N/A	0.00
	6/1/2016	1501.32	111.69	1389.63	111.61	1389.71	0.08
	6/2/2016	1501.32	111.74	1389.58	111.66	1389.66	0.08
	6/7/2016	1501.32	NM	NM	NM	NM	NM
	6/11/2016	1501.32	111.95	1389.37	111.85	1389.47	0.10
	6/27/2016	1501.32	112.02	1389.30	112.01	1389.31	0.01
	7/10/2016	1501.32	112.05	1389.27	112.04	1389.28	0.01
	8/5/2016	1501.32	112.20	1389.12	112.18	1389.14	0.02
	8/18/2016	1501.32	112.27	1389.05	112.22	1389.10	0.05
	9/5/2016	1501.32	112.22	1389.10	112.21	1389.11	0.01
	9/16/2016	1501.32	112.21	1389.11	N/A	N/A	0.00
	10/3/2016	1501.32	112.38	1388.94	112.37	1388.95	0.01
	10/13/2016	1501.32	112.26	1389.06	112.25	1389.07	0.01
	Well Decommissioned in 2017		NM	NM	NM	NM	NM
MW-7	11/21/1998	1498.75	112.83	1385.92	N/A	N/A	0.00
	12/1/1998	1498.75	112.95	1385.80	N/A	N/A	0.00
	9/16/1999	1498.75	116.86	1381.89	N/A	N/A	0.00
	11/11/1999	1498.75	116.87	1381.88	N/A	N/A	0.00
	5/17/2000	1498.75	116.55	1382.20	N/A	N/A	0.00
	7/14/2000	1498.75	116.56	1382.19	N/A	N/A	0.00
	3/27/2001	1502.44	NM	NM	N/A	N/A	0.00
	7/12/2001	1502.44	103.82	1398.62	N/A	N/A	0.00
	9/21/2001	1502.44	112.66	1389.78	N/A	N/A	0.00
	11/19/2001	1502.44	113.53	1388.91	N/A	N/A	0.00
	6/12/2002	1502.44	115.12	1387.32	N/A	N/A	0.00
	10/4/2002	1502.44	114.77	1387.67	N/A	N/A	0.00
	6/24/2003	1502.44	114.71	1387.73	N/A	N/A	0.00
	10/1/2003	1502.44	114.99	1387.45	N/A	N/A	0.00
	6/11/2004	1502.44	114.88	1387.56	N/A	N/A	0.00
	10/18/2004	1502.44	114.50	1387.94	N/A	N/A	0.00
	6/27/2005	1502.44	114.26	1388.18	N/A	N/A	0.00
	10/17/2005	1502.44	114.04	1388.40	N/A	N/A	0.00
	6/2/2006	1502.44	114.73	1387.71	N/A	N/A	0.00
	10/5/2006	1502.44	113.52	1388.92	N/A	N/A	0.00
	7/17/2007	1502.44	114.06	1388.38	N/A	N/A	0.00

**Table 1 - Groundwater and Free Product Elevations
PS09 Mainline Turbine Sump**

Well Name	Date	Well Elevation (feet above MSL) ^A	Depth to Groundwater (feet)	Groundwater Elevation ^B (feet above MSL)	Depth to Free Product (feet)	Free Product Elevation (feet above MSL)	Free Product Thickness (feet)
MW-7 Continued	10/4/2007	1502.44	114.37	1388.07	N/A	N/A	0.00
	7/24/2008	1502.44	114.76	1387.68	N/A	N/A	0.00
	7/17/2009	1502.44	111.38	1391.06	N/A	N/A	0.00
	8/11/2010	1502.44	115.50	1386.94	N/A	N/A	0.00
	9/8/2011	1502.44	115.18	1387.26	N/A	N/A	0.00
	7/20/2012	1502.44	115.09	1387.35	N/A	N/A	0.00
	8/22/2013	1502.44	115.75	1386.69	N/A	N/A	0.00
	9/19/2013	1502.44	115.69	1386.75	N/A	N/A	0.00
	6/5/2014	1502.44	116.02	1386.42	N/A	N/A	0.00
	7/15/2015	1502.44	115.44	1387.00	N/A	N/A	0.00
MW-8	6/6/2016	1502.44	114.00	1388.44	N/A	N/A	0.00
	6/7/2017	1502.44	114.97	1387.47	N/A	N/A	0.00
	11/22/1998	1498.64	113.34	1385.30	N/A	N/A	0.00
	12/11/1998	1498.64	113.67	1384.97	N/A	N/A	0.00
	6/9/1999	1498.64	113.98	1384.66	N/A	N/A	0.00
	9/17/1999	1498.64	114.52	1384.12	N/A	N/A	0.00
	5/17/2000	1498.64	115.02	1383.62	N/A	N/A	0.00
	7/14/2000	1498.64	115.24	1383.40	N/A	N/A	0.00
	10/13/2000	1498.64	112.60	1386.04	N/A	N/A	0.00
	3/27/2001	1498.37	NM	NM	N/A	N/A	0.00
	7/12/2001	1498.37	99.45	1398.92	N/A	N/A	0.00
	9/21/2001	1498.37	100.39	1397.98	N/A	N/A	0.00
	11/19/2001	1498.37	NM	NM	N/A	N/A	0.00
	6/12/2002	1498.37	106.21	1392.16	N/A	N/A	0.00
	10/4/2002	1498.37	108.68	1389.69	N/A	N/A	0.00
	6/25/2003	1498.37	114.64	1383.73	N/A	N/A	0.00
	10/1/2003	1498.37	114.77	1383.60	N/A	N/A	0.00
	6/11/2004	1498.37	115.16	1383.21	N/A	N/A	0.00
	10/18/2004	1498.37	115.28	1383.09	N/A	N/A	0.00
	6/27/2005	1498.37	114.49	1383.88	N/A	N/A	0.00
	10/16/2005	1498.37	114.77	1383.60	N/A	N/A	0.00
	6/2/2006	1498.37	NM	NM	N/A	N/A	0.00
	10/5/2006	1498.37	113.55	1384.82	N/A	N/A	0.00
	7/17/2007	1498.37	114.67	1383.70	N/A	N/A	0.00
	10/4/2007	1498.37	114.70	1383.67	N/A	N/A	0.00
	7/24/2008	1498.37	114.89	1383.48	N/A	N/A	0.00
	7/18/2009	1498.37	101.56	1396.81	N/A	N/A	0.00
	8/11/2010	1498.37	109.79	1388.58	N/A	N/A	0.00
	9/8/2011	1498.37	110.10	1388.27	N/A	N/A	0.00
	7/20/2012	1498.37	111.38	1386.99	N/A	N/A	0.00
	8/22/2013	1498.37	114.46	1383.91	N/A	N/A	0.00
	9/19/2013	1498.37	114.67	1383.70	N/A	N/A	0.00
	6/5/2014	1498.37	114.89	1383.48	N/A	N/A	0.00
	7/15/2015	1498.37	114.17	1384.20	N/A	N/A	0.00
	6/7/2016	1498.37	114.60	1383.77	N/A	N/A	0.00
	6/7/2017	1498.37	115.31	1383.06	N/A	N/A	0.00
MW-10	12/1/1998	1501.01	110.61	1390.40	N/A	N/A	0.00
	6/9/1999	1501.01	111.12	1389.89	N/A	N/A	0.00
	9/16/1999	1501.01	111.49	1389.52	N/A	N/A	0.00
	11/11/1999	1501.01	111.62	1389.39	N/A	N/A	0.00
	5/17/2000	1501.01	110.53	1390.48	N/A	N/A	0.00
	7/16/2000	1501.01	110.19	1390.82	N/A	N/A	0.00
	10/11/2000	1501.01	108.60	1392.41	N/A	N/A	0.00
	3/27/2001	1501.01	101.05	1399.96	N/A	N/A	0.00
	7/12/2001	1501.01	102.54	1398.47	N/A	N/A	0.00
	9/20/2001	1501.01	103.50	1397.51	N/A	N/A	0.00
	11/19/2001	1501.01	104.71	1396.30	N/A	N/A	0.00
	6/12/2002	1501.01	108.42	1392.59	N/A	N/A	0.00
	10/3/2002	1501.01	108.82	1392.19	N/A	N/A	0.00
	6/24/2003	1501.01	109.67	1391.34	N/A	N/A	0.00
	10/2/2003	1501.01	110.26	1390.75	N/A	N/A	0.00
	6/10/2004	1501.01	110.33	1390.68	N/A	N/A	0.00
	10/19/2004	1501.01	109.21	1391.80	N/A	N/A	0.00
	6/28/2005	1501.01	109.02	1391.99	N/A	N/A	0.00
	10/16/2005	1501.01	108.80	1392.21	N/A	N/A	0.00
	6/1/2006	1501.01	110.41	1390.60	N/A	N/A	0.00
	10/6/2006	1501.01	107.60	1393.41	N/A	N/A	0.00

**Table 1 - Groundwater and Free Product Elevations
PS09 Mainline Turbine Sump**

Well Name	Date	Well Elevation (feet above MSL) ^A	Depth to Groundwater (feet)	Groundwater Elevation ^B (feet above MSL)	Depth to Free Product (feet)	Free Product Elevation (feet above MSL)	Free Product Thickness (feet)
MW-10 Continued	7/17/2007	1501.01	108.80	1392.21	N/A	N/A	0.00
	10/4/2007	1501.01	108.70	1392.31	N/A	N/A	0.00
	7/24/2008	1501.01	110.13	1390.88	N/A	N/A	0.00
	7/17/2009	1501.01	104.74	1396.27	N/A	N/A	0.00
	8/12/2010	1501.01	109.47	1391.54	N/A	N/A	0.00
	9/8/2011	1501.01	102.88	1398.13	N/A	N/A	0.00
	7/20/2012	1501.01	109.20	1391.81	N/A	N/A	0.00
	8/22/2013	1501.01	111.10	1389.91	N/A	N/A	0.00
	9/19/2013	1501.01	111.23	1389.78	N/A	N/A	0.00
	6/3/2014	1501.01	112.44	1388.57	N/A	N/A	0.00
	7/15/2015	1501.01	111.30	1389.71	N/A	N/A	0.00
	6/7/2016	1501.01	111.42	1389.59	N/A	N/A	0.00
	6/6/2017	1501.01	112.50	1388.51	N/A	N/A	0.00

Notes:

- ^A 2001 and later elevation data based on December 2001 survey
^B Recovery well groundwater elevations have not been corrected to account for presence of free product

Abbreviations:

MSL mean sea level
N/A not applicable; no measurable free product
NM not measured

Table 2 - 2017 Groundwater Analytical Results
PS09 Mainline Turbine Sump
(All results in mg/L)

Analytical Method and Analyte	ADEC 2017 Groundwater Cleanup Level ^A	Sample Locations ^B											
		MW-2		MW-3		MW-7		MW-27		MW-8		MW-10	
		07-Jun-17 1177902003		07-Jun-17 1177902005		07-Jun-17 1177902004 (Primary)		07-Jun-17 1177902006 (Duplicate)		07-Jun-17 1177902002		07-Jun-17 1177902001	
		Conc. ^C	Flag	Conc. ^C	Flag	Conc. ^C	Flag	Conc. ^C	Flag	Conc. ^C	Flag	Conc. ^C	Flag
DRO by Method AK102													
Diesel Range Organics	1.5	0.287	J	[0.273]	ND	0.987	=	1.07	=	0.272	J	[0.288]	ND
BTEX by Method SW8021B													
Benzene	0.0046	[0.00025]	ND	[0.00025]	ND	0.00158	=	0.00160	=	[0.00025]	ND	[0.00025]	ND
Toluene	1.1	[0.0005]	ND	[0.0005]	ND	[0.0005]	ND	[0.0005]	ND	[0.0005]	ND	[0.0005]	ND
Ethylbenzene	0.015	[0.0005]	ND	[0.0005]	ND	[0.0005]	ND	[0.0005]	ND	[0.0005]	ND	[0.0005]	ND
o-Xylene	--	[0.0005]	ND	[0.0005]	ND	[0.0005]	ND	[0.0005]	ND	[0.0005]	ND	[0.0005]	ND
P & M-Xylene	--	[0.001]	ND	[0.001]	ND	[0.001]	ND	[0.001]	ND	[0.001]	ND	[0.001]	ND
Xylenes (total) ³	0.19	[0.001]	ND	[0.001]	ND	[0.001]	ND	[0.001]	ND	[0.001]	ND	[0.001]	ND
BTEX and Petroleum VOCs by Method SW8260C													
Benzene	0.0046	--	--	--	--	0.00149	=	0.00148	=	--	--	--	--
Toluene	1.1	--	--	--	--	[0.0005]	ND	[0.0005]	ND	--	--	--	--
Ethylbenzene	0.015	--	--	--	--	[0.0005]	ND	[0.0005]	ND	--	--	--	--
m,p-Xylene	--	--	--	--	--	[0.001]	ND	[0.001]	ND	--	--	--	--
o-Xylene	--	--	--	--	--	[0.0005]	ND	[0.0005]	ND	--	--	--	--
Xylenes (total) ^D	0.19	--	--	--	--	[0.001]	ND	[0.001]	ND	--	--	--	--
1,2,4-Trimethylbenzene	0.015	--	--	--	--	[0.0005]	ND	[0.0005]	ND	--	--	--	--
1,3,5-Trimethylbenzene	0.12	--	--	--	--	[0.0005]	ND	[0.0005]	ND	--	--	--	--
Isopropylbenzene (Cumene)	--	--	--	--	--	[0.0005]	ND	[0.0005]	ND	--	--	--	--
Methyl-t-butyl ether	140	--	--	--	--	[0.005]	ND	[0.005]	ND	--	--	--	--
Naphthalene	0.0017	--	--	--	--	[0.0005]	ND	[0.0005]	ND	--	--	--	--
n-Butylbenzene	1	--	--	--	--	[0.0005]	ND	[0.0005]	ND	--	--	--	--
n-Propylbenzene	0.66	--	--	--	--	[0.0005]	ND	[0.0005]	ND	--	--	--	--
sec-Butylbenzene	2	--	--	--	--	0.00119	=	0.00118	=	--	--	--	--
Styrene	1.2	--	--	--	--	[0.0005]	ND	[0.0005]	ND	--	--	--	--
tert-Butylbenzene	0.69	--	--	--	--	[0.0005]	ND	[0.0005]	ND	--	--	--	--

Notes

- A This cleanup level corresponds to ADEC groundwater cleanup levels, 18 AAC 75.345, Table C, revised as of October 1, 2017.
- B The field sample identification number, date collected, and laboratory sample identification number are provided.
- C The maximum concentration of a detected analyte is shown. The highest LOD is shown in [brackets] for ND analytes.
- D Total values were the summation of detected compounds only. If compounds were ND, then the highest LOD was listed.

Abbreviations

-- not applicable or screening criteria does not exist for this compound
AAC Alaska Administrative Code
ADEC Alaska Department of Environmental Conservation
BTEX benzene, toluene, ethylbenzene, total xylenes

Data Flags

- = Analyte listed at concentration listed in column to the left.
The analyte was positively identified, but the result was between the LOQ and DL; the quantitation was an estimate.
- J Nondetect; the limit of detection is presented in brackets to the right
- ND

DL detection limit
LOQ limit of quantitation
mg/L milligrams per liter
DRO diesel range organics

VOC volatile organic compound
LOD limit of detection

Table 3 - Historic Groundwater Analytical Results
PS09 Mainline Turbine Sump
(All results in mg/L)

Well Name	Sample Designation	Date Sampled	AK 102	BTEX USEPA Method 8021B				PAHs USEPA Method 8270SIM																
			Diesel Range Organics	Benzene	Toluene	Ethylbenzene	Total Xylenes	2-Methylnaphthalene	Acenaphthylene	Acenaphthene	Anthracene	Benzo(a)anthracene	Benzo(e)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Dibenzofuran	Fluoranthene	Fluorene	Indeno(1,2,3-)pyrene	Naphthalene	Phenanthrene	Pyrene
ADEC 2015 Groundwater Cleanup Level ^A			1.5	0.005	1.0	0.7	10	N/A	N/A	2.2	11	0.0012	0.0002	0.0012	0.012	0.12	0.00012	0.073	1.5	1.5	0.0012	0.73	11	1.1
ADEC 2016 Groundwater Cleanup Level ^B			1.5	0.0046	1.1	0.015	0.19	0.036	0.260	0.530	0.043	0.00012	0.000034	0.00034	0.00080	0.0020	0.000034	0.0079	0.260	0.290	0.00019	0.0017	0.170	0.120
ADEC 2017 Groundwater Cleanup Level ^C			1.5	0.0046	1.1	0.015	0.19	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MW-1 ^E	PS9-1	11/7/1997	--	0.200	0.72	0.13	1.6	1,000	ND	0.00182	0.002	0.00011	0.00002	0.00006	0.00002	0.00118	ND	0.00366	0.0006	0.00465	0.00003	0.7	0.074	0.00161
MW-2	PS9-2	11/7/1997	--	ND	ND	ND	ND	0.13	0.02	ND	ND	ND	ND	ND	ND	ND	ND	0.00003	0.00003	0.00005	ND	0.0001	0.00008	0.00004
	PS9-4 ^D	11/7/1997	--	ND	ND	ND	ND	0.14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00008	0.00004	0.00003
	MW-2	4/1/1998	--	ND	ND	ND	ND	22	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.037	0.033	ND
	MW-8	4/1/1998	--	ND	ND	ND	ND	23	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.037	0.056	ND
	MW-2	11/22/1998	--	ND	ND	ND	ND	0.08	ND	ND	ND	0.00006	ND	ND	ND	0.00005	ND	ND	ND	ND	ND	ND	ND	ND
	MW-11 ^D	11/22/1998	--	ND	ND	ND	ND	ND	ND	ND	ND	0.00006	ND	ND	ND	0.00005	ND	ND	ND	ND	ND	ND	ND	ND
	MW-2	6/9/1999	1.80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-11 ^D	6/9/1999	2.40	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00012	0.00013	ND
	MW-2	9/17/1999	0.82	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-2	11/11/1999	0.25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-2	5/17/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-2	7/16/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-2	10/13/2000	0.58	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-2	3/27/2001	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-2	7/12/2001	0.58	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-20 ^D	7/12/2001	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-2	9/20/2001	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-20 ^D	9/20/2001	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-2	11/16/2001	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-20 ^D	11/16/2001	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-2	6/11/2002	0.576	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-2	10/5/2002	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-2	6/25/2003	ND [0.483]	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-2	10/2/2003	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND [0.0000614]	ND	ND
	MW-2	6/10/2004	ND	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-2	10/19/2004	ND	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-2	6/28/2005	0.501	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	--	--
	MW-2	10/17/2005	0.0846	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	--	--
	MW-2	6/02/2006	0.586	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND [0.002]	--	--
	MW-2	10/5/2006	ND [0.313]	ND [0.0004]	ND [0.001]	0.00336	0.00561	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0041	--	--
	MW-2	7/18/2007	0.128 J	ND [0.0004]	0.00031 J	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	DUP-1 ^D	7/18/2007	0.114 J	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-2	10/4/2007	ND [0.300]	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND [0.002]	--	--
	DUP-1 ^D	10/4/2007	0.3	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND [0.002]	--	--
	MW-2	7/25/2008	0.257 J	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND [0.002]	--	--
	MW-2A ^D	7/25/2008	0.357	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND [0.002]	--	--
	MW-2	7/18/2009	0.237 J	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND [0.002]	--	--
	MW-14 ^D	7/18/2009	ND [0.769]	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND [0.002]	--	--
	MW-2	8/11/2010	1.75	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-2D ^D	8/11/2010	0.389 J	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-2	9/8/2011	0.218 J	ND [0.0005]	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-2	7/20/2012	ND [0.36]	ND [0.0003]	ND [0.00062]	ND [0.00062]	ND [0.00186]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-2	9/19/2013	0.289 J	ND [0.0003]	ND [0.00062]	ND [0.00062]	ND [0.00186]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-29 ^D	9/19/2013	0.196 J	ND [0.0003]	ND [0.00062]	ND [0.00062]	ND [0.00186]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-2	6/5/2014	ND [0.306]	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.001]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-29 ^D	6/5/2014	ND [0.33]	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.001]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-2	7/15/2015	0.511 J	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.001]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-29 ^D	7/15/2015	0.458 J	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.001]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
MW-2	6/6/2016	0.297 J	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.001]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
MW-29 ^D	6/6/2016	0.238 J	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.001]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
MW-2	6/7/2017	0.287 J	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.001]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	

Table 3 - Historic Groundwater Analytical Results
PS09 Mainline Turbine Sump
(All results in mg/L)

