

December 17, 2018

Begich Towers, Inc.
100 Kenai Street
Whittier, Alaska 99693

Attn: Dr. Karen Dempster

**RE: GROUNDWATER MONITORING, BEGICH TOWERS, 100 KENAI STREET,
WHITTIER, ALASKA; ADEC FILE NO. 2114.26.002**

This report presents the results of Shannon & Wilson's groundwater monitoring events conducted at 100 Kenai Street, Whittier, Alaska. A vicinity map 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. 2114.26.002.

Authorization to proceed with the project was received in the form of a signed proposal on May 21, 2018 by Dr. Karen Dempster, President of Begich Towers, Inc. (BTI). The project was conducted in general accordance with our June 5, 2018 *Work Plan for Groundwater Monitoring, Begich Towers, 100 Kenai Street, Whittier, Alaska* which was approved by Mr. Josh Barsis of the ADEC in the form of a letter dated June 15, 2018.

BACKGROUND

As documented in IT Alaska, Inc.'s (IT Alaska) October 2, 2000 Corrective Action Report, a 15,000-gallon heating fuel underground storage tank (UST) was removed from the site in September 1999. Soil samples collected from the UST excavation contained a maximum of 4,080 milligrams per kilogram (mg/kg) diesel range organics (DRO) which exceeds the ADEC Method Two migration to groundwater cleanup level of 230 mg/kg. At that time, approximately 93 tons of impacted soil were removed and thermally remediated off site.

In 2000, IT Alaska conducted a limited removal action, followed by collecting field screening and analytical soil samples from the excavation base. The excavation was advanced to a maximum depth of 12 feet below ground surface (bgs). Groundwater was not encountered during the excavation activities. At that time, an additional 125 tons of impacted soil were transported to Anchorage for thermal treatment. Analytical samples collected from the limits of the cleanup excavation contained a maximum of 1,220 mg/kg DRO.

In November 2016, Shannon & Wilson conducted a release investigation in the vicinity of the limited removal action conducted by IT Alaska that included advancing four soil borings (Borings B1 through B4), installing three temporary groundwater monitoring wells (Wells TMW1, TMW2, and TMW3), and collecting analytical soil and groundwater samples. DRO concentrations in soil samples collected from Borings B1 (365 mg/kg), B2 (1,940 mg/kg), and B3 (486 mg/kg) exceed the ADEC Method Two Migration to Groundwater cleanup level. DRO concentrations in groundwater samples from Temporary Monitoring Wells TMW1 (31,500 micrograms per milligrams [$\mu\text{g/L}$]), TMW2 (26,100 $\mu\text{g/L}$), and TMW3 (10,500 $\mu\text{g/L}$) were greater than the ADEC Table C cleanup level of 1,500 $\mu\text{g/L}$. The locations of the borings and temporary monitoring wells are shown on Figure 2.

During 2017, three soil borings (Borings B5 through B7) and three groundwater monitoring wells (Wells B5MW through B7MW) were advanced/installed at the site. DRO-impacted soil (maximum of 648 mg/kg) is present in the vicinity of the former UST at concentrations greater than the ADEC cleanup level. Soil samples collected from Borings B6 and B7 did not contain target analytes greater than ADEC cleanup levels. The groundwater sample collected from Monitoring Well B5MW did not contain target analytes greater than ADEC cleanup levels. Groundwater was not present in Wells B6MW and B7MW.

In a letter dated April 30, 2018, the ADEC requested semi-annual groundwater sampling of Monitoring Wells B5MW, B6MW, and B7MW. The purpose of this project is to address the ADEC's request. The goal of the project is to receive a Cleanup Complete with Institutional Controls (CCIC) from the ADEC. The locations of the borings, monitoring wells, and general site features are shown on Figure 2.

FIELD ACTIVITIES

The field activities included two groundwater sampling events and investigation-derived waste management. SGS North America Inc. (SGS) provided chemical analysis of groundwater samples. Field notes are included in Attachment 1.

Groundwater Monitoring Well Sampling

Groundwater samples were collected from Monitoring Well B5MW on July 2 and September 28, 2018. Monitoring Wells B6MW and B7MW were dry during each sampling event. Prior to initiating each groundwater sampling event, the static water level was measured in the wells using a water level indicator. The water level indicator was decontaminated using an

alconox/water mixture and a water rinse prior to insertion in each well. The depths to groundwater in the monitoring wells are listed on Table 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. The pump rate was set at approximately 0.1 liter per minute (L/min) with a goal of limiting the sustained water drawdown to a maximum of 4 inches. The drawdown was determined using a water level indicator that was checked regularly throughout the purging/sampling process.

During the purging process, field personnel monitored water quality parameters (pH, conductivity, temperature, and turbidity) and purge volume. When water quality parameters stabilized over three successive readings (pH within 0.1 unit, conductivity within 3 percent, temperature within 3 percent [minimum 0.2 degree Celsius], and turbidity within 10 percent or three consecutive readings of less than 10 Nephelometric Turbidity Units [NTUs]) groundwater samples were collected. Analytical samples were collected in decreasing order of volatility by transferring water directly from the pump tubing into laboratory-supplied containers. Final water quality parameters from the July and September 2018 sampling events are listed on Tables 1.1 and 1.2, respectively.

Investigation Derived Waste Disposal

Investigation derived waste (IDW) from this project consisted of purge and decontamination water from the two sampling events which are containerized in labeled 5-gallon buckets and stored on site pending results. With ADEC approval, the purge and decontamination water from Monitoring Well B5MW was discharged to an unpaved portion of the property.

LABORATORY ANALYSES

The groundwater samples were delivered to SGS using chain-of-custody procedures. The samples were analyzed for DRO by Alaska Method (AK) 102, residual range organics (RRO) by AK 103, and polynuclear aromatic hydrocarbons (PAHs) by Environmental Protection Agency (EPA) Method 8270D selective ion method (SIM). The laboratory reports and completed ADEC Laboratory Data Review Checklists 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 (September 2018). The cleanup levels and analytical results for the July and September 2018 sampling events are provided in Tables 2.1 and 2.2, respectively.

July 2018 Sampling Event

Duplicate Sample Set B5MW/B15MW, collected from Monitoring Well B5MW, contained concentrations of DRO (maximum of 839 µg/L) and RRO (maximum of 259 µg/L) less than the ADEC Table C cleanup levels of 1,500 µg/L and 1,100 µg/L, respectively. Five PAHs were also detected at concentrations less than the respective ADEC Table C cleanup levels. The remaining analytes were not detected.

September 2018 Sampling Event

Duplicate Sample Set B5MW/B15MW, collected from Monitoring Well B5MW, contained concentrations of DRO (maximum of 396 µg/L) and six PAHs less than the respective ADEC Table C cleanup levels. The remaining analytes were not detected.

QUALITY ASSURANCE SUMMARY

The project laboratory 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, matrix spike/matrix spike duplicates (MS/MSD), 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).

External quality controls included one groundwater primary/duplicate sample set (B5MW/B15MW) for each sampling event to assess precision of the sampling and analysis process using the calculated relative percent difference (RPD). The RPD for DRO between the primary/duplicate for the September 2018 sampling event was greater than the recommended DQO of 30 percent. Because the concentrations are below the ADEC cleanup level, it is our opinion that the RPD failure does not impact data usability for this project. The affected data are “E”-flagged in Table 2.2.

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.

SUMMARY

Analytical groundwater samples collected from Well B5MW on July 2 and September 28, 2018 did not contain concentrations of target analytes greater than the respective ADEC Table C cleanup levels. Groundwater was not present in Wells B6MW or B7MW.

Although impacted soil remains on site, it does not appear to extend off site. Groundwater samples have not contained target analyte concentrations in excess of the ADEC cleanup levels in on-property Well B5MW. We therefore recommend that the site be considered for closure with institutional controls.

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 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.

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.

Begich Towers, Inc.
Attn: Dr. Karen Dempster
December 17, 2018
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SHANNON & WILSON, INC.

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.

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:

Handwritten signature of Jake Kesler in blue ink.

Jake Kesler
Environmental Scientist

Reviewed by:

Handwritten signature of Dan McMahon in blue ink.

Dan McMahon
Associate

Encl: Tables 1.1, 1.2, 2.1 and 2.2, Figures 1 and 2, and Attachments 1 through 3

TABLE 1.1
JULY 2018 GROUNDWATER SAMPLING LOG

	Monitoring Well Number		
	B5MW	B6MW	B7MW
Water Level Measurement Data			
Date Water Level Measured	7/2/2018	7/2/2018	7/2/2018
Time Water Level Measured	11:30	11:20	11:25
Measured Depth to Water (ft below TOC)	13.70	-	-
Purging/Sampling Data			
Date Sampled	7/2/2018	NS	NS
Time Sampled	12:16	NS	NS
Measured Depth to Water (ft below TOC)	13.70	-	-
Total Depth of Well (ft below TOC)	18.49	19.70	20.34
Water Column in Well (ft)	4.79	-	-
Gallons per Foot	0.16	0.16	0.16
Water Column Volume (gallons)	0.77	-	-
Total Volume Pumped (gallons)	1.4	0.0	0.0
Sampling Method	Submersible Pump	NS	NS
Diameter of Well Casing	2-inch	2-inch	2-inch
Water Quality Data			
Temperature (°C)	11.4	-	-
Specific Conductance (µS/cm)	67	-	-
pH (Standard Units)	6.08	-	-
Turbidity (NTU)	63.2	-	-
Remarks	Duplicate Sample "B15MW"	No water in well	No water in well

Notes: Water quality parameters were measured with a Hanna water quality instrument and MicroTPW Turbidimeter.

- = not applicable or not tested for this parameter

NS = Not Sampled

TOC = top of casing

°C = degrees Celsius

ft = feet

µS/cm = microsiemens per centimeter

mg/L = milligrams per liter

NTU = nephelometric turbidity units

TABLE 1.2
SEPTEMBER 2018 GROUNDWATER SAMPLING LOG

	Monitoring Well Number		
	B5MW	B6MW	B7MW
Water Level Measurement Data			
Date Water Level Measured	9/28/2018	9/28/2018	9/28/2018
Time Water Level Measured	11:05	10:50	10:45
Measured Depth to Water (ft below TOC)	14.65	-	-
Purging/Sampling Data			
Date Sampled	9/28/2018	NS	NS
Time Sampled	11:39	NS	NS
Measured Depth to Water (ft below TOC)	14.65	-	-
Total Depth of Well (ft below TOC)	18.75	19.70	20.34
Water Column in Well (ft)	4.10	-	-
Gallons per Foot	0.16	0.16	0.16
Water Column Volume (gallons)	0.66	-	-
Total Volume Pumped (gallons)	1.5	0.0	0.0
Sampling Method	Submersible Pump	NS	NS
Diameter of Well Casing	2-inch	2-inch	2-inch
Water Quality Data			
Temperature (°C)	11.1	-	-
Specific Conductance (µS/cm)	109	-	-
pH (Standard Units)	8.30	-	-
Turbidity (NTU)	8.98	-	-
Remarks	Duplicate Sample "B15MW"	No water in well	No water in well

Notes: Water quality parameters were measured with a Hanna water quality instrument and MicroTPW Turbidimeter.

