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2017 Water Monitoring Report Happy Valley West

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2017 Water Monitoring Report Happy Valley West

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ACRONYMS

°C	degrees Celsius
±	plus or minus
AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
ADNR	Alaska Department of Natural Resources
Alyeska	Alyeska Pipeline Service Company
BLM	Bureau of Land Management
BTEX	benzene, toluene, ethylbenzene, and xylenes
COC	chain of custody
DRO	diesel range organics
FCMR	flow control management reservoir
ft	feet
GRO	gasoline range organics
LOD	limit of detection
mg/L	milligrams per liter
ND	not detected
PAH	polycyclic aromatic hydrocarbon
QA	quality assurance
QAR	quality assurance review
QC	quality control
SGS	SGS North America, Inc.
SIM	selective ion monitoring
SLR	SLR International Corporation
TAH	total aromatic hydrocarbon
TAqH	total aqueous hydrocarbon
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compound

SUMMARY

SLR International Corporation (SLR) conducted one groundwater and surface water sampling event at Happy Valley West on August 1, 2017 on behalf of Alyeska Pipeline Service Company (Alyeska). The purpose of this event was to continue data collection for evaluation of the natural attenuation of dissolved petroleum hydrocarbons in groundwater and to monitor impacts to surface water in the adjacent Happy Valley Creek.

Groundwater samples were collected from three existing wells and surface water samples were collected at two locations. Groundwater analytical results indicated that none of the target analytes were present above Alaska Department of Environmental Conservation (ADEC) groundwater cleanup levels. The continued attenuation of petroleum hydrocarbons is indicated by declining or low concentrations of diesel range organics; the absence of benzene, toluene, ethylbenzene, and xylenes (BTEX) and gasoline range organic detections; and very limited detections of polynuclear aromatic hydrocarbons (PAHs) well below applicable cleanup levels. Additionally, analysis of 16 petroleum hydrocarbon-derived volatile organic compounds was completed for well Sentry-1R as requested by ADEC; no detections were reported.

Surface water samples were collected from Happy Valley Creek located adjacent to the historical drainage discharge and downslope from the remaining soil contamination on the pad. Surface water analytical results for sample locations WS-2R and WS-10R demonstrate a third year of non-detect BTEX and PAH concentrations and the resulting total aromatic hydrocarbons and total aqueous hydrocarbons concentrations are well below applicable water quality standards. Shovel sheen testing was also conducted in the vicinity of the surface water sample locations; no sheen was observed.

Based on the results of sampling between 2014 and 2017, SLR recommends that Alyeska request a status of Cleanup Complete for the Happy Valley West site. The results indicate the persistence of low to below-detection hydrocarbon concentrations in groundwater with no complete exposure pathways.

1. INTRODUCTION

SLR International Corporation (SLR) conducted a single groundwater and surface water monitoring event at Happy Valley West in 2017 on behalf of Alyeska Pipeline Service Company (Alyeska). The purpose of the monitoring event was to assess the natural attenuation of dissolved petroleum hydrocarbons in groundwater downgradient of residual soil contamination on the Happy Valley pad and to monitor the water quality in the adjacent Happy Valley Creek. This report describes site activities including project approach, sampling methodology, and analytical sample results.

Project activities were conducted in accordance with the *2017 Water Monitoring Work Plan, Happy Valley West* (Work Plan; SLR, 2017b).

1.1 PROJECT BACKGROUND

Happy Valley Camp was one of the 19 original construction camps used during the construction of the Trans Alaska Pipeline System. The camp was located north of the Brooks Range, on the Arctic Coastal Plain, between Pump Stations 2 and 3 at Milepost 336 of the Dalton Highway (Pipeline Milepost 82), (Figure 1). The historical camp facilities were divided into two locations bisected by the Dalton Highway: Happy Valley East and Happy Valley West.

Happy Valley West was constructed in 1970 by Alyeska for use as a pipeline construction camp. Alyeska operated the Happy Valley Camp under a temporary land-use permit (number F-20436) from the U.S. Department of the Interior, Bureau of Land Management (BLM). Prior to the BLM land-use permit's expiration on September 27, 1984, Happy Valley Camp was restored by a reclamation effort approved through a formal Greensheet process. The BLM then conveyed the land to the State of Alaska. The land is presently under the jurisdiction of the Alaska Department of Natural Resources (ADNR), Division of Mining, Land, and Water.

During pipeline construction, the camp held facilities for housing personnel, storing fuel, maintaining vehicles, and stockpiling material. Fuel was stored in fuel bladders or steel tanks within secondary containment areas. Waste water was treated at a chemical-physical sewage plant and discharged into an unlined flow control management reservoir (FCMR). Solid waste was either incinerated or buried at a permitted disposal site. Drinking water for Happy Valley West was obtained from a well that was installed in the Happy Valley Creek alluvium.

The Happy Valley West land has functioned as a material and equipment storage area and as a temporary work camp by different parties under permit to ADNR since the dismantling of the original facilities. The area has also been used as an unofficial camping area by the public.

Alyeska records identify four releases, totaling 16,800 gallons of diesel fuel, at Happy Valley West during Alyeska's use of the property. The documented releases are as follows:

- **1970:** 6,000 gallons of diesel fuel was spilled at an equipment parking area;
- **June 1972:** 1,000 gallons of diesel fuel was spilled between the fuel bladder farm and a utility building;

- **May 1973:** 8,000 gallons of diesel fuel was spilled in the area of the fuel bladder farm; and,
- **April 1975:** 1,800 gallons of diesel fuel was spilled at a day tank.

1.2 PHYSICAL SETTING

The Arctic Coastal Plain is treeless and rises gradually from sea level to the adjacent foothills located approximately 20 miles to the south of Happy Valley Camp. The region is underlain by thick permafrost reaching to a depth of up to 2,500 feet (ft) below ground surface. Happy Valley West is located in a transitional zone between the Arctic Coastal Plains and the Foothills, an area of well-developed drainages with coarse sediments as in Happy Valley Creek. The sediments in the area of Happy Valley West are Quaternary alluvial deposits (Mull and Adams, 1989). Shallow suprapermfrost groundwater that is frozen seasonally is present beneath the former camp, although Happy Valley Creek may flow well into the winter months.

Topographically, the northern portion of the Happy Valley West pad is relatively flat and was historically used for shop buildings, equipment parking, and the fuel bladder farm. The southern part of the pad is partially on a hillside, with two constructed terraces where the living quarters had been located. The portion of the pad adjacent to Happy Valley Creek is topographically lower by approximately 5 ft than the rest of the pad. The camp FCMR, which received the waste water effluent, was constructed in this area. The pad area on which buildings, shops, and living quarters were located is collectively referred to as the upper pad, and the pad adjacent to Happy Valley Creek on which the FCMR was built is referred to as the lower pad. There are no structures remaining on the pad from the historical pipeline construction camp.

1.2.1 GEOLOGY

The former camp pad consists of fill material that varied in thickness from 6 to 8 ft, with the thickest areas near the transition between the upper and lower pad. The sediments on the pad vary in grain size from cobbles to silt, with layers of organic material interspaced. The underlying sediments are typical of braided or meandering stream deposits. Typically, fine-grained and organic material is predominant in the upslope regions underlying the upper pad, grading to either gravel fill material or coarse streambed sediments in the area closer to Happy Valley Creek (SLR, 2003).

1.2.2 HYDROGEOLOGY

Groundwater is not continuous in the upslope area and the saturated zone thickness in the central area of the Happy Valley West pad is variable, ranging from 2 to 4 ft. A 1969 air photograph of the area indicates a drainage system was present on the northern part of the pad in the vicinity of decommissioned monitoring well MW-21 and extended down to Happy Valley Creek in the vicinity former surface water sampling point WS-10 (Figure 2). This drainage system was backfilled during pad construction.

A site investigation conducted in 2003 indicated a groundwater flow direction to the north-northwest with a gradient varying between 0.025 and 0.039 ft per ft (SLR, 2003).

In 2012, groundwater and surface water level measurements indicated that Happy Valley Creek is a gaining stream (i.e., recharged by groundwater from the gravel pad to the stream) from June to July, and a losing stream (i.e., net flow from the stream to groundwater) from August to late September (SLR, 2013).

1.3 PREVIOUS SITE INVESTIGATIONS

Previous site investigations, monitoring, and cleanup efforts conducted at Happy Valley West are summarized below:

- **1995:** An environmental site assessment using a non-intrusive electromagnetic survey was conducted and indications of contamination including soil discoloration, odor, stressed vegetation, and the presence of sheen on surface water were noted at the time of the survey (AGRA, 1995).
- **1996 – 1997:** Soil, groundwater, and surface water sampling was initiated in 1996, and a risk-based corrective action was conducted in 1997. Risk-based cleanup levels were developed for hydrocarbons in soil and surface water in conjunction with site assessment activities (EMCON, 1999; IT, 2000b; SLR, 2001, 2002, and 2014b).
- **1998:** Contaminated soil in two areas was removed and thermally treated, after which the excavated areas were backfilled with clean soil (Oasis Environmental, 1999).
- **2000:** An assessment of soil contamination on the upper pad identified an area of soil with elevated concentrations of diesel (IT, 2000a).
- **2001:** Source removal was completed to address seasonal surface water with total aromatic hydrocarbon (TAH) and total aqueous hydrocarbon (TAQH) concentrations exceeding Alaska Water Quality Standards (SLR, 2001).
- **2003:** An expanded site assessment characterized the area adjacent to Happy Valley Creek and the lateral extent of contamination on the upper pad. The findings were used to estimate the buffer width required for successful natural attenuation in preparation for further excavation (SLR, 2003).
- **2004:** A removal action was completed to create a sufficient buffer for natural attenuation to prevent contamination from reaching Happy Valley Creek. The removal action did not remove impacted soil below the surface of Happy Valley Creek or from depths below frozen soil in the area adjacent to Happy Valley Creek (SLR, 2005). The removal action included excavation and relocation of stream bank in the area of surface water sample locations WS-02 and WS-10, now designated WS-02R and WS-10R (SLR, 2006).
- **2004 – 2006:** Sentry wells Sentry-1, Sentry-2, and Sentry-3, were installed and sampled to monitor groundwater quality downslope of remediation trenches where Regenesis® Oxygen Release Compound® was applied in the saturated zone. Diesel range organics (DRO) exceeding the Alaska Department of Environmental Conservation (ADEC) cleanup level was found in the groundwater in the sentry wells; the likely source being contaminated soil used as backfill during the 2001 excavation (SLR, 2007).

- **2007:** Replacement sentry wells, Sentry-1R, Sentry-2R, and Sentry-3R were installed further downslope (SLR, 2007). By 2007, TAH and TAqH concentrations in Happy Valley Creek no longer exceeded ADEC water quality standards, with the exception of surface water sampling point WS-3, between 2004 and 2006. WS-3 was likely located in the remnants of a historical interceptor trench excavated in the 1970s in response to one of the original releases. This depression was backfilled in 2007 (SLR, 2009).
- **2008:** Concentrations of DRO above the ADEC groundwater cleanup level were reported in sentry wells and concentrations were elevated relative to the 2007 analytical results (SLR, 2009). In discussions with ADEC in February 2009, Alyeska agreed to increase the monitoring frequency to two events during the 2009 field season (ADEC, 2009).
- **2012:** Evaluation of water levels in sentry wells and the creek indicated that the reach of Happy Valley Creek adjacent to the site indicated that it is a gaining stream in June and July and a losing stream through late September. This seasonal change in groundwater flow may cause DRO to leach from impacted soil into the groundwater (SLR, 2013).
- **2009 – 2013:** Groundwater and surface water monitoring were completed twice a year from 2009 to 2012, then on an annual basis beginning in 2013. Exceedances of the cleanup level for DRO were reported in groundwater in at least one sentry well a year between 2009 and 2013; however, surface water TAH and TAqH concentrations remained below Alaska Water Quality Standards (SLR, 2014a).
- **2014:** No exceedances were reported for groundwater samples, but the calculated TAH concentration for surface water were slightly above Alaska Water Quality Standards at both sampling locations. The calculated TAH concentrations were driven by the presence of toluene in these samples, which was attributed to blank contamination and thus considered to be biased high. SLR found hydrocarbon sheen in the vicinity of WS-10R upon disruption of the sediment (SLR, 2014b).
- **2015 – 2016:** All groundwater analyte concentrations were below applicable ADEC cleanup levels for a third consecutive year and surface water analyte concentrations were below applicable ADEC cleanup levels or standards for a second consecutive year (SLR, 2015 and 2017a).

1.4 PROJECT OBJECTIVES

The objectives of monitoring activities completed at Happy Valley West in 2017 included:

- Collection of groundwater samples to monitor the dissolved petroleum hydrocarbons including historically sampled analytes and petroleum hydrocarbon volatile organic compounds (VOCs), added in 2017 as requested by ADEC;
- Collection of surface water samples to determine if impacted groundwater is migrating to Happy Valley Creek; and
- Conducting shovel sheen tests to monitor for hydrocarbons in the sediment of the stream bank.

2. REGULATORY CRITERIA

The applicable regulatory criteria for groundwater and surface water are described in the following sections.

2.1 GROUNDWATER

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 March 23, 2017 (ADEC, 2017b). Although there has not been a drinking water well in use on the site since the work camp well was decommissioned, the shallow groundwater at the site, which is suprapermafrost groundwater, has not been reclassified as not being a potential drinking water source. Consequently, ADEC groundwater cleanup levels contained in 18 AAC 75.345, Table C, are applicable to this site. The cleanup levels for hydrocarbon constituents historically monitored in groundwater are as follows:

- Benzene, 0.0046 milligrams per liter (mg/L);
- Toluene, 1.1 mg/L;
- Ethylbenzene, 0.015 mg/L;
- Xylenes (total), 0.19 mg/L;
- Gasoline range organics (GRO), 2.2 mg/L; and
- DRO, 1.5 mg/L.

Cleanup levels for additional petroleum hydrocarbon-related VOCs monitored in 2017 for select 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.

Cleanup levels for individual polycyclic aromatic hydrocarbon (PAH) compounds are presented in Table 1 due to the large number of congener compounds.

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

2.2 SURFACE WATER

Alaska surface water criteria are outlined in 18 AAC 70, *Water Quality Standards*, amended as of February 5, 2017 (ADEC, 2017a), which identifies standards for water use classes and subclasses. For fresh water, these classes are as follows:

- (A) Water supply
 - (i) Drinking, culinary, and food processing
 - (ii) Agriculture, including irrigation and stock watering
 - (iii) Aquaculture
 - (iv) Industrial
- (B) Water recreation
 - (i) Contact recreation
 - (ii) Secondary recreation
- (C) Growth and propagation of fish, shellfish, other aquatic life, and wildlife

Without reclassifying a water body, it is appropriate to apply the most stringent water quality criteria to the water body. The fresh water uses with the most stringent water quality criteria are (A)(iii) water supply: aquaculture, and (C) growth and propagation of fish, shellfish, other aquatic life, and wildlife.

Water Quality Standards adopts by reference water quality criteria as listed in the *Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances* (ADEC, 2008). The appropriate surface water total hydrocarbon criteria are:

- TAH, 0.010 mg/L; and
- TAqH, 0.015 mg/L.

Water quality standards for individual PAHs are provided for reference in Table 5.

3. FIELD ACTIVITIES

A single groundwater and surface water monitoring event was completed on August 1, 2017. All field activities were completed in accordance with Alyeska operating procedures and the ADEC-approved Work Plan (SLR, 2017b). Groundwater and surface water sampling was conducted in accordance with ADEC's *Field Sampling Guidance* (ADEC, 2016). Site features and the position of groundwater monitoring wells and surface water sampling locations are shown on Figure 2. A photograph log of site activities is provided as Appendix A and copies of the field logbook and field forms are provided as Appendix B and C, respectively.

3.1 GROUNDWATER MONITORING

Groundwater samples were collected from monitoring wells Sentry-1R, Sentry-2R, and Sentry-3R (Figure 2). A duplicate sample was collected from well Sentry-1R, and was designated Sentry-4R. Sample collection observations and groundwater quality parameters were recorded in the bound project field logbook provided in Appendix B and on groundwater sampling forms provided in Appendix C.

3.1.1 WELL GAUGING

Gauging of depth to groundwater in wells was conducted prior to collection of groundwater samples. All measurements were made to the nearest 0.01 ft using an electronic water level indicator or product interface probe. Depth to groundwater was measured from the top of the well casing for each well.

3.1.2 SAMPLING PROCEDURES

Monitoring wells were sampled using the low-flow sampling method which consisted of purging wells at a sufficiently low rate to maintain a drawdown of the water column less than 0.33 ft within the well casing. Wells were purged using a peristaltic pump with an adjustable flow rate connected to a flow cell with Teflon[®]-lined tubing; the flow rate was monitored and adjusted so drawdown did not exceed the 0.33 ft. threshold. Sample integrity was maintained by proper collection, handling, and documentation during transfer to the project laboratory as described in Section 3.3.

Water quality parameters were measured at regular intervals during purging and recorded on the field forms. Parameters were measured using a YSI[®] Model 556 multi-meter with flow-through cell. Purging was considered complete once water quality parameters stabilized and a drawdown of less than 0.33 ft. was maintained. The readings were considered stable when three successive discrete measurements, collected three to five minutes apart were within the criteria below for three of the following four parameters:

- pH, plus or minus (\pm) 0.1 standard units;
- Specific conductance, \pm 3 percent microSiemens per centimeter;

- Oxidation-reduction potential, ± 10 millivolts; and,
- Dissolved oxygen, ± 10 percent.

3.1.3 ANALYTICAL SAMPLING PROGRAM

Groundwater samples for all wells were analyzed by the following analytical methods:

- Benzene, toluene, ethylbenzene, and xylenes (BTEX) by U.S. Environmental Protection Agency (USEPA) Method 8021B;
- PAHs by USEPA Method 8270D with selective ion monitoring (SIM);
- GRO by Alaska Method 101; and
- DRO by Alaska Method 102.

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 at the most impacted site well, Sentry-1R. The list of 16 VOCs evaluated by USEPA Method SW8260B 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).

3.2 SURFACE WATER MONITORING

Surface water samples were collected from sample locations WS-2R and WS-10R (Figure 2). A duplicate sample was collected from sample location WS-2R and was designated

WS-29R. Shovel sheen testing was also conducted along 168 ft of streambank encompassing either side of the surface water sample locations. Sample collection observations, surface water quality parameters, and shovel sheen tests were recorded in the bound project field logbook provided in Appendix B and on surface water sampling forms provided in Appendix C.

3.2.1 SAMPLING PROCEDURES

Surface water samples were collected using a new, unpreserved transfer bottle to fill sample bottles for each location. Clean nitrile gloves were worn by field staff handling sampling equipment, and new gloves were donned at each sampling location. Sample integrity was maintained by proper collection, handling, and documentation during transfer to the project laboratory as described in Section 3.3.

3.2.2 ANALYTICAL SAMPLING PROGRAM

Concentrations of TAH and TAqH in surface water were evaluated consistent with ADEC regulations, by laboratory methods specified in Note 7 of the *Water Quality Standards For Designated Uses* table included in 18 AAC 70.020(b) (ADEC, 2017a). Laboratory methods used included:

- BTEX using USEPA Method 8021B; and
- PAHs using USEPA Method 8270D with SIM for the 16 PAHs listed by USEPA Method 610.

The results of these analyses were used to calculate TAH and TAqH values using the methodology described below.

1. The TAH value for each surface water sample was calculated by summing detected concentrations of BTEX compounds. For compounds that were not detected (ND), the limit of detection (LOD) was used in place of the ND value in the summation. If BTEX compounds were ND, the result was presented as ND at or above the sum of the LOD for all BTEX compounds.
2. The TAqH value for each surface water sample was calculated by summing the calculated TAH value (or the LOD of the TAH value if it was ND) and the detected concentrations of PAHs. For compounds that were ND, the LOD was used in place of the ND value in the summation. When neither BTEX nor PAH compounds were detected, the TAqH value for each sample was presented as ND at or above the sum of the LOD for each BTEX and PAH compound.

Total xylenes were calculated using the sum of p- and m-xylenes and o-xylene, or by the summation of LOD values for p and m-xylenes and o-xylene in place of any ND values.

3.2.3 SHOVEL SHEEN TEST PROCEDURES

Shovel sheen testing was conducted following surface water sampling to avoid impacting surface water samples. Sheen testing was conducted along the stream bank staring at a point along the stream bank approximately 60 ft upstream of sample location WS-10R. Sheen testing

was performed every 4 ft, progressing downstream from the starting point for 168 ft. The sheen test area was similar to that of the previous test conducted in 2014 (SLR, 2014b). At each test location, the sediment was disrupted and visually observed for evidence of petroleum, oil, and lubricant (POL) derived sheen in the surface water. Shovel sheen testing locations are shown on Figure 2. Observations were documented in the field logbook (Appendix B).

3.3 SAMPLE HANDLING, DOCUMENTATION, AND CHAIN OF CUSTODY

Groundwater and surface water samples were collected directly into laboratory-supplied containers appropriate for the required analyses. The samples were labeled and placed into a pre-chilled cooler with gel ice as soon as possible following collection. Sample and cooler temperatures were maintained at approximately 4 degrees Celsius (°C), $\pm 2^{\circ}\text{C}$, throughout transport to the laboratory. Samples were handled and transported in a manner that maintained sample integrity and did not exceed specified holding times. Each sample and any accompanying trip blank(s) were documented on the project chain of custody (COC) form.

The samples were delivered directly to SGS North America, Inc. (SGS) in Fairbanks, Alaska under proper COC procedures. Samples were then transferred to the SGS Anchorage, an ADEC-approved laboratory. Samples were analyzed within the respective laboratory hold times for each requested analysis.

3.4 QUALITY ASSURANCE AND QUALITY CONTROL

Quality assurance (QA)/quality control (QC) procedures were maintained throughout the sampling activities. QA procedures included the analysis of field duplicates and trip blanks, and a laboratory data QA review (QAR) by qualified SLR staff. The QAR included the completion of an ADEC Laboratory Data Review Checklist for each analytical report. 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 summarized in Section 4.4. The QAR and the completed ADEC Laboratory Data Review Checklist are presented in Appendix D.

3.5 WORK PLAN DEVIATIONS

No deviations to the Work Plan occurred during the water monitoring event.

3.6 WASTE MANAGEMENT

No hazardous waste was generated during the field event. Purge and decontamination water generated during the sampling activities was transported to Alyeska Pump Station 1 for disposal. Disposable sampling materials were disposed of as non-oily in the nearest waste receptacle.

4. RESULTS

This section describes groundwater and surface water monitoring results and key findings from the laboratory data QAR. Groundwater depths are shown in Table 1. Results of historical groundwater analyses are presented in Table 2 and petroleum hydrocarbon VOC results for 2017 are shown in Table 3. Surface water analytical results for GRO, DRO, and BTEX analytes are presented in Table 4 and results for PAHs in Table 5. The QAR, completed ADEC Laboratory Data Review Checklist, and laboratory analytical report are included as Appendix D.

4.1 GROUNDWATER LEVELS AND SITE OBSERVATIONS

The groundwater depths measured in 2017 were 7.35, 7.90, and 8.31 ft for wells Sentry-1R, Sentry-2R, and Sentry-3R, respectively (Table 1). The measured depths for each well were within the typical range of 2007 to 2015 historical July and August depths for each well.

The water level and apparent flow rate in Happy Valley Creek appeared to be normal at the time of sampling in 2017 (Appendix A, Photograph 1). No substantial rainfall occurred in the three days prior to the sampling event.

