

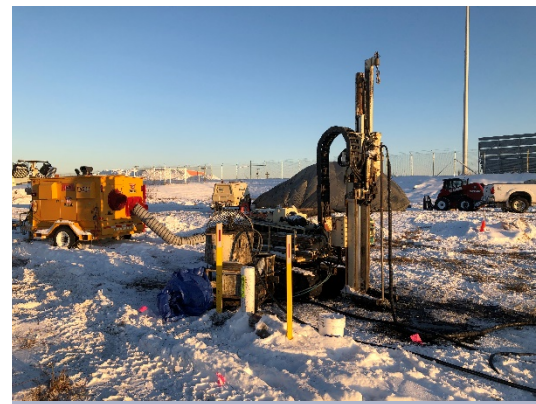
SUBMITTED TO:  
Fairbanks International  
Airport  
6450 Airport Way, Suite 1  
Fairbanks, AK 99709



BY:  
Shannon & Wilson  
2355 Hill Road  
Fairbanks, AK 99709  
  
(907) 479-0600  
[www.shannonwilson.com](http://www.shannonwilson.com)

FINAL

SUMMARY REPORT  
Fairbanks International Airport  
PlumeStop® Pilot Study  
FAIRBANKS, ALASKA



PAGE INTENTIONALLY LEFT BLANK FOR DOUBLE-SIDED PRINTING

Submitted To: Fairbanks International Airport  
6450 Airport Way, Suite 1  
Fairbanks, AK 99709  
Attn: Elise Thomas

Subject: FINAL SUMMARY REPORT, FAIRBANKS INTERNATIONAL AIRPORT  
PLUMESTOP® PILOT STUDY, FAIRBANKS, ALASKA

Shannon & Wilson prepared this report to document the results of the PlumeStop® pilot study conducted at the Fairbanks International Airport (FAI) in collaboration with the FAI, Regensis, Inc. (Regensis) and GeoTek Alaska (GeoTek). The pilot study was funded through cost sharing with Regensis, GeoTek, and Shannon & Wilson Inc.'s research program. FAI's portion of these services were authorized by Professional Services Agreement Number 25-19-1-013 issued by DOT&PF on December 19, 2018, via Amendment 5, NTP 4-4 dated February 25, 2019 and Amendment 24, NTP 4-4a dated May 14, 2020.

This draft report was prepared by the undersigned. We have provided copies to FAI and Regensis. Following your and Regensis' review, we will revise this report and submit the final version to the Alaska Department of Environmental Conservation (DEC) for their records.

We appreciate the opportunity to be of service to you on this project. If you have questions concerning this report, or we may be of further service, please contact us.

Sincerely,

SHANNON & WILSON

Marcy Nadel  
Geologist, Project Manager

Kristen Freiburger  
Associate, Statewide Project Manager

ARM:KRF:MDN:AMJ:CBD/arm

1 Introduction .....1

1.1 Purpose and Objectives .....1

1.2 Background .....1

1.2.1 Site Background .....2

1.2.2 CAC and PlumeStop® Background .....2

1.3 Geology and Hydrology .....3

1.4 Contaminants of Concern and Regulatory History .....3

1.4.1 Summary of PFAS Regulation Changes in Alaska .....4

1.5 Scope of Services .....4

2 Field Activities .....5

2.1 Project Design .....6

2.1.1 Monitoring Well Installation .....6

2.1.2 Baseline Sampling .....7

2.1.3 Grain-Size Analysis .....8

2.1.4 Passive Flux Meter .....8

2.2 PlumeStop® Injection .....9

2.3 Temporary Well Points .....10

2.3.1 Groundwater Flow Direction .....10

2.4 Post-Injection Monitoring .....11

2.5 Deviations .....12

2.6 Sample Custody, Storage, and Shipping .....12

2.7 Investigation Derived Waste .....12

3 Analytical Methods and Results .....13

4 Discussion .....14

4.1 PlumeStop® Injection Lessons Learned .....14

4.2 Mitigation of PFAS at the FAI .....15

4.3 Recommendations .....15

5 References .....16

Exhibits

Exhibit 1-1: Applicable Regulatory Action Levels .....3  
 Exhibit 2-1: Monitoring well installation.....7  
 Exhibit 2-2: Settling tubes with subsurface soil collected from MW installation.....8  
 Exhibit 2-3: PlumeStop® and water containers at the injection site. ....9  
 Exhibit 2-4: Hydraulic Gradient Monitoring Results.....10  
 Exhibit 2-5: Groundwater samples collected on September 17, 2020. ....11

Tables

Table 1: Summary of August 2019 Baseline Monitoring Well Analytical Results  
 Table 2: Summary of MW-1903-20 Results August 2019 Through June 2021

Figures

Figure 1: Fairbanks International Airport Vicinity  
 Figure 2: Monitoring Well Locations  
 Figure 3: Injection Locations

Appendices

Appendix A: Subsurface Soil Conditions  
 Appendix B: Field Forms  
 Appendix C: Analytical Results  
 Appendix D: Groundwater Gradient Documents  
 Appendix E: PlumeStop® Documents  
 Appendix F: Permits and Approval Documentation  
 Important Information

## ACRONYMS

AAC	Alaska Administrative Code
AFFF	aqueous film forming foam
ARFF	Airport Rescue and Firefighting
°C	degrees Celsius
bgs	below ground surface
CAC	colloidal activated carbon
DEC	Alaska Department of Environmental Conservation
DO	dissolved oxygen
DOC	dissolved organic carbon
DOT&PF	Alaska Department of Transportation and Public Facilities
DVT	design verification testing
bgs	below ground surface
EPA	U.S. Environmental Protection Agency
FAI	Fairbanks International Airport
ft	feet
GAC	granular activated carbon
gal	gallon
GeoTek	GeoTek Alaska, Inc.
IDW	investigation derived waste
lbs.	pounds
LDRC	laboratory data review checklist
LHA	lifetime health advisory
mg/L	milligrams per liter
mV	millivolts
MW	monitoring well
ng/L	nanograms per liter
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutanesulfonic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFM	passive flux meter
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
QA/QC	quality assurance/quality control
Regenesis	Regenesis, Inc.
RL	laboratory reporting limit

ACRONYMS

SGS	SGS North America, Inc.
TOC	total organic carbon
TTZ	target treatment zone
TWP	temporary well point
YSI	YSI multiprobe water quality meter
µS	microSiemens

# 1 INTRODUCTION

Shannon & Wilson, Inc. prepared this report to document the PlumeStop® pilot study conducted at the Fairbanks International Airport (FAI) in Fairbanks, Alaska (Figure 1). This study was conducted in collaboration with PlumeStop® manufacturer, Regenesis, Inc., (Regenesis), GeoTek Alaska (GeoTek), and the FAI. This summary report covers work completed in August 2019 through June 2021. The FAI is an active Alaska Department of Environmental Conservation (DEC) listed contaminated site due to the presences of per- and polyfluoroalkyl substances (PFAS) in groundwater, surface water, and soil (File Number 100.38.277, Hazard ID 26816).

This report was prepared for the FAI and Regenesis in accordance with the terms and conditions of our contract with the Alaska Department of Transportation & Public Facilities (DOT&PF), relevant DEC guidance documents, and 18 Alaska Administrative Code (AAC) 75.335.

## 1.1 Purpose and Objectives

This purpose of the services described in this report was evaluate the effectiveness of PlumeStop®, a liquid colloidal activated charcoal (CAC) product, to mitigate the transport of PFAS in groundwater near the FAI.

Our objectives were to:

- Install a 20-foot monitoring well (MW) within the area known to be affected by PFAS (Figure 2);
- Inject PlumeStop® surrounding the screened interval of the MW (Figure 3);
- Document the dose response of PlumeStop® on multiple PFAS compounds under field conditions; and
- Monitor PFAS concentrations at the MW for a minimum of one year.

## 1.2 Background

Aqueous film forming foam (AFFF) products have historically been used in airport operations for suppressing airplane fires, and in fire training exercises. AFFF contain PFAS, including perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA). These compounds are commonly referred to as "forever chemicals" due to their persistence,



toxicity, and bioaccumulative potential. There is evidence that exposure to these compounds can lead to adverse health effects.

In Alaska, surface water bodies and residential homes with private water-supply wells are commonly located near airports. The need to protect sensitive offsite receptors has driven interest in in-situ remediation technologies. CAC is gaining traction in the environmental remediation industry as a groundwater technology that can be used to sequester PFAS and prevent its migration.

### 1.2.1 Site Background

The FAI terminal is located at 6450 Airport Way in Fairbanks, Alaska (Figure 1). The geographic coordinates of the primary FAI runway, 2L-20R, are latitude 64.8160, longitude -147.8612.

The FAI Aircraft Rescue and Firefighting (ARFF) program has used AFFF for training, systems testing, and emergency response at the FAI since the 1970s. In 2017, the FAI began an investigation in collaboration with DEC and Shannon & Wilson to investigate the extent of PFAS migration from the FAI. Monitoring of water-supply wells in the neighborhoods downgradient of the FAI found PFAS concentrations above applicable action levels in 107 private drinking-water wells.

PFAS regulations have evolved as continuing research offers new insights into the toxicological impacts of these compounds. A summary of the regulatory history of PFAS in Alaska is included in Section 1.4.1.

### 1.2.2 CAC and PlumeStop® Background

In 2018, Shannon & Wilson contacted Regenesis to collaborate on a remediation method to sequester PFAS at the FAI and document how it prevents or slows further transport of PFAS. Activated carbon has been used as an effective remediation technology to remove PFAS from groundwater in pump-and-treat systems using granular activated carbon (GAC). Regenesis' CAC product PlumeStop® is an in-situ groundwater remediate designed to filter and retain environmental contaminants out of the groundwater as it moves through the subsurface.

PlumeStop® liquid activated carbon is composed of less-than-two-micron particles of activated carbon and dispersants suspended in water. Once in the subsurface, the material binds to the aquifer matrix. Case studies conducted by Regenesis have shown PlumeStop® to be effective in reducing concentrations of PFOS and PFOA in the downgradient plume when injected at a source area (Regenesis, 2018).

### 1.3 Geology and Hydrology

The FAI and vicinity are at the northern edge of the Tanana Lowlands physiographic province. The Tanana Lowlands province forms a large, arcuate band of alluvial sediments between the Alaska Range and the Yukon-Tanana Uplands. The Lowlands consist of vegetated floodplains and low benches cut by the Tanana River, and sloughs and oxbow lakes at former channel positions of the Tanana or Chena Rivers. The floodplain generally slopes to the west or northwest by approximately five feet (ft.) per mile (Nelson, 1978).

Based on our experience and knowledge of hydrogeology in the Fairbanks area, the horizontal regional gradient in this area is relatively flat, typically averaging two to four ft. per mile. Depth to groundwater ranges from 5 ft. to 12 ft. below ground surface, depending on local topography. Seasonal fluctuation in groundwater levels can range from 0.2 to 9 ft. (Glass et. al., 1996).

A more detailed summary of the geology and hydrology of the FAI study area is included in our first private well summary report, dated September 28, 2018. This report includes a figure summarizing regional United States Geological Survey (USGS) groundwater contours.

### 1.4 Contaminants of Concern and Regulatory History

The primary contaminants of concern for the PlumeStop® site are PFOS and PFOA. However, groundwater samples were submitted for 21 (August 2019) or 25 PFAS analytes (October 2019 through March 2021), as shown in Tables 1 and 2.

The pilot study was designed to target the five PFAS compounds included in the former DEC action level for drinking water: PFOS, PFOA, perfluoroheptanoic acid (PFHpA), perfluorohexanesulfonic acid (PFHxS), and perfluorononanoic acid (PFNA). Of these contaminants, only PFOS and PFOA are regulated with numeric action levels or cleanup levels, as summarized in Exhibit 1-1 below.

**Exhibit 1-1: Applicable Regulatory Action Levels**

Media	Compound	Level
Drinking water	PFOS + PFOA	70 ng/L <sup>a</sup>
Groundwater	PFOS	400 ng/L <sup>b</sup>
Groundwater	PFOA	400 ng/L <sup>b</sup>

Notes:

a Drinking-water action level reported in DEC October 2019 Technical Memorandum.

b DEC groundwater-cleanup level reported in 18 AAC 75.345, Table C.

ng/L = nanograms per liter

### 1.4.1 Summary of PFAS Regulation Changes in Alaska

In May 2016 the U.S. Environmental Protection Agency (EPA) published a Lifetime Health Advisory (LHA) level of 70 nanograms per liter (ng/L) for the sum of PFOS and PFOA in drinking water. The DEC Contaminated Sites Program published groundwater-cleanup levels for PFOS and PFOA in November 2016 of 400 ng/L for each compound individually. Prior to the publication of these levels, there were no state-level cleanup levels established for PFAS.

On August 20, 2018, the DEC published a Technical Memorandum describing a new state action level for PFAS in drinking water. The action level is 70 ng/L for the sum of five PFAS compounds: PFOS, PFOA, PFHpA, PFHxS, and PFNA. The Technical Memorandum includes a separate action level for perfluorobutanesulfonic acid (PFBS).

On April 9, 2019 DEC issued an update to the August 20, 2018 Technical Memorandum rescinding the previous action level to align with EPA's LHA level.

## 1.5 Scope of Services

The Scope of Services described below was proposed in our May 17, 2019 letter submitted to DEC. Modifications were made in coordination with the FAI and research study partners. Field activities are described in detail in Section 2.0. Deviations from our planned scope are described in Section 2.5.

The scope of services summarized in this report includes:

- Installation, development and sampling of two MWs with five-foot screens;
- Analysis of soil grain size from each screened interval;
- Deployment of one five-foot passive flux meter (PFM) per well for analysis of Darcy velocity and PFAS mass flux;
- PlumeStop® injection tests;
- Injection of PlumeStop® in a grid pattern upgradient and cross gradient from the onsite MW;
- Decommissioning of the injection points following PlumeStop® injection;
- Quarterly sampling of groundwater from the onsite MW from fall 2020 to summer 2021; and
- Evaluation of the *in-situ* PlumeStop® remediation of PFAS compounds at the FAI.

This report was prepared for the exclusive use of the FAI, Regeneration, and their representatives. This effort presents our professional judgment as to the conditions of the site. Information presented here is based on the sampling and analyses we performed. This report should not be used for other purposes without our approval or if any of the following occurs:

- Project details change, or new information becomes available, such as revised regulatory levels or the discovery of additional source areas.
- Conditions change due to natural forces or human activity at, under, or adjacent to the project site.
- Assumptions stated in this report have changed.
- If the site ownership or land use has changed.
- Regulations, laws, cleanup levels, or applicable action levels change.
- If the site's regulatory status has changed.

If any of these occur, we should be retained to review the applicability of our analyses and recommendations. This report should not be used for other purposes without Shannon & Wilson's review. If a service is not specifically indicated in this report, do not assume it was performed.

## 2 FIELD ACTIVITIES

This section summarizes field activities performed between July 2019 and March 2021. The following Shannon & Wilson staff participated in the field effort:

- Craig Beebe
- Cherissa Dukelow
- Audrey Freeman
- Marcy Nadel
- Brittany Blood
- Amber Masters
- Veselina Yakimova
- Adam Wyborny
- Justin Risley

These individuals are State of Alaska Qualified Environmental Professionals as defined in 18 AAC 75.333[b]. Copies of Shannon & Wilson's boring logs are included in Appendix A and field notes are included in Appendix B.

## 2.1 Project Design

Before PlumeStop injection could begin, Regenesis and Shannon & Wilson conducted a series of steps called Design Verification Testing (DVT). The purpose of this program was to characterize remedial conditions in the test area. DVT included detailed soil logging and grain-size analysis, groundwater sampling for target and non-target analytes, using PFMs to measure contaminant flux, and injection testing. Shannon & Wilson also provided regional groundwater velocity and gradient information for the Fairbanks vicinity to Regenesis. Upon compilation of the data, Regenesis used design models to estimate the application volumes, quantity of CAC, and anticipated longevity of treatment.

Regenesis, Shannon & Wilson and GeoTek completed the direct push injection application of CAC in the pilot test area in Winter 2019.

### 2.1.1 Monitoring Well Installation

Prior to drilling activities, Shannon & Wilson requested utility locates from local utility providers using the Alaska Digline. Star Electric completed utility locates on private property.

GeoTek installed two groundwater MWs in August 2019. MWs are co-located with soil boring locations, as shown on our soil boring logs (Appendix A). MW locations are shown on Figure 2. Shannon & Wilson coordinated with the property owner, the Alaska Joint Electrical Apprenticeship Training Center at 4782 Dale Road, to install the offsite MW-1904-35 on private property. GeoTek used a Geoprobe Model 8040DT drill rig to install the MWs using DT45 direct-push tooling. The drill rig advanced a solid barrel (4.5-inch outside diameter) direct-push device for collecting continuous core samples of unconsolidated material followed by a hollow stem auger.

GeoTek completed MW-1903-20 using a stickup monument and MW-1904-35 with a flush-mounted monument. Both wells were constructed using two-inch inside-diameter PVC casings. The screens are constructed with pre-pack 0.010-inch slotted screen with 20/40 sand and threaded end caps. The filter pack within the annular space at and around the screened interval is 10/20 silica sand. A bentonite chip seal followed by pea gravel, sand, or natural gravel slough fills the remaining annular space, depending on the well. *Monitoring Well Construction Details* field forms are included in Appendix B.

Onsite well MW-1903-20 was drilled to approximately 20 ft. below ground surface (bgs), screened in the target treatment zone (TTZ) from 15 to 20 ft. bgs. Offsite well MW-1904-35 was drilled to 36 ft. bgs, screened in the TTZ from 31 to 36 ft. bgs.

No sooner than 24 hours after installation, the MWs were developed using a diaphragm pump and surge block until purge water ran clear.

Development water was purged into 55-gallon steel drums to settle prior to being filtered with GAC and discharged to the ground surface. Investigation derived waste (IDW) management is described in Section 2.7.



**Exhibit 2-1: Monitoring well installation.**

### 2.1.2 Baseline Sampling

Immediately following development, we purged the MWs using a submersible whale pump until water parameters stabilized or a total of three well volumes had been purged. We measured the following parameters using a multiprobe water quality meter (YSI): pH, temperature in degrees Celsius (°C), conductivity in microSiemens ( $\mu\text{S}$ ), dissolved oxygen (DO) in milligrams per liter (mg/L), and redox potential in millivolts (mV). Parameters were recorded approximately once every three to five minutes until sample collection. The following values were used to indicate stability for a minimum of three consecutive readings:  $\pm 0.1$  pH,  $\pm 3$  percent °C,  $\pm 10$  percent DO,  $\pm 3$  percent conductivity, and  $\pm 10$  mV redox. Water clarity (visual) was also recorded. Following parameter stabilization, we collected water samples for analysis using laboratory-supplied containers.

Groundwater samples were submitted to Eurofins TestAmerica Inc. (Eurofins TestAmerica) for analysis of 21 PFAS via EPA Method 537M and to SGS North America, Inc. (SGS) for analysis of petroleum compounds, metals, total organic carbon (TOC), and dissolved organic carbon (DOC). Results of August 2019 baseline sampling are presented in Table 1.

In October 2019, Shannon & Wilson collected additional baseline groundwater samples from MW-1903-20 and MW-1904-35 for a longer list of PFAS analytes. These samples were

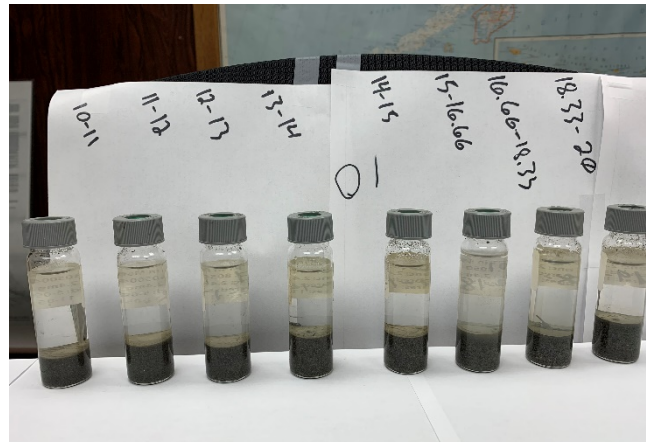
submitted to Eurofins TestAmerica for analysis of 25 PFAS by EPA Method 537M. These results are reported on Table 2.

Copies of the *Monitoring Well Sampling Logs* are included in Appendix B, Field Forms.

### 2.1.3 Grain-Size Analysis

In addition to continuous soil core logging, two samples of subsurface soil from each MW screened interval were analyzed by Shannon & Wilson's materials testing lab in Fairbanks. Sample 19-01, S-4a was collected from 16.7 ft. bgs and sample S-4b was collected from 18.3 ft. bgs in MW-1903-20. The TTZ for the onsite well (MW-1903-20) is comprised of poorly graded sand with silt and gravel (SP-SM) and poorly graded sand (GP).

Sample 19-02, S-7a was collected from 32.9 ft. bgs and S-7b was collected from 34.5 ft. bgs in MW-1904-35. The TTZ for the offsite well is well-graded gravel with sand (GW) to poorly graded sand with gravel (SP).



**Exhibit 2-2: Settling tubes with subsurface soil collected from MW installation.**

Grain size distribution charts are included in Appendix A. Shannon & Wilson's geologist used settling tubes to assist with quantifying the relative percentage of fines when describing subsurface soils (Exhibit 2-2).

### 2.1.4 Passive Flux Meter

On August 5, 2019 EnviroFlux™ PFMs were installed in each MW within the screened interval. The passive flux meters were removed on August 19, 2019 and sent to the University of Florida for analysis of Darcy velocity and PFAS mass flux. In MW-1903-20 the PFM was analyzed for two vertical intervals, 16.4 to 18.1 ft. bgs and 18.4 to 20.1 ft bgs. In MW-1904-35 the PFM was analyzed for 32.0 to 34.1 ft. bgs and 34.3 to 35.9 ft bgs. Darcy velocity and mass flux tables are included with the analytical data in Appendix C.

Groundwater seepage velocity was estimated based on the division of the resulting Darcy velocity by estimated soil porosity in the TTZ (Regenesis, 2019). Seepage velocity and mass flux data were collected to allow design of accurate carbon loading rates. Regenesis used

modeling software PlumeForce™ to determine the quantity of carbon needed to capture the PFAS species present at their respective flux rates and relative isotherm values.

## 2.2 PlumeStop® Injection

In October and November 2019, Regenesis and GeoTek began preparations for PlumeStop® injections. They collected groundwater elevation measurements and performed injection testing using pre-field design estimations. GeoTek advanced each injection point. CAC was injected by advancing a two-foot multi-port injection tool and injecting material in one- or two-foot intervals.

Post-injection direct push soil cores were collected by GeoTek to observe PlumeStop® staining in the length of the core. Where necessary, Regenesis increased the volume of PlumeStop® to improve dispersion in the next injection point. PFAS-free water was used to mix and dilute the PlumeStop®. Several pumps and alternative methods were attempted during the injection effort to improve dispersion in the subsurface. Photographs are included in Appendix E.



**Exhibit 2-3: PlumeStop® and water containers at the injection site.**

In total, Regenesis and GeoTek injected approximately 8,470 gallons of PlumeStop at 20 injection points around MW-1903-20. Injection point locations are shown on Figure 3.

Local conditions at MW-1903-20 were significantly more transmissive than suggested by regional aquifer-wide values, pre-injection soil grain-size analysis, and the PFM results. As a result, the PlumeStop® dosing ratio and injection spacing were modified during the field effort by slowing the injection rate and changing the injection pump to match field conditions. After discussions regarding budget constraints and additional time required due to subsurface conditions, Shannon & Wilson, FAI, and Regenesis decided not to move forward with PlumeStop® injection at the offsite location.



## 2.3 Temporary Well Points

On October 28, 2019, GeoTek, Regenesis, and Shannon & Wilson installed two temporary well points (TWPs) near MW-1903-20. These TWP were installed to measure groundwater elevation during PlumeStop® injection. TWPs were installed upgradient of MW-1903-20 using 1-inch diameter PVC casing, with 10 ft. of slotted screen from 4 to 14 ft. bgs. TWP-1 was installed to the southeast of MW-1903-20 and TWP-2 was installed to the northeast (Figure 3). TWPs were purged using a peri-pump after installation. Purge water was filtered onsite using GAC before being discharged to the ground surface (Section 2.7).

Regenesis and Shannon & Wilson measured relative groundwater elevations in TWP-1, TWP-2, and MW-1903-20 to determine the localized hydraulic gradient and flow direction.

### 2.3.1 Groundwater Flow Direction

Groundwater flow direction was calculated by entering the depth to water measurements from TWP-1, TWP-2, and MW-1903-20 into the EPA-Online Hydraulic Gradient Calculator. The flow varied from a west-southwest to northwest direction from October 2019 through March 2021. A hydraulic gradient could not be calculated from measurements collected in June 2021 because the TWPs became frost jacked and a new survey of the measuring point was not performed. Calculated groundwater gradient results are shown in Exhibit 2-4 and groundwater gradient measurements are included as Appendix D. Variations in groundwater flow direction during the reporting period are within the range anticipated during project design.

#### Exhibit 2-4: Hydraulic Gradient Monitoring Results

Month and Year	Degrees <sup>a</sup>	Direction
October 2019	249	West Southwest
December 2019	273	West
March 2020	284	West
September 2020	273	West
December 2020	310	Northwest
March 2021	292	West Northwest

Notes:

a Calculated using EPA Online-Tools Hydraulic Gradient Calculator.

## 2.4 Post-Injection Monitoring

Due to high concentrations of PlumeStop® injectate suspended in the groundwater, Shannon & Wilson was unable to submit an analytical MW sample immediately following the PlumeStop® injections. The concentration of suspended PlumeStop® in the groundwater samples was too high for commercial laboratory analysis.

In December 2019, Shannon & Wilson collected and sent a groundwater sample from MW-1903-20 to Regenesis' California laboratory to remove entrained PlumeStop® using a centrifuge prior to submittal to Eurofins TestAmerica. The December 2019 sample was analyzed for 25 PFAS via EPA Method 537M. Groundwater samples collected in March 2020 and June 2020 were sent to the Regenesis laboratory for analysis of CAC concentrations. These samples were not submitted to analytical laboratories for analysis of PFAS due to sample hold-time constraints and budgetary concerns (i.e., budget was retained for samples that could be analyzed). The MW was checked monthly from February to September 2020 to determine the amount of suspended CAC.

By September 2020, the amount of PlumeStop® CAC in the groundwater had decreased to levels that would allow for analysis to commercial laboratories without pre-submittal centrifuging. Over time the CAC had settled or parked in the aquifer pore space. Quarterly samples were collected and submitted to the analytical laboratories on September 17, 2020, December 22, 2020, March 16, 2021, and June 17, 2021. Copied of our *Monitoring Well Sampling Logs* are included in Appendix B.

During sampling, Shannon & Wilson purged and sampled the MW using a submersible pump or peri-pump following the procedures described in Section 2.1.2 above. Following parameter stabilization, we collected groundwater samples using laboratory-supplied containers. Groundwater samples were submitted to Eurofins TestAmerica for analysis of 25 PFAS and to SGS for analysis of calcium, magnesium, TOC, and DOC.



**Exhibit 2-5: Groundwater samples collected on September 17, 2020.**

## 2.5 Deviations

In general, we conducted our services in accordance with the approved plans and research proposals. The following are deviations from the approved plans.

- Our proposed scope of services included PFM analysis for Darcy velocity because PFAS mass flux analysis was not available when the study was outlined. The PFMs were submitted for PFAS mass flux in addition to Darcy velocity.
- Our proposed research plan indicated 12 to 17 PlumeStop® injection points and injection of 4,400 pounds (lbs.) of undiluted PlumeStop® at each MW. Due to unexpected challenges, 20 injection points were installed near MW-1903-20 and over 8,000 lbs. of diluted PlumeStop® was injected.
- Due to an increase in injections points and amount of PlumeStop® at MW-1903-20, the individual well budget was exceeded, and the remaining pilot study tasks re-evaluated. The pilot study site was reduced to only the vicinity of the onsite well, MW-1903-20.
- Initially, Shannon & Wilson had planned to monitor PFAS, metals, and carbon concentrations in the MW monthly for the first three months. Monitoring was postponed due to PlumeStop remaining in suspension and COVID-related project delays. The MW was sampled quarterly for one year beginning in September 2020, and ending 19 months after injection.

## 2.6 Sample Custody, Storage, and Shipping

Immediately after collection, groundwater samples were placed in individual Ziploc bags and stored in a designated sample cooler maintained between 0 °C and 6 °C with ice substitute. Shannon & Wilson maintained custody of the samples until submitting them to the laboratory for analysis.

Shannon & Wilson submitted samples for analysis of PFAS to Eurofins TestAmerica using Alaska Airlines Cargo's Goldstreak service. For shipping we packaged analytical samples and chain-of-custody forms in a hard-sided cooler with an adequate quantity of ice substitute. The samples were packaged as necessary to prevent bottle breakage, in a liner bag, and sealed with custody seals on the outside of each cooler. Samples submitted to SGS were hand delivered to the local receiving office.

## 2.7 Investigation Derived Waste

Purge water generated during well development and water used to decontaminate the drill augers was filtered through a GAC system. Water was collected into 55-gallon steel drums to settle priors to filtration through GAC. Following GAC treatment, the water was

discharged to the ground surface. Soil drill cuttings were spread on the ground surface in the vicinity of each MW.

Shannon & Wilson's MW tubing, direct push soil liners, nitrile gloves, and other disposable investigation-derived waste were brought to the municipal landfill.

### 3 ANALYTICAL METHODS AND RESULTS

Shannon & Wilson submitted the analytical samples to Eurofins TestAmerica in West Sacramento, California, for determination of PFAS using EPA Method 537M. Groundwater samples were also submitted to SGS for analysis of petroleum compounds, carbon, and metals. Baseline sample results for both MWs are presented in Table 1. The analytical results for post-injection monitoring at MW-1903-20 are presented in Table 2.

Analytical laboratory reports, corresponding DEC Laboratory Data-Review Checklists (LDRCs), and our Quality Control, Quality Assurance summary (QA/QC) are included in Appendix C. The pilot study was designed to sequester PFOS, PFOA, PFHxS, PFNA, and PFHpA; however, additional PFAS detected in groundwater samples are discussed in this section. Groundwater results were compared to the drinking-water action level presented in DEC's October 2019 Technical Memorandum of 70 ng/L for the sum of PFOA and PFOS. Fully fluorinated PFAS compounds such as PFOS, PFHpS, PFHxS, and PFBS are chemically similar but vary in compound size, namely the length of the carbon-fluorine chain. The chain length is commonly referred to as 'C8' for eight carbons, 'C6' for six carbons, etc.

Prior to the injection of PlumeStop®, we collected baseline analytical groundwater samples from MW-1903-20 in August and October 2019. The highest concentrations of PFAS included PFHxS detected at 530 ng/L; PFOS detected at 280 ng/L; PFOA detected at 240 ng/L; and perfluorohexanoic acid (PFHxA) at 200 ng/L. PFBA, PFBS, PFPeA, PFHpA, PFHpS, and FOSA were also detected in baseline groundwater samples (Table 2). The detected analytes vary in chain length from C4 to C8 carbons long.

The first post-injection sample collected in December 2019 showed detectable results of PFOS below the laboratory reporting limit (RL). Other PFAS analytes were not detected in the sample collected in December 2019.

PFOS was also detected below the RL in the project sample and field duplicate collected on September 17, 2020 (Table 2). PFOA was not detected in the groundwater and field duplicate sample collected from MW-1903-20 on September 17, 2020. PFOS and PFOA were

not detected in quarterly groundwater samples collected in December 2020, March 2021, or June 2021.

PFBA was detected in baseline samples and post-injection samples, except for the December 2019 sample. PFBA is C4 PFAS compound, one of the smallest PFAS compounds. PFBA concentrations ranged from 20 to 25 ng/L. Post-injection PFBA concentrations were between 80 and 88 percent of baseline.

PFBS was detected at 100 ng/L in the August 2019 baseline sample. PFBS is also a C4 PFAS compound. The analyte remained not detected until the March 2021 and June 2021 sampling events where it was detected at an estimated concentration below the RL.

PFPeA was detected at 58 ng/L in the October 2019 baseline sample. PFPeA is slightly larger at five carbons long (C5). The analyte was detected in September 2020 at 5.6 ng/L and in each subsequent sampling event at an increasing concentration. Post-injection PFPeA concentrations were approximately 10 percent of baseline concentration when detected in September 2020, and nearly 50 percent of baseline concentration in June 2021.

## 4 DISCUSSION

We present here our discussion relevant to the effectiveness of PlumeStop® as an *in situ* treatment option for mitigating the transportation of PFAS in groundwater near the FAI.

### 4.1 PlumeStop® Injection Lessons Learned

In a 2019 report summarizing the outcomes of PlumeStop® application at the FAI, Regensis states that the pilot study has provided logistical benchmarks for future work at the FAI and other sites in Alaska. PlumeStop® injection challenges at the FAI indicate a need to apply larger volumes of CAC to achieve adequate distribution. This would require changes to the injection setup including pump size, manifold configurations, and tank capacity. GeoTek and Regensis have begun the process of designing a system that addresses the challenges encountered during PlumeStop® application at the FAI (Regensis, 2019). The summary report produced by Regensis is included in Appendix E.

This pilot study was designed to target the former DEC "sum of 5" action level for one year. This means we could expect breakthrough of PFOS, PFOA, PFHxS, PFHpA, and/or PFHpA beginning with the December 2020 sample. Instead, we see partial breakthrough of the short-chain compounds PFBA (85 percent) and PFPeA (20 percent). Small carboxylic acids such as these compounds are more difficult to filter.

## 4.2 Mitigation of PFAS at the FAI

Initial baseline sampling of groundwater in MW-1903-20 showed PFOS and PFOA concentrations over seven times the LHA level. PFHxS and PFHpA were detected at 530 ng/L and 24 ng/L, respectively. PFNA was not detected in August 2019 baseline samples. Two months after PlumeStop® injection, groundwater samples collected from MW-1903-20 had an estimated detection of PFOS below the RL. Other PFAS analytes were not detected. As of December 2020, PFOS, PFOA, PFHpA, PFHxS, and PFNA were not detected in the post-injection samples (Table 2). These results indicate that PlumeStop® effectively treated PFOS and PFOA in groundwater at the FAI for nearly twenty months.

Out of eight other PFAS analytes that were detected in the baseline samples, three analytes had detectable results twenty months after PlumeStop® injection, including PFBA, PFBS, and PFPeA. These analytes contain fewer carbons in their chemical structure (short-chain) and are displaced from the CAC sites by larger chain PFAS analytes. GAC is known to perform poorly in sorbing short-chain PFAS compared to long-chain PFAS, such as PFOS and PFOA. The pilot study indicates that PlumeStop® is less effective at long-term treatment of short-chain PFAS. However, we note that the pilot study was not designed to target these analytes.

## 4.3 Recommendations

Based on the results of the pilot study and our previous work at the FAI, Shannon & Wilson recommends the DOT&PF:

- monitor PFAS, TOC, and DOC concentrations in MW-1903-20 annually to continue to evaluate the long-term effectiveness of CAC for *in situ* treatment of PFAS at the FAI;
- consider additional PlumeStop® applications near the FAI where AFFF was used, as a barrier between source areas and offsite locations where there is potential for impacts to private water supply wells and surface water bodies used for fishing or by animals;
- work with Regenesis to evaluate the potential for PlumeStop® treatment at other DOT&PF PFAS sites throughout Alaska.

## 5 REFERENCES

Alaska Department of Environmental Conservation (DEC), 2017, 18 AAC 75: Oil and other hazardous substances pollution control: Juneau, Alaska, July, available:

<http://dec.alaska.gov/commish/regulations/>

Alaska Department of Environmental Conservation (DEC), 2017, Data quality objectives, checklists, quality assurance requirements for laboratory data, and sample handling: Juneau, Alaska, March.

Alaska Department of Environmental Conservation (DEC), 2017, Site characterization work plan and reporting guidance for investigation of contaminated sites: Juneau, Alaska, DEC Division of Spill Prevention and Response, Contaminated Sites Program, March, available: [http://dec.alaska.gov/spar/csp/guidance\\_forms/csguidance.htm](http://dec.alaska.gov/spar/csp/guidance_forms/csguidance.htm).

Alaska Department of Environmental Conservation (DEC), 2019, Field sampling guidance: Juneau, Alaska, DEC Division of Spill Prevention and Response, Contaminated Sites Program, August, available:

[http://dec.alaska.gov/spar/csp/guidance\\_forms/csguidance.htm](http://dec.alaska.gov/spar/csp/guidance_forms/csguidance.htm).

Regenesis, 2018, Breakthrough Treatment for PFAS. Case Study: First Demonstrated *In Situ* Treatment Solution for PFOA/PFOS at Former Industrial Site. Prepared by Regenesis, 2018.

Regenesis, 2019, Application Summary Report for PlumeStop Pilot Testing at the Fairbanks International Airport Site (MW-1903-20), prepared for Shannon & Wilson by Regenesis, December 5, 2019.

