

March 2, 2020

Fairweather, LLC  
301 Calista Court  
Anchorage, Alaska 99518

Attn: Mr. Guy Miyagishima

**RE: GROUNDWATER MONITORING ACTIVITIES, 151 WEST 100<sup>th</sup> AVENUE,  
ANCHORAGE, ALASKA; ADEC FILE NO. 2100.38.539**

This report presents the results of Shannon & Wilson's August 2019 and February 2020 groundwater monitoring events conducted at 151 West 100<sup>th</sup> Avenue, Anchorage, Alaska. A site plan showing the project site and surrounding area is included as Figure 1. The property is identified by the Alaska Department of Environmental Conservation (ADEC) as File No. 2100.38.539.

The groundwater monitoring activities were conducted in accordance with our July 29, 2019 work plan, which was approved by Mr. Robert Weimer of the ADEC on July 29, 2019 via email.

## **BACKGROUND**

During geotechnical explorations conducted by Shannon & Wilson in November 2012, petroleum-impacted soil was identified at the site. Shannon & Wilson conducted additional site activities in March 2013. As part of the activities, eight borings/temporary groundwater monitoring wells were advanced/installed and sampled. Diesel range organics (DRO) and benzene were detected in several of the borings at concentrations exceeding the ADEC cleanup levels. Concentrations of gasoline range organics (GRO) (maximum of 4.82 milligrams per liter [mg/L]) and benzene (maximum of 1.40 mg/L) were also detected in the groundwater at concentrations exceeding the current ADEC Table C cleanup levels.

Shannon & Wilson conducted an interim removal action at the site in November and December 2014, which included excavating soil, constructing an on-site landfarm, stockpiling potentially clean overburden soil, and collecting screening and analytical soil samples from the stockpiles and excavation. Soil samples collected from the limits of the final excavation did not contain GRO, DRO, toluene, ethylbenzene, xylenes, or polynuclear aromatic hydrocarbons (PAHs) at concentrations greater than ADEC Method Two cleanup levels. Benzene was detected at a concentration (0.0705 milligrams per kilogram [mg/kg]) greater than the current ADEC cleanup

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level of 0.022 mg/kg in one sample (Sample EX2SW12) collected from the south sidewall of the excavation, at a depth of approximately 11 to 12 feet below ground surface (bgs).

Of the approximately 2,250 cubic yards (cy) of excavated soil, approximately 1,320 cy of potentially impacted soil were placed in the on-site landfarm and about 930 cy of clean overburden soil were stockpiled, sampled, and subsequently used to backfill the excavation. During backfilling, Oxygen Release Compound (ORC) Advanced® was placed in the base of the excavation. Following sampling and with ADEC approval, the landfarmed material was used to backfill the remainder of the excavation.

In May 2016, three borings (Borings B30, B31, and B32) were advanced in the vicinity of the former excavation. Boring B30 was located within the former excavation at the approximate location of Sample EX2SW12, where benzene had been detected at a concentration exceeding the ADEC Method Two cleanup level. Analysis of a soil sample collected from Boring B30 detected 0.0349 mg/kg benzene, which exceeds the ADEC Method Two cleanup level. The borings were completed as groundwater Monitoring Wells MW30, MW31, and MW32. Analysis of a groundwater sample collected from Well MW30 in May 2016 detected 0.0231 mg/L benzene which exceeds the ADEC cleanup level of 0.0046 mg/L. Other tested analytes were either not detected or measured at concentrations below the ADEC cleanup levels in the remaining soil and groundwater samples. The excavation limits and monitoring wells are shown on Figure 1.

In 2017 and 2018, Shannon & Wilson performed quarterly groundwater monitoring activities at the site, and two of the four monitoring events detected benzene in Well MW30 above the ADEC cleanup level. To achieve site closure without institutional controls, Mr. Robert Weimer of ADEC, on July 10, 2019, requested that two consecutive groundwater samples collected from Well MW30 show benzene levels below the ADEC Table C cleanup levels. The purpose of this project is to progress to site closure without institutional controls.

### **FIELD ACTIVITIES**

The groundwater monitoring activities were conducted by Shannon & Wilson on August 16, 2019 and February 3, 2020. The project consisted of collecting groundwater samples, managing investigation-derived waste (IDW), and reporting to ADEC. Field notes are provided in Attachment 1.

The samples were collected using low-flow techniques to reduce the effects of stagnant well casing water on chemical concentrations and to obtain a groundwater sample that is

representative of the surrounding water-bearing formation. The well was purged and sampled with a submersible pump and disposable tubing. The submersible pump was placed within the top 1 foot of the groundwater column. A pump rate was adjusted with the goal of limiting the sustained water drawdown to a maximum of 0.3 foot (typical pump rate of 0.1 to 0.5 liter per minute).

Water quality parameters (pH, temperature, specific conductance, and turbidity) and purge volume were recorded and monitored during the process. Purging was considered complete when at least one well volume was removed and all four of the following stabilization criteria were met over three successive readings: pH within 0.1 unit, temperature within 3 percent (minimum 0.2 degree Celsius), specific conductance within 3 percent, and turbidity within 10 percent or three consecutive readings of less than 10 nephelometric turbidity units (NTU). During both sampling events, water quality parameters stabilized within one hour of purging. The final water quality parameters are listed in Table 1. Analytical groundwater samples were collected by transferring water directly from the in-well submersible pump tubing into laboratory-supplied containers.

### **LABORATORY ANALYSES**

The groundwater samples were delivered to SGS North America Inc. (SGS) using chain-of-custody procedures. The samples were analyzed for volatile organic compounds (VOCs) by Environmental Protection Agency (EPA) Method 8260C. One trip blank sample accompanied the analytical sample containers from and to the laboratory during each sampling event, and was tested for VOCs by EPA Method 8260C. The laboratory reports are provided in Attachment 2.

### **DISCUSSION OF ANALYTICAL RESULTS**

The reported contaminant concentrations in the groundwater were compared to the cleanup levels listed in Table C of 18 Alaska Administrative Code (AAC) 75.345 (October 2018). The cleanup levels and analytical results for the groundwater sampling events are provided in Table 2. A summary of the historical groundwater results is provided in Table 3.

During each sampling event dichlorodifluoromethane (maximum of 0.0518 mg/L) and trichlorofluoromethane (maximum of 0.000930 mg/L) were detected at concentrations less than the ADEC Table C cleanup levels of 0.20 mg/L and 5.2 mg/L, respectively. The remaining tested analytes were not detected.

### **QUALITY ASSURANCE SUMMARY**

SGS follows on-going quality assurance/quality control (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, and laboratory control sample/laboratory control sample duplicates (LCS/LCSD) to determine precision, accuracy, and matrix bias. If a DQO was not met, the project laboratory provides a report specific note identifying the problem in the Case Narrative section of their Laboratory Analysis Reports (See Attachment 2).

One laboratory-supplied trip blank accompanied the sample containers during transport to and from the project during each sampling event. There were no detections in the trip blanks, indicating that the samples were not cross contaminated by these compounds during the sample handling, storage, or testing process.

Shannon & Wilson reviewed the SGS deliverables and completed the ADEC's Laboratory Data Review Checklist (LDRC) for each data package 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 for the objectives of this project were noted. Based on this quality assurance summary, we find the project data to be complete and usable to support the intended data uses.

### **INVESTIGATION DERIVED WASTE**

Investigation derived waste (IDW) from this project consisted of purge and decontamination water from each groundwater monitoring event containerized in labeled 5-gallon buckets. Following the review of this report, with ADEC approval, purge and decontamination water from the groundwater monitoring events will be discharged to an unpaved portion of the property.

### **CONCLUSIONS/RECOMMENDATIONS**

Benzene was not detected in the groundwater samples collected from Monitoring Well MW30 in August 2019 or February 2020. Therefore, we recommend requesting site closure from the ADEC and decommissioning the on-site monitoring wells.

### **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. The sampling and analyses performed can provide you with

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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 assessment activities. Changes in site conditions can occur over time, due to natural forces or human activity. In addition, changes in government codes, regulations, or laws may occur. Because of such changes beyond our control, our observations and interpretations may need to be revised.

Shannon & Wilson has prepared the documents in Attachment 3, "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:



Alec Rizzo  
Geologist

Reviewed by:



Dan P. McMahon, PMP  
Senior Associate

Encl: Table 1, 2, and 3; Figure 1; and Attachments 1, 2, and 3

**TABLE 1  
GROUNDWATER SAMPLING LOG**

	Monitoring Well Number	
	MW30	MW30
<b>Water Level Measurement Data</b>		
Date Water Level Measured	8/16/2019	2/3/2020
Time Water Level Measured	10:50	10:05
Surveyed TOC Elevation (ft)	100.95	100.95
Measured Depth to Water (ft below TOC)	7.86	9.29
Water Level Elevation (ft)	93.09	91.66
<b>Purging/Sampling Data</b>		
Date Sampled	8/16/2019	2/3/2020
Time Sampled	11:50	11:10
Measured Depth to Water (ft below TOC)	7.86	9.29
Total Depth of Well (ft below TOC)	19.20	19.19
Water Column in Well (ft)	11.34	9.90
Gallons per Foot	0.16	0.16
Water Column Volume (gallons)	1.81	1.58
Total Volume Pumped (gallons)	2.2	2.2
Sampling Method	Submersible Pump	Submersible Pump
Diameter of Well Casing	2-inch	2-inch
<b>Water Quality Data</b>		
Temperature (°C)	14.13	3.85
Specific Conductance (µS/cm)	928	1,156
pH (Standard Units)	6.48	4.67
Turbidity (NTU)	6.12	36.44
<b>Remarks</b>		

Notes: Water quality parameters were measured with a Hanna water quality instrument and MicroTPW Turbidimeter. Well survey conducted by Shannon & Wilson on May 18, 2016 using a temporary benchmark elevation of 100.00 feet.

- = not applicable or not tested for this parameter
- TOC = top of casing
- °C = degrees Celsius
- ft = feet
- µS/cm = microsiemens per centimeter
- mg/L = milligrams per liter
- NTU = nephelometric turbidity units

**TABLE 2**  
**SUMMARY OF WATER ANALYTICAL RESULTS**

Parameter Tested	Method*	Cleanup Level (mg/L)**	Sample ID Number <sup>^</sup> , Water Depth in Feet BTOC, and Sample Date (See Table 1 and Figure 1)			
			Monitoring Well		Trip Blank	
			MW30 7.86 8/16/2019	MW30 9.29 2/3/2020	WTB - 8/16/2019	WTB - 2/3/2020
Volatile Organic Compounds (VOCs)						
Benzene - mg/L	EPA 8260C	0.0046	<0.000200	<0.000200	<0.000200	<0.000200
Toluene - mg/L	EPA 8260C	1.1	<0.000500	<0.000500	<0.000500	<0.000500
Ethylbenzene - mg/L	EPA 8260C	0.015	<0.000500	<0.000500	<0.000500	<0.000500
Xylenes (total) - mg/L	EPA 8260C	0.19	<0.00150	<0.00150	<0.00150	<0.00150
Dichlorodifluoromethane - mg/L	EPA 8260C	0.20	<b>0.0518</b>	<b>0.0422</b>	<0.000500	<0.000500
Trichlorofluoromethane - mg/L	EPA 8260C	5.2	<b>0.000930 J</b>	<b>0.000641 J</b>	<0.000500	<0.000500
Other VOCs - mg/L	EPA 8260C	Various	ND	ND	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 (October 2018)
- <sup>^</sup> = Sample ID number preceded by "103781-" on the chain of custody form
- mg/L = Milligrams per liter
- <0.00150 = Analyte not detected; laboratory limit of detection of 0.00150 mg/L
- 0.00119** = Analyte detected
- = Not applicable or sample not tested for this analyte
- J** = Estimated concentration less than the limit of quantitation. See the SGS laboratory report for more details.
- BTOC = Below Top of Casing
- ND = Not detected

**TABLE 3  
HISTORICAL GROUNDWATER DATA**

Monitoring Well	Date	Groundwater Depth <sup>^</sup> (feet)	Parameter Tested and Cleanup Level (mg/L) <sup>^^</sup>					
			GRO 2.2	DRO 1.5	Benzene 0.0046	Toluene 1.1	Ethylbenzene 0.015	Xylenes 0.19
MW30	5/16/2016*	4.92	<b>0.0818 J</b>	<b>1.29</b>	<b>0.0231</b>	<b>0.000440 J</b>	<b>0.000370 J</b>	<0.00150
	5/11/2017*	7.43	-	<0.588 B	<b>0.00416</b>	<b>0.000460 J</b>	<0.000500	<0.00150
	8/22/2017 *	3.94	-	<b>0.665</b>	<b>0.0128</b>	<0.000500	<0.000500	<0.00150
	11/1/2017*	2.48	-	<b>0.958 E</b>	<b>0.00178</b>	<0.000500	<0.000500	<0.00150
	2/22/2018*	8.58	-	<b>0.530 J</b>	<b>0.0103</b>	<0.000500	<0.000500	<0.00150
	8/16/2019	7.86	-	-	-	<0.000200	<0.000500	<0.00150
	2/3/2020	9.29	-	-	-	<0.000200	<0.000500	<0.00150
MW31	5/16/2016	5.90	<0.0500	<b>0.296 J</b>	<0.000250	<0.000500	<0.000500	<0.00150
	5/11/2017	6.67	-	<b>0.644 B</b>	<0.000200	<b>0.000460 J</b>	<0.000500	<0.00150
	8/22/2017	3.84	-	<b>0.802</b>	<0.000200	<0.000500	<0.000500	<0.00150
	11/1/2017	2.53	-	<b>0.794</b>	<0.000200	<0.000500	<0.000500	<0.00150
	2/22/2018	9.25	-	<b>0.558 J</b>	<0.000200	<0.000500	<0.000500	<0.00150
MW32	5/16/2016	6.31	<0.0500	<b>0.195 J</b>	<0.000250	<0.000500	<0.000500	<0.00150
	5/11/2017	7.29	-	<0.588 B	<0.000200	<0.000500	<0.000500	<0.00150
	8/22/2017	3.32	-	<0.294	<0.000200	<0.000500	<0.000500	<0.00150
	11/1/2017	2.96	-	<b>0.206 J</b>	<0.000200	<0.000500	<0.000500	<0.00150
	2/22/2018	9.71	-	<0.310	<0.000200	<0.000500	<0.000500	<0.00150

## Notes:

- <sup>^</sup> = Depth of static groundwater level below the top of casing
- <sup>^^</sup> = Groundwater cleanup levels based on 18 AAC 75.345 Table C, 18 AAC 75 (October 2018)
- = Sample not tested for this parameter
- \* = The highest concentration from a primary/duplicate sample set
- 1.29** = Analyte detected
- 0.0231** = Reported concentration exceeds the applicable ADEC cleanup level
- <0.0500 = Analyte not detected; laboratory reporting limit of 0.0500 mg/L
- mg/L = Milligrams per liter
- J** = Concentration is an estimate less than the laboratory limit of quantitation (LOQ).
- B** = Compound detected in method blank at an estimated concentration.