4.2 GROUNDWATER ANALYTICAL RESULTS

All groundwater analyte concentrations were below cleanup levels for the fourth consecutive year (i.e., 2014 – 2017) for monitoring wells Sentry-1R, Sentry-2R, and Sentry-3R. The continued attenuation of petroleum hydrocarbons is indicated by declining or low concentrations of DRO, the absence of BTEX and GRO detections, and very limited detections of PAHs well below cleanup levels. Groundwater analytical results for historically sampled analytes are presented in Table 2 and results for 2017 are summarized as follows:

- **DRO:** All detections were below the cleanup level of 1.5 mg/L with wells Sentry-1R and Sentry-2R showing persistent non-detect or estimated (below the laboratory LOD) concentrations. DRO in well Sentry-3R returned to ND from a recent high of 1.01 mg/L in 2016, the highest reported concentration since 3.55 mg/L in July 2013.
- **GRO:** No detections were reported; detections at low, estimated concentrations below the laboratory LOD were reported in 2015. The cleanup level of 2.2 mg/L has never been exceeded in any well.
- **BTEX:** No detections of constituent compounds were reported; the last detection occurred in 2015 when very low concentrations of toluene from 0.00036 to 0.00855 mg/L were reported. BTEX constituents have been infrequently detected since monitoring was initiated in 2004 and all detections have been near or below the LOD.
- **PAHs:** A single detection of congener compound naphthalene was reported for primary and duplicate Sentry-1R samples at low, estimated concentrations of 0.0000611 and 0.0000546 mg/L, respectively. Naphthalene was previously detected in Sentry-1R at similar concentrations from 2014 to 2016. Other than detections of

naphthalene at Sentry-1R, historical detections of PAHs for all wells are limited to infrequent detections at estimated concentrations well below applicable cleanup levels.

Petroleum hydrocarbon VOCs analyzed by USEPA Method 8260B were not detected in monitoring well Sentry-1R and its associated duplicate sample, as shown in Table 3. As a result, petroleum VOCs are not considered contaminants of concern at this site.

4.3 SURFACE WATER ANALYTICAL RESULTS

Surface water analytical results for sample locations WS-2R and WS-10R demonstrate a third year of ND BTEX and PAH concentrations and the resulting TAH and TAqH concentrations were well below applicable cleanup levels. Calculated TAH and TAqH values are shown in Tables 4 and 5. Historical surface water sample results are summarized as follows:

- **BTEX and TAH:** No BTEX compounds have been detected in surface water samples WS-2R (primary and duplicate) and WS-10R since 2014. The 2017 TAH concentration of 0.00275 mg/L for both locations was calculated from the detection limits for BTEX compounds and is well below the TAH cleanup level of 0.010 mg/L. TAH has not exceeded the cleanup level at either sample location since 2003.
- **PAHs and TAqH:** PAH congeners have not been detected since 2014 and 2010 for WS-2R and WS-10R, respectively. Prior detections at either sampling location were limited to a single PAH reported at low or estimated concentrations well below the cleanup level; these limited PAH detections resulted in calculated TAqH concentrations well below the TAqH cleanup level of 0.015 mg/L.

4.4 SHOVEL SHEEN TEST RESULTS

No positive sheen test results were reported at any of the 43 test locations along the 168 ft length test area, including the test location nearest to WS-02R where a sheen-positive result was reported in 2014 (SLR, 2014).

4.5 ANALYTICAL DATA QUALITY

The analytical data was deemed acceptable for use with minor issues noted in the QAR with respect to sample receipt, laboratory method blanks, continuous calibration verifications, standard recoveries, and duplicate sample percent relative differences. Flagged data was considered useable without qualification. Further discussion is provided in the laboratory QAR (Appendix D).

5. CONCLUSIONS AND RECOMMENDATIONS

The results of groundwater and surface water monitoring completed in 2017 at the Happy Valley West site indicates that residual soil contamination on the Happy Valley pad is naturally attenuating as demonstrated by diminishing impacts from dissolved hydrocarbons concentrations in groundwater and a lack of impacts to surface water in the adjacent creek. This evaluation is supported by the following findings:

1. All groundwater analyte concentrations were below cleanup levels for the fourth consecutive year for monitoring wells Sentry-1R, Sentry-2R, and Sentry-3R. The continued attenuation of petroleum hydrocarbons is indicated by declining or low concentrations of DRO, the absence of BTEX and GRO detections, and very limited detections of PAHs well below cleanup levels.
2. Analysis of 16 petroleum hydrocarbon VOCs USEPA Method SW8260C was completed for well Sentry-1R as requested by ADEC; no detections were reported.
3. Surface water analytical results for sample locations WS-2R and WS-10R demonstrate a third year of ND BTEX and PAH concentrations with the resulting TAH and TAqH concentrations well below applicable cleanup levels. The most recent data are consistent with limited, very low concentration detections since 2005.

Groundwater and surface water conditions were representative of typical hydrogeological conditions during the sampling event.

Petroleum hydrocarbon contaminated soils were excavated from the site in 1998, 2001 and 2004 resulting in a buffer zone of clean soil between the upper pad subsurface soil contamination and the creek west of the pad. The remaining soil contamination in the upper pad is found at a depth greater than 2 feet bgs. Groundwater hydrocarbon concentrations from the Sentry wells have been below ADEC groundwater cleanup levels for four consecutive years. Surface water samples collected from the creek have been below the Water Quality Criteria for TAH and TAqH for three consecutive years or longer. Based on these data, SLR recommends Alyeska request a Cleanup Complete with institutional controls designation for the Happy Valley West site.

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SLR, 2017b. 2017 Water Monitoring Work Plan, Happy Valley West. May.

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 actual 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 actual overall site environmental conditions.

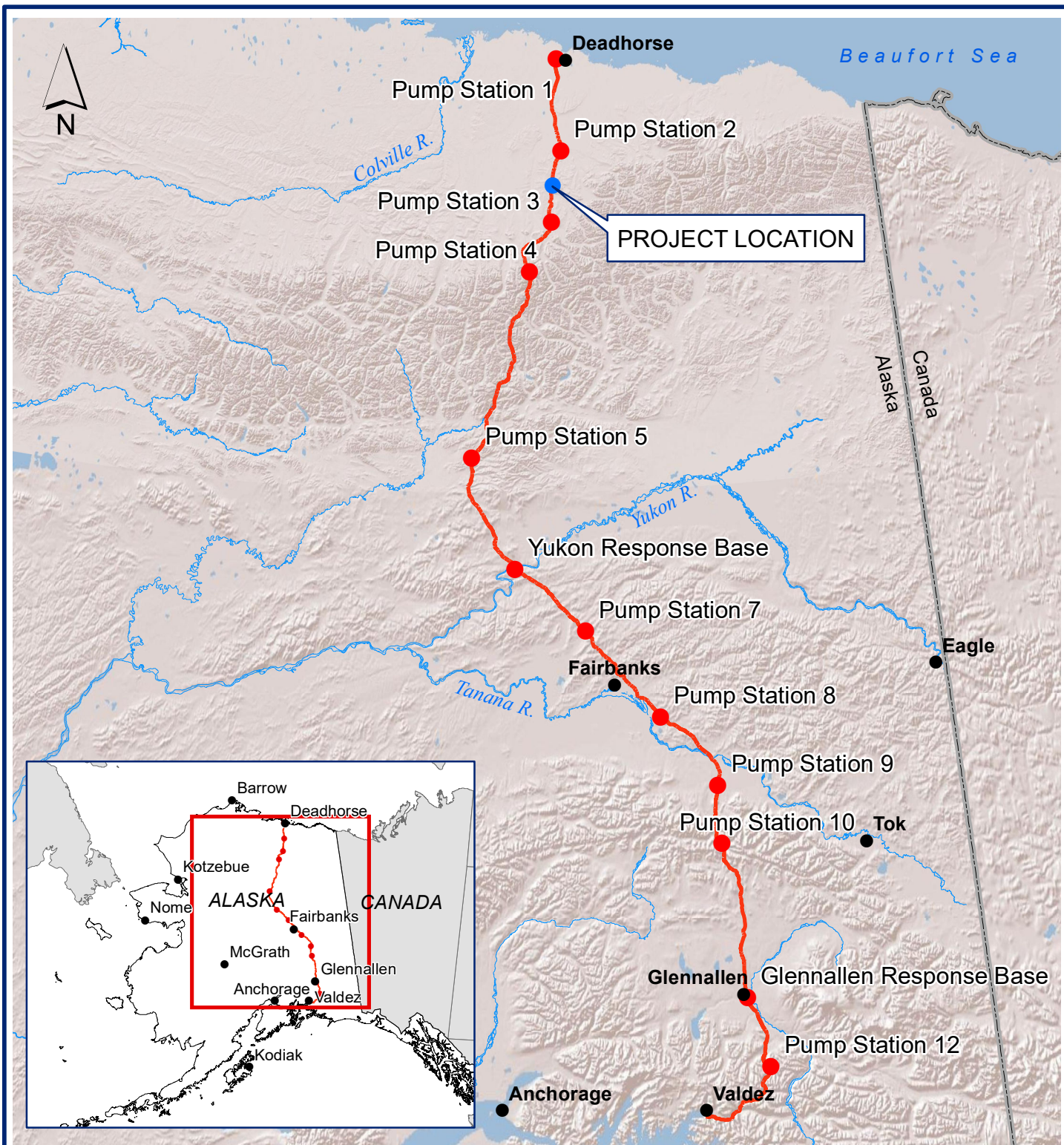
The passage of time, manifestation of latent conditions, or occurrence of future events may require further study at the site, analysis of the data, and/or reevaluation of the findings, observations, and conclusions in the work product.

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 Detail



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
HAPPY VALLEY WEST
PIPELINE MILEPOST 82

Report

2017 WATER MONITORING REPORT
HAPPY VALLEY WEST

Drawing

SITE LOCATION MAP

Drawing January 2018

File Name F1 Happy Valley RPT_17.mxd

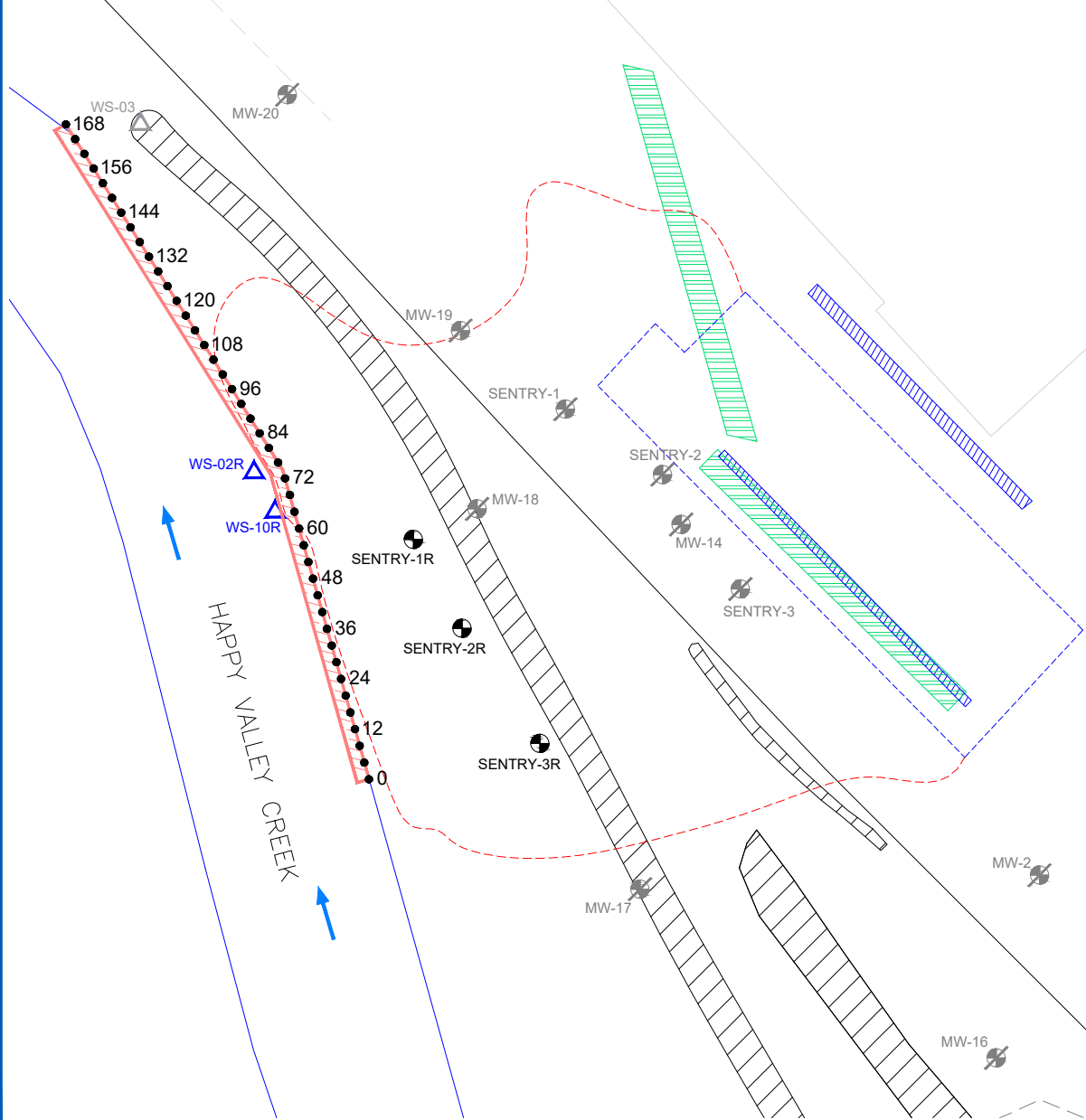
Scale As Shown

Project No. 105.01288.17015

Fig. No.

1

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



LEGEND

- SURFACE WATER SAMPLE LOCATION
- PREVIOUS SURFACE WATER SAMPLE LOCATION
- SENTRY WELL LOCATION
- PREVIOUS MONITORING WELL / SENTRY WELL LOCATION
- SHEEN MONITORING LOCATION
- 2004 ORC TRENCHES
- 2001 ORC TRENCHES
- 1970s INTERCEPT TRENCHES
- APPROXIMATE AREA OF SHOVEL SHEEN TESTING
- 2004 EXCAVATION AREA PERIMETER
- 2001 EXCAVATION AREA PERIMETER
- CREEK FLOW DIRECTION

NOTES

PREVIOUS MONITORING WELL, SENTRY WELL, AND SURFACE WATER SAMPLING LOCATIONS HAVE BEEN REMOVED, DECOMMISSIONED, OR DESTROYED AND ARE NO LONGER AVAILABLE FOR SAMPLING.

Site
ALYESKA PIPELINE SERVICE COMPANY
HAPPY VALLEY WEST
PIPELINE MILEPOST 82

Report
2017 WATER MONITORING REPORT
HAPPY VALLEY WEST

Drawing
SITE DETAIL

Date January 2018

Scale 1"=40'

Fig. No.

File Name F2 HVV RPT_17

Project No. 105.01288.17015

2



SCALE: 1" = 40'
WHEN PLOTTED AT 11 x 17 PAGE SIZE
0 40' 80' 120'



TABLES

Table 1	Monitoring Well Groundwater Depths
Table 2	Groundwater Analytical Results
Table 3	2017 Groundwater Petroleum Hydrocarbon VOC Results
Table 4	Surface Water GRO, DRO, and BTEX Analytical Results
Table 5	Surface Water PAH Analytical Results

**Table 1: Monitoring Well Groundwater Depths
Happy Valley West**

Monitoring Well	Date	Depth to Water from Top of Casing (feet) ^A
Sentry-1R	9/10/2007	8.77
	8/5/2008	6.38
	7/14/2009	7.41
	9/1/2009	7.03
	7/19/2010	7.98
	9/22/2010	7.95
	7/9/2011	8.11
	9/12/2011	7.12
	7/3/2012	8.13
	9/26/2012	7.77
	7/2/2013	7.47
	8/20/2014	7.95
	7/24/2015	8.67
	6/19/2016	6.78
	8/1/2017	7.90
Sentry-2R	9/10/2007	9.12
	8/5/2008	6.79
	7/14/2009	7.66
	9/1/2009	7.47
	7/19/2010	8.30
	9/22/2010	8.30
	7/9/2011	8.41
	9/12/2011	7.58
	7/3/2012	8.59
	9/26/2012	8.13
	7/2/2013	7.81
	8/20/2014	8.32
	7/24/2015	9.02
	6/20/2016	7.28
	8/1/2017	8.31
Sentry-3R	9/10/2007	8.32
	8/5/2008	5.58
	7/14/2009	6.62
	9/1/2009	6.51
	7/19/2010	7.41
	9/22/2010	7.45
	7/9/2011	7.54
	9/12/2011	7.58
	7/3/2012	7.08
	9/26/2012	7.22
	7/2/2013	6.74
	8/20/2014	7.38
	7/24/2015	8.27
	6/20/2016	5.99
	8/1/2017	7.35

Notes:

^A Groundwater elevation above sea level not available; wells have not been surveyed

Table 2: Groundwater Analytical Results
Happy Valley West
(all results in mg/L)

Monitoring Well	Sample Designation	Sample Date	AK 101	AK 102	BTEX USEPA Method 8021B				PAHs USEPA Method 8270D			
			Gasoline Range Organics	Diesel Range Organics	Benzene	Ethylbenzene	Toluene	Total Xylenes	Acenaphthene	Fluorene	Naphthalene	Pyrene
ADEC Groundwater Cleanup Levels ^A			2.2	1.5	0.005	0.7	1	10	2.2	1.5	0.73	1.1
ADEC Groundwater Cleanup Levels ^{B,C}			2.2	1.5	0.0046	0.015	1.1	0.19	0.53	0.29	0.0017	0.12
Sentry-1	Sentry-1	9/24/2004	0.203	4.67	0.000565	0.00236	ND [0.0005]	0.0178	--	--	--	--
	Sentry-1	7/25/2005	0.121	7.71	0.00086	0.00867	ND [0.002]	0.01788	--	--	--	--
	MW-A ^D	7/25/2005	0.125	6.72	0.00105	0.00903	ND [0.002]	0.01894	--	--	--	--
	Sentry-1	9/3/2005	ND [0.090]	4.7	0.0006	ND [0.002]	0.00929	0.00401	--	--	--	--
	Dup-1 ^D	9/3/2005	ND [0.090]	4.79	0.000544	ND [0.002]	0.00742	0.00404	--	--	--	--
	Sentry-1	7/26/2006	0.266	6.54	0.00133	0.0226	ND [0.002]	0.0372	--	--	--	--
	Sentry-1	9/12/2006	ND [0.100]	4.27	0.000986	0.00531	ND [0.002]	0.00592	--	--	--	--
Well removed in September 2007 and replaced with Sentry-1R												
Sentry-1R	Sentry-1	9/11/2007	0.208	2.06	ND [0.0005]	ND [0.002]	0.00218	0.00219	--	--	--	--
	Sentry-1R	8/5/2008	ND [0.1]	4.26	0.000676	ND [0.002]	0.00558	0.00621	--	--	--	--
	Sentry-4R ^D	8/5/2008	ND [0.100]	5.21	0.00063	ND [0.002]	0.00566	0.00843	--	--	--	--
	Sentry-1	7/14/2009	0.0359 J	3.82	0.000188 J	0.000938	ND [0.002]	0.00124	--	--	--	--
	Sentry-4 ^D	7/14/2009	0.0429 J	3.43	0.00021 J	0.0012	ND [0.002]	0.00152	--	--	--	--
	Sentry-1	9/1/2009	ND [0.1]	0.376 J	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	--	--	--	--
	Sentry-1R	7/19/2010	ND [0.1]	4.53	ND [0.0005]	ND [0.002]	ND [0.002]	0.00078 J	--	--	--	--
	Sentry-4R ^D	7/19/2010	0.0353 J	4.16	ND [0.0005]	ND [0.002]	ND [0.002]	0.00063 J	--	--	--	--
	Sentry-1R	9/22/2010	0.0536 J	1.19	ND [0.0005]	ND [0.002]	ND [0.002]	0.00157 J	--	--	--	--
	Sentry-1R	7/9/2011	0.0352 J	3.73	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	--	--	--	--
	Sentry-4R ^D	7/9/2011	0.0421 J	3.77	ND [0.0005]	ND [0.002]	ND [0.002]	0.00066 J	--	--	--	--
	Sentry-1R	9/12/2011	ND [0.1]	0.296 J	ND [0.0005]	ND [0.001]	ND [0.001]	ND [0.001]	--	--	--	--
	Sentry-1R	7/3/2012	0.053 J	2.98	ND [0.0003]	ND [0.00062]	ND [0.00062]	0.00115 J	ND [0.0003]	ND [0.0003]	0.000559 J	ND [0.00003]
	Sentry-4R ^D	7/3/2012	0.0533 J	4.68	ND [0.0003]	ND [0.00062]	ND [0.00062]	0.00105 J	ND [0.00003]	ND [0.00003]	0.000903 J	ND [0.00003]
	Sentry-1R	9/26/2012	ND [0.062]	0.604 J	ND [0.0003]	ND [0.00062]	ND [0.00062]	ND [0.00062]	ND [0.0000306]	ND [0.0000306]	0.000608 J	ND [0.0000306]
	Sentry-4R ^D	9/26/2012	0.0343 J	0.296 J	ND [0.0003]	ND [0.00062]	ND [0.00062]	ND [0.00062]	0.0000574	0.000077	0.000352	ND [0.00003]
	Sentry-1R	7/2/2013	0.0413 J	7.19	0.00015 J	0.00142	0.00044 J	0.00135 J	ND [0.00003]	ND [0.00003]	ND [0.000062]	ND [0.00003]
	Sentry-4R ^D	7/2/2013	0.0404 J	6.79	ND [0.0003]	0.00139	ND [0.00062]	0.00131 J	ND [0.00003]	ND [0.00003]	ND [0.000062]	ND [0.00003]
	Sentry-1R	8/20/2014	0.0409 J	1.19	ND [0.00025]	ND [0.0005]	0.0062 B, J	ND [0.0015]	ND [0.0000263]	ND [0.0000263]	0.000103 J	ND [0.0000263]
	Sentry-4R ^D	8/20/2014	0.0496 J	1.28	ND [0.00025]	ND [0.0005]	0.00913 B, J	ND [0.0015]	ND [0.000025]	ND [0.000025]	0.000361 J	ND [0.000025]
	Sentry-1R	7/24/2015	ND [0.05]	1.19	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.0015]	ND [0.0000252] QL	ND [0.0000252] QL	0.000166 QL,QN	ND [0.0000252]
	Sentry-4R ^D	7/24/2015	0.0317 J	0.903	ND [0.00025]	ND [0.0005]	0.00036 J	ND [0.0015]	ND [0.000025]	ND [0.000025]	0.000283 QN	ND [0.000025]
	Sentry-1R	6/20/2016	ND [0.05]	1.09 MN	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.001]	ND [0.000024]	ND [0.000024]	0.000199	ND [0.000024]
	Sentry-4R ^D	6/20/2016	ND [0.05]	0.721 MN	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.001]	ND [0.0000245]	ND [0.0000245]	0.000212	ND [0.0000245]
	Sentry-1R	8/1/2017	ND [0.05]	ND [0.294]	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.001]	ND [0.000025]	ND [0.000025]	0.0000611 J	ND [0.000025]
	Sentry-4R ^D	8/1/2017	ND [0.05]	0.183 J	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.001]	ND [0.000025]	ND [0.000025]	0.0000546 J	ND [0.000025]
Sentry-2	Sentry-2	9/24/2004	0.476	5.84	ND [0.0005]	0.0063	ND [0.0005]	0.0135	--	--	--	--
	MW-Dup ^D	9/24/2004	0.454	4.53	ND [0.0005]	0.00654	ND [0.0005]	0.0143	--	--	--	--
	NS	7/25/2005	--	--	--	--	--	--	--	--	--	--
	Sentry-2	9/3/2005	0.121	8.5	0.0016	ND [0.002]	0.00584	0.00621	--	--	--	--
	Sentry-2	7/26/2006	0.382	5.7	0.00176	0.0335	ND [0.002]	0.0596	--	--	--	--
	Sentry-2	9/12/2006	0.211	4.34	0.00211	0.0127	ND [0.002]	0.01862	--	--	--	--
Well removed in September 2007 and replaced with Sentry-2R												

Table 2: Groundwater Analytical Results
Happy Valley West
(all results in mg/L)