- = not applicable or not tested for this parameter

NS = Not Sampled

TOC = top of casing

°C = degrees Celsius

ft = feet

µS/cm = microsiemens per centimeter

mg/L = milligrams per liter

NTU = nephelometric turbidity units

TABLE 2.1
SUMMARY OF JULY 2018 WATER ANALYTICAL RESULTS

Parameter Tested	Method*	Cleanup Level (µg/L)**	Sample ID Number^ and Water Depth in Feet BTOC (See Table 1.1 and Figure 2)	
			Monitoring Well	
			B5MW 13.70	B15MW~ 13.70
Diesel Range Organics (DRO) - µg/L	AK 102	1,500	839	685
Residual Range Organics (RRO) - µg/L	AK 103	1,100	259 J	<250
Polynuclear Aromatic Hydrocarbons (PAH) - µg/L				
Acenaphthene - µg/L	EPA 8270D SIM	530	0.158	0.150
Fluoranthene - µg/L	EPA 8270D SIM	260	0.0696	0.0762
Fluorene - µg/L	EPA 8270D SIM	290	0.586	0.587
Phenanthrene - µg/L	EPA 8270D SIM	170	0.164	0.168
Pyrene - µg/L	EPA 8270D SIM	120	0.123	0.129
Other PAHs - µg/L	EPA 8270D SIM	Various	ND	ND

Notes:

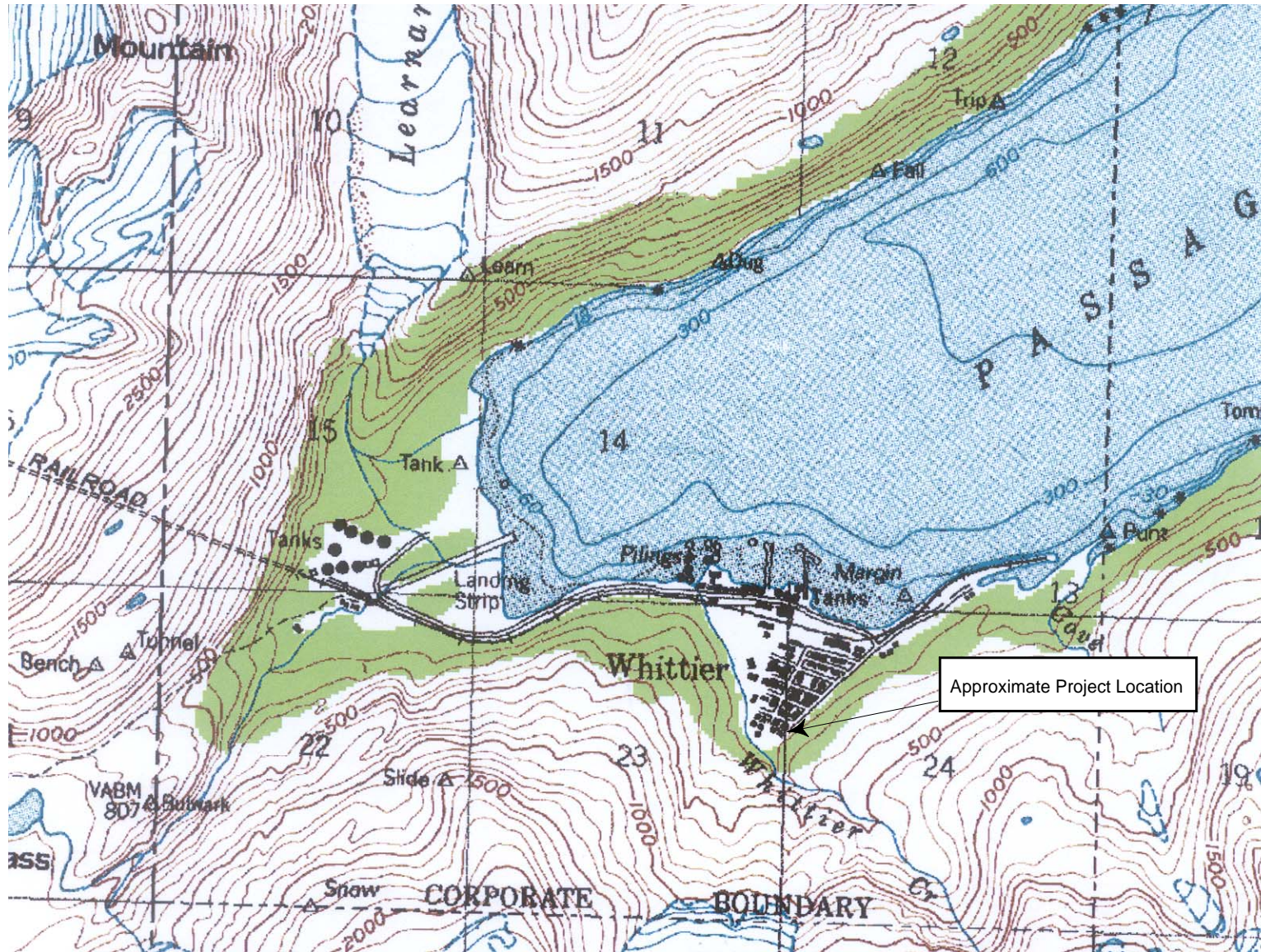
- * = See Attachment 2 for compounds tested, methods, and laboratory reporting limits
- ** = Groundwater cleanup levels are listed in Table C, 18 AAC 75.345 (September 2018)
- ^ = Sample ID number preceded by "100705-" on the chain of custody form
- µg/L = Micrograms per liter
- <250 = Analyte not detected; laboratory limit of detection of 250 µg/L
- 839** = Analyte detected
- = Not applicable or sample not tested for this analyte
- ~ = Field duplicate of Sample B5MW
- 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 2.2
SUMMARY OF 2018 SEPTEMBER WATER ANALYTICAL RESULTS

Parameter Tested	Method*	Cleanup Level (µg/L)**	Sample ID Number^ and Water Depth in Feet BTOC (See Table 1.2 and Figure 2)	
			Monitoring Well	
			B5MW 14.65	B15MW~ 14.65
Diesel Range Organics (DRO) - µg/L	AK 102	1,500	252 J, E	396 J, E
Residual Range Organics (RRO) - µg/L	AK 103	1,100	<245	<250
Polynuclear Aromatic Hydrocarbons (PAH) - µg/L				
Acenaphthene - µg/L	EPA 8270D SIM	530	0.0393 J	0.0367 J
Benzo(a)Anthracene - µg/L	EPA 8270D SIM	0.30	0.0411 J	<0.0250
Fluoranthene - µg/L	EPA 8270D SIM	260	0.128	0.107
Fluorene - µg/L	EPA 8270D SIM	290	0.243	0.204
Phenanthrene - µg/L	EPA 8270D SIM	170	0.0611	0.0525
Pyrene - µg/L	EPA 8270D SIM	120	0.353	0.302
Other PAHs - µg/L	EPA 8270D SIM	Various	ND	ND

Notes:

- * = See Attachment 2 for compounds tested, methods, and laboratory reporting limits
- ** = Groundwater cleanup levels are listed in Table C, 18 AAC 75.345 (September 2018)
- ^ = Sample ID number preceded by "100705-" on the chain of custody form
- µg/L = Micrograms per liter
- <245 = Analyte not detected; laboratory limit of detection of 245 µg/L
- 252** = Analyte detected
- = Not applicable or sample not tested for this analyte
- ~ = Field duplicate of Sample B5MW
- 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
- E** = Estimated concentration due to RPD QC failure. See laboratory data review checklist in Attachment 2 for more details.



Elevation in Feet
 Contour Interval 100 Feet
 Taken from Seward D-5 SE
 U.S. Geological Survey Quadrangle

0 0.5 Mile 1.0 Mile
 APPROXIMATE SCALE IN FEET



100 Kenai Street
 Whittier, Alaska

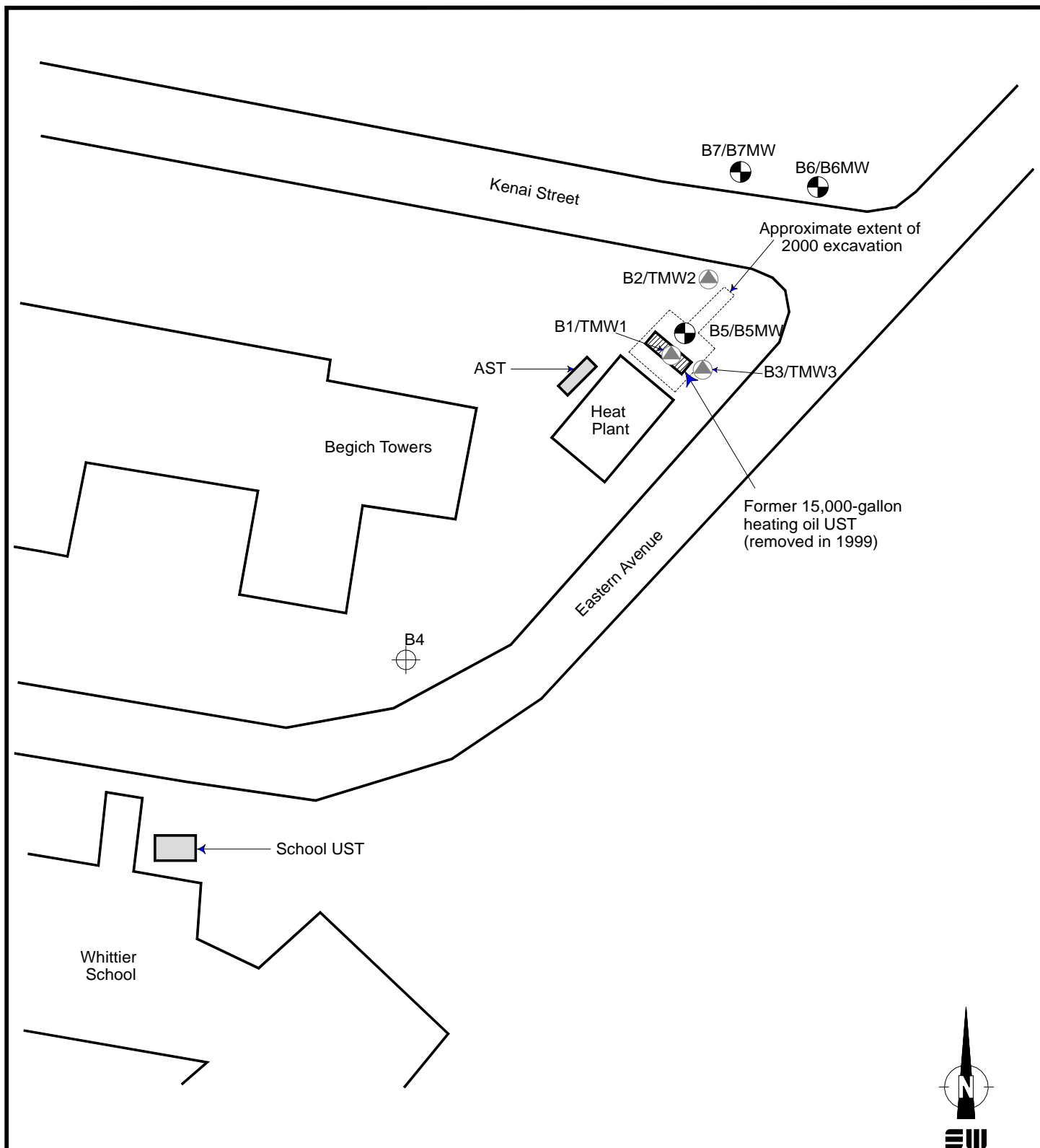
VICINITY MAP

December 2018


100705-001


SHANNON & WILSON, INC.
 Geotechnical & Environmental Consultants


Fig. 1



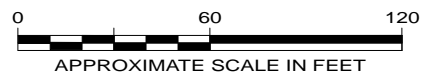
LEGEND

- 

B4
 Approximate location of Boring B4 advanced by Shannon & Wilson in November 2016.
- 