Map adapted from aerial imagery provided by Google Earth Pro, reproduced by permission granted by Google Earth Mapping Service.



**LEGEND**

- 
 B30/MW30 Approximate Location of Boring/Monitoring Well B30/MW30, advanced by Shannon & Wilson on May 13, 2016

151 West 100th Avenue  
Anchorage, Alaska

**SITE PLAN**

March 2020

103781-001

**ATTACHMENT 1**

**FIELD NOTES**



# LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 103781-001

Location: 151 W 100<sup>th</sup> Ave, ANC

Weather: Sunny 60°F

Well No.: MW30

Date: 8/16/19

Time Started: 10:45

Time Completed: 12:10

Develop Date: —

Develop End Time: —

(24 hour break)

## INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 10:50 Date of Depth Measurement: 8/16/19

Measuring Point (MP): Top of PVC Casing / Top of Steel Protective Casing / Other: —

Diameter of Casing: 2" Well Screen Interval: 4.20' - 19.20'

Total Depth of Well Below MP: 19.20 Product Thickness, if noted: —

Depth-to-Water (DTW) Below MP: 7.86

Water Column in Well: 11.34 (Total Depth of Well Below MP - DTW Below MP)

Gallons per foot: 0.16

Gallons in Well: 1.81 (Water Column in Well x Gallons per foot)

## PURGING DATA

Date Purged: 8/16/19 Time Started: 11:01 Time Completed: 11:45

Three Well Volumes: 5.43 (Gallons in Well x 3)

Gallons Purged: 2.2 Depth of Pump (generally 2 ft from bottom): 8.80

Max. Drawdown (generally 0.3 ft): 0.28 Pump Rate: 0.24/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>11:05</u>	<u>0.3</u>	<u>0.3</u>	<u>7.88</u>	<u>0.02</u>	<u>13.64</u>	<u>873</u>	<u>—</u>	<u>5.78</u>	<u>252.3</u>	<u>24.75</u>
<u>11:10</u>	<u>0.6</u>	<u>0.3</u>	<u>8.09</u>	<u>0.23</u>	<u>13.88</u>	<u>889</u>	<u>—</u>	<u>5.97</u>	<u>244.8</u>	<u>21.98</u>
<u>11:15</u>	<u>1.0</u>	<u>0.2</u>	<u>8.14</u>	<u>0.28</u>	<u>14.73</u>	<u>906</u>	<u>—</u>	<u>6.11</u>	<u>228.6</u>	<u>20.72</u>
<u>11:20</u>	<u>1.2</u>	<u>0.2</u>	<u>8.06</u>	<u>0.20</u>	<u>15.61</u>	<u>913</u>	<u>—</u>	<u>6.34</u>	<u>208.5</u>	<u>18.32</u>
<u>11:25</u>	<u>1.4</u>	<u>0.2</u>	<u>8.10</u>	<u>0.24</u>	<u>14.33</u>	<u>933</u>	<u>—</u>	<u>6.50</u>	<u>195.0</u>	<u>7.99</u>
<u>11:30</u>	<u>1.6</u>	<u>0.2</u>	<u>8.08</u>	<u>0.22</u>	<u>14.43</u>	<u>926</u>	<u>—</u>	<u>6.37</u>	<u>200.0</u>	<u>7.05</u>

## SAMPLING DATA

Odor: none Color: clear

Sample Designation: 103781-MW30 Time / Date: 11:50 8/16/19

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 YSI 556 + Micro TPW turbidimeter

Calibration Info (Time, Ranges, etc) YSI calibrated @ S+W office @ 8AM 8/16. turbidimeter cal. 7/26/19

Remarks: Screen length is 15 ft. ground water within screened interval of well.

Water began dropping quickly around 11:15, so decreased pump rate.

Sampling Personnel: LCJ

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



Shannon & Wilson, Inc.

### LOW-FLOW WATER SAMPLING LOG

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Job No: 103781-001 Location: 151 W 100th Ave, ANC Site: 151 W 100th Ave  
 Well No.: MW30  
 Date: 8/16/19

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)
11:35	1.8	0.2	8.09	0.23	15.45	932 ✓	-	6.51 ✓	190.1 ✓	8.76 ✓
11:40	2.0	0.2	8.10	0.24	14.61	929 ✓	-	6.55 ✓	183.1 ✓	9.39 ✓
11:45	2.2	0.2	8.11	0.25	14.13	928 ✓	-	6.48 ✓	185.7 ✓	6.12 ✓

11:50 = sample time  
 ↓ cond., pH, ORP, & turbidity stable and > 1 well vol. purged

	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: 103781-001 Location: 151 W 100<sup>th</sup> Ave, Anch. Weather: Cloudy 20°F  
 Well No.: MW30  
 Date: 2/3/2020 Time Started: 10:00 Time Completed: 11:35  
 Develop Date: — Develop End Time: — (24 hour break)

## INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 10:05 Date of Depth Measurement: 2/3/20  
 Measuring Point (MP): Top of PVC Casing / Top of Steel Protective Casing / Other:  
 Diameter of Casing: 2" Well Screen Interval: 4.19 - 19.19'  
 Total Depth of Well Below MP: 19.19 Product Thickness, if noted: —  
 Depth-to-Water (DTW) Below MP: 9.29  
 Water Column in Well: 9.90 (Total Depth of Well Below MP - DTW Below MP)  
 Gallons per foot: 0.16  
 Gallons in Well: 1.58 (Water Column in Well x Gallons per foot)

## PURGING DATA

Date Purged: 2/3/20 Time Started: 10:24 Time Completed: 11:09  
 Three Well Volumes: 4.74 (Gallons in Well x 3)  
 Gallons Purged: 2.2 Depth of Pump (generally 2 ft from bottom): 10.2 ft  
 Max. Drawdown (generally 0.3 ft): 0.29 Pump Rate: 0.2 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)
10:29	0.2	0.2	9.58	0.29	3.77	815		3.29	353.1	236.0
10:34	0.5	0.2	9.58	0.29	3.94	883		3.55	345.1	187.8
10:39	0.7	0.2	9.55	0.26	2.84	1043		3.89	331.7	161.2
10:44	1.0	0.2	9.51	0.22	2.93	1116		3.87	335.6	96.90
10:49	1.2	0.2	9.51	0.22	3.40	1140		4.00	330.8	53.67
10:54	1.5	0.2	9.51	0.22	3.69	1151		4.24	319.6	36.84

## SAMPLING DATA

Odor: none Color: mostly clear  
 Sample Designation: 103781-MW30 Time / Date: 11:10 2/3/20  
 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 YSI 556 + MicroT<sub>PW</sub>  
 Calibration Info (Time, Ranges, etc) 9:00 2/3/20

Remarks: pump in top foot of water column. screen length is 15 feet. water v/i screen.

Sampling Personnel: LCJ

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



Shannon & Wilson, Inc.

### LOW-FLOW WATER SAMPLING LOG

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Job No: 103781-001 Location: Anchorage, AK Site: 151 W 100th Ave  
 Well No.: MW30  
 Date: 2/3/2020

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)
10:59	1.7	0.2	9.51	0.22	3.67	1156		4.43	311.6	35.20
11:04	2.0	0.2	9.50	0.21	3.83	1157		4.60	304.8	37.97
11:09	2.2	0.2	9.50	0.21	3.85	1156		4.67	301.8	36.44

Call but pH stable and > 1 well volume purged

11:10 = 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.

**ATTACHMENT 2**

**RESULTS OF ANALYTICAL TESTING BY  
SGS NORTH AMERICA INC. OF ANCHORAGE, ALASKA AND  
ADEC LABORATORY DATA REVIEW CHECKLISTS**

## Laboratory Report of Analysis

To: Shannon & Wilson, Inc.  
5430 Fairbanks St. Suite 3  
Anchorage, AK 99518  
(907)561-2120

Report Number: **1194708**

Client Project: **103781 151 W 100th Ave**

Dear Jacob Tracy,

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 Jillian 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.

---

Jillian Janssen  
Project Manager  
Jillian.Janssen@sgs.com

Date



## Case Narrative

SGS Client: **Shannon & Wilson, Inc.**  
SGS Project: **1194708**  
Project Name/Site: **103781 151 W 100th Ave**  
Project Contact: **Jacob Tracy**

Refer to sample receipt form for information on sample condition.

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

Print Date: 08/27/2019 8:44:42AM

### Laboratory Qualifiers

Enclosed are the analytical results associated with the above work order. The results apply to the samples as received. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. This document is issued by the Company under its General Conditions of Service accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

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

SGS maintains a formal Quality Assurance/Quality Control (QA/QC) program. A copy of our Quality Assurance Plan (QAP), which outlines this program, is available at your request. The laboratory certification numbers are AK00971 (DW Chemistry & Microbiology) & 17-021 (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). SGS is only certified for the analytes listed on our Drinking Water Certification, and only those analytes will be reported to the State of Alaska for compliance. Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth by the SGS QAP and, when applicable, other regulatory authorities.

The following descriptors or qualifiers may be found in your report:

*	The analyte has exceeded allowable regulatory or control limits.
!	Surrogate out of control limits.
B	Indicates the analyte is found in a blank associated with the sample.
CCV/CVA/CVB	Continuing Calibration Verification
CCCV/CVC/CVCA/CVCB	Closing Continuing Calibration Verification
CL	Control Limit
DF	Analytical Dilution Factor
DL	Detection Limit (i.e., maximum method detection limit)
E	The analyte result is above the calibrated range.
GT	Greater Than
IB	Instrument Blank
ICV	Initial Calibration Verification
J	The quantitation is an estimation.
LCS(D)	Laboratory Control Spike (Duplicate)
LLQC/LLIQC	Low Level Quantitation Check
LOD	Limit of Detection (i.e., 1/2 of the LOQ)
LOQ	Limit of Quantitation (i.e., reporting or practical quantitation limit)
LT	Less Than
MB	Method Blank
MS(D)	Matrix Spike (Duplicate)
ND	Indicates the analyte is not detected.
RPD	Relative Percent Difference
U	Indicates the analyte was analyzed for but not detected.