Monitoring Well	Sample Designation	Sample Date	AK 101	AK 102	BTEX USEPA Method 8021B				PAHs USEPA Method 8270D			
			Gasoline Range Organics	Diesel Range Organics	Benzene	Ethylbenzene	Toluene	Total Xylenes	Acenaphthene	Fluorene	Naphthalene	Pyrene
ADEC Groundwater Cleanup Levels ^A			2.2	1.5	0.005	0.7	1	10	2.2	1.5	0.73	1.1
ADEC Groundwater Cleanup Levels ^{B,C}			2.2	1.5	0.0046	0.015	1.1	0.19	0.53	0.29	0.0017	0.12
Sentry-2R	Sentry-2	9/11/2007	0.235	1.06	ND [0.0005]	ND [0.002]	0.0026	0.0022	--	--	--	--
	Dup-1 ^D	9/11/2007	0.21	1.08	ND [0.0005]	ND [0.002]	0.00239	0.00202	--	--	--	--
	Sentry-2R	8/5/2008	ND [0.100]	2.26	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	--	--	--	--
	Sentry-2	7/14/2009	0.0823 J	2.22	ND [0.0005]	0.00182 J	ND [0.002]	0.00392 J	--	--	--	--
	Sentry-2	9/1/2009	0.0926 J	0.457 J	ND [0.0005]	0.000666 J	ND [0.002]	0.00265	--	--	--	--
	Sentry-4 ^D	9/1/2009	0.103	0.471 J	ND [0.0005]	0.000792 J	ND [0.002]	0.00302 J	--	--	--	--
	Sentry-2R	7/19/2010	0.0354 J	1.76	ND [0.0005]	ND [0.002]	ND [0.002]	0.0009 J	--	--	--	--
	Sentry-2R	9/22/2010	0.0659 J	0.361 J	ND [0.0005]	ND [0.002]	ND [0.002]	0.00106 J	--	--	--	--
	Sentry-2R	7/9/2011	ND [0.1]	1.91	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	--	--	--	--
	Sentry-2R	9/12/2011	ND [0.1]	0.513 J	ND [0.0005]	ND [0.001]	ND [0.001]	0.000464 J	--	--	--	--
	Sentry-2R	7/3/2012	0.0316 J	2.74	ND [0.0003]	ND [0.00062]	ND [0.00062]	ND [0.00062]	--	ND [0.0003]	ND [0.000062]	ND [0.00003]
	Sentry-2R	9/26/2012	ND [0.062]	0.22 J	ND [0.0003]	ND [0.00062]	ND [0.00062]	ND [0.00062]	--	ND [0.0000304]	ND [0.0000626]	ND [0.0000304]
	Sentry-2R	7/2/2013	0.0922 J	3.7	ND [0.0003]	ND [0.00062]	ND [0.00062]	ND [0.00062]	--	ND [0.00003]	ND [0.000062]	ND [0.00003]
	Sentry-2R	8/20/2014	0.0372 J	0.295 J	ND [0.00025]	ND [0.0005]	0.00492 B	0.0047 J	0.0000207 J	0.0000245 J	0.000112	ND [0.0000259]
	Sentry-2R	7/24/2015	ND [0.05]	ND [0.31]	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.0015]	ND [0.000025]	ND [0.000025]	0.000117	ND [0.000025]
Sentry-2R	6/20/2016	ND [0.05]	0.336 J	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.001]	ND [0.000024]	ND [0.000024]	ND [0.0000481]	ND [0.000024]	
Sentry-2R	8/1/2017	ND [0.05]	0.261 J	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.001]	ND [0.000027]	ND [0.000027]	ND [0.000054]	ND [0.000027]	
Sentry-3	Sentry-3	9/24/2004	0.235	2.45	ND [0.0005]	0.00205	ND [0.0005]	0.00798	--	--	--	--
	NS	7/25/2005	--	--	--	--	--	--	--	--	--	--
	NS	9/3/2005	--	--	--	--	--	--	--	--	--	--
	Sentry-3	7/26/2006	0.505	5.47	0.00185	0.0512	ND [0.002]	0.0801	--	--	--	--
	NS	9/12/2006	--	--	--	--	--	--	--	--	--	--
Well removed in September 2007 and replaced with Sentry-3R												
Sentry-3R	Sentry-3	9/11/2007	ND [0.100]	0.366	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	--	--	--	--
	Sentry-3R	8/5/2008	ND [0.100]	2.23	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	--	--	--	--
	Sentry-3	7/14/2009	0.0415 J	2.09	0.000229 J	0.00241	ND [0.002]	0.0027 J	--	--	--	--
	Sentry-3	9/1/2009	ND [0.1]	ND [0.714]	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	--	--	--	--
	Sentry-3R	7/19/2010	ND [0.1]	2.45	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	--	--	--	--
	Sentry-3R	9/22/2010	ND [0.1]	0.553 J	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	--	--	--	--
	Sentry-4R ^D	9/22/2010	ND [0.1]	0.548 J	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	--	--	--	--
	Sentry-3R	7/9/2011	ND [0.1]	1.49	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	--	--	--	--
	Sentry-3R	9/12/2011	ND [0.1]	ND [0.645]	ND [0.0005]	ND [0.001]	ND [0.001]	ND [0.001]	--	--	--	--
	Sentry-4R ^D	9/12/2011	ND [0.1]	ND [0.645]	ND [0.0005]	ND [0.001]	ND [0.001]	ND [0.001]	--	--	--	--
	Sentry-3R	7/3/2012	--	3.2	--	--	--	--	--	ND [0.0003]	ND [0.000062]	0.0000192 J
	Sentry-3R	9/26/2012	ND [0.062]	0.543 J	ND [0.0003]	ND [0.00062]	ND [0.00062]	ND [0.00062]	--	ND [0.0000304]	0.0000627 J	ND [0.0000304]
	Sentry-3R	7/2/2013	ND [0.062]	3.55	ND [0.0003]	ND [0.00062]	0.0004 J	ND [0.00062]	--	ND [0.00003]	ND [0.000062]	ND [0.00003]
	Sentry-3R	8/20/2014	0.0425 J	0.376 J	ND [0.00025]	ND [0.0005]	0.00855 B	ND [0.0015]	ND [0.0000263]	ND [0.0000263]	ND [0.0000525]	ND [0.0000263]
	Sentry-3R	7/24/2015	ND [0.05]	ND [0.302]	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.0015]	ND [0.000025]	ND [0.000025]	ND [0.00005]	ND [0.000025]
Sentry-3R	6/20/2016	ND [0.05]	1.01	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.001]	ND [0.0000236]	ND [0.0000236]	ND [0.0000471]	ND [0.0000236]	
Sentry-3R	8/1/2017	ND [0.05]	ND [0.315]	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.001]	ND [0.0000265]	ND [0.0000265]	ND [0.000053]	ND [0.0000265]	

Table 2: Groundwater Analytical Results
Happy Valley West
(all results in mg/L)

Monitoring Well	Sample Designation	Sample Date	AK 101	AK 102	BTEX USEPA Method 8021B				PAHs USEPA Method 8270D			
			Gasoline Range Organics	Diesel Range Organics	Benzene	Ethylbenzene	Toluene	Total Xylenes	Acenaphthene	Fluorene	Naphthalene	Pyrene
ADEC Groundwater Cleanup Levels ^A			2.2	1.5	0.005	0.7	1	10	2.2	1.5	0.73	1.1
ADEC Groundwater Cleanup Levels ^{B,C}			2.2	1.5	0.0046	0.015	1.1	0.19	0.53	0.29	0.0017	0.12

Notes:

- A ADEC Cleanup Levels (18 AAC 75.345, Table C) as revised on June 17, 2015; results from 2015 and prior were compared to these cleanup levels.
- B ADEC Cleanup Levels (18 AAC 75.345, Table C) as revised on Nov. 6, 2016; results from 2016 were compared to these cleanup levels.
- C ADEC Cleanup Levels (18 AAC 75.345, Table C) as revised on March 23, 2017; results from 2017 were compared to these cleanup levels.
- D Duplicate of preceding sample
- 3.2 **Bold** results exceed ADEC cleanup levels.
- ND [0.0005] ND Bracketed Values presented as Limit of Detection beginning in 2012; previous years presented as the Limit of Quantitation or Practical Quantitation Limit

Data Flags and Abbreviations:

--	not analyzed	NS	Not sampled
AAC	Alaska Administrative Code	PAHs	polynuclear aromatic hydrocarbons
ADEC	Alaska Department of Environmental Conservation	QL	Estimated with potential slightly low bias
AK	Alaska Method	QN	Estimated with unknown bias
B	Estimated with potential high bias	USEPA	U.S. Environmental Protection Agency
BTEX	benzene, toluene, ethylbenzene, and xylenes		
J	Estimated value below the limit of quantitation (LOQ)		
mg/L	milligrams per liter		
MN	Estimated with unknown bias due to matrix		
ND	Not detected at or above the [Limit of Detection]		

**Table 3: 2017 Groundwater Petroleum Hydrocarbon VOC Results
Happy Valley West
(all results in mg/L)**

Monitoring Well	Sample Name	Sample Date	USEPA Method SW8260C															
			Benzene	Toluene	Ethylbenzene	o-Xylene	P & M - Xylene	Xylenes (total)	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	Isopropylbenzene (Cumene)	Methyl-t-butyl ether	Naphthalene	n-Butylbenzene	n-Propylbenzene	sec-Butylbenzene	Styrene	tert-Butylbenzene
ADEC Groundwater Cleanup Levels ^A			0.0046	1.1	0.015	--	--	0.19	0.015	0.12	0.45	0.14	0.0017	1	0.66	2	1.2	0.69
Sentry-1R	Sentry-1R	8/1/17	ND [0.0002]	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.001]	ND [0.0015]	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.005]	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.0005]
	Sentry-4R ^B	8/1/17	ND [0.0002]	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.001]	ND [0.0015]	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.005]	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.0005]
Trip Blank	Trip Blank	8/1/17	ND [0.0002]	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.001]	ND [0.0015]	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.005]	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.0005]

Notes:

^A ADEC Cleanup Levels (18 AAC 75.345, Table C) as revised on March 23, 2017; results from 2017 were compared to these cleanup levels.

^B Duplicate of preceding sample

3.2 **Bold** results exceed ADEC cleanup levels.

ND [0.0005] ND Bracketed Values presented as Limit of Detection beginning in 2012

Data Flags and Abbreviations:

AAC	Alaska Administrative Code	USEPA	U.S. Environmental Protection Agency
ADEC	Alaska Department of Environmental Conservation	VOC	volatile organic compound
BTEX	benzene, toluene, ethylbenzene, and xylenes		
J	Estimated value below the limit of quantitation (LOQ)		
mg/L	milligram per liter		

Table 4: Surface Water Sample GRO, DRO, and BTEX Analytical Results
Happy Valley West
(all units in mg/L)

Sample Location	Sample Designation	Date Sampled	AK 101	AK 102	BTEX USEPA Method 602 or 8021B				Total Aromatic Hydrocarbons ^A
			Gasoline Range Organics	Diesel Range Organics	Benzene	Toluene	Ethylbenzene	Total Xylenes	
ADEC Water Quality Standards ^B			N/A	N/A	N/A	N/A	N/A	N/A	0.010
WS-02	HV-WS-02	8/19/1996	0.35	3.9	ND [0.001]	ND [0.001]	0.0038	0.0084	0.0122
	HV-WS-02	9/6/1997	ND	0.137	ND	ND	ND	ND	ND
	HV-WS-02	8/30/1998	0.13	2.99	ND [0.001]	ND [0.001]	0.001	0.004	0.005
	HV-WS-30 ^C	8/30/1998	0.13	2.84	ND [0.001]	ND [0.001]	0.001	0.004	0.005
	HV-WS-02	8/17/2000	0.12	49.4	0.0008	ND [1]	0.021	0.023	0.045
	HVW-SW2A	8/23/2001	--	6.4	0.00489	ND [0.002]	0.00945	0.01485	0.02919
	HVW-SW-2B	8/29/2001	--	6.11	0.00367	ND [0.002]	0.00535	0.01085	0.01987
	WS-21 ^D	8/20/2002	--	2.34	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	ND
	WS-2	9/4/2002	--	3.8	0.00066	0.00209	0.00125	0.00249	0.00649
	WS-2	7/9/2003	--	4.75	0.000786	ND [0.0005]	0.011	0.0227	0.0345
	FD-1 ^C	7/9/2003	--	--	0.000725	ND [0.0005]	0.0105	0.0221	0.0333
	WS-2	8/23/2003	0.314	4.04	ND [0.0005]	ND [0.0005]	0.00524	0.0139	0.0191
	WS-Dup ^C	8/23/2003	0.304	4.02	ND [0.0005]	ND [0.0005]	0.00534	0.0100	0.0153
	WS-2	9/17/2003	0.372	3.33	0.000892	ND [0.0005]	0.00451	0.0135	0.0189
	WS-2	9/13/2004	--	--	ND [0.0005]	ND [0.0005]	0.00368	0.00848	0.01216
WS-Dup ^C	9/13/2004	--	--	ND [0.0005]	ND [0.0005]	0.00418	0.00955	0.01373	
WS-02R ^F	WS-2R	9/23/2004	--	--	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.001]	ND
	WS-02R	7/25/2005	--	--	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.002]	ND
	WS-Dup ^C	7/25/2005	--	--	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.002]	ND
	WS-2R	9/3/2005	--	--	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.002]	ND
	Dup-2 ^C	9/3/2005	--	--	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.002]	ND
	WS-2R	7/26/2006	--	--	ND [0.0005]	ND [0.002]	ND [0.002]	0.00238	0.00238
	WS-2	9/12/2006	--	--	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.002]	ND
	NS	9/10/2007	--	--	--	--	--	--	--
	WS-2R	8/6/2008	--	--	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.003]	ND
	WS-5R ^C	8/6/2008	--	--	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.003]	ND
	WS-2R	7/14/2009	--	--	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	ND
	WS-2R	9/1/2009	--	--	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	ND
	WS-2R	7/19/2010	--	--	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	ND
	WS-2R	9/22/2010	--	--	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	ND
	WS-2R	7/9/2011	--	--	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	ND
	WS-21R ^C	7/9/2011	--	--	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	ND
	WS-2R	9/12/2011	--	--	ND [0.0005]	ND [0.001]	ND [0.001]	ND [0.001]	ND
	WS-02R	7/3/2012	--	--	ND [0.0003]	ND [0.00062]	ND [0.00062]	ND [0.00062]	ND [0.00216]
	WS-02R	9/26/2012	--	--	ND [0.0003]	ND [0.00062]	ND [0.00062]	ND [0.00062]	ND [0.00216]
	WS-21R ^C	9/26/2012	--	--	ND [0.0003]	ND [0.00062]	ND [0.00062]	ND [0.00062]	ND [0.00216]
	WS-02R	7/2/2013	--	--	ND [0.0003]	0.00044 J	ND [0.00062]	ND [0.00062]	0.00198 J
	WS-21R ^C	7/2/2013	--	--	ND [0.0003]	ND [0.00062]	ND [0.00062]	ND [0.00062]	ND [0.00216]
	WS-2R	8/20/2014	--	--	ND [0.00025]	0.00611 B, J	ND [0.0005]	ND [0.0015]	0.00836 B, J
	WS-21R ^C	8/20/2014	--	--	ND [0.00025]	0.00874 B, J	ND [0.0005]	ND [0.0015]	0.01099 B, J
	WS-2R	7/24/2015	--	--	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.0015]	ND [0.00275]
	WS-21R ^C	7/24/2015	--	--	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.0015]	ND [0.00275]
	WS-2R	6/20/2016	--	--	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.0015]	ND [0.00275]
	WS-29R ^C	6/20/2016	--	--	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.0015]	ND [0.00275]
	WS-2R	8/1/2017	--	--	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.0015]	ND [0.00275]
	WS-99R ^C	8/1/2017	--	--	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.0015]	ND [0.00275]
	WS-03	HV-WS-03	8/19/1996	ND [0.1]	0.24	ND [0.001]	ND [0.001]	0.0018	ND [0.003]
HV-WS-03		9/6/1997	ND	0.17	ND	ND	ND	ND	ND
HV-WS-03		8/30/1998	--	0.17	--	--	--	--	--
HV-WS-03		9/1/1999	0.21	4.7	0.0012	ND [0.001]	0.0076	0.0104	0.0192
HV-WS-03		8/17/2000	ND [0.050]	ND [0.100]	ND [0.0005]	ND [0.001]	ND [0.001]	ND [0.001]	ND
HVW-SW3A		8/23/2001	--	3.52	0.00231	ND [0.002]	0.0415	0.0546	0.0984
HVW-SW-3B		8/29/2001	--	3.63	0.000795	ND [0.002]	0.0126	0.01999	0.0334
WS-3		8/20/2002	--	4.02	0.00218	ND [0.002]	0.0512	0.0638	0.1172
WS-D ^C		8/20/2002	--	4.89	0.00224	ND [0.002]	0.0581	0.0709	0.1312
WS-3		9/4/2002	--	2.22	ND [0.0005]	ND [0.002]	0.00646	0.01365	0.02011
WS-3		7/9/2003	--	ND [0.240]	0.00337	0.000745	0.0394	0.0730	0.1165
WS-3		8/23/2003	0.24	1.63	ND [0.0005]	ND [0.0005]	0.0112	0.0211	0.0323

Table 4: Surface Water Sample GRO, DRO, and BTEX Analytical Results
Happy Valley West
(all units in mg/L)

Sample Location	Sample Designation	Date Sampled	AK 101	AK 102	BTX USEPA Method 602 or 8021B				Total Aromatic Hydrocarbons ^A
			Gasoline Range Organics	Diesel Range Organics	Benzene	Toluene	Ethylbenzene	Total Xylenes	
ADEC Water Quality Standards ^B			N/A	N/A	N/A	N/A	N/A	N/A	0.010
WS-03 Contd.	WS-3	9/13/2004	--	--	ND [0.0005]	ND [0.0005]	0.00174	0.00342	0.00516
	WS-03R ^E	7/25/2005	--	--	ND [0.0004]	ND [0.001]	0.00195	0.00237	0.00432
	WS-3	9/3/2005	--	--	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.002]	ND
	WS-3	7/26/2006	--	--	0.00345	0.00814	0.0130	0.02565	0.0502
	WS-3	9/12/2006	--	--	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.002]	ND
Sampling discontinued after 2006, trench backfilled in 2007									
WS-10	HV-WS-10	8/19/1996	--	0.1	--	--	--	--	--
	HV-WS-10	9/6/1997	ND	ND	ND	ND	ND	ND	ND
	HV-WS-10	8/30/1998	ND [0.050]	0.14	ND [0.001]	ND [0.001]	ND [0.001]	ND [0.001]	ND
	HV-WS-10	9/1/1999	0.39	0.36	0.002	ND [0.001]	0.0065	0.0142	0.0227
	HV-WS-30 ^C	9/1/1999	0.37	0.35	0.0021	ND [0.001]	0.0061	0.0133	0.0215
	HV-WS-10	8/17/2000	ND [0.050]	0.12	ND [0.0005]	ND [0.001]	ND [0.001]	ND [0.001]	ND
	FD-6 ^C	8/17/2000	ND [0.050]	0.11	ND [0.0005]	ND [0.001]	ND [0.001]	ND [0.001]	ND
	HVV-SW10A	8/23/2001	--	ND	ND	ND [0.002]	ND [0.002]	ND [0.002]	ND
	HVV-SW10B	8/29/2001	--	1.03	0.000628	ND [0.002]	ND [0.002]	ND [0.002]	0.000628
	WS-10	8/20/2002	--	ND [0.505]	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	ND
	WS-10	9/4/2002	--	ND [0.500]	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	ND
	WS-10	7/9/2003	--	4.35	ND [0.0005]	ND [0.0005]	0.000657	0.0143	0.0150
	WS-10	8/23/2003	ND [0.080]	ND [0.250]	ND [0.0005]	ND [0.0005]	0.000566	ND [0.001]	0.000566
	WS-10	9/17/2003	0.694	2.14	0.0018	ND [0.0005]	0.0197	0.0426	0.0641
	WS-Dup ^C	9/17/2003	0.575	1.7	0.00151	ND [0.0005]	0.0158	0.0346	0.0519
WS-10R ^F	WS-10	9/13/2004	--	--	ND [0.0005]	ND [0.0005]	0.000678	0.00169	0.00237
	WS-10R	7/25/2005	--	--	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.002]	ND
	WS-10R	9/3/2005	--	--	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.002]	ND
	WS-10R	7/26/2006	--	--	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	ND
	WS-10	9/12/2006	--	--	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.002]	ND
	NS	9/10/2007	--	--	--	--	--	--	--
	WS-10R	8/6/2008	--	--	ND [0.0004]	ND [0.001]	ND [0.001]	ND [0.003]	ND
	WS-10R	7/14/2009	--	--	ND [0.0005]	ND [0.002]	ND [0.002]	0.000783 J	ND
	WS-9R ^C	7/14/2009	--	--	ND [0.0005]	ND [0.002]	ND [0.002]	0.000927 J	0.000927 J
	WS-10R	9/1/2009	--	--	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	ND
	WS-20R ^C	9/1/2009	--	--	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	ND
	WS-10R	7/19/2010	--	--	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	ND
	WS-21R ^C	7/19/2010	--	--	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	ND
	WS-10R	9/22/2010	--	--	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	ND
	WS-21R ^C	9/22/2010	--	--	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	ND
	WS-10R	7/9/2011	--	--	ND [0.0005]	ND [0.002]	ND [0.002]	ND [0.002]	ND
	WS-10R	9/12/2011	--	--	ND [0.0005]	ND [0.001]	ND [0.001]	ND [0.001]	ND
	WS-21R ^C	9/12/2011	--	--	ND [0.0005]	ND [0.001]	ND [0.001]	ND [0.001]	ND
	WS-10R	7/3/2012	--	--	ND [0.0003]	ND [0.00062]	ND [0.00062]	ND [0.00062]	ND [0.00216]
	WS-21R ^C	7/3/2012	--	--	ND [0.0003]	ND [0.00062]	ND [0.00062]	ND [0.00062]	ND [0.00216]
	WS-10R	9/26/2012	--	--	ND [0.0003]	ND [0.00062]	ND [0.00062]	ND [0.00062]	ND [0.00216]
	WS-10R	7/2/2013	--	--	ND [0.0003]	ND [0.00062]	ND [0.00062]	ND [0.00062]	ND [0.00216]
	WS-10R	8/22/2014	--	--	ND [0.00025]	0.00805 B	ND [0.0005]	ND [0.0015]	0.0103 B
	WS-10R	7/24/2015	--	--	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.0015]	ND [0.00275]
	WS-10R	6/20/2016	--	--	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.0015]	ND [0.00275]
	WS-10R	8/1/2017	--	--	ND [0.00025]	ND [0.0005]	ND [0.0005]	ND [0.0015]	ND [0.00275]

Notes:

- ^A Total aromatic hydrocarbons were calculated as described in report Section 3.2.2.
^B ADEC Water Quality Standards (18 AAC 70) Amended as of February 5, 2017.
^C Duplicate of preceding sample
^D WS-02 was flooded and could not be reached; WS-21 is an alternate location for WS-02
^E WS-03 was dry; WS-03R is an alternate location for WS-03
^F WS-02R and WS-10R are approximate replacement sample sites for WS-02 and WS-10 which were excavated in 2004
1.0 Bold results exceed ADEC Water Quality Standards
ND [0.001] ND bracketed values presented as Limit of Detection beginning in 2012; previous years are presented as the Limit of Quantitation or Practical Quantitation Limit

Abbreviations:

- Not analyzed
AAC Alaska Administrative Code
ADEC Alaska Department of Environmental Conservation
AK Alaska Method
B Estimated value with potential high bias
BTEX benzene, toluene, ethylbenzene and xylenes
J Estimated value below the limit of quantitation (LOQ)
mg/L milligrams per liter
N/A Not applicable
USEPA U.S. Environmental Protection Agency

Table 5: Surface Water Sample PAH Analytical Results
Happy Valley West
(all units in mg/L)