Well Name	Sample Designation	Date Sampled	AK 102	BTEX USEPA Method 8021B				PAHs USEPA Method 8270SIM																
			Diesel Range Organics	Benzene	Toluene	Ethylbenzene	Total Xylenes	2-Methylnaphthalene	Acenaphthylene	Acenaphthene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Dibenzofuran	Fluoranthene	Fluorene	Indeno(1,2,3)pyrene	Naphthalene	Phenanthrene	Pyrene
ADEC 2015 Groundwater Cleanup Level ^A			1.5	0.005	1.0	0.7	10	N/A	N/A	2.2	11	0.0012	0.0002	0.0012	0.012	0.12	0.00012	0.073	1.5	1.5	0.0012	0.73	11	1.1
ADEC 2016 Groundwater Cleanup Level ^B			1.5	0.0046	1.1	0.015	0.19	0.036	0.260	0.530	0.043	0.00012	0.000034	0.00034	0.00080	0.0020	0.000034	0.0079	0.260	0.290	0.00019	0.0017	0.170	0.120
ADEC 2017 Groundwater Cleanup Level ^C			1.5	0.0046	1.1	0.015	0.19	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MW-3	PS9-3	11/7/1997	--	ND	ND	ND	ND	0.16	ND	ND	ND	0.00033	0.00018	0.00051	0.00048	0.00044	0.00034	ND	0.00011	0.00002	0.0003	0.00008	0.00005	0.00018
	MW-3	4/1/1998	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-3	11/21/1998	--	ND	ND	ND	ND	0.06	ND	ND	ND	0.00007	ND	ND	ND	0.00005	ND	ND	ND	ND	ND	ND	ND	ND
	MW-3	6/9/1999	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-3	9/16/1999	0.14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-3	11/11/1999	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-3	5/17/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-3	7/16/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-3	10/11/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-3	3/27/2001	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.000065	ND	ND
	MW-3	7/11/2001	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-3	9/20/2001	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-3	11/16/2001	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-3	6/10/2002	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-3	10/3/2002	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-3	6/25/2003	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-3	10/2/2003	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND [0.0000583]	ND	ND
	MW-3	6/11/2004	ND	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-3	10/19/2004	ND	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-3	6/28/2005	0.514	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	--	--
	MW-3	10/17/2005	0.100	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	--	--
	MW-3	6/01/2006	ND [0.3]	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND [0.002]	--	--
	MW-3	10/6/2006	ND [0.311]	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND [0.002]	--	--
	MW-4	10/6/2006	ND [0.314]	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND [0.002]	--	--
	MW-3	7/18/2007	0.0138 J	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-3	10/4/2007	ND [0.313]	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND [0.002]	--	--
	MW-3	7/24/2008	0.105 J	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND [0.002]	--	--
	MW-3	7/18/2009	ND [0.769]	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND [0.002]	--	--
	MW-3	8/12/2010	ND [0.714]	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-3	9/8/2011	0.275 J	ND [0.0005]	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	7/20/2012	ND [0.396]	ND [0.0003]	ND [0.00062]	ND [0.00062]	ND [0.00186]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
MW-3	9/19/2013	ND [0.368]	ND [0.0003]	ND [0.00062]	ND [0.00062]	ND [0.00186]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
MW-3	6/3/2014	ND [0.371]	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.001]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
MW-3	7/15/2015	0.425 J	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.001]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
MW-3	6/7/2016	ND [0.278]	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.001]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
MW-3	6/7/2017	ND [0.273]	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.001]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
MW-4 ^F	MW-4	11/21/1998	--	ND	0.007	ND	ND	0.14	ND	0.00002	ND	0.00006	ND	ND	ND	0.00006	ND	ND	ND	0.00006	ND	ND	ND	ND
	MW-4	6/9/1999	1.10	ND	0.036	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-4	9/16/1999	0.57	ND	0.0014	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-4	11/11/1999	0.24	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-4	5/17/2000	ND	ND	0.0058	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-4	7/16/2000	0.30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-4	10/13/2000	0.36	ND	0.0028	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-4	3/27/2001	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	--	ND	ND	ND	ND	ND	ND
	MW-4	7/12/2001	ND	ND	0.00604	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	--	ND	ND	ND	ND	ND	ND
	MW-4	9/20/2001	ND	ND	0.00285	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	--	ND	ND	ND	ND	ND	ND
	MW-4	11/16/2001	0.84	ND	0.00103	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	--	ND	ND	ND	ND	ND	ND
	MW-4	6/11/2002	0.649	ND	0.0285	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	--	ND	ND	ND	ND	ND	ND
	MW-4	10/5/2002	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-4	6/25/2003	ND [0.422]	ND	0.00223	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	--	ND	ND	ND	ND	ND	ND	
MW-4	10/2/2003	0.41	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	--	ND	ND	ND	ND [0.0000543]	ND	ND	

Table 3 - Historic Groundwater Analytical Results
PS09 Mainline Turbine Sump
(All results in mg/L)

Well Name	Sample Designation	Date Sampled	AK 102	BTEX USEPA Method 8021B				PAHs USEPA Method 8270SIM																	
			Diesel Range Organics	Benzene	Toluene	Ethylbenzene	Total Xylenes	2-Methylnaphthalene	Acenaphthylene	Acenaphthene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Dibenzofuran	Fluoranthene	Fluorene	Indeno(1,2,3-)pyrene	Naphthalene	Phenanthrene	Pyrene	
ADEC 2015 Groundwater Cleanup Level ^A			1.5	0.005	1.0	0.7	10	N/A	N/A	2.2	11	0.0012	0.0002	0.0012	0.012	0.12	0.00012	0.073	1.5	1.5	0.0012	0.73	11	1.1	
ADEC 2016 Groundwater Cleanup Level ^B			1.5	0.0046	1.1	0.015	0.19	0.036	0.260	0.530	0.043	0.00012	0.000034	0.00034	0.00080	0.0020	0.000034	0.0079	0.260	0.290	0.00019	0.0017	0.170	0.120	
ADEC 2017 Groundwater Cleanup Level ^C			1.5	0.0046	1.1	0.015	0.19	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
MW-4 ^F	MW-4	6/11/2004	1.41	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Continued	MW-4	10/18/2004	0.779	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
MW-7	MW-7	11/21/1998	--	ND	ND	ND	ND	0.26	ND	ND	ND	0.00006	ND	ND	ND	0.00005	ND	ND	ND	0.00005	ND	ND	ND	ND	
	MW-7	11/11/1999	--	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	MW-7	5/17/2000	2.12	0.00112	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.000113	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-7	7/16/2000	--	0.00154	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-7	10/11/2000	0.385	0.00160	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-7	3/27/2001	ND	0.00125	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-7	7/12/2001	2.96	ND	ND	ND	0.00517	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00002	ND	ND	
	MW-7	9/21/2001	ND	0.00095	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-7	11/19/2001	ND	0.00397	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-7	6/12/2002	ND	0.000974	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-7	10/4/2002	ND	0.00197	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-7	6/25/2003	ND [0.498]	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-7	10/1/2003	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND [0.0828]	ND	ND	
	MW-7	6/11/2004	ND	0.00377	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	MW-7	10/19/2004	ND	0.0299	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	MW-7	6/27/2005	0.928	0.0299	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	--	--	
	MW-7	10/17/2005	0.627	0.0284	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	--	--	
	MW-7	6/02/2006	ND [0.5]	0.0318	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND [0.002]	--	--	
	MW-7	10/5/2006	0.677	0.0218	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND [0.002]	--	--	
	MW-7	7/18/2007	0.686	0.0241	0.000440 J	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	MW-7	10/4/2007	0.973	0.0231	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND [0.002]	--	--	
	MW-7	7/24/2008	0.564	0.0275	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND [0.002]	--	--	
	MW-7	7/17/2009	0.489 J	0.0634	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND [0.002]	--	--	
	MW-7	8/11/2010	0.909	0.0243	ND [0.002]	ND [0.002]	ND [0.002]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	MW-7	9/8/2011	1.47	0.0128	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	MW-97 ^D	9/8/2011	1.33	0.0124	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-7	7/20/2012	1.08	0.00452	ND [0.00062]	ND [0.00062]	0.00039 J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-7	9/19/2013	1.29	0.00494	ND [0.00062]	ND [0.00062]	ND [0.00186]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-7	6/5/2014	1.03	0.00481	ND [0.0005]	ND [0.0005]	ND [0.001]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-7	7/15/2015	0.867	0.00122	ND [0.0005]	ND [0.0005]	ND [0.001]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-7	6/6/2016	0.887	0.00057	ND [0.0005]	ND [0.0005]	ND [0.001]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-7	6/7/2017	0.987	0.00158	ND [0.0005]	ND [0.0005]	ND [0.001]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-27 ^D	6/7/2017	1.07	0.0016	ND [0.0005]	ND [0.0005]	ND [0.001]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-8	MW-8	11/22/1998	--	ND	0.022	ND	ND	0.45	ND	0.00006	ND	0.00005	ND	ND	ND	ND	ND	ND	ND	0.00009	ND	0.00012	ND	ND	
	MW-8	9/17/1999	--	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	-	--	--	
	MW-8	5/17/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00185	ND	0.00186	0.00246	ND	
	MW-8	7/16/2000	--	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	MW-8	10/13/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-8	3/27/2001	1.10	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.000165	ND	ND	
	MW-8	7/12/2001	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-8	9/21/2001	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-8	11/19/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-8	6/12/2002	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-8	10/5/2002	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW-8	7/3/2003	1.16	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	--	ND	ND	ND	ND	ND	ND	ND
	MW-8	10/1/2003	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	--	ND	ND	ND	ND [0.0000594]	ND	ND	ND
	MW-8	6/11/2004	ND	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	ND	--	--	--	--	--	--
	MW-8	10/19/2004	ND	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	ND	--	--	--	--	--	--
MW-8	6/28/2005	0.753	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	--	--	--	

Table 3 - Historic Groundwater Analytical Results
PS09 Mainline Turbine Sump
(All results in mg/L)

Well Name	Sample Designation	Date Sampled	AK 102	BTEX USEPA Method 8021B				PAHs USEPA Method 8270SIM																	
			Diesel Range Organics	Benzene	Toluene	Ethylbenzene	Total Xylenes	2-Methylnaphthalene	Acenaphthylene	Acenaphthene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Dibenzofuran	Fluoranthene	Fluorene	Indeno(1,2,3-)pyrene	Naphthalene	Phenanthrene	Pyrene	
ADEC 2015 Groundwater Cleanup Level ^A			1.5	0.005	1.0	0.7	10	N/A	N/A	2.2	11	0.0012	0.0002	0.0012	0.012	0.12	0.00012	0.073	1.5	1.5	0.0012	0.73	11	1.1	
ADEC 2016 Groundwater Cleanup Level ^B			1.5	0.0046	1.1	0.015	0.19	0.036	0.260	0.530	0.043	0.00012	0.000034	0.00034	0.00080	0.0020	0.000034	0.0079	0.260	0.290	0.00019	0.0017	0.170	0.120	
ADEC 2017 Groundwater Cleanup Level ^C			1.5	0.0046	1.1	0.015	0.19	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
MW-8 Continued	MW-8	10/17/2005	0.167	0.00091	0.0068	0.00073	0.00316	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	--	--	
	N/A	June 2006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	MW-8	10/5/2006	ND [0.541]	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND [0.002]	--	--	
	MW-8	7/18/2007	0.365 J	ND [0.0004]	0.00085 J	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	MW-8	10/4/2007	ND [0.300]	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND [0.002]	--	--	
	MW-8	7/24/2008	0.115 J	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND [0.002]	--	--	
	MW-8	7/18/2009	0.909	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND [0.002]	--	--	
	MW-8	8/11/2010	ND [0.714]	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	MW-8	9/8/2011	0.218 J	ND [0.0005]	ND[0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-8	7/20/2012	ND [0.392]	ND [0.0003]	ND [0.00062]	ND [0.00062]	ND [0.00186]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-8	9/19/2013	ND [0.368]	ND [0.0003]	ND [0.00062]	ND [0.00062]	ND [0.00186]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-8	6/5/2014	ND [0.361]	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.001]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-8	7/15/2015	0.315 J	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.001]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-8	6/7/2016	0.229 J	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.001]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
MW-8	6/7/2017	0.272 J	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.001]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
MW-10	MW-10	11/21/1998	94	ND	ND	ND	ND	ND	ND	ND	ND	0.00006	ND	ND	ND	0.00005	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-10A	11/23/1998	10.8	ND	0.002	ND	0.001	26	ND	0.00024	0.00005	ND	ND	ND	ND	ND	ND	0.00008	ND	0.00033	ND	0.00033	0.00006	0.00006	
	MW-10	6/9/1999	16	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00023	0.00039	ND	
	MW-10	9/16/1999	1.60	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-15	9/16/1999	1.70	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-10	11/11/1999	5.40	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-25 ^D	11/11/1999	2.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-10	5/17/2000	2.11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-11 ^D	5/17/2000	1.17	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-10	7/16/2000	1.57	ND	0.0042	0.0026	0.0128	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-11 ^D	7/16/2000	0.69	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-10	10/11/2000	ND	0.0007	0.0032	0.0029	0.0142	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-11 ^D	10/11/2000	0.33	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-10	3/27/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-11 ^D	3/27/2001	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-10	7/12/2001	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-10	9/20/2001	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-10	11/19/2001	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-10	6/12/2002	0.533	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-D ^D	6/12/2002	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-10	10/4/2002	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-D ^D	10/4/2002	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-10	6/24/2003	ND [0.475]	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-D ^D	6/24/2003	ND [0.488]	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-10	10/2/2003	ND	0.00174	0.00239	ND	0.00329	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND [0.0000544]	ND	ND	
	MW-D ^D	10/2/2003	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-10	6/11/2004	0.620	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	MW-D ^D	6/11/2004	0.776	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	MW-10	10/19/2004	ND	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	FD-1 ^D	10/19/2004	ND	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	MW-10	6/28/2005	0.497	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	--	--	
	MW-Dup ^D	6/28/2005	ND	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	--	--	
	MW-10	10/16/2005	0.141	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	--	--	
MW-12 ^D	10/16/2005	0.164	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	--	--		
MW-10	6/1/2006	ND [0.3]	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND [0.002]	--	--		
MW-Dup ^D	6/1/2006	ND [0.3]	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND [0.002]	--	--		

Table 3 - Historic Groundwater Analytical Results
PS09 Mainline Turbine Sump
(All results in mg/L)

Well Name	Sample Designation	Date Sampled	AK 102	BTEX USEPA Method 8021B				PAHs USEPA Method 8270SIM																
			Diesel Range Organics	Benzene	Toluene	Ethylbenzene	Total Xylenes	2-Methylnaphthalene	Acenaphthylene	Acenaphthene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Dibenzofuran	Fluoranthene	Fluorene	Indeno(1,2,3)-pyrene	Naphthalene	Phenanthrene	Pyrene
ADEC 2015 Groundwater Cleanup Level ^A			1.5	0.005	1.0	0.7	10	N/A	N/A	2.2	11	0.0012	0.0002	0.0012	0.012	0.12	0.00012	0.073	1.5	1.5	0.0012	0.73	11	1.1
ADEC 2016 Groundwater Cleanup Level ^B			1.5	0.0046	1.1	0.015	0.19	0.036	0.260	0.530	0.043	0.00012	0.000034	0.00034	0.00080	0.0020	0.000034	0.0079	0.260	0.290	0.00019	0.0017	0.170	0.120
ADEC 2017 Groundwater Cleanup Level ^C			1.5	0.0046	1.1	0.015	0.19	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MW-10 (continued)	MW-10	10/6/2006	ND [0.311]	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	ND [0.002]	--	--	
	MW-10	7/18/2007	0.19 J	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	MW-10	10/5/2007	ND [0.313]	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	ND [0.002]	--	--	
	MW-10	7/24/2008	0.245 J J	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	ND [0.002]	--	--	
	MW-10	7/17/2009	ND [0.714]	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	ND [0.002]	--	--	
	MW-10	8/12/2010	ND [0.714]	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	MW-10	9/8/2011	0.247 J	ND [0.0005]	ND [0.001]	ND [0.001]	ND [0.003]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	MW-10	7/20/2012	ND [0.372]	ND [0.0003]	ND [0.00062]	ND [0.00062]	ND [0.00186]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	MW-30 ^D	7/20/2012	ND [0.36]	ND [0.0003]	ND [0.00062]	ND [0.00062]	ND [0.00186]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	MW-10	9/19/2013	ND [0.36]	ND [0.0003]	ND [0.00062]	ND [0.00062]	ND [0.00186]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	MW-10	6/3/2014	ND [0.313]	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.001]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	MW-10	7/15/2015	0.479 J	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.001]																	
	MW-10	6/7/2016	ND [0.283]	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.001]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
MW-10	6/7/2017	ND [0.288]	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.001]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		

Notes:

0.005

Shaded results exceeded ADEC 2015 cleanup levels; see Note ^A below

1.71

Results in **bold** exceed ADEC 2016 or 2017 cleanup levels; see Note ^B below

^A

Sample results for 2015 and prior years were compared with ADEC 2015 cleanup levels (18 AAC 75), as revised on June 17, 2015

^B

Sample Results for 2016 were compared with ADEC 2016 cleanup levels (18 AAC 75), as revised on November 6, 2016. Concentration units of mg/L are used for consistency with historical data.

^C

Sample Results for 2017 were compared with ADEC 2017 cleanup levels (18 AAC 75), revised as of October 1, 2017. Concentration units of mg/L are used for consistency with historical data.

^D

Duplicate of preceding sample

^E

Sampling discontinued after 1997 event due to the presence of free product in the well

^F

Well destroyed in 2005

ND [0.005]

Analytes that were not detected in 2012-2017 are presented with the limit of detection in brackets. Analytes that were not detected prior to 2012 are presented with the practical quantitation limit or LOQ in brackets.

Abbreviations:

--

not analyzed

AAC

Alaska Administrative Code

ADEC

Alaska Department of Environmental Conservation

AK

Alaska Method

BTEX

benzene, toluene, ethylbenzen, and xylenes

DL

detection limit

mg/L

milligrams per liter

J

The analyte was positively identified, but the result was between the LOQ and DL; the quantitation was an estimate.

LOQ

limit of quantitation

ND

Nondetect; the limit of detection is presented in brackets to the right

N/A

not applicable

PAH

polynuclear aromatic hydrocarbons

USEPA

United States Environmental Protection Agency

Table 4 - 1998-2017 MW-1 Summary of Product Gauging and Recovery
PS09 Mainline Turbine Sump

Year	Date	Description	Amount Recovered (gal)	Depth to Product (ft)	Depth to Water (ft)	Product Thickness (ft)
1998 to 2010 Maximum Apparent Thickness^A	11/22/1998	--	N/A	114.54	114.73	0.19
	10/7/1999	--	N/A	115.48	116.71	1.23
	12/28/2000	--	N/A	104.80	112.00	7.20
	7/19/2001	--	N/A	101.92	106.40	4.48
	6/10/2002	--	N/A	108.56	108.90	0.34
	6/3/2003	--	N/A	110.12	111.07	0.95
	6/2/2004	--	N/A	110.99	111.89	0.90
	5/31/2006	--	N/A	110.70	111.41	0.71
	6/2/2008	--	N/A	109.80	110.22	0.42
	7/17/2009	--	N/A	104.48	108.36	3.88
	10/8/2010	--	N/A	107.43	108.25	0.82
2011	6/24/2011	Initial Measurement	N/A	107.94	108.94	1.00
		Deployment 1	0.1875	108.03	108.3	0.27
		Deployment 2	0.025	108.03	108.25	0.22
		Deployment 3	0.125	108.08	108.1	0.02
	7/18/2011	Initial Measurement	N/A	108.34	109.02	0.68
		Deployment 1	0.0625	108.39	108.61	0.22
		Deployment 2	0.125	108.41	108.44	0.03
	7/26/2011	Initial Measurement	N/A	108.45	108.64	0.19
		Deployment 1	sheen	108.5	108.53	0.03
	8/8/2011	Initial Measurement	0.0825	108.69	108.75	0.06
		Deployment 1	0.0125	108.7	108.71	0.01
	8/22/2011	Initial Measurement	0.0625	108.53	108.54	0.01
	9/9/2011	Initial Measurement	0.0625	108.84	108.86	0.02
	9/19/2011	Initial Measurement	sheen	108.6	108.61	0.01
	10/6/2011	Initial Measurement	sheen	108.51	108.52	0.01
	10/26/2011	Initial Measurement	0.025	108.56	108.57	0.01
2012	8/9/2012	Initial Measurement	N/A	109.70	110.06	0.36
	8/23/2012	Initial Measurement	0.0625	109.58	109.78	0.2
	9/6/2012	Initial Measurement	sheen	109.75	109.90	0.15
		Deploy 2" Rigid Sorbent	0.162	109.75	109.90	0.15
		Deploy 2" Rigid Sorbent	0.162	NM	NM	NM
		Deploy 2" Rigid Sorbent	0.162	109.78	109.80	0.02
	9/21/2012	Initial Measurement	0.031	109.69	109.83	0.14
		Deploy 2" Rigid Sorbent	0.162	NM	NM	NM
		Deploy 2" Rigid Sorbent	0.162	NM	NM	NM
		Deploy 2" Rigid Sorbent	0.081	NM	NM	NM
		Deploy 2" Rigid Sorbent	0.081	109.70	109.73	0.03
	10/8/2012	Initial Measurement	0.005	109.75	109.88	0.13
		Deploy 2" Rigid Sorbent	0.162	NM	NM	NM
		Deploy 2" Rigid Sorbent	0.162	109.78	109.81	0.03
		Deploy 2" Rigid Sorbent	0.162	109.80	109.81	0.01
	10/22/2012	Initial Measurement	0.005	109.78	109.89	0.11
		Deploy 2" Rigid Sorbent	0.162	109.82	109.83	0.01
2013	6/19/2013	Frozen	N/A ^B	NM	NM	NM
	6/27/2013	Frozen	N/A ^B	NM	NM	NM
	7/19/2013	Frozen	N/A ^B	NM	NM	NM
	8/2/2013	Frozen	N/A ^B	NM	NM	NM
	8/14/2013	Frozen	N/A ^B	NM	NM	NM
	8/29/2013	Initial Measurement	N/A	111.41	112.62	1.21
		2" SoakEase deployment 1	0.17	111.44	112.45	1.01
		2" SoakEase deployment 2	0.17	111.45	112.40	0.95
		2" SoakEase deployment 3	0.25	111.49	112.32	0.83
		2" SoakEase deployment 4	0.25	111.50	112.20	0.70
		2" SoakEase (2 socks)	0.12	111.52	112.16	0.64
		1.66" Product bailer	0.06	NM	NM	NM
		2" SoakEase (2 socks)	0.12	111.56	112.04	0.48
		2" SoakEase (2 socks)	0.12	111.55	111.95	0.40
	9/12/2013	Initial Measurement	0.00	111.60	112.39	0.79
		2" SoakEase deployment 1	0.12	111.62	112.24	0.62
		2" SoakEase deployment 2	0.25	111.64	112.15	0.51
		2" SoakEase deployment 3	0.25	111.65	112.10	0.45
		2" SoakEase deployment 4	0.25	111.66	112.04	0.38
		2" SoakEase deployment 5	0.25	111.67	112.04	0.37
	10/4/2013	Initial Measurement	0.25	111.69	112.43	0.74
		2" SoakEase deployments 1-2	0.50	111.73	112.23	0.50
		2" SoakEase deployments 3-4	0.50	111.74	112.15	0.41
		2" SoakEase deployments 5-6	0.50	111.78	111.96	0.18
		2" SoakEase deployments 7-8	0.50	111.79	111.88	0.09
		2" SoakEase deployments 9-10	0.50	111.79	111.80	0.01