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

## Sample Summary

<u>Client Sample ID</u>	<u>Lab Sample ID</u>	<u>Collected</u>	<u>Received</u>	<u>Matrix</u>
103781-MW30	1194708001	08/16/2019	08/16/2019	Water (Surface, Eff., Ground)
103781-WTB	1194708002	08/16/2019	08/16/2019	Water (Surface, Eff., Ground)

<u>Method</u>	<u>Method Description</u>
SW8260C	Volatile Organic Compounds (W) FULL

Print Date: 08/27/2019 8:44:44AM

## Detectable Results Summary

Client Sample ID: **103781-MW30**

Lab Sample ID: 1194708001

### **Volatile GC/MS**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Dichlorodifluoromethane	51.8	ug/L
Trichlorofluoromethane	0.930J	ug/L

Print Date: 08/27/2019 8:44:46AM

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



Results of 103781-MW30

Client Sample ID: 103781-MW30
Client Project ID: 103781 151 W 100th Ave
Lab Sample ID: 1194708001
Lab Project ID: 1194708

Collection Date: 08/16/19 11:50
Received Date: 08/16/19 13:01
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 103781-MW30

Client Sample ID: 103781-MW30
Client Project ID: 103781 151 W 100th Ave
Lab Sample ID: 1194708001
Lab Project ID: 1194708

Collection Date: 08/16/19 11:50
Received Date: 08/16/19 13:01
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 **103781-MW30**

Client Sample ID: **103781-MW30**  
Client Project ID: **103781 151 W 100th Ave**  
Lab Sample ID: 1194708001  
Lab Project ID: 1194708

Collection Date: 08/16/19 11:50  
Received Date: 08/16/19 13:01  
Matrix: Water (Surface, Eff., Ground)  
Solids (%):  
Location:

Results by **Volatile GC/MS**

**Batch Information**

Analytical Batch: VMS19349  
Analytical Method: SW8260C  
Analyst: CMC  
Analytical Date/Time: 08/24/19 19:21  
Container ID: 1194708001-A

Prep Batch: VXX34725  
Prep Method: SW5030B  
Prep Date/Time: 08/24/19 06:00  
Prep Initial Wt./Vol.: 5 mL  
Prep Extract Vol: 5 mL

Analytical Batch: VMS19339  
Analytical Method: SW8260C  
Analyst: CMC  
Analytical Date/Time: 08/22/19 22:18  
Container ID: 1194708001-A

Prep Batch: VXX34706  
Prep Method: SW5030B  
Prep Date/Time: 08/22/19 06:00  
Prep Initial Wt./Vol.: 5 mL  
Prep Extract Vol: 5 mL



Results of 103781-WTB

Client Sample ID: 103781-WTB
Client Project ID: 103781 151 W 100th Ave
Lab Sample ID: 1194708002
Lab Project ID: 1194708

Collection Date: 08/16/19 11:00
Received Date: 08/16/19 13:01
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 103781-WTB**

Client Sample ID: **103781-WTB**  
 Client Project ID: **103781 151 W 100th Ave**  
 Lab Sample ID: 1194708002  
 Lab Project ID: 1194708

Collection Date: 08/16/19 11:00  
 Received Date: 08/16/19 13:01  
 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		08/21/19 16:59
Chloromethane	0.500 U	1.00	0.310	ug/L	1		08/21/19 16:59
cis-1,2-Dichloroethene	0.500 U	1.00	0.310	ug/L	1		08/21/19 16:59
cis-1,3-Dichloropropene	0.250 U	0.500	0.150	ug/L	1		08/21/19 16:59
Dibromochloromethane	0.250 U	0.500	0.150	ug/L	1		08/21/19 16:59
Dibromomethane	0.500 U	1.00	0.310	ug/L	1		08/21/19 16:59
Dichlorodifluoromethane	0.500 U	1.00	0.310	ug/L	1		08/21/19 16:59
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		08/21/19 16:59
Freon-113	5.00 U	10.0	3.10	ug/L	1		08/21/19 16:59
Hexachlorobutadiene	0.500 U	1.00	0.310	ug/L	1		08/21/19 16:59
Isopropylbenzene (Cumene)	0.500 U	1.00	0.310	ug/L	1		08/21/19 16:59
Methylene chloride	2.50 U	5.00	1.00	ug/L	1		08/21/19 16:59
Methyl-t-butyl ether	5.00 U	10.0	3.10	ug/L	1		08/21/19 16:59
Naphthalene	0.500 U	1.00	0.310	ug/L	1		08/21/19 16:59
n-Butylbenzene	0.500 U	1.00	0.310	ug/L	1		08/21/19 16:59
n-Propylbenzene	0.500 U	1.00	0.310	ug/L	1		08/21/19 16:59
o-Xylene	0.500 U	1.00	0.310	ug/L	1		08/21/19 16:59
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		08/21/19 16:59
sec-Butylbenzene	0.500 U	1.00	0.310	ug/L	1		08/21/19 16:59
Styrene	0.500 U	1.00	0.310	ug/L	1		08/21/19 16:59
tert-Butylbenzene	0.500 U	1.00	0.310	ug/L	1		08/21/19 16:59
Tetrachloroethene	0.500 U	1.00	0.310	ug/L	1		08/21/19 16:59
Toluene	0.500 U	1.00	0.310	ug/L	1		08/21/19 16:59
trans-1,2-Dichloroethene	0.500 U	1.00	0.310	ug/L	1		08/21/19 16:59
trans-1,3-Dichloropropene	0.500 U	1.00	0.310	ug/L	1		08/21/19 16:59
Trichloroethene	0.500 U	1.00	0.310	ug/L	1		08/21/19 16:59
Trichlorofluoromethane	0.500 U	1.00	0.310	ug/L	1		08/21/19 16:59
Vinyl acetate	5.00 U	10.0	3.10	ug/L	1		08/21/19 16:59
Vinyl chloride	0.0750 U	0.150	0.0500	ug/L	1		08/21/19 16:59
Xylenes (total)	1.50 U	3.00	1.00	ug/L	1		08/21/19 16:59
<b>Surrogates</b>							
1,2-Dichloroethane-D4 (surr)	91.1	81-118		%	1		08/21/19 16:59
4-Bromofluorobenzene (surr)	97.6	85-114		%	1		08/21/19 16:59
Toluene-d8 (surr)	100	89-112		%	1		08/21/19 16:59

## Results of 103781-WTB

Client Sample ID: **103781-WTB**  
Client Project ID: **103781 151 W 100th Ave**  
Lab Sample ID: 1194708002  
Lab Project ID: 1194708

Collection Date: 08/16/19 11:00  
Received Date: 08/16/19 13:01  
Matrix: Water (Surface, Eff., Ground)  
Solids (%):  
Location:

## Results by Volatile GC/MS

### Batch Information

Analytical Batch: VMS19336  
Analytical Method: SW8260C  
Analyst: CMC  
Analytical Date/Time: 08/21/19 16:59  
Container ID: 1194708002-A

Prep Batch: VXX34699  
Prep Method: SW5030B  
Prep Date/Time: 08/21/19 06:00  
Prep Initial Wt./Vol.: 5 mL  
Prep Extract Vol: 5 mL



### Method Blank

Blank ID: MB for HBN 1798328 [VXX/34699]

Blank Lab ID: 1527129

QC for Samples:

1194708002

Matrix: Water (Surface, Eff., Ground)

### 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: 08/27/2019 8:44:58AM



**Method Blank**

Blank ID: MB for HBN 1798328 [VXX/34699]

Blank Lab ID: 1527129

QC for Samples:  
1194708002

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
<b>Surrogates</b>				
1,2-Dichloroethane-D4 (surr)	91.5	81-118		%
4-Bromofluorobenzene (surr)	95.8	85-114		%
Toluene-d8 (surr)	101	89-112		%

Print Date: 08/27/2019 8:44:58AM



**Method Blank**

Blank ID: MB for HBN 1798328 [VXX/34699]  
Blank Lab ID: 1527129

Matrix: Water (Surface, Eff., Ground)

QC for Samples:  
1194708002

**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: VMS19336  
Analytical Method: SW8260C  
Instrument: VPA 780/5975 GC/MS  
Analyst: CMC  
Analytical Date/Time: 8/21/2019 3:07:00PM

Prep Batch: VXX34699  
Prep Method: SW5030B  
Prep Date/Time: 8/21/2019 6:00:00AM  
Prep Initial Wt./Vol.: 5 mL  
Prep Extract Vol: 5 mL

Print Date: 08/27/2019 8:44:58AM

## Blank Spike Summary

Blank Spike ID: LCS for HBN 1194708 [VXX34699]  
 Blank Spike Lab ID: 1527130  
 Date Analyzed: 08/21/2019 15:22

Spike Duplicate ID: LCSD for HBN 1194708 [VXX34699]  
 Spike Duplicate Lab ID: 1527131  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1194708002

## 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	31.1	104	30	30.8	103	( 78-124 )	1.10	(< 20 )
1,1,1-Trichloroethane	30	30.1	100	30	29.7	99	( 74-131 )	1.50	(< 20 )
1,1,2,2-Tetrachloroethane	30	28.6	95	30	28.6	96	( 71-121 )	0.17	(< 20 )
1,1,2-Trichloroethane	30	29.5	98	30	29.5	98	( 80-119 )	0.00	(< 20 )
1,1-Dichloroethane	30	29.5	98	30	29.1	97	( 77-125 )	1.30	(< 20 )
1,1-Dichloroethene	30	30.9	103	30	30.2	101	( 71-131 )	2.10	(< 20 )
1,1-Dichloropropene	30	31.5	105	30	31.1	104	( 79-125 )	1.30	(< 20 )
1,2,3-Trichlorobenzene	30	29.0	97	30	28.2	94	( 69-129 )	2.80	(< 20 )
1,2,3-Trichloropropane	30	27.5	92	30	26.5	89	( 73-122 )	3.70	(< 20 )
1,2,4-Trichlorobenzene	30	29.3	98	30	28.8	96	( 69-130 )	1.70	(< 20 )
1,2,4-Trimethylbenzene	30	28.4	95	30	27.9	93	( 79-124 )	1.80	(< 20 )
1,2-Dibromo-3-chloropropane	30	27.3	91	30	25.6	85	( 62-128 )	6.40	(< 20 )
1,2-Dibromoethane	30	31.2	104	30	31.6	105	( 77-121 )	1.20	(< 20 )
1,2-Dichlorobenzene	30	28.3	95	30	28.0	93	( 80-119 )	1.40	(< 20 )
1,2-Dichloroethane	30	27.9	93	30	27.6	92	( 73-128 )	1.20	(< 20 )
1,2-Dichloropropane	30	29.8	99	30	30.0	100	( 78-122 )	0.80	(< 20 )
1,3,5-Trimethylbenzene	30	28.1	94	30	27.9	93	( 75-124 )	0.64	(< 20 )
1,3-Dichlorobenzene	30	28.4	95	30	28.6	95	( 80-119 )	0.91	(< 20 )
1,3-Dichloropropane	30	29.2	97	30	29.1	97	( 80-119 )	0.48	(< 20 )
1,4-Dichlorobenzene	30	28.6	95	30	28.1	94	( 79-118 )	1.80	(< 20 )
2,2-Dichloropropane	30	30.0	100	30	29.5	98	( 60-139 )	1.70	(< 20 )
2-Butanone (MEK)	90	87.1	97	90	82.5	92	( 56-143 )	5.40	(< 20 )
2-Chlorotoluene	30	27.2	91	30	26.9	90	( 79-122 )	1.00	(< 20 )
2-Hexanone	90	89.8	100	90	86.5	96	( 57-139 )	3.70	(< 20 )
4-Chlorotoluene	30	27.3	91	30	27.0	90	( 78-122 )	1.30	(< 20 )
4-Isopropyltoluene	30	29.5	98	30	29.4	98	( 77-127 )	0.34	(< 20 )
4-Methyl-2-pentanone (MIBK)	90	95.1	106	90	92.1	102	( 67-130 )	3.20	(< 20 )
Benzene	30	31.2	104	30	30.9	103	( 79-120 )	0.77	(< 20 )
Bromobenzene	30	28.3	94	30	28.1	94	( 80-120 )	0.67	(< 20 )
Bromochloromethane	30	31.5	105	30	31.5	105	( 78-123 )	0.00	(< 20 )
Bromodichloromethane	30	29.8	99	30	29.6	99	( 79-125 )	0.71	(< 20 )
Bromoform	30	31.7	106	30	31.5	105	( 66-130 )	0.79	(< 20 )
Bromomethane	30	26.4	88	30	28.5	95	( 53-141 )	7.70	(< 20 )
Carbon disulfide	45	44.7	99	45	43.6	97	( 64-133 )	2.50	(< 20 )

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## Blank Spike Summary

Blank Spike ID: LCS for HBN 1194708 [VXX34699]  
 Blank Spike Lab ID: 1527130  
 Date Analyzed: 08/21/2019 15:22

Spike Duplicate ID: LCSD for HBN 1194708 [VXX34699]  
 Spike Duplicate Lab ID: 1527131  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1194708002