B1/TMW1
 Approximate location of Boring/Temporary Monitoring Well B1/TMW1 advanced/installed by Shannon & Wilson in November 2016.
- 

B5/B5MW
 Approximate location of Boring/Monitoring Well B5/B5MW advanced/installed by Shannon & Wilson in July 2017.
- AST = Aboveground Storage Tank
- UST = Underground Storage Tank



100 Kenai Street Whittier, Alaska	
SITE PLAN	
December 2018	100705-001
 SHANNON & WILSON, INC. Geotechnical & Environmental Consultants	
Fig. 2	

ATTACHMENT 1

FIELD NOTES

LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 100705-001 Location: Bayich Towers Weather: 57°F Sunny
Well No.: B5MW
Date: 7/2/18 Time Started: 11:30 Time Completed: 12:45
Develop Date: — Develop End Time: — (24 hour break)

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 11:30 Date of Depth Measurement: 7/2/18
Measuring Point (MP): Top of PVC Casing / Top of Steel Protective Casing / Other: —
Diameter of Casing: 2" Well Screen Interval: —
Total Depth of Well Below MP: 18.49 Product Thickness, if noted: —
Depth-to-Water (DTW) Below MP: 13.70
Water Column in Well: 4.79 (Total Depth of Well Below MP - DTW Below MP)
Gallons per foot: 0.16
Gallons in Well: 0.77 (Water Column in Well x Gallons per foot)

PURGING DATA

Date Purged: 7/2/18 Time Started: 11:40 Time Completed: 12:40
Three Well Volumes: 2.31 (Gallons in Well x 3)
Gallons Purged: 1.4 Depth of Pump (generally 2 ft from bottom): 14.70
* Max. Drawdown (generally 0.3 ft): 0.9 Pump Rate: 0.5, 0.1 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)
11:42	0.1	0.5	13.70	0.0	8.85	129	1.81	6.53	162.3	182.3
11:45	0.4	0.5	14.60	0.9	8.60	71	—	5.40	—	128.7
11:48	0.6	0.1	14.60	0.9	8.61	83	—	5.30	—	110.2
11:51	0.8	0.1	14.51	0.81	8.63	72	—	5.16	—	90.4
11:54	0.9	0.1	14.35	0.65	9.37	61	—	5.13	—	87.12
11:57	1.0	0.1	14.30	0.6	10.44	59	—	5.37	—	80.22

SAMPLING DATA

Odor: none Color: clear
Sample Designation: 100705-B5MW Time / Date: 12:16 7/2/18
QC Sample Designation: 100705-B5MW Time / Date: 12:30 7/2/18
QA Sample Designation: — Time / Date: —

Evacuation Method: Submersible Pump / Other: —
Sampling Method: Submersible Pump / Other: mini-whale

Water Quality Instruments Used/Manufacturer/Model Number YSI 556, turbid. meter

Calibration Info (Time, Ranges, etc) calibrated @ 11:30 7/2/18

* Remarks: Flow rate reduced to 0.1 L/min to minimize drawdown

Sampling Personnel: SSK

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.

Job No: 100705-001 Location: 100 Kenai St. Site: Beigh Towers
Well No.: B5 MW
Date: 7/2/18

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

Page 2

LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 100705-001

Location: Bagich Towers

Weather: 57°F Sunny

Well No.: B6MW

Date: 7/2/18

Time Started: 11:20

Time Completed: 11:20

Develop Date: -

Develop End Time: -

(24 hour break)

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 11:20

Date of Depth Measurement: 7/2/18

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

Diameter of Casing: 2"

Well Screen Interval: -

Total Depth of Well Below MP: 19.70

Product Thickness, if noted: -

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

Water Column in Well: -

(Total Depth of Well Below MP - DTW Below MP)

Gallons per foot: 0.16

Gallons in Well: 0.0

(Water Column in Well x Gallons per foot)

PURGING DATA

Date Purged: _____ Time Started: _____ Time Completed: _____

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

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

Max. Drawdown (generally 0.3 ft): _____ Pump Rate: _____

Well Purged Dry: Yes ☐ No ☐ (If yes, use Well Purged Dry Log)

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

SAMPLING DATA

Odor: _____ Color: _____

Sample Designation: _____ Time / Date: _____

QC Sample Designation: _____ Time / Date: _____

QA Sample Designation: _____ Time / Date: _____

Evacuation Method: Submersible Pump / Other: _____

Sampling Method: Submersible Pump / Other: _____

Water Quality Instruments Used/Manufacturer/Model Number _____

Calibration Info (Time, Ranges, etc) _____

Remarks: No water in well.

Sampling Personnel: SSK

WELL CASING VOLUMES (GAL/FT): 1" = 0.04 2" = 0.16 4" = 0.65

ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23

LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 100705-001

Location: Beigich Towers

Weather: 57°F Sunny

Well No.: B7/MW

Date: 7/2/18

Time Started: 11:25

Time Completed: 11:25

Develop Date: -

Develop End Time: -

(24 hour break)

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 11:25

Date of Depth Measurement: 7/2/18

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

Diameter of Casing: 2"

Well Screen Interval: -

Total Depth of Well Below MP: 20.34

Product Thickness, if noted: -

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

Water Column in Well: -

(Total Depth of Well Below MP - DTW Below MP)

Gallons per foot: 0.16

Gallons in Well: 0.0

(Water Column in Well x Gallons per foot)

PURGING DATA

Date Purged: - Time Started: - Time Completed: -

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

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

Max. Drawdown (generally 0.3 ft): - Pump Rate: -

Well Purged Dry: Yes ☐ No ☐ (If yes, use Well Purged Dry Log)

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

SAMPLING DATA

Odor: - Color: -

Sample Designation: - Time / Date: -

QC Sample Designation: - Time / Date: -

QA Sample Designation: - Time / Date: -

Evacuation Method: Submersible Pump / Other: -

Sampling Method: Submersible Pump / Other: -

Water Quality Instruments Used/Manufacturer/Model Number: -

Calibration Info (Time, Ranges, etc): -

Remarks: No water in well.

Sampling Personnel: JSK

WELL CASING VOLUMES (GAL/FT): 1" = 0.04 2" = 0.16 4" = 0.65

ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23

FIELD ACTIVITIES DAILY LOG

Date 7/2/18

Sheet 1 of 1

Project No. 100705-001

Project Name: Beigich Towers, 100 Kenai St, Whittier, Alaska

Field activity subject: Groundwater Sampling

Description of daily activities and events:

- 10:30 - arrive at whittier tunnel
- 10:45 - well recon
 - found wells: B5MW, B6MW, B7MW + soil + water drums
 - Soil drums: B5, B6, B7
 - Pump water drums: B5MW
- 11:15 - calibrate YSI + turbidimeter
- Wells B6MW + B7MW dry - no sample
- 11:30 - begin ~~sample~~ pumping B5MW
- Sample 100705-B5MW @ 12:16
- Stop @ 12:30
- 12:45 - finish sampling
- 13:00 - dump B6 + B7 soil cuttings + take drums to Stew
- 14:15 - depart for Stew, SAS to drop samples off

Visitors on site: _____

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

Weather conditions: 60°F Sunny

Important telephone calls: _____

Personnel on site: JK

Signature: [Signature]

Date: 7/2/18

LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 100705-001 Location: Bogach towers Weather: 50°F overcast
Well No.: BSMW
Date: 9/28/18 Time Started: 11:00 Time Completed: 12:15
Develop Date: — Develop End Time: — (24 hour break)

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 11:05 Date of Depth Measurement: 9/28/18
Measuring Point (MP): Top of PVC Casing / Top of Steel Protective Casing / Other: —
Diameter of Casing: 2" Well Screen Interval: —
Total Depth of Well Below MP: 18.75 Product Thickness, if noted: —
Depth-to-Water (DTW) Below MP: 14.65
Water Column in Well: 4.10 (Total Depth of Well Below MP - DTW Below MP)
Gallons per foot: 0.16
Gallons in Well: 0.66 (Water Column in Well x Gallons per foot)

PURGING DATA

Date Purged: 9/28/18 Time Started: 11:18 Time Completed: 12:00
Three Well Volumes: 1.98 (Gallons in Well x 3)
Gallons Purged: 1.5 Depth of Pump (generally 2 ft from bottom): 15.65 ft.
Max. Drawdown (generally 0.3 ft): 0.04 Pump Rate: 0.3 L/min
Well Purged Dry: Yes ☐ No ☒ (If yes, use Well Purged Dry Log)

Time:	Gallons:	Pump Rate (L/min):	DTW (ft BMP):	Drawdown (ft):	Temp: (°C)	Sp. Cond.: (uS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (NTU)
11:20	0.2	0.3	14.65	0.0	11.2	120	—	8.13	—	15.3
11:23	0.4	0.3	14.67	0.02	11.2	112	—	8.10	—	65.27
11:26	0.6	0.3	14.67	0.02	11.1	117	—	8.20	—	24.68
11:29	0.8	0.3	14.69	0.04	11.1	110	—	8.27	—	18.72
11:32	1.0	0.3	14.69	0.04	11.1	111	—	8.29	—	9.21
11:35	1.3	0.3	14.69	0.04	11.1	110	—	8.30	—	9.10
11:38	1.5	0.3	14.69	0.04	11.1	109	—	8.30	—	8.98

SAMPLING DATA

Odor: none Color: slightly orange
Sample Designation: 100705-BSMW Time / Date: 11:39 9/28/18
QC Sample Designation: 100705-BSMW Time / Date: 11:50 9/28/18
QA Sample Designation: — Time / Date: —

Evacuation Method: Submersible Pump / Other: —

Sampling Method: Submersible Pump / Other: —

Water Quality Instruments Used/Manufacturer/Model Number Hanna sticks

Calibration Info (Time, Ranges, etc) Calibrated 0800 9/28/18

Remarks: NRC picked up soil from BS @ 10:00 9/28/18

Sampling Personnel: JJK

WELL CASING VOLUMES (GAL/FT): 1" = 0.04 2" = 0.16 4" = 0.65

ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23

LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 100705-001

Location: Beach Towers

Weather: 50°F overcast

Well No.: B6 MW

Date: 9/28/18

Time Started: 10:50

Time Completed: 10:50

Develop Date: -

Develop End Time: -

(24 hour break)

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 10:50

Date of Depth Measurement: 9/28/18

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

Diameter of Casing: 2"

Well Screen Interval: -

Total Depth of Well Below MP: 19.70

Product Thickness, if noted: -

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

Water Column in Well: -

(Total Depth of Well Below MP - DTW Below MP)

Gallons per foot: 0.16

Gallons in Well: 0.0

(Water Column in Well x Gallons per foot)

PURGING DATA

Date Purged: - Time Started: - Time Completed: -

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

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

Max. Drawdown (generally 0.3 ft): - Pump Rate: -

Well Purged Dry: Yes ☐ No ☐ (If yes, use Well Purged Dry Log)

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

SAMPLING DATA

Odor: - Color: -

Sample Designation: - Time / Date: -

QC Sample Designation: - Time / Date: -

QA Sample Designation: - Time / Date: -

Evacuation Method: Submersible Pump / Other: -

Sampling Method: Submersible Pump / Other: -

Water Quality Instruments Used/Manufacturer/Model Number -

Calibration Info (Time, Ranges, etc) -

Remarks: No water in well.

