SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

July 11, 2018

Matanuska-Susitna Borough
Land and Resource Management
350 East Dahlia Avenue
Palmer, Alaska 99645

Attn: Ms. Tracy McDaniel

RE: SITE CHARACTERIZATION ACTIVITIES, FORMER GOOSE CREEK COMMUNITY CENTER, MILE 94 PARKS HIGHWAY, ALASKA; *ADEC FILE NO.* 2269.38.001

This letter presents the results of Shannon & Wilson's site characterization activities conducted at the former Goose Creek Community Center located at Mile 94 of the Parks Highway in 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. 2269.38.001.

Authorization to proceed with the project was received from the Matanuska-Susitna Borough (MSB) in the form of purchase order No. 2017-00003098. The project was conducted in accordance with our April 5, 2017 *Work Plan for Site Characterization Activities, Former Goose Creek Community Center, Mile 94 Parks Highway, Alaska 2269.38.001*, which was approved by Ms. Danielle Duncan of the ADEC in the form of a letter dated April 11, 2017.

BACKGROUND

In November 1999, AlaskChem Engineering removed a heating oil underground storage tank (UST) of unspecified capacity (assumed to be 500 gallons based on site drawings) from the south side of the Goose Creek Community Center. The approximate location of the former UST is shown on Figure 2. Confirmation soil samples collected from the base of the UST excavation contained up to 1,800 milligrams per kilogram (mg/kg) diesel range organics (DRO). The excavated material was not sampled and was used to backfill the tank excavation.

To evaluate potential impacts to groundwater, Shannon & Wilson installed Monitoring Wells MW-1 through MW-4 in May 2001 and Wells MW-5 and MW-6 in September 2001 at the site.

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The wells have been periodically sampled between May 2001 and October 2014. The approximate well locations are shown on Figure 2.

During October 2014, Monitoring Wells MW-2 and MW-4 were sampled. Monitoring Wells MW-5 and MW-6 could not be located and were assumed destroyed. Monitoring Wells MW-1 and MW-3 which have not historically contained detectable concentrations of petroleum hydrocarbons were not sampled. Based on the results of the October 2014 sampling event, DRO (2.56 milligrams per liter [mg/L]) exceeding the ADEC cleanup level of 1.5 mg/L was detected in the sample collected from Monitoring Well MW-2. The remaining tested analytes were either not detected or were detected at concentrations less than the ADEC cleanup level in the sample collected from Well MW-2. Target analytes were less than the applicable ADEC cleanup levels or not detected in the sample collected from Well MW-4.

In a July 11, 2016 letter, Ms. Danielle Duncan of the ADEC stated that additional characterization of the on-site contamination was required to progress toward site closure. The purpose of this project is to address ADEC's request. The objectives of this project are to:

- collect soil samples at the location of the former UST excavation to evaluate the current contaminant concentrations in soil; and
- install one downgradient monitoring well and collect groundwater samples (summer and fall 2017) from the new well and Monitoring Wells MW-2 and MW-4 to determine the extent of contamination and evaluate if impacted groundwater extends to off-site parcels to the southeast.

FIELD ACTIVITIES

The field activities included advancing two soil borings, installing one groundwater monitoring well, collecting analytical soil and groundwater samples, and investigation-derived waste (IDW) management. Discovery Drilling, Inc. (Discovery) of Anchorage, Alaska provided the equipment and personnel to advance the borings and install the groundwater monitoring well. SGS North America Inc. (SGS) provided chemical analysis of soil and groundwater samples. A Shannon & Wilson representative was present during field activities to identify the boring locations, log subsurface materials, screen and sample subsurface soil, and collect groundwater samples. Site photographs taken during field activities are included as Attachment 1 and field notes are included in Attachment 2.

Prior to advancing the borings, the utility locate center was contacted to mark buried utilities within the project area. The locations of the borings, monitoring wells, and general site features are shown on Figure 2. Boring logs and well construction details are included in Attachment 3.

Soil Borings

Two soil borings, designated Boring B7 and B8, were advanced by Discovery on July 26, 2017 (Photographs 1 and 2). Boring B7 was advanced downgradient of Monitoring Wells MW-2 and MW-4 with respect to groundwater flow direction. Boring B8 was advanced within the footprint of the former UST excavation. The borings were advanced using a truck-mounted drill rig with 4.25-inch inside diameter hollow-stem augers. Borings B7 and B8 were advanced to approximately 22 feet and 12 feet below ground surface (bgs), respectively. Because groundwater was not observed during drilling, Boring B7 was advanced to a depth that was assumed to be at least 5 feet below the soil/groundwater interface to install a groundwater monitoring well. Depth to water was measured in nearby Monitoring Well MW-2 and was approximately 15 feet bgs. Groundwater was encountered in Boring B8 at approximately 12 feet bgs.

Soil samples were collected at 2.5-foot intervals using a 2-foot long, 3-inch outside diameter spilt-spoon sampler, driven using a 340-pound hammer. Soil screening samples were collected to the base of the borings. Immediately following retrieval and opening of the split-spoons, soil samples for field screening and laboratory analysis were collected. The analytical sample jars for volatile analyses were collected first, followed by the non-volatile analytical sample jars, and finally the field screening sample. A clean stainless-steel spoon was used to collect soil samples for field screening and laboratory analysis. The split-spoon sampler was decontaminated with an alconox wash and deionized water rinse after each use to prevent cross contamination between soil sampling intervals.

Each soil sample was visually described and “screened” for volatile organic compounds (VOCs) using a photoionization detector (PID) and ADEC-approved headspace screening techniques. The PID was calibrated before screening activities with 100 parts per million (ppm) isobutylene standard gas. Headspace samples were collected in re-sealable plastic bags by filling them with freshly exposed soil to about one-half capacity and then sealing the top. Headspace samples were allowed to warm to at least 40 degrees Fahrenheit prior to field headspace screening. Field headspace readings were obtained within 1 hour of sample collection. Screening was

accomplished by inserting the PID sampling probe into the air space above the soil in the bag and recording the maximum reading.

One analytical soil sample was selected from each boring. The samples were collected from the interval with the highest PID reading. Soil samples for laboratory analysis were collected in laboratory-supplied jars in decreasing order of volatility. For each volatile sample, at least 25 grams of soil, but no more than what can be completely submerged with 25-milliliters of methanol, was placed into a pre-weighted, 4-ounce jar with a septa lid. A 25-milliliter aliquot of methanol containing laboratory added surrogates was added to the sample jar to submerge the soil sample. For each non-volatile sample, the laboratory-supplied jar was completely filled with soil taking care to avoid gravel and debris. Sample jars were filled using decontaminated stainless-steel spoons, placed in coolers with ice packs, and transferred to the laboratory using chain-of-custody procedures. Field screening results are summarized in Table 1.

Monitoring Well Installation, and Development

Boring B7 was completed as Monitoring Well MW-7 (Photographs 3 and 4). The monitoring well was constructed of 2-inch nominal inside diameter schedule 40 polyvinyl chloride (PVC) pipe with threaded connections. The lower portion of the well consists of a 15-foot section of 0.010-inch slotted well screen. The well screen interval was selected to encompass the anticipated groundwater depths present throughout the year. A sand pack of 20/40 silica sand was used to backfill around the well screen to approximately 2 feet above the screened section. Hydrated bentonite chips were used to backfill the boring from the top of the sand pack to approximately 0.5 foot bgs to create a seal. Silica sand was placed above the bentonite and a stickup protective casing was placed around the well. Monitoring well construction details are included in Attachment 3.

Monitoring Well MW-7 was developed on October 20, 2017 using a surge block and submersible pump (alternating 3- to 5-minute cycles of each). Prior to initiating well development, water depth relative to the top of the well casings was measured with an electronic depth-to-water meter. During well development, water quality parameters, including temperature, specific conductance, pH, and turbidity were measured with YSI 556 and MicroTPW water quality instruments. Since water quality parameters did not stabilize, development was considered complete after 3 hours of effort was expended. Approximately 50

gallons of water were removed from Well MW-7 during development. Groundwater data, including final water quality parameter measurements during development, are summarized in Tables 2.1.

Groundwater Monitoring Well Sampling

Groundwater samples were collected from Monitoring Wells MW-2, MW-4, and MW-7 on October 20, 2017 and May 3, 2018. Prior to initiating groundwater sampling activities, water depths relative to the top of the well casings were measured with an electronic depth-to-water meter in Monitoring Well MW-1 through MW-4, and MW-7.

With the exception of Well MW-7 on October 20, 2017, the monitoring wells were purged and sampled using a low-flow sampling technique, using a submersible pump with disposable vinyl tubing. A groundwater sample was collected from Well MW-7 on October 20, 2017 directly after development once the well had recharged to at least 80 percent pre-purge volume. Sampling was initiated at the remaining wells by purging each well to reduce the effect of stagnant well casing water on chemical concentrations and to obtain groundwater samples that are representative of the surrounding water-bearing formation. A submersible pump was placed within 2 feet of the measured groundwater depth in each well. The pump rate was set at approximately 0.2 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 an electronic water probe that was checked regularly throughout the purging/sampling process. Purging was considered complete when at least one well volume was removed and the following stabilization criteria were met over three successive readings: pH was within 0.1 unit, temperature was within 3 percent (minimum 0.2 degree Celsius), specific conductance was within three percent, and turbidity was within 10 percent or three consecutive readings of less than 10 Nephelometric Turbidity Units (NTU). If parameters did not stabilize within 1 hour of purging, purging was considered complete and a sample collected. The pump was decontaminated in between each well. Final water quality parameters are listed on Tables 2.1 and 2.2.

Analytical samples were collected by transferring water directly from the pump tubing into the laboratory supplied containers. The sample jars were filled in decreasing order of volatility.

Well Survey

A level loop survey was conducted on October 20, 2017 to determine the top-of-casing elevations of the groundwater monitoring wells relative to a temporary benchmark with an arbitrary on-site elevation benchmark assigned an elevation of 100.00 feet. The elevations were surveyed to an accuracy of 0.01 foot. Based on the October 20, 2017 groundwater elevations and survey, the approximate groundwater flow direction is to the southeast. The May 3, 2018 groundwater elevation also show the groundwater flow direction to the southeast. The surveyed well elevations and corresponding October 2017 and May 2018 groundwater elevations are listed in Tables 2.1 and 2.2, respectively.

Investigation-Derived Waste

IDW consisted of development water, purge water, and soil cuttings. The purge water was containerized in 5-gallon buckets and transported to Central Landfill in Palmer, Alaska on June 22, 2018 for disposal. Prior to disposing of the purge water, a ADEC *Transport, Treatment & Disposal Approval Form for Contaminated Media* was completed and approved by ADEC. The soil cuttings and development water from Boring B7/Monitoring Well MW-7 were stored in 55-gallon drums pending analytical results. The soil/development water were spread/spilled to the ground surface at the site on June 22, 2018, respectively. Prior to spreading the soil and spilling the development water from Boring B7/Monitoring Well MW-7, the ADEC was notified and approved of these activities.

LABORATORY ANAYLSIS

The analytical soil and groundwater samples were submitted to SGS in coolers with ice packs using chain-of-custody procedures. The SGS laboratory report and completed ADEC Laboratory Data Review Checklists are provided in Attachment 4.

Three soil samples, including one duplicate, were analyzed for gasoline range organics (GRO) by Alaska Method (AK) 101; DRO by AK 102; benzene, toluene, ethylbenzene, and xylenes (BTEX) by Environmental Protection Agency (EPA) Method 8021B; and polynuclear aromatic hydrocarbons (PAHs) by EPA Method 8270D selective ion method (SIM). One soil trip blank was submitted with the soil samples and analyzed for GRO by AK 101 and BTEX by EPA Method 8021B.

Four groundwater samples, including one duplicate sample, were submitted during each sampling event and analyzed for GRO by AK 101, DRO by AK 102, and BTEX by EPA Method 8021B. One water trip blank was submitted during each sampling event with the groundwater samples and analyzed for GRO by AK 101 and BTEX by EPA Method 8021B.

SUBSURFACE CONDITIONS

Based on our observations of soil recovered from the borings, soil at the site generally consists of sand with varying silt and gravel content. Cobbles were encountered in Boring B7 from approximately 5 to 17 feet bgs. During drilling, groundwater was encountered at approximately 12 feet bgs in Boring B8. Groundwater was not encountered during drilling in Boring B7. Prior to sampling on October 20, 2017, groundwater depths varied from 6.46 feet bgs in Well MW-4 to 8.57 feet bgs in Well MW-7. On May 3, 2018, groundwater depths varied form 2.71 feet bgs in Well MW-1 to 6.29 feet bgs in Well MW-4. Groundwater elevations varied from 98.72 feet at Well MW-1 to 94.01 feet at Well MW-7. Based on the May 3, 2018 groundwater depths and elevations, the approximate flow direction is to the southeast. These results are consistent with historical results.

DISCUSSION OF ANALYTICAL RESULTS

The analytical soil and groundwater sample results were compared to the ADEC cleanup levels presented in the November 2017, 18 Alaska Administrative Code (AAC) 75 regulations. The applicable soil criteria consist of the most stringent ADEC Method Two cleanup levels listed in Tables B1 and B2 of 18 AAC 75.341, for the “under 40-inch (precipitation) zone”, and groundwater cleanup levels are established in Table C of 18 AAC 75.345. The analytical soil sample results are summarized in Table 3 and the analytical groundwater sample results are summarized in Tables 4.1 and 4.2. Historical groundwater results are presented in Table 5.

Soil Samples

Sample B8S14 (duplicate of Sample B8S4), collected from Boring B8, contained a concentration of DRO (309 mg/kg) greater than the ADEC Method Two Migration to Groundwater cleanup level of 250 mg/kg. Primary Sample B8S4 contained a concentration of DRO (198 mg/kg) less than the ADEC cleanup level. The sample was collected from approximately 7.5 to 9.5 feet bgs which is beneath the former excavation limits. The remaining target analytes were either not detected or were measured at concentrations less than ADEC cleanup levels.

Groundwater Samples

Groundwater samples collected in October 2017 contained a maximum DRO concentration of 1.36 mg/L (Well MW-2) which is less than the ADEC Table C cleanup level of 1.5 mg/L. All remaining target analytes were also either not detected or were detected at concentrations less than the ADEC cleanup levels.

The groundwater sample collected from Monitoring Well MW-2 in May 2018 contained a concentration of DRO (2.04 mg/L) which is greater than the ADEC Table C cleanup level of 1.5 mg/L. All remaining target analytes were either not detected or were detected at concentrations less than the ADEC cleanup levels.

QUALITY ASSURANCE SUMMARY

SGS follows on-going quality assurance/quality control (QA/QC) procedures to evaluate conformance to applicable ADEC data quality objectives (DQOs). 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 report (See Attachment 4).

External quality controls include one soil duplicate set and two groundwater duplicate sets (one per sampling event) to assess the precision of the sampling and analysis process using the calculated relative percent difference (RPD). The RPDs are within the ADEC recommended DQOs of 50 percent for soil and 30 percent for groundwater.

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

Shannon & Wilson conducted a limited data assessment to review the laboratory's compliance with precision, accuracy, sensitivity, and completeness to the DQOs. Shannon & Wilson reviewed the SGS data deliverables and completed the ADEC's Laboratory Data Review

Checklist for each data package, which are included in Attachment 4. No non-conformances that would adversely affect the quality or usability of the data were noted.

CONCLUSIONS

The site characterization activities conducted at the former Goose Creek Community Center consisted of advancing two soil borings, installing one groundwater monitoring well, and collecting soil and groundwater samples.

During the UST closure activities in 1999, a soil sample collected from the base of the UST excavation contained 1,800 mg/kg DRO. A duplicate sample set collected from this location during the July 2017 site characterization activities contained a maximum of 309 mg/kg DRO. Based on these limited data, the concentration of DRO remaining at the location of the former UST has decreased by about 80 percent. In addition, the reported concentration exceeds the ADEC Method Two migration to groundwater cleanup level (250 mg/kg) but is less than the ADEC Method Two human health cleanup level of 10,250 mg/kg. Boring B7, which was advanced downgradient of the former UST with respect to groundwater flow, did not contain concentrations of target analytes greater than ADEC cleanup levels.

Groundwater samples collected in October 2017 did not contain concentrations of target analytes greater than ADEC cleanup levels. The groundwater sample collected from Well MW-2 in May 2018 contained a concentration of DRO (2.04 mg/L) greater than the ADEC cleanup level (1.5 mg/L). The remaining target analyte concentrations are less than ADEC cleanup levels. Historical results show overall decreasing trends for GRO, DRO, and BTEX in Monitoring Wells MW-2 and MW-4 since 2001. DRO concentrations have remained stable in MW-2 since 2014. Samples from Well MW-4, which is within the limits of the former UST excavation, have been less than the ADEC Table C cleanup level since 2014. DRO-impacted groundwater is delineated downgradient of the former UST by Monitoring Well MW-7.

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.

Shannon & Wilson has prepared the documents in Attachment 5, "Important Information About Your Geotechnical/Environmental Report", to assist you and others in understanding the use and limitations of our reports. You are advised that various state and federal agencies (ADEC, EPA, etc.) may require the reporting of this information. Shannon & Wilson does not assume the responsibility for reporting these findings and therefore has not, and will not, disclose the results of this study, except with your permission or as required by law.

We appreciate the opportunity to be of service. If you have questions or comments concerning this report, please call Dan P. McMahon or the undersigned at (907) 561-2120.

Sincerely,

SHANNON & WILSON, INC.

Jake Tracy, EIT
Engineering Staff

Encl.: Tables 1, 2.1, 2.2, 3, 4.1, and 4.2; Figures 1 and 2; and Attachments 1 through 5

TABLE 1
SAMPLE LOCATIONS AND DESCRIPTIONS

Sample Number	Date	Sample Location (See Figure 2 and Attachment 3)	Depth (feet bgs or btoc)	Headspace (ppm) ^
Soil Samples				
Boring B7				
B7S1	7/26/2017	Boring B7, Sample S1	0-2.5	0.5
B7S2	7/26/2017	Boring B7, Sample S2	2.5-4.5	0.0
B7S3	7/26/2017	Boring B7, Sample S3; no recovery	5-7	-
* B7S4	7/26/2017	Boring B7, Sample S4	7.5-9.5	0.9
B7S5	7/26/2017	Boring B7, Sample S5	10-12	0.0
B7S6	7/26/2017	Boring B7, Sample S6	12.5-13.75	0.3
B7S7	7/26/2017	Boring B7, Sample S7	15-17	0.0
B7S8	7/26/2017	Boring B7, Sample S8	17.5-19.5	0.1
B7S9	7/26/2017	Boring B7, Sample S9	20-22	0.0
Boring B8				
B8S1	7/26/2017	Boring B8, Sample S1	0-2.5	0.3
B8S2	7/26/2017	Boring B8, Sample S2	2.5-4.5	0.3
B8S3	7/26/2017	Boring B8, Sample S3	5-7	200
* B8S4	7/26/2017	Boring B8, Sample S4	7.5-9.5	220
* B8S14	7/26/2017	Duplicate of Sample B8S4	7.5-9.5	220
B8S5	7/26/2017	Boring B8, Sample S5	10-12	1.5
Groundwater Samples				
* MW2	10/20/2017	Monitoring Well MW-2	10.61	-
* MW2	5/3/2018	Monitoring Well MW-2	6.49	-
* MW4	10/20/2017	Monitoring Well MW-4	10.10	-
* MW14	10/20/2017	Duplicate of Sample MW-4	10.10	-
* MW4	5/3/2018	Monitoring Well MW-4	9.93	-
* MW14	5/3/2018	Duplicate of Sample MW-4	9.93	-
* MW7	10/20/2017	Monitoring Well MW-7	11.42	-
* MW7	5/3/2018	Monitoring Well MW-7	7.80	-
Quality Control Samples				
* STB	7/26/2017	Soil Trip Blank	-	-
* TB	10/20/2017	Water Trip Blank		
* TB	5/3/2018	Water Trip Blank	-	-

Notes:

* = Sample analyzed by the project laboratory (See Tables 3, 4.1, and 4.2)
^ = Field screening instrument was a Thermo Environmental Instruments 580B photoionization detector (PID).
- = Measurement not recorded or not applicable
bgs = below ground surface
btoc = below top of casing
ppm = parts per million

TABLE 2.1
OCTOBER 2017 WELL DEVELOPMENT AND SAMPLING LOG

	Monitoring Well Number				
	MW1	**MW2**	**MW3**	**MW4**	**MW7**
Development Data					
Date of Development	-	-	-	-	10/20/2017
Time Development Initiated	-	-	-	-	11:10
Time Development Completed	-	-	-	-	13:55
Development Method	-	-	-	-	Surge block/ SP
Water Level Measurement Data					
Date Water Level Measured	10/20/2017	10/20/2017	10/20/2017	10/20/2017	10/20/2017
Time Water Level Measured	11:08	11:00	11:22	11:16	10:45
Depth to Water Below MP (feet)	10.33	10.61	9.87	10.10	11.42
Height of MP relative to ground surface (feet)	2.92	1.93	2.35	3.64	2.85
Depth to Water (feet bgs)	7.41	8.68	7.52	6.46	8.57
Measuring Point Elevation* (feet)	104.35	102.74	102.92	104.16	101.81
Groundwater Elevation (feet)	94.02	92.13	93.05	94.06	90.39
Sampling Data					
Date Sampled	NS	10/20/2017	NS	10/20/2017	10/20/2017
Time Sampled	NS	12:15	NS	13:36	14:00
Measured Depth to Water (feet below TOC)	10.33	10.61	9.87	10.10	11.42
Total Depth of Well (feet below TOC)	16.51	18.53	19.44	15.70	22.23
Water Column in Well (feet)	6.18	7.92	9.57	5.60	10.81
Gallons per Foot	0.16	0.16	0.16	0.16	0.16
Water Column Volume (gallons)	0.98	1.26	1.53	0.90	1.73
Total Volume Pumped (gallons)	NS	1.8	NS	2.0	50
Sampling Method	NS	SP	NS	SP	SP
Diameter of Well Casing	2-inch	2-inch	2-inch	2-inch	2-inch
Water Quality Data					
Date Measured	-	10/20/2017	-	10/20/2017	10/20/2017
Temperature (°C)	-	6.0	-	4.6	4.0
pH (Standard Units)	-	5.16	-	4.74	5.05
Specific Conductivity (µS/cm)	-	68	-	50	47
ORP (mV)	-	226	-	249	258
Turbidity (NTU)	-	7.43	-	6.12	9.06
Remarks	Water Level Only		Water Level Only	Duplicate Sample MW14	

Notes:
Water quality parameters were measured with a YSI 556 or Hanna meter and a Hach turbidimeter
*Survey conducted by Shannon & Wilson on October 20, 2017 with a temporary benchmark elevation of 100.00 feet

MP	= Measuring point
SP	= Submersible pump
bgs	= Below ground surface
NS	= Not sampled
TOC	= Top of casing
-	= Not applicable or not measured
µS/cm	= Microsiemens per centimeter
mV	= Millivolt
ORP	= Oxidation-reduction potential
NTU	= Nephelometric turbidity unit
^{o}C	= Degrees Celsius