Sample Location	Sample Name	Date Sampled	PAHs USEPA Method 8270D ^B													PAHs USEPA Method 8270D ^B (Continued)			Total Aqueous Hydrocarbons ^A	
			Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]-anthracene	Benzo[a]pyrene	Benzo[b]-fluoranthene	Benzo[a]pyrene	Benzo[b]-fluoranthene	Benzo[g,h,i]-perylene	Chrysene	Fluoranthene	Fluorene	Indeno-[1,2,3-c,d]pyrene	Naphthalene	Phenanthrene	Pyrene		
ADEC Water Quality Criteria ^C			1	N/A	9.6	N/A	0.0002	N/A	N/A	N/A	N/A	0.3	1.3	N/A	N/A	N/A	0.96	0.015		
WS-02	HV-WS-02	8/19/1996	ND [0.005]	--	ND [0.005]	ND [0.0022]	--	--	--	--	--	ND [0.005]	ND [0.005]	ND [0.005]	0.037	--	ND [0.005]	0.0370		
	HV-WS-02	9/6/1997	ND	ND	ND	ND	ND	ND	ND	--	ND	ND	ND	0.00082	ND	ND	0.00082			
	HV-WS-02	8/30/1998	0.00008	0.0012	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	0.00013	ND [0.00002]	0.0023	ND [0.00002]	ND [0.00002]	0.004		
	HV-WS-30 ^D	8/30/1998	0.00008	0.0012	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	0.00013	ND [0.00002]	0.0025	ND [0.00002]	ND [0.00002]	0.004		
	HV-WS-02	8/17/2000	ND [0.00002]	0.00032	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	0.000		
	HVW-SW2A	8/23/2001	ND [0.00211]	--	ND [0.000105]	ND [0.000137]	ND [0.000158]	ND [0.000105]	ND [0.000158]	ND [0.000105]	--	ND [0.000105]	--	ND [0.00211]	ND [0.000105]	0.0122	--	ND [0.000105]	0.0122	
	HVW-SW-2B	8/29/2001	0.000157	--	ND [0.000115]	ND [0.000149]	ND [0.000172]	ND [0.000115]	ND [0.000172]	ND [0.000115]	--	ND [0.000115]	--	0.000215	ND [0.000115]	0.00208	--	ND [0.000115]	0.00245	
	WS-21 ^E	8/20/2002	ND [0.000101]	--	ND [0.000101]	ND [0.000101]	ND [0.000101]	ND [0.000101]	ND [0.000101]	ND [0.000101]	--	ND [0.000101]	ND [0.000101]	ND [0.000101]	ND [0.000101]	ND [0.000101]	--	ND [0.000101]	ND	
	WS-2	9/4/2002	0.00022	--	ND [0.000108]	ND [0.000108]	ND [0.000108]	ND [0.000108]	ND [0.000108]	ND [0.000108]	--	ND [0.000108]	ND [0.000108]	0.000386	ND [0.000108]	0.00584	--	ND [0.000108]	0.00645	
	WS-2	7/9/2003	ND [0.002]	ND [0.002]	ND [0.002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.002]	ND [0.002]	ND [0.00002]	0.0167	ND [0.002]	ND [0.00002]	0.0167	
	FD-1 ^D	7/9/2003	ND [0.002]	ND [0.002]	ND [0.002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.002]	ND [0.002]	ND [0.00002]	0.0209	ND [0.002]	ND [0.00002]	0.0209	
	WS-2	8/23/2003	ND [0.0025]	ND [0.0025]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0025]	ND [0.0001]	0.0203	ND [0.0001]	ND [0.0001]	0.0203	
	WS-Dup ^D	8/23/2003	ND [0.0025]	ND [0.0025]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0025]	ND [0.0001]	0.0224	ND [0.0001]	ND [0.0001]	0.0224	
	WS-2	9/17/2003	ND [0.001]	ND [0.001]	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.0005]	0.00742	ND [0.0005]	ND [0.0005]	0.0074	
	WS-2	9/13/2004	0.000168	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	0.000284	ND [0.0001]	ND [0.0013]	ND [0.0001]	ND [0.0001]	0.00045	
	WS-Dup ^D	9/13/2004	0.000188	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	0.000273	ND [0.0001]	ND [0.0019]	ND [0.0001]	ND [0.0001]	0.00046	
WS-02R ^G	WS-2R	9/23/2004	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND	
	WS-02R	7/25/2005	ND [0.001]	ND [0.001]	ND [0.0003]	0.0001	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0002]	ND [0.0002]	ND [0.0004]	ND [0.0002]	ND [0.0002]	ND [0.001]	ND [0.0003]	ND [0.0002]	0.0001	
	WS-Dup ^D	7/25/2005	ND [0.001]	ND [0.001]	0.00047	0.00016	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0002]	ND [0.0002]	ND [0.0001]	ND [0.0002]	ND [0.0002]	0.0021	0.0024	ND [0.0002]	0.0051	
	WS-2R	9/3/2005	ND [0.00005]	--	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	--	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.0001]	--	ND [0.00005]	ND	
	Dup-2 ^D	9/3/2005	ND [0.00005]	--	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	--	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.0001]	--	ND [0.00005]	ND	
	WS-2R	7/26/2006	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	0.000189	ND [0.00005]	ND [0.00005]	0.00019	
	WS-2	9/12/2006	ND [0.00005]	--	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	--	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	0.000148	--	ND [0.00005]	0.000148	
	NS	9/10/2007	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	WS-2R	8/6/2008	ND [0.0000526]	--	ND [0.0000526]	ND [0.0000526]	ND [0.0000526]	ND [0.0000526]	ND [0.0000526]	ND [0.0000526]	--	ND [0.0000526]	ND [0.0000526]	ND [0.0000526]	ND [0.0000526]	ND [0.000105]	--	ND [0.0000526]	ND	
	WS-5R ^C	8/6/2008	ND [0.0000526]	--	ND [0.0000526]	ND [0.0000526]	ND [0.0000526]	ND [0.0000526]	ND [0.0000526]	ND [0.0000526]	--	ND [0.0000526]	ND [0.0000526]	ND [0.0000526]	ND [0.0000526]	ND [0.000105]	--	ND [0.0000526]	ND	
	WS-2R	7/14/2009	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	0.0000174 J	ND [0.00005]	0.000408	ND [0.00005]	ND [0.00005]	0.000425 J	
	WS-2R	9/1/2009	ND [0.0000521]	ND [0.0000521]	ND [0.0000521]	ND [0.0000521]	ND [0.0000521]	ND [0.0000521]	ND [0.0000521]	ND [0.0000521]	ND [0.0000521]	ND [0.0000521]	ND [0.0000521]	ND [0.0000521]	ND [0.0000521]	ND [0.000104]	ND [0.0000521]	ND [0.0000521]	ND	
	WS-2R	7/19/2010	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	0.000018 J	0.0000302 J	0.000018 J	0.0000302 J	0.0000454 J	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	0.0000309 J	ND [0.0001]	ND [0.00005]	ND [0.00005]	0.000173 J
	WS-2R	9/22/2010	ND [0.0000505]	ND [0.0000505]	ND [0.0000505]	ND [0.0000505]	ND [0.0000505]	ND [0.0000505]	ND [0.0000505]	ND [0.0000505]	ND [0.0000505]	ND [0.0000505]	ND [0.0000505]	ND [0.0000505]	ND [0.0000505]	ND [0.000101]	ND [0.0000505]	ND [0.0000505]	ND	
	WS-2R	7/9/2011	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.0001]	ND [0.00005]	ND [0.00005]	ND	
	WS-21R ^D	7/9/2011	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.0001]	ND [0.00005]	ND [0.00005]	ND	
	WS-2R	9/12/2011	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.0001]	ND [0.00005]	ND [0.00005]	ND	
	WS-02R	7/3/2012	ND [0.0000306] □	ND [0.0000306]	ND [0.0000306]	ND [0.0000306]	ND [0.0000306]	ND [0.0000306]	ND [0.0000306]	ND [0.0000306]	ND [0.0000306]	ND [0.0000306]	ND [0.0000306]	ND [0.0000306]	ND [0.0000306]	ND [0.0000632]	ND [0.0000306]	ND [0.0000306]	ND [0.00262]	
	WS-2R	9/26/2012	ND [0.00003]	ND [0.00003]	ND [0.00003]	ND [0.00003]	ND [0.00003]	ND [0.00003]	ND [0.00003]	ND [0.00003]	ND [0.00003]	ND [0.00003]	ND [0.00003]	ND [0.00003]	ND [0.00003]	ND [0.000062]	ND [0.00003]	ND [0.00003]	ND [0.00261]	
	WS-21R ^D	9/26/2012	ND [0.0000304]	ND [0.0000304]	ND [0.0000304]	ND [0.0000304]	ND [0.0000304]	ND [0.0000304]	ND [0.0000304]	ND [0.0000304]	ND [0.0000304]	ND [0.0000304]	ND [0.0000304]	ND [0.0000304]	ND [0.0000304]	ND [0.0000626]	ND [0.0000304]	ND [0.0000304]	ND [0.00262]	
	WS-2R	7/2/2013	ND [0.00003]	ND [0.00003]	ND [0.00003]	ND [0.00003]	ND [0.00003]	ND [0.00003]	ND [0.00003]	ND [0.0										

Table 5: Surface Water Sample PAH Analytical Results
Happy Valley West
(all units in mg/L)

Sample Location	Sample Name	Date Sampled	PAHs USEPA Method 8270D ^B													PAHs USEPA Method 8270D ^B (Continued)			Total Aqueous Hydrocarbons ^A
			Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]-anthracene	Benzo[a]pyrene	Benzo[b]-fluoranthene	Benzo[a]pyrene	Benzo[b]-fluoranthene	Benzo[g,h,i]-perylene	Chrysene	Fluoranthene	Fluorene	Indeno-[1,2,3-c,d]pyrene	Naphthalene	Phenanthrene	Pyrene	
ADEC Water Quality Criteria ^C			1	N/A	9.6	N/A	0.0002	N/A	N/A	N/A	N/A	0.3	1.3	N/A	N/A	N/A	0.96	0.015	
WS-03	HV-WS-03	8/19/1996	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0000	
	HV-WS-03	9/6/1997	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00313	ND	ND	0.00313	
	HV-WS-03	8/30/1998	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	0.00093	ND [0.00002]	ND [0.00002]	0.00093	
	HV-WS-03	9/1/1999	ND [0.001]	0.0011	ND [0.000001]	ND [0.000001]	ND [0.000001]	ND [0.000001]	ND [0.000001]	ND [0.000001]	ND [0.000001]	ND [0.000001]	ND [0.000001]	0.0011	ND [0.000001]	0.053	ND [0.000001]	ND [0.000001]	0.055
	HV-WS-03	8/17/2000	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	0.00008	ND [0.00002]	ND [0.00002]	0.00008	
	HVW-SW3A	8/23/2001	ND [0.000128]	--	ND [0.0001]	ND [0.00013]	ND [0.00015]	ND [0.0001]	ND [0.00015]	ND [0.0001]	--	ND [0.0001]	--	0.000164	ND [0.0001]	0.0463	--	ND [0.0001]	0.0465
	HVW-SW-3B	8/29/2001	0.000128	--	ND [0.000099]	ND [0.000129]	ND [0.000149]	ND [0.000099]	ND [0.000149]	ND [0.000099]	--	ND [0.000099]	--	0.000228	ND [0.000099]	0.0171	--	ND [0.000099]	0.0175
	WS-3	8/20/2002	0.0002	--	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	--	ND [0.0001]	ND [0.0001]	0.000322	ND [0.0001]	0.122	--	ND [0.0001]	0.123
WS-03	WS-D ^D	8/20/2002	0.000197	--	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	--	ND [0.0001]	ND [0.0001]	0.000315	ND [0.0001]	0.125	--	ND [0.0001]	0.125512
	WS-3	9/4/2002	0.000121	--	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	--	ND [0.0001]	ND [0.0001]	0.000184	ND [0.0001]	0.00166	--	ND [0.0001]	0.00197
	WS-3	7/9/2003	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	0.0000244	ND [0.00002]	0.000614	0.0000265	ND [0.00002]	0.0007
	WS-3	8/23/2003	ND [0.002]	ND [0.002]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.002]	ND [0.0001]	0.00687	ND [0.0001]	ND [0.0001]	0.0069
	WS-3	9/13/2004	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0004]	ND [0.0001]	ND [0.0001]	0.00000	
	WS-03R ^F	7/25/2005	ND [0.002]	ND [0.002]	0.0028	0.00026	ND [0.0002]	ND [0.0002]	ND [0.0002]	ND [0.0002]	ND [0.0004]	ND [0.0008]	ND [0.0004]	ND [0.0004]	0.065	0.0084	ND [0.0004]	0.076	
	WS-3	9/3/2005	ND [0.0000515]	--	ND [0.0000151]	ND [0.0000515]	ND [0.0000515]	ND [0.0000515]	ND [0.0000515]	ND [0.0000515]	--	ND [0.0000515]	ND [0.0000515]	ND [0.0000515]	ND [0.0000515]	ND [0.000103]	--	ND [0.0000515]	ND
	WS-3	7/26/2006	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	0.000144	ND [0.00005]	0.0103	ND [0.00005]	ND [0.00005]	0.0104
WS-10	WS-3	9/12/2006	ND [0.0000534]	--	ND [0.0000534]	ND [0.0000534]	ND [0.0000534]	ND [0.0000534]	ND [0.0000534]	ND [0.0000534]	--	ND [0.0000534]	ND [0.0000534]	ND [0.0000534]	ND [0.0000534]	0.00051	--	ND [0.0000534]	0.00051
	Sampling discontinued after 2006, trench backfilled in 2007															Sampling discontinued after 2006, trench backfilled in 2007			
	HV-WS-10	8/19/1996	ND [0.00002]	--	ND [0.00002]	ND [0.00002]	ND [0.000009]	--	ND [0.000009]	--	--	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	0.00027	--	ND [0.00002]	0.00027
	HV-WS-10	9/6/1997	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00084	ND	ND	0.00084	
	HV-WS-10	8/30/1998	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	0.00025	ND [0.00002]	ND [0.00002]	0.00025	
	HV-WS-10	9/1/1999	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	0.00043	ND [0.00005]	ND [0.00005]	0.0004	
	HV-WS-30 ^D	9/1/1999	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	0.00033	ND [0.00005]	ND [0.00005]	0.0003	
	HV-WS-10	8/17/2000	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	0.00032	ND [0.00002]	ND [0.00002]	0.00032	
	FD-6 ^D	8/17/2000	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	0.00046	ND [0.00002]	ND [0.00002]	0.00046	
	HVW-SW10A	8/23/2001	ND [0.000104]	--	ND [0.000104]	ND [0.000135]	ND [0.000156]	ND [0.000104]	ND [0.000156]	ND [0.000104]	--	ND [0.000104]	--	ND [0.000104]	ND [0.000104]	0.00181	--	ND [0.000104]	0.00181
	HVW-SW10B	8/29/2001	ND [0.0001]	--	ND [0.0001]	ND [0.00013]	ND [0.00015]	ND [0.0001]	ND [0.00015]	ND [0.0001]	--	ND [0.0001]	--	ND [0.0001]	ND [0.0001]	ND [0.0001]	--	ND [0.0001]	0.00000
	WS-10	8/20/2002	ND [0.000101]	--	ND [0.000101]	ND [0.000101]	ND [0.000101]	ND [0.000101]	ND [0.000101]	ND [0.000101]	--	ND [0.000101]	ND [0.000101]	ND [0.000101]	ND [0.000101]	0.000478	--	ND [0.000101]	0.00048
	WS-10	9/4/2002	ND [0.0001]	--	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	--	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	0.000708	--	ND [0.0001]	0.000708
	WS-10	7/9/2003	ND [0.002]	ND [0.002]	ND [0.002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.00002]	ND [0.002]	ND [0.002]	ND [0.00002]	0.0472	ND [0.002]	ND [0.00002]	0.0472
WS-10	8/23/2003	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	0.000789	ND [0.0001]	ND [0.0001]	0.000789	
WS-10	9/17/2003	ND [0.0002]	ND [0.0002]	ND [0.0002]	ND [0.0002]	ND [0.0002]	ND [0.0002]	ND [0.0002]	ND [0.0002]	ND [0.0002]	ND [0.0002]	ND [0.0002]	0.00025	ND [0.0002]	0.0135	ND [0.0002]	ND [0.0002]	0.0138	
WS-Dup ^D	9/17/2003	ND [0.0002]	ND [0.0002]	ND [0.0002]	ND [0.0002]	ND [0.0002]	ND [0.0002]	ND [0.0002]	ND [0.0002]	ND [0.0002]	ND [0.0002]	ND [0.0002]	ND [0.0002]	ND [0.0002]	0.00412	ND [0.0002]	ND [0.0002]	0.0041	
WS-10	9/13/2004	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	0.000359	ND [0.0001]	ND [0.0001]	0.00036	

Notes:

- ^A Total aqueous hydrocarbons were calculated as described in report Section 3.2.2. Refer to Table 4 for total aromatic hydrocarbon values.
- ^B PAHs not presented in this table were not detected in surface water samples.
- ^C Water quality criteria correspond to ADEC 18 AAC 70.020b (March 23, 2017), adapted by reference from *Alaska Water Quality Criteria Manual for Toxic and other Deleterious Organic and Inorganic Substances* (December 12, 2008).
- ^D Duplicate of preceding sample
- ^E WS-02 was flooded and could not be reached; WS-21 is an alternate location.

Data Flags and Abbreviations:

- not analyzed
- AACAlaska Administrative Code
- ADECAlaska Department of Environmental Conservation
- BEstimated with potential high bias
- JEstimated value below the limit of quantitation (LOQ)
- mg/Lmilligrams per liter
- N/Anot applicable; no water quality criteria listed^F
- NSNot sampled
- PAHpolynuclear aromatic hydrocarbons
- USEPAU.S. Environmental Protection Agency

Table 5: Surface Water Sample PAH Analytical Results
Happy Valley West
(all units in mg/L)

Sample Location	Sample Name	Date Sampled	PAHs USEPA Method 8270D ^B													PAHs USEPA Method 8270D ^B (Continued)			Total Aqueous Hydrocarbons ^A
			Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]-anthracene	Benzo[a]pyrene	Benzo[b]-fluoranthene	Benzo[a]pyrene	Benzo[b]-fluoranthene	Benzo[g,h,i]-perylene	Chrysene	Fluoranthene	Fluorene	Indeno-[1,2,3-c,d]pyrene	Naphthalene	Phenanthrene	Pyrene	
ADEC Water Quality Criteria ^C			1	N/A	9.6	N/A	0.0002	N/A	N/A	N/A	N/A	N/A	0.3	1.3	N/A	N/A	N/A	0.96	0.015
WS-10R ^G	WS-10R	9/23/2004	ND [0.0001]	ND [0.0001]	ND [0001]	ND [0001]	ND [0001]	ND [0001]	ND [0001]	ND [0001]	ND [0001]	ND [0001]	ND [0001]	ND [0.0001]	ND [0001]	0.000462	ND [0.0001]	ND [0001]	0.000462
	WS-10R	7/25/2005	ND [0.001]	ND [0.001]	ND [0.0003]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0001]	ND [0.0002]	ND [0.0002]	ND [0.0004]	ND [0.0002]	ND [0.0002]	ND [0.001]	ND [0.0003]	ND [0.0002]	ND
	WS-10R	9/3/2005	ND [0.00005]	--	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	--	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.0001]	--	ND [0.00005]	ND
	WS-10R	7/26/2006	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	0.000474	ND [0.00005]	ND [0.00005]	0.000474
	WS-10	9/12/2006	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	--	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	0.000167	--	ND [0.00005]	0.000167
	NS	9/10/2007	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	WS-10R	8/6/2008	ND [0.00005]	--	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	--	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	0.00067	--	ND [0.00005]	0.00067
	WS-10R	7/14/2009	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	0.0000753 J	ND [0.00005]	ND [0.00005]	0.0000753 J
	WS-9R ^D	7/14/2009	ND [0.0000526]	ND [0.0000526]	ND [0.0000526]	ND [0.0000526]	ND [0.0000526]	ND [0.0000526]	ND [0.0000526]	ND [0.0000526]	ND [0.0000526]	ND [0.0000526]	ND [0.0000526]	ND [0.0000526]	ND [0.0000526]	ND [0.000105]	ND [0.0000526]	ND [0.0000526]	0.000000 J
	WS-10R	9/1/2009	ND [0.0000538]	ND [0.0000538]	ND [0.0000538]	ND [0.0000538]	ND [0.0000538]	ND [0.0000538]	ND [0.0000538]	ND [0.0000538]	ND [0.0000538]	ND [0.0000538]	ND [0.0000538]	ND [0.0000538]	ND [0.0000538]	ND [0.000108]	ND [0.0000538]	ND [0.0000538]	ND
	WS-20R ^D	9/1/2009	ND [0.0000515]	ND [0.0000515]	ND [0.0000515]	ND [0.0000515]	ND [0.0000515]	ND [0.0000515]	ND [0.0000515]	ND [0.0000515]	ND [0.0000515]	ND [0.0000515]	ND [0.0000515]	ND [0.0000515]	ND [0.0000515]	ND [0.000103]	ND [0.0000515]	ND [0.0000515]	ND
	WS-10R	7/19/2010	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	0.0000696 J	ND [0.00005]	ND [0.00005]	0.0000696 J
	WS-21R ^D	7/19/2010	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	0.000046 J	ND [0.00005]	ND [0.00005]	0.000046 J
	WS-10R	9/22/2010	ND [0.0000515]	ND [0.0000515]	ND [0.0000515]	0.0000169 J	ND [0.0000515]	0.0000191 J	ND [0.0000515]	0.0000191 J	ND [0.0000515]	0.0000243 J	ND [0.0000515]	ND [0.0000515]	ND [0.0000515]	ND [0.000103]	ND [0.0000515]	ND [0.0000515]	0.0000794 J
	WS-21R ^D	9/22/2010	ND [0.00005]	ND [0.00005]	ND [0.00005]	0.0000232 J	0.0000151 J	0.000027 J	0.0000151 J	0.000027 J	0.0000191 J	0.0000253 J	0.0000383 J	ND [0.00005]	ND [0.00005]	ND [0.0001]	ND [0.00005]	0.0000328 J	0.000223 J
	WS-10R	7/9/2011	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.0001]	ND [0.00005]	ND [0.00005]	ND
	WS-10R	9/12/2011	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.0001]	ND [0.00005]	ND [0.00005]	ND
	WS-21R ^D	9/12/2011	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.0001]	ND [0.00005]	ND [0.00005]	ND
	WS-10R	7/3/2012	ND [0.000032]	ND [0.000032]	ND [0.000032]	ND [0.000032]	ND [0.000032]	ND [0.000032]	ND [0.000032]	ND [0.000032]	ND [0.000032]	ND [0.000032]	ND [0.000032]	ND [0.000032]	ND [0.000032]	ND [0.000066]	ND [0.000032]	ND [0.000032]	ND [0.00271]
	WS-21R ^D	7/3/2012	ND [0.0000316]	ND [0.0000316]	ND [0.0000316]	ND [0.0000316]	ND [0.0000316]	ND [0.0000316]	ND [0.0000316]	ND [0.0000316]	ND [0.0000316]	ND [0.0000316]	ND [0.0000316]	ND [0.0000316]	ND [0.0000316]	ND [0.0000652]	ND [0.0000316]	ND [0.0000316]	ND [0.00267]
	WS-10R	9/26/2012	ND [0.0000304]	ND [0.0000304]	ND [0.0000304]	ND [0.0000304]	ND [0.0000304]	ND [0.0000304]	ND [0.0000304]	ND [0.0000304]	ND [0.0000304]	ND [0.0000304]	ND [0.0000304]	ND [0.0000304]	ND [0.0000304]	ND [0.0000626]	ND [0.0000304]	ND [0.0000304]	ND [0.00268]
	WS-10R	7/2/2013	ND [0.00003]	ND [0.00003]	ND [0.00003]	ND [0.00003]	ND [0.00003]	ND [0.00003]	ND [0.00003]	ND [0.00003]	ND [0.00003]	ND [0.00003]	ND [0.00003]	ND [0.00003]	ND [0.00003]	ND [0.000062]	ND [0.00003]	ND [0.00003]	ND [0.00267]
	WS-10R	8/22/2014	ND [0.000025]	ND [0.000025]	ND [0.000025]	ND [0.000025]	ND [0.000025]	ND [0.000025]	ND [0.000025]	ND [0.000025]	ND [0.000025]	ND [0.000025]	ND [0.000025]	ND [0.000025]	ND [0.000025]	ND [0.00005]	ND [0.000025]	ND [0.000025]	0.010725 B
	WS-10R	7/24/2015	ND [0.0000261]	ND [0.0000261]	ND [0.0000261]	ND [0.0000261]	ND [0.0000261]	ND [0.0000261]	ND [0.0000261]	ND [0.0000261]	ND [0.0000261]	ND [0.0000261]	ND [0.0000261]	ND [0.0000261]	ND [0.0000261]	ND [0.000052]	ND [0.0000261]	ND [0.0000261]	ND [0.0031154]
	WS-10R	6/20/2016	ND [0.0000232]	ND [0.0000232]	ND [0.0000232]	ND [0.0000232]	ND [0.00000925]	ND [0.0000232]	ND [0.00000925]	ND [0.0000232]	ND [0.0000232]	ND [0.0000232]	ND [0.0000232]	ND [0.0000232]	ND [0.0000232]	ND [0.0000463]	ND [0.0000232]	ND [0.0000232]	ND [0.003116]
	WS-10R	8/1/2017	ND [0.0000236]	ND [0.0000236]	ND [0.0000236]	ND [0.0000236]	ND [0.00000945]	ND [0.0000236]	ND [0.00000945]	ND [0.0000236]	ND [0.0000236]	ND [0.0000236]	ND [0.0000236]	ND [0.0000236]	ND [0.0000236]	ND [0.0000471]	ND [0.0000236]	ND [0.0000236]	ND [0.0031228]

Notes:

^ATotal aqueous hydrocarbons were calculated as described in report Section 3.2.2. Refer to Table 4 for total aromatic hydrocarbon values.