Sampling Personnel: SSK

WELL CASING VOLUMES (GAL/FT): 1" = 0.04 2" = 0.16 4" = 0.65

ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23

LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 100705-001

Location: Bigich Towers

Weather: 50°F overcast

Well No.: B7MW

Date: 9/28/18

Time Started: 10:45

Time Completed: 10:45

Develop Date: —

Develop End Time: —

(24 hour break)

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 10:45

Date of Depth Measurement: 9/28/18

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

Diameter of Casing: 2"

Well Screen Interval: —

Total Depth of Well Below MP: 20.34

Product Thickness, if noted: —

Depth-to-Water (DTW) Below MP: —

Water Column in Well: —

(Total Depth of Well Below MP - DTW Below MP)

Gallons per foot: 0.16

Gallons in Well: 0.0

(Water Column in Well x Gallons per foot)

PURGING DATA

Date Purged: — Time Started: — Time Completed: —

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

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

Max. Drawdown (generally 0.3 ft): — Pump Rate: —

Well Purged Dry: Yes ☐ No ☐ (If yes, use Well Purged Dry Log)

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

SAMPLING DATA

Odor: — Color: —

Sample Designation: — Time / Date: —

QC Sample Designation: — Time / Date: —

QA Sample Designation: — Time / Date: —

Evacuation Method: Submersible Pump / Other: —

Sampling Method: Submersible Pump / Other: —

Water Quality Instruments Used/Manufacturer/Model Number —

Calibration Info (Time, Ranges, etc) —

Remarks: No water in well.

Sampling Personnel: JJK

WELL CASING VOLUMES (GAL/FT): 1" = 0.04 2" = 0.16 4" = 0.65

ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23

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)433-3226

Report Number: **1183350**

Client Project: **100705-001 Begich Towers**

Dear Jake Kesler,

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

If there are any questions about the report or services performed during this project, please call 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 Vlahovich
Project Manager
Jillian.Vlahovich@sgs.com

Date

Case Narrative

SGS Client: **Shannon & Wilson, Inc.**
SGS Project: **1183350**
Project Name/Site: **100705-001 Begich Towers**
Project Contact: **Jake Kesler**

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: 07/10/2018 12:33:28PM

Report of Manual Integrations

<u>Laboratory ID</u>	<u>Client Sample ID</u>	<u>Analytical Batch</u>	<u>Analyte</u>	<u>Reason</u>
8270D SIM LV (PAH)				
1183350001	100705-B5MW	XMS10877	Acenaphthene	SP
1183350002	100705-B15MW	XMS10877	Acenaphthene	SP

Manual Integration Reason Code Descriptions

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

All DRO/RRO analysis are integrated per SOP.

Print Date: 07/10/2018 12:33:29PM

Laboratory Qualifiers

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

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

SGS maintains a formal Quality Assurance/Quality Control (QA/QC) program. A copy of our Quality Assurance Plan (QAP), which outlines this program, is available at your request. The laboratory certification numbers are AK00971 DW Chemistry (Provisionally Certified as of 06/11/2018 for Mercury by EPA245.1, Beryllium and Copper by EPA200.8) & 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). 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>
18KSWW-5 MS	1183346002	07/01/2018	07/02/2018	Water (Surface, Eff., Ground)

<u>Method</u>	<u>Method Description</u>
8270D SIM LV (PAH)	8270 PAH SIM GC/MS Liq/Liq ext. LV
AK102	DRO/RRO Low Volume Water
AK103	DRO/RRO Low Volume Water

100705-B5MW	1183350001	07/02/2018	07/02/2018	Water (Surface, Eff., Ground)
100705-B15MW	1183350002	07/02/2018	07/02/2018	Water (Surface, Eff., Ground)

<u>Method</u>	<u>Method Description</u>
8270D SIM LV (PAH)	8270 PAH SIM GC/MS Liq/Liq ext. LV
AK102	DRO/RRO Low Volume Water
AK103	DRO/RRO Low Volume Water

Print Date: 07/10/2018 12:33:31PM

Detectable Results Summary

Client Sample ID: **100705-B5MW**

Lab Sample ID: 1183350001

Polynuclear Aromatics GC/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Acenaphthene	0.158	ug/L
Fluoranthene	0.0696	ug/L
Fluorene	0.586	ug/L
Phenanthrene	0.164	ug/L
Pyrene	0.123	ug/L
Diesel Range Organics	0.839	mg/L
Residual Range Organics	0.259J	mg/L

Semivolatile Organic Fuels

Client Sample ID: **100705-B15MW**

Lab Sample ID: 1183350002

Polynuclear Aromatics GC/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Acenaphthene	0.150	ug/L
Fluoranthene	0.0762	ug/L
Fluorene	0.587	ug/L
Phenanthrene	0.168	ug/L
Pyrene	0.129	ug/L
Diesel Range Organics	0.685	mg/L

Semivolatile Organic Fuels

Results of 100705-B5MW

Client Sample ID: **100705-B5MW**
 Client Project ID: **100705-001 Begich Towers**
 Lab Sample ID: 1183350001
 Lab Project ID: 1183350

Collection Date: 07/02/18 12:16
 Received Date: 07/02/18 15:52
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by Polynuclear Aromatics GC/MS

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
1-Methylnaphthalene	0.0236 U	0.0472	0.0142	ug/L	1		07/09/18 16:30
2-Methylnaphthalene	0.0236 U	0.0472	0.0142	ug/L	1		07/09/18 16:30
Acenaphthene	0.158	0.0472	0.0142	ug/L	1		07/09/18 16:30
Acenaphthylene	0.0236 U	0.0472	0.0142	ug/L	1		07/09/18 16:30
Anthracene	0.0236 U	0.0472	0.0142	ug/L	1		07/09/18 16:30
Benzo(a)Anthracene	0.0236 U	0.0472	0.0142	ug/L	1		07/09/18 16:30
Benzo[a]pyrene	0.00945 U	0.0189	0.00585	ug/L	1		07/09/18 16:30
Benzo[b]Fluoranthene	0.0236 U	0.0472	0.0142	ug/L	1		07/09/18 16:30
Benzo[g,h,i]perylene	0.0236 U	0.0472	0.0142	ug/L	1		07/09/18 16:30
Benzo[k]fluoranthene	0.0236 U	0.0472	0.0142	ug/L	1		07/09/18 16:30
Chrysene	0.0236 U	0.0472	0.0142	ug/L	1		07/09/18 16:30
Dibenzo[a,h]anthracene	0.00945 U	0.0189	0.00585	ug/L	1		07/09/18 16:30
Fluoranthene	0.0696	0.0472	0.0142	ug/L	1		07/09/18 16:30
Fluorene	0.586	0.0472	0.0142	ug/L	1		07/09/18 16:30
Indeno[1,2,3-c,d] pyrene	0.0236 U	0.0472	0.0142	ug/L	1		07/09/18 16:30
Naphthalene	0.0471 U	0.0943	0.0292	ug/L	1		07/09/18 16:30
Phenanthrene	0.164	0.0472	0.0142	ug/L	1		07/09/18 16:30
Pyrene	0.123	0.0472	0.0142	ug/L	1		07/09/18 16:30
Surrogates							
2-Methylnaphthalene-d10 (surr)	82.8	47-106		%	1		07/09/18 16:30
Fluoranthene-d10 (surr)	77.7	24-116		%	1		07/09/18 16:30

Batch Information

Analytical Batch: XMS10877
 Analytical Method: 8270D SIM LV (PAH)
 Analyst: BMZ
 Analytical Date/Time: 07/09/18 16:30
 Container ID: 1183350001-C

Prep Batch: XXX39825
 Prep Method: SW3520C
 Prep Date/Time: 07/03/18 08:03
 Prep Initial Wt./Vol.: 265 mL
 Prep Extract Vol: 1 mL

Results of 100705-B5MW

Client Sample ID: **100705-B5MW**
 Client Project ID: **100705-001 Begich Towers**
 Lab Sample ID: 1183350001
 Lab Project ID: 1183350

Collection Date: 07/02/18 12:16
 Received Date: 07/02/18 15:52
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by Semivolatile Organic Fuels

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Diesel Range Organics	0.839	0.577	0.173	mg/L	1		07/05/18 14:23
Surrogates							
5a Androstane (surr)	103	50-150		%	1		07/05/18 14:23

Batch Information

Analytical Batch: XFC14362
 Analytical Method: AK102
 Analyst: CMS
 Analytical Date/Time: 07/05/18 14:23
 Container ID: 1183350001-A

Prep Batch: XXX39827
 Prep Method: SW3520C
 Prep Date/Time: 07/03/18 08:48
 Prep Initial Wt./Vol.: 260 mL
 Prep Extract Vol: 1 mL

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Residual Range Organics	0.259 J	0.481	0.144	mg/L	1		07/05/18 14:23
Surrogates							
n-Triacontane-d62 (surr)	107	50-150		%	1		07/05/18 14:23

Batch Information

Analytical Batch: XFC14362
 Analytical Method: AK103
 Analyst: CMS
 Analytical Date/Time: 07/05/18 14:23
 Container ID: 1183350001-A

Prep Batch: XXX39827
 Prep Method: SW3520C
 Prep Date/Time: 07/03/18 08:48
 Prep Initial Wt./Vol.: 260 mL
 Prep Extract Vol: 1 mL

Results of 100705-B15MW

Client Sample ID: **100705-B15MW**
 Client Project ID: **100705-001 Begich Towers**
 Lab Sample ID: 1183350002
 Lab Project ID: 1183350

Collection Date: 07/02/18 12:30
 Received Date: 07/02/18 15:52
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by Polynuclear Aromatics GC/MS

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
1-Methylnaphthalene	0.0250 U	0.0500	0.0150	ug/L	1		07/09/18 16:50
2-Methylnaphthalene	0.0250 U	0.0500	0.0150	ug/L	1		07/09/18 16:50
Acenaphthene	0.150	0.0500	0.0150	ug/L	1		07/09/18 16:50
Acenaphthylene	0.0250 U	0.0500	0.0150	ug/L	1		07/09/18 16:50
Anthracene	0.0250 U	0.0500	0.0150	ug/L	1		07/09/18 16:50
Benzo(a)Anthracene	0.0250 U	0.0500	0.0150	ug/L	1		07/09/18 16:50
Benzo[a]pyrene	0.0100 U	0.0200	0.00620	ug/L	1		07/09/18 16:50
Benzo[b]Fluoranthene	0.0250 U	0.0500	0.0150	ug/L	1		07/09/18 16:50
Benzo[g,h,i]perylene	0.0250 U	0.0500	0.0150	ug/L	1		07/09/18 16:50
Benzo[k]fluoranthene	0.0250 U	0.0500	0.0150	ug/L	1		07/09/18 16:50
Chrysene	0.0250 U	0.0500	0.0150	ug/L	1		07/09/18 16:50
Dibenzo[a,h]anthracene	0.0100 U	0.0200	0.00620	ug/L	1		07/09/18 16:50
Fluoranthene	0.0762	0.0500	0.0150	ug/L	1		07/09/18 16:50
Fluorene	0.587	0.0500	0.0150	ug/L	1		07/09/18 16:50
Indeno[1,2,3-c,d] pyrene	0.0250 U	0.0500	0.0150	ug/L	1		07/09/18 16:50
Naphthalene	0.0500 U	0.100	0.0310	ug/L	1		07/09/18 16:50
Phenanthrene	0.168	0.0500	0.0150	ug/L	1		07/09/18 16:50
Pyrene	0.129	0.0500	0.0150	ug/L	1		07/09/18 16:50
Surrogates							
2-Methylnaphthalene-d10 (surr)	75.7	47-106		%	1		07/09/18 16:50
Fluoranthene-d10 (surr)	73.2	24-116		%	1		07/09/18 16:50

