

March 29, 2018

Crowley Fuels LLC
201 Arctic Slope Avenue
Anchorage, Alaska 99518

Attn: Mr. Prathap Kodial

RE: NOVEMBER 2017 GROUNDWATER MONITORING, 459 WEST BLUFF DRIVE, ANCHORAGE, ALASKA; ADEC FILE NO. 2100.38.321

This report presents the results of Shannon & Wilson's November 2017 groundwater monitoring activities conducted at the Crowley Fuels LLC (Crowley) facility at 459 West Bluff Drive, Anchorage, Alaska. The 2017 groundwater monitoring activities were conducted by Shannon & Wilson, Inc. on November 21, 2017. Authorization to proceed with the project was provided by Todd Bullock in the form of purchase order number 2903114 on October 26, 2017.

SITE AND PROJECT DESCRIPTION

Site Description

The Crowley facility is a fuel distribution terminal located in the Port of Anchorage, as shown on Figure 1. Elevation varies at the site by approximately 20 feet, generally sloping downward towards the northern portion of the site. The site contains 27 bulk fuel above-ground storage tanks (ASTs), pipelines, a rail loading rack, and office/warehouse/shop buildings. A pipeline linked to the Port of Anchorage valve yard, located 2,000 feet to the north, transfers petroleum products between the tank farm and oceangoing tankers/barges. This pipeline is the primary method of fuel delivery to and from the site. A lined detention pond and runoff basin are located in the northeastern portion of the site. A site plan is included as Figure 2.

Background

A site investigation conducted in 1987 identified impacted soil and groundwater at the site. Twenty-one monitoring wells (MW-1 through MW-21) were installed in 1989 at the site. The monitoring wells were sampled once in 1989, and annually from 1996 through 2009. The results indicate concentrations of gasoline range organics (GRO), diesel range organics (DRO), benzene, and ethylbenzene exceed Alaska Department of Environmental Conservation (ADEC) groundwater cleanup levels.

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In a letter dated October 2, 2017, the ADEC approved a groundwater monitoring program comprising biennial sample collection from Monitoring Wells MW-6B, MW-13A, MW-14, and MW-19R. The remaining wells were decommissioned during the liner installation activities in 2011.

Purpose and Objectives

The purpose of this project is to monitor trends in dissolved phase hydrocarbon concentration gradients and distribution across the site. The project objective consisted of sampling four groundwater monitoring wells: Wells MW-6B, MW-13A, and MW-19R (Well MW-14 was frozen and therefore could not be sampled). These wells have historically contained concentrations of GRO, DRO, residual range organics (RRO), benzene and/or ethylbenzene above the ADEC cleanup levels.

FIELD ACTIVITIES

The groundwater monitoring field effort consisted of depth to water measurements and sample collection at three monitoring wells. Copies of the field notes are included as Attachment 1.

Groundwater Sampling

Groundwater samples were collected from Wells MW-6B, MW-13A, MW-19R on November 21, 2017. Depth to water measurements were taken with an electronic water level indicator prior to purging and sampling activities. The wells were purged and sampled using a low-flow groundwater sampling method with a submersible pump and disposable tubing. The wells were sampled when water quality parameters taken three minutes apart stabilized (three successive readings were within 10 percent for turbidity if greater than 10 NTUs; 0.1 standard unit for pH; and 3 percent for conductivity and temperature). Depth to water level and final water quality parameters measurements are summarized in Table 1.

For quality control purposes, one field duplicate sample, designated Sample MW-103A, was collected from Well MW-13A. The groundwater samples were transferred into laboratory-supplied containers in order from most volatile to least volatile and placed into chilled coolers for delivery to the project laboratory. Purge and decontamination water from the monitoring wells was contained in one labeled 55-gallon drum.

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Groundwater Flow Direction

The November 2017 depth to water measurements and client-provided well survey data were used to interpret the groundwater flow direction. Groundwater elevations ranged from 31.62 feet above mean sea level (MSL) in Well MW-13A to 50.98 feet above MSL in Well MW-6B. The groundwater data indicate an overall flow direction to the west at a gradient of 2 percent. The groundwater elevations are within historical range, and the overall flow direction is consistent with historical data.

Groundwater flow direction at the site is likely affected by multiple factors, including tidal influence, precipitation, and topography. Tidal effects appear to be the governing factor within 150 to 200 feet of Cook Inlet. These apparent tidal influences in the western portions of the property are likely contributing to fluctuations in flow direction and gradient in that area.

LABORATORY ANALYSES

Four groundwater samples, including one field duplicate, were submitted to SGS for analytical testing. The groundwater samples were analyzed for GRO by Alaska Method (AK) 101, DRO by AK 102, RRO by AK 103, and aromatic hydrocarbons (BTEX) by environmental protection agency 8021B (EPA 8021B). The duplicate sample set MW-13A/MW-103A were also analyzed for volatile organic compounds (VOCs) by EPA 8260C and polynuclear aromatic hydrocarbons (PAHs) by EPA Method 8270D selective ion method (SIM). One trip blank sample accompanied the analytical sample containers from and to the laboratory during the sampling event, and were tested for GRO by AK 101 and VOCs by EPA Method 8260C. The laboratory reports are provided in Attachment 2.

INVESTIGATION DERIVED WASTE

Investigation-derived waste (IDW) from this project consisted of one 55-gallon drum of purgewater. NRC Alaska, Inc. (NRC) picked up the drum on December 20, 2017. A waste manifest by NRC is included in Attachment 3.

DISCUSSION OF ANALYTICAL RESULTS

The reported contaminant concentrations in the groundwater were compared to the cleanup levels listed in Table C, 18 AAC 75.345 (November 2017). The analytical sample results and cleanup levels are listed in Table 2. Graphs of select constituents exceeding ADEC cleanup

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levels are included as Figure 3. A summary of historical groundwater data for the three monitoring wells is included in Table 3.

The following parameters exceed the ADEC cleanup levels in one or more wells sampled in November 2017:

- GRO concentrations in Well MW-19R;
- DRO and benzene concentrations in Wells MW-6B, MW-13A, and MW-19R;
- RRO concentrations in Wells MW-6B and MW-13A;
- Naphthalene and 1,2,4-trimethylbenzene concentrations in Well MW-13A. Note that the naphthalene value analyzed by EPA Method 8260C is approximately 7 to 25 times the naphthalene value analyzed by EPA Method 8270D SIM.

Concentrations of GRO, DRO, and/or benzene appear to be decreasing in downgradient Wells MW-13A and MW-19R, as shown in Table 3 and Figure 3. Concentrations of DRO (29.1 milligrams per liter [mg/L]) and RRO (2.07 mg/L) measured in Well MW-6B in November 2017 are the highest measured concentrations since 20004.

QUALITY ASSURANCE SUMMARY

SGS follows on-going quality assurance/quality control (QA/QC) procedures to evaluate conformance to applicable ADEC data quality objectives (DQO). Internal laboratory controls to assess data quality for this project include surrogates, method blanks, matrix spikes/matrix spike duplicates (MS/MSD), and laboratory control sample/laboratory control sample duplicates (LCS/LCSD) to measure precision, accuracy, and matrix bias. If a DQO was not met, the project laboratory provides a report specific note identifying the problem in the Case Narrative section of their Laboratory Analysis Reports (See Attachment 2).

External quality controls included one water trip blank (WTB) and a duplicate sample set. The laboratory-prepared water trip blank sample accompanied the project sample bottles from the laboratory to the site during sampling activities and back again to SGS. The water trip blank sample did not contain detectable concentrations of target analytes. These results suggest that the project water samples were not cross-contaminated during sampling, transporting, or analysis of the samples.

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Shannon & Wilson's analytical data evaluation included a review of laboratory results for field duplicate Samples MW-13A and MW-103A to document the precision of the sampling and analytical process. The primary and duplicate sample results were compared using the calculated RPD values, as shown in Table 4. The RPD was not within the DQO of 30 percent for ethylbenzene, 1-methylnaphthalene, acenaphthene, fluorene, and naphthalene. The affected analytes are flagged "E" and are considered estimates due to the RPD failures.

Shannon & Wilson reviewed the SGS data deliverables and completed the ADEC's Laboratory Data Review Checklists (LDRC), which are included in Attachment 2. Quality control discrepancies and the impact to data quality/usability are described in further detail in the LDRC. In our opinion, no non-conformances that would adversely impact data usability were noted.

SUMMARY

The November 2017 groundwater monitoring event included analytical groundwater sampling of three wells. The November 2017 sample results and historical data continue to suggest that the plume is stable or shrinking based on recent trends of most contaminants of concern in downgradient Wells MW-13A and MW-19R. The spike in DRO and RRO concentrations in upgradient Monitoring Well MW-6B suggest there may be off-site source contributions to the impacted groundwater plume.

CLOSURE/LIMITATIONS

This report was prepared for the exclusive use of our clients and their representatives in the study of this site. The findings we have presented within this report are based on the limited sampling and analyses that we conducted. They should not be construed as a definite conclusion regarding the site's groundwater conditions. Therefore, the sampling and analyses performed can provide you with only our professional judgment as to the environmental characteristics of this site, and in no way guarantees that an agency or its staff will reach the same conclusions as Shannon & Wilson, Inc. The data presented in this report should be considered representative of the time of our site assessment. Changes in site conditions can occur over time, due to natural forces or human activity. In addition, changes in government codes, regulations, or laws may occur. Because of such changes beyond our control, our observations and interpretations may need to be revised.

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Shannon & Wilson has prepared the documents in Attachment 4, "Important Information About Your Geotechnical/Environmental Report", to assist you and others in understanding the use and limitations of our reports. You are advised that various state and federal agencies (ADEC, EPA, etc.) may require the reporting of this information. Shannon & Wilson does not assume the responsibility for reporting these findings and therefore has not, and will not, disclose the results of this study, except with your permission or as required by law.

We appreciate the opportunity to be of service. Please call the undersigned at (907) 561-2120 with questions or comments concerning this report.

Sincerely,

SHANNON & WILSON, INC.

Prepared by:



Jake Kesler
Environmental Scientist

Reviewed by:



Matthew Henry, P.E.
Vice President

Encl: Tables 1 through 4, Figures 1 through 3, and Attachments 1 through 4

TABLE 1
GROUNDWATER SAMPLING LOG

	Monitoring Well Number			
	MW-6B	MW-13A	MW-14	MW-19R
Water Level Measurement Data				
Date Water Level Measured	11/21/2017	11/21/2017	11/21/2017	11/21/2017
Time Water Level Measured	11:35	15:45	-	14:20
MP Elevation, Feet (MSL)*	76.40	38.01	-	40.19
Depth to Water Below MP, Feet	25.42	6.39	-	6.19
Groundwater Elevation, Feet	50.98	31.62	-	34.00
Purging/Sampling Data				
Date Sampled	11/21/2017	11/21/2017	-	11/21/2017
Time Sampled	12:57	16:23	-	15:11
Depth to Water Below MP, Feet	25.42	6.39	-	6.19
Total Depth of Well Below MP, Feet	31.12	10.65	-	14.39
Water Column in Well, Feet	5.70	4.26	-	8.20
Gallons per Foot	0.65	0.65	0.65	0.16
Gallons in Well	3.71	2.77	-	1.31
Total Gallons Pumped	3.9	3.0	-	2.2
Purging/Sampling Method	Submersible Pump	Submersible Pump	-	Submersible Pump
Diameter of Well Casing	4-inch	4-inch	4-inch	2-inch
Water Quality Data				
Temperature, °C	3.6	2.9	-	3.1
Specific Conductance, µS/cm	871	589	-	272
pH, Standard Units	7.10	7.56	-	7.45
Turbidity, NTU	5.05	32.40	-	48.82
Remarks	Hydrocarbon odor	Hydrocarbon odor Duplicate sample "MW-103A"	Well frozen - Could not sample	Hydrocarbon odor

Notes:

Water quality parameters were measured with Hanna Sticks and Hach Turbidimeter water quality instruments.

* = Previous reports provided by the client indicate that MP elevations were surveyed in 2007 by Karabelnikoff Surveying.

MSL = Mean sea level

MP = Measuring point

µS/cm = Microsiemens per centimeter

NTU = Nephelometric Turbidity Units

mV = Millivolt

°C = Degrees Celsius

- = Not applicable or not measured

TABLE 2
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

Parameter Tested	Method*	Cleanup Level**	Sample ID Number [^] and Water Elevation in Feet above Mean Sea Level or Sample Date (See Table 1, Figure 2, and Attachment 2)				
			Monitoring Wells				Trip Blank
			MW-6B 50.98	MW-13A 31.62	MW-103A~ 31.62	MW-19R 34.00	WTB 11/21/2017
Gasoline Range Organics (GRO) - mg/L	AK101	2.2	0.697 J+	2.00	2.15	3.43	<0.0500
Diesel Range Organics (DRO) - mg/L	AK102	1.5	29.1	4.96	5.50	1.59	-
Residual Range Organics (RRO) - mg/L	AK103	1.1	2.07	0.930	1.22	0.338 J	-
Volatile Organic Compounds (VOCs)							
Benzene - mg/L	EPA 8021B/8260C	0.0046	0.0192	0.0613	0.0669	0.0290	<0.000200
Toluene - mg/L	EPA 8021B/8260C	1.1	0.000520 J	0.00655	0.00752	0.00453	<0.000500
Ethylbenzene - mg/L	EPA 8021B/8260C	0.015	0.0689	0.133 E	0.19 E	0.0142	<0.000500
Xylenes - mg/L	EPA 8021B/8260C	0.19	0.0591	0.370	0.38	0.0403	<0.00150
1,2,4-Trimethylbenzene - mg/L	EPA 8260C	0.015	-	0.0952	0.1	-	<0.000500
1,3,5-Trimethylbenzene - mg/L	EPA 8260C	0.12	-	0.0265	0.0265	-	<0.000500
4-Isopropyltoluene - mg/L	EPA 8260C	-	-	0.00204	0.00207	-	<0.000500
Isopropylbenzene (Cumene) - mg/L	EPA 8260C	0.45	-	0.00328	0.00406	-	<0.000500
Naphthalene - mg/L	EPA 8260C	0.0017	-	0.0728	0.0776	-	<0.000500
n-Propylbenzene - mg/L	EPA 8260C	9.1	-	0.00426	0.00498	-	<0.000500
sec-Butylbenzene - mg/L	EPA 8260C	2	-	0.000620 J	0.000640 J	-	<0.000500
tert-Butylbenzene - mg/L	EPA 8260C	0.69	-	0.000590 J	0.000580 J	-	<0.000500
Other VOCs - mg/L	EPA 8260C	Various	-	ND	ND	-	ND
Polynuclear Aromatic Hydrocarbons (PAHs)							
1-Methylnaphthalene - mg/L	EPA 8270D SIM	0.011	-	0.000974 E	0.00373 E	-	-
2-Methylnaphthalene - mg/L	EPA 8270D SIM	0.036	-	<0.0000250	0.000812	-	-
Acenaphthene - mg/L	EPA 8270D SIM	0.53	-	0.000272 E	0.000409 E	-	-
Fluorene - mg/L	EPA 8270D SIM	0.29	-	0.000227 E	0.000509 E	-	-
Naphthalene - mg/L	EPA 8270D SIM	0.0017	-	0.00290 E	0.0115 E	-	-
Other PAH Analytes -mg/L	EPA 8270D SIM	Various	-	ND	ND	-	-

Notes:

- * = See Attachment 2 for compounds tested, methods, and laboratory reporting limits
- ** = Groundwater cleanup levels are listed in Table C, 18 AAC 75.345 (November 2017) for the "under 40 inches (precipitation) zone"
- ^ = Sample ID number preceded by "20069-" on the chain of custody form
- mg/L = Milligrams per Liter
- <0.0500 = Analyte not detected; laboratory limit of detection of 0.0500 mg/L
- 0.0591** = Analyte detected
- 29.1** = Analyte detected above ADEC cleanup level
- = Not applicable or sample not tested for this analyte
- ~ = Duplicate of preceeding sample
- J = Estimated concentration less than the limit of quantitation. See the SGS laboratory report for details.
- J+ = Analyte result is potentially biased high due to surrogate failure.
- E = Result is an estimate due to a primary/duplicate sample relative percent difference (RPD) failure.
- ND = Not detected

TABLE 3
SUMMARY OF HISTORICAL GROUNDWATER DATA

Monitoring Well	Sample Date	Groundwater Elevation (feet) MSL	Parameter Tested and Cleanup Level* in mg/L			
			GRO 2.2	DRO 1.5	RRO 1.1	Benzene 0.0046
MW-1	05/11/05	32.67	11.0	7.00	-	1.30
	05/16/06	32.58	16.0	5.40	-	1.50
	09/11/07	32.95	14.0	3.20	<0.380	2.10
	08/21/08~	32.87	14.5	4.00	-	1.52
	10/07/08	33.14	-	-	-	-
	08/18/09~	32.79	1.99	1.31	<0.385	0.656
	09/02/10	33.24	2.20	1.10	0.270	0.580
	10/07/11	32.58	3.67	1.13	0.283 J	0.707
	10/10/2012~	34.07	3.56	1.80	0.549	1.12
	10/22/13	33.40	2.31	0.876	0.252 J	0.663
10/23/2014~	32.81	0.884	0.418 J	<0.250	0.214	
MW-6B	05/11/05	53.00	2.20	15.0	-	0.0900
	05/15/06	52.58	2.30	23.0	-	0.0540
	09/12/07	50.37	1.80	9.00	<0.380	0.0600
	08/21/08	50.94	1.60	13.2	-	0.0472
	10/08/08	50.75	-	-	<3.54	0.0461
	08/19/09	50.30	1.52	13.0	1.45	0.0310
	09/01/10	50.62	1.10	23.0	<3.50	0.0310
	10/07/11	49.87	0.933	17.6	1.85	0.0175
	10/10/12	52.25	1.27 J+	7.58	0.836	0.0232
	10/22/13	53.00	2.05	7.64	0.683	0.0540
	10/23/14	50.78	1.18	6.16	0.596	0.0446
11/21/17	50.98	0.697 J+	29.1	2.07	0.0192	
MW-13A	05/11/05	31.53	14.0	11.0	-	0.430
	05/16/06	31.28	15.0	22.0	-	0.330
	09/12/07	32.73	13.0	7.90	<0.410	0.400
	08/21/08	31.61	17.1	16.4	-	0.291
	10/09/08	32.32	-	-	<3.54	0.293
	08/18/09	32.31	9.73	10.3	1.35	0.232
	09/01/10~	32.46	8.70	18.0	<1.40	0.260
	10/7/2011~	31.59	8.62	16.7	2.98	0.248
	10/10/12	33.76	6.52	10.1	1.55	0.167
	10/22/13	32.77	7.15	11.3	1.48	0.208
	10/23/14	32.16	5.56	11.2	1.47	0.154
11/21/2017~	31.62	2.15	5.50	1.22	0.0669	
MW-14	05/11/05	33.50	5.00	11.0	-	0.012
	05/15/06	33.81	5.20	15.0	-	0.018
	08/21/08	32.93	4.38	13.4	-	0.00804
	10/08/08	33.48	-	-	1.65	0.00715
	08/19/09	33.41	2.38	5.25	0.596	0.0021
	09/01/10	33.55	2.70	9.00	<0.780	0.0040
	10/07/11	32.51	2.64	8.44	1.18	0.00371
	10/26/12	-	1.56 J+	2.90	0.195 J	0.00723
	10/22/13	-	3.06	3.98	0.332 J	0.00731
	10/23/14	-	0.641 J	1.03	<0.250	0.00498 J
	11/21/17	Well Frozen - could not sample				