U.S. Environmental Protection Agency (EPA), 2016, Drinking water health advisory for perfluorooctanoic acid (PFOA), Document Number 822-R-16-005: Washington, DC, U.S. EPA Office of Water, Health and Ecological Criteria Division, May, available:

[https://www.epa.gov/sites/production/files/2016-05/documents/pfoa\\_health\\_advisory\\_final\\_508.pdf](https://www.epa.gov/sites/production/files/2016-05/documents/pfoa_health_advisory_final_508.pdf)

**Table 1. Summary of August 2019 Baseline Monitoring Well Analytical Results**

Analytical Method	Analyte	Sample Name	MW-1903-20	MW-1904-35
		Sample Date	8/2/2019	8/2/2019
EPA 537 (modified)	Perfluoro-octane sulfonate (PFOS)	ng/L	<b>270</b>	15 J
	Perfluoro-octanoic acid (PFOA)	ng/L	<b>240</b>	30
	Perfluoro-hexansulfonic acid (PFHxS)	ng/L	530	570
	Perfluorohexanoic acid (PFHxA)	ng/L	200	150
	Perfluoroheptanesulfonic Acid (PFHpS)	ng/L	11 J	<18
	Perfluoro-heptanoic acid (PFHpA)	ng/L	24	29
	Perfluorobutane-sulfonic acid (PFBS)	ng/L	100	56
	Perfluorobutanoic acid (PFBA)	ng/L	24	23
	Perfluoropentanoic acid (PFPeA)	ng/L	55	22
	Perfluorodecanesulfonic acid (PFDS)	ng/L	<18	<18
	Perfluorodecanoic acid (PFDA)	ng/L	<18	<18
	Perfluorododecanoic acid (PFDoA)	ng/L	<18	<18
	Perfluoro-nonanoic acid (PFNA)	ng/L	<18	<18
	Perfluorooctane Sulfonamide (FOSA)	ng/L	<18	<18
	Perfluorotetradecanoic acid (PFTeA)	ng/L	<18	<18
	Perfluorotridecanoic Acid (PFTriA)	ng/L	<18	<18
	Perfluoroundecanoic acid (PFUnA)	ng/L	<18	<18
	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	ng/L	<180	<180
	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	ng/L	<180	<180
	6:2 FTS	ng/L	<180	<180
8:2 FTS	ng/L	<180	<180	
AK101	Gasoline Range Organics (GRO)	mg/L	<0.0500	<0.0500
AK102	Diesel Range Organics (DRO)	mg/L	<0.566 B*	<0.577 B*
AK103	Residual Range Organics (RRO)	mg/L	<0.236	0.176 J
SW8260C	Benzene	µg/L	<0.200	<0.200
	Ethylbenzene	µg/L	<0.500	<0.500
	o-Xylene	µg/L	<0.500	<0.500
	P & M -Xylene	µg/L	<1.00	<1.00
	Toluene	µg/L	<0.500	<0.500
	Total Xylenes	µg/L	<1.50	<1.50
EP200.8	Calcium	mg/L	90.0	71.7
	Dissolved Iron	mg/L	14.5	5.36
	Total Iron	mg/L	16.8	12.1
	Dissolved Magnesium	mg/L	22.9	17.2
	Total Magnesium	mg/L	23.0	17.7
SM 5310B	Total Organic Carbon	mg/L	4.74	4.16
SM 5310B	Dissolved Organic Carbon	mg/L	4.53	4.15

ng/L nanograms per liter

µg/L micrograms per liter

mg/L milligrams per liter

**Bold** Concentration exceeds Environmental Protection Agency (EPA) Lifetime Health Advisory (LHA) Level of 70 ng/L for PFOS and PFOA combined.

&lt; Analyte not detected; listed as less than the reporting limit.

J Estimated concentration, detected greater than the method detection limit and less than the reporting limit. Flag applied by laboratory.

B\* Result considered not detected due to contamination present in method control blank. Flag applied by S&amp;W.



**Table 2. Summary of MW-1903-20 Results August 2019 Through June 2021**

Sample Name				MW-1903-20									
Description				Baseline		Post-Injection (Centrifuged)	Samples sent to Regenesis lab only		Post-Injection (Water somewhat clear)		Post-Injection (Slightly clearer)	Post-Injection (Clearer still)	Post-Injection (Clearer still)
Analyte	Chain Length	EPA LHA	Units	8/2/19	10/25/19	12/17/19	3/13/20	6/16/20	9/17/20		12/22/20	3/16/21	6/17/21
Perfluorobutanoic acid (PFBA)	C4	-	ng/L	24	25	<1.9 B*	-	-	21	21	21	22	20
Perfluorobutanesulfonic acid (PFBS)	C4	-	ng/L	100	96	<1.8	-	-	<1.8	<1.7	<1.8	0.29 J	0.29 J
Perfluoropentanoic acid (PFPeA)	C5	-	ng/L	55	58	<1.8	-	-	5.6	4.8	12	23	27
Perfluorohexanoic acid (PFHxA)	C6	-	ng/L	200	190	<1.8	-	-	<1.8	<1.7	<1.8	<1.8	<1.8
Perfluorohexanesulfonic acid (PFHxS)	C6	-	ng/L	530	470 J*	<1.8 B*	-	-	<1.8	<1.7	<1.8	<1.8	<1.8
Perfluoroheptanoic acid (PFHpA)	C7	-	ng/L	24	22	<1.8	-	-	<1.8	<1.7	<1.8	<1.8	<1.8
Perfluoroheptanesulfonic Acid (PFHpS)	C7	-	ng/L	11 J	11	<1.8	-	-	<1.8	<1.7	<1.8	<1.8	<1.8
Perfluorooctanoic acid (PFOA)	C8	70†	ng/L	<b>240</b>	<b>220</b>	<1.8	-	-	<1.8	<1.7	<1.8	<1.8	<1.8
Perfluorooctanesulfonic acid (PFOS)	C8		ng/L	<b>270</b>	<b>280</b>	1.2 J*	-	-	0.53 J*	1.5 J*	<1.8	<1.8	<1.8
Perfluorooctanesulfonamide (FOSA)	C8	-	ng/L	<18	0.35 J	<1.8	-	-	1.0 J	1.2 J	<1.8	<1.8	<1.8
Perfluorononanoic acid (PFNA)	C9	-	ng/L	<18	<1.8	<1.8	-	-	<1.8	<1.7	<1.8	<1.8	<1.8
Perfluorodecanoic acid (PFDA)	C10	-	ng/L	<18	<1.8	<1.8	-	-	<1.8	<1.7	<1.8	<1.8	<1.8
Perfluorodecanesulfonic acid (PFDS)	C10	-	ng/L	<18	<1.8	<1.8	-	-	<1.8	<1.7	<1.8	<1.8	<1.8
Perfluoroundecanoic acid (PFUnA)	C11	-	ng/L	<18	<1.8	<1.8	-	-	<1.8	<1.7	<1.8	<1.8	<1.8
Perfluorododecanoic acid (PFDoA)	C12	-	ng/L	<18	<1.8	<1.8	-	-	<1.8	<1.7	<1.8	<1.8	<1.8
Perfluorotridecanoic acid (PFTriA)	C13	-	ng/L	<18	<1.8	<1.8	-	-	<1.8	<1.7	<1.8	<1.8	<1.8
Perfluorotetradecanoic acid (PFTeA)	C14	-	ng/L	<18	<1.8	<1.8 J*	-	-	<1.8	<1.7	<1.8	<1.8	<1.8
6:2 FTS	-	-	ng/L	<180	<18	<18	-	-	<4.4	<4.4	<4.6	<4.4	<4.6
8:2 FTS	-	-	ng/L	<180	<18	<18	-	-	<1.8	<1.7	<1.8	<1.8	<1.8
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	-	-	ng/L	<180	<18	<18	-	-	<4.4	<4.4	<4.6	<4.4	<4.6
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	-	-	ng/L	<180	<18	<18	-	-	<4.4	<4.4	<4.6	<4.4	<4.6
9Cl-PF3ONS	-	-	ng/L	-	<1.8	<1.8	-	-	<1.8	<1.7	<1.8	<1.8	<1.8
11Cl-PF3OUdS	-	-	ng/L	-	<1.8	<1.8	-	-	<1.8	<1.7	<1.8	<1.8	<1.8
HFPO-DA (associated with GenX)	-	-	ng/L	-	<3.6	<3.6	-	-	<3.5	<3.5	<3.7	<3.5	<3.7
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	-	-	ng/L	-	<1.8	<1.8	-	-	<1.8	<1.7	<1.8	<1.8	<1.8
Calcium	-	-	mg/L	90.0	-	-	-	-	99.4	94.2	103	83.7 J	109
Dissolved Iron	-	-	mg/L	14.5	-	-	-	-	-	-	-	-	-
Total Iron	-	-	mg/L	16.8	-	-	-	-	-	-	-	-	-
Dissolved Magnesium	-	-	mg/L	22.9	-	-	-	-	-	-	-	-	-
Total Magnesium	-	-	mg/L	23.0	-	-	-	-	25.1	24.2	25.5	20.9	25.6
Total Organic Carbon	-	-	mg/L	4.74	-	-	-	-	39.4	43.8	24.6	9.35	6.27
Dissolved Organic Carbon	-	-	mg/L	-	-	-	-	-	24.6	21.4	-	3.58	3.14
Activated Carbon	-	-	mg/L	-	-	2,532	230	167	-	-	-	-	-

ng/L nanograms per liter, equivalent to parts per trillion  
 mg/L milligrams per liter, equivalent to parts per million  
 EPA Environmental Protection Agency  
 LHA Lifetime Health Advisory  
 † EPA LHA level is 70 ppt for PFOS and PFOA combined.  
 - Action level not established or sample not submitted.  
 < Analyte not detected; listed as less than the reporting limit (RL) unless otherwise flagged due to quality-control (QC) failures.  
**Bold** Concentration exceeds LHA level.  
 J Estimated concentration, detected greater than the method detection limit (MDL) and less than the RL. Flag applied by the laboratory.  
 J\* Result considered estimated due to a QC failure. Flag applied by Shannon & Wilson, Inc.  
 B\* Result is included in the same preparatory batch as a blank detection for the associated analyte. Flag applied by Shannon & Wilson, Inc.

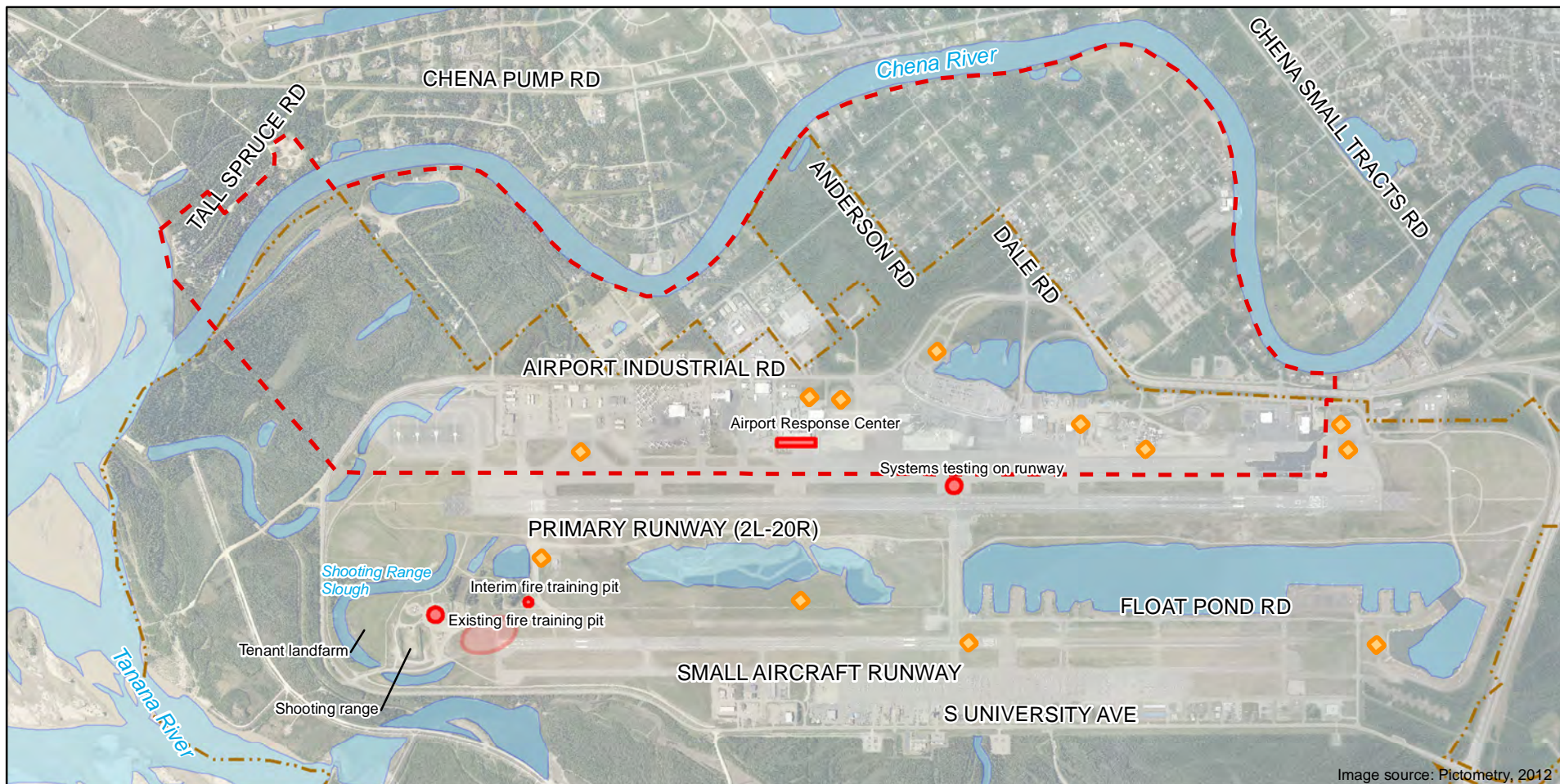
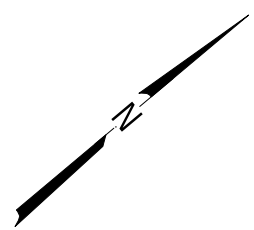
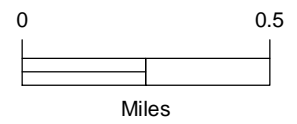


Image source: Pictometry, 2012

**LEGEND**

- PFAS-impacted Area
- Aircraft Rescue and Firefighting (ARFF) Training Sites
- ARFF Site, Approx.
- FAI Boundary
- ARFF Emergency Response Sites



Fairbanks International Airport Fairbanks, Alaska	
<b>FAIRBANKS INTERNATIONAL AIRPORT VICINITY</b>	
December 2021	102519-005
<b>SHANNON &amp; WILSON, INC.</b> <small>GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS</small>	
<b>Figure 1</b>	

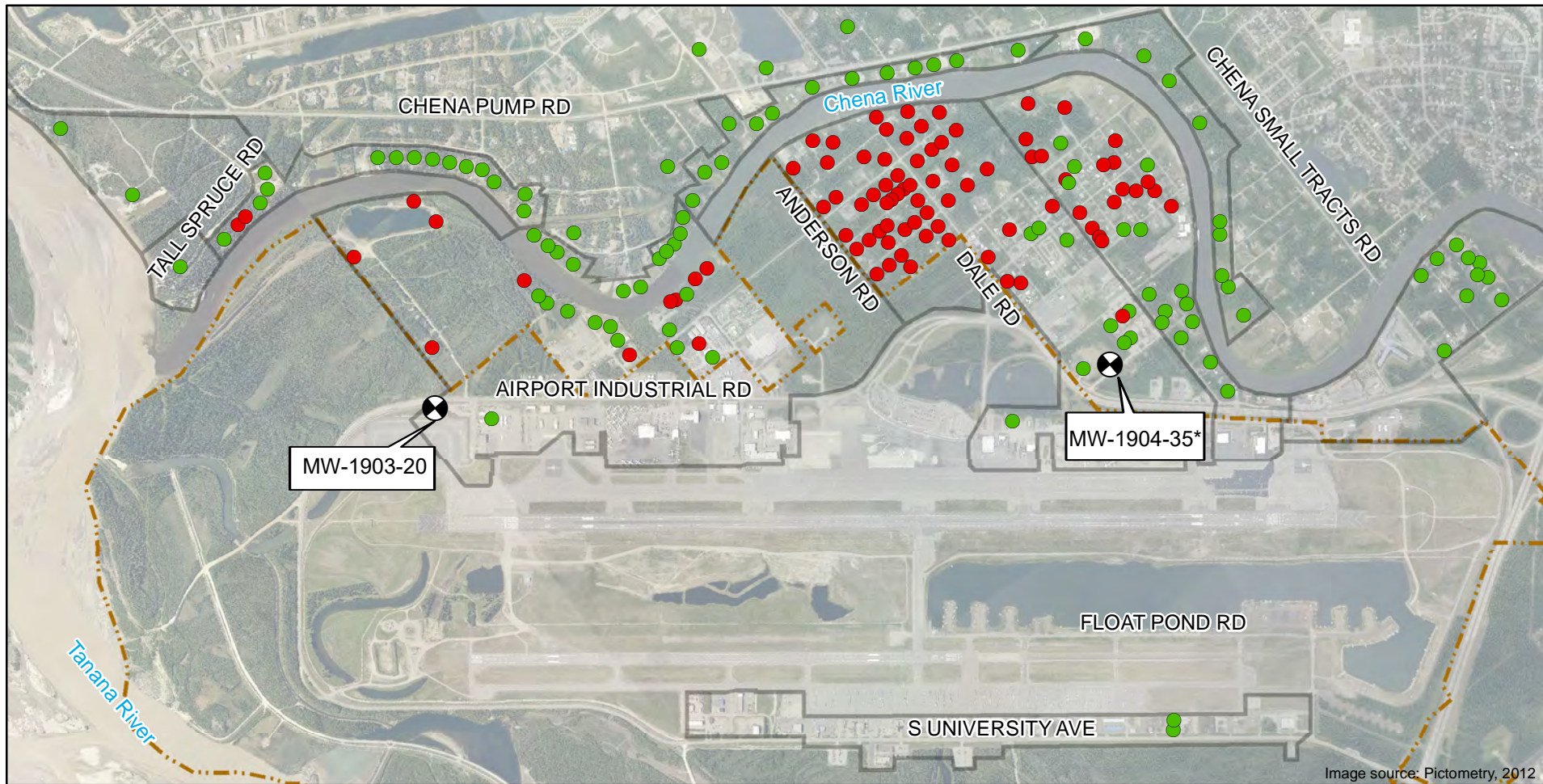





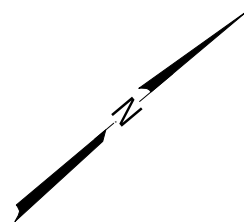
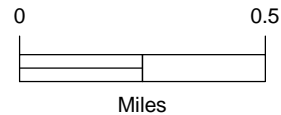
Image source: Pictometry, 2012

**LEGEND**

- Maximum combined (PFOS+PFOA) result under effective Lifetime Health Advisory Level (65 ppt)
- Over 65 ppt

-  MW locations
-  Well Search Areas
-  FAI Boundary

\* MW-1904-35 vicinity did not receive PlumeStop injections



Fairbanks International Airport  
Fairbanks, Alaska

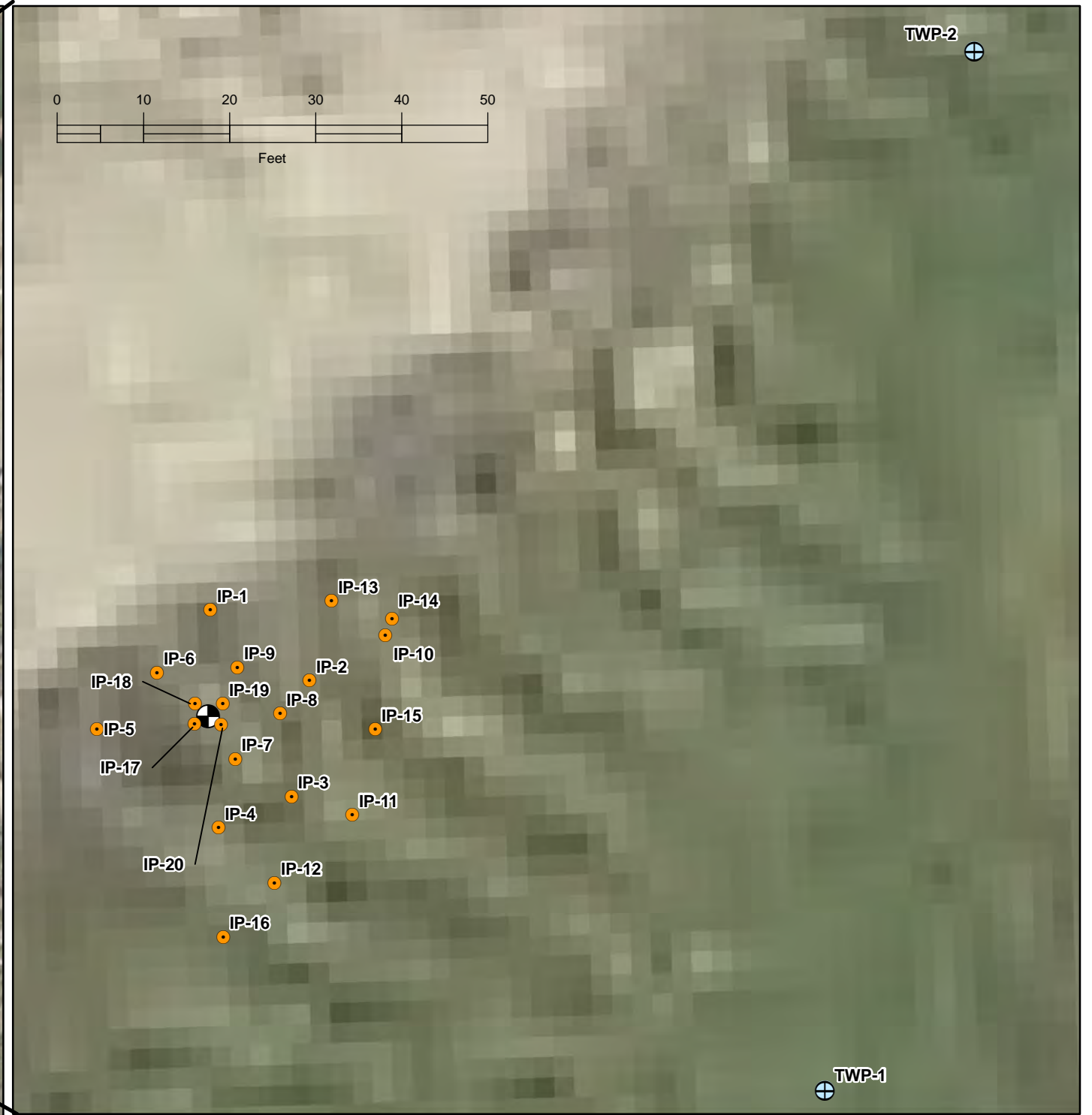
**MONITORING WELL  
LOCATIONS**

December 2021

102519-005

**SHANNON & WILSON, INC.**  
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

**Figure 2**



**LEGEND**

- Injection Point
- ⊕ PlumeStop Monitoring Well
- ⊕ Temporary Well Point



Fairbanks International Airport Fairbanks, Alaska	
<b>INJECTION LOCATIONS</b>	
December 2021	102519-005
SHANNON & WILSON, INC. <small>GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS</small>	<b>Figure 3</b>

## Appendix A

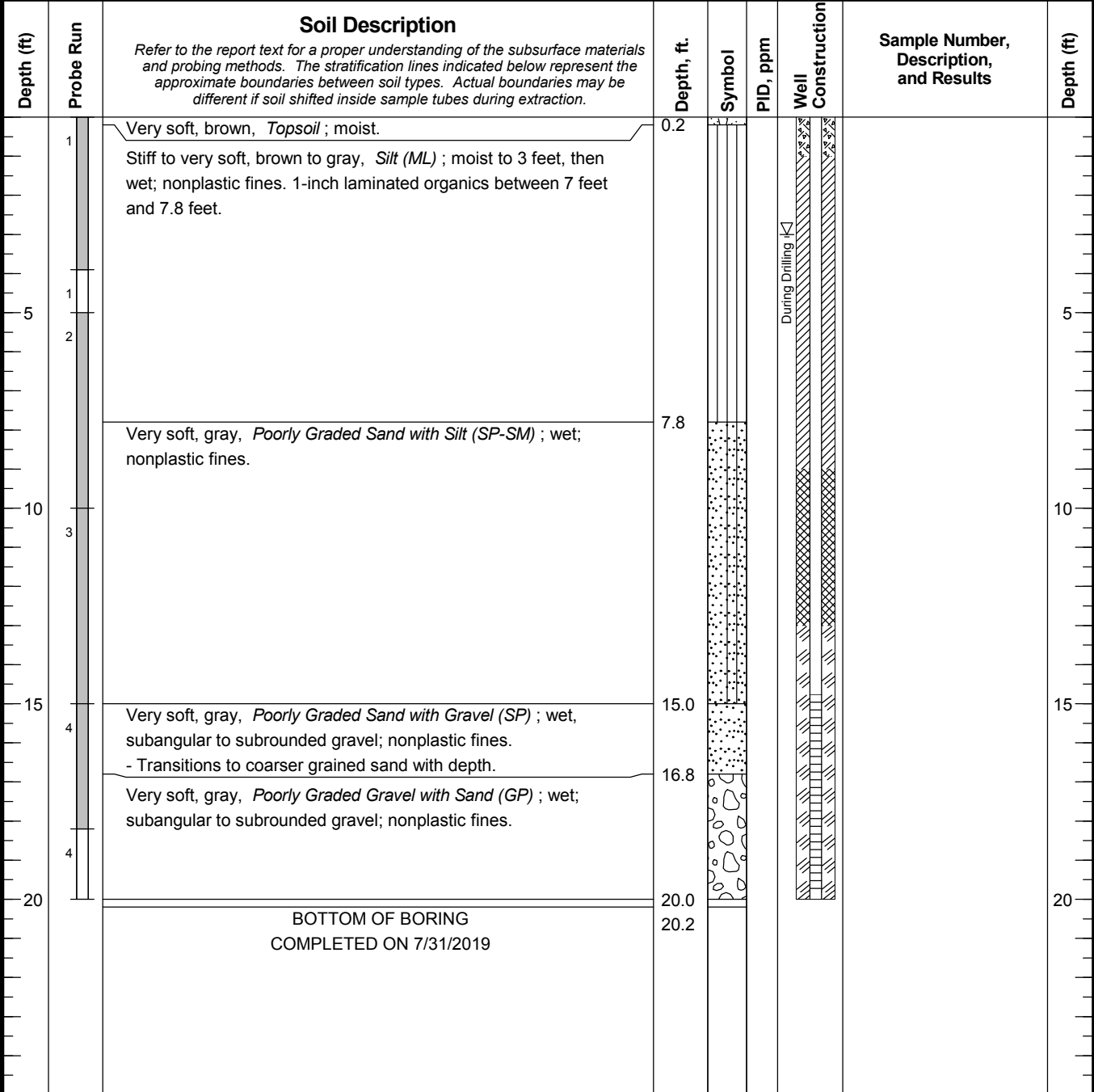
# Subsurface Soil Conditions

### CONTENTS

- Soil Boring Logs
- Grain Size Distribution

# LOG OF GEOPROBE

Date Started	7/31/19	Location	Fairbanks International Airport	Ground Elevation:	NA
Date Completed	7/31/19			Typical Run Length	5 feet
Total Depth (ft)	20.0	Drilling Company:	GeoTek Alaska	Hole Diameter:	3.75 inches



Typ: CAB  
 Rev: DYM  
 Log: CAB  
 GPJ 9/17/19  
 21-20447  
 11-4-06050-656  
 GPJ  
 WELL

### NOTES

1. In some cases where recovery was low in the upper part of the run, the soil sample may have slid down in the tube prior to removal from the ground.
2. Groundwater level, if indicated above, was estimated during probing and should be considered approximate.
3. Refer to KEY for definitions and explanation of symbols.
4. CT = corrosion test sample; TR = thermal resistivity sample; EN = environmental sample; GE = geotechnical sample; AR = archeological sample.

### LEGEND

- |   |   |  |
|---|---|--|
| 2" Plastic Tube - No Soil Recovery<br>2" Plastic Tube with Soil Recovery<br>Run No. | Piezometer Screen and Sand Filter<br>Ground Water Level ATD |  |
|---|---|--|

PlumeStop Fairbanks, Alaska	
<h2 style="margin: 0;">LOG OF GEOPROBE 19-03</h2>	
August 2019	11-4-06060-656
<b>SHANNON &amp; WILSON, INC.</b> Geotechnical and Environmental Consultants	<b>Figure A-1</b>

# LOG OF GEOPROBE

Date Started	7/31/19	Location	IBEW - Kornfeind Training Center
Date Completed	7/31/19	Ground Elevation:	NA
Total Depth (ft)	35.0	Drilling Company:	GeoTek Alaska
		Typical Run Length	5 feet
		Hole Diameter:	3.75 inches

Depth (ft)	Probe Run	Soil Description	Depth, ft.	Symbol	PID, ppm	Well Construction	Sample Number, Description, and Results	Depth (ft)
	1	Very soft, brown, <i>Topsoil</i> ; moist.	0.1					
		Stiff to very soft, brown, <i>Silt (ML)</i> ; moist; little to trace organics; nonplastic fines.			7.1			
		Very stiff to medium stiff, brown, <i>Silt with Sand (ML)</i> ; moist; nonplastic fines.	2.9					
5	1	Very soft, brown, <i>Poorly Graded Gravel with Silt and Sand (GP-GM)</i> ; moist; subangular to subrounded gravel; nonplastic fines.	5.0		9			5
	2	Very soft to soft, brown, <i>Sand with Silt (SP-SM)</i> ; wet; nonplastic fines.	8.1		9.1			
		Very soft, brown, <i>Poorly Graded Gravel with Silt and Sand (GP-GM)</i> ; wet; subangular to subrounded gravel; nonplastic fines.	10.0		10.8			
10	3	Very soft, gray, <i>Poorly Graded Gravel with Sand (GP)</i> wet; subangular to subrounded gravel; interbedded sand between 18 and 19 feet; nonplastic fines.	15.0		9.1			10
					10.8			
15	4				11.1			15
					10.5			
20	5							20
	5							

CONTINUED NEXT PAGE

NOTES

1. In some cases where recovery was low in the upper part of the run, the soil sample may have slid down in the tube prior to removal from the ground.
2. Groundwater level, if indicated above, was estimated during probing and should be considered approximate.
3. Refer to KEY for definitions and explanation of symbols.
4. CT = corrosion test sample; TR = thermal resistivity sample; EN = environmental sample; GE = geotechnical sample; AR = archeological sample.

LEGEND

2" Plastic Tube with Soil Recovery	Piezometer Screen and Sand Filter
2" Plastic Tube - No Soil Recovery	Ground Water Level ATD

Run No.

PlumeStop  
Fairbanks, Alaska

**LOG OF GEOPROBE 19-04**

August 2019 11-4-06060-656

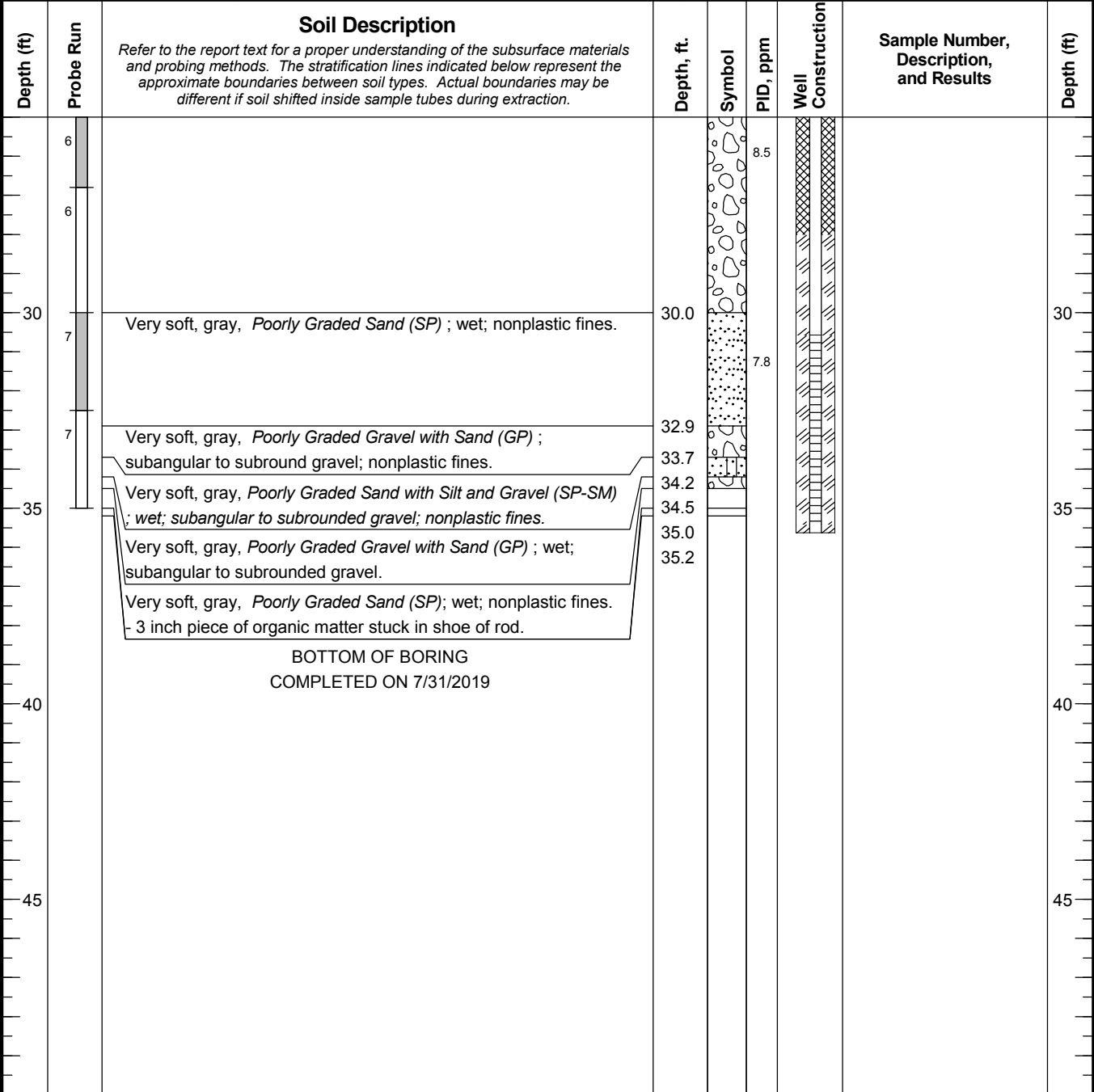
**SHANNON & WILSON, INC.**  
Geotechnical and Environmental Consultants

**Figure A-2**  
Sheet 1 of 2

GEOPROBE WELL 11-4-06050-656.GPJ 21-20447.GPJ 9/17/19 Log: CAB Rev: DYM Typ: CAB

# LOG OF GEOPROBE

Date Started	7/31/19	Location	IBEW - Kornfeind Training Center
Date Completed	7/31/19	Ground Elevation:	NA
Total Depth (ft)	35.0	Typical Run Length	5 feet
		Drilling Company:	GeoTek Alaska
		Hole Diameter:	3.75 inches



Typ: CAB  
 Rev: DYM  
 Log: CAB  
 GPJ 9/17/19  
 11-4-06050-656  
 GPJ 21-20447

### NOTES

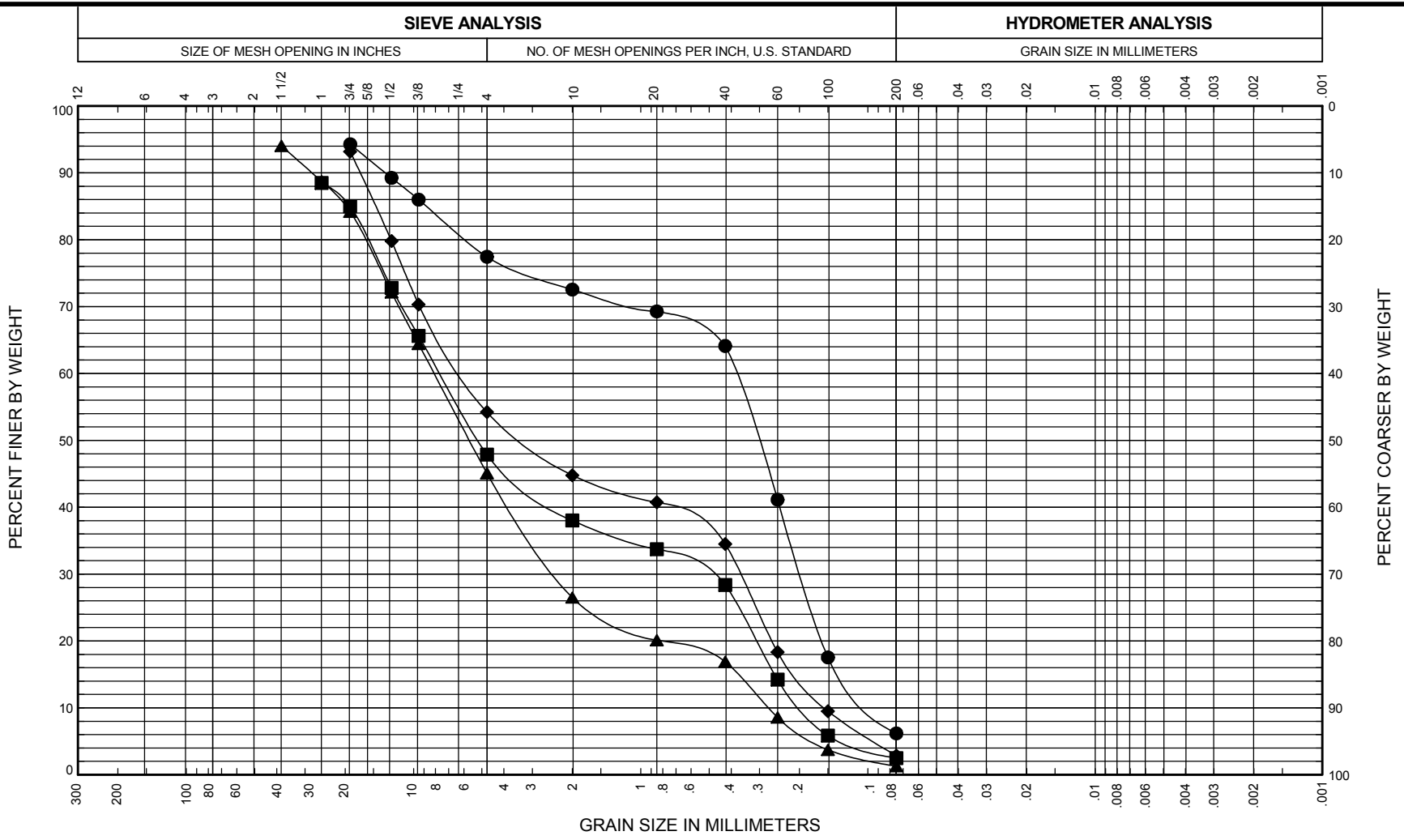
1. In some cases where recovery was low in the upper part of the run, the soil sample may have slid down in the tube prior to removal from the ground.
2. Groundwater level, if indicated above, was estimated during probing and should be considered approximate.
3. Refer to KEY for definitions and explanation of symbols.
4. CT = corrosion test sample; TR = thermal resistivity sample; EN = environmental sample; GE = geotechnical sample; AR = archeological sample.