TABLE 2.2
MAY 2018 WELL SAMPLING LOG

	Monitoring Well Number				
	MW1	**MW2**	**MW3**	**MW4**	**MW7**
Water Level Measurement Data					
Date Water Level Measured	5/3/2018	5/3/2018	5/3/2018	5/3/2018	5/3/2018
Time Water Level Measured	10:38	10:46	10:52	11:00	11:05
Depth to Water Below MP (feet)	5.63	6.49	4.93	9.93	7.80
Height of MP relative to ground surface (feet)	2.92	1.93	2.35	3.64	2.85
Depth to Water (feet bgs)	2.71	4.56	2.58	6.29	4.95
Measuring Point Elevation* (feet)	104.35	102.74	102.92	104.16	101.81
Groundwater Elevation (feet)	98.72	96.25	97.99	94.23	94.01
Sampling Data					
Date Sampled	NS	5/3/2018	NS	5/3/2018	5/3/2018
Time Sampled	NS	14:00	NS	15:30	12:20
Measured Depth to Water (feet below TOC)	5.63	6.49	4.93	9.93	7.80
Total Depth of Well (feet below TOC)	16.60	18.53	19.44	15.70	22.25
Water Column in Well (feet)	10.97	12.04	14.51	5.77	14.45
Gallons per Foot	0.16	0.16	0.16	0.16	0.16
Water Column Volume (gallons)	1.76	1.93	2.32	0.92	2.31
Total Volume Pumped (gallons)	NS	2.0	NS	1.2	2.6
Sampling Method	NS	SP	NS	SP	SP
Diameter of Well Casing	2-inch	2-inch	2-inch	2-inch	2-inch
Water Quality Data					
Date Measured	-	5/3/2018	-	5/3/2018	5/3/2018
Temperature (°C)	-	4.42	-	2.51	3.71
pH (Standard Units)	-	4.48	-	4.60	3.72
Specific Conductivity (µS/cm)	-	68	-	27	88
ORP (mV)	-	136.4	-	151.9	188.1
Turbidity (NTU)	-	0.09	-	6.19	8.92
Remarks	Water Level Only		Water Level Only	Duplicate Sample MW14	

Notes:
Water quality parameters were measured with a YSI 556 or Hanna meter and a Hach turbidimeter
*Survey conducted by Shannon & Wilson on October 20, 2017 with a temporary benchmark elevation of 100.00 feet

MP	= Measuring point
SP	= Submersible pump
bgs	= Below ground surface
NS	= Not sampled
TOC	= Top of casing
-	= Not applicable or not measured
µS/cm	= Microsiemens per centimeter
mV	= Millivolt
NTU	= Nephelometric turbidity unit
^{o}C	= Degrees Celsius

TABLE 3
SUMMARY OF SOIL ANALYTICAL RESULTS

Parameter Tested	Method*	Cleanup Level (mg/kg)**	Sample ID Number^ and Soil Sample Depth in Feet bgs or Date Sampled (See Table 1, Figure 2, and Attachment 3)			
			Soil Samples			Trip Blank
			B7S4 7.5-9.5	B8S4 7.5-9.5	B8S14~ 7.5-9.5	STB 7/26/2017
PID Headspace Reading - ppm	OVM 580B	-	0.9	220	220	-
Gasoline Range Organics (GRO) - mg/kg	AK 101	300	**1.69 J**	**19.9 J+**	**12.4**	<0.950
Diesel Range Organics (DRO) - mg/kg	AK 102	250	**6.79 J**	**198**	**309**	-
Aromatic Volatile Organics (BTEX)						
Benzene - mg/kg	EPA 8021B	0.022	<0.00525	<0.00515	<0.00570	<0.00476
Toluene - mg/kg	EPA 8021B	6.7	<0.0104	<0.0103	<0.0114	<0.00950
Ethylbenzene - mg/kg	EPA 8021B	0.13	**0.0480**	<0.0103	<0.0114	<0.00950
Xylenes (total) - mg/kg	EPA 8021B	1.5	**0.219**	**0.361**	**0.245**	<0.0286
Polynuclear Aromatic Hydrocarbons (PAHs) - mg/kg	EPA 8270D SIM	Various	ND	ND	ND	-

Notes:

*	= See Attachment 4 for compounds tested, methods, and laboratory reporting limits
**	= Soil cleanup level is the most stringent ADEC Method 2 standard listed in Table B1 or B2, 18 AAC 75 (Novebmer 2017), for the "under 40 inches (precipitation) zone."
^	= Sample ID number preceded by "17676-" on the chain of custody form
mg/kg	= Milligram per kilogram
<0.00525	= Analyte not detected; laboratory limit of detection of 0.00525 mg/kg
0.0480	= Analyte detected
309	= Reported concentration exceeds the ADEC cleanup level
-	= Not applicable or sample not tested for this analyte
J	= Estimated concentration less than the limit of quantitation. See the SGS laboratory report for more details.
J+	= Concentration possibly biased high due to high surrogate recovery. See the SGS laboratory report for more details.
~	= Duplicate of preceding sample
ppm	= Parts per million
ND	= Not detected

TABLE 4.1
OCTOBER 2017 SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

Parameter Tested	Method*	Cleanup Level (mg/L)**	Sample ID Number^ and Water Depth in Feet BTOC or Sample Date (See Tables 1 and 2, Figure 2, and Attachment 3)				
			Monitoring Wells				Trip Blank
			MW2 10.61	MW4 10.10	MW14~ 10.10	MW7 11.42	TB 10/20/2017
Gasoline Range Organics (GRO) - mg/L	AK 101	2.2	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Diesel Range Organics (DRO) - mg/L	AK 102	1.5	**1.36**	**0.940**	**1.12**	<0.294	-
Aromatic Volatile Organics (BTEX)							
Benzene - mg/L	EPA 8021B	0.0046	<0.000250	<0.000250	<0.000250	**0.000160 J**	<0.000250
Toluene - mg/L	EPA 8021B	1.1	**0.000340 J**	**0.000370 J**	**0.000370 J**	**0.000680 J**	<0.000500
Ethylbenzene - mg/L	EPA 8021B	0.015	**0.000560 J**	**0.000330 J**	<0.000500	<0.000500	<0.000500
Xylenes (total) - mg/L	EPA 8021B	0.19	**0.00246 J**	**0.00120 J**	**0.000710 J**	**0.00133 J**	<0.00150

Notes:

*	= See Attachment 4 for compounds tested, methods, and laboratory reporting limits
**	= Groundwater cleanup levels are listed in Table C, 18 AAC 75.345 (November 2017)
^	= Sample ID number preceded by "17676-" on the chain of custody form
mg/L	= Milligrams per liter
<0.0500	= Analyte not detected; laboratory limit of detection of 0.0500 mg/L
1.36	= Analyte detected
-	= Not applicable or sample not tested for this analyte
~	= Field duplicate of preceeding sample
J	= Estimated concentration less than the limit of quantitation. See the SGS laboratory report for more details.
BTOC	= Below Top of Casing

TABLE 4.2
MAY 2018 SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

Parameter Tested	Method*	Cleanup Level (mg/L)**	Sample ID Number^ and Water Depth in Feet BTOC or Sample Date (See Tables 1 and 2, Figure 2, and Attachment 3)				
			Monitoring Wells				Trip Blank
			MW2 6.49	MW4 9.93	MW14~ 9.93	MW7 7.80	WTB 5/3/2018
Gasoline Range Organics (GRO) - mg/L	AK 101	2.2	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Diesel Range Organics (DRO) - mg/L	AK 102	1.5	**2.04**	**0.375 J**	**0.293 J**	<0.294	-
Aromatic Volatile Organics (BTEX)							
Benzene - mg/L	EPA 8021B	0.0046	<0.000250	<0.000250	<0.000250	<0.000250	<0.000250
Toluene - mg/L	EPA 8021B	1.1	<0.000500	<0.000500	<0.000500	<0.000500	<0.000500
Ethylbenzene - mg/L	EPA 8021B	0.015	<0.000500	**0.000350 J**	<0.000500	<0.000500	<0.000500
Xylenes (total) - mg/L	EPA 8021B	0.19	<0.00150	**0.00164 J**	<0.00150	<0.00150	<0.00150

Notes:

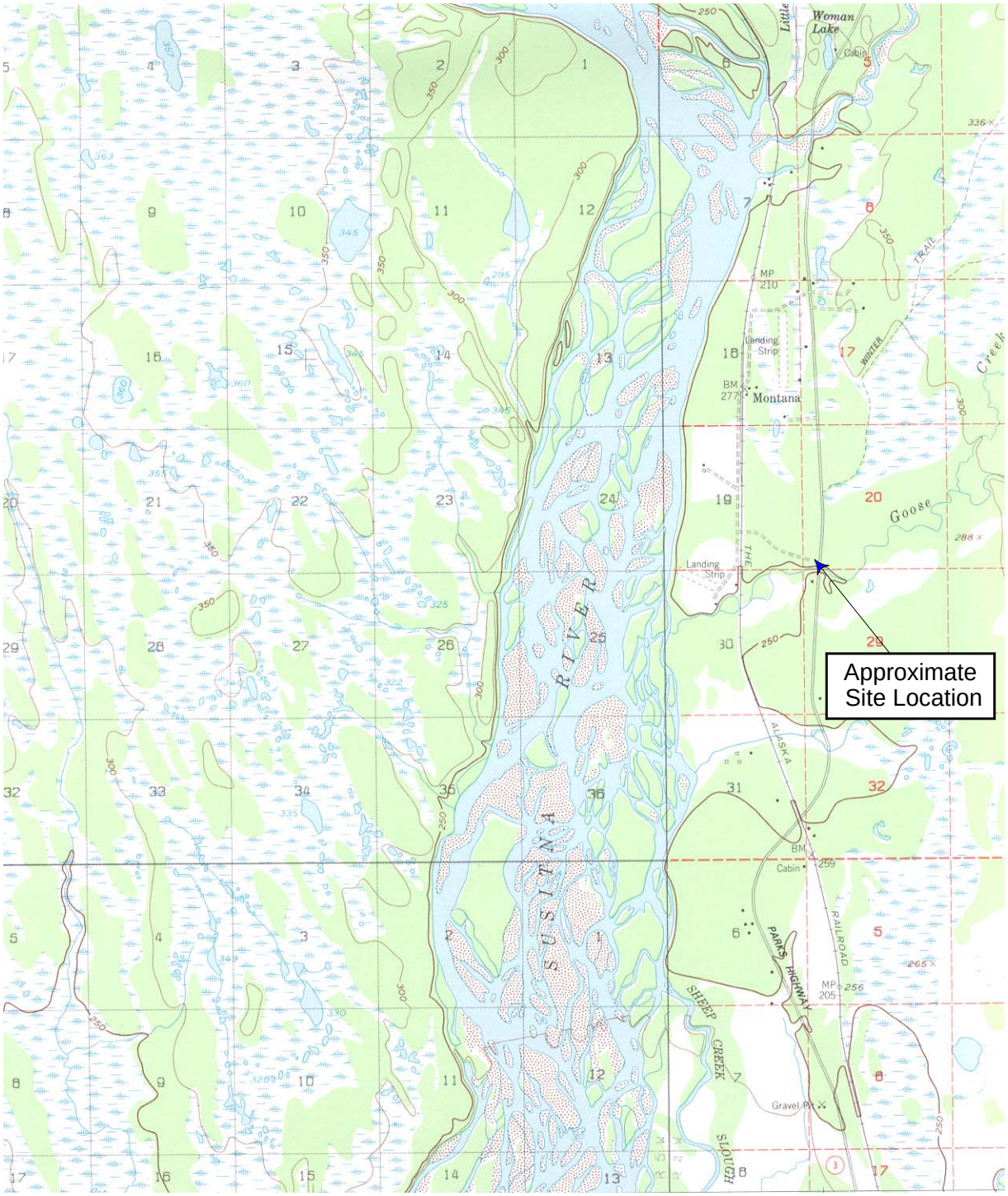
*	= See Attachment 4 for compounds tested, methods, and laboratory reporting limits
**	= Groundwater cleanup levels are listed in Table C, 18 AAC 75.345 (November 2017)
^	= Sample ID number preceded by "17676-" on the chain of custody form
mg/L	= Milligrams per liter
<0.0500	= Analyte not detected; laboratory limit of detection of 0.0500 mg/L
0.375	= Analyte detected
2.04	= Reported concentration exceeds the regulated cleanup level
-	= Not applicable or sample not tested for this analyte
~	= Field duplicate of preceeding sample
J	= Estimated concentration less than the limit of quantitation. See the SGS laboratory report for more details.
ND	= Not detected
BTOC	= Below Top of Casing

TABLE 5
HISTORICAL GROUNDWATER DATA

Well No.	Sample Date	Groundwater Depth^ (ft)	Target Analyte Concentrations and ADEC Cleanup Level (mg/L)*			
			GRO (2.2)	DRO (1.5)	Benzene (0.0046)	Total BTEX
MW-1	5/30/2001	6.69	<0.0900	<0.515	<0.000500	<0.00650
MW-2	5/30/2001	6.84	**8.70**	**16.6**	**0.0260**	**2.41**
	9/20/2001	14.74	**2.92**	**9.53**	**0.104**	**1.30**
	5/14/2002	11.88	**0.546**	**7.72**	**0.00237**	**0.139**
	10/14/2002	8.02	**0.932**	**7.86**	**0.00520**	**0.264**
	10/1/2014~	10.79	**0.131 J+**	**2.56**	**0.000750**	**0.00605**
	10/20/2017	10.61	<0.0500	**1.36**	<0.000250	**0.00336 J**
	5/3/2018	6.49	<0.0500	**2.04**	<0.000250	<0.00275
MW-3	5/30/2001	6.45	<0.0900	<0.595	<0.000500	**0.00236**
MW-4	5/30/2001	6.35	**5.63**	**8.91**	<0.0250	**1.67**
	9/20/2001	13.51	**2.15**	**9.44**	**0.00356**	**0.891**
	5/14/2002	8.65	**0.49**	**4.83**	<0.000500	**0.128**
	10/14/2002	7.54	**1.16**	**6.84**	**0.00255**	**0.382**
	10/1/2014	11.00	**0.0402 J**	**1.33**	<0.000250	<0.00325
	10/20/2017~	10.10	<0.0500	**1.12**	<0.000250	**0.00190 J**
	5/3/2018~	9.93	<0.0500	**0.375 J**	<0.000250	**0.00199 J**
MW-5	10/14/2002	Groundwater not encountered.				
	10/1/2014	Could not locate. Assumed destroyed.				
MW-6	10/14/2002	7.09	<0.0900	<0.526	<0.000500	<0.00650
	10/1/2014	Could not locate. Assumed destroyed.				
MW-7	10/20/2017	11.42	<0.0500	<0.294	**0.000160 J**	**0.00217 J**
	5/3/2017	7.80	<0.0500	<0.294	<0.000250	<0.00275

Notes:

^	= Depth of static groundwater level below the measuring point or top of casing
*	= Groundwater cleanup levels are listed in Table C, 18 AAC 75.345 (November 2017)
<0.000250	= Analyte not detected; laboratory limit of detection of 0.000250 mg/L
0.546	= Analyte detected
8.70	= Analyte concentration exceeds ADEC cleanup level
J	= Estimated concentration detected below the reporting limit
J+	= Concentration may be biased high due to surrogate failure
~	= Listed value based on highest concentration in duplicate set
mg/L	= Milligrams per liter
ft	= Feet



0 1 2

APPROXIMATE SCALE IN MILES

Elevation in meters
Contour interval 5 meters
Taken from Talkeetna A-1 SE
U.S. Geological Survey Quadrangle (1987)

N

Former Goose Creek Community Center
Mile 94 Parks Highway, Alaska

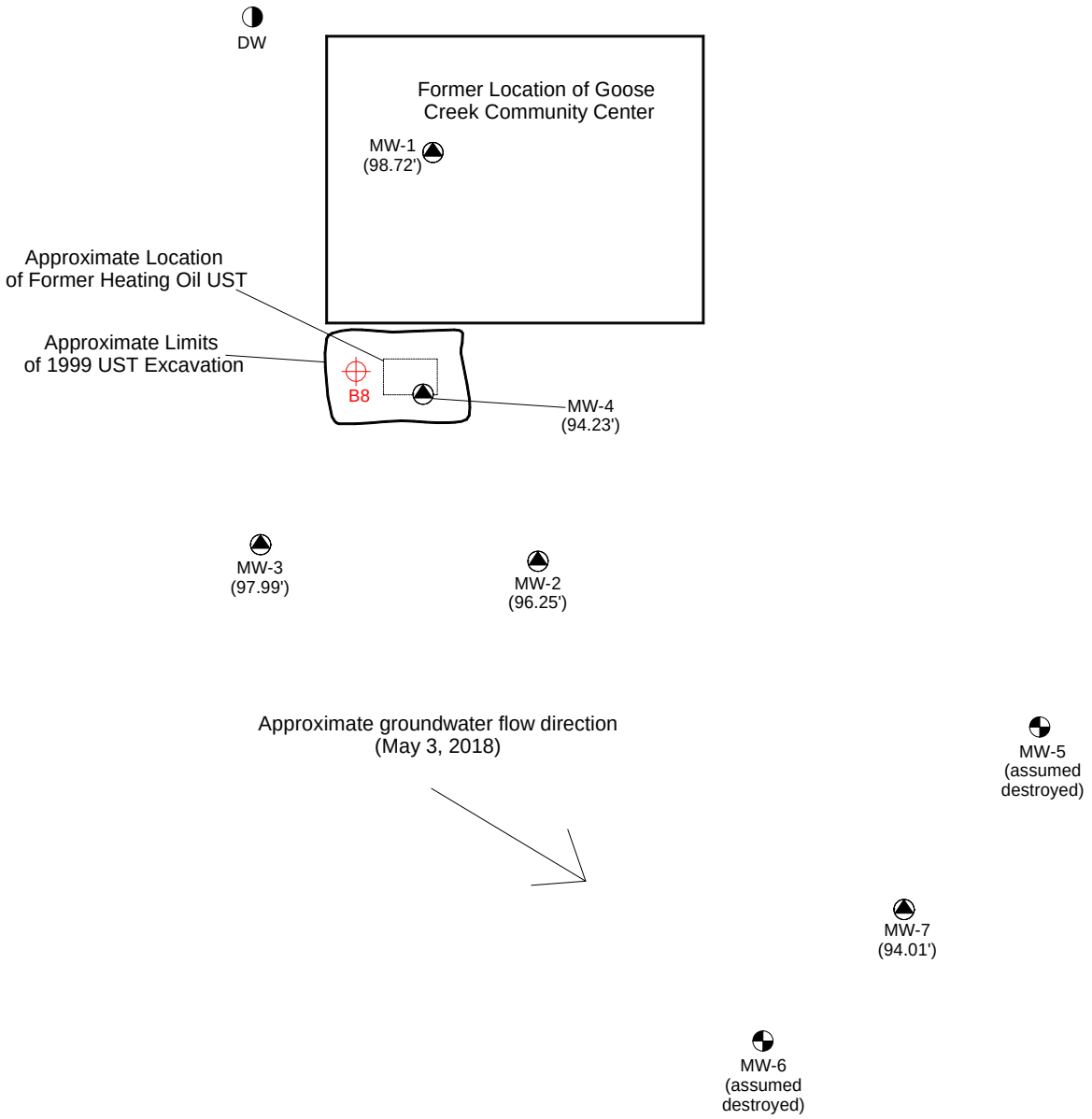
VICINITY MAP

July 2018

32-1-17676-002

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

Fig. 1



LEGEND

B8 — Approximate location of Boring B8 advanced by Shannon & Wilson in July 2017

MW-1 (98.72') — Approximate location of Monitoring Well MW-1 installed by Shannon & Wilson and groundwater elevation of 101.64 feet based on October 20, 2017 level-loop survey and May 3, 2018 water level measurements.

MW-5 — Approximate location of former Drive Point Well MW-5 installed by Shannon & Wilson in September 2001.

DW — Approximate location of former drinking water well assumed decommissioned during demolition activities in 1999 and 2000.

0 20 40
APPROXIMATE SCALE IN FEET

N

Former Goose Creek Community Center
Mile 94 Parks Highway, Alaska

SITE PLAN

July 2018 32-1-17676-002

SHANNON & WILSON, INC.
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Fig. 2

ATTACHMENT 1

SITE PHOTOGRAPHS

Photo 1: Looking north while advancing Boring B8. (July 26, 2017)

Photo 2: Looking south while advancing Boring B7. (July 26, 2017)

Former Goose Creek Community Center
Mile 94 Parks Highway, Alaska

PHOTOS 1 AND 2

July 2018 32-1-17676-002

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Photo 3: Looking southeast while installing Monitoring Well MW-7. (October 20, 2017)

Photo 4: Looking east at Monitoring Well MW-7. (October 20, 2017)

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Mile 94 Parks Highway, Alaska

PHOTOS 3 AND 4

July 2018 | 32-1-17676-002

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ATTACHMENT 2

FIELD NOTES

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIELD LOG OF BORING

DRILL COMPANY/DRILLER: Discovery / Dick
DRILL RIG EQUIPMENT: CME 75 Truck rig
DRILLING METHOD: HSA
HAMMER TYPE: Auto ROD TYPE/DIA.:
HAMMER WEIGHT: 340 HAMMER DROP:
CASING SIZE/TYPE: HOLE SIZE:

JOB NO: 17676-002 BORING NO: B7
JOB NAME: Goose Creek
LOGGED BY: JCT
LOCATION: Goose Creek ELEV.: –
START DATE: 7/26/17 END DATE:
WEATHER DURING DRILLING: Rain 56°F

SAMPLE DATA

TIME / DATE	SAMP. NO. / TYPE	DEPTH FROM / TO	DRIVING RESISTANCE BLOWS / 6 INCH	L. REC. / Env. Sample (Y/N)	DRILL ACTION	CONTACTS / GROUNDWATER	PID	CONST. %	FIELD IDENTIFICATION [Density/consistency, color, Group Name (USCS); moisture; constituent properties (particle size, plasticity, etc.); organics; structure; other; unit name]
1210	S1	0	–	–			0.5	G S F	Light brown Silt with Sand; moist few organics
7/26	GRAB	2.5		Y					
1220	S2	2.5	2 2				0	G S F	~~Same~~ Brown Sand with Silt; moist
7/26	3SS	4.5	3 5	Y					
1225	S3	5	9 16	0		Cobble	–	G S F	No recovery. Pounded rock down.
7/26	3SS	7	21 26	N					
* 1235	S4	7.5	24 27	1			0.9	G S F	Very dense Sand with Silt and gravel; moist Cobble in end of sampler
7/26	3SS	9.5	46 26	Y					
1245	S5	10	34 21	1.8			0	G S F	Cobble 6" then ~~Dense~~ Sand with Silt to Silt with Sand moist.
7/26	3SS	12	23 16	Y					
1255	S6	12.5	7 30	2			0.3	G S F	Same Cobble at ~14.2'
7/26	3SS	14.5	50 for 3"	Y					
1305	S7	15	15 20	2			0	G S F	Same with cobbles
7/26	3SS	17	24 26	Y					

SUMMARY FIELD LOG OF BORING

DEPTH FROM	DEPTH TO	USCS CLASSIF.	GENERALIZED SOIL DESCRIPTION FOR DRAFTED GINT LOG

COMMENTS (i.e. materials used, visitors, problems, etc.):
DTW in MW-2 was ~15' bgs

GROUNDWATER DATA

WATER DEPTH	TIME	DATE

SUMMARY OF TIME AND FOOTAGE

FOOTAGE DRILLED: SAMPLES: Attempted / Recovered
DRILL/SAMPLE hrs. STANDBY: hrs.
SETUP/CLEANUP: hrs. WELL INSTALL: hrs.
OTHER:

BORING: B7 SHEET 1 OF

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIELD LOG OF BORING

DRILL COMPANY/DRILLER: Discovery / Dick
DRILL RIG EQUIPMENT: CME 75 Truck
DRILLING METHOD: HSA
HAMMER TYPE: Auto ROD TYPE/DIA.:
HAMMER WEIGHT: 340 HAMMER DROP:
CASING SIZE/TYPE: HOLE SIZE:

JOB NO: 17676-002 BORING NO: B7
JOB NAME: Goose Creek
LOGGED BY: JCT
LOCATION: Goose Creek ELEV.:
START DATE: 7/26/17 END DATE: 7/26/17
WEATHER DURING DRILLING: Rain 56°F

SAMPLE DATA

TIME / DATE	SAMP. NO. / TYPE	DEPTH FROM / TO	DRIVING RESISTANCE BLOWS / 6 INCH	L. REC. / Env. Sample (Y/N)	DRILL ACTION	CONTACTS / GROUNDWATER	PID	CONST. %	FIELD IDENTIFICATION [Density/consistency, color, Group Name (USCS); moisture; constituent properties (particle size, plasticity, etc.); organics; structure; other; unit name]
1315	S8	17.5	19 26	2			0.1	G S F	Same
7/26	355	19.5	26 39	Y					
1330	S9	20	20 24	2		Did not see water during drilling	0	G S F	Same
7/26	355	22	28 25	Y					