See Notes on Page 2

**TABLE 3
SUMMARY OF HISTORICAL GROUNDWATER DATA**

Monitoring Well	Sample Date	Groundwater Elevation (feet) MSL	Parameter Tested and Cleanup Level* in mg/L			
			GRO 2.2	DRO 1.5	RRO 1.1	Benzene 0.0046
MW-19R	09/12/07	34.49	3.50	6.90	6.50	0.020
	08/21/08	34.24	5.16	4.19	-	0.00448
	10/08/08	34.26	-	-	1.09	0.00373
	08/18/09	35.09	4.01	1.92	<0.385	0.00530
	09/02/10	34.42	4.80	2.80	<0.350	0.00300
	10/07/11	33.89	6.05	3.92	1.07	0.00214
	10/10/12	35.59	3.25 J+	2.57	0.717	0.00159
	10/22/13~	35.10	5.04	3.01	0.348 J	0.00398
	10/23/14	32.49	5.31	1.88	0.416 J	0.0186
	11/21/17	34.00	3.43	1.59	0.338 J	0.0290

Notes: Data prior to 2011 provided by ARCADIS

- * = Groundwater cleanup levels are from Table C, 18 AAC 75.345 (November 2017)
- mg/L = Milligrams per liter
- MSL = Mean sea level
- GRO = Gasoline range organics
- DRO = Diesel range organics
- RRO = Residual range organics
- <0.380 = Analyte not detected at or above the laboratory reporting limit of 0.380 mg/L
- <3.54 = Laboratory limit of detection is greater than the ADEC Table C cleanup level
- 1.99 = Analyte detected
- 3.50** = Reported concentration equals or exceeds cleanup level
- = Not applicable or sample not tested for this analyte
- ~ = The higher concentrations between primary and duplicate samples are tabulated
- J = Analyte detected, but at a concentration less than the laboratory reporting limit
- J+ = Project result may be biased high due to surrogate failure (See LDRC, Attachment 2)
- J- = Project result may be biased low due to surrogate failure

TABLE 4
QUALITY CONTROL DATA

Parameter Tested	Primary Sample MW-13A	Duplicate Sample MW-103A	Precision (RPD)	Precision QC Limit
Gasoline Range Organics (GRO) - mg/L	2.00	2.15	7%	30%
Diesel Range Organics (DRO) - mg/L	4.96	5.50	10%	30%
Residual Range Organics (RRO) - mg/L	0.930	1.22	27%	30%
Volatile Organic Compounds (VOCs)				
Benzene - mg/L	0.0613	0.067	9%	30%
Toluene - mg/L	0.00655	0.00752	14%	30%
Ethylbenzene - mg/L	0.133	0.190	35%	30%
Xylenes - mg/L	0.370	0.380	3%	30%
1,2,4-Trimethylbenzene - mg/L	0.0952	0.1	5%	30%
1,3,5-Trimethylbenzene - mg/L	0.0265	0.0265	0%	30%
4-Isopropyltoluene - mg/L	0.00204	0.00207	1%	30%
Isopropylbenzene (Cumene) - mg/L	0.00328	0.00406	21%	30%
Naphthalene - mg/L	0.0728	0.0776	6%	30%
n-Propylbenzene - mg/L	0.00426	0.00498	16%	30%
sec-Butylbenzene - mg/L	0.00062	0.00064	3%	30%
tert-Butylbenzene - mg/L	0.00059	0.00058	2%	30%
Polynuclear Aromatic Hydrocarbons (PAHs)				
1-Methylnaphthalene - mg/L	0.000974	0.00373	117%	30%
2-Methylnaphthalene - mg/L	<0.0000250	0.000812	-	30%
Acenaphthene - mg/L	0.000272	0.000409	40%	30%
Fluorene - mg/L	0.000227	0.000509	77%	30%
Naphthalene - mg/L	0.00290	0.0115	119%	30%

Notes:

RPD = Relative percent difference

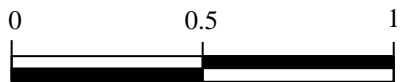
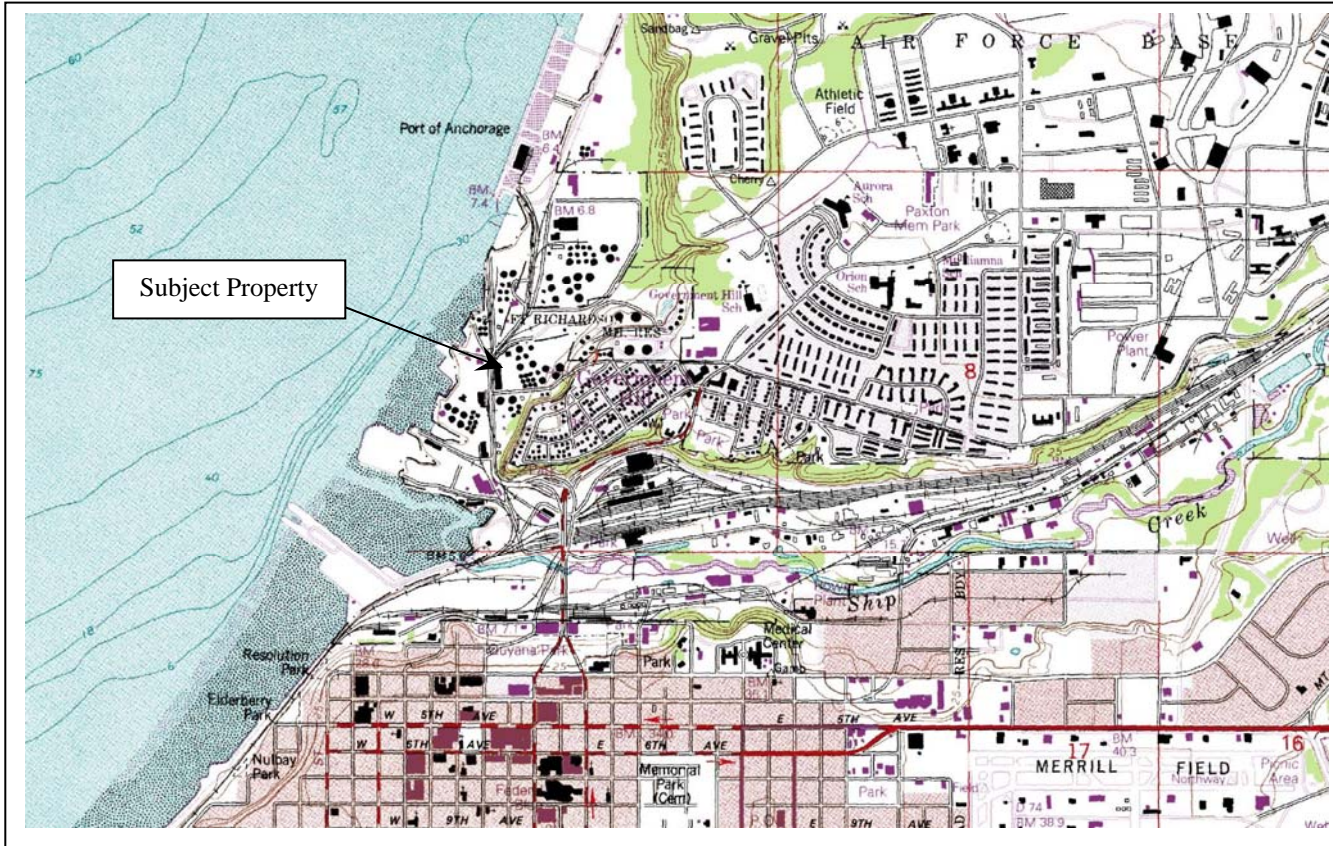
QC = Quality control

NA = RPD not calculated due to non-detectable results

mg/L = Milligrams per liter

35% = RPD is greater than the precision QC limit

- = RPD could not be calculated due a non-detect value




Approximate scale
1 inch equals approximately 1/2 mile


Taken from
Anchorage A-8 NE Quadrangle
U.S. Geological Survey





459 West Bluff Drive Anchorage, Alaska	
VICINITY MAP	
March 2018	32-1-20069-001
 SHANNON & WILSON, INC. Geotechnical & Environmental Consultants	Fig. 1


LEGEND

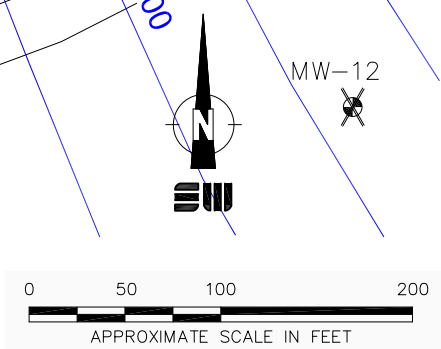
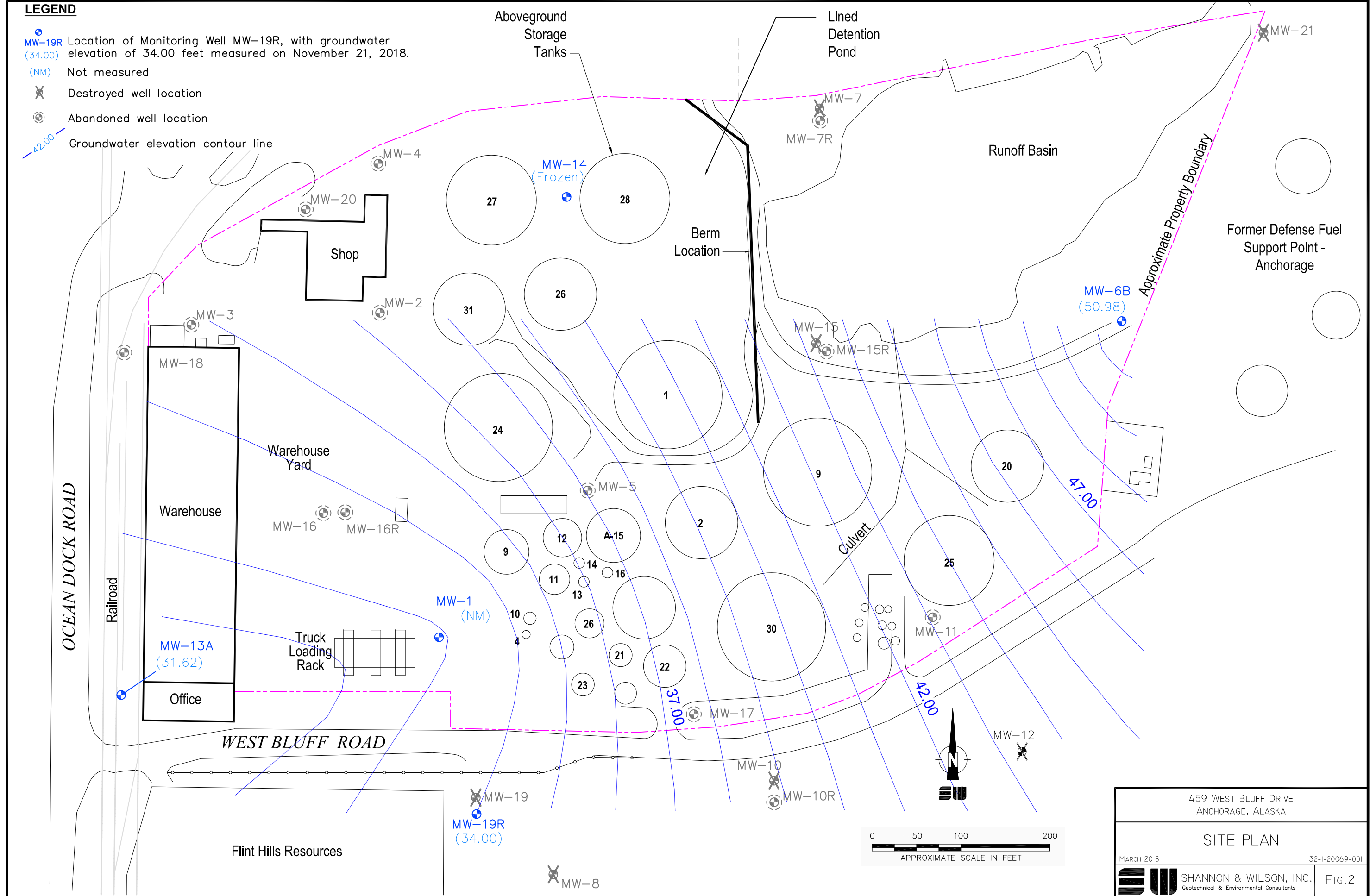
 **MW-19R** Location of Monitoring Well MW-19R, with groundwater elevation of 34.00 feet measured on November 21, 2018.

 (NM) Not measured

 Destroyed well location

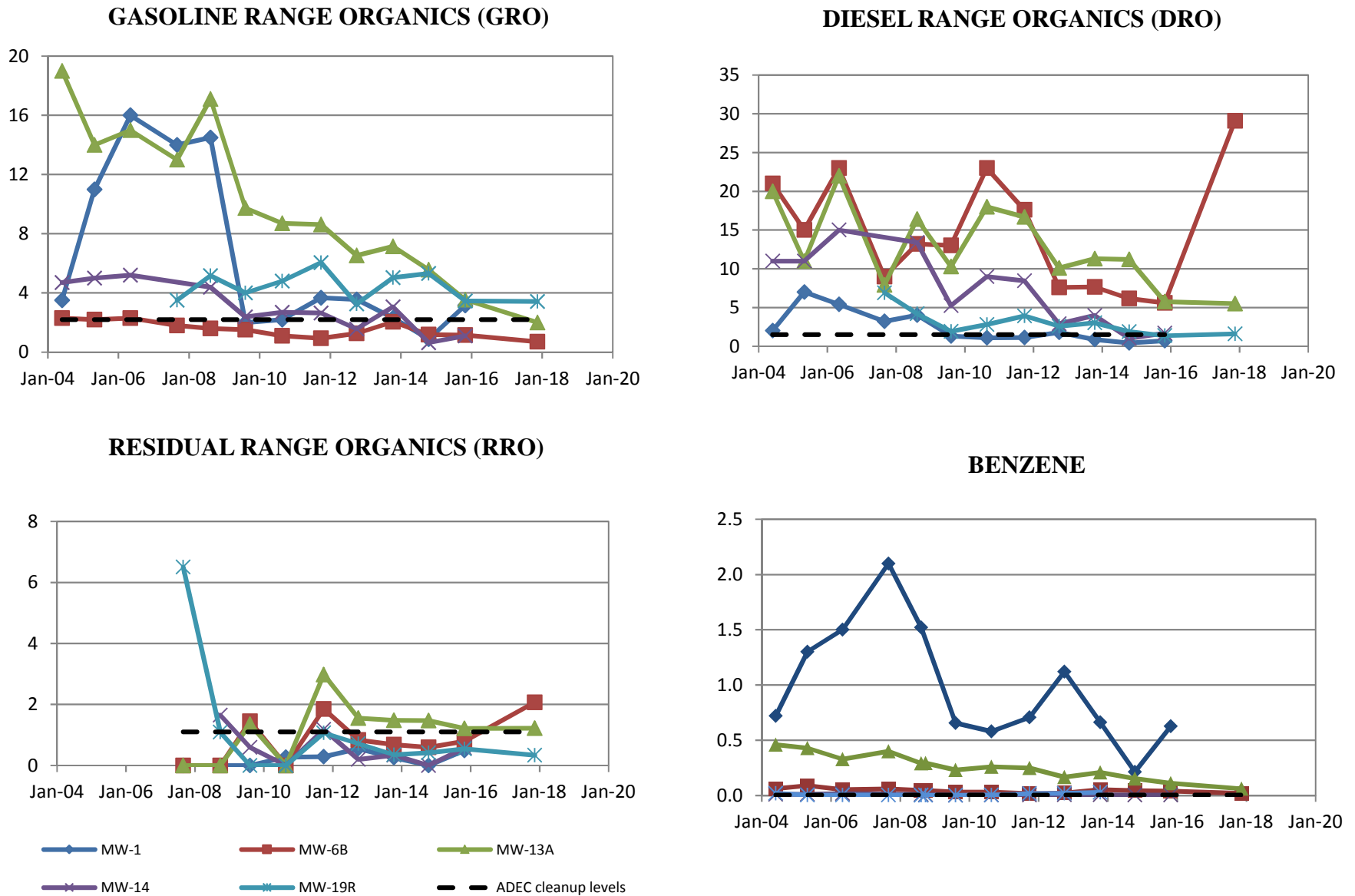
 Abandoned well location

 42.00 Groundwater elevation contour line



459 WEST BLUFF DRIVE ANCHORAGE, ALASKA	
SITE PLAN	
MARCH 2018	32-I-20069-001
 SHANNON & WILSON, INC. Geotechnical & Environmental Consultants	FIG. 2

**FIGURE 3
GRAPHS OF SELECT CONSITUENTS IN MILLIGRAMS PER LITER**



ATTACHMENT 1
FIELD NOTES

FIELD ACTIVITIES DAILY LOG

Date 11/21/17

Sheet 1 of 1

Project No. 32-1-20089

Project Name: Crowley Groundwater Sampling

Field activity subject: Groundwater Sampling

Description of daily activities and events:

- 0900 - depart for 459 W. Bluff Dr.
- 0915 - arrive at Security check-in at Anchorage Port
- 0930 - arrive at Crowley to meet Todd Kasteler 907-340342
- 0945 - well recon for wells MW-6B, MW-13A, MW-19R, MW-14
- 10:45 - well MW-14 frozen solid - no sample
- well MW-19R is flushpoint and ~5 m. below ice difficult to locate - rented metal detector to locate well
- 11:15 - calibrate sampling equipment before purging wells
- 11:30 - begin sampling/purging process on wells
- 1300 - drive to port to rent metal detector
 - locate well MW-19R + take string logs for future reference / finding well
- 17:00 - finish sampling
 - depart port (port of Anchorage) + Crowley Site
- 17:30 - arrive at Sheehen + Wilson
- 17:35 - unload gear / fill out COC etc
- 18:00 - depart Sheehen + Wilson for home.