## 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	30.8	103	30	30.2	101	( 72-136 )	1.80	(< 20 )
Chlorobenzene	30	29.6	99	30	29.1	97	( 82-118 )	1.80	(< 20 )
Chloroethane	30	24.1	80	30	22.5	75	( 60-138 )	6.90	(< 20 )
Chloroform	30	29.5	98	30	29.2	97	( 79-124 )	1.10	(< 20 )
Chloromethane	30	24.2	81	30	25.4	85	( 50-139 )	4.80	(< 20 )
cis-1,2-Dichloroethene	30	31.9	106	30	31.9	106	( 78-123 )	0.03	(< 20 )
cis-1,3-Dichloropropene	30	31.1	104	30	31.1	104	( 75-124 )	0.13	(< 20 )
Dibromochloromethane	30	30.6	102	30	30.3	101	( 74-126 )	0.95	(< 20 )
Dibromomethane	30	29.0	97	30	29.1	97	( 79-123 )	0.21	(< 20 )
Dichlorodifluoromethane	30	26.0	87	30	24.8	83	( 32-152 )	4.80	(< 20 )
Ethylbenzene	30	29.9	100	30	29.7	99	( 79-121 )	0.70	(< 20 )
Freon-113	45	47.3	105	45	46.2	103	( 70-136 )	2.30	(< 20 )
Hexachlorobutadiene	30	29.2	97	30	29.8	99	( 66-134 )	2.00	(< 20 )
Isopropylbenzene (Cumene)	30	31.1	104	30	30.5	102	( 72-131 )	2.00	(< 20 )
Methylene chloride	30	33.1	110	30	32.9	110	( 74-124 )	0.64	(< 20 )
Methyl-t-butyl ether	45	43.7	97	45	43.4	97	( 71-124 )	0.69	(< 20 )
Naphthalene	30	29.3	98	30	29.0	97	( 61-128 )	1.10	(< 20 )
n-Butylbenzene	30	29.0	97	30	28.7	96	( 75-128 )	1.00	(< 20 )
n-Propylbenzene	30	28.7	96	30	28.7	96	( 76-126 )	0.00	(< 20 )
o-Xylene	30	28.6	96	30	28.2	94	( 78-122 )	1.50	(< 20 )
P & M -Xylene	60	59.9	100	60	59.6	99	( 80-121 )	0.57	(< 20 )
sec-Butylbenzene	30	29.5	98	30	29.3	98	( 77-126 )	0.37	(< 20 )
Styrene	30	31.1	104	30	31.0	103	( 78-123 )	0.55	(< 20 )
tert-Butylbenzene	30	28.7	96	30	28.4	95	( 78-124 )	1.10	(< 20 )
Tetrachloroethene	30	31.9	106	30	31.8	106	( 74-129 )	0.35	(< 20 )
Toluene	30	29.5	98	30	29.4	98	( 80-121 )	0.17	(< 20 )
trans-1,2-Dichloroethene	30	31.9	106	30	31.5	105	( 75-124 )	1.50	(< 20 )
trans-1,3-Dichloropropene	30	30.1	100	30	30.4	101	( 73-127 )	0.96	(< 20 )
Trichloroethene	30	31.2	104	30	30.9	103	( 79-123 )	0.96	(< 20 )
Trichlorofluoromethane	30	27.7	92	30	26.2	87	( 65-141 )	5.60	(< 20 )
Vinyl acetate	30	28.8	96	30	28.3	94	( 54-146 )	1.60	(< 20 )
Vinyl chloride	30	27.1	90	30	26.3	88	( 58-137 )	3.00	(< 20 )
Xylenes (total)	90	88.6	98	90	87.8	98	( 79-121 )	0.88	(< 20 )

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## Blank Spike Summary

Blank Spike ID: LCS for HBN 1194708 [VXX34699]  
 Blank Spike Lab ID: 1527130  
 Date Analyzed: 08/21/2019 15:22

Spike Duplicate ID: LCSD for HBN 1194708 [VXX34699]  
 Spike Duplicate Lab ID: 1527131  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1194708002

## Results by SW8260C

Parameter	Blank Spike (%)			Spike Duplicate (%)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
<b>Surrogates</b>									
1,2-Dichloroethane-D4 (surr)	30	88.1	88	30	87.3	87	( 81-118 )	0.91	
4-Bromofluorobenzene (surr)	30	95	95	30	94.9	95	( 85-114 )	0.11	
Toluene-d8 (surr)	30	102	102	30	102	102	( 89-112 )	0.36	

## Batch Information

Analytical Batch: **VMS19336**  
 Analytical Method: **SW8260C**  
 Instrument: **VPA 780/5975 GC/MS**  
 Analyst: **CMC**

Prep Batch: **VXX34699**  
 Prep Method: **SW5030B**  
 Prep Date/Time: **08/21/2019 06:00**  
 Spike Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL  
 Dupe Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL

Print Date: 08/27/2019 8:45:01AM





**Method Blank**

Blank ID: MB for HBN 1798381 [VXX/34706]

Matrix: Water (Surface, Eff., Ground)

Blank Lab ID: 1527380

QC for Samples:  
1194708001

**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

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### Method Blank

Blank ID: MB for HBN 1798381 [VXX/34706]

Blank Lab ID: 1527380

QC for Samples:  
1194708001

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
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
<b>Surrogates</b>				
1,2-Dichloroethane-D4 (surr)	104	81-118		%
4-Bromofluorobenzene (surr)	101	85-114		%
Toluene-d8 (surr)	102	89-112		%

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## Method Blank

Blank ID: MB for HBN 1798381 [VXX/34706]  
Blank Lab ID: 1527380

Matrix: Water (Surface, Eff., Ground)

QC for Samples:  
1194708001

## 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: VMS19339  
Analytical Method: SW8260C  
Instrument: Agilent 7890-75MS  
Analyst: CMC  
Analytical Date/Time: 8/22/2019 3:55:00PM

Prep Batch: VXX34706  
Prep Method: SW5030B  
Prep Date/Time: 8/22/2019 6:00:00AM  
Prep Initial Wt./Vol.: 5 mL  
Prep Extract Vol: 5 mL

Print Date: 08/27/2019 8:45:06AM



### Blank Spike Summary

Blank Spike ID: LCS for HBN 1194708 [VXX34706]  
 Blank Spike Lab ID: 1527381  
 Date Analyzed: 08/22/2019 16:10

Spike Duplicate ID: LCSD for HBN 1194708 [VXX34706]  
 Spike Duplicate Lab ID: 1527382  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1194708001

### 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	30.4	101	30	30.1	100	( 78-124 )	0.99	(< 20 )
1,1,1-Trichloroethane	30	29.4	98	30	28.1	94	( 74-131 )	4.40	(< 20 )
1,1,2,2-Tetrachloroethane	30	30.3	101	30	30.2	101	( 71-121 )	0.30	(< 20 )
1,1,2-Trichloroethane	30	29.8	99	30	29.3	98	( 80-119 )	1.60	(< 20 )
1,1-Dichloroethane	30	28.9	96	30	27.9	93	( 77-125 )	3.60	(< 20 )
1,1-Dichloroethene	30	29.2	97	30	27.7	92	( 71-131 )	5.30	(< 20 )
1,1-Dichloropropene	30	30.1	100	30	28.9	96	( 79-125 )	4.00	(< 20 )
1,2,3-Trichlorobenzene	30	31.7	106	30	32.5	108	( 69-129 )	2.40	(< 20 )
1,2,3-Trichloropropane	30	30.0	100	30	30.0	100	( 73-122 )	0.10	(< 20 )
1,2,4-Trichlorobenzene	30	32.0	107	30	32.3	108	( 69-130 )	0.68	(< 20 )
1,2,4-Trimethylbenzene	30	31.6	105	30	30.7	102	( 79-124 )	3.00	(< 20 )
1,2-Dibromo-3-chloropropane	30	31.1	104	30	30.8	103	( 62-128 )	0.97	(< 20 )
1,2-Dibromoethane	30	30.7	102	30	30.7	102	( 77-121 )	0.16	(< 20 )
1,2-Dichlorobenzene	30	29.7	99	30	29.6	99	( 80-119 )	0.30	(< 20 )
1,2-Dichloroethane	30	28.6	95	30	28.1	94	( 73-128 )	1.70	(< 20 )
1,2-Dichloropropane	30	29.6	99	30	28.9	96	( 78-122 )	2.60	(< 20 )
1,3,5-Trimethylbenzene	30	31.3	104	30	30.6	102	( 75-124 )	2.40	(< 20 )
1,3-Dichlorobenzene	30	30.5	102	30	29.6	99	( 80-119 )	2.80	(< 20 )
1,3-Dichloropropane	30	30.2	101	30	30.0	100	( 80-119 )	0.53	(< 20 )
1,4-Dichlorobenzene	30	30.7	102	30	30.1	100	( 79-118 )	1.90	(< 20 )
2,2-Dichloropropane	30	31.3	104	30	30.0	100	( 60-139 )	4.20	(< 20 )
2-Butanone (MEK)	90	90.2	100	90	89.8	100	( 56-143 )	0.41	(< 20 )
2-Chlorotoluene	30	31.2	104	30	30.4	101	( 79-122 )	2.70	(< 20 )
2-Hexanone	90	90.7	101	90	91.4	102	( 57-139 )	0.74	(< 20 )
4-Chlorotoluene	30	31.3	104	30	30.3	101	( 78-122 )	3.20	(< 20 )
4-Isopropyltoluene	30	31.9	106	30	30.6	102	( 77-127 )	4.20	(< 20 )
4-Methyl-2-pentanone (MIBK)	90	88.4	98	90	89.0	99	( 67-130 )	0.59	(< 20 )
Benzene	30	29.1	97	30	28.0	93	( 79-120 )	3.80	(< 20 )
Bromobenzene	30	30.5	102	30	29.9	100	( 80-120 )	2.00	(< 20 )
Bromochloromethane	30	27.7	92	30	27.0	90	( 78-123 )	2.60	(< 20 )
Bromodichloromethane	30	29.2	97	30	28.5	95	( 79-125 )	2.50	(< 20 )
Bromoform	30	29.7	99	30	29.8	99	( 66-130 )	0.27	(< 20 )
Bromomethane	30	29.6	99	30	28.9	96	( 53-141 )	2.30	(< 20 )
Carbon disulfide	45	44.3	98	45	42.2	94	( 64-133 )	4.90	(< 20 )

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## Blank Spike Summary

Blank Spike ID: LCS for HBN 1194708 [VXX34706]  
 Blank Spike Lab ID: 1527381  
 Date Analyzed: 08/22/2019 16:10

Spike Duplicate ID: LCSD for HBN 1194708  
 [VXX34706]  
 Spike Duplicate Lab ID: 1527382  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1194708001

## 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	29.3	98	30	28.0	93	( 72-136 )	4.30	(< 20 )
Chlorobenzene	30	28.2	94	30	27.9	93	( 82-118 )	1.20	(< 20 )
Chloroethane	30	31.3	104	30	28.0	93	( 60-138 )	11.20	(< 20 )
Chloroform	30	27.9	93	30	27.2	91	( 79-124 )	2.70	(< 20 )
Chloromethane	30	27.5	92	30	26.0	87	( 50-139 )	5.60	(< 20 )
cis-1,2-Dichloroethene	30	28.7	96	30	27.7	93	( 78-123 )	3.30	(< 20 )
cis-1,3-Dichloropropene	30	30.9	103	30	29.9	100	( 75-124 )	3.30	(< 20 )
Dibromochloromethane	30	30.2	101	30	30.0	100	( 74-126 )	0.63	(< 20 )
Dibromomethane	30	28.8	96	30	28.5	95	( 79-123 )	1.10	(< 20 )
Dichlorodifluoromethane	30	27.5	92	30	26.1	87	( 32-152 )	5.20	(< 20 )
Ethylbenzene	30	29.1	97	30	28.3	94	( 79-121 )	3.00	(< 20 )
Freon-113	45	44.5	99	45	42.7	95	( 70-136 )	4.20	(< 20 )
Hexachlorobutadiene	30	33.0	110	30	32.2	107	( 66-134 )	2.30	(< 20 )
Isopropylbenzene (Cumene)	30	30.8	103	30	29.8	99	( 72-131 )	3.40	(< 20 )
Methylene chloride	30	28.7	96	30	27.9	93	( 74-124 )	2.90	(< 20 )
Methyl-t-butyl ether	45	44.3	98	45	43.8	97	( 71-124 )	0.95	(< 20 )
n-Butylbenzene	30	33.0	110	30	32.2	107	( 75-128 )	2.30	(< 20 )
n-Propylbenzene	30	31.9	106	30	30.7	102	( 76-126 )	3.90	(< 20 )
o-Xylene	30	28.4	95	30	28.0	93	( 78-122 )	1.70	(< 20 )
P & M -Xylene	60	58.9	98	60	57.6	96	( 80-121 )	2.20	(< 20 )
sec-Butylbenzene	30	31.8	106	30	30.9	103	( 77-126 )	2.80	(< 20 )
Styrene	30	30.8	103	30	29.9	100	( 78-123 )	3.20	(< 20 )
tert-Butylbenzene	30	30.9	103	30	30.0	100	( 78-124 )	3.00	(< 20 )
Tetrachloroethene	30	30.6	102	30	29.9	100	( 74-129 )	2.20	(< 20 )
Toluene	30	28.0	93	30	27.5	92	( 80-121 )	2.10	(< 20 )
trans-1,2-Dichloroethene	30	29.0	97	30	27.8	93	( 75-124 )	4.30	(< 20 )
trans-1,3-Dichloropropene	30	31.9	106	30	32.0	107	( 73-127 )	0.28	(< 20 )
Trichloroethene	30	29.5	98	30	28.3	95	( 79-123 )	3.90	(< 20 )
Trichlorofluoromethane	30	29.2	97	30	27.5	92	( 65-141 )	6.00	(< 20 )
Vinyl acetate	30	30.5	102	30	30.2	101	( 54-146 )	0.96	(< 20 )
Vinyl chloride	30	28.3	95	30	26.9	90	( 58-137 )	5.10	(< 20 )
Xylenes (total)	90	87.3	97	90	85.6	95	( 79-121 )	2.00	(< 20 )

## Surrogates

Print Date: 08/27/2019 8:45:13AM

## Blank Spike Summary

Blank Spike ID: LCS for HBN 1194708 [VXX34706]  
 Blank Spike Lab ID: 1527381  
 Date Analyzed: 08/22/2019 16:10

Spike Duplicate ID: LCSD for HBN 1194708 [VXX34706]  
 Spike Duplicate Lab ID: 1527382  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1194708001