SUMMARY FIELD LOG OF BORING

DEPTH FROM	DEPTH TO	USCS CLASSIF.	GENERALIZED SOIL DESCRIPTION FOR DRAFTED GINT LOG

COMMENTS (i.e. materials used, visitors, problems, etc.):
Called Dig-, Said to set well from 5 to 20 bgs

GROUNDWATER DATA

WATER DEPTH	TIME	DATE
—	—	—

SUMMARY OF TIME AND FOOTAGE

FOOTAGE DRILLED: 22 SAMPLES: Attempted / Recovered
DRILL/SAMPLE hrs. STANDBY: hrs.
SETUP/CLEANUP: hrs. WELL INSTALL: hrs.
OTHER:

BORING: B7 SHEET 2 OF 2

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIELD LOG OF BORING

DRILL COMPANY/DRILLER: Discovery / Dick
DRILL RIG EQUIPMENT: CME 75 Truck Mount
DRILLING METHOD: HSA
HAMMER TYPE: Auto ROD TYPE/DIA.:
HAMMER WEIGHT: 340 HAMMER DROP:
CASING SIZE/TYPE: HOLE SIZE:

JOB NO: 17676-002 BORING NO: B8
JOB NAME: Goose Creek
LOGGED BY: JCT
LOCATION: Goose Creek ELEV.: —
START DATE: 7/26/17 END DATE:
WEATHER DURING DRILLING: Overcast Low 56°F

SAMPLE DATA

TIME / DATE	SAMP. NO. / TYPE	DEPTH FROM / TO	DRIVING RESISTANCE BLOWS / 6 INCH	L. REC. / Env. Sample (Y/N)	DRILL ACTION	CONTACTS / GROUNDWATER	PID	CONST. %	FIELD IDENTIFICATION [Density/consistency, color, Group Name (USCS); moisture; constituent properties (particle size, plasticity, etc.); organics; structure; other; unit name]
1050	S1	0	—	—			0.3	G S F	Light brown Silt with Sand; moist few organics on top of sample
7/26	GRAB	2.5		Y					
1100	S2	2.5	3 2	1.8			0.3	G S F	Same no organics trace gravel
7/26	3SS	4.5	2 3	Y					
1110	S3	5	4 4	2			200	G S F	Same to ~6.5' then Gray Silt with gravel; moist HC odor Saturated
7/26	3SS	7	3 6	Y					
* 1120	S4	7.5	6 14	1.6			220	G S F	Same. HC odor decreased at about 9' bgs
7/26	3SS	9.5	16 19	Y					Duplicate sample collected B8S14
1135	S5	10	11 13	2.0			1.5	G S F	Brown Silt with Sand and gravel moist
7/26	3SS	12	16 23	Y		▽			Water at very end of sampler
								G S F	
								G S F	

SUMMARY FIELD LOG OF BORING

DEPTH FROM	DEPTH TO	USCS CLASSIF.	GENERALIZED SOIL DESCRIPTION FOR DRAFTED GINT LOG

COMMENTS (i.e. materials used, visitors, problems, etc.):
HC odor from 6.5 to 9' bgs
Filled in boring with cuttings mixed with clean sand/gravel
Had to cut down small trees to access Boring

GROUNDWATER DATA

WATER DEPTH	TIME	DATE
~12	1135	7/26/17

SUMMARY OF TIME AND FOOTAGE

FOOTAGE DRILLED: 12 SAMPLES: 5 Attempted 5 Recovered
DRILL/SAMPLE hrs. STANDBY: hrs.
SETUP/CLEANUP: hrs. WELL INSTALL: hrs.
OTHER:

BORING: B8 SHEET 1 OF 1

LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 32-1-17676-002 Location: Goose Creek Weather: 8° Clear

Well No.: MW-1

Date: 10/20/2017 Time Started: — Time Completed: —

Develop Date: — Develop End Time: — (24 hour break)

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 11:08 Date of Depth Measurement: 10/20/2017

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

Diameter of Casing: 2in Well Screen Interval: —

Total Depth of Well Below MP: 16.51 Product Thickness, if noted: —

Depth-to-Water (DTW) Below MP: 10.33 gs-TOC = 3.17 − .25 = 2.92

Water Column in Well: 6.18 (Total Depth of Well Below MP - DTW Below MP)

Gallons per foot: 0.16

Gallons in Well: 0.98 (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: DTW ONLY

Sampling Personnel: MOV

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: 32-1-17676-002 Location: Goose Creek Weather: 8° clear

Well No.: MW-2

Date: 10/20/17 Time Started: 11:35 Time Completed: 12:32

Develop Date: — Develop End Time: — (24 hour break)

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 11:00 Date of Depth Measurement: 10/20/17

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

Diameter of Casing: 2in Well Screen Interval: —

Total Depth of Well Below MP: 18.53 Product Thickness, if noted: —

Depth-to-Water (DTW) Below MP: 10.61 3.29 - 1.36 = 1.93

Water Column in Well: 7.92 (Total Depth of Well Below MP - DTW Below MP)

Gallons per foot: 0.16

Gallons in Well: 1.26 (Water Column in Well x Gallons per foot)

PURGING DATA

Date Purged: 10/20/17 Time Started: 11:45 Time Completed: 12:25

Three Well Volumes: 3.80 (Gallons in Well x 3) 1 ft below water collum

Gallons Purged: 1.8 Depth of Pump (~~generally 2 ft from bottom~~): ~ 11.6 ft

Max. Drawdown (generally 0.3 ft): 0.22 Pump Rate: 0.2L/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) 3%	Sp. Cond.: (uS/cm) 3%	DO: (mg/L)	pH: (S.U.) .1	ORP: (mV) ±10	Turb: (NTU)
11:50	0.2	0.2	10.80	0.19	4.5	53		5.36	215	95.27
11:53	0.4	—	—	—	5.1	54		5.21	218	41.64
11:56	0.6	0.2	10.82	0.21	5.5	57		5.15	225	29.23
11:59	0.8	—	—	—	5.8	60		5.18	222	12.95
12:02	1.0	—	—	—	5.9	62		5.19	222	10.00
12:05	1.2	—	—	—	5.9	64		5.19	223	9.97

SAMPLING DATA

Odor: None Noted Color: Clear

Sample Designation: 17676-MW2 Time / Date: 12:15 / 10/20/2017

QC Sample Designation: — Time / Date: —

QA Sample Designation: — Time / Date: —

Evacuation Method: Submersible Pump / Other: Mini whale

Sampling Method: Submersible Pump / Other: Mini whale

Water Quality Instruments Used/Manufacturer/Model Number Hanna Stick # 2 + #3

Calibration Info (Time, Ranges, etc) Calibrated Hanna Stick #2 + #3 @ 11:30

Remarks: Started clear, Stayed clear, Sampled clear

Sampling Personnel: ATV

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

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

LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Continued from previous page

Job No: 32-1-17676-002 Location: Goose Creek Site: 8° Clear
Well No.: MW-2
Date: 10/20/2017

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)
					5.9	64		.1	±10	
12:08	1.4	0.2	10.83	0.22	5.9	67		5.16	226	8.96
12:11	1.6	–	–	–	5.9	68		5.13	225	7.71
12:14	1.8	–	–	–	6.0	68	↓	5.16	226	7.43
	All Parameters Stabilized ✓									
12:15	Sample time									

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

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

LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 32-1-17676-002 Location: Goose Creek Weather: 8° clear

Well No.: MW-3

Date: 10/20/2017 Time Started: — Time Completed: —

Develop Date: — Develop End Time: — (24 hour break)

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 11:22 Date of Depth Measurement: 10/20/2017

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

Diameter of Casing: 2 inch Well Screen Interval: —

Total Depth of Well Below MP: 19.44 Product Thickness, if noted: —

Depth-to-Water (DTW) Below MP: 9.87 gs - TOC = 3.3 - .95 = 2.35

Water Column in Well: 9.57 (Total Depth of Well Below MP - DTW Below MP)

Gallons per foot: 0.16

Gallons in Well: 1.53 (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: DTW only

Sampling Personnel: ADV

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: 32-1-17676-002 Location: Goose Creek Weather: 8° Clear

Well No.: MW-4

Date: 10/20/17 Time Started: 12:45 Time Completed: 1425

Develop Date: – Develop End Time: – (24 hour break)

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 11:16 Date of Depth Measurement: 10/20/17

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

Diameter of Casing: 2in Well Screen Interval: –

Total Depth of Well Below MP: 15.70 Product Thickness, if noted: –

Depth-to-Water (DTW) Below MP: 10.10 gs - TOC = 3.94 - .3 = 3.64

Water Column in Well: 5.6 (Total Depth of Well Below MP - DTW Below MP)

Gallons per foot: 0.16

Gallons in Well: 0.90 (Water Column in Well x Gallons per foot)

PURGING DATA

Date Purged: 10/20/17 Time Started: 13:05 Time Completed: 1355

Three Well Volumes: 2.69 (Gallons in Well x 3) 2 ft below water collum

Gallons Purged: 2.0 Depth of Pump (~~generally 2 ft from bottom~~): ~11.10 ft

Max. Drawdown (generally 0.3 ft): 0.22 Pump Rate: 0.2 L/MIN

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

Time:	Gallons:	Pump Rate (L/min):	DTW (ft BMP):	Drawdown (ft):	Temp: (°C)	Sp. Cond.: (uS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (NTU)
13:08	0.2	0.2	10.21	.11	4.0	49		4.85	252	146.9
13:11	0.4	0.2	–	–	3.8	50		4.83	250	93.62
13:14	0.6	–	–	–	3.2	49		4.77	252	61.09
13:17	0.8	0.2	10.29	.19	4.8	50		4.76	250	33.15
13:20	1.0	–	–	–	5.0	50		4.76	249	22.15
13:23	1.2	–	–	–	4.8	50		4.75	249	14.76

SAMPLING DATA

Odor: None Noted Color: Clear

Sample Designation: 17676-MW4 Time / Date: 13:36 / 10/20/2017

QC Sample Designation: 17676-MW14 Time / Date: +30 min 14:06 / 10/20/2017

QA Sample Designation: – Time / Date: –

Evacuation Method: Submersible Pump / Other: mini whale

Sampling Method: Submersible Pump / Other: mini whale

Water Quality Instruments Used/Manufacturer/Model Number Hanna Stick #2 + #3

Calibration Info (Time, Ranges, etc) See MW-2 Low-Flow Water Sampling Log Please

Remarks: Started clear, stayed clear,

Sampling Personnel: ADV

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

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

LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Continued from previous page

Job No: 32-1-17676-002 Location: Goose Creek Site: _____

Well No.: MW-4

Date: 10/20/2017

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)
					4.8	50		4.75	249	
13:26	1.4	0.2	10.32	0.22	4.6	49		4.66	251	9.24
13:29	1.6	–	–	–	4.5	50		4.73	253	7.14
13:32	1.8	–	–	–	4.6	50	↓	4.74	249	6.9
13:35	2.0	0.2	10.32	0.22	4.6	50	↓	4.74	249	6.12
	All Parameters stabilized									
13:36	Sample time									

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

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

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

WELL DEVELOPMENT LOG

Shannon & Wilson, Inc.

Job No: 32-1-17676-002 Location: Goose Creek Weather: 8°

Concern: DRO Well No.: MW-7

Develop Date: 10/20/2017 Time Started: 1100 Time Completed:

PURGING DATA

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

Time of Depth Measurement: 10:45

Diameter of Casing: 1" ☐ 2" ☑

Total Depth of Well Below MP: 22.23

Depth-to-Water (DTW) Below MP: 11.42

Water Column in Well: 10.81 (Total Depth of Well Below MP - DTW Below MP)

Gallons per foot: 0.16

Gallons in Well: 1.73 (Water Column in Well x Gallons per foot)

Three Well Volumes: 5.18 (Gallons in Well x 3)

Gallons Purged:

DEVELOPMENT DATA

Odor: None Color: light Brown

Time:	Gallons:	Temp: (°C)	Sp. Cond.: (mS/cm)	pH: (S.U.)	ORP: (mV)	Turb: (ntu)
1110	5	6.3	97	5.14	197	>1000
1125	10	6.0	54	5.08	195	977.8
1140	15	4.3	69	5.05	223	951.3
1155	20	4.1	63	5.01	230	>1000
1210	25	4.2	60	5.00	239	>1000
1225	30	4.3	54	4.90	244	894.0
1240	35	4.2	49	4.92	252	134.1
1255	40	4.0	47	5.09	252	534.3

Surging	Surging Time (minutes)	Gallons Purged	Purging Time (minutes)
1	5	5	5
2	5	5 (10)	5
3	5	5 (15)	5
4	5	5 (20)	5
5	5	5 (25)	5
6	5	5 (30)	5

Evacuation Method: Proactive Pump / Other: Whale Surge Block: PVC

Remarks:

Sampling Personnel: JCT

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

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

WELL DEVELOPMENT LOG

Shannon & Wilson, Inc.

Job No: 17676-002 Location: Goose Creek Weather: Clear 8°F
Concern: DRO Well No.: MW7
Date: 10/20/17 Time Started: Time Completed:

DEVELOPMENT DATA CONTINUED

	Time:	Gallons:	Temp: (°C)	Sp. Cond.: (mS/cm)	pH: (S.U.)	ORP: (mV)	Turb: (ntu)
Slowed flow rate down to get turbidity down	1310	41	3.9	47	5.10	255	33.01
	1315	42	4.0	49	5.12	256	33.54
	1320	43	4.1	52	5.10	256	32.86
	1325	44	4.1	49	5.05	256	167.0
	1330	45	4.0	47	5.06	256	60.05
Raised pump up to top 1' for sample	1335	46	4.0	47	5.06	257	34.73
	1340	47	4.0	47	5.05	257	25.44
	1345	48	3.9	48	5.06	257	14.02
	1350	49	4.0	48	5.05	258	9.83
	1355	50	4.0	47	5.05	258	9.06
	1400	Sample time					

Remarks:

Sampling Personnel: Jake Tracy

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

LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 32-1-17676-002 Location: Goose Creek Weather: 8° Clear

Well No.: MW-7

Date: 10/20/2017 Time Started: _____ Time Completed: _____

Develop Date: — Develop End Time: — (24 hour break)

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: _____ Date of Depth Measurement: 10/20/2017

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

Diameter of Casing: 2in Well Screen Interval: —

Total Depth of Well Below MP: 22.23 Product Thickness, if noted: —

Depth-to-Water (DTW) Below MP: 11.42 3.47 - .62 = 2.85

Water Column in Well: 10.81 (Total Depth of Well Below MP - DTW Below MP)

Gallons per foot: 0.16

Gallons in Well: 1.73 (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: _____

Sampling Personnel: ADV

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 5/3/2018
Sheet 1 of 1
Project No. 32-1-17676-002

Project Name: Goose Creek Site Characterization
Field activity subject: Groundwater Sampling
Description of daily activities and events:

8:30 Left for site.
10:15 on-site - locating wells / meet w/ Emerson Krueger from MSB.

10:38 - 11:05 DTW in all wells

11:20 @ MW-7
Sample taken @ 12:20

12:55 @ MW-2
Sample taken @ 14:00

14:35 @ MW-4
Sample taken @ 15:30
Dup MW-14 time → 16:00

16:30 Cleaned up site.
16:45 left site for PAQ

18:15 Stored samples in locked + secured garage (heated)

5/4/2018

9:56 Dropped samples at SGS

Visitors on site: Emerson Krueger from MSB 10-12

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

Weather conditions:

Important telephone calls:

Personnel on site: ADV
Signature:

Date: 5/4/2018

LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 32-1176-16-001 Location: Goose Creek Weather: 38° overcast

Well No.: MW-1

Date: 5/3/2018 Time Started: — Time Completed: —

Develop Date: — Develop End Time: — (24 hour break)

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 10:38 Date of Depth Measurement: 5/3/2018

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

Diameter of Casing: 2in Well Screen Interval: —

Total Depth of Well Below MP: 16.60 Product Thickness, if noted: —

Depth-to-Water (DTW) Below MP: 5.63

Water Column in Well: 10.97 (Total Depth of Well Below MP - DTW Below MP)

Gallons per foot: 0.16

Gallons in Well: 1.75 (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: DTW only

Sampling Personnel: ADV

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: 32-1-17676-002 Location: Goose Creek Weather: 39° overcast

Well No.: MW-2

Date: 5/3/2018 Time Started: 12:55 Time Completed: 14:30

Develop Date: — Develop End Time: — (24 hour break)

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 10:46 Date of Depth Measurement: 5/3/2018

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

Diameter of Casing: 2inch Well Screen Interval: —

Total Depth of Well Below MP: 18.53 Product Thickness, if noted: —

Depth-to-Water (DTW) Below MP: 6.49

Water Column in Well: 12.0 (Total Depth of Well Below MP - DTW Below MP)

Gallons per foot: 0.16

Gallons in Well: 1.93 (Water Column in Well x Gallons per foot)

PURGING DATA

Date Purged: 5/3/2018 Time Started: 13:16 Time Completed: 14:15

Three Well Volumes: 5.80 (Gallons in Well x 3)

Gallons Purged: 2.0 Depth of Pump (generally 2 ft from bottom): 7.49

Max. Drawdown (generally 0.3 ft): 0.23 Pump Rate: 0.2-0.3 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) 3%	Sp. Cond.: (uS/cm) 3%	DO: (mg/L)	pH: (S.U.) .1	ORP: (mV) ±10	Turb: (NTU)
13:20	0.2	0.2	6.53	0.04	4.03	57	8.44	5.21	104.4	1.72
13:23	0.2	0.2	6.58	0.09	3.88	57	7.60	4.82	122.2	1.59
13:26	0.4	0.3	6.60	0.11	4.16	57	7.12	4.51	133.7	1.27
13:29	0.4	0.2	6.68	0.19	4.29	56	6.93	4.44	134.1	1.12
13:32	0.6	0.3	6.70	0.21	4.30	55	6.85	4.41	134.2	1.01
13:35	0.8	0.2	6.70	0.21	4.30	55	6.78	4.39	135.2	.97

SAMPLING DATA

Odor: None Noted Color: Clear

Sample Designation: 17676-MW2 Time / Date: 14:00 5/3/2018

QC Sample Designation: — Time / Date: —

QA Sample Designation: — Time / Date: —

Evacuation Method: Submersible Pump / Other: mini whale

Sampling Method: Submersible Pump / Other: mini whale

Water Quality Instruments Used/Manufacturer/Model Number YSI #1 + Turbidimeter #

Calibration Info (Time, Ranges, etc) See MW-7 Field Notes

Remarks: Started clear, stayed clear,

Sampling Personnel: ADV

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

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

LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Continued from previous page

Job No: 32-1-17676-002 Location: Goose Creek Site: Mile 94
Well No.: MW-2
Date: 5/3/2018

Time:	Gallons:	Pump Rate (L/min):	DTW (ft BMP):	Drawdown (ft):	Temp: (°C) 3%	Sp. Cond (uS/cm) 3%	DO (mg/L)	pH: (S.U.) .1	ORP: (mV) ±10	Turb: (NTU) ↓10
13:38	1.0	0.2	6.70	.21	4.31	56	6.53	4.38	135.6	.91
13:41	1.2	0.2	6.70	.21	4.33	57	6.26	4.39	136.0	.90
13:44	1.2	0.2	6.70	.21	4.39	58	5.92	4.39	135.9	.91
13:47	1.4	0.3	6.72	.23	4.37	68	5.68	4.41	135.9	.85
13:50	1.6	0.3	6.72	.23	4.41	67	5.45	4.46	136.6	.80
13:53	1.8	0.2	6.72	.23	4.41	68	5.35	4.47	136.7	.29
13:56	1.8	0.2	6.72	.23	4.42	68	5.37	4.46	136.5	.18
13:59	2.0	0.2	6.72	.23	4.42	68	5.36	4.48	136.4	.09
14:00	Sample time									

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

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

LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 32-1-17676-002 Location: Goose Creek Weather: 39° overcast
Well No.: MW-3
Date: 5/3/2018 Time Started: — Time Completed: —
Develop Date: — Develop End Time: — (24 hour break)

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 10:52 Date of Depth Measurement: 5/3/2018
Measuring Point (MP): Top of PVC Casing / Top of Steel Protective Casing / Other: Top of PVC Casing
Diameter of Casing: 2in Well Screen Interval: —
Total Depth of Well Below MP: 19.44 Product Thickness, if noted: —
Depth-to-Water (DTW) Below MP: 4.93
Water Column in Well: 14.51 (Total Depth of Well Below MP - DTW Below MP)
Gallons per foot: 0.16
Gallons in Well: 2.32 (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: DTW only

Sampling Personnel: ADV

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: 32-1-17676-002 Location: Goose Creek Weather: 38° overcast

Well No.: MW-4

Date: 5/3/2018 Time Started: 14:35 Time Completed: 16:30

Develop Date: — Develop End Time: — (24 hour break)

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 11:00 Date of Depth Measurement: 5/3/2018

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

Diameter of Casing: 2 inch Well Screen Interval: —

Total Depth of Well Below MP: 15.70 Product Thickness, if noted: —

Depth-to-Water (DTW) Below MP: 9.93

Water Column in Well: 5.77 (Total Depth of Well Below MP - DTW Below MP)

Gallons per foot: 0.16

Gallons in Well: 0.92 (Water Column in Well x Gallons per foot)

PURGING DATA

Date Purged: 5/3/2018 Time Started: 14:53 Time Completed: 15:55

Three Well Volumes: 2.77 (Gallons in Well x 3)

Gallons Purged: 1.2 Depth of Pump ~~(generally 2 ft from bottom)~~: 10.93ft

Max. Drawdown (generally 0.3 ft): 0.24 Pump Rate: 0.2L/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) 3%	Sp. Cond.: (uS/cm) 3%	DO: (mg/L)	pH: (S.U.) .1	ORP: (mV) ±10	Turb: (NTU) 10% ↓ 3x 10
14:58	0.2	0.2	10.15	0.22	3.05	29	9.30	5.58	126.4	56.16
15:01	0.4	0.2	-	-	2.83	27	8.74	5.09	144.3	44.65
15:04	0.4	0.2	10.15	0.22	2.68	27	8.68	4.91	150.8	41.53
15:07	0.6	0.2	10.16	0.23	2.59	26	8.67	4.84	153.6	31.72
15:10	0.6	0.2	10.16	0.23	2.56	26	8.64	4.80	153.7	26.53
15:13	0.8	0.2	10.16	0.23	2.53	26	8.43	4.74	152.5	15.92

SAMPLING DATA

Odor: None Noted Color: Clear

Sample Designation: 17676-MW4 Time / Date: 15:30 / 5/3/2018

QC Sample Designation: 17676-MW14 Time / Date: +30 → 16:00 / 5/3/2018

QA Sample Designation: — Time / Date: —

Evacuation Method: Submersible Pump / Other: mini whale

Sampling Method: Submersible Pump / Other: mini whale

Water Quality Instruments Used/Manufacturer/Model Number YSI #1 + Turbidimeter #3

Calibration Info (Time, Ranges, etc) See MW-7 Field Notes

Remarks: Started clear, Stayed clear, Sampled clear

Sampling Personnel: ADV

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

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

LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Continued from previous page

Job No: 32-1-17676-002 Location: Mile 94 Site: Goose Creek
Well No.: MW-4
Date: 5/3/2018

Time:	Gallons:	Pump Rate (L/min):	DTW (ft BMP):	Drawdown (ft):	Temp: (°C) 3%	Sp. Cond (uS/cm) 3%	DO (mg/L) —	pH: (S.U.) .1	ORP: (mV) ±10	Turb: (NTU) 10% or 10 ↓ 3×
15:16	0.8	0.2	10.16	0.23	2.48	26	8.15	4.67	152.7	13.15
15:19	0.8	0.2	10.16	0.23	2.48	27	7.95	4.64	153.0	9.53
15:22	1.0	0.2	10.17	0.24	2.49	27	7.87	4.62	152.7	8.66
15:25	1.0	0.2	10.17	0.24	2.50	27	7.74	4.60	152.7	8.14
15:28	1.2	0.2	10.17	0.24	2.51	27	7.53	4.60	151.9	6.19
15:30	Sample time									
16:00	Dup Sample time									