Batch Information

Analytical Batch: XMS10877
 Analytical Method: 8270D SIM LV (PAH)
 Analyst: BMZ
 Analytical Date/Time: 07/09/18 16:50
 Container ID: 1183350002-C

Prep Batch: XXX39825
 Prep Method: SW3520C
 Prep Date/Time: 07/03/18 08:03
 Prep Initial Wt./Vol.: 250 mL
 Prep Extract Vol: 1 mL

Results of 100705-B15MW

Client Sample ID: **100705-B15MW**
 Client Project ID: **100705-001 Begich Towers**
 Lab Sample ID: 1183350002
 Lab Project ID: 1183350

Collection Date: 07/02/18 12:30
 Received Date: 07/02/18 15:52
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by Semivolatile Organic Fuels

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Diesel Range Organics	0.685	0.600	0.180	mg/L	1		07/05/18 14:33
Surrogates							
5a Androstane (surr)	104	50-150		%	1		07/05/18 14:33

Batch Information

Analytical Batch: XFC14362
 Analytical Method: AK102
 Analyst: CMS
 Analytical Date/Time: 07/05/18 14:33
 Container ID: 1183350002-A

Prep Batch: XXX39827
 Prep Method: SW3520C
 Prep Date/Time: 07/03/18 08:48
 Prep Initial Wt./Vol.: 250 mL
 Prep Extract Vol: 1 mL

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Residual Range Organics	0.250 U	0.500	0.150	mg/L	1		07/05/18 14:33
Surrogates							
n-Triacontane-d62 (surr)	106	50-150		%	1		07/05/18 14:33

Batch Information

Analytical Batch: XFC14362
 Analytical Method: AK103
 Analyst: CMS
 Analytical Date/Time: 07/05/18 14:33
 Container ID: 1183350002-A

Prep Batch: XXX39827
 Prep Method: SW3520C
 Prep Date/Time: 07/03/18 08:48
 Prep Initial Wt./Vol.: 250 mL
 Prep Extract Vol: 1 mL

Method Blank

Blank ID: MB for HBN 1781921 [XXX/39825]

Blank Lab ID: 1456850

QC for Samples:

1183350001, 1183350002

Matrix: Water (Surface, Eff., Ground)

Results by 8270D SIM LV (PAH)

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

Surrogates

2-Methylnaphthalene-d10 (surr)	80.7	47-106	%
Fluoranthene-d10 (surr)	78.3	24-116	%

Batch Information

Analytical Batch: XMS10877
 Analytical Method: 8270D SIM LV (PAH)
 Instrument: SVA Agilent 780/5975 GC/MS
 Analyst: BMZ
 Analytical Date/Time: 7/9/2018 12:03:00PM

Prep Batch: XXX39825
 Prep Method: SW3520C
 Prep Date/Time: 7/3/2018 8:03:26AM
 Prep Initial Wt./Vol.: 250 mL
 Prep Extract Vol: 1 mL

Blank Spike Summary

Blank Spike ID: LCS for HBN 1183350 [XXX39825]

Blank Spike Lab ID: 1456851

Date Analyzed: 07/09/2018 12:23

Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1183350001, 1183350002

Results by 8270D SIM LV (PAH)

Blank Spike (ug/L)

Parameter	Spike	Result	Rec (%)	CL
1-Methylnaphthalene	2	1.81	91	(41-115)
2-Methylnaphthalene	2	1.66	83	(39-114)
Acenaphthene	2	1.94	97	(48-114)
Acenaphthylene	2	1.83	92	(35-121)
Anthracene	2	1.77	89	(53-119)
Benzo(a)Anthracene	2	1.79	90	(59-120)
Benzo[a]pyrene	2	1.90	95	(53-120)
Benzo[b]Fluoranthene	2	1.85	92	(53-126)
Benzo[g,h,i]perylene	2	1.68	84	(44-128)
Benzo[k]fluoranthene	2	1.82	91	(54-125)
Chrysene	2	1.86	93	(57-120)
Dibenzo[a,h]anthracene	2	1.50	75	(44-131)
Fluoranthene	2	1.81	91	(58-120)
Fluorene	2	1.74	87	(50-118)
Indeno[1,2,3-c,d] pyrene	2	1.67	84	(48-130)
Naphthalene	2	1.76	88	(43-114)
Phenanthrene	2	1.72	86	(53-115)
Pyrene	2	1.88	94	(53-121)

Surrogates

2-Methylnaphthalene-d10 (surr)	2	83.9	84	(47-106)
Fluoranthene-d10 (surr)	2	82.8	83	(24-116)

Batch Information

Analytical Batch: XMS10877

Analytical Method: 8270D SIM LV (PAH)

Instrument: SVA Agilent 780/5975 GC/MS

Analyst: BMZ

Prep Batch: XXX39825

Prep Method: SW3520C

Prep Date/Time: 07/03/2018 08:03

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

Dupe Init Wt./Vol.: Extract Vol:

Print Date: 07/10/2018 12:33:35PM

Method Blank

Blank ID: MB for HBN 1781926 [XXX/39827]
Blank Lab ID: 1456876

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1183350001, 1183350002

Results by AK102

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Diesel Range Organics	0.300U	0.600	0.180	mg/L
Surrogates				
5a Androstane (surr)	93.2	60-120		%

Batch Information

Analytical Batch: XFC14362
Analytical Method: AK102
Instrument: Agilent 7890B R
Analyst: CMS
Analytical Date/Time: 7/5/2018 12:45:00PM

Prep Batch: XXX39827
Prep Method: SW3520C
Prep Date/Time: 7/3/2018 8:48:12AM
Prep Initial Wt./Vol.: 250 mL
Prep Extract Vol: 1 mL

Print Date: 07/10/2018 12:33:36PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1183350 [XXX39827]
 Blank Spike Lab ID: 1456877
 Date Analyzed: 07/05/2018 12:55

Spike Duplicate ID: LCSD for HBN 1183350
 [XXX39827]
 Spike Duplicate Lab ID: 1456878
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1183350001, 1183350002

Results by AK102

Parameter	Blank Spike (mg/L)			Spike Duplicate (mg/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Diesel Range Organics	20	20.1	100	20	20.4	102	(75-125)	1.50	(< 20)
Surrogates									
5a Androstane (surr)	0.4	113	113	0.4	116	116	(60-120)	3.10	

Batch Information

Analytical Batch: **XFC14362**
 Analytical Method: **AK102**
 Instrument: **Agilent 7890B R**
 Analyst: **CMS**

Prep Batch: **XXX39827**
 Prep Method: **SW3520C**
 Prep Date/Time: **07/03/2018 08:48**
 Spike Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL
 Dupe Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL

Print Date: 07/10/2018 12:33:38PM

Method Blank

Blank ID: MB for HBN 1781926 [XXX/39827]
Blank Lab ID: 1456876

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1183350001, 1183350002

Results by AK103

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Residual Range Organics	0.250U	0.500	0.150	mg/L
Surrogates				
n-Triacontane-d62 (surr)	96.1	60-120		%

Batch Information

Analytical Batch: XFC14362
Analytical Method: AK103
Instrument: Agilent 7890B R
Analyst: CMS
Analytical Date/Time: 7/5/2018 12:45:00PM

Prep Batch: XXX39827
Prep Method: SW3520C
Prep Date/Time: 7/3/2018 8:48:12AM
Prep Initial Wt./Vol.: 250 mL
Prep Extract Vol: 1 mL

Print Date: 07/10/2018 12:33:39PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1183350 [XXX39827]
 Blank Spike Lab ID: 1456877
 Date Analyzed: 07/05/2018 12:55

Spike Duplicate ID: LCSD for HBN 1183350
 [XXX39827]
 Spike Duplicate Lab ID: 1456878
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1183350001, 1183350002

Results by AK103

Parameter	Blank Spike (mg/L)			Spike Duplicate (mg/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Residual Range Organics	20	18.8	94	20	19.0	95	(60-120)	1.20	(< 20)
Surrogates									
n-Triacontane-d62 (surr)	0.4	108	108	0.4	109	109	(60-120)	1.50	

Batch Information

Analytical Batch: **XFC14362**
 Analytical Method: **AK103**
 Instrument: **Agilent 7890B R**
 Analyst: **CMS**

Prep Batch: **XXX39827**
 Prep Method: **SW3520C**
 Prep Date/Time: **07/03/2018 08:48**
 Spike Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL
 Dupe Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL

Print Date: 07/10/2018 12:33:40PM



e-Sample Receipt Form

SGS Workorder #:

1183350



1 1 8 3 3 5 0

Review Criteria		Condition (Yes, No, N/A)	Exceptions Noted below	
Chain of Custody / Temperature Requirements			<input checked="" type="checkbox"/> yes	Exemption permitted if sampler hand carries/delivers.
Were Custody Seals intact? Note # & location		<input type="text" value="n/a"/>		
COC accompanied samples?		<input checked="" type="checkbox"/> yes		
<input checked="" type="checkbox"/> yes **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)?	<input checked="" type="checkbox"/> yes	Cooler ID:	1	@ 5.1 °C Therm. ID: D35
	<input type="text" value="n/a"/>	Cooler ID:		@ °C Therm. ID:
	<input type="text" value="n/a"/>	Cooler ID:		@ °C Therm. ID:
	<input type="text" value="n/a"/>	Cooler ID:		@ °C Therm. ID:
	<input type="text" value="n/a"/>	Cooler ID:		@ °C Therm. ID:
*If >6°C, were samples collected <8 hours ago?		<input type="text" value="n/a"/>		
If <0°C, were sample containers ice free?		<input type="text" value="n/a"/>		
If samples received <u>without</u> a temperature blank, the "cooler temperature" will be documented in lieu of the temperature blank & "COOLER TEMP" will be noted to the right. In cases where neither a temp blank nor cooler temp can be obtained, note "ambient" or "chilled".				
Note: Identify containers received at non-compliant temperature . Use form FS-0029 if more space is needed.				
Holding Time / Documentation / Sample Condition Requirements				Note: Refer to form F-083 "Sample Guide" for specific holding times.
Were samples received within holding time?		<input checked="" type="checkbox"/> yes		
Do samples match COC** (i.e., sample IDs, dates/times collected)?		<input checked="" type="checkbox"/> yes		
**Note: If times differ <1hr, record details & login per COC.				
Were analyses requested unambiguous? (i.e., method is specified for analyses with >1 option for analysis)		<input checked="" type="checkbox"/> yes		
			<input type="text" value="n/a"/>	***Exemption permitted for metals (e.g. 200.8/6020A).
Were proper containers (type/mass/volume/preservative***) used?		<input checked="" type="checkbox"/> yes		
Volatile / LL-Hg Requirements				
Were Trip Blanks (i.e., VOAs, LL-Hg) in cooler with samples?		<input checked="" type="checkbox"/> yes		
Were all water VOA vials free of headspace (i.e., bubbles ≤ 6mm)?		<input type="text" value="n/a"/>		
Were all soil VOAs field extracted with MeOH+BFB?		<input checked="" type="checkbox"/> yes		
Note to Client: Any "No", answer above indicates non-compliance with standard procedures and may impact data quality.				
Additional notes (if applicable):				



Sample Containers and Preservatives

<u>Container Id</u>	<u>Preservative</u>	<u>Container Condition</u>	<u>Container Id</u>	<u>Preservative</u>	<u>Container Condition</u>
1183350001-A	HCL to pH < 2	OK			
1183350001-B	HCL to pH < 2	OK			
1183350001-C	No Preservative Required	OK			
1183350001-D	No Preservative Required	OK			
1183350002-A	HCL to pH < 2	OK			
1183350002-B	HCL to pH < 2	OK			
1183350002-C	No Preservative Required	OK			
1183350002-D	No Preservative Required	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.