## Results by SW8260C

Parameter	Blank Spike (%)			Spike Duplicate (%)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
1,2-Dichloroethane-D4 (surr)	30	97.5	98	30	98.1	98	( 81-118 )	0.61	
4-Bromofluorobenzene (surr)	30	103	103	30	101	101	( 85-114 )	1.40	
Toluene-d8 (surr)	30	101	101	30	103	103	( 89-112 )	2.60	

## Batch Information

Analytical Batch: **VMS19339**  
 Analytical Method: **SW8260C**  
 Instrument: **Agilent 7890-75MS**  
 Analyst: **CMC**

Prep Batch: **VXX34706**  
 Prep Method: **SW5030B**  
 Prep Date/Time: **08/22/2019 06:00**  
 Spike Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL  
 Dupe Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL

Print Date: 08/27/2019 8:45:13AM

## Method Blank

Blank ID: MB for HBN 1798477 [VXX/34725]

Blank Lab ID: 1527815

QC for Samples:

1194708001

Matrix: Water (Surface, Eff., Ground)

## Results by SW8260C

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Naphthalene	0.500U	1.00	0.310	ug/L
<b>Surrogates</b>				
1,2-Dichloroethane-D4 (surr)	91.7	81-118		%
4-Bromofluorobenzene (surr)	94.8	85-114		%
Toluene-d8 (surr)	102	89-112		%

## Batch Information

Analytical Batch: VMS19349  
Analytical Method: SW8260C  
Instrument: VPA 780/5975 GC/MS  
Analyst: CMC  
Analytical Date/Time: 8/24/2019 5:21:00PM

Prep Batch: VXX34725  
Prep Method: SW5030B  
Prep Date/Time: 8/24/2019 6:00:00AM  
Prep Initial Wt./Vol.: 5 mL  
Prep Extract Vol: 5 mL

Print Date: 08/27/2019 8:45:16AM

## Blank Spike Summary

Blank Spike ID: LCS for HBN 1194708 [VXX34725]  
 Blank Spike Lab ID: 1527816  
 Date Analyzed: 08/24/2019 17:36

Spike Duplicate ID: LCSD for HBN 1194708 [VXX34725]  
 Spike Duplicate Lab ID: 1527817  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1194708001

## Results by SW8260C

Parameter	Blank Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL	
	Spike	Result	Rec (%)	Spike	Result	Rec (%)				
Naphthalene	30	31.3	104	30	34.2	114	( 61-128 )	8.70	(< 20 )	
<b>Surrogates</b>										
1,2-Dichloroethane-D4 (surr)	30	88	88	30	87.6	88	( 81-118 )	0.38		
4-Bromofluorobenzene (surr)	30	94.7	95	30	96.1	96	( 85-114 )	1.40		
Toluene-d8 (surr)	30	103	103	30	103	103	( 89-112 )	0.07		

## Batch Information

Analytical Batch: **VMS19349**  
 Analytical Method: **SW8260C**  
 Instrument: **VPA 780/5975 GC/MS**  
 Analyst: **CMC**

Prep Batch: **VXX34725**  
 Prep Method: **SW5030B**  
 Prep Date/Time: **08/24/2019 06:00**  
 Spike Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL  
 Dupe Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL

Print Date: 08/27/2019 8:45:19AM





**SHANNON & WILSON, INC.**  
Geotechnical and Environmental Consultants

**CHAIN-OF-CUSTODY RECORD**

Laboratory SGS Page 1 of 1  
Attn: Jillian

400 N. 34th Street, Suite 100 Seattle, WA 98103 (206) 632-8020  
2355 Hill Road Fairbanks, AK 99709 (907) 479-0600  
3990 Collins Way, Suite 100 Lake Oswego, OR 97035 (503) 223-6147

2043 Westport Center Drive St. Louis, MO 63146-3564 (314) 699-9660  
5430 Fairbanks Street, Suite 3 Anchorage, AK 99518 (907) 561-2120  
1321 Bannock Street, Suite 200 Denver, CO 80204 (303) 825-3800

2705 Saint Andrews Loop, Suite A Pasco, WA 99301-3378 (509) 946-6309

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

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	Analysis Parameters/Sample Container Description (include preservative if used)					Total Number of Containers	Remarks/Matrix	
103781-MW30		11:50	8/16/19	X	X	VOCs EPA 8260C					3	ground water	
103781-WTB		11:00	↓		←						↓	lab trip blank	

Project Information		Sample Receipt	
Project Number: <u>103781</u>	Total Number of Containers: _____	COC Seals/Intact? Y/N/NA	
Project Name: <u>151 WIDOW AVE</u>	Received Good Cond./Cold	Delivery Method:	
Contact: <u>JCT</u>	Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	(attach shipping bill, if any)	
Sampler: <u>LCJ</u>			

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: <u>[Signature]</u> Time: <u>13:03</u>	Signature: _____ Time: _____	Signature: _____ Time: _____
Printed Name: <u>Lori Jones</u> Date: <u>8/16/19</u>	Printed Name: _____ Date: _____	Printed Name: _____ Date: _____
Company: <u>S &amp; W</u>	Company: _____	Company: _____
Received By: 1.	Received By: 2.	Received By: 3.
Signature: <u>[Signature]</u> Time: _____	Signature: <u>[Signature]</u> Time: _____	Signature: <u>[Signature]</u> Time: <u>13:01</u>
Printed Name: _____ Date: _____	Printed Name: _____ Date: _____	Printed Name: <u>Michelle Albarran</u> Date: <u>8/16/19</u>
Company: _____	Company: _____	Company: <u>SGS 8.1 DSB</u>

Instructions	
Requested Turnaround Time: <u>Standard</u>	
Special Instructions:	
<u>Profile: 334864 JK</u>	
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 #:

1194708



1 1 9 4 7 0 8

Review Criteria	Condition (Yes, No, N/A)	Exceptions Noted below
<b>Chain of Custody / Temperature Requirements</b>	<b>Yes</b>	Exemption permitted if sampler hand carries/delivers.
Were Custody Seals intact? Note # & location	N/A	Absent
COC accompanied samples?	Yes	
DOD: Were samples received in COC corresponding coolers?	N/A	
<b>Yes</b> **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)?	No	Cooler ID: 1 @ 8.1 °C Therm. ID: D58
		Cooler ID: @ °C Therm. ID:
		Cooler ID: @ °C Therm. ID:
		Cooler ID: @ °C Therm. ID:
		Cooler ID: @ °C Therm. ID:
If samples received without a temperature blank, the "cooler temperature" will be documented instead & "COOLER TEMP" will be noted to the right. "ambient" or "chilled" will be noted if neither is available.		
*If >6°C, were samples collected <8 hours ago?	Yes	
If <0°C, were sample containers ice free?	N/A	
Note: Identify containers received at non-compliant temperature . Use form FS-0029 if more space is needed.		
<b>Holding Time / Documentation / Sample Condition Requirements</b>		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.		
***Note: If sample information on containers differs from COC, SGS will default to COC information		
Were analytical requests clear? (i.e., method is specified for analyses with multiple option for analysis (Ex: BTEX, Metals))	Yes	
Were proper containers (type/mass/volume/preservative***) used?	Yes	N/A ***Exemption permitted for metals (e.g, 200.8/6020A).
<b>Volatile / LL-Hg Requirements</b>		
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	
<b>Note to Client:</b> 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>
1194708001-A	HCL to pH < 2	OK			
1194708001-B	HCL to pH < 2	OK			
1194708001-C	HCL to pH < 2	OK			
1194708002-A	HCL to pH < 2	OK			
1194708002-B	HCL to pH < 2	OK			
1194708002-C	HCL to pH < 2	OK			

### Container Condition Glossary

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

NC- The container provided was not preserved or was under-preserved. The method does not allow for additional preservative added after collection.

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.

QN - Insufficient sample quantity provided.

## LABORATORY DATA REVIEW CHECKLIST

**Completed by:** Alec Rizzo

**Title:** Groundwater Monitoring Activities

**Date:** 2/18/2020

**Consultant Firm:** Shannon & Wilson, Inc.

**Laboratory Name:** SGS North America Inc.

**Laboratory Report Number:** 1194708

**Laboratory Report Date:** 8/27/2019

**Contaminated Site Name:** 151 West 100<sup>th</sup> Avenue

**ADEC File Number:** 2100.38.539

**Hazard Identification Number:** 25985

(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

Comments:

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

**Yes** / No / **NA**

Comments: *The samples were not transferred to another "network" laboratory or sub-contracted to an alternate laboratory.*

### 2. Chain of Custody (COC)

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

**Yes** / No / NA

Comments:

- b. Correct analyses requested? **Yes** / No / NA

Comments:

### 3. Laboratory Sample Receipt Documentation

- a. Sample/cooler temperature documented and within range at receipt (0° to 6° C)?

**Yes** / **No** / NA

Comments: *The cooler temperature blank was 8.1° Celsius.*

Laboratory Report Number:

- b. Sample preservation acceptable - acidified waters, Methanol preserved VOC soil (GRO, BTEX, VOCs, etc.)? **Yes** / No / NA  
Comments:
- c. Sample condition documented - broken, leaking (MeOH), zero headspace (VOC vials)? **Yes** / No / NA  
Comments:
- d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.? **Yes** / No / NA  
Comments: *No discrepancies were noted.*
- e. Data quality or usability affected?  
Comments: *The samples were submitted within two hours of sample collection, therefore it is our opinion that the temperature exceedance does not impact data usability.*

#### 4. Case Narrative

- a. Present and understandable? **Yes** / No / NA  
Comments:
- b. Discrepancies, errors or QC failures noted by the lab? Yes / No / **NA**  
Comments: *No discrepancies were noted.*
- c. Were all corrective actions documented? Yes / No / **NA**  
Comments:
- d. What is the effect on data quality/usability, according to the case narrative?  
Comments: *The case narrative does not discuss quality/usability.*

#### 5. Sample Results

- a. Correct analyses performed/reported as requested on COC? **Yes** / No / NA  
Comments:
- b. All applicable holding times met? **Yes** / No / NA  
Comments:
- c. All soils reported on a dry weight basis? Yes / No / **NA**  
Comments:
- d. Are the reported LOQs less than the Cleanup Level or the minimum required detection level for the project? Yes / **No** / NA  
Comments: *The LOQ for 1,2,3-trichloropropane is greater than its respective ADEC Table C cleanup level.*

Laboratory Report Number:

- e. Data quality or usability affected?

Comments: *The groundwater data cannot be used to determine whether or not concentrations of 1,2,3-trichloropropane are present at concentrations less than the LOQ but greater than the ADEC Table C groundwater cleanup level.*

## 6. QC Samples

### a. Method Blank

- i. One method blank reported per matrix, analysis, and 20 samples?

**Yes** / No / NA

Comments:

- ii. All method blank results less than limit of quantitation (LOQ) or project specified objectives?

**Yes** / No / NA

Comments:

- iii. If above LOQ or project specified objectives, what samples are affected?

Comments:

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

Yes / No / **NA**

Comments:

- v. Data quality or usability affected?

Comments: *See above.*

### 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

Comments:

- ii. Metals/Inorganics - One LCS and one sample duplicate reported per matrix, analysis and 20 samples? Yes / No / **NA**

Comments:

- iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable. (AK petroleum methods: AK 101 60%-120%, AK 102 75%-125%, AK 103 60%-120%; all other analyses see the laboratory QC pages) **Yes** / No / NA

Comments:

Laboratory Report Number:

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

Comments:

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

Comments:

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

Yes / No / **NA**

Comments:

- vii. Data quality or usability affected?

Comments: *No, see above.*

**c. Matrix Spike/Matrix Spike Duplicate (MS/MSD)**

**Note: Leave blank if not required for project**

- i. Organics - One MS/MSD reported per matrix, analysis, and 20 samples?

Yes / No / **NA**

Comments:

- ii. Metals/Inorganics - One MS and one MSD reported per matrix, analysis and 20 samples? Yes / No / **NA**

Comments:

- iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable. (AK petroleum methods: AK 101 60%-120%, AK 102 75%-125%, AK 103 60%-120%; all other analyses see the laboratory QC pages) Yes / No / **NA**

Comments:

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

Comments:

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

Comments:

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

Yes / No / **NA**

Comments:

Laboratory Report Number:

vii. Data quality or usability affected?

Comments: *No, see above.*

**d. Surrogates - Organics Only or Isotope Dilution Analytes (IDA) – Isotope Dilution Methods Only**

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

Comments:

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

Comments:

iii. Do the sample results with failed surrogate/IDA recoveries have data flags? If so, are the data flags clearly defined? **Yes** / No / **NA**

Comments:

iv. Data quality or usability affected?

Comments: *See above.*

**e. Trip Blank - Volatile analyses only (GRO, BTEX, VOCs, etc.)**

i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples? **Yes** / No / NA

Comments:

ii. Is the cooler used to transport the trip blank and volatile samples clearly indicated on the COC? **Yes** / **No** / NA

Comments: *Only one cooler was used to transport the samples.*

iii. All results less than LOQ and project specified objectives? **Yes** / No / NA

Comments:

iv. If above LOQ or project specified DQOs, what samples are affected?

Comments:

v. Data quality or usability affected?

Comments: *See above.*

**f. Field Duplicate**

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

**Yes** / **No** / NA



Laboratory Report Number:

Comments: *Per our ADEC-approved workplan a field duplicate was not collected.*

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

Comments:

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

Comments:

- iv. Data quality or usability affected?