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

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

LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 32-1-17676-002 Location: Goose Creek Weather: 39° overcast

Well No.: MW-7

Date: 5/3/2018 Time Started: 11:20 Time Completed: 12:50

Develop Date: 10/20/2017 Develop End Time: 14:00 (24 hour break)

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 11:05 Date of Depth Measurement: 5/3/2018

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

Diameter of Casing: 2 inch Well Screen Interval: —

Total Depth of Well Below MP: 22.25 Product Thickness, if noted: —

Depth-to-Water (DTW) Below MP: 7.80

Water Column in Well: 14.45 (Total Depth of Well Below MP - DTW Below MP)

Gallons per foot: 0.16

Gallons in Well: 2.31 (Water Column in Well x Gallons per foot)

PURGING DATA

Date Purged: 5/3/2018 Time Started: 11:40 Time Completed: 12:40

Three Well Volumes: 6.94 (Gallons in Well x 3)

Gallons Purged: 2.6 Depth of Pump (~~generally 2 ft from bottom~~): 8.80 ft

Max. Drawdown (generally 0.3 ft): 0.20 Pump Rate: 0.2 L/MIN

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

Time:	Gallons:	Pump Rate (L/min):	DTW (ft BMP):	Drawdown (ft):	Temp: (°C)	Sp. Cond.: (uS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (NTU)
11:43	0.2	0.2	7.95	0.15	3.52	144	13.10	3.11	218	29.42
11:46	0.5	0.3	7.95	0.15	3.58	131	12.52	3.01	226	26.85
11:49	0.7	0.2	7.96	0.16	3.81	107	12.45	3.02	222	25.82
11:52	0.9	0.2	7.80	0.20	3.78	103	12.60	3.20	214.6	21.26
11:55	1.1	0.2	7.80	0.20	3.66	98	12.40	3.30	205.6	15.92
11:58	1.3	0.2	7.80	0.20	3.89	98	11.92	3.39	199.2	18.36

SAMPLING DATA

Odor: None Noted Color: Clear

Sample Designation: 17676 - MW7 Time / Date: 12:20 / 5/3/2018

QC Sample Designation: — Time / Date: —

QA Sample Designation: — Time / Date: —

Evacuation Method: Submersible Pump / Other: Mini whale

Sampling Method: Submersible Pump / Other: mini whale

Water Quality Instruments Used/Manufacturer/Model Number YSI #1, Turbidimeter #

Calibration Info (Time, Ranges, etc) Calibrated YSI #1 + Turbidimeter @ 11:15

Remarks: Started clear, stayed clear, sampled clear

Sampling Personnel: ADV

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

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

LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Continued from previous page

Job No: 32-1-17676-002 Location: Goose creek Site: Mile 99

Well No.: MW-7

Date: 5/3/2018

Time:	Gallons:	Pump Rate (L/min):	DTW (ft BMP):	Drawdown (ft):	Temp: (°C) 3%	Sp. Cond (uS/cm) 3%	DO (mg/L) ±0	pH: (S.U.) .1	ORP: (mV) 10%	Turb: (NTU) 10↓
12:01	1.5	0.2	7.80	0.20	4.67	92	95.2	4.07	173.3	12.66
12:04	1.7	0.2	7.80	0.20	3.52	88	95.1	3.92	181.9	11.70
12:07	1.9	0.2	7.80	0.20	3.56	✓89	94.3	✓3.76	✓188.1	10.68
✓12:10	2.2	0.2	7.80	0.20	3.74	✓89	92.8	✓3.71	✓188.1	✓9.70
✓12:13	2.4	0.2	7.80	0.20	3.72	✓89	91.1	✓3.74	✓188.2	✓9.23
✓12:16	✓2.6	0.2	7.80	0.20	3.71	✓88	91.7	✓3.72	✓188.1	✓8.92
12:20	Sample time									

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

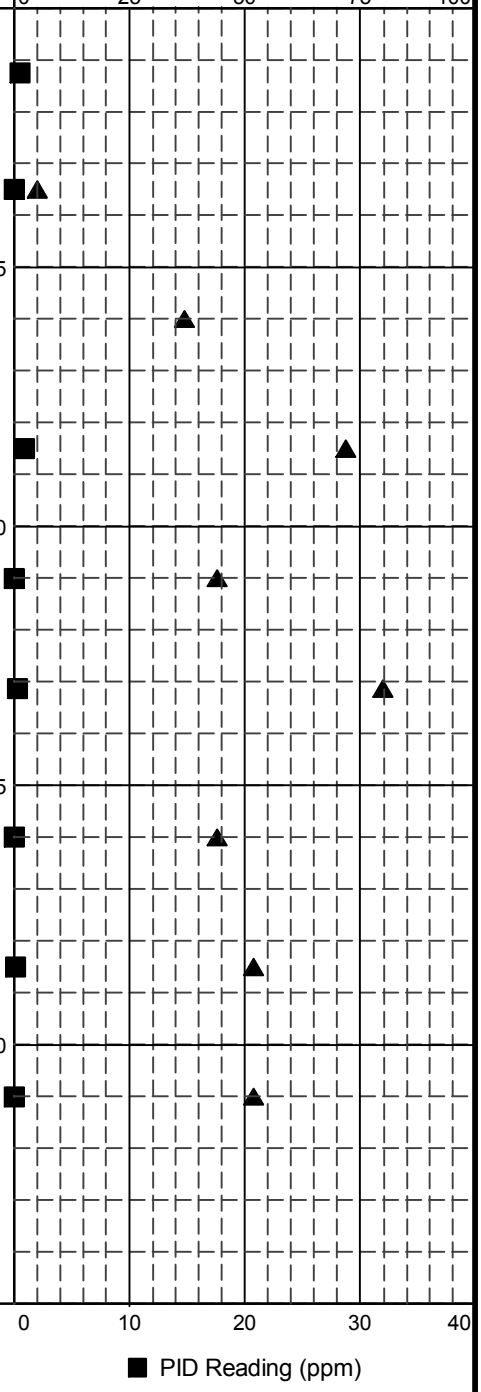
EPA guidance requires all parameters to stabilize for 3 consecutive readings before sampling. If not stable within 2 hours, collect sample.

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

ATTACHMENT 3

BORING LOGS AND WELL CONSTRUCTION DETAILS

MATERIAL DESCRIPTION Approx. Elevation:	Depth, Ft.	Symbol	Samples	Ground Water	Depth, Ft.	Penetration Resistance (340 lb. weight, 30" drop) ▲ Blows per foot
Loose to very dense, light brown to brown, *Silt with Sand (ML) to Silty Sand (SM)*; moist; few organics and cobbles			S1, S2, S3 *, S4, S5, S6, S7, S8, S9	5/3/2018	5, 10, 15, 20	0, 25, 50, 75, 100
Bottom of Boring Boring Completed 7/26/17	22.0					



LEGEND

- * Sample not recovered
- 3" O.D. Split Spoon Sample
- Grab Sample
- Static Water Level
- Solid Casing, Sand Pack
- Solid Casing and Annular Seal
- Slotted Section, Filter Sand
- Solid Casing, Cuttings Backfill

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. USC letter symbol based on visual classification.

Former Goose Creek Community Center
Mile 94 Parks Highway, Alaska

LOG OF BORING B7

July 2018 | 32-1-17676-002

SHANNON & WILSON, INC.
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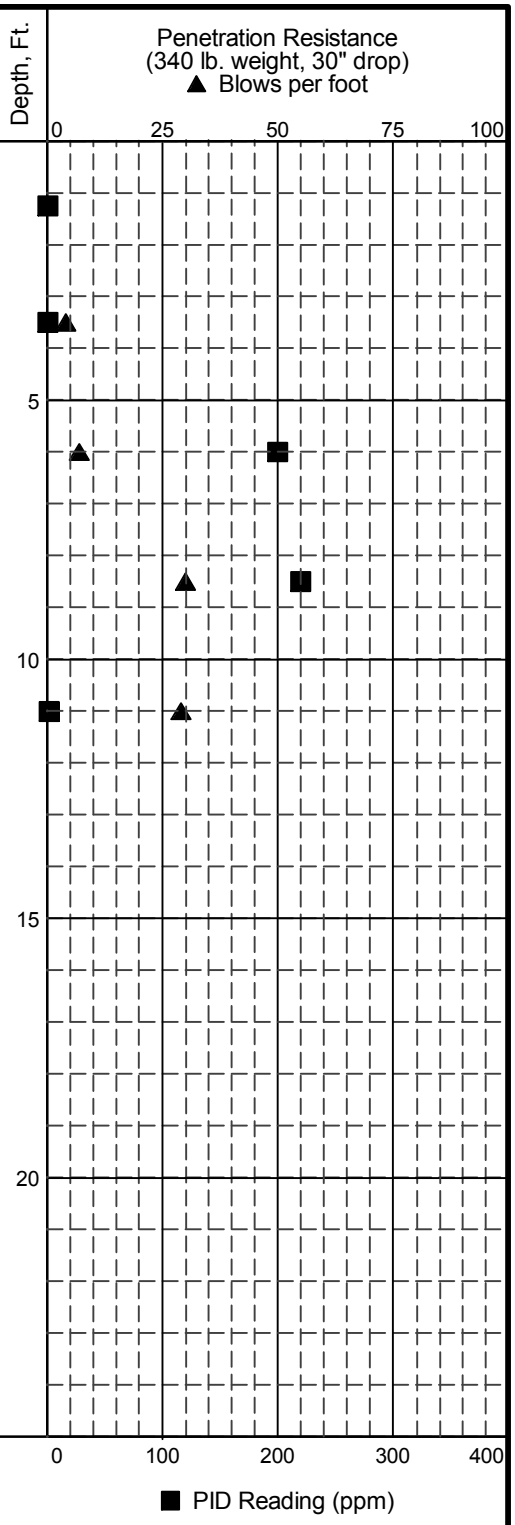
FIG. 3-1

ENVIRONMENTAL LOG GINT.GPJ S&W GEO1.GDT 7/11/18

REV 3 - Approved for Submittal

MATERIAL DESCRIPTION Approx. Elevation:	Depth, Ft.	Symbol	Samples	Ground Water Depth, Ft.
Loose, light brown, *Silt with Sand (ML)*; moist; few organics			S1, S2, S3	
Medium dense, gray, *Gravelly Silt with Sand (ML)*; moist to wet; hydrocarbon odor from about 6.5 to 9 feet below ground surface	6.5		S4, S5	7/26/17
Bottom of Boring Boring Completed 7/26/17	12.0			



LEGEND

* Sample not recovered
3" O.D. Split Spoon Sample
Grab Sample
Ground Water Level At Time Of Drilling

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. USC letter symbol based on visual classification.

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Mile 94 Parks Highway, Alaska

LOG OF BORING B8

July 2018 32-1-17676-002

SHANNON & WILSON, INC.
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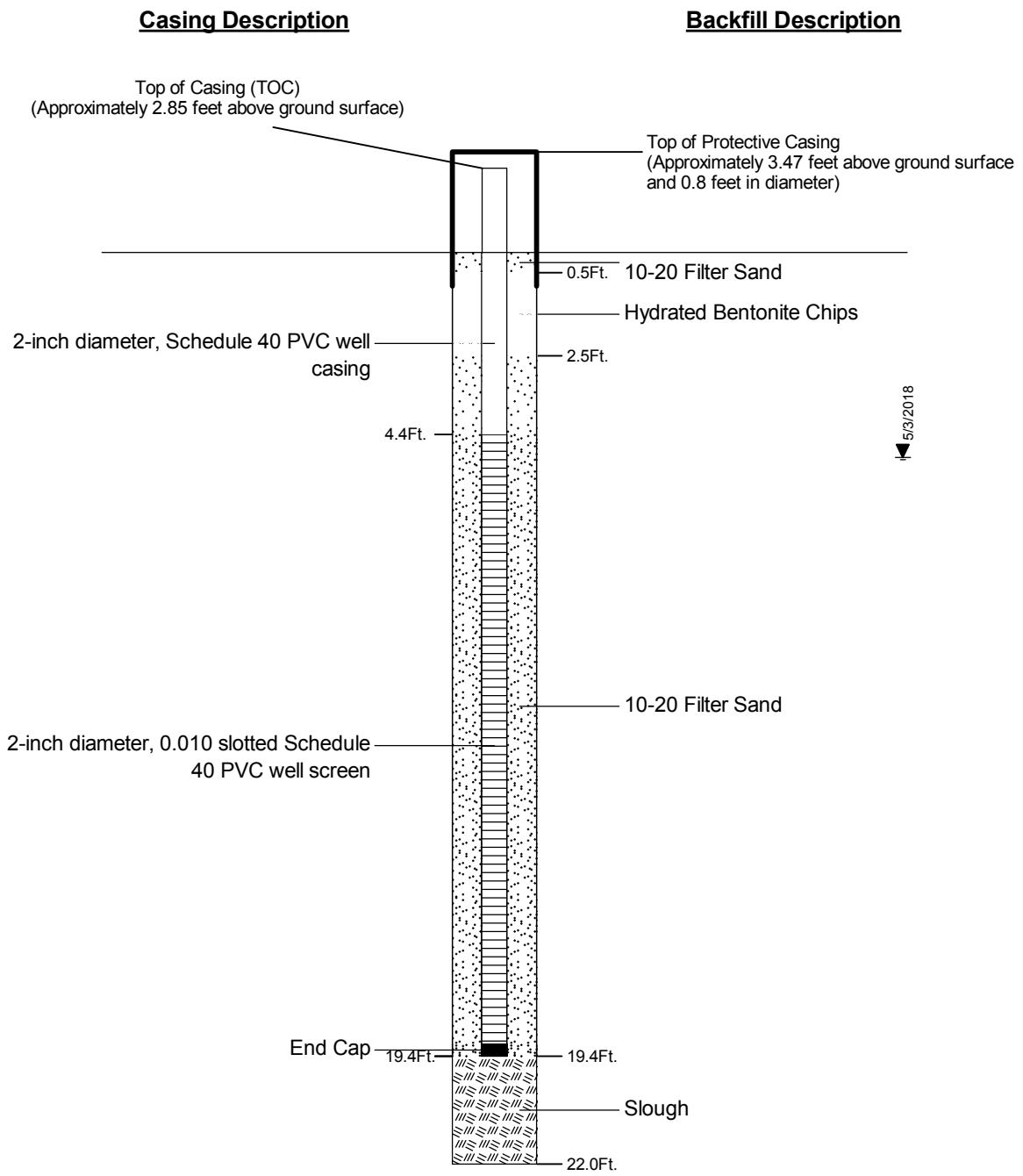
FIG. 3-2

ENVIRONMENTAL LOG GINT.GPJ S&W GEO1.GDT 7/11/18

REV 3 - Approved for Submittal



LEGEND

Groundwater Level ATD

Static Groundwater Level

NOTE: All joints use threaded connections.

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MONITORING WELL MW-7
CONSTRUCTION DETAIL

July 2018 32-1-17676-002

SHANNON & WILSON, INC.
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Fig. 3-3

ATTACHMENT 4

RESULTS OF ANALYTICAL TESTING BY

SGS NORTH AMERICA INC. OF ANCHORAGE, ALASKA AND

ADEC LABORATORY DATA REVIEW CHECKLISTS

Laboratory Report of Analysis

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

Report Number: **1174881**

Client Project: **17676-002 Goose Creek**

Dear Jacob Tracy,

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

If there are any questions about the report or services performed during this project, please call Victoria 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.

_____

Victoria Pennick Date
Project Manager
Victoria.Pennick@sgs.com

Print Date: 08/04/2017 4:16:39PM

Case Narrative

SGS Client: **Shannon & Wilson, Inc.**
SGS Project: **1174881**
Project Name/Site: **17676-002 Goose Creek**
Project Contact: **Jacob Tracy**

Refer to sample receipt form for information on sample condition.

17676-B8S4 (1174881002) PS

AK101 - Surrogate recovery for 4-bromofluorobenzene (164%) does not meet QC criteria due to matrix interference.

1174881002MS (1401151) MS

8021B - MS recovery for o-Xylene (130%) does not meet QC criteria due to matrix interference. Refer to LCS/LCSD for accuracy requirements.

1174881002MSD (1401152) MSD

8021B - MSD recovery for o-Xylene (132%) does not meet QC criteria due to matrix interference. Refer to LCS/LCSD 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.

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

Report of Manual Integrations

Laboratory ID	Client Sample ID	Analytical Batch	Analyte	Reason
8270D SIM (PAH)				
1400875	1174880014MS	XMS10281	Benzo[k]fluoranthene	BLC
1400876	1174880014MSD	XMS10281	Benzo[k]fluoranthene	BLC

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: 08/04/2017 4:16:42PM

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, indenmification and jurisdiction issues defined therein.

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

SGS maintains a formal Quality Assurance/Quality Control (QA/QC) program. A copy of our Quality Assurance Plan (QAP), which outlines this program, is available at your request. The laboratory certification numbers are AK00971 (DW Chemistry & Microbiology) & UST-005 (CS) for ADEC and 2944.01 for DOD ELAP/ISO17025 (RCRA methods: 1020B, 1311, 3010A, 3050B, 3520C, 3550C, 5030B, 5035A, 6020A, 7470A, 7471B, 8015C, 8021B, 8082A, 8260C, 8270D, 8270D-SIM, 9040C, 9045D, 9056A, 9060A, AK101 and AK102/103). Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth by the SGS QAP and, when applicable, other regulatory authorities.

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

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

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

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

Sample Summary

Client Sample ID	Lab Sample ID	Collected	Received	Matrix
17676-B7S4	1174881001	07/26/2017	07/26/2017	Soil/Solid (dry weight)
17676-B8S4	1174881002	07/26/2017	07/26/2017	Soil/Solid (dry weight)
17676-B8S14	1174881003	07/26/2017	07/26/2017	Soil/Solid (dry weight)
17676-STB	1174881004	07/26/2017	07/26/2017	Soil/Solid (dry weight)

Method	Method Description
8270D SIM (PAH)	8270 PAH SIM Semi-Volatiles GC/MS
AK101	AK101/8021 Combo. (S)
SW8021B	AK101/8021 Combo. (S)
AK102	Diesel Range Organics (S)
SM21 2540G	Percent Solids SM2540G

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Detectable Results Summary

Client Sample ID: **17676-B7S4**
Lab Sample ID: 1174881001

Semivolatile Organic Fuels
Volatile Fuels

Parameter	Result	Units
Diesel Range Organics	6.79J	mg/Kg
Ethylbenzene	48.0	ug/Kg
Gasoline Range Organics	1.69J	mg/Kg
o-Xylene	38.5	ug/Kg
P & M -Xylene	180	ug/Kg

Client Sample ID: **17676-B8S4**
Lab Sample ID: 1174881002

Semivolatile Organic Fuels
Volatile Fuels

Parameter	Result	Units
Diesel Range Organics	198	mg/Kg
Gasoline Range Organics	19.9	mg/Kg
o-Xylene	191	ug/Kg
P & M -Xylene	170	ug/Kg

Client Sample ID: **17676-B8S14**
Lab Sample ID: 1174881003

Semivolatile Organic Fuels
Volatile Fuels

Parameter	Result	Units
Diesel Range Organics	309	mg/Kg
Gasoline Range Organics	12.4	mg/Kg
o-Xylene	142	ug/Kg
P & M -Xylene	103	ug/Kg

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

Results of **17676-B7S4**

Client Sample ID: **17676-B7S4**
Client Project ID: **17676-002 Goose Creek**
Lab Sample ID: 1174881001
Lab Project ID: 1174881

Collection Date: 07/26/17 12:35
Received Date: 07/26/17 17:22
Matrix: Soil/Solid (dry weight)
Solids (%):91.4
Location:

Results by **Polynuclear Aromatics GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
1-Methylnaphthalene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 17:24
2-Methylnaphthalene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 17:24
Acenaphthene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 17:24
Acenaphthylene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 17:24
Anthracene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 17:24
Benzo(a)Anthracene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 17:24
Benzo[a]pyrene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 17:24
Benzo[b]Fluoranthene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 17:24
Benzo[g,h,i]perylene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 17:24
Benzo[k]fluoranthene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 17:24
Chrysene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 17:24
Dibenzo[a,h]anthracene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 17:24
Fluoranthene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 17:24
Fluorene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 17:24
Indeno[1,2,3-c,d] pyrene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 17:24
Naphthalene	10.9	U	21.8	6.53	ug/Kg	1		08/03/17 17:24
Phenanthrene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 17:24
Pyrene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 17:24
Surrogates								
2-Fluorobiphenyl (surr)	87.1		46-115		%	1		08/03/17 17:24
Terphenyl-d14 (surr)	88		58-133		%	1		08/03/17 17:24

Batch Information

Analytical Batch: XMS10281
Analytical Method: 8270D SIM (PAH)
Analyst: DSD
Analytical Date/Time: 08/03/17 17:24
Container ID: 1174881001-A

Prep Batch: XXX37993
Prep Method: SW3550C
Prep Date/Time: 07/27/17 12:33
Prep Initial Wt./Vol.: 22.624 g
Prep Extract Vol: 5 mL

Print Date: 08/04/2017 4:16:47PM

J flagging is activated

Results of **17676-B7S4**

Client Sample ID: **17676-B7S4**
Client Project ID: **17676-002 Goose Creek**
Lab Sample ID: 1174881001
Lab Project ID: 1174881

Collection Date: 07/26/17 12:35
Received Date: 07/26/17 17:22
Matrix: Soil/Solid (dry weight)
Solids (%):91.4
Location:

Results by **Semivolatile Organic Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	6.79	J	21.7	6.74	mg/Kg	1		07/28/17 19:02
Surrogates								
5a Androstane (surr)	89.9		50-150		%	1		07/28/17 19:02

Batch Information

Analytical Batch: XFC13599
Analytical Method: AK102
Analyst: JMG
Analytical Date/Time: 07/28/17 19:02
Container ID: 1174881001-A

Prep Batch: XXX37996
Prep Method: SW3550C
Prep Date/Time: 07/27/17 19:00
Prep Initial Wt./Vol.: 30.223 g
Prep Extract Vol: 1 mL

Print Date: 08/04/2017 4:16:47PM

J flagging is activated

Results of **17676-B7S4**

Client Sample ID: **17676-B7S4**
Client Project ID: **17676-002 Goose Creek**
Lab Sample ID: 1174881001
Lab Project ID: 1174881

Collection Date: 07/26/17 12:35
Received Date: 07/26/17 17:22
Matrix: Soil/Solid (dry weight)
Solids (%):91.4
Location:

Results by **Volatile Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Gasoline Range Organics	1.69	J	2.09	0.628	mg/Kg	1		07/27/17 15:24
Surrogates								
4-Bromofluorobenzene (surr)	105		50-150		%	1		07/27/17 15:24

Batch Information

Analytical Batch: VFC13777
Analytical Method: AK101
Analyst: ST
Analytical Date/Time: 07/27/17 15:24
Container ID: 1174881001-B

Prep Batch: VXX30966
Prep Method: SW5035A
Prep Date/Time: 07/26/17 12:35
Prep Initial Wt./Vol.: 84.377 g
Prep Extract Vol: 32.2966 mL

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	5.25	U	10.5	3.35	ug/Kg	1		07/27/17 15:24
Ethylbenzene	48.0		20.9	6.54	ug/Kg	1		07/27/17 15:24
o-Xylene	38.5		20.9	6.54	ug/Kg	1		07/27/17 15:24
P & M -Xylene	180		41.9	12.6	ug/Kg	1		07/27/17 15:24
Toluene	10.4	U	20.9	6.54	ug/Kg	1		07/27/17 15:24
Surrogates								
1,4-Difluorobenzene (surr)	94		72-119		%	1		07/27/17 15:24

Batch Information

Analytical Batch: VFC13777
Analytical Method: SW8021B
Analyst: ST
Analytical Date/Time: 07/27/17 15:24
Container ID: 1174881001-B

Prep Batch: VXX30966
Prep Method: SW5035A
Prep Date/Time: 07/26/17 12:35
Prep Initial Wt./Vol.: 84.377 g
Prep Extract Vol: 32.2966 mL