Visitors on site: Todd Kasteler (Crowley employee + escort/truck card holder).

Changes from plans/specifications and other special orders and important decisions:

Rent metal detector to find flushpoint well MW-19R
MW-14 - frozen - no sample collected.

Weather conditions: 20°F, overcast

Important telephone calls: Matt Henry - informed Matt of frozen well and that a metal detector was needed to find MW-19R

Personnel on site: JJK + Todd Kasteler (escort).

Signature: JJK

Date: 11/21/2017

LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 32-1-20089 Location: Crowley Weather: 20°F overcast
 Well No.: MW-6B
 Date: 11/21/17 Time Started: 11:30 Time Completed: 13:30
 Develop Date: _____ Develop End Time: _____ (24 hour break)

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 11:35 Date of Depth Measurement: 11/21/17
 Measuring Point (MP): Top of PVC Casing / Top of Steel Protective Casing / Other: _____
 Diameter of Casing: 4" Well Screen Interval: _____
 Total Depth of Well Below MP: 31.12 Product Thickness, if noted: _____
 Depth-to-Water (DTW) Below MP: 25.42
 Water Column in Well: 5.7 (Total Depth of Well Below MP - DTW Below MP)
 Gallons per foot: 0.65
 Gallons in Well: 3.705 (Water Column in Well x Gallons per foot)

PURGING DATA

Date Purged: 11/21/17 Time Started: 12:10 Time Completed: 12:56
 Three Well Volumes: _____ (Gallons in Well x 3)
 Gallons Purged: 3.9 Depth of Pump (generally 2 ft from bottom): 26.42
 Max. Drawdown (generally 0.3 ft): 0.18 Pump Rate: 0.54/min
 Well Purged Dry: Yes No (If yes, use Well Purged Dry Log)

Time:	Gallons:	Pump Rate (L/min):	DTW (ft BMP):	Drawdown (ft):	Temp: (°C)	Sp. Cond.: (uS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (NTU)
<u>12:13</u>	<u>0.2</u>	<u>0.5</u>	<u>26.45</u>	<u>0.03</u>	<u>3.3</u>	<u>868</u>	-	<u>6.51</u>	-	<u>16.28</u>
<u>12:16</u>	<u>0.2</u>	<u>0.5</u>	-	-	<u>2.9</u>	<u>863</u>	-	<u>7.01</u>	-	<u>9.18</u>
<u>12:19</u>	<u>0.2</u>	-	-	-	<u>2.9</u>	<u>864</u>	-	<u>6.98</u>	-	<u>9.23</u>
<u>12:22</u>	<u>0.2</u>	-	<u>25.46</u>	<u>0.04</u>	<u>3.1</u>	<u>862</u>	-	<u>6.93</u>	-	<u>8.91</u>
<u>12:25</u>	<u>0.2</u>	-	-	-	<u>3.4</u>	<u>861</u>	-	<u>6.91</u>	-	<u>9.86</u>
<u>12:28</u>	<u>0.2</u>	↓	-	-	<u>3.4</u>	<u>858</u>	-	<u>6.92</u>	-	<u>9.78</u>

SAMPLING DATA

Odor: strong HC Color: Clear
 Sample Designation: 20089-MW6B Time / Date: 12:57 11/21/17
 QC Sample Designation: _____ Time / Date: _____
 QA Sample Designation: _____ Time / Date: _____
 Evacuation Method: Submersible Pump / Other: mini-whale
 Sampling Method: Submersible Pump / Other: _____
 Water Quality Instruments Used/Manufacturer/Model Number Hanna #2, turbidimeter #2
 Calibration Info (Time, Ranges, etc) Hanna #2, turbidimeter #2 see JSK 11/21/17 field notes
 Remarks: _____

Sampling Personnel: JSK

WELL CASING VOLUMES (GAL/FT): 1" = 0.04 2" = 0.16 4" = 0.65
 ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23

17.2 20.6

LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Continued from previous page

Job No: 321-20089 Location: Crawley Site: 459 W. Bluff Dr
 Well No.: MW-6B
 Date: 11/21/17

Time:	Gallons:	Pump Rate (L/min):	DTW (ft BMP):	Drawdown (ft):	Temp: (°C)	Sp. Cond (uS/cm)	DO (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (NTU)
12:31	0.3	0.4	25.49	0.07	3.6	868	-	6.92	-	7.06
12:34	0.3		-	-	3.6	869	-	6.94	-	7.02
12:38	0.3		-	-	3.8	872	-	6.93	-	6.89
12:41			25.50	0.08	3.7	874	-	6.98	-	6.75
12:44			-	-	3.9	874	-	6.98	-	6.72
12:47			-	-	3.8	873	-	6.99	-	6.42
12:50			25.60	0.18	3.8	875	-	7.11	-	5.92
12:53			-	-	3.7	872	-	7.09	-	5.08
12:56			-	-	3.8	871	-	7.10	-	5.05
12:57	SAMPLE TIME									
13:02			-	-						
13:05			-	-						
13:08			-	-						
13:09	SAMPLE TIME									

	Interval (minutes)	Pump Rate (mL/min):	Drawdown (ft):	Temp: (°C)	Sp. Cond.: (uS/cm)	DO (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (NTU)
ADEC 1ay 2010)	3 to 5	100 to 150	<0.0328	±3% or ±0.2	±3%	±10%	±0.1	±10	±10%
EPA an. 2010)	5	50	<0.3	±3%	±3%	±10%	±0.1	±10	±10% or <5 NTU

EPA guidance requires all parameters to stabilize for 3 consecutive readings before sampling. If not stable within 2 hours, collect sample.
 ADEC guidance requires 3 parameters (4 if using temperature) to stabilize for 3 consecutive readings before sampling.

LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 32-1-20069 Location: Crawley Weather: 20°F overcast
 Well No.: MW-13A
 Date: 11/21/17 Time Started: 15:45 Time Completed: 17:00
 Develop Date: _____ Develop End Time: _____ (24 hour break)

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 15:45 Date of Depth Measurement: 11/21/17
 Measuring Point (MP): Top of PVC Casing / Top of Steel Protective Casing / Other: _____
 Diameter of Casing: 4" Well Screen Interval: _____
 Total Depth of Well Below MP: 10.65 Product Thickness, if noted: _____
 Depth-to-Water (DTW) Below MP: 6.39 ft.
 Water Column in Well: 4.26 (Total Depth of Well Below MP - DTW Below MP)
 Gallons per foot: 0.65
 Gallons in Well: 2.77 (Water Column in Well x Gallons per foot)

PURGING DATA

Date Purged: 11/21/17 Time Started: 15:50 Time Completed: 16:22
 Three Well Volumes: 8.3 (Gallons in Well x 3)
 Gallons Purged: 8.3 Depth of Pump (generally 2 ft from bottom): 7.39
 Max. Drawdown (generally 0.3 ft): 0.12 Pump Rate: 0.4 L/min
 Well Purged Dry: Yes No (If yes, use Well Purged Dry Log)

Time:	Gallons:	Pump Rate (L/min):	DTW (ft BMP):	Drawdown (ft):	Temp: (°C)	Sp. Cond.: (uS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (NTU)
15:55	0.3	0.4	6.44	0.05	3.0	578	-	7.31	-	28.08
15:58		0.4	-	-	3.3	586	-	7.44	-	43.25
16:01			-	-	3.2	589	-	7.50	-	39.29
16:04			6.46	0.07	2.9	599	-	7.57	-	43.44
16:07			-	-	2.9	589	-	7.89	-	44.04
16:10	↓	↓	-	-	2.9	590	-	7.58	-	37.62

SAMPLING DATA

Odor: Strong HC Color: clear
 Sample Designation: 20069-MW-13A Time / Date: 16:23 11/21/17
 QC Sample Designation: 20069-MW-103A Time / Date: 16:48 11/21/17
 QA Sample Designation: _____ Time / Date: _____

Evacuation Method: Submersible Pump / Other: _____
 Sampling Method: Submersible Pump / Other: Mini-whale
 Water Quality Instruments Used/Manufacturer/Model Number: Hanna #2, turbidimeter #2.
 Calibration Info (Time, Ranges, etc): See JJK 11/21/17 field notes.
 Remarks: JJK JK Duplicate sample 103A

Sampling Personnel: JJK
 WELL CASING VOLUMES (GAL/FT): 1" = 0.04 2" = 0.16 4" = 0.65
 ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23

LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Continued from previous page

Job No: 32-20069 Location: Crawley Site: 459 W. Bluff Dr
 Well No.: MW-13A
 Date: 11/21/17

Time:	Gallons:	Pump Rate (L/min):	DTW (ft BMP):	Drawdown (ft):	Temp: (°C)	Sp. Cond (uS/cm)	DO (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (NTU)
2.1 16:13	0.3	0.4	6.50	0.4	2.8	589	-	7.57	-	32.48
2.4 16:16					2.9	592	-	7.58	-	33.71
2.7 16:19					2.9	589	-	7.55	-	31.91
3.0 16:22			6.51	0.12	2.9	589	-	7.56	-	32.40
16:23	SAMPLE TIME									
16:48	DUP SAMPLE TIME									
Interval (minutes)	Pump Rate (mL/min):	Drawdown (ft):	Temp: (°C)	Sp. Cond.: (uS/cm)	DO (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (NTU)		
ADEC 1ay 2010)	3 to 5	100 to 150	<0.0328	±3% or ±0.2	±3%	±10%	±0.1	±10	±10%	
EPA an. 2010)	5	50	<0.3	±3%	±3%	±10%	±0.1	±10	±10% or <5 NTU	

EPA guidance requires all parameters to stabilize for 3 consecutive readings before sampling. If not stable within 2 hours, collect sample.
 ADEC guidance requires 3 parameters (4 if using temperature) to stabilize for 3 consecutive readings before sampling.

LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 32-1-20089 Location: Crawley Weather: 20°F overcast
 Well No.: MW-19R
 Date: 11/21/17 Time Started: 14:00 Time Completed: 15:30
 Develop Date: - Develop End Time: - (24 hour break)

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 14:20 Date of Depth Measurement: 11/21/17
 Measuring Point (MP): Top of PVC Casing / Top of Steel Protective Casing / Other:
 Diameter of Casing: 2" Well Screen Interval: -
 Total Depth of Well Below MP: 14.39 Product Thickness, if noted: -
 Depth-to-Water (DTW) Below MP: 6.19
 Water Column in Well: 8.20 (Total Depth of Well Below MP - DTW Below MP)
 Gallons per foot: 0.16
 Gallons in Well: 1.31 (Water Column in Well x Gallons per foot)

PURGING DATA

Date Purged: 11/21/17 Time Started: 14:30 Time Completed: 15:10
 Three Well Volumes: 3.93 (Gallons in Well x 3)
 Gallons Purged: 2.2 Depth of Pump (generally 2 ft from bottom): 7.19
 Max. Drawdown (generally 0.3 ft): 0.11 Pump Rate: ~0.3 L/min
 Well Purged Dry: Yes No (If yes, use Well Purged Dry Log)

Time:	Gallons:	Pump Rate (L/min):	DTW (ft BMP):	Drawdown (ft):	Temp: (°C)	Sp. Cond.: (uS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (NTU)
14:40	0.2	0.3	6.20	0.01	2.7	531	-	6.81	-	>1000
14:43	0.2	0.3	-	-	2.4	529	-	7.24	-	>1000
14:46	0.2	0.3	-	-	3.0	536	-	7.27	-	829
14:49	0.2	0.3	6.24	0.05	3.0	531	-	7.29	-	390.4
14:52	0.2	0.3	-	-	2.9	535	-	7.49	-	201.8
214:55	0.2	0.3	-	-	2.8	536	-	7.48	-	143.7

SAMPLING DATA

Odor: strong HC Color: brown/grey
 Sample Designation: 20089-MW19R Time / Date: 15:11 11/21/17
 QC Sample Designation: - Time / Date: -
 QA Sample Designation: - Time / Date: -

Evacuation Method: Submersible Pump / Other: Mini-whale
 Sampling Method: Submersible Pump / Other: Mini-whale

Water Quality Instruments Used/Manufacturer/Model Number Hanna #2, turbidimeter #2

Calibration Info (Time, Ranges, etc) See JSK 11/21/17 field notes

Remarks: Flush mount, Grey sludge in wells

Sampling Personnel: JSK

WELL CASING VOLUMES (GAL/FT): 1" = 0.04 2" = 0.16 4" = 0.65
 ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23

LOW-FLOW WATER SAMPLING LOG

20.0
17.2

Shannon & Wilson, Inc.

Continued from previous page

Job No: 32-1-20089 Location: Crawley Site: 459 W. Bluff Dr.
 Well No.: MW-19K
 Date: 11/21/17

Time:	Gallons:	Pump Rate (L/min):	DTW (ft BMP):	Drawdown (ft):	Temp: (°C)	Sp. Cond (uS/cm)	DO (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (NTU)
14:58	0.2	0.3	6.28	0.09	3.0	549	-	7.44	-	121.4
15:01	0.2	0.3	-	0.09	2.9	274	-	7.42	-	88.3
15:04	0.2	0.3	-	-	2.9 ✓	276 ✓	-	7.44	-	51.93 ✓
15:07	0.2	0.3	6.30	0.11	3.0 ✓	273 ✓	-	7.46	-	49.97 ✓
15:10	0.2	0.3	-	-	3.1 ✓	272 ✓	-	7.45 ✓	-	48.82 ✓
15:11	SAMPLE TIME									
	Interval (minutes)	Pump Rate (mL/min):	Drawdown (ft):	Temp: (°C)	Sp. Cond.: (uS/cm)	DO (mg/L)	pH: (S.U.)	ORP: (mV)		Turb: (NTU)

ADEC (May 2010)	3 to 5	100 to 150	<0.0328	±3% or ±0.2	±3%	±10%	±0.1	±10		±10%
EPA (Jan. 2010)	5	50	<0.3	±3%	±3%	±10%	±0.1	±10		±10% or <5 NTU

EPA guidance requires all parameters to stabilize for 3 consecutive readings before sampling. If not stable within 2 hours, collect sample.
 ADEC guidance requires 3 parameters (4 if using temperature) to stabilize for 3 consecutive readings before sampling.

LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 321-20069 Location: Crowley Weather: 70°F overcast
 Well No.: MW-14
 Date: 11/21/17 Time Started: 10:45 Time Completed: 11:15
 Develop Date: _____ Develop End Time: _____ (24 hour break)

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 11:00 Date of Depth Measurement: 11/21/17
 Measuring Point (MP): Top of PVC Casing / Top of Steel Protective Casing / Other: _____
 Diameter of Casing: 4" Well Screen Interval: _____
 Total Depth of Well Below MP: - Frozen well Product Thickness, if noted: _____
 Depth-to-Water (DTW) Below MP: 4.74
 Water Column in Well: _____ (Total Depth of Well Below MP - DTW Below MP)
 Gallons per foot: 0.65
 Gallons in Well: _____ (Water Column in Well x Gallons per foot)
 TOC: 3.83
 Top of streak up: 3.95

PURGING DATA

Date Purged: _____ Time Started: _____ Time Completed: _____
 Three Well Volumes: _____ (Gallons in Well x 3)
 Gallons Purged: _____ Depth of Pump (generally 2 ft from bottom): _____
 Max. Drawdown (generally 0.3 ft): _____ Pump Rate: _____
 Well Purged Dry: Yes No (If yes, use Well Purged Dry Log)

Time:	Gallons:	Pump Rate (L/min):	DTW (ft BMP):	Drawdown (ft):	Temp: (°C)	Sp. Cond.: (uS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (NTU)
<u>WELL FROZEN - NO SAMPLE COLLECTED.</u>										

SAMPLING DATA

Odor: _____ Color: _____
 Sample Designation: _____ Time / Date: _____
 QC Sample Designation: _____ Time / Date: _____
 QA Sample Designation: _____ Time / Date: _____

Evacuation Method: Submersible Pump / Other: N/A
 Sampling Method: Submersible Pump / Other: N/A
 Water Quality Instruments Used/Manufacturer/Model Number No SAMPLE COLLECTED - Frozen well.
 Calibration Info (Time, Ranges, etc) See JSK 11/21/17 field notes.
 Remarks: Well frozen - NO SAMPLE COLLECTED

Sampling Personnel: JSK

WELL CASING VOLUMES (GAL/FT): 1" = 0.04 2" = 0.16 4" = 0.65
 ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23

LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Continued from previous page

Job No: 32-1-20069 Location: Crowley Site: 459 W. Bluff Dr.
 Well No.: MW-19
 Date: 11/21/17

Time:	Gallons:	Pump Rate (L/min):	DTW (ft BMP):	Drawdown (ft):	Temp: (°C)	Sp. Cond (uS/cm)	DO (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (NTU)

WELL FROZEN - NO SAMPLES COLLECTED

	Interval (minutes)	Pump Rate (mL/min):	Drawdown (ft):	Temp: (°C)	Sp. Cond.: (uS/cm)	DO (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (NTU)
ADEC (ay 2010)	3 to 5	100 to 150	<0.0328	±3% or ±0.2	±3%	±10%	±0.1	±10	±10%
EPA (an. 2010)	5	50	<0.3	±3%	±3%	±10%	±0.1	±10	±10% or <5 NTU

EPA guidance requires all parameters to stabilize for 3 consecutive readings before sampling. If not stable within 2 hours, collect sample.

ADEC guidance requires 3 parameters (4 if using temperature) to stabilize for 3 consecutive readings before sampling.