Comments: *See above.*

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

**Yes / No / NA**

Comments: *A decontamination or equipment blank was not included in our ADEC-approved work plan.*

- i. All results less than LOQ and project specified objectives?

**Yes / No / NA**

Comments:

- ii. If above LOQ or project specified objectives, what samples are affected?

Comments:

- iii. Data quality or usability affected?

Comments:

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

- a. Defined and appropriate? **Yes / No / NA**

Comments: *A key is provided on Page 3 of the SGS Laboratory Report.*



## Laboratory Report of Analysis

To: Shannon & Wilson, Inc.  
5430 Fairbanks St. Suite 3  
Anchorage, AK 99518  
(907)561-2120

Report Number: **1200419**

Client Project: **103781 151 w 100th Ave.**

Dear Jacob Tracy,

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

## Case Narrative

SGS Client: **Shannon & Wilson, Inc.**  
SGS Project: **1200419**  
Project Name/Site: **103781 151 w 100th Ave.**  
Project Contact: **Jacob Tracy**

Refer to sample receipt form for information on sample condition.

**LCS for HBN 1804313 [VXX/35415 (1550874) LCS**

8260C - LCS recovery for chloroethane does not meet QC criteria. This analyte was not detected above the LOQ in the associated samples.

**LCSD for HBN 1804313 [VXX/3541 (1550875) LCSD**

8260C - LCSD recovery for chloroethane does not meet QC criteria. This analyte was not detected above the LOQ in the associated samples.

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

Print Date: 02/13/2020 10:02:11AM

## Laboratory Qualifiers

Enclosed are the analytical results associated with the above work order. The results apply to the samples as received. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. This document is issued by the Company under its General Conditions of Service accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

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

SGS maintains a formal Quality Assurance/Quality Control (QA/QC) program. A copy of our Quality Assurance Plan (QAP), which outlines this program, is available at your request. The laboratory certification numbers are AK00971 (DW Chemistry & Microbiology) & 17-021 (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). SGS is only certified for the analytes listed on our Drinking Water Certification (DW methods: 200.8, 2130B, 2320B, 2510B, 300.0, 4500-CN-C,E, 4500-H-B, 4500-NO3-F, 4500-P-E and 524.2) and only those analytes will be reported to the State of Alaska for compliance. Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth by the SGS QAP and, when applicable, other regulatory authorities.

The following descriptors or qualifiers may be found in your report:

*	The analyte has exceeded allowable regulatory or control limits.
!	Surrogate out of control limits.
B	Indicates the analyte is found in a blank associated with the sample.
CCV/CVA/CVB	Continuing Calibration Verification
CCCV/CVC/CVCA/CVCB	Closing Continuing Calibration Verification
CL	Control Limit
DF	Analytical Dilution Factor
DL	Detection Limit (i.e., maximum method detection limit)
E	The analyte result is above the calibrated range.
GT	Greater Than
IB	Instrument Blank
ICV	Initial Calibration Verification
J	The quantitation is an estimation.
LCS(D)	Laboratory Control Spike (Duplicate)
LLQC/LLIQC	Low Level Quantitation Check
LOD	Limit of Detection (i.e., 1/2 of the LOQ)
LOQ	Limit of Quantitation (i.e., reporting or practical quantitation limit)
LT	Less Than
MB	Method Blank
MS(D)	Matrix Spike (Duplicate)
ND	Indicates the analyte is not detected.
RPD	Relative Percent Difference
U	Indicates the analyte was analyzed for but not detected.

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

## Sample Summary

<u>Client Sample ID</u>	<u>Lab Sample ID</u>	<u>Collected</u>	<u>Received</u>	<u>Matrix</u>
103781-MW30	1200419001	02/03/2020	02/03/2020	Water (Surface, Eff., Ground)
103781-WTB	1200419002	02/03/2020	02/03/2020	Water (Surface, Eff., Ground)

Method

SW8260C

Method Description

Volatile Organic Compounds (W) FULL

## Detectable Results Summary

Client Sample ID: **103781-MW30**

Lab Sample ID: 1200419001

### **Volatile GC/MS**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Dichlorodifluoromethane	42.2	ug/L
Trichlorofluoromethane	0.641J	ug/L



Results of 103781-MW30

Client Sample ID: 103781-MW30
Client Project ID: 103781 151 w 100th Ave.
Lab Sample ID: 1200419001
Lab Project ID: 1200419

Collection Date: 02/03/20 11:10
Received Date: 02/03/20 12:48
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 103781-MW30

Client Sample ID: 103781-MW30
Client Project ID: 103781 151 w 100th Ave.
Lab Sample ID: 1200419001
Lab Project ID: 1200419

Collection Date: 02/03/20 11:10
Received Date: 02/03/20 12:48
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 **103781-MW30**

Client Sample ID: **103781-MW30**  
Client Project ID: **103781 151 w 100th Ave.**  
Lab Sample ID: 1200419001  
Lab Project ID: 1200419

Collection Date: 02/03/20 11:10  
Received Date: 02/03/20 12:48  
Matrix: Water (Surface, Eff., Ground)  
Solids (%):  
Location:

Results by **Volatile GC/MS**

**Batch Information**

Analytical Batch: VMS19792  
Analytical Method: SW8260C  
Analyst: NRB  
Analytical Date/Time: 02/07/20 01:49  
Container ID: 1200419001-A

Prep Batch: VXX35415  
Prep Method: SW5030B  
Prep Date/Time: 02/06/20 06:00  
Prep Initial Wt./Vol.: 5 mL  
Prep Extract Vol: 5 mL

Analytical Batch: VMS19793  
Analytical Method: SW8260C  
Analyst: NRB  
Analytical Date/Time: 02/11/20 18:20  
Container ID: 1200419001-B

Prep Batch: VXX35416  
Prep Method: SW5030B  
Prep Date/Time: 02/11/20 06:00  
Prep Initial Wt./Vol.: 5 mL  
Prep Extract Vol: 5 mL



Results of 103781-WTB

Client Sample ID: 103781-WTB  
Client Project ID: 103781 151 w 100th Ave.  
Lab Sample ID: 1200419002  
Lab Project ID: 1200419

Collection Date: 02/03/20 11:00  
Received Date: 02/03/20 12:48  
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		02/07/20 03:20
1,1,1-Trichloroethane	0.500 U	1.00	0.310	ug/L	1		02/07/20 03:20
1,1,2,2-Tetrachloroethane	0.250 U	0.500	0.150	ug/L	1		02/07/20 03:20
1,1,2-Trichloroethane	0.200 U	0.400	0.120	ug/L	1		02/07/20 03:20
1,1-Dichloroethane	0.500 U	1.00	0.310	ug/L	1		02/07/20 03:20
1,1-Dichloroethene	0.500 U	1.00	0.310	ug/L	1		02/07/20 03:20
1,1-Dichloropropene	0.500 U	1.00	0.310	ug/L	1		02/07/20 03:20
1,2,3-Trichlorobenzene	0.500 U	1.00	0.310	ug/L	1		02/07/20 03:20
1,2,3-Trichloropropane	0.500 U	1.00	0.310	ug/L	1		02/07/20 03:20
1,2,4-Trichlorobenzene	0.500 U	1.00	0.310	ug/L	1		02/07/20 03:20
1,2,4-Trimethylbenzene	0.500 U	1.00	0.310	ug/L	1		02/07/20 03:20
1,2-Dibromo-3-chloropropane	5.00 U	10.0	3.10	ug/L	1		02/07/20 03:20
1,2-Dibromoethane	0.0375 U	0.0750	0.0180	ug/L	1		02/07/20 03:20
1,2-Dichlorobenzene	0.500 U	1.00	0.310	ug/L	1		02/07/20 03:20
1,2-Dichloroethane	0.250 U	0.500	0.150	ug/L	1		02/07/20 03:20
1,2-Dichloropropane	0.500 U	1.00	0.310	ug/L	1		02/07/20 03:20
1,3,5-Trimethylbenzene	0.500 U	1.00	0.310	ug/L	1		02/07/20 03:20
1,3-Dichlorobenzene	0.500 U	1.00	0.310	ug/L	1		02/07/20 03:20
1,3-Dichloropropane	0.250 U	0.500	0.150	ug/L	1		02/07/20 03:20
1,4-Dichlorobenzene	0.250 U	0.500	0.150	ug/L	1		02/07/20 03:20
2,2-Dichloropropane	0.500 U	1.00	0.310	ug/L	1		02/07/20 03:20
2-Butanone (MEK)	5.00 U	10.0	3.10	ug/L	1		02/07/20 03:20
2-Chlorotoluene	0.500 U	1.00	0.310	ug/L	1		02/07/20 03:20
2-Hexanone	5.00 U	10.0	3.10	ug/L	1		02/07/20 03:20
4-Chlorotoluene	0.500 U	1.00	0.310	ug/L	1		02/07/20 03:20
4-Isopropyltoluene	0.500 U	1.00	0.310	ug/L	1		02/07/20 03:20
4-Methyl-2-pentanone (MIBK)	5.00 U	10.0	3.10	ug/L	1		02/07/20 03:20
Benzene	0.200 U	0.400	0.120	ug/L	1		02/07/20 03:20
Bromobenzene	0.500 U	1.00	0.310	ug/L	1		02/07/20 03:20
Bromochloromethane	0.500 U	1.00	0.310	ug/L	1		02/07/20 03:20
Bromodichloromethane	0.250 U	0.500	0.150	ug/L	1		02/07/20 03:20
Bromoform	0.500 U	1.00	0.310	ug/L	1		02/07/20 03:20
Bromomethane	2.50 U	5.00	2.00	ug/L	1		02/07/20 03:20
Carbon disulfide	5.00 U	10.0	3.10	ug/L	1		02/07/20 03:20
Carbon tetrachloride	0.500 U	1.00	0.310	ug/L	1		02/07/20 03:20
Chlorobenzene	0.250 U	0.500	0.150	ug/L	1		02/07/20 03:20
Chloroethane	0.500 U	1.00	0.310	ug/L	1		02/07/20 03:20

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J flagging is activated



Results of 103781-WTB

Client Sample ID: 103781-WTB
Client Project ID: 103781 151 w 100th Ave.
Lab Sample ID: 1200419002
Lab Project ID: 1200419

Collection Date: 02/03/20 11:00
Received Date: 02/03/20 12:48
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 103781-WTB**

Client Sample ID: **103781-WTB**  
Client Project ID: **103781 151 w 100th Ave.**  
Lab Sample ID: 1200419002  
Lab Project ID: 1200419

Collection Date: 02/03/20 11:00  
Received Date: 02/03/20 12:48  
Matrix: Water (Surface, Eff., Ground)  
Solids (%):  
Location:

**Results by Volatile GC/MS**

**Batch Information**

Analytical Batch: VMS19792  
Analytical Method: SW8260C  
Analyst: NRB  
Analytical Date/Time: 02/07/20 03:20  
Container ID: 1200419002-A

Prep Batch: VXX35415  
Prep Method: SW5030B  
Prep Date/Time: 02/06/20 06:00  
Prep Initial Wt./Vol.: 5 mL  
Prep Extract Vol: 5 mL



### Method Blank

Blank ID: MB for HBN 1804313 [VXX/35415]

Blank Lab ID: 1550873

QC for Samples:

1200419001, 1200419002

Matrix: Water (Surface, Eff., Ground)

### 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	2.00	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

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### Method Blank

Blank ID: MB for HBN 1804313 [VXX/35415]

Blank Lab ID: 1550873

QC for Samples:

1200419001, 1200419002

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	5.00U	10.0	3.10	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
<b>Surrogates</b>				
1,2-Dichloroethane-D4 (surr)	102	81-118		%
4-Bromofluorobenzene (surr)	101	85-114		%
Toluene-d8 (surr)	99.6	89-112		%

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**Method Blank**

Blank ID: MB for HBN 1804313 [VXX/35415]  
Blank Lab ID: 1550873

Matrix: Water (Surface, Eff., Ground)

QC for Samples:  
1200419001, 1200419002

**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: VMS19792  
Analytical Method: SW8260C  
Instrument: Agilent 7890-75MS  
Analyst: NRB  
Analytical Date/Time: 2/6/2020 9:13:00PM

Prep Batch: VXX35415  
Prep Method: SW5030B  
Prep Date/Time: 2/6/2020 6:00:00AM  
Prep Initial Wt./Vol.: 5 mL  
Prep Extract Vol: 5 mL

Print Date: 02/13/2020 10:02:21AM



### Leaching Blank

Blank ID: LB for HBN 1804185 [TCLP/10480]  
Blank Lab ID: 1550404

Matrix: Water (Surface, Eff., Ground)

QC for Samples:  
1200419001, 1200419002

### Results by SW8260C

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
1,1-Dichloroethene	25.0U	50.0	15.5	ug/L
1,2-Dichloroethane	12.5U	25.0	7.50	ug/L
1,4-Dichlorobenzene	12.5U	25.0	7.50	ug/L
2-Butanone (MEK)	250U	500	155	ug/L
Benzene	10.0U	20.0	6.00	ug/L
Carbon tetrachloride	25.0U	50.0	15.5	ug/L
Chlorobenzene	12.5U	25.0	7.50	ug/L
Chloroform	25.0U	50.0	15.5	ug/L
Hexachlorobutadiene	25.0U	50.0	15.5	ug/L
Tetrachloroethene	25.0U	50.0	15.5	ug/L
Trichloroethene	25.0U	50.0	15.5	ug/L
Vinyl chloride	25.0U	50.0	15.5	ug/L
<b>Surrogates</b>				
1,2-Dichloroethane-D4 (surr)	115	81-118		%
4-Bromofluorobenzene (surr)	107	85-114		%
Toluene-d8 (surr)	105	89-112		%