### LEGEND

2" Plastic Tube - No Soil Recovery 2" Plastic Tube with Soil Recovery Run No.	Piezometer Screen and Sand Filter Ground Water Level ATD
---	---

PlumeStop Fairbanks, Alaska	
<h2 style="margin: 0;">LOG OF GEOPROBE 19-04</h2>	
August 2019	11-4-06060-656
<b>SHANNON &amp; WILSON, INC.</b> Geotechnical and Environmental Consultants	<b>Figure A-2</b> Sheet 2 of 2





COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	FINES: SILT OR CLAY
	GRAVEL		SAND			

BORING AND SAMPLE NO.	DEPTH (feet)	U.S.C.S. SYMBOL	SAMPLE DESCRIPTION	FINES %	NAT. W.C. %	LL %	PL %	PI %
● 19-03, S-4a	16.7	SP-SM	Poorly Graded Sand with Silt and Gravel	6.2				
■ 19-03, S-4b	18.3	GP	Poorly Graded Gravel with Sand	2.5				
▲ 19-04, S-7a	32.9	GW	Well-Graded Gravel with Sand	1.3				
◆ 19-04, S-7b	34.5	SP	Poorly Graded Sand with Gravel	2.9				

PlumeStop  
Fairbanks, Alaska

**GRAIN SIZE DISTRIBUTION**

August 2019 11-4-06060-656

<b>SHANNON &amp; WILSON, INC.</b> Geotechnical and Environmental Consultants	<b>Figure A-3</b>
---	-------------------

Appendix B  
Field Forms

APPENDIX B: FIELD FORMS

### MONITORING WELL CONSTRUCTION DETAILS

Monitoring Well No. <u>MW-19-01<sup>1903-20</sup></u>	Date Installed <u>7/31/2019</u>
Project Name <u>Plume Stop</u>	Logged By <u>CA3</u>
Project Number <u>11-4-06050-656</u>	Driller <u>GeoTek/Elen Rawson</u>

**I. TOP SECTION (CASING)**

Initial Pipe Length 10.02  
 Cutoff Length 2.29  
 Add-on Length \_\_\_\_\_  
**Total Length** 7.73

**IV. WELL DATA**

Pipe Type: PVC  SS  Other \_\_\_\_\_  
 Diameter: 2"  4"  Other \_\_\_\_\_  
 Slot Size: 0.01  0.02  Other \_\_\_\_\_  
 Joint Pin End: Up  Down  Type \_\_\_\_\_

**II. MID SECTION (CASING)**

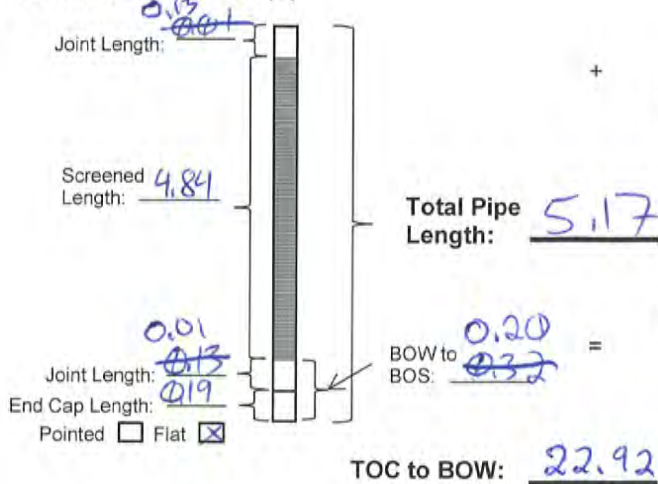
Number of Blank Sections 1  
 Length of Section(s): \_\_\_\_\_

<u>10.02</u>				
<b>Sum of Lengths:</b>				<u>10.02</u>

**V. BACKFILL**

	Depth Below GS	
	Bottom	Top
CEM (No Pipe)	-	-
CEM_PB	<u>1.00</u>	<u>0.0</u>
*SLUF_PB/FIL_PB	-	-
BCH_PB	<u>13.00</u>	<u>9.00</u>
*SLUF_PB/FIL_PB	-	-
BGR_PB	<u>15.00</u>	<u>1.00</u>
*SLUF_PB/FIL_PB	<u>14.84</u>	<u>13.00</u>
*SLUF_RS/FIL_PS	<u>19.68</u>	<u>14.76</u>
*SLUF/FIL (No Pipe)	-	-
*SLUF_PB/FIL_PB	<u>22.0</u>	<u>13.0</u>
Filter Pack Type or Gradation	<u>Prepack 0.01 slot 20/40 sand</u>	

**III. SCREENED SECTION(S)**



**VI. MONUMENTS**

Stuckup  Flushmount   
 TOM to GS 2.52  
 TOM to TOC 0.46  
 ^TOC to GS 2.06  
 Lock type N/A

**VII. MOISTURE CONTENT**

Depth to Water Below GS \_\_\_\_\_  
 Frozen Soil Below GS  
 Bottom \_\_\_\_\_ Top \_\_\_\_\_  
 Seasonal 1 \_\_\_\_\_  
 Seasonal 2 \_\_\_\_\_  
 Permafrost 1 \_\_\_\_\_  
 Permafrost 2 \_\_\_\_\_

- BCH = Bentonite Chips (gINT code)
- BGR = Bentonite Grout (gINT code)
- bgs = Below Ground Surface
- BOS = Bottom of Screen
- BOW = Bottom of Well
- CEM = Cement (gINT code)
- FIL = Sand Pack (gINT code)
- GS = Ground Surface
- SLUF = Natural Collapse/ Pea Gravel (gINT code)
- SS = Stainless Steel
- TOC = Top of Casing
- TOM = Top of Monument
- TOS = Top of Screen
- PB = Blank Pipe (gINT code)
- PS = Slotted Pipe (gINT code)
- \* Circle filter-pack type
- ^ Flushmount = Negative Number
- Stickup = Positive Number

**VIII. CALCULATIONS BELOW GROUND SURFACE**

TOC to BOW 22.92  
 - BOW to BOS 0.20  
**= TOC to BOS** 22.72  
 TOC to BOS 22.72  
 - Screened Length 4.84  
**= TOC to TOS** 17.88

TOC to BOW	<u>22.92</u>
- TOC to GS	<u>2.06</u>
<b>BOW bgs</b>	<u>20.86</u>
TOC to TOS	<u>17.88</u>
- TOC to GS	<u>2.06</u>
<b>TOS bgs</b>	<u>15.82</u>
TOC to BOS	<u>22.72</u>
- TOC to GS	<u>2.06</u>
<b>BOS bgs</b>	<u>20.66</u>

## WELL DEVELOPMENT LOG

Owner-Client Shannon & Wilson  
 Location Fairbanks AK, FAI  
 Weather Rain, 10 mph wind 50°F  
 Development Personnel CAB

Well No. ~~11-4-06050-656~~ MW-1903-20  
 Project No 11-4-06050-656  
 Date 8/2/2019

Diameter and Type of Casing: 2" PVC  
 Total Depth of Well **Before** Development (feet below top of casing): 22.88  
 Depth to Water **Before** Development (feet below top of casing): 3.86  
 Depth to Screen Top and Bottom (from Construction Log): Top: ~18 Bottom: ~23

### Development Details

Feet of water in well <u>19.02</u>	Time pumping started <u>1550</u>
Gallons per foot <u>0.17</u>	Flow rate (gal/min) <u>~6 gal/min</u>
Gallons in well <u>3.24</u>	Flow-rate measurement method: <u>Visual</u>
Surge method <u>Block</u>	Time pumping ended <u>1605</u>
Pump used <u>Diaphragm</u>	Gallons Pumped <u>90 gal</u>
Tubing used (ft) <u>30</u>	Disposal: <u>GAC# 2</u>

Depth to Water **After** Development (feet below top of casing): 3.84  
 Total Depth of Well **After** Development (feet below top of casing): 22.88

### Observations

Time	Water Clarity (Visual)	Time	Water Clarity (Visual)
1551	Extremely turbid		
1555	Turbid		
1559	Slightly Turbid		
1601	Very Slightly Turbid		
1602	Clear		
1604	Clear		

NOTES: \_\_\_\_\_

### WELL CASING VOLUMES

Diameter of Well (ID-inches)	1 1/4	<u>2</u>	3	4	6	8
Gallons per lineal foot	0.08	0.17	0.38	0.66	1.5	2.6

MDN

# MONITORING WELL SAMPLING LOG

Owner/Client Shannon & Wilson Inc  
 Location Fairbanks AK FAX  
 Sampling Personnel CAB  
 Weather Conditions Rain, 10 mph wind Air Temp. (°F) 50

Project No. 11-4-06050-696  
 Date 8/2/2019  
 Well MW-19-01  
 Time started 1620  
 Time completed 1725

Sample No. MW-19-01 1903-20 Time 1640  
 Duplicate — Time —  
 Equipment Blank — Time —

Pump Whale  
 Purging Method portable / dedicated pump  
 Pumping Start 1625  
 Purge Rate (gal./min.) ~0.75  
 Pumping End 1640  
 Pump Set Depth Below MP (ft.) 20.88  
 KuriTec Tubing (ft.) 30  
 TruPoly Tubing (ft.) —

Diameter and Type of Casing 2" PVC  
 Approximate Total Depth of Well Below MP (ft.) 22.88  
 Measured Total Depth of Well Below MP (ft.) 22.88  
 Depth to Water Below MP (ft.) 3.84  
 Depth to Ice (if frozen) Below MP (ft.) —  
 Feet of Water in Well 19.04  
 Gallons per foot 0.17  
 Gallons in Well 3.24  
 Purge Water Volume (gal.) 11.25 + 90 <sup>~100 gal</sup>  
 Purge Water Disposal GACH2

Monument Condition Good

Casing Condition Good

Wiring Condition (dedicated pumps) N/A

Measuring Point (MP) Top of Casing (TOC)

Monument type: Stickup / Flushmount  
 Measurement method: Rod & level / Tape measure

Top-of-casing to monument (ft.) 0.46  
 Monument to ground surface (ft.) 2.52

Datalogger type n/a  
 Datalogger serial # n/a  
 Measured cable length (ft.) n/a

- Lock present and operational N/A
- Well name legible on outside of well N/A
- Evidence of frost-jacking N/A

Notes Well developed immediately before sampling. 90 gallons purged.

### WELL CASING VOLUMES

Diameter of Well [ID-inches]	CMT	1¼	2	3	4	6	8
Gallons per lineal foot	0.000253	0.08	0.17	0.38	0.66	1.5	2.6

MDW

Well No.  
1903-20  
MW-19-01



### MONITORING WELL CONSTRUCTION DETAILS

Monitoring Well No. <u>MW-19030</u>	Date Installed <u>7/31/2019</u>
Project Name <u>HomeStop</u>	Logged By <u>CAB</u>
Project Number <u>11-4-06050-656</u>	Driller <u>Geotech Hasky/Glen Rawson</u>

#### I. TOP SECTION (CASING)

Initial Pipe Length 10.02  
 Cutoff Length 5.39 9.67  
 Add-on Length \_\_\_\_\_  
**Total Length** 6.67 0.35

#### IV. WELL DATA

Pipe Type: PVC  SS  Other \_\_\_\_\_  
 Diameter: 2"  4"  Other \_\_\_\_\_  
 Slot Size: 0.01  0.02  Other \_\_\_\_\_  
 Joint Pin End: Up  Down  Type \_\_\_\_\_

#### II. MID SECTION (CASING)

Number of Blank Sections x3  
 Length of Section(s): \_\_\_\_\_

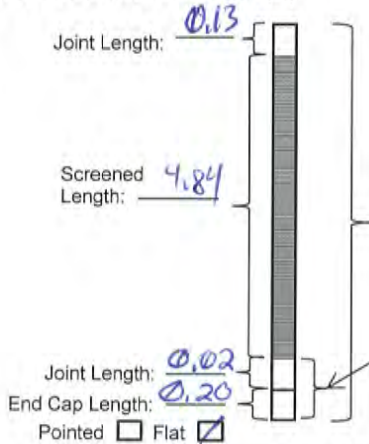
<u>10.05</u>		
<u>10.02</u>		
<u>10.02</u>		

Sum of Lengths: 30.09  
20.07

#### V. BACKFILL

	Depth Below GS		Bottom	Top
	Bottom	Top		
CEM (No Pipe)	<u>0.5</u>	<u>0.0</u>		
CEM PB	<u>2.00</u>	<u>0.5</u>		
*SLUF_PB/FIL_PB	<u>10.0</u>	<u>2.00</u>		
BCH_PB	<u>28.0</u>	<u>25.00</u>		
*SLUF_PB/FIL_PB				
BGR_PB	<u>25.0</u>	<u>10.0</u>		
*SLUF_PB/FIL_PB	<u>29.42</u>	<u>28.00</u>		
*SLUF_PB/FIL_PS	<u>34.48</u>	<u>28.00</u>		
*SLUF/FIL (No Pipe)	<u>34.48</u>	<u>28.00</u>		
*SLUF_PB/FIL_PB	<u>35.0</u>	<u>28.00</u>		
Filter Pack Type or Gradation	<u>Prepack 0.01 4/20/40</u>			

#### III. SCREENED SECTION(S)



Total Pipe Length: 5.19

BOW to BOS: 0.22  
**TOC to BOW:** 31.84 35.63

#### VI. MONUMENTS

Stuckup  Flushmount   
 TOM to GS -0.56  
 TOM to TOC Flush  
 ^TOC to GS \_\_\_\_\_  
 Lock type \_\_\_\_\_

#### VII. MOISTURE CONTENT

Depth to Water Below GS \_\_\_\_\_  
 Frozen Soil Below GS  
 Bottom \_\_\_\_\_ Top \_\_\_\_\_  
 Seasonal 1 \_\_\_\_\_  
 Seasonal 2 \_\_\_\_\_  
 Permafrost 1 \_\_\_\_\_  
 Permafrost 2 \_\_\_\_\_

- BCH = Bentonite Chips (gINT code)
- BGR = Bentonite Grout (gINT code)
- bgs = Below Ground Surface
- BOS = Bottom of Screen
- BOW = Bottom of Well
- CEM = Cement (gINT code)
- FIL = Sand Pack (gINT code)
- GS = Ground Surface
- SLUF = Natural Collapse/ Pea Gravel (gINT code)
- SS = Stainless Steel
- TOC = Top of Casing
- TOM = Top of Monument
- TOS = Top of Screen
- PB = Blank Pipe (gINT code)
- PS = Slotted Pipe (gINT code)
- \* Circle filter-pack type
- ^ Flushmount = Negative Number
- Stuckup = Positive Number

#### VIII. CALCULATIONS BELOW GROUND SURFACE

TOC to BOW 35.63  
 - BOW to BOS 0.22  
**= TOC to BOS** 35.41  
 TOC to BOS 35.41  
 - Screened Length 4.84  
**= TOC to TOS** 30.57

TOC to BOW	<u>35.63</u>
- TOC to GS	<u>-0.56</u>
<b>BOW bgs</b>	<u>36.19</u>
TOC to TOS	<u>30.57</u>
- TOC to GS	<u>-0.56</u>
<b>TOS bgs</b>	<u>31.13</u>
TOC to BOS	<u>35.41</u>
- TOC to GS	<u>-0.56</u>
<b>BOS bgs</b>	<u>35.97</u>

MDN

MW-19030  
 1904-35

## WELL DEVELOPMENT LOG

Owner-Client Shannon & Wilson, Inc Well No. MW-19-020<sup>04-35</sup>  
 Location Fortbanks AK, Kurnfield training camp Project No 11-4-06050-656  
 Weather Rain, 50°F Date 8/2/2019  
 Development Personnel CAB

Diameter and Type of Casing: 2" PVC  
 Total Depth of Well **Before** Development (feet below top of casing): 35.55  
 Depth to Water **Before** Development (feet below top of casing): 35.55 (CAB) 8.06  
 Depth to Screen Top and Bottom (from Construction Log): Top: ~35 Bottom: ~30

### Development Details

Feet of water in well 27.49 Time pumping started 12:12  
 Gallons per foot 0.17 Flow rate (gal/min) ~4.5 gal/min  
 Gallons in well 4.67 Flow-rate measurement method: Visual  
 Surge method Block Time pumping ended 12:39  
 Pump used Diaphragm Gallons Pumped 95 gal  
 Tubing used (ft) 45 Disposal: GAC # 2

Depth to Water **After** Development (feet below top of casing): 8.05  
 Total Depth of Well **After** Development (feet below top of casing): 35.56

### Observations

Time	Water Clarity (Visual)		Time	Water Clarity (Visual)
1212	Extremely turbid		1239	Clear
1213	Slightly turbid - Pump stop		1239	Pump Stop
1219	Very turbid - Pump start			
1224	Turbid			
1225	Slightly Turbid			
1226	Clear			
1227	Turbid			
1230	Slightly turbid			
1235	Very Slightly turbid			
1238	Clear			

NOTES: \_\_\_\_\_

### WELL CASING VOLUMES

Diameter of Well (ID-inches)	1 1/4	2	3	4	6	8
Gallons per lineal foot	0.08	0.17	0.38	0.66	1.5	2.6

MDN



# MONITORING WELL SAMPLING LOG

Owner/Client Shannon & Wilson Inc  
 Location Fairbanks, AK Korfoid Training Center  
 Sampling Personnel CAB  
 Weather Conditions Rain Air Temp. (°F) 50°F

Project No. 11-4-06050-656  
 Date 8/2/2017  
 Well MW-19-020  
 Time started 1305 1904-35  
 Time completed 1436

Sample No. MW-1904-35  
~~MW-19-020~~  
 Duplicate —  
 Equipment Blank —  
 Time 1337  
 Time —  
 Time —

Pump Whale  
 Purging Method portable / dedicated pump  
 Pumping Start 1316  
 Purge Rate (gal./min.) ~0.75 gal/min  
 Pumping End 1337  
 Pump Set Depth Below MP (ft.) 33.56  
 KuriTec Tubing (ft.) 45  
 TruPoly Tubing (ft.) —

Diameter and Type of Casing 2" PVC  
 Approximate Total Depth of Well Below MP (ft.) 35.550  
 Measured Total Depth of Well Below MP (ft.) 35.56  
 Depth to Water Below MP (ft.) 8.05  
 Depth to Ice (if frozen) Below MP (ft.) —  
 Feet of Water in Well 27.51  
 Gallons per foot 0.17  
 Gallons in Well 4.68  
 Purge Water Volume (gal.) 6 x 15.75 + 95 ≈ 110  
 Purge Water Disposal GAC # 2 gallons

Monument Condition Good

Casing Condition Good

Wiring Condition N/A  
 (dedicated pumps)

Measuring Point (MP) Top of Casing (TOC)

Monument type: Stickup / Flushmount  
 Measurement method: Rod & level / Tape measure

Top-of-casing to monument (ft.) - 0.56  
 Monument to ground surface (ft.) —

Datalogger type n/a  
 Datalogger serial # n/a  
 Measured cable length (ft.) n/a

- Lock present and operational N/A
- Well name legible on outside of well N/A
- Evidence of frost-jacking N/A

Notes Sampling after development. 95 gallons purged.

### WELL CASING VOLUMES

Diameter of Well [ID-inches]	CMT	1"	2"	3"	4"	6"	8"
Gallons per lineal foot	0.000253	0.08	0.17	0.38	0.66	1.5	2.6

MDN

Well No. 1904-35  
MW-19-020





# MONITORING WELL SAMPLING LOG

Owner/Client DOT & PF  
 Location FAI  
 Sampling Personnel GCD  
 Weather Conditions Snow, overcast Air Temp. (°F) 31

Project No. 102519-005  
 Date 10/25/19  
 Well MW-1903-20  
 Time started 1200  
 Time completed 1330

Sample No. MW-1903-20 Time 1249  
 Duplicate - Time -  
 Equipment Blank - Time -

Purging Method whole pump  
 Pumping Start 12:09 - 12:30; 12:31  
 Purge Rate (gal./min.) 2.1 gpm @ 20.6 ft  
 Pumping End 1249

Diameter and Type of Casing 2" PVC  
 Approximate Total Depth of Well Below MP (ft.) -  
 Measured Total Depth of Well Below MP (ft.) 22.95  
 Depth to Water Below MP (ft.) 7.41  
 Depth to Ice (if frozen) Below MP (ft.) -  
 Feet of Water in Well 15.54  
 Gallons per foot 0.17  
 Gallons in Well 2.04  
 Purge Water Volume (gal.) ~25

Pump Set Depth Below MP (ft.) 222  
 Tubing (ft.) 242

Purge Water Disposal GAC drum, then to ground surface, 230ft. away from well through hose

Monument Condition Good

Casing Condition Good

Measuring Point (MP) Top of Casing (TOC)

Monument type: Stickup Flushmount

Top-of-casing to monument (ft.) 0.44  
 Monument to ground surface (ft.) 1.51

- Lock present and operational -N/A, no lock
- Well name legible on outside of well well was labelled MW-19-01, changed to MW-1903-20
- Evidence of frost-jacking No

Notes Flow adjusted to flow slowly into GAC, fast enough to ensure flow would not cease (no. 6 gpm)

### WELL CASING VOLUMES

Diameter of Well [ID-inches]	1 1/4	2	3	4	6	8
Gallons per lineal foot	0.08	0.17	0.38	0.66	1.5	2.6

Well No.  
MW-1903-20

*MW*



# MONITORING WELL SAMPLING LOG

Owner/Client DOT & PF  
 Location FAT / IDEW  
 Sampling Personnel GCD  
 Weather Conditions Partly to mostly cloudy, some sun Air Temp. (°F) 31

Project No. 102519-005  
 Date 10/25/19  
 Well MW-1904-36  
 Time started 1400  
 Time completed 1555

Sample No. MW-1904-34 Time 1502  
 Duplicate \_\_\_\_\_ Time \_\_\_\_\_  
 Equipment Blank \_\_\_\_\_ Time \_\_\_\_\_

Purging Method Whisk pump  
 Pumping Start 1433  
 Purge Rate (gal./min.) ~0.4 gpm  
 Pumping End 1502  
 Pump Set Depth Below MP (ft.) ~34.5  
 Tubing (ft.) ~40

Diameter and Type of Casing 2" PVC  
 Approximate Total Depth of Well Below MP (ft.) \_\_\_\_\_  
 Measured Total Depth of Well Below MP (ft.) 35.04  
 Depth to Water Below MP (ft.) 9.88  
 Depth to Ice (if frozen) Below MP (ft.) \_\_\_\_\_  
 Feet of Water in Well 25.70  
 Gallons per foot 0.17  
 Gallons in Well 4.38  
 Purge Water Volume (gal.) ~12

Monument Condition Good, frozen  
 Casing Condition Good  
 Purge Water Disposal GAC drum, then to ground surface  
≥ 30ft. away from well through hole

Measuring Point (MP) Top of Casing (TOC) Monument type: Stickup Flushmount

Top-of-casing to monument (ft.) 0.41  
 Monument to ground surface (ft.) N/A, flush

- Lock present and operational -No lock
- Well name legible on outside of well well was labelled MW-19-02, changed to MW-1904-36
- Evidence of frost-jacking No

Notes well monument + lid was frozen shut, needed to thaw to open  
turned flow rate as low as possible before flow would stop  
added (~0.4 gpm)

### WELL CASING VOLUMES

Diameter of Well [ID-inches]	1 1/4	<u>(2)</u>	3	4	6	8
Gallons per lineal foot	0.08	<u>(0.17)</u>	0.38	0.66	1.5	2.6

Well No. MW-1904-36

MDN



# MONITORING WELL SAMPLING LOG

Owner/Client Fairbanks International Airport  
 Location Plume Stop Study Site  
 Sampling Personnel RLW, AEF  
 Weather Conditions sunny, some clouds Air Temp. (°F) 5

Project No. 102519-005  
 Date 12/17/19  
 Well MW-1903-20  
 Time started 1100  
 Time completed 1530

Sample No. MW-1903-20 Time 1335  
 Duplicate MW-2903-20 RW Time 1325 RW  
 Equipment Blank — Time —

Pump Whale  
 Purging Method portable y dedicated pump  
 Pumping Start 1237  
 Purge Rate (gal./min.) 0.5 to 1 gpm  
 Pumping End 1335 @ 1308 gpm  
 Pump Set Depth Below MP (ft.) 17  
 KuriTec Tubing (ft.) 30  
 TruPoly Tubing (ft.) —

Diameter and Type of Casing 2" PVC  
 Approximate Total Depth of Well Below MP (ft.) —  
 Measured Total Depth of Well Below MP (ft.) 21.75 + 1.2 = 22.95  
 Depth to Water Below MP (ft.) 7.31  
 Depth to Ice (if frozen) Below MP (ft.) —  
 Feet of Water in Well 15.64 ft  
 Gallons per foot 0.17  
 Gallons in Well 2.65  
 Purge Water Volume (gal.) 7.98, measured  
 Purge Water Disposal GAC (~9 gal total)

Monument Condition Good  
 Casing Condition erood  
 Wiring Condition N/A  
 (dedicated pumps)

Measuring Point (MP) Top of Casing (TOC)

Monument type: Stickup / Flushmount  
 Measurement method: Rod & level / Tape measure

Top-of-casing to monument (ft.) 0.57  
 Monument to ground surface (ft.) 2.35

Datalogger type n/a  
 Datalogger serial # n/a  
 Measured cable length (ft.) n/a

- Lock present and operational N/A
- Well name legible on outside of well
- Evidence of frost-jacking none

Notes Water was very black  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

### WELL CASING VOLUMES

Diameter of Well [ID-inches]	CMT	1/4	<u>2</u>	3	4	6	8
Gallons per lineal foot	0.000253	0.08	<u>0.17</u>	0.38	0.66	1.5	2.6

MDN

Well No.  
MW-1903-20





# MONITORING WELL SAMPLING LOG

Owner/Client Plume Stop  
 Location FAI outside gate  
 Sampling Personnel APM  
 Weather Conditions Clear/Sunny Air Temp. (°F) ~65°F

Project No. 102519-005  
 Date 6/16/20  
 Well 1903-20  
 Time started 9:45  
 Time completed 11:26

Sample No. MW-1903-20 Time 11:26  
 Duplicate MW-2903-20 Time -  
 Equipment Blank N/A Time -

Pump Peri Pump B  
 Purging Method portable / dedicated pump  
 Pumping Start 10:47, 11:15  
 Purge Rate (gal./min.) -  
 Pumping End 11:00, 11:25  
 Pump Set Depth Below MP (ft.) ~22  
 KuriTec Tubing (ft.) -  
 TruPoly Tubing (ft.) 26

Diameter and Type of Casing 2" PVC  
 Approximate Total Depth of Well Below MP (ft.) 20ft  
 Measured Total Depth of Well Below MP (ft.) 22.14 + 0.9 = 23.04  
 Depth to Water Below MP (ft.) 5.05'  
 Depth to Ice (if frozen) Below MP (ft.) -  
 Feet of Water in Well 17.99  
 Gallons per foot 0.17  
 Gallons in Well ~3 gallons  
 Purge Water Volume (gal.) ~2 gal  
 Purge Water Disposal contained in drum for offsite disposal through MRC

Monument Condition Good  
 Casing Condition Good  
 Wiring Condition N/A  
 (dedicated pumps)

Measuring Point (MP) Top of Casing (TOC) Monument type: Stickup / Flushmount  
 Measurement method: Rod & level / Tape measure

Top-of-casing to monument (ft.) -0.07  
 Monument to ground surface (ft.) 2.54

Datalogger type n/a  
 Datalogger serial # n/a  
 Measured cable length (ft.) n/a

Lock present and operational N/A  
 Well name legible on outside of well  
 Evidence of frost-jacking No

Notes Probe H = feet + inches? maybe 5'0.5"

### WELL CASING VOLUMES

Diameter of Well (ID-inches)	CMT	1/4	<u>2</u>	3	4	6	8
Gallons per lineal foot	0.000253	0.08	<u>0.17</u>	0.38	0.66	1.5	2.6

Well No.  
MW-1903-20

*MDW*



## MONITORING WELL SAMPLING LOG

Owner/Client FAI / DOT  
 Location FAI plume stop  
 Sampling Personnel VTY  
 Weather Conditions overcast Air Temp. (°F) 52°

Project No. 102519  
 Date 9/17/20  
 Well MW-1903-20  
 Time started 1120  
 Time completed 1400

Sample No. MW-1903-20 Time 1315  
 Duplicate MW-2303-20 Time 1305  
 Equipment Blank — Time —

Purging Method peri pump  
 Pumping Start 1223  
 Purge Rate (gal./min.) 0.2  
 Pumping End 1320

Diameter and Type of Casing 2" PVC  
 Approximate Total Depth of Well Below MP (ft.) 20  
 Measured Total Depth of Well Below MP (ft.) 21.57 + 1.27 →  
 Depth to Water Below MP (ft.) 5.59  
 Depth to Ice (if frozen) Below MP (ft.) — 22.84  
 Feet of Water in Well 17.25  
 Gallons per foot 0.17  
 Gallons in Well 3  
 Purge Water Volume (gal.) ~12

Pump Set Depth Below MP (ft.) 21  
 Tubing (ft.) 30

Purge Water Disposal designated drum for offsite disposal (NPC US Ecology)

Monument Condition good

Casing Condition good

Measuring Point (MP) Top of Casing (TOC)

Monument type: Stickup Flushmount

Top-of-casing to monument (ft.) -0.07 -0.7 (casing higher than monument)  
 Monument to ground surface (ft.) 2.52

Lock present and operational  
 Well name legible on outside of well  
 Evidence of frost-jacking no

Notes TWP N 7.09 DTW  
TWP S 6.59 DTW

### WELL CASING VOLUMES

Diameter of Well [ID-inches]	1 1/4	2	3	4	6	8
Gallons per lineal foot	0.08	0.17	0.38	0.66	1.5	2.6

MDN

Well No.  
MW-1903-20



# MONITORING WELL SAMPLING LOG

Owner/Client FAI/DOJ  
 Location FAI Plume Stop  
 Sampling Personnel ARM  
 Weather Conditions clear Air Temp. (°F) 25

Project No. 102519  
 Date 2/22/20  
 Well MW-1903-20  
 Time started 1115  
 Time completed 1230/1300

Sample No. MW-1903-20 Time 1157  
 Duplicate — Time —  
 Equipment Blank — Time —

Purging Method port pump  
 Pumping Start 1115  
 Purge Rate (gal./min.) ~0.15  
 Pumping End 1154  
 Pump Set Depth Below MP (ft.) 20 19'  
 Tubing (ft.) ~23'

Diameter and Type of Casing 2" PVC  
 Approximate Total Depth of Well Below MP (ft.) 20'  
 Measured Total Depth of Well Below MP (ft.) 21.70 + 1.12 = 22.82  
 Depth to Water Below MP (ft.) 6.80  
 Depth to Ice (if frozen) Below MP (ft.) —  
 Feet of Water in Well 16.02  
 Gallons per foot 0.17  
 Gallons in Well 2.7  
 Purge Water Volume (gal.) 8.17 = 3WW  
 Purge Water Disposal GAC + GS Actual purged

Monument Condition Good  
 Casing Condition good

Measuring Point (MP) Top of Casing (TOC) Monument type: Stickup Flushmount

Top-of-casing to monument (ft.) 0.20  
 Monument to ground surface (ft.) 2.50

- Lock present and operational N/A
- Well name legible on outside of well N/A
- Evidence of frost-jacking NO

Notes \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

### WELL CASING VOLUMES

Diameter of Well [ID-inches]	1 1/4	2	3	4	6	8
Gallons per lineal foot	0.08	0.17	0.38	0.66	1.5	2.6

Well No.  
MW-1903-20

*MOW*



# MONITORING WELL SAMPLING LOG

Owner/Client FAI  
 Location FAI Plume Stop  
 Sampling Personnel J&R  
 Weather Conditions mostly clear Air Temp. (°F) 11°

Project No. 102519-035  
 Date 3-18-21  
 Well MW-1903-20  
 Time started 13:40  
 Time completed 14:51

Sample No. MW-1903-20 Time 14:26  
 Duplicate \_\_\_\_\_ Time \_\_\_\_\_  
 Equipment Blank \_\_\_\_\_ Time \_\_\_\_\_

Pump Peri Pump  
 Purging Method portable / dedicated pump  
 Pumping Start 14:01  
 Purge Rate (gal./min.) 0.1 @ .16 1/min  
 Pumping End 14:29  
 Pump Set Depth Below MP (ft.) 19'  
 KuriTec Tubing (ft.) 3'  
 TruPoly Tubing (ft.) 24'

Diameter and Type of Casing 2"  
 Approximate Total Depth of Well Below MP (ft.) 20'  
 Measured Total Depth of Well Below MP (ft.) 21.57 + 427 = 2284  
 Depth to Water Below MP (ft.) 7.90  
 Depth to Ice (if frozen) Below MP (ft.) \_\_\_\_\_  
 Feet of Water in Well 14.94  
 Gallons per foot 0.17  
 Gallons in Well 2.54  
 Purge Water Volume (gal.) ~3  
 Purge Water Disposal GAC discharge & 30' from well

Monument Condition good  
 Casing Condition good  
 Wiring Condition \_\_\_\_\_  
 (dedicated pumps) \_\_\_\_\_

Measuring Point (MP) Top of Casing (TOC)

Monument type: Stickup / Flushmount  
 Measurement method: Rod & level / Tape measure

Top-of-casing to monument (ft.) 0.57  
 Monument to ground surface (ft.) 2.53

Datalogger type n/a  
 Datalogger serial # n/a  
 Measured cable length (ft.) n/a

- Lock present and operational no lock
- Well name legible on outside of well
- Evidence of frost-jacking none

Notes TWP-1 TWP-2  
M-6: 3.46 M-6: 2.8 3.52  
DW: 9.37 DW: 9.87

### WELL CASING VOLUMES

Diameter of Well [ID-inches]	CMT	1 1/4	2	3	4	6	8
Gallons per lineal foot	0.000253	0.08	0.17	0.38	0.66	1.5	2.6

Well No.

MW-1903-20

MDW





# MONITORING WELL SAMPLING LOG

Owner/Client FAI  
 Location FAI - plume stop well  
 Sampling Personnel VTY  
 Weather Conditions overcast Air Temp. (°F) 57°

Project No. 102519  
 Date 6/17/21  
 Well MW-1903-20  
 Time started 1300  
 Time completed 1445

Sample No. MW-1903-20 Time 1400  
 Duplicate \_\_\_\_\_ Time \_\_\_\_\_  
 Equipment Blank \_\_\_\_\_ Time \_\_\_\_\_

Pump peri  
 Purging Method portable / dedicated pump Diameter and Type of Casing 2" PVC  
 Pumping Start 1332 Approximate Total Depth of Well Below MP (ft.) 20  
 Purge Rate (gal./min.) 0.1 Measured Total Depth of Well Below MP (ft.) 21.45 + 1.37  
 Pumping End 1405 Depth to Water Below MP (ft.) 6.69  
 Pump Set Depth Below MP (ft.) 21 Depth to Ice (if frozen) Below MP (ft.) —  
 KuriTec Tubing (ft.) \_\_\_\_\_ Feet of Water in Well 16.13  
 TruPoly Tubing (ft.) 30 peri + silicone Gallons per foot 0.17  
 Gallons in Well 2.7  
 Purge Water Volume (gal.) 23.3 gal  
 Purge Water Disposal GAC

Monument Condition good  
 Casing Condition good  
 Wiring Condition \_\_\_\_\_  
 (dedicated pumps) \_\_\_\_\_

Measuring Point (MP) Top of Casing (TOC) Monument type: Stickup / Flushmount  
 Measurement method: Rod & level / Tape measure

Top-of-casing to monument (ft.) \_\_\_\_\_ Datalogger type n/a  
 Monument to ground surface (ft.) \_\_\_\_\_ Datalogger serial # n/a  
 Measured cable length (ft.) n/a

- Lock present and operational
- Well name legible on outside of well
- Evidence of frost-jacking wone

Notes \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

### WELL CASING VOLUMES

Diameter of Well [ID-inches]	CMT	1 1/4	2	3	4	6	8
Gallons per lineal foot	0.000253	0.08	0.17	0.38	0.66	1.5	2.6

MDN

TWP-2  
 DTW: 8.63

TWP-1  
 7.25

Well No. MW-1903-20



Appendix C

# Analytical Results

## And QA/QC Summary

### CONTENTS

- Quality Assurance/Quality Control (QA/QC) Summary
- Eurofins TestAmerica Laboratories, Sacramento (Eurofins TestAmerica), SGS North America, Anchorage (SGS) Analytical Reports and DEC Laboratory Data Review Checklists (LDRCs)
- EnviroFlux Background
- Darcy Velocity and PFAS Flux Results

## ACRONYMS

°C	degrees Celsius
DEC	Alaska Department of Environmental Conservation
Eurofins TestAmerica	Eurofins TestAmerica Laboratories, Sacramento
FB	field blank
IDA	isotope dilution analyte
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
LDRC	Laboratory Data Review Checklist
LOD	limit of detection
LOQ	laboratory limit of quantitation
MB	method blank
MDL	method detection limit
MS	matrix spike
MSD	matrix spike duplicate
QA	quality assurance
QC	quality control
RL	reporting limit
RPD	relative percent difference

## QUALITY ASSURANCE (QA) / QUALITY CONTROL (QC) SUMMARY

Quality Assurance/Quality Control (QA/QC) procedures assist in producing data of acceptable quality and reliability. We reviewed the analytical results for laboratory QC samples and conducted our own QA assessment for this project. We reviewed the chain-of-custody records and laboratory receipt forms to check custody was not breached, sample holding times were met, and the samples were properly handled from the point of collection through analysis by the laboratory. Our QA review procedures allowed us to document the accuracy and precision of the analytical data, as well as check the analyses were sufficiently sensitive to detect analytes at levels below regulatory standards.