^BPAHs not presented in this table were not detected in surface water samples.

^CWater quality criteria correspond to ADEC 18 AAC 70.020b (March 23, 2017), adapted by reference from *Alaska Water Quality Criteria Manual for Toxic and other Deleterious Organic and Inorganic Substances* (December 12, 2008).

^DDuplicate of preceding sample

^EWS-02 was flooded and could not be reached; WS-21 is an alternate location.

^FWS-03 was dry; WS-03R is an alternate location for WS-03

^GWS-02R and WS-10R are approximate replacement sample sites for WS-02 and WS-10 which were excavated in 2004

1.0C Water Quality Standards

ND bracketed values presented as Limit of Detection beginning in 2012; previous years are presented as the Limit of Quantitation or Practical Quantitation Limit

ND [0.001]

Data Flags and Abbreviations:

--not analyzed

AACAlaska Administrative Code

ADECAlaska Department of Environmental Conservation

BEstimated with potential high bias

JEstimated value below the limit of quantitation (LOQ)

mg/Lmilligrams per liter

N/Anot applicable; no water quality criteria listed^F

NSNot sampled

PAHpolynuclear aromatic hydrocarbon

USEPAU.S. Environmental Protection Agency

APPENDIX A

PHOTOGRAPH LOG

2017 Water Monitoring Report
Happy Valley West
ALYESKA PIPELINE SERVICE COMPANY
PO Box 196660
3700 Centerpoint Drive
Anchorage, Alaska 99519-6660

January 2018



Photo 1:

Typical August creek flow at surface water sample location WS-10R. The sample was collected from surface water adjacent to the blue cooler; photograph looking east.



SITE PHOTOGRAPHS
August 1, 2017

2017 Water Monitoring Report
Happy Valley West

Job No: 105.01288.17015



Photo 2: Inspection of stream bank sediments during shovel sheen testing. A survey tape (upper right) was used to measure out testing locations.



SITE PHOTOGRAPHS
August 1, 2017

2017 Water Monitoring Report
Happy Valley West

Job No: 105.01288.17015

APPENDIX B

FIELD LOGBOOK

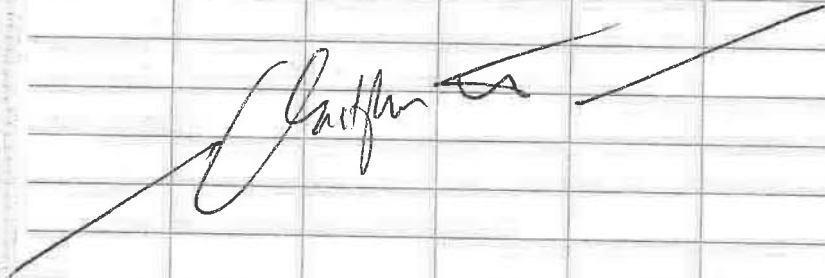
2017 Water Monitoring Report
Happy Valley West
ALYESKA PIPELINE SERVICE COMPANY
PO Box 196660
3700 Centerpoint Drive
Anchorage, Alaska 99519-6660

January 2018

6/21/16 HAPPY VALLEY 105.01288 16.016

- 0635- Leave Camp for Producers
 0945- Arrive in Producers fuel tanks.
 1000-1100- Strip sample coolers and equipment.
 1100-1230- Drop off Delta truck, check in for flight

1720- Arrive at home, end of day.



Happy Valley Wayt

- 0620- Depart for Happy Valley, Tailgate
 Safety Meeting en-route. 0930-Arrive at site
 0940- Collect Surface Water Sample
WS-2R and duplicate WS-17R at
 "1800"
 0952- Collect Surface Water Sample
WS-10R
 0943 - Start Sentry-1R purge
 1020- Collect Sample Sentry-1R and
 duplicate Sentry-10R at "1700"
 "Petroleum list" Vocs for both.
 1100 - Sample Sentry-2R
 1140- Conduct Shear Sheen test (over)
 1155, No Sheen observed.
 1129- Sample Sentry-3R.
 1130-1200 - Pack equipment & samples
 1205-1500 - Return to deadhorse,
 Construction Zones slow travel.
 END OF DAY

OVER →

For Sediment Notes

Rite in the Rain

60°F, cloudy

C. VEANT, C. GRANT, S. OLIVER

Happy Valley Gw Sampling 2/11/17

The Sheen tests along
0-100 feet showed
no sheen visible on
soil, river sediments, or
stream bank cobbles.

~~At~~ 2.0

None of the test
locations exhibited an odor.

* Consider sampling/testing
from 30' - 110' next
field event.

100 160 152 144 136 128 120 112 104 96 88 80 72 64 56 48 40 32 24 16 8 0

WS-02A
A
A inside

Sediment Sheen testing locations - 4 ft to 100 ft

Return to the Rain

APPENDIX C

FIELD FORMS

2017 Water Monitoring Report Happy Valley West

ALYESKA PIPELINE SERVICE COMPANY

PO Box 196660

3700 Centerpoint Drive

Anchorage, Alaska 99519-6660

January 2018

Site/Client Name: APSC PS01				Well ID: <u>Sentry-1R</u>						
Project #: 105.01288.1601				Sample ID: <u>Sentry-1R</u>						
Sampled By: <u>Seth Oliver / C. V. Vohrt</u>				Sample Time: <u>10:20</u>		Sample Date: <u>8 / 1 / 2016</u>				
Weather Conditions: <u>~ 50°F, windy</u>				Duplicate ID: <u>Sentry-1OR @ 17:00</u>						
Sampling Method: <input checked="" type="checkbox"/> Low Flow <input type="checkbox"/> Other <u>1</u>				MS/MSD <input type="checkbox"/> Yes <input 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>2</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>7.90</u>				Tubing/Pump Depth (ft. BTOC): <u>~ 10</u>						
Total Depth (ft BTOC): <u>NM</u>				Purge Start Time (24-hr): <u>0943</u>						
Depth to Product (ft. BTOC): <u>NM</u>				Purge End Time (24-hr): <u>1010</u>						
Product Thickness (ft): <u>—</u>				Total Purge Time (min): <u>27</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%)	ORP (mV) (± 10mV)	pH (± 0.1)	Turbidity (NTU) (± 10%, or <5 NTU)	DTW (ft BTOC)	Drawdown (ft) (Max _____ ft)
0946	.200	0.6	10.37	707	2.77	242.5	6.59	L	7.95	0.05
0950	.200	1.4	10.16	593	1.85	247.2	6.66	L	7.95	0.05
0954	.200	2.2	10.17	506	1.36	241.9	6.69	L	7.95	0.05
0958	.200	3.0	10.21	553	1.24	232.6	6.71	L	7.95	0.05
1002	.200	3.8	10.27	548	0.99	222.5	6.77	L	7.95	0.05
1006	.200	4.6	10.29	545	0.88	218.3	6.80	L	7.95	0.05
1010	.200	5.4	10.41	542	0.86	215.9	6.84	L	7.95	0.05
Parameter Stable (Check applicable) ✓ ✓ ✓ ✓										
Sample Color: <u>None</u>			Sample Odor: <u>None</u>			Sheen: <u>None</u>				
Analyses				Analytical Sampling						
				Check Applicable						
16 Petroleum Vocs				✓						
GRW IBTEX				✓						
PAH				✓						
DRO				✓						
Notes:										
Equipment: Pump Type <u>Peristaltic</u> Tubing (Type/Length) <u>1/4" OD PTFE-lined</u> Bailer Type _____ Water Level Meter <u>Geo Slope indicator</u> 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 checked="" type="checkbox"/> Containerized <input checked="" type="checkbox"/> Treated (how?) <u>Transported to PS01</u>										

Groundwater Sampling Form

Site/Client Name: APSC PSD1				Well ID: SENTRY-3R						
Project #: 105.01288.1601				Sample ID: SENTRY-3R						
Sampled By: C. GIRANT				Sample Time: 1129		Sample Date: 8/1/2016				
Weather Conditions: 60°F cloudy				Duplicate ID: —						
Sampling Method: <input checked="" type="checkbox"/> Low Flow <input type="checkbox"/> Other				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: 2 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): 7.35				Tubing/Pump Depth (ft. BTOC): ~10						
Total Depth (ft. BTOC): —				Purge Start Time (24-hr): 1116 Start @ 11:50 L						
Depth to Product (ft. BTOC): —				Purge End Time (24-hr): 1128 112						
Product Thickness (ft): —				Total Purge Time (min): 12						
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%)	ORP (mV) (± 10mV)	pH (± 0.1)	Turbidity (NTU) (± 10%, or <5 NTU)	DTW (ft BTOC)	Drawdown (ft) (Max — ft)
1114	200	11.50	9.59	0.449	3.08	178.5	7.01		7.40	.05
1119	200	12.0	9.46	0.449	0.99	150.5	6.99		7.40	.05
1122	200	12.5	9.54	0.449	0.59	181.9	6.94		7.40	.05
1125	200	13.0	9.52	0.449	0.52	181.4	6.95		7.40	.05
1128	200	13.5	9.48	0.450	0.82	180.0	6.94		7.40	.05
Parameter Stable (Check applicable) ✓ ✓ ✓ ✓										
Sample Color: CLEAR			Sample Odor: NONE			Sheen: NONE				
Analyses				Analytical Sampling				Comments		
Check Applicable										
DRO, GAS, BTEX & PAH				✓						
Notes:										
Equipment: Pump Type Peristaltic Tubing (Type/Length) 1/4" OD PTFE-lined Bailer Type — Water Level Meter Geo Slick Multi-Parameter Meter (Make/SN#) YJ4 556 Turbidity Meter (Make/SN#) Filter Lot # Purge Water Handling: <input type="checkbox"/> Discharged to surface <input checked="" type="checkbox"/> Containerized <input checked="" type="checkbox"/> Treated (how?) Transported to PSD1										



Surface Water Sampling Form

Client / Site Name: APSC / PS01 <u>HAPPY VALLEY</u>		Location ID: SW- <u>02R</u>				
Project #: 105.01288.1601 <u>17015</u>		Sample ID: <u>WS-2R</u>				
Sampled By: <u>C. Venot</u>		Sample Time: <u>0940</u> Sample Date: <u>8/11/2017</u>				
Weather Conditions: <u>60°F light drizzle</u>		Duplicate ID: _____				
		MS/MSD <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Trip Blank Required: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				
Location Information						
Distance from Bank (ft): <u>1</u>		Depth of Water (ft): <u>0.8</u>				
Flowing Water: <input checked="" type="checkbox"/> Rapid <input type="checkbox"/> Slow <input type="checkbox"/> Stagnant Pool						
Co-Located Sediment Sample: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		GPS Coordinates: Northing _____ Easting _____				
Sheen Test						
<input checked="" type="checkbox"/> No Sheen <input type="checkbox"/> Sheen Observed: POL-fluid rainbow / Biogenic-platey / other _____						
Water Quality Parameters						
Temp (°C)	Specific Conductance (µS/cm)	DO (mg/L)	pH	ORP (mV)	Color	Odor
<u>13.47</u>	<u>33</u>	<u>2.78</u>	<u>7.85</u>	<u>135.4</u>	<u>clear</u>	<u>none</u>
Analytical Sampling						
Analyses	Number/Type of Bottle	Preservative/Comments	Analyses	Number/Type of Bottle	Preservative/Comments	
BTEX	3x - 40 mL VOA	HCl				
PAH SIM	2x - 250 mL Amber					
Sulfate	1x - 125 mL poly	Eq. Shop only				
Notes (indicate collection method): 250 mL unpreserved bottle dip						
Equipment Used: Pump Type _____ N/A (Type/Length) _____ N/A						
Multi-Parameter Meter (Make/SN#) <u>YSI 556</u> Turbidity Meter (Make/SN#) _____ N/A						
GPS (Type/Unit Number) _____ N/A Filter Lot # _____ N/A						

Client / Site Name: APSC / PS01 <u>HAPPY VALLEY</u>		Location ID: SW- <u>WS-10R</u>				
Project #: 105.01288.1601 <u>17015</u>		Sample ID: <u>WS-10R</u>				
Sampled By: <u>C. Venot</u>		Sample Time: <u>0952</u> Sample Date: <u>8/11/2017</u>				
Weather Conditions: <u>60°F light drizzle</u>		Duplicate ID: <u>WS-19A</u>				
		MS/MSD <input type="checkbox"/> Yes <input type="checkbox"/> No Trip Blank Required: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				
Location Information						
Distance from Bank (ft): <u>1</u>		Depth of Water (ft): <u>0.8</u>				
Distance from Bank (ft): _____						
Co-Located Sediment Sample: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		GPS Coordinates: Northing _____ Easting _____				
Sheen Test						
<input checked="" type="checkbox"/> No Sheen <input type="checkbox"/> Sheen Observed: POL-fluid rainbow / Biogenic-platey / other _____						
Water Quality Parameters						
Temp (°C)	Specific Conductance (µS/cm)	Temp (°C) DO	Specific Conductance (µS/cm) pH	Temp (°C) ORP	Specific Conductance (µS/cm)	Odor Temp (°C)
<u>13.51</u>	<u>24</u>	<u>8.72</u>	<u>8.02</u>	<u>136.3</u>	<u>clear</u>	<u>none</u>
Analytical Sampling						
Analyses	Number/Type of Bottle	Analyses	Number/Type of Bottle	Analyses	Number/Type of Bottle	
BTEX	3x - 40 mL VOA	BTEX	3x - 40 mL VOA	BTEX	3x - 40 mL VOA	
PAH SIM	2x - 250 mL Amber	PAH SIM	2x - 250 mL Amber	PAH SIM	2x - 250 mL Amber	
Sulfate	1x - 125 mL poly	Sulfate	1x - 125 mL poly	Sulfate	1x - 125 mL poly	
Notes (indicate collection method): 250 mL unpreserved bottle dip						
Equipment Used: Pump Type _____ N/A (Type/Length) _____ N/A						
Multi-Parameter Meter (Make/SN#) <u>YSI 556</u> Turbidity Meter (Make/SN#) _____ N/A						
GPS (Type/Unit Number) _____ N/A Filter Lot # _____ N/A						

APPENDIX D

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

**2017 Water Monitoring Report
Happy Valley West
ALYESKA PIPELINE SERVICE COMPANY
PO Box 196660
3700 Centerpoint Drive
Anchorage, Alaska 99519-6660**

January 2018

Report

LABORATORY DATA QUALITY ASSURANCE REVIEW

HAPPY VALLEY WEST GROUNDWATER AND SURFACE WATER MONITORING 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 105.01288.17015

ADEC File Number 330.38.049

ACRONYMS AND ABBREVIATIONS

%	percent
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
EDD	electronic data deliverable
GRO	gasoline range organics
GW	groundwater
ID	identification
LCL	lower control limit
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
LOD	limit of detection
LOQ	limit of quantitation
LV	low volume
mg/L	milligram per liter
MS	matrix spike
MSD	matrix spike duplicate
ND	not detected
PAH	polycyclic aromatic hydrocarbons
PARCCS	precision, accuracy, representativeness, comparability, completeness, and sensitivity
QA	quality assurance
QAR	quality assurance review
QC	quality control
QCS	quality control sample
RPD	relative percent difference
SDG	sample delivery group
SGS	SGS North America, Inc.
SIM	selective ion monitoring
SLR	SLR International Corporation
SM	Standard Methods
UCL	upper control limit
µg/L	micrograms per liter
VOA	volatile organic analysis
VOC	volatile organic compounds

Introduction

This report summarizes a review of analytical data for groundwater and surface water samples collected on August 1, 2017 at Happy Valley West. 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, Method, and Analyte Summary

SDG	Date Collected	Date Received by Laboratory	Temperature Blank	Matrix	Analytical Method	Analyte
1115178	8/1/17	SGS, Anchorage 8/3/17	4.3°C	Groundwater and Surface Water	SW8021B	BTEX
					SW8260C	Petroleum VOCs ¹
					AK101	GRO
					AK102 LV	DRO
					SW8270D LV	PAH SIM

Note:

1 - 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 xylenes

DRO – diesel range organics

GRO – gasoline range organics

LV – low volume

PAH – polynuclear aromatic hydrocarbons

SDG – sample delivery group

SIM – selective ion monitoring

VOC – volatile organic compounds

The laboratory final report was provided as Level II deliverable, and included documentation of the delivery group chain-of-custody (COC) and sample receipt condition. A Microsoft Access compatible electronic data deliverable (EDD) for the report was also provided. The PDF laboratory report is provided electronically 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 quality assurance program and standard operating procedures.

The analytical data was reviewed for consistency with any project specific requirements, *ADEC Technical Memorandum, Environmental Laboratory Data and Quality Assurance* (ADEC 2017b) 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, 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 narrative 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 deliverable and was reviewed only from the case narrative;
- Verifying that surrogate analyses were within recovery acceptance limits;
- Verifying that Laboratory Control Samples (LCS), Laboratory Control Sample Duplicates (LCSD), Matrix Spike (MS), and Matrix Spike Duplicate (MSD) recoveries were within acceptance limits;
- Evaluating the result relative percent difference (RPD) between primary and duplicate field samples, LCS/LCSD, and MS/MSD; and
- Providing an overall assessment of laboratory data quality and qualifying sample results as necessary.

Data Qualifications

As part of the quality assurance review, 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.

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.

Sample Receipt

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

- The COC recorded the trip blank collection date as July 14, 2017 with no time indicated. Typically the trip blank is assigned a sample collection date and time matching that of the first sample collected. The laboratory correctly reported the trip blank as having the same collection date and time as that of the earliest sample (August 1, 2017 at 0940). Data was not impacted.

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 not detected (ND) in any method blanks at or above the Limit of Detection (LOD), except as noted in Table 3. Since a high bias would be indicated by the method blank, and all associated samples had toluene results of ND, data was not affected.

Table 3 Method Blank Detections

Sample ID	Method	Analyte	Result (µg/L)	LOD (µg/L)
MB	SW8021B	Toluene	1.1	0.5

Trip Blanks

One trip blank was submitted and analyzed for volatile methods (GRO by AK101, BTEX by SW8021B, and Petroleum VOCs by SW8260C). Analytes were not detected in the trip blank at or above the LOD.

Reporting Limits

For non-detect results, LODs were compared to applicable cleanup levels for the site. For ground water samples, LODs were compared to 18 AAC 75, *Oil and Other Hazardous Substances Pollution Control*, section .345 Table C, Groundwater Cleanup Levels (ADEC, 2017c). For surface water samples, LODs were compared to 18 AAC 70, *Water Quality Standards* (ADEC, 2017a). ADEC 18 AAC 70 references *Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances* (ADEC, 2008). All results of non-detect 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, except as noted in Table 4.

Table 4 CCV Recovery Exceedances and Affected Data

Sample ID	Lab ID	Analytical Batch	Method	Analyte	Percent Recovery (%)	Recovery Limit (%)
CCV 1765682	1403717	VFC13797	SW8021B	Benzene	122	80-120
CCV 1765682	1403721				123	80-120
All associated samples had results of ND for the listed analyte. Data was not affected.						

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, except as noted in Table 5.

Table 5 LCS/LCSD Recovery Qualifications

Lab ID	Method Analyte	Prep Batch	LCSD Recovery (%)	Recovery Limits (%)
1403711	Benzene	VXX31040	123	80-120
All associated samples had results of ND for the listed analyte. Data was not affected.				

Matrix Spike and Matrix Spike Duplicate Samples

MS and MSDs were analyzed at the appropriate frequencies. All MS and MSD recoveries and RPDs were within analytical method and SGS percent recovery acceptance limits.

Field Duplicates

The field duplicate sample frequency is presented in Table 6. Parent sample and field duplicate pairs are presented in Table 7. 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.

Table 6 Field Duplicate Frequency, Methods, and Analytes

Matrix	Analytical Method	Analyte	Number of Primary Samples	Number of Field Duplicates
Groundwater	SW8021B	BTEX	3	1
	AK101	GRO	3	1
	AK102 LV	DRO	3	1
	SW8270D LV	PAH SIM	2	1
Surface water	SW8021B	BTEX	2	1
	SW8270D LV	PAH SIM	2	1

Abbreviations:

BTEX – benzene, toluene, ethylbenzene, and xylenes

DRO – diesel range organics

GRO – gasoline range organics

LV – low volume

PAH – polynuclear aromatic hydrocarbons

SIM – selective ion monitoring

Table 7 Field Duplicate Identification

Sample Type	Parent Sample ID	Duplicate Sample ID	All RPDs acceptable (Y/N)
Groundwater	Sentry-1R	Sentry-4R	N
Surface water	WS-2R	WS-99R	Y

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, except as noted in the CCV and LCS/LCSD sections.
- 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% complete with respect to analysis because no data were rejected.
- Sensitivity: Sensitivity goals were met, except as noted in the Method Blanks section.

This data were considered of good quality and acceptable for use with the noted limitations and qualifications in this QAR. No data were rejected.

References

- ADEC, 2008. Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances. December.
- ADEC, 2017a. Water Quality Standards. Amended as of February 5.
- ADEC, 2017b. Data Quality Objectives, Checklists, Quality Assurance Requirements for Laboratory Data, and Sample Handling. Technical Memorandum. March 2017.
- ADEC, 2017c. Alaska Administrative Code (18 AAC 75), Oil and Other Hazardous Substances Pollution Control. Revised as of March 23, 2017.

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 17, 2017

CS Report Name:

Happy Valley West
Groundwater and Surface
Water Monitoring

Report Date:

August 21, 2017

Consultant Firm:

SLR International Corporation

Laboratory Name:

SGS Anchorage, AK.

Laboratory Report Number:

1175178

ADEC File Number:

330.38.049

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 is ADEC approved for the methods used.

- 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:

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:

The COC recorded the trip blank collection date as July 14, 2017 with no time indicated. Typically the trip blank is assigned a sample collection date and time matching that of the first sample collected. The laboratory correctly reported the trip blank as having the same collection date and time as that of the earliest sample (August 1, 2017 at 0940). Data was not impacted.

- 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:

All samples were received in acceptable condition.

- 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.?

No discrepancies were noted.

☒ Yes ☐ No

Comments:

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:

The case narrative notes an LCSD exceedance and a MB detection. All affected samples, in both instances, were ND.

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:

N/A, no effect.

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.

d. Are the reported LOQs less than the Cleanup Level or the minimum required detection level for the project?

All reported LOQs were less than the cleanup levels.

☒ 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:

The method blank for toluene (Method SW8021B), had a detection of 1.1µg/L. All associated samples had results of ND and data was not affected.

iii. If above LOQ, what samples are affected?

Comments:

All associated samples had results of ND, therefore, no data was affected.

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

☐ Yes ☒ No

Comments:

N/A, no data were affected.

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:

No metals or inorganics were analyzed.