### Batch Information

Analytical Batch: VMS19792  
Analytical Method: SW8260C  
Instrument: Agilent 7890-75MS  
Analyst: NRB  
Analytical Date/Time: 2/7/2020 1:03:00AM

Prep Batch: VXX35415  
Prep Method: SW5030B  
Prep Date/Time: 2/6/2020 6:00:00AM  
Prep Initial Wt./Vol.: 5 mL  
Prep Extract Vol: 5 mL

Print Date: 02/13/2020 10:02:21AM





### Blank Spike Summary

Blank Spike ID: LCS for HBN 1200419 [VXX35415]  
 Blank Spike Lab ID: 1550874  
 Date Analyzed: 02/06/2020 21:28

Spike Duplicate ID: LCSD for HBN 1200419 [VXX35415]  
 Spike Duplicate Lab ID: 1550875  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1200419001, 1200419002

### 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	31.1	104	30	31.3	104	( 78-124 )	0.47	(< 20 )
1,1,1-Trichloroethane	30	30.3	101	30	30.6	102	( 74-131 )	0.92	(< 20 )
1,1,2,2-Tetrachloroethane	30	31.6	105	30	32.3	108	( 71-121 )	2.20	(< 20 )
1,1,2-Trichloroethane	30	31.5	105	30	31.6	105	( 80-119 )	0.36	(< 20 )
1,1-Dichloroethane	30	30.6	102	30	30.4	101	( 77-125 )	0.89	(< 20 )
1,1-Dichloroethene	30	32.3	108	30	32.0	107	( 71-131 )	1.00	(< 20 )
1,1-Dichloropropene	30	31.1	104	30	31.1	104	( 79-125 )	0.05	(< 20 )
1,2,3-Trichlorobenzene	30	31.1	104	30	33.1	110	( 69-129 )	6.40	(< 20 )
1,2,3-Trichloropropane	30	31.2	104	30	32.2	107	( 73-122 )	3.10	(< 20 )
1,2,4-Trichlorobenzene	30	30.4	101	30	32.1	107	( 69-130 )	5.40	(< 20 )
1,2,4-Trimethylbenzene	30	31.7	106	30	31.7	106	( 79-124 )	0.11	(< 20 )
1,2-Dibromo-3-chloropropane	30	31.4	105	30	32.4	108	( 62-128 )	3.30	(< 20 )
1,2-Dibromoethane	30	31.6	105	30	32.1	107	( 77-121 )	1.70	(< 20 )
1,2-Dichlorobenzene	30	31.5	105	30	32.1	107	( 80-119 )	2.00	(< 20 )
1,2-Dichloroethane	30	28.9	96	30	29.1	97	( 73-128 )	0.70	(< 20 )
1,2-Dichloropropane	30	31.4	105	30	31.7	106	( 78-122 )	0.97	(< 20 )
1,3,5-Trimethylbenzene	30	31.6	105	30	32.1	107	( 75-124 )	1.60	(< 20 )
1,3-Dichlorobenzene	30	31.2	104	30	31.9	106	( 80-119 )	2.40	(< 20 )
1,3-Dichloropropane	30	31.3	104	30	31.5	105	( 80-119 )	0.79	(< 20 )
1,4-Dichlorobenzene	30	31.1	104	30	31.8	106	( 79-118 )	2.50	(< 20 )
2,2-Dichloropropane	30	30.8	103	30	30.6	102	( 60-139 )	0.90	(< 20 )
2-Butanone (MEK)	90	96.0	107	90	98.0	109	( 56-143 )	2.00	(< 20 )
2-Chlorotoluene	30	31.7	106	30	31.2	104	( 79-122 )	1.60	(< 20 )
2-Hexanone	90	94.5	105	90	97.7	109	( 57-139 )	3.30	(< 20 )
4-Chlorotoluene	30	29.3	98	30	29.4	98	( 78-122 )	0.15	(< 20 )
4-Isopropyltoluene	30	31.5	105	30	32.7	109	( 77-127 )	3.70	(< 20 )
4-Methyl-2-pentanone (MIBK)	90	97.8	109	90	100	112	( 67-130 )	2.60	(< 20 )
Benzene	30	30.9	103	30	31.1	104	( 79-120 )	0.49	(< 20 )
Bromobenzene	30	31.9	106	30	32.5	108	( 80-120 )	1.80	(< 20 )
Bromochloromethane	30	30.7	102	30	30.9	103	( 78-123 )	0.85	(< 20 )
Bromodichloromethane	30	30.8	103	30	31.2	104	( 79-125 )	1.40	(< 20 )
Bromoform	30	31.3	104	30	31.8	106	( 66-130 )	1.50	(< 20 )
Bromomethane	30	32.1	107	30	31.4	105	( 53-141 )	2.30	(< 20 )
Carbon disulfide	45	47.3	105	45	46.3	103	( 64-133 )	2.10	(< 20 )

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### Blank Spike Summary

Blank Spike ID: LCS for HBN 1200419 [VXX35415]  
 Blank Spike Lab ID: 1550874  
 Date Analyzed: 02/06/2020 21:28

Spike Duplicate ID: LCSD for HBN 1200419 [VXX35415]  
 Spike Duplicate Lab ID: 1550875  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1200419001, 1200419002

### 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	30.8	103	30	30.6	102	( 72-136 )	0.84	(< 20 )
Chlorobenzene	30	30.0	100	30	29.9	100	( 82-118 )	0.02	(< 20 )
Chloroethane	30	49.1	164	* 30	42.8	143	* ( 60-138 )	13.70	(< 20 )
Chloroform	30	30.4	101	30	30.2	101	( 79-124 )	0.60	(< 20 )
Chloromethane	30	29.9	100	30	30.7	102	( 50-139 )	2.40	(< 20 )
cis-1,2-Dichloroethene	30	30.9	103	30	30.9	103	( 78-123 )	0.04	(< 20 )
cis-1,3-Dichloropropene	30	31.7	106	30	31.8	106	( 75-124 )	0.47	(< 20 )
Dibromochloromethane	30	31.3	104	30	31.5	105	( 74-126 )	0.82	(< 20 )
Dibromomethane	30	30.9	103	30	31.1	104	( 79-123 )	0.65	(< 20 )
Dichlorodifluoromethane	30	33.4	111	30	32.6	109	( 32-152 )	2.40	(< 20 )
Ethylbenzene	30	31.1	104	30	31.5	105	( 79-121 )	1.20	(< 20 )
Freon-113	45	48.3	107	45	47.7	106	( 70-136 )	1.20	(< 20 )
Hexachlorobutadiene	30	31.2	104	30	31.4	105	( 66-134 )	0.68	(< 20 )
Isopropylbenzene (Cumene)	30	31.7	106	30	31.9	106	( 72-131 )	0.73	(< 20 )
Methylene chloride	30	31.5	105	30	31.2	104	( 74-124 )	0.74	(< 20 )
Methyl-t-butyl ether	45	46.6	104	45	46.6	104	( 71-124 )	0.03	(< 20 )
Naphthalene	30	30.4	101	30	33.6	112	( 61-128 )	10.10	(< 20 )
n-Butylbenzene	30	31.9	106	30	31.9	106	( 75-128 )	0.05	(< 20 )
n-Propylbenzene	30	31.9	106	30	32.3	108	( 76-126 )	1.30	(< 20 )
o-Xylene	30	31.3	104	30	31.6	105	( 78-122 )	0.84	(< 20 )
P & M -Xylene	60	62.5	104	60	62.4	104	( 80-121 )	0.08	(< 20 )
sec-Butylbenzene	30	31.9	106	30	32.6	109	( 77-126 )	2.10	(< 20 )
Styrene	30	32.4	108	30	31.6	105	( 78-123 )	2.40	(< 20 )
tert-Butylbenzene	30	31.8	106	30	31.8	106	( 78-124 )	0.01	(< 20 )
Tetrachloroethene	30	31.4	105	30	31.6	105	( 74-129 )	0.45	(< 20 )
Toluene	30	30.1	100	30	30.6	102	( 80-121 )	1.30	(< 20 )
trans-1,2-Dichloroethene	30	31.2	104	30	31.0	103	( 75-124 )	0.60	(< 20 )
trans-1,3-Dichloropropene	30	31.9	106	30	31.9	106	( 73-127 )	0.04	(< 20 )
Trichloroethene	30	30.9	103	30	30.9	103	( 79-123 )	0.15	(< 20 )
Trichlorofluoromethane	30	35.9	120	30	35.8	119	( 65-141 )	0.03	(< 20 )
Vinyl acetate	30	31.5	105	30	31.7	106	( 54-146 )	0.74	(< 20 )
Vinyl chloride	30	30.9	103	30	30.4	101	( 58-137 )	1.70	(< 20 )
Xylenes (total)	90	93.8	104	90	94.0	104	( 79-121 )	0.23	(< 20 )

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### Blank Spike Summary

Blank Spike ID: LCS for HBN 1200419 [VXX35415]  
Blank Spike Lab ID: 1550874  
Date Analyzed: 02/06/2020 21:28

Spike Duplicate ID: LCSD for HBN 1200419 [VXX35415]  
Spike Duplicate Lab ID: 1550875  
Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1200419001, 1200419002

### Results by SW8260C

Parameter	Blank Spike (%)			Spike Duplicate (%)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
<b>Surrogates</b>									
1,2-Dichloroethane-D4 (surr)	30	97	97	30	96.2	96	( 81-118 )	0.84	
4-Bromofluorobenzene (surr)	30	100	100	30	99.9	100	( 85-114 )	0.39	
Toluene-d8 (surr)	30	101	101	30	101	101	( 89-112 )	0.17	

### Batch Information

Analytical Batch: VMS19792  
Analytical Method: SW8260C  
Instrument: Agilent 7890-75MS  
Analyst: NRB

Prep Batch: VXX35415  
Prep Method: SW5030B  
Prep Date/Time: 02/06/2020 06:00  
Spike Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL  
Dupe Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL

Print Date: 02/13/2020 10:02:24AM



### Method Blank

Blank ID: MB for HBN 1804336 [VXX/35416]

Blank Lab ID: 1551000

QC for Samples:

1200419001

Matrix: Water (Surface, Eff., Ground)

### 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
1,1,2-Trichloroethane	0.200U	0.400	0.120	ug/L
1,2-Dibromoethane	0.0375U	0.0750	0.0180	ug/L
1,3-Dichloropropane	0.250U	0.500	0.150	ug/L
Bromoform	0.500U	1.00	0.310	ug/L
Chlorobenzene	0.250U	0.500	0.150	ug/L
Dibromochloromethane	0.250U	0.500	0.150	ug/L
Ethylbenzene	0.500U	1.00	0.310	ug/L
Isopropylbenzene (Cumene)	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
Styrene	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-1,3-Dichloropropene	0.500U	1.00	0.310	ug/L
<b>Surrogates</b>				
1,2-Dichloroethane-D4 (surr)	106	81-118		%
4-Bromofluorobenzene (surr)	94.8	85-114		%
Toluene-d8 (surr)	97.7	89-112		%

### Batch Information

Analytical Batch: VMS19793  
Analytical Method: SW8260C  
Instrument: Agilent 7890-75MS  
Analyst: NRB  
Analytical Date/Time: 2/11/2020 3:01:00PM

Prep Batch: VXX35416  
Prep Method: SW5030B  
Prep Date/Time: 2/11/2020 6:00:00AM  
Prep Initial Wt./Vol.: 5 mL  
Prep Extract Vol: 5 mL

Print Date: 02/13/2020 10:02:27AM



### Leaching Blank

Blank ID: LB for HBN 1804303 [TCLP/10486]  
Blank Lab ID: 1550869

Matrix: Water (Surface, Eff., Ground)

QC for Samples:  
1200419001

### Results by SW8260C

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Chlorobenzene	12.5U	25.0	7.50	ug/L
Tetrachloroethene	25.0U	50.0	15.5	ug/L
<b>Surrogates</b>				
1,2-Dichloroethane-D4 (surr)	104	81-118		%
4-Bromofluorobenzene (surr)	94.6	85-114		%
Toluene-d8 (surr)	100	89-112		%

### Batch Information

Analytical Batch: VMS19793  
Analytical Method: SW8260C  
Instrument: Agilent 7890-75MS  
Analyst: NRB  
Analytical Date/Time: 2/11/2020 4:34:00PM

Prep Batch: VXX35416  
Prep Method: SW5030B  
Prep Date/Time: 2/11/2020 6:00:00AM  
Prep Initial Wt./Vol.: 5 mL  
Prep Extract Vol: 5 mL

Print Date: 02/13/2020 10:02:27AM



### Blank Spike Summary

Blank Spike ID: LCS for HBN 1200419 [VXX35416]  
 Blank Spike Lab ID: 1551001  
 Date Analyzed: 02/11/2020 15:16