Laboratory QC procedures included evaluating surrogate and/or isotope dilution analyte (IDA) recoveries, performing continuing calibration checks, and analyzing method blanks (MBs), laboratory control samples (LCSs), and matrix spikes (MSs) to assess accuracy and precision. LCS, LCS duplicate (LCSD), MS, and MS duplicates (MSD), and surrogate and/or IDA recovery analyses were performed to evaluate the accuracy of the analytical process. Analytical precision was assessed by comparing the results of duplicate analyses performed on duplicate-sample, LCS/LCSD, and MS/MSD pairs.

Field QC procedures included collecting field-duplicate samples. Samplers used single-use equipment to reduce the potential for sample cross-contamination.

The laboratory reports contain a case narrative and forms documenting sample-receipt conditions. Details regarding the results of our QA review are presented below. The laboratory reports and corresponding DEC LDRCs are presented in this appendix, in numerical order. During our review we applied a standardized set of flags indicating estimated data or analytical bias for data brought into question during the review.

### Sample Handling

Samples collected by Shannon & Wilson were shipped to Eurofins TestAmerica in Sacramento, California or SGS in Fairbanks, Alaska as described in Section 2.6. The evaluation of proper sample handling procedures included verification of the following: correct chain-of-custody documentation, appropriate sample containers and preservatives, cooler temperatures maintained between 0 degrees Celsius (°C) and 6 °C, ice-free samples, and sample analyses within method-specified holding times.

The samples were received with complete chain-of-custody information, in good condition, properly preserved, within the acceptable temperature range, and analyzed within method-specified holding times.

### Analytical Sensitivity

The laboratory's method detection limit (MDL) is the lowest analyte concentration that can be measured. The laboratory's limit of quantitation (LOQ) is the lowest analyte concentration that can be routinely measured in the sampled matrix with confidence, or the point at which a concentration is considered quantitative. Sample matrix, instrument performance, sample dilutions, and other factors will impact the MDL and reporting limit (RL) for each analysis. The laboratory references the LOQ as their RL.

In cases where analytes were not detected at concentrations above their MDL, the analytical results are presented in our data-summary tables with reference to their RLs. For example, a sample that does not contain an analyte at a concentration greater than its MDL and has an RL of 2.0 ng/L would be tabulated as "<2.0 ng/L," where "<" indicates the analyte was not detected above the MDL. If the analyte is detected between the MDL and the RL, its concentration is considered an estimate; in our tables, this value is flagged with a 'J' and is applied by the laboratory. The laboratory RLs associated with this project are considered adequate for report preparation and data analysis.

Laboratory MBs were analyzed in association with samples collected for this project to check for contributions to the analytical results possibly attributable to laboratory-based contamination. Project samples are only affected by the MB detections if the sample has a reported detection within ten times the MB detection in the associated preparatory batch.

MBs were analyzed for each preparatory batch. The results are bolded as an exceedance in the analytical data table, where applicable. For a detailed discussion including MB detections that did not result in data qualification, please see the associated LDRCs. MB detections did not result in data qualification for samples analyzed as a part of this project with the following exceptions:

- Eurofins TestAmerica Work Order 320-57358 Rev1: PFBA and PFHxS were detected below the RL in the MB samples associated with this work order. PFBA and PFHxS are considered not detected in sample MW-1903-20 and were flagged B\* at the LOQ in the analytical tables.

## Accuracy

Accuracy refers to reporting the correct analyte concentration and is a comparison between the measured value and a known or expected value. Laboratory analytical accuracy may be assessed through the analyte recoveries from LCS/LCSD and/or MS/MSD analyses, and the recovery of analyte IDAs added to project samples. The LCS/LCSDs are spikes of known analyte concentrations added to a clean matrix; the MS/MSDs are spikes of known analyte concentrations added to project samples to address matrix interferences. IDAs are compounds that are similar to the analytes being evaluated by a given method, added prior to sample preparation and analysis, to evaluate matrix interferences and other inefficiencies of sample extraction.

The laboratories' LCS, LCSD, MS, MSD, and surrogate/IDA recovery failures did not require data qualification for samples analyzed as a part of this project. For a detailed discussion including recovery failures that did not result in data qualification, please see the associated LDRCs.

## Precision

Field-duplicate samples were collected during September 2020 sample collection.

The relative percent difference (RPD; difference between the sample and its field-duplicate divided by the mean of the two was calculated to evaluate the precision of the data). An RPD was evaluated only if the results of the analyses for both the primary and field-duplicate sample were detected for a given analyte. Results of RPD calculations for each of these duplicate sample sets met the data quality objective of 30 percent for water samples, where calculable.

Laboratory analytical precision can also be assessed by comparing the results of duplicate analyses performed on LCS/LCSD, MS/MSD, and laboratory-duplicate samples, and evaluating the associated RPDs. The laboratory LCS/LCSD, MS/MSD, and laboratory-duplicate sample RPDs were within laboratory acceptance criteria.

## Additional Quality Control Discrepancies

The concentration of perfluorohexanesulfonic acid (PFHxS) associated with Eurofins TestAmerica Work Order 320-55729-1 exceeded the instrument calibration range. Historical data indicate that for the isotope dilution method, dilution and re-analysis will not produce significantly different results from those reported above the calibration range. PFHxS for the following samples were flagged 'J\*' in the analytical tables: MW-1903-20 and MW-1904-36. The peak did not saturate the instrument detector.



The transition mass ratio for the following analytes was outside of the established ratio limits for certain samples. Laboratory analyst judgement was used to positively identify these analytes. The qualitative identification of these analytes has some degree of uncertainty; the following results have been flagged 'J' as estimated.

- Eurofins TestAmerica Work Order 320-57358 Rev.1: PFOS for MW-1903-20 was flagged 'J\*' in the analytical tables.

#### Data Quality Summary

By working in general accordance with our proposed scope of services, we consider the samples we collected for this project to be representative of site conditions at the locations and times they were obtained. In general, the quality of the analytical data for this project does not appear to have been compromised by analytical irregularities and is adequate for the purposes of our assessment.



## Laboratory Report of Analysis

To: Shannon & Wilson-Fairbanks  
2355 Hill Rd.  
Fairbanks, AK 99701  
(907)479-0600

Report Number: **1199604**

Client Project: **11-4-06050 Plume Stop**

Dear Kristen Freiburger,

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 Jennifer 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.

---

Jennifer Dawkins  
Project Manager  
Jennifer.Dawkins@sgs.com

Date



## Case Narrative

**SGS Client: Shannon & Wilson-Fairbanks**

**SGS Project: 1199604**

**Project Name/Site: 11-4-06050 Plume Stop**

Refer to sample receipt form for information on sample condition.

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

### Laboratory Qualifiers

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

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

SGS maintains a formal Quality Assurance/Quality Control (QA/QC) program. A copy of our Quality Assurance Plan (QAP), which outlines this program, is available at your request. The laboratory certification numbers are AK00971 (DW Chemistry & Microbiology) & 17-021 (CS) for ADEC and 2944.01 for DOD ELAP/ISO17025 (RCRA methods: 1020B, 1311, 3010A, 3050B, 3520C, 3550C, 5030B, 5035A, 6020A, 7470A, 7471B, 8015C, 8021B, 8082A, 8260C, 8270D, 8270D-SIM, 9040C, 9045D, 9056A, 9060A, AK101 and AK102/103). SGS is only certified for the analytes listed on our Drinking Water Certification, and only those analytes will be reported to the State of Alaska for compliance. Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth by the SGS QAP and, when applicable, other regulatory authorities.

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

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

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

### Sample Summary

<u>Client Sample ID</u>	<u>Lab Sample ID</u>	<u>Collected</u>	<u>Received</u>	<u>Matrix</u>
MW-19-02	1199604001	08/02/2019	08/06/2019	Water (Surface, Eff., Ground)
MW-19-01	1199604002	08/02/2019	08/06/2019	Water (Surface, Eff., Ground)
MW-19-02	1199604003	08/02/2019	08/06/2019	Water (Surface, Eff., Ground)
MW-19-01	1199604004	08/02/2019	08/06/2019	Water (Surface, Eff., Ground)
Trip Blank	1199604005	08/02/2019	08/06/2019	Water (Surface, Eff., Ground)

<u>Method</u>	<u>Method Description</u>
SM 5310B	Dissolved Organic Carbon
AK102	DRO/RRO Low Volume Water
AK103	DRO/RRO Low Volume Water
AK101	Gasoline Range Organics (W)
EP200.8	Metals in Drinking Water by ICP-MS DISSO
EP200.8	Metals in Water by 200.8 ICP-MS
SM 5310B	Total Organic Carbon
SW8260C	Volatile Organic Compounds (W)

Print Date: 08/15/2019 1:59:25PM

### Detectable Results Summary

Client Sample ID: **MW-19-02**

Lab Sample ID: 1199604001

**Metals by ICP/MS**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Calcium	71700	ug/L
Iron	12100	ug/L
Magnesium	17700	ug/L

**Semivolatile Organic Fuels**

Diesel Range Organics	0.287J	mg/L
Residual Range Organics	0.176J	mg/L
Total Organic Carbon	4160	ug/L

**Waters Department**

Client Sample ID: **MW-19-01**

Lab Sample ID: 1199604002

**Metals by ICP/MS**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Calcium	90000	ug/L
Iron	16800	ug/L
Magnesium	23000	ug/L

**Semivolatile Organic Fuels**

Diesel Range Organics	0.216J	mg/L
Total Organic Carbon	4740	ug/L

**Waters Department**

Client Sample ID: **MW-19-02**

Lab Sample ID: 1199604003

**Dissolved Metals by ICP/MS**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Iron	5360	ug/L
Magnesium	17200	ug/L
Total Organic Carbon, Dissolved	4150	ug/L

**Waters Department**

Client Sample ID: **MW-19-01**

Lab Sample ID: 1199604004

**Dissolved Metals by ICP/MS**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Iron	14500	ug/L
Magnesium	22900	ug/L
Total Organic Carbon, Dissolved	4530	ug/L

**Waters Department**

## Results of MW-19-02

Client Sample ID: **MW-19-02**  
 Client Project ID: **11-4-06050 Plume Stop**  
 Lab Sample ID: 1199604001  
 Lab Project ID: 1199604

Collection Date: 08/02/19 13:37  
 Received Date: 08/06/19 10:55  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

## Results by Metals by ICP/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Calcium	71700	500	150	ug/L	1		08/08/19 18:47
Iron	12100	250	78.0	ug/L	1		08/08/19 18:47
Magnesium	17700	50.0	15.0	ug/L	1		08/08/19 18:47

## Batch Information

Analytical Batch: MMS10585  
 Analytical Method: EP200.8  
 Analyst: DSH  
 Analytical Date/Time: 08/08/19 18:47  
 Container ID: 1199604001-J

Prep Batch: MX32644  
 Prep Method: E200.2  
 Prep Date/Time: 08/08/19 13:28  
 Prep Initial Wt./Vol.: 20 mL  
 Prep Extract Vol: 50 mL

## Results of MW-19-02

Client Sample ID: **MW-19-02**  
 Client Project ID: **11-4-06050 Plume Stop**  
 Lab Sample ID: 1199604001  
 Lab Project ID: 1199604

Collection Date: 08/02/19 13:37  
 Received Date: 08/06/19 10:55  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

## Results by Semivolatile Organic Fuels

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Diesel Range Organics	0.287 J	0.577	0.173	mg/L	1		08/14/19 21:15
<b>Surrogates</b>							
5a Androstane (surr)	71.8	50-150		%	1		08/14/19 21:15

## Batch Information

Analytical Batch: XFC15242  
 Analytical Method: AK102  
 Analyst: VDL  
 Analytical Date/Time: 08/14/19 21:15  
 Container ID: 1199604001-G

Prep Batch: XXX42009  
 Prep Method: SW3520C  
 Prep Date/Time: 08/14/19 09:57  
 Prep Initial Wt./Vol.: 260 mL  
 Prep Extract Vol: 1 mL

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Residual Range Organics	0.176 J	0.481	0.144	mg/L	1		08/14/19 21:15
<b>Surrogates</b>							
n-Triacontane-d62 (surr)	83.2	50-150		%	1		08/14/19 21:15

## Batch Information

Analytical Batch: XFC15242  
 Analytical Method: AK103  
 Analyst: VDL  
 Analytical Date/Time: 08/14/19 21:15  
 Container ID: 1199604001-G

Prep Batch: XXX42009  
 Prep Method: SW3520C  
 Prep Date/Time: 08/14/19 09:57  
 Prep Initial Wt./Vol.: 260 mL  
 Prep Extract Vol: 1 mL



## Results of MW-19-02

Client Sample ID: **MW-19-02**  
 Client Project ID: **11-4-06050 Plume Stop**  
 Lab Sample ID: 1199604001  
 Lab Project ID: 1199604

Collection Date: 08/02/19 13:37  
 Received Date: 08/06/19 10:55  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

## Results by Volatile Fuels

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Gasoline Range Organics	0.0500 U	0.100	0.0310	mg/L	1		08/13/19 02:41
<b>Surrogates</b>							
4-Bromofluorobenzene (surr)	88.6	50-150		%	1		08/13/19 02:41

## Batch Information

Analytical Batch: VFC14874  
 Analytical Method: AK101  
 Analyst: NRB  
 Analytical Date/Time: 08/13/19 02:41  
 Container ID: 1199604001-A

Prep Batch: VXX34632  
 Prep Method: SW5030B  
 Prep Date/Time: 08/12/19 06:00  
 Prep Initial Wt./Vol.: 5 mL  
 Prep Extract Vol: 5 mL

## Results of MW-19-02

Client Sample ID: **MW-19-02**  
 Client Project ID: **11-4-06050 Plume Stop**  
 Lab Sample ID: 1199604001  
 Lab Project ID: 1199604

Collection Date: 08/02/19 13:37  
 Received Date: 08/06/19 10:55  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

## Results by Volatile GC/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Benzene	0.200 U	0.400	0.120	ug/L	1		08/09/19 21:14
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		08/09/19 21:14
o-Xylene	0.500 U	1.00	0.310	ug/L	1		08/09/19 21:14
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		08/09/19 21:14
Toluene	0.500 U	1.00	0.310	ug/L	1		08/09/19 21:14
Xylenes (total)	1.50 U	3.00	1.00	ug/L	1		08/09/19 21:14
<b>Surrogates</b>							
1,2-Dichloroethane-D4 (surr)	115	81-118		%	1		08/09/19 21:14
4-Bromofluorobenzene (surr)	105	85-114		%	1		08/09/19 21:14
Toluene-d8 (surr)	93	89-112		%	1		08/09/19 21:14

## Batch Information

Analytical Batch: VMS19286  
 Analytical Method: SW8260C  
 Analyst: CMC  
 Analytical Date/Time: 08/09/19 21:14  
 Container ID: 1199604001-D

Prep Batch: VXX34620  
 Prep Method: SW5030B  
 Prep Date/Time: 08/09/19 06:00  
 Prep Initial Wt./Vol.: 5 mL  
 Prep Extract Vol: 5 mL

## Results of MW-19-02

Client Sample ID: **MW-19-02**  
 Client Project ID: **11-4-06050 Plume Stop**  
 Lab Sample ID: 1199604001  
 Lab Project ID: 1199604

Collection Date: 08/02/19 13:37  
 Received Date: 08/06/19 10:55  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

## Results by Waters Department

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Total Organic Carbon	4160	1000	400	ug/L	1		08/08/19 15:52

## Batch Information

Analytical Batch: WTC2942  
 Analytical Method: SM 5310B  
 Analyst: BMZ  
 Analytical Date/Time: 08/08/19 15:52  
 Container ID: 1199604001-I

## Results of MW-19-01

Client Sample ID: **MW-19-01**  
 Client Project ID: **11-4-06050 Plume Stop**  
 Lab Sample ID: 1199604002  
 Lab Project ID: 1199604

Collection Date: 08/02/19 16:40  
 Received Date: 08/06/19 10:55  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

## Results by Metals by ICP/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Calcium	90000	500	150	ug/L	1		08/08/19 18:50
Iron	16800	250	78.0	ug/L	1		08/08/19 18:50
Magnesium	23000	50.0	15.0	ug/L	1		08/08/19 18:50

## Batch Information

Analytical Batch: MMS10585  
 Analytical Method: EP200.8  
 Analyst: DSH  
 Analytical Date/Time: 08/08/19 18:50  
 Container ID: 1199604002-J

Prep Batch: MXX32644  
 Prep Method: E200.2  
 Prep Date/Time: 08/08/19 13:28  
 Prep Initial Wt./Vol.: 20 mL  
 Prep Extract Vol: 50 mL



Results of MW-19-01

Client Sample ID: MW-19-01
Client Project ID: 11-4-06050 Plume Stop
Lab Sample ID: 1199604002
Lab Project ID: 1199604

Collection Date: 08/02/19 16:40
Received Date: 08/06/19 10:55
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Semivolatile Organic Fuels

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

Batch Information

Analytical Batch: XFC15242
Analytical Method: AK102
Analyst: VDL
Analytical Date/Time: 08/14/19 21:25
Container ID: 1199604002-G
Prep Batch: XXX42009
Prep Method: SW3520C
Prep Date/Time: 08/14/19 09:57
Prep Initial Wt./Vol.: 265 mL
Prep Extract Vol: 1 mL

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

Batch Information

Analytical Batch: XFC15242
Analytical Method: AK103
Analyst: VDL
Analytical Date/Time: 08/14/19 21:25
Container ID: 1199604002-G
Prep Batch: XXX42009
Prep Method: SW3520C
Prep Date/Time: 08/14/19 09:57
Prep Initial Wt./Vol.: 265 mL
Prep Extract Vol: 1 mL

## Results of MW-19-01

Client Sample ID: **MW-19-01**  
 Client Project ID: **11-4-06050 Plume Stop**  
 Lab Sample ID: 1199604002  
 Lab Project ID: 1199604

Collection Date: 08/02/19 16:40  
 Received Date: 08/06/19 10:55  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

## Results by Volatile Fuels

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Gasoline Range Organics	0.0500 U	0.100	0.0310	mg/L	1		08/13/19 02:58
<b>Surrogates</b>							
4-Bromofluorobenzene (surr)	91.9	50-150		%	1		08/13/19 02:58

## Batch Information

Analytical Batch: VFC14874  
 Analytical Method: AK101  
 Analyst: NRB  
 Analytical Date/Time: 08/13/19 02:58  
 Container ID: 1199604002-A

Prep Batch: VXX34632  
 Prep Method: SW5030B  
 Prep Date/Time: 08/12/19 06:00  
 Prep Initial Wt./Vol.: 5 mL  
 Prep Extract Vol: 5 mL

## Results of MW-19-01

Client Sample ID: **MW-19-01**  
 Client Project ID: **11-4-06050 Plume Stop**  
 Lab Sample ID: 1199604002  
 Lab Project ID: 1199604

Collection Date: 08/02/19 16:40  
 Received Date: 08/06/19 10:55  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

## Results by Volatile GC/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Benzene	0.200 U	0.400	0.120	ug/L	1		08/07/19 21:29
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		08/07/19 21:29
o-Xylene	0.500 U	1.00	0.310	ug/L	1		08/07/19 21:29
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		08/07/19 21:29
Toluene	0.500 U	1.00	0.310	ug/L	1		08/07/19 21:29
Xylenes (total)	1.50 U	3.00	1.00	ug/L	1		08/07/19 21:29
<b>Surrogates</b>							
1,2-Dichloroethane-D4 (surr)	111	81-118		%	1		08/07/19 21:29
4-Bromofluorobenzene (surr)	97.2	85-114		%	1		08/07/19 21:29
Toluene-d8 (surr)	96.6	89-112		%	1		08/07/19 21:29

## Batch Information

Analytical Batch: VMS19277  
 Analytical Method: SW8260C  
 Analyst: CMC  
 Analytical Date/Time: 08/07/19 21:29  
 Container ID: 1199604002-D

Prep Batch: VXX34608  
 Prep Method: SW5030B  
 Prep Date/Time: 08/07/19 06:00  
 Prep Initial Wt./Vol.: 5 mL  
 Prep Extract Vol: 5 mL



**Results of MW-19-01**

Client Sample ID: **MW-19-01**  
Client Project ID: **11-4-06050 Plume Stop**  
Lab Sample ID: 1199604002  
Lab Project ID: 1199604

Collection Date: 08/02/19 16:40  
Received Date: 08/06/19 10:55  
Matrix: Water (Surface, Eff., Ground)  
Solids (%):  
Location:

**Results by Waters Department**

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Total Organic Carbon	4740	1000	400	ug/L	1		08/08/19 16:10

**Batch Information**

Analytical Batch: WTC2942  
Analytical Method: SM 5310B  
Analyst: BMZ  
Analytical Date/Time: 08/08/19 16:10  
Container ID: 1199604002-I



## Results of MW-19-02

Client Sample ID: **MW-19-02**  
 Client Project ID: **11-4-06050 Plume Stop**  
 Lab Sample ID: 1199604003  
 Lab Project ID: 1199604

Collection Date: 08/02/19 13:37  
 Received Date: 08/06/19 10:55  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

## Results by Dissolved Metals by ICP/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Iron	5360	250	78.0	ug/L	1		08/08/19 18:53
Magnesium	17200	50.0	15.0	ug/L	1		08/08/19 18:53

## Batch Information

Analytical Batch: MMS10585  
 Analytical Method: EP200.8  
 Analyst: DSH  
 Analytical Date/Time: 08/08/19 18:53  
 Container ID: 1199604003-B

Prep Batch: MXX32644  
 Prep Method: E200.2  
 Prep Date/Time: 08/08/19 13:28  
 Prep Initial Wt./Vol.: 20 mL  
 Prep Extract Vol: 50 mL

## Results of MW-19-02

Client Sample ID: **MW-19-02**  
 Client Project ID: **11-4-06050 Plume Stop**  
 Lab Sample ID: 1199604003  
 Lab Project ID: 1199604

Collection Date: 08/02/19 13:37  
 Received Date: 08/06/19 10:55  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

## Results by Waters Department

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Total Organic Carbon,Dissolved	4150	1000	400	ug/L	1		08/08/19 16:24

## Batch Information

Analytical Batch: WTC2942  
 Analytical Method: SM 5310B  
 Analyst: BMZ  
 Analytical Date/Time: 08/08/19 16:24  
 Container ID: 1199604003-A

## Results of MW-19-01

Client Sample ID: **MW-19-01**  
 Client Project ID: **11-4-06050 Plume Stop**  
 Lab Sample ID: 1199604004  
 Lab Project ID: 1199604

Collection Date: 08/02/19 16:40  
 Received Date: 08/06/19 10:55  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

## Results by Dissolved Metals by ICP/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Iron	14500	250	78.0	ug/L	1		08/08/19 18:56
Magnesium	22900	50.0	15.0	ug/L	1		08/08/19 18:56

## Batch Information

Analytical Batch: MMS10585  
 Analytical Method: EP200.8  
 Analyst: DSH  
 Analytical Date/Time: 08/08/19 18:56  
 Container ID: 1199604004-B

Prep Batch: MX32644  
 Prep Method: E200.2  
 Prep Date/Time: 08/08/19 13:28  
 Prep Initial Wt./Vol.: 20 mL  
 Prep Extract Vol: 50 mL



**Results of MW-19-01**

Client Sample ID: **MW-19-01**  
Client Project ID: **11-4-06050 Plume Stop**  
Lab Sample ID: 1199604004  
Lab Project ID: 1199604

Collection Date: 08/02/19 16:40  
Received Date: 08/06/19 10:55  
Matrix: Water (Surface, Eff., Ground)  
Solids (%):  
Location:

**Results by Waters Department**

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Total Organic Carbon,Dissolved	4530	1000	400	ug/L	1		08/08/19 16:38

**Batch Information**

Analytical Batch: WTC2942  
Analytical Method: SM 5310B  
Analyst: BMZ  
Analytical Date/Time: 08/08/19 16:38  
Container ID: 1199604004-A

## Results of Trip Blank

Client Sample ID: **Trip Blank**  
 Client Project ID: **11-4-06050 Plume Stop**  
 Lab Sample ID: 1199604005  
 Lab Project ID: 1199604

Collection Date: 08/02/19 13:37  
 Received Date: 08/06/19 10:55  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

## Results by Volatile Fuels

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Gasoline Range Organics	0.0500 U	0.100	0.0310	mg/L	1		08/13/19 01:48
<b>Surrogates</b>							
4-Bromofluorobenzene (surr)	81.1	50-150		%	1		08/13/19 01:48

## Batch Information

Analytical Batch: VFC14874  
 Analytical Method: AK101  
 Analyst: NRB  
 Analytical Date/Time: 08/13/19 01:48  
 Container ID: 1199604005-A

Prep Batch: VXX34632  
 Prep Method: SW5030B  
 Prep Date/Time: 08/12/19 06:00  
 Prep Initial Wt./Vol.: 5 mL  
 Prep Extract Vol: 5 mL

## Results of Trip Blank

Client Sample ID: **Trip Blank**  
 Client Project ID: **11-4-06050 Plume Stop**  
 Lab Sample ID: 1199604005  
 Lab Project ID: 1199604

Collection Date: 08/02/19 13:37  
 Received Date: 08/06/19 10:55  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

## Results by Volatile GC/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Benzene	0.200 U	0.400	0.120	ug/L	1		08/07/19 16:59
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		08/07/19 16:59
o-Xylene	0.500 U	1.00	0.310	ug/L	1		08/07/19 16:59
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		08/07/19 16:59
Toluene	0.500 U	1.00	0.310	ug/L	1		08/07/19 16:59
Xylenes (total)	1.50 U	3.00	1.00	ug/L	1		08/07/19 16:59

## Surrogates

1,2-Dichloroethane-D4 (surr)	110	81-118		%	1		08/07/19 16:59
4-Bromofluorobenzene (surr)	98.1	85-114		%	1		08/07/19 16:59
Toluene-d8 (surr)	96.7	89-112		%	1		08/07/19 16:59

## Batch Information

Analytical Batch: VMS19277  
 Analytical Method: SW8260C  
 Analyst: CMC  
 Analytical Date/Time: 08/07/19 16:59  
 Container ID: 1199604005-D

Prep Batch: VXX34608  
 Prep Method: SW5030B  
 Prep Date/Time: 08/07/19 06:00  
 Prep Initial Wt./Vol.: 5 mL  
 Prep Extract Vol: 5 mL

## Method Blank

Blank ID: MB for HBN 1797638 [MXX/32644]  
Blank Lab ID: 1524327

Matrix: Water (Surface, Eff., Ground)

QC for Samples:  
1199604001, 1199604002, 1199604003, 1199604004

## Results by EP200.8

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Calcium	250U	500	150	ug/L
Iron	125U	250	78.0	ug/L
Magnesium	25.0U	50.0	15.0	ug/L

## Batch Information

Analytical Batch: MMS10585  
Analytical Method: EP200.8  
Instrument: Perkin Elmer Nexlon P5  
Analyst: DSH  
Analytical Date/Time: 8/8/2019 5:30:12PM

Prep Batch: MXX32644  
Prep Method: E200.2  
Prep Date/Time: 8/8/2019 1:28:59PM  
Prep Initial Wt./Vol.: 20 mL  
Prep Extract Vol: 50 mL

## Blank Spike Summary

Blank Spike ID: LCS for HBN 1199604 [MXX32644]  
 Blank Spike Lab ID: 1524335  
 Date Analyzed: 08/08/2019 17:33

Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1199604001, 1199604002, 1199604003, 1199604004

## Results by EP200.8

Parameter	Blank Spike (ug/L)			CL
	Spike	Result	Rec (%)	
Calcium	10000	10300	103	( 85-115 )
Iron	5000	5290	106	( 85-115 )
Magnesium	10000	10800	108	( 85-115 )

## Batch Information

Analytical Batch: **MMS10585**  
 Analytical Method: **EP200.8**  
 Instrument: **Perkin Elmer Nexlon P5**  
 Analyst: **DSH**

Prep Batch: **MXX32644**  
 Prep Method: **E200.2**  
 Prep Date/Time: **08/08/2019 13:28**  
 Spike Init Wt./Vol.: 10000 ug/L Extract Vol: 50 mL  
 Dupe Init Wt./Vol.: Extract Vol:



## Matrix Spike Summary

Original Sample ID: 1524337  
 MS Sample ID: 1524339 MS  
 MSD Sample ID:

Analysis Date: 08/08/2019 18:20  
 Analysis Date: 08/08/2019 18:23  
 Analysis Date:  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1199604001, 1199604002, 1199604003, 1199604004

## Results by EP200.8

Parameter	Sample	Matrix Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Calcium	6080	10000	16400	103				70-130		
Iron	125U	5000	5410	108				70-130		
Magnesium	978	10000	11700	107				70-130		

## Batch Information

Analytical Batch: MMS10585  
 Analytical Method: EP200.8  
 Instrument: Perkin Elmer Nexlon P5  
 Analyst: DSH  
 Analytical Date/Time: 8/8/2019 6:23:51PM

Prep Batch: MXX32644  
 Prep Method: DW Digest for Metals on ICP-MS  
 Prep Date/Time: 8/8/2019 1:28:59PM  
 Prep Initial Wt./Vol.: 20.00mL  
 Prep Extract Vol: 50.00mL

Print Date: 08/15/2019 1:59:31PM

## Method Blank

Blank ID: MB for HBN 1797643 [VXX/34608]

Blank Lab ID: 1524355

QC for Samples:

1199604002, 1199604005

Matrix: Water (Surface, Eff., Ground)

## Results by SW8260C

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Benzene	0.200U	0.400	0.120	ug/L
Ethylbenzene	0.500U	1.00	0.310	ug/L
o-Xylene	0.500U	1.00	0.310	ug/L
P & M -Xylene	1.00U	2.00	0.620	ug/L
Toluene	0.500U	1.00	0.310	ug/L
Xylenes (total)	1.50U	3.00	1.00	ug/L
<b>Surrogates</b>				
1,2-Dichloroethane-D4 (surr)	110	81-118		%
4-Bromofluorobenzene (surr)	98.2	85-114		%
Toluene-d8 (surr)	96	89-112		%

## Batch Information

Analytical Batch: VMS19277  
 Analytical Method: SW8260C  
 Instrument: VPA 780/5975 GC/MS  
 Analyst: CMC  
 Analytical Date/Time: 8/7/2019 1:21:00PM

Prep Batch: VXX34608  
 Prep Method: SW5030B  
 Prep Date/Time: 8/7/2019 6:00:00AM  
 Prep Initial Wt./Vol.: 5 mL  
 Prep Extract Vol: 5 mL

## Blank Spike Summary

Blank Spike ID: LCS for HBN 1199604 [VXX34608]  
 Blank Spike Lab ID: 1524356  
 Date Analyzed: 08/07/2019 13:36

Spike Duplicate ID: LCSD for HBN 1199604 [VXX34608]  
 Spike Duplicate Lab ID: 1524357  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1199604002, 1199604005

## Results by SW8260C

Parameter	Blank Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Benzene	30	25.7	86	30	25.2	84	( 79-120 )	2.20	(< 20 )
Ethylbenzene	30	25.9	86	30	25.2	84	( 79-121 )	2.70	(< 20 )
o-Xylene	30	25.7	86	30	25.0	83	( 78-122 )	2.60	(< 20 )
P & M -Xylene	60	52.0	87	60	50.3	84	( 80-121 )	3.40	(< 20 )
Toluene	30	25.0	83	30	24.2	81	( 80-121 )	3.20	(< 20 )
Xylenes (total)	90	77.7	86	90	75.3	84	( 79-121 )	3.10	(< 20 )

## Surrogates

1,2-Dichloroethane-D4 (surr)	30	105	105	30	105	105	( 81-118 )	0.13	
4-Bromofluorobenzene (surr)	30	99.3	99	30	99.7	100	( 85-114 )	0.40	
Toluene-d8 (surr)	30	99.3	99	30	99.2	99	( 89-112 )	0.07	

## Batch Information

Analytical Batch: VMS19277  
 Analytical Method: SW8260C  
 Instrument: VPA 780/5975 GC/MS  
 Analyst: CMC

Prep Batch: VXX34608  
 Prep Method: SW5030B  
 Prep Date/Time: 08/07/2019 06:00  
 Spike Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL  
 Dupe Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL

## Method Blank

Blank ID: MB for HBN 1797720 [VXX/34620]  
 Blank Lab ID: 1524643

Matrix: Water (Surface, Eff., Ground)

QC for Samples:  
 1199604001

## Results by SW8260C

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Benzene	0.200U	0.400	0.120	ug/L
Ethylbenzene	0.500U	1.00	0.310	ug/L
o-Xylene	0.500U	1.00	0.310	ug/L
P & M -Xylene	1.00U	2.00	0.620	ug/L
Toluene	0.500U	1.00	0.310	ug/L
Xylenes (total)	1.50U	3.00	1.00	ug/L
<b>Surrogates</b>				
1,2-Dichloroethane-D4 (surr)	114	81-118		%
4-Bromofluorobenzene (surr)	105	85-114		%
Toluene-d8 (surr)	93.2	89-112		%

## Batch Information

Analytical Batch: VMS19286  
 Analytical Method: SW8260C  
 Instrument: Agilent 7890-75MS  
 Analyst: CMC  
 Analytical Date/Time: 8/9/2019 10:58:00AM

Prep Batch: VXX34620  
 Prep Method: SW5030B  
 Prep Date/Time: 8/9/2019 6:00:00AM  
 Prep Initial Wt./Vol.: 5 mL  
 Prep Extract Vol: 5 mL

## Blank Spike Summary

Blank Spike ID: LCS for HBN 1199604 [VXX34620]  
 Blank Spike Lab ID: 1524644  
 Date Analyzed: 08/09/2019 11:13

Spike Duplicate ID: LCSD for HBN 1199604 [VXX34620]  
 Spike Duplicate Lab ID: 1524645  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1199604001

## Results by SW8260C

Parameter	Blank Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Benzene	30	27.6	92	30	27.1	90	( 79-120 )	1.60	(< 20 )
Ethylbenzene	30	26.4	88	30	26.4	88	( 79-121 )	0.34	(< 20 )
o-Xylene	30	26.2	87	30	26.1	87	( 78-122 )	0.23	(< 20 )
P & M -Xylene	60	53.6	89	60	54.9	92	( 80-121 )	2.40	(< 20 )
Toluene	30	27.5	92	30	27.5	92	( 80-121 )	0.07	(< 20 )
Xylenes (total)	90	79.8	89	90	81.0	90	( 79-121 )	1.50	(< 20 )
<b>Surrogates</b>									
1,2-Dichloroethane-D4 (surr)	30	107	107	30	107	107	( 81-118 )	0.72	
4-Bromofluorobenzene (surr)	30	106	106	30	105	105	( 85-114 )	0.60	
Toluene-d8 (surr)	30	92.3	92	30	91	91	( 89-112 )	1.50	

## Batch Information

Analytical Batch: VMS19286  
 Analytical Method: SW8260C  
 Instrument: Agilent 7890-75MS  
 Analyst: CMC

Prep Batch: VXX34620  
 Prep Method: SW5030B  
 Prep Date/Time: 08/09/2019 06:00  
 Spike Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL  
 Dupe Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL

## Method Blank

Blank ID: MB for HBN 1797813 [VXX/34632]  
 Blank Lab ID: 1525004

Matrix: Water (Surface, Eff., Ground)

QC for Samples:  
 1199604001, 1199604002, 1199604005

## Results by AK101

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Gasoline Range Organics	0.0500U	0.100	0.0310	mg/L
<b>Surrogates</b>				
4-Bromofluorobenzene (surr)	82.4	50-150		%

## Batch Information

Analytical Batch: VFC14874  
 Analytical Method: AK101  
 Instrument: Agilent 7890 PID/FID  
 Analyst: NRB  
 Analytical Date/Time: 8/13/2019 1:30:00AM

Prep Batch: VXX34632  
 Prep Method: SW5030B  
 Prep Date/Time: 8/12/2019 6:00:00AM  
 Prep Initial Wt./Vol.: 5 mL  
 Prep Extract Vol: 5 mL

## Blank Spike Summary

Blank Spike ID: LCS for HBN 1199604 [VXX34632]  
 Blank Spike Lab ID: 1525005  
 Date Analyzed: 08/13/2019 06:29

Spike Duplicate ID: LCSD for HBN 1199604 [VXX34632]  
 Spike Duplicate Lab ID: 1525006  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1199604001, 1199604002, 1199604005

## Results by AK101

Parameter	Blank Spike (mg/L)			Spike Duplicate (mg/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Gasoline Range Organics	1.00	1.04	104	1.00	1.04	104	( 60-120 )	0.33	(< 20 )

### Surrogates

4-Bromofluorobenzene (surr)	0.0500	98.6	99	0.0500	91.6	92	( 50-150 )	7.40	
-----------------------------	--------	------	----	--------	------	----	------------	------	--

## Batch Information

Analytical Batch: **VFC14874**  
 Analytical Method: **AK101**  
 Instrument: **Agilent 7890 PID/FID**  
 Analyst: **NRB**