ATTACHMENT 2
RESULTS OF ANALYTICAL TESTING BY
SGS NORTH AMERICA INC. OF ANCHORAGE, ALASKA
AND
ADEC LABORATORY DATA REVIEW CHECKLIST



Laboratory Report of Analysis

To: Shannon & Wilson, Inc.
5430 Fairbanks Street Suite 3
Anchorage, AK 99518
(907)433-3226

Report Number: **1179898**

Client Project: **32-1-20069 Crowley GW**

Dear Jake Kesler,

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.

Justin Nelson
Project Manager
Justin.Nelson@sgs.com

Date

Print Date: 12/06/2017 3:08:34PM

SGS North America Inc. | 200 West Potter Drive, Anchorage, AK 99518
t 907.562.2343 f 907.561.5301 www.us.sgs.com

Member of SGS Group

Case Narrative

SGS Client: **Shannon & Wilson, Inc.**
SGS Project: **1179898**
Project Name/Site: **32-1-20069 Crowley GW**
Project Contact: **Jake Kesler**

Refer to sample receipt form for information on sample condition.

20069-MW6B (1179898001) PS

AK101 - Surrogate recovery for 4-bromofluorobenzene (242%) does not meet QC criteria due to matrix interference.

LCSD for HBN 1772958 [VXX/3178 (1427990) LCSD

8260C - LCSD RPD for bromomethane (22.6) does not meet QC criteria. This analyte was not detected in 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: 12/06/2017 3:08:35PM

Report of Manual Integrations

<u>Laboratory ID</u>	<u>Client Sample ID</u>	<u>Analytical Batch</u>	<u>Analyte</u>	<u>Reason</u>
SW8260C				
1179898003	20069-13A	VMS17480	4-Isopropyltoluene	SP
1179898004	20069-103A	VMS17480	4-Isopropyltoluene	SP

Manual Integration Reason Code Descriptions

Code	Description
O	Original Chromatogram
M	Modified Chromatogram
SS	Skimmed surrogate
BLG	Closed baseline gap
RP	Reassign peak name
PIR	Pattern integration required
IT	Included tail
SP	Split peak
RSP	Removed split peak
FPS	Forced peak start/stop
BLC	Baseline correction
PNF	Peak not found by software

All DRO/RRO analysis are integrated per SOP.

Print Date: 12/06/2017 3:08:36PM

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 (Provisionally Certified as of 10/12/2017) & Microbiology (Provisionally Certified as of 9/21/2017) & 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	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>
20069-MW6B	1179898001	11/21/2017	11/22/2017	Water (Surface, Eff., Ground)
20069-MW19R	1179898002	11/21/2017	11/22/2017	Water (Surface, Eff., Ground)
20069-13A	1179898003	11/21/2017	11/22/2017	Water (Surface, Eff., Ground)
20069-103A	1179898004	11/21/2017	11/22/2017	Water (Surface, Eff., Ground)
WTB	1179898005	11/21/2017	11/22/2017	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.
AK102	DRO/RRO Low Volume Water
AK103	DRO/RRO Low Volume Water
AK101	Gasoline Range Organics (W)
SW8260C	Volatile Organic Compounds (W) FULL

Print Date: 12/06/2017 3:08:40PM

Detectable Results Summary

Client Sample ID: **20069-MW6B**

Lab Sample ID: 1179898001

Semivolatile Organic Fuels

Volatile Fuels

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	29.1	mg/L
Residual Range Organics	2.07	mg/L
Benzene	19.2	ug/L
Ethylbenzene	68.9	ug/L
Gasoline Range Organics	0.697	mg/L
o-Xylene	3.91	ug/L
P & M -Xylene	55.6	ug/L
Toluene	0.520J	ug/L

Client Sample ID: **20069-MW19R**

Lab Sample ID: 1179898002

Semivolatile Organic Fuels

Volatile Fuels

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	1.59	mg/L
Residual Range Organics	0.338J	mg/L
Benzene	29.0	ug/L
Ethylbenzene	14.2	ug/L
Gasoline Range Organics	3.43	mg/L
o-Xylene	2.55	ug/L
P & M -Xylene	37.7	ug/L
Toluene	4.53	ug/L

Client Sample ID: **20069-13A**

Lab Sample ID: 1179898003

Polynuclear Aromatics GC/MS

Semivolatile Organic Fuels

Volatile Fuels

Volatile GC/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
1-Methylnaphthalene	0.974	ug/L
Acenaphthene	0.272	ug/L
Fluorene	0.227	ug/L
Naphthalene	2.90	ug/L
Diesel Range Organics	4.96	mg/L
Residual Range Organics	0.930	mg/L
Gasoline Range Organics	2.00	mg/L
1,2,4-Trimethylbenzene	95.2	ug/L
1,3,5-Trimethylbenzene	26.5	ug/L
4-Isopropyltoluene	2.04	ug/L
Benzene	61.3	ug/L
Ethylbenzene	133	ug/L
Isopropylbenzene (Cumene)	3.28	ug/L
Naphthalene	72.8	ug/L
n-Propylbenzene	4.26	ug/L
o-Xylene	4.56	ug/L
P & M -Xylene	366	ug/L
sec-Butylbenzene	0.620J	ug/L
tert-Butylbenzene	0.590J	ug/L
Toluene	6.55	ug/L
Xylenes (total)	370	ug/L

Print Date: 12/06/2017 3:08:41PM

Detectable Results Summary

Client Sample ID: **20069-103A**
 Lab Sample ID: 1179898004
Polynuclear Aromatics GC/MS

Semivolatile Organic Fuels

Volatile Fuels

Volatile GC/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
1-Methylnaphthalene	3.73	ug/L
2-Methylnaphthalene	0.812	ug/L
Acenaphthene	0.409	ug/L
Fluorene	0.509	ug/L
Naphthalene	11.5	ug/L
Diesel Range Organics	5.50	mg/L
Residual Range Organics	1.22	mg/L
Gasoline Range Organics	2.15	mg/L
1,2,4-Trimethylbenzene	100	ug/L
1,3,5-Trimethylbenzene	26.5	ug/L
4-Isopropyltoluene	2.07	ug/L
Benzene	66.9	ug/L
Ethylbenzene	190	ug/L
Isopropylbenzene (Cumene)	4.06	ug/L
Naphthalene	77.6	ug/L
n-Propylbenzene	4.98	ug/L
o-Xylene	4.83	ug/L
P & M -Xylene	375	ug/L
sec-Butylbenzene	0.640J	ug/L
tert-Butylbenzene	0.580J	ug/L
Toluene	7.52	ug/L
Xylenes (total)	380	ug/L



Results of 20069-MW6B

Client Sample ID: 20069-MW6B
Client Project ID: 32-1-20069 Crowley GW
Lab Sample ID: 1179898001
Lab Project ID: 1179898

Collection Date: 11/21/17 12:57
Received Date: 11/22/17 10:06
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Semivolatile Organic Fuels

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Rows include Diesel Range Organics and Surrogates (5a Androstane).

Batch Information

Analytical Batch: XFC14002
Analytical Method: AK102
Analyst: JMG
Analytical Date/Time: 11/30/17 20:14
Container ID: 1179898001-D
Prep Batch: XXX38895
Prep Method: SW3520C
Prep Date/Time: 11/29/17 08:36
Prep Initial Wt./Vol.: 250 mL
Prep Extract Vol: 1 mL

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Rows include Residual Range Organics and Surrogates (n-Triacontane-d62).

Batch Information

Analytical Batch: XFC14002
Analytical Method: AK103
Analyst: JMG
Analytical Date/Time: 11/30/17 20:14
Container ID: 1179898001-D
Prep Batch: XXX38895
Prep Method: SW3520C
Prep Date/Time: 11/29/17 08:36
Prep Initial Wt./Vol.: 250 mL
Prep Extract Vol: 1 mL



Results of 20069-MW6B

Client Sample ID: 20069-MW6B
Client Project ID: 32-1-20069 Crowley GW
Lab Sample ID: 1179898001
Lab Project ID: 1179898

Collection Date: 11/21/17 12:57
Received Date: 11/22/17 10:06
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Volatile Fuels

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row: Gasoline Range Organics, 0.697, 0.100, 0.0310, mg/L, 1, 11/23/17 16:53

Surrogates

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row: 4-Bromofluorobenzene (surr), 242, *, 50-150, %, 1, 11/23/17 16:53

Batch Information

Analytical Batch: VFC14005
Analytical Method: AK101
Analyst: NRB
Analytical Date/Time: 11/23/17 16:53
Container ID: 1179898001-A

Prep Batch: VXX31763
Prep Method: SW5030B
Prep Date/Time: 11/22/17 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Rows: Benzene, Ethylbenzene, o-Xylene, P & M -Xylene, Toluene

Surrogates

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row: 1,4-Difluorobenzene (surr), 99, 77-115, %, 1, 11/23/17 16:53

Batch Information

Analytical Batch: VFC14005
Analytical Method: SW8021B
Analyst: NRB
Analytical Date/Time: 11/23/17 16:53
Container ID: 1179898001-A

Prep Batch: VXX31763
Prep Method: SW5030B
Prep Date/Time: 11/22/17 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Analytical Batch: VFC14007
Analytical Method: SW8021B
Analyst: NRO
Analytical Date/Time: 11/29/17 23:16
Container ID: 1179898001-A

Prep Batch: VXX31778
Prep Method: SW5030B
Prep Date/Time: 11/29/17 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL



Results of 20069-MW19R

Client Sample ID: 20069-MW19R
Client Project ID: 32-1-20069 Crowley GW
Lab Sample ID: 1179898002
Lab Project ID: 1179898

Collection Date: 11/21/17 15:11
Received Date: 11/22/17 10:06
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Semivolatile Organic Fuels

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Rows include Diesel Range Organics and Surrogates (5a Androstane).

Batch Information

Analytical Batch: XFC14002
Analytical Method: AK102
Analyst: JMG
Analytical Date/Time: 11/30/17 20:24
Container ID: 1179898002-D
Prep Batch: XXX38895
Prep Method: SW3520C
Prep Date/Time: 11/29/17 08:36
Prep Initial Wt./Vol.: 255 mL
Prep Extract Vol: 1 mL

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Rows include Residual Range Organics and Surrogates (n-Triacontane-d62).

Batch Information

Analytical Batch: XFC14002
Analytical Method: AK103
Analyst: JMG
Analytical Date/Time: 11/30/17 20:24
Container ID: 1179898002-D
Prep Batch: XXX38895
Prep Method: SW3520C
Prep Date/Time: 11/29/17 08:36
Prep Initial Wt./Vol.: 255 mL
Prep Extract Vol: 1 mL



Results of 20069-MW19R

Client Sample ID: 20069-MW19R
Client Project ID: 32-1-20069 Crowley GW
Lab Sample ID: 1179898002
Lab Project ID: 1179898

Collection Date: 11/21/17 15:11
Received Date: 11/22/17 10:06
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Volatile Fuels

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row 1: Gasoline Range Organics, 3.43, 0.500, 0.155, mg/L, 5, 11/30/17 01:07

Surrogates

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row 1: 4-Bromofluorobenzene (surr), 138, 50-150, %, 5, 11/30/17 01:07

Batch Information

Analytical Batch: VFC14007
Analytical Method: AK101
Analyst: NRO
Analytical Date/Time: 11/30/17 01:07
Container ID: 1179898002-A

Prep Batch: VXX31778
Prep Method: SW5030B
Prep Date/Time: 11/29/17 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Rows: Benzene, Ethylbenzene, o-Xylene, P & M -Xylene, Toluene

Surrogates

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row 1: 1,4-Difluorobenzene (surr), 102, 77-115, %, 1, 11/23/17 17:11

Batch Information

Analytical Batch: VFC14007
Analytical Method: SW8021B
Analyst: NRO
Analytical Date/Time: 11/30/17 01:07
Container ID: 1179898002-A

Prep Batch: VXX31778
Prep Method: SW5030B
Prep Date/Time: 11/29/17 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Analytical Batch: VFC14005
Analytical Method: SW8021B
Analyst: NRB
Analytical Date/Time: 11/23/17 17:11
Container ID: 1179898002-A

Prep Batch: VXX31763
Prep Method: SW5030B
Prep Date/Time: 11/22/17 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL



Results of 20069-13A

Client Sample ID: 20069-13A
Client Project ID: 32-1-20069 Crowley GW
Lab Sample ID: 1179898003
Lab Project ID: 1179898

Collection Date: 11/21/17 16:23
Received Date: 11/22/17 10:06
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Polynuclear Aromatics GC/MS

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Lists various polynuclear aromatic hydrocarbons and their surrogate compounds with associated quality and detection data.

Batch Information

Analytical Batch: XMS10572
Analytical Method: 8270D SIM LV (PAH)
Analyst: DSD
Analytical Date/Time: 12/01/17 22:32
Container ID: 1179898003-I

Prep Batch: XXX38882
Prep Method: SW3520C
Prep Date/Time: 11/27/17 09:14
Prep Initial Wt./Vol.: 250 mL
Prep Extract Vol: 1 mL



Results of 20069-13A

Client Sample ID: 20069-13A
Client Project ID: 32-1-20069 Crowley GW
Lab Sample ID: 1179898003
Lab Project ID: 1179898

Collection Date: 11/21/17 16:23
Received Date: 11/22/17 10:06
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Semivolatile Organic Fuels

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Rows include Diesel Range Organics and Surrogates (5a Androstane).

Batch Information

Analytical Batch: XFC14002
Analytical Method: AK102
Analyst: JMG
Analytical Date/Time: 11/30/17 20:34
Container ID: 1179898003-G
Prep Batch: XXX38895
Prep Method: SW3520C
Prep Date/Time: 11/29/17 08:36
Prep Initial Wt./Vol.: 244 mL
Prep Extract Vol: 1 mL

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Rows include Residual Range Organics and Surrogates (n-Triacontane-d62).

Batch Information

Analytical Batch: XFC14002
Analytical Method: AK103
Analyst: JMG
Analytical Date/Time: 11/30/17 20:34
Container ID: 1179898003-G
Prep Batch: XXX38895
Prep Method: SW3520C
Prep Date/Time: 11/29/17 08:36
Prep Initial Wt./Vol.: 244 mL
Prep Extract Vol: 1 mL

Results of 20069-13A

Client Sample ID: **20069-13A**
 Client Project ID: **32-1-20069 Crowley GW**
 Lab Sample ID: 1179898003
 Lab Project ID: 1179898

Collection Date: 11/21/17 16:23
 Received Date: 11/22/17 10:06
 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	2.00	0.100	0.0310	mg/L	1		11/23/17 17:30
Surrogates							
4-Bromofluorobenzene (surr)	109	50-150		%	1		11/23/17 17:30

Batch Information

Analytical Batch: VFC14005
 Analytical Method: AK101
 Analyst: NRB
 Analytical Date/Time: 11/23/17 17:30
 Container ID: 1179898003-A

Prep Batch: VXX31763
 Prep Method: SW5030B
 Prep Date/Time: 11/22/17 06:00
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL



Results of 20069-13A

Client Sample ID: 20069-13A
Client Project ID: 32-1-20069 Crowley GW
Lab Sample ID: 1179898003
Lab Project ID: 1179898

Collection Date: 11/21/17 16:23
Received Date: 11/22/17 10:06
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Volatile GC/MS

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Lists various chemical compounds and their detection results.



Results of 20069-13A

Client Sample ID: 20069-13A
Client Project ID: 32-1-20069 Crowley GW
Lab Sample ID: 1179898003
Lab Project ID: 1179898

Collection Date: 11/21/17 16:23
Received Date: 11/22/17 10:06
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Volatile GC/MS

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Lists various chemical compounds and their detection results.

Results of 20069-13A

Client Sample ID: **20069-13A**
Client Project ID: **32-1-20069 Crowley GW**
Lab Sample ID: 1179898003
Lab Project ID: 1179898

Collection Date: 11/21/17 16:23
Received Date: 11/22/17 10:06
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Volatile GC/MS

Batch Information

Analytical Batch: VMS17480
Analytical Method: SW8260C
Analyst: FDR
Analytical Date/Time: 12/01/17 18:52
Container ID: 1179898003-D

Prep Batch: VXX31784
Prep Method: SW5030B
Prep Date/Time: 12/01/17 00:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL



Results of 20069-103A

Client Sample ID: 20069-103A
Client Project ID: 32-1-20069 Crowley GW
Lab Sample ID: 1179898004
Lab Project ID: 1179898

Collection Date: 11/21/17 16:48
Received Date: 11/22/17 10:06
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Polynuclear Aromatics GC/MS

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Lists various polynuclear aromatic hydrocarbons and their surrogate compounds with associated quality and detection data.

Batch Information

Analytical Batch: XMS10572
Analytical Method: 8270D SIM LV (PAH)
Analyst: DSD
Analytical Date/Time: 12/01/17 22:52
Container ID: 1179898004-I

Prep Batch: XXX38882
Prep Method: SW3520C
Prep Date/Time: 11/27/17 09:14
Prep Initial Wt./Vol.: 260 mL
Prep Extract Vol: 1 mL

Analytical Batch: XMS10575
Analytical Method: 8270D SIM LV (PAH)
Analyst: DSD
Analytical Date/Time: 12/04/17 23:58
Container ID: 1179898004-I

Prep Batch: XXX38882
Prep Method: SW3520C
Prep Date/Time: 11/27/17 09:14
Prep Initial Wt./Vol.: 260 mL
Prep Extract Vol: 1 mL



Results of 20069-103A

Client Sample ID: 20069-103A
Client Project ID: 32-1-20069 Crowley GW
Lab Sample ID: 1179898004
Lab Project ID: 1179898

Collection Date: 11/21/17 16:48
Received Date: 11/22/17 10:06
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Semivolatile Organic Fuels

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row: Diesel Range Organics, 5.50, 0.588, 0.176, mg/L, 1, 11/30/17 20:43

Surrogates

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row: 5a Androstane (surr), 85.6, 50-150, %, 1, 11/30/17 20:43

Batch Information

Analytical Batch: XFC14002
Analytical Method: AK102
Analyst: JMG
Analytical Date/Time: 11/30/17 20:43
Container ID: 1179898004-G

Prep Batch: XXX38895
Prep Method: SW3520C
Prep Date/Time: 11/29/17 08:36
Prep Initial Wt./Vol.: 255 mL
Prep Extract Vol: 1 mL

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row: Residual Range Organics, 1.22, 0.490, 0.147, mg/L, 1, 11/30/17 20:43

Surrogates

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row: n-Triacontane-d62 (surr), 86.7, 50-150, %, 1, 11/30/17 20:43

Batch Information

Analytical Batch: XFC14002
Analytical Method: AK103
Analyst: JMG
Analytical Date/Time: 11/30/17 20:43
Container ID: 1179898004-G

Prep Batch: XXX38895
Prep Method: SW3520C
Prep Date/Time: 11/29/17 08:36
Prep Initial Wt./Vol.: 255 mL
Prep Extract Vol: 1 mL

Results of 20069-103A

Client Sample ID: **20069-103A**
 Client Project ID: **32-1-20069 Crowley GW**
 Lab Sample ID: 1179898004
 Lab Project ID: 1179898

Collection Date: 11/21/17 16:48
 Received Date: 11/22/17 10:06
 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	2.15	0.100	0.0310	mg/L	1		11/23/17 17:48
Surrogates							
4-Bromofluorobenzene (surr)	111	50-150		%	1		11/23/17 17:48

Batch Information

Analytical Batch: VFC14005
 Analytical Method: AK101
 Analyst: NRB
 Analytical Date/Time: 11/23/17 17:48
 Container ID: 1179898004-A

Prep Batch: VXX31763
 Prep Method: SW5030B
 Prep Date/Time: 11/22/17 06:00
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL



Results of 20069-103A

Client Sample ID: 20069-103A
Client Project ID: 32-1-20069 Crowley GW
Lab Sample ID: 1179898004
Lab Project ID: 1179898

Collection Date: 11/21/17 16:48
Received Date: 11/22/17 10:06
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Volatile GC/MS

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Lists various chemical compounds and their detection results.