Print Date: 08/04/2017 4:16:47PM

J flagging is activated

Results of **17676-B8S4**

Client Sample ID: **17676-B8S4**
Client Project ID: **17676-002 Goose Creek**
Lab Sample ID: 1174881002
Lab Project ID: 1174881

Collection Date: 07/26/17 11:20
Received Date: 07/26/17 17:22
Matrix: Soil/Solid (dry weight)
Solids (%):91.9
Location:

Results by **Polynuclear Aromatics GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
1-Methylnaphthalene	13.4	U	26.8	8.05	ug/Kg	1		08/03/17 17:45
2-Methylnaphthalene	13.4	U	26.8	8.05	ug/Kg	1		08/03/17 17:45
Acenaphthene	13.4	U	26.8	8.05	ug/Kg	1		08/03/17 17:45
Acenaphthylene	13.4	U	26.8	8.05	ug/Kg	1		08/03/17 17:45
Anthracene	13.4	U	26.8	8.05	ug/Kg	1		08/03/17 17:45
Benzo(a)Anthracene	13.4	U	26.8	8.05	ug/Kg	1		08/03/17 17:45
Benzo[a]pyrene	13.4	U	26.8	8.05	ug/Kg	1		08/03/17 17:45
Benzo[b]Fluoranthene	13.4	U	26.8	8.05	ug/Kg	1		08/03/17 17:45
Benzo[g,h,i]perylene	13.4	U	26.8	8.05	ug/Kg	1		08/03/17 17:45
Benzo[k]fluoranthene	13.4	U	26.8	8.05	ug/Kg	1		08/03/17 17:45
Chrysene	13.4	U	26.8	8.05	ug/Kg	1		08/03/17 17:45
Dibenzo[a,h]anthracene	13.4	U	26.8	8.05	ug/Kg	1		08/03/17 17:45
Fluoranthene	13.4	U	26.8	8.05	ug/Kg	1		08/03/17 17:45
Fluorene	13.4	U	26.8	8.05	ug/Kg	1		08/03/17 17:45
Indeno[1,2,3-c,d] pyrene	13.4	U	26.8	8.05	ug/Kg	1		08/03/17 17:45
Naphthalene	10.8	U	21.5	6.44	ug/Kg	1		08/03/17 17:45
Phenanthrene	13.4	U	26.8	8.05	ug/Kg	1		08/03/17 17:45
Pyrene	13.4	U	26.8	8.05	ug/Kg	1		08/03/17 17:45
Surrogates								
2-Fluorobiphenyl (surr)	66.3		46-115		%	1		08/03/17 17:45
Terphenyl-d14 (surr)	69.4		58-133		%	1		08/03/17 17:45

Batch Information

Analytical Batch: XMS10281
Analytical Method: 8270D SIM (PAH)
Analyst: DSD
Analytical Date/Time: 08/03/17 17:45
Container ID: 1174881002-A

Prep Batch: XXX37993
Prep Method: SW3550C
Prep Date/Time: 07/27/17 12:33
Prep Initial Wt./Vol.: 22.805 g
Prep Extract Vol: 5 mL

Print Date: 08/04/2017 4:16:47PM

J flagging is activated

Results of **17676-B8S4**

Client Sample ID: **17676-B8S4**
Client Project ID: **17676-002 Goose Creek**
Lab Sample ID: 1174881002
Lab Project ID: 1174881

Collection Date: 07/26/17 11:20
Received Date: 07/26/17 17:22
Matrix: Soil/Solid (dry weight)
Solids (%):91.9
Location:

Results by **Semivolatile Organic Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	198		21.5	6.65	mg/Kg	1		07/27/17 20:16
Surrogates								
5a Androstane (surr)	83.7		50-150		%	1		07/27/17 20:16

Batch Information

Analytical Batch: XFC13600
Analytical Method: AK102
Analyst: JMG
Analytical Date/Time: 07/27/17 20:16
Container ID: 1174881002-A

Prep Batch: XXX37994
Prep Method: SW3550C
Prep Date/Time: 07/27/17 14:14
Prep Initial Wt./Vol.: 30.418 g
Prep Extract Vol: 1 mL

Print Date: 08/04/2017 4:16:47PM

J flagging is activated

Results of **17676-B8S4**

Client Sample ID: **17676-B8S4**
Client Project ID: **17676-002 Goose Creek**
Lab Sample ID: 1174881002
Lab Project ID: 1174881

Collection Date: 07/26/17 11:20
Received Date: 07/26/17 17:22
Matrix: Soil/Solid (dry weight)
Solids (%):91.9
Location:

Results by **Volatile Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Gasoline Range Organics	19.9		2.05	0.616	mg/Kg	1		07/27/17 15:43
Surrogates								
4-Bromofluorobenzene (surr)	164	*	50-150		%	1		07/27/17 15:43

Batch Information

Analytical Batch: VFC13777
Analytical Method: AK101
Analyst: ST
Analytical Date/Time: 07/27/17 15:43
Container ID: 1174881002-B

Prep Batch: VXX30966
Prep Method: SW5035A
Prep Date/Time: 07/26/17 11:20
Prep Initial Wt./Vol.: 84.317 g
Prep Extract Vol: 31.8341 mL

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	5.15	U	10.3	3.29	ug/Kg	1		07/27/17 15:43
Ethylbenzene	10.3	U	20.5	6.41	ug/Kg	1		07/27/17 15:43
o-Xylene	191		20.5	6.41	ug/Kg	1		07/27/17 15:43
P & M -Xylene	170		41.1	12.3	ug/Kg	1		07/27/17 15:43
Toluene	10.3	U	20.5	6.41	ug/Kg	1		07/27/17 15:43
Surrogates								
1,4-Difluorobenzene (surr)	95.6		72-119		%	1		07/27/17 15:43

Batch Information

Analytical Batch: VFC13777
Analytical Method: SW8021B
Analyst: ST
Analytical Date/Time: 07/27/17 15:43
Container ID: 1174881002-B

Prep Batch: VXX30966
Prep Method: SW5035A
Prep Date/Time: 07/26/17 11:20
Prep Initial Wt./Vol.: 84.317 g
Prep Extract Vol: 31.8341 mL

Print Date: 08/04/2017 4:16:47PM

J flagging is activated

Results of **17676-B8S14**

Client Sample ID: **17676-B8S14**
Client Project ID: **17676-002 Goose Creek**
Lab Sample ID: 1174881003
Lab Project ID: 1174881

Collection Date: 07/26/17 11:50
Received Date: 07/26/17 17:22
Matrix: Soil/Solid (dry weight)
Solids (%):90.9
Location:

Results by **Polynuclear Aromatics GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
1-Methylnaphthalene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 18:06
2-Methylnaphthalene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 18:06
Acenaphthene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 18:06
Acenaphthylene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 18:06
Anthracene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 18:06
Benzo(a)Anthracene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 18:06
Benzo[a]pyrene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 18:06
Benzo[b]Fluoranthene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 18:06
Benzo[g,h,i]perylene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 18:06
Benzo[k]fluoranthene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 18:06
Chrysene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 18:06
Dibenzo[a,h]anthracene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 18:06
Fluoranthene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 18:06
Fluorene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 18:06
Indeno[1,2,3-c,d] pyrene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 18:06
Naphthalene	10.9	U	21.8	6.53	ug/Kg	1		08/03/17 18:06
Phenanthrene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 18:06
Pyrene	13.6	U	27.2	8.16	ug/Kg	1		08/03/17 18:06
Surrogates								
2-Fluorobiphenyl (surr)	84.2		46-115		%	1		08/03/17 18:06
Terphenyl-d14 (surr)	89.7		58-133		%	1		08/03/17 18:06

Batch Information

Analytical Batch: XMS10281
Analytical Method: 8270D SIM (PAH)
Analyst: DSD
Analytical Date/Time: 08/03/17 18:06
Container ID: 1174881003-A

Prep Batch: XXX37993
Prep Method: SW3550C
Prep Date/Time: 07/27/17 12:33
Prep Initial Wt./Vol.: 22.746 g
Prep Extract Vol: 5 mL

Print Date: 08/04/2017 4:16:47PM

J flagging is activated

Results of **17676-B8S14**

Client Sample ID: **17676-B8S14**
Client Project ID: **17676-002 Goose Creek**
Lab Sample ID: 1174881003
Lab Project ID: 1174881

Collection Date: 07/26/17 11:50
Received Date: 07/26/17 17:22
Matrix: Soil/Solid (dry weight)
Solids (%):90.9
Location:

Results by **Semivolatile Organic Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	309		21.8	6.75	mg/Kg	1		07/27/17 20:26
Surrogates								
5a Androstane (surr)	84.8		50-150		%	1		07/27/17 20:26

Batch Information

Analytical Batch: XFC13600
Analytical Method: AK102
Analyst: JMG
Analytical Date/Time: 07/27/17 20:26
Container ID: 1174881003-A

Prep Batch: XXX37994
Prep Method: SW3550C
Prep Date/Time: 07/27/17 14:14
Prep Initial Wt./Vol.: 30.321 g
Prep Extract Vol: 1 mL

Print Date: 08/04/2017 4:16:47PM

J flagging is activated

Results of **17676-B8S14**

Client Sample ID: **17676-B8S14**
Client Project ID: **17676-002 Goose Creek**
Lab Sample ID: 1174881003
Lab Project ID: 1174881

Collection Date: 07/26/17 11:50
Received Date: 07/26/17 17:22
Matrix: Soil/Solid (dry weight)
Solids (%):90.9
Location:

Results by **Volatile Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Gasoline Range Organics	12.4		2.28	0.684	mg/Kg	1		07/27/17 16:40
Surrogates								
4-Bromofluorobenzene (surr)	139		50-150		%	1		07/27/17 16:40

Batch Information

Analytical Batch: VFC13777
Analytical Method: AK101
Analyst: ST
Analytical Date/Time: 07/27/17 16:40
Container ID: 1174881003-B

Prep Batch: VXX30966
Prep Method: SW5035A
Prep Date/Time: 07/26/17 11:50
Prep Initial Wt./Vol.: 77.364 g
Prep Extract Vol: 32.069 mL

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	5.70	U	11.4	3.65	ug/Kg	1		07/27/17 16:40
Ethylbenzene	11.4	U	22.8	7.12	ug/Kg	1		07/27/17 16:40
o-Xylene	142		22.8	7.12	ug/Kg	1		07/27/17 16:40
P & M -Xylene	103		45.6	13.7	ug/Kg	1		07/27/17 16:40
Toluene	11.4	U	22.8	7.12	ug/Kg	1		07/27/17 16:40
Surrogates								
1,4-Difluorobenzene (surr)	97.4		72-119		%	1		07/27/17 16:40

Batch Information

Analytical Batch: VFC13777
Analytical Method: SW8021B
Analyst: ST
Analytical Date/Time: 07/27/17 16:40
Container ID: 1174881003-B

Prep Batch: VXX30966
Prep Method: SW5035A
Prep Date/Time: 07/26/17 11:50
Prep Initial Wt./Vol.: 77.364 g
Prep Extract Vol: 32.069 mL

Print Date: 08/04/2017 4:16:47PM

J flagging is activated

Results of **17676-STB**

Client Sample ID: **17676-STB**
Client Project ID: **17676-002 Goose Creek**
Lab Sample ID: 1174881004
Lab Project ID: 1174881

Collection Date: 07/26/17 09:00
Received Date: 07/26/17 17:22
Matrix: Soil/Solid (dry weight)
Solids (%):
Location:

Results by **Volatile Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Gasoline Range Organics	0.950	U	1.90	0.571	mg/Kg	1		07/27/17 14:27
Surrogates								
4-Bromofluorobenzene (surr)	88.8		50-150		%	1		07/27/17 14:27

Batch Information

Analytical Batch: VFC13777
Analytical Method: AK101
Analyst: ST
Analytical Date/Time: 07/27/17 14:27
Container ID: 1174881004-A

Prep Batch: VXX30966
Prep Method: SW5035A
Prep Date/Time: 07/26/17 09:00
Prep Initial Wt./Vol.: 65.636 g
Prep Extract Vol: 25 mL

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	4.76	U	9.52	3.05	ug/Kg	1		07/27/17 14:27
Ethylbenzene	9.50	U	19.0	5.94	ug/Kg	1		07/27/17 14:27
o-Xylene	9.50	U	19.0	5.94	ug/Kg	1		07/27/17 14:27
P & M -Xylene	19.1	U	38.1	11.4	ug/Kg	1		07/27/17 14:27
Toluene	9.50	U	19.0	5.94	ug/Kg	1		07/27/17 14:27
Surrogates								
1,4-Difluorobenzene (surr)	93.8		72-119		%	1		07/27/17 14:27

Batch Information

Analytical Batch: VFC13777
Analytical Method: SW8021B
Analyst: ST
Analytical Date/Time: 07/27/17 14:27
Container ID: 1174881004-A

Prep Batch: VXX30966
Prep Method: SW5035A
Prep Date/Time: 07/26/17 09:00
Prep Initial Wt./Vol.: 65.636 g
Prep Extract Vol: 25 mL

Print Date: 08/04/2017 4:16:47PM

J flagging is activated

Method Blank

Blank ID: MB for HBN 1764660 [SPT/10243]
Blank Lab ID: 1401096

Matrix: Soil/Solid (dry weight)

QC for Samples:
1174881001, 1174881002, 1174881003

Results by **SM21 2540G**

Parameter	Results	LOQ/CL	DL	Units
Total Solids	100			%

Batch Information

Analytical Batch: SPT10243
Analytical Method: SM21 2540G
Instrument:
Analyst: NIC
Analytical Date/Time: 7/27/2017 4:35:00PM

Print Date: 08/04/2017 4:16:49PM

Duplicate Sample Summary

Original Sample ID: 1174880006
Duplicate Sample ID: 1401098

Analysis Date: 07/27/2017 16:35
Matrix: Soil/Solid (dry weight)

QC for Samples:

1174881001, 1174881002, 1174881003

Results by **SM21 2540G**

NAME	Original	Duplicate	Units	RPD (%)	RPD CL
Total Solids	84.6	83.5	%	1.30	(< 15)

Batch Information

Analytical Batch: SPT10243
Analytical Method: SM21 2540G
Instrument:
Analyst: NIC

Print Date: 08/04/2017 4:16:50PM

Duplicate Sample Summary

Original Sample ID: 1174881003
Duplicate Sample ID: 1401099

Analysis Date: 07/27/2017 16:35
Matrix: Soil/Solid (dry weight)

QC for Samples:

1174881001, 1174881002, 1174881003

Results by **SM21 2540G**

NAME	Original	Duplicate	Units	RPD (%)	RPD CL
Total Solids	90.9	91.4	%	0.54	(< 15)

Batch Information

Analytical Batch: SPT10243
Analytical Method: SM21 2540G
Instrument:
Analyst: NIC

Print Date: 08/04/2017 4:16:50PM

Duplicate Sample Summary

Original Sample ID: 1173985022
Duplicate Sample ID: 1401123
QC for Samples:

Analysis Date: 07/27/2017 16:35
Matrix: Soil/Solid (dry weight)

Results by **SM21 2540G**

NAME	Original	Duplicate	Units	RPD (%)	RPD CL
Total Solids	87.0	86.2	%	0.90	(< 15)

Batch Information

Analytical Batch: SPT10243
Analytical Method: SM21 2540G
Instrument:
Analyst: NIC

Print Date: 08/04/2017 4:16:50PM

Method Blank

Blank ID: MB for HBN 1764673 [VXX/30966]
Blank Lab ID: 1401146

Matrix: Soil/Solid (dry weight)

QC for Samples:
1174881001, 1174881002, 1174881003, 1174881004

Results by **AK101**

Parameter	Results	LOQ/CL	DL	Units
Gasoline Range Organics	1.25U	2.50	0.750	mg/Kg
Surrogates				
4-Bromofluorobenzene (surr)	95.1	50-150		%

Batch Information

Analytical Batch: VFC13777
Analytical Method: AK101
Instrument: Agilent 7890 PID/FID
Analyst: ST
Analytical Date/Time: 7/27/2017 2:08:00PM

Prep Batch: VXX30966
Prep Method: SW5035A
Prep Date/Time: 7/27/2017 8:00:00AM
Prep Initial Wt./Vol.: 50 g
Prep Extract Vol: 25 mL

Print Date: 08/04/2017 4:16:53PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1174881 [VXX30966]
Blank Spike Lab ID: 1401149
Date Analyzed: 07/27/2017 13:11

Spike Duplicate ID: LCSD for HBN 1174881 [VXX30966]
Spike Duplicate Lab ID: 1401150
Matrix: Soil/Solid (dry weight)

QC for Samples: 1174881001, 1174881002, 1174881003, 1174881004

Results by **AK101**

	Blank Spike (mg/Kg)			Spike Duplicate (mg/Kg)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Gasoline Range Organics	12.5	12.9	103	12.5	12.7	102	(60-120)	1.50	(< 20)
Surrogates									
4-Bromofluorobenzene (surr)	1.25	107	107	1.25	107	107	(50-150)	0.65	

Batch Information

Analytical Batch: **VFC13777**
Analytical Method: **AK101**
Instrument: **Agilent 7890 PID/FID**
Analyst: **ST**

Prep Batch: **VXX30966**
Prep Method: **SW5035A**
Prep Date/Time: **07/27/2017 08:00**
Spike Init Wt./Vol.: 12.5 mg/Kg Extract Vol: 25 mL
Dupe Init Wt./Vol.: 12.5 mg/Kg Extract Vol: 25 mL

SGS North America Inc.
200 West Potter Drive Anchorage, AK 95518
t 907.562.2343 f 907.561.5301 www.us.sgs.com

Method Blank

Blank ID: MB for HBN 1764673 [VXX/30966]
Blank Lab ID: 1401146

Matrix: Soil/Solid (dry weight)

QC for Samples:
1174881001, 1174881002, 1174881003, 1174881004

Results by **SW8021B**

Parameter	Results	LOQ/CL	DL	Units
Benzene	6.25U	12.5	4.00	ug/Kg
Ethylbenzene	12.5U	25.0	7.80	ug/Kg
o-Xylene	12.5U	25.0	7.80	ug/Kg
P & M -Xylene	25.0U	50.0	15.0	ug/Kg
Toluene	12.5U	25.0	7.80	ug/Kg
Surrogates				
1,4-Difluorobenzene (surr)	93.6	72-119		%

Batch Information

Analytical Batch: VFC13777
Analytical Method: SW8021B
Instrument: Agilent 7890 PID/FID
Analyst: ST
Analytical Date/Time: 7/27/2017 2:08:00PM

Prep Batch: VXX30966
Prep Method: SW5035A
Prep Date/Time: 7/27/2017 8:00:00AM
Prep Initial Wt./Vol.: 50 g
Prep Extract Vol: 25 mL

SGS North America Inc.
200 West Potter Drive Anchorage, AK 95518
t 907.562.2343 f 907.561.5301 www.us.sgs.com

Blank Spike Summary

Blank Spike ID: LCS for HBN 1174881 [VXX30966]
Blank Spike Lab ID: 1401147
Date Analyzed: 07/27/2017 12:33

Spike Duplicate ID: LCSD for HBN 1174881 [VXX30966]
Spike Duplicate Lab ID: 1401148
Matrix: Soil/Solid (dry weight)

QC for Samples: 1174881001, 1174881002, 1174881003, 1174881004

Results by **SW8021B**

	Blank Spike (ug/Kg)			Spike Duplicate (ug/Kg)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Benzene	1250	1330	106	1250	1380	110	(75-125)	4.10	(< 20)
Ethylbenzene	1250	1270	102	1250	1320	106	(75-125)	3.80	(< 20)
o-Xylene	1250	1290	103	1250	1330	106	(75-125)	2.90	(< 20)
P & M -Xylene	2500	2580	103	2500	2680	107	(80-125)	3.70	(< 20)
Toluene	1250	1300	104	1250	1350	108	(70-125)	3.40	(< 20)
Surrogates									
1,4-Difluorobenzene (surr)	1250	99.7	100	1250	99	99	(72-119)	0.79	

Batch Information

Analytical Batch: **VFC13777**
Analytical Method: **SW8021B**
Instrument: **Agilent 7890 PID/FID**
Analyst: **ST**

Prep Batch: **VXX30966**
Prep Method: **SW5035A**
Prep Date/Time: **07/27/2017 08:00**
Spike Init Wt./Vol.: 1250 ug/Kg Extract Vol: 25 mL
Dupe Init Wt./Vol.: 1250 ug/Kg Extract Vol: 25 mL

Print Date: 08/04/2017 4:16:58PM

Matrix Spike Summary

Original Sample ID: 1174881002
MS Sample ID: 1401151 MS
MSD Sample ID: 1401152 MSD

Analysis Date: 07/27/2017 15:43
Analysis Date: 07/27/2017 16:02
Analysis Date: 07/27/2017 16:21
Matrix: Soil/Solid (dry weight)

QC for Samples: 1174881001, 1174881002, 1174881003, 1174881004

Results by **SW8021B**

		Matrix Spike (ug/Kg)				Spike Duplicate (ug/Kg)					
Parameter	Sample	Spike	Result	Rec (%)		Spike	Result	Rec (%)		CL	RPD (%)	RPD CL
Benzene	5.15U	806	859	107		806	871	108		75-125	1.30	(< 20)
Ethylbenzene	10.3U	806	806	100		806	812	101		75-125	0.72	(< 20)
o-Xylene	191	806	1240	130	*	806	1251	132	*	75-125	1.10	(< 20)
P & M -Xylene	170	1610	1850	104		1610	1861	105		80-125	0.77	(< 20)
Toluene	10.3U	806	800	99		806	806	100		70-125	0.80	(< 20)
Surrogates												
1,4-Difluorobenzene (surr)		806	807	100		806	825	102		72-119	2.10	

Batch Information

Analytical Batch: VFC13777
Analytical Method: SW8021B
Instrument: Agilent 7890 PID/FID
Analyst: ST
Analytical Date/Time: 7/27/2017 4:02:00PM

Prep Batch: VXX30966
Prep Method: AK101 Extraction (S)
Prep Date/Time: 7/27/2017 8:00:00AM
Prep Initial Wt./Vol.: 84.32g
Prep Extract Vol: 25.00mL

Print Date: 08/04/2017 4:16:59PM

Method Blank

Blank ID: MB for HBN 1764608 [XXX/37993]
Blank Lab ID: 1400873

Matrix: Soil/Solid (dry weight)

QC for Samples:
1174881001, 1174881002, 1174881003

Results by **8270D SIM (PAH)**

Parameter	Results	LOQ/CL	DL	Units
1-Methylnaphthalene	12.5U	25.0	7.50	ug/Kg
2-Methylnaphthalene	12.5U	25.0	7.50	ug/Kg
Acenaphthene	12.5U	25.0	7.50	ug/Kg
Acenaphthylene	12.5U	25.0	7.50	ug/Kg
Anthracene	12.5U	25.0	7.50	ug/Kg
Benzo(a)Anthracene	12.5U	25.0	7.50	ug/Kg
Benzo[a]pyrene	12.5U	25.0	7.50	ug/Kg
Benzo[b]Fluoranthene	12.5U	25.0	7.50	ug/Kg
Benzo[g,h,i]perylene	12.5U	25.0	7.50	ug/Kg
Benzo[k]fluoranthene	12.5U	25.0	7.50	ug/Kg
Chrysene	12.5U	25.0	7.50	ug/Kg
Dibenzo[a,h]anthracene	12.5U	25.0	7.50	ug/Kg
Fluoranthene	12.5U	25.0	7.50	ug/Kg
Fluorene	12.5U	25.0	7.50	ug/Kg
Indeno[1,2,3-c,d] pyrene	12.5U	25.0	7.50	ug/Kg
Naphthalene	10.0U	20.0	6.00	ug/Kg
Phenanthrene	12.5U	25.0	7.50	ug/Kg
Pyrene	12.5U	25.0	7.50	ug/Kg
Surrogates				
2-Fluorobiphenyl (surr)	87.7	46-115		%
Terphenyl-d14 (surr)	89.5	58-133		%