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

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

LABORATORY DATA REVIEW CHECKLIST

Completed by: Jake Kesler

Title: Environmental Staff

Date: December 2018

CS Report Name: Groundwater Monitoring, Begich Towers, 100 Kenai Street, Whittier, Alaska

Laboratory Report Date: July 10, 2018

Consultant Firm: Shannon & Wilson Inc.

Laboratory Name: SGS North America Inc.

Laboratory Report Number: 1183350

ADEC File Number: 2114.26.002

ADEC RecKey Number: NA

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

1. Laboratory

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

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** (please explain)

Comments:

2. Chain of Custody (COC)

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

- b. Correct analyses requested? **Yes** / No / NA (please explain)

Comments:

3. Laboratory Sample Receipt Documentation

- a. Sample/cooler temperature documented and within range at receipt (0° to 6° C)? **Yes** / No / NA (please explain)

Comments: *The cooler Temperature blank was recorded at 5.1° C.*

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

Comments:

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

Comments:

- d. If there were any discrepancies, were they documented? – For example, incorrect sample containers/preservation, sample temperature outside acceptance range, insufficient or missing samples, etc.? **Yes** / No / **NA** (please explain)

Comments: *No discrepancies were noted.*

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

Comments:

4. Case Narrative

- a. Present and understandable? **Yes** / No / NA (please explain)

Comments:

- b. Discrepancies, errors, or QC failures identified by the lab? **Yes** / **No** / NA (please explain)

Comments: *The case narrative notes to refer to sample receipt form for information on sample condition.*

- c. Were corrective actions documented? **Yes** / **No** / NA (please explain)

Comments:

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

Comments: *The case narrative does not comment on data quality/usability.*

5. Sample Results

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

Comments:

- b. All applicable holding times met? **Yes** / No / NA (please explain)

Comments:

All soils reported on a dry weight basis? **Yes** / No / **NA** (please explain)

Comments:

- c. Are the reported LOQs less than the Cleanup Level or the minimum required detection level for the project? **Yes** / No / NA (please explain)

Comments:

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

Comments:

6. QC Samples

a. Method Blank

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

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

- i. Organics - One LCS/LCSD reported per matrix, analysis, and 20 samples?
(LCS/LCSD required per AK methods, LCS required per SW846) **Yes** / No / NA
(please explain)
Comments:
- ii. Metals/Inorganics - One LCS and one sample duplicate reported per matrix, analysis
and 20 samples? **Yes** / No / **NA** (please explain)
Comments:
- iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory
limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101
60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the
laboratory QC pages) **Yes** / No / NA (please explain)
Comments:
- iv. Precision – All relative percent differences (RPDs) reported and less than method or
laboratory limits? And project specified DQOs, if applicable. RPD reported from
LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods
20%, VOCs 20%; all other analyses see the laboratory QC pages) **Yes** / No / NA
(please explain)
Comments:
- v. If %R or RPD is outside of acceptable limits, what samples are affected? **NA**
Comments:

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

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

Comments:

- vii. Data quality or usability affected? Please explain. Yes / No / **NA** (please explain)

Comments:

c. Surrogates - Organics Only

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

Comments:

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

Comments:

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

Comments:

- iv. Data quality or usability affected? Please explain. Yes / No / **NA** (please explain)

Comments:

d. Trip Blank - Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.)

- i. One trip blank reported per matrix, analysis and cooler? (If not, enter explanation below.) Yes / **No** / NA (please explain)

Comments: *Volatile analysis were not analyzed; therefore, a trip blank was not submitted with the project samples.*

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

Comments:

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

Comments:

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

Comments:

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

Comments:

e. Field Duplicate

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

Yes / No / NA (please explain)

Comments:

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

Comments:

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

Comments:

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

Comments:

f. Decontamination or Equipment Blank (if not applicable)

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

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

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

Comments:

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

Comments:

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

Comments:

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

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

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

Laboratory Report of Analysis

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

Report Number: **1185577**

Client Project: **100705-001 Begich Tower**

Dear Jake Kesler,

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

If there are any questions about the report or services performed during this project, please call 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 Vlahovich
Project Manager
Jillian.Vlahovich@sgs.com

Date

Case Narrative

SGS Client: **Shannon & Wilson, Inc.**
SGS Project: **1185577**
Project Name/Site: **100705-001 Begich Tower**
Project Contact: **Jake Kesler**

Refer to sample receipt form for information on sample condition.

1185564002-H(1479313MS) (1479314) MS

8270D SIM - PAH MS recovery for several analytes does not meet QC criteria. Refer to the LCS for accuracy requirements.

1185564002-H(1479313MSD) (1479315) MSD

8270D SIM - PAH MSD recovery for several analytes does not meet QC criteria. Refer to the LCS for accuracy requirements.

*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: 10/12/2018 9:03:07AM

Laboratory Qualifiers

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

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

SGS maintains a formal Quality Assurance/Quality Control (QA/QC) program. A copy of our Quality Assurance Plan (QAP), which outlines this program, is available at your request. The laboratory certification numbers are AK00971 (DW Chemistry & Microbiology) & 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). 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>
100705-B5MW	1185577001	09/28/2018	09/28/2018	Water (Surface, Eff., Ground)
100705-B15MW	1185577002	09/28/2018	09/28/2018	Water (Surface, Eff., Ground)

<u>Method</u>	<u>Method Description</u>
8270D SIM LV (PAH)	8270 PAH SIM GC/MS Liq/Liq ext. LV
AK102	DRO/RRO Low Volume Water
AK103	DRO/RRO Low Volume Water

Print Date: 10/12/2018 9:03:10AM

Detectable Results Summary

Client Sample ID: **100705-B5MW**

Lab Sample ID: 1185577001

Polynuclear Aromatics GC/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Acenaphthene	0.0393J	ug/L
Benzo(a)Anthracene	0.0411J	ug/L
Fluoranthene	0.128	ug/L
Fluorene	0.243	ug/L
Phenanthrene	0.0611	ug/L
Pyrene	0.353	ug/L
Diesel Range Organics	0.252J	mg/L

Semivolatile Organic Fuels

Client Sample ID: **100705-B15MW**

Lab Sample ID: 1185577002

Polynuclear Aromatics GC/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Acenaphthene	0.0367J	ug/L
Fluoranthene	0.107	ug/L
Fluorene	0.204	ug/L
Phenanthrene	0.0525	ug/L
Pyrene	0.302	ug/L
Diesel Range Organics	0.396J	mg/L

Semivolatile Organic Fuels

Results of 100705-B5MW

Client Sample ID: **100705-B5MW**
 Client Project ID: **100705-001 Begich Tower**
 Lab Sample ID: 1185577001
 Lab Project ID: 1185577

Collection Date: 09/28/18 11:39
 Received Date: 09/28/18 16:27
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by Polynuclear Aromatics GC/MS

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
1-Methylnaphthalene	0.0236 U	0.0472	0.0142	ug/L	1		10/10/18 14:45
2-Methylnaphthalene	0.0236 U	0.0472	0.0142	ug/L	1		10/10/18 14:45
Acenaphthene	0.0393 J	0.0472	0.0142	ug/L	1		10/10/18 14:45
Acenaphthylene	0.0236 U	0.0472	0.0142	ug/L	1		10/10/18 14:45
Anthracene	0.0236 U	0.0472	0.0142	ug/L	1		10/10/18 14:45
Benzo(a)Anthracene	0.0411 J	0.0472	0.0142	ug/L	1		10/10/18 14:45
Benzo[a]pyrene	0.00945 U	0.0189	0.00585	ug/L	1		10/10/18 14:45
Benzo[b]Fluoranthene	0.0236 U	0.0472	0.0142	ug/L	1		10/10/18 14:45
Benzo[g,h,i]perylene	0.0236 U	0.0472	0.0142	ug/L	1		10/10/18 14:45
Benzo[k]fluoranthene	0.0236 U	0.0472	0.0142	ug/L	1		10/10/18 14:45
Chrysene	0.0236 U	0.0472	0.0142	ug/L	1		10/10/18 14:45
Dibenzo[a,h]anthracene	0.00945 U	0.0189	0.00585	ug/L	1		10/10/18 14:45
Fluoranthene	0.128	0.0472	0.0142	ug/L	1		10/10/18 14:45
Fluorene	0.243	0.0472	0.0142	ug/L	1		10/10/18 14:45
Indeno[1,2,3-c,d] pyrene	0.0236 U	0.0472	0.0142	ug/L	1		10/10/18 14:45
Naphthalene	0.0471 U	0.0943	0.0292	ug/L	1		10/10/18 14:45
Phenanthrene	0.0611	0.0472	0.0142	ug/L	1		10/10/18 14:45
Pyrene	0.353	0.0472	0.0142	ug/L	1		10/10/18 14:45
Surrogates							
2-Methylnaphthalene-d10 (surr)	75	47-106		%	1		10/10/18 14:45
Fluoranthene-d10 (surr)	70.4	24-116		%	1		10/10/18 14:45

Batch Information

Analytical Batch: XMS11143
 Analytical Method: 8270D SIM LV (PAH)
 Analyst: BMZ
 Analytical Date/Time: 10/10/18 14:45
 Container ID: 1185577001-C

Prep Batch: XXX40613
 Prep Method: SW3520C
 Prep Date/Time: 09/29/18 08:38
 Prep Initial Wt./Vol.: 265 mL
 Prep Extract Vol: 1 mL

Results of 100705-B5MW

Client Sample ID: **100705-B5MW**
 Client Project ID: **100705-001 Begich Tower**
 Lab Sample ID: 1185577001
 Lab Project ID: 1185577

Collection Date: 09/28/18 11:39
 Received Date: 09/28/18 16:27
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by Semivolatile Organic Fuels

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Diesel Range Organics	0.252 J	0.588	0.176	mg/L	1		10/01/18 13:47
Surrogates							
5a Androstane (surr)	83.9	50-150		%	1		10/01/18 13:47

Batch Information

Analytical Batch: XFC14664
 Analytical Method: AK102
 Analyst: VDL
 Analytical Date/Time: 10/01/18 13:47
 Container ID: 1185577001-A

Prep Batch: XXX40621
 Prep Method: SW3520C
 Prep Date/Time: 09/30/18 08:53
 Prep Initial Wt./Vol.: 255 mL
 Prep Extract Vol: 1 mL

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Residual Range Organics	0.245 U	0.490	0.147	mg/L	1		10/01/18 13:47
Surrogates							
n-Triacontane-d62 (surr)	107	50-150		%	1		10/01/18 13:47

Batch Information

Analytical Batch: XFC14664
 Analytical Method: AK103
 Analyst: VDL
 Analytical Date/Time: 10/01/18 13:47
 Container ID: 1185577001-A

Prep Batch: XXX40621
 Prep Method: SW3520C
 Prep Date/Time: 09/30/18 08:53
 Prep Initial Wt./Vol.: 255 mL
 Prep Extract Vol: 1 mL

Results of 100705-B15MW

Client Sample ID: **100705-B15MW**
 Client Project ID: **100705-001 Begich Tower**
 Lab Sample ID: 1185577002
 Lab Project ID: 1185577