Prep Batch: **VXX34632**  
 Prep Method: **SW5030B**  
 Prep Date/Time: **08/12/2019 06:00**  
 Spike Init Wt./Vol.: 1.00 mg/L Extract Vol: 5 mL  
 Dupe Init Wt./Vol.: 1.00 mg/L Extract Vol: 5 mL

Print Date: 08/15/2019 1:59:38PM

## Method Blank

Blank ID: MB for HBN 1797639 [WTC/2942]

Blank Lab ID: 1524333

QC for Samples:

1199604001, 1199604002, 1199604003, 1199604004

Matrix: Water (Surface, Eff., Ground)

## Results by SM 5310B

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Total Organic Carbon	500U	1000	400	ug/L

## Batch Information

Analytical Batch: WTC2942

Analytical Method: SM 5310B

Instrument: TOC Analyzer

Analyst: BMZ

Analytical Date/Time: 8/8/2019 12:18:19PM



## Blank Spike Summary

Blank Spike ID: LCS for HBN 1199604 [WTC2942]

Blank Spike Lab ID: 1524331

Date Analyzed: 08/08/2019 12:01

Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1199604001, 1199604002, 1199604003, 1199604004

## Results by SM 5310B

Parameter	Blank Spike (ug/L)			CL ( 80-120 )
	Spike	Result	Rec (%)	
Total Organic Carbon	75000	68900	92	

## Batch Information

Analytical Batch: **WTC2942**

Analytical Method: **SM 5310B**

Instrument: **TOC Analyzer**

Analyst: **BMZ**

Print Date: 08/15/2019 1:59:41PM

## Matrix Spike Summary

Original Sample ID: 1194336001  
 MS Sample ID: 1524350 MS  
 MSD Sample ID: 1524351 MSD

Analysis Date: 08/08/2019 12:34  
 Analysis Date: 08/08/2019 12:50  
 Analysis Date: 08/08/2019 13:04  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1199604001, 1199604002, 1199604003, 1199604004

## Results by SM 5310B

Parameter	Sample	Matrix Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Total Organic Carbon	1370	10000	10400	91	10000	10100	87	75-125	3.20	(< 25 )

## Batch Information

Analytical Batch: WTC2942  
 Analytical Method: SM 5310B  
 Instrument: TOC Analyzer  
 Analyst: BMZ  
 Analytical Date/Time: 8/8/2019 12:50:09PM

## Method Blank

Blank ID: MB for HBN 1797870 [XXX/42009]

Blank Lab ID: 1525243

QC for Samples:

1199604001, 1199604002

Matrix: Water (Surface, Eff., Ground)

## Results by AK102

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Diesel Range Organics	0.247J	0.600	0.180	mg/L
<b>Surrogates</b>				
5a Androstane (surr)	88.3	60-120		%

## Batch Information

Analytical Batch: XFC15242

Analytical Method: AK102

Instrument: Agilent 7890B F

Analyst: VDL

Analytical Date/Time: 8/14/2019 7:26:00PM

Prep Batch: XXX42009

Prep Method: SW3520C

Prep Date/Time: 8/14/2019 9:57:21AM

Prep Initial Wt./Vol.: 250 mL

Prep Extract Vol: 1 mL

## Blank Spike Summary

Blank Spike ID: LCS for HBN 1199604 [XXX42009]  
 Blank Spike Lab ID: 1525244  
 Date Analyzed: 08/14/2019 19:36

Spike Duplicate ID: LCSD for HBN 1199604 [XXX42009]  
 Spike Duplicate Lab ID: 1525245  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1199604001, 1199604002

## Results by AK102

Parameter	Blank Spike (mg/L)			Spike Duplicate (mg/L)			CL	RPD (%)	RPD CL	
	Spike	Result	Rec (%)	Spike	Result	Rec (%)				
Diesel Range Organics	20	19.0	95	20	17.8	89	( 75-125 )	6.60	(< 20 )	
<b>Surrogates</b>										
5a Androstane (surr)	0.4	86.9	87	0.4	85.4	85	( 60-120 )	1.70		

## Batch Information

Analytical Batch: **XFC15242**  
 Analytical Method: **AK102**  
 Instrument: **Agilent 7890B F**  
 Analyst: **VDL**

Prep Batch: **XXX42009**  
 Prep Method: **SW3520C**  
 Prep Date/Time: **08/14/2019 09:57**  
 Spike Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL  
 Dupe Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL

## Method Blank

Blank ID: MB for HBN 1797870 [XXX/42009]

Blank Lab ID: 1525243

QC for Samples:

1199604001, 1199604002

Matrix: Water (Surface, Eff., Ground)

## Results by AK103

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Residual Range Organics	0.250U	0.500	0.150	mg/L
<b>Surrogates</b>				
n-Triacontane-d62 (surr)	103	60-120		%

## Batch Information

Analytical Batch: XFC15242

Analytical Method: AK103

Instrument: Agilent 7890B F

Analyst: VDL

Analytical Date/Time: 8/14/2019 7:26:00PM

Prep Batch: XXX42009

Prep Method: SW3520C

Prep Date/Time: 8/14/2019 9:57:21AM

Prep Initial Wt./Vol.: 250 mL

Prep Extract Vol: 1 mL

## Blank Spike Summary

Blank Spike ID: LCS for HBN 1199604 [XXX42009]  
 Blank Spike Lab ID: 1525244  
 Date Analyzed: 08/14/2019 19:36

Spike Duplicate ID: LCSD for HBN 1199604 [XXX42009]  
 Spike Duplicate Lab ID: 1525245  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1199604001, 1199604002

## Results by AK103

Parameter	Blank Spike (mg/L)			Spike Duplicate (mg/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Residual Range Organics	20	16.7	84	20	16.0	80	( 60-120 )	4.60	(< 20 )
<b>Surrogates</b>									
n-Triacontane-d62 (surr)	0.4	92.4	92	0.4	92.9	93	( 60-120 )	0.56	

## Batch Information

Analytical Batch: **XFC15242**  
 Analytical Method: **AK103**  
 Instrument: **Agilent 7890B F**  
 Analyst: **VDL**

Prep Batch: **XXX42009**  
 Prep Method: **SW3520C**  
 Prep Date/Time: **08/14/2019 09:57**  
 Spike Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL  
 Dupe Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL

1199604



CHAI

SHANNON & WILSON, INC.  
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

2355 Hill Road  
Fairbanks, AK 99709  
(907) 479-0600  
www.shannonwilson.com

Y RECORD

Laboratory SGS Page 1 of 1

Attn:

Analytical Methods (include preservative if used)

GRD (HCL)	STEX (HCL) 8/26	DPS (HCL)	RPO (HCL)	TOL (HCL)	DCC (HCL)	TOTAL Fe + Mn + Cu	Dissolved Fe + Mn (HNO3)	Total Number of Containers
X	X	X	X	X	X	X	X	12
X	X	X	X	X	X	X	X	12

Remarks/Matrix Composition/Grab? Sample Containers

Quote No: \_\_\_\_\_

J-Flags:  Yes  No

Turn Around Time:  Normal  Rush

Please Specify \_\_\_\_\_

Sample Identity	Lab No.	Time	Date Sampled
MW-19-02	DAJ 3 Ab	1337	8/2/2019
MW-19-01	DAJ 4 Ab	1640	8/2/2019
5 AF			

Project Information

Number: 11-4-06050

Name: Pumestop

Contact: KRF

Ongoing Project? Yes  No

Sampler: CAS

Sample Receipt

Total No. of Containers: \_\_\_\_\_

COC Seals/Intact? Y/N/C

Received Good Cond./Cob: \_\_\_\_\_

Temp: 46

Delivery Method: Hand

Relinquished By: 1.

Signature: [Signature] Time: 11:05

Printed Name: Craig Beebe Date: 8/5/19

Company: Shannon & Wilson, Inc.

Relinquished By: 2.

Signature: [Signature] Time: 1406

Printed Name: David Warner Date: 8/5/19

Company: SGS

Relinquished By: 3.

Signature: \_\_\_\_\_ Time: \_\_\_\_\_

Printed Name: \_\_\_\_\_ Date: \_\_\_\_\_

Company: \_\_\_\_\_

Notes:

Profile: 347128

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

Received By: 1.

Signature: [Signature] Time: 1405

Printed Name: David Warner Date: 8/5/19

Company: SGS

Received By: 2.

Signature: \_\_\_\_\_ Time: \_\_\_\_\_

Printed Name: \_\_\_\_\_ Date: \_\_\_\_\_

Company: \_\_\_\_\_

Received By: 3.

Signature: JAW Time: 1055

Printed Name: \_\_\_\_\_ Date: 8/6/19

Company: SGS FLIP 3.10c 058

No. 36075



e-Sample Receipt Form FBK

SGS Workorder #:

1199604

1199604

Review Criteria		Condition (Yes, No, N/A)	Exceptions Noted below	
<b>Chain of Custody / Temperature Requirements</b>			<b>Yes</b>	Exemption permitted if sampler hand carries/delivers.
Were Custody Seals intact? Note # & location		N/A		
COC accompanied samples?		Yes		
DOD: Were samples received in COC corresponding coolers?		N/A		
<input type="checkbox"/> **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 @ 4.6 °C	Therm. ID: D23
If samples received without a temperature blank, the "cooler temperature" will be documented instead & "COOLER TEMP" will be noted to the right. "ambient" or "chilled" will be noted if neither is available.			Cooler ID: @	Therm. ID:
			Cooler ID: @	Therm. ID:
			Cooler ID: @	Therm. ID:
			Cooler ID: @	Therm. ID:
*If >6°C, were samples collected <8 hours ago?				
If <0°C, were sample containers ice free?				
Note: Identify containers received at non-compliant temperature . Use form FS-0029 if more space is needed.				
<b>Holding Time / Documentation / Sample Condition Requirements</b>		Note: Refer to form F-083 "Sample Guide" for specific holding times.		
Do samples match COC** (i.e., sample IDs, dates/times collected)?		N/C		
**Note: If times differ <1hr, record details & login per COC. ***Note: If sample information on containers differs from COC, SGS will default to COC information				
Were samples in good condition (no leaks/cracks/breakage)?		Yes		
Were analytical requests clear? (i.e., method is specified for analyses with multiple option for analysis (Ex: BTEX, Metals))		Yes		
Were Trip Blanks (i.e., VOAs, LL-Hg) in cooler with samples?		Yes		
Were all water VOA vials free of headspace (i.e., bubbles ≤ 6mm)?		N/C		
Were all soil VOAs field extracted with MeOH+BFB?		N/A		
For Rush/Short Hold Time, was RUSH/Short HT email sent?		N/A		
<b>Note to Client:</b> Any "No", answer above indicates non-compliance with standard procedures and may impact data quality.				
Additional notes (if applicable):				
<b>SGS Profile #</b>	<b>347128</b>		347128	





## Sample Containers and Preservatives

<u>Container Id</u>	<u>Preservative</u>	<u>Container Condition</u>	<u>Container Id</u>	<u>Preservative</u>	<u>Container Condition</u>
1199604001-A	HCL to pH < 2	OK			
1199604001-B	HCL to pH < 2	OK			
1199604001-C	HCL to pH < 2	OK			
1199604001-D	HCL to pH < 2	OK			
1199604001-E	HCL to pH < 2	OK			
1199604001-F	HCL to pH < 2	OK			
1199604001-G	HCL to pH < 2	OK			
1199604001-H	HCL to pH < 2	OK			
1199604001-I	HCL to pH < 2	OK			
1199604001-J	HNO3 to pH < 2	OK			
1199604002-A	HCL to pH < 2	OK			
1199604002-B	HCL to pH < 2	OK			
1199604002-C	HCL to pH < 2	OK			
1199604002-D	HCL to pH < 2	OK			
1199604002-E	HCL to pH < 2	OK			
1199604002-F	HCL to pH < 2	OK			
1199604002-G	HCL to pH < 2	OK			
1199604002-H	HCL to pH < 2	OK			
1199604002-I	HCL to pH < 2	OK			
1199604002-J	HNO3 to pH < 2	OK			
1199604003-A	HCL to pH < 2	OK			
1199604003-B	HNO3 to pH < 2	OK			
1199604004-A	HCL to pH < 2	OK			
1199604004-B	HNO3 to pH < 2	OK			
1199604005-A	HCL to pH < 2	OK			
1199604005-B	HCL to pH < 2	OK			
1199604005-C	HCL to pH < 2	OK			
1199604005-D	HCL to pH < 2	OK			
1199604005-E	HCL to pH < 2	OK			
1199604005-F	HCL to pH < 2	OK			

### Container Condition Glossary

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

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

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

DM - The container was received damaged.

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

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

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

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

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

**Laboratory Data Review Checklist**

Completed By:

Kristen Freiburger

Title:

Associate

Date:

August 19, 2019

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

August 15, 2019

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

SGS North America Inc.

Laboratory Report Number:

1199604

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

1. Laboratory

- a. Did an ADEC CS approved laboratory receive and
- perform
- all of the submitted sample analyses?

 Yes  No

Comments:

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

 Yes  No

Comments:

Analyses were performed by SGS in Anchorage, AK.

2. Chain of Custody (CoC)

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

 Yes  No

Comments:

- b. Correct Analyses requested?

 Yes  No

Comments:

3. Laboratory Sample Receipt Documentation

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

 Yes  No

Comments:

- b. Sample preservation acceptable – acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

 Yes  No

Comments:

- c. Sample condition documented – broken, leaking (Methanol), zero headspace (VOC vials)?

 Yes  No

Comments:

The sample receipt form notes that the samples arrived at the laboratory in good condition.

- d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

Yes  No

Comments:

There were no discrepancies noted by the laboratory in the sample receipt documentation.

- e. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected.

#### 4. Case Narrative

- a. Present and understandable?

Yes  No

Comments:

- b. Discrepancies, errors, or QC failures identified by the lab?

Yes  No

Comments:

There were no discrepancies, errors or QC failures noted in the case narrative.

- c. Were all corrective actions documented?

Yes  No

Comments:

No corrective actions were documented in the case narrative.

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

Comments:

The case narrative does not note an effect on data quality.

#### 5. Samples Results

- a. Correct analyses performed/reported as requested on COC?

Yes  No

Comments:

- b. All applicable holding times met?

Yes  No

Comments:

c. All soils reported on a dry weight basis?

Yes  No

Comments:

N/A; soil samples were not submitted with this work order.

d. Are the reported LOQs less than the Cleanup Level or the minimum required detection level for the project?

Yes  No

Comments:

The LOD was used for this report. LODs were below the ADEC regulatory limits, where applicable.

e. Data quality or usability affected?

Yes  No

Comments:

The data quality and/or usability are not affected.

## 6. QC Samples

a. Method Blank

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

Yes  No

Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

Yes  No

Comments:

Yes; however, DRO was detected in the method blank below the LOQ at an estimated concentration of 0.247J mg/L.

iii. If above LOQ, what samples are affected?

Comments:

Both project samples have concentrations within 5 times the method blank concentration. The project sample results are affected, each sample is flagged "UB" at the LOQ.

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

Yes  No

Comments:

See above.

v. Data quality or usability affected?

Comments:

Yes; 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

Comments:

LCS/LCSD or LCS/MS/MSD samples were analyzed for organic analyses associated with this report.

- ii. Metals/Inorganics – one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes  No

Comments:

LCS and MS samples were analyzed for metals associated with this report. We are unable to assess the analytical precision of the metals analyses.

- 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

Comments:

- iv. Precision – All relative percent differences (RPD) 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

Comments:

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

Comments:

None; analytical accuracy and precision were demonstrated to be within acceptable limits.

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

Yes  No

Comments:

Qualification of the data was not required; see above.

- vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

The data quality and/or usability are not affected.

## c. Surrogates – Organics Only

i. Are surrogate recoveries reported for organic analyses – field, QC and laboratory samples?

Yes  No

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

Comments:

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

Yes  No

Comments:

N/A; see above.

iv. Data quality or usability affected?

Comments:

The data quality and usability are not affected; see above.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples? (If not, enter explanation below.)

Yes  No

Comments:

ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC? (If not, a comment explaining why must be entered below)

Yes  No

Comments:

One cooler was used to transport the project samples.

iii. All results less than LOQ?

Yes  No

Comments:

iv. If above LOQ, what samples are affected?

Comments:

N/A; see above.

v. Data quality or usability affected?

Comments:

The data quality and/or usability are not affected; see above.

e. Field Duplicate

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

Yes  No

Comments:

ii. Submitted blind to lab?

Yes  No

Comments:

A field-duplicate sample was not collected for this project.

iii. Precision – All relative percent differences (RPD) less than specified DQOs?  
(Recommended: 30% water, 50% soil)

$$\text{RPD (\%)} = \text{Absolute value of: } \frac{(R_1 - R_2)}{((R_1 + R_2)/2)} \times 100$$

Where  $R_1$  = Sample Concentration  
 $R_2$  = Field Duplicate Concentration

Yes  No

Comments:

N/A; a field-duplicate sample was not submitted in this work order.

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

Comments:

The data quality and/or usability are not affected; see above

f. Decontamination or Equipment Blank (If not applicable, a comment stating why must be entered below).

Yes  No  Not Applicable

Equipment blanks were not submitted for this project.



i. All results less than LOQ?

Yes  No

Comments:

N/A; an equipment-blank sample was not collected.

ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment-blank sample was not collected.

iii. Data quality or usability affected?

Comments:

Data quality and/or usability were not affected.

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

a. Defined and appropriate?

Yes  No

Comments:

There were no additional flags/qualifiers required for this work order.

## ANALYTICAL REPORT

Eurofins TestAmerica, Sacramento  
880 Riverside Parkway  
West Sacramento, CA 95605  
Tel: (916)373-5600

Laboratory Job ID: 320-52978-1  
Client Project/Site: PlumeStop

**For:**

Shannon & Wilson, Inc  
2355 Hill Rd.  
Fairbanks, Alaska 99709-5244

Attn: Kristen Freiburger



---

Authorized for release by:  
8/19/2019 3:19:28 PM

David Alltucker, Project Manager I  
(916)374-4383  
[david.alltucker@testamericainc.com](mailto:david.alltucker@testamericainc.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:  
[www.testamericainc.com](http://www.testamericainc.com)

*The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.*

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*



# Table of Contents

Cover Page . . . . .	1
Table of Contents . . . . .	2
Definitions/Glossary . . . . .	3
Case Narrative . . . . .	4
Detection Summary . . . . .	5
Client Sample Results . . . . .	6
Isotope Dilution Summary . . . . .	8
QC Sample Results . . . . .	9
QC Association Summary . . . . .	13
Lab Chronicle . . . . .	14
Certification Summary . . . . .	15
Method Summary . . . . .	16
Sample Summary . . . . .	17
Chain of Custody . . . . .	18
Receipt Checklists . . . . .	19

# Definitions/Glossary

Client: Shannon & Wilson, Inc  
Project/Site: PlumeStop

Job ID: 320-52978-1

## Qualifiers

### LCMS

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
▫	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

# Case Narrative

Client: Shannon & Wilson, Inc  
Project/Site: PlumeStop

Job ID: 320-52978-1

---

**Job ID: 320-52978-1**

---

**Laboratory: Eurofins TestAmerica, Sacramento**

## Narrative

---

### Job Narrative 320-52978-1

#### Receipt

The samples were received on 8/6/2019 10:25 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.2° C.

#### LCMS

Method(s) 537 (modified): Results for samples MW-19-02 (320-52978-1) and MW-19-01 (320-52978-2) were reported from the analysis of a diluted extract due to high concentration of the target analyte in the analysis of the undiluted extract. The dilution factor was applied to the labeled internal standard area counts and these area counts were within acceptance limits

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### Organic Prep

Method(s) 3535: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-313706

Method(s) 3535: The following samples are light orange and contain sediment at the bottom of the bottle prior to extraction: MW-19-02 (320-52978-1) and MW-19-01 (320-52978-2)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

# Detection Summary

Client: Shannon & Wilson, Inc  
Project/Site: PlumeStop

Job ID: 320-52978-1

## Client Sample ID: MW-19-02

## Lab Sample ID: 320-52978-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	23		18	3.2	ng/L	10		537 (modified)	Total/NA
Perfluoropentanoic acid (PFPeA)	22		18	4.4	ng/L	10		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	150		18	5.3	ng/L	10		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	29		18	2.3	ng/L	10		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	30		18	7.7	ng/L	10		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	56		18	1.8	ng/L	10		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	570	B	18	1.5	ng/L	10		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	15	J	18	4.9	ng/L	10		537 (modified)	Total/NA

## Client Sample ID: MW-19-01

## Lab Sample ID: 320-52978-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	24		18	3.1	ng/L	10		537 (modified)	Total/NA
Perfluoropentanoic acid (PFPeA)	55		18	4.3	ng/L	10		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	200		18	5.1	ng/L	10		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	24		18	2.2	ng/L	10		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	240		18	7.5	ng/L	10		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	100		18	1.8	ng/L	10		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	530	B	18	1.5	ng/L	10		537 (modified)	Total/NA
Perfluoroheptanesulfonic Acid (PFHpS)	11	J	18	1.7	ng/L	10		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	270		18	4.8	ng/L	10		537 (modified)	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Sacramento

# Client Sample Results

Client: Shannon & Wilson, Inc  
Project/Site: PlumeStop

Job ID: 320-52978-1

**Client Sample ID: MW-19-02**

**Lab Sample ID: 320-52978-1**

Date Collected: 08/02/19 13:37

Matrix: Water

Date Received: 08/06/19 10:25

**Method: 537 (modified) - Fluorinated Alkyl Substances**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	23		18	3.2	ng/L		08/09/19 05:35	08/15/19 01:57	10
Perfluoropentanoic acid (PFPeA)	22		18	4.4	ng/L		08/09/19 05:35	08/15/19 01:57	10
Perfluorohexanoic acid (PFHxA)	150		18	5.3	ng/L		08/09/19 05:35	08/15/19 01:57	10
Perfluoroheptanoic acid (PFHpA)	29		18	2.3	ng/L		08/09/19 05:35	08/15/19 01:57	10
Perfluorooctanoic acid (PFOA)	30		18	7.7	ng/L		08/09/19 05:35	08/15/19 01:57	10
Perfluorononanoic acid (PFNA)	ND		18	2.4	ng/L		08/09/19 05:35	08/15/19 01:57	10
Perfluorodecanoic acid (PFDA)	ND		18	2.8	ng/L		08/09/19 05:35	08/15/19 01:57	10
Perfluoroundecanoic acid (PFUnA)	ND		18	10	ng/L		08/09/19 05:35	08/15/19 01:57	10
Perfluorododecanoic acid (PFDoA)	ND		18	5.0	ng/L		08/09/19 05:35	08/15/19 01:57	10
Perfluorotridecanoic acid (PFTriA)	ND		18	12	ng/L		08/09/19 05:35	08/15/19 01:57	10
Perfluorotetradecanoic acid (PFTeA)	ND		18	2.6	ng/L		08/09/19 05:35	08/15/19 01:57	10
Perfluorobutanesulfonic acid (PFBS)	56		18	1.8	ng/L		08/09/19 05:35	08/15/19 01:57	10
Perfluorohexanesulfonic acid (PFHxS)	570	B	18	1.5	ng/L		08/09/19 05:35	08/15/19 01:57	10
Perfluoroheptanesulfonic Acid (PFHpS)	ND		18	1.7	ng/L		08/09/19 05:35	08/15/19 01:57	10
Perfluorooctanesulfonic acid (PFOS)	15	J	18	4.9	ng/L		08/09/19 05:35	08/15/19 01:57	10
Perfluorodecanesulfonic acid (PFDS)	ND		18	2.9	ng/L		08/09/19 05:35	08/15/19 01:57	10
Perfluorooctanesulfonamide (FOSA)	ND		18	3.2	ng/L		08/09/19 05:35	08/15/19 01:57	10
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		180	28	ng/L		08/09/19 05:35	08/15/19 01:57	10
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		180	17	ng/L		08/09/19 05:35	08/15/19 01:57	10
6:2 FTS	ND		180	18	ng/L		08/09/19 05:35	08/15/19 01:57	10
8:2 FTS	ND		180	18	ng/L		08/09/19 05:35	08/15/19 01:57	10

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFBA	82		25 - 150	08/09/19 05:35	08/15/19 01:57	10
13C5 PFPeA	89		25 - 150	08/09/19 05:35	08/15/19 01:57	10
13C2 PFHxA	88		25 - 150	08/09/19 05:35	08/15/19 01:57	10
13C4 PFHpA	89		25 - 150	08/09/19 05:35	08/15/19 01:57	10
13C4 PFOA	91		25 - 150	08/09/19 05:35	08/15/19 01:57	10
13C5 PFNA	94		25 - 150	08/09/19 05:35	08/15/19 01:57	10
13C2 PFDA	90		25 - 150	08/09/19 05:35	08/15/19 01:57	10
13C2 PFUnA	90		25 - 150	08/09/19 05:35	08/15/19 01:57	10
13C2 PFDoA	86		25 - 150	08/09/19 05:35	08/15/19 01:57	10
13C2 PFTeDA	79		25 - 150	08/09/19 05:35	08/15/19 01:57	10
13C3 PFBS	94		25 - 150	08/09/19 05:35	08/15/19 01:57	10
18O2 PFHxS	102		25 - 150	08/09/19 05:35	08/15/19 01:57	10
13C4 PFOS	88		25 - 150	08/09/19 05:35	08/15/19 01:57	10
13C8 FOSA	90		25 - 150	08/09/19 05:35	08/15/19 01:57	10
d3-NMeFOSAA	94		25 - 150	08/09/19 05:35	08/15/19 01:57	10
d5-NEtFOSAA	99		25 - 150	08/09/19 05:35	08/15/19 01:57	10
M2-6:2 FTS	120		25 - 150	08/09/19 05:35	08/15/19 01:57	10
M2-8:2 FTS	100		25 - 150	08/09/19 05:35	08/15/19 01:57	10

Eurofins TestAmerica, Sacramento

# Client Sample Results

Client: Shannon & Wilson, Inc  
Project/Site: PlumeStop

Job ID: 320-52978-1

**Client Sample ID: MW-19-01**

**Lab Sample ID: 320-52978-2**

Date Collected: 08/02/19 16:40

Matrix: Water

Date Received: 08/06/19 10:25

**Method: 537 (modified) - Fluorinated Alkyl Substances**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	24		18	3.1	ng/L		08/09/19 05:35	08/15/19 02:05	10
Perfluoropentanoic acid (PFPeA)	55		18	4.3	ng/L		08/09/19 05:35	08/15/19 02:05	10
Perfluorohexanoic acid (PFHxA)	200		18	5.1	ng/L		08/09/19 05:35	08/15/19 02:05	10
Perfluoroheptanoic acid (PFHpA)	24		18	2.2	ng/L		08/09/19 05:35	08/15/19 02:05	10
Perfluorooctanoic acid (PFOA)	240		18	7.5	ng/L		08/09/19 05:35	08/15/19 02:05	10
Perfluorononanoic acid (PFNA)	ND		18	2.4	ng/L		08/09/19 05:35	08/15/19 02:05	10
Perfluorodecanoic acid (PFDA)	ND		18	2.7	ng/L		08/09/19 05:35	08/15/19 02:05	10
Perfluoroundecanoic acid (PFUnA)	ND		18	9.7	ng/L		08/09/19 05:35	08/15/19 02:05	10
Perfluorododecanoic acid (PFDoA)	ND		18	4.8	ng/L		08/09/19 05:35	08/15/19 02:05	10
Perfluorotridecanoic acid (PFTriA)	ND		18	11	ng/L		08/09/19 05:35	08/15/19 02:05	10
Perfluorotetradecanoic acid (PFTeA)	ND		18	2.6	ng/L		08/09/19 05:35	08/15/19 02:05	10
Perfluorobutanesulfonic acid (PFBS)	100		18	1.8	ng/L		08/09/19 05:35	08/15/19 02:05	10
Perfluorohexanesulfonic acid (PFHxS)	530	B	18	1.5	ng/L		08/09/19 05:35	08/15/19 02:05	10
Perfluoroheptanesulfonic Acid (PFHpS)	11	J	18	1.7	ng/L		08/09/19 05:35	08/15/19 02:05	10
Perfluorooctanesulfonic acid (PFOS)	270		18	4.8	ng/L		08/09/19 05:35	08/15/19 02:05	10
Perfluorodecanesulfonic acid (PFDS)	ND		18	2.8	ng/L		08/09/19 05:35	08/15/19 02:05	10
Perfluorooctanesulfonamide (FOSA)	ND		18	3.1	ng/L		08/09/19 05:35	08/15/19 02:05	10
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		180	27	ng/L		08/09/19 05:35	08/15/19 02:05	10
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		180	17	ng/L		08/09/19 05:35	08/15/19 02:05	10
6:2 FTS	ND		180	18	ng/L		08/09/19 05:35	08/15/19 02:05	10
8:2 FTS	ND		180	18	ng/L		08/09/19 05:35	08/15/19 02:05	10

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFBA	65		25 - 150	08/09/19 05:35	08/15/19 02:05	10
13C5 PFPeA	69		25 - 150	08/09/19 05:35	08/15/19 02:05	10
13C2 PFHxA	69		25 - 150	08/09/19 05:35	08/15/19 02:05	10
13C4 PFHpA	70		25 - 150	08/09/19 05:35	08/15/19 02:05	10
13C4 PFOA	71		25 - 150	08/09/19 05:35	08/15/19 02:05	10
13C5 PFNA	68		25 - 150	08/09/19 05:35	08/15/19 02:05	10
13C2 PFDA	67		25 - 150	08/09/19 05:35	08/15/19 02:05	10
13C2 PFUnA	67		25 - 150	08/09/19 05:35	08/15/19 02:05	10
13C2 PFDoA	70		25 - 150	08/09/19 05:35	08/15/19 02:05	10
13C2 PFTeDA	63		25 - 150	08/09/19 05:35	08/15/19 02:05	10
13C3 PFBS	68		25 - 150	08/09/19 05:35	08/15/19 02:05	10
18O2 PFHxS	79		25 - 150	08/09/19 05:35	08/15/19 02:05	10
13C4 PFOS	70		25 - 150	08/09/19 05:35	08/15/19 02:05	10
13C8 FOSA	69		25 - 150	08/09/19 05:35	08/15/19 02:05	10
d3-NMeFOSAA	70		25 - 150	08/09/19 05:35	08/15/19 02:05	10
d5-NEtFOSAA	69		25 - 150	08/09/19 05:35	08/15/19 02:05	10
M2-6:2 FTS	86		25 - 150	08/09/19 05:35	08/15/19 02:05	10
M2-8:2 FTS	74		25 - 150	08/09/19 05:35	08/15/19 02:05	10

Eurofins TestAmerica, Sacramento



# Isotope Dilution Summary

Client: Shannon & Wilson, Inc  
Project/Site: PlumeStop

Job ID: 320-52978-1

## Method: 537 (modified) - Fluorinated Alkyl Substances

Matrix: Water

Prep Type: Total/NA

### Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	PFBA (25-150)	PFPeA (25-150)	PFHxA (25-150)	PFHpA (25-150)	PFOA (25-150)	PFNA (25-150)	PFDA (25-150)	PFUnA (25-150)
320-52978-1	MW-19-02	82	89	88	89	91	94	90	90
320-52978-2	MW-19-01	65	69	69	70	71	68	67	67
LCS 320-313706/2-A	Lab Control Sample	86	88	86	88	87	87	84	85
LCSD 320-313706/3-A	Lab Control Sample Dup	71	73	76	75	76	75	73	71
MB 320-313706/1-A	Method Blank	64	65	64	66	67	64	63	63

### Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	PFDaA (25-150)	PFTDA (25-150)	3C3-PFB: (25-150)	PFHxS (25-150)	PFOS (25-150)	PFOSA (25-150)	-NMeFOS/ (25-150)	-NEtFOS/ (25-150)
320-52978-1	MW-19-02	86	79	94	102	88	90	94	99
320-52978-2	MW-19-01	70	63	68	79	70	69	70	69
LCS 320-313706/2-A	Lab Control Sample	84	80	86	99	87	84	83	80
LCSD 320-313706/3-A	Lab Control Sample Dup	72	67	76	86	73	69	69	69
MB 320-313706/1-A	Method Blank	63	58	65	75	64	62	59	60

### Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	M262FTS (25-150)	M282FTS (25-150)
320-52978-1	MW-19-02	120	100
320-52978-2	MW-19-01	86	74
LCS 320-313706/2-A	Lab Control Sample	107	98
LCSD 320-313706/3-A	Lab Control Sample Dup	88	85
MB 320-313706/1-A	Method Blank	80	73

#### Surrogate Legend

- PFBA = 13C4 PFBA
- PFPeA = 13C5 PFPeA
- PFHxA = 13C2 PFHxA
- PFHpA = 13C4 PFHpA
- PFOA = 13C4 PFOA
- PFNA = 13C5 PFNA
- PFDA = 13C2 PFDA
- PFUnA = 13C2 PFUnA
- PFDaA = 13C2 PFDaA
- PFTDA = 13C2 PFTeDA
- 13C3-PFBs = 13C3 PFBS
- PFHxS = 18O2 PFHxS
- PFOS = 13C4 PFOS
- PFOSA = 13C8 FOSA
- d3-NMeFOSAA = d3-NMeFOSAA
- d5-NEtFOSAA = d5-NEtFOSAA
- M262FTS = M2-6:2 FTS
- M282FTS = M2-8:2 FTS

# QC Sample Results

Client: Shannon & Wilson, Inc  
Project/Site: PlumeStop

Job ID: 320-52978-1

## Method: 537 (modified) - Fluorinated Alkyl Substances

**Lab Sample ID: MB 320-313706/1-A**  
**Matrix: Water**  
**Analysis Batch: 315245**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 313706**

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Perfluorobutanoic acid (PFBA)	ND		2.0	0.35	ng/L		08/09/19 05:35	08/14/19 23:41	1
Perfluoropentanoic acid (PFPeA)	ND		2.0	0.49	ng/L		08/09/19 05:35	08/14/19 23:41	1
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		08/09/19 05:35	08/14/19 23:41	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		08/09/19 05:35	08/14/19 23:41	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		08/09/19 05:35	08/14/19 23:41	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		08/09/19 05:35	08/14/19 23:41	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		08/09/19 05:35	08/14/19 23:41	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		08/09/19 05:35	08/14/19 23:41	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		08/09/19 05:35	08/14/19 23:41	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		08/09/19 05:35	08/14/19 23:41	1
Perfluorotetradecanoic acid (PFTeA)	0.300	J	2.0	0.29	ng/L		08/09/19 05:35	08/14/19 23:41	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		08/09/19 05:35	08/14/19 23:41	1
Perfluorohexanesulfonic acid (PFHxS)	0.276	J	2.0	0.17	ng/L		08/09/19 05:35	08/14/19 23:41	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		2.0	0.19	ng/L		08/09/19 05:35	08/14/19 23:41	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		08/09/19 05:35	08/14/19 23:41	1
Perfluorodecanesulfonic acid (PFDS)	ND		2.0	0.32	ng/L		08/09/19 05:35	08/14/19 23:41	1
Perfluorooctanesulfonamide (FOSA)	ND		2.0	0.35	ng/L		08/09/19 05:35	08/14/19 23:41	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		20	3.1	ng/L		08/09/19 05:35	08/14/19 23:41	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		20	1.9	ng/L		08/09/19 05:35	08/14/19 23:41	1
6:2 FTS	ND		20	2.0	ng/L		08/09/19 05:35	08/14/19 23:41	1
8:2 FTS	ND		20	2.0	ng/L		08/09/19 05:35	08/14/19 23:41	1

Isotope Dilution	MB	MB	Limits	Prepared	Analyzed	Dil Fac
	%Recovery	Qualifier				
13C4 PFBA	64		25 - 150	08/09/19 05:35	08/14/19 23:41	1
13C5 PFPeA	65		25 - 150	08/09/19 05:35	08/14/19 23:41	1
13C2 PFHxA	64		25 - 150	08/09/19 05:35	08/14/19 23:41	1
13C4 PFHpA	66		25 - 150	08/09/19 05:35	08/14/19 23:41	1
13C4 PFOA	67		25 - 150	08/09/19 05:35	08/14/19 23:41	1
13C5 PFNA	64		25 - 150	08/09/19 05:35	08/14/19 23:41	1
13C2 PFDA	63		25 - 150	08/09/19 05:35	08/14/19 23:41	1
13C2 PFUnA	63		25 - 150	08/09/19 05:35	08/14/19 23:41	1
13C2 PFDoA	63		25 - 150	08/09/19 05:35	08/14/19 23:41	1
13C2 PFTeDA	58		25 - 150	08/09/19 05:35	08/14/19 23:41	1
13C3 PFBS	65		25 - 150	08/09/19 05:35	08/14/19 23:41	1
18O2 PFHxS	75		25 - 150	08/09/19 05:35	08/14/19 23:41	1
13C4 PFOS	64		25 - 150	08/09/19 05:35	08/14/19 23:41	1
13C8 FOSA	62		25 - 150	08/09/19 05:35	08/14/19 23:41	1
d3-NMeFOSAA	59		25 - 150	08/09/19 05:35	08/14/19 23:41	1
d5-NEtFOSAA	60		25 - 150	08/09/19 05:35	08/14/19 23:41	1
M2-6:2 FTS	80		25 - 150	08/09/19 05:35	08/14/19 23:41	1
M2-8:2 FTS	73		25 - 150	08/09/19 05:35	08/14/19 23:41	1