Results of 20069-103A

Client Sample ID: **20069-103A**
 Client Project ID: **32-1-20069 Crowley GW**
 Lab Sample ID: 1179898004
 Lab Project ID: 1179898

Collection Date: 11/21/17 16:48
 Received Date: 11/22/17 10:06
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by Volatile GC/MS

<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>
Chloroform	0.500 U	1.00	0.310	ug/L	1		12/01/17 19:08
Chloromethane	0.500 U	1.00	0.310	ug/L	1		12/01/17 19:08
cis-1,2-Dichloroethene	0.500 U	1.00	0.310	ug/L	1		12/01/17 19:08
cis-1,3-Dichloropropene	0.250 U	0.500	0.150	ug/L	1		12/01/17 19:08
Dibromochloromethane	0.250 U	0.500	0.150	ug/L	1		12/01/17 19:08
Dibromomethane	0.500 U	1.00	0.310	ug/L	1		12/01/17 19:08
Dichlorodifluoromethane	0.500 U	1.00	0.310	ug/L	1		12/01/17 19:08
Ethylbenzene	190	1.00	0.310	ug/L	1		12/01/17 19:08
Freon-113	5.00 U	10.0	3.10	ug/L	1		12/01/17 19:08
Hexachlorobutadiene	0.500 U	1.00	0.310	ug/L	1		12/01/17 19:08
Isopropylbenzene (Cumene)	4.06	1.00	0.310	ug/L	1		12/01/17 19:08
Methylene chloride	2.50 U	5.00	1.00	ug/L	1		12/01/17 19:08
Methyl-t-butyl ether	5.00 U	10.0	3.10	ug/L	1		12/01/17 19:08
Naphthalene	77.6	1.00	0.310	ug/L	1		12/01/17 19:08
n-Butylbenzene	0.500 U	1.00	0.310	ug/L	1		12/01/17 19:08
n-Propylbenzene	4.98	1.00	0.310	ug/L	1		12/01/17 19:08
o-Xylene	4.83	1.00	0.310	ug/L	1		12/01/17 19:08
P & M -Xylene	375	20.0	6.20	ug/L	10		12/01/17 18:21
sec-Butylbenzene	0.640 J	1.00	0.310	ug/L	1		12/01/17 19:08
Styrene	0.500 U	1.00	0.310	ug/L	1		12/01/17 19:08
tert-Butylbenzene	0.580 J	1.00	0.310	ug/L	1		12/01/17 19:08
Tetrachloroethene	0.500 U	1.00	0.310	ug/L	1		12/01/17 19:08
Toluene	7.52	1.00	0.310	ug/L	1		12/01/17 19:08
trans-1,2-Dichloroethene	0.500 U	1.00	0.310	ug/L	1		12/01/17 19:08
trans-1,3-Dichloropropene	0.500 U	1.00	0.310	ug/L	1		12/01/17 19:08
Trichloroethene	0.500 U	1.00	0.310	ug/L	1		12/01/17 19:08
Trichlorofluoromethane	0.500 U	1.00	0.310	ug/L	1		12/01/17 19:08
Vinyl acetate	5.00 U	10.0	3.10	ug/L	1		12/01/17 19:08
Vinyl chloride	0.0750 U	0.150	0.0500	ug/L	1		12/01/17 19:08
Xylenes (total)	380	30.0	10.0	ug/L	10		12/01/17 18:21
Surrogates							
1,2-Dichloroethane-D4 (surr)	95.7	81-118		%	1		12/01/17 19:08
4-Bromofluorobenzene (surr)	96.1	85-114		%	1		12/01/17 19:08
Toluene-d8 (surr)	99.3	89-112		%	1		12/01/17 19:08

Results of 20069-103A

Client Sample ID: **20069-103A**
Client Project ID: **32-1-20069 Crowley GW**
Lab Sample ID: 1179898004
Lab Project ID: 1179898

Collection Date: 11/21/17 16:48
Received Date: 11/22/17 10:06
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Volatile GC/MS

Batch Information

Analytical Batch: VMS17480
Analytical Method: SW8260C
Analyst: FDR
Analytical Date/Time: 12/01/17 18:21
Container ID: 1179898004-D

Prep Batch: VXX31784
Prep Method: SW5030B
Prep Date/Time: 12/01/17 00:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Analytical Batch: VMS17480
Analytical Method: SW8260C
Analyst: FDR
Analytical Date/Time: 12/01/17 19:08
Container ID: 1179898004-D

Prep Batch: VXX31784
Prep Method: SW5030B
Prep Date/Time: 12/01/17 00:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Results of WTB

Client Sample ID: **WTB**
 Client Project ID: **32-1-20069 Crowley GW**
 Lab Sample ID: 1179898005
 Lab Project ID: 1179898

Collection Date: 11/21/17 12:50
 Received Date: 11/22/17 10:06
 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		11/23/17 02:41
Surrogates							
4-Bromofluorobenzene (surr)	83.4	50-150		%	1		11/23/17 02:41

Batch Information

Analytical Batch: VFC14003
 Analytical Method: AK101
 Analyst: NRB
 Analytical Date/Time: 11/23/17 02:41
 Container ID: 1179898005-A

Prep Batch: VXX31761
 Prep Method: SW5030B
 Prep Date/Time: 11/22/17 06:00
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL



Results of WTB

Client Sample ID: **WTB**
 Client Project ID: **32-1-20069 Crowley GW**
 Lab Sample ID: 1179898005
 Lab Project ID: 1179898

Collection Date: 11/21/17 12:50
 Received Date: 11/22/17 10:06
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by Volatile GC/MS

<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>
1,1,1,2-Tetrachloroethane	0.250 U	0.500	0.150	ug/L	1		12/01/17 14:29
1,1,1-Trichloroethane	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
1,1,2,2-Tetrachloroethane	0.250 U	0.500	0.150	ug/L	1		12/01/17 14:29
1,1,2-Trichloroethane	0.200 U	0.400	0.120	ug/L	1		12/01/17 14:29
1,1-Dichloroethane	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
1,1-Dichloroethene	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
1,1-Dichloropropene	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
1,2,3-Trichlorobenzene	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
1,2,3-Trichloropropane	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
1,2,4-Trichlorobenzene	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
1,2,4-Trimethylbenzene	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
1,2-Dibromo-3-chloropropane	5.00 U	10.0	3.10	ug/L	1		12/01/17 14:29
1,2-Dibromoethane	0.0375 U	0.0750	0.0180	ug/L	1		12/01/17 14:29
1,2-Dichlorobenzene	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
1,2-Dichloroethane	0.250 U	0.500	0.150	ug/L	1		12/01/17 14:29
1,2-Dichloropropane	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
1,3,5-Trimethylbenzene	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
1,3-Dichlorobenzene	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
1,3-Dichloropropane	0.250 U	0.500	0.150	ug/L	1		12/01/17 14:29
1,4-Dichlorobenzene	0.250 U	0.500	0.150	ug/L	1		12/01/17 14:29
2,2-Dichloropropane	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
2-Butanone (MEK)	5.00 U	10.0	3.10	ug/L	1		12/01/17 14:29
2-Chlorotoluene	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
2-Hexanone	5.00 U	10.0	3.10	ug/L	1		12/01/17 14:29
4-Chlorotoluene	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
4-Isopropyltoluene	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
4-Methyl-2-pentanone (MIBK)	5.00 U	10.0	3.10	ug/L	1		12/01/17 14:29
Benzene	0.200 U	0.400	0.120	ug/L	1		12/01/17 14:29
Bromobenzene	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
Bromochloromethane	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
Bromodichloromethane	0.250 U	0.500	0.150	ug/L	1		12/01/17 14:29
Bromoform	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
Bromomethane	2.50 U	5.00	1.50	ug/L	1		12/01/17 14:29
Carbon disulfide	5.00 U	10.0	3.10	ug/L	1		12/01/17 14:29
Carbon tetrachloride	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
Chlorobenzene	0.250 U	0.500	0.150	ug/L	1		12/01/17 14:29
Chloroethane	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29

Print Date: 12/06/2017 3:08:42PM

J flagging is activated



Results of WTB

Client Sample ID: **WTB**
 Client Project ID: **32-1-20069 Crowley GW**
 Lab Sample ID: 1179898005
 Lab Project ID: 1179898

Collection Date: 11/21/17 12:50
 Received Date: 11/22/17 10:06
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by Volatile GC/MS

<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>
Chloroform	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
Chloromethane	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
cis-1,2-Dichloroethene	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
cis-1,3-Dichloropropene	0.250 U	0.500	0.150	ug/L	1		12/01/17 14:29
Dibromochloromethane	0.250 U	0.500	0.150	ug/L	1		12/01/17 14:29
Dibromomethane	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
Dichlorodifluoromethane	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
Freon-113	5.00 U	10.0	3.10	ug/L	1		12/01/17 14:29
Hexachlorobutadiene	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
Isopropylbenzene (Cumene)	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
Methylene chloride	2.50 U	5.00	1.00	ug/L	1		12/01/17 14:29
Methyl-t-butyl ether	5.00 U	10.0	3.10	ug/L	1		12/01/17 14:29
Naphthalene	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
n-Butylbenzene	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
n-Propylbenzene	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
o-Xylene	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		12/01/17 14:29
sec-Butylbenzene	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
Styrene	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
tert-Butylbenzene	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
Tetrachloroethene	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
Toluene	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
trans-1,2-Dichloroethene	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
trans-1,3-Dichloropropene	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
Trichloroethene	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
Trichlorofluoromethane	0.500 U	1.00	0.310	ug/L	1		12/01/17 14:29
Vinyl acetate	5.00 U	10.0	3.10	ug/L	1		12/01/17 14:29
Vinyl chloride	0.0750 U	0.150	0.0500	ug/L	1		12/01/17 14:29
Xylenes (total)	1.50 U	3.00	1.00	ug/L	1		12/01/17 14:29
Surrogates							
1,2-Dichloroethane-D4 (surr)	107	81-118		%	1		12/01/17 14:29
4-Bromofluorobenzene (surr)	100	85-114		%	1		12/01/17 14:29
Toluene-d8 (surr)	98.7	89-112		%	1		12/01/17 14:29

Results of WTB

Client Sample ID: **WTB**
Client Project ID: **32-1-20069 Crowley GW**
Lab Sample ID: 1179898005
Lab Project ID: 1179898

Collection Date: 11/21/17 12:50
Received Date: 11/22/17 10:06
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Volatile GC/MS

Batch Information

Analytical Batch: VMS17480
Analytical Method: SW8260C
Analyst: FDR
Analytical Date/Time: 12/01/17 14:29
Container ID: 1179898005-A

Prep Batch: VXX31784
Prep Method: SW5030B
Prep Date/Time: 12/01/17 00:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Method Blank

Blank ID: MB for HBN 1772768 [VXX/31761]

Blank Lab ID: 1427156

QC for Samples:

1179898005

Matrix: Water (Surface, Eff., Ground)

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				
1,4-Difluorobenzene (surr)	102	77-115		%
4-Bromofluorobenzene (surr)	82.7	50-150		%

Batch Information

Analytical Batch: VFC14003

Analytical Method: AK101

Instrument: Agilent 7890A PID/FID

Analyst: NRB

Analytical Date/Time: 11/22/2017 1:45:00PM

Prep Batch: VXX31761

Prep Method: SW5030B

Prep Date/Time: 11/22/2017 6:00:00AM

Prep Initial Wt./Vol.: 5 mL

Prep Extract Vol: 5 mL

Print Date: 12/06/2017 3:08:45PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1179898 [VXX31761]
 Blank Spike Lab ID: 1427159
 Date Analyzed: 11/22/2017 14:40

Spike Duplicate ID: LCSD for HBN 1179898 [VXX31761]
 Spike Duplicate Lab ID: 1427160
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1179898005

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	0.960	96	1.00	1.01	101	(60-120)	4.70	(< 20)	
Surrogates										
4-Bromofluorobenzene (surr)	0.0500	90.1	90	0.0500	97	97	(50-150)	7.30		

Batch Information

Analytical Batch: **VFC14003**
 Analytical Method: **AK101**
 Instrument: **Agilent 7890A PID/FID**
 Analyst: **NRB**

Prep Batch: **VXX31761**
 Prep Method: **SW5030B**
 Prep Date/Time: **11/22/2017 06:00**
 Spike Init Wt./Vol.: 1.00 mg/L Extract Vol: 5 mL
 Dupe Init Wt./Vol.: 1.00 mg/L Extract Vol: 5 mL

Method Blank

Blank ID: MB for HBN 1772786 [VXX/31763]
 Blank Lab ID: 1427245

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
 1179898001, 1179898002, 1179898003, 1179898004

Results by AK101

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Ethylbenzene	0.000500U	0.00100	0.000310	mg/L
Gasoline Range Organics	0.0500U	0.100	0.0310	mg/L
o-Xylene	0.000500U	0.00100	0.000310	mg/L
P & M -Xylene	0.00100U	0.00200	0.000620	mg/L
Toluene	0.000500U	0.00100	0.000310	mg/L
Surrogates				
1,4-Difluorobenzene (surr)	101	77-115		%
4-Bromofluorobenzene (surr)	87.8	50-150		%

Batch Information

Analytical Batch: VFC14005
 Analytical Method: AK101
 Instrument: Agilent 7890A PID/FID
 Analyst: NRB
 Analytical Date/Time: 11/23/2017 11:19:00AM

Prep Batch: VXX31763
 Prep Method: SW5030B
 Prep Date/Time: 11/22/2017 6:00:00AM
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL

Blank Spike Summary

Blank Spike ID: LCS for HBN 1179898 [VXX31763]
 Blank Spike Lab ID: 1427246
 Date Analyzed: 11/23/2017 18:25

Spike Duplicate ID: LCSD for HBN 1179898 [VXX31763]
 Spike Duplicate Lab ID: 1427247
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1179898001, 1179898002, 1179898003, 1179898004

Results by AK101

Parameter	Blank Spike (mg/L)			Spike Duplicate (mg/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Ethylbenzene	0.100	0.0983	98	0.100	0.104	104	(75-125)	5.90	(< 20)
o-Xylene	0.100	0.103	103	0.100	0.113	113	(80-120)	8.60	(< 20)
P & M -Xylene	0.200	0.204	102	0.200	0.221	110	(75-130)	8.00	(< 20)
Toluene	0.100	0.0982	98	0.100	0.106	106	(75-120)	7.40	(< 20)
Surrogates									
1,4-Difluorobenzene (surr)	0.0500	105	105	0.0500	104	104	(77-115)	1.10	

Batch Information

Analytical Batch: **VFC14005**
 Analytical Method: **AK101**
 Instrument: **Agilent 7890A PID/FID**
 Analyst: **NRB**

Prep Batch: **VXX31763**
 Prep Method: **SW5030B**
 Prep Date/Time: **11/22/2017 06:00**
 Spike Init Wt./Vol.: 0.100 mg/L Extract Vol: 5 mL
 Dupe Init Wt./Vol.: 0.100 mg/L Extract Vol: 5 mL

Blank Spike Summary

Blank Spike ID: LCS for HBN 1179898 [VXX31763]
 Blank Spike Lab ID: 1427248
 Date Analyzed: 11/23/2017 18:44

Spike Duplicate ID: LCSD for HBN 1179898 [VXX31763]
 Spike Duplicate Lab ID: 1427249
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1179898001, 1179898002, 1179898003, 1179898004

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	0.989	99	1.00	0.948	95	(60-120)	4.20	(< 20)

Surrogates

4-Bromofluorobenzene (surr)	0.0500	97.4	97	0.0500	93.1	93	(50-150)	4.50	
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Batch Information

Analytical Batch: **VFC14005**
 Analytical Method: **AK101**
 Instrument: **Agilent 7890A PID/FID**
 Analyst: **NRB**

Prep Batch: **VXX31763**
 Prep Method: **SW5030B**
 Prep Date/Time: **11/22/2017 06:00**
 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: 12/06/2017 3:08:51PM

Matrix Spike Summary

Original Sample ID: 1179880001
 MS Sample ID: 1427250 MS
 MSD Sample ID: 1427251 MSD

Analysis Date: 11/23/2017 18:07
 Analysis Date: 11/23/2017 12:33
 Analysis Date: 11/23/2017 12:51
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1179898001, 1179898002, 1179898003, 1179898004

Results by AK101

Parameter	Sample	Matrix Spike (mg/L)			Spike Duplicate (mg/L)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Gasoline Range Organics	0.100U	1.00	0.971	97	1.00	1.05	105	60-120	7.40	(< 20)
Surrogates										
4-Bromofluorobenzene (surr)		0.0500	0.0461	92	0.0500	0.0493	99	50-150	6.70	

Batch Information

Analytical Batch: VFC14005
 Analytical Method: AK101
 Instrument: Agilent 7890A PID/FID
 Analyst: NRB
 Analytical Date/Time: 11/23/2017 12:33:00PM