Collection Date: 09/28/18 11:50
 Received Date: 09/28/18 16:27
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by Polynuclear Aromatics GC/MS

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
1-Methylnaphthalene	0.0250 U	0.0500	0.0150	ug/L	1		10/10/18 15:05
2-Methylnaphthalene	0.0250 U	0.0500	0.0150	ug/L	1		10/10/18 15:05
Acenaphthene	0.0367 J	0.0500	0.0150	ug/L	1		10/10/18 15:05
Acenaphthylene	0.0250 U	0.0500	0.0150	ug/L	1		10/10/18 15:05
Anthracene	0.0250 U	0.0500	0.0150	ug/L	1		10/10/18 15:05
Benzo(a)Anthracene	0.0250 U	0.0500	0.0150	ug/L	1		10/10/18 15:05
Benzo[a]pyrene	0.0100 U	0.0200	0.00620	ug/L	1		10/10/18 15:05
Benzo[b]Fluoranthene	0.0250 U	0.0500	0.0150	ug/L	1		10/10/18 15:05
Benzo[g,h,i]perylene	0.0250 U	0.0500	0.0150	ug/L	1		10/10/18 15:05
Benzo[k]fluoranthene	0.0250 U	0.0500	0.0150	ug/L	1		10/10/18 15:05
Chrysene	0.0250 U	0.0500	0.0150	ug/L	1		10/10/18 15:05
Dibenzo[a,h]anthracene	0.0100 U	0.0200	0.00620	ug/L	1		10/10/18 15:05
Fluoranthene	0.107	0.0500	0.0150	ug/L	1		10/10/18 15:05
Fluorene	0.204	0.0500	0.0150	ug/L	1		10/10/18 15:05
Indeno[1,2,3-c,d] pyrene	0.0250 U	0.0500	0.0150	ug/L	1		10/10/18 15:05
Naphthalene	0.0500 U	0.100	0.0310	ug/L	1		10/10/18 15:05
Phenanthrene	0.0525	0.0500	0.0150	ug/L	1		10/10/18 15:05
Pyrene	0.302	0.0500	0.0150	ug/L	1		10/10/18 15:05
Surrogates							
2-Methylnaphthalene-d10 (surr)	60.2	47-106		%	1		10/10/18 15:05
Fluoranthene-d10 (surr)	61	24-116		%	1		10/10/18 15:05

Batch Information

Analytical Batch: XMS11143
 Analytical Method: 8270D SIM LV (PAH)
 Analyst: BMZ
 Analytical Date/Time: 10/10/18 15:05
 Container ID: 1185577002-C

Prep Batch: XXX40613
 Prep Method: SW3520C
 Prep Date/Time: 09/29/18 08:38
 Prep Initial Wt./Vol.: 250 mL
 Prep Extract Vol: 1 mL

Results of 100705-B15MW

Client Sample ID: **100705-B15MW**
 Client Project ID: **100705-001 Begich Tower**
 Lab Sample ID: 1185577002
 Lab Project ID: 1185577

Collection Date: 09/28/18 11:50
 Received Date: 09/28/18 16:27
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by Semivolatile Organic Fuels

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Diesel Range Organics	0.396 J	0.600	0.180	mg/L	1		10/01/18 13:57
Surrogates							
5a Androstane (surr)	86.1	50-150		%	1		10/01/18 13:57

Batch Information

Analytical Batch: XFC14664
 Analytical Method: AK102
 Analyst: VDL
 Analytical Date/Time: 10/01/18 13:57
 Container ID: 1185577002-A

Prep Batch: XXX40621
 Prep Method: SW3520C
 Prep Date/Time: 09/30/18 08:53
 Prep Initial Wt./Vol.: 250 mL
 Prep Extract Vol: 1 mL

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Residual Range Organics	0.250 U	0.500	0.150	mg/L	1		10/01/18 13:57
Surrogates							
n-Triacontane-d62 (surr)	110	50-150		%	1		10/01/18 13:57

Batch Information

Analytical Batch: XFC14664
 Analytical Method: AK103
 Analyst: VDL
 Analytical Date/Time: 10/01/18 13:57
 Container ID: 1185577002-A

Prep Batch: XXX40621
 Prep Method: SW3520C
 Prep Date/Time: 09/30/18 08:53
 Prep Initial Wt./Vol.: 250 mL
 Prep Extract Vol: 1 mL

Method Blank

Blank ID: MB for HBN 1786970 [XXX/40613]
Blank Lab ID: 1479308

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1185577001, 1185577002

Results by 8270D SIM LV (PAH)

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

Surrogates

2-Methylnaphthalene-d10 (surr)	73.4	47-106	%
Fluoranthene-d10 (surr)	73.2	24-116	%

Batch Information

Analytical Batch: XMS11143
Analytical Method: 8270D SIM LV (PAH)
Instrument: SVA Agilent 780/5975 GC/MS
Analyst: BMZ
Analytical Date/Time: 10/10/2018 11:00:00AM

Prep Batch: XXX40613
Prep Method: SW3520C
Prep Date/Time: 9/29/2018 8:38:14AM
Prep Initial Wt./Vol.: 250 mL
Prep Extract Vol: 1 mL

Print Date: 10/12/2018 9:03:13AM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1185577 [XXX40613]

Blank Spike Lab ID: 1479309

Date Analyzed: 10/10/2018 11:20

Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1185577001, 1185577002

Results by 8270D SIM LV (PAH)

Blank Spike (ug/L)

Parameter	Spike	Result	Rec (%)	CL
1-Methylnaphthalene	2	1.34	67	(41-115)
2-Methylnaphthalene	2	1.33	67	(39-114)
Acenaphthene	2	1.33	67	(48-114)
Acenaphthylene	2	1.38	69	(35-121)
Anthracene	2	1.35	68	(53-119)
Benzo(a)Anthracene	2	1.46	73	(59-120)
Benzo[a]pyrene	2	1.33	67	(53-120)
Benzo[b]Fluoranthene	2	1.46	73	(53-126)
Benzo[g,h,i]perylene	2	1.35	67	(44-128)
Benzo[k]fluoranthene	2	1.54	77	(54-125)
Chrysene	2	1.54	77	(57-120)
Dibenzo[a,h]anthracene	2	1.20	60	(44-131)
Fluoranthene	2	1.49	75	(58-120)
Fluorene	2	1.39	70	(50-118)
Indeno[1,2,3-c,d] pyrene	2	1.42	71	(48-130)
Naphthalene	2	1.38	69	(43-114)
Phenanthrene	2	1.35	67	(53-115)
Pyrene	2	1.58	79	(53-121)

Surrogates

2-Methylnaphthalene-d10 (surr)	2	71.8	72	(47-106)
Fluoranthene-d10 (surr)	2	75.3	75	(24-116)

Batch Information

Analytical Batch: XMS11143

Analytical Method: 8270D SIM LV (PAH)

Instrument: SVA Agilent 780/5975 GC/MS

Analyst: BMZ

Prep Batch: XXX40613

Prep Method: SW3520C

Prep Date/Time: 09/29/2018 08:38

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

Dupe Init Wt./Vol.: Extract Vol:

Print Date: 10/12/2018 9:03:14AM

Matrix Spike Summary

Original Sample ID: 1479313
MS Sample ID: 1479314 MS
MSD Sample ID: 1479315 MSD

Analysis Date: 10/10/2018 13:03
Analysis Date: 10/10/2018 13:23
Analysis Date: 10/10/2018 13:44
Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1185577001, 1185577002

Results by 8270D SIM LV (PAH)

Parameter	Sample	Matrix Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
1-Methylnaphthalene	0.00670U	0.515	.245	48	0.562	0.271	48	41-115	9.90	(< 20)
2-Methylnaphthalene	0.00670U	0.515	.247	48	0.562	0.277	49	39-114	11.60	(< 20)
Acenaphthene	0.00670U	0.515	.222	43 *	0.562	0.258	46 *	48-114	14.90	(< 20)
Acenaphthylene	0.00670U	0.515	.242	47	0.562	0.268	48	35-121	10.20	(< 20)
Anthracene	0.00670U	0.515	.171	33 *	0.562	0.182	32 *	53-119	6.60	(< 20)
Benzo(a)Anthracene	0.00670U	0.515	.109	21 *	0.562	0.117	21 *	59-120	7.50	(< 20)
Benzo(a)pyrene	0.00269U	0.515	.0688	13 *	0.562	0.0756	14 *	53-120	9.30	(< 20)
Benzo(b)Fluoranthene	0.00670U	0.515	.0936	18 *	0.562	0.0988	18 *	53-126	5.50	(< 20)
Benzo(g,h,i)perylene	0.00670U	0.515	.0777	15 *	0.562	0.0865	15 *	44-128	10.80	(< 20)
Benzo(k)fluoranthene	0.00670U	0.515	.0695	14 *	0.562	0.0763	14 *	54-125	9.30	(< 20)
Chrysene	0.00670U	0.515	.147	29 *	0.562	0.160	29 *	57-120	8.70	(< 20)
Dibenzo(a,h)anthracene	0.00269U	0.515	.0413	8 *	0.562	0.0466	8 *	44-131	12.10	(< 20)
Fluoranthene	0.0443	0.515	.226	35 *	0.562	0.235	34 *	58-120	4.00	(< 20)
Fluorene	0.00670U	0.515	.232	45 *	0.562	0.254	45 *	50-118	9.00	(< 20)
Indeno[1,2,3-c,d] pyrene	0.00670U	0.515	.0515	10 *	0.562	0.0570	10 *	48-130	10.10	(< 20)
Naphthalene	0.0135U	0.515	.262	51	0.562	0.286	51	43-114	9.00	(< 20)
Phenanthrene	0.0217	0.515	.261	47 *	0.562	0.277	46 *	53-115	5.90	(< 20)
Pyrene	0.0324	0.515	.26	44 *	0.562	0.275	43 *	53-121	5.80	(< 20)
Surrogates										
2-Methylnaphthalene-d10 (surr)		0.515	.262	51	0.562	0.292	52	47-106	10.90	
Fluoranthene-d10 (surr)		0.515	.169	33	0.562	0.178	32	24-116	5.50	

Batch Information

Analytical Batch: XMS11143
Analytical Method: 8270D SIM LV (PAH)
Instrument: SVA Agilent 780/5975 GC/MS
Analyst: BMZ
Analytical Date/Time: 10/10/2018 1:23:00PM

Prep Batch: XXX40613
Prep Method: 3520 Liq/Liq Ext for 8270 PAH SIM LV
Prep Date/Time: 9/29/2018 8:38:14AM
Prep Initial Wt./Vol.: 970.00mL
Prep Extract Vol: 1.00mL

Print Date: 10/12/2018 9:03:14AM

Method Blank

Blank ID: MB for HBN 1786983 [XXX/40621]
Blank Lab ID: 1479366

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1185577001, 1185577002

Results by AK102

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Diesel Range Organics	0.300U	0.600	0.180	mg/L
Surrogates				
5a Androstane (surr)	94.7	60-120		%

Batch Information

Analytical Batch: XFC14664
Analytical Method: AK102
Instrument: Agilent 7890B F
Analyst: VDL
Analytical Date/Time: 10/1/2018 12:44:00PM

Prep Batch: XXX40621
Prep Method: SW3520C
Prep Date/Time: 9/30/2018 8:53:22AM
Prep Initial Wt./Vol.: 250 mL
Prep Extract Vol: 1 mL