Eurofins TestAmerica, Sacramento

# QC Sample Results

Client: Shannon & Wilson, Inc  
Project/Site: PlumeStop

Job ID: 320-52978-1

## Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

**Lab Sample ID: LCS 320-313706/2-A**  
**Matrix: Water**  
**Analysis Batch: 315245**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 313706**  
**%Rec.**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Perfluorobutanoic acid (PFBA)	40.0	40.9		ng/L		102	70 - 130
Perfluoropentanoic acid (PFPeA)	40.0	39.8		ng/L		100	66 - 126
Perfluorohexanoic acid (PFHxA)	40.0	40.2		ng/L		100	66 - 126
Perfluoroheptanoic acid (PFHpA)	40.0	39.3		ng/L		98	66 - 126
Perfluorooctanoic acid (PFOA)	40.0	39.6		ng/L		99	64 - 124
Perfluorononanoic acid (PFNA)	40.0	39.5		ng/L		99	68 - 128
Perfluorodecanoic acid (PFDA)	40.0	38.9		ng/L		97	69 - 129
Perfluoroundecanoic acid (PFUnA)	40.0	36.4		ng/L		91	60 - 120
Perfluorododecanoic acid (PFDoA)	40.0	40.0		ng/L		100	71 - 131
Perfluorotridecanoic acid (PFTriA)	40.0	39.0		ng/L		97	72 - 132
Perfluorotetradecanoic acid (PFTeA)	40.0	38.7		ng/L		97	68 - 128
Perfluorobutanesulfonic acid (PFBS)	35.4	36.1		ng/L		102	73 - 133
Perfluorohexanesulfonic acid (PFHxS)	36.4	31.4		ng/L		86	63 - 123
Perfluoroheptanesulfonic Acid (PFHpS)	38.1	38.9		ng/L		102	68 - 128
Perfluorooctanesulfonic acid (PFOS)	37.1	34.2		ng/L		92	67 - 127
Perfluorodecanesulfonic acid (PFDS)	38.6	35.6		ng/L		92	68 - 128
Perfluorooctanesulfonamide (FOSA)	40.0	39.3		ng/L		98	70 - 130
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	36.3		ng/L		91	67 - 127
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	37.5		ng/L		94	65 - 125
6:2 FTS	37.9	37.7		ng/L		99	66 - 126
8:2 FTS	38.3	37.6		ng/L		98	67 - 127

Isotope Dilution	LCS LCS		Limits
	%Recovery	Qualifier	
13C4 PFBA	86		25 - 150
13C5 PFPeA	88		25 - 150
13C2 PFHxA	86		25 - 150
13C4 PFHpA	88		25 - 150
13C4 PFOA	87		25 - 150
13C5 PFNA	87		25 - 150
13C2 PFDA	84		25 - 150
13C2 PFUnA	85		25 - 150
13C2 PFDoA	84		25 - 150
13C2 PFTeDA	80		25 - 150
13C3 PFBS	86		25 - 150
18O2 PFHxS	99		25 - 150
13C4 PFOS	87		25 - 150
13C8 FOSA	84		25 - 150
d3-NMeFOSAA	83		25 - 150
d5-NEtFOSAA	80		25 - 150

Eurofins TestAmerica, Sacramento

# QC Sample Results

Client: Shannon & Wilson, Inc  
Project/Site: PlumeStop

Job ID: 320-52978-1

## Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

**Lab Sample ID: LCS 320-313706/2-A**  
**Matrix: Water**  
**Analysis Batch: 315245**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 313706**

<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>LCS Qualifier</i>	<i>Limits</i>
M2-6:2 FTS	107		25 - 150
M2-8:2 FTS	98		25 - 150

**Lab Sample ID: LCSD 320-313706/3-A**  
**Matrix: Water**  
**Analysis Batch: 315245**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 313706**

<i>Analyte</i>	<i>Spike Added</i>	<i>LCSD Result</i>	<i>LCSD Qualifier</i>	<i>Unit</i>	<i>D</i>	<i>%Rec</i>	<i>%Rec. Limits</i>	<i>RPD</i>	<i>RPD Limit</i>
Perfluorobutanoic acid (PFBA)	40.0	40.7		ng/L		102	70 - 130	1	30
Perfluoropentanoic acid (PFPeA)	40.0	39.4		ng/L		98	66 - 126	1	30
Perfluorohexanoic acid (PFHxA)	40.0	39.4		ng/L		98	66 - 126	2	30
Perfluoroheptanoic acid (PFHpA)	40.0	38.1		ng/L		95	66 - 126	3	30
Perfluorooctanoic acid (PFOA)	40.0	38.0		ng/L		95	64 - 124	4	30
Perfluorononanoic acid (PFNA)	40.0	36.7		ng/L		92	68 - 128	7	30
Perfluorodecanoic acid (PFDA)	40.0	37.9		ng/L		95	69 - 129	2	30
Perfluoroundecanoic acid (PFUnA)	40.0	37.6		ng/L		94	60 - 120	3	30
Perfluorododecanoic acid (PFDoA)	40.0	40.0		ng/L		100	71 - 131	0	30
Perfluorotridecanoic acid (PFTriA)	40.0	36.8		ng/L		92	72 - 132	6	30
Perfluorotetradecanoic acid (PFTeA)	40.0	38.2		ng/L		96	68 - 128	1	30
Perfluorobutanesulfonic acid (PFBS)	35.4	33.3		ng/L		94	73 - 133	8	30
Perfluorohexanesulfonic acid (PFHxS)	36.4	30.5		ng/L		84	63 - 123	3	30
Perfluoroheptanesulfonic Acid (PFHpS)	38.1	38.8		ng/L		102	68 - 128	0	30
Perfluorooctanesulfonic acid (PFOS)	37.1	34.5		ng/L		93	67 - 127	1	30
Perfluorodecanesulfonic acid (PFDS)	38.6	35.6		ng/L		92	68 - 128	0	30
Perfluorooctanesulfonamide (FOSA)	40.0	39.0		ng/L		98	70 - 130	1	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	38.0		ng/L		95	67 - 127	4	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	37.9		ng/L		95	65 - 125	1	30
6:2 FTS	37.9	39.4		ng/L		104	66 - 126	4	30
8:2 FTS	38.3	36.2		ng/L		95	67 - 127	4	30

<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>LCS Qualifier</i>	<i>Limits</i>
13C4 PFBA	71		25 - 150
13C5 PFPeA	73		25 - 150
13C2 PFHxA	76		25 - 150
13C4 PFHpA	75		25 - 150
13C4 PFOA	76		25 - 150
13C5 PFNA	75		25 - 150
13C2 PFDA	73		25 - 150
13C2 PFUnA	71		25 - 150
13C2 PFDoA	72		25 - 150

Eurofins TestAmerica, Sacramento

# QC Sample Results

Client: Shannon & Wilson, Inc  
Project/Site: PlumeStop

Job ID: 320-52978-1

## Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCSD 320-313706/3-A

Matrix: Water

Analysis Batch: 315245

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 313706

<i>Isotope Dilution</i>	<i>LCSD</i>		<i>Limits</i>
	<i>%Recovery</i>	<i>Qualifier</i>	
<i>13C2 PFTeDA</i>	67		25 - 150
<i>13C3 PFBS</i>	76		25 - 150
<i>18O2 PFHxS</i>	86		25 - 150
<i>13C4 PFOS</i>	73		25 - 150
<i>13C8 FOSA</i>	69		25 - 150
<i>d3-NMeFOSAA</i>	69		25 - 150
<i>d5-NEtFOSAA</i>	69		25 - 150
<i>M2-6:2 FTS</i>	88		25 - 150
<i>M2-8:2 FTS</i>	85		25 - 150

# QC Association Summary

Client: Shannon & Wilson, Inc  
Project/Site: PlumeStop

Job ID: 320-52978-1

## LCMS

### Prep Batch: 313706

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-52978-1	MW-19-02	Total/NA	Water	3535	
320-52978-2	MW-19-01	Total/NA	Water	3535	
MB 320-313706/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-313706/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-313706/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

### Analysis Batch: 315245

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-52978-1	MW-19-02	Total/NA	Water	537 (modified)	313706
320-52978-2	MW-19-01	Total/NA	Water	537 (modified)	313706
MB 320-313706/1-A	Method Blank	Total/NA	Water	537 (modified)	313706
LCS 320-313706/2-A	Lab Control Sample	Total/NA	Water	537 (modified)	313706
LCSD 320-313706/3-A	Lab Control Sample Dup	Total/NA	Water	537 (modified)	313706

# Lab Chronicle

Client: Shannon & Wilson, Inc  
Project/Site: PlumeStop

Job ID: 320-52978-1

## Client Sample ID: MW-19-02

Date Collected: 08/02/19 13:37

Date Received: 08/06/19 10:25

## Lab Sample ID: 320-52978-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			275.9 mL	10.0 mL	313706	08/09/19 05:35	MTN	TAL SAC
Total/NA	Analysis	537 (modified)		10			315245	08/15/19 01:57	JRB	TAL SAC

## Client Sample ID: MW-19-01

Date Collected: 08/02/19 16:40

Date Received: 08/06/19 10:25

## Lab Sample ID: 320-52978-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			283.7 mL	10.0 mL	313706	08/09/19 05:35	MTN	TAL SAC
Total/NA	Analysis	537 (modified)		10			315245	08/15/19 02:05	JRB	TAL SAC

### Laboratory References:

TAL SAC = Eurofins TestAmerica, Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

# Accreditation/Certification Summary

Client: Shannon & Wilson, Inc  
Project/Site: PlumeStop

Job ID: 320-52978-1

## Laboratory: Eurofins TestAmerica, Sacramento

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-020	01-20-21
ANAB	Dept. of Defense ELAP		L2468	01-20-21
ANAB	DoD		L2468	01-20-21
ANAB	DOE		L2468.01	01-20-21
ANAB	ISO/IEC 17025		L2468	08-09-21
Arizona	State		AZ0708	08-11-20
Arkansas DEQ	State Program	6	88-0691	06-17-20
California	State		2897	01-31-20
California	State Program	9	2897	01-31-20
Colorado	State Program	8	CA00044	08-31-19
Connecticut	State		PH-0691	06-30-21
Connecticut	State Program	1	PH-0691	06-30-21
Florida	NELAP	4	E87570	06-30-20
Florida	NELAP		E87570	06-30-20
Hawaii	State		<cert No.>	01-29-20
Hawaii	State Program	9	N/A	01-29-20
Illinois	NELAP	5	200060	03-17-20 *
Illinois	NELAP		200060	03-17-20
Kansas	NELAP	7	E-10375	10-31-19
Louisiana	NELAP	6	30612	06-30-20
Maine	State Program	1	CA0004	04-14-20
Michigan	State		9947	01-29-20
Michigan	State Program	5	9947	01-31-20
New Hampshire	NELAP	1	2997	04-20-20
New York	NELAP	2	11666	04-01-20
Oregon	NELAP	10	4040	01-29-20
Oregon	NELAP		4040	01-29-20
Pennsylvania	NELAP	3	68-01272	03-31-20
Pennsylvania	NELAP		68-01272	03-31-20
Texas	NELAP	6	T104704399	05-31-20
Texas	NELAP		T104704399-19-13	05-31-20
US Fish & Wildlife	Federal		LE148388-0	07-31-20
US Fish & Wildlife	US Federal Programs		58448	07-31-20
USDA	Federal		P330-18-00239	01-17-21
USEPA UCMR	Federal	1	CA00044	12-31-20
Utah	NELAP	8	CA00044	02-29-20
Vermont	State Program	1	VT-4040	04-16-20
Virginia	NELAP	3	460278	03-14-20
Virginia	NELAP		460278	03-14-20
Washington	State		C581	05-05-20
Washington	State Program	10	C581	05-05-20
West Virginia (DW)	State		9930C	12-31-19
West Virginia (DW)	State Program	3	9930C	12-31-19
Wyoming	State Program	8	8TMS-L	01-28-19 *

\* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Eurofins TestAmerica, Sacramento



# Method Summary

Client: Shannon & Wilson, Inc  
Project/Site: PlumeStop

Job ID: 320-52978-1

Method	Method Description	Protocol	Laboratory
537 (modified)	Fluorinated Alkyl Substances	EPA	TAL SAC
3535	Solid-Phase Extraction (SPE)	SW846	TAL SAC

**Protocol References:**

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

**Laboratory References:**

TAL SAC = Eurofins TestAmerica, Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15

# Sample Summary

Client: Shannon & Wilson, Inc  
Project/Site: PlumeStop

Job ID: 320-52978-1

---

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
320-52978-1	MW-19-02	Water	08/02/19 13:37	08/06/19 10:25	
320-52978-2	MW-19-01	Water	08/02/19 16:40	08/06/19 10:25	

---

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15



## Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-52978-1

**Login Number: 52978**

**List Source: Eurofins TestAmerica, Sacramento**

**List Number: 1**

**Creator: Oropeza, Salvador**

Question	Answer	Comment
Radioactivity wasn't checked or is <math>\leq</math> background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	Seal present with no number.
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

**Laboratory Data Review Checklist**

Completed By:

Kristen Freiburger

Title:

Associate

Date:

August 19, 2019

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

August 19, 2019

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-52978-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

1. Laboratory

- a. Did an ADEC CS approved laboratory receive and
- perform
- all of the submitted sample analyses?

 Yes  No

Comments:

The ADEC certified the TestAmerica Laboratories West Sacramento, CA location for the analysis of perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) on February 6, 2018. These compounds were included in the ADEC's Contaminated Sites Laboratory Approval 17-020.

- 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

Comments:

Analyses were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

 Yes  No

Comments:

- b. Correct Analyses requested?

 Yes  No

Comments:

3. Laboratory Sample Receipt Documentation

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

 Yes  No

Comments:

The temperature blank was measured within the acceptable temperature range of 0 °C to 6 °C upon arrival at the laboratory. The temperature of the sample cooler upon receipt was 5.2 °C.

- b. Sample preservation acceptable – acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

 Yes  No

Comments:

Analysis of PFAS by this method does not require chemical preservation.

- c. Sample condition documented – broken, leaking (Methanol), zero headspace (VOC vials)?

 Yes  No

Comments:

The sample receipt form notes that the samples arrived at the laboratory in good condition.

- d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

Yes  No

Comments:

There were no discrepancies noted by the laboratory in the sample receipt documentation.

- e. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected.

#### 4. Case Narrative

- a. Present and understandable?

Yes  No

Comments:

- b. Discrepancies, errors, or QC failures identified by the lab?

Yes  No

Comments:

The samples arrived in good condition, properly preserved, and within the required temperature range.

The case narrative notes there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) in conjunction with laboratory preparation batch 320-313706.

The case narratives notes the results are reported using a diluted extract due to high concentration of target analytes.

The laboratory notes samples *MW-19-01* and *MW-19-02* were received with a light orange color and sediment at the bottom of the bottle prior to extraction.

- c. Were all corrective actions documented?

Yes  No

Comments:

No corrective actions were documented in the case narrative.

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

Comments:

The case narrative does not note an effect on data quality.

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

Yes  No

Comments:

b. All applicable holding times met?

Yes  No

Comments:

The laboratory indicates that the water samples were analyzed using direct injection. The 28-day hold time for analysis using direct aqueous injection (DAI) was met for all samples.

c. All soils reported on a dry weight basis?

Yes  No

Comments:

N/A; soil samples were not submitted with this work order.

d. Are the reported LOQs less than the Cleanup Level or the minimum required detection level for the project?

Yes  No

Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than the applicable ADEC regulatory limits for drinking water in this sample.

e. Data quality or usability affected?

Yes  No

Comments:

The data quality and/or usability are not affected.

6. QC Samples

a. Method Blank

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

Yes  No

Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

Yes  No

Comments:

Yes; however, PFTeA and PFHxS were detected below the LOQ in the method blank at 0.300 J ppt and 0.276 J ppt, respectively.

iii. If above LOQ, what samples are affected?

Comments:

None. PFTeA was not detected in the associated projects. PFHxS was detected at concentrations greater than 10 times the method blank detection.



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

Yes  No

Comments:

No samples are affected; therefore, qualification is not required.

v. Data quality or usability affected?

Comments:

The data quality and/or usability are not affected.

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

Comments:

ii. Metals/Inorganics – one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes  No

Comments:

N/A; metals and/or inorganics were not analyzed as part of this work order.

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

Comments:

iv. Precision – All relative percent differences (RPD) 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

Comments:

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

Comments:

None; analytical accuracy and precision were demonstrated to be within acceptable limits.

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

Yes  No

Comments:

Qualification of the data was not required; see above.

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

The data quality and/or usability are not affected.

c. Surrogates – Organics Only

i. Are surrogate recoveries reported for organic analyses – field, QC and laboratory samples?

Yes  No

Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a <sup>13</sup>C-isotope of each target analyte, and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

Comments:

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

Yes  No

Comments:

N/A; there were no IDA recovery failures associated with this work order.

iv. Data quality or usability affected?

Comments:

The data quality and usability are not affected; see above.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples? (If not, enter explanation below.)

Yes  No

Comments:

PFAS are not volatile compounds; therefore, a trip blank is not required.

- ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC? (If not, a comment explaining why must be entered below)

Yes  No

Comments:

N/A; a trip blank is not required.

- iii. All results less than LOQ?

Yes  No

Comments:

N/A; a trip blank is not required.

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

Comments:

None; a trip blank was not submitted with this work order.

- v. Data quality or usability affected?

Comments:

The data quality and/or usability are not affected; see above.

- e. Field Duplicate

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

Yes  No

Comments:

- ii. Submitted blind to lab?

Yes  No

Comments:

A field-duplicate sample was not collected for this project.

- iii. Precision – All relative percent differences (RPD) less than specified DQOs?  
(Recommended: 30% water, 50% soil)

$$\text{RPD (\%)} = \text{Absolute value of: } \frac{(R_1 - R_2)}{((R_1 + R_2)/2)} \times 100$$

Where  $R_1$  = Sample Concentration  
 $R_2$  = Field Duplicate Concentration

Yes  No

Comments:

N/A; a field-duplicate sample was not submitted in this work order.

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

Comments:

The data quality and/or usability are not affected; see above

f. Decontamination or Equipment Blank (If not applicable, a comment stating why must be entered below).

Yes  No  Not Applicable

An equipment blank was not collected for this project.

i. All results less than LOQ?

Yes  No

Comments:

N/A; see above.

ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment-blank sample was not collected.

iii. Data quality or usability affected?

Comments:

No, data quality and/or usability were not affected.

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

a. Defined and appropriate?

Yes  No

Comments:

There were no additional flags/qualifiers required for this work order.

## ANALYTICAL REPORT

Eurofins TestAmerica, Sacramento  
880 Riverside Parkway  
West Sacramento, CA 95605  
Tel: (916)373-5600

Laboratory Job ID: 320-55769-1  
Client Project/Site: PFAS

**For:**

Shannon & Wilson, Inc  
2355 Hill Rd.  
Fairbanks, Alaska 99709-5244

Attn: Marcy Nadel



---

Authorized for release by:  
11/18/2019 3:07:01 PM

David Alltucker, Project Manager I  
(916)374-4383  
[david.alltucker@testamericainc.com](mailto:david.alltucker@testamericainc.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:  
[www.testamericainc.com](http://www.testamericainc.com)

*The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.*

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

# Table of Contents

Cover Page . . . . .	1
Table of Contents . . . . .	2
Definitions/Glossary . . . . .	3
Case Narrative . . . . .	4
Detection Summary . . . . .	5
Client Sample Results . . . . .	6
Isotope Dilution Summary . . . . .	9
QC Sample Results . . . . .	10
QC Association Summary . . . . .	14
Lab Chronicle . . . . .	15
Certification Summary . . . . .	16
Method Summary . . . . .	17
Sample Summary . . . . .	18
Chain of Custody . . . . .	19
Receipt Checklists . . . . .	20



# Definitions/Glossary

Client: Shannon & Wilson, Inc  
Project/Site: PFAS

Job ID: 320-55769-1

## Qualifiers

### LCMS

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
E	Result exceeded calibration range.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
□	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

# Case Narrative

Client: Shannon & Wilson, Inc  
Project/Site: PFAS

Job ID: 320-55769-1

**Job ID: 320-55769-1**

**Laboratory: Eurofins TestAmerica, Sacramento**

## Narrative

### Job Narrative 320-55769-1

#### Receipt

The samples were received on 10/29/2019 11:35 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 4.5° C.

#### LCMS

Method 537 (modified): Due to a shortage in the marketplace for 13C3-PFBS, the target analytes Perfluorobutanesulfonic acid (PFBS) and/or Perfluoropentanesulfonic acid (PFPeS) could not be quantitated against 13C3-PFBS (its labeled variant) as listed in the SOP. PFBS and PFPeS were quantitated versus 18O2-PFHxS instead.

Method 537 (modified): The concentration of Perfluorohexanesulfonic acid (PFHxS) associated with the following samples exceeded the instrument calibration range: MW-1903-20 (320-55769-1) and MW-1904-36 (320-55769-2). These analytes have been qualified; however, the peak did not saturate the instrument detector. Historical data indicate that for the isotope dilution method, dilution and re-analysis will not produce significantly different results from those reported above the calibration range.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### Organic Prep

Method 3535: the following samples contain a thin layer of sediment/particulates at the bottom of the bottle prior to extraction: MW-1903-20 (320-55769-1) and MW-1904-36 (320-55769-2)

Method 3535: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-336875.

Method 3535: During the solid phase extraction process, the following samples have non-settable particulates which clogged the extraction column: MW-1903-20 (320-55769-1).

Method 3535: The following samples are yellow after extraction: MW-1903-20 (320-55769-1) and MW-1904-36 (320-55769-2)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



# Detection Summary

Client: Shannon & Wilson, Inc  
Project/Site: PFAS

Job ID: 320-55769-1

## Client Sample ID: MW-1903-20

## Lab Sample ID: 320-55769-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	25	B	1.8	0.31	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	190		1.8	0.52	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	22		1.8	0.22	ng/L	1		537 (modified)	Total/NA
Perfluoropentanoic acid (PFPeA)	58		1.8	0.44	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	220		1.8	0.76	ng/L	1		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	96		1.8	0.18	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	470	E B	1.8	0.15	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	280		1.8	0.48	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanesulfonic Acid (PFHpS)	11		1.8	0.17	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonamide (FOSA)	0.35	J	1.8	0.31	ng/L	1		537 (modified)	Total/NA

## Client Sample ID: MW-1904-36

## Lab Sample ID: 320-55769-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	13	B	1.8	0.31	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	160		1.8	0.52	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	30		1.8	0.22	ng/L	1		537 (modified)	Total/NA
Perfluoropentanoic acid (PFPeA)	25		1.8	0.44	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	33		1.8	0.76	ng/L	1		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	58		1.8	0.18	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	600	E B	1.8	0.15	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	15		1.8	0.48	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanesulfonic Acid (PFHpS)	1.6	J	1.8	0.17	ng/L	1		537 (modified)	Total/NA
HFPO-DA (GenX)	2.6	J	3.6	1.3	ng/L	1		537 (modified)	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Sacramento

# Client Sample Results

Client: Shannon & Wilson, Inc  
Project/Site: PFAS

Job ID: 320-55769-1

**Client Sample ID: MW-1903-20**

**Lab Sample ID: 320-55769-1**

Date Collected: 10/25/19 12:49

Matrix: Water

Date Received: 10/29/19 11:35

**Method: 537 (modified) - Fluorinated Alkyl Substances**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	25	B	1.8	0.31	ng/L		11/08/19 05:29	11/11/19 03:43	1
Perfluorohexanoic acid (PFHxA)	190		1.8	0.52	ng/L		11/08/19 05:29	11/11/19 03:43	1
Perfluoroheptanoic acid (PFHpA)	22		1.8	0.22	ng/L		11/08/19 05:29	11/11/19 03:43	1
Perfluoropentanoic acid (PFPeA)	58		1.8	0.44	ng/L		11/08/19 05:29	11/11/19 03:43	1
Perfluorooctanoic acid (PFOA)	220		1.8	0.76	ng/L		11/08/19 05:29	11/11/19 03:43	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.24	ng/L		11/08/19 05:29	11/11/19 03:43	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		11/08/19 05:29	11/11/19 03:43	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.98	ng/L		11/08/19 05:29	11/11/19 03:43	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.49	ng/L		11/08/19 05:29	11/11/19 03:43	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		11/08/19 05:29	11/11/19 03:43	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.26	ng/L		11/08/19 05:29	11/11/19 03:43	1
Perfluorobutanesulfonic acid (PFBS)	96		1.8	0.18	ng/L		11/08/19 05:29	11/11/19 03:43	1
Perfluorohexanesulfonic acid (PFHxS)	470	E B	1.8	0.15	ng/L		11/08/19 05:29	11/11/19 03:43	1
Perfluorooctanesulfonic acid (PFOS)	280		1.8	0.48	ng/L		11/08/19 05:29	11/11/19 03:43	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		18	1.7	ng/L		11/08/19 05:29	11/11/19 03:43	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		18	2.8	ng/L		11/08/19 05:29	11/11/19 03:43	1
Perfluoroheptanesulfonic Acid (PFHpS)	11		1.8	0.17	ng/L		11/08/19 05:29	11/11/19 03:43	1
Perfluorodecanesulfonic acid (PFDS)	ND		1.8	0.29	ng/L		11/08/19 05:29	11/11/19 03:43	1
Perfluorooctanesulfonamide (FOSA)	0.35	J	1.8	0.31	ng/L		11/08/19 05:29	11/11/19 03:43	1
6:2 FTS	ND		18	1.8	ng/L		11/08/19 05:29	11/11/19 03:43	1
8:2 FTS	ND		18	1.8	ng/L		11/08/19 05:29	11/11/19 03:43	1
9Cl-PF3ONS	ND		1.8	0.21	ng/L		11/08/19 05:29	11/11/19 03:43	1
HFPO-DA (GenX)	ND		3.6	1.3	ng/L		11/08/19 05:29	11/11/19 03:43	1
11Cl-PF3OUdS	ND		1.8	0.29	ng/L		11/08/19 05:29	11/11/19 03:43	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.16	ng/L		11/08/19 05:29	11/11/19 03:43	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFHxA	93		25 - 150	11/08/19 05:29	11/11/19 03:43	1
13C4 PFHpA	97		25 - 150	11/08/19 05:29	11/11/19 03:43	1
13C4 PFOA	102		25 - 150	11/08/19 05:29	11/11/19 03:43	1
13C5 PFNA	98		25 - 150	11/08/19 05:29	11/11/19 03:43	1
13C2 PFDA	106		25 - 150	11/08/19 05:29	11/11/19 03:43	1
13C2 PFUnA	97		25 - 150	11/08/19 05:29	11/11/19 03:43	1
13C8 FOSA	90		25 - 150	11/08/19 05:29	11/11/19 03:43	1
13C2 PFDoA	103		25 - 150	11/08/19 05:29	11/11/19 03:43	1
13C4 PFBA	68		25 - 150	11/08/19 05:29	11/11/19 03:43	1
13C2 PFTeDA	94		25 - 150	11/08/19 05:29	11/11/19 03:43	1
13C5 PFPeA	91		25 - 150	11/08/19 05:29	11/11/19 03:43	1
18O2 PFHxS	107		25 - 150	11/08/19 05:29	11/11/19 03:43	1
13C4 PFOS	95		25 - 150	11/08/19 05:29	11/11/19 03:43	1
d3-NMeFOSAA	94		25 - 150	11/08/19 05:29	11/11/19 03:43	1
d5-NEtFOSAA	94		25 - 150	11/08/19 05:29	11/11/19 03:43	1
M2-6:2 FTS	121		25 - 150	11/08/19 05:29	11/11/19 03:43	1
M2-8:2 FTS	119		25 - 150	11/08/19 05:29	11/11/19 03:43	1

Eurofins TestAmerica, Sacramento

# Client Sample Results

Client: Shannon & Wilson, Inc  
Project/Site: PFAS

Job ID: 320-55769-1

**Client Sample ID: MW-1903-20**

**Date Collected: 10/25/19 12:49**

**Date Received: 10/29/19 11:35**

**Lab Sample ID: 320-55769-1**

**Matrix: Water**

**Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)**

<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
13C3 HFPO-DA	91		25 - 150	11/08/19 05:29	11/11/19 03:43	1

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

# Client Sample Results

Client: Shannon & Wilson, Inc  
Project/Site: PFAS

Job ID: 320-55769-1

**Client Sample ID: MW-1904-36**

**Lab Sample ID: 320-55769-2**

Date Collected: 10/25/19 15:02

Matrix: Water

Date Received: 10/29/19 11:35

**Method: 537 (modified) - Fluorinated Alkyl Substances**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	13	B	1.8	0.31	ng/L		11/08/19 05:29	11/11/19 03:52	1
Perfluorohexanoic acid (PFHxA)	160		1.8	0.52	ng/L		11/08/19 05:29	11/11/19 03:52	1
Perfluoroheptanoic acid (PFHpA)	30		1.8	0.22	ng/L		11/08/19 05:29	11/11/19 03:52	1
Perfluoropentanoic acid (PFPeA)	25		1.8	0.44	ng/L		11/08/19 05:29	11/11/19 03:52	1
Perfluorooctanoic acid (PFOA)	33		1.8	0.76	ng/L		11/08/19 05:29	11/11/19 03:52	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.24	ng/L		11/08/19 05:29	11/11/19 03:52	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		11/08/19 05:29	11/11/19 03:52	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.98	ng/L		11/08/19 05:29	11/11/19 03:52	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.49	ng/L		11/08/19 05:29	11/11/19 03:52	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		11/08/19 05:29	11/11/19 03:52	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.26	ng/L		11/08/19 05:29	11/11/19 03:52	1
Perfluorobutanesulfonic acid (PFBS)	58		1.8	0.18	ng/L		11/08/19 05:29	11/11/19 03:52	1
Perfluorohexanesulfonic acid (PFHxS)	600	E B	1.8	0.15	ng/L		11/08/19 05:29	11/11/19 03:52	1
Perfluorooctanesulfonic acid (PFOS)	15		1.8	0.48	ng/L		11/08/19 05:29	11/11/19 03:52	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		18	1.7	ng/L		11/08/19 05:29	11/11/19 03:52	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		18	2.8	ng/L		11/08/19 05:29	11/11/19 03:52	1
Perfluoroheptanesulfonic Acid (PFHpS)	1.6	J	1.8	0.17	ng/L		11/08/19 05:29	11/11/19 03:52	1
Perfluorodecanesulfonic acid (PFDS)	ND		1.8	0.28	ng/L		11/08/19 05:29	11/11/19 03:52	1
Perfluorooctanesulfonamide (FOSA)	ND		1.8	0.31	ng/L		11/08/19 05:29	11/11/19 03:52	1
6:2 FTS	ND		18	1.8	ng/L		11/08/19 05:29	11/11/19 03:52	1
8:2 FTS	ND		18	1.8	ng/L		11/08/19 05:29	11/11/19 03:52	1
9CI-PF3ONS	ND		1.8	0.21	ng/L		11/08/19 05:29	11/11/19 03:52	1
HFPO-DA (GenX)	2.6	J	3.6	1.3	ng/L		11/08/19 05:29	11/11/19 03:52	1
11CI-PF3OUdS	ND		1.8	0.28	ng/L		11/08/19 05:29	11/11/19 03:52	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.16	ng/L		11/08/19 05:29	11/11/19 03:52	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFHxA	96		25 - 150	11/08/19 05:29	11/11/19 03:52	1
13C4 PFHpA	97		25 - 150	11/08/19 05:29	11/11/19 03:52	1
13C4 PFOA	107		25 - 150	11/08/19 05:29	11/11/19 03:52	1
13C5 PFNA	106		25 - 150	11/08/19 05:29	11/11/19 03:52	1
13C2 PFDA	106		25 - 150	11/08/19 05:29	11/11/19 03:52	1
13C2 PFUnA	104		25 - 150	11/08/19 05:29	11/11/19 03:52	1
13C8 FOSA	92		25 - 150	11/08/19 05:29	11/11/19 03:52	1
13C2 PFDoA	112		25 - 150	11/08/19 05:29	11/11/19 03:52	1
13C4 PFBA	68		25 - 150	11/08/19 05:29	11/11/19 03:52	1
13C2 PFTeDA	105		25 - 150	11/08/19 05:29	11/11/19 03:52	1
13C5 PFPeA	93		25 - 150	11/08/19 05:29	11/11/19 03:52	1
18O2 PFHxS	108		25 - 150	11/08/19 05:29	11/11/19 03:52	1
13C4 PFOS	99		25 - 150	11/08/19 05:29	11/11/19 03:52	1
d3-NMeFOSAA	101		25 - 150	11/08/19 05:29	11/11/19 03:52	1
d5-NEtFOSAA	97		25 - 150	11/08/19 05:29	11/11/19 03:52	1
M2-6:2 FTS	134		25 - 150	11/08/19 05:29	11/11/19 03:52	1
M2-8:2 FTS	133		25 - 150	11/08/19 05:29	11/11/19 03:52	1
13C3 HFPO-DA	74		25 - 150	11/08/19 05:29	11/11/19 03:52	1

Eurofins TestAmerica, Sacramento

# Isotope Dilution Summary

Client: Shannon & Wilson, Inc  
Project/Site: PFAS

Job ID: 320-55769-1

## Method: 537 (modified) - Fluorinated Alkyl Substances

Matrix: Water

Prep Type: Total/NA

### Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	PFHxA (25-150)	PFHpA (25-150)	PFOA (25-150)	PFNA (25-150)	PFDA (25-150)	PFUnA (25-150)	PFOSA (25-150)	PFDoA (25-150)
320-55769-1	MW-1903-20	93	97	102	98	106	97	90	103
320-55769-2	MW-1904-36	96	97	107	106	106	104	92	112
LCS 320-336875/2-A	Lab Control Sample	101	102	106	102	102	105	90	109
LCSD 320-336875/3-A	Lab Control Sample Dup	100	100	107	102	104	103	92	114
MB 320-336875/1-A	Method Blank	106	102	109	107	107	105	93	115

### Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	PFBA (25-150)	PFTDA (25-150)	PFPeA (25-150)	PFHxS (25-150)	PFOS (25-150)	-NMeFOS <sub>i</sub> (25-150)	-NEtFOS <sub>i</sub> (25-150)	M262FTS (25-150)
320-55769-1	MW-1903-20	68	94	91	107	95	94	94	121
320-55769-2	MW-1904-36	68	105	93	108	99	101	97	134
LCS 320-336875/2-A	Lab Control Sample	100	112	100	109	97	99	98	106
LCSD 320-336875/3-A	Lab Control Sample Dup	100	112	99	112	102	100	99	108
MB 320-336875/1-A	Method Blank	103	115	101	118	102	99	99	109

### Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	M282FTS (25-150)	HFPODA (25-150)
320-55769-1	MW-1903-20	119	91
320-55769-2	MW-1904-36	133	74
LCS 320-336875/2-A	Lab Control Sample	112	97
LCSD 320-336875/3-A	Lab Control Sample Dup	112	67
MB 320-336875/1-A	Method Blank	113	117

#### Surrogate Legend

- PFHxA = 13C2 PFHxA
- PFHpA = 13C4 PFHpA
- PFOA = 13C4 PFOA
- PFNA = 13C5 PFNA
- PFDA = 13C2 PFDA
- PFUnA = 13C2 PFUnA
- PFOSA = 13C8 FOSA
- PFDoA = 13C2 PFDoA
- PFBA = 13C4 PFBA
- PFTDA = 13C2 PFTeDA
- PFPeA = 13C5 PFPeA
- PFHxS = 18O2 PFHxS
- PFOS = 13C4 PFOS
- d3-NMeFOSAA = d3-NMeFOSAA
- d5-NEtFOSAA = d5-NEtFOSAA
- M262FTS = M2-6:2 FTS
- M282FTS = M2-8:2 FTS
- HFPODA = 13C3 HFPO-DA

# QC Sample Results

Client: Shannon & Wilson, Inc  
Project/Site: PFAS

Job ID: 320-55769-1

## Method: 537 (modified) - Fluorinated Alkyl Substances

**Lab Sample ID: MB 320-336875/1-A**  
**Matrix: Water**  
**Analysis Batch: 337470**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 336875**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	0.864	J	2.0	0.35	ng/L		11/08/19 05:29	11/11/19 03:19	1
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		11/08/19 05:29	11/11/19 03:19	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		11/08/19 05:29	11/11/19 03:19	1
Perfluoropentanoic acid (PFPeA)	ND		2.0	0.49	ng/L		11/08/19 05:29	11/11/19 03:19	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		11/08/19 05:29	11/11/19 03:19	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		11/08/19 05:29	11/11/19 03:19	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		11/08/19 05:29	11/11/19 03:19	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		11/08/19 05:29	11/11/19 03:19	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		11/08/19 05:29	11/11/19 03:19	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		11/08/19 05:29	11/11/19 03:19	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.29	ng/L		11/08/19 05:29	11/11/19 03:19	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		11/08/19 05:29	11/11/19 03:19	1
Perfluorohexanesulfonic acid (PFHxS)	0.301	J	2.0	0.17	ng/L		11/08/19 05:29	11/11/19 03:19	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		11/08/19 05:29	11/11/19 03:19	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		20	1.9	ng/L		11/08/19 05:29	11/11/19 03:19	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		20	3.1	ng/L		11/08/19 05:29	11/11/19 03:19	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		2.0	0.19	ng/L		11/08/19 05:29	11/11/19 03:19	1
Perfluorodecanesulfonic acid (PFDS)	ND		2.0	0.32	ng/L		11/08/19 05:29	11/11/19 03:19	1
Perfluorooctanesulfonamide (FOSA)	ND		2.0	0.35	ng/L		11/08/19 05:29	11/11/19 03:19	1
6:2 FTS	ND		20	2.0	ng/L		11/08/19 05:29	11/11/19 03:19	1
8:2 FTS	ND		20	2.0	ng/L		11/08/19 05:29	11/11/19 03:19	1
9CI-PF3ONS	ND		2.0	0.24	ng/L		11/08/19 05:29	11/11/19 03:19	1
HFPO-DA (GenX)	ND		4.0	1.5	ng/L		11/08/19 05:29	11/11/19 03:19	1
11CI-PF3OUdS	ND		2.0	0.32	ng/L		11/08/19 05:29	11/11/19 03:19	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.18	ng/L		11/08/19 05:29	11/11/19 03:19	1