Spike Duplicate ID: LCSD for HBN 1200419 [VXX35416]  
 Spike Duplicate Lab ID: 1551002  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1200419001

### 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	31.6	105	30	31.8	106	( 78-124 )	0.66	(< 20 )
1,1,2-Trichloroethane	30	29.7	99	30	29.7	99	( 80-119 )	0.22	(< 20 )
1,2-Dibromoethane	30	31.0	103	30	31.4	105	( 77-121 )	1.20	(< 20 )
1,3-Dichloropropane	30	29.5	98	30	29.2	97	( 80-119 )	0.99	(< 20 )
Bromoform	30	31.9	106	30	32.2	107	( 66-130 )	0.98	(< 20 )
Chlorobenzene	30	30.1	100	30	29.6	99	( 82-118 )	1.40	(< 20 )
Dibromochloromethane	30	31.9	106	30	31.6	105	( 74-126 )	0.71	(< 20 )
Ethylbenzene	30	31.1	104	30	31.0	103	( 79-121 )	0.28	(< 20 )
Isopropylbenzene (Cumene)	30	31.8	106	30	31.2	104	( 72-131 )	1.70	(< 20 )
o-Xylene	30	31.3	104	30	31.1	104	( 78-122 )	0.85	(< 20 )
P & M -Xylene	60	62.8	105	60	62.1	104	( 80-121 )	1.10	(< 20 )
Styrene	30	31.4	105	30	31.2	104	( 78-123 )	0.62	(< 20 )
Tetrachloroethene	30	33.4	111	30	32.8	109	( 74-129 )	1.70	(< 20 )
Toluene	30	29.5	98	30	29.0	97	( 80-121 )	1.40	(< 20 )
trans-1,3-Dichloropropene	30	29.9	100	30	30.0	100	( 73-127 )	0.09	(< 20 )

### Surrogates

1,2-Dichloroethane-D4 (surr)	30	101	101	30	100	100	( 81-118 )	0.44	
4-Bromofluorobenzene (surr)	30	95.4	95	30	94.2	94	( 85-114 )	1.20	
Toluene-d8 (surr)	30	99.3	99	30	98.8	99	( 89-112 )	0.51	

### Batch Information

Analytical Batch: VMS19793  
 Analytical Method: SW8260C  
 Instrument: Agilent 7890-75MS  
 Analyst: NRB

Prep Batch: VXX35416  
 Prep Method: SW5030B  
 Prep Date/Time: 02/11/2020 06:00  
 Spike Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL  
 Dupe Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL

Print Date: 02/13/2020 10:02:30AM

1200419



**SHANNON & WILSON, INC.**  
Geotechnical and Environmental Consultants

**CHAIN-OF-CUSTODY RECORD**

Laboratory SGS Page 1 of 1  
Attn: Justin Nelson

400 N. 34th Street, Suite 100  
Seattle, WA 98103  
(206) 632-8020

2043 Westport Center Drive  
St. Louis, MO 63146-3564  
(314) 699-9660

2705 Saint Andrews Loop, Suite A  
Pasco, WA 99301-3378  
(509) 946-6309

2355 Hill Road  
Fairbanks, AK 99709  
(907) 479-0600

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

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	Analysis Parameters/Sample Container Description					Total Number of Containers	Remarks/Matrix	
103781-MW30	① A-C	11:10	2/3/20	X	X	VOLS EPA 8260C					3	groundwater	
103781-WTB	② A-C	11:00	2/3/20		X								

Project Information		Sample Receipt	
Project Number: <u>103781</u>	Total Number of Containers		
Project Name: <u>151 W 100th Ave</u>	COC Seals/Intact? Y/N/NA		
Contact: <u>JCT</u>	Received Good Cond./Cold		
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Delivery Method:		
Sampler: <u>LCT</u>	(attach shipping bill, if any)		

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: <u>[Signature]</u> Time: <u>12:49</u>	Signature: _____ Time: _____	Signature: _____ Time: _____
Printed Name: <u>Wor Jones</u> Date: <u>2/3/20</u>	Printed Name: _____ Date: _____	Printed Name: _____ Date: _____
Company: <u>SFW</u>	Company: _____	Company: _____

Instructions	
Requested Turnaround Time: <u>Standard</u>	
Special Instructions:	
<del>XXXXXXXXXXXX</del> <u>365303 JN</u>	

Received By: 1.	Received By: 2.	Received By: 3.
Signature: _____ Time: _____	Signature: _____ Time: _____	Signature: <u>[Signature]</u> Time: <u>12:48</u>
Printed Name: _____ Date: _____	Printed Name: _____ Date: _____	Printed Name: <u>JAW</u> Date: <u>2/3/20</u>
Company: _____	Company: _____	Company: <u>SGS 3.7°C D59</u>

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 #:

1200419



1 2 0 0 4 1 9

Review Criteria	Condition (Yes, No, N/A)	Exceptions Noted below
<b>Chain of Custody / Temperature Requirements</b>		<b>Yes</b> Exemption permitted if sampler hand carries/delivers.
Were Custody Seals intact? Note # & location	N/A	absent
COC accompanied samples?	Yes	
DOD: Were samples received in COC corresponding coolers?	N/A	
<b>Yes</b> **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 @ 3.7 °C Therm. ID: D59
		Cooler ID: @ °C Therm. ID:
		Cooler ID: @ °C Therm. ID:
		Cooler ID: @ °C Therm. ID:
		Cooler ID: @ °C Therm. ID:
If samples received without a temperature blank, the "cooler temperature" will be documented instead & "COOLER TEMP" will be noted to the right. "ambient" or "chilled" will be noted if neither is available.		
*If >6°C, were samples collected <8 hours ago?	N/A	
If <0°C, were sample containers ice free?	N/A	
Note: Identify containers received at non-compliant temperature . Use form FS-0029 if more space is needed.		
<b>Holding Time / Documentation / Sample Condition Requirements</b>		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.		
***Note: If sample information on containers differs from COC, SGS will default to COC information		
Were analytical requests clear? (i.e., method is specified for analyses with multiple option for analysis (Ex: BTEX, Metals)	Yes	
Were proper containers (type/mass/volume/preservative***) used?	Yes	N/A ***Exemption permitted for metals (e.g.200.8/6020A).
<b>Volatile / LL-Hg Requirements</b>		
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	
<b>Note to Client:</b> 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>
1200419001-A	HCL to pH < 2	OK			
1200419001-B	HCL to pH < 2	OK			
1200419001-C	HCL to pH < 2	OK			
1200419002-A	HCL to pH < 2	OK			
1200419002-B	HCL to pH < 2	OK			
1200419002-C	HCL to pH < 2	OK			

### Container Condition Glossary

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

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

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

DM - The container was received damaged.

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

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

NC- The container provided was not preserved or was under-preserved. The method does not allow for additional preservative added after collection.

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.

QN - Insufficient sample quantity provided.

## LABORATORY DATA REVIEW CHECKLIST

**Completed by:** Alec Rizzo

**Title:** Groundwater Monitoring Activities

**Date:** 2/18/2020

**Consultant Firm:** Shannon & Wilson, Inc.

**Laboratory Name:** SGS North America Inc.

**Laboratory Report Number:** 1200419

**Laboratory Report Date:** 2/13/2020

**Contaminated Site Name:** 151 West 100<sup>th</sup> Avenue

**ADEC File Number:** 2100.38.539

**Hazard Identification Number:** 25985

(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

Comments:

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

**Yes** / No / **NA**

Comments: *The samples were not transferred to another "network" laboratory or sub-contracted to an alternate laboratory.*

### 2. Chain of Custody (COC)

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

**Yes** / No / NA

Comments:

- b. Correct analyses requested? **Yes** / No / NA

Comments:

### 3. Laboratory Sample Receipt Documentation

- a. Sample/cooler temperature documented and within range at receipt (0° to 6° C)?

**Yes** / No / NA

Comments: *The temperature blank had a temperature of 3.7° C*

Laboratory Report Number:

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

Comments:

- c. Sample condition documented - broken, leaking (MeOH), zero headspace (VOC vials)? **Yes**/ No / NA

Comments:

- d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.? **Yes**/ No / NA

Comments: *No discrepancies were noted.*

- e. Data quality or usability affected?

Comments: *Data quality/usability are considered unaffected; see above.*

#### 4. Case Narrative

- a. Present and understandable? **Yes**/ No / NA

Comments:

- b. Discrepancies, errors or QC failures noted by the lab? **Yes**/ No / NA

Comments: *LCS and LCSD recovery for chloroethane does not meet QC criteria. The analyte was not detected above the LOQ in the associated samples.*

- c. Were all corrective actions documented? Yes **No**/ NA

Comments:

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

Comments: *The case narrative does not discuss quality/usability.*

#### 5. Sample Results

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

Comments:

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

Comments:

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

Comments:

- d. Are the reported LOQs less than the Cleanup Level or the minimum required detection level for the project? Yes **No**/ NA

Comments: *The LOQ for 1,2,3-trichloropropane is greater than its respective ADEC Table C cleanup level.*

Laboratory Report Number:

e. Data quality or usability affected?

Comments: *The groundwater data cannot be used to determine whether or not concentrations of 1,2,3-trichloropropane are present at concentrations less than the LOQ but greater than the ADEC Table C groundwater cleanup level.*

**6. QC Samples**

**a. Method Blank**

i. One method blank reported per matrix, analysis, and 20 samples?

**Yes** / No / NA

Comments:

ii. All method blank results less than limit of quantitation (LOQ) or project specified objectives?

**Yes** / No / NA

Comments:

iii. If above LOQ or project specified objectives, what samples are affected?

Comments:

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

Yes / No / **NA**

Comments:

v. Data quality or usability affected?

Comments: *See above.*

**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

Comments:

ii. Metals/Inorganics - One LCS and one sample duplicate reported per matrix, analysis and 20 samples? Yes / No / **NA**

Comments:

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable. (AK petroleum methods: AK 101 60%-120%, AK 102 75%-125%, AK 103 60%-120%; all other analyses see the laboratory QC pages) **Yes** / **No** / NA

Comments: *LCS/LCSD recovery for chloroethane does not meet QC criteria.*

Laboratory Report Number:

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

Comments:

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

Comments: *Each Project Sample*

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

**Yes** / **No** / NA

Comments: *Chloroethane was not detected above the LOQ in the associated samples. Therefore, flagging is not required.*

- vii. Data quality or usability affected?

Comments: *No, see above.*

**c. Matrix Spike/Matrix Spike Duplicate (MS/MSD)**

**Note: Leave blank if not required for project**

- i. Organics - One MS/MSD reported per matrix, analysis, and 20 samples?

**Yes** / No / **NA**

Comments:

- ii. Metals/Inorganics - One MS and one MSD reported per matrix, analysis and 20 samples? **Yes** / No / **NA**

Comments:

- iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable. (AK petroleum methods: AK 101 60%-120%, AK 102 75%-125%, AK 103 60%-120%; all other analyses see the laboratory QC pages) **Yes** / No / **NA**

Comments:

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

Comments:

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

Comments:

Laboratory Report Number:

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

vii. Data quality or usability affected?  
Comments: *No, see above.*

**d. Surrogates - Organics Only or Isotope Dilution Analytes (IDA) – Isotope Dilution Methods Only**

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

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

iii. Do the sample results with failed surrogate/IDA recoveries have data flags? If so, are the data flags clearly defined? **Yes** / No / **NA**  
Comments:

iv. Data quality or usability affected?  
Comments: *See above.*

**e. Trip Blank - Volatile analyses only (GRO, BTEX, VOCs, etc.)**

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

ii. Is the cooler used to transport the trip blank and volatile samples clearly indicated on the COC? **Yes** / **No** / NA  
Comments: *Only one cooler was used to transport the samples.*

iii. All results less than LOQ and project specified objectives? **Yes** / No / NA  
Comments:

iv. If above LOQ or project specified DQOs, what samples are affected?  
Comments:

v. Data quality or usability affected?  
Comments: *See above.*

Laboratory Report Number:

**f. Field Duplicate**

- i.** One field duplicate submitted per matrix, analysis and 10 project samples?  
Yes  No / NA  
Comments: *Per our ADEC-approved work plan, a field duplicate was not collected.*
  
- ii.** Were the field duplicates submitted blind to the lab? Yes / No  NA  
Comments:
  
- iii.** Precision – All relative percent differences (RPDs) less than specified project objectives? (Recommended: 30% for water, 50% for soil) Yes / No  NA  
Comments:
  
- iv.** Data quality or usability affected?  
Comments: *See above.*

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

- Yes /  No / NA  
Comments: *A decontamination or equipment blank was not included in our ADEC-approved work plan.*
  
- i.** All results less than LOQ and project specified objectives?  
Yes / No  NA  
Comments:
  
- ii.** If above LOQ or project specified objectives, what samples are affected?  
Comments:
  
- iii.** Data quality or usability affected?  
Comments:

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

- a.** Defined and appropriate?  Yes / No / NA  
Comments: *A key is provided on Page 3 of the SGS Laboratory Report.*

**ATTACHMENT 3**

**IMPORTANT INFORMATION ABOUT YOUR**

**GEOTECHNICAL/ENVIRONMENTAL REPORT**





Date: March 2020  
To: Fairweather LLC  
151 West 100<sup>th</sup> Avenue, Anchorage, Alaska

## **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