Prep Batch: VXX31763
 Prep Method: Volatile Fuels Extraction (W)
 Prep Date/Time: 11/22/2017 6:00:00AM
 Prep Initial Wt./Vol.: 5.00mL
 Prep Extract Vol: 5.00mL

Method Blank

Blank ID: MB for HBN 1772786 [VXX/31763]
 Blank Lab ID: 1427245

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
 1179898001, 1179898002, 1179898003, 1179898004

Results by SW8021B

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Ethylbenzene	0.500U	1.00	0.310	ug/L
o-Xylene	0.500U	1.00	0.310	ug/L
P & M -Xylene	1.00U	2.00	0.620	ug/L
Toluene	0.500U	1.00	0.310	ug/L
Surrogates				
1,4-Difluorobenzene (surr)	101	77-115		%

Batch Information

Analytical Batch: VFC14005
 Analytical Method: SW8021B
 Instrument: Agilent 7890A PID/FID
 Analyst: NRB
 Analytical Date/Time: 11/23/2017 11:19:00AM

Prep Batch: VXX31763
 Prep Method: SW5030B
 Prep Date/Time: 11/22/2017 6:00:00AM
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL

Print Date: 12/06/2017 3:08:54PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1179898 [VXX31763]
 Blank Spike Lab ID: 1427246
 Date Analyzed: 11/23/2017 18:25

Spike Duplicate ID: LCSD for HBN 1179898 [VXX31763]
 Spike Duplicate Lab ID: 1427247
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1179898001, 1179898002, 1179898003, 1179898004

Results by SW8021B

Parameter	Blank Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Ethylbenzene	100	98.3	98	100	104	104	(75-125)	5.90	(< 20)
o-Xylene	100	103	103	100	113	113	(80-120)	8.60	(< 20)
P & M -Xylene	200	204	102	200	221	110	(75-130)	8.00	(< 20)
Toluene	100	98.2	98	100	106	106	(75-120)	7.40	(< 20)
Surrogates									
1,4-Difluorobenzene (surr)	50	105	105	50	104	104	(77-115)	1.10	

Batch Information

Analytical Batch: **VFC14005**
 Analytical Method: **SW8021B**
 Instrument: **Agilent 7890A PID/FID**
 Analyst: **NRB**

Prep Batch: **VXX31763**
 Prep Method: **SW5030B**
 Prep Date/Time: **11/22/2017 06:00**
 Spike Init Wt./Vol.: 100 ug/L Extract Vol: 5 mL
 Dupe Init Wt./Vol.: 100 ug/L Extract Vol: 5 mL



Method Blank

Blank ID: MB for HBN 1772893 [VXX/31778]

Blank Lab ID: 1427672

QC for Samples:

1179898001, 1179898002

Matrix: Water (Surface, Eff., Ground)

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)	85.8	50-150		%

Batch Information

Analytical Batch: VFC14007
Analytical Method: AK101
Instrument: Agilent 7890A PID/FID
Analyst: NRO
Analytical Date/Time: 11/30/2017 4:30:00AM

Prep Batch: VXX31778
Prep Method: SW5030B
Prep Date/Time: 11/29/2017 6:00:00AM
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 12/06/2017 3:08:56PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1179898 [VXX31778]
 Blank Spike Lab ID: 1427673
 Date Analyzed: 11/30/2017 03:53

Spike Duplicate ID: LCSD for HBN 1179898 [VXX31778]
 Spike Duplicate Lab ID: 1427674
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1179898001, 1179898002

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	0.984	98	1.00	0.975	98	(60-120)	0.97	(< 20)

Surrogates

4-Bromofluorobenzene (surr)	0.0500	92.1	92	0.0500	90.3	90	(50-150)	2.00	
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Batch Information

Analytical Batch: **VFC14007**
 Analytical Method: **AK101**
 Instrument: **Agilent 7890A PID/FID**
 Analyst: **NRO**

Prep Batch: **VXX31778**
 Prep Method: **SW5030B**
 Prep Date/Time: **11/29/2017 06:00**
 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: 12/06/2017 3:08:58PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1179898 [VXX31778]
 Blank Spike Lab ID: 1427684
 Date Analyzed: 11/29/2017 11:31

Spike Duplicate ID: LCSD for HBN 1179898 [VXX31778]
 Spike Duplicate Lab ID: 1427685
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1179898001, 1179898002

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	1.04	104	1.00	1.03	103	(60-120)	0.50	(< 20)

Surrogates

4-Bromofluorobenzene (surr)	0.0500	90.5	91	0.0500	93.7	94	(50-150)	3.50	
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Batch Information

Analytical Batch: **VFC14007**
 Analytical Method: **AK101**
 Instrument: **Agilent 7890A PID/FID**
 Analyst: **NRO**

Prep Batch: **VXX31778**
 Prep Method: **SW5030B**
 Prep Date/Time: **11/29/2017 06:00**
 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: 12/06/2017 3:08:58PM

Method Blank

Blank ID: MB for HBN 1772893 [VXX/31778]

Blank Lab ID: 1427672

QC for Samples:

1179898001, 1179898002

Matrix: Water (Surface, Eff., Ground)

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
Surrogates				
1,4-Difluorobenzene (surr)	110	77-115		%

Batch Information

Analytical Batch: VFC14007

Analytical Method: SW8021B

Instrument: Agilent 7890A PID/FID

Analyst: NRO

Analytical Date/Time: 11/30/2017 4:30:00AM

Prep Batch: VXX31778

Prep Method: SW5030B

Prep Date/Time: 11/29/2017 6:00:00AM

Prep Initial Wt./Vol.: 5 mL

Prep Extract Vol: 5 mL

Print Date: 12/06/2017 3:08:59PM

Method Blank

Blank ID: MB for HBN 1772958 [VXX/31784]
 Blank Lab ID: 1427988

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
 1179898003, 1179898004, 1179898005

Results by SW8260C

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
1,1,1,2-Tetrachloroethane	0.250U	0.500	0.150	ug/L
1,1,1-Trichloroethane	0.500U	1.00	0.310	ug/L
1,1,2,2-Tetrachloroethane	0.250U	0.500	0.150	ug/L
1,1,2-Trichloroethane	0.200U	0.400	0.120	ug/L
1,1-Dichloroethane	0.500U	1.00	0.310	ug/L
1,1-Dichloroethene	0.500U	1.00	0.310	ug/L
1,1-Dichloropropene	0.500U	1.00	0.310	ug/L
1,2,3-Trichlorobenzene	0.500U	1.00	0.310	ug/L
1,2,3-Trichloropropane	0.500U	1.00	0.310	ug/L
1,2,4-Trichlorobenzene	0.500U	1.00	0.310	ug/L
1,2,4-Trimethylbenzene	0.500U	1.00	0.310	ug/L
1,2-Dibromo-3-chloropropane	5.00U	10.0	3.10	ug/L
1,2-Dibromoethane	0.0375U	0.0750	0.0180	ug/L
1,2-Dichlorobenzene	0.500U	1.00	0.310	ug/L
1,2-Dichloroethane	0.250U	0.500	0.150	ug/L
1,2-Dichloropropane	0.500U	1.00	0.310	ug/L
1,3,5-Trimethylbenzene	0.500U	1.00	0.310	ug/L
1,3-Dichlorobenzene	0.500U	1.00	0.310	ug/L
1,3-Dichloropropane	0.250U	0.500	0.150	ug/L
1,4-Dichlorobenzene	0.250U	0.500	0.150	ug/L
2,2-Dichloropropane	0.500U	1.00	0.310	ug/L
2-Butanone (MEK)	5.00U	10.0	3.10	ug/L
2-Chlorotoluene	0.500U	1.00	0.310	ug/L
2-Hexanone	5.00U	10.0	3.10	ug/L
4-Chlorotoluene	0.500U	1.00	0.310	ug/L
4-Isopropyltoluene	0.500U	1.00	0.310	ug/L
4-Methyl-2-pentanone (MIBK)	5.00U	10.0	3.10	ug/L
Benzene	0.200U	0.400	0.120	ug/L
Bromobenzene	0.500U	1.00	0.310	ug/L
Bromochloromethane	0.500U	1.00	0.310	ug/L
Bromodichloromethane	0.250U	0.500	0.150	ug/L
Bromoform	0.500U	1.00	0.310	ug/L
Bromomethane	2.50U	5.00	1.50	ug/L
Carbon disulfide	5.00U	10.0	3.10	ug/L
Carbon tetrachloride	0.500U	1.00	0.310	ug/L
Chlorobenzene	0.250U	0.500	0.150	ug/L
Chloroethane	0.500U	1.00	0.310	ug/L
Chloroform	0.500U	1.00	0.310	ug/L

Print Date: 12/06/2017 3:09:04PM

Method Blank

Blank ID: MB for HBN 1772958 [VXX/31784]

Blank Lab ID: 1427988

QC for Samples:

1179898003, 1179898004, 1179898005

Matrix: Water (Surface, Eff., Ground)

Results by SW8260C

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Chloromethane	0.500U	1.00	0.310	ug/L
cis-1,2-Dichloroethene	0.500U	1.00	0.310	ug/L
cis-1,3-Dichloropropene	0.250U	0.500	0.150	ug/L
Dibromochloromethane	0.250U	0.500	0.150	ug/L
Dibromomethane	0.500U	1.00	0.310	ug/L
Dichlorodifluoromethane	0.500U	1.00	0.310	ug/L
Ethylbenzene	0.500U	1.00	0.310	ug/L
Freon-113	5.00U	10.0	3.10	ug/L
Hexachlorobutadiene	0.500U	1.00	0.310	ug/L
Isopropylbenzene (Cumene)	0.500U	1.00	0.310	ug/L
Methylene chloride	2.50U	5.00	1.00	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
Tetrachloroethene	0.500U	1.00	0.310	ug/L
Toluene	0.500U	1.00	0.310	ug/L
trans-1,2-Dichloroethene	0.500U	1.00	0.310	ug/L
trans-1,3-Dichloropropene	0.500U	1.00	0.310	ug/L
Trichloroethene	0.500U	1.00	0.310	ug/L
Trichlorofluoromethane	0.500U	1.00	0.310	ug/L
Vinyl acetate	5.00U	10.0	3.10	ug/L
Vinyl chloride	0.0750U	0.150	0.0500	ug/L
Xylenes (total)	1.50U	3.00	1.00	ug/L
Surrogates				
1,2-Dichloroethane-D4 (surr)	106	81-118		%
4-Bromofluorobenzene (surr)	101	85-114		%
Toluene-d8 (surr)	98.9	89-112		%

Print Date: 12/06/2017 3:09:04PM

Method Blank

Blank ID: MB for HBN 1772958 [VXX/31784]
Blank Lab ID: 1427988

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1179898003, 1179898004, 1179898005

Results by SW8260C

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
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Batch Information

Analytical Batch: VMS17480
Analytical Method: SW8260C
Instrument: Agilent 7890-75MS
Analyst: FDR
Analytical Date/Time: 12/1/2017 11:45:00AM

Prep Batch: VXX31784
Prep Method: SW5030B
Prep Date/Time: 12/1/2017 12:00:00AM
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 12/06/2017 3:09:04PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1179898 [VXX31784]
 Blank Spike Lab ID: 1427989
 Date Analyzed: 12/01/2017 12:01

Spike Duplicate ID: LCSD for HBN 1179898
 [VXX31784]
 Spike Duplicate Lab ID: 1427990
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1179898003, 1179898004, 1179898005

Results by SW8260C

Parameter	Blank Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
1,1,1,2-Tetrachloroethane	30	31.0	103	30	31.3	104	(78-124)	0.74	(< 20)
1,1,1-Trichloroethane	30	30.4	101	30	29.4	98	(74-131)	3.40	(< 20)
1,1,2,2-Tetrachloroethane	30	29.5	99	30	29.5	98	(71-121)	0.20	(< 20)
1,1,2-Trichloroethane	30	31.3	104	30	31.5	105	(80-119)	0.67	(< 20)
1,1-Dichloroethane	30	29.3	98	30	28.6	95	(77-125)	2.30	(< 20)
1,1-Dichloroethene	30	31.4	105	30	29.4	98	(71-131)	6.60	(< 20)
1,1-Dichloropropene	30	31.4	105	30	30.5	102	(79-125)	3.00	(< 20)
1,2,3-Trichlorobenzene	30	27.8	93	30	29.6	99	(69-129)	6.00	(< 20)
1,2,3-Trichloropropane	30	28.7	96	30	28.3	94	(73-122)	1.40	(< 20)
1,2,4-Trichlorobenzene	30	26.9	90	30	27.3	91	(69-130)	1.10	(< 20)
1,2,4-Trimethylbenzene	30	29.9	100	30	29.4	98	(79-124)	1.80	(< 20)
1,2-Dibromo-3-chloropropane	30	27.4	91	30	28.4	95	(62-128)	3.50	(< 20)
1,2-Dibromoethane	30	30.5	102	30	31.1	104	(77-121)	1.90	(< 20)
1,2-Dichlorobenzene	30	28.9	96	30	28.6	95	(80-119)	0.97	(< 20)
1,2-Dichloroethane	30	28.6	95	30	28.0	93	(73-128)	1.90	(< 20)
1,2-Dichloropropane	30	31.5	105	30	31.1	104	(78-122)	1.30	(< 20)
1,3,5-Trimethylbenzene	30	30.2	101	30	29.0	97	(75-124)	4.00	(< 20)
1,3-Dichlorobenzene	30	29.6	99	30	29.2	97	(80-119)	1.30	(< 20)
1,3-Dichloropropane	30	31.5	105	30	31.7	106	(80-119)	0.85	(< 20)
1,4-Dichlorobenzene	30	29.5	98	30	28.9	96	(79-118)	2.10	(< 20)
2,2-Dichloropropane	30	30.6	102	30	29.5	98	(60-139)	3.60	(< 20)
2-Butanone (MEK)	90	86.8	96	90	90.7	101	(56-143)	4.40	(< 20)
2-Chlorotoluene	30	29.8	99	30	29.0	97	(79-122)	2.60	(< 20)
2-Hexanone	90	92.1	102	90	95.9	107	(57-139)	4.10	(< 20)
4-Chlorotoluene	30	29.7	99	30	29.1	97	(78-122)	2.10	(< 20)
4-Isopropyltoluene	30	30.7	102	30	29.3	98	(77-127)	4.50	(< 20)
4-Methyl-2-pentanone (MIBK)	90	88.0	98	90	89.8	100	(67-130)	2.00	(< 20)
Benzene	30	30.8	103	30	29.9	100	(79-120)	3.10	(< 20)
Bromobenzene	30	29.4	98	30	29.2	97	(80-120)	0.72	(< 20)
Bromochloromethane	30	29.7	99	30	29.3	98	(78-123)	1.30	(< 20)
Bromodichloromethane	30	31.2	104	30	30.7	102	(79-125)	1.70	(< 20)
Bromoform	30	31.6	105	30	31.8	106	(66-130)	0.63	(< 20)
Bromomethane	30	38.5	128	30	30.7	102	(53-141)	22.60	* (< 20)
Carbon disulfide	45	45.8	102	45	43.5	97	(64-133)	5.20	(< 20)

Print Date: 12/06/2017 3:09:05PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1179898 [VXX31784]
 Blank Spike Lab ID: 1427989
 Date Analyzed: 12/01/2017 12:01

Spike Duplicate ID: LCSD for HBN 1179898
 [VXX31784]
 Spike Duplicate Lab ID: 1427990
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1179898003, 1179898004, 1179898005

Results by SW8260C

Parameter	Blank Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Carbon tetrachloride	30	31.1	104	30	30.0	100	(72-136)	3.60	(< 20)
Chlorobenzene	30	30.1	100	30	29.8	99	(82-118)	1.20	(< 20)
Chloroethane	30	33.4	111	30	31.4	105	(60-138)	6.20	(< 20)
Chloroform	30	29.6	99	30	28.9	96	(79-124)	2.40	(< 20)
Chloromethane	30	30.0	100	30	28.3	94	(50-139)	5.90	(< 20)
cis-1,2-Dichloroethene	30	29.5	98	30	28.8	96	(78-123)	2.40	(< 20)
cis-1,3-Dichloropropene	30	31.8	106	30	31.2	104	(75-124)	1.90	(< 20)
Dibromochloromethane	30	31.9	106	30	31.9	106	(74-126)	0.25	(< 20)
Dibromomethane	30	30.2	101	30	29.8	99	(79-123)	1.20	(< 20)
Dichlorodifluoromethane	30	30.8	103	30	28.8	96	(32-152)	6.60	(< 20)
Ethylbenzene	30	30.8	103	30	30.5	102	(79-121)	0.98	(< 20)
Freon-113	45	49.1	109	45	46.7	104	(70-136)	5.10	(< 20)
Hexachlorobutadiene	30	30.2	101	30	29.6	99	(66-134)	2.00	(< 20)
Isopropylbenzene (Cumene)	30	31.3	104	30	30.6	102	(72-131)	2.30	(< 20)
Methylene chloride	30	29.3	98	30	28.8	96	(74-124)	1.60	(< 20)
Methyl-t-butyl ether	45	45.2	100	45	45.4	101	(71-124)	0.42	(< 20)
Naphthalene	30	27.4	91	30	29.8	99	(61-128)	8.40	(< 20)
n-Butylbenzene	30	30.8	103	30	29.8	100	(75-128)	3.00	(< 20)
n-Propylbenzene	30	30.3	101	30	29.6	99	(76-126)	2.60	(< 20)
o-Xylene	30	30.5	102	30	30.3	101	(78-122)	0.43	(< 20)
P & M -Xylene	60	62.5	104	60	61.3	102	(80-121)	2.00	(< 20)
sec-Butylbenzene	30	30.3	101	30	29.0	97	(77-126)	4.50	(< 20)
Styrene	30	31.3	104	30	31.3	104	(78-123)	0.13	(< 20)
tert-Butylbenzene	30	29.9	100	30	29.4	98	(78-124)	1.70	(< 20)
Tetrachloroethene	30	31.2	104	30	30.6	102	(74-129)	1.70	(< 20)
Toluene	30	29.1	97	30	28.8	96	(80-121)	1.00	(< 20)
trans-1,2-Dichloroethene	30	29.1	97	30	28.4	95	(75-124)	2.50	(< 20)
trans-1,3-Dichloropropene	30	32.3	108	30	32.5	108	(73-127)	0.80	(< 20)
Trichloroethene	30	31.2	104	30	30.2	101	(79-123)	3.10	(< 20)
Trichlorofluoromethane	30	32.9	110	30	31.1	104	(65-141)	5.80	(< 20)
Vinyl acetate	30	32.4	108	30	33.0	110	(54-146)	1.90	(< 20)
Vinyl chloride	30	31.6	105	30	29.5	98	(58-137)	6.70	(< 20)
Xylenes (total)	90	93.0	103	90	91.6	102	(79-121)	1.50	(< 20)