Table 4 - 1998-2017 MW-1 Summary of Product Gauging and Recovery
PS09 Mainline Turbine Sump

Year	Date	Description	Amount Recovered (gal)	Depth to Product (ft)	Depth to Water (ft)	Product Thickness (ft)
2013 Continued	10/17/2013	Initial Measurement	0.12	111.68	112.01	0.33
		2" SoakEase deployment 1	0.12	111.72	111.84	0.12
		2" SoakEase deployment 2	0.25	111.74	111.80	0.06
		2" SoakEase deployment 3	0.06	111.74	111.76	0.02
2014	5/8/2014	Initial Measurement	N/A ^B	112.43	114.15	1.72
	6/3/2014	Initial Measurement	N/A ^B	112.57	114.28	1.71
	6/4/2014 ^D	Initial Measurement	N/A	112.60	114.32	1.72
		Submersible pump	1.50	112.83	112.96	0.13
		2" SoakEase deployment 1	0.20	112.81	113.12	0.31
		2" SoakEase deployment 2	0.13	112.80	113.10	0.30
		2" SoakEase deployment 3	0.07	112.83	113.00	0.17
		2" SoakEase deployment 4	0.03	112.83	112.96	0.13
	6/5/2014 ^D	Final Measurement	N/A	112.73	113.19	0.46
	7/9/2014	Initial Measurement	N/A	112.81	113.80	0.99
		1.66" Product bailer	0.38	112.88	113.35	0.47
	7/28/2014	Initial Measurement	N/A	112.85	113.63	0.78
		1.66" Product bailer	0.38	112.91	113.18	0.27
		2" SoakEase deployment 1	0.15	112.93	113.07	0.14
		2" SoakEase deployment 2	0.15	112.94	112.96	0.02
	8/7/2014	Initial Measurement	N/A	112.74	113.55	0.81
		1.66" Product bailer	0.20	112.80	113.13	0.33
	8/26/2014	Initial Measurement	N/A	112.53	113.48	0.95
		1.66" Product bailer	0.40	112.62	113.05	0.43
		2" SoakEase deployment 1	0.10	112.68	112.69	0.01
	9/23/2014	Initial Measurement	N/A	112.29	112.93	0.64
		1.66" Product bailer	0.25	112.32	112.72	0.40
		2" SoakEase (3 socks)	0.25	112.38	112.39	0.01
	10/9/2014	Initial Measurement	N/A	112.00	112.43	0.43
		2" SoakEase (3 socks)	0.55 ^C	112.01	112.43	0.42
2015	6/4/2015	Initial Measurement	N/A ^B	N/A	N/A	N/A
	7/3/2015	Initial Measurement	N/A ^B	N/A	N/A	N/A
	7/14/2015	Initial Measurement	N/A	111.48	112.06	0.58
	7/22/2015 ^D	Initial Measurement	N/A	111.44	111.92	0.48
		1.66" Product bailer	0.26	111.43	111.70	0.27
		2" SoakEase (2 socks)		111.43	111.72	0.29
	8/12/2015	Initial Measurement ^C	N/A	111.72	112.14	0.42
		1.66" Product bailer	0.26	111.76	111.99	0.23
	8/25/2015	Initial Measurement ^C	0.12	111.82	112.11	0.29
		2" SoakEase (2 socks)	0.13	111.82	111.84	0.02
	9/13/2015	Initial Measurement ^C	N/A	111.82	112.11	0.29
		2" SoakEase (2 socks)	0.21	111.82	111.84	0.02
	10/1/2015	Initial Measurement ^C	N/A	112.08	112.28	0.20
		1.66" Product bailer	0.1	NM	NM	NM
		2" SoakEase (2 socks)	0.25	NM	NM	NM
2016	6/1/2016	Frozen	N/A ^B	NM	NM	NM
	6/2/2016	Initial Measurement	N/A	111.64	112.23	0.59
	6/7/2016	1.66" Product bailer	0.14	111.78	112.54	0.76
	6/11/2016	Initial 2" SoakEase Recovery ^C	0.08	111.78	112.27	0.49
		2" SoakEase (4 socks)	0.50	111.85	111.86	0.01
	6/27/2016	Initial 2" SoakEase Recovery ^C	0.13	111.93	112.25	0.32
		2" SoakEase (2 socks)	0.25	112.01	112.14	0.13
	7/10/2016	Initial Measurement	N/A	112.03	112.24	0.21
		2" SoakEase (2 socks)	0.17	112.05	112.09	0.04
	8/5/2016	Initial 2" SoakEase Recovery ^C	0.20	112.19	112.26	0.07
		2" SoakEase (1 sock)	0.06	112.19	112.24	0.05
	8/18/2016	Initial 2" SoakEase Recovery ^C	0.17	112.24	112.34	0.10
		2" SoakEase (1 sock)	0.08	112.25	112.26	0.01
	9/5/2016	Initial 2" SoakEase Recovery ^C	0.13	112.18	112.29	0.11
		1.66" Product bailer	0.09	112.20	112.21	0.01
	9/16/2016	Initial Measurement	N/A	112.22	112.33	0.11
		2" SoakEase (2 socks)	0.15	112.22	112.23	0.01
	10/3/2016	Initial Measurement	N/A	112.33	112.59	0.26
		1.66" Product bailer	0.06	112.36	112.49	0.13
		2" SoakEase (2 socks)	0.17	NM	112.39	0.00
	10/13/2016	Initial Measurement	N/A	112.25	112.42	0.17
		2" SoakEase (2 socks)	0.26	112.28	112.28	0.00
2017	5/25/2017	Frozen	N/A ^B	NM	NM	NM
	5/26/2017	Initial Measurement	N/A	112.78	114.03	1.25
	6/5/2017 to 6/7/2017	Initial Measurement	N/A	112.76	114.17	1.41
		1.66" Product bailer	0.92	NM	NM	0.20
		1.66" Product bailer	0.26	NM	NM	NM
		2" SoakEase (2 socks)	0.25	NM	NM	NM
		2" SoakEase (1 sock)	0.06	112.96	113.11	0.15

**Table 4 - 1998-2017 MW-1 Summary of Product Gauging and Recovery
PS09 Mainline Turbine Sump**

Year	Date	Description	Amount Recovered (gal)	Depth to Product (ft)	Depth to Water (ft)	Product Thickness (ft)
2017 Continued	6/27/2017	Initial 2" SoakEase Recovery ^C	0.13	112.99	113.33	0.34
		2" Soakease (2 socks)	0.38	NM	113.01	NM
	7/24/2017	Initial 2" SoakEase Recovery ^C	0.13	113.14	113.43	0.29
		2" Soakease (3 socks)	0.44	113.17	113.20	0.03
	9/14/2017	Initial 2" SoakEase Recovery ^C	0.25	113.2	113.61	0.41
		1.66" Product bailer	0.08	NM	NM	NM
		2" Soakease (3 socks)	0.50	113.24	113.29	0.05
	9/28/2017	Initial 2" SoakEase Recovery ^C	0.25	113.16	113.45	0.29
		2" Soakease (3 socks)	0.18	113.10	113.14	0.04
	10/19/2017	Initial 2" SoakEase Recovery ^C	0.13	113.16	113.35	0.19
		2" Soakease (3 socks)	0.25	113.18	113.19	0.01
Product Recovery Summary	Year		Gallons	Percent of 2011-2016 Total Recovered Volume		
	1998-2010 ^A		N/A	N/A		
	2011		0.8	3%		
	2012		1.7	7%		
	2013		8.2	35%		
	2014		4.7	20%		
	2015		1.3	6%		
	2016		2.6	11%		
	2017		4.2	18%		
	Total 2011 to 2017		23.5	--		

Notes:

- 0.01** BOLD values indicate the maximum measured product thickness for each year
- A Product recovery cannisters were operated for recovery of product during this period, recovery volumes were not noted for individual wells.
- B Ice plug above product depth prevented canister from being deployed for recovery
- C Product measurement following removal of sorbent sock
- D Product measurements during baildown test

Soak Ease™ 2" down-well socks absorb approximately 0.25 gallon of product each

Soak Ease™ 4" down-well socks absorb approximately 0.75 gallon of product each

Abbreviations:

ft	feet	N/A	not applicable
gal	gallons	NM	not measured

Table 5 - 1998-2017 MW-5 Summary of Product Gauging and Recovery
PS09 Mainline Turbine Sump

Year	Date	Description	Amount Recovered (gal)	Depth to Product (ft)	Depth to Water (ft)	Product Thickness (ft)
1998 to 2010 Maximum Apparent Thickness^A	12/1/1998	--	--	110.83	111.62	0.79
	9/16/1999	--	--	111.51	113.56	2.05
	12/29/2000	--	--	100.90	109.20	8.30
	7/19/2001	--	--	101.30	109.30	8.00
	6/10/2002	--	--	108.53	109.60	1.07
	6/3/2003	--	--	110.10	110.85	0.75
	6/2/2004	--	--	110.94	111.72	0.78
	6/20/2005	--	--	109.40	111.65	2.25
	5/31/2006	--	--	110.64	111.15	0.51
	5/30/2007	--	--	108.72	108.94	0.22
	7/1/2008	--	--	110.27	110.49	0.22
	7/18/2009	--	--	104.42	108.25	3.83
	10/12/2010	--	--	107.12	108.12	1.00
2011	6/24/2011	Frozen	N/A	NM	NM	N/A
	7/18/2011	Frozen	N/A	NM	NM	N/A
	7/26/2011	Frozen	N/A	NM	NM	N/A
	8/8/2011	Initial Measurement	N/A	108.61	108.8	0.19
		Deployment 1	0.75	108.63	108.75	0.12
		Deployment 2	0.75	108.64	108.7	0.06
		Deployment 3	0.25	108.63	108.66	0.03
	8/22/2011	Initial Measurement	N/A	108.42	108.6	0.18
		Deployment 1	0.33	108.45	108.53	0.08
		Deployment 2	0.33	108.46	108.49	0.03
	9/9/2011	Initial Measurement	1	108.8	108.86	0.06
		Deployment 1	0.75	108.84	108.87	0.03
	9/19/2011	Initial Measurement	1	108.54	108.61	0.07
		Deployment 1	0.5	108.55	108.56	0.01
	10/6/2011	Initial Measurement	sheen	108.44	108.46	0.02
	10/26/2011	Initial Measurement	1	108.4	108.43	0.03
2012	6/5/2012	Initial Measurement	N/A ^B	109.68	110.05	0.37
	6/20/2012	Initial Measurement	N/A ^B	109.77	110.13	0.36
	7/5/2012	Initial Measurement	N/A ^B	109.70	110.04	0.34
	7/20/2012	Initial Measurement	N/A	109.67	109.94	0.27
		Deployment 1	0.00	109.63	109.93	0.3
	8/3/2012	Initial Measurement	0.00	109.71	110.03	0.32
		Deployment 1	0.00	109.71	110.03	0.32
	8/9/2012	Initial Measurement	1	109.68	109.92	0.24
		Deployment 1	0.00	109.68	109.92	0.24
	8/23/2012	Initial Measurement	1	109.51	109.71	0.2
	9/6/2012	Initial Measurement	1	109.67	109.87	0.2
	9/21/2012	Initial Measurement	1	109.59	109.79	0.2
	10/8/2012	Initial Measurement	1	109.66	109.85	0.19
	10/22/2012	Initial Measurement	1	109.75	109.85	0.1
	6/19/2013	Initial Measurement	N/A ^B	111.00	111.66	0.66
	6/27/2013	Initial Measurement	N/A ^B	111.10	112.07	0.97
2013	7/19/2013	Frozen	N/A ^B	NM	NM	NM
	8/2/2013	Initial Measurement	N/A	111.22	111.94	0.72
	8/14/2013	Initial Measurement	0.03	111.52	112.38	0.86
	8/29/2013	Initial Measurement	0.01	111.62	112.50	0.88
		2" SoakEase (3 socks)	0.75	111.50	112.21	0.71
		2" SoakEase (4 socks)	0.75	111.55	112.02	0.47
		2" SoakEase (3 socks)	0.75	111.56	111.95	0.39
		2" SoakEase (3 socks)	0.75	111.58	111.85	0.27
		2" SoakEase (3 socks)	0.75	111.62	111.77	0.15
		2" SoakEase (2 socks)	0.50	111.60	111.71	0.11
	9/12/2013	Initial Measurement	0.50	111.55	112.48	0.93
		2" SoakEase (3 socks)	0.75	111.57	112.33	0.76
		2" SoakEase (3 socks)	0.75	111.61	112.18	0.57
		2" SoakEase (3 socks)	0.75	111.64	112.01	0.37
		2" SoakEase (3 socks)	0.75	111.67	111.85	0.18
		2" SoakEase (3 socks)	0.75	111.72	111.81	0.09
	10/4/2013	Initial Measurement	0.75	111.61	112.50	0.89
		4" SoakEase (2 socks)	1.50	111.76	112.22	0.46
		4" SoakEase (2 socks)	1.50	111.80	112.11	0.31
		4" SoakEase (2 socks)	1.50	111.75	112.00	0.25
		4" SoakEase (2 socks)	1.50	111.80	111.90	0.10
	10/17/2013	4" SoakEase (2 socks)	1.50	111.90	111.92	0.02
		Initial Measurement	0.75	111.66	112.40	0.74
		4" SoakEase (1 sock)	0.75	111.74	112.36	0.62
		2" SoakEase (3 socks)	0.75	111.79	112.19	0.40
		2" SoakEase (3 socks)	0.75	111.85	112.05	0.20
		2" SoakEase (2 socks)	0.34	111.80	111.95	0.15

Table 5 - 1998-2017 MW-5 Summary of Product Gauging and Recovery
PS09 Mainline Turbine Sump

Year	Date	Description	Amount Recovered (gal)	Depth to Product (ft)	Depth to Water (ft)	Product Thickness (ft)
2014	5/8/2014	Initial Measurement	N/A	112.32	114.30	1.98
	6/3/2014	Initial Measurement	N/A ^B	112.48	114.43	1.95
	6/4/2014 ^D	Initial Measurement	N/A	112.48	114.45	1.97
		Submersible pump	3.49	112.41	113.35	0.94
	6/5/2014 ^D	4" SoakEase (1 sock)	0.26	112.90	112.92	0.02
		Final Measurement	N/A	112.59	113.24	0.65
	7/9/2014	Initial Measurement	N/A ^B	112.61	114.67	2.06
	7/28/2014	Initial Measurement	N/A	112.64	114.21	1.57
		3.33" Product bailer	2.25	112.95	113.52	0.57
		4" SoakEase (1 sock)	0.66	112.92	113.04	0.12
	8/7/2014	Initial Measurement	N/A	112.59	113.87	1.28
		3.33" Product bailer	1.90	112.75	113.04	0.29
	8/26/2014	Initial Measurement	N/A	112.52	113.02	0.50
		3.33" Product bailer	1.00	112.64	112.77	0.13
		4" SoakEase (1 sock)	0.10	112.68	112.70	0.02
	9/23/2014	Initial Measurement	N/A	112.29	112.54	0.25
		3.33" Product bailer	0.33	112.34	112.46	0.12
		4" SoakEase (1 sock)	0.07	112.43	112.44	0.01
	10/9/2014	Initial Measurement	N/A	111.94	112.23	0.29
		3.33" Product bailer	0.5	112.00	112.05	0.05
		Initial Measurement	N/A	112.01	112.01	0.00
		4" SoakEase (2 socks)	0.25	112.02	112.03	0.01
2015	6/4/2015	Initial Measurement	N/A ^B	111.04	111.70	0.66
	7/3/2015	Initial Measurement	N/A ^B	N/A	N/A	N/A
		4" SoakEase (1 sock)	0.16 ^C	N/A	N/A	N/A
	7/14/2015	Initial Measurement	N/A	111.31	112.44	1.13
	7/21/2015 ^D	Initial Measurement	N/A	111.41	112.31	0.90
		Submersible pump	1.9	111.62	111.70	0.08
	8/12/2015	Initial Measurement ^C	0.5	111.60	112.82	1.22
		3.33" Product bailer	2.1	111.71	112.05	0.34
	8/25/2015	Initial Measurement ^C	0.5	111.57	112.68	1.11
		3.33" Product bailer, 4" SoakEase	2.0	111.21	111.84	0.63
	9/13/2015	Initial Measurement ^C	N/A	111.58	112.98	1.40
		3.33" Product bailer, 4" SoakEase	2.1	111.90	112.33	0.43
	10/1/2015	Initial Measurement ^C	N/A	111.79	113.22	1.43
		3.33" Product bailer, 4" SoakEase	4.25	112.11	112.18	0.07
2016	6/1/2016	Initial Measurement	N/A	111.46	112.20	0.74
	6/2/2016	Initial Measurement	N/A	111.50	112.43	0.93
	6/7/2016	Initial Measurement	N/A	111.58	113.06	1.48
	6/11/2016	Initial Measurement	N/A	111.60	112.85	1.25
		1.66" bailer, 4" SoakEase (3 socks)	1.60	NM	NM	NM
	6/27/2016	Initial 4" SoakEase Recovery ^C	0.26	111.81	113.05	1.24
		4" SoakEase (6 sock)	2.00	not recorded	not recorded	0.23
	7/10/2016	Initial 4" SoakEase Recovery ^C	0.26	111.89	113.00	1.11
		3.33" bailer, 4" SoakEase	2.05	111.97	112.38	0.41
	8/5/2016	Initial 4" SoakEase Recovery ^C	0.26	111.97	112.93	0.96
		3.33" bailer	2.20	NM	NM	NM
		4" SoakEase (1 sock)	0.40	111.26	111.49	0.23
	8/18/2016	Initial 4" SoakEase Recovery ^C	0.40	112.12	113.09	0.97
		3.33" bailer	1.50	NM	NM	NM
		4" SoakEase (1 sock)	0.40	112.28	112.48	0.20
	9/5/2016	Initial 4" SoakEase Recovery ^C	0.40	112.10	112.62	0.52
		4" SoakEase (1 sock)	0.40	NM	NM	NM
		3.33" bailer	0.31	112.14	112.33	0.19
	9/16/2016	Initial Measurement	N/A	112.09	112.49	0.40
		3.33" bailer	0.50	112.14	112.36	0.22
		4" SoakEase (2 socks)	0.30	112.22	112.25	0.03
	10/3/2016	Initial Measurement	N/A	112.25	112.56	0.31
		3.33" bailer	0.50	112.33	112.38	0.05
		4" SoakEase (1 sock)	0.10	112.39	112.39	0.00
	10/13/2016	Initial Measurement	N/A	112.17	112.38	0.21
		3.33" bailer	0.50	112.22	112.31	0.09
		4" SoakEase (1 sock)	0.26	112.26	112.26	0.00
2017	5/25/2017	Frozen	N/A ^B	NM	NM	NM
	5/26/2017	Initial Measurement	N/A	112.72	113.83	1.11
	6/5/2017 to 6/7/2017	Initial Measurement	N/A	112.70	114.03	1.33
		3.33" bailer	1.18	112.70	114.02	1.32
		4" SoakEase (1 sock)	0.25	NM	NM	NM
		4" SoakEase (1 sock)	0.25	112.89	113.22	0.33
	6/27/2017	Initial 4" SoakEase Recovery ^C	0.3	112.84	113.75	0.91
		3.33" bailer	1.58	NM	NM	NM
		4" SoakEase (2 socks)	1.50	113.08	113.12	0.04