- 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:

Two CCVs and one LCSD had benzene recoveries (122%, 123%, and 123%) slightly above the acceptable upper control limit of 120%.

- 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:

A high bias was indicated and all associated samples had results of ND for the listed analyte. Data was not affected.

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

☐ Yes ☒ No

Comments:

N/A, all affected samples had results of ND.

- vii. Data quality or usability affected?

Comments:

Data was not affected.

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, all surrogate recoveries were acceptable.

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:

Yes, only one cooler was used to transport all samples on this workorder.

iii. All results less than LOQ?

☒ Yes ☐ No

Comments:

iv. If above LOQ, what samples are affected?

Comments:

No samples were reported above LOQ.

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:

One field duplicate was analyzed per 10 samples per analyte and matrix.

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:

Samples with both results below the LOQ (J flagged or non-detect) were considered acceptable without qualification.

- iv. Data quality or usability affected?

Comments:

No impact.

- 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 affect.

- 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:

All other data flags and qualifiers were defined appropriately.

Attachment 2

Laboratory Deliverables

(Data package and electronic files)

Laboratory Report of Analysis

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

Report Number: **1175178**

Client Project: **APSC PS01 Happy Valley**

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

2017.10.20

08:35:14 -08'00'

Justin Nelson
Project Manager
Justin.Nelson@sgs.com

Date

Revised Report - This report has been reissued to include a signature and pagination.
No data has changed.

Print Date: 08/18/2017 3:02:49PM

Case Narrative

SGS Client: **Alyeska Pipeline Srv Co.**
 SGS Project: **1175178**
 Project Name/Site: **APSC PS01 Happy Valley**
 Project Contact: **Scott Rose**

Refer to sample receipt form for information on sample condition.

LCSD for HBN 1765681 [VXX/3104 (1403711) LCSD

8021B - LCSD recovery for benzene (123%) does not meet QC criteria. However this analyte is non detect in the associated samples.

MB for HBN 1765681 [VXX/31040] (1403709) MB

AK101/8021B - MB has toluene concentration above LOQ and it does not meet QC criteria. However this analyte is non detect in the associated samples.

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

Print Date: 08/18/2017 3:02:50PM

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>
WS-2R	1175178001	08/01/2017	08/03/2017	Water (Surface, Eff., Ground)
WS-10R	1175178002	08/01/2017	08/03/2017	Water (Surface, Eff., Ground)
WS-99R	1175178003	08/01/2017	08/03/2017	Water (Surface, Eff., Ground)
Sentry-1R	1175178004	08/01/2017	08/03/2017	Water (Surface, Eff., Ground)
Sentry-2R	1175178005	08/01/2017	08/03/2017	Water (Surface, Eff., Ground)
Sentry-3R	1175178006	08/01/2017	08/03/2017	Water (Surface, Eff., Ground)
Sentry-4R	1175178007	08/01/2017	08/03/2017	Water (Surface, Eff., Ground)
Trip Blank	1175178008	08/01/2017	08/03/2017	Water (Surface, Eff., Ground)

<u>Method</u>	<u>Method Description</u>
8270D SIM LV (PAH)	8270 PAH SIM GC/MS Liq/Liq ext. LV
AK101	AK101/8021 Combo.
SW8021B	AK101/8021 Combo.
SW8021B	BTEX 8021
SW8260C	BTEX 8260 w/Naphthalene (W)
AK102	DRO Low Volume (W)

Print Date: 08/18/2017 3:02:54PM

Detectable Results Summary

Client Sample ID: **Sentry-1R**

Lab Sample ID: 1175178004

Polynuclear Aromatics GC/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Naphthalene	0.0611J	ug/L

Client Sample ID: **Sentry-2R**

Lab Sample ID: 1175178005

Semivolatile Organic Fuels

Volatile Fuels

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	0.261J	mg/L
o-Xylene	0.330J	ug/L

Client Sample ID: **Sentry-4R**

Lab Sample ID: 1175178007

Polynuclear Aromatics GC/MS

Semivolatile Organic Fuels

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Naphthalene	0.0546J	ug/L
Diesel Range Organics	0.183J	mg/L

Results of WS-2R

Client Sample ID: **WS-2R**
 Client Project ID: **APSC PS01 Happy Valley**
 Lab Sample ID: 1175178001
 Lab Project ID: 1175178

Collection Date: 08/01/17 09:40
 Received Date: 08/03/17 10:09
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by Polynuclear Aromatics GC/MS

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Acenaphthene	0.0256 U	0.0512	0.0154	ug/L	1		08/16/17 17:18
Acenaphthylene	0.0256 U	0.0512	0.0154	ug/L	1		08/16/17 17:18
Anthracene	0.0256 U	0.0512	0.0154	ug/L	1		08/16/17 17:18
Benzo(a)Anthracene	0.0256 U	0.0512	0.0154	ug/L	1		08/16/17 17:18
Benzo[a]pyrene	0.0103 U	0.0205	0.00635	ug/L	1		08/16/17 17:18
Benzo[b]Fluoranthene	0.0256 U	0.0512	0.0154	ug/L	1		08/16/17 17:18
Benzo[g,h,i]perylene	0.0256 U	0.0512	0.0154	ug/L	1		08/16/17 17:18
Benzo[k]fluoranthene	0.0256 U	0.0512	0.0154	ug/L	1		08/16/17 17:18
Chrysene	0.0256 U	0.0512	0.0154	ug/L	1		08/16/17 17:18
Dibenzo[a,h]anthracene	0.0103 U	0.0205	0.00635	ug/L	1		08/16/17 17:18
Fluoranthene	0.0256 U	0.0512	0.0154	ug/L	1		08/16/17 17:18
Fluorene	0.0256 U	0.0512	0.0154	ug/L	1		08/16/17 17:18
Indeno[1,2,3-c,d] pyrene	0.0256 U	0.0512	0.0154	ug/L	1		08/16/17 17:18
Naphthalene	0.0510 U	0.102	0.0318	ug/L	1		08/16/17 17:18
Phenanthrene	0.0256 U	0.0512	0.0154	ug/L	1		08/16/17 17:18
Pyrene	0.0256 U	0.0512	0.0154	ug/L	1		08/16/17 17:18
Surrogates							
2-Fluorobiphenyl (surr)	82.5	53-106		%	1		08/16/17 17:18
Terphenyl-d14 (surr)	79.5	58-132		%	1		08/16/17 17:18

Batch Information

Analytical Batch: XMS10314
 Analytical Method: 8270D SIM LV (PAH)
 Analyst: NRB
 Analytical Date/Time: 08/16/17 17:18
 Container ID: 1175178001-D

Prep Batch: XXX38062
 Prep Method: SW3520C
 Prep Date/Time: 08/04/17 07:56
 Prep Initial Wt./Vol.: 244 mL
 Prep Extract Vol: 1 mL

Results of WS-2R

Client Sample ID: **WS-2R**
 Client Project ID: **APSC PS01 Happy Valley**
 Lab Sample ID: 1175178001
 Lab Project ID: 1175178

Collection Date: 08/01/17 09:40
 Received Date: 08/03/17 10:09
 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		08/07/17 22:12
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		08/07/17 22:12
o-Xylene	0.500 U	1.00	0.310	ug/L	1		08/07/17 22:12
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		08/07/17 22:12
Toluene	0.500 U	1.00	0.310	ug/L	1		08/07/17 22:12
Surrogates							
1,4-Difluorobenzene (surr)	94.2	77-115		%	1		08/07/17 22:12

Batch Information

Analytical Batch: VFC13797
 Analytical Method: SW8021B
 Analyst: ST
 Analytical Date/Time: 08/07/17 22:12
 Container ID: 1175178001-A

Prep Batch: VXX31040
 Prep Method: SW5030B
 Prep Date/Time: 08/07/17 08:00
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL

Results of WS-10R

Client Sample ID: **WS-10R**
 Client Project ID: **APSC PS01 Happy Valley**
 Lab Sample ID: 1175178002
 Lab Project ID: 1175178

Collection Date: 08/01/17 09:52
 Received Date: 08/03/17 10:09
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by Polynuclear Aromatics GC/MS

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Acenaphthene	0.0236 U	0.0472	0.0142	ug/L	1		08/16/17 17:38
Acenaphthylene	0.0236 U	0.0472	0.0142	ug/L	1		08/16/17 17:38
Anthracene	0.0236 U	0.0472	0.0142	ug/L	1		08/16/17 17:38
Benzo(a)Anthracene	0.0236 U	0.0472	0.0142	ug/L	1		08/16/17 17:38
Benzo[a]pyrene	0.00945 U	0.0189	0.00585	ug/L	1		08/16/17 17:38
Benzo[b]Fluoranthene	0.0236 U	0.0472	0.0142	ug/L	1		08/16/17 17:38
Benzo[g,h,i]perylene	0.0236 U	0.0472	0.0142	ug/L	1		08/16/17 17:38
Benzo[k]fluoranthene	0.0236 U	0.0472	0.0142	ug/L	1		08/16/17 17:38
Chrysene	0.0236 U	0.0472	0.0142	ug/L	1		08/16/17 17:38
Dibenzo[a,h]anthracene	0.00945 U	0.0189	0.00585	ug/L	1		08/16/17 17:38
Fluoranthene	0.0236 U	0.0472	0.0142	ug/L	1		08/16/17 17:38
Fluorene	0.0236 U	0.0472	0.0142	ug/L	1		08/16/17 17:38
Indeno[1,2,3-c,d] pyrene	0.0236 U	0.0472	0.0142	ug/L	1		08/16/17 17:38
Naphthalene	0.0471 U	0.0943	0.0292	ug/L	1		08/16/17 17:38
Phenanthrene	0.0236 U	0.0472	0.0142	ug/L	1		08/16/17 17:38
Pyrene	0.0236 U	0.0472	0.0142	ug/L	1		08/16/17 17:38
Surrogates							
2-Fluorobiphenyl (surr)	82.8	53-106		%	1		08/16/17 17:38
Terphenyl-d14 (surr)	79.8	58-132		%	1		08/16/17 17:38

Batch Information

Analytical Batch: XMS10314
 Analytical Method: 8270D SIM LV (PAH)
 Analyst: NRB
 Analytical Date/Time: 08/16/17 17:38
 Container ID: 1175178002-D

Prep Batch: XXX38062
 Prep Method: SW3520C
 Prep Date/Time: 08/04/17 07:56
 Prep Initial Wt./Vol.: 265 mL
 Prep Extract Vol: 1 mL

Results of WS-10R

Client Sample ID: **WS-10R**
 Client Project ID: **APSC PS01 Happy Valley**
 Lab Sample ID: 1175178002
 Lab Project ID: 1175178

Collection Date: 08/01/17 09:52
 Received Date: 08/03/17 10:09
 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		08/07/17 22:31
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		08/07/17 22:31
o-Xylene	0.500 U	1.00	0.310	ug/L	1		08/07/17 22:31
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		08/07/17 22:31
Toluene	0.500 U	1.00	0.310	ug/L	1		08/07/17 22:31
Surrogates							
1,4-Difluorobenzene (surr)	93.7	77-115		%	1		08/07/17 22:31

Batch Information

Analytical Batch: VFC13797
 Analytical Method: SW8021B
 Analyst: ST
 Analytical Date/Time: 08/07/17 22:31
 Container ID: 1175178002-A

Prep Batch: VXX31040
 Prep Method: SW5030B
 Prep Date/Time: 08/07/17 08:00
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL

Results of WS-99R

Client Sample ID: **WS-99R**
 Client Project ID: **APSC PS01 Happy Valley**
 Lab Sample ID: 1175178003
 Lab Project ID: 1175178

Collection Date: 08/01/17 18:00
 Received Date: 08/03/17 10:09
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by Polynuclear Aromatics GC/MS

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Acenaphthene	0.0240 U	0.0481	0.0144	ug/L	1		08/16/17 17:59
Acenaphthylene	0.0240 U	0.0481	0.0144	ug/L	1		08/16/17 17:59
Anthracene	0.0240 U	0.0481	0.0144	ug/L	1		08/16/17 17:59
Benzo(a)Anthracene	0.0240 U	0.0481	0.0144	ug/L	1		08/16/17 17:59
Benzo[a]pyrene	0.00960 U	0.0192	0.00596	ug/L	1		08/16/17 17:59
Benzo[b]Fluoranthene	0.0240 U	0.0481	0.0144	ug/L	1		08/16/17 17:59
Benzo[g,h,i]perylene	0.0240 U	0.0481	0.0144	ug/L	1		08/16/17 17:59
Benzo[k]fluoranthene	0.0240 U	0.0481	0.0144	ug/L	1		08/16/17 17:59
Chrysene	0.0240 U	0.0481	0.0144	ug/L	1		08/16/17 17:59
Dibenzo[a,h]anthracene	0.00960 U	0.0192	0.00596	ug/L	1		08/16/17 17:59
Fluoranthene	0.0240 U	0.0481	0.0144	ug/L	1		08/16/17 17:59
Fluorene	0.0240 U	0.0481	0.0144	ug/L	1		08/16/17 17:59
Indeno[1,2,3-c,d] pyrene	0.0240 U	0.0481	0.0144	ug/L	1		08/16/17 17:59
Naphthalene	0.0481 U	0.0962	0.0298	ug/L	1		08/16/17 17:59
Phenanthrene	0.0240 U	0.0481	0.0144	ug/L	1		08/16/17 17:59
Pyrene	0.0240 U	0.0481	0.0144	ug/L	1		08/16/17 17:59
Surrogates							
2-Fluorobiphenyl (surr)	81	53-106		%	1		08/16/17 17:59
Terphenyl-d14 (surr)	79.5	58-132		%	1		08/16/17 17:59

Batch Information

Analytical Batch: XMS10314
 Analytical Method: 8270D SIM LV (PAH)
 Analyst: NRB
 Analytical Date/Time: 08/16/17 17:59
 Container ID: 1175178003-D

Prep Batch: XXX38062
 Prep Method: SW3520C
 Prep Date/Time: 08/04/17 07:56
 Prep Initial Wt./Vol.: 260 mL
 Prep Extract Vol: 1 mL

Results of WS-99R

Client Sample ID: **WS-99R**
 Client Project ID: **APSC PS01 Happy Valley**
 Lab Sample ID: 1175178003
 Lab Project ID: 1175178

Collection Date: 08/01/17 18:00
 Received Date: 08/03/17 10:09
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by Volatile Fuels

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.250 U	0.500	0.150	ug/L	1		08/07/17 22:50
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		08/07/17 22:50
o-Xylene	0.500 U	1.00	0.310	ug/L	1		08/07/17 22:50
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		08/07/17 22:50
Toluene	0.500 U	1.00	0.310	ug/L	1		08/07/17 22:50
Surrogates							
1,4-Difluorobenzene (surr)	93.7	77-115		%	1		08/07/17 22:50

Batch Information

Analytical Batch: VFC13797
 Analytical Method: SW8021B
 Analyst: ST
 Analytical Date/Time: 08/07/17 22:50
 Container ID: 1175178003-A

Prep Batch: VXX31040
 Prep Method: SW5030B
 Prep Date/Time: 08/07/17 08:00
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL

Results of Sentry-1R

Client Sample ID: **Sentry-1R**
 Client Project ID: **APSC PS01 Happy Valley**
 Lab Sample ID: 1175178004
 Lab Project ID: 1175178

Collection Date: 08/01/17 10:20
 Received Date: 08/03/17 10:09
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by Polynuclear Aromatics GC/MS

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Acenaphthene	0.0250 U	0.0500	0.0150	ug/L	1		08/16/17 18:19
Acenaphthylene	0.0250 U	0.0500	0.0150	ug/L	1		08/16/17 18:19
Anthracene	0.0250 U	0.0500	0.0150	ug/L	1		08/16/17 18:19
Benzo(a)Anthracene	0.0250 U	0.0500	0.0150	ug/L	1		08/16/17 18:19
Benzo[a]pyrene	0.0100 U	0.0200	0.00620	ug/L	1		08/16/17 18:19
Benzo[b]Fluoranthene	0.0250 U	0.0500	0.0150	ug/L	1		08/16/17 18:19
Benzo[g,h,i]perylene	0.0250 U	0.0500	0.0150	ug/L	1		08/16/17 18:19
Benzo[k]fluoranthene	0.0250 U	0.0500	0.0150	ug/L	1		08/16/17 18:19
Chrysene	0.0250 U	0.0500	0.0150	ug/L	1		08/16/17 18:19
Dibenzo[a,h]anthracene	0.0100 U	0.0200	0.00620	ug/L	1		08/16/17 18:19
Fluoranthene	0.0250 U	0.0500	0.0150	ug/L	1		08/16/17 18:19
Fluorene	0.0250 U	0.0500	0.0150	ug/L	1		08/16/17 18:19
Indeno[1,2,3-c,d] pyrene	0.0250 U	0.0500	0.0150	ug/L	1		08/16/17 18:19
Naphthalene	0.0611 J	0.100	0.0310	ug/L	1		08/16/17 18:19
Phenanthrene	0.0250 U	0.0500	0.0150	ug/L	1		08/16/17 18:19
Pyrene	0.0250 U	0.0500	0.0150	ug/L	1		08/16/17 18:19
Surrogates							
2-Fluorobiphenyl (surr)	86	53-106		%	1		08/16/17 18:19
Terphenyl-d14 (surr)	82.4	58-132		%	1		08/16/17 18:19

Batch Information

Analytical Batch: XMS10314
 Analytical Method: 8270D SIM LV (PAH)
 Analyst: NRB
 Analytical Date/Time: 08/16/17 18:19
 Container ID: 1175178004-G

Prep Batch: XXX38062
 Prep Method: SW3520C
 Prep Date/Time: 08/04/17 07:56
 Prep Initial Wt./Vol.: 250 mL
 Prep Extract Vol: 1 mL

Results of Sentry-1R

Client Sample ID: **Sentry-1R**
 Client Project ID: **APSC PS01 Happy Valley**
 Lab Sample ID: 1175178004
 Lab Project ID: 1175178

Collection Date: 08/01/17 10:20
 Received Date: 08/03/17 10:09
 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	0.294 U	0.588	0.176	mg/L	1		08/06/17 22:03
Surrogates							
5a Androstane (surr)	80.9	50-150		%	1		08/06/17 22:03

Batch Information

Analytical Batch: XFC13638
 Analytical Method: AK102
 Analyst: JMG
 Analytical Date/Time: 08/06/17 22:03
 Container ID: 1175178004-I

Prep Batch: XXX38079
 Prep Method: SW3520C
 Prep Date/Time: 08/06/17 09:20
 Prep Initial Wt./Vol.: 255 mL
 Prep Extract Vol: 1 mL

Results of Sentry-1R

Client Sample ID: **Sentry-1R**
 Client Project ID: **APSC PS01 Happy Valley**
 Lab Sample ID: 1175178004
 Lab Project ID: 1175178

Collection Date: 08/01/17 10:20
 Received Date: 08/03/17 10:09
 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>
Gasoline Range Organics	0.0500 U	0.100	0.0310	mg/L	1		08/07/17 23:09

Surrogates

4-Bromofluorobenzene (surr)	91.9	50-150		%	1		08/07/17 23:09
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Batch Information

Analytical Batch: VFC13797
 Analytical Method: AK101
 Analyst: ST
 Analytical Date/Time: 08/07/17 23:09
 Container ID: 1175178004-A

Prep Batch: VXX31040
 Prep Method: SW5030B
 Prep Date/Time: 08/07/17 08:00
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL

<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		08/07/17 23:09
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		08/07/17 23:09
o-Xylene	0.500 U	1.00	0.310	ug/L	1		08/07/17 23:09
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		08/07/17 23:09
Toluene	0.500 U	1.00	0.310	ug/L	1		08/07/17 23:09

Surrogates

1,4-Difluorobenzene (surr)	92.9	77-115		%	1		08/07/17 23:09
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Batch Information

Analytical Batch: VFC13797
 Analytical Method: SW8021B
 Analyst: ST
 Analytical Date/Time: 08/07/17 23:09
 Container ID: 1175178004-A

Prep Batch: VXX31040
 Prep Method: SW5030B
 Prep Date/Time: 08/07/17 08:00
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL

Results of Sentry-1R

Client Sample ID: **Sentry-1R**
 Client Project ID: **APSC PS01 Happy Valley**
 Lab Sample ID: 1175178004
 Lab Project ID: 1175178

Collection Date: 08/01/17 10:20
 Received Date: 08/03/17 10:09
 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		08/09/17 06:32
1,3,5-Trimethylbenzene	0.500 U	1.00	0.310	ug/L	1		08/09/17 06:32
Benzene	0.200 U	0.400	0.120	ug/L	1		08/09/17 06:32
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		08/09/17 06:32
Isopropylbenzene (Cumene)	0.500 U	1.00	0.310	ug/L	1		08/09/17 06:32
Methyl-t-butyl ether	5.00 U	10.0	3.10	ug/L	1		08/09/17 06:32
Naphthalene	0.500 U	1.00	0.310	ug/L	1		08/09/17 06:32
n-Butylbenzene	0.500 U	1.00	0.310	ug/L	1		08/09/17 06:32
n-Propylbenzene	0.500 U	1.00	0.310	ug/L	1		08/09/17 06:32
o-Xylene	0.500 U	1.00	0.310	ug/L	1		08/09/17 06:32
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		08/09/17 06:32
sec-Butylbenzene	0.500 U	1.00	0.310	ug/L	1		08/09/17 06:32
Styrene	0.500 U	1.00	0.310	ug/L	1		08/09/17 06:32
tert-Butylbenzene	0.500 U	1.00	0.310	ug/L	1		08/09/17 06:32
Toluene	0.500 U	1.00	0.310	ug/L	1		08/09/17 06:32
Xylenes (total)	1.50 U	3.00	1.00	ug/L	1		08/09/17 06:32
Surrogates							
1,2-Dichloroethane-D4 (surr)	104	81-118		%	1		08/09/17 06:32
4-Bromofluorobenzene (surr)	103	85-114		%	1		08/09/17 06:32
Toluene-d8 (surr)	103	89-112		%	1		08/09/17 06:32

Batch Information

Analytical Batch: VMS17043
 Analytical Method: SW8260C
 Analyst: FDR
 Analytical Date/Time: 08/09/17 06:32
 Container ID: 1175178004-D

Prep Batch: VXX31056
 Prep Method: SW5030B
 Prep Date/Time: 08/08/17 06:00
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL

Results of Sentry-2R

Client Sample ID: **Sentry-2R**
 Client Project ID: **APSC PS01 Happy Valley**
 Lab Sample ID: 1175178005
 Lab Project ID: 1175178

Collection Date: 08/01/17 11:08
 Received Date: 08/03/17 10:09
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by Polynuclear Aromatics GC/MS

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Acenaphthene	0.0270 U	0.0539	0.0162	ug/L	1		08/16/17 18:40
Acenaphthylene	0.0270 U	0.0539	0.0162	ug/L	1		08/16/17 18:40
Anthracene	0.0270 U	0.0539	0.0162	ug/L	1		08/16/17 18:40
Benzo(a)Anthracene	0.0270 U	0.0539	0.0162	ug/L	1		08/16/17 18:40
Benzo[a]pyrene	0.0108 U	0.0216	0.00668	ug/L	1		08/16/17 18:40
Benzo[b]Fluoranthene	0.0270 U	0.0539	0.0162	ug/L	1		08/16/17 18:40
Benzo[g,h,i]perylene	0.0270 U	0.0539	0.0162	ug/L	1		08/16/17 18:40
Benzo[k]fluoranthene	0.0270 U	0.0539	0.0162	ug/L	1		08/16/17 18:40
Chrysene	0.0270 U	0.0539	0.0162	ug/L	1		08/16/17 18:40
Dibenzo[a,h]anthracene	0.0108 U	0.0216	0.00668	ug/L	1		08/16/17 18:40
Fluoranthene	0.0270 U	0.0539	0.0162	ug/L	1		08/16/17 18:40
Fluorene	0.0270 U	0.0539	0.0162	ug/L	1		08/16/17 18:40
Indeno[1,2,3-c,d] pyrene	0.0270 U	0.0539	0.0162	ug/L	1		08/16/17 18:40
Naphthalene	0.0540 U	0.108	0.0334	ug/L	1		08/16/17 18:40
Phenanthrene	0.0270 U	0.0539	0.0162	ug/L	1		08/16/17 18:40
Pyrene	0.0270 U	0.0539	0.0162	ug/L	1		08/16/17 18:40
Surrogates							
2-Fluorobiphenyl (surr)	75.3	53-106		%	1		08/16/17 18:40
Terphenyl-d14 (surr)	71.5	58-132		%	1		08/16/17 18:40