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFHxA	106		25 - 150	11/08/19 05:29	11/11/19 03:19	1
13C4 PFHpA	102		25 - 150	11/08/19 05:29	11/11/19 03:19	1
13C4 PFOA	109		25 - 150	11/08/19 05:29	11/11/19 03:19	1
13C5 PFNA	107		25 - 150	11/08/19 05:29	11/11/19 03:19	1
13C2 PFDA	107		25 - 150	11/08/19 05:29	11/11/19 03:19	1
13C2 PFUnA	105		25 - 150	11/08/19 05:29	11/11/19 03:19	1
13C8 FOSA	93		25 - 150	11/08/19 05:29	11/11/19 03:19	1
13C2 PFDoA	115		25 - 150	11/08/19 05:29	11/11/19 03:19	1
13C4 PFBA	103		25 - 150	11/08/19 05:29	11/11/19 03:19	1
13C2 PFTeDA	115		25 - 150	11/08/19 05:29	11/11/19 03:19	1
13C5 PFPeA	101		25 - 150	11/08/19 05:29	11/11/19 03:19	1
18O2 PFHxS	118		25 - 150	11/08/19 05:29	11/11/19 03:19	1
13C4 PFOS	102		25 - 150	11/08/19 05:29	11/11/19 03:19	1
d3-NMeFOSAA	99		25 - 150	11/08/19 05:29	11/11/19 03:19	1
d5-NEtFOSAA	99		25 - 150	11/08/19 05:29	11/11/19 03:19	1
M2-6:2 FTS	109		25 - 150	11/08/19 05:29	11/11/19 03:19	1
M2-8:2 FTS	113		25 - 150	11/08/19 05:29	11/11/19 03:19	1
13C3 HFPO-DA	117		25 - 150	11/08/19 05:29	11/11/19 03:19	1

Eurofins TestAmerica, Sacramento

# QC Sample Results

Client: Shannon & Wilson, Inc  
Project/Site: PFAS

Job ID: 320-55769-1

## Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

**Lab Sample ID: LCS 320-336875/2-A**  
**Matrix: Water**  
**Analysis Batch: 337470**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 336875**  
**%Rec.**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Perfluorobutanoic acid (PFBA)	40.0	44.9		ng/L		112	76 - 136
Perfluorohexanoic acid (PFHxA)	40.0	39.1		ng/L		98	73 - 133
Perfluoroheptanoic acid (PFHpA)	40.0	40.5		ng/L		101	72 - 132
Perfluoropentanoic acid (PFPeA)	40.0	40.4		ng/L		101	71 - 131
Perfluorooctanoic acid (PFOA)	40.0	38.2		ng/L		96	70 - 130
Perfluorononanoic acid (PFNA)	40.0	43.6		ng/L		109	75 - 135
Perfluorodecanoic acid (PFDA)	40.0	42.2		ng/L		105	76 - 136
Perfluoroundecanoic acid (PFUnA)	40.0	36.6		ng/L		91	68 - 128
Perfluorododecanoic acid (PFDoA)	40.0	38.4		ng/L		96	71 - 131
Perfluorotridecanoic acid (PFTriA)	40.0	38.6		ng/L		96	71 - 131
Perfluorotetradecanoic acid (PFTeA)	40.0	37.7		ng/L		94	70 - 130
Perfluorobutanesulfonic acid (PFBS)	35.4	34.1		ng/L		96	67 - 127
Perfluorohexanesulfonic acid (PFHxS)	36.4	31.7		ng/L		87	59 - 119
Perfluorooctanesulfonic acid (PFOS)	37.1	38.6		ng/L		104	70 - 130
Perfluoroheptanesulfonic Acid (PFHpS)	38.1	39.9		ng/L		105	76 - 136
Perfluorodecanesulfonic acid (PFDS)	38.6	42.3		ng/L		110	71 - 131
Perfluorooctanesulfonamide (FOSA)	40.0	43.3		ng/L		108	73 - 133
6:2 FTS	37.9	43.2		ng/L		114	59 - 175
8:2 FTS	38.3	37.8		ng/L		99	75 - 135
9CI-PF3ONS	37.3	44.8		ng/L		120	75 - 135
HFPO-DA (GenX)	40.0	42.6		ng/L		106	51 - 173
11CI-PF3OUdS	37.7	37.9		ng/L		101	54 - 114
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.7	44.2		ng/L		117	79 - 139

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
13C2 PFHxA	101		25 - 150
13C4 PFHpA	102		25 - 150
13C4 PFOA	106		25 - 150
13C5 PFNA	102		25 - 150
13C2 PFDA	102		25 - 150
13C2 PFUnA	105		25 - 150
13C8 FOSA	90		25 - 150
13C2 PFDoA	109		25 - 150
13C4 PFBA	100		25 - 150
13C2 PFTeDA	112		25 - 150
13C5 PFPeA	100		25 - 150
18O2 PFHxS	109		25 - 150
13C4 PFOS	97		25 - 150
d3-NMeFOSAA	99		25 - 150
d5-NEtFOSAA	98		25 - 150

Eurofins TestAmerica, Sacramento

# QC Sample Results

Client: Shannon & Wilson, Inc  
Project/Site: PFAS

Job ID: 320-55769-1

## Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

**Lab Sample ID: LCS 320-336875/2-A**  
**Matrix: Water**  
**Analysis Batch: 337470**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 336875**

<i>Isotope Dilution</i>	<i>LCS LCS</i>		<i>Limits</i>
	<i>%Recovery</i>	<i>Qualifier</i>	
M2-6:2 FTS	106		25 - 150
M2-8:2 FTS	112		25 - 150
13C3 HFPO-DA	97		25 - 150

**Lab Sample ID: LCSD 320-336875/3-A**  
**Matrix: Water**  
**Analysis Batch: 337470**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 336875**

<i>Analyte</i>	<i>Spike Added</i>	<i>LCSD Result</i>	<i>LCSD Qualifier</i>	<i>Unit</i>	<i>D</i>	<i>%Rec</i>	<i>%Rec. Limits</i>	<i>RPD</i>	<i>RPD Limit</i>
Perfluorohexanoic acid (PFHxA)	40.0	39.8		ng/L		99	73 - 133	2	30
Perfluoroheptanoic acid (PFHpA)	40.0	38.6		ng/L		97	72 - 132	5	30
Perfluoropentanoic acid (PFPeA)	40.0	37.5		ng/L		94	71 - 131	7	30
Perfluorooctanoic acid (PFOA)	40.0	38.2		ng/L		95	70 - 130	0	30
Perfluorononanoic acid (PFNA)	40.0	40.4		ng/L		101	75 - 135	7	30
Perfluorodecanoic acid (PFDA)	40.0	39.9		ng/L		100	76 - 136	5	30
Perfluoroundecanoic acid (PFUnA)	40.0	39.3		ng/L		98	68 - 128	7	30
Perfluorododecanoic acid (PFDoA)	40.0	38.4		ng/L		96	71 - 131	0	30
Perfluorotridecanoic acid (PFTriA)	40.0	36.9		ng/L		92	71 - 131	4	30
Perfluorotetradecanoic acid (PFTeA)	40.0	38.4		ng/L		96	70 - 130	2	30
Perfluorobutanesulfonic acid (PFBS)	35.4	32.2		ng/L		91	67 - 127	6	30
Perfluorohexanesulfonic acid (PFHxS)	36.4	30.2		ng/L		83	59 - 119	5	30
Perfluorooctanesulfonic acid (PFOS)	37.1	34.8		ng/L		94	70 - 130	10	30
Perfluoroheptanesulfonic Acid (PFHpS)	38.1	37.6		ng/L		99	76 - 136	6	30
Perfluorodecanesulfonic acid (PFDS)	38.6	40.1		ng/L		104	71 - 131	5	30
Perfluorooctanesulfonamide (FOSA)	40.0	42.7		ng/L		107	73 - 133	1	30
6:2 FTS	37.9	39.5		ng/L		104	59 - 175	9	30
8:2 FTS	38.3	35.8		ng/L		93	75 - 135	5	30
9CI-PF3ONS	37.3	39.4		ng/L		106	75 - 135	13	30
HFPO-DA (GenX)	40.0	55.4		ng/L		139	51 - 173	26	30
11CI-PF3OUdS	37.7	34.9		ng/L		93	54 - 114	8	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.7	41.0		ng/L		109	79 - 139	7	30

<i>Isotope Dilution</i>	<i>LCSD LCSD</i>		<i>Limits</i>
	<i>%Recovery</i>	<i>Qualifier</i>	
13C2 PFHxA	100		25 - 150
13C4 PFHpA	100		25 - 150
13C4 PFOA	107		25 - 150
13C5 PFNA	102		25 - 150
13C2 PFDA	104		25 - 150
13C2 PFUnA	103		25 - 150
13C8 FOSA	92		25 - 150

Eurofins TestAmerica, Sacramento



# QC Sample Results

Client: Shannon & Wilson, Inc  
Project/Site: PFAS

Job ID: 320-55769-1

## Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCSD 320-336875/3-A

Matrix: Water

Analysis Batch: 337470

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 336875

<i>Isotope Dilution</i>	<i>LCS D</i> <i>%Recovery</i>	<i>LCS D</i> <i>Qualifier</i>	<i>Limits</i>
13C2 PFDoA	114		25 - 150
13C4 PFBA	100		25 - 150
13C2 PFTeDA	112		25 - 150
13C5 PFPeA	99		25 - 150
18O2 PFHxS	112		25 - 150
13C4 PFOS	102		25 - 150
d3-NMeFOSAA	100		25 - 150
d5-NEtFOSAA	99		25 - 150
M2-6:2 FTS	108		25 - 150
M2-8:2 FTS	112		25 - 150
13C3 HFPO-DA	67		25 - 150

# QC Association Summary

Client: Shannon & Wilson, Inc  
Project/Site: PFAS

Job ID: 320-55769-1

## LCMS

### Prep Batch: 336875

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-55769-1	MW-1903-20	Total/NA	Water	3535	
320-55769-2	MW-1904-36	Total/NA	Water	3535	
MB 320-336875/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-336875/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-336875/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

### Analysis Batch: 337470

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-55769-1	MW-1903-20	Total/NA	Water	537 (modified)	336875
320-55769-2	MW-1904-36	Total/NA	Water	537 (modified)	336875
MB 320-336875/1-A	Method Blank	Total/NA	Water	537 (modified)	336875
LCS 320-336875/2-A	Lab Control Sample	Total/NA	Water	537 (modified)	336875
LCSD 320-336875/3-A	Lab Control Sample Dup	Total/NA	Water	537 (modified)	336875

# Lab Chronicle

Client: Shannon & Wilson, Inc  
Project/Site: PFAS

Job ID: 320-55769-1

**Client Sample ID: MW-1903-20**

**Date Collected: 10/25/19 12:49**

**Date Received: 10/29/19 11:35**

**Lab Sample ID: 320-55769-1**

**Matrix: Water**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			279.3 mL	10.0 mL	336875	11/08/19 05:29	MTN	TAL SAC
Total/NA	Analysis	537 (modified)		1			337470	11/11/19 03:43	P1N	TAL SAC

**Client Sample ID: MW-1904-36**

**Date Collected: 10/25/19 15:02**

**Date Received: 10/29/19 11:35**

**Lab Sample ID: 320-55769-2**

**Matrix: Water**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			280.9 mL	10.0 mL	336875	11/08/19 05:29	MTN	TAL SAC
Total/NA	Analysis	537 (modified)		1			337470	11/11/19 03:52	P1N	TAL SAC

**Laboratory References:**

TAL SAC = Eurofins TestAmerica, Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

# Accreditation/Certification Summary

Client: Shannon & Wilson, Inc  
Project/Site: PFAS

Job ID: 320-55769-1

## Laboratory: Eurofins TestAmerica, Sacramento

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	17-020	01-20-21
ANAB	Dept. of Defense ELAP	L2468	01-20-21
ANAB	Dept. of Energy	L2468.01	01-20-21
ANAB	ISO/IEC 17025	L2468	01-20-21
Arizona	State	AZ0708	08-11-20
Arkansas DEQ	State	19-042-0	06-17-20
California	State	2897	01-31-20
Colorado	State	CA0004	08-31-20
Connecticut	State	PH-0691	06-30-21
Florida	NELAP	E87570	06-30-20
Georgia	State	4040	01-29-20
Hawaii	State	<cert No.>	01-29-20
Illinois	NELAP	200060	03-17-20
Kansas	NELAP	E-10375	10-31-20 *
Louisiana	NELAP	01944	06-30-20
Maine	State	2018009	04-14-20
Michigan	State	9947	01-29-20
Michigan	State Program	9947	01-31-20
Nevada	State	CA000442020-1	07-31-20
New Hampshire	NELAP	2997	04-18-20
New Jersey	NELAP	CA005	06-30-20
New York	NELAP	11666	04-01-20
Oregon	NELAP	4040	01-29-20
Pennsylvania	NELAP	68-01272	03-31-20
Texas	NELAP	T104704399-19-13	05-31-20
US Fish & Wildlife	US Federal Programs	58448	07-31-20
USDA	US Federal Programs	P330-18-00239	07-31-21
Utah	NELAP	CA000442019-01	02-29-20
Vermont	State	VT-4040	04-16-20
Virginia	NELAP	460278	03-14-20
Washington	State	C581	05-05-20
West Virginia (DW)	State	9930C	12-31-19
Wyoming	State Program	8TMS-L	01-28-19 *

\* Accreditation/Certification renewal pending - accreditation/certification considered valid.

# Method Summary

Client: Shannon & Wilson, Inc  
Project/Site: PFAS

Job ID: 320-55769-1

Method	Method Description	Protocol	Laboratory
537 (modified)	Fluorinated Alkyl Substances	EPA	TAL SAC
3535	Solid-Phase Extraction (SPE)	SW846	TAL SAC

**Protocol References:**

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

**Laboratory References:**

TAL SAC = Eurofins TestAmerica, Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600



# Sample Summary

Client: Shannon & Wilson, Inc  
Project/Site: PFAS

Job ID: 320-55769-1

---

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
320-55769-1	MW-1903-20	Water	10/25/19 12:49	10/29/19 11:35	
320-55769-2	MW-1904-36	Water	10/25/19 15:02	10/29/19 11:35	

---

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15



# Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-55769-1

**Login Number: 55769**

**List Source: Eurofins TestAmerica, Sacramento**

**List Number: 1**

**Creator: Oropeza, Salvador**

Question	Answer	Comment
Radioactivity wasn't checked or is <math>\leq</math> background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	1091853, 1091852
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



**Laboratory Data Review Checklist**

Completed By:

Brittany Blood

Title:

Environmental Professional I

Date:

11/25/2019

Consultant Firm:

Shannon and Wilson, Inc.

Laboratory Name:

Eurofins TestAmerica

Laboratory Report Number:

320-55769-1

Laboratory Report Date:

11/18/2019

CS Site Name:

Plume Stop PFAS

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-55769-1

Laboratory Report Date:

11/18/2019

CS Site Name:

Plume Stop PFAS

**Note: Any N/A or No box checked must have an explanation in the comments box.**

1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

Yes  No  N/A  Comments:

The ADEC certified the TestAmerica/Eurofins Laboratories West Sacramento, CA location for the analysis of perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) on February 6, 2018. These compounds were included in the ADEC's Contaminated Sites Laboratory Approval 17-020.

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  N/A  Comments:

Samples were not transferred to another laboratory.

2. Chain of Custody (CoC)

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

Yes  No  N/A  Comments:

b. Correct analyses requested?

Yes  No  N/A  Comments:

3. Laboratory Sample Receipt Documentation

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

Yes  No  N/A  Comments:

b. Sample preservation acceptable – acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

Yes  No  N/A  Comments:

Analysis of PFAS compounds does not require chemical preservation.

320-55769-1

Laboratory Report Date:

11/18/2019

CS Site Name:

Plume Stop PFAS

c. Sample condition documented – broken, leaking (Methanol), zero headspace (VOC vials)?

Yes  No  N/A  Comments:

The sample receipt form notes that the samples were received in good condition.

d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

Yes  No  N/A  Comments:

There were not any discrepancies with this work order.

e. Data quality or usability affected?

Comments:

Data quality and/or usability was not affected; see above.

4. Case Narrative

a. Present and understandable?

Yes  No  N/A  Comments:

320-55769-1

Laboratory Report Date:

11/18/2019

CS Site Name:

Plume Stop PFAS

b. Discrepancies, errors, or QC failures identified by the lab?

Yes  No  N/A  Comments:

Method 537 (modified): Due to a shortage in the marketplace for 13C3-PFBS, the target analytes Perfluorobutanesulfonic acid (PFBS) and/or Perfluoropentanesulfonic acid (PFPeS) could not be quantitated against 13C3-PFBS (its labeled variant) as listed in the SOP. PFBS and PFPeS were quantitated versus 18O2-PFHxS instead.

The concentration of perfluorohexanesulfonic acid (PFHxS) associated with the following samples exceeded the instrument calibration range: *MW-1903-20* and *MW-1904-36*. These analytes have been qualified by the laboratory; however, the peak did not saturate the instrument detector. Historical data indicate that for the isotope dilution method, dilution and re-analysis will not produce significantly different results from those reported above the calibration range. The aforementioned samples have been flagged "J\*".

The following samples contain a thin layer of sediment/particulates at the bottom of the bottle prior to extraction: *MW-1903-20* and *MW-1904-36*.

Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-336875.

During the solid phase extraction process, the following samples have non-settable particulates which clogged the extraction column: *MW-1903-20*.

The following samples are yellow after extraction: *MW-1903-20* and *MW-1904-36*.

c. Were all corrective actions documented?

Yes  No  N/A  Comments:

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

Comments:

Data quality and/or usability was not affected; see above.

320-55769-1

Laboratory Report Date:

11/18/2019

CS Site Name:

Plume Stop PFAS

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

Yes  No  N/A  Comments:

b. All applicable holding times met?

Yes  No  N/A  Comments:

c. All soils reported on a dry weight basis?

Yes  No  N/A  Comments:

These samples are water samples.

d. Are the reported LOQs less than the Cleanup Level or the minimum required detection level for the project?

Yes  No  N/A  Comments:

e. Data quality or usability affected?

The data quality and/or usability was not affected; see above

6. QC Samples

a. Method Blank

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

Yes  No  N/A  Comments:

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

Yes  No  N/A  Comments:

All method blank results are less than the LOQ, however the method blank results for PFBA and PFHxS were below the LOQ.

320-55769-1

Laboratory Report Date:

11/18/2019

CS Site Name:

Plume Stop PFAS

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

Comments:

No samples were affected as all PFBA and PFHxS results in the project samples were more than 10 times above the method blank results.

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

Yes  No  N/A  Comments:

See above.

v. Data quality or usability affected?

Comments:

Data quality and/or usability was not affected.

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  N/A  Comments:

ii. Metals/Inorganics – one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes  No  N/A  Comments:

N/A; metals and/or inorganics were not analyzed as part of this work order.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes  No  N/A  Comments:

320-55769-1

Laboratory Report Date:

11/18/2019

CS Site Name:

Plume Stop PFAS

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from LCS/LCSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes  No  N/A  Comments:

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

Comments:

Not applicable, see above.

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

Yes  No  N/A  Comments:

No flags or data qualification was required for LCS/LCSD.

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

Data quality and/or usability was not affected; see above.

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

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

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

Yes  No  N/A  Comments:

There was insufficient volume to perform a MS/MSD associated with the preparation batch.

ii. Metals/Inorganics – one MS and one MSD reported per matrix, analysis and 20 samples?

Yes  No  N/A  Comments:

N/A; metals and/or inorganics were not analyzed as a part of this work order.

320-55769-1

Laboratory Report Date:

11/18/2019

CS Site Name:

Plume Stop PFAS

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes  No  N/A  Comments:

See above.

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes  No  N/A  Comments:

See above.

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

Comments:

Not applicable, see above.

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

Yes  No  N/A  Comments:

See above.

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

Data quality and/or usability was not affected.

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

i. Are surrogate/IDA recoveries reported for organic analyses – field, QC and laboratory samples?

Yes  No  N/A  Comments:



320-55769-1

Laboratory Report Date:

11/18/2019

CS Site Name:

Plume Stop PFAS

- ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

Yes  No  N/A  Comments:

- iii. Do the sample results with failed surrogate/IDA recoveries have data flags? If so, are the data flags clearly defined?

Yes  No  N/A  Comments:

- iv. Data quality or usability affected?

Comments:

Data quality and/or usability was not affected; see above.

- e. Trip Blanks

- i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples? (If not, enter explanation below.)

Yes  No  N/A  Comments:

PFAS is not a volatile compound, therefore a trip blank was not required.

- ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC? (If not, a comment explaining why must be entered below)

Yes  No  N/A  Comments:

A trip blank was not required.

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

Yes  No  N/A  Comments:

A trip blank was not required.

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

Comments:

Not applicable, see above.

320-55769-1

Laboratory Report Date:

11/18/2019

CS Site Name:

Plume Stop PFAS

v. Data quality or usability affected?

Comments:

Data quality and or usability were not affected.

f. Field Duplicate

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

Yes  No  N/A  Comments:

A field-duplicate was not collected for the samples submitted in this work order. However, field-duplicate samples are submitted at the appropriate frequency for the overall project.

ii. Submitted blind to lab?

Yes  No  N/A  Comments:

See above.

iii. Precision – All relative percent differences (RPD) less than specified project objectives? (Recommended: 30% water, 50% soil)

$$RPD (\%) = \text{Absolute value of: } \frac{(R_1 - R_2)}{((R_1 + R_2) / 2)} \times 100$$

Where R<sub>1</sub> = Sample Concentration  
R<sub>2</sub> = Field Duplicate Concentration

Yes  No  N/A  Comments:

See above.

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

Comments:

Data quality and/or usability were not affected.

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

Yes  No  N/A  Comments:

An equipment blank was not submitted with this work order, however an equipment blank was submitted for the overall project.

320-55769-1

Laboratory Report Date:

11/18/2019

CS Site Name:

Plume Stop PFAS

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

Yes  No  N/A  Comments:

See above.

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

Comments:

See above.

iii. Data quality or usability affected?

Comments:

Data quality and or usability was not affected.

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

a. Defined and appropriate?

Yes  No  N/A  Comments:

See section 4b above.

## ANALYTICAL REPORT

Eurofins TestAmerica, Sacramento  
880 Riverside Parkway  
West Sacramento, CA 95605  
Tel: (916)373-5600

Laboratory Job ID: 320-57358-1  
Client Project/Site: FAI Plume stop  
Revision: 1

For:  
Shannon & Wilson, Inc  
2355 Hill Rd.  
Fairbanks, Alaska 99709-5244

Attn: Marcy Nadel



Authorized for release by:  
1/21/2020 8:22:52 AM

David Alltucker, Project Manager I  
(916)374-4383  
[david.alltucker@testamericainc.com](mailto:david.alltucker@testamericainc.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:  
[www.testamericainc.com](http://www.testamericainc.com)

*The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.*

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*



# Table of Contents

Cover Page . . . . .	1
Table of Contents . . . . .	2
Definitions/Glossary . . . . .	3
Case Narrative . . . . .	4
Detection Summary . . . . .	5
Client Sample Results . . . . .	6
Isotope Dilution Summary . . . . .	7
QC Sample Results . . . . .	8
QC Association Summary . . . . .	12
Lab Chronicle . . . . .	13
Certification Summary . . . . .	14
Method Summary . . . . .	15
Sample Summary . . . . .	16
Chain of Custody . . . . .	17
Receipt Checklists . . . . .	18

# Definitions/Glossary

Client: Shannon & Wilson, Inc  
Project/Site: FAI Plume stop

Job ID: 320-57358-1

## Qualifiers

### LCMS

Qualifier	Qualifier Description
*	Isotope Dilution analyte is outside acceptance limits.
B	Compound was found in the blank and sample.
I	Value is EMPC (estimated maximum possible concentration).
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

# Case Narrative

Client: Shannon & Wilson, Inc  
Project/Site: FAI Plume stop

Job ID: 320-57358-1

**Job ID: 320-57358-1**

**Laboratory: Eurofins TestAmerica, Sacramento**

## Narrative

### Job Narrative 320-57358-1

#### Revision 1/21/2020

This report has been revised to add additional reported analytes.

#### Receipt

The sample was received on 12/27/2019 8:45 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.6° C.

#### LCMS

Method 537 (modified): The "I" qualifier means the transition mass ratio for the indicated analytes were outside of the established ratio limits. The qualitative identification of the analytes has some degree of uncertainty. However, analyst judgment was used to positively identify the analytes. MW-1903-20 (320-57358-1)

Method 537 (modified): The Isotope Dilution Analyte (IDA) recovery of 13C2 PFTeDA associated with the following sample is below the method recommended limit: MW-1903-20 (320-57358-1). Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the sample.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### Organic Prep

Method 3535: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-348841.

Method 3535: Sample is dark amber in color, clear and slightly viscous. Sample extract is amber colored. MW-1903-20 (320-57358-1)

Method 3535: Sample was fortified with IDA, centrifuged and decanted prior to solid-phase extraction. MW-1903-20 (320-57358-1)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

# Detection Summary

Client: Shannon & Wilson, Inc  
Project/Site: FAI Plume stop

Job ID: 320-57358-1

**Client Sample ID: MW-1903-20**

**Lab Sample ID: 320-57358-1**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	1.9	B	1.8	0.32	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	0.38	J B	1.8	0.15	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.2	J I	1.8	0.49	ng/L	1		537 (modified)	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Sacramento



# Client Sample Results

Client: Shannon & Wilson, Inc  
Project/Site: FAI Plume stop

Job ID: 320-57358-1

**Client Sample ID: MW-1903-20**

**Lab Sample ID: 320-57358-1**

Date Collected: 12/17/19 13:35

Matrix: Water

Date Received: 12/27/19 08:45

**Method: 537 (modified) - Fluorinated Alkyl Substances**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Perfluorobutanoic acid (PFBA)</b>	<b>1.9</b>	<b>B</b>	1.8	0.32	ng/L		12/31/19 14:55	01/02/20 14:22	1
Perfluorohexanoic acid (PFHxA)	ND		1.8	0.53	ng/L		12/31/19 14:55	01/02/20 14:22	1
Perfluoroheptanoic acid (PFHpA)	ND		1.8	0.23	ng/L		12/31/19 14:55	01/02/20 14:22	1
Perfluoropentanoic acid (PFPeA)	ND		1.8	0.45	ng/L		12/31/19 14:55	01/02/20 14:22	1
Perfluorooctanoic acid (PFOA)	ND		1.8	0.77	ng/L		12/31/19 14:55	01/02/20 14:22	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.25	ng/L		12/31/19 14:55	01/02/20 14:22	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		12/31/19 14:55	01/02/20 14:22	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	1.0	ng/L		12/31/19 14:55	01/02/20 14:22	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.50	ng/L		12/31/19 14:55	01/02/20 14:22	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		12/31/19 14:55	01/02/20 14:22	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.26	ng/L		12/31/19 14:55	01/02/20 14:22	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.8	0.18	ng/L		12/31/19 14:55	01/02/20 14:22	1
<b>Perfluorohexanesulfonic acid (PFHxS)</b>	<b>0.38</b>	<b>J B</b>	1.8	0.15	ng/L		12/31/19 14:55	01/02/20 14:22	1
<b>Perfluorooctanesulfonic acid (PFOS)</b>	<b>1.2</b>	<b>J I</b>	1.8	0.49	ng/L		12/31/19 14:55	01/02/20 14:22	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		1.8	0.17	ng/L		12/31/19 14:55	01/02/20 14:22	1
Perfluorodecanesulfonic acid (PFDS)	ND		1.8	0.29	ng/L		12/31/19 14:55	01/02/20 14:22	1
Perfluorooctanesulfonamide (FOSA)	ND		1.8	0.32	ng/L		12/31/19 14:55	01/02/20 14:22	1
6:2 FTS	ND		18	1.8	ng/L		12/31/19 14:55	01/02/20 14:22	1
8:2 FTS	ND		18	1.8	ng/L		12/31/19 14:55	01/02/20 14:22	1
9Cl-PF3ONS	ND		1.8	0.22	ng/L		12/31/19 14:55	01/02/20 14:22	1
HFPO-DA (GenX)	ND		3.6	1.4	ng/L		12/31/19 14:55	01/02/20 14:22	1
11Cl-PF3OUdS	ND		1.8	0.29	ng/L		12/31/19 14:55	01/02/20 14:22	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.16	ng/L		12/31/19 14:55	01/02/20 14:22	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		18	1.7	ng/L		12/31/19 14:55	01/02/20 14:22	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		18	2.8	ng/L		12/31/19 14:55	01/02/20 14:22	1
<b>Isotope Dilution</b>	<b>%Recovery</b>	<b>Qualifier</b>	<b>Limits</b>				<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
13C2 PFHxA	93		25 - 150				12/31/19 14:55	01/02/20 14:22	1
13C4 PFHpA	85		25 - 150				12/31/19 14:55	01/02/20 14:22	1
13C4 PFOA	92		25 - 150				12/31/19 14:55	01/02/20 14:22	1
13C5 PFNA	85		25 - 150				12/31/19 14:55	01/02/20 14:22	1
13C2 PFDA	80		25 - 150				12/31/19 14:55	01/02/20 14:22	1
13C2 PFUnA	69		25 - 150				12/31/19 14:55	01/02/20 14:22	1
13C8 FOSA	88		25 - 150				12/31/19 14:55	01/02/20 14:22	1
13C2 PFDoA	54		25 - 150				12/31/19 14:55	01/02/20 14:22	1
13C4 PFBA	70		25 - 150				12/31/19 14:55	01/02/20 14:22	1
13C2 PFTeDA	22	*	25 - 150				12/31/19 14:55	01/02/20 14:22	1
13C5 PFPeA	87		25 - 150				12/31/19 14:55	01/02/20 14:22	1
18O2 PFHxS	102		25 - 150				12/31/19 14:55	01/02/20 14:22	1
13C4 PFOS	95		25 - 150				12/31/19 14:55	01/02/20 14:22	1
d3-NMeFOSAA	78		25 - 150				12/31/19 14:55	01/02/20 14:22	1
d5-NEtFOSAA	76		25 - 150				12/31/19 14:55	01/02/20 14:22	1
M2-6:2 FTS	123		25 - 150				12/31/19 14:55	01/02/20 14:22	1
M2-8:2 FTS	99		25 - 150				12/31/19 14:55	01/02/20 14:22	1
13C3 HFPO-DA	89		25 - 150				12/31/19 14:55	01/02/20 14:22	1
13C3 PFBS	107		25 - 150				12/31/19 14:55	01/02/20 14:22	1

Eurofins TestAmerica, Sacramento

# Isotope Dilution Summary

Client: Shannon & Wilson, Inc  
Project/Site: FAI Plume stop

Job ID: 320-57358-1

## Method: 537 (modified) - Fluorinated Alkyl Substances

Matrix: Water

Prep Type: Total/NA

### Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	PFHxA (25-150)	PFHpA (25-150)	PFOA (25-150)	PFNA (25-150)	PFDA (25-150)	PFUnA (25-150)	PFOSA (25-150)	PFDoA (25-150)
320-57358-1	MW-1903-20	93	85	92	85	80	69	88	54
LCS 320-348841/2-A	Lab Control Sample	102	93	97	96	97	95	106	108
LCSD 320-348841/3-A	Lab Control Sample Dup	93	102	95	88	95	91	103	99
MB 320-348841/1-A	Method Blank	102	97	95	94	92	97	106	103

### Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	PFBA (25-150)	PFTDA (25-150)	PFPeA (25-150)	PFHxS (25-150)	PFOS (25-150)	-NMeFOS <sub>i</sub> (25-150)	-NEtFOS <sub>i</sub> (25-150)	M262FTS (25-150)
320-57358-1	MW-1903-20	70	22 *	87	102	95	78	76	123
LCS 320-348841/2-A	Lab Control Sample	108	100	97	117	118	103	101	117
LCSD 320-348841/3-A	Lab Control Sample Dup	110	92	99	114	119	100	99	120
MB 320-348841/1-A	Method Blank	100	97	97	117	117	104	103	117

### Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	M282FTS (25-150)	HFPODA (25-150)	3C3-PFB <sub>s</sub> (25-150)
320-57358-1	MW-1903-20	99	89	107
LCS 320-348841/2-A	Lab Control Sample	116	89	115
LCSD 320-348841/3-A	Lab Control Sample Dup	120	90	116
MB 320-348841/1-A	Method Blank	119	76	114

#### Surrogate Legend

- PFHxA = 13C2 PFHxA
- PFHpA = 13C4 PFHpA
- PFOA = 13C4 PFOA
- PFNA = 13C5 PFNA
- PFDA = 13C2 PFDA
- PFUnA = 13C2 PFUnA
- PFOSA = 13C8 FOSA
- PFDoA = 13C2 PFDoA
- PFBA = 13C4 PFBA
- PFTDA = 13C2 PFTeDA
- PFPeA = 13C5 PFPeA
- PFHxS = 18O2 PFHxS
- PFOS = 13C4 PFOS
- d3-NMeFOSAA = d3-NMeFOSAA
- d5-NEtFOSAA = d5-NEtFOSAA
- M262FTS = M2-6:2 FTS
- M282FTS = M2-8:2 FTS
- HFPODA = 13C3 HFPO-DA
- 13C3-PFBS = 13C3 PFBS

# QC Sample Results

Client: Shannon & Wilson, Inc  
Project/Site: FAI Plume stop

Job ID: 320-57358-1

## Method: 537 (modified) - Fluorinated Alkyl Substances

**Lab Sample ID: MB 320-348841/1-A**  
**Matrix: Water**  
**Analysis Batch: 348936**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 348841**

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Perfluorobutanoic acid (PFBA)	0.460	J	2.0	0.35	ng/L		12/31/19 14:55	01/02/20 13:58	1
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		12/31/19 14:55	01/02/20 13:58	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		12/31/19 14:55	01/02/20 13:58	1
Perfluoropentanoic acid (PFPeA)	ND		2.0	0.49	ng/L		12/31/19 14:55	01/02/20 13:58	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		12/31/19 14:55	01/02/20 13:58	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		12/31/19 14:55	01/02/20 13:58	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		12/31/19 14:55	01/02/20 13:58	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		12/31/19 14:55	01/02/20 13:58	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		12/31/19 14:55	01/02/20 13:58	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		12/31/19 14:55	01/02/20 13:58	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.29	ng/L		12/31/19 14:55	01/02/20 13:58	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		12/31/19 14:55	01/02/20 13:58	1
Perfluorohexanesulfonic acid (PFHxS)	0.304	J	2.0	0.17	ng/L		12/31/19 14:55	01/02/20 13:58	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		12/31/19 14:55	01/02/20 13:58	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		2.0	0.19	ng/L		12/31/19 14:55	01/02/20 13:58	1
Perfluorodecanesulfonic acid (PFDS)	ND		2.0	0.32	ng/L		12/31/19 14:55	01/02/20 13:58	1
Perfluorooctanesulfonamide (FOSA)	ND		2.0	0.35	ng/L		12/31/19 14:55	01/02/20 13:58	1
6:2 FTS	ND		20	2.0	ng/L		12/31/19 14:55	01/02/20 13:58	1
8:2 FTS	ND		20	2.0	ng/L		12/31/19 14:55	01/02/20 13:58	1
9Cl-PF3ONS	ND		2.0	0.24	ng/L		12/31/19 14:55	01/02/20 13:58	1
HFPO-DA (GenX)	ND		4.0	1.5	ng/L		12/31/19 14:55	01/02/20 13:58	1
11Cl-PF3OUdS	ND		2.0	0.32	ng/L		12/31/19 14:55	01/02/20 13:58	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.18	ng/L		12/31/19 14:55	01/02/20 13:58	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		20	1.9	ng/L		12/31/19 14:55	01/02/20 13:58	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		20	3.1	ng/L		12/31/19 14:55	01/02/20 13:58	1
Isotope Dilution	MB	MB	Limits			Prepared	Analyzed	Dil Fac	
13C2 PFHxA	102		25 - 150			12/31/19 14:55	01/02/20 13:58	1	
13C4 PFHpA	97		25 - 150			12/31/19 14:55	01/02/20 13:58	1	
13C4 PFOA	95		25 - 150			12/31/19 14:55	01/02/20 13:58	1	
13C5 PFNA	94		25 - 150			12/31/19 14:55	01/02/20 13:58	1	
13C2 PFDA	92		25 - 150			12/31/19 14:55	01/02/20 13:58	1	
13C2 PFUnA	97		25 - 150			12/31/19 14:55	01/02/20 13:58	1	
13C8 FOSA	106		25 - 150			12/31/19 14:55	01/02/20 13:58	1	
13C2 PFDoA	103		25 - 150			12/31/19 14:55	01/02/20 13:58	1	
13C4 PFBA	100		25 - 150			12/31/19 14:55	01/02/20 13:58	1	
13C2 PFTeDA	97		25 - 150			12/31/19 14:55	01/02/20 13:58	1	
13C5 PFPeA	97		25 - 150			12/31/19 14:55	01/02/20 13:58	1	
18O2 PFHxS	117		25 - 150			12/31/19 14:55	01/02/20 13:58	1	
13C4 PFOS	117		25 - 150			12/31/19 14:55	01/02/20 13:58	1	
d3-NMeFOSAA	104		25 - 150			12/31/19 14:55	01/02/20 13:58	1	
d5-NEtFOSAA	103		25 - 150			12/31/19 14:55	01/02/20 13:58	1	
M2-6:2 FTS	117		25 - 150			12/31/19 14:55	01/02/20 13:58	1	
M2-8:2 FTS	119		25 - 150			12/31/19 14:55	01/02/20 13:58	1	
13C3 HFPO-DA	76		25 - 150			12/31/19 14:55	01/02/20 13:58	1	

Eurofins TestAmerica, Sacramento

# QC Sample Results

Client: Shannon & Wilson, Inc  
Project/Site: FAI Plume stop

Job ID: 320-57358-1

## Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

**Lab Sample ID: MB 320-348841/1-A**  
**Matrix: Water**  
**Analysis Batch: 348936**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 348841**