Print Date: 12/06/2017 3:09:05PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1179898 [VXX31784]
 Blank Spike Lab ID: 1427989
 Date Analyzed: 12/01/2017 12:01

Spike Duplicate ID: LCSD for HBN 1179898 [VXX31784]
 Spike Duplicate Lab ID: 1427990
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1179898003, 1179898004, 1179898005

Results by SW8260C

Parameter	Blank Spike (%)			Spike Duplicate (%)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Surrogates									
1,2-Dichloroethane-D4 (surr)	30	98	98	30	96.6	97	(81-118)	1.50	
4-Bromofluorobenzene (surr)	30	99.4	99	30	97.7	98	(85-114)	1.70	
Toluene-d8 (surr)	30	101	101	30	102	102	(89-112)	0.73	

Batch Information

Analytical Batch: **VMS17480**
 Analytical Method: **SW8260C**
 Instrument: **Agilent 7890-75MS**
 Analyst: **FDR**

Prep Batch: **VXX31784**
 Prep Method: **SW5030B**
 Prep Date/Time: **12/01/2017 00:00**
 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: 1427991
 MS Sample ID: 1427992 MS
 MSD Sample ID: 1427993 MSD

Analysis Date: 12/01/2017 20:10
 Analysis Date: 12/01/2017 21:44
 Analysis Date: 12/01/2017 21:59
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1179898003, 1179898004, 1179898005

Results by SW8260C

Parameter	Sample	Matrix Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
1,1,1,2-Tetrachloroethane	0.250U	30.0	29	97	30.0	30.5	102	78-124	5.30	(< 20)
1,1,1-Trichloroethane	0.500U	30.0	30.9	103	30.0	29.7	99	74-131	3.90	(< 20)
1,1,2,2-Tetrachloroethane	0.250U	30.0	30	100	30.0	29.9	100	71-121	0.30	(< 20)
1,1,2-Trichloroethane	0.200U	30.0	30.2	101	30.0	31.1	104	80-119	3.10	(< 20)
1,1-Dichloroethane	0.500U	30.0	30.4	101	30.0	29.1	97	77-125	4.20	(< 20)
1,1-Dichloroethene	0.500U	30.0	31	103	30.0	29.9	100	71-131	3.70	(< 20)
1,1-Dichloropropene	0.500U	30.0	31.6	105	30.0	30.4	101	79-125	3.70	(< 20)
1,2,3-Trichlorobenzene	0.500U	30.0	31.8	106	30.0	32.5	108	69-129	2.10	(< 20)
1,2,3-Trichloropropane	0.500U	30.0	29.4	98	30.0	28.9	96	73-122	1.90	(< 20)
1,2,4-Trichlorobenzene	0.500U	30.0	29.2	98	30.0	29.6	99	69-130	1.20	(< 20)
1,2,4-Trimethylbenzene	0.500U	30.0	30.3	101	30.0	30.3	101	79-124	0.07	(< 20)
1,2-Dibromo-3-chloropropane	5.00U	30.0	29	97	30.0	29.0	97	62-128	0.00	(< 20)
1,2-Dibromoethane	0.0375U	30.0	29.7	99	30.0	30.7	102	77-121	3.20	(< 20)
1,2-Dichlorobenzene	0.500U	30.0	29.5	98	30.0	29.5	98	80-119	0.17	(< 20)
1,2-Dichloroethane	0.250U	30.0	29.1	97	30.0	28.0	93	73-128	3.70	(< 20)
1,2-Dichloropropane	0.500U	30.0	32.3	108	30.0	31.2	104	78-122	3.50	(< 20)
1,3,5-Trimethylbenzene	0.500U	30.0	30.7	102	30.0	30.4	101	75-124	0.69	(< 20)
1,3-Dichlorobenzene	0.500U	30.0	29.9	100	30.0	30.2	101	80-119	0.96	(< 20)
1,3-Dichloropropane	0.250U	30.0	30.6	102	30.0	31.4	105	80-119	2.40	(< 20)
1,4-Dichlorobenzene	0.250U	30.0	29.8	100	30.0	29.7	99	79-118	0.54	(< 20)
2,2-Dichloropropane	0.500U	30.0	28.8	96	30.0	27.4	91	60-139	5.00	(< 20)
2-Butanone (MEK)	5.00U	90.0	90.2	100	90.0	83.9	93	56-143	7.20	(< 20)
2-Chlorotoluene	0.500U	30.0	30.7	102	30.0	30.4	101	79-122	0.88	(< 20)
2-Hexanone	5.00U	90.0	94.6	105	90.0	93.4	104	57-139	1.20	(< 20)
4-Chlorotoluene	0.500U	30.0	30	100	30.0	29.9	100	78-122	0.60	(< 20)
4-Isopropyltoluene	0.500U	30.0	31	103	30.0	31.1	104	77-127	0.48	(< 20)
4-Methyl-2-pentanone (MIBK)	5.00U	90.0	94.1	105	90.0	89.2	99	67-130	5.30	(< 20)
Benzene	0.200U	30.0	31.3	104	30.0	30.5	102	79-120	2.60	(< 20)
Bromobenzene	0.500U	30.0	30.1	100	30.0	29.9	100	80-120	0.57	(< 20)
Bromochloromethane	0.500U	30.0	31	103	30.0	30.0	100	78-123	3.40	(< 20)
Bromodichloromethane	0.250U	30.0	31.6	105	30.0	30.5	102	79-125	3.80	(< 20)
Bromoform	0.500U	30.0	29.8	99	30.0	30.7	102	66-130	3.20	(< 20)
Bromomethane	2.50U	30.0	20.3	68	30.0	19.1	64	53-141	5.80	(< 20)
Carbon disulfide	5.00U	45.0	45.8	102	45.0	44.5	99	64-133	2.90	(< 20)
Carbon tetrachloride	0.500U	30.0	30.4	101	30.0	29.3	98	72-136	3.80	(< 20)
Chlorobenzene	0.250U	30.0	29.8	99	30.0	29.6	99	82-118	0.81	(< 20)
Chloroethane	0.500U	30.0	32.9	110	30.0	30.9	103	60-138	6.20	(< 20)

Print Date: 12/06/2017 3:09:06PM

Matrix Spike Summary

Original Sample ID: 1427991
 MS Sample ID: 1427992 MS
 MSD Sample ID: 1427993 MSD

Analysis Date: 12/01/2017 20:10
 Analysis Date: 12/01/2017 21:44
 Analysis Date: 12/01/2017 21:59
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1179898003, 1179898004, 1179898005

Results by SW8260C

Parameter	Sample	Matrix Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Chloroform	0.500U	30.0	30.7	102	30.0	29.3	98	79-124	4.80	(< 20)
Chloromethane	0.500U	30.0	28.4	95	30.0	26.0	87	50-139	9.10	(< 20)
cis-1,2-Dichloroethene	0.500U	30.0	31	103	30.0	29.8	99	78-123	4.20	(< 20)
cis-1,3-Dichloropropene	0.250U	30.0	31.6	105	30.0	30.4	101	75-124	3.90	(< 20)
Dibromochloromethane	0.250U	30.0	30.5	102	30.0	31.0	103	74-126	1.40	(< 20)
Dibromomethane	0.500U	30.0	31.3	104	30.0	30.1	100	79-123	3.90	(< 20)
Dichlorodifluoromethane	0.500U	30.0	28	93	30.0	27.4	91	32-152	2.20	(< 20)
Ethylbenzene	0.500U	30.0	31.2	104	30.0	30.8	103	79-121	1.30	(< 20)
Freon-113	5.00U	45.0	47.4	105	45.0	46.0	102	70-136	3.00	(< 20)
Hexachlorobutadiene	0.500U	30.0	31.3	104	30.0	32.0	107	66-134	2.00	(< 20)
Isopropylbenzene (Cumene)	0.500U	30.0	30.8	103	30.0	30.9	103	72-131	0.26	(< 20)
Methylene chloride	2.50U	30.0	30.4	101	30.0	29.1	97	74-124	4.40	(< 20)
Methyl-t-butyl ether	5.00U	45.0	46.5	103	45.0	44.9	100	71-124	3.60	(< 20)
Naphthalene	0.730J	30.0	32.1	105	30.0	32.6	106	61-128	1.70	(< 20)
n-Butylbenzene	0.500U	30.0	30.4	101	30.0	30.7	102	75-128	1.20	(< 20)
n-Propylbenzene	0.500U	30.0	30.5	102	30.0	30.4	101	76-126	0.20	(< 20)
o-Xylene	0.500U	30.0	30.2	101	30.0	30.6	102	78-122	1.10	(< 20)
P & M -Xylene	1.00U	60.0	61.8	103	60.0	61.4	102	80-121	0.67	(< 20)
sec-Butylbenzene	0.500U	30.0	30.8	103	30.0	31.2	104	77-126	1.20	(< 20)
Styrene	0.500U	30.0	31.3	104	30.0	31.1	104	78-123	0.58	(< 20)
tert-Butylbenzene	0.500U	30.0	30.5	102	30.0	30.7	102	78-124	0.72	(< 20)
Tetrachloroethene	0.500U	30.0	29.1	97	30.0	30.4	101	74-129	4.20	(< 20)
Toluene	0.500U	30.0	28.3	94	30.0	28.9	96	80-121	1.90	(< 20)
trans-1,2-Dichloroethene	0.500U	30.0	30.2	101	30.0	29.0	97	75-124	4.00	(< 20)
trans-1,3-Dichloropropene	0.500U	30.0	30.2	101	30.0	30.6	102	73-127	1.30	(< 20)
Trichloroethene	0.500U	30.0	31.5	105	30.0	30.1	100	79-123	4.60	(< 20)
Trichlorofluoromethane	0.500U	30.0	31.8	106	30.0	30.9	103	65-141	2.60	(< 20)
Vinyl acetate	5.00U	30.0	28.2	94	30.0	26.9	90	54-146	5.00	(< 20)
Vinyl chloride	0.0750U	30.0	29.7	99	30.0	28.6	95	58-137	3.70	(< 20)
Xylenes (total)	1.50U	90.0	92	102	90.0	91.9	102	79-121	0.09	(< 20)
Surrogates										
1,2-Dichloroethane-D4 (surr)		30.0	29.8	99	30.0	28.9	96	81-118	3.20	
4-Bromofluorobenzene (surr)		30.0	29.4	98	30.0	29.8	99	85-114	1.10	
Toluene-d8 (surr)		30.0	29.4	98	30.0	30.4	101	89-112	3.40	

Print Date: 12/06/2017 3:09:06PM

Matrix Spike Summary

Original Sample ID: 1427991
 MS Sample ID: 1427992 MS
 MSD Sample ID: 1427993 MSD

Analysis Date:
 Analysis Date: 12/01/2017 21:44
 Analysis Date: 12/01/2017 21:59
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1179898003, 1179898004, 1179898005

Results by SW8260C

Parameter	Sample	Matrix Spike (%)			Spike Duplicate (%)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			

Batch Information

Analytical Batch: VMS17480
 Analytical Method: SW8260C
 Instrument: Agilent 7890-75MS
 Analyst: FDR
 Analytical Date/Time: 12/1/2017 9:44:00PM

Prep Batch: VXX31784
 Prep Method: Volatiles Extraction 8240/8260 FULL
 Prep Date/Time: 12/1/2017 12:00:00AM
 Prep Initial Wt./Vol.: 5.00mL
 Prep Extract Vol: 5.00mL

Print Date: 12/06/2017 3:09:06PM

Method Blank

Blank ID: MB for HBN 1772729 [XXX/38882]
 Blank Lab ID: 1427022

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
 1179898003, 1179898004

Results by 8270D SIM LV (PAH)

Parameter	Results	LOQ/CL	DL	Units
1-Methylnaphthalene	0.0250U	0.0500	0.0150	ug/L
2-Methylnaphthalene	0.0250U	0.0500	0.0150	ug/L
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-Methylnaphthalene-d10 (surr)	70.2	47-106		%
Fluoranthene-d10 (surr)	69.9	24-116		%

Batch Information

Analytical Batch: XMS10572
 Analytical Method: 8270D SIM LV (PAH)
 Instrument: Agilent GC 7890B/5977A SWA
 Analyst: DSD
 Analytical Date/Time: 12/1/2017 6:06:00PM

Prep Batch: XXX38882
 Prep Method: SW3520C
 Prep Date/Time: 11/27/2017 9:14:02AM
 Prep Initial Wt./Vol.: 250 mL
 Prep Extract Vol: 1 mL

Blank Spike Summary

Blank Spike ID: LCS for HBN 1179898 [XXX38882]

Blank Spike Lab ID: 1427023

Date Analyzed: 12/01/2017 18:27

Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1179898003, 1179898004

Results by 8270D SIM LV (PAH)

Blank Spike (ug/L)

Parameter	Spike	Result	Rec (%)	CL
1-Methylnaphthalene	2	1.60	80	(41-115)
2-Methylnaphthalene	2	1.50	75	(39-114)
Acenaphthene	2	1.54	77	(48-114)
Acenaphthylene	2	1.60	80	(35-121)
Anthracene	2	1.61	81	(53-119)
Benzo(a)Anthracene	2	1.63	82	(59-120)
Benzo[a]pyrene	2	1.51	76	(53-120)
Benzo[b]Fluoranthene	2	1.62	81	(53-126)
Benzo[g,h,i]perylene	2	1.51	75	(44-128)
Benzo[k]fluoranthene	2	1.63	82	(54-125)
Chrysene	2	1.69	84	(57-120)
Dibenzo[a,h]anthracene	2	1.48	74	(44-131)
Fluoranthene	2	1.65	82	(58-120)
Fluorene	2	1.62	81	(50-118)
Indeno[1,2,3-c,d] pyrene	2	1.54	77	(48-130)
Naphthalene	2	1.50	75	(43-114)
Phenanthrene	2	1.57	78	(53-115)
Pyrene	2	1.69	85	(53-121)

Surrogates

2-Methylnaphthalene-d10 (surr)	2	72.5	73	(47-106)
Fluoranthene-d10 (surr)	2	72	72	(24-116)

Batch Information

Analytical Batch: XMS10572

Analytical Method: 8270D SIM LV (PAH)

Instrument: Agilent GC 7890B/5977A SWA

Analyst: DSD

Prep Batch: XXX38882

Prep Method: SW3520C

Prep Date/Time: 11/27/2017 09:14

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

Dupe Init Wt./Vol.: Extract Vol:

Matrix Spike Summary

Original Sample ID: 1179890001
 MS Sample ID: 1427024 MS
 MSD Sample ID: 1427025 MSD

Analysis Date: 12/01/2017 18:47
 Analysis Date: 12/01/2017 19:08
 Analysis Date: 12/01/2017 19:28
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1179898003, 1179898004

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 (%)			
1-Methylnaphthalene	0.0245U	1.96	1.54	79	1.96	1.50	77	41-115	3.00	(< 20)
2-Methylnaphthalene	0.0245U	1.96	1.42	72	1.96	1.42	72	39-114	0.27	(< 20)
Acenaphthene	0.0245U	1.96	1.48	76	1.96	1.46	75	48-114	1.30	(< 20)
Acenaphthylene	0.0245U	1.96	1.53	78	1.96	1.52	78	35-121	0.67	(< 20)
Anthracene	0.0245U	1.96	1.54	78	1.96	1.52	78	53-119	1.10	(< 20)
Benzo(a)Anthracene	0.0245U	1.96	1.58	81	1.96	1.49	76	59-120	5.80	(< 20)
Benzo(a)pyrene	0.00980U	1.96	1.43	73	1.96	1.35	69	53-120	6.20	(< 20)
Benzo(b)Fluoranthene	0.0245U	1.96	1.47	75	1.96	1.39	71	53-126	5.80	(< 20)
Benzo(g,h,i)perylene	0.0245U	1.96	1.33	68	1.96	1.27	65	44-128	5.10	(< 20)
Benzo(k)fluoranthene	0.0245U	1.96	1.5	77	1.96	1.45	74	54-125	3.80	(< 20)
Chrysene	0.0245U	1.96	1.61	82	1.96	1.54	79	57-120	4.30	(< 20)
Dibenzo(a,h)anthracene	0.00980U	1.96	1.31	67	1.96	1.22	62	44-131	7.20	(< 20)
Fluoranthene	0.0245U	1.96	1.59	81	1.96	1.53	78	58-120	3.50	(< 20)
Fluorene	0.0245U	1.96	1.55	79	1.96	1.52	78	50-118	1.90	(< 20)
Indeno[1,2,3-c,d] pyrene	0.0245U	1.96	1.34	69	1.96	1.27	65	48-130	6.00	(< 20)
Naphthalene	0.0490U	1.96	1.45	74	1.96	1.45	74	43-114	0.12	(< 20)
Phenanthrene	0.0245U	1.96	1.52	78	1.96	1.47	75	53-115	3.30	(< 20)
Pyrene	0.0245U	1.96	1.65	84	1.96	1.57	80	53-121	4.50	(< 20)
Surrogates										
2-Methylnaphthalene-d10 (surr)		1.96	1.36	69	1.96	1.36	69	47-106	0.16	
Fluoranthene-d10 (surr)		1.96	1.43	73	1.96	1.35	69	24-116	5.50	

Batch Information

Analytical Batch: XMS10572
 Analytical Method: 8270D SIM LV (PAH)
 Instrument: Agilent GC 7890B/5977A SWA
 Analyst: DSD
 Analytical Date/Time: 12/1/2017 7:08:00PM

Prep Batch: XXX38882
 Prep Method: 3520 Liq/Liq Ext for 8270 PAH SIM LV
 Prep Date/Time: 11/27/2017 9:14:02AM
 Prep Initial Wt./Vol.: 255.00mL
 Prep Extract Vol: 1.00mL

Method Blank

Blank ID: MB for HBN 1772833 [XXX/38895]
Blank Lab ID: 1427440

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1179898001, 1179898002, 1179898003, 1179898004