Batch Information

Analytical Batch: XMS10314
 Analytical Method: 8270D SIM LV (PAH)
 Analyst: NRB
 Analytical Date/Time: 08/16/17 18:40
 Container ID: 1175178005-D

Prep Batch: XXX38062
 Prep Method: SW3520C
 Prep Date/Time: 08/04/17 07:56
 Prep Initial Wt./Vol.: 232 mL
 Prep Extract Vol: 1 mL

Results of Sentry-2R

Client Sample ID: **Sentry-2R**
 Client Project ID: **APSC PS01 Happy Valley**
 Lab Sample ID: 1175178005
 Lab Project ID: 1175178

Collection Date: 08/01/17 11:08
 Received Date: 08/03/17 10:09
 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	0.261 J	0.610	0.183	mg/L	1		08/06/17 22:13
Surrogates							
5a Androstane (surr)	81.4	50-150		%	1		08/06/17 22:13

Batch Information

Analytical Batch: XFC13638
 Analytical Method: AK102
 Analyst: JMG
 Analytical Date/Time: 08/06/17 22:13
 Container ID: 1175178005-F

Prep Batch: XXX38079
 Prep Method: SW3520C
 Prep Date/Time: 08/06/17 09:20
 Prep Initial Wt./Vol.: 246 mL
 Prep Extract Vol: 1 mL

Results of Sentry-2R

Client Sample ID: **Sentry-2R**
 Client Project ID: **APSC PS01 Happy Valley**
 Lab Sample ID: 1175178005
 Lab Project ID: 1175178

Collection Date: 08/01/17 11:08
 Received Date: 08/03/17 10:09
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by Volatile Fuels

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Gasoline Range Organics	0.0500 U	0.100	0.0310	mg/L	1		08/07/17 23:28

Surrogates

4-Bromofluorobenzene (surr)	95	50-150		%	1		08/07/17 23:28
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Batch Information

Analytical Batch: VFC13797
 Analytical Method: AK101
 Analyst: ST
 Analytical Date/Time: 08/07/17 23:28
 Container ID: 1175178005-A

Prep Batch: VXX31040
 Prep Method: SW5030B
 Prep Date/Time: 08/07/17 08:00
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.250 U	0.500	0.150	ug/L	1		08/07/17 23:28
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		08/07/17 23:28
o-Xylene	0.330 J	1.00	0.310	ug/L	1		08/07/17 23:28
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		08/07/17 23:28
Toluene	0.500 U	1.00	0.310	ug/L	1		08/07/17 23:28

Surrogates

1,4-Difluorobenzene (surr)	94.3	77-115		%	1		08/07/17 23:28
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Batch Information

Analytical Batch: VFC13797
 Analytical Method: SW8021B
 Analyst: ST
 Analytical Date/Time: 08/07/17 23:28
 Container ID: 1175178005-A

Prep Batch: VXX31040
 Prep Method: SW5030B
 Prep Date/Time: 08/07/17 08:00
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL

Results of Sentry-3R

Client Sample ID: **Sentry-3R**
 Client Project ID: **APSC PS01 Happy Valley**
 Lab Sample ID: 1175178006
 Lab Project ID: 1175178

Collection Date: 08/01/17 11:29
 Received Date: 08/03/17 10:09
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by Polynuclear Aromatics GC/MS

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Acenaphthene	0.0265 U	0.0530	0.0159	ug/L	1		08/16/17 19:00
Acenaphthylene	0.0265 U	0.0530	0.0159	ug/L	1		08/16/17 19:00
Anthracene	0.0265 U	0.0530	0.0159	ug/L	1		08/16/17 19:00
Benzo(a)Anthracene	0.0265 U	0.0530	0.0159	ug/L	1		08/16/17 19:00
Benzo[a]pyrene	0.0106 U	0.0212	0.00657	ug/L	1		08/16/17 19:00
Benzo[b]Fluoranthene	0.0265 U	0.0530	0.0159	ug/L	1		08/16/17 19:00
Benzo[g,h,i]perylene	0.0265 U	0.0530	0.0159	ug/L	1		08/16/17 19:00
Benzo[k]fluoranthene	0.0265 U	0.0530	0.0159	ug/L	1		08/16/17 19:00
Chrysene	0.0265 U	0.0530	0.0159	ug/L	1		08/16/17 19:00
Dibenzo[a,h]anthracene	0.0106 U	0.0212	0.00657	ug/L	1		08/16/17 19:00
Fluoranthene	0.0265 U	0.0530	0.0159	ug/L	1		08/16/17 19:00
Fluorene	0.0265 U	0.0530	0.0159	ug/L	1		08/16/17 19:00
Indeno[1,2,3-c,d] pyrene	0.0265 U	0.0530	0.0159	ug/L	1		08/16/17 19:00
Naphthalene	0.0530 U	0.106	0.0328	ug/L	1		08/16/17 19:00
Phenanthrene	0.0265 U	0.0530	0.0159	ug/L	1		08/16/17 19:00
Pyrene	0.0265 U	0.0530	0.0159	ug/L	1		08/16/17 19:00
Surrogates							
2-Fluorobiphenyl (surr)	81.5	53-106		%	1		08/16/17 19:00
Terphenyl-d14 (surr)	82.3	58-132		%	1		08/16/17 19:00

Batch Information

Analytical Batch: XMS10314
 Analytical Method: 8270D SIM LV (PAH)
 Analyst: NRB
 Analytical Date/Time: 08/16/17 19:00
 Container ID: 1175178006-D

Prep Batch: XXX38062
 Prep Method: SW3520C
 Prep Date/Time: 08/04/17 07:56
 Prep Initial Wt./Vol.: 236 mL
 Prep Extract Vol: 1 mL

Results of Sentry-3R

Client Sample ID: **Sentry-3R**
 Client Project ID: **APSC PS01 Happy Valley**
 Lab Sample ID: 1175178006
 Lab Project ID: 1175178

Collection Date: 08/01/17 11:29
 Received Date: 08/03/17 10:09
 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	0.315 U	0.630	0.189	mg/L	1		08/06/17 22:23
Surrogates							
5a Androstane (surr)	80.3	50-150		%	1		08/06/17 22:23

Batch Information

Analytical Batch: XFC13638
 Analytical Method: AK102
 Analyst: JMG
 Analytical Date/Time: 08/06/17 22:23
 Container ID: 1175178006-F

Prep Batch: XXX38079
 Prep Method: SW3520C
 Prep Date/Time: 08/06/17 09:20
 Prep Initial Wt./Vol.: 238 mL
 Prep Extract Vol: 1 mL

Results of Sentry-3R

Client Sample ID: **Sentry-3R**
 Client Project ID: **APSC PS01 Happy Valley**
 Lab Sample ID: 1175178006
 Lab Project ID: 1175178

Collection Date: 08/01/17 11:29
 Received Date: 08/03/17 10:09
 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>
Gasoline Range Organics	0.0500 U	0.100	0.0310	mg/L	1		08/07/17 23:47

Surrogates

4-Bromofluorobenzene (surr)	94.1	50-150		%	1		08/07/17 23:47
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Batch Information

Analytical Batch: VFC13797
 Analytical Method: AK101
 Analyst: ST
 Analytical Date/Time: 08/07/17 23:47
 Container ID: 1175178006-A

Prep Batch: VXX31040
 Prep Method: SW5030B
 Prep Date/Time: 08/07/17 08:00
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL

<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		08/07/17 23:47
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		08/07/17 23:47
o-Xylene	0.500 U	1.00	0.310	ug/L	1		08/07/17 23:47
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		08/07/17 23:47
Toluene	0.500 U	1.00	0.310	ug/L	1		08/07/17 23:47

Surrogates

1,4-Difluorobenzene (surr)	93.1	77-115		%	1		08/07/17 23:47
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Batch Information

Analytical Batch: VFC13797
 Analytical Method: SW8021B
 Analyst: ST
 Analytical Date/Time: 08/07/17 23:47
 Container ID: 1175178006-A

Prep Batch: VXX31040
 Prep Method: SW5030B
 Prep Date/Time: 08/07/17 08:00
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL

Results of Sentry-4R

Client Sample ID: **Sentry-4R**
 Client Project ID: **APSC PS01 Happy Valley**
 Lab Sample ID: 1175178007
 Lab Project ID: 1175178

Collection Date: 08/01/17 17:00
 Received Date: 08/03/17 10:09
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by Polynuclear Aromatics GC/MS

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Acenaphthene	0.0250 U	0.0500	0.0150	ug/L	1		08/16/17 19:21
Acenaphthylene	0.0250 U	0.0500	0.0150	ug/L	1		08/16/17 19:21
Anthracene	0.0250 U	0.0500	0.0150	ug/L	1		08/16/17 19:21
Benzo(a)Anthracene	0.0250 U	0.0500	0.0150	ug/L	1		08/16/17 19:21
Benzo[a]pyrene	0.0100 U	0.0200	0.00620	ug/L	1		08/16/17 19:21
Benzo[b]Fluoranthene	0.0250 U	0.0500	0.0150	ug/L	1		08/16/17 19:21
Benzo[g,h,i]perylene	0.0250 U	0.0500	0.0150	ug/L	1		08/16/17 19:21
Benzo[k]fluoranthene	0.0250 U	0.0500	0.0150	ug/L	1		08/16/17 19:21
Chrysene	0.0250 U	0.0500	0.0150	ug/L	1		08/16/17 19:21
Dibenzo[a,h]anthracene	0.0100 U	0.0200	0.00620	ug/L	1		08/16/17 19:21
Fluoranthene	0.0250 U	0.0500	0.0150	ug/L	1		08/16/17 19:21
Fluorene	0.0250 U	0.0500	0.0150	ug/L	1		08/16/17 19:21
Indeno[1,2,3-c,d] pyrene	0.0250 U	0.0500	0.0150	ug/L	1		08/16/17 19:21
Naphthalene	0.0546 J	0.100	0.0310	ug/L	1		08/16/17 19:21
Phenanthrene	0.0250 U	0.0500	0.0150	ug/L	1		08/16/17 19:21
Pyrene	0.0250 U	0.0500	0.0150	ug/L	1		08/16/17 19:21
Surrogates							
2-Fluorobiphenyl (surr)	88.7	53-106		%	1		08/16/17 19:21
Terphenyl-d14 (surr)	85.9	58-132		%	1		08/16/17 19:21

Batch Information

Analytical Batch: XMS10314
 Analytical Method: 8270D SIM LV (PAH)
 Analyst: NRB
 Analytical Date/Time: 08/16/17 19:21
 Container ID: 1175178007-G

Prep Batch: XXX38062
 Prep Method: SW3520C
 Prep Date/Time: 08/04/17 07:56
 Prep Initial Wt./Vol.: 250 mL
 Prep Extract Vol: 1 mL

Results of Sentry-4R

Client Sample ID: **Sentry-4R**
 Client Project ID: **APSC PS01 Happy Valley**
 Lab Sample ID: 1175178007
 Lab Project ID: 1175178

Collection Date: 08/01/17 17:00
 Received Date: 08/03/17 10:09
 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	0.183 J	0.605	0.181	mg/L	1		08/06/17 22:33
Surrogates							
5a Androstane (surr)	73.2	50-150		%	1		08/06/17 22:33

Batch Information

Analytical Batch: XFC13638
 Analytical Method: AK102
 Analyst: JMG
 Analytical Date/Time: 08/06/17 22:33
 Container ID: 1175178007-I

Prep Batch: XXX38079
 Prep Method: SW3520C
 Prep Date/Time: 08/06/17 09:20
 Prep Initial Wt./Vol.: 248 mL
 Prep Extract Vol: 1 mL

Results of Sentry-4R

Client Sample ID: **Sentry-4R**
 Client Project ID: **APSC PS01 Happy Valley**
 Lab Sample ID: 1175178007
 Lab Project ID: 1175178

Collection Date: 08/01/17 17:00
 Received Date: 08/03/17 10:09
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by Volatile Fuels

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Gasoline Range Organics	0.0500 U	0.100	0.0310	mg/L	1		08/08/17 00:07

Surrogates

4-Bromofluorobenzene (surr)	96.2	50-150		%	1		08/08/17 00:07
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Batch Information

Analytical Batch: VFC13797
 Analytical Method: AK101
 Analyst: ST
 Analytical Date/Time: 08/08/17 00:07
 Container ID: 1175178007-A

Prep Batch: VXX31040
 Prep Method: SW5030B
 Prep Date/Time: 08/07/17 08:00
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.250 U	0.500	0.150	ug/L	1		08/08/17 00:07
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		08/08/17 00:07
o-Xylene	0.500 U	1.00	0.310	ug/L	1		08/08/17 00:07
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		08/08/17 00:07
Toluene	0.500 U	1.00	0.310	ug/L	1		08/08/17 00:07

Surrogates

1,4-Difluorobenzene (surr)	93.6	77-115		%	1		08/08/17 00:07
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Batch Information

Analytical Batch: VFC13797
 Analytical Method: SW8021B
 Analyst: ST
 Analytical Date/Time: 08/08/17 00:07
 Container ID: 1175178007-A

Prep Batch: VXX31040
 Prep Method: SW5030B
 Prep Date/Time: 08/07/17 08:00
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL

Results of Sentry-4R

Client Sample ID: **Sentry-4R**
 Client Project ID: **APSC PS01 Happy Valley**
 Lab Sample ID: 1175178007
 Lab Project ID: 1175178

Collection Date: 08/01/17 17:00
 Received Date: 08/03/17 10:09
 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		08/09/17 06:49
1,3,5-Trimethylbenzene	0.500 U	1.00	0.310	ug/L	1		08/09/17 06:49
Benzene	0.200 U	0.400	0.120	ug/L	1		08/09/17 06:49
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		08/09/17 06:49
Isopropylbenzene (Cumene)	0.500 U	1.00	0.310	ug/L	1		08/09/17 06:49
Methyl-t-butyl ether	5.00 U	10.0	3.10	ug/L	1		08/09/17 06:49
Naphthalene	0.500 U	1.00	0.310	ug/L	1		08/09/17 06:49
n-Butylbenzene	0.500 U	1.00	0.310	ug/L	1		08/09/17 06:49
n-Propylbenzene	0.500 U	1.00	0.310	ug/L	1		08/09/17 06:49
o-Xylene	0.500 U	1.00	0.310	ug/L	1		08/09/17 06:49
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		08/09/17 06:49
sec-Butylbenzene	0.500 U	1.00	0.310	ug/L	1		08/09/17 06:49
Styrene	0.500 U	1.00	0.310	ug/L	1		08/09/17 06:49
tert-Butylbenzene	0.500 U	1.00	0.310	ug/L	1		08/09/17 06:49
Toluene	0.500 U	1.00	0.310	ug/L	1		08/09/17 06:49
Xylenes (total)	1.50 U	3.00	1.00	ug/L	1		08/09/17 06:49
Surrogates							
1,2-Dichloroethane-D4 (surr)	105	81-118		%	1		08/09/17 06:49
4-Bromofluorobenzene (surr)	99.9	85-114		%	1		08/09/17 06:49
Toluene-d8 (surr)	103	89-112		%	1		08/09/17 06:49

Batch Information

Analytical Batch: VMS17043
 Analytical Method: SW8260C
 Analyst: FDR
 Analytical Date/Time: 08/09/17 06:49
 Container ID: 1175178007-D

Prep Batch: VXX31056
 Prep Method: SW5030B
 Prep Date/Time: 08/08/17 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: **APSC PS01 Happy Valley**
 Lab Sample ID: 1175178008
 Lab Project ID: 1175178

Collection Date: 08/01/17 09:40
 Received Date: 08/03/17 10:09
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by Volatile Fuels

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Gasoline Range Organics	0.0500 U	0.100	0.0310	mg/L	1		08/08/17 00:26

Surrogates

4-Bromofluorobenzene (surr)	94.7	50-150		%	1		08/08/17 00:26
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Batch Information

Analytical Batch: VFC13797
 Analytical Method: AK101
 Analyst: ST
 Analytical Date/Time: 08/08/17 00:26
 Container ID: 1175178008-C

Prep Batch: VXX31040
 Prep Method: SW5030B
 Prep Date/Time: 08/07/17 08:00
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.250 U	0.500	0.150	ug/L	1		08/08/17 00:26
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		08/08/17 00:26
o-Xylene	0.500 U	1.00	0.310	ug/L	1		08/08/17 00:26
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		08/08/17 00:26
Toluene	0.500 U	1.00	0.310	ug/L	1		08/08/17 00:26

Surrogates

1,4-Difluorobenzene (surr)	94.9	77-115		%	1		08/08/17 00:26
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Batch Information

Analytical Batch: VFC13797
 Analytical Method: SW8021B
 Analyst: ST
 Analytical Date/Time: 08/08/17 00:26
 Container ID: 1175178008-C

Prep Batch: VXX31040
 Prep Method: SW5030B
 Prep Date/Time: 08/07/17 08:00
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL

Results of Trip Blank

Client Sample ID: **Trip Blank**
 Client Project ID: **APSC PS01 Happy Valley**
 Lab Sample ID: 1175178008
 Lab Project ID: 1175178

Collection Date: 08/01/17 09:40
 Received Date: 08/03/17 10:09
 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		08/08/17 16:03
1,3,5-Trimethylbenzene	0.500 U	1.00	0.310	ug/L	1		08/08/17 16:03
Benzene	0.200 U	0.400	0.120	ug/L	1		08/08/17 16:03
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		08/08/17 16:03
Isopropylbenzene (Cumene)	0.500 U	1.00	0.310	ug/L	1		08/08/17 16:03
Methyl-t-butyl ether	5.00 U	10.0	3.10	ug/L	1		08/08/17 16:03
Naphthalene	0.500 U	1.00	0.310	ug/L	1		08/08/17 16:03
n-Butylbenzene	0.500 U	1.00	0.310	ug/L	1		08/08/17 16:03
n-Propylbenzene	0.500 U	1.00	0.310	ug/L	1		08/08/17 16:03
o-Xylene	0.500 U	1.00	0.310	ug/L	1		08/08/17 16:03
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		08/08/17 16:03
sec-Butylbenzene	0.500 U	1.00	0.310	ug/L	1		08/08/17 16:03
Styrene	0.500 U	1.00	0.310	ug/L	1		08/08/17 16:03
tert-Butylbenzene	0.500 U	1.00	0.310	ug/L	1		08/08/17 16:03
Toluene	0.500 U	1.00	0.310	ug/L	1		08/08/17 16:03
Xylenes (total)	1.50 U	3.00	1.00	ug/L	1		08/08/17 16:03
Surrogates							
1,2-Dichloroethane-D4 (surr)	104	81-118		%	1		08/08/17 16:03
4-Bromofluorobenzene (surr)	103	85-114		%	1		08/08/17 16:03
Toluene-d8 (surr)	103	89-112		%	1		08/08/17 16:03

Batch Information

Analytical Batch: VMS17042
 Analytical Method: SW8260C
 Analyst: FDR
 Analytical Date/Time: 08/08/17 16:03
 Container ID: 1175178008-A

Prep Batch: VXX31052
 Prep Method: SW5030B
 Prep Date/Time: 08/08/17 06:00
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL

Method Blank

Blank ID: MB for HBN 1765681 [VXX/31040]
Blank Lab ID: 1403709

Matrix: Water (Surface, Eff., Ground)

QC for Samples:

1175178001, 1175178002, 1175178003, 1175178004, 1175178005, 1175178006, 1175178007, 1175178008

Results by AK101

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Gasoline Range Organics	0.0500U	0.100	0.0310	mg/L
Surrogates				
4-Bromofluorobenzene (surr)	96.2	50-150		%

Batch Information

Analytical Batch: VFC13797
Analytical Method: AK101
Instrument: Agilent 7890 PID/FID
Analyst: ST
Analytical Date/Time: 8/7/2017 8:17:00PM

Prep Batch: VXX31040
Prep Method: SW5030B
Prep Date/Time: 8/7/2017 8:00:00AM
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 08/18/2017 3:03:04PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1175178 [VXX31040]
 Blank Spike Lab ID: 1403712
 Date Analyzed: 08/08/2017 02:01

Spike Duplicate ID: LCSD for HBN 1175178
 [VXX31040]
 Spike Duplicate Lab ID: 1403713
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1175178001, 1175178002, 1175178003, 1175178004, 1175178005, 1175178006, 1175178007, 1175178008

Results by AK101

Parameter	Blank Spike (mg/L)			Spike Duplicate (mg/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Gasoline Range Organics	1.00	1.01	101	1.00	0.966	97	(60-120)	4.30	(< 20)
Surrogates									
4-Bromofluorobenzene (surr)	0.0500	104	104	0.0500	99.1	99	(50-150)	4.30	

Batch Information

Analytical Batch: **VFC13797**
 Analytical Method: **AK101**
 Instrument: **Agilent 7890 PID/FID**
 Analyst: **ST**

Prep Batch: **VXX31040**
 Prep Method: **SW5030B**
 Prep Date/Time: **08/07/2017 08:00**
 Spike Init Wt./Vol.: 1.00 mg/L Extract Vol: 5 mL
 Dupe Init Wt./Vol.: 1.00 mg/L Extract Vol: 5 mL

Print Date: 08/18/2017 3:03:07PM

Method Blank

Blank ID: MB for HBN 1765681 [VXX/31040]
Blank Lab ID: 1403709

Matrix: Water (Surface, Eff., Ground)

QC for Samples:

1175178001, 1175178002, 1175178003, 1175178004, 1175178005, 1175178006, 1175178007, 1175178008

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	1.10*	1.00	0.310	ug/L
Surrogates				
1,4-Difluorobenzene (surr)	92.7	77-115		%

Batch Information

Analytical Batch: VFC13797
Analytical Method: SW8021B
Instrument: Agilent 7890 PID/FID
Analyst: ST
Analytical Date/Time: 8/7/2017 8:17:00PM

Prep Batch: VXX31040
Prep Method: SW5030B
Prep Date/Time: 8/7/2017 8:00:00AM
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 08/18/2017 3:03:10PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1175178 [VXX31040]

Blank Spike Lab ID: 1403710

Date Analyzed: 08/08/2017 01:42

Spike Duplicate ID: LCSD for HBN 1175178 [VXX31040]

Spike Duplicate Lab ID: 1403711

Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1175178001, 1175178002, 1175178003, 1175178004, 1175178005, 1175178006, 1175178007, 1175178008

Results by SW8021B

Parameter	Blank Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Benzene	100	118	118	100	123	123	* (80-120)	3.60	(< 20)
Ethylbenzene	100	107	107	100	110	110	(75-125)	3.10	(< 20)
o-Xylene	100	105	105	100	108	108	(80-120)	2.40	(< 20)
P & M -Xylene	200	212	106	200	218	109	(75-130)	3.00	(< 20)
Toluene	100	110	110	100	114	114	(75-120)	3.40	(< 20)
Surrogates									
1,4-Difluorobenzene (surr)	50	103	103	50	105	105	(77-115)	1.30	

Batch Information

Analytical Batch: VFC13797

Analytical Method: SW8021B

Instrument: Agilent 7890 PID/FID

Analyst: ST

Prep Batch: VXX31040

Prep Method: SW5030B

Prep Date/Time: 08/07/2017 08:00

Spike Init Wt./Vol.: 100 ug/L Extract Vol: 5 mL

Dupe Init Wt./Vol.: 100 ug/L Extract Vol: 5 mL

Print Date: 08/18/2017 3:03:11PM

Method Blank

Blank ID: MB for HBN 1765793 [VXX/31052]
Blank Lab ID: 1404028

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1175178008

Results by SW8260C

Parameter	Results	LOQ/CL	DL	Units
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)	104	81-118		%
4-Bromofluorobenzene (surr)	101	85-114		%
Toluene-d8 (surr)	103	89-112		%

Batch Information

Analytical Batch: VMS17042
Analytical Method: SW8260C
Instrument: VPA 780/5975 GC/MS
Analyst: FDR
Analytical Date/Time: 8/8/2017 12:14:00PM