Batch Information

Analytical Batch: XMS10281
Analytical Method: 8270D SIM (PAH)
Instrument: SVA Agilent 780/5975 GC/MS
Analyst: DSD
Analytical Date/Time: 8/3/2017 4:43:00PM

Prep Batch: XXX37993
Prep Method: SW3550C
Prep Date/Time: 7/27/2017 12:33:52PM
Prep Initial Wt./Vol.: 22.5 g
Prep Extract Vol: 5 mL

Print Date: 08/04/2017 4:16:59PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1174881 [XXX37993]
Blank Spike Lab ID: 1400874
Date Analyzed: 08/03/2017 17:04

Matrix: Soil/Solid (dry weight)

QC for Samples: 1174881001, 1174881002, 1174881003

Results by **8270D SIM (PAH)**

	Blank Spike (ug/Kg)			
Parameter	Spike	Result	Rec (%)	CL
1-Methylnaphthalene	111	96.9	87	(43-111)
2-Methylnaphthalene	111	89.7	81	(39-114)
Acenaphthene	111	119	107	(44-111)
Acenaphthylene	111	97.6	88	(39-116)
Anthracene	111	98.3	89	(50-114)
Benzo(a)Anthracene	111	94.6	85	(54-122)
Benzo[a]pyrene	111	95.2	86	(50-125)
Benzo[b]Fluoranthene	111	98.0	88	(53-128)
Benzo[g,h,i]perylene	111	99.6	90	(49-127)
Benzo[k]fluoranthene	111	96.6	87	(56-123)
Chrysene	111	101	91	(57-118)
Dibenzo[a,h]anthracene	111	101	91	(50-129)
Fluoranthene	111	96.9	87	(55-119)
Fluorene	111	97.0	87	(47-114)
Indeno[1,2,3-c,d] pyrene	111	100	90	(49-130)
Naphthalene	111	93.0	84	(38-111)
Phenanthrene	111	95.5	86	(49-113)
Pyrene	111	101	91	(55-117)
Surrogates				
2-Fluorobiphenyl (surr)	111	92.9	93	(46-115)
Terphenyl-d14 (surr)	111	92.1	92	(58-133)

Batch Information

Analytical Batch: **XMS10281**
Analytical Method: **8270D SIM (PAH)**
Instrument: **SVA Agilent 780/5975 GC/MS**
Analyst: **DSD**

Prep Batch: **XXX37993**
Prep Method: **SW3550C**
Prep Date/Time: **07/27/2017 12:33**
Spike Init Wt./Vol.: 111 ug/Kg Extract Vol: 5 mL
Dupe Init Wt./Vol.: Extract Vol:

Print Date: 08/04/2017 4:17:01PM

Matrix Spike Summary

Original Sample ID: 1174880014
MS Sample ID: 1400875 MS
MSD Sample ID: 1400876 MSD

Analysis Date: 08/03/2017 22:53
Analysis Date: 08/03/2017 23:14
Analysis Date: 08/03/2017 23:34
Matrix: Soil/Solid (dry weight)

QC for Samples: 1174881001, 1174881002, 1174881003

Results by **8270D SIM (PAH)**

		Matrix Spike (ug/Kg)			Spike Duplicate (ug/Kg)					
Parameter	Sample	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
1-Methylnaphthalene	26.4U	118	95.3	81	118	91.4	77	43-111	4.20	(< 20)
2-Methylnaphthalene	26.4U	118	88.0	74	118	84.1	71	39-114	4.50	(< 20)
Acenaphthene	26.4U	118	118	100	118	116	98	44-111	1.80	(< 20)
Acenaphthylene	26.4U	118	96.9	82	118	94.0	79	39-116	3.10	(< 20)
Anthracene	26.4U	118	95.3	81	118	94.2	80	50-114	1.10	(< 20)
Benzo(a)Anthracene	26.4U	118	84.1	71	118	83.6	71	54-122	0.76	(< 20)
Benzo[a]pyrene	26.4U	118	80.0	68	118	81.2	69	50-125	1.50	(< 20)
Benzo[b]Fluoranthene	26.4U	118	83.4	71	118	84.8	72	53-128	1.70	(< 20)
Benzo[g,h,i]perylene	26.4U	118	76.6	65	118	78.1	66	49-127	1.90	(< 20)
Benzo[k]fluoranthene	26.4U	118	81.4	69	118	82.4	70	56-123	1.20	(< 20)
Chrysene	26.4U	118	88.4	75	118	88.9	75	57-118	0.44	(< 20)
Dibenzo[a,h]anthracene	26.4U	118	79.0	67	118	79.2	67	50-129	0.29	(< 20)
Fluoranthene	26.4U	118	90.8	77	118	90.9	77	55-119	0.05	(< 20)
Fluorene	26.4U	118	96.7	82	118	94.7	80	47-114	2.00	(< 20)
Indeno[1,2,3-c,d] pyrene	26.4U	118	76.4	65	118	77.8	66	49-130	1.80	(< 20)
Naphthalene	21.1U	118	89.0	75	118	85.7	73	38-111	3.80	(< 20)
Phenanthrene	26.4U	118	93.2	79	118	91.4	77	49-113	2.00	(< 20)
Pyrene	26.4U	118	96.2	81	118	95.3	81	55-117	0.98	(< 20)
Surrogates										
2-Fluorobiphenyl (surr)		118	103	87	118	98.6	83	46-115	4.10	
Terphenyl-d14 (surr)		118	107	90	118	104	88	58-133	2.40	

Batch Information

Analytical Batch: XMS10281
Analytical Method: 8270D SIM (PAH)
Instrument: SVA Agilent 780/5975 GC/MS
Analyst: DSD
Analytical Date/Time: 8/3/2017 11:14:00PM

Prep Batch: XXX37993
Prep Method: Sonication Extr Soil 8270 PAH SIM 5ml
Prep Date/Time: 7/27/2017 12:33:52PM
Prep Initial Wt./Vol.: 22.65g
Prep Extract Vol: 5.00mL

Print Date: 08/04/2017 4:17:02PM

Method Blank

Blank ID: MB for HBN 1764620 [XXX/37994]
Blank Lab ID: 1400942

QC for Samples:
1174881002, 1174881003

Matrix: Soil/Solid (dry weight)

Results by **AK102**

Parameter	Results	LOQ/CL	DL	Units
Diesel Range Organics	10.0U	20.0	6.20	mg/Kg
Surrogates				
5a Androstane (surr)	61.4	60-120		%

Batch Information

Analytical Batch: XFC13599
Analytical Method: AK102
Instrument: Agilent 7890B F
Analyst: JMG
Analytical Date/Time: 7/28/2017 3:09:00PM

Prep Batch: XXX37994
Prep Method: SW3550C
Prep Date/Time: 7/27/2017 2:14:58PM
Prep Initial Wt./Vol.: 30 g
Prep Extract Vol: 1 mL

Print Date: 08/04/2017 4:17:04PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1174881 [XXX37994]
Blank Spike Lab ID: 1400943
Date Analyzed: 07/27/2017 19:57

Spike Duplicate ID: LCSD for HBN 1174881 [XXX37994]
Spike Duplicate Lab ID: 1400944
Matrix: Soil/Solid (dry weight)

QC for Samples: 1174881002, 1174881003

Results by **AK102**

	Blank Spike (mg/Kg)			Spike Duplicate (mg/Kg)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Diesel Range Organics	167	136	82	167	136	82	(75-125)	0.19	(< 20)
Surrogates									
5a Androstane (surr)	3.33	92.9	93	3.33	92.9	93	(60-120)	0.04	

Batch Information

Analytical Batch: **XFC13600**
Analytical Method: **AK102**
Instrument: **Agilent 7890B F**
Analyst: **JMG**

Prep Batch: **XXX37994**
Prep Method: **SW3550C**
Prep Date/Time: **07/27/2017 14:14**
Spike Init Wt./Vol.: 167 mg/Kg Extract Vol: 1 mL
Dupe Init Wt./Vol.: 167 mg/Kg Extract Vol: 1 mL

SGS North America Inc.
200 West Potter Drive Anchorage, AK 95518
t 907.562.2343 f 907.561.5301 www.us.sgs.com

Method Blank

Blank ID: MB for HBN 1764644 [XXX/37996]
Blank Lab ID: 1401048

QC for Samples:
1174881001

Matrix: Soil/Solid (dry weight)

Results by **AK102**

Parameter	Results	LOQ/CL	DL	Units
Diesel Range Organics	10.0U	20.0	6.20	mg/Kg
Surrogates				
5a Androstane (surr)	80.9	60-120		%

Batch Information

Analytical Batch: XFC13599
Analytical Method: AK102
Instrument: Agilent 7890B F
Analyst: JMG
Analytical Date/Time: 7/28/2017 3:47:00PM

Prep Batch: XXX37996
Prep Method: SW3550C
Prep Date/Time: 7/27/2017 7:00:09PM
Prep Initial Wt./Vol.: 30 g
Prep Extract Vol: 1 mL

Print Date: 08/04/2017 4:17:07PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1174881 [XXX37996]
Blank Spike Lab ID: 1401049
Date Analyzed: 07/28/2017 15:57

Spike Duplicate ID: LCSD for HBN 1174881 [XXX37996]
Spike Duplicate Lab ID: 1401050
Matrix: Soil/Solid (dry weight)

QC for Samples: 1174881001

Results by **AK102**

	Blank Spike (mg/Kg)			Spike Duplicate (mg/Kg)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Diesel Range Organics	167	159	95	167	156	94	(75-125)	1.70	(< 20)
Surrogates									
5a Androstane (surr)	3.33	96.9	97	3.33	96	96	(60-120)	0.90	

Batch Information

Analytical Batch: **XFC13599**
Analytical Method: **AK102**
Instrument: **Agilent 7890B F**
Analyst: **JMG**

Prep Batch: **XXX37996**
Prep Method: **SW3550C**
Prep Date/Time: **07/27/2017 19:00**
Spike Init Wt./Vol.: 167 mg/Kg Extract Vol: 1 mL
Dupe Init Wt./Vol.: 167 mg/Kg Extract Vol: 1 mL

SGS North America Inc.
200 West Potter Drive Anchorage, AK 95518
t 907.562.2343 f 907.561.5301 www.us.sgs.com

1174881

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Laboratory: SGS
Attn: Todd

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

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

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

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) ~~699-6550~~

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

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

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

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

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	GRO / BTEX AK101	GRO 8015 / DRO / PAH AK102	8260D					Total Number of Containers	Remarks/Matrix
17676-B7S4	1 A-B	1235	7/24/17		X	X	X						2	Soil
B8S4	2 A-B	1120			X	X	X						2	
B8S14	3 A-B	1150			X	X	X						2	
STB	4 A	900				X							1	Trip Blank

Project Information	Sample Receipt
Project Number: 17676-002	Total Number of Containers
Project Name: Goose Creek	COC Seals/Intact? Y/N/NA
Contact: JGT	Received Good Cond./Cold
Ongoing Project? Yes ☒ No ☐	Delivery Method:
Sampler: JCT	(attach shipping bill, if any)

Instructions

Requested Turnaround Time: Standard

Special Instructions:

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 1723	Signature: Time:	Signature: Time:
Printed Name: Jake Tracy Date: 7/24/17	Printed Name: Date:	Printed Name: Date:
Company: SHW	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time:	Signature: Time:	Signature: Time: 17:23
Printed Name: Date:	Printed Name: Date:	Printed Name: Carl Stipe Date: 7/26
Company:	Company:	Company: SGS

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

F-19-91/UR

HD CS: Absent 3.8 D21

No. 30885

e-Sample Receipt Form

SGS Workorder #: **1174881**

1 1 7 4 8 8 1

Review Criteria	Condition (Yes, No, N/A)	Exceptions Noted below
Chain of Custody / Temperature Requirements	Yes	Exemption permitted if sampler hand carries/delivers.
Were Custody Seals intact? Note # & location	N/A	ABSENT
COC accompanied samples?	Yes	
N/A **Exemption permitted if chilled & collected <8 hours ago, or for samples where chilling is not required		
Temperature blank compliant* (i.e., 0-6 °C after CF)?	Yes	Cooler ID: 1 @ 3.8 °C Therm. ID: D21
		Cooler ID: @ °C Therm. ID:
		Cooler ID: @ °C Therm. ID:
		Cooler ID: @ °C Therm. ID:
		Cooler ID: @ °C Therm. ID:
If >6°C, were samples collected <8 hours ago?	N/A	
If <0°C, were sample containers ice free?	N/A	
If samples received without a temperature blank, the "cooler temperature" will be documented in lieu of the temperature blank & "**COOLER TEMP**" will be noted to the right. In cases where neither a temp blank nor cooler temp can be obtained, note "ambient" or "chilled".		
Note: Identify containers received at non-compliant temperature . Use form FS-0029 if more space is needed.		
Holding Time / Documentation / Sample Condition Requirements		Note: Refer to form F-083 "Sample Guide" for specific holding times.
Were samples received within holding time?	Yes	
Do samples **match COC**** (i.e.,sample IDs,dates/times collected)? **Note: If times differ <1hr, record details & login per COC.	Yes	
Were analyses requested unambiguous? (i.e., method is specified for analyses with >1 option for analysis)	Yes	
		N/A ***Exemption permitted for metals (e.g,200.8/6020A).
Were proper containers (type/mass/volume/preservative***)used?	Yes	
Volatile / LL-Hg Requirements		
Were Trip Blanks (i.e., VOAs, LL-Hg) in cooler with samples?	N/A	
Were all water VOA vials free of headspace (i.e., bubbles ≤ 6mm)?	N/A	
Were all soil VOAs field extracted with MeOH+BFB?	N/A	

Note to Client: Any "No", answer above indicates non-compliance with standard procedures and may impact data quality.

Additional notes (if applicable):

F102b_SRFpm_20170131

Sample Containers and Preservatives

Container Id	Preservative	Container Condition	Container Id	Preservative	Container Condition
1174881001-A	No Preservative Required	OK			
1174881001-B	Methanol field pres. 4 C	OK			
1174881002-A	No Preservative Required	OK			
1174881002-B	Methanol field pres. 4 C	OK			
1174881003-A	No Preservative Required	OK			
1174881003-B	Methanol field pres. 4 C	OK			
1174881004-A	Methanol field pres. 4 C	OK			

Container Condition Glossary

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

OK - The container was received at an acceptable pH for the analysis requested.
BU - The container was received with headspace greater than 6mm.
DM- The container was received damaged.
FR- The container was received frozen and not usable for Bacteria or BOD analyses.
PA - The container was received outside of the acceptable pH for the analysis requested. Preservative was added upon receipt and the container is now at the correct pH. See the Sample Receipt Form for details on the amount and lot # of the preservative added.
PH - The container was received outside of the acceptable pH for the analysis requested. Preservative was added upon receipt, but was insufficient to bring the container to the correct pH for the analysis requested. See the Sample Receipt Form for details on the amount and lot # of the preservative added.

LABORATORY DATA REVIEW CHECKLIST

Completed by: Matt Woods
Title: Environmental Engineer
Date: July 2018

CS Report Name: Goose Creek Community Center, Mile 94 Parks Highway, Alaska

Laboratory Report Date: August 7, 2017

Consultant Firm: Shannon & Wilson, Inc.

Laboratory Name: SGS North America Inc.
Laboratory Report Number: *1174881*

ADEC File Number: 2269.38.001
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: *The samples were not transferred to another laboratory.*

2. Chain of Custody (COC)

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

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 temperature blank was documented at 3.8° 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: *No discrepancies noted.*

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.
Comments: *See above.*

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 laboratory noted the following:*

- *Surrogate recovery for 4-bromofluorobenzene (164%) does not meet QC criteria due to matrix interference for Sample B8S4.*
- *MS/MSD recoveries for o-Xylene do not meet QC criteria due to matrix interference. Refer to LCS/LCSD for accuracy requirements.*

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 discuss 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? **NA** Please explain.
Comments: *See above.*

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: *No discrepancies noted.*

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

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

i. Organics - One LCS/LCSD reported per matrix, analysis, and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846) **Yes / No / NA** (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. ***NA***
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: *Surrogate recovery for 4-bromofluorobenzene (164%) does not meet QC criteria due to matrix interference for Sample B8S4.*

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined? **Yes / No / NA** (please explain)
Comments: *The affected samples are flagged "J+" on Table 2.*

iv. Data quality or usability affected? Please explain. ***NA***
Comments: *The GRO result for Sample B8S4 may be biased high due to surrogate failure.*

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

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

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

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. ***NA***
Comments:

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?
Yes / No / NA (please explain)
Comments: *Sample B8S14 is the field duplicate of B8S4.*

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.
Comments:

f. Decontamination or Equipment Blank (if not applicable)
Yes / No / NA (please explain)
Comments: *The use of a decontamination or equipment blank was beyond the scope of the ADEC-approved work plan for this project.*

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

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

ii. Data quality or usability affected? Please explain. ***NA***
Comments:

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

a. Defined and appropriate? **Yes / No / NA** (please explain)
Comments: *Laboratory specific data flags/qualifiers are defined on page 4 of the laboratory report.*

Laboratory Report of Analysis

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

Report Number: **1179312**

Client Project: **32-1-17676-002 Goose Creek**

Dear Jacob Tracy,

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

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

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

Sincerely,
SGS North America Inc.

_____

Justin Nelson Date
Project Manager
Justin.Nelson@sgs.com

Print Date: 10/31/2017 12:24:56PM

Case Narrative

SGS Client: **Shannon & Wilson, Inc.**
SGS Project: **1179312**
Project Name/Site: **32-1-17676-002 Goose Creek**
Project Contact: **Jacob Tracy**

Refer to sample receipt form for information on sample condition.

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

Print Date: 10/31/2017 12:24:57PM

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, indenmification and jurisdiction issues defined therein.

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

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

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

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Sample Summary

Client Sample ID	Lab Sample ID	Collected	Received	Matrix
17676-MW2	1179312001	10/20/2017	10/23/2017	Water (Surface, Eff., Ground)
17676-MW4	1179312002	10/20/2017	10/23/2017	Water (Surface, Eff., Ground)
17676-MW7	1179312003	10/20/2017	10/23/2017	Water (Surface, Eff., Ground)
17676-MW14	1179312004	10/20/2017	10/23/2017	Water (Surface, Eff., Ground)
17676-TB	1179312005	10/20/2017	10/23/2017	Water (Surface, Eff., Ground)

Method	Method Description
AK101	AK101/8021 Combo.
SW8021B	AK101/8021 Combo.
AK102	DRO Low Volume (W)

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Detectable Results Summary

Client Sample ID: **17676-MW2**
Lab Sample ID: 1179312001

Semivolatile Organic Fuels
Volatile Fuels

Parameter	Result	Units
Diesel Range Organics	1.36	mg/L
Ethylbenzene	0.560J	ug/L
o-Xylene	0.580J	ug/L
P & M -Xylene	1.88J	ug/L
Toluene	0.340J	ug/L

Client Sample ID: **17676-MW4**
Lab Sample ID: 1179312002

Semivolatile Organic Fuels
Volatile Fuels

Parameter	Result	Units
Diesel Range Organics	0.940	mg/L
Ethylbenzene	0.330J	ug/L
P & M -Xylene	1.20J	ug/L
Toluene	0.370J	ug/L

Client Sample ID: **17676-MW7**
Lab Sample ID: 1179312003

Volatile Fuels

Parameter	Result	Units
Benzene	0.160J	ug/L
o-Xylene	0.320J	ug/L
P & M -Xylene	1.01J	ug/L
Toluene	0.680J	ug/L

Client Sample ID: **17676-MW14**
Lab Sample ID: 1179312004

Semivolatile Organic Fuels
Volatile Fuels

Parameter	Result	Units
Diesel Range Organics	1.12	mg/L
P & M -Xylene	0.710J	ug/L
Toluene	0.370J	ug/L

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Results of **17676-MW2**

Client Sample ID: **17676-MW2**
Client Project ID: **32-1-17676-002 Goose Creek**
Lab Sample ID: 1179312001
Lab Project ID: 1179312

Collection Date: 10/20/17 12:15
Received Date: 10/23/17 16:34
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Semivolatile Organic Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	1.36		0.600	0.180	mg/L	1		10/29/17 01:39
Surrogates								
5a Androstane (surr)	78.4		50-150		%	1		10/29/17 01:39

Batch Information

Analytical Batch: XFC13927
Analytical Method: AK102
Analyst: CMS
Analytical Date/Time: 10/29/17 01:39
Container ID: 1179312001-D

Prep Batch: XXX38753
Prep Method: SW3520C
Prep Date/Time: 10/27/17 08:16
Prep Initial Wt./Vol.: 250 mL
Prep Extract Vol: 1 mL

J flagging is activated

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Results of **17676-MW2**

Client Sample ID: **17676-MW2**
Client Project ID: **32-1-17676-002 Goose Creek**
Lab Sample ID: 1179312001
Lab Project ID: 1179312

Collection Date: 10/20/17 12:15
Received Date: 10/23/17 16:34
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Volatile Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Gasoline Range Organics	0.0500	U	0.100	0.0310	mg/L	1		10/28/17 00:31
Surrogates								
4-Bromofluorobenzene (surr)	100		50-150		%	1		10/28/17 00:31

Batch Information

Analytical Batch: VFC13967
Analytical Method: AK101
Analyst: ST
Analytical Date/Time: 10/28/17 00:31
Container ID: 1179312001-A

Prep Batch: VXX31614
Prep Method: SW5030B
Prep Date/Time: 10/27/17 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.250	U	0.500	0.150	ug/L	1		10/28/17 00:31
Ethylbenzene	0.560	J	1.00	0.310	ug/L	1		10/28/17 00:31
o-Xylene	0.580	J	1.00	0.310	ug/L	1		10/28/17 00:31
P & M -Xylene	1.88	J	2.00	0.620	ug/L	1		10/28/17 00:31
Toluene	0.340	J	1.00	0.310	ug/L	1		10/28/17 00:31
Surrogates								
1,4-Difluorobenzene (surr)	94.8		77-115		%	1		10/28/17 00:31

Batch Information

Analytical Batch: VFC13967
Analytical Method: SW8021B
Analyst: ST
Analytical Date/Time: 10/28/17 00:31
Container ID: 1179312001-A

Prep Batch: VXX31614
Prep Method: SW5030B
Prep Date/Time: 10/27/17 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 10/31/2017 12:25:05PM

J flagging is activated

Results of **17676-MW4**

Client Sample ID: **17676-MW4**
Client Project ID: **32-1-17676-002 Goose Creek**
Lab Sample ID: 1179312002
Lab Project ID: 1179312

Collection Date: 10/20/17 13:36
Received Date: 10/23/17 16:34
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Semivolatile Organic Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	0.940		0.588	0.176	mg/L	1		10/29/17 01:49
Surrogates								
5a Androstane (surr)	86		50-150		%	1		10/29/17 01:49

Batch Information

Analytical Batch: XFC13927
Analytical Method: AK102
Analyst: CMS
Analytical Date/Time: 10/29/17 01:49
Container ID: 1179312002-D

Prep Batch: XXX38753
Prep Method: SW3520C
Prep Date/Time: 10/27/17 08:16
Prep Initial Wt./Vol.: 255 mL
Prep Extract Vol: 1 mL

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Results of **17676-MW4**

Client Sample ID: **17676-MW4**
Client Project ID: **32-1-17676-002 Goose Creek**
Lab Sample ID: 1179312002
Lab Project ID: 1179312

Collection Date: 10/20/17 13:36
Received Date: 10/23/17 16:34
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Volatile Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Gasoline Range Organics	0.0500	U	0.100	0.0310	mg/L	1		10/28/17 00:50
Surrogates								
4-Bromofluorobenzene (surr)	99.5		50-150		%	1		10/28/17 00:50

Batch Information

Analytical Batch: VFC13967
Analytical Method: AK101
Analyst: ST
Analytical Date/Time: 10/28/17 00:50
Container ID: 1179312002-A

Prep Batch: VXX31614
Prep Method: SW5030B
Prep Date/Time: 10/27/17 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.250	U	0.500	0.150	ug/L	1		10/28/17 00:50
Ethylbenzene	0.330	J	1.00	0.310	ug/L	1		10/28/17 00:50
o-Xylene	0.500	U	1.00	0.310	ug/L	1		10/28/17 00:50
P & M -Xylene	1.20	J	2.00	0.620	ug/L	1		10/28/17 00:50
Toluene	0.370	J	1.00	0.310	ug/L	1		10/28/17 00:50
Surrogates								
1,4-Difluorobenzene (surr)	94.6		77-115		%	1		10/28/17 00:50