**Table 5 - 1998-2017 MW-5 Summary of Product Gauging and Recovery
PS09 Mainline Turbine Sump**

Year	Date	Description	Amount Recovered (gal)	Depth to Product (ft)	Depth to Water (ft)	Product Thickness (ft)
2017 Continued	7/24/2017	Initial 4" SoakEase Recovery ^C	0.6	113.05	113.86	0.81
		3.33" bailer	0.53	NM	NM	NM
		4" SoakEase (1 sock)	0.56	113.67	113.83	0.16
	9/14/2017	Initial 4" SoakEase Recovery ^C	0.38	113.12	114.02	0.90
		3.33" bailer	0.80	NM	NM	NM
		4" SoakEase (1 sock)	0.56	113.24	113.29	0.05
	9/28/2017	Initial Measurement	N/A	112.93	113.38	0.45
		3.33" bailer	0.53	NM	NM	NM
		4" SoakEase (2 socks)	0.50	113.10	113.18	0.08
	10/19/2017	Initial 4" SoakEase Recovery ^C	0.25	113.05	113.48	0.43
		3.33" bailer	0.38	113.12	113.25	0.13
		4" SoakEase (1 sock)	0.06	113.14	113.16	0.02
Product Recovery Summary	Year		Gallons	Percent of Total Recovered Volume		
	1998-2010 ^D		N/A	N/A		
	2011		6.7	8%		
	2012		6.0	7%		
	2013		20.1	25%		
	2014		10.8	13%		
	2015		13.5	17%		
	2016		14.6	18%		
	2017		10.1	12%		
	Total 2011 to 2017		81.8	--		

Notes:

- 0.01** BOLD values indicate the maximum measured product thickness for each year
- A Product recovery cannisters were operated for recovery of product during this period, recovery volumes were not noted for individual wells.
- B Ice plug above product depth prevented canister from being deployed for recovery
- C Product measurement following removal of sorbent sock
- D Product measurements during baildown test

Soak Ease™ 2" down-well socks absorb approximately 0.25 gallon of product each

Soak Ease™ 4" down-well socks absorb approximately 0.75 gallon of product each

Abbreviations:

ft	feet	N/A	not applicable
gal	gallons	NM	not measured

**Table 6 - 1998-2017 Annual Product Recovery Summary
PS09 Mainline Turbine Sump**

Product Recovery Summary	Period	Volume Recovered (gallons)	Percent of Total Recovered Volume ^A (gallons)	Number of Recovery Events	Recovery Volume per Event (gallons)
	1998-2010 ^B	1,085	90%	N/A	N/A
	2011 ^C	11.2	0.9%	4	2.8
	2012 ^D	8.7	0.7%	4	2.2
	2013 ^D	30.8	2.6%	4	7.7
	2014 ^E	16.2	1.4%	7	2.3
	2015 ^E	15.1	1.3%	5	3.0
	2016 ^E	17.8	1.5%	10	1.8
	2017 ^E	14.3	1.2%	6	2.4
	Grand Total	1,199	100%	40	--

Notes:

- Not applicable
- A Total annual recovery for Monitoring wells MW-1, MW-5, and MW-6 1998 through 2016, monitoring wells MW-1 and MW-5 in 2017.
- B Product recovery using oil skimmer pump and pneumatically-driven pumps for 1998 through 2009 and product bailers in 2010.
- C Product Recovery using Keck[®] Product Recovery Cannisters as an active recovery system
- D Product Recovery using bailers and Keck[®] Product Recovery Cannisters as passive recovery systems.
- E Product recovery using Durham Geo Slope Indicator SoakEaseTM sorbent socks and product-selective bailers

APPENDIX A

PHOTOGRAPH LOG

2017 Groundwater Monitoring and Product Recovery Report
Pump Station 9 Mainline Turbine Sump

ALYESKA PIPELINE SERVICE COMPANY

P.O. Box 196660

3700 Centerpoint Drive

Anchorage, Alaska 99519-6660

March 2018



Photo 1: Thawing of product recovery well MW-5 using a portable generator in containment and electric heat trace (June 5, 2017).



PHOTOGRAPH LOG
June to October 2017

2017 Groundwater Monitoring and Product Recovery
Report
Pump Station 9 Mainline Turbine Sump

Job No: 105.01288.17018

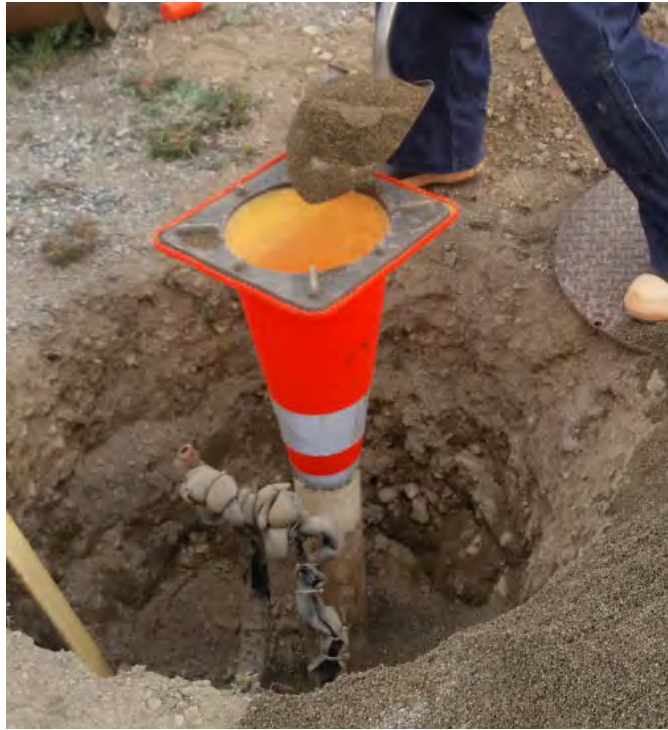


Photo 2: Decommissioning of recovery well MW-6 (June 7, 2017).



Photo 3: Remaining electrical wires as part of the product extraction system left in the ground at the location of former recovery well MW-6 (June 7, 2017).



PHOTOGRAPH LOG
June to October 2017

2017 Groundwater Monitoring and Product Recovery
Report
Pump Station 9 Mainline Turbine Sump

Job No: 105.01288.17018



Photo 4: Well purging prior to sampling using a tripod and pulley to retrieve the disposable bailer used for sample collection (June 6, 2017).



Photo 5: Turbine fuel recovered with a sorbent sock during product recovery at recovery well MW-1 (September 28, 2017).



PHOTOGRAPH LOG
June to October 2017

2017 Groundwater Monitoring and Product Recovery
Report
Pump Station 9 Mainline Turbine Sump

Job No: 105.01288.17018



Photo 6: Conducting product recovery at recovery well MW-5 with containment and absorbent spill prevention measures in place (June 6, 2017).



PHOTOGRAPH LOG
June to October 2017

2017 Groundwater Monitoring and Product Recovery
Report
Pump Station 9 Mainline Turbine Sump

Job No: 105.01288.17018



Photo 7: Weathered turbine fuel removed from recovery well MW-5 (September 28, 2017).



Photo 8: Final product recovery and reinstallation of heat trace wires (October 19, 2017).



PHOTOGRAPH LOG
June to October 2017

2017 Groundwater Monitoring and Product Recovery
Report
Pump Station 9 Mainline Turbine Sump

Job No: 105.01288.17018

APPENDIX B

FIELD LOGBOOK

2017 Groundwater Monitoring and Product Recovery Report
Pump Station 9 Mainline Turbine Sump

ALYESKA PIPELINE SERVICE COMPANY

P.O. Box 196660

3700 Centerpoint Drive

Anchorage, Alaska 99519-6660

March 2018

30 5/25/17

A Johnson, PS09 well thawing, 50°F, cloudy

0900 move in office, storage unit

0940 depart for PS09 from Fairbanks

1130 arrive PS09

1145 get permit from Di

1200 start thawing w/ pre installed heat trace, all wells
Frozen (MW-1, MW-5, MW-6)

1230 call w/ C. Venot about heat trace connection to building
for old product recovery compressed air system, will verify
they are disconnected w/ station tech so MW-6
can safely be decommissioned

1300 wells still frozen, standing water on top of MW-5
ice plug to about 4ft bgs

1400 small holes have thawed around heat trace in all wells,
heat trace's are all free now

1700 pick up site, close permit

1730 arrive at Diamond Willow in Delta for the night

Austin Johnson

5/26/17

50°F afternoon

31

A. Johnson, PS09 well thawing, 30°F w/ snow morning,

0700 depart Diamond Willow for PS09

0730 ~~get~~ arrive PS09, obtain permit

0800 start thawing all wells, light snow if falling

1300 2 inch holes opened up in MW-5 and MW-6,
2 inch hole in MW-1, able to gauge product depths

1315	well	DTP	DTW	thickness
	MW-1	112.78	114.03	1.25
	MW-5	112.72	113.83	1.11
	MW-6	112.94	113.08	0.14

1600 2.5 inch holes opened in MW-5 and MW-6,
1.5 inch hole in MW-1

reinstall heat trace caps, close wells and permit

1620 depart PS09

1800 arrive Fairbanks, demote

1830 end of day

Austin Johnson

C. VENT 18. WOELBER

PS09 Product Recovery/GW Monitoring 105-01288-1701E

6/5/17

0430 - Depart home for airport. Meet Brett Woelber at airport

0700 - Arrive in Fairbanks, stop at Office, warehouse, TIT, and SGS.

0800 - Check out key for PS08 (see PS08 notebook.)

0930-1030 - Stop at PS08 to walk/inspect FTA

1030-1230 - Travel to Delta Junction.

13:10 - Arrive at PS09

13:30 - Obtain work permit, Tailgate Safety Meeting

13:50 - Start thawing MW-5, MW-6, MW-1

14:30 Remove top air/pump hoses or lines from MW-6.

Gauge MW-5, DTP = 112.76, DTW = 114.17, PT = 1.41 ft

Gauge MW-5, DTP = 112.70, DTW = 114.03, PT = 1.23 ft

MW-6 DTP = 112.94, DTW = 113.01, PT = 0.07 ft

1600 - Knock ice out of MW-6

1650 - Start product recovery on MW-1, 3.5L total recovered. End of the run 0.2 ft

1755 - End product recovery on MW-1, cleanup & close out permit

1815 - At hotel in Delta Junction

Christopher J. Vent

6/5/17

0550 - Depart Delta Junction

0615 - obtain work permit

0650 - Calibrate YSI. Meet Jim Lawlor + Ross Oliver (perm)

0744 - Set up on MW-10

0845 - Collect Sample MW-10. Cut well down by 0.125 ft to prevent interference with well monument lid.

0900 - 1400 - bail down MW-1 again, 1.0L product recovered. Deploy Sorbent sock as backup, Recover ~80% Saturated sock. (4.5L total)

1503 - Commence product recovery on MW-5.

1518 - Gauge MW-5 DTP = 112.70', DTW = 114.02', PT = 1.22 ft. Bail 4.5L out of well. Deploy Sorbent sock.

1525 - Deploy Sorbent + 2nd sock in MW-1.

1630 - Dump ~4gal fuel and ~25gal water in Sump

1645 - Remove 1/3 saturated sock from MW-1 and 1/3 sat. sock from MW-5.

1715 - cleaned, Close wells for night.

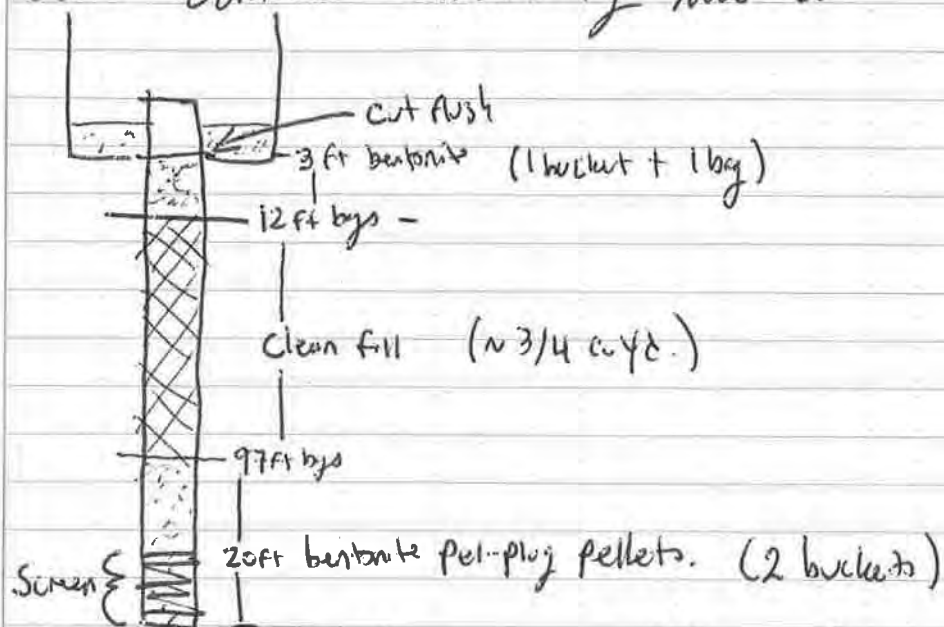
1745 - Depart for Delta Junction

1800 - At hotel

Christy
6/6/17

- 0550 - Depart Delta Junction for PS09
 0630 - ~~Obtain work permits~~ Rev. permit not issued yet.
 pref. field equipment for sampling and product recovery
 0710 - Obtain work permit. Speak to Mike Aiken about MLT & MLV projects
 0715 - gauge MW-1, remove Sorbent sock. 1/4 of sock is saturated.
 Place DTP = 112.96 ft, DTW = 113.11 FT = 0.15 ft
 Place 1/2 length Sorbent sock into well, close up well
 0727 Gauge MW-5: 112.89 DTP, DTW = 113.22 FT = 0.33 ft, lower
 4" sock into well for polishing. 1/3 of sock is saturated.

0800 - Continue decommissioning MW-6.



Well Seal total!
 3 buckets bentonite + 1 1/2 sacks

- 0805 - Calibrate YSI
 0820 - Deploy Sorbent in MW-5 for passive recovery. DTP = 112.97, DTW = 113.45
 Leave sample in Sorbent in well for passive recovery.
 0924 - Re-sample MW-10 w/o purge. Discard 6/7 sample.
 0955 - Setup on MW-7. 11:03 - well dry, will leave to recharge.
 1127 - collect Sample MW-8 after ~24hr recharge
 1140 - Collect Sample MW-2 after ~24hr recharge.
 1210 - Dispose of oily waste and well monument in appropriate waste bins.
 1250 - Collect Sample MW-7 and dup MW-27, including analyses for "petroleum vocs"
 per ADEC Request. Dup MW-27 is at "1600"
 1445 - purge & Sample MW-3. Dispose of purge water in booster Sump
 1500 - Depart for Fairbanks
 ~1650 Drop samples at lab, demob equipment.
 ~1800 - Arrive at airport, wait for flight to ANC.
 2145 - Arrive at home.

C. V. E. A. O. T.

PS09 MLT Sump Product Recovery

6/27/17

0405 - Depart home for Air Airport

10:05 - Arrive at PS09

1030 - Obtain work permits Tailgate Safety Meeting.

1043 - Gauge Well:

Post-Product Recovery

Product recovered:

	DTW	DTP	PT	DTW	DTP	PT
MW-5	113.75ft	112.64ft	0.89ft	113.12	113.08	0.04

^{Saturated} 1/3 Sorbent Soak removed prior to measurement.

	DTW	DTP	PT	DTW	DTP	PT
MW-1	113.33	112.99	0.34ft	113.04ft	NM	0.00ft

^{Saturated} 1/2 Sorbent removed prior to measurement.

1055 - Begin product recovery on MW-5. 4L removed with product bailer. Stop & Switch to MW-1.

11:20 - Begin product recovery on MW-1. Removes 1/16 bailer + 1.5 Saturated Sorbents deployed as bails.

1230 - Return to MW-5. remove 1L additional fuel w/ bailer. Remove 2 Sorbent Soaks (fully-saturated) deployed as bails.

1340 - Dispose of fuel in Sump (5L total), Closeout permit. Cleanup & decon equipment.

~1350 Depart for Fairbanks, Arrive around 1520.

+600 1500-1600 MLV equipment prep.

END OF DAY

Christopher Turner

6/27/17

7/24/17 PS09 MLT Imp Product Recovery C. VENET 105.01218.17018

0930 - Pickup Gear from Fairbanks Warehouse

1020 - Depart for PS09

1250 - Arrive at PS09, Wait for work permit (Computer System down)

1320 - Open MW-65 ^{ret at 712.5} Remove one 4" sorbent sock, 3/4 Saturated.

1335 - Open MW-1, 1/2 Saturated Sorbent Sock (2") removed.

Product Measurements:

Final

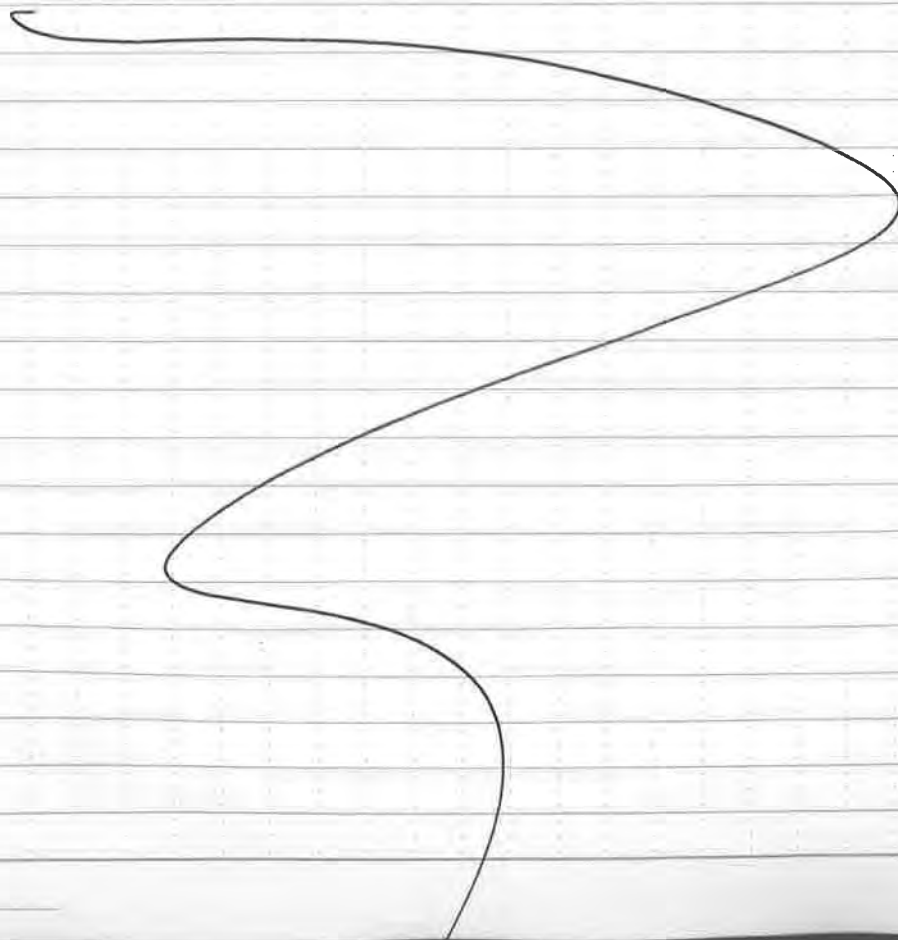
	DTP _{initial}	DTW _{initial}	DT (hr)	Product Removal	DTP	DTW	PT
MW-65	113.05	113.06	0.81	3/4 sock, 2L bailed, 3/4 sock	113.13	113.83	
				(7/24 re-measure to verify)	113.87	113.87	0.45
MW-1	113.14	113.43	0.29	1/2 sock, 1 sock, 1/4 sock	113.20	113.17	0.03

1420 - Close of Wells, leave Sorbent Socks in place

1440 - Depart for Fairbanks after disposing of recovered fuel and oily wastes.

1650 - Arrive in Fairbanks.

Chitfm



Civerot PS09 MLT Sump Product Recovery 9/14/17

0435 - Depart home for Airport

0800 - Depart Fairbanks for PS09

0950 - Arrive at PS09, obtain work permit.

1000 - Remove Sorbent Sacks from well MW-5 ($\frac{1}{2}$ Saturated) MW-1 ($\frac{1}{2}$ Saturated)

1015 - Gauge Well MW-1 and MW-5

	DTP	DTW	PT	Product Amount bailed	Post-removal		
					DTP	DTW	PT
MW-5	113.12 ft	114.02 ft	0.96 ft	3L + $\frac{1}{2}$ sub + $\frac{3}{4}$ sub	113.24	113.24	0.05
				=	113.30	113.32	0.02

MW-1	113.20	113.61	0.41 ft	1 sub + 0.3L + $\frac{1}{2}$ sub + $\frac{1}{2}$ sub	113.24	113.29	0.05
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1045 - MW-5 + bailed 3L product, Well is nearly dry. Use Sorbent for polishing.

1058 - Bail ~0.3L from MW-1. Use Sorbent for polishing

1120 - Remove $\frac{3}{4}$ Saturated Sorbent from MW-5, deploy new sorbent.

1140 - Remove $\frac{1}{2}$ Saturated Sorbent from MW-1, Use another Sorbent for polishing

1145 - Remove $\frac{3}{4}$ ^{saturates} Sorbent from MW-5.

1205 - Leave $\frac{1}{2}$ length (shw-1) Sorbent in MW-1, close up well

1210 - ~~leave~~ No Sorbent left in MW-5, close-up well.

1230 - Closeout permit, dispose of 3.3L product in Mainline Sump. Depart for Anchorage

9/28/2017 B. Woelber partly cloudy

0630 organize gear, check in with PS09 security, depart Fairbanks

0905 Arrive Pump'9

0935 Obtain work permit

0940 Tailgate meeting

- pump station operations
- driving to/from/at pump station
- bailing product
- handling sorbent socks

PPE: FR clothing, steel-toed boots, work gloves, nitrile gloves, glasses, hard hat

1007 Begin work at MWS 1375

Depth to product = ~~113.06~~ 112.93 Feet BTOC

Depth to water = 113.38 BToc

Product thickness = 0.51 feet

1102 ~2 liters of free product recovered from MW5. End bailing.

1104 Begin work at MW7.

Removed sorbent sock. ~100% saturated. See photos.

1121 Deploy and remove sorbent sock to "polish" MWS. Sock is $\sim \frac{1}{3}$ saturated.

1135 Deploy and remove sorbent sock into MW5. Sock is $\sim \frac{1}{3}$ saturated

1151 Remeasure product and water depths at MWS

Depth to product = 113.10' feet BTOC

Depth to water = 113.18 feet BTOC

Product thickness = 0.08 feet

1215 MW1

Depth to product = 113.16 feet BTOC

Depth to water = 113.45 Feet BTOC

Product thickness = 0.29 Feet

Polish well with 2 sorbent socks

First sock = $\frac{1}{2} - \frac{2}{3}$ saturated

second sack = $\frac{1}{5}$ saturated

Remeasure product thickness

Depth to water = 113.10 Feet

product

Depth to water = 113.14 feet BW

1300 Dispose of $\frac{1}{2}$ gallon ~~city waste~~ in sump booster pump

1315 Dispose of oily waste in oily waste connex

1320 Close permit, depart Pso9

1520 Arrive Fairbanks, check in with Alyeska Security, return gear, return

truck to DIF.

1730-1900 Flight AFH to ANC

BH South Wilk

- A. Johnson, PS09 product recovery, 150°F, cloudy
- 0800 make at office, storage unit
- 0900 depart for PS09
- 1100 arrive PS09, get permit from Kevin Kriska
- 1130 measure product levels ~~at MW-5~~ after pulling sack from last visit, recover ~ 1 quart
 DTP 113.05'
 DTW 113.48', thickness 0.43'
- 1155 deploy 5 four inch bailers, recover ~ 1 quart MW-5
 DTP 113.08'
 DTW 113.32', thickness 0.24'
- 1215 deploy 3 four inch bailers, recover ~ 0.50 quart MW-5
 DTP 113.12'
 DTW 113.25', thickness 0.13'
- 1230 deploy four inch sock, recover ~ 0.25 quart MW-5
 DTP 113.14' total MW-5: 2.75 quart
 DTW 113.16', thickness 0.02'
- 1235 install heat trace in MW-5, close well
- 1240 open MW-1 and pull existing sock, recover ~ 0.50 quart
 DTP 113.16'
 DTW 113.35', thickness 0.19'
- 1310 deploy 3 two inch socks, recover ~ 1 quart MW-1
 DTP 113.18' total MW-1: 1.50 quart
 DTW 113.19', thickness 0.01'
- 1330 install heat trace in MW-1, close well, depart for PS09
- 1530 arrive Fairbanks, demobilize 1630 end of day

Austin Johnson

APPENDIX C

WELL SAMPLING CALCULATION AND RECORD SHEETS

2017 Groundwater Monitoring and Product Recovery Report Pump Station 9 Mainline Turbine Sump

ALYESKA PIPELINE SERVICE COMPANY

P.O. Box 196660

3700 Centerpoint Drive

Anchorage, Alaska 99519-6660

March 2018



Groundwater Sampling Form

Site/Client Name: <u>APSC PS09</u>		Well ID: <u>MW-2</u>								
Project #: <u>165.01288.17018</u>		Sample ID: <u>MW-2</u>								
Sampled By: <u>B. WOELBER</u>		Sample Time: <u>1142</u>	Sample Date: <u>6/7/17</u>							
Weather Conditions: <u>Cloudy ~ 65°F</u>		Duplicate ID: <u>—</u>								
Sampling Method: <input type="checkbox"/> Low Flow <input checked="" type="checkbox"/> Other <u>3-VOLUME</u>		MS/MSD <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Trip Blank Required: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No								
Well Information										
Well Type: <input checked="" type="checkbox"/> Permanent <input type="checkbox"/> Temporary		Well Diameter: <u>4</u> in.	Screen Interval: _____ ft BGS to _____ ft BGS							
Well Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor (if fair or poor explain in Notes)		Stickup <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No; If yes, _____ ft above ground								
Gauging/Purging Information										
Depth to Water (ft BTOC): <u>121.90</u>		Tubing/Pump Depth (ft. BTOC): <u>—</u>								
Total Depth (ft. BTOC): <u>133.80</u>		Purge Start Time (24-hr) <u>1104</u>								
Depth to Product (ft. BTOC): <u>—</u>		Purge End Time (24-hr) <u>1135</u>								
Product Thickness (ft) <u>Water Thickness = 13.4</u>		Total Purge Time (min) <u>—</u>								
LOW FLOW: Max Draw Down = (Tubing Depth - Top of Screen Depth) _____ X 0.25 = _____ (ft); if screen interval is not known or water table is below top of screen, then use default value of 0.3 ft.										
Min. purge volume if required: purge volume (gal) = volume of water/ft _____ (gal/ft) X Water column thickness _____ (ft) X # of casing volumes _____ = _____ gal										
Well Diameter - gal/ft		1" - 0.041 gal/ft	2" - 0.163 gal/ft							
		4" - 0.653 gal/ft	6" - 1.469 gal/ft							
Water Quality Parameters										
(Achieve stable parameters for 3 consecutive reading, 4 parameters if practical [each reading taken after pumping a minimum of 1 flow through cell volume])										
Time (24-hr)	Flow Rate (liter/minute)	Purge Volume (gal)	Temp (°C) (± 3 %)	Specific Conductance (µS/cm²) (± 3%)	DO (mg/L) (± 10%)	pH (± 0.1)	ORP (mV) (± 10mV)	Turbidity (NTU) (± 10%, or <5 NTU)	DTW (ft BTOC)	Drawdown (ft) (Max _____ ft)
6/6/17 1104	—	2	4.32	1761	16.51	6.96	128.3	low med BW	—	—
1112	—	6	3.20	1554	7.97	7.30	102.4	low	—	—
1118	—	8	2.90	1138	23.01	7.26	93.2	low	—	—
1122	—	10.5	3.12	1584	7.20	7.29	87.2	low	—	—
1128	—	11.5	3.01	1539	7.76	7.41	81.5	low	—	—
1135	—	12.0	Well dry, will let recharge			—				
6/7/17 1142	Collect sample after letting recharge 24 hrs.									
Parameter Stable (Check applicable)										
Sample Color: <u>Clear</u>			Sample Odor: <u>None</u>			Sheen: <u>None</u>				
Analytical Sampling										
Analyses				Check Applicable		Comments				
DRO										
BTEX										
Notes: $(11.9 \text{ ft} \times \frac{0.653 \text{ gal}}{\text{ft}}) \times 3 = 23.3 \text{ gallons.}$										
Equipment: Pump Type _____ Tubing (Type/Length) _____ Bailer Type <u>Poly 4"</u>										
Water Level Meter _____ Multi-Parameter Meter (Make/SN#) <u>YSI 556</u>										
Turbidity Meter (Make/SN#) _____ Filter Lot # _____										
Purge Water Handling: <input type="checkbox"/> Discharged to surface <input type="checkbox"/> Containerized <input checked="" type="checkbox"/> Treated (how?) <u>Sump</u>										



Groundwater Sampling Form

Site/Client Name: <u>APSC PS09</u>		Well ID: <u>MW-3</u>								
Project #: <u>105.01288.17018</u>		Sample ID: <u>MW-3</u>								
Sampled By: <u>B. WOELBER</u>		Sample Time: <u>1445</u> Sample Date: <u>6/7/17</u>								
Weather Conditions: <u>Cloudy</u>		Duplicate ID: _____								
Sampling Method: <input type="checkbox"/> Low Flow <input checked="" type="checkbox"/> Other <u>3-VOLUME</u>		MS/MSD <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Trip Blank Required: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No								
Well Information										
Well Type: <input checked="" type="checkbox"/> Permanent <input type="checkbox"/> Temporary		Well Diameter: <u>2</u> in.								
Well Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor (if fair or poor explain in Notes)		Screen Interval: _____ ft BGS to _____ ft BGS								
		Stickup <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No; If yes, _____ ft above ground								
Gauging/Purging Information										
Depth to Water (ft BTOC): <u>114.54</u>		Tubing/Pump Depth (ft. BTOC): <u>—</u>								
Total Depth (ft. BTOC): <u>116.84</u>		Purge Start Time (24-hr): <u>1330</u>								
Depth to Product (ft. BTOC): _____		Purge End Time (24-hr): <u>1440</u>								
Product Thickness (ft): <u>Water Thickness = 2.3 ft</u>		Total Purge Time (min): <u>70</u>								
LOW FLOW: Max Draw Down = (Tubing Depth - Top of Screen Depth) _____ X 0.25 = _____ (ft); if screen interval is not known or water table is below top of screen, then use default value of 0.3 ft;										
Min. purge volume if required: purge volume (gal) = volume of water/ft _____ (gal/ft) X Water column thickness _____ (ft) X # of casing volumes _____ = _____ gal										
Well Diameter - gal/ft: 1" - 0.041 gal/ft <u>2" - 0.163 gal/ft</u> <u>4" - 0.653 gal/ft</u> 6" - 1.469 gal/ft										
Water Quality Parameters										
(Achieve stable parameters for 3 consecutive reading, 4 parameters if practical [each reading taken after pumping a minimum of 1 flow through cell volume])										
Time (24-hr)	Flow Rate (liter/minute)	Purge Volume (gal)	Temp (°C) (± 3 %)	Specific Conductance (µS/cm²) (± 3 %)	DO (mg/L) (± 10 %)	pH (± 0.1)	ORP (mV) (± 10mV)	Turbidity (NTU) (± 10%, or <5 NTU)	DTW (ft BTOC)	Drawdown (ft) (Max _____ ft)
<u>1332</u>	<u>—</u>	<u><1</u>	<u>5.25</u>	<u>880</u>	<u>5.69</u>	<u>6.61</u>	<u>69.8</u>	<u>med</u>	<u>—</u>	<u>—</u>
<u>1330</u>	<u>—</u>	<u>1 1/2</u>	<u>4.73</u>	<u>826</u>	<u>6.64</u>	<u>7.37</u>	<u>-2.1</u>	<u>Med</u>	<u>—</u>	<u>—</u>
<u>1345</u>	<u>—</u>	<u>3</u>	<u>4.41</u>	<u>830</u>	<u>6.77</u>	<u>7.10</u>	<u>-21.5</u>	<u>Low-med</u>	<u>—</u>	<u>—</u>
<u>1355</u>	<u>—</u>	<u>~1 1/2</u>	<u>4.57</u>	<u>453</u>	<u>6.93</u>	<u>7.47</u>	<u>-52.1</u>	<u>low-med</u>	<u>—</u>	<u>—</u>
<u>1413</u>	<u>—</u>	<u>2</u>	<u>4.87</u>	<u>871</u>	<u>7.35</u>	<u>7.24</u>	<u>-39.6</u>	<u>Low</u>	<u>—</u>	<u>—</u>
<u>1440</u>	<u>—</u>	<u>2.5</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>Low</u>	<u>—</u>	<u>—</u>
Parameter Stable (Check applicable)										
Sample Color: _____			Sample Odor: _____			Sheen: _____				
Analytical Sampling										
Analyses				Check Applicable		Comments				
Notes: $(2.3 \text{ ft} \times \frac{0.163 \text{ gal}}{\text{ft}}) \times 3 = 0.3 \text{ gal} \times 2.4 \text{ gal}$										
Equipment: Pump Type _____ Tubing (Type/Length) _____ Bailer Type <u>Pony 2"</u>										
Water Level Meter _____ Multi-Parameter Meter (Make/SN#) <u>YS 556</u>										
Turbidity Meter (Make/SN#) _____ Filter Lot # _____										
Purge Water Handling: <input type="checkbox"/> Discharged to surface <input type="checkbox"/> Containerized <input checked="" type="checkbox"/> Treated (how?) <u>Sump</u>										



Groundwater Sampling Form

Site/Client Name: <u>APSC PS09</u>		Well ID: <u>MW-7</u>								
Project #: <u>105-01288-17018</u>		Sample ID: <u>MW-7</u>								
Sampled By: <u>C. VENT, B. WOELGER</u>		Sample Time: <u>1250</u> Sample Date: <u>6/7/17</u>								
Weather Conditions: <u>Cloudy ~ 55°F</u>		Duplicate ID: <u>MW-27</u>								
Sampling Method: <input type="checkbox"/> Low Flow <input checked="" type="checkbox"/> Other <u>3-volume</u>		MS/MSD <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Trip Blank Required: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No								
Well Information										
Well Type: <input checked="" type="checkbox"/> Permanent <input type="checkbox"/> Temporary		Well Diameter: <u>4</u> in.								
Well Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor (if fair or poor explain in Notes)		Screen Interval: _____ ft BGS to _____ ft BGS								
		Stickup <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No; If yes, _____ ft above ground								
Gauging/Purging Information										
Depth to Water (ft BTOC): <u>114.97</u>		Tubing/Pump Depth (ft. BTOC): _____								
Total Depth (ft. BTOC): <u>119.00</u>		Purge Start Time (24-hr) <u>1024</u>								
Depth to Product (ft. BTOC): _____		Purge End Time (24-hr) <u>1103</u>								
Product Thickness (ft) <u>Water column 4.03 ft</u>		Total Purge Time (min) <u>39</u>								
LOW FLOW: Max Draw Down = (Tubing Depth - Top of Screen Depth) _____ X 0.25 = _____ (ft); if screen interval is not known or water table is below top of screen, then use default value of 0.3 ft.										
Min. purge volume if required: purge volume (gal) = volume of water/ft _____ (gal/ft) X Water column thickness _____ (ft) X # of casing volumes _____ = _____ gal										
Well Diameter - gal/ft		1" - 0.041 gal/ft								
		2" - 0.163 gal/ft								
		4" - 0.653 gal/ft								
		6" - 1.469 gal/ft								
Water Quality Parameters										
(Achieve stable parameters for 3 consecutive reading, 4 parameters if practical [each reading taken after pumping a minimum of 1 flow through cell volume])										
Time (24-hr)	Flow Rate (liter/minute)	Purge Volume (gal)	Temp (°C) (± 3 %)	Specific Conductance (µS/cm²) (± 3%)	DO (mg/L) (± 10%)	pH (± 0.1)	ORP (mV) (± 10mV)	Turbidity (NTU) (± 10%, or <5 NTU)	DTW (ft BTOC)	Drawdown (ft) (Max _____ ft)
1024	—	1	4.23	844	5.78	7.17	267.4	low-mid	—	—
1036	—	3 1/2	4.07	909	5.04	6.53	205.2	low	—	—
1042	—	4 1/2	3.86	991	4.86	6.69	216.5	low	—	—
1053	—	5.0	3.71	904	4.53	5.93	249.6	low-clear	—	—
1103	—	6.5	—	—	Well dry, will let recharge.					
Parameter Stable (Check applicable)										
Sample Color: <u>None, clear</u>			Sample Odor: <u>None</u>			Sheen: <u>None</u>				
Analytical Sampling										
Analyses				Check Applicable		Comments				
BTEX 3x VOA				HCL						
VOLs (petroleum list) 3x VOA				HCL						
DRO 2x AL				HCL						
Notes: $4.03 \text{ ft} \times (0.653 \text{ gal/ft}) \times 3 = 7.9 \text{ gal}$ Well has gravel in bottom.										
Equipment: Pump Type _____ Tubing (Type/Length) _____ Bailer Type <u>Poly 4"</u>										
Water Level Meter _____ Multi-Parameter Meter (Make/SN#) <u>YS1556</u>										
Turbidity Meter (Make/SN#) _____ Filter Lot # _____										
Purge Water Handling: <input type="checkbox"/> Discharged to surface <input type="checkbox"/> Containerized <input checked="" type="checkbox"/> Treated (how?) <u>sump</u>										



Groundwater Sampling Form

Site/Client Name: <u>APSC PS09</u>		Well ID: <u>MW-8</u>								
Project #: <u>105.01288.17018</u>		Sample ID: <u>MW-8</u>								
Sampled By: <u>B. WOELBER</u>		Sample Time: <u>1127</u> Sample Date: <u>6/7/17</u>								
Weather Conditions:		Duplicate ID: <u> </u>								
Sampling Method: <input type="checkbox"/> Low Flow <input checked="" type="checkbox"/> Other <u>3-VOLUME</u>		MS/MSD <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Trip Blank Required: <input type="checkbox"/> Yes <input type="checkbox"/> No								
Well Information										
Well Type: <input checked="" type="checkbox"/> Permanent <input type="checkbox"/> Temporary		Well Diameter: <u>4</u> in. Screen Interval: <u> </u> ft BGS to <u> </u> ft BGS								
Well Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor (if fair or poor explain in Notes)		Stickup <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No; if yes, <u> </u> ft above ground								
Gauging/Purging Information										
Depth to Water (ft BTOC): <u>115.31</u>		Tubing/Pump Depth (ft. BTOC): <u> </u>								
Total Depth (ft BTOC): <u>116.84</u>		Purge Start Time (24-hr) <u>1000</u>								
Depth to Product (ft. BTOC)		Purge End Time (24-hr) <u>1036</u>								
Product Thickness (ft) <u>water thickness = 1.53 ft.</u>		Total Purge Time (min) <u>36</u>								
LOW FLOW: Max Draw Down = (Tubing Depth - Top of Screen Depth) <u> </u> X 0.25 = <u> </u> (ft); if screen interval is not known or water table is below top of screen, then use default value of 0.3 ft.;										
Min. purge volume if required: purge volume (gal) = volume of water/ft <u> </u> (gal/ft) X Water column thickness <u> </u> (ft) X # of casing volumes <u> </u> = <u> </u> gal										
Well Diameter - gal/ft		1" - 0.041 gal/ft 2" - 0.163 gal/ft <u>4" - 0.653 gal/ft</u> 6" - 1.469 gal/ft								
Water Quality Parameters										
(Achieve stable parameters for 3 consecutive reading, 4 parameters if practical [each reading taken after pumping a minimum of 1 flow through cell volume])										
Time (24-hr)	Flow Rate (liter/minute)	Purge Volume (gal)	Temp (°C) (± 3 %)	Specific Conductance (µS/cm²) (± 3%)	DO (mg/L) (± 10%)	pH (± 0.1)	ORP (mV) (± 10mV)	Turbidity (NTU) (± 10%, or <5 NTU)	DTW (ft BTOC)	Drawdown (ft) (Max <u> </u> ft)
<u>6/6/17 1012</u>	<u> </u>	<u>0.75</u>	<u>5.4</u>	<u>660</u>	<u>7.53</u>	<u>7.71</u>	<u>132.2</u>	<u>med-high</u>	<u>NM</u>	<u> </u>
<u>1036</u>	<u> </u>	<u>1.5</u>	<u>well dry, close up & let recharge</u>							
<u>6/7/17 1127</u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
<u>Collect sample MW-8 after well recharge</u>										
Parameter Stable (Check applicable) <input type="checkbox"/>										
Sample Color: <u>Clear</u>			Sample Odor: <u>None</u>			Sheen: <u>None</u>				
Analytical Sampling										
Analyses				Check Applicable				Comments		
<u>DDO</u>										
<u>BTEX</u>										
Notes: <u>3 x (1.53 water column x 0.653 gal/ft) = 3.00 gallon purge</u>										
Equipment: Pump Type <u> </u> Tubing (Type/Length) <u> </u> Bailer Type <u>Poly 4"</u>										
Water Level Meter <u> </u> Multi-Parameter Meter (Make/SN#) <u>YS1556</u>										
Turbidity Meter (Make/SN#) <u> </u> Filter Lot # <u> </u>										
Purge Water Handling: <input type="checkbox"/> Discharged to surface <input type="checkbox"/> Containerized <input checked="" type="checkbox"/> Treated (how?) <u>sump</u>										



Groundwater Sampling Form

Site/Client Name: <u>APSC p509</u>		Well ID: <u>MW-10</u>								
Project #: <u>185-01288.17018</u>		Sample ID: <u>MW-10</u>								
Sampled By: <u>C. VENST</u>		Sample Time: <u>0845</u> Sample Date: <u>6/6/17</u>								
Weather Conditions: <u>Cloudy ~ 60°F</u>		Duplicate ID: <u> </u>								
Sampling Method: <input type="checkbox"/> Low Flow <input checked="" type="checkbox"/> Other <u>3-volume</u>		MS/MSD <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Trip Blank Required: <input type="checkbox"/> Yes <input type="checkbox"/> No								
Well Information										
Well Type: <input checked="" type="checkbox"/> Permanent <input type="checkbox"/> Temporary		Well Diameter <u>4</u> in. Screen Interval: <u> </u> ft BGS to <u> </u> ft BGS								
Well Condition: <input checked="" type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor (if fair or poor explain in Notes)		Stickup <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No; if yes, <u> </u> ft above ground								
Gauging/Purging Information										
Depth to Water (ft BTOC): <u>112.63 - 125 = 112.505</u>		Tubing/Pump Depth (ft. BTOC): <u> </u>								
Total Depth (ft BTOC): <u>116.13 - 125 = 116.005</u>		Purge Start Time (24-hr) <u>0826</u>								
Depth to Product (ft. BTOC) <u>column 1</u>		Purge End Time (24-hr) <u>0838</u>								
Product Thickness (ft) <u>water column = 3.5 ft</u>		Total Purge Time (min) <u>12</u>								
LOW FLOW: Max Draw Down = (Tubing Depth - Top of Screen Depth) <u> </u> X 0.25 = <u> </u> (ft); if screen interval is not known or water table is below top of screen, then use default value of 0.3 ft;										
Min. purge volume if required: purge volume (gal) = volume of water/ft <u> </u> (gal/ft) X Water column thickness <u> </u> (ft) X # of casing volumes <u> </u> = <u> </u> gal										
Well Diameter - gal/ft		1" - 0.041 gal/ft 2" - 0.163 gal/ft <u>4" - 0.653 gal/ft</u> 6" - 1.469 gal/ft								
Water Quality Parameters										
(Achieve stable parameters for 3 consecutive reading, 4 parameters if practical [each reading taken after pumping a minimum of 1 flow through cell volume])										
Time (24-hr)	Flow Rate (liter/minute)	Purge Volume (gal)	Temp (°C) (± 3 %)	Specific Conductance (µS/cm²) (± 3 %)	DO (mg/L) (± 10 %)	pH (± 0.1)	ORP (mV) (± 10mV)	Turbidity (NTU) (± 10% or 5 NTU)	DTW (ft BTOC)	Drawdown (ft) (Max <u> </u> ft)
<u>0826</u>	<u>—</u>	<u>2</u>	<u>4.21</u>	<u>776</u>	<u>7.50</u>	<u>4.79</u>	<u>292.5</u>	<u>Low-mes</u>	<u>NA</u>	<u>—</u>
<u>0830</u>	<u>—</u>	<u>4 1/2</u>	<u>3.64</u>	<u>714</u>	<u>5.50</u>	<u>5.57</u>	<u>292.6</u>	<u>"</u>	<u>NA</u>	<u>—</u>
<u>0835</u>	<u>—</u>	<u>6 1/2</u>	<u>3.15</u>	<u>712</u>	<u>6.54</u>	<u>5.75</u>	<u>231.3</u>	<u>Low</u>	<u>NA</u>	<u>—</u>
<u>0838</u>	<u>—</u>	<u>7.0</u>	<u>3.12</u>	<u>710</u>	<u>6.73</u>	<u>6.14</u>	<u>207.3</u>	<u>Low</u>	<u>NA</u>	<u>—</u>
Parameter Stable (Check applicable)										
Sample Color: <u>Clear</u>			Sample Odor: <u>None</u>			Sheen: <u>None</u>				
Analytical Sampling										
Analyses				Check Applicable		Comments				
<u>DRO 2x 250mL AG</u>										
<u>BTEX 3x 40mL VOA HCL</u>										
Notes: <u>3 x (3.5 ft water column x 0.653 gal/ft) = 6.86 gal</u> <u>Purge</u> <u>PVC well casing too close to steel monument, PVC cut down ~ 2" (1.25 ft)</u>										
Equipment: Pump Type <u> </u> Tubing (Type/Length) <u> </u> Bailer Type <u> </u>										
Water Level Meter <u> </u> Multi-Parameter Meter (Make/SN#) <u>YSI 556</u> <u>poly 4"</u>										
Turbidity Meter (Make/SN#) <u> </u> Filter Lot # <u> </u>										
Purge Water Handling: <input type="checkbox"/> Discharged to surface <input type="checkbox"/> Containerized <input checked="" type="checkbox"/> Treated (how?) <u>Sump</u>										

APPENDIX D

SLR QUALITY ASSURANCE REVIEW, ADEC LABORATORY DATA REVIEW CHECKLIST, AND LABORATORY ANALYTICAL RESULTS

DRAFT 2017 Groundwater Monitoring and Product Recovery Report Pump Station 9 Mainline Turbine Sump

ALYESKA PIPELINE SERVICE COMPANY

P.O. Box 196660

3700 Centerpoint Drive

Anchorage, Alaska 99519-6660

March 2018

Report

LABORATORY DATA QUALITY ASSURANCE REVIEW

PS09 MLT SUMP 2017 GROUNDWATER MONITORING

PUMP STATION 9 ALYESKA PIPELINE SERVICE COMPANY

October 2017

Prepared by: Sarah Croisant
Reviewed by: Jennifer McLean

SLR International Corporation
2700 Gambell Street, Suite 200
Anchorage, AK 99503

SLR Project Number 105.01288.17018

ADEC File Number 330.38.065

ACRONYMS AND ABBREVIATIONS

AAC	Alaska Administrative Code
AK	Alaska
ADEC	Alaska Department of Environmental Conservation
BTEX	benzene, toluene, ethylbenzene, and xylenes
°C	degrees Celsius
CCV	continuing calibration verification
COC	chain of custody
DL	detection limit
DRO	diesel range organics
EDDs	electronic data deliverable
GRO	gasoline range organics
GW	groundwater
ID	identification
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
LOD	limit of detection
LOQ	limit of quantitation
MS	matrix spike
MSD	matrix spike duplicate
ND	non-detect
PARCCS	precision, accuracy, representativeness, comparability, completeness, and sensitivity
QA	quality assurance
QAR	quality assurance review
QC	quality control
RPD	relative percent difference
SDG	sample delivery group
SGS	SGS North America, Inc.
SLR	SLR International Corporation
TCLP	Toxicity Characteristic Leaching Procedure
VOCs	volatile organic compounds

Introduction

This report summarizes a review of analytical data for samples collected on June 7, 2107 in support of groundwater monitoring activities at the PS09 MLT Sump site. Samples were collected by SLR International Corporation (SLR). SGS North America, Inc (SGS) provided analytical support to the project. SGS maintains a current Alaska Department of Environmental Conservation (ADEC) Contaminated Sites approval number (UST-005) for analytical methods of interest, as applicable. Table 1 provides a summary of work orders, sample receipt, analytical methods, and analytes.

Table 1 Sample Receipt, Matrix, Method, and Analyte Summary

SDG	Date Collected	Date Received by Laboratory	Temp. Blank	Matrix	Analytical Method	Analyte
1177902	6/7/2017	6/7/2017 Fairbanks 6/9/2017 Anchorage	5.7°C 1.7°C	GW	AK102	DRO
					SW8021B	BTEX
					SW8260C	Petroleum VOCs ¹

Notes:

1 - BTEX and a short list of petroleum VOCs were analyzed. Analytes reported were benzene, toluene, ethylbenzene, total xylenes (m,p-xylene and o-xylene), 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, isopropylbenzene (cumene), methyl-t-butyl ether, naphthalene, n-butylbenzene, n-propylbenzene, sec-butylbenzene, styrene, and tert-butylbenzene.

Acronyms:

°C – degrees Celsius

AK – Alaska

BTEX – benzene, toluene, ethylbenzene, and total xylenes

DRO – diesel range organics

GW – groundwater

SDG – sample delivery group

VOCs – volatile organic compounds

The laboratory final report was presented as a Level II deliverable and included documentation of the delivery group chain of custody (COC) and sample receipt condition. An Microsoft Access compatible electronic data deliverable (EDD) was also provided. The PDF laboratory report is provided as Attachment 2.

Quality Assurance Program

A quality assurance (QA) program was followed for this project that addressed project administration, sampling, quality control (QC), and data review. SLR adhered to required and established sampling and COC protocols. The select laboratory maintains an internal QA program and standard operating procedures.

The analytical data was reviewed for consistency with any project specific requirements *ADEC Technical Memorandum, Data Quality Objectives, Checklists, Quality Assurance Requirements for Laboratory Data, and Sample Handling (ADEC, 2017a)* requirements, analytical method criteria and laboratory criteria. An ADEC Laboratory Data Review Checklist was completed for the SDG, and is included as Attachment 1 to this Quality Assurance Review (QAR). A review for any anomalies to the project requirements for precision, accuracy, representativeness, comparability, completeness and sensitivity (PARCCS) are noted in this QAR, and any data qualifications discussed.

The data review included the following, as applicable:

- Reviewing COC records for completeness, signatures, and dates;
- Identifying any sample receipt or preservation anomalies that could impact data quality;
- Verifying that QC blanks (e.g., field blanks, equipment blanks, trip blanks, method blanks, etc.); were properly prepared, identified, and analyzed;
- Evaluating whether laboratory reporting limits met project goals;
- Reviewing calibration verification recoveries, to include confirming that the laboratory did not identify any Continuing Calibration Verification (CCV) recoveries or other calibration related criteria as being outside applicable acceptance limits;
- Reviewing the case narratives for any discussion of any internal standard recoveries outside of acceptance limits. Internal standard performance was not otherwise presented in the report or in the electronic data deliverables and was reviewed only from the case narratives;
- Verifying that surrogate analyses were within recovery acceptance limits;
- Verifying that Laboratory Control Samples (LCS) and Laboratory Control Sample Duplicates (LCSD) recoveries were within acceptance limits;
- Evaluating the result relative percent difference (RPD) between primary and duplicate field samples, and LCS/LCSD; and
- Providing an overall assessment of laboratory data quality and qualifying sample results as necessary.

Data Qualifications

As part of this QAR, qualifiers (i.e. flags) were applied to data as determined necessary based on specified criteria, or professional judgement. In all cases, the basis for qualification and the applied data flag are discussed in this QAR. Table 2 provides a list of potential qualifiers (i.e., flags). These data flags were appended to the data as appropriate.

Table 2 Data Qualifiers

Qualifier	Definition
Q	One or more laboratory quality control criteria (e.g., LCS recovery, surrogate spike recovery) failed. Where applicable, an “H”, “L”, or “N” was appended to indicate positive, negative, or unknown bias, respectively.
J	The analyte was positively identified but the result was outside the calibration range, between the limit of quantitation (LOQ) and the detection limit (DL); the quantitation was an estimate.
M	The concentration was an estimate due to a sample matrix quality control failure. Where applicable, an “H”, “L”, or “N” was appended to indicate positive, negative, or unknown bias, respectively.
B	Blank contamination: The analyte was positively identified in the blank (e.g., trip blank, method blank, equipment blank, etc.) associated with the sample and the concentration reported for the sample was less than five times that of the blank (ten times for metals and common laboratory contaminants methylene chloride and acetone).
P	Sample preservation requirements were not satisfied.
HT	Holding time exceeded. Value is an estimate.

A discussion of the project data quality relative to PARCCS goals and summary of any anomalies or failures requiring data qualifiers follows.

Data Validation

Data Packages

The data package was checked for transcription errors, omissions, or other anomalies. No issues were noted with regards to the data package, except as noted below.

- The PDF laboratory report included a Toxicity Characteristic Leaching Procedure (TCLP) leaching blank for benzene by Method SW8260C. TCLP was not requested, nor analyzed for this work order. The SW8260C method blank was non-detect (ND) for benzene. Data was not impacted.

Sample Receipt

The sample receipt documentation was checked for anomalies. No issues were noted with regards to the receipt of the samples.

Preservation (Chemical and Temperature)

Samples were appropriately preserved and were submitted to SGS. No issues were noted in regard to sample preservation.

Holding Times

All sample analysis was conducted within holding time criteria.

Laboratory Method Blanks

Laboratory method blanks were analyzed at the appropriate frequencies. Analytes were ND in any method blanks at or above the Limit of Detection (LOD).

Trip Blanks

One trip blank was submitted and analyzed for volatile methods (BTEX by method SW8021B and VOCs by method SW8260C). Analytes were not detected in the trip blank at or above the LOD.

Reporting Limits

For ND results, LODs were compared to applicable cleanup levels for the site. For groundwater samples, LODs were compared to 18 AAC 75, *Oil and Other Hazardous Substances Pollution Control*, section 75.345 Table C, Groundwater Cleanup Levels (ADEC, 2017b). All results of ND had LODs at or below applicable cleanup levels.

Continuous Calibration Verifications (CCVs)

CCVs were analyzed at the appropriate frequencies. CCV data was included only in the EDD, not in the case narrative. All CCV recoveries were within acceptable limits, as reviewed in the EDD.

Internal Standards

No internal standards were noted in the case narrative as outside of acceptance limits. Internal standard performance criteria were considered met.

Surrogate Recovery Results

Surrogate analysis was performed at the required frequencies. All surrogate recoveries were within analytical method and SGS percent recovery acceptance limits.

Laboratory Control Samples and Laboratory Control Duplicate Samples

LCS and LCSDs were analyzed at the appropriate frequencies. All LCS and LCSD recoveries and RPDs were within analytical method and SGS percent recovery acceptance limits.

Matrix Spike and Matrix Spike Duplicate Samples

No matrix spikes (MS) or matrix spike duplicates (MSD) were analyzed in association with these samples.

Field Duplicates

The field duplicate sample frequency is presented in Table 3. Parent sample and field duplicate pairs are presented in Table 4. The frequency satisfied the requirement of one per 10 samples or less per matrix and analyte. Field duplicates were submitted blind to the laboratory.

Samples with both results below the LOQ (J flagged or non-detect) were considered acceptable without qualification. All parent sample/field duplicate RPDs were within the ADEC required 30% for waters.

Table 3 Field Duplicate Frequency, Methods, and Analyses

Analytical Method	Analyte	Number of Primary Samples	Number of Field Duplicates
SW8021B	BTEX	5	1
SW8260C	BTEX and Petroleum VOCs	1	1
AK102	DRO	5	1

Table 4 Field Duplicate Identification

Parent Sample ID	Duplicate Sample ID	All RPDs acceptable (Y/N)
MW-7	MW-27	Y

Abbreviations:

ID - identifier

Laboratory Duplicate Samples

No laboratory duplicates were analyzed in association with these samples.

Overall Assessment

Precision, Accuracy, Representativeness, Comparability, Completeness, and Sensitivity Summary

- Precision: Precision goals were met.
- Accuracy: Accuracy goals were met.
- Representativeness: Representativeness goals were met. The samples were collected from usual locations in accordance with applicable requirements and guidance documents.
- Comparability: Comparability goals were met. SGS laboratory provided analytical support for all methods.
- Completeness: Completeness goals were met. The data were 100 percent complete with respect to analysis because no data were rejected.

- Sensitivity: Sensitivity goals were met.

This data were considered of good quality and acceptable for use. No data were rejected.

References

- ADEC, 2017a. *Data Quality Objectives, Checklists, Quality Assurance Requirements for Laboratory Data, and Sample Handling*. Technical Memorandum. March.
- ADEC, 2017b. *Alaska Administrative Code (18 AAC 75), Oil and Other Hazardous Substances Pollution Control*. As amended through March 23.

Attachments

Attachment 1 – ADEC Data Review Checklist

Attachment 2 – Laboratory Deliverable

Attachment 1

ADEC Data Review Checklist

Laboratory Data Review Checklist

Completed by:

Sarah Croisant

Title:

Staff Scientist

Date:

October 02, 2017

CS Report Name:

PS09 MLT Sump 2017
Groundwater Monitoring

Report Date:

September 14, 2017

Consultant Firm:

SLR International Corporation

Laboratory Name:

SGS of Anchorage, AK

Laboratory Report Number:

1177902

ADEC File Number:

330.38.065

Hazard Identification Number:

N/A

1. Laboratory

- a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

☒ Yes ☐ No

Comments:

SGS Anchorage, AK performed all analyses. They are ADEC approved.

- 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?

☐ Yes ☒ No

Comments:

N/A, the samples were not transferred to any other laboratory.

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 (0° to 6° C)?

☒ Yes ☐ No

Comments:

- b. Sample preservation acceptable – acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

☒ Yes ☐ No

Comments:

- c. Sample condition documented – broken, leaking (Methanol), zero headspace (VOC vials)?

☒ Yes ☐ No

Comments:

- d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

☒ Yes ☐ No

Comments:

N/A, no discrepancies were noted.

e. Data quality or usability affected?

Comments:

N/A, no affect.

4. Case Narrative

a. Present and understandable?

☒ Yes ☐ No

Comments:

b. Discrepancies, errors or QC failures identified by the lab?

☒ Yes ☐ No

Comments:

This was not noted in the case narrative, but the PDF laboratory report included a TCLP leaching blank for benzene by Method SW8260C. TCLP was not requested, nor analyzed for this work order. The SW8260C method blank was non-detect for benzene.

c. Were all corrective actions documented?

☒ Yes ☐ No

Comments:

N/A, no corrective actions were necessary.

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

Comments:

Data was not impacted.

5. Samples 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?

☒ Yes ☐ No

Comments:

N/A, no soils were analyzed on this workorder.

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?

Comments:

N/A, no affect.

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 limit of quantitation (LOQ)?

☒ Yes ☐ No

Comments:

iii. If above LOQ, what samples are affected?

Comments:

N/A, no results above LOQ.

iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

☐ Yes ☒ No

Comments:

N/A, no affected samples.

v. Data quality or usability affected?

Comments:

N/A, no affect.

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)

☒ Yes ☐ No

Comments:

ii. Metals/Inorganics – one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

☐ Yes ☒ No

Comments:

N/A, no metals or inorganics were analyzed with this workorder.

- iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory 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 (RPD) 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?

Comments:

N/A, no affected samples.

- vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

☐ Yes ☒ No

Comments:

N/A, no affected samples.

- vii. Data quality or usability affected?

Comments:

N/A, no affect.

c. Surrogates – Organics Only

- i. Are surrogate recoveries reported for organic analyses – field, QC and laboratory samples?

☒ 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)

☒ Yes ☐ No

Comments:

- iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

☒ Yes ☐ No

Comments:

N/A, no affected results.

iv. Data quality or usability affected?

Comments:

N/A, no affect.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

i. One trip blank reported per matrix, analysis and cooler?

☒ Yes ☐ No

Comments:

ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC?
(If not, a comment explaining why must be entered below)

☐ Yes ☐ No

Comments:

iii. All results less than LOQ?

☒ Yes ☐ No

Comments:

iv. If above LOQ, what samples are affected?

Comments:

N/A, no affected samples.

v. Data quality or usability affected?

Comments:

N/A, no affect.

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

☒ Yes ☐ No

Comments:

ii. Submitted blind to lab?

☒ Yes ☐ No

Comments:

- iii. Precision – All relative percent differences (RPD) less than specified DQOs?
(Recommended: 30% water, 50% soil)

$$\text{RPD (\%)} = \text{Absolute value of: } \frac{(R_1 - R_2)}{((R_1 + R_2)/2)} \times 100$$

Where R_1 = Sample Concentration
 R_2 = Field Duplicate Concentration

☒ Yes ☐ No

Comments:

- iv. Data quality or usability affected?

Comments:

N/A, no affect.

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

☐ Yes ☐ No ☒ Not Applicable

- i. All results less than LOQ?

☐ Yes ☒ No

Comments:

Dedicated or disposable equipment was used for the collection of all samples.

- ii. If above LOQ, what samples are affected?

Comments:

N/A, no affected samples.

- iii. Data quality or usability affected?

Comments:

N/A, no affect.

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab Specific, etc.)

- a. Defined and appropriate?

☒ Yes ☐ No

Comments:

Attachment 2
Laboratory Deliverable

(Data package)

Laboratory Report of Analysis

To: Alyeska Pipeline Srv Co.
4601 Business Park Blvd K42
Anchorage, AK 99503
(907)222-1112

Report Number: **1177902**

Client Project: **PS09 MLT Sump**

Dear Scott Rose,

Enclosed are the results of the analytical services performed under the referenced project for the received samples and associated QC as applicable. The samples are certified to meet the requirements of the National Environmental Laboratory Accreditation Conference Standards. Copies of this report and supporting data will be retained in our files for a period of ten years in the event they are required for future reference. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. Any samples submitted to our laboratory will be retained for a maximum of fourteen (14) days from the date of this report unless other archiving requirements were included in the quote.

If there are any questions about the report or services performed during this project, please call Justin at (907) 562-2343. We will be happy to answer any questions or concerns which you may have.

Thank you for using SGS North America Inc. for your analytical services. We look forward to working with you again on any additional analytical needs.

Sincerely,
SGS North America Inc.



SGS North America Inc.
Environmental Services – Alaska Division
Project Manager

Justin Nelson
2017.09.14
12:56:42 -08'00'

Justin Nelson
Project Manager
Justin.Nelson@sgs.com

Date

Revised Report - This report has been reissued to modify the 8260C compound list,
per client request.

Case Narrative

SGS Client: **Alyeska Pipeline Srv Co.**

SGS Project: **1177902**

Project Name/Site: **PS09 MLT Sump**

Project Contact: **Scott Rose**

Refer to sample receipt form for information on sample condition.

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

Print Date: 09/08/2017 8:51:37AM

Laboratory Qualifiers

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. This document is issued by the Company under its General Conditions of Service accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the context or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

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 2944.01 for DOD ELAP/ISO17025 (RCRA methods: 1020B, 1311, 3010A, 3050B, 3520C, 3550C, 5030B, 5035A, 6020A, 7470A, 7471B, 8015C, 8021B, 8082A, 8260C, 8270D, 8270D-SIM, 9040C, 9045D, 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, 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/CVA/CVB	Continuing Calibration Verification
CCCV/CVC/CVCA/CVCB	Closing Continuing Calibration Verification
CL	Control Limit
DF	Analytical Dilution Factor
DL	Detection Limit (i.e., maximum method detection limit)
E	The analyte result is above the calibrated range.
GT	Greater Than
IB	Instrument Blank
ICV	Initial Calibration Verification
J	The quantitation is an estimation.
LCS(D)	Laboratory Control Spike (Duplicate)
LLQC/LLIQC	Low Level Quantitation Check
LOD	Limit of Detection (i.e., 1/2 of the LOQ)
LOQ	Limit of Quantitation (i.e., reporting or practical quantitation limit)
LT	Less Than
MB	Method Blank
MS(D)	Matrix Spike (Duplicate)
ND	Indicates the analyte is not detected.
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.

Sample Summary

<u>Client Sample ID</u>	<u>Lab Sample ID</u>	<u>Collected</u>	<u>Received</u>	<u>Matrix</u>
MW-10	1177902001	06/07/2017	06/09/2017	Water (Surface, Eff., Ground)
MW-8	1177902002	06/07/2017	06/09/2017	Water (Surface, Eff., Ground)
MW-2	1177902003	06/07/2017	06/09/2017	Water (Surface, Eff., Ground)
MW-7	1177902004	06/07/2017	06/09/2017	Water (Surface, Eff., Ground)
MW-3	1177902005	06/07/2017	06/09/2017	Water (Surface, Eff., Ground)
MW-27	1177902006	06/07/2017	06/09/2017	Water (Surface, Eff., Ground)
Trip Blank	1177902007	06/07/2017	06/09/2017	Water (Surface, Eff., Ground)

<u>Method</u>	<u>Method Description</u>
SW8021B	BTEX 8021
AK102	DRO Low Volume (W)
SW8260C	Volatile Organic Compounds (W) FULL

Print Date: 09/08/2017 8:51:40AM

Detectable Results Summary

Client Sample ID: **MW-8**
 Lab Sample ID: 1177902002
Semivolatile Organic Fuels

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	0.272J	mg/L

Client Sample ID: **MW-2**
 Lab Sample ID: 1177902003
Semivolatile Organic Fuels

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	0.287J	mg/L

Client Sample ID: **MW-7**
 Lab Sample ID: 1177902004
Semivolatile Organic Fuels
Volatile Fuels
Volatile GC/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	0.987	mg/L
Benzene	1.58	ug/L
Benzene	1.49	ug/L
sec-Butylbenzene	1.19	ug/L

Client Sample ID: **MW-27**
 Lab Sample ID: 1177902006
Semivolatile Organic Fuels
Volatile Fuels
Volatile GC/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	1.07	mg/L
Benzene	1.60	ug/L
Benzene	1.48	ug/L
sec-Butylbenzene	1.18	ug/L



Results of MW-10

Client Sample ID: **MW-10**
Client Project ID: **PS09 MLT Sump**
Lab Sample ID: 1177902001
Lab Project ID: 1177902

Collection Date: 06/07/17 08:45
Received Date: 06/09/17 12:05
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Semivolatile Organic Fuels

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Diesel Range Organics	0.288 U	0.577	0.173	mg/L	1		06/15/17 13:20
Surrogates							
5a Androstane (surr)	88.2	50-150		%	1		06/15/17 13:20

Batch Information

Analytical Batch: XFC13427
Analytical Method: AK102
Analyst: KMD
Analytical Date/Time: 06/15/17 13:20
Container ID: 1177902001-D

Prep Batch: XXX37558
Prep Method: SW3520C
Prep Date/Time: 06/13/17 07:42
Prep Initial Wt./Vol.: 260 mL
Prep Extract Vol: 1 mL

Print Date: 09/08/2017 8:51:41AM

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Results of MW-10

Client Sample ID: **MW-10**
Client Project ID: **PS09 MLT Sump**
Lab Sample ID: 1177902001
Lab Project ID: 1177902

Collection Date: 06/07/17 08:45
Received Date: 06/09/17 12:05
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Volatile Fuels

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Benzene	0.250 U	0.500	0.150	ug/L	1		06/17/17 02:06
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		06/17/17 02:06
o-Xylene	0.500 U	1.00	0.310	ug/L	1		06/17/17 02:06
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		06/17/17 02:06
Toluene	0.500 U	1.00	0.310	ug/L	1		06/17/17 02:06
Surrogates							
1,4-Difluorobenzene (surr)	93.2	77-115		%	1		06/17/17 02:06

Batch Information

Analytical Batch: VFC13683
Analytical Method: SW8021B
Analyst: ST
Analytical Date/Time: 06/17/17 02:06
Container ID: 1177902001-A

Prep Batch: VXX30678
Prep Method: SW5030B
Prep Date/Time: 06/16/17 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL



Results of MW-8

Client Sample ID: **MW-8**
Client Project ID: **PS09 MLT Sump**
Lab Sample ID: 1177902002
Lab Project ID: 1177902

Collection Date: 06/07/17 11:27
Received Date: 06/09/17 12:05
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Semivolatile Organic Fuels

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Diesel Range Organics	0.272 J	0.610	0.183	mg/L	1		06/15/17 13:30
Surrogates							
5a Androstane (surr)	68.4	50-150		%	1		06/15/17 13:30

Batch Information

Analytical Batch: XFC13427
Analytical Method: AK102
Analyst: KMD
Analytical Date/Time: 06/15/17 13:30
Container ID: 1177902002-D

Prep Batch: XXX37558
Prep Method: SW3520C
Prep Date/Time: 06/13/17 07:42
Prep Initial Wt./Vol.: 246 mL
Prep Extract Vol: 1 mL

Print Date: 09/08/2017 8:51:41AM

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Results of MW-8

Client Sample ID: **MW-8**
Client Project ID: **PS09 MLT Sump**
Lab Sample ID: 1177902002
Lab Project ID: 1177902

Collection Date: 06/07/17 11:27
Received Date: 06/09/17 12:05
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Volatile Fuels

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Benzene	0.250 U	0.500	0.150	ug/L	1		06/17/17 02:25
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		06/17/17 02:25
o-Xylene	0.500 U	1.00	0.310	ug/L	1		06/17/17 02:25
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		06/17/17 02:25
Toluene	0.500 U	1.00	0.310	ug/L	1		06/17/17 02:25
Surrogates							
1,4-Difluorobenzene (surr)	93.1	77-115		%	1		06/17/17 02:25

Batch Information

Analytical Batch: VFC13683
Analytical Method: SW8021B
Analyst: ST
Analytical Date/Time: 06/17/17 02:25
Container ID: 1177902002-A

Prep Batch: VXX30678
Prep Method: SW5030B
Prep Date/Time: 06/16/17 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL



Results of MW-2

Client Sample ID: **MW-2**
Client Project ID: **PS09 MLT Sump**
Lab Sample ID: 1177902003
Lab Project ID: 1177902

Collection Date: 06/07/17 11:46
Received Date: 06/09/17 12:05
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Semivolatile Organic Fuels

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Diesel Range Organics	0.287 J	0.577	0.173	mg/L	1		06/15/17 13:39
Surrogates							
5a Androstane (surr)	71.3	50-150		%	1		06/15/17 13:39

Batch Information

Analytical Batch: XFC13427
Analytical Method: AK102
Analyst: KMD
Analytical Date/Time: 06/15/17 13:39
Container ID: 1177902003-D

Prep Batch: XXX37558
Prep Method: SW3520C
Prep Date/Time: 06/13/17 07:42
Prep Initial Wt./Vol.: 260 mL
Prep Extract Vol: 1 mL

Print Date: 09/08/2017 8:51:41AM

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Results of MW-2

Client Sample ID: **MW-2**
Client Project ID: **PS09 MLT Sump**
Lab Sample ID: 1177902003
Lab Project ID: 1177902

Collection Date: 06/07/17 11:46
Received Date: 06/09/17 12:05
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Volatile Fuels

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Benzene	0.250 U	0.500	0.150	ug/L	1		06/17/17 02:44
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		06/17/17 02:44
o-Xylene	0.500 U	1.00	0.310	ug/L	1		06/17/17 02:44
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		06/17/17 02:44
Toluene	0.500 U	1.00	0.310	ug/L	1		06/17/17 02:44
Surrogates							
1,4-Difluorobenzene (surr)	93.3	77-115		%	1		06/17/17 02:44

Batch Information

Analytical Batch: VFC13683
Analytical Method: SW8021B
Analyst: ST
Analytical Date/Time: 06/17/17 02:44
Container ID: 1177902003-A

Prep Batch: VXX30678
Prep Method: SW5030B
Prep Date/Time: 06/16/17 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL



Results of MW-7

Client Sample ID: **MW-7**
Client Project ID: **PS09 MLT Sump**
Lab Sample ID: 1177902004
Lab Project ID: 1177902

Collection Date: 06/07/17 12:50
Received Date: 06/09/17 12:05
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Semivolatile Organic Fuels

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Diesel Range Organics	0.987	0.577	0.173	mg/L	1		06/15/17 13:49
Surrogates							
5a Androstane (surr)	84.9	50-150		%	1		06/15/17 13:49

Batch Information

Analytical Batch: XFC13427
Analytical Method: AK102
Analyst: KMD
Analytical Date/Time: 06/15/17 13:49
Container ID: 1177902004-G

Prep Batch: XXX37558
Prep Method: SW3520C
Prep Date/Time: 06/13/17 07:42
Prep Initial Wt./Vol.: 260 mL
Prep Extract Vol: 1 mL

Print Date: 09/08/2017 8:51:41AM

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Results of MW-7

Client Sample ID: **MW-7**
Client Project ID: **PS09 MLT Sump**
Lab Sample ID: 1177902004
Lab Project ID: 1177902

Collection Date: 06/07/17 12:50
Received Date: 06/09/17 12:05
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Volatile Fuels

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Benzene	1.58	0.500	0.150	ug/L	1		06/17/17 03:03
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		06/17/17 03:03
o-Xylene	0.500 U	1.00	0.310	ug/L	1		06/17/17 03:03
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		06/17/17 03:03
Toluene	0.500 U	1.00	0.310	ug/L	1		06/17/17 03:03
Surrogates							
1,4-Difluorobenzene (surr)	90.6	77-115		%	1		06/17/17 03:03

Batch Information

Analytical Batch: VFC13683
Analytical Method: SW8021B
Analyst: ST
Analytical Date/Time: 06/17/17 03:03
Container ID: 1177902004-A

Prep Batch: VXX30678
Prep Method: SW5030B
Prep Date/Time: 06/16/17 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 09/08/2017 8:51:41AM

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Results of MW-7

Client Sample ID: **MW-7**
Client Project ID: **PS09 MLT Sump**
Lab Sample ID: 1177902004
Lab Project ID: 1177902

Collection Date: 06/07/17 12:50
Received Date: 06/09/17 12:05
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Volatile GC/MS

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
1,2,4-Trimethylbenzene	0.500 U	1.00	0.310	ug/L	1		06/14/17 00:33
1,3,5-Trimethylbenzene	0.500 U	1.00	0.310	ug/L	1		06/14/17 00:33
Benzene	1.49	0.400	0.120	ug/L	1		06/14/17 00:33
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		06/14/17 00:33
Isopropylbenzene (Cumene)	0.500 U	1.00	0.310	ug/L	1		06/14/17 00:33
Methyl-t-butyl ether	5.00 U	10.0	3.10	ug/L	1		06/14/17 00:33
Naphthalene	0.500 U	1.00	0.310	ug/L	1		06/14/17 00:33
n-Butylbenzene	0.500 U	1.00	0.310	ug/L	1		06/14/17 00:33
n-Propylbenzene	0.500 U	1.00	0.310	ug/L	1		06/14/17 00:33
o-Xylene	0.500 U	1.00	0.310	ug/L	1		06/14/17 00:33
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		06/14/17 00:33
sec-Butylbenzene	1.19	1.00	0.310	ug/L	1		06/14/17 00:33
Styrene	0.500 U	1.00	0.310	ug/L	1		06/14/17 00:33
tert-Butylbenzene	0.500 U	1.00	0.310	ug/L	1		06/14/17 00:33
Toluene	0.500 U	1.00	0.310	ug/L	1		06/14/17 00:33
Xylenes (total)	1.50 U	3.00	1.00	ug/L	1		06/14/17 00:33
Surrogates							
1,2-Dichloroethane-D4 (surr)	109	81-118		%	1		06/14/17 00:33
4-Bromofluorobenzene (surr)	99.2	85-114		%	1		06/14/17 00:33
Toluene-d8 (surr)	98.2	89-112		%	1		06/14/17 00:33

Batch Information

Analytical Batch: VMS16822
Analytical Method: SW8260C
Analyst: NRB
Analytical Date/Time: 06/14/17 00:33
Container ID: 1177902004-D

Prep Batch: VXX30655
Prep Method: SW5030B
Prep Date/Time: 06/13/17 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 09/08/2017 8:51:41AM

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Results of **MW-3**

Client Sample ID: **MW-3**
Client Project ID: **PS09 MLT Sump**
Lab Sample ID: 1177902005
Lab Project ID: 1177902

Collection Date: 06/07/17 14:45
Received Date: 06/09/17 12:05
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Semivolatile Organic Fuels**

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Diesel Range Organics	0.273 U	0.545	0.164	mg/L	1		06/15/17 13:59
Surrogates							
5a Androstane (surr)	86.5	50-150		%	1		06/15/17 13:59

Batch Information

Analytical Batch: XFC13427
Analytical Method: AK102
Analyst: KMD
Analytical Date/Time: 06/15/17 13:59
Container ID: 1177902005-D

Prep Batch: XXX37558
Prep Method: SW3520C
Prep Date/Time: 06/13/17 07:42
Prep Initial Wt./Vol.: 275 mL
Prep Extract Vol: 1 mL

Print Date: 09/08/2017 8:51:41AM

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Results of MW-3

Client Sample ID: **MW-3**
Client Project ID: **PS09 MLT Sump**
Lab Sample ID: 1177902005
Lab Project ID: 1177902

Collection Date: 06/07/17 14:45
Received Date: 06/09/17 12:05
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Volatile Fuels

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Benzene	0.250 U	0.500	0.150	ug/L	1		06/17/17 03:21
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		06/17/17 03:21
o-Xylene	0.500 U	1.00	0.310	ug/L	1		06/17/17 03:21
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		06/17/17 03:21
Toluene	0.500 U	1.00	0.310	ug/L	1		06/17/17 03:21
Surrogates							
1,4-Difluorobenzene (surr)	92.8	77-115		%	1		06/17/17 03:21

Batch Information

Analytical Batch: VFC13683
Analytical Method: SW8021B
Analyst: ST
Analytical Date/Time: 06/17/17 03:21
Container ID: 1177902005-A

Prep Batch: VXX30678
Prep Method: SW5030B
Prep Date/Time: 06/16/17 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL



Results of MW-27

Client Sample ID: **MW-27**
Client Project ID: **PS09 MLT Sump**
Lab Sample ID: 1177902006
Lab Project ID: 1177902

Collection Date: 06/07/17 16:00
Received Date: 06/09/17 12:05
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Semivolatile Organic Fuels

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Diesel Range Organics	1.07	0.566	0.170	mg/L	1		06/15/17 14:09
Surrogates							
5a Androstane (surr)	86.3	50-150		%	1		06/15/17 14:09

Batch Information

Analytical Batch: XFC13427
Analytical Method: AK102
Analyst: KMD
Analytical Date/Time: 06/15/17 14:09
Container ID: 1177902006-G

Prep Batch: XXX37558
Prep Method: SW3520C
Prep Date/Time: 06/13/17 07:42
Prep Initial Wt./Vol.: 265 mL
Prep Extract Vol: 1 mL

Print Date: 09/08/2017 8:51:41AM

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Results of MW-27

Client Sample ID: **MW-27**
Client Project ID: **PS09 MLT Sump**
Lab Sample ID: 1177902006
Lab Project ID: 1177902

Collection Date: 06/07/17 16:00
Received Date: 06/09/17 12:05
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Volatile Fuels

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Benzene	1.60	0.500	0.150	ug/L	1		06/17/17 03:40
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		06/17/17 03:40
o-Xylene	0.500 U	1.00	0.310	ug/L	1		06/17/17 03:40
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		06/17/17 03:40
Toluene	0.500 U	1.00	0.310	ug/L	1		06/17/17 03:40
Surrogates							
1,4-Difluorobenzene (surr)	90.7	77-115		%	1		06/17/17 03:40

Batch Information

Analytical Batch: VFC13683
Analytical Method: SW8021B
Analyst: ST
Analytical Date/Time: 06/17/17 03:40
Container ID: 1177902006-A

Prep Batch: VXX30678
Prep Method: SW5030B
Prep Date/Time: 06/16/17 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL



Results of MW-27

Client Sample ID: **MW-27**
Client Project ID: **PS09 MLT Sump**
Lab Sample ID: 1177902006
Lab Project ID: 1177902

Collection Date: 06/07/17 16:00
Received Date: 06/09/17 12:05
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Volatile GC/MS

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
1,2,4-Trimethylbenzene	0.500 U	1.00	0.310	ug/L	1		06/14/17 00:51
1,3,5-Trimethylbenzene	0.500 U	1.00	0.310	ug/L	1		06/14/17 00:51
Benzene	1.48	0.400	0.120	ug/L	1		06/14/17 00:51
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		06/14/17 00:51
Isopropylbenzene (Cumene)	0.500 U	1.00	0.310	ug/L	1		06/14/17 00:51
Methyl-t-butyl ether	5.00 U	10.0	3.10	ug/L	1		06/14/17 00:51
Naphthalene	0.500 U	1.00	0.310	ug/L	1		06/14/17 00:51
n-Butylbenzene	0.500 U	1.00	0.310	ug/L	1		06/14/17 00:51
n-Propylbenzene	0.500 U	1.00	0.310	ug/L	1		06/14/17 00:51
o-Xylene	0.500 U	1.00	0.310	ug/L	1		06/14/17 00:51
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		06/14/17 00:51
sec-Butylbenzene	1.18	1.00	0.310	ug/L	1		06/14/17 00:51
Styrene	0.500 U	1.00	0.310	ug/L	1		06/14/17 00:51
tert-Butylbenzene	0.500 U	1.00	0.310	ug/L	1		06/14/17 00:51
Toluene	0.500 U	1.00	0.310	ug/L	1		06/14/17 00:51
Xylenes (total)	1.50 U	3.00	1.00	ug/L	1		06/14/17 00:51
Surrogates							
1,2-Dichloroethane-D4 (surr)	108	81-118		%	1		06/14/17 00:51
4-Bromofluorobenzene (surr)	101	85-114		%	1		06/14/17 00:51
Toluene-d8 (surr)	97.7	89-112		%	1		06/14/17 00:51

Batch Information

Analytical Batch: VMS16822
Analytical Method: SW8260C
Analyst: NRB
Analytical Date/Time: 06/14/17 00:51
Container ID: 1177902006-D

Prep Batch: VXX30655
Prep Method: SW5030B
Prep Date/Time: 06/13/17 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL



Results of Trip Blank

Client Sample ID: **Trip Blank**
Client Project ID: **PS09 MLT Sump**
Lab Sample ID: 1177902007
Lab Project ID: 1177902

Collection Date: 06/07/17 08:45
Received Date: 06/09/17 12:05
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Volatile Fuels

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Benzene	0.250 U	0.500	0.150	ug/L	1		06/16/17 22:22
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		06/16/17 22:22
o-Xylene	0.500 U	1.00	0.310	ug/L	1		06/16/17 22:22
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		06/16/17 22:22
Toluene	0.500 U	1.00	0.310	ug/L	1		06/16/17 22:22
Surrogates							
1,4-Difluorobenzene (surr)	95.2	77-115		%	1		06/16/17 22:22

Batch Information

Analytical Batch: VFC13683
Analytical Method: SW8021B
Analyst: ST
Analytical Date/Time: 06/16/17 22:22
Container ID: 1177902007-A

Prep Batch: VXX30678
Prep Method: SW5030B
Prep Date/Time: 06/16/17 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 09/08/2017 8:51:41AM

J flagging is activated

SGS North America Inc.

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Results of Trip Blank

Client Sample ID: **Trip Blank**
Client Project ID: **PS09 MLT Sump**
Lab Sample ID: 1177902007
Lab Project ID: 1177902

Collection Date: 06/07/17 08:45
Received Date: 06/09/17 12:05
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Volatile GC/MS

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
1,2,4-Trimethylbenzene	0.500 U	1.00	0.310	ug/L	1		06/13/17 20:12
1,3,5-Trimethylbenzene	0.500 U	1.00	0.310	ug/L	1		06/13/17 20:12
Benzene	0.200 U	0.400	0.120	ug/L	1		06/13/17 20:12
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		06/13/17 20:12
Isopropylbenzene (Cumene)	0.500 U	1.00	0.310	ug/L	1		06/13/17 20:12
Methyl-t-butyl ether	5.00 U	10.0	3.10	ug/L	1		06/13/17 20:12
Naphthalene	0.500 U	1.00	0.310	ug/L	1		06/13/17 20:12
n-Butylbenzene	0.500 U	1.00	0.310	ug/L	1		06/13/17 20:12
n-Propylbenzene	0.500 U	1.00	0.310	ug/L	1		06/13/17 20:12
o-Xylene	0.500 U	1.00	0.310	ug/L	1		06/13/17 20:12
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		06/13/17 20:12
sec-Butylbenzene	0.500 U	1.00	0.310	ug/L	1		06/13/17 20:12
Styrene	0.500 U	1.00	0.310	ug/L	1		06/13/17 20:12
tert-Butylbenzene	0.500 U	1.00	0.310	ug/L	1		06/13/17 20:12
Toluene	0.500 U	1.00	0.310	ug/L	1		06/13/17 20:12
Xylenes (total)	1.50 U	3.00	1.00	ug/L	1		06/13/17 20:12
Surrogates							
1,2-Dichloroethane-D4 (surr)	107	81-118		%	1		06/13/17 20:12
4-Bromofluorobenzene (surr)	102	85-114		%	1		06/13/17 20:12
Toluene-d8 (surr)	97.6	89-112		%	1		06/13/17 20:12

Batch Information

Analytical Batch: VMS16822
Analytical Method: SW8260C
Analyst: NRB
Analytical Date/Time: 06/13/17 20:12
Container ID: 1177902007-D

Prep Batch: VXX30655
Prep Method: SW5030B
Prep Date/Time: 06/13/17 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 09/08/2017 8:51:41AM

J flagging is activated



Method Blank

Blank ID: MB for HBN 1761018 [VXX/30655]
Blank Lab ID: 1390647

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1177902004, 1177902006, 1177902007

Results by SW8260C

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
1,2,4-Trimethylbenzene	0.500U	1.00	0.310	ug/L
1,3,5-Trimethylbenzene	0.500U	1.00	0.310	ug/L
Benzene	0.200U	0.400	0.120	ug/L
Ethylbenzene	0.500U	1.00	0.310	ug/L
Isopropylbenzene (Cumene)	0.500U	1.00	0.310	ug/L
Methyl-t-butyl ether	5.00U	10.0	3.10	ug/L
Naphthalene	0.500U	1.00	0.310	ug/L
n-Butylbenzene	0.500U	1.00	0.310	ug/L
n-Propylbenzene	0.500U	1.00	0.310	ug/L
o-Xylene	0.500U	1.00	0.310	ug/L
P & M -Xylene	1.00U	2.00	0.620	ug/L
sec-Butylbenzene	0.500U	1.00	0.310	ug/L
Styrene	0.500U	1.00	0.310	ug/L
tert-Butylbenzene	0.500U	1.00	0.310	ug/L
Toluene	0.500U	1.00	0.310	ug/L
Xylenes (total)	1.50U	3.00	1.00	ug/L
Surrogates				
1,2-Dichloroethane-D4 (surr)	103	81-118		%
4-Bromofluorobenzene (surr)	102	85-114		%
Toluene-d8 (surr)	98	89-112		%

Batch Information

Analytical Batch: VMS16822
Analytical Method: SW8260C
Instrument: VPA 780/5975 GC/MS
Analyst: NRB
Analytical Date/Time: 6/13/2017 4:48:00PM

Prep Batch: VXX30655
Prep Method: SW5030B
Prep Date/Time: 6/13/2017 6:00:00AM
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 09/08/2017 8:51:44AM



Leaching Blank

Blank ID: LB for HBN 1760623 [TCLP/8880]
Blank Lab ID: 1389472

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1177902004, 1177902006, 1177902007

Results by SW8260C

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Benzene	73.6*	20.0	6.00	ug/L
Surrogates				
1,2-Dichloroethane-D4 (surr)	107	81-118		%
4-Bromofluorobenzene (surr)	105	85-114		%
Toluene-d8 (surr)	98.2	89-112		%

Batch Information

Analytical Batch: VMS16822
Analytical Method: SW8260C
Instrument: VPA 780/5975 GC/MS
Analyst: NRB
Analytical Date/Time: 6/13/2017 7:19:00PM

Prep Batch: VXX30655
Prep Method: SW5030B
Prep Date/Time: 6/13/2017 6:00:00AM
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 09/08/2017 8:51:44AM

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Blank Spike Summary

Blank Spike ID: LCS for HBN 1177902 [VXX30655]

Blank Spike Lab ID: 1390648

Date Analyzed: 06/13/2017 17:52

Spike Duplicate ID: LCSD for HBN 1177902 [VXX30655]

Spike Duplicate Lab ID: 1390649

Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1177902004, 1177902006, 1177902007

Results by SW8260C

Parameter	Blank Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
1,2,4-Trimethylbenzene	30	32.0	107	30	31.2	104	(79-124)	2.60	(< 20)
1,3,5-Trimethylbenzene	30	31.9	106	30	31.2	104	(75-124)	2.40	(< 20)
Benzene	30	31.3	104	30	30.8	103	(79-120)	1.90	(< 20)
Ethylbenzene	30	31.6	105	30	31.2	104	(79-121)	1.40	(< 20)
Isopropylbenzene (Cumene)	30	32.1	107	30	31.3	104	(72-131)	2.40	(< 20)
Methyl-t-butyl ether	45	47.6	106	45	47.1	105	(71-124)	1.10	(< 20)
Naphthalene	30	35.5	118	30	33.1	110	(61-128)	7.10	(< 20)
n-Butylbenzene	30	33.8	113	30	31.7	106	(75-128)	6.30	(< 20)
n-Propylbenzene	30	32.3	108	30	31.5	105	(76-126)	2.40	(< 20)
o-Xylene	30	31.0	103	30	31.0	103	(78-122)	0.14	(< 20)
P & M -Xylene	60	63.5	106	60	62.3	104	(80-121)	2.00	(< 20)
sec-Butylbenzene	30	33.3	111	30	31.5	105	(77-126)	5.40	(< 20)
Styrene	30	32.0	107	30	31.4	105	(78-123)	1.80	(< 20)
tert-Butylbenzene	30	32.4	108	30	31.4	105	(78-124)	3.10	(< 20)
Toluene	30	30.6	102	30	29.5	98	(80-121)	3.60	(< 20)
Xylenes (total)	90	94.5	105	90	93.3	104	(79-121)	1.40	(< 20)

Surrogates

1,2-Dichloroethane-D4 (surr)	30	95.1	95	30	95.8	96	(81-118)	0.72
4-Bromofluorobenzene (surr)	30	99.8	100	30	100	100	(85-114)	0.64
Toluene-d8 (surr)	30	100	100	30	98.7	99	(89-112)	1.70

Batch Information

Analytical Batch: VMS16822
Analytical Method: SW8260C
Instrument: VPA 780/5975 GC/MS
Analyst: NRB

Prep Batch: VXX30655
Prep Method: SW5030B
Prep Date/Time: 06/13/2017 06:00
Spike Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL
Dupe Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL

Print Date: 09/08/2017 8:51:46AM



Method Blank

Blank ID: MB for HBN 1761209 [VXX/30678]
Blank Lab ID: 1391441

Matrix: Water (Surface, Eff., Ground)

QC for Samples:

1177902001, 1177902002, 1177902003, 1177902004, 1177902005, 1177902006, 1177902007

Results by SW8021B

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Benzene	0.250U	0.500	0.150	ug/L
Ethylbenzene	0.500U	1.00	0.310	ug/L
o-Xylene	0.500U	1.00	0.310	ug/L
P & M -Xylene	1.00U	2.00	0.620	ug/L
Toluene	0.500U	1.00	0.310	ug/L
Surrogates				
1,4-Difluorobenzene (surr)	95.4	77-115		%

Batch Information

Analytical Batch: VFC13683
Analytical Method: SW8021B
Instrument: Agilent 7890A PID/FID
Analyst: ST
Analytical Date/Time: 6/16/2017 8:49:00PM

Prep Batch: VXX30678
Prep Method: SW5030B
Prep Date/Time: 6/16/2017 8:00:00AM
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 09/08/2017 8:51:48AM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1177902 [VXX30675]
Blank Spike Lab ID: 1391442
Date of Analysis: 06/17/2017 01:29

Spike D/ pliuas ID: LCSD for HBN 1177902 [VXX30675]
Spike D/ pliuas Lab ID: 1391443
Sample Name: s a8iM x a8er W/ rfaue(, ffE . ro/ nzG

g C for SaP pleR 1177902001(1177902002(1177902003(1177902004(1177902005(1177902006(1177902007

ceR l8RbA SW8021B

) araPe8r	Blank Spike W%LG			Spike D/ pliuas W%LG			CL	c) D W%G	c) D CL
	Spike	ceR l8	ceU W%G	Spike	ceR l8	ceU W%G			
Benzyene	100	106	106	100	105	105	W50-120 G	2B0	W 20 G
, 8hA benzyene	100	101	101	100	102	102	W7Q-12QG	1B0	W 20 G
o-XAlene	100	97B	97	100	95B	99	W50-120 G	1B0	W 20 G
) < s -XAlene	200	197	99	200	200	100	W7Q-130 G	1B0	W 20 G
&ol/ ene	100	97B	95	100	99B	100	W7Q-120 G	2B0	W 20 G
Surrogates									
1(4-Difl/ orobenzyene W rrG	Q0	99B	99	Q0	95B	95	W7-11QG	1B0	

Batch Information

t nalA8ual Ba8jh: VFC13683
t nalA8ual s e8hoz: SW8021B
InR8/ Pen8 Agilent 7890A PID/FID
t nalAR8 ST

) rep Ba8jh: VXX30678
) rep s e8hoz: SW5030B
) rep Date&Time: 06/16/2017 08:00
Spike Ini8x 88VolE 100 / %L , M8au8Vol: QPL
D/ pe Ini8x 88VolE 100 / %L , M8au8Vol: QPL



Method Blank

Blank ID: MB for HBN 1760927 [XXX/37558]
Blank Lab ID: 1390280

Matrix: Water (Surface, Eff., Ground)

QC for Samples:

1177902001, 1177902002, 1177902003, 1177902004, 1177902005, 1177902006

Results by AK102

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Diesel Range Organics	0.300U	0.600	0.180	mg/L
Surrogates				
5a Androstane (surr)	81.3	60-120		%

Batch Information

Analytical Batch: XFC13427
Analytical Method: AK102
Instrument: Agilent 7890B R
Analyst: KMD
Analytical Date/Time: 6/15/2017 11:26:00AM

Prep Batch: XXX37558
Prep Method: SW3520C
Prep Date/Time: 6/13/2017 7:42:50AM
Prep Initial Wt./Vol.: 250 mL
Prep Extract Vol: 1 mL

Print Date: 09/08/2017 8:51:52AM

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Blank Spike Summary

Blank Spike ID: LCS for HBN 1177902 [XXX37558]
Blank Spike Lab ID: 1390281
Date Analyzed: 06/15/2017 11:36

Spike Duplicate ID: LCSD for HBN 1177902
[XXX37558]
Spike Duplicate Lab ID: 1390282
Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1177902001, 1177902002, 1177902003, 1177902004, 1177902005, 1177902006

Results by AK102

Parameter	Blank Spike (mg/L)			Spike Duplicate (mg/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Diesel Range Organics	20	18.9	95	20	19.2	96	(75-125)	1.60	(< 20)
Surrogates									
5a Androstane (surr)	0.4	95.6	96	0.4	98.5	99	(60-120)	3.00	

Batch Information

Analytical Batch: **XFC13427**
Analytical Method: **AK102**
Instrument: **Agilent 7890B R**
Analyst: **KMD**

Prep Batch: **XXX37558**
Prep Method: **SW3520C**
Prep Date/Time: **06/13/2017 07:42**
Spike Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL
Dupe Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL

Print Date: 09/08/2017 8:51:53AM



1177902

CH

Locations Nationwide
Alaska
Maryland
New Jersey
New York
North Carolina
Indiana
Kentucky

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Section 1				Section 2				Section 3				Section 4				Section 5			
CLIENT: APSC				PROJECT IDENTIFICATION				PRESERVATIVE				INSTRUCTIONS: Sections 1 - 5 must be filled out. Omissions may delay the onset of analysis.				Data Deliverable Requirements:			
CONTACT: JANTINE BOYETTE				DATE				Type				Section 4				Requested Turnaround Time and/or Special Instructions:			
PROJECT PDSQ MLT				TIME				C =				Cooler ID:				Temp Blank °C: 5.7			
NAME: SUMR				HH:MM				COMP				Yes No				or Ambient []			
REPORTS TO: S. ROSE				MATRIX CODE				G =				DOD Project?				Chain of Custody Seal: (Circle)			
J. BOYETTE				A Q				GRAB								INTACT BROKEN			
E-MAIL: SPANEC SLAUS@STAN.EDU				A Q				Multi								ABSENT			
QUOTE #: SPELNE.104				A Q				Incr-								(See attached Sample Receipt Form)			
P.O. #: 105-01204.17010				A Q				mental								Chain of Custody Seal: (Circle)			
APSC				A Q				Soils								INTACT BROKEN			
RESERVED for lab use				DATE				Type				Section 4 <td colspan="4">Requested Turnaround Time and/or Special Instructions:</td>				Requested Turnaround Time and/or Special Instructions:			
1A-E MW-10				06/07/17 08:45				C				HCL				STD. TURN-AROUND * REFER TO 16			
2A-E MW-8				06/07/17 11:27				G				HCL				PETROLEUM VOC LIST SENT TO JUSTIN NELSON (SGS)			
3A-E MW-2				06/07/17 11:46				G				HCL							
4A-H MW-7				06/07/17 12:50				G				HCL							
5A-E MW-3				06/07/17 14:45				G				HCL							
6A-H MW-27				06/07/17 16:00				G				HCL							
7A-F TRIP blank																			
Relinquished By: (1) C. UENO T				Date				Time				Received By:				6/7/17 16:45			
Relinquished By: (2)				Date				Time				Received By:				6/8/17 16:00			
Relinquished By: (3)				Date				Time				Received By:				6/9/17 12:05			
Relinquished By: (4)				Date				Time				Received For Laboratory By:				June Collee			

ANC: TB 1.7
#D36
OS: 17.1B

[] 200 W. Potter Drive Anchorage, AK 99518 Tel: (907) 562-2343 Fax: (907) 561-5301
[] 5500 Business Drive Wilmington, NC 28405 Tel: (910) 350-1903 Fax: (910) 350-1557

http://www.sgs.com/terms-and-conditions



Note: This form is to be completed by Fairbanks Receiving Staff for all samples

Form F010r08_SRFforTransfers revised 04272016



e-Sample Receipt Form

SGS Workorder #:

1177902



1 1 7 7 9 0 2

Review Criteria		Condition (Yes, No, N/A)	Exceptions Noted below	
Chain of Custody / Temperature Requirements			N/A	Exemption permitted if sampler hand carries/delivers.
Were Custody Seals intact? Note # & location		Yes	1F 1B	
COC accompanied samples?		Yes		
N/A		**Exemption permitted if chilled & collected <8 hours ago, or for samples where chilling is not required		
Temperature blank compliant* (i.e., 0-6 °C after CF)?	Yes	Cooler ID:	1	@ 1.7 °C Therm. ID: D36
		Cooler ID:		@ °C Therm. ID:
		Cooler ID:		@ °C Therm. ID:
		Cooler ID:		@ °C Therm. ID:
		Cooler ID:		@ °C Therm. ID:
*If >6°C, were samples collected <8 hours ago?		N/A		
If <0°C, were sample containers ice free?		N/A		
If samples 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 nor cooler temp can be obtained, note "ambient" or "chilled".				
Note: Identify containers received at non-compliant temperature . Use form FS-0029 if more space is needed.				
Holding Time / Documentation / Sample Condition Requirements		Note: Refer to form F-083 "Sample Guide" for specific holding times.		
Were samples received within holding time?		Yes		
Do samples match COC ** (i.e., sample IDs, dates/times collected)?		Yes		
**Note: If times differ <1hr, record details & login per COC.				
Were analyses requested unambiguous? (i.e., method is specified for analyses with >1 option for analysis)		Yes		
		N/A	***Exemption permitted for metals (e.g. 200.8/6020A).	
Were proper containers (type/mass/volume/preservative***) used?		Yes		
Volatile / LL-Hg Requirements				
Were Trip Blanks (i.e., VOAs, LL-Hg) in cooler with samples?		Yes		
Were all water VOA vials free of headspace (i.e., bubbles ≤ 6mm)?		Yes		
Were all soil VOAs field extracted with MeOH+BFB?		N/A		
Note to Client: Any "No", answer above indicates non-compliance with standard procedures and may impact data quality.				
Additional notes (if applicable):				



Sample Containers and Preservatives

<u>Container Id</u>	<u>Preservative</u>	<u>Container Condition</u>	<u>Container Id</u>	<u>Preservative</u>	<u>Container Condition</u>
1177902001-A	HCL to pH < 2	OK			
1177902001-B	HCL to pH < 2	OK			
1177902001-C	HCL to pH < 2	OK			
1177902001-D	HCL to pH < 2	OK			
1177902001-E	HCL to pH < 2	OK			
1177902002-A	HCL to pH < 2	OK			
1177902002-B	HCL to pH < 2	OK			
1177902002-C	HCL to pH < 2	OK			
1177902002-D	HCL to pH < 2	OK			
1177902002-E	HCL to pH < 2	OK			
1177902003-A	HCL to pH < 2	OK			
1177902003-B	HCL to pH < 2	OK			
1177902003-C	HCL to pH < 2	OK			
1177902003-D	HCL to pH < 2	OK			
1177902003-E	HCL to pH < 2	OK			
1177902004-A	HCL to pH < 2	OK			
1177902004-B	HCL to pH < 2	OK			
1177902004-C	HCL to pH < 2	OK			
1177902004-D	HCL to pH < 2	OK			
1177902004-E	HCL to pH < 2	OK			
1177902004-F	HCL to pH < 2	OK			
1177902004-G	HCL to pH < 2	OK			
1177902004-H	HCL to pH < 2	OK			
1177902005-A	HCL to pH < 2	OK			
1177902005-B	HCL to pH < 2	OK			
1177902005-C	HCL to pH < 2	OK			
1177902005-D	HCL to pH < 2	OK			
1177902005-E	HCL to pH < 2	OK			
1177902006-A	HCL to pH < 2	OK			
1177902006-B	HCL to pH < 2	OK			
1177902006-C	HCL to pH < 2	OK			
1177902006-D	HCL to pH < 2	OK			
1177902006-E	HCL to pH < 2	OK			
1177902006-F	HCL to pH < 2	OK			
1177902006-G	HCL to pH < 2	OK			
1177902006-H	HCL to pH < 2	OK			
1177902007-A	HCL to pH < 2	OK			
1177902007-B	HCL to pH < 2	OK			
1177902007-C	HCL to pH < 2	OK			
1177902007-D	HCL to pH < 2	OK			
1177902007-E	HCL to pH < 2	OK			
1177902007-F	HCL to pH < 2	OK			

Container Id

Preservative

Container
Condition

Container Id

Preservative

Container
Condition

Container Condition Glossary

Containers for bacteriological, low level mercury and VOA vials are not opened prior to analysis and will be assigned condition code OK unless evidence indicates than an inappropriate container was submitted.

OK - The container was received at an acceptable pH for the analysis requested.

BU - The container was received with headspace greater than 6mm.

DM- The container was received damaged.

FR- The container was received frozen and not usable for Bacteria or BOD analyses.

PA - The container was received outside of the acceptable pH for the analysis requested. Preservative was added upon receipt and the container is now at the correct pH. See the Sample Receipt Form for details on the amount and lot # of the preservative added.

PH - The container was received outside of the acceptable pH for the analysis requested. Preservative was added upon receipt, but was insufficient to bring the container to the correct pH for the analysis requested. See the Sample Receipt Form for details on the amount and lot # of the preservative added.