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)	85.3	60-120		%

Batch Information

Analytical Batch: XFC14002
Analytical Method: AK102
Instrument: Agilent 7890B F
Analyst: JMG
Analytical Date/Time: 11/30/2017 5:09:00PM

Prep Batch: XXX38895
Prep Method: SW3520C
Prep Date/Time: 11/29/2017 8:36:04AM
Prep Initial Wt./Vol.: 250 mL
Prep Extract Vol: 1 mL

Print Date: 12/06/2017 3:09:11PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1179898 [XXX38895]
 Blank Spike Lab ID: 1427441
 Date Analyzed: 11/30/2017 17:19

Spike Duplicate ID: LCSD for HBN 1179898
 [XXX38895]
 Spike Duplicate Lab ID: 1427442
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1179898001, 1179898002, 1179898003, 1179898004

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	17.3	87	20	19.6	98	(75-125)	12.50	(< 20)
Surrogates									
5a Androstane (surr)	0.4	89.1	89	0.4	102	102	(60-120)	13.10	

Batch Information

Analytical Batch: **XFC14002**
 Analytical Method: **AK102**
 Instrument: **Agilent 7890B F**
 Analyst: **JMG**

Prep Batch: **XXX38895**
 Prep Method: **SW3520C**
 Prep Date/Time: **11/29/2017 08:36**
 Spike Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL
 Dupe Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL

Method Blank

Blank ID: MB for HBN 1772833 [XXX/38895]
 Blank Lab ID: 1427440

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
 1179898001, 1179898002, 1179898003, 1179898004

Results by AK103

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Residual Range Organics	0.250U	0.500	0.150	mg/L
Surrogates				
n-Triacontane-d62 (surr)	93.4	60-120		%

Batch Information

Analytical Batch: XFC14002
 Analytical Method: AK103
 Instrument: Agilent 7890B F
 Analyst: JMG
 Analytical Date/Time: 11/30/2017 5:09:00PM

Prep Batch: XXX38895
 Prep Method: SW3520C
 Prep Date/Time: 11/29/2017 8:36:04AM
 Prep Initial Wt./Vol.: 250 mL
 Prep Extract Vol: 1 mL

Print Date: 12/06/2017 3:09:14PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1179898 [XXX38895]
 Blank Spike Lab ID: 1427441
 Date Analyzed: 11/30/2017 17:19

Spike Duplicate ID: LCSD for HBN 1179898
 [XXX38895]
 Spike Duplicate Lab ID: 1427442
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1179898001, 1179898002, 1179898003, 1179898004

Results by AK103

Parameter	Blank Spike (mg/L)			Spike Duplicate (mg/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Residual Range Organics	20	18.6	93	20	21.5	107	(60-120)	14.60	(< 20)
Surrogates									
n-Triacontane-d62 (surr)	0.4	86.7	87	0.4	104	104	(60-120)	18.40	

Batch Information

Analytical Batch: **XFC14002**
 Analytical Method: **AK103**
 Instrument: **Agilent 7890B F**
 Analyst: **JMG**

Prep Batch: **XXX38895**
 Prep Method: **SW3520C**
 Prep Date/Time: **11/29/2017 08:36**
 Spike Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL
 Dupe Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL

Print Date: 12/06/2017 3:09:17PM

1179898



SHANNON & WILSON, INC.

Geotechnical and Environmental Consultants

CHAIN-OF-CUSTODY RECORD

Laboratory SGS Page 1 of 1
Attn: _____

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2043 Westport Center Drive
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3990 Collins Way, Suite 100
Lake Oswego, OR 97035
(503) 223-6147

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

Analysis Parameters/Sample Container Description

(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	DRO/RPO AK 102/AK 103	GPO/BTEX AK 101	GRO AK 101	VOCs EPA 8260C	PAHs EPA 8270/8280	Total Number of Containers	Remarks/Matrix
20069-MW6B	①A-E	12:57	11/21/17	X	X	X					5	Groundwater
20069-MW19R	②A-E	15:11	11/21/17	X	X	X					5	Groundwater
20069-13A	③A-J	16:23	11/21/17	X	X		X	X	X		10	Groundwater
20069-103A	④A-J	16:48	11/21/17	X	X		X	X	X		10	Groundwater
WTB	⑤A-E	12:50	11/21/17				X	X			1	Water Trip Blank

Project Information	Sample Receipt
Project Number: <u>32-1-20069</u>	Total Number of Containers: _____
Project Name: <u>Crowley GW</u>	COC Seals/Intact? Y/N <u>NA</u>
Contact: <u>JJK</u>	Received Good Cond./Cold <u>3.6</u>
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Delivery Method: <u>Hand Delivered</u> # <u>024</u>
Sampler: <u>JJK</u>	(attach shipping bill, if any)

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: <u>[Signature]</u> Time: <u>10:11</u>	Signature: _____ Time: _____	Signature: _____ Time: _____
Printed Name: <u>Jake Kesler</u> Date: <u>11/22/17</u>	Printed Name: _____ Date: _____	Printed Name: _____ Date: _____
Company: <u>STW</u>	Company: _____	Company: _____
Received By: 1.	Received By: 2.	Received By: 3.
Signature: _____ Time: _____	Signature: _____ Time: _____	Signature: <u>[Signature]</u> Time: <u>10:06</u>
Printed Name: _____ Date: _____	Printed Name: _____ Date: _____	Printed Name: <u>Nicholas Wells</u> Date: <u>11/22/17</u>
Company: _____	Company: _____	Company: <u>SGS</u>

Instructions
Requested Turnaround Time: <u>STANDARD</u>
Special Instructions: _____

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



e-Sample Receipt Form

SGS Workorder #:

1179898



1 1 7 9 8 9 8

Review Criteria	Condition (Yes, No, N/A)	Exceptions Noted below
Chain of Custody / Temperature Requirements		
Were Custody Seals intact? Note # & location	N/A	Hand Delivered
COC accompanied samples?	Yes	
<input type="checkbox"/> N/A **Exemption permitted if chilled & collected <8 hours ago, or for samples where chilling is not required		
Temperature blank compliant* (i.e., 0-6 °C after CF)?	Yes	Cooler ID: 1 @ 3.6 °C Therm. ID: D24
		Cooler ID: @ °C Therm. ID:
		Cooler ID: @ °C Therm. ID:
		Cooler ID: @ °C Therm. ID:
		Cooler ID: @ °C Therm. ID:
*If >6°C, were samples collected <8 hours ago?	N/A	
If <0°C, were sample containers ice free?	N/A	
<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)?	Yes	
**Note: If times differ <1hr, record details & login per COC.		
Were analyses requested unambiguous? (i.e., method is specified for analyses with >1 option for analysis)	Yes	
Were proper containers (type/mass/volume/preservative***) used?	Yes	<input type="checkbox"/> N/A ***Exemption permitted for metals (e.g.200.8/6020A).
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>
1179898001-A	HCL to pH < 2	OK			
1179898001-B	HCL to pH < 2	OK			
1179898001-C	HCL to pH < 2	OK			
1179898001-D	HCL to pH < 2	OK			
1179898001-E	HCL to pH < 2	OK			
1179898002-A	HCL to pH < 2	OK			
1179898002-B	HCL to pH < 2	OK			
1179898002-C	HCL to pH < 2	OK			
1179898002-D	HCL to pH < 2	OK			
1179898002-E	HCL to pH < 2	OK			
1179898003-A	HCL to pH < 2	OK			
1179898003-B	HCL to pH < 2	OK			
1179898003-C	HCL to pH < 2	OK			
1179898003-D	HCL to pH < 2	OK			
1179898003-E	HCL to pH < 2	OK			
1179898003-F	HCL to pH < 2	OK			
1179898003-G	HCL to pH < 2	OK			
1179898003-H	HCL to pH < 2	OK			
1179898003-I	No Preservative Required	OK			
1179898003-J	No Preservative Required	OK			
1179898004-A	HCL to pH < 2	OK			
1179898004-B	HCL to pH < 2	OK			
1179898004-C	HCL to pH < 2	OK			
1179898004-D	HCL to pH < 2	OK			
1179898004-E	HCL to pH < 2	OK			
1179898004-F	HCL to pH < 2	OK			
1179898004-G	HCL to pH < 2	OK			
1179898004-H	HCL to pH < 2	OK			
1179898004-I	No Preservative Required	OK			
1179898004-J	No Preservative Required	OK			
1179898005-A	HCL to pH < 2	OK			
1179898005-B	HCL to pH < 2	OK			
1179898005-C	HCL to pH < 2	OK			

Container Id Preservative

Container
Condition

Container Id Preservative

Container
Condition

Container Condition Glossary

Containers for bacteriological, low level mercury and VOA vials are not opened prior to analysis and will be assigned condition code OK unless evidence indicates that 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.

IC - The container provided for microbiology analysis was not a laboratory-supplied, pre-sterilized container and therefore was not suitable for analysis.

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.

LABORATORY DATA REVIEW CHECKLIST

Completed by: Jake Kesler

Title: Environmental Staff

Date: March 2018

CS Report Name: November 2017 Groundwater Monitoring, Crowley 459 West Bluff Drive, Anchorage, Alaska

Laboratory Report Date: December 6, 2017

Consultant Firm: Shannon & Wilson, Inc.

Laboratory Name: SGS North America Inc.

Laboratory Report Number: 1179898

ADEC File Number: 2100.38.321

ADEC RecKey Number: NA

(NOTE: NA = not applicable; Text in *italics* added by Shannon & Wilson, Inc.)

1. Laboratory

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

2. Chain of Custody (COC)

- a. COC information completed, signed, and dated (including released/received by)? Yes / No / NA (please explain)
- b. Correct analyses requested? Yes / No / NA (please explain)

3. Laboratory Sample Receipt Documentation

- a. Sample/cooler temperature documented and within range at receipt (0° to 6° C)? Yes / No / NA (please explain)
Comments: *The cooler temperature blank was recorded at 3.6°C.*
- b. Sample preservation acceptable - acidified waters, Methanol-preserved VOC soil (GRO, BTEX, VOCs, etc.)? Yes / No / NA (please explain)

- c. Sample condition documented - broken, leaking (soil MeOH), zero headspace (VOC vials)? **Yes** / No / NA (please explain)
Comments:
- d. If there were any discrepancies, were they documented (e.g., incorrect sample containers/preservation, sample temperatures outside range, insufficient sample size, missing samples)? Yes / No / **NA** (please explain)
Comments: *No discrepancies documented.*
- e. Data quality or usability affected? Please explain. Yes / No / **NA** (please explain)
Comments:

4. Case Narrative

- a. Present and understandable? **Yes** / No / NA (please explain)
Comments:
- b. Discrepancies, errors, or QC failures identified by the lab? **Yes** / No / NA (please explain)
Comments: *The case narrative noted the following:*
- *Surrogate recovery, associated with Sample MW6B, for 4-bromofluorobenzene does not meet QC criteria due to matrix interference.*
 - *LCSD RPD for bromomethane does not meet QC criteria. This analyte was not detected in associated samples.*
- c. Were corrective actions documented? Yes / **No** / NA (please explain)
Comments:
- d. What is the effect on data quality/usability, according to the case narrative?
Comments: *The case narrative does not comment on data quality/usability.*

5. Sample Results

- a. Correct analyses performed/reported as requested on COC? **Yes** / No / NA (please explain)
Comments:
- b. All applicable holding times met? **Yes** / No / NA (please explain)
- c. All soils reported on a dry-weight basis? Yes / No / **NA** (please explain)
- d. Are the reported LOQs less than the Cleanup Level or the minimum required detection level for the project? **Yes** / No / NA (please explain)
Comments:

- e. Data quality or usability affected? **Yes / No / NA** (please explain)
Comments:

6. QC Samples

a. **Method Blank**

- i. One method blank reported per matrix, analysis, and 20 samples?
Yes / No / NA (please explain)
- ii. All method blank results less than LOQ? **Yes** / No / NA (please explain)
Comments:
- iii. If above LOQ, what samples are affected? **NA**
Comments:
- iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?
Yes / No / NA (please explain)
Comments:
- v. Data quality or usability affected? Explain. **Yes / No / NA** (please explain)

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 / NA
- ii. Metals/Inorganics - One LCS and one sample duplicate reported per matrix, analysis and 20 samples? **Yes / No / NA** (please explain)
- 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 / NA (please explain)
Comments:
- iv. Precision – All relative percent differences (RPDs) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages) **Yes / No / NA** (please explain)
Comments: *The LCSD RPD for bromomethane does not meet QC criteria.*
- v. If %R or RPD is outside of acceptable limits, what samples are affected? **NA**
Comments: *Bromomethane was not detected in the associated samples and therefore are not affected.*

vi. Do the affected samples(s) have data flags? If so, are the data flags clearly defined?
Yes / No **(NA)** (please explain)
Comments:

vii. Data quality or usability affected? Yes **(No)** / NA (please explain)
Comments: *See above.*

c. Surrogates - Organics Only

i. Are surrogate recoveries reported for organic analyses, field, QC and laboratory samples? **(Yes)** / No / NA (please explain)

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)** / NA (please explain)
Comments: *Sample MW6B had a surrogate recovery for 4-bromofluorobenzene that does not meet QC criteria due to matrix interference.*

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined? **(Yes)** / No / NA (please explain)
Comments: *The GRO result for Sample MW6B may be biased high and is flagged “J+”.*

iv. Data quality or usability affected? Please explain. **(Yes)** / No / NA (please explain)
Comments: *See above.*

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

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

ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC? (If not, a comment stating why must be entered below.) Yes **(No)** / NA (please explain)
Comments: *Only one cooler was used to transport/deliver the samples.*

iii. All results less than LOQ? **(Yes)** / No / NA (please explain)

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

v. Data quality or usability affected? Please explain. Yes / No **(NA)** (please explain)
Comments:

e. Field Duplicate

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

Yes / No / NA (please explain)

Comments:

- ii. Submitted blind to the lab? **Yes** / No / NA (please explain)

Comments:

- iii. Precision – All relative percent differences (RPDs) less than specified DQOs? (Recommended: 30% for water, 50% for soil) **Yes** / **No** / NA (please explain)

Comments: *Primary/duplicate sample set had RPD failures for ethylbenzene, 1-methylnaphthalene, acenaphthene, fluorene, and naphthalene.*

- iv. Data quality or usability affected? Explain.

Comment: *The affected analytes are flagged “E” on Table 2 and are considered estimates due to the RPD failures.*

f. Decontamination or Equipment Blank (if not applicable)

Yes / No / **NA** (please explain)

Comments: *The use of a decontamination or equipment blank was not included in our ADEC-approved work plan.*

- i. All results less than LOQ? **Yes** / No / **NA** (please explain)

Comments:

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

Comments:

- iii. Data quality or usability affected? Please explain. **NA**

Comments:

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

- a. Defined and appropriate? **Yes** / No / NA (please explain)

Comments: *A key is provided on page 4 of the laboratory report.*

ATTACHMENT 3
WASTE MANIFEST

NON-HAZARDOUS WASTE MANIFEST

Please print or type (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE MANIFEST		1. Generator's US EPA ID No. AKR0000831750		Manifest Document No. 120911A	2. Page 1 of 1																														
3. Generator's Name and Mailing Address CROWLEY FUELS LLC ANC 459 WEST BLUFF ROAD ANCHORAGE, AK 99501		CROWLEY FUELS LLC ANC 459 WEST BLUFF ROAD ANCHORAGE, AK 99501		32																															
4. Generator's Phone ()		6. US EPA ID Number AKR000004184		A. State Transporter's ID (907) 258-1558																															
5. Transporter 1 Company Name NRC ALASKA LLC		7. Transporter 2 Company Name		B. Transporter 1 Phone																															
8. US EPA ID Number		9. Designated Facility Name and Site Address NRC ALASKA LLC 2020 VIKING DRIVE ANCHORAGE, AK 99501		C. State Transporter's ID																															
10. US EPA ID Number AKR000004184		11. WASTE DESCRIPTION		D. Transporter 2 Phone																															
E. State Facility's ID		<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">HM</th> <th rowspan="2">Containers</th> <th rowspan="2">13. Total Quantity</th> <th rowspan="2">14. Unit Wt./Vol.</th> </tr> <tr> <th>No.</th> <th>Type</th> </tr> </thead> <tbody> <tr> <td>a.</td> <td>Material Not Regulated by DOT</td> <td>1</td> <td>DM</td> <td>60</td> <td>P</td> </tr> <tr> <td>b.</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>c.</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>d.</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		HM	Containers	13. Total Quantity	14. Unit Wt./Vol.	No.	Type	a.	Material Not Regulated by DOT	1	DM	60	P	b.						c.						d.						F. Facility's Phone (907) 258-1558	
HM	Containers							13. Total Quantity	14. Unit Wt./Vol.																										
				No.	Type																														
a.	Material Not Regulated by DOT			1	DM	60	P																												
b.																																			
c.																																			
d.																																			
G. Additional Descriptions for Materials Listed Above 1) EA0301 OLY WATER		H. Handling Codes for Wastes Listed Above <input type="checkbox"/> 13463																																	
15. Special Handling Instructions and Additional Information Shipper's Certification: This is to certify that the above-named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation																																			
16. GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.																																			
Printed/Typed Name Jake Kesler		Signature <i>[Signature]</i>		Date Month Day Year 12 20 17																															
17. Transporter 1 Acknowledgement of Receipt of Materials		Signature <i>[Signature]</i>		Date Month Day Year 12 20 17																															
Printed/Typed Name ROY C TRISDALE JR		Signature <i>[Signature]</i>		Date Month Day Year 12 20 17																															
18. Transporter 2 Acknowledgement of Receipt of Materials		Signature		Date Month Day Year																															
Printed/Typed Name		Signature		Date Month Day Year																															
19. Discrepancy Indication Space																																			
20. Facility Owner or Operator: Certification of receipt of the waste materials covered by this manifest, except as noted in item 19.																																			
Printed/Typed Name		Signature		Date Month Day Year																															

NON-HAZARDOUS WASTE

GENERATOR

TRANSPORTER

FACILITY

ATTACHMENT 4
IMPORTANT INFORMATION ABOUT YOUR
GEOTECHNICAL/ENVIRONMENTAL REPORT



Date: March 2018
To: Crowley Fuels, LLC

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL/ENVIRONMENTAL REPORT

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include: the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used: (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors which were considered in the development of the report have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports, and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the
ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland