2018 Groundwater and Drinking Water Monitoring
UAA Kenai Peninsula College MAPTS
Mile 3.2 Kalifornsky Beach Road
Soldotna, Alaska

December 2018

SHANNON & WILSON, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

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ACRONYMS AND ABBREVIATIONS

ADEC	Alaska Department of Environmental Conservation
AFFF	Aqueous Film Forming Foams
DQO	Data Quality Objective
DRO	Diesel Range Organics
EPA	Environmental Protection Agency
GAC	Granular Activated Carbon
HPLC-MS-MS	High Performance Liquid Chromatography-Tandem Mass Spectrometry
IDW	Investigation Derived Waste
KPC	Kenai Peninsula College
LCS	Laboratory Control Sample
LDRC	Laboratory Data Review Checklist
MAPTS	Mining and Petroleum Training Site
µg/L	Micrograms per liter
MS/MSD	Matrix Spike/Matrix Spike Duplicate
mV	Millivolts
NTU	Nephelometric Turbidity Unit
ORP	Oxidation-Reduction Potential
PFAS	Per- Polyfluoroalkyl Substances
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonate
SGS	SGS North America Inc. of Anchorage, Alaska
UAA	University of Alaska, Anchorage
US EPA	U.S. Environmental Protection Agency

2018 GROUNDWATER AND DRINKING WATER MONITORING
UAA KENAI PENINSULA COLLEGE MAPTS
MILE 3.2 KALIFORNSKY BEACH ROAD
SOLDOTNA, ALASKA

1.0 INTRODUCTION

This report presents the results of Shannon & Wilson's 2018 groundwater and drinking water monitoring at the University of Alaska Anchorage's (UAA) Kenai Peninsula College (KPC) former Mining and Petroleum Training Site (MAPTS). The former MAPTS is located on the KPC campus between College Loop Road and Kalifornsky Beach Road in Soldotna, Alaska, as shown on Figure 1.

Written authorization to proceed with this work was received from UAA Facilities Planning and Construction with Purchase Order No. P0515902 Amendment A, issued May 12, 2018.

2.0 BACKGROUND

The MAPTS was used for fire training from approximately 1980 to 1988. The fire suppressants used during training at the MAPTS included primarily water, but also sodium bicarbonate, ABC multipurpose dry chemical (a mix of monoammonium phosphate and ammonium sulfate), and aqueous film forming foams (AFFF). AFFF contain fluorosurfactants including two substances, perfluorooctanoic acid (PFOA) and perfluorooctane sulphonic acid (PFOS), which are emerging Per- and Polyfluoroalkyl Substances (PFAS) that the Alaska Department of Environmental Conservation (ADEC) became aware of in 2012 during site remediation work conducted at the MAPTS.

Groundwater monitoring to evaluate PFOS and PFOA concentrations has been conducted at the former MAPTS since 2013. Analytical groundwater sampling was initiated in site wells surrounding the former Cell 2 remediation area. The approximate location of former Cell 2 remediation area and the site's groundwater monitoring wells are shown on Figure 2. PFOS concentrations were measured in Wells B4MW and B5MW (located along the western boundary of UAA property) at levels that exceed the ADEC Table C cleanup level. However, neither PFOS nor PFOA has been detected in off-site Wells B7MW and B8MW, suggesting that the PFOS groundwater plume has been delineated to the northwest, which is the downgradient direction of inferred groundwater flow.

In November 2016, one monitoring well (Well B9MW) was installed downgradient of Wells B4MW and B5MW to determine the leading edge of the plume. Groundwater samples collected from Well B9MW in November 2016 and June 2017 contained detectable PFOS and/or PFOA at concentrations less than the ADEC Table C cleanup level. These data indicate the leading edge of the PFOS/PFOA plume in groundwater, with respect to apparent west/northwest flow direction, appears to be between Monitoring Wells B4MW and B5MW, located at the western boundary of the UAA property, and Well B9MW, located approximately 325 feet northwest of Well B4MW.

During our November 2016 field work, nine drinking water wells were sampled on properties to the west/northwest of the former MAPTS. Four of the nine drinking water wells sampled (Swan, Camp, Henry, and KB Properties) contained concentrations or estimated concentrations of PFOS and/or PFOA below the ADEC Table C cleanup levels. The detected concentrations of PFOS and PFOA are also less than the U.S. Environmental Protection Agency (US EPA) health advisory level of 0.07 micrograms per liter (µg/L). The four wells that contained concentrations of PFOS and/or PFOA in 2016 were sampled in June and September 2017. Three of the wells (Camp, Henry, and KB Properties) contained concentrations of PFOS and/or PFOA in June 2017 and all four of the wells (Swan, Camp, Henry, and KB Properties) contained concentrations of PFOS and/or PFOA in September 2017. The sample results are generally consistent with historical results.

3.0 PROJECT ACTIVITIES

The overall project purpose is to obtain a Cleanup Complete designation from the ADEC, with or without Institutional Controls. The objective of this effort is to comply with the ADEC's 2018 requests which included:

- Collecting groundwater samples from Monitoring Wells B4MW, B5MW, and B9MW in spring 2018. If the analytical results from Well B4MW decreased to less than the ADEC cleanup level, and remain below cleanup level in Well B5MW, a second sampling event was to be conducted; and

- Collecting analytical drinking water samples from the four off-site drinking water wells that have had PFOS/PFOA detections and analyze them for PFAS in lieu of PFOS/PFOA.

Under subcontract to Shannon & Wilson, SGS North America Inc. (SGS) of Anchorage, Alaska analyzed the groundwater and drinking water samples through their reference laboratory.

4.0 FIELD ACTIVITIES

The field activities were conducted in material accordance with our ADEC-approved March 30, 2018 work plan with the condition that the drinking water samples and the sample from Well B4MW be analyzed for PFAS in lieu of PFOS/PFOA. Field notes are provided in Appendix A.

4.1 Drinking Water Sampling

On May 16, 2018, drinking water samples were collected from drinking water systems at four properties identified as Swan, Camp, Henry, and KB Properties. Prior to sampling the wells, the property owners were notified and provided written or verbal permission to sample the drinking water. The locations of the drinking water wells are shown on Figure 2.

To prevent possible cross contamination, the well heads for the drinking water wells were not opened during sampling. Instead, the spigot or faucet closest to the well was used to collect the drinking water sample. Each well system was purged for at least 15 minutes prior to sampling to remove water from the system piping and to obtain a representative sample of formation groundwater. The KB Properties (KBP) well was sampled upgradient of potential water treatment units. Samples from the Swan (SWAN), Camp (CAMP), and Henry (HEN) wells were sampled from sinks downgradient of potential water treatment units. One duplicate sample (Sample CAMP2) was collected from the well on the property identified as Camp. The drinking water samples were placed in a chilled cooler and delivered to SGS using chain-of-custody procedures.

4.2 Groundwater Sampling

On May 16, 2018, a low-flow method was used to purge and sample Monitoring Wells B4MW, B5MW, and B9MW. The pump inlet was set to within approximately 2 feet of the top of the water column. The pump was operated at approximately 0.2 liter per minute with a goal of limiting sustained water drawdown to a maximum of 0.3 foot. Water quality parameters were monitored at approximately 5-minute intervals. Groundwater samples were collected when the water quality parameters stabilized in each well and water levels recharged to at least 80 percent of the pre-purge water volumes in each well. Water quality parameters were considered stabilized when three consecutive measurements indicate that: pH was within 0.1 unit, temperature was within 3 percent, specific conductance was within 3 percent, oxidation-reduction potential (ORP) was within 10 millivolts (mV), and turbidity was within 10 percent or less than 10 Nephelometric Turbidity Units (NTUs). Water for the samples was transferred directly into laboratory-supplied containers and placed in a chilled cooler for delivery to the

project laboratory. The purging and sampling data are summarized in Table 1. A water sampling log is provided in Appendix A.

4.3 Groundwater Flow Direction

On May 16, 2018, prior to well sampling, the static water levels were measured in Monitoring Wells B4MW, B5MW, and B9MW using an electronic water level probe. The water level probe was decontaminated prior to insertion in each well. The water level measurements and calculated elevations are provided in Table 1. The approximate groundwater flow direction using May 16, 2018 measurements was towards the northwest, as shown on Figure 2, which is consistent with previous groundwater flow directions. The water level calculated elevations are provided on Figure 2.

4.4 Investigation-Derived Waste Treatment and Disposal

Investigation-derived waste (IDW) for this project consisted of purge water and disposable sampling materials such as gloves and tubing. The disposable sampling materials were disposed as unregulated solid waste at the local landfill. The purge water was treated by passing the water through granulated activated carbon (GAC) and discharging the treated water to the ground surface. The used GAC was retained and will be reused for future groundwater monitoring events.

5.0 LABORATORY ANALYSIS

The four groundwater samples, including one duplicate sample, were analyzed for PFOS and PFOA by High-Performance Liquid Chromatography Tandem Mass Spectrometry (HPLC-MS-MS) on a one month turnaround time. Sample B4MW was also analyzed for the remaining PFAS. Five drinking water samples, including one duplicate, were tested for PFAS by HPLC-MS-MS in lieu of PFOS/PFOA. The SGS laboratory analysis report is provided in Appendix B.

6.0 DISCUSSION OF RESULTS

The analytical groundwater and drinking water results were compared to ADEC's August 20, 2018 Technical Memorandum for PFAS. The groundwater analytical results are summarized in Table 2 and the drinking water analytical results are summarized in Table 3. Historical groundwater and drinking water analytical results are summarized in Tables 4 and 5, respectively. Copies of the analytical laboratory reports are provided in Appendix B.

6.1 Drinking Water Sample Analytical Results

Samples from three of the four wells tested in May 2018 contained concentrations or estimated concentrations of PFOS and/or PFOA (wells at the Camp, Henry, and KB Properties parcels). The highest concentrations were 0.0123 µg/L PFOA in the Camp sample and 0.00417 µg/L PFOS in the KB Properties sample. The Camp and Henry samples also contained concentrations of perfluorohexanesulfonic acid (0.0137 µg/L) and perfluorononanoic acid (0.00329 µg/L), respectively. The remaining PFAS were not detected in any of the wells. All concentrations, as well as the sum of all concentrations in each sample, are less than the ADEC action level of 0.07 µg/L.

The 2018 drinking water results are generally consistent with previous data. Estimated PFOS concentrations from the sample collected from the Henry well have been decreasing since 2016. No other clearly increasing or decreasing trends are apparent.

6.2 Groundwater Analytical Results

Samples from each of the three monitoring wells tested contained detectable PFOA, and samples from two (Wells B4MW and B5MW) contained detectable concentrations of PFOS. The highest levels were measured in Sample B5MW, which contained maximum concentrations of 0.224 µg/L PFOA and 0.805 µg/L PFOS. Samples from Wells B4MW and B5MW contain concentrations of PFAS greater than the ADEC action level of 0.07 µg/L. Concentrations of PFAS in Sample B9MW are less than the ADEC action level.

The May 2018 groundwater sample results are consistent with historical data. After being less than the ADEC cleanup level of 0.40 µg/L in 2017, PFOS in Well B5MW is above the cleanup level in 2018. PFOS in Well B4MW has been decreasing since 2014 but remains above the ADEC cleanup level of 0.40 µg/L. PFOA and PFOS in Well B9MW remain below cleanup levels or are non-detect.

6.3 Quality Assurance Summary

The project laboratory implements on-going quality assurance/quality control procedures to evaluate conformance to applicable ADEC data quality objectives (DQOs). Internal laboratory controls to assess data quality for this project includes surrogates, method blanks, laboratory control samples (LCS), and matrix spike/matrix spike duplicates (MS/MSD) to assess precision, accuracy, and matrix bias. If a DQO was not met, the project laboratory provides a report

specific note identifying the problem in the case narrative section of their Laboratory Analysis Report (See Appendix B).

Shannon & Wilson reviewed the SGS data deliverables and completed the ADEC's Laboratory Data Review Checklist (LDRC), which is included in Appendix B. Quality control discrepancies and the impact to data quality/usability are described in further detail in the LDRC. In our opinion, no non-conformances that would adversely impact data usability were noted, and we find the project data to be complete and useable to support the project purpose and objectives.

7.0 SUMMARY AND CONCLUSIONS

PFAS continues to be measured in Monitoring Wells B4MW and B5MW at concentrations greater than the ADEC Table C cleanup level and ADEC action level, although there may be qualitative indications of overall long term decreasing trends in both wells. Because the sample results were not below the ADEC cleanup level, a second fall 2018 sampling event was not conducted.

The PFOS/PFOA plume appears to be delineated to the west/northwest of former Cell 2 excavation. The leading edge of the PFOS/PFOA plume in groundwater, with respect to apparent west/northwest flow direction, appears to be between Monitoring Wells B4MW and B5MW, located at the western boundary of the UAA property, and Well B9MW, located approximately 325 feet northwest of Well B4MW.

Drinking water samples collected in May 2018 from Camp (CAMP), Henry (HEN), and KB Properties (KBP) contained concentrations of PFOS and/or PFOA less than the ADEC cleanup level and less than the ADEC summed action level. PFAS were not detected in the sample collected from Swan (SWAN). All results are consistent with historical data.

8.0 CLOSURE/LIMITATIONS

This report was prepared for the exclusive use of our client and their representatives. The findings we have presented within this report are based on the limited sampling and analyses that we conducted. They should not be construed as definite conclusions regarding the project site's groundwater conditions. It is possible that our subsurface tests missed higher levels, although our intention was to sample in accordance with the ADEC-approved work plan. As a result, the sampling and analyses performed can only provide you with our professional judgment as to the environmental characteristics of this site, and in no way guarantees that an agency or its staff

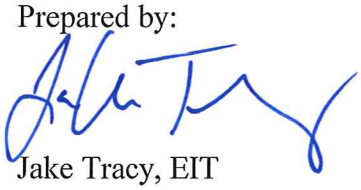
be considered representative of the time of our site assessment. Changes in site conditions can occur over time, due to natural forces or human activity. In addition, changes in government codes, regulations, or laws may occur. Because of such changes beyond our control, our observations and interpretations may need to be revised. Shannon & Wilson has prepared the document in Appendix C, 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 unless specifically requested and authorized by you, or as required by law.

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

SHANNON & WILSON, INC.

Prepared by:



Jake Tracy, EIT
Engineering Staff

Approved by:

Matthew Hemry
Vice President

TABLE 1
WELL SAMPLING LOG

	Monitoring Wells		
	B4MW	**B5MW**	**B9MW**
Water Level Measurement Data			
Date Water Level Measured	5/16/2018	5/16/2018	5/16/2018
Time Water Level Measured	9:48	9:56	9:20
Depth to Water Below Measuring Point (feet)	22.59	20.07	25.82
Well Stickup (feet)	2.7	2.8	2.5
Depth to Water Below Ground Surface (feet)	19.89	17.27	23.32
Measuring Point Elevation* (feet)	92.32	92.09	95.01
Groundwater Elevation* (feet)	69.73	72.02	69.19
Purging/Sampling Data			
Date Sampled	5/16/2018	5/16/2018	5/16/2018
Time Sampled	12:30	13:45	10:40
Depth to Water Below MP (feet)	22.59	20.07	25.82
Total Depth of Well Below MP (feet)	27.05	25.54	30.62
Water Column in Well (feet)	4.46	5.47	4.80
Gallons per Foot	0.16	0.16	0.16
Gallons in Well	0.71	0.88	0.77
Gallons Purged	2.0	1.7	4.0
Purging/Sampling Method	Submersible pump	Submersible pump	Submersible pump
Diameter of Well Casing	2-inch	2-inch	2-inch
Water Quality Data at Time of Sampling			
Temperature (^{o}C)	4.7	5.9	6.2
Specific Conductance (mS/cm)	175	128	184
pH (standard units)	5.93	5.91	5.42
Turbidity (NTU)	0.33	4.78	4.68
Remarks	Duplicate "B14MW"		

Notes:

Water quality parameters were measured with YSI-556 and MicroTPW water quality instruments.

* = Well survey conducted by McLane Consulting on January 24, 2016. Elevation based on North American Vertical Datum of 1988.

^{o}C = degrees Celsius

mS/cm = millisiemens per centimeter

NTU = Nephelometric Turbidity Unit

MP = Measuring point

TABLE 2
SUMMARY OF MAY 2018 GROUNDWATER ANALYTICAL RESULTS

Parameter Tested	Method*	ADEC Action Level (µg/L)**	Sample ID Number^ and Depth of Groundwater Below Ground Surface in Feet (See Table 1 and Figure 2)			
			Monitoring Wells			
			B4MW 20.47	B14MW~ 20.47	B5MW 17.88	B9MW 23.82
Perfluorooctanesulfonic acid (PFOS) - µg/L	HPLC-MS-MS	-	**0.767**	**0.801**	**0.805**	<0.017
Perfluorooctanoic acid (PFOA) - µg/L	HPLC-MS-MS	-	**0.178**	**0.175**	**0.224**	**0.00671 J**
Perfluorononanoic acid (PFNA) - µg/L	HPLC-MS-MS	-	**0.276**	-	-	-
Perfluorohexanesulfonic acid (PFHxS) - µg/L	HPLC-MS-MS	-	**0.460**	-	-	-
Perfluoroheptanoic acid (PFHpA) - µg/L	HPLC-MS-MS	-	**0.262**	-	-	-
Total Per- and Polyfluoroalkyl substances (PFAS) - µg/L	HPLC-MS-MS	0.07	**1.94**	**0.976**	**1.03**	**0.00671 J**

Notes:

*	= See the SGS laboratory report for compounds tested, methods, and laboratory reporting limits
**	= ADEC action level is listed in ADEC's August 20, 2018 Technical Memorandum
^	= Sample ID number preceded by "20106-" on the chain-of-custody form
µg/L	= Micrograms per liter
HPLC-MS-MS	= High-performance liquid chromatography-tandem mass spectrometry
<0.017	= Analyte not detected; laboratory reporting limit of 0.0080 µg/L
0.178	= Analyte detected
1.94	= Reported total concentration exceeds the ADEC action level
J	= Estimated concentration less than the limit of quantitation. See the SGS laboratory report for details.
~	= Duplicate of Sample B4MW
-	= Not applicable or sample not tested for this analyte.

TABLE 3
SUMMARY OF MAY 2018 DRINKING WATER ANALYTICAL RESULTS

Parameter Tested	Method	ADEC Action Level (µg/L)**	Sample ID Number^, Parcel Owners Name, and Parcel ID Number				
			Drinking Water Wells				
			SWAN Swan 5543012	CAMP Camp 5543011	CAMP2~ Camp 5543011	HEN Henry 5543008	KBP KB Prop. 5543013
Perfluorooctanesulfonic acid (PFOS) - µg/L	HPLC-MS-MS	-	<0.0080	**0.00356 J**	**0.00337 J**	**0.00350 J-**	**0.00417 J**
Perfluorooctanoic acid (PFOA) - µg/L	HPLC-MS-MS	-	<0.0080	**0.0123**	**0.0121**	<0.0080	<0.0083
Perfluorononanoic acid (PFNA) - µg/L	HPLC-MS-MS	-	<0.0080	<0.0080	<0.0080	**0.00329 J-**	<0.0083
Perfluorohexanesulfonic acid (PFHxS) - µg/L	HPLC-MS-MS	-	<0.0080	**0.0137**	**0.0132**	<0.0080	<0.0083
Perfluoroheptanoic acid (PFHpA) - µg/L	HPLC-MS-MS	-	<0.0080	<0.0080	<0.0080	<0.0080	<0.0083
Total Per- and Polyfluoroalkyl substances (PFAS) - µg/L	HPLC-MS-MS	0.07	<0.0080	**0.0296**	**0.0287**	**0.00679 J-**	**0.00417 J**

Notes:

*	= See the SGS laboratory report for compounds tested, methods, and laboratory reporting limits
**	= ADEC action level is listed in ADEC's August 20, 2018 Technical Memorandum
^	= Sample ID number preceded by "20106-" on the chain-of-custody form
~	= Sample CAMP2 is the duplicate of Sample CAMP
µg/L	= Micrograms per liter
HPLC-MS-MS	= High-performance liquid chromatography-tandem mass spectrometry
<0.0080	= Analyte not detected; laboratory reporting limit of 0.0040 µg/L
0.0123	= Analyte detected
J	= Estimated concentration less than the limit of quantitation. See the SGS laboratory report for details.
J-	= Concentration potentially biased low due to failed surrogate recovery
-	= Cleanup level not established

TABLE 4
SUMMARY OF HISTORICAL GROUNDWATER SAMPLE ANALYTICAL RESULTS

Monitoring Well No.	Date Sampled	Depth to Static Water Level (bgs)	Parameter Tested	
			Perfluorooctanoic acid (PFOA) µg/L	Perfluorooctane sulfonic (PFOS) µg/L
RM4	3/5/2014*	15.58	**0.150**	**3.5**
	6/17/2014	16.11	-	-
	11/13/2014	15.74	-	-
B1MW	3/5/2014	16.21	**0.054**	**0.66**
	6/17/2014	16.91	**0.014**	**0.055**
	11/13/2014	16.38	**0.054**	**0.400**
	3/21/2016	16.62	**0.0135**	**0.0274**
B2MW	3/5/2014	18.36	**0.590**	**11.0**
	6/17/2014	18.91	-	-
	11/13/2014	18.44	-	-
B3MW	12/5/2013	11.94	**0.0120**	**0.0054**
	3/4/2014	13.67	**0.0093**	<0.0050
	6/17/2014	14.30	-	-
	11/13/2014	14.00	-	-
B4MW	3/4/2014	18.71	**0.330**	**1.4**
	6/18/2014*	19.43	**0.210**	**1.6**
	11/13/2014*	18.76	**0.190**	**1.8**
	3/21/2016*	19.43	**0.295**	**1.63**
	6/28/2017*	20.47	**0.127**	**1.07**
	5/16/2018*	19.89	**0.178**	**0.801**
B5MW	3/4/2014	16.29	**0.089**	**1.9**
	6/18/2014	16.94	**0.150**	**2.1**
	11/13/2014	16.36	**0.250**	**1.5**
	3/21/2016	16.81	**0.292**	**1.52**
	6/28/2017	17.88	**0.0929**	**0.313**
	5/16/2018	17.27	**0.224**	**0.805**
B6MW	3/5/2014	19.24	**0.0810**	**0.42**
	6/17/2014	19.59	**0.0360**	**0.21**
	11/14/2014	19.39	**0.0130**	**0.10**
	3/20/2016	19.50	<0.0093	**0.0116**
B7MW	7/22/2015	22.21	<0.0050	<0.0050
	3/20/2016	22.05	<0.0096	<0.0096
B8MW	7/22/2015	22.04	<0.0050	<0.0050
	3/20/2016	21.11	<0.0096	<0.0096
B9MW	11/30/2016*	25.10	**0.0133**	**0.00851**
	6/28/2017	23.82	**0.00908 J**	<0.016 B
	5/16/2018	23.32	**0.00671 J**	<0.017
	Action Level**		**0.07**	**0.07**

Notes:

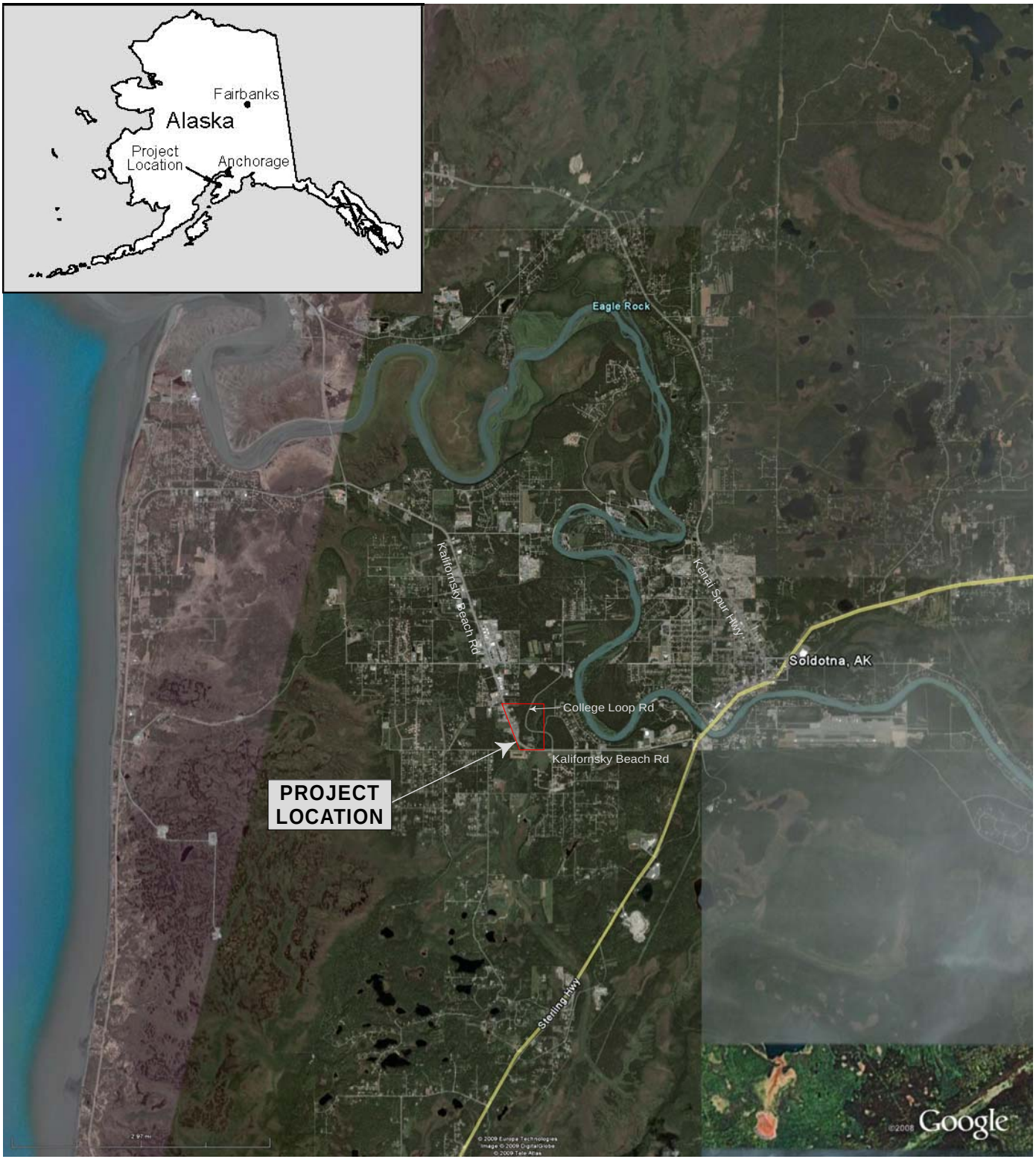
*	= Higher of primary/duplicate pair selected
**	= ADEC action level is listed in ADEC's August 20, 2018 Technical Memorandum
bgs	= Below ground surface
µg/L	= Micrograms per liter
<0.0050	= Analyte not detected; laboratory reporting limit of 0.0050 µg/L
0.094	= Analyte detected
0.590	= Reported concentration exceeds ADEC cleanup level
J	= Estimated concentration less than the reporting limit.
B	= Sample potentially affected by method blank detection.
-	= Not applicable or sample not tested for this analyte.

TABLE 5
SUMMARY OF HISTORICAL DRINKING WATER SAMPLE ANALYTICAL RESULTS

Drinking Water Well Owner and Parcel Number	Date Sampled	Parameter Tested	
		Perfluorooctanoic acid (PFOA) µg/L	Perfluorooctane sulfonate (PFOS) µg/L
Leadens 5543021	2/24/2014 11/29/2016	<0.0050 <0.0080	<0.0050 <0.0080
Giesler 5543022	2/24/2014 11/29/2016	<0.0050 <0.0080	<0.0050 <0.0080
Avigo 5543024	2/24/2014 11/29/2016	- <0.0080	- <0.0080
Straume 5543025	2/24/2014 11/29/2016	<0.0050 <0.0080	<0.0050 <0.0080
Thomson 5543013	2/24/2014 11/29/2016	<0.0050 <0.0080	<0.0050 <0.0080
Swan 5543012	2/24/2014 11/29/2016 6/28/2017 9/7/2017* 5/16/2018	- **0.00281 J** <0.0016 **0.0026** <0.0080	- <0.0080 <0.0016 <0.0047 <0.0080
Camp 5543011	2/24/2014 11/29/2016 6/28/2017* 9/7/2017* 5/16/2018*	- **0.0132** **0.00943 J** **0.016** **0.0123**	- **0.00316 J** **0.00506 J** **0.0040 J** **0.00356 J**
Henry 5543008	2/24/2014 11/29/2016 6/28/2017 9/7/2017* 5/16/2018	<0.0050 <0.0080 <0.017 **0.0010 J** <0.0080	<0.0050 **0.00760 J** **0.00551 J** **0.0041 J** **0.00350 J**
KB Properties 5543007	2/24/2014 11/29/2016 6/28/2017 9/7/2017* 5/16/2018	- <0.0080 <0.017 J- **0.0010 J** <0.0083	- **0.00541 J** **0.00701 J-** **0.0067** **0.00417 J**
	Action Level**	**0.07**	**0.07**

Notes:

*	= Higher of primary/duplicate pair selected
**	= ADEC action level is listed in ADEC's August 20, 2018 Technical Memorandum
µg/L	= Micrograms per liter
<0.0050	= Analyte not detected; laboratory reporting limit of 0.0050 µg/L
0.0132	= Analyte detected
-	= Not applicable or sample not tested for this analyte.
J	= Estimated concentration less than the limit of quantitation.
J-	= Concentration potentially biased low due to failed surrogate recovery



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

0 2 4

APPROXIMATE SCALE IN MILES

Mile 3.2 Kalifornsky Beach Road
Soldotna, Alaska

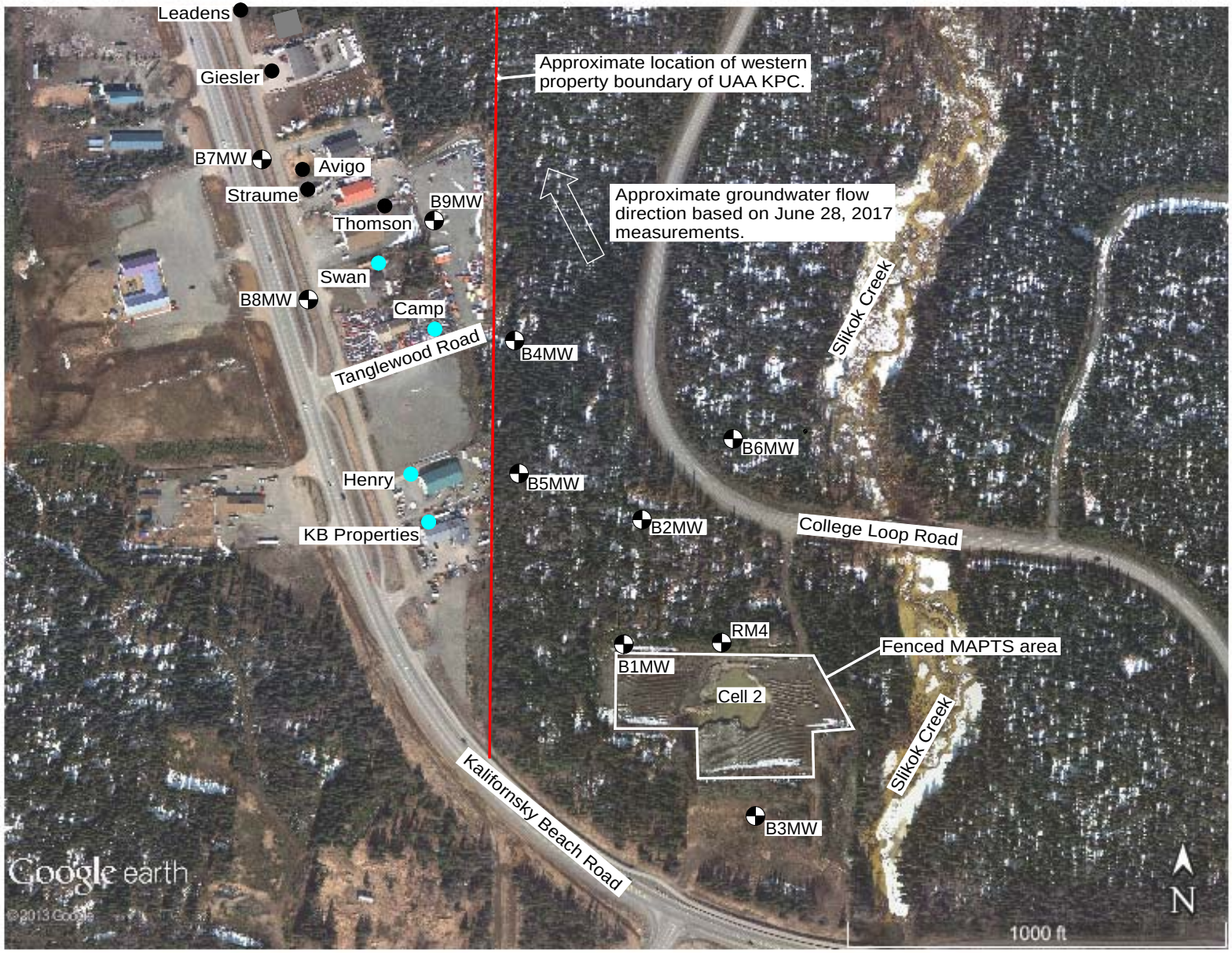
VICINITY MAP

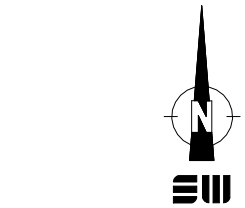
December 2018

32-1-20106-001

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

Fig. 1





0 400 800

APPROXIMATE SCALE IN FEET

LEGEND

B9MW — Approximate location of Monitoring Well B9MW.

Swan — Approximate location of Swan's drinking water well to be sampled in April 2018.

Giesler — Approximate location of Giesler's drinking water well.

Map adapted from aerial imagery provided by Google Earth Pro, reproduced by permission granted by Google Earth Mapping Service. Imagery date: 4/17/2011

Mile 3.2 Kalifornsky Beach Road
Soldotna, Alaska

SITE PLAN

December 2018

32-1-20106-001

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

Fig. 2

APPENDIX A

FIELD NOTES

LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 20106-001 Location: VAA KPC Weather: RAIN ~45 °F

Well No.: B4MW

Date: 5/16/18 Time Started: 1115 Time Completed: 1255

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

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 948 Date of Depth Measurement: 5/16/18

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

Diameter of Casing: 2" Well Screen Interval: —

Total Depth of Well Below MP: 27.05 Product Thickness, if noted: —

Depth-to-Water (DTW) Below MP: 22.59

Water Column in Well: 4.46 (Total Depth of Well Below MP - DTW Below MP)

Gallons per foot: 0.16

Gallons in Well: 0.72 (Water Column in Well x Gallons per foot)

PURGING DATA

Date Purged: 5/16/18 Time Started: 1150 Time Completed: ~~24.2~~

Three Well Volumes: 2.16 (Gallons in Well x 3)

Gallons Purged: 2 Depth of Pump (generally 2 ft from bottom): ~24.2

Max. Drawdown (generally 0.3 ft): 0.05 Pump Rate: 0.2 - 0.25

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)
1202	0.6	~0.2	-	-	5.2	153	-	5.85	-	4.61
12:07	0.9	↓	-	-	5.3	161	-	5.82	-	3.39
12:12	1.2	↓	22.64	0.05	4.9	167	-	5.82	-	2.27
12:17	1.5	↓	-	-	4.9	172	-	5.93	-	1.55
12:22	1.75	↓	-	-	4.8	175	-	5.92	-	0.73
12:27	2.0	↓	22.63	0.04	4.7	175	-	5.93	-	0.33

SAMPLING DATA

Odor: None Color: clear

Sample Designation: 20106 - B4MW Time / Date: 1230 5/16/18

QC Sample Designation: 20106 - B14MW Time / Date: 1245 5/16/18

QA Sample Designation: — Time / Date: —

Evacuation Method: Submersible Pump / Other: Whale

Sampling Method: Submersible Pump / Other: Whale

Water Quality Instruments Used/Manufacturer/Model Number: MicroTPW #201106168 III, Hanna 98129 (S4W)

Calibration Info (Time, Ranges, etc): 0.2, 10, 1000 NTU 5/14; pH 4.0, 7.0 + 1413 uS 5/15

Remarks: 2 X 120 ml poly for PFOA/PFOS

Sampling Personnel: JCT / RTH

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: 20106-001 Location: VAP KPC Weather: Rain 47°F

Well No.: B5mw

Date: 5/16/18 Time Started: 1300 Time Completed: 1400

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

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 956 Date of Depth Measurement: 5/16/18

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

Diameter of Casing: 2" Well Screen Interval: —

Total Depth of Well Below MP: 25.54 Product Thickness, if noted: —

Depth-to-Water (DTW) Below MP: 20.07

Water Column in Well: 5.47 (Total Depth of Well Below MP - DTW Below MP)

Gallons per foot: 0.16

Gallons in Well: 0.88 (Water Column in Well x Gallons per foot)

PURGING DATA

Date Purged: 5/16/18 Time Started: 1310 Time Completed: 1340

Three Well Volumes: 2.64 (Gallons in Well x 3)

Gallons Purged: _____ Depth of Pump (~~generally 2 ft from bottom~~): ~22

Max. Drawdown (generally 0.3 ft): _____ Pump Rate: 0.2 - 0.3

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)
1320	0.5	0.2	-	-	6.2	127	-	6.47	-	15.42
1325	0.8	|	20.40	-	5.6	124	-	6.00	-	16.27
1330	1.1	|	20.09	0.03	5.8	127	-	5.90	-	8.43
1335	1.4	|	20.08	0.01	6.0	128	-	5.90	-	4.32
1340	1.7	|	20.08	0.01	5.9	128	-	5.91	-	4.78
~~1345~~	2.0	|					-		-	

SAMPLING DATA

Odor: None Color: Clear

Sample Designation: 20106 - B5mw Time / Date: 1345 5/16/18

QC Sample Designation: — Time / Date: —

QA Sample Designation: — Time / Date: —

Evacuation Method: Submersible Pump / Other: whale

Sampling Method: Submersible Pump / Other: whale

Water Quality Instruments Used/Manufacturer/Model Number Micro TPW #20110618, Hanna Combo Stick 98129

Calibration Info (Time, Ranges, etc) 0.2, 10, 5/14 1000 NTU; pH 4.0, 7.0, 1413 µS 5/15

Remarks: 2 x 120 ml poly for PFOA, PFOS

Sampling Personnel: JLT | NTH

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: 20106-001 Location: JBAB KLC Weather: Overcast 45°F
Well No.: B9MW
Date: 5/16/18 Time Started: 915 Time Completed: 1106
Develop Date: — Develop End Time: — (24 hour break)

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 920 Date of Depth Measurement: 5/16/18
Measuring Point (MP): (Top of PVC Casing) / Top of Steel Protective Casing / Other: _____
Diameter of Casing: 2" Well Screen Interval: —
Total Depth of Well Below MP: 30.62 Product Thickness, if noted: —
Depth-to-Water (DTW) Below MP: 25.82
Water Column in Well: 4.80 (Total Depth of Well Below MP - DTW Below MP)
Gallons per foot: 0.16
Gallons in Well: 0.77 (Water Column in Well x Gallons per foot)

PURGING DATA

Date Purged: 5/16/18 Time Started: 935 Time Completed: 1035
Three Well Volumes: N/A (Gallons in Well x 3)
Gallons Purged: 4.0 Depth of Pump (~~generally 2 ft from bottom~~): ~27
Max. Drawdown (generally 0.3 ft): <0.1' Pump Rate: 203 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)
950	0.5	0.2-0.3	-	-	5.8	233	-	~~5.84~~ 4.89	-	104.8
955	0.9	↓	-	-	5.6	189	-	4.85	-	62.28
1000	1.2		-	-	5.6	188	-	4.93	-	29.13
1005	1.5		-	-	5.3	189	-	4.98	-	13.06
1010	1.8		-	-	5.4	187	-	5.18	-	7.71
1015	2.1		-	-	5.4	188	-	5.26	-	12.08

SAMPLING DATA

Odor: None Color: Clear
Sample Designation: 20106-B9MW Time / Date: 1040 5/16/18 NATK
QC Sample Designation: — Time / Date: —
QA Sample Designation: — Time / Date: —

Evacuation Method: Submersible Pump / Other: Whale
Sampling Method: Submersible Pump / Other: Whale
Water Quality Instruments Used/Manufacturer/Model Number Micro TPW 20110616G(TTI), Hanna 9828 Combo Stick 6(SKW)
Calibration Info (Time, Ranges, etc) Turb: 5/14 0.2, 10.0, 1000 NTU. pH: 4.0 & 7.0, Cond 1413 µS 5/16
Remarks: 2 x 120 mL poly for PFOA/PFOS

Sampling Personnel: JCT / NATK

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: 20106-001 Location: LAA KPC Site: _____

Well No.: BGMW

Date: 5/16/[illegible]

Time:	Gallons:	Pump Rate (L/min):	DTW (ft BMP):	Drawdown (ft):	Temp: (°C)	Sp. Cond (uS/cm)	DO (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (NTU)
10:20	2.5	0.3	25.82	0	6.5	185	-	5.35	-	9.46
10:25	2.9	0.3	-	-	6.54	186	-	5.42	-	9.82
10:30	3.3	0.3	-	-	6.2	185	-	5.42	-	8.67
10:35	3.7	0.3	-	-	6.2	184		5.42	-	4.68

	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.

WATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 20106-001 Location: UAA Lake Weather: Overcast 45°F

Well No.: SWAN

Date: 5/16/18 Time Started: 1120 Time Completed: 1137

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

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: _____ Date of Depth Measurement: _____

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

Diameter of Casing: _____ Well Screen Interval: _____

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

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

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

Gallons per foot: _____

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

PURGING DATA

Date Purged: 5/16/18 Time Started: 1120 Time Completed: 1135

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

Gallons Purged: 30 gal Depth of Pump Placement: —

Maximum Drawdown: — Pump Rate: 2 gal/min

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

Time:	Gallons:	Temp: (°C)	Sp. Cond.: (mS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (ntu)	DTW (Feet)

SAMPLING DATA

Odor: None Color: Clear

Sample Designation: 20106 - SWAN Time / Date: 1135 5/16/18

QC Sample Designation: — Time / Date: —

QA Sample Designation: — Time / Date: —

Evacuation Method: Dedicated Bladder Pump / Other: Bathroom Sink

Sampling Method: Dedicated Bladder Pump / Other: _____

Remarks: _____

Sampling Personnel: JCT

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

WATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 20106-001 Location: UAA ICPC Weather: Overcast 45°F

Well No.: Camp

Date: 5/16/18 Time Started: 1115 Time Completed: 1132

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

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: _____ Date of Depth Measurement: _____

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

Diameter of Casing: _____ Well Screen Interval: _____

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

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

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

Gallons per foot: _____

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

PURGING DATA

Date Purged: 5/16/18 Time Started: 1115 Time Completed: 1130

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

Gallons Purged: 30 gal Depth of Pump Placement: —

Maximum Drawdown: — Pump Rate: 2 gal/min

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

Time:	Gallons:	Temp: (°C)	Sp. Cond.: (mS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (ntu)	DTW (Feet)

SAMPLING DATA

Odor: None Color: Clear

Sample Designation: 20106-Camp Time / Date: 1130 5/16/18

QC Sample Designation: 20106-Camp2 Time / Date: 1145 5/16/18

QA Sample Designation: — Time / Date: —

Evacuation Method: Dedicated Bladder Pump / Other: ~~—~~ Bathroom Sink

Sampling Method: Dedicated Bladder Pump / Other: _____

Remarks: _____

Sampling Personnel: _____

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

WATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 20106-001 Location: UAA KPL Weather: Overcast 45 F

Well No.: KB Properties

Date: 5/16/18 Time Started: 1047 Time Completed: 1105

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

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: _____ Date of Depth Measurement: _____

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

Diameter of Casing: _____ Well Screen Interval: _____

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

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

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

Gallons per foot: _____

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

PURGING DATA

Date Purged: 5/16/18 Time Started: 1047 Time Completed: 1102

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

Gallons Purged: ~75 gal Depth of Pump Placement: —

Maximum Drawdown: — Pump Rate: ~5 gal/min

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

Time:	Gallons:	Temp: (°C)	Sp. Cond.: (mS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (ntu)	DTW (Feet)

SAMPLING DATA

Odor: None Color: Clear

Sample Designation: 20106 - KBP Time / Date: 1102 5/16/18

QC Sample Designation: — Time / Date: —

QA Sample Designation: — Time / Date: —

Evacuation Method: Dedicated Bladder Pump / Other: Spigot prior to treatment

Sampling Method: ~~Dedicated Bladder Pump~~ / Other: _____

Remarks: Sample from water treatment room prior to treatment

Sampling Personnel: JCT

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

WATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 20106-001 Location: URA KPC Weather: Overcast

Well No.: HENRY

Date: 5/16/18 Time Started: 1057 Time Completed: 1115

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

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: _____ Date of Depth Measurement: _____

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

Diameter of Casing: _____ Well Screen Interval: _____

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

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

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

Gallons per foot: _____

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

PURGING DATA

Date Purged: 5/16/18 Time Started: 1057 Time Completed: 1112

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

Gallons Purged: 30 Depth of Pump Placement: —

Maximum Drawdown: — Pump Rate: 2 gal/min

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

Time:	Gallons:	Temp: (°C)	Sp. Cond.: (mS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (ntu)	DTW (Feet)

SAMPLING DATA

Odor: None Color: Clear

Sample Designation: 20106-HEN Time / Date: 1112 5/16/18

QC Sample Designation: — Time / Date: —

QA Sample Designation: — Time / Date: —

Evacuation Method: ~~Dedicated Bladder Pump~~ / Other: Bathroom Sink

Sampling Method: ~~Dedicated Bladder Pump~~ / Other: _____

Remarks: _____

Sampling Personnel: JCT

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

APPENDIX B

RESULTS OF ANALYTICAL TESTING BY

SGS NORTH AMERICA INC. AND

ADEC LABORATORY DATA REVIEW CHECKLIST

Laboratory Report of Analysis

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

Report Number: **1182277**

Client Project: **20106-001 UAA KPC**

Dear Jacob Tracy,

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

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

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

Sincerely,
SGS North America Inc.

Jillian Vlahovich Date
Project Manager
Jillian.Vlahovich@sgs.com

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

Case Narrative

SGS Client: **Shannon & Wilson, Inc.**
SGS Project: **1182277**
Project Name/Site: **20106-001 UAA KPC**
Project Contact: **Jacob Tracy**

Refer to sample receipt form for information on sample condition.

REVISED REPORT

This report revised to report full list PFAS for sample 1182277001 per attached client request.

PFCs by EPA 357 were anlayzed by SGS of Orlando, FL.

*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

Sample Summary

Client Sample ID	Lab Sample ID	Collected	Received	Matrix
20106-B4MW	1182277001	05/16/2018	05/18/2018	Water (Surface, Eff., Ground)
20106-B14MW	1182277002	05/16/2018	05/18/2018	Water (Surface, Eff., Ground)
20106-B5MW	1182277003	05/16/2018	05/18/2018	Water (Surface, Eff., Ground)
20106-B9MW	1182277004	05/16/2018	05/18/2018	Water (Surface, Eff., Ground)
20106-SWAN	1182277005	05/16/2018	05/18/2018	Drinking Water
20106-CAMP	1182277006	05/16/2018	05/18/2018	Drinking Water
20106-CAMP2	1182277007	05/16/2018	05/18/2018	Drinking Water
20106-HEN	1182277008	05/16/2018	05/18/2018	Drinking Water
20106-KBP	1182277009	05/16/2018	05/18/2018	Drinking Water

Method	Method Description

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

Vlahovich, Jillian (Anchorage)

From: Jacob Tracy <JCT@shanwil.com>
Sent: Monday, December 03, 2018 12:29 PM
To: Vlahovich, Jillian (Anchorage)
Subject: RE: WO 1182277

Yes please proceed.

Thanks,

Jake Tracy
Shannon & Wilson, Inc.
907.433.3221

From: Vlahovich, Jillian (Anchorage) <Jillian.Vlahovich@sgs.com>
Sent: Monday, December 03, 2018 12:07 PM
To: Jacob Tracy <JCT@shanwil.com>
Subject: RE: WO 1182277

Hi Jake,

I can submit a request to our subcontract laboratory, however the cost to re-report with additional compounds is $50.00/sample. Would you like me to proceed?

Thanks,

Jillian Vlahovich
Environment, Health, and Safety
Project Manager

Office: +00 1 907 562-2343
Direct: +00 1 907 550-3208

From: Jacob Tracy [mailto:JCT@shanwil.com]
Sent: Monday, December 03, 2018 10:16 AM
To: Vlahovich, Jillian (Anchorage) <Jillian.Vlahovich@sgs.com>
Subject: WO 1182277

Hi Jillian,

For work order 1182277 would you be able to include the full list of PFCs for Sample B4MW. Please let me know if you need any additional information.

Thanks,

Jake Tracy
Shannon & Wilson, Inc.
907.433.3221

1182277
Revised Report

CHAIN-OF-CUSTODY RECORD

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

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

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

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

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

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

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

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

Laboratory SGS
Attn: JILLIAN

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

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFOS / PFOA	PFCs					Total Number of Containers	Remarks/Matrix
20106 - B4MW	(1) A-B	1230	5/16/18		X	X						2	GROUND WATER
B14MW	(2) A-B	1245			X	X							
B5MW	(3) A-B	1345			X	X							
B9MW	(4) A-B	1040			X	X							
SWAN	(5) A-B	1135			X		X						DRINKING WATER
CAMP	(6) A-B	1130			X		X						
CAMP2	(7) A-B	1145			X		X						
HEN	(8) A-B	1112			X		X						
KBP	(9) A-B	1102			X		X						

Project Information	Sample Receipt
Project Number: 20106-001	Total Number of Containers
Project Name: UAA KPC	COC Seals/Intact? Y/N/NA
Contact: JCT	Received Good Cond./Cold
Ongoing Project? Yes ☒ No ☐	Delivery Method:
Sampler: JCT / RTH	(attach shipping bill, if any)

Instructions
Requested Turnaround Time: STANDARD
Special Instructions:

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 1149	Signature: Time:	Signature: Time:
Printed Name: JAKE TRALY Date: 5/18/18	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: 1149
Printed Name: Date:	Printed Name: Date:	Printed Name: Nicole Wamr Date: 5/18/18
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 4.9 D24
cc: H&D

No. 635338

e-Sample Receipt Form

Revised Report

SGS Workorder #: **1182277**

1 1 8 2 2 7 7

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	handdelivered
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 @ 4.9 °C Therm. ID: D24
	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)?	yes	
**Note: If times differ <1hr, record details & login per COC.		
Were analyses requested unambiguous? (i.e., method is specified for analyses with >1 option for analysis)	yes	
	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):

Sample Containers and Preservatives

Container Id	Preservative	Container Condition	Container Id	Preservative	Container Condition
1182277001-A	No Preservative Required	OK			
1182277001-B	No Preservative Required	OK			
1182277002-A	No Preservative Required	OK			
1182277002-B	No Preservative Required	OK			
1182277003-A	No Preservative Required	OK			
1182277003-B	No Preservative Required	OK			
1182277004-A	No Preservative Required	OK			
1182277004-B	No Preservative Required	OK			
1182277005-A	No Preservative Required	OK			
1182277005-B	No Preservative Required	OK			
1182277006-A	No Preservative Required	OK			
1182277006-B	No Preservative Required	OK			
1182277007-A	No Preservative Required	OK			
1182277007-B	No Preservative Required	OK			
1182277008-A	No Preservative Required	OK			
1182277008-B	No Preservative Required	OK			
1182277009-A	No Preservative Required	OK			
1182277009-B	No Preservative Required	OK			

Container Condition Glossary

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

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

Orlando, FL

Reissue #1
12/06/18

The results set forth herein are provided by SGS North America Inc.

e-Hardcopy 2.0
Automated Report

Technical Report for

SGS North America, Inc

1182277

SGS Job Number: FA54384

Sampling Date: 05/16/18

Report to:

SGS North America, Inc

julie.shumway@sgs.com

ATTN: Julie Shumway

Total number of pages in report: 31

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable.

Caitlin Brice, M.S.
General Manager

Client Service contact: Andrea Colby 407-425-6700

Certifications: FL(E83510), LA(03051), KS(E-10327), IL(200063), NC(573), NJ(FL002), NY(12022), SC(96038001) DoD ELAP(ANAB L2229), AZ(AZ0806), CA(2937), TX(T104704404), PA(68-03573), VA(460177), AK, AR, IA, KY, MA, MS, ND, NH, NV, OK, OR, UT, WA, WV

December 5, 2018

Ms. Julie Shumway
SGS
200 W Potter Dr.
Anchorage, AK 99518

RE: SGS North America Inc. - Orlando job FA54384 Reissue

Dear Ms. Shumway,

The final report for job number FA54384 has been edited to reflect requested corrections. These edits have been incorporated into the revised report.

The additional compounds have been reported per your request.

Please feel free to contact us if we can be of further assistance.

Sincerely,

SGS North America, Inc. - Orlando

Florida ♦ 4405 Vineland Road ♦ Suite C-15 ♦ Orlando, FL 32811 ♦ tel: 407 425-6700 ♦ fax: 407 425-0707

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SGS North America Inc.

Sample Summary

SGS North America, Inc

1182277

Job No: FA54384

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
FA54384-1	05/16/18	12:30	JS	05/22/18	AQ	Ground Water	20106-B4MW
FA54384-2	05/16/18	12:45	JS	05/22/18	AQ	Ground Water	20106-B14MW
FA54384-3	05/16/18	13:45	JS	05/22/18	AQ	Ground Water	20106-B5MW
FA54384-4	05/16/18	10:40	JS	05/22/18	AQ	Ground Water	20106-B9MW
FA54384-5	05/16/18	11:35	JS	05/22/18	DW	Drinking Water	20106-SWAN
FA54384-6	05/16/18	11:30	JS	05/22/18	DW	Drinking Water	20106-CAMP
FA54384-7	05/16/18	11:45	JS	05/22/18	DW	Drinking Water	20106-CAMP2
FA54384-8	05/16/18	11:12	JS	05/22/18	DW	Drinking Water	20106-HEN
FA54384-9	05/16/18	11:02	JS	05/22/18	DW	Drinking Water	20106-KBP

SAMPLE DELIVERY GROUP CASE NARRATIVE

Client: SGS North America, Inc **Job** FA54384

Site: 1182277 **Report** 5/31/2018 11:49:55

9 Sample(s), 0 Trip Blank(s) and 0 Field Blank(s) were collected on 05/16/2018 and were received at SGS North America Inc - Orlando on 05/22/2018 properly preserved, at 4.4 Deg. C and intact. These Samples received an SGS Orlando job number of FA54384. A listing of the Laboratory Sample ID, Client Sample ID and dates of collection are presented in the Results Summary Section.

Except as noted below, all method specified calibrations and quality control performance criteria were met for this job. For more information, please refer to QC summary pages.

MS Semi-volatiles By Method EPA 537

Matrix: DW **Batch ID:** OP70170

All samples were extracted within the recommended method holding time.

All samples were analyzed within the recommended method holding time.

Sample(s) FA54384-8MS, FA54384-8MSD were used as the QC samples indicated.

All method blanks for this batch meet method specific criteria.

Matrix Spike Recovery(s) for Perfluorotetradecanoic acid, Perfluorotridecanoic acid are outside control limits. Probable cause is due to matrix interference.

Matrix Spike Duplicate Recovery(s) for EtFOSAA, Perfluorotetradecanoic acid, Perfluorotridecanoic acid are outside control limits. Probable cause is due to matrix interference.

Sample(s) FA54384-8 have surrogates outside control limits. Confirmation run for surrogate recoveries.

FA54384-8 for 13C2-PFDA, d5-NEtFOSAA: Outside control limits due to matrix interference. Confirmed by reanalysis. Insufficient sample for re-extraction.

FA54384-6 for Perfluorotridecanoic acid: Associated ICV outside control limits high, however sample ND.

FA54384-7 for Perfluorotridecanoic acid: Associated ICV outside control limits high, however sample ND.

FA54384-5 for Perfluorotridecanoic acid: Associated ICV outside control limits high, however sample ND.

FA54384-9 for Perfluorotridecanoic acid: Associated ICV outside control limits high, however sample ND.

FA54384-8 for Perfluorotridecanoic acid: Associated ICV outside control limits high, however sample ND.

MS Semi-volatiles By Method EPA 537 MOD

Matrix: AQ **Batch ID:** OP70169

All samples were extracted within the recommended method holding time.

All samples were analyzed within the recommended method holding time.

Sample(s) FA54384-1MS, FA54384-4DUP were used as the QC samples indicated.

All method blanks for this batch meet method specific criteria.

Matrix Spike Recovery(s) for Perfluorooctanesulfonic acid are outside control limits. Outside control limits due to high level in sample relative to spike amount.

Sample(s) FA54384-1, FA54384-2, OP70169-MS have surrogates outside control limits.

FA54384-1 for 13C2-PFDA: Outside control limits due to dilution.

FA54384-1 for 13C2-PFHxA: Outside control limits due to dilution.

OP70169-MS for 13C2-PFDA: Outside control limits due to dilution.

OP70169-MS for 13C2-PFHxA: Outside control limits due to dilution.

FA54384-2 for 13C2-PFDA: Outside control limits due to dilution.

FA54384-2 for 13C2-PFHxA: Outside control limits due to dilution.

SGS Orlando certifies that this report meets the project requirements for analytical data produced for the samples as received at SGS Orlando and as stated on the COC. SGS Orlando certifies that the data meets the Data Quality Objectives for precision, accuracy and completeness as specified in the SGS Orlando Quality Manual except as noted above. This report is to be used in its entirety. SGS Orlando is not responsible for any assumptions of data quality if partial data packages are used.

Narrative prepared by:

_____

Ellen Pampel, LogIn Supervisor (signature on file)

Summary of Hits

Job Number: FA54384
Account: SGS North America, Inc
Project: 1182277
Collected: 05/16/18

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
FA54384-1	**20106-B4MW**					
Perfluoropentanoic acid		0.293	0.017	0.0083	ug/l	EPA 537 MOD
Perfluorohexanoic acid		0.264	0.017	0.0083	ug/l	EPA 537 MOD
Perfluoroheptanoic acid		0.262	0.017	0.0083	ug/l	EPA 537 MOD
Perfluorooctanoic acid		0.178	0.017	0.0042	ug/l	EPA 537 MOD
Perfluorononanoic acid		0.276	0.017	0.0042	ug/l	EPA 537 MOD
Perfluorodecanoic acid		0.0146 J	0.017	0.0083	ug/l	EPA 537 MOD
Perfluoroundecanoic acid		0.275	0.017	0.0083	ug/l	EPA 537 MOD
Perfluorotridecanoic acid [a]		0.00883 J	0.017	0.0083	ug/l	EPA 537 MOD
Perfluorobutanesulfonic acid		0.0193	0.017	0.0083	ug/l	EPA 537 MOD
Perfluoropentanesulfonic acid		0.0371	0.017	0.0083	ug/l	EPA 537 MOD
Perfluorohexanesulfonic acid		0.460	0.017	0.0083	ug/l	EPA 537 MOD
Perfluoroheptanesulfonic acid		0.0232	0.017	0.0083	ug/l	EPA 537 MOD
Perfluorooctanesulfonic acid		0.767	0.33	0.083	ug/l	EPA 537 MOD
6:2 Fluorotelomer sulfonate		0.202	0.042	0.017	ug/l	EPA 537 MOD
8:2 Fluorotelomer sulfonate		0.153	0.042	0.017	ug/l	EPA 537 MOD
FA54384-2	**20106-B14MW**					
Perfluorooctanoic acid		0.175	0.017	0.0042	ug/l	EPA 537 MOD
Perfluorooctanesulfonic acid		0.801	0.33	0.083	ug/l	EPA 537 MOD
FA54384-3	**20106-B5MW**					
Perfluorooctanoic acid		0.224	0.017	0.0042	ug/l	EPA 537 MOD
Perfluorooctanesulfonic acid		0.805	0.017	0.0042	ug/l	EPA 537 MOD
FA54384-4	**20106-B9MW**					
Perfluorooctanoic acid		0.00671 J	0.017	0.0042	ug/l	EPA 537 MOD
FA54384-5	**20106-SWAN**					
No hits reported in this sample.						
FA54384-6	**20106-CAMP**					
Perfluorooctanoic acid		0.0123	0.0080	0.0020	ug/l	EPA 537
Perfluorohexanesulfonic acid		0.0137	0.0080	0.0040	ug/l	EPA 537
Perfluorooctanesulfonic acid		0.00356 J	0.0080	0.0020	ug/l	EPA 537
FA54384-7	**20106-CAMP2**					
Perfluorooctanoic acid		0.0121	0.0080	0.0020	ug/l	EPA 537

Summary of Hits

Job Number: FA54384
Account: SGS North America, Inc
Project: 1182277
Collected: 05/16/18

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
Perfluorohexanesulfonic acid		0.0132	0.0080	0.0040	ug/l	EPA 537
Perfluorooctanesulfonic acid		0.00337 J	0.0080	0.0020	ug/l	EPA 537
FA54384-8	**20106-HEN**					
Perfluorononanoic acid		0.00329 J	0.0080	0.0020	ug/l	EPA 537
Perfluorooctanesulfonic acid		0.00350 J	0.0080	0.0020	ug/l	EPA 537
FA54384-9	**20106-KBP**					
Perfluorooctanesulfonic acid		0.00417 J	0.0083	0.0021	ug/l	EPA 537

(a) Associated ICV outside control limits high.

Sample Results

Report of Analysis

SGS North America Inc.

Report of Analysis

Client Sample ID: 20106-B4MW
Lab Sample ID: FA54384-1
Matrix: AQ - Ground Water
Method: EPA 537 MOD IN HOUSE
Project: 1182277

Date Sampled: 05/16/18
Date Received: 05/22/18
Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Q46840.D	1	05/28/18 13:57	NAF	05/22/18 16:00	OP70169	SQ1144
Run #2	Q46778.D	20	05/25/18 19:53	NAF	05/22/18 16:00	OP70169	SQ1143

	Initial Volume	Final Volume
Run #1	120 ml	1.0 ml
Run #2	120 ml	1.0 ml

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
2706-90-3	Perfluoropentanoic acid	0.293	0.017	0.0083	ug/l	
307-24-4	Perfluorohexanoic acid	0.264	0.017	0.0083	ug/l	
375-85-9	Perfluoroheptanoic acid	0.262	0.017	0.0083	ug/l	
335-67-1	Perfluorooctanoic acid	0.178	0.017	0.0042	ug/l	
375-95-1	Perfluorononanoic acid	0.276	0.017	0.0042	ug/l	
335-76-2	Perfluorodecanoic acid	0.0146	0.017	0.0083	ug/l	J
2058-94-8	Perfluoroundecanoic acid	0.275	0.017	0.0083	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.017	0.0083	ug/l	
72629-94-8	Perfluorotridecanoic acid [a]	0.00883	0.017	0.0083	ug/l	J
376-06-7	Perfluorotetradecanoic acid	ND	0.017	0.0083	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.0193	0.017	0.0083	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	0.0371	0.017	0.0083	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.460	0.017	0.0083	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.0232	0.017	0.0083	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.767 [b]	0.33	0.083	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.017	0.0083	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.017	0.0083	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.017	0.0083	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.042	0.017	ug/l	
2991-50-6	EtFOSAA	ND	0.042	0.017	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.042	0.017	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	0.202	0.042	0.017	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	0.153	0.042	0.017	ug/l	

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

SGS North America Inc.

Report of Analysis

Client Sample ID:	20106-B4MW		
Lab Sample ID:	FA54384-1	**Date Sampled:**	05/16/18
Matrix:	AQ - Ground Water	**Date Received:**	05/22/18
Method:	EPA 537 MOD IN HOUSE	**Percent Solids:**	n/a
Project:	1182277		

PFAS List

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	13C2-PFHxA	103%	0% [c]	61-134%
	13C2-PFDA	91%	0% [c]	62-128%
	d5-EtFOSAA	89%	0% [c]	57-135%

(a) Associated ICV outside control limits high.
(b) Result is from Run# 2
(c) Outside control limits due to dilution.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

SGS North America Inc.

Report of Analysis

Client Sample ID: 20106-B14MW
Lab Sample ID: FA54384-2
Matrix: AQ - Ground Water
Method: EPA 537 MOD IN HOUSE
Project: 1182277

Date Sampled: 05/16/18
Date Received: 05/22/18
Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Q46842.D	1	05/28/18 14:38	NAF	05/22/18 16:00	OP70169	SQ1144
Run #2	Q46780.D	20	05/25/18 20:35	NAF	05/22/18 16:00	OP70169	SQ1143

	Initial Volume	Final Volume
Run #1	120 ml	1.0 ml
Run #2	120 ml	1.0 ml

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
335-67-1	Perfluorooctanoic acid	0.175	0.017	0.0042	ug/l	
PERFLUOROALKYLSULFONATES						
1763-23-1	Perfluorooctanesulfonic acid	0.801 [a]	0.33	0.083	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	13C2-PFHxA	104%	0% [b]	61-134%
	13C2-PFDA	93%	0% [b]	62-128%

(a) Result is from Run# 2
(b) Outside control limits due to dilution.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

SGS North America Inc.

Report of Analysis

Client Sample ID: 20106-B5MW
Lab Sample ID: FA54384-3
Matrix: AQ - Ground Water
Method: EPA 537 MOD IN HOUSE
Project: 1182277

Date Sampled: 05/16/18
Date Received: 05/22/18
Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Q46843.D	1	05/28/18 14:59	NAF	05/22/18 16:00	OP70169	SQ1144
Run #2							

	Initial Volume	Final Volume
Run #1	120 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
335-67-1	Perfluorooctanoic acid	0.224	0.017	0.0042	ug/l	
PERFLUOROALKYLSULFONATES						
1763-23-1	Perfluorooctanesulfonic acid	0.805	0.017	0.0042	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	13C2-PFHxA	103%		61-134%
	13C2-PFDA	91%		62-128%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

SGS North America Inc.

Report of Analysis

Client Sample ID:	20106-B9MW		
Lab Sample ID:	FA54384-4	**Date Sampled:**	05/16/18
Matrix:	AQ - Ground Water	**Date Received:**	05/22/18
Method:	EPA 537 MOD IN HOUSE	**Percent Solids:**	n/a
Project:	1182277		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Q46844.D	1	05/28/18 15:20	NAF	05/22/18 16:00	OP70169	SQ1144
Run #2							

	Initial Volume	Final Volume
Run #1	120 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
335-67-1	Perfluorooctanoic acid	0.00671	0.017	0.0042	ug/l	J
PERFLUOROALKYLSULFONATES						
1763-23-1	Perfluorooctanesulfonic acid	ND	0.017	0.0042	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	13C2-PFHxA	110%		61-134%
	13C2-PFDA	97%		62-128%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

SGS North America Inc.

Report of Analysis

Client Sample ID:	20106-SWAN		
Lab Sample ID:	FA54384-5	**Date Sampled:**	05/16/18
Matrix:	DW - Drinking Water	**Date Received:**	05/22/18
Method:	EPA 537 EPA 537	**Percent Solids:**	n/a
Project:	1182277		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Q46894.D	1	05/29/18 13:22	NAF	05/22/18 16:00	OP70170	SQ1145
Run #2							

	Initial Volume	Final Volume
Run #1	250 ml	1.0 ml
Run #2		

Perfluorinated Alkyl Acids

CAS No.	Compound	Result	MCL	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS							
307-24-4	Perfluorohexanoic acid	ND		0.0080	0.0040	ug/l	
375-85-9	Perfluoroheptanoic acid	ND		0.0080	0.0040	ug/l	
335-67-1	Perfluorooctanoic acid	ND		0.0080	0.0020	ug/l	
375-95-1	Perfluorononanoic acid	ND		0.0080	0.0020	ug/l	
335-76-2	Perfluorodecanoic acid	ND		0.0080	0.0040	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND		0.0080	0.0040	ug/l	
307-55-1	Perfluorododecanoic acid	ND		0.0080	0.0040	ug/l	
72629-94-8	Perfluorotridecanoic acid [a]	ND		0.0080	0.0040	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND		0.0080	0.0040	ug/l	
PERFLUOROALKYLSULFONATES							
375-73-5	Perfluorobutanesulfonic acid	ND		0.0080	0.0040	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND		0.0080	0.0040	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND		0.0080	0.0020	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS							
2355-31-9	MeFOSAA	ND		0.020	0.0080	ug/l	
2991-50-6	EtFOSAA	ND		0.020	0.0080	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	13C2-PFHxA	102%		70-130%
	13C2-PFDA	100%		70-130%
	d5-EtFOSAA	83%		70-130%

(a) Associated ICV outside control limits high, however sample ND.

ND = Not detected MDL = Method Detection Limit
MCL = Maximum Contamination Level (40 CFR 141)
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

SGS North America Inc.

Report of Analysis

Client Sample ID:	20106-CAMP		
Lab Sample ID:	FA54384-6	**Date Sampled:**	05/16/18
Matrix:	DW - Drinking Water	**Date Received:**	05/22/18
Method:	EPA 537 EPA 537	**Percent Solids:**	n/a
Project:	1182277		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Q46895.D	1	05/29/18 13:43	NAF	05/22/18 16:00	OP70170	SQ1145
Run #2							

	Initial Volume	Final Volume
Run #1	250 ml	1.0 ml
Run #2		

Perfluorinated Alkyl Acids

CAS No.	Compound	Result	MCL	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS							
307-24-4	Perfluorohexanoic acid	ND		0.0080	0.0040	ug/l	
375-85-9	Perfluoroheptanoic acid	ND		0.0080	0.0040	ug/l	
335-67-1	Perfluorooctanoic acid	0.0123		0.0080	0.0020	ug/l	
375-95-1	Perfluorononanoic acid	ND		0.0080	0.0020	ug/l	
335-76-2	Perfluorodecanoic acid	ND		0.0080	0.0040	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND		0.0080	0.0040	ug/l	
307-55-1	Perfluorododecanoic acid	ND		0.0080	0.0040	ug/l	
72629-94-8	Perfluorotridecanoic acid [a]	ND		0.0080	0.0040	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND		0.0080	0.0040	ug/l	
PERFLUOROALKYLSULFONATES							
375-73-5	Perfluorobutanesulfonic acid	ND		0.0080	0.0040	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.0137		0.0080	0.0040	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.00356		0.0080	0.0020	ug/l	J
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS							
2355-31-9	MeFOSAA	ND		0.020	0.0080	ug/l	
2991-50-6	EtFOSAA	ND		0.020	0.0080	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	13C2-PFHxA	101%		70-130%
	13C2-PFDA	105%		70-130%
	d5-EtFOSAA	83%		70-130%

(a) Associated ICV outside control limits high, however sample ND.

ND = Not detected MDL = Method Detection Limit
MCL = Maximum Contamination Level (40 CFR 141)
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

SGS North America Inc.

Report of Analysis

Client Sample ID: 20106-CAMP2
Lab Sample ID: FA54384-7
Matrix: DW - Drinking Water
Method: EPA 537 EPA 537
Project: 1182277

Date Sampled: 05/16/18
Date Received: 05/22/18
Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Q46896.D	1	05/29/18 14:05	NAF	05/22/18 16:00	OP70170	SQ1145
Run #2							

	Initial Volume	Final Volume
Run #1	250 ml	1.0 ml
Run #2		

Perfluorinated Alkyl Acids

CAS No.	Compound	Result	MCL	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS							
307-24-4	Perfluorohexanoic acid	ND		0.0080	0.0040	ug/l	
375-85-9	Perfluoroheptanoic acid	ND		0.0080	0.0040	ug/l	
335-67-1	Perfluorooctanoic acid	0.0121		0.0080	0.0020	ug/l	
375-95-1	Perfluorononanoic acid	ND		0.0080	0.0020	ug/l	
335-76-2	Perfluorodecanoic acid	ND		0.0080	0.0040	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND		0.0080	0.0040	ug/l	
307-55-1	Perfluorododecanoic acid	ND		0.0080	0.0040	ug/l	
72629-94-8	Perfluorotridecanoic acid [a]	ND		0.0080	0.0040	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND		0.0080	0.0040	ug/l	
PERFLUOROALKYLSULFONATES							
375-73-5	Perfluorobutanesulfonic acid	ND		0.0080	0.0040	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.0132		0.0080	0.0040	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.00337		0.0080	0.0020	ug/l	J
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS							
2355-31-9	MeFOSAA	ND		0.020	0.0080	ug/l	
2991-50-6	EtFOSAA	ND		0.020	0.0080	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	13C2-PFHxA	91%		70-130%
	13C2-PFDA	87%		70-130%
	d5-EtFOSAA	74%		70-130%

(a) Associated ICV outside control limits high, however sample ND.

ND = Not detected MDL = Method Detection Limit
MCL = Maximum Contamination Level (40 CFR 141)
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

SGS North America Inc.

Report of Analysis

Client Sample ID:	20106-HEN		
Lab Sample ID:	FA54384-8	**Date Sampled:**	05/16/18
Matrix:	DW - Drinking Water	**Date Received:**	05/22/18
Method:	EPA 537 EPA 537	**Percent Solids:**	n/a
Project:	1182277		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Q46897.D	1	05/29/18 14:26	NAF	05/22/18 16:00	OP70170	SQ1145
Run #2 [a]	Q46816.D	1	05/26/18 09:06	NAF	05/22/18 16:00	OP70170	SQ1143

	Initial Volume	Final Volume
Run #1	250 ml	1.0 ml
Run #2	250 ml	1.0 ml

Perfluorinated Alkyl Acids

CAS No.	Compound	Result	MCL	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS							
307-24-4	Perfluorohexanoic acid	ND		0.0080	0.0040	ug/l	
375-85-9	Perfluoroheptanoic acid	ND		0.0080	0.0040	ug/l	
335-67-1	Perfluorooctanoic acid	ND		0.0080	0.0020	ug/l	
375-95-1	Perfluorononanoic acid	0.00329		0.0080	0.0020	ug/l	J
335-76-2	Perfluorodecanoic acid	ND		0.0080	0.0040	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND		0.0080	0.0040	ug/l	
307-55-1	Perfluorododecanoic acid	ND		0.0080	0.0040	ug/l	
72629-94-8	Perfluorotridecanoic acid [b]	ND		0.0080	0.0040	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND		0.0080	0.0040	ug/l	
PERFLUOROALKYLSULFONATES							
375-73-5	Perfluorobutanesulfonic acid	ND		0.0080	0.0040	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND		0.0080	0.0040	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.00350		0.0080	0.0020	ug/l	J
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS							
2355-31-9	MeFOSAA	ND		0.020	0.0080	ug/l	
2991-50-6	EtFOSAA	ND		0.020	0.0080	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	13C2-PFHxA	86%	93%	70-130%
	13C2-PFDA	63% [c]	55% [d]	70-130%
	d5-EtFOSAA	40% [c]	38% [d]	70-130%

(a) Confirmation run for surrogate recoveries.
(b) Associated ICV outside control limits high, however sample ND.
(c) Outside control limits due to matrix interference. Confirmed by reanalysis. Insufficient sample for re-extraction.
(d) Outside control limits.

ND = Not detected MDL = Method Detection Limit
MCL = Maximum Contamination Level (40 CFR 141)
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

SGS North America Inc.

Report of Analysis

Client Sample ID:	20106-KBP		
Lab Sample ID:	FA54384-9	**Date Sampled:**	05/16/18
Matrix:	DW - Drinking Water	**Date Received:**	05/22/18
Method:	EPA 537 EPA 537	**Percent Solids:**	n/a
Project:	1182277		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Q46900.D	1	05/29/18 15:30	NAF	05/22/18 16:00	OP70170	SQ1145
Run #2							

	Initial Volume	Final Volume
Run #1	240 ml	1.0 ml
Run #2		

Perfluorinated Alkyl Acids

CAS No.	Compound	Result	MCL	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS							
307-24-4	Perfluorohexanoic acid	ND		0.0083	0.0042	ug/l	
375-85-9	Perfluoroheptanoic acid	ND		0.0083	0.0042	ug/l	
335-67-1	Perfluorooctanoic acid	ND		0.0083	0.0021	ug/l	
375-95-1	Perfluorononanoic acid	ND		0.0083	0.0021	ug/l	
335-76-2	Perfluorodecanoic acid	ND		0.0083	0.0042	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND		0.0083	0.0042	ug/l	
307-55-1	Perfluorododecanoic acid	ND		0.0083	0.0042	ug/l	
72629-94-8	Perfluorotridecanoic acid [a]	ND		0.0083	0.0042	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND		0.0083	0.0042	ug/l	
PERFLUOROALKYLSULFONATES							
375-73-5	Perfluorobutanesulfonic acid	ND		0.0083	0.0042	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND		0.0083	0.0042	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.00417		0.0083	0.0021	ug/l	J
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS							
2355-31-9	MeFOSAA	ND		0.021	0.0083	ug/l	
2991-50-6	EtFOSAA	ND		0.021	0.0083	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	13C2-PFHxA	98%		70-130%
	13C2-PFDA	110%		70-130%
	d5-EtFOSAA	89%		70-130%

(a) Associated ICV outside control limits high, however sample ND.

ND = Not detected MDL = Method Detection Limit
MCL = Maximum Contamination Level (40 CFR 141)
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

SGS

SGS North America Inc.
CHAIN OF CUSTODY RECORD

1182277

FA54384

Locations Nationwide

Alaska	Florida
New Jersey	Colorado
Texas	North Carolina
Virginia	Louisiana

www.us.sgs.com

CLIENT:	SGS North America Inc. - Alaska Division	SGS Reference:	SGS Orlando, FL
CONTACT:	Julie Shumway	PHONE NO:	(907) 562-2343
PROJECT NAME:	1182277	PWSID#:	
		NPDL#:	
REPORTS TO:		E-MAIL:	Julie.Shumway@sgs.com
INVOICE TO:	SGS - Alaska	QUOTE #:	
		P.O. #:	1182277

Additional Comments: All soils report out in dry weight unless otherwise requested.

Page 1 of 1

RESERVED for lab use	SAMPLE IDENTIFICATION	DATE mm/dd/yy	TIME HHMM	MATRIX/ MATRIX	# CONTAINERS	Preservative Used:	NONE	NONE			MS	MSD	SGS lab #	Loc ID	REMARKS
						TYPE C = COMP G = GRAB Incremental Soils	PFOS + PFOA	PFCs by EPA 357							
1	20106-B4MW	5/16/2018	12:30	GW	2	GRAB	X						1182277001		
2	20106-B14MW	5/16/2018	12:45	GW	2	GRAB	X						1182277002		
3	20106-B5MW	5/16/2018	13:45	GW	2	GRAB	X						1182277003		
4	20106-B9MW	5/16/2018	10:40	GW	2	GRAB	X						1182277004		
5	20106-SWAN	5/16/2018	11:35	DW	2	GRAB		X					1182277005		
6	20106-CAMP	5/16/2018	11:30	DW	2	GRAB		X					1182277006		
7	20106-CAMP2	5/16/2018	11:45	DW	2	GRAB		X					1182277007		
8	20106-HEN	5/16/2018	11:12	DW	2	GRAB		X					1182277008		
9	20106-KBP	5/16/2018	11:02	DW	2	GRAB		X					1182277009		

	Date	Time	Received By:
Relinquished By: (1)	5/21/18	1020	UPS
Relinquished By: (2) UPS	Date	Time	Received By:
Relinquished By: (3)	Date	Time	Received By:
Relinquished By: (4)	Date	Time	Received For Laboratory By: 1000 05/22/18

DOD Project? ☐ YES ☑ NO
Report to DL (J Flags) ☑
Cooler ID:

Data Deliverable Requirements: Level 2 + DV EDD

Requested Turnaround Time and-or Special Instructions:

Standard.
Report all analyses for Soils/Waters in mg/L or mg/Kg, where possible

Temp Blank °C: 4.4
or Ambient [ ]

Chain of Custody Seal: (Circle)
INTACT BROKEN ABSENT

[X] 200 W. Potter Drive Anchorage, AK 99518 Tel: (907) 562-2343 Fax: (907) 561-5301
[ ] 5500 Business Drive Wilmington, NC 28405 Tel: (910) 350-1903 Fax: (910) 350-1557

http://www.sgs.com/terms_and_conditions.htm

1182277_PFCs_5.21.18.xls

SGS Sample Receipt Summary

Revised By:

Job Number: FA54384 **Client:** SGS **Project:** 1182277

Date / Time Received: 5/22/2018 10:00:00 AM **Delivery Method:** UPS **Airbill #'s:** 1za8619w0163268574

Therm ID: IR 1; **Therm CF:** 0.4; **# of Coolers:** 1

Cooler Temps (Raw Measured) °C: Cooler 1: (4.0);

Cooler Temps (Corrected) °C: Cooler 1: (4.4);

Cooler Information	Y	or	N
1. Custody Seals Present	☑		☐
2. Custody Seals Intact	☑		☐
3. Temp criteria achieved	☑		☐
4. Cooler temp verification	IR Gun		
5. Cooler media	Ice (Bag)		

Trip Blank Information	Y	or	N	N/A
1. Trip Blank present / cooler	☐		☐	☑
2. Trip Blank listed on COC	☐		☐	☑
	W	**or**	**S**	**N/A**
3. Type Of TB Received	☐		☐	☑

Sample Information	Y	or	N	N/A
1. Sample labels present on bottles	☑		☐	
2. Samples preserved properly	☑		☐	
3. Sufficient volume/containers recvd for analysis:	☑		☐	
4. Condition of sample	Intact			
5. Sample recvd within HT	☑		☐	
6. Dates/Times/IDs on COC match Sample Label	☑		☐	
7. VOCs have headspace	☐		☐	☑
8. Bottles received for unspecified tests	☐		☑	
9. Compositing instructions clear	☐		☐	☑
10. Voa Soil Kits/Jars received past 48hrs?	☐		☐	☑
11. % Solids Jar received?	☐		☐	☑
12. Residual Chlorine Present?	☐		☐	☑

Misc. Information

Number of Encores: 25-Gram _____ 5-Gram _____ Number of 5035 Field Kits: _____ Number of Lab Filtered Metals: _____

Test Strip Lot #s: pH 0-3 230315 pH 10-12 219813A Other: (Specify) _____ _____

Residual Chlorine Test Strip Lot #: _____

Comments

SM001
Rev. Date 05/24/17

Technician: SHAYLAP Date: 5/22/2018 10:00:00 A Reviewer: P.H Date: 5/22/2018

Job Change Order: FA54684

Requested Date:	7/3/2018	**Received Date:**	6/2/2018
Account Name:	Pratt & Whitney	**Due Date:**	6/18/2018
Project	1880: NPDES	**Deliverable:**	COMMA
CSR:	kenneth.overstreet	**TAT (Days):**	1

Sample #:
FA54684-all

Change: Remove 1631 HG, client resampled.

Above Changes Per: Ken Overstreet **Date:** 7/3/2018

To Client: This Change Order is confirmation of the revisions, previously discussed with the Client Service Representative.

Job Change Order: FA54384

Requested Date:	12/5/2018	**Received Date:**	5/22/2018
Account Name:	SGS North America, Inc	**Due Date:**	6/5/2018
Project Description:	1182277	**Deliverable:**	COMMBN
CSR:	AC	**TAT (Days):**	2

==========

Sample #: FA54384-all

Dept:

TAT: 2

Change:
Please report the list of 24 PFAS compounds

==========

Above Changes Per: Julie Shumway **Date/Time:** 12/5/2018 8:49:44 AM

To Client: This Change Order is confirmation of the revisions, previously discussed with the Client Service Representative.

Page 1 of 1

MS Semi-volatiles

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QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: FA54384
Account: SGSAKA SGS North America, Inc
Project: 1182277

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP70169-MB	Q46771.D	1	05/25/18	NAF	05/22/18	OP70169	SQ1143

The QC reported here applies to the following samples: **Method:** EPA 537 MOD

FA54384-1, FA54384-2, FA54384-3, FA54384-4

CAS No.	Compound	Result	RL	MDL	Units	Q
2706-90-3	Perfluoropentanoic acid	ND	0.017	0.0083	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.017	0.0083	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.017	0.0083	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.017	0.0042	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.017	0.0042	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.017	0.0083	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.017	0.0083	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.017	0.0083	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.017	0.0083	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.017	0.0083	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.017	0.0083	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.017	0.0083	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.017	0.0083	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.017	0.0083	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.017	0.0042	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.017	0.0083	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.017	0.0083	ug/l	
754-91-6	PFOSA	ND	0.017	0.0083	ug/l	
2355-31-9	MeFOSAA	ND	0.042	0.017	ug/l	
2991-50-6	EtFOSAA	ND	0.042	0.017	ug/l	
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.042	0.017	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.042	0.017	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.042	0.017	ug/l	

CAS No.	Surrogate Recoveries		Limits
	13C2-PFHxA	102%	61-134%
	13C2-PFDA	87%	62-128%
	d5-EtFOSAA	90%	57-135%

Method Blank Summary

Job Number: FA54384
Account: SGSAKA SGS North America, Inc
Project: 1182277

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP70170-MB	Q46893.D	1	05/29/18	NAF	05/22/18	OP70170	SQ1145

The QC reported here applies to the following samples: **Method:** EPA 537

FA54384-5, FA54384-6, FA54384-7, FA54384-8, FA54384-9

CAS No.	Compound	Result	RL	MDL	Units	Q
307-24-4	Perfluorohexanoic acid	ND	0.0080	0.0040	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0080	0.0040	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0080	0.0020	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0080	0.0020	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0080	0.0040	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0080	0.0040	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0080	0.0040	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0080	0.0040	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0080	0.0040	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0080	0.0040	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0080	0.0040	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0080	0.0020	ug/l	
2355-31-9	MeFOSAA	ND	0.020	0.0080	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0080	ug/l	

CAS No.	Surrogate Recoveries		Limits
	13C2-PFHxA	97%	70-130%
	13C2-PFDA	90%	70-130%
	d5-EtFOSAA	82%	70-130%

Blank Spike Summary

Job Number: FA54384
Account: SGSAKA SGS North America, Inc
Project: 1182277

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP70169-BS	Q46770.D	1	05/25/18	NAF	05/22/18	OP70169	SQ1143

The QC reported here applies to the following samples: **Method:** EPA 537 MOD

FA54384-1, FA54384-2, FA54384-3, FA54384-4

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
2706-90-3	Perfluoropentanoic acid	0.167	0.159	95	40-131
307-24-4	Perfluorohexanoic acid	0.167	0.188	113	63-146
375-85-9	Perfluoroheptanoic acid	0.167	0.199	119	71-138
335-67-1	Perfluorooctanoic acid	0.167	0.183	110	74-137
375-95-1	Perfluorononanoic acid	0.167	0.146	88	76-140
335-76-2	Perfluorodecanoic acid	0.167	0.148	89	65-148
2058-94-8	Perfluoroundecanoic acid	0.167	0.153	92	57-138
307-55-1	Perfluorododecanoic acid	0.167	0.156	94	58-118
72629-94-8	Perfluorotridecanoic acid	0.167	0.171	103	52-120
376-06-7	Perfluorotetradecanoic acid	0.167	0.153	92	49-122
375-73-5	Perfluorobutanesulfonic acid	0.147	0.184	125	73-148
2706-91-4	Perfluoropentanesulfonic acid	0.157	0.192	123	70-130
355-46-4	Perfluorohexanesulfonic acid	0.152	0.163	107	74-142
375-92-8	Perfluoroheptanesulfonic acid	0.158	0.154	97	74-123
1763-23-1	Perfluorooctanesulfonic acid	0.154	0.164	106	70-134
68259-12-1	Perfluorononanesulfonic acid	0.16	0.162	101	70-130
335-77-3	Perfluorodecanesulfonic acid	0.161	0.151	94	56-127
754-91-6	PFOSA	0.167	0.0965	58	40-142
2355-31-9	MeFOSAA	0.167	0.143	86	57-128
2991-50-6	EtFOSAA	0.167	0.150	90	55-135
757124-72-4	4:2 Fluorotelomer sulfonate	0.156	0.193	124	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	0.158	0.170	107	70-153
39108-34-4	8:2 Fluorotelomer sulfonate	0.16	0.129	81	61-154

CAS No.	Surrogate Recoveries	BSP	Limits
	13C2-PFHxA	118%	61-134%
	13C2-PFDA	92%	62-128%
	d5-EtFOSAA	94%	57-135%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA54384
Account: SGSAKA SGS North America, Inc
Project: 1182277

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP70170-BS	Q46892.D	1	05/29/18	NAF	05/22/18	OP70170	SQ1145

The QC reported here applies to the following samples: **Method:** EPA 537

FA54384-5, FA54384-6, FA54384-7, FA54384-8, FA54384-9

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
307-24-4	Perfluorohexanoic acid	0.08	0.0767	96	70-130
375-85-9	Perfluoroheptanoic acid	0.08	0.0860	108	70-130
335-67-1	Perfluorooctanoic acid	0.08	0.0835	104	70-130
375-95-1	Perfluorononanoic acid	0.08	0.0749	94	70-130
335-76-2	Perfluorodecanoic acid	0.08	0.0692	87	70-130
2058-94-8	Perfluoroundecanoic acid	0.08	0.0678	85	70-130
307-55-1	Perfluorododecanoic acid	0.08	0.0708	89	70-130
72629-94-8	Perfluorotridecanoic acid	0.08	0.0756	95	70-130
376-06-7	Perfluorotetradecanoic acid	0.08	0.0736	92	70-130
375-73-5	Perfluorobutanesulfonic acid	0.0708	0.0691	98	70-130
355-46-4	Perfluorohexanesulfonic acid	0.0728	0.0641	88	70-130
1763-23-1	Perfluorooctanesulfonic acid	0.074	0.0700	95	70-130
2355-31-9	MeFOSAA	0.08	0.0674	84	70-130
2991-50-6	EtFOSAA	0.08	0.0679	85	70-130

CAS No.	Surrogate Recoveries	BSP	Limits
	13C2-PFHxA	101%	70-130%
	13C2-PFDA	99%	70-130%
	d5-EtFOSAA	87%	70-130%

* = Outside of Control Limits.

Matrix Spike Summary

Job Number: FA54384
Account: SGSAKA SGS North America, Inc
Project: 1182277

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP70169-MS	Q46779.D	20	05/25/18	NAF	05/22/18	OP70169	SQ1143
FA54384-1	Q46840.D	1	05/28/18	NAF	05/22/18	OP70169	SQ1144
FA54384-1	Q46778.D	20	05/25/18	NAF	05/22/18	OP70169	SQ1143

The QC reported here applies to the following samples: **Method:** EPA 537 MOD

FA54384-1, FA54384-2, FA54384-3, FA54384-4

CAS No.	Compound	FA54384-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	Limits
2706-90-3	Perfluoropentanoic acid	0.293		0.167	0.375	49	40-131
307-24-4	Perfluorohexanoic acid	0.264		0.167	0.440	106	63-146
375-85-9	Perfluoroheptanoic acid	0.262		0.167	0.460	119	71-138
335-67-1	Perfluorooctanoic acid	0.178		0.167	0.351	104	74-137
375-95-1	Perfluorononanoic acid	0.276		0.167	0.398	73*	76-140
335-76-2	Perfluorodecanoic acid	0.0146	J	0.167	ND	-9*	65-148
2058-94-8	Perfluoroundecanoic acid	0.275		0.167	0.384	65	57-138
307-55-1	Perfluorododecanoic acid	ND		0.167	ND	0*	58-118
72629-94-8	Perfluorotridecanoic acid	0.00883	J	0.167	ND	-5*	52-120
376-06-7	Perfluorotetradecanoic acid	ND		0.167	ND	0*	49-122
375-73-5	Perfluorobutanesulfonic acid	0.0193		0.148	0.186	113	73-148
2706-91-4	Perfluoropentanesulfonic acid	0.0371		0.157	0.229	122	70-130
355-46-4	Perfluorohexanesulfonic acid	0.460		0.152	0.654	128	74-142
375-92-8	Perfluoroheptanesulfonic acid	0.0232		0.158	ND	-15*	74-123
1763-23-1	Perfluorooctanesulfonic acid	0.767 [b]		0.154	1.04	177* [a]	70-134
68259-12-1	Perfluorononanesulfonic acid	ND		0.16	ND	0*	70-130
335-77-3	Perfluorodecanesulfonic acid	ND		0.161	ND	0*	56-127
754-91-6	PFOSA	ND		0.167	ND	0*	40-142
2355-31-9	MeFOSAA	ND		0.167	ND	0*	57-128
2991-50-6	EtFOSAA	ND		0.167	ND	0*	55-135
757124-72-4	4:2 Fluorotelomer sulfonate	ND		0.156	ND	0*	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	0.202		0.158	0.357	98	70-153
39108-34-4	8:2 Fluorotelomer sulfonate	0.153		0.16	ND	-96*	61-154

CAS No.	Surrogate Recoveries	MS	FA54384-1	FA54384-1	Limits
	13C2-PFHxA	0%* [c]	103%	0%* [c]	61-134%
	13C2-PFDA	0%* [c]	91%	0%* [c]	62-128%
	d5-EtFOSAA	0%* [c]	89%	0%* [c]	57-135%

(a) Outside control limits due to high level in sample relative to spike amount.
(b) Result is from Run #2.
(c) Outside control limits due to dilution.

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA54384
Account: SGSAKA SGS North America, Inc
Project: 1182277

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP70170-MS	Q46898.D	1	05/29/18	NAF	05/22/18	OP70170	SQ1145
OP70170-MSD	Q46899.D	1	05/29/18	NAF	05/22/18	OP70170	SQ1145
FA54384-8 [a]	Q46816.D	1	05/26/18	NAF	05/22/18	OP70170	SQ1143
FA54384-8	Q46897.D	1	05/29/18	NAF	05/22/18	OP70170	SQ1145

The QC reported here applies to the following samples: **Method:** EPA 537

FA54384-5, FA54384-6, FA54384-7, FA54384-8, FA54384-9

CAS No.	Compound	FA54384-8 ug/l	Q	Spike ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
307-24-4	Perfluorohexanoic acid	ND [b]		0.167	0.152	91	0.167	0.155	93	2	70-130/30
375-85-9	Perfluoroheptanoic acid	ND [b]		0.167	0.161	97	0.167	0.167	100	4	70-130/30
335-67-1	Perfluorooctanoic acid	ND [b]		0.167	0.155	93	0.167	0.161	97	4	70-130/30
375-95-1	Perfluorononanoic acid	0.00329 [b]	J	0.167	0.142	83	0.167	0.143	84	1	70-130/30
335-76-2	Perfluorodecanoic acid	ND [b]		0.167	0.135	81	0.167	0.120	72	12	70-130/30
2058-94-8	Perfluoroundecanoic acid	ND [b]		0.167	0.133	80	0.167	0.123	74	8	70-130/30
307-55-1	Perfluorododecanoic acid	ND [b]		0.167	0.119	71	0.167	0.127	76	7	70-130/30
72629-94-8	Perfluorotridecanoic acid	ND [b]		0.167	0.0896	54*	0.167	0.110	66*	20	70-130/30
376-06-7	Perfluorotetradecanoic acid	ND [b]		0.167	0.0585	35*	0.167	0.0688	41*	16	70-130/30
375-73-5	Perfluorobutanesulfonic acid	ND [b]		0.147	0.128	87	0.147	0.137	93	7	70-130/30
355-46-4	Perfluorohexanesulfonic acid	ND [b]		0.152	0.111	73	0.152	0.119	78	7	70-130/30
1763-23-1	Perfluorooctanesulfonic acid	0.00350 [b]	J	0.154	0.126	79	0.154	0.127	80	1	70-130/30
2355-31-9	MeFOSAA	ND [b]		0.167	0.130	78	0.167	0.120	72	8	70-130/30
2991-50-6	EtFOSAA	ND [b]		0.167	0.127	76	0.167	0.115	69*	10	70-130/30

CAS No.	Surrogate Recoveries	MS	MSD	FA54384-8	FA54384-8	Limits
	13C2-PFHxA	88%	106%	93%	86%	70-130%
	13C2-PFDA	85%	88%	55%* [d]	63%* [c]	70-130%
	d5-EtFOSAA	73%	80%	38%* [d]	40%* [c]	70-130%

(a) Confirmation run for surrogate recoveries.
(b) Result is from Run #2.
(c) Outside control limits due to matrix interference. Confirmed by reanalysis. Insufficient sample for re-extraction.
(d) Outside control limits.

* = Outside of Control Limits.

Duplicate Summary

Job Number: FA54384
Account: SGSAKA SGS North America, Inc
Project: 1182277

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP70169-DUP	Q46845.D	1	05/28/18	NAF	05/22/18	OP70169	SQ1144
FA54384-4	Q46844.D	1	05/28/18	NAF	05/22/18	OP70169	SQ1144

The QC reported here applies to the following samples: **Method:** EPA 537 MOD

FA54384-1, FA54384-2, FA54384-3, FA54384-4

CAS No.	Compound	FA54384-4 ug/l	Q	DUP ug/l	Q	RPD	Limits
2706-90-3	Perfluoropentanoic acid	ND		ND		nc	30
307-24-4	Perfluorohexanoic acid	ND		ND		nc	30
375-85-9	Perfluoroheptanoic acid	ND		ND		nc	30
335-67-1	Perfluorooctanoic acid	0.00671	J	0.00646	J	4	30
375-95-1	Perfluorononanoic acid	ND		ND		nc	30
335-76-2	Perfluorodecanoic acid	ND		ND		nc	30
2058-94-8	Perfluoroundecanoic acid	ND		ND		nc	30
307-55-1	Perfluorododecanoic acid	ND		ND		nc	30
72629-94-8	Perfluorotridecanoic acid	ND		ND		nc	30
376-06-7	Perfluorotetradecanoic acid	ND		ND		nc	30
375-73-5	Perfluorobutanesulfonic acid	ND		ND		nc	30
2706-91-4	Perfluoropentanesulfonic acid	ND		ND		nc	30
355-46-4	Perfluorohexanesulfonic acid	0.0125	J	0.0131	J	5	30
375-92-8	Perfluoroheptanesulfonic acid	ND		ND		nc	30
1763-23-1	Perfluorooctanesulfonic acid	ND		ND		nc	30
68259-12-1	Perfluorononanesulfonic acid	ND		ND		nc	30
335-77-3	Perfluorodecanesulfonic acid	ND		ND		nc	30
754-91-6	PFOSA	ND		ND		nc	30
2355-31-9	MeFOSAA	ND		ND		nc	30
2991-50-6	EtFOSAA	ND		ND		nc	30
757124-72-4	4:2 Fluorotelomer sulfonate	ND		ND		nc	30
27619-97-2	6:2 Fluorotelomer sulfonate	ND		ND		nc	30
39108-34-4	8:2 Fluorotelomer sulfonate	ND		ND		nc	30

CAS No.	Surrogate Recoveries	DUP	FA54384-4	Limits
	13C2-PFHxA	98%	110%	61-134%
	13C2-PFDA	88%	97%	62-128%
	d5-EtFOSAA	87%		57-135%

* = Outside of Control Limits.

LABORATORY DATA REVIEW CHECKLIST

Completed by: Jake Tracy
Title: Environmental Engineering Staff
Date: September 2018

CS Report Name: 2018 Groundwater and Drinking Water Monitoring, UAA KPC MAPTS, Mile 3.2 Kalifornsky Beach Road, Soldotna, Alaska

Laboratory Report Date: May 31, 2018

Consultant Firm: Shannon & Wilson, Inc.

Laboratory Name: SGS North America Inc.
Laboratory Report Number: 1182277

ADEC File Number: 2333.38.034
ADEC Hazard ID Number: 454
(**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: *The ADEC has not approved any analytical laboratory for perfluorinated compound (PFC).*

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: *Analyses were performed by SGS of Orlando, Florida.*

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° ± 6° C)?
Yes / No / NA (please explain)
Comments: *The cooler temperature was 4.9° C upon receipt at SGS in Anchorage, Alaska and 4.4°C at SGS in Orlando, Florida.*

b. Sample preservation acceptable - acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)? **Yes / No / NA** (please explain)
Comments: *The method does not require a preservative.*

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:

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:*

- *The MS recovery for perfluorotetradecanoic acid, perfluorotridecanoic acid are outside control limits. Probable cause is due to matrix interference.*
- *The MSD recovery(s) for EtFOSAA, perfluorotetradecanoic acid, and perfluorotridecanoic acid are outside control limits. Probable cause is due to matrix interference.*
- *MS recovery for perfluorooctanesulfonic acid are outside control limits. Outside control limits due to high level in sample relative to spike amount.*
- *Sample HEN has surrogates outside control limits. Confirmation run for surrogate recoveries.*

c. Were corrective actions documented? **Yes / No / NA** (please explain)
Comments: *Sample HEN was re-confirmed by reanalysis.*

d. What is the effect on data quality/usability, according to the case narrative? **NA**
Comments: *Due to the surrogate failure associated with Sample HEN, the results are biased low and flagged "J-" on Table 3 of this report.*

5. Sample Results

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

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

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

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

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

6. QC Samples

a. Method Blank

i. One method blank reported per matrix, analysis, and 20 samples?
Yes / No / NA (please explain)
Comments:

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

iii. If above LOQ, what samples are affected?
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. **NA**
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: *One LCS and MS/MSD were reported per matrix, analysis, and 20 samples.*

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%; all other analyses see the laboratory QC pages) **Yes / No / NA** (please explain)
Comments:

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

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

vii. Data quality or usability affected? Please explain. **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: *Sample HEN has surrogates outside control limits.*

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: *Sample HEN is considered biased low due to the surrogate failure.*

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

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

i. One trip blank reported per matrix, analysis and cooler? (If not, enter explanation below.) **Yes / No / NA** (please explain)
Comments: *Volatile analyses were not requested with this work order.*

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

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

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

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

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples? **Yes / No / NA** (please explain)
Comments: *Sample CAMP2 is the field duplicate of Sample CAMP.*

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

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

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

f. Decontamination or Equipment Blank
Yes / No / NA (please explain)
Comments: *No decontamination or equipment blank submitted as per our work plan.*

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

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

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

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

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

APPENDIX C

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL/ENVIRONMENTAL REPORT

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Appendix C

Date: December 2018
To: University of Alaska Anchorage
Re: 2018 PFOS/PFOA Groundwater Monitoring
UAA Kenai Peninsula College MAPTS
Soldotna, Alaska

Important Information About Your Geotechnical/Environmental Report

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

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

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

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

SUBSURFACE CONDITIONS CAN CHANGE.

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

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

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

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

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

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

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

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

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

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

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

READ RESPONSIBILITY CLAUSES CLOSELY.

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

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