Prep Batch: VXX31052
Prep Method: SW5030B
Prep Date/Time: 8/8/2017 6:00:00AM
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 08/18/2017 3:03:12PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1175178 [VXX31052]

Blank Spike Lab ID: 1404029

Date Analyzed: 08/08/2017 13:15

Spike Duplicate ID: LCSD for HBN 1175178 [VXX31052]

Spike Duplicate Lab ID: 1404030

Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1175178008

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	30.0	100	30	29.3	98	(79-124)	2.20	(< 20)
1,3,5-Trimethylbenzene	30	29.8	99	30	28.9	96	(75-124)	3.00	(< 20)
Benzene	30	27.3	91	30	26.8	89	(79-120)	1.80	(< 20)
Ethylbenzene	30	28.8	96	30	28.2	94	(79-121)	2.10	(< 20)
Isopropylbenzene (Cumene)	30	29.3	98	30	28.7	96	(72-131)	2.00	(< 20)
Methyl-t-butyl ether	45	43.1	96	45	44.2	98	(71-124)	2.60	(< 20)
Naphthalene	30	31.2	104	30	29.9	100	(61-128)	4.30	(< 20)
n-Butylbenzene	30	30.1	100	30	29.3	98	(75-128)	2.60	(< 20)
n-Propylbenzene	30	29.4	98	30	28.3	94	(76-126)	4.00	(< 20)
o-Xylene	30	29.2	97	30	28.6	95	(78-122)	1.80	(< 20)
P & M -Xylene	60	58.6	98	60	57.3	96	(80-121)	2.10	(< 20)
sec-Butylbenzene	30	29.7	99	30	28.9	96	(77-126)	2.70	(< 20)
Styrene	30	30.3	101	30	30.0	100	(78-123)	1.30	(< 20)
tert-Butylbenzene	30	29.2	97	30	28.6	95	(78-124)	2.00	(< 20)
Toluene	30	27.1	91	30	26.6	89	(80-121)	2.00	(< 20)
Xylenes (total)	90	87.7	98	90	86.0	96	(79-121)	2.00	(< 20)

Surrogates

1,2-Dichloroethane-D4 (surr)	30	98.7	99	30	98.4	98	(81-118)	0.34
4-Bromofluorobenzene (surr)	30	101	101	30	101	101	(85-114)	0.73
Toluene-d8 (surr)	30	101	101	30	101	101	(89-112)	0.20

Batch Information

Analytical Batch: **VMS17042**
Analytical Method: **SW8260C**
Instrument: **VPA 780/5975 GC/MS**
Analyst: **FDR**

Prep Batch: **VXX31052**
Prep Method: **SW5030B**
Prep Date/Time: **08/08/2017 06:00**
Spike Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL
Dupe Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL

Matrix Spike Summary

Original Sample ID: 1404172
MS Sample ID: 1404031 MS
MSD Sample ID: 1404032 MSD

Analysis Date: 08/08/2017 21:02
Analysis Date: 08/08/2017 21:19
Analysis Date: 08/08/2017 21:37
Matrix: Soil/Solid (dry weight)

QC for Samples: 1175178008

Results by SW8260C

Parameter	Sample	Matrix Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
1,2,4-Trimethylbenzene	25.0U	1500	1500	100	1500	1510	100	75-123	0.27	(< 20)
1,3,5-Trimethylbenzene	25.0U	1500	1480	99	1500	1470	98	73-124	0.98	(< 20)
Benzene	9.00J	1500	1380	92	1500	1350	90	77-121	2.20	(< 20)
Ethylbenzene	25.0U	1500	1450	97	1500	1420	95	76-122	2.50	(< 20)
Isopropylbenzene (Cumene)	25.0U	1500	1460	97	1500	1420	95	68-134	2.20	(< 20)
Methyl-t-butyl ether	250U	2250	2240	100	2250	2230	99	73-125	0.76	(< 20)
Naphthalene	25.0U	1500	1500	100	1500	1520	101	62-129	1.60	(< 20)
n-Butylbenzene	25.0U	1500	1500	100	1500	1470	98	70-128	1.90	(< 20)
n-Propylbenzene	25.0U	1500	1480	98	1500	1430	95	73-125	3.20	(< 20)
o-Xylene	25.0U	1500	1470	98	1500	1470	98	77-123	0.03	(< 20)
P & M -Xylene	33.5J	3000	2920	96	3000	2860	94	77-124	2.10	(< 20)
sec-Butylbenzene	25.0U	1500	1480	99	1500	1460	98	73-126	1.10	(< 20)
Styrene	25.0U	1500	1530	102	1500	1500	100	76-124	2.10	(< 20)
tert-Butylbenzene	25.0U	1500	1460	97	1500	1460	97	73-125	0.31	(< 20)
Toluene	250	1500	1600	90	1500	1540	86	77-121	3.40	(< 20)
Xylenes (total)	75.0U	4500	4390	98	4500	4330	96	78-124	1.40	(< 20)
Surrogates										
1,2-Dichloroethane-D4 (surr)		1500	1480	99	1500	1470	98	71-136	0.34	
4-Bromofluorobenzene (surr)		1500	1530	102	1500	1540	103	55-151	0.88	
Toluene-d8 (surr)		1500	1500	100	1500	1500	100	85-116	0.03	

Batch Information

Analytical Batch: VMS17042
Analytical Method: SW8260C
Instrument: VPA 780/5975 GC/MS
Analyst: FDR
Analytical Date/Time: 8/8/2017 9:19:01PM

Prep Batch: VXX31052
Prep Method: Volatiles Extraction 8240/8260 FULL
Prep Date/Time: 8/8/2017 6:00:00AM
Prep Initial Wt./Vol.: 5.00mL
Prep Extract Vol: 5.00mL

Print Date: 08/18/2017 3:03:16PM

Method Blank

Blank ID: MB for HBN 1765829 [VXX/31056]

Blank Lab ID: 1404187

QC for Samples:

1175178004, 1175178007

Matrix: Water (Surface, Eff., Ground)

Results by SW8260C

Parameter	Results	LOQ/CL	DL	Units
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)	104	81-118	%
4-Bromofluorobenzene (surr)	102	85-114	%
Toluene-d8 (surr)	103	89-112	%

Batch Information

Analytical Batch: VMS17043
 Analytical Method: SW8260C
 Instrument: VPA 780/5975 GC/MS
 Analyst: FDR
 Analytical Date/Time: 8/8/2017 11:59:00PM

Prep Batch: VXX31056
 Prep Method: SW5030B
 Prep Date/Time: 8/8/2017 6:00:00AM
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL

Print Date: 08/18/2017 3:03:17PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1175178 [VXX31056]
Blank Spike Lab ID: 1404188
Date Analyzed: 08/09/2017 00:30

Spike Duplicate ID: LCSD for HBN 1175178 [VXX31056]
Spike Duplicate Lab ID: 1404189
Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1175178004, 1175178007

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	28.8	96	30	28.5	95	(79-124)	0.80	(< 20)
1,3,5-Trimethylbenzene	30	28.8	96	30	28.4	95	(75-124)	1.60	(< 20)
Benzene	30	26.7	89	30	26.1	87	(79-120)	2.10	(< 20)
Ethylbenzene	30	28.0	93	30	27.6	92	(79-121)	1.40	(< 20)
Isopropylbenzene (Cumene)	30	28.4	95	30	27.9	93	(72-131)	1.80	(< 20)
Methyl-t-butyl ether	45	41.9	93	45	43.5	97	(71-124)	3.70	(< 20)
Naphthalene	30	26.7	89	30	29.6	99	(61-128)	10.50	(< 20)
n-Butylbenzene	30	30.0	100	30	28.7	96	(75-128)	4.40	(< 20)
n-Propylbenzene	30	28.5	95	30	27.6	92	(76-126)	3.20	(< 20)
o-Xylene	30	28.2	94	30	28.2	94	(78-122)	0.00	(< 20)
P & M -Xylene	60	56.3	94	60	55.5	93	(80-121)	1.30	(< 20)
sec-Butylbenzene	30	29.7	99	30	28.5	95	(77-126)	4.10	(< 20)
Styrene	30	29.5	98	30	29.4	98	(78-123)	0.27	(< 20)
tert-Butylbenzene	30	29.0	97	30	28.0	94	(78-124)	3.40	(< 20)
Toluene	30	26.3	88	30	25.8	86	(80-121)	1.90	(< 20)
Xylenes (total)	90	84.5	94	90	83.8	93	(79-121)	0.88	(< 20)

Surrogates

1,2-Dichloroethane-D4 (surr)	30	100	100	30	98.8	99	(81-118)	1.40
4-Bromofluorobenzene (surr)	30	101	101	30	102	102	(85-114)	1.70
Toluene-d8 (surr)	30	101	101	30	101	101	(89-112)	0.20

Batch Information

Analytical Batch: VMS17043
Analytical Method: SW8260C
Instrument: VPA 780/5975 GC/MS
Analyst: FDR

Prep Batch: VXX31056
Prep Method: SW5030B
Prep Date/Time: 08/08/2017 06:00
Spike Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL
Dupe Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL

Method Blank

Blank ID: MB for HBN 1765290 [XXX/38062]
Blank Lab ID: 1402911

Matrix: Water (Surface, Eff., Ground)

QC for Samples:

1175178001, 1175178002, 1175178003, 1175178004, 1175178005, 1175178006, 1175178007

Results by 8270D SIM LV (PAH)

Parameter	Results	LOQ/CL	DL	Units
Acenaphthene	0.0250U	0.0500	0.0150	ug/L
Acenaphthylene	0.0250U	0.0500	0.0150	ug/L
Anthracene	0.0250U	0.0500	0.0150	ug/L
Benzo(a)Anthracene	0.0250U	0.0500	0.0150	ug/L
Benzo[a]pyrene	0.0100U	0.0200	0.00620	ug/L
Benzo[b]Fluoranthene	0.0250U	0.0500	0.0150	ug/L
Benzo[g,h,i]perylene	0.0250U	0.0500	0.0150	ug/L
Benzo[k]fluoranthene	0.0250U	0.0500	0.0150	ug/L
Chrysene	0.0250U	0.0500	0.0150	ug/L
Dibenzo[a,h]anthracene	0.0100U	0.0200	0.00620	ug/L
Fluoranthene	0.0250U	0.0500	0.0150	ug/L
Fluorene	0.0250U	0.0500	0.0150	ug/L
Indeno[1,2,3-c,d] pyrene	0.0250U	0.0500	0.0150	ug/L
Naphthalene	0.0500U	0.100	0.0310	ug/L
Phenanthrene	0.0250U	0.0500	0.0150	ug/L
Pyrene	0.0250U	0.0500	0.0150	ug/L

Surrogates

2-Fluorobiphenyl (surr)	106	53-106	%
Terphenyl-d14 (surr)	104	58-132	%

Batch Information

Analytical Batch: XMS10314
Analytical Method: 8270D SIM LV (PAH)
Instrument: SVA Agilent 780/5975 GC/MS
Analyst: NRB
Analytical Date/Time: 8/16/2017 1:52:00PM

Prep Batch: XXX38062
Prep Method: SW3520C
Prep Date/Time: 8/4/2017 7:56:20AM
Prep Initial Wt./Vol.: 250 mL
Prep Extract Vol: 1 mL

Print Date: 08/18/2017 3:03:20PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1175178 [XXX38062]

Blank Spike Lab ID: 1402912

Date Analyzed: 08/16/2017 14:13

Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1175178001, 1175178002, 1175178003, 1175178004, 1175178005, 1175178006, 1175178007

Results by 8270D SIM LV (PAH)

Blank Spike (ug/L)

Parameter	Spike	Result	Rec (%)	CL
Acenaphthene	2	2.19	110	(48-114)
Acenaphthylene	2	1.80	90	(35-121)
Anthracene	2	1.81	91	(53-119)
Benzo(a)Anthracene	2	1.77	88	(59-120)
Benzo[a]pyrene	2	1.78	89	(53-120)
Benzo[b]Fluoranthene	2	1.78	89	(53-126)
Benzo[g,h,i]perylene	2	1.77	88	(44-128)
Benzo[k]fluoranthene	2	1.74	87	(54-125)
Chrysene	2	1.86	93	(57-120)
Dibenzo[a,h]anthracene	2	1.75	88	(44-131)
Fluoranthene	2	1.78	89	(58-120)
Fluorene	2	1.79	89	(50-118)
Indeno[1,2,3-c,d] pyrene	2	1.76	88	(48-130)
Naphthalene	2	1.76	88	(43-114)
Phenanthrene	2	1.77	88	(53-115)
Pyrene	2	1.86	93	(53-121)

Surrogates

2-Fluorobiphenyl (surr)	2	96.6	97	(53-106)
Terphenyl-d14 (surr)	2	95.8	96	(58-132)

Batch Information

Analytical Batch: XMS10314

Analytical Method: 8270D SIM LV (PAH)

Instrument: SVA Agilent 780/5975 GC/MS

Analyst: NRB

Prep Batch: XXX38062

Prep Method: SW3520C

Prep Date/Time: 08/04/2017 07:56

Spike Init Wt./Vol.: 2 ug/L Extract Vol: 1 mL

Dupe Init Wt./Vol.: Extract Vol:

Print Date: 08/18/2017 3:03:22PM

Matrix Spike Summary

Original Sample ID: 1175169001
MS Sample ID: 1402913 MS
MSD Sample ID: 1402914 MSD

Analysis Date: 08/16/2017 14:34
Analysis Date: 08/16/2017 14:54
Analysis Date: 08/16/2017 15:15
Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1175178001, 1175178002, 1175178003, 1175178004, 1175178005, 1175178006, 1175178007

Results by 8270D SIM LV (PAH)

Parameter	Sample	Matrix Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Acenaphthene	0.0500U	2.07	2.07	100	2.00	1.97	98	48-114	5.00	(< 20)
Acenaphthylene	0.0500U	2.07	1.69	82	2.00	1.60	80	35-121	5.50	(< 20)
Anthracene	0.0500U	2.07	1.7	82	2.00	1.63	82	53-119	4.10	(< 20)
Benzo(a)Anthracene	0.0500U	2.07	1.53	74	2.00	1.44	72	59-120	6.40	(< 20)
Benzo[a]pyrene	0.0200U	2.07	1.33	64	2.00	1.22	61	53-120	8.70	(< 20)
Benzo[b]Fluoranthene	0.0500U	2.07	1.36	66	2.00	1.27	63	53-126	7.30	(< 20)
Benzo[g,h,i]perylene	0.0500U	2.07	1.23	59	2.00	1.11	56	44-128	9.60	(< 20)
Benzo[k]fluoranthene	0.0500U	2.07	1.34	65	2.00	1.20	60	54-125	10.70	(< 20)
Chrysene	0.0500U	2.07	1.65	80	2.00	1.54	77	57-120	6.80	(< 20)
Dibenzo[a,h]anthracene	0.0200U	2.07	1.21	59	2.00	1.11	55	44-131	9.10	(< 20)
Fluoranthene	0.0500U	2.07	1.67	81	2.00	1.57	79	58-120	6.00	(< 20)
Fluorene	0.0500U	2.07	1.74	84	2.00	1.66	83	50-118	4.90	(< 20)
Indeno[1,2,3-c,d] pyrene	0.0500U	2.07	1.2	58	2.00	1.09	55	48-130	9.30	(< 20)
Naphthalene	0.100U	2.07	1.71	83	2.00	1.62	81	43-114	5.50	(< 20)
Phenanthrene	0.0500U	2.07	1.73	84	2.00	1.66	83	53-115	4.70	(< 20)
Pyrene	0.0500U	2.07	1.78	86	2.00	1.67	83	53-121	6.70	(< 20)
Surrogates										
2-Fluorobiphenyl (surr)		2.07	1.81	88	2.00	1.70	85	53-106	6.20	
Terphenyl-d14 (surr)		2.07	1.62	79	2.00	1.51	76	58-132	7.20	

Batch Information

Analytical Batch: XMS10314
Analytical Method: 8270D SIM LV (PAH)
Instrument: SVA Agilent 780/5975 GC/MS
Analyst: NRB
Analytical Date/Time: 8/16/2017 2:54:00PM

Prep Batch: XXX38062
Prep Method: 3520 Liq/Liq Ext for 8270 PAH SIM LV
Prep Date/Time: 8/4/2017 7:56:20AM
Prep Initial Wt./Vol.: 242.00mL
Prep Extract Vol: 1.00mL

Print Date: 08/18/2017 3:03:23PM

Method Blank

Blank ID: MB for HBN 1765492 [XXX/38079]
Blank Lab ID: 1403198

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1175178004, 1175178005, 1175178006, 1175178007

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)	84.7	60-120		%

Batch Information

Analytical Batch: XFC13638
Analytical Method: AK102
Instrument: Agilent 7890B F
Analyst: JMG
Analytical Date/Time: 8/6/2017 9:34:00PM

Prep Batch: XXX38079
Prep Method: SW3520C
Prep Date/Time: 8/6/2017 9:20:44AM
Prep Initial Wt./Vol.: 250 mL
Prep Extract Vol: 1 mL

Print Date: 08/18/2017 3:03:25PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1175178 [XXX38079]
 Blank Spike Lab ID: 1403199
 Date Analyzed: 08/06/2017 21:44

Spike Duplicate ID: LCSD for HBN 1175178
 [XXX38079]
 Spike Duplicate Lab ID: 1403200
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1175178004, 1175178005, 1175178006, 1175178007

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	20.4	102	20	19.1	95	(75-125)	6.70	(< 20)
Surrogates									
5a Androstane (surr)	0.4	103	103	0.4	96	96	(60-120)	6.80	

Batch Information

Analytical Batch: **XFC13638**
 Analytical Method: **AK102**
 Instrument: **Agilent 7890B F**
 Analyst: **JMG**

Prep Batch: **XXX38079**
 Prep Method: **SW3520C**
 Prep Date/Time: **08/06/2017 09:20**
 Spike Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL
 Dupe Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL

Print Date: 08/18/2017 3:03:27PM



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1175178



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CLIENT:

CONTACT: Christophe Venot PHONE NO: 907-264-6912

PROJECT NAME: APSC PS01 Happy Valley PERMIT#: 105.01288.17015

REPORTS TO: SCOTT ROSE E-MAIL: SROSE@slrconsulting.com
Christophe Venot cvenot@slrconsulting.com

INVOICE TO: Alyeska Pipeline Service Co. QUOTE #: 105.01288.14014 P.O. #:

Instructions: Sections 1 - 3 must be filled out.
Omissions may delay the onset of analysis.

Page 1 of 1

Section 3 Preservative

#	Type	GR/BTEX (AK101/EPA8021B)	DRO Low Volume (AK102)	Petroleum VOC (8260)	BTEX (EPA 8021B)	PAH SIM (EPA 8270D)	REMARKS/LOC ID
1	C						
2	C						
3	C						
4	C						
5	C						
6	C						
7	C						
8	C						
9	C						
10	C						
11	C						
12	C						
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93	C						
94	C						
95	C						
96	C						
97	C						
98	C						
99	C						
100	C						

RESERVED for lab use	SAMPLE IDENTIFICATION	DATE mm/dd/yy	TIME HH/MM	MATRIX/MATRIX CODE
1A-E WS-2R	8/1/17	0940	W	
2A-E WS-10R		0952	W	
3A-E WS-99R		1000	W	
4A-J SENTRY-1R		1020	W	
5A-G SENTRY-2R		1108	W	
6A-G SENTRY-3R		1129	W	
7A-J SENTRY-4R		1700	W	
8A-C TRAIL BLANK-1	7/14/17		W	

Relinquished By: (1)	Date	Time	Received By:
<i>Christophe Venot</i>	8/1/17	10:00	<i>SM-2</i>
Relinquished By: (2)	Date	Time	Received By:
<i>SM-2</i>	8/3/17	1009	
Relinquished By: (3)	Date	Time	Received By:
Relinquished By: (4)	Date	Time	Received For Laboratory By:
	8/3/17	10:09	<i>SM-2</i>

Section 4	DOD Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Data Deliverable Requirements:
Cooler ID:		LEVEL II
Requested Turnaround Time and/or Special Instructions:		STANDARD
Temp Blank °C:		
or Ambient []		
Chain of Custody Seal: (Circle)		
INTACT	BROKEN	ABSENT
(See attached Sample Receipt Form)		

http://www.sgs.com/terms-and-conditions
#1: 4.3 0224
#2: 2.0 1724- 480 8/3/17
F083-Kit_Request_and_COC_Templates-Blank
Revised 2013-03-24

SGS Workorder #:

1175178



1 1 7 5 1 7 8

Review Criteria		Condition (Yes, No, N/A)	Exceptions Noted below	
Chain of Custody / Temperature Requirements			Yes	Exemption permitted if sampler hand carries/delivers.
Were Custody Seals intact? Note # & location		N/A	Absent	
COC accompanied samples?		Yes		
<div>N/A</div> **Exemption permitted if chilled & collected <8 hours ago, or for samples where chilling is not required		Yes	Cooler ID: 1	@ 4.3 °C Therm. ID: D24
Temperature blank compliant* (i.e., 0-6 °C after CF)?		N/A	Cooler ID:	@ °C Therm. ID:
		N/A	Cooler ID:	@ °C Therm. ID:
		N/A	Cooler ID:	@ °C Therm. ID:
		N/A	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		
<p>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".</p> <p>Note: Identify containers received at non-compliant temperature . Use form FS-0029 if more space is needed.</p>				
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)? <div>**Note: If times differ <1hr, record details & login per COC.</div>		Yes		
Were analyses requested unambiguous? (i.e., method is specified for analyses with >1 option for analysis)		Yes		
<div>N/A</div> ***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>
1175178001-A	HCL to pH < 2	OK	1175178007-D	HCL to pH < 2	OK
1175178001-B	HCL to pH < 2	OK	1175178007-E	HCL to pH < 2	OK
1175178001-C	HCL to pH < 2	OK	1175178007-F	HCL to pH < 2	OK
1175178001-D	No Preservative Required	OK	1175178007-G	No Preservative Required	OK
1175178001-E	No Preservative Required	OK	1175178007-H	No Preservative Required	OK
1175178002-A	HCL to pH < 2	OK	1175178007-I	HCL to pH < 2	OK
1175178002-B	HCL to pH < 2	OK	1175178007-J	HCL to pH < 2	OK
1175178002-C	HCL to pH < 2	OK	1175178008-A	HCL to pH < 2	OK
1175178002-D	No Preservative Required	OK	1175178008-B	HCL to pH < 2	OK
1175178002-E	No Preservative Required	OK	1175178008-C	HCL to pH < 2	OK
1175178003-A	HCL to pH < 2	OK			
1175178003-B	HCL to pH < 2	OK			
1175178003-C	HCL to pH < 2	OK			
1175178003-D	No Preservative Required	OK			
1175178003-E	No Preservative Required	OK			
1175178004-A	HCL to pH < 2	OK			
1175178004-B	HCL to pH < 2	OK			
1175178004-C	HCL to pH < 2	OK			
1175178004-D	HCL to pH < 2	OK			
1175178004-E	HCL to pH < 2	OK			
1175178004-F	HCL to pH < 2	OK			
1175178004-G	No Preservative Required	OK			
1175178004-H	No Preservative Required	OK			
1175178004-I	HCL to pH < 2	OK			
1175178004-J	HCL to pH < 2	OK			
1175178005-A	HCL to pH < 2	OK			
1175178005-B	HCL to pH < 2	OK			
1175178005-C	HCL to pH < 2	OK			
1175178005-D	No Preservative Required	OK			
1175178005-E	No Preservative Required	OK			
1175178005-F	HCL to pH < 2	OK			
1175178005-G	HCL to pH < 2	OK			
1175178006-A	HCL to pH < 2	OK			
1175178006-B	HCL to pH < 2	OK			
1175178006-C	HCL to pH < 2	OK			
1175178006-D	No Preservative Required	OK			
1175178006-E	No Preservative Required	OK			
1175178006-F	HCL to pH < 2	OK			
1175178006-G	HCL to pH < 2	OK			
1175178007-A	HCL to pH < 2	OK			
1175178007-B	HCL to pH < 2	OK			
1175178007-C	HCL to pH < 2	OK			

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.