Print Date: 10/12/2018 9:03:15AM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1185577 [XXX40621]
 Blank Spike Lab ID: 1479367
 Date Analyzed: 10/01/2018 12:55

Spike Duplicate ID: LCSD for HBN 1185577
 [XXX40621]
 Spike Duplicate Lab ID: 1479368
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1185577001, 1185577002

Results by AK102

Parameter	Blank Spike (mg/L)			Spike Duplicate (mg/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Diesel Range Organics	20	19.4	97	20	19.8	99	(75-125)	2.40	(< 20)
Surrogates									
5a Androstane (surr)	0.4	109	109	0.4	111	111	(60-120)	1.60	

Batch Information

Analytical Batch: **XFC14664**
 Analytical Method: **AK102**
 Instrument: **Agilent 7890B F**
 Analyst: **VDL**

Prep Batch: **XXX40621**
 Prep Method: **SW3520C**
 Prep Date/Time: **09/30/2018 08:53**
 Spike Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL
 Dupe Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL

Print Date: 10/12/2018 9:03:17AM

Method Blank

Blank ID: MB for HBN 1786983 [XXX/40621]
Blank Lab ID: 1479366

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1185577001, 1185577002

Results by AK103

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Residual Range Organics	0.250U	0.500	0.150	mg/L
Surrogates				
n-Triacontane-d62 (surr)	110	60-120		%

Batch Information

Analytical Batch: XFC14664
Analytical Method: AK103
Instrument: Agilent 7890B F
Analyst: VDL
Analytical Date/Time: 10/1/2018 12:44:00PM

Prep Batch: XXX40621
Prep Method: SW3520C
Prep Date/Time: 9/30/2018 8:53:22AM
Prep Initial Wt./Vol.: 250 mL
Prep Extract Vol: 1 mL

Print Date: 10/12/2018 9:03:18AM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1185577 [XXX40621]
 Blank Spike Lab ID: 1479367
 Date Analyzed: 10/01/2018 12:55

Spike Duplicate ID: LCSD for HBN 1185577
 [XXX40621]
 Spike Duplicate Lab ID: 1479368
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1185577001, 1185577002

Results by AK103

Parameter	Blank Spike (mg/L)			Spike Duplicate (mg/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Residual Range Organics	20	19.8	99	20	20.0	100	(60-120)	0.86	(< 20)
Surrogates									
n-Triacontane-d62 (surr)	0.4	117	117	0.4	112	112	(60-120)	4.20	

Batch Information

Analytical Batch: **XFC14664**
 Analytical Method: **AK103**
 Instrument: **Agilent 7890B F**
 Analyst: **VDL**

Prep Batch: **XXX40621**
 Prep Method: **SW3520C**
 Prep Date/Time: **09/30/2018 08:53**
 Spike Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL
 Dupe Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL

Print Date: 10/12/2018 9:03:21AM



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Laboratory, SES Page 1 of 1
Attn: J. Lee

CHAIN-OF-CUSTODY RECORD

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[illegible][illegible]

Project Information		Sample Receipt	
Project Number: 100705-001	Total Number of Containers		
Project Name: Beryzhi Tower	COC Seals/Intact? Y/N/NA		
Contact: JCT	Received Good Cond./Cold		
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Delivery Method:		
Sampler: JSSK	(attach shipping bill, if any)		

Instructions	
Requested Turnaround Time: Standard	
Special Instructions:	

Relinquished By: 1.		Relinquished By: 2.		Relinquished By: 3.	
Signature: <i>[Signature]</i>	Time: 16:24	Signature: _____	Time: _____	Signature: _____	Time: _____
Printed Name: Mike Kessler	Date: 9/23/18	Printed Name: _____	Date: _____	Printed Name: _____	Date: _____
Company: STW		Company: _____		Company: _____	

Received By: 1.		Received By: 2.		Received By: 3.	
Signature: _____	Time: _____	Signature: _____	Time: _____	Signature: <i>[Signature]</i>	Time: 16:37
Printed Name: _____	Date: _____	Printed Name: _____	Date: _____	Printed Name: Kyle Tolkinen	Date: 9/23/18
Company: _____		Company: _____		Company: SCS	

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 #:

1185577



1 1 8 5 5 7 7

Review Criteria		Condition (Yes, No, N/A)	Exceptions Noted below	
Chain of Custody / Temperature Requirements			<input checked="" type="checkbox"/> yes	Exemption permitted if sampler hand carries/delivers.
Were Custody Seals intact? Note # & location		<input type="text" value="n/a"/>	handdelivered	
COC accompanied samples?		<input checked="" type="checkbox"/> yes		
<input type="text" value="n/a"/> **Exemption permitted if chilled & collected <8 hours ago, or for samples where chilling is not required				
Temperature blank compliant* (i.e., 0-6 °C after CF)?	<input checked="" type="checkbox"/> yes	Cooler ID:	<input type="text" value="1"/>	@ <input type="text" value="1.7"/> °C Therm. ID: <input type="text" value="D12"/>
	<input type="text" value="n/a"/>	Cooler ID:		@ °C Therm. ID:
	<input type="text" value="n/a"/>	Cooler ID:		@ °C Therm. ID:
	<input type="text" value="n/a"/>	Cooler ID:		@ °C Therm. ID:
	<input type="text" value="n/a"/>	Cooler ID:		@ °C Therm. ID:
*If >6°C, were samples collected <8 hours ago?		<input type="text" value="n/a"/>		
If <0°C, were sample containers ice free?		<input type="text" value="n/a"/>		
If samples received <u>without</u> a temperature blank, the "cooler temperature" will be documented in lieu of the temperature blank & "COOLER TEMP" will be noted to the right. In cases where neither a temp blank nor cooler temp can be obtained, note "ambient" or "chilled".				
Note: Identify containers received at non-compliant temperature . Use form FS-0029 if more space is needed.				
Holding Time / Documentation / Sample Condition Requirements		Note: Refer to form F-083 "Sample Guide" for specific holding times.		
Were samples received within holding time?		<input checked="" type="checkbox"/> yes		
Do samples match COC** (i.e., sample IDs, dates/times collected)?		<input checked="" type="checkbox"/> yes		
**Note: If times differ <1hr, record details & login per COC.				
Were analyses requested unambiguous? (i.e., method is specified for analyses with >1 option for analysis)		<input checked="" type="checkbox"/> yes		
Were proper containers (type/mass/volume/preservative***) used?		<input checked="" type="checkbox"/> yes	<input type="text" value="n/a"/> ***Exemption permitted for metals (e.g. 200.8/6020A).	
Volatile / LL-Hg Requirements				
Were Trip Blanks (i.e., VOAs, LL-Hg) in cooler with samples?		<input type="text" value="n/a"/>		
Were all water VOA vials free of headspace (i.e., bubbles ≤ 6mm)?		<input type="text" value="n/a"/>		
Were all soil VOAs field extracted with MeOH+BFB?		<input type="text" value="n/a"/>		
Note to Client: Any "No", answer above indicates non-compliance with standard procedures and may impact data quality.				
Additional notes (if applicable):				

Sample Containers and Preservatives

<u>Container Id</u>	<u>Preservative</u>	<u>Container Condition</u>	<u>Container Id</u>	<u>Preservative</u>	<u>Container Condition</u>
1185577001-A	HCL to pH < 2	OK			
1185577001-B	HCL to pH < 2	OK			
1185577001-C	No Preservative Required	OK			
1185577001-D	No Preservative Required	OK			
1185577002-A	HCL to pH < 2	OK			
1185577002-B	HCL to pH < 2	OK			
1185577002-C	No Preservative Required	OK			
1185577002-D	No Preservative Required	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.

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

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

LABORATORY DATA REVIEW CHECKLIST

Completed by: Jake Kesler

Title: Environmental Staff

Date: December 2018

CS Report Name: Groundwater Monitoring, Begich Towers, 100 Kenai Street, Whittier, Alaska

Laboratory Report Date: October 12, 2018

Consultant Firm: Shannon & Wilson Inc.

Laboratory Name: SGS North America Inc.

Laboratory Report Number: 1185577

ADEC File Number: 2114.26.002

ADEC RecKey Number: NA

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

1. Laboratory

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

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** (please explain)

Comments:

2. Chain of Custody (COC)

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

- b. Correct analyses requested? **Yes** / No / NA (please explain)

Comments:

3. Laboratory Sample Receipt Documentation

- a. Sample/cooler temperature documented and within range at receipt (0° to 6° C)? **Yes** / No / NA (please explain)

Comments: *The cooler temperature blank was recorded at 1.7° C.*

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

Comments:

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

Comments:

- d. If there were any discrepancies, were they documented? – For example, incorrect sample containers/preservation, sample temperature outside acceptance range, insufficient or missing samples, etc.? **Yes** / No / **NA** (please explain)

Comments: *No discrepancies noted.*

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

Comments:

4. Case Narrative

- a. Present and understandable? **Yes** / No / NA (please explain)

Comments:

- b. Discrepancies, errors, or QC failures identified by the lab? **Yes** / No / NA (please explain)

Comments: *MS/MSD recovery for several PAH analytes does not meet QC criteria.*

- c. Were corrective actions documented? **Yes** / **No** / NA (please explain)

Comments: *The case narrative notes to refer to the LCS for accuracy requirements.*

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

Comments: *The case narrative does not comment on data quality/usability.*

5. Sample Results

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

Comments:

- b. All applicable holding times met? **Yes** / No / NA (please explain)

Comments:

- c. Are the reported LOQs less than the Cleanup Level or the minimum required detection level for the project? **Yes** / No / NA (please explain)

Comments:

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

Comments:

6. QC Samples

a. Method Blank

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

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

- i. Organics - One LCS/LCSD reported per matrix, analysis, and 20 samples?
(LCS/LCSD required per AK methods, LCS required per SW846) **Yes** / No / NA
(please explain)
Comments:
- ii. Metals/Inorganics - One LCS and one sample duplicate reported per matrix, analysis
and 20 samples? **Yes** / No / **NA** (please explain)
Comments:
- iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory
limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101
60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the
laboratory QC pages) **Yes** / No / NA (please explain)
Comments:
- iv. Precision – All relative percent differences (RPDs) reported and less than method or
laboratory limits? And project specified DQOs, if applicable. RPD reported from
LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods
20%, VOCs 20%; all other analyses see the laboratory QC pages) **Yes** / No / NA
(please explain)
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** (please explain)
Comments:

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

c. Surrogates - Organics Only

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

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

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

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

d. Trip Blank - Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.)

i. One trip blank reported per matrix, analysis and cooler? (If not, enter explanation below.) Yes / **No** / NA (please explain)
Comments: *Volatile analysis were not analyzed; therefore, a trip blank was not submitted with the project samples.*

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

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

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

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

e. Field Duplicate

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

Yes / No / NA (please explain)

Comments:

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

Comments:

- iii. Precision – All relative percent differences (RPDs) less than specified DQOs?

(Recommended: 30% for water, 50% for soil) **Yes** / **No** / NA (please explain)

Comments: *The RPD for DRO between the field primary/duplicate in September 2018 (44%) was greater than the recommended DQO of 30 percent.*

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

Comments: *The affected samples are flagged “E” on Table 2.2 of this report and are considered estimated.*

f. Decontamination or Equipment Blank (if not applicable)

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

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

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

Comments:

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

Comments:

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

Comments:

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

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

Comments: *A key is provided on page 3 of the laboratory report.*

ATTACHMENT 3

IMPORTANT INFORMATION ABOUT YOUR

GEOTECHNICAL/ENVIRONMENTAL REPORT



Date: December 2018
To: Begich Towers, Inc.

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