Batch Information

Analytical Batch: VFC13967
Analytical Method: SW8021B
Analyst: ST
Analytical Date/Time: 10/28/17 00:50
Container ID: 1179312002-A

Prep Batch: VXX31614
Prep Method: SW5030B
Prep Date/Time: 10/27/17 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 10/31/2017 12:25:05PM

J flagging is activated

Results of **17676-MW7**

Client Sample ID: **17676-MW7**
Client Project ID: **32-1-17676-002 Goose Creek**
Lab Sample ID: 1179312003
Lab Project ID: 1179312

Collection Date: 10/20/17 14:00
Received Date: 10/23/17 16:34
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Semivolatile Organic Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	0.294	U	0.588	0.176	mg/L	1		10/29/17 01:58
Surrogates								
5a Androstane (surr)	78.8		50-150		%	1		10/29/17 01:58

Batch Information

Analytical Batch: XFC13927
Analytical Method: AK102
Analyst: CMS
Analytical Date/Time: 10/29/17 01:58
Container ID: 1179312003-D

Prep Batch: XXX38753
Prep Method: SW3520C
Prep Date/Time: 10/27/17 08:16
Prep Initial Wt./Vol.: 255 mL
Prep Extract Vol: 1 mL

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Results of **17676-MW7**

Client Sample ID: **17676-MW7**
Client Project ID: **32-1-17676-002 Goose Creek**
Lab Sample ID: 1179312003
Lab Project ID: 1179312

Collection Date: 10/20/17 14:00
Received Date: 10/23/17 16:34
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Volatile Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Gasoline Range Organics	0.0500	U	0.100	0.0310	mg/L	1		10/28/17 01:47
Surrogates								
4-Bromofluorobenzene (surr)	101		50-150		%	1		10/28/17 01:47

Batch Information

Analytical Batch: VFC13967
Analytical Method: AK101
Analyst: ST
Analytical Date/Time: 10/28/17 01:47
Container ID: 1179312003-A

Prep Batch: VXX31614
Prep Method: SW5030B
Prep Date/Time: 10/27/17 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.160	J	0.500	0.150	ug/L	1		10/28/17 01:47
Ethylbenzene	0.500	U	1.00	0.310	ug/L	1		10/28/17 01:47
o-Xylene	0.320	J	1.00	0.310	ug/L	1		10/28/17 01:47
P & M -Xylene	1.01	J	2.00	0.620	ug/L	1		10/28/17 01:47
Toluene	0.680	J	1.00	0.310	ug/L	1		10/28/17 01:47
Surrogates								
1,4-Difluorobenzene (surr)	93.8		77-115		%	1		10/28/17 01:47

Batch Information

Analytical Batch: VFC13967
Analytical Method: SW8021B
Analyst: ST
Analytical Date/Time: 10/28/17 01:47
Container ID: 1179312003-A

Prep Batch: VXX31614
Prep Method: SW5030B
Prep Date/Time: 10/27/17 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 10/31/2017 12:25:05PM

J flagging is activated

Results of **17676-MW14**

Client Sample ID: **17676-MW14**
Client Project ID: **32-1-17676-002 Goose Creek**
Lab Sample ID: 1179312004
Lab Project ID: 1179312

Collection Date: 10/20/17 14:06
Received Date: 10/23/17 16:34
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Semivolatile Organic Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	1.12		0.577	0.173	mg/L	1		10/29/17 02:08
Surrogates								
5a Androstane (surr)	80.7		50-150		%	1		10/29/17 02:08

Batch Information

Analytical Batch: XFC13927
Analytical Method: AK102
Analyst: CMS
Analytical Date/Time: 10/29/17 02:08
Container ID: 1179312004-D

Prep Batch: XXX38753
Prep Method: SW3520C
Prep Date/Time: 10/27/17 08:16
Prep Initial Wt./Vol.: 260 mL
Prep Extract Vol: 1 mL

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Results of **17676-MW14**

Client Sample ID: **17676-MW14**
Client Project ID: **32-1-17676-002 Goose Creek**
Lab Sample ID: 1179312004
Lab Project ID: 1179312

Collection Date: 10/20/17 14:06
Received Date: 10/23/17 16:34
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Volatile Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Gasoline Range Organics	0.0500	U	0.100	0.0310	mg/L	1		10/28/17 02:06
Surrogates								
4-Bromofluorobenzene (surr)	95		50-150		%	1		10/28/17 02:06

Batch Information

Analytical Batch: VFC13967
Analytical Method: AK101
Analyst: ST
Analytical Date/Time: 10/28/17 02:06
Container ID: 1179312004-A

Prep Batch: VXX31614
Prep Method: SW5030B
Prep Date/Time: 10/27/17 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.250	U	0.500	0.150	ug/L	1		10/28/17 02:06
Ethylbenzene	0.500	U	1.00	0.310	ug/L	1		10/28/17 02:06
o-Xylene	0.500	U	1.00	0.310	ug/L	1		10/28/17 02:06
P & M -Xylene	0.710	J	2.00	0.620	ug/L	1		10/28/17 02:06
Toluene	0.370	J	1.00	0.310	ug/L	1		10/28/17 02:06
Surrogates								
1,4-Difluorobenzene (surr)	96.6		77-115		%	1		10/28/17 02:06

Batch Information

Analytical Batch: VFC13967
Analytical Method: SW8021B
Analyst: ST
Analytical Date/Time: 10/28/17 02:06
Container ID: 1179312004-A

Prep Batch: VXX31614
Prep Method: SW5030B
Prep Date/Time: 10/27/17 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 10/31/2017 12:25:05PM

J flagging is activated

Results of **17676-TB**

Client Sample ID: **17676-TB**
Client Project ID: **32-1-17676-002 Goose Creek**
Lab Sample ID: 1179312005
Lab Project ID: 1179312

Collection Date: 10/20/17 15:00
Received Date: 10/23/17 16:34
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Volatile Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Gasoline Range Organics	0.0500	U	0.100	0.0310	mg/L	1		10/27/17 22:18
Surrogates								
4-Bromofluorobenzene (surr)	102		50-150		%	1		10/27/17 22:18

Batch Information

Analytical Batch: VFC13967
Analytical Method: AK101
Analyst: ST
Analytical Date/Time: 10/27/17 22:18
Container ID: 1179312005-A

Prep Batch: VXX31614
Prep Method: SW5030B
Prep Date/Time: 10/27/17 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.250	U	0.500	0.150	ug/L	1		10/27/17 22:18
Ethylbenzene	0.500	U	1.00	0.310	ug/L	1		10/27/17 22:18
o-Xylene	0.500	U	1.00	0.310	ug/L	1		10/27/17 22:18
P & M -Xylene	1.00	U	2.00	0.620	ug/L	1		10/27/17 22:18
Toluene	0.500	U	1.00	0.310	ug/L	1		10/27/17 22:18
Surrogates								
1,4-Difluorobenzene (surr)	95.1		77-115		%	1		10/27/17 22:18

Batch Information

Analytical Batch: VFC13967
Analytical Method: SW8021B
Analyst: ST
Analytical Date/Time: 10/27/17 22:18
Container ID: 1179312005-A

Prep Batch: VXX31614
Prep Method: SW5030B
Prep Date/Time: 10/27/17 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

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Method Blank

Blank ID: MB for HBN 1771079 [VXX/31614]
Blank Lab ID: 1422756

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1179312001, 1179312002, 1179312003, 1179312004, 1179312005

Results by **AK101**

Parameter	Results	LOQ/CL	DL	Units
Gasoline Range Organics	0.0500U	0.100	0.0310	mg/L
Surrogates				
4-Bromofluorobenzene (surr)	100	50-150		%

Batch Information

Analytical Batch: VFC13967
Analytical Method: AK101
Instrument: Agilent 7890 PID/FID
Analyst: ST
Analytical Date/Time: 10/27/2017 9:59:00PM

Prep Batch: VXX31614
Prep Method: SW5030B
Prep Date/Time: 10/27/2017 8:00:00AM
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 10/31/2017 12:25:07PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1179312 [VXX31614]
Blank Spike Lab ID: 1422759
Date Analyzed: 10/28/2017 01:28

Spike Duplicate ID: LCSD for HBN 1179312 [VXX31614]
Spike Duplicate Lab ID: 1422760
Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1179312001, 1179312002, 1179312003, 1179312004, 1179312005

Results by **AK101**

	Blank Spike (mg/L)			Spike Duplicate (mg/L)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Gasoline Range Organics	1.00	0.945	95	1.00	0.935	94	(60-120)	1.20	(< 20)
Surrogates									
4-Bromofluorobenzene (surr)	0.0500	102	102	0.0500	101	101	(50-150)	0.45	

Batch Information

Analytical Batch: **VFC13967**
Analytical Method: **AK101**
Instrument: **Agilent 7890 PID/FID**
Analyst: **ST**

Prep Batch: **VXX31614**
Prep Method: **SW5030B**
Prep Date/Time: **10/27/2017 08:00**
Spike Init Wt./Vol.: 1.00 mg/L Extract Vol: 5 mL
Dupe Init Wt./Vol.: 1.00 mg/L Extract Vol: 5 mL

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Method Blank

Blank ID: MB for HBN 1771079 [VXX/31614]
Blank Lab ID: 1422756

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1179312001, 1179312002, 1179312003, 1179312004, 1179312005

Results by **SW8021B**

Parameter	Results	LOQ/CL	DL	Units
Benzene	0.250U	0.500	0.150	ug/L
Ethylbenzene	0.500U	1.00	0.310	ug/L
o-Xylene	0.500U	1.00	0.310	ug/L
P & M -Xylene	1.00U	2.00	0.620	ug/L
Toluene	0.500U	1.00	0.310	ug/L
Surrogates				
1,4-Difluorobenzene (surr)	94.2	77-115		%

Batch Information

Analytical Batch: VFC13967
Analytical Method: SW8021B
Instrument: Agilent 7890 PID/FID
Analyst: ST
Analytical Date/Time: 10/27/2017 9:59:00PM

Prep Batch: VXX31614
Prep Method: SW5030B
Prep Date/Time: 10/27/2017 8:00:00AM
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

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Blank Spike Summary

Blank Spike ID: LCS for HBN 1179312 [VXX31614]
Blank Spike Lab ID: 1422757
Date Analyzed: 10/28/2017 01:09

Spike Duplicate ID: LCSD for HBN 1179312 [VXX31614]
Spike Duplicate Lab ID: 1422758
Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1179312001, 1179312002, 1179312003, 1179312004, 1179312005

Results by **SW8021B**

	Blank Spike (ug/L)			Spike Duplicate (ug/L)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Benzene	100	105	105	100	106	106	(80-120)	1.10	(< 20)
Ethylbenzene	100	101	101	100	102	102	(75-125)	0.37	(< 20)
o-Xylene	100	100	100	100	100	100	(80-120)	0.30	(< 20)
P & M -Xylene	200	202	101	200	203	101	(75-130)	0.48	(< 20)
Toluene	100	102	102	100	103	103	(75-120)	0.56	(< 20)
Surrogates									
1,4-Difluorobenzene (surr)	50	103	103	50	103	103	(77-115)	0.33	

Batch Information

Analytical Batch: **VFC13967**
Analytical Method: **SW8021B**
Instrument: **Agilent 7890 PID/FID**
Analyst: **ST**

Prep Batch: **VXX31614**
Prep Method: **SW5030B**
Prep Date/Time: **10/27/2017 08:00**
Spike Init Wt./Vol.: 100 ug/L Extract Vol: 5 mL
Dupe Init Wt./Vol.: 100 ug/L Extract Vol: 5 mL

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Method Blank

Blank ID: MB for HBN 1770979 [XXX/38753]
Blank Lab ID: 1422524

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1179312001, 1179312002, 1179312003, 1179312004

Results by **AK102**

Parameter	Results	LOQ/CL	DL	Units
Diesel Range Organics	0.300U	0.600	0.180	mg/L
Surrogates				
5a Androstane (surr)	82.8	60-120		%

Batch Information

Analytical Batch: XFC13927
Analytical Method: AK102
Instrument: Agilent 7890B F
Analyst: CMS
Analytical Date/Time: 10/28/2017 11:42:00PM

Prep Batch: XXX38753
Prep Method: SW3520C
Prep Date/Time: 10/27/2017 8:16:27AM
Prep Initial Wt./Vol.: 250 mL
Prep Extract Vol: 1 mL

Print Date: 10/31/2017 12:25:15PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1179312 [XXX38753]
Blank Spike Lab ID: 1422525
Date Analyzed: 10/28/2017 23:52

Spike Duplicate ID: LCSD for HBN 1179312 [XXX38753]
Spike Duplicate Lab ID: 1422526
Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1179312001, 1179312002, 1179312003, 1179312004

Results by **AK102**

	Blank Spike (mg/L)			Spike Duplicate (mg/L)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Diesel Range Organics	20	18.6	93	20	18.7	93	(75-125)	0.57	(< 20)
Surrogates									
5a Androstane (surr)	0.4	96.8	97	0.4	97.9	98	(60-120)	1.20	

Batch Information

Analytical Batch: **XFC13927**
Analytical Method: **AK102**
Instrument: **Agilent 7890B F**
Analyst: **CMS**

Prep Batch: **XXX38753**
Prep Method: **SW3520C**
Prep Date/Time: **10/27/2017 08:16**
Spike Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL
Dupe Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL

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1179312

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

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CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Laboratory: SGS
Attn: Justin

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

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	GRO/BTEX AK101/8021B	DRO/AK102					Total Number of Containers	Remarks/Matrix
17676-MW2	1 A-E	12:15	10/20/17		✓	✓	✓					5	Groundwater
MW4	2 A-E	13:36			✓	✓	✓					5	
MW7	3 A-E	14:00			✓	✓	✓					5	
MW14	4 A-E	14:06			✓	✓	✓					5	
TB	5 A-C	15:00				✓						1 Box	Lab Supplied TB

Project Information	Sample Receipt	
Project Number: 32-1-17676-002	Total Number of Containers	
Project Name: Goose Creek	COC Seals/Intact? Y/N/NA	
Contact: JCT	Received Good Cond./Cold	2.1
Ongoing Project? Yes ☑ No ☐	Delivery Method: Hand Delivered (attach shipping bill, if any)	#D10
Sampler: JCT, ADV		

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 1634	Signature: Time:	Signature: Time:
Printed Name: Jake Tracy Date: 10/23/17	Printed Name: Date:	Printed Name: Date:
Company: S+W	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time:	Signature: Time:	Signature: Time: 16:34
Printed Name: Date:	Printed Name: Date:	Printed Name: Nicholas Wells Date: 10/23/17
Company:	Company:	Company: SGS

Instructions

Requested Turnaround Time: Standard

Special Instructions:

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

21 of 22

F-19-91/UR

No. 35295

e-Sample Receipt Form

SGS Workorder #: **1179312**

1 1 7 9 3 1 2

Review Criteria	Condition (Yes, No, N/A)	Exceptions Noted below
Chain of Custody / Temperature Requirements	yes	Exemption permitted if sampler hand carries/delivers.
Were Custody Seals intact? Note # & location	n/a	ABSENT
COC accompanied samples?	yes	
n/a **Exemption permitted if chilled & collected <8 hours ago, or for samples where chilling is not required		
Temperature blank compliant* (i.e., 0-6 °C after CF)?	yes	Cooler ID: 1 @ 2.1 °C Therm. ID: D10
	n/a	Cooler ID: @ °C Therm. ID:
	n/a	Cooler ID: @ °C Therm. ID:
	n/a	Cooler ID: @ °C Therm. ID:
	n/a	Cooler ID: @ °C Therm. ID:
If >6°C, were samples collected <8 hours ago?	n/a	
If <0°C, were sample containers ice free?	n/a	
If samples received without a temperature blank, the "cooler temperature" will be documented in lieu of the temperature blank & "**COOLER TEMP**" will be noted to the right. In cases where neither a temp blank nor cooler temp can be obtained, note "ambient" or "chilled".		
Note: Identify containers received at non-compliant temperature . Use form FS-0029 if more space is needed.		
Holding Time / Documentation / Sample Condition Requirements		Note: Refer to form F-083 "Sample Guide" for specific holding times.
Were samples received within holding time?	yes	
Do samples **match COC**** (i.e.,sample IDs,dates/times collected)? **Note: If times differ <1hr, record details & login per COC.	yes	
Were analyses requested unambiguous? (i.e., method is specified for analyses with >1 option for analysis)	yes	
		n/a ***Exemption permitted for metals (e.g,200.8/6020A).
Were proper containers (type/mass/volume/preservative***)used?	yes	
Volatile / LL-Hg Requirements		
Were Trip Blanks (i.e., VOAs, LL-Hg) in cooler with samples?	yes	
Were all water VOA vials free of headspace (i.e., bubbles ≤ 6mm)?	yes	
Were all soil VOAs field extracted with MeOH+BFB?	n/a	

Note to Client: Any "No", answer above indicates non-compliance with standard procedures and may impact data quality.

Additional notes (if applicable):

Sample Containers and Preservatives

Container Id	Preservative	Container Condition	Container Id	Preservative	Container Condition
1179312001-A	HCL to pH < 2	OK			
1179312001-B	HCL to pH < 2	OK			
1179312001-C	HCL to pH < 2	OK			
1179312001-D	HCL to pH < 2	OK			
1179312001-E	HCL to pH < 2	OK			
1179312002-A	HCL to pH < 2	OK			
1179312002-B	HCL to pH < 2	OK			
1179312002-C	HCL to pH < 2	OK			
1179312002-D	HCL to pH < 2	OK			
1179312002-E	HCL to pH < 2	OK			
1179312003-A	HCL to pH < 2	OK			
1179312003-B	HCL to pH < 2	OK			
1179312003-C	HCL to pH < 2	OK			
1179312003-D	HCL to pH < 2	OK			
1179312003-E	HCL to pH < 2	OK			
1179312004-A	HCL to pH < 2	OK			
1179312004-B	HCL to pH < 2	OK			
1179312004-C	HCL to pH < 2	OK			
1179312004-D	HCL to pH < 2	OK			
1179312004-E	HCL to pH < 2	OK			
1179312005-A	HCL to pH < 2	OK			
1179312005-B	HCL to pH < 2	OK			
1179312005-C	HCL to pH < 2	OK			

Container Condition Glossary

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

OK - The container was received at an acceptable pH for the analysis requested.
BU - The container was received with headspace greater than 6mm.
DM - The container was received damaged.
FR - The container was received frozen and not usable for Bacteria or BOD analyses.
IC - The container provided for microbiology analysis was not a laboratory-supplied, pre-sterilized container and therefore was not suitable for analysis.
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 Scientist
Date: July 2018

CS Report Name: Goose Creek Community Center, Mile 94 Parks Highway, Alaska

Laboratory Report Date: November 3, 2017

Consultant Firm: Shannon & Wilson, Inc.

Laboratory Name: SGS North America Inc.
Laboratory Report Number: *1179312*

ADEC File Number: 2269.38.001.
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: *The samples were not transferred to another laboratory.*

2. Chain of Custody (COC)

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

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 temperature blank was documented at 2.1° 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 noted.*

e. Data quality or usability affected? Please explain.
Comments: *See above.*

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 discuss 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: *Soil samples were not submitted under this work order.*

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? **NA** Please explain.
Comments: *See above.*

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? Please explain.
Comments: *See above.*

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

i. Organics - One LCS/LCSD reported per matrix, analysis, and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846) **Yes / No / NA** (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. ***NA***
Comments: *See above.*

c. Surrogates - Organics Only

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

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

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

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

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. ***NA***
Comments:

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?
Yes / No / NA (please explain)
Comments: *Sample MW14 is the field duplicate of MW4.*

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.
Comments:

f. Decontamination or Equipment Blank (if not applicable)
Yes / No / NA (please explain)
Comments: *The use of a decontamination or equipment blank was beyond the scope of the ADEC-approved work plan for this project.*

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

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

ii. Data quality or usability affected? Please explain. ***NA***
Comments:

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

a. Defined and appropriate? **Yes / No / NA** (please explain)
Comments: *Laboratory specific data flags/qualifiers are defined on page 3 of the laboratory report.*

Laboratory Report of Analysis

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

Report Number: **1181948**

Client Project: **32-1-17676-002 Goose Creek**

Dear Alena Voigt,

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 Date
Project Manager
Jillian.Vlahovich@sgs.com

Print Date: 05/21/2018 4:46:44PM

Case Narrative

SGS Client: **Shannon & Wilson, Inc.**
SGS Project: **1181948**
Project Name/Site: **32-1-17676-002 Goose Creek**
Project Contact: **Alena Voigt**

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: 05/21/2018 4:46:46PM

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, indenmification 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.

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Sample Summary

Client Sample ID	Lab Sample ID	Collected	Received	Matrix
17676-MW2	1181948001	05/03/2018	05/04/2018	Water (Surface, Eff., Ground)
17676-MW4	1181948002	05/03/2018	05/04/2018	Water (Surface, Eff., Ground)
17676-MW7	1181948003	05/03/2018	05/04/2018	Water (Surface, Eff., Ground)
17676-MW14	1181948004	05/03/2018	05/04/2018	Water (Surface, Eff., Ground)
17676-TB	1181948005	05/03/2018	05/04/2018	Water (Surface, Eff., Ground)

Method	Method Description
AK101	AK101/8021 Combo.
SW8021B	AK101/8021 Combo.
AK102	DRO Low Volume (W)

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Detectable Results Summary

Client Sample ID: **17676-MW2**
Lab Sample ID: 1181948001

Semivolatile Organic Fuels

Parameter	Result	Units
Diesel Range Organics	2.04	mg/L

Client Sample ID: **17676-MW4**
Lab Sample ID: 1181948002

Semivolatile Organic Fuels

Parameter	Result	Units
Diesel Range Organics	0.375J	mg/L

Volatile Fuels

Parameter	Result	Units
Ethylbenzene	0.350J	ug/L
o-Xylene	0.630J	ug/L
P & M -Xylene	1.01J	ug/L
Xylenes (total)	1.64J	ug/L

Client Sample ID: **17676-MW14**
Lab Sample ID: 1181948004

Semivolatile Organic Fuels

Parameter	Result	Units
Diesel Range Organics	0.293J	mg/L

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Results of **17676-MW2**

Client Sample ID: **17676-MW2**
Client Project ID: **32-1-17676-002 Goose Creek**
Lab Sample ID: 1181948001
Lab Project ID: 1181948

Collection Date: 05/03/18 14:00
Received Date: 05/04/18 09:58
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Semivolatile Organic Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	2.04		0.588	0.176	mg/L	1		05/08/18 15:06
Surrogates								
5a Androstane (surr)	85.6		50-150		%	1		05/08/18 15:06

Batch Information

Analytical Batch: XFC14194
Analytical Method: AK102
Analyst: CMS
Analytical Date/Time: 05/08/18 15:06
Container ID: 1181948001-D

Prep Batch: XXX39436
Prep Method: SW3520C
Prep Date/Time: 05/07/18 12:03
Prep Initial Wt./Vol.: 255 mL
Prep Extract Vol: 1 mL

J flagging is activated

SGS North America Inc.
200 West Potter Drive Anchorage, AK 95518
t 907.562.2343 **f** 907.561.5301 www.us.sgs.com

Results of **17676-MW2**

Client Sample ID: **17676-MW2**
Client Project ID: **32-1-17676-002 Goose Creek**
Lab Sample ID: 1181948001
Lab Project ID: 1181948

Collection Date: 05/03/18 14:00
Received Date: 05/04/18 09:58
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Volatile Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Gasoline Range Organics	0.0500	U	0.100	0.0310	mg/L	1		05/11/18 05:33
Surrogates								
4-Bromofluorobenzene (surr)	77		50-150		%	1		05/11/18 05:33

Batch Information

Analytical Batch: VFC14139
Analytical Method: AK101
Analyst: ST
Analytical Date/Time: 05/11/18 05:33
Container ID: 1181948001-A

Prep Batch: VXX32209
Prep Method: SW5030B
Prep Date/Time: 05/10/18 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.250	U	0.500	0.150	ug/L	1		05/11/18 05:33
Ethylbenzene	0.500	U	1.00	0.310	ug/L	1		05/11/18 05:33
o-Xylene	0.500	U	1.00	0.310	ug/L	1		05/11/18 05:33
P & M -Xylene	1.00	U	2.00	0.620	ug/L	1		05/11/18 05:33
Toluene	0.500	U	1.00	0.310	ug/L	1		05/11/18 05:33
Xylenes (total)	1.50	U	3.00	0.930	ug/L	1		05/11/18 05:33
Surrogates								
1,4-Difluorobenzene (surr)	93		77-115		%	1		05/11/18 05:33

Batch Information

Analytical Batch: VFC14139
Analytical Method: SW8021B
Analyst: ST
Analytical Date/Time: 05/11/18 05:33
Container ID: 1181948001-A

Prep Batch: VXX32209
Prep Method: SW5030B
Prep Date/Time: 05/10/18 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 05/21/2018 4:46:58PM

J flagging is activated

Results of **17676-MW4**

Client Sample ID: **17676-MW4**
Client Project ID: **32-1-17676-002 Goose Creek**
Lab Sample ID: 1181948002
Lab Project ID: 1181948

Collection Date: 05/03/18 15:30
Received Date: 05/04/18 09:58
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Semivolatile Organic Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	0.375	J	0.588	0.176	mg/L	1		05/08/18 15:16
Surrogates								
5a Androstane (surr)	94		50-150		%	1		05/08/18 15:16

Batch Information

Analytical Batch: XFC14194
Analytical Method: AK102
Analyst: CMS
Analytical Date/Time: 05/08/18 15:16
Container ID: 1181948002-D

Prep Batch: XXX39436
Prep Method: SW3520C
Prep Date/Time: 05/07/18 12:03
Prep Initial Wt./Vol.: 255 mL
Prep Extract Vol: 1 mL

J flagging is activated

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Results of **17676-MW4**

Client Sample ID: **17676-MW4**
Client Project ID: **32-1-17676-002 Goose Creek**
Lab Sample ID: 1181948002
Lab Project ID: 1181948

Collection Date: 05/03/18 15:30
Received Date: 05/04/18 09:58
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Volatile Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Gasoline Range Organics	0.0500	U	0.100	0.0310	mg/L	1		05/11/18 06:09
Surrogates								
4-Bromofluorobenzene (surr)	78.5		50-150		%	1		05/11/18 06:09

Batch Information

Analytical Batch: VFC14139
Analytical Method: AK101
Analyst: ST
Analytical Date/Time: 05/11/18 06:09
Container ID: 1181948002-A

Prep Batch: VXX32209
Prep Method: SW5030B
Prep Date/Time: 05/10/18 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.250	U	0.500	0.150	ug/L	1		05/11/18 06:09
Ethylbenzene	0.350	J	1.00	0.310	ug/L	1		05/11/18 06:09
o-Xylene	0.630	J	1.00	0.310	ug/L	1		05/11/18 06:09
P & M -Xylene	1.01	J	2.00	0.620	ug/L	1		05/11/18 06:09
Toluene	0.500	U	1.00	0.310	ug/L	1		05/11/18 06:09
Xylenes (total)	1.64	J	3.00	0.930	ug/L	1		05/11/18 06:09
Surrogates								
1,4-Difluorobenzene (surr)	91.4		77-115		%	1		05/11/18 06:09

Batch Information

Analytical Batch: VFC14139
Analytical Method: SW8021B
Analyst: ST
Analytical Date/Time: 05/11/18 06:09
Container ID: 1181948002-A

Prep Batch: VXX32209
Prep Method: SW5030B
Prep Date/Time: 05/10/18 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

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Results of **17676-MW7**

Client Sample ID: **17676-MW7**
Client Project ID: **32-1-17676-002 Goose Creek**
Lab Sample ID: 1181948003
Lab Project ID: 1181948

Collection Date: 05/03/18 12:20
Received Date: 05/04/18 09:58
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Semivolatile Organic Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	0.294	U	0.588	0.176	mg/L	1		05/08/18 15:25
Surrogates								
5a Androstane (surr)	88.9		50-150		%	1		05/08/18 15:25

Batch Information

Analytical Batch: XFC14194
Analytical Method: AK102
Analyst: CMS
Analytical Date/Time: 05/08/18 15:25
Container ID: 1181948003-D

Prep Batch: XXX39436
Prep Method: SW3520C
Prep Date/Time: 05/07/18 12:03
Prep Initial Wt./Vol.: 255 mL
Prep Extract Vol: 1 mL

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Results of **17676-MW7**

Client Sample ID: **17676-MW7**
Client Project ID: **32-1-17676-002 Goose Creek**
Lab Sample ID: 1181948003
Lab Project ID: 1181948

Collection Date: 05/03/18 12:20
Received Date: 05/04/18 09:58
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Volatile Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Gasoline Range Organics	0.0500	U	0.100	0.0310	mg/L	1		05/11/18 06:27
Surrogates								
4-Bromofluorobenzene (surr)	77.2		50-150		%	1		05/11/18 06:27

Batch Information

Analytical Batch: VFC14139
Analytical Method: AK101
Analyst: ST
Analytical Date/Time: 05/11/18 06:27
Container ID: 1181948003-A

Prep Batch: VXX32209
Prep Method: SW5030B
Prep Date/Time: 05/10/18 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.250	U	0.500	0.150	ug/L	1		05/11/18 06:27
Ethylbenzene	0.500	U	1.00	0.310	ug/L	1		05/11/18 06:27
o-Xylene	0.500	U	1.00	0.310	ug/L	1		05/11/18 06:27
P & M -Xylene	1.00	U	2.00	0.620	ug/L	1		05/11/18 06:27
Toluene	0.500	U	1.00	0.310	ug/L	1		05/11/18 06:27
Xylenes (total)	1.50	U	3.00	0.930	ug/L	1		05/11/18 06:27
Surrogates								
1,4-Difluorobenzene (surr)	92.4		77-115		%	1		05/11/18 06:27

Batch Information

Analytical Batch: VFC14139
Analytical Method: SW8021B
Analyst: ST
Analytical Date/Time: 05/11/18 06:27
Container ID: 1181948003-A

Prep Batch: VXX32209
Prep Method: SW5030B
Prep Date/Time: 05/10/18 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

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Results of **17676-MW14**

Client Sample ID: **17676-MW14**
Client Project ID: **32-1-17676-002 Goose Creek**
Lab Sample ID: 1181948004
Lab Project ID: 1181948

Collection Date: 05/03/18 16:00
Received Date: 05/04/18 09:58
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Semivolatile Organic Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	0.293	J	0.588	0.176	mg/L	1		05/08/18 16:55
Surrogates								
5a Androstane (surr)	87.1		50-150		%	1		05/08/18 16:55

Batch Information

Analytical Batch: XFC14194
Analytical Method: AK102
Analyst: CMS
Analytical Date/Time: 05/08/18 16:55
Container ID: 1181948004-D

Prep Batch: XXX39436
Prep Method: SW3520C
Prep Date/Time: 05/07/18 12:03
Prep Initial Wt./Vol.: 255 mL
Prep Extract Vol: 1 mL

J flagging is activated

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Results of **17676-MW14**

Client Sample ID: **17676-MW14**
Client Project ID: **32-1-17676-002 Goose Creek**
Lab Sample ID: 1181948004
Lab Project ID: 1181948

Collection Date: 05/03/18 16:00
Received Date: 05/04/18 09:58
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Volatile Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Gasoline Range Organics	0.0500	U	0.100	0.0310	mg/L	1		05/11/18 06:45
Surrogates								
4-Bromofluorobenzene (surr)	74.4		50-150		%	1		05/11/18 06:45

Batch Information

Analytical Batch: VFC14139
Analytical Method: AK101
Analyst: ST
Analytical Date/Time: 05/11/18 06:45
Container ID: 1181948004-A

Prep Batch: VXX32209
Prep Method: SW5030B
Prep Date/Time: 05/10/18 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.250	U	0.500	0.150	ug/L	1		05/11/18 06:45
Ethylbenzene	0.500	U	1.00	0.310	ug/L	1		05/11/18 06:45
o-Xylene	0.500	U	1.00	0.310	ug/L	1		05/11/18 06:45
P & M -Xylene	1.00	U	2.00	0.620	ug/L	1		05/11/18 06:45
Toluene	0.500	U	1.00	0.310	ug/L	1		05/11/18 06:45
Xylenes (total)	1.50	U	3.00	0.930	ug/L	1		05/11/18 06:45
Surrogates								
1,4-Difluorobenzene (surr)	92.4		77-115		%	1		05/11/18 06:45

Batch Information

Analytical Batch: VFC14139
Analytical Method: SW8021B
Analyst: ST
Analytical Date/Time: 05/11/18 06:45
Container ID: 1181948004-A

Prep Batch: VXX32209
Prep Method: SW5030B
Prep Date/Time: 05/10/18 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

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Results of **17676-TB**

Client Sample ID: **17676-TB**
Client Project ID: **32-1-17676-002 Goose Creek**
Lab Sample ID: 1181948005
Lab Project ID: 1181948

Collection Date: 05/03/18 16:30
Received Date: 05/04/18 09:58
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Volatile Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Gasoline Range Organics	0.0500	U	0.100	0.0310	mg/L	1		05/11/18 04:21
Surrogates								
4-Bromofluorobenzene (surr)	75.3		50-150		%	1		05/11/18 04:21

Batch Information

Analytical Batch: VFC14139
Analytical Method: AK101
Analyst: ST
Analytical Date/Time: 05/11/18 04:21
Container ID: 1181948005-A

Prep Batch: VXX32209
Prep Method: SW5030B
Prep Date/Time: 05/10/18 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.250	U	0.500	0.150	ug/L	1		05/11/18 04:21
Ethylbenzene	0.500	U	1.00	0.310	ug/L	1		05/11/18 04:21
o-Xylene	0.500	U	1.00	0.310	ug/L	1		05/11/18 04:21
P & M -Xylene	1.00	U	2.00	0.620	ug/L	1		05/11/18 04:21
Toluene	0.500	U	1.00	0.310	ug/L	1		05/11/18 04:21
Xylenes (total)	1.50	U	3.00	0.930	ug/L	1		05/11/18 04:21
Surrogates								
1,4-Difluorobenzene (surr)	92.4		77-115		%	1		05/11/18 04:21

Batch Information

Analytical Batch: VFC14139
Analytical Method: SW8021B
Analyst: ST
Analytical Date/Time: 05/11/18 04:21
Container ID: 1181948005-A

Prep Batch: VXX32209
Prep Method: SW5030B
Prep Date/Time: 05/10/18 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 05/21/2018 4:46:58PM

J flagging is activated

Method Blank

Blank ID: MB for HBN 1779483 [VXX/32209]
Blank Lab ID: 1445921

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1181948001, 1181948002, 1181948003, 1181948004, 1181948005

Results by **AK101**

Parameter	Results	LOQ/CL	DL	Units
Gasoline Range Organics	0.0500U	0.100	0.0310	mg/L
Surrogates				
4-Bromofluorobenzene (surr)	77.9	50-150		%

Batch Information

Analytical Batch: VFC14139
Analytical Method: AK101
Instrument: Agilent 7890 PID/FID
Analyst: ST
Analytical Date/Time: 5/10/2018 1:39:00PM

Prep Batch: VXX32209
Prep Method: SW5030B
Prep Date/Time: 5/10/2018 8:00:00AM
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 05/21/2018 4:46:59PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1181948 [VXX32209]
Blank Spike Lab ID: 1445924
Date Analyzed: 05/10/2018 20:52

Spike Duplicate ID: LCSD for HBN 1181948 [VXX32209]
Spike Duplicate Lab ID: 1445925
Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1181948001, 1181948002, 1181948003, 1181948004, 1181948005

Results by **AK101**

	Blank Spike (mg/L)			Spike Duplicate (mg/L)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Gasoline Range Organics	1.00	0.909	91	1.00	0.954	95	(60-120)	4.80	(< 20)
Surrogates									
4-Bromofluorobenzene (surr)	0.0500	82.8	83	0.0500	81.1	81	(50-150)	2.10	

Batch Information

Analytical Batch: **VFC14139**
Analytical Method: **AK101**
Instrument: **Agilent 7890 PID/FID**
Analyst: **ST**

Prep Batch: **VXX32209**
Prep Method: **SW5030B**
Prep Date/Time: **05/10/2018 08:00**
Spike Init Wt./Vol.: 1.00 mg/L Extract Vol: 5 mL
Dupe Init Wt./Vol.: 1.00 mg/L Extract Vol: 5 mL

Print Date: 05/21/2018 4:47:01PM

Method Blank

Blank ID: MB for HBN 1779483 [VXX/32209]
Blank Lab ID: 1445921

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1181948001, 1181948002, 1181948003, 1181948004, 1181948005

Results by **SW8021B**

Parameter	Results	LOQ/CL	DL	Units
Benzene	0.250U	0.500	0.150	ug/L
Ethylbenzene	0.500U	1.00	0.310	ug/L
o-Xylene	0.500U	1.00	0.310	ug/L
P & M -Xylene	1.00U	2.00	0.620	ug/L
Toluene	0.500U	1.00	0.310	ug/L
Xylenes (total)	1.50U	3.00	0.930	ug/L
Surrogates				
1,4-Difluorobenzene (surr)	92.8	77-115		%

Batch Information

Analytical Batch: VFC14139
Analytical Method: SW8021B
Instrument: Agilent 7890 PID/FID
Analyst: ST
Analytical Date/Time: 5/10/2018 1:39:00PM

Prep Batch: VXX32209
Prep Method: SW5030B
Prep Date/Time: 5/10/2018 8:00:00AM
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

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Blank Spike Summary

Blank Spike ID: LCS for HBN 1181948 [VXX32209]
Blank Spike Lab ID: 1445922
Date Analyzed: 05/10/2018 20:34

Spike Duplicate ID: LCSD for HBN 1181948 [VXX32209]
Spike Duplicate Lab ID: 1445923
Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1181948001, 1181948002, 1181948003, 1181948004, 1181948005

Results by **SW8021B**

	Blank Spike (ug/L)			Spike Duplicate (ug/L)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Benzene	100	109	109	100	119	119	(80-120)	9.40	(< 20)
Ethylbenzene	100	96.9	97	100	106	106	(75-125)	8.80	(< 20)
o-Xylene	100	96.2	96	100	105	105	(80-120)	8.70	(< 20)
P & M -Xylene	200	192	96	200	211	105	(75-130)	9.00	(< 20)
Toluene	100	106	106	100	116	116	(75-120)	8.70	(< 20)
Xylenes (total)	300	289	96	300	316	105	(79-121)	8.90	(< 20)
Surrogates									
1,4-Difluorobenzene (surr)	50	102	102	50	103	103	(77-115)	0.90	

Batch Information

Analytical Batch: **VFC14139**
Analytical Method: **SW8021B**
Instrument: **Agilent 7890 PID/FID**
Analyst: **ST**

Prep Batch: **VXX32209**
Prep Method: **SW5030B**
Prep Date/Time: **05/10/2018 08:00**
Spike Init Wt./Vol.: 100 ug/L Extract Vol: 5 mL
Dupe Init Wt./Vol.: 100 ug/L Extract Vol: 5 mL

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Method Blank

Blank ID: MB for HBN 1779269 [XXX/39436]
Blank Lab ID: 1445020

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1181948001, 1181948002, 1181948003, 1181948004

Results by **AK102**

Parameter	Results	LOQ/CL	DL	Units
Diesel Range Organics	0.300U	0.600	0.180	mg/L
Surrogates				
5a Androstane (surr)	91.4	60-120		%

Batch Information

Analytical Batch: XFC14194
Analytical Method: AK102
Instrument: Agilent 7890B R
Analyst: CMS
Analytical Date/Time: 5/8/2018 2:37:00PM

Prep Batch: XXX39436
Prep Method: SW3520C
Prep Date/Time: 5/7/2018 12:03:29PM
Prep Initial Wt./Vol.: 250 mL
Prep Extract Vol: 1 mL

Print Date: 05/21/2018 4:47:08PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1181948 [XXX39436]
Blank Spike Lab ID: 1445021
Date Analyzed: 05/08/2018 14:47

Spike Duplicate ID: LCSD for HBN 1181948 [XXX39436]
Spike Duplicate Lab ID: 1445022
Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1181948001, 1181948002, 1181948003, 1181948004

Results by **AK102**

	Blank Spike (mg/L)			Spike Duplicate (mg/L)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Diesel Range Organics	20	20.3	101	20	18.8	94	(75-125)	7.60	(< 20)
Surrogates									
5a Androstane (surr)	0.4	106	106	0.4	98.6	99	(60-120)	7.40	

Batch Information

Analytical Batch: **XFC14194**
Analytical Method: **AK102**
Instrument: **Agilent 7890B R**
Analyst: **CMS**

Prep Batch: **XXX39436**
Prep Method: **SW3520C**
Prep Date/Time: **05/07/2018 12:03**
Spike Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL
Dupe Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL

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1181948

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

CHAIN-OF-CUSTODY RECORD

Laboratory SGS Page 1 of 1
Attn: Jillian

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Fairbanks, AK 99709
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5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

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

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

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

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	GRO/BTEX AK101/8021	DRO/AK102					Total Number of Containers	Remarks/Matrix
17676-MW2	1 A-E	14:00	5/3/18		✓	✓	✓						Groundwater
17676-MW4	2 A-E	15:30	↓		✓	✓	✓						↓
17676-MW7	3 A-E	12:20	↓		✓	✓	✓						↓
17676-MW14	4 A-E	16:00	↓		✓	✓	✓						↓
17676-TB	5 A-C	16:30	↓			✓							lab Supplied TB

Project Information	Sample Receipt
Project Number: 32-17676-002	Total Number of Containers
Project Name: Goose Creek	COC Seals/Intact? Y/N/NA (NA)
Contact: ADV, JCT	Received Good Cond./Cold
Ongoing Project? Yes ☑ No ☐	Delivery Method: Hand Delivered
Sampler: ADV	(attach shipping bill, if any)

Instructions
Requested Turnaround Time: Standard
Special Instructions:

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Alena Voigt Time: 9:56	Signature: Time:	Signature: Time:
Printed Name: Alena Voigt Date: 5/4/18	Printed Name: Date:	Printed Name: Date:
Company: Shannon Wilson	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time:	Signature: Time:	Signature: Time: 0954
Printed Name: Date:	Printed Name: Date:	Printed Name: Nicole Warner Date: 5/4/18
Company:	Company:	Company: SGS

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

F-19-91/UR

TB: 1.6 D40

No. 35445

e-Sample Receipt Form

SGS Workorder #: **1181948**

1 1 8 1 9 4 8

Review Criteria	Condition (Yes, No, N/A)	Exceptions Noted below
Chain of Custody / Temperature Requirements	yes	Exemption permitted if sampler hand carries/delivers.
Were Custody Seals intact? Note # & location	n/a	ABSENT
COC accompanied samples?	yes	
n/a **Exemption permitted if chilled & collected <8 hours ago, or for samples where chilling is not required		
Temperature blank compliant* (i.e., 0-6 °C after CF)?	yes	Cooler ID: 1 @ 1.6 °C Therm. ID: D40
	n/a	Cooler ID: @ °C Therm. ID:
	n/a	Cooler ID: @ °C Therm. ID:
	n/a	Cooler ID: @ °C Therm. ID:
	n/a	Cooler ID: @ °C Therm. ID:
If >6°C, were samples collected <8 hours ago?	n/a	
If <0°C, were sample containers ice free?	n/a	
If samples received without a temperature blank, the "cooler temperature" will be documented in lieu of the temperature blank & "**COOLER TEMP**" will be noted to the right. In cases where neither a temp blank nor cooler temp can be obtained, note "ambient" or "chilled".		
Note: Identify containers received at non-compliant temperature . Use form FS-0029 if more space is needed.		
Holding Time / Documentation / Sample Condition Requirements		Note: Refer to form F-083 "Sample Guide" for specific holding times.
Were samples received within holding time?	yes	
Do samples **match COC**** (i.e.,sample IDs,dates/times collected)? **Note: If times differ <1hr, record details & login per COC.	yes	
Were analyses requested unambiguous? (i.e., method is specified for analyses with >1 option for analysis)	yes	
		n/a ***Exemption permitted for metals (e.g,200.8/6020A).
Were proper containers (type/mass/volume/preservative***)used?	yes	
Volatile / LL-Hg Requirements		
Were Trip Blanks (i.e., VOAs, LL-Hg) in cooler with samples?	yes	
Were all water VOA vials free of headspace (i.e., bubbles ≤ 6mm)?	yes	
Were all soil VOAs field extracted with MeOH+BFB?	n/a	

Note to Client: Any "No", answer above indicates non-compliance with standard procedures and may impact data quality.

Additional notes (if applicable):

Sample Containers and Preservatives

Container Id	Preservative	Container Condition	Container Id	Preservative	Container Condition
1181948001-A	HCL to pH < 2	OK			
1181948001-B	HCL to pH < 2	OK			
1181948001-C	HCL to pH < 2	OK			
1181948001-D	HCL to pH < 2	OK			
1181948001-E	HCL to pH < 2	OK			
1181948002-A	HCL to pH < 2	OK			
1181948002-B	HCL to pH < 2	OK			
1181948002-C	HCL to pH < 2	OK			
1181948002-D	HCL to pH < 2	OK			
1181948002-E	HCL to pH < 2	OK			
1181948003-A	HCL to pH < 2	OK			
1181948003-B	HCL to pH < 2	OK			
1181948003-C	HCL to pH < 2	OK			
1181948003-D	HCL to pH < 2	OK			
1181948003-E	HCL to pH < 2	OK			
1181948004-A	HCL to pH < 2	OK			
1181948004-B	HCL to pH < 2	OK			
1181948004-C	HCL to pH < 2	OK			
1181948004-D	HCL to pH < 2	OK			
1181948004-E	HCL to pH < 2	OK			
1181948005-A	HCL to pH < 2	OK			
1181948005-B	HCL to pH < 2	OK			
1181948005-C	HCL to pH < 2	OK			

Container Condition Glossary

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

OK - The container was received at an acceptable pH for the analysis requested.
BU - The container was received with headspace greater than 6mm.
DM - The container was received damaged.
FR - The container was received frozen and not usable for Bacteria or BOD analyses.
IC - The container provided for microbiology analysis was not a laboratory-supplied, pre-sterilized container and therefore was not suitable for analysis.
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: Matt Woods
Title: Environmental Engineer
Date: July 2018

CS Report Name: Goose Creek Community Center, Mile 94 Parks Highway, Alaska

Laboratory Report Date: May 22, 2018

Consultant Firm: Shannon & Wilson, Inc.

Laboratory Name: SGS North America Inc.
Laboratory Report Number: *1181948*

ADEC File Number: 2269.38.001
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: *The samples were not transferred to another laboratory.*

2. Chain of Custody (COC)

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

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 temperature blank was documented at 1.6° 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.
Comments: *See above.*

4. Case Narrative

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

b. Discrepancies, errors or QC failures identified by the lab? **Yes / No / NA** (please explain)
Comments: *The case narrative noted 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 discuss 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: *Soil samples were not submitted under this work order.*

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? **NA** Please explain.
Comments: *See above.*

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? 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. ***NA***
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. ***NA***
Comments:

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

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

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

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. ***NA***
Comments:

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?
Yes / No / NA (please explain)
Comments: *Sample MW14 is the field duplicate of MW4.*

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.
Comments:

f. Decontamination or Equipment Blank (if not applicable)
Yes / No / NA (please explain)
Comments: *The use of a decontamination or equipment blank was beyond the scope of the ADEC-approved work plan for this project.*

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

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

ii. Data quality or usability affected? Please explain. ***NA***
Comments:

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

a. Defined and appropriate? **Yes / No / NA** (please explain)
Comments: *Laboratory specific data flags/qualifiers are defined on page 3 of the laboratory report.*

ATTACHMENT 5

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL/ENVIRONMENTAL REPORT

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