Isotope Dilution	MB MB		Limits	Prepared	Analyzed	Dil Fac
	%Recovery	Qualifier				
13C3 PFBS	114		25 - 150	12/31/19 14:55	01/02/20 13:58	1

**Lab Sample ID: LCS 320-348841/2-A**  
**Matrix: Water**  
**Analysis Batch: 348936**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 348841**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorohexanoic acid (PFHxA)	40.0	40.0		ng/L		100	73 - 133
Perfluoroheptanoic acid (PFHpA)	40.0	43.2		ng/L		108	72 - 132
Perfluoropentanoic acid (PFPeA)	40.0	41.9		ng/L		105	71 - 131
Perfluorooctanoic acid (PFOA)	40.0	39.8		ng/L		100	70 - 130
Perfluorononanoic acid (PFNA)	40.0	41.8		ng/L		105	75 - 135
Perfluorodecanoic acid (PFDA)	40.0	42.1		ng/L		105	76 - 136
Perfluoroundecanoic acid (PFUnA)	40.0	39.8		ng/L		100	68 - 128
Perfluorododecanoic acid (PFDoA)	40.0	35.6		ng/L		89	71 - 131
Perfluorotridecanoic acid (PFTriA)	40.0	35.1		ng/L		88	71 - 131
Perfluorotetradecanoic acid (PFTeA)	40.0	37.8		ng/L		95	70 - 130
Perfluorobutanesulfonic acid (PFBS)	35.4	36.5		ng/L		103	67 - 127
Perfluorohexanesulfonic acid (PFHxS)	36.4	35.8		ng/L		98	59 - 119
Perfluorooctanesulfonic acid (PFOS)	37.1	39.5		ng/L		106	70 - 130
Perfluoroheptanesulfonic Acid (PFHpS)	38.1	39.4		ng/L		103	76 - 136
Perfluorodecanesulfonic acid (PFDS)	38.6	38.5		ng/L		100	71 - 131
Perfluorooctanesulfonamide (FOSA)	40.0	39.2		ng/L		98	73 - 133
6:2 FTS	37.9	39.2		ng/L		103	59 - 175
8:2 FTS	38.3	39.7		ng/L		104	75 - 135
9CI-PF3ONS	37.3	37.3		ng/L		100	75 - 135
HFPO-DA (GenX)	40.0	41.1		ng/L		103	51 - 173
11CI-PF3OUdS	37.7	36.8		ng/L		98	54 - 114
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.7	35.3		ng/L		94	79 - 139

Isotope Dilution	LCS LCS		Limits
	%Recovery	Qualifier	
13C2 PFHxA	102		25 - 150
13C4 PFHpA	93		25 - 150
13C4 PFOA	97		25 - 150
13C5 PFNA	96		25 - 150
13C2 PFDA	97		25 - 150
13C2 PFUnA	95		25 - 150
13C8 FOSA	106		25 - 150
13C2 PFDoA	108		25 - 150
13C4 PFBA	108		25 - 150

Eurofins TestAmerica, Sacramento

# QC Sample Results

Client: Shannon & Wilson, Inc  
Project/Site: FAI Plume stop

Job ID: 320-57358-1

## Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

**Lab Sample ID: LCS 320-348841/2-A**  
**Matrix: Water**  
**Analysis Batch: 348936**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 348841**

<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
13C2 PFTeDA	100		25 - 150
13C5 PFPeA	97		25 - 150
18O2 PFHxS	117		25 - 150
13C4 PFOS	118		25 - 150
d3-NMeFOSAA	103		25 - 150
d5-NEtFOSAA	101		25 - 150
M2-6:2 FTS	117		25 - 150
M2-8:2 FTS	116		25 - 150
13C3 HFPO-DA	89		25 - 150
13C3 PFBS	115		25 - 150

**Lab Sample ID: LCSD 320-348841/3-A**  
**Matrix: Water**  
**Analysis Batch: 348936**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 348841**

<i>Analyte</i>	<i>Spike Added</i>	<i>LCSD Result</i>	<i>LCSD Qualifier</i>	<i>Unit</i>	<i>D</i>	<i>%Rec</i>	<i>Limits</i>	<i>RPD</i>	<i>RPD Limit</i>
Perfluorobutanoic acid (PFBA)	40.0	42.6		ng/L		107	76 - 136	2	30
Perfluorohexanoic acid (PFHxA)	40.0	42.7		ng/L		107	73 - 133	6	30
Perfluoroheptanoic acid (PFHpA)	40.0	39.0		ng/L		98	72 - 132	10	30
Perfluoropentanoic acid (PFPeA)	40.0	40.3		ng/L		101	71 - 131	4	30
Perfluorooctanoic acid (PFOA)	40.0	39.0		ng/L		97	70 - 130	2	30
Perfluorononanoic acid (PFNA)	40.0	43.2		ng/L		108	75 - 135	3	30
Perfluorodecanoic acid (PFDA)	40.0	39.1		ng/L		98	76 - 136	7	30
Perfluoroundecanoic acid (PFUnA)	40.0	40.9		ng/L		102	68 - 128	3	30
Perfluorododecanoic acid (PFDoA)	40.0	38.6		ng/L		96	71 - 131	8	30
Perfluorotridecanoic acid (PFTriA)	40.0	41.2		ng/L		103	71 - 131	16	30
Perfluorotetradecanoic acid (PFTeA)	40.0	41.1		ng/L		103	70 - 130	8	30
Perfluorobutanesulfonic acid (PFBS)	35.4	36.6		ng/L		104	67 - 127	0	30
Perfluorohexanesulfonic acid (PFHxS)	36.4	36.4		ng/L		100	59 - 119	2	30
Perfluorooctanesulfonic acid (PFOS)	37.1	38.5		ng/L		104	70 - 130	2	30
Perfluoroheptanesulfonic Acid (PFHpS)	38.1	38.6		ng/L		101	76 - 136	2	30
Perfluorodecanesulfonic acid (PFDS)	38.6	38.5		ng/L		100	71 - 131	0	30
Perfluorooctanesulfonamide (FOSA)	40.0	39.7		ng/L		99	73 - 133	1	30
6:2 FTS	37.9	38.8		ng/L		102	59 - 175	1	30
8:2 FTS	38.3	39.1		ng/L		102	75 - 135	1	30
9CI-PF3ONS	37.3	36.8		ng/L		99	75 - 135	1	30
HFPO-DA (GenX)	40.0	38.8		ng/L		97	51 - 173	6	30
11CI-PF3OUdS	37.7	36.3		ng/L		96	54 - 114	1	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.7	34.9		ng/L		93	79 - 139	1	30

Eurofins TestAmerica, Sacramento

# QC Sample Results

Client: Shannon & Wilson, Inc  
 Project/Site: FAI Plume stop

Job ID: 320-57358-1

## Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

<i>Isotope Dilution</i>	<i>LCS D LCS D</i>		<i>Limits</i>
	<i>%Recovery</i>	<i>Qualifier</i>	
13C2 PFHxA	93		25 - 150
13C4 PFHpA	102		25 - 150
13C4 PFOA	95		25 - 150
13C5 PFNA	88		25 - 150
13C2 PFDA	95		25 - 150
13C2 PFUnA	91		25 - 150
13C8 FOSA	103		25 - 150
13C2 PFDoA	99		25 - 150
13C4 PFBA	110		25 - 150
13C2 PFTeDA	92		25 - 150
13C5 PFPeA	99		25 - 150
18O2 PFHxS	114		25 - 150
13C4 PFOS	119		25 - 150
d3-NMeFOSAA	100		25 - 150
d5-NEtFOSAA	99		25 - 150
M2-6:2 FTS	120		25 - 150
M2-8:2 FTS	120		25 - 150
13C3 HFPO-DA	90		25 - 150
13C3 PFBS	116		25 - 150



# QC Association Summary

Client: Shannon & Wilson, Inc  
Project/Site: FAI Plume stop

Job ID: 320-57358-1

## LCMS

### Prep Batch: 348841

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-57358-1	MW-1903-20	Total/NA	Water	3535	
MB 320-348841/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-348841/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-348841/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

### Analysis Batch: 348936

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-57358-1	MW-1903-20	Total/NA	Water	537 (modified)	348841
MB 320-348841/1-A	Method Blank	Total/NA	Water	537 (modified)	348841
LCS 320-348841/2-A	Lab Control Sample	Total/NA	Water	537 (modified)	348841
LCSD 320-348841/3-A	Lab Control Sample Dup	Total/NA	Water	537 (modified)	348841

# Lab Chronicle

Client: Shannon & Wilson, Inc  
Project/Site: FAI Plume stop

Job ID: 320-57358-1

**Client Sample ID: MW-1903-20**

**Lab Sample ID: 320-57358-1**

**Date Collected: 12/17/19 13:35**

**Matrix: Water**

**Date Received: 12/27/19 08:45**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			274.7 mL	10.00 mL	348841	12/31/19 14:55	JER	TAL SAC
Total/NA	Analysis	537 (modified)		1			348936	01/02/20 14:22	S1M	TAL SAC

**Laboratory References:**

TAL SAC = Eurofins TestAmerica, Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15



# Accreditation/Certification Summary

Client: Shannon & Wilson, Inc  
 Project/Site: FAI Plume stop

Job ID: 320-57358-1

## Laboratory: Eurofins TestAmerica, Sacramento

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	17-020	01-20-21
ANAB	Dept. of Defense ELAP	L2468	01-20-21
ANAB	Dept. of Energy	L2468.01	01-20-21
ANAB	ISO/IEC 17025	L2468	01-20-21
Arizona	State	AZ0708	08-11-20
Arkansas DEQ	State	19-042-0	06-17-20
California	State	2897	01-31-20 *
Colorado	State	CA0004	08-31-20
Connecticut	State	PH-0691	06-30-21
Florida	NELAP	E87570	06-30-20
Georgia	State	4040	01-29-20 *
Hawaii	State	<cert No.>	01-29-20 *
Illinois	NELAP	200060	03-17-20
Kansas	NELAP	E-10375	10-31-20 *
Louisiana	NELAP	01944	06-30-20
Maine	State	2018009	04-14-20
Michigan	State	9947	01-29-20 *
Michigan	State Program	9947	01-31-20
Nevada	State	CA000442020-1	07-31-20
New Hampshire	NELAP	2997	04-18-20
New Jersey	NELAP	CA005	06-30-20
New York	NELAP	11666	04-01-20
Oregon	NELAP	4040	01-29-20 *
Pennsylvania	NELAP	68-01272	03-31-20
Texas	NELAP	T104704399-19-13	05-31-20
US Fish & Wildlife	US Federal Programs	58448	07-31-20
USDA	US Federal Programs	P330-18-00239	07-31-21
Utah	NELAP	CA000442019-01	02-29-20
Vermont	State	VT-4040	04-16-20
Virginia	NELAP	460278	03-14-20
Washington	State	C581	05-05-20
West Virginia (DW)	State	9930C	12-31-19 *
Wyoming	State Program	8TMS-L	01-28-19 *

\* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Eurofins TestAmerica, Sacramento

# Method Summary

Client: Shannon & Wilson, Inc  
Project/Site: FAI Plume stop

Job ID: 320-57358-1

Method	Method Description	Protocol	Laboratory
537 (modified)	Fluorinated Alkyl Substances	EPA	TAL SAC
3535	Solid-Phase Extraction (SPE)	SW846	TAL SAC

**Protocol References:**

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

**Laboratory References:**

TAL SAC = Eurofins TestAmerica, Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600



# Sample Summary

Client: Shannon & Wilson, Inc  
Project/Site: FAI Plume stop

Job ID: 320-57358-1

---

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
320-57358-1	MW-1903-20	Water	12/17/19 13:35	12/27/19 08:45	

---

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

# CHAIN-OF-CUSTODY RECORD

Laboratory Page 1 of 1  
 Test America  
 Attn: David Albacher

Analytical Methods (include preservative if used)

Quote No: \_\_\_\_\_  
 J-Flags:  Yes  No

Turn Around Time:  
 Normal  Rush  
 Please Specify \_\_\_\_\_

PFAS x 23	
Total Number of Containers	

Sample Identity	Lab No.	Time	Date Sampled	Remarks/Matrix Composition/Grab? Sample Containers
MW-1903-20		1335	12/17/19	
MW-1903-20		1325	12/17/19	2 Black water from Granular Activated Carbon



**Project Information**  
 Number: 102519-005  
 Name: FAI Plumbing  
 Contact: Marcy Nadel  
 Ongoing Project? Yes  No   
 Sampler: PLW, AEF

**Sample Receipt**  
 Total No. of Containers: 4  
 COC Seals/Intact? Y/N/N/A  
 Received Good Cond./Cold  
 Temp:  
 Delivery Method: UPS

**Notes:**  
 PFAS x 23 See attached  
 Sent to Regnessis for filtration

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

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: <u>[Signature]</u> Printed Name: <u>Marcy Nadel</u> Company: <u>Shannon &amp; Wilson</u>	Signature: <u>[Signature]</u> Printed Name: <u>Saru</u> Company: <u>REGENESIS</u>	Signature: _____ Printed Name: _____ Company: _____
Time: <u>1440</u> Date: <u>12/18/19</u>	Time: <u>12:00</u> Date: <u>12/26/19</u>	Time: _____ Date: _____
Received By: 1. Signature: <u>[Signature]</u> Printed Name: <u>Saru</u> Company: <u>REGENESIS</u>	Received By: 2. Signature: <u>[Signature]</u> Printed Name: <u>Sarah Thompson</u> Company: <u>ETA LLC</u>	Received By: 3. Signature: _____ Printed Name: _____ Company: _____
Time: <u>8:20 AM</u> Date: <u>12/23/19</u>	Time: <u>845</u> Date: <u>12/27/19</u>	Time: _____ Date: _____



## Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-57358-1

**Login Number: 57358**

**List Source: Eurofins TestAmerica, Sacramento**

**List Number: 1**

**Creator: Her, David A**

Question	Answer	Comment
Radioactivity wasn't checked or is <math>\leq</math> background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	Seal present with no number.
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

**Laboratory Data Review Checklist**

Completed By:

Brittany Blood

Title:

Environmental Professional I

Date:

1/21/2020

Consultant Firm:

Shannon and Wilson, Inc.

Laboratory Name:

Eurofins/TestAmerica

Laboratory Report Number:

320-57358-1 REV1

Laboratory Report Date:

1/21/2020

CS Site Name:

Fairbanks Fire Training Pit

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

Laboratory Report Date:

1/21/2020

CS Site Name:

Fairbanks Fire Training Pit

**Note: Any N/A or No box checked must have an explanation in the comments box.**

1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

Yes  No  N/A  Comments:

The ADEC certified the TestAmerica/Eurofins Laboratories West Sacramento, CA location for the analysis of perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) on February 6, 2018. These compounds were included in the ADEC's Contaminated Sites Laboratory Approval 17-020.

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  N/A  Comments:

Samples were not transferred to another laboratory.

2. Chain of Custody (CoC)

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

Yes  No  N/A  Comments:

b. Correct analyses requested?

Yes  No  N/A  Comments:

3. Laboratory Sample Receipt Documentation

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

Yes  No  N/A  Comments:

b. Sample preservation acceptable – acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

Yes  No  N/A  Comments:

Analysis of PFAS compounds does not require chemical preservation.

Laboratory Report Date:

1/21/2020

CS Site Name:

Fairbanks Fire Training Pit

c. Sample condition documented – broken, leaking (Methanol), zero headspace (VOC vials)?

Yes  No  N/A  Comments:

The sample receipt form notes that the samples were received in good condition.

d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

Yes  No  N/A  Comments:

There were no discrepancies noted in this work order.

e. Data quality or usability affected?

Comments:

Data quality and or usability are not affected; see above.

4. Case Narrative

a. Present and understandable?

Yes  No  N/A  Comments:



Laboratory Report Date:

1/21/2020

CS Site Name:

Fairbanks Fire Training Pit

b. Discrepancies, errors, or QC failures identified by the lab?

Yes  No  N/A  Comments:

The "I" qualifier means the transition mass ratio for the indicated analytes were outside of the established ratio limits. The qualitative identification of the analytes has some degree of uncertainty. However, analyst judgment was used to positively identify the analytes. Therefore, the PFOS result in project sample *MW-1903-20* was qualified "J\*".

Method 537 (modified): The Isotope Dilution Analyte (IDA) recovery of <sup>13</sup>C<sub>2</sub> PFTeDA associated with the following sample is below the method recommended limit: *MW-1903-20*. Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the sample.

Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-348841.

Sample *MW-1903-20* dark amber in color, clear and slightly viscous and the sample extract is amber colored.

*MW-1903-20* was fortified with IDA, centrifuged and decanted prior to solid-phase extraction.

The laboratory report was revised to include analytical data for N-ethylperfluorooctane sulfonamidoacetic acid (NEtFOSAA) and N-methylperfluorooctane sulfonamidoacetic acid (NMeFOSAA), for a total of 25 PFAS analytes.

c. Were all corrective actions documented?

Yes  No  N/A  Comments:

See above.

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

Comments:

There is no affect on data quality and/or usability; see above.

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

Yes  No  N/A  Comments:

Laboratory Report Date:

1/21/2020

CS Site Name:

Fairbanks Fire Training Pit

b. All applicable holding times met?

Yes  No  N/A  Comments:

c. All soils reported on a dry weight basis?

Yes  No  N/A  Comments:

All samples in this work order had a water matrix.

d. Are the reported LOQs less than the Cleanup Level or the minimum required detection level for the project?

Yes  No  N/A  Comments:

e. Data quality or usability affected?

Data quality and/or usability were not affected; see above.

6. QC Samples

a. Method Blank

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

Yes  No  N/A  Comments:

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

Yes  No  N/A  Comments:

The results for Method Blank 320-348841/1-A were all less than the reporting limit for PFAS. However, PFBA and PFHxS were detected above the method detection limit but less than the reporting limit.

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

Comments:

Project sample *MW-1903-20* was affected.

Laboratory Report Date:

1/21/2020

CS Site Name:

Fairbanks Fire Training Pit

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

Yes  No  N/A  Comments:

PFBA and PFHxS results for sample *MW-1903-20* were qualified B\* at the LOQ and are considered not detected due to sample-contamination identified in the blank.

v. Data quality or usability affected?

Comments:

Data quality and or usability was not affected.

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  N/A  Comments:

ii. Metals/Inorganics – one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes  No  N/A  Comments:

N/A; metals and/or inorganics were not analyzed as part of this work order.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes  No  N/A  Comments:

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from LCS/LCSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes  No  N/A  Comments:

Laboratory Report Date:

1/21/2020

CS Site Name:

Fairbanks Fire Training Pit

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

Comments:

No samples were affected.

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

Yes  No  N/A  Comments:

Qualification of the data was not necessary; see above.

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

The data quality and/or usability was not affected.

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

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

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

Yes  No  N/A  Comments:

Insufficient sample volume was available to perform a MS/MSD with the associated preparatory batch.

ii. Metals/Inorganics – one MS and one MSD reported per matrix, analysis and 20 samples?

Yes  No  N/A  Comments:

N/A; metals and/or inorganics were not analyzed as a part of this work order.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes  No  N/A  Comments:

See above.

Laboratory Report Date:

1/21/2020

CS Site Name:

Fairbanks Fire Training Pit

- iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes  No  N/A  Comments:

See above.

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

Comments:

Not applicable, see above.

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

Yes  No  N/A  Comments:

See above.

- vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

Data quality and/or usability was not affected.

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

- i. Are surrogate/IDA recoveries reported for organic analyses – field, QC and laboratory samples?

Yes  No  N/A  Comments:

- ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

Yes  No  N/A  Comments:

The IDA recovery for PFTeDA was below the laboratory limits

- iii. Do the sample results with failed surrogate/IDA recoveries have data flags? If so, are the data flags clearly defined?

Yes  No  N/A  Comments:

PFTeA was not detected in the associated project sample, therefore the non-detect PFTeA result in sample MW-1903-20 was qualified J\*.

Laboratory Report Date:

1/21/2020

CS Site Name:

Fairbanks Fire Training Pit

iv. Data quality or usability affected?

Comments:

See above.

e. Trip Blanks

i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples?  
(If not, enter explanation below.)

Yes  No  N/A  Comments:

PFAS are not volatile compounds; therefore, a trip blank is not required.

ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC?  
(If not, a comment explaining why must be entered below)

Yes  No  N/A  Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ and project specified objectives?

Yes  No  N/A  Comments:

No samples were affected.

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

Comments:

No samples were affected.

v. Data quality or usability affected?

Comments:

Data quality and/or usability were not affected; see above.

f. Field Duplicate

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

Yes  No  N/A  Comments:

A field-duplicate was not collected for the samples submitted in this work order. However, field-duplicate samples are submitted at the appropriate frequency for the overall project.

Laboratory Report Date:

1/21/2020

CS Site Name:

Fairbanks Fire Training Pit

ii. Submitted blind to lab?

Yes  No  N/A  Comments:

See above.

iii. Precision – All relative percent differences (RPD) less than specified project objectives?  
(Recommended: 30% water, 50% soil)

$$RPD (\%) = \text{Absolute value of: } \frac{(R_1 - R_2)}{((R_1 + R_2) / 2)} \times 100$$

Where  $R_1$  = Sample Concentration  
 $R_2$  = Field Duplicate Concentration

Yes  No  N/A  Comments:

See above.

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

Comments:

Data quality and/or usability are not affected; see above.

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

Yes  No  N/A  Comments:

An equipment blank sample was not collected. Equipment blanks will be submitted at the proper frequency for the project as a whole.

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

Yes  No  N/A  Comments:

See above.

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

Comments:

Not applicable.

iii. Data quality or usability affected?

Comments:

Data quality and/or usability not affected.

320-57358-1 REV1

Laboratory Report Date:

1/21/2020

CS Site Name:

Fairbanks Fire Training Pit

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

a. Defined and appropriate?

Yes  No  N/A

Comments:

See 4b, above.





## Laboratory Report of Analysis

To: Shannon & Wilson-Fairbanks  
2355 Hill Rd  
Fairbanks, AK 99707  
(907)479-0600

Report Number: **1209671**

Client Project: **102519 FAI**

Dear Mary Nadel,

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 Jennifer 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.

---

Jennifer Dawkins  
Project Manager  
Jennifer.Dawkins@sgs.com

Date

## Case Narrative

SGS Client: **Shannon & Wilson-Fairbanks**

SGS Project: **1209671**

Project Name/Site: **102519 FAI**

Project Contact: **Mary Nadel**

Refer to sample receipt form for information on sample condition.

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

Print Date: 10/13/2020 5:02:31PM

## Laboratory Qualifiers

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

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

SGS maintains a formal Quality Assurance/Quality Control (QA/QC) program. A copy of our Quality Assurance Plan (QAP), which outlines this program, is available at your request. The laboratory certification numbers are AK00971 (DW Chemistry & Microbiology) & 17-021 (CS) for ADEC and 2944.01 for DOD ELAP/ISO17025 (RCRA methods: 1020B, 1311, 3010A, 3050B, 3520C, 3550C, 5030B, 5035A, 6020B, 7470A, 7471B, 8015C, 8021B, 8082A, 8260D, 8270D, 8270D-SIM, 9040C, 9045D, 9056A, 9060A, AK101 and AK102/103). SGS is only certified for the analytes listed on our Drinking Water Certification (DW methods: 200.8, 2130B, 2320B, 2510B, 300.0, 4500-CN-C,E, 4500-H-B, 4500-NO3-F, 4500-P-E and 524.2) and only those analytes will be reported to the State of Alaska for compliance. Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth by the SGS QAP and, when applicable, other regulatory authorities.

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

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

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

## Sample Summary

<u>Client Sample ID</u>	<u>Lab Sample ID</u>	<u>Collected</u>	<u>Received</u>	<u>Matrix</u>
MW-1903-20	1209671001	09/17/2020	09/18/2020	Water (Surface, Eff., Ground)
MW-2903-20	1209671002	09/17/2020	09/18/2020	Water (Surface, Eff., Ground)

<u>Method</u>	<u>Method Description</u>
SM 5310B	Dissolved Organic Carbon
EP200.8	Metals in Water by 200.8 ICP-MS
SM 5310B	Total Organic Carbon

Print Date: 10/13/2020 5:02:35PM

### Detectable Results Summary

Client Sample ID: **MW-1903-20**

Lab Sample ID: 1209671001

**Metals by ICP/MS**

**Waters Department**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Calcium	99400	ug/L
Magnesium	25100	ug/L
Total Organic Carbon	39400	ug/L
Total Organic Carbon,Dissolved	24600	ug/L

Client Sample ID: **MW-2903-20**

Lab Sample ID: 1209671002

**Metals by ICP/MS**

**Waters Department**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Calcium	94200	ug/L
Magnesium	24200	ug/L
Total Organic Carbon	43800	ug/L
Total Organic Carbon,Dissolved	21400	ug/L

## Results of MW-1903-20

Client Sample ID: **MW-1903-20**  
 Client Project ID: **102519 FAI**  
 Lab Sample ID: 1209671001  
 Lab Project ID: 1209671

Collection Date: 09/17/20 13:15  
 Received Date: 09/18/20 08:54  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

## Results by Metals by ICP/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Calcium	99400	25000	7500	ug/L	10		10/12/20 16:18
Magnesium	25100	2500	750	ug/L	10		10/12/20 16:18

## Batch Information

Analytical Batch: MMS10913  
 Analytical Method: EP200.8  
 Analyst: DMM  
 Analytical Date/Time: 10/12/20 16:18  
 Container ID: 1209671001-A

Prep Batch: MX33682  
 Prep Method: E200.2  
 Prep Date/Time: 09/30/20 12:35  
 Prep Initial Wt./Vol.: 4 mL  
 Prep Extract Vol: 50 mL



**Results of MW-1903-20**

Client Sample ID: **MW-1903-20**  
Client Project ID: **102519 FAI**  
Lab Sample ID: 1209671001  
Lab Project ID: 1209671

Collection Date: 09/17/20 13:15  
Received Date: 09/18/20 08:54  
Matrix: Water (Surface, Eff., Ground)  
Solids (%):  
Location:

**Results by Waters Department**

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Total Organic Carbon	39400	1000	400	ug/L	1		09/22/20 01:13
Total Organic Carbon,Dissolved	24600	1000	400	ug/L	1		09/22/20 01:30

**Batch Information**

Analytical Batch: WTC3036  
Analytical Method: SM 5310B  
Analyst: EWW  
Analytical Date/Time: 09/22/20 01:13  
Container ID: 1209671001-B

Analytical Batch: WTC3036  
Analytical Method: SM 5310B  
Analyst: EWW  
Analytical Date/Time: 09/22/20 01:30  
Container ID: 1209671001-C

**Results of MW-2903-20**

Client Sample ID: **MW-2903-20**  
 Client Project ID: **102519 FAI**  
 Lab Sample ID: 1209671002  
 Lab Project ID: 1209671

Collection Date: 09/17/20 13:05  
 Received Date: 09/18/20 08:54  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

**Results by Metals by ICP/MS**

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Calcium	94200	25000	7500	ug/L	10		10/12/20 16:21
Magnesium	24200	2500	750	ug/L	10		10/12/20 16:21

**Batch Information**

Analytical Batch: MMS10913  
 Analytical Method: EP200.8  
 Analyst: DMM  
 Analytical Date/Time: 10/12/20 16:21  
 Container ID: 1209671002-A

Prep Batch: MXX33682  
 Prep Method: E200.2  
 Prep Date/Time: 09/30/20 12:35  
 Prep Initial Wt./Vol.: 4 mL  
 Prep Extract Vol: 50 mL



## Results of MW-2903-20

Client Sample ID: **MW-2903-20**  
 Client Project ID: **102519 FAI**  
 Lab Sample ID: 1209671002  
 Lab Project ID: 1209671

Collection Date: 09/17/20 13:05  
 Received Date: 09/18/20 08:54  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

## Results by Waters Department

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Total Organic Carbon	43800	1000	400	ug/L	1		09/22/20 01:48
Total Organic Carbon,Dissolved	21400	1000	400	ug/L	1		09/22/20 02:33

## Batch Information

Analytical Batch: WTC3036  
 Analytical Method: SM 5310B  
 Analyst: EWW  
 Analytical Date/Time: 09/22/20 01:48  
 Container ID: 1209671002-B

Analytical Batch: WTC3036  
 Analytical Method: SM 5310B  
 Analyst: EWW  
 Analytical Date/Time: 09/22/20 02:33  
 Container ID: 1209671002-C

## Method Blank

Blank ID: MB for HBN 1812376 [MXX/33682]

Blank Lab ID: 1584620

QC for Samples:

1209671001, 1209671002

Matrix: Water (Surface, Eff., Ground)

## Results by EP200.8

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Calcium	250U	500	150	ug/L
Magnesium	25.0U	50.0	15.0	ug/L

## Batch Information

Analytical Batch: MMS10913

Analytical Method: EP200.8

Instrument: Perkin Elmer Nexlon P5

Analyst: DMM

Analytical Date/Time: 10/12/2020 2:27:02PM

Prep Batch: MXX33682

Prep Method: E200.2

Prep Date/Time: 9/30/2020 12:35:16PM

Prep Initial Wt./Vol.: 20 mL

Prep Extract Vol: 50 mL

## Blank Spike Summary

Blank Spike ID: LCS for HBN 1209671 [MXX33682]  
Blank Spike Lab ID: 1584621  
Date Analyzed: 10/12/2020 14:30

Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1209671001, 1209671002

## Results by EP200.8

Parameter	Blank Spike (ug/L)			CL
	Spike	Result	Rec (%)	
Calcium	10000	10600	106	( 85-115 )
Magnesium	10000	11300	113	( 85-115 )

## Batch Information

Analytical Batch: **MMS10913**  
Analytical Method: **EP200.8**  
Instrument: **Perkin Elmer Nexlon P5**  
Analyst: **DMM**

Prep Batch: **MXX33682**  
Prep Method: **E200.2**  
Prep Date/Time: **09/30/2020 12:35**  
Spike Init Wt./Vol.: 10000 ug/L Extract Vol: 50 mL  
Dupe Init Wt./Vol.: Extract Vol:

## Matrix Spike Summary

Original Sample ID: 1584623  
 MS Sample ID: 1584624 MS  
 MSD Sample ID:

Analysis Date: 10/12/2020 14:33  
 Analysis Date: 10/12/2020 14:35  
 Analysis Date:  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1209671001, 1209671002

## Results by EP200.8

Parameter	Sample	Matrix Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Calcium	45900	10000	56100	102				70-130		
Magnesium	8400	10000	19200	108				70-130		

## Batch Information

Analytical Batch: MMS10913  
 Analytical Method: EP200.8  
 Instrument: Perkin Elmer Nexlon P5  
 Analyst: DMM  
 Analytical Date/Time: 10/12/2020 2:35:59PM

Prep Batch: MXX33682  
 Prep Method: DW Digest for Metals on ICP-MS  
 Prep Date/Time: 9/30/2020 12:35:16PM  
 Prep Initial Wt./Vol.: 20.00mL  
 Prep Extract Vol: 50.00mL

## Method Blank

Blank ID: MB for HBN 1811995 [WTC/3036]

Blank Lab ID: 1582649

QC for Samples:

1209671001, 1209671002

Matrix: Water (Surface, Eff., Ground)

## Results by SM 5310B

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Total Organic Carbon	500U	1000	400	ug/L

## Batch Information

Analytical Batch: WTC3036

Analytical Method: SM 5310B

Instrument: TOC Analyzer 2

Analyst: EWW

Analytical Date/Time: 9/21/2020 7:22:30PM

Print Date: 10/13/2020 5:02:46PM

## Blank Spike Summary

Blank Spike ID: LCS for HBN 1209671 [WTC3036]

Blank Spike Lab ID: 1582648

Date Analyzed: 09/21/2020 19:08

Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1209671001, 1209671002

## Results by SM 5310B

Parameter	Blank Spike (ug/L)			CL
	Spike	Result	Rec (%)	
Total Organic Carbon	75000	76400	102	( 80-120 )

## Batch Information

Analytical Batch: **WTC3036**

Analytical Method: **SM 5310B**

Instrument: **TOC Analyzer 2**

Analyst: **EWV**

Print Date: 10/13/2020 5:02:48PM

## Matrix Spike Summary

Original Sample ID: 1204837001  
 MS Sample ID: 1582644 MS  
 MSD Sample ID: 1582645 MSD

Analysis Date: 09/21/2020 17:39  
 Analysis Date: 09/21/2020 17:57  
 Analysis Date: 09/21/2020 18:15  
 Matrix: Drinking Water

QC for Samples:

## Results by SM 5310B

Parameter	Sample	Matrix Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Total Organic Carbon	4780	10000	13200	85	10000	13400	86	75-125	1.40	(< 25 )

## Batch Information

Analytical Batch: WTC3036  
 Analytical Method: SM 5310B  
 Instrument: TOC Analyzer 2  
 Analyst: EWW  
 Analytical Date/Time: 9/21/2020 5:57:27PM

## Matrix Spike Summary

Original Sample ID: 1205001001  
 MS Sample ID: 1582650 MS  
 MSD Sample ID: 1582651 MSD

Analysis Date: 09/21/2020 20:59  
 Analysis Date: 09/21/2020 21:15  
 Analysis Date: 09/21/2020 21:32  
 Matrix: Drinking Water

QC for Samples: 1209671001, 1209671002

## Results by SM 5310B

Parameter	Sample	Matrix Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Total Organic Carbon	1000U	10000	9780	98	10000	10100	101	75-125	3.50	(< 25 )

## Batch Information

Analytical Batch: WTC3036  
 Analytical Method: SM 5310B  
 Instrument: TOC Analyzer 2  
 Analyst: EWW  
 Analytical Date/Time: 9/21/2020 9:15:15PM







e-Sample Receipt Form

SGS Workorder #:

1209671



1 2 0 9 6 7 1

Review Criteria	Condition (Yes, No, N/A)	Exceptions Noted below
<b>Chain of Custody / Temperature Requirements</b>		
Were Custody Seals intact? Note # & location	Yes	1F, 1B
COC accompanied samples?	Yes	
DOD: Were samples received in COC corresponding coolers?	N/A	
N/A **Exemption permitted if chilled & collected <8 hours ago, or for samples where chilling is not required		
Temperature blank compliant* (i.e., 0-6 °C after CF)?	Yes	Cooler ID: 1 @ 2.6 °C Therm. ID: D50
		Cooler ID: @ °C Therm. ID:
		Cooler ID: @ °C Therm. ID:
		Cooler ID: @ °C Therm. ID:
		Cooler ID: @ °C Therm. ID:
*If >6°C, were samples collected <8 hours ago?	N/A	
If <0°C, were sample containers ice free?	N/A	
Note: Identify containers received at non-compliant temperature . Use form FS-0029 if more space is needed.		
<b>Holding Time / Documentation / Sample Condition Requirements</b>		
Note: Refer to form F-083 "Sample Guide" for specific holding times.		
Were samples received within holding time?	Yes	
Do samples match COC** (i.e., sample IDs, dates/times collected)?	Yes	
**Note: If times differ <1hr, record details & login per COC.		
***Note: If sample information on containers differs from COC, SGS will default to COC information		
Were analytical requests clear? (i.e., method is specified for analyses with multiple option for analysis (Ex: BTEX, Metals)	Yes	
Were proper containers (type/mass/volume/preservative***) used?	Yes	Yes ***Exemption permitted for metals (e.g, 200.8/6020A).
<b>Volatile / LL-Hg Requirements</b>		
Were Trip Blanks (i.e., VOAs, LL-Hg) in cooler with samples?	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	
<b>Note to Client:</b> Any "No", answer above indicates non-compliance with standard procedures and may impact data quality.		
Additional notes (if applicable):		



e-Sample Receipt Form FBK

SGS Workorder #:

1209671

1209671

Review Criteria		Condition (Yes, No, N/A)	Exceptions Noted below	
<b>Chain of Custody / Temperature Requirements</b>			<b>Yes</b>	Exemption permitted if sampler hand carries/delivers.
Were Custody Seals intact? Note # & location		N/A		
COC accompanied samples?		Yes		
DOD: Were samples received in COC corresponding coolers?		N/A		
<input type="checkbox"/> **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 @ 5.8 °C	Therm. ID: D63
If samples received without a temperature blank, the "cooler temperature" will be documented instead & "COOLER TEMP" will be noted to the right. "ambient" or "chilled" will be noted if neither is available.			Cooler ID: @	°C Therm. ID:
			Cooler ID: @	°C Therm. ID:
			Cooler ID: @	°C Therm. ID:
			Cooler ID: @	°C Therm. ID:
*If >6°C, were samples collected <8 hours ago?				
If <0°C, were sample containers ice free?				
Note: Identify containers received at non-compliant temperature . Use form FS-0029 if more space is needed.				
<b>Holding Time / Documentation / Sample Condition Requirements</b>		Note: Refer to form F-083 "Sample Guide" for specific holding times.		
Do samples match COC** (i.e., sample IDs, dates/times collected)?		N/C		
**Note: If times differ <1hr, record details & login per COC. ***Note: If sample information on containers differs from COC, SGS will default to COC information				
Were samples in good condition (no leaks/cracks/breakage)?		Yes		
Were analytical requests clear? (i.e., method is specified for analyses with multiple option for analysis (Ex: BTEX, Metals))		Yes		
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		
For Rush/Short Hold Time, was RUSH/Short HT email sent?		N/A		
<b>Note to Client:</b> Any "No", answer above indicates non-compliance with standard procedures and may impact data quality.				
Additional notes (if applicable):				
<b>SGS Profile #</b>			0	



## Sample Containers and Preservatives

<u>Container Id</u>	<u>Preservative</u>	<u>Container Condition</u>	<u>Container Id</u>	<u>Preservative</u>	<u>Container Condition</u>
1209671001-A	HNO3 to pH < 2	OK			
1209671001-B	HCL to pH < 2	OK			
1209671001-C	HCL to pH < 2	OK			
1209671001-D	HCL to pH < 2	OK			
1209671002-A	HNO3 to pH < 2	OK			
1209671002-B	HCL to pH < 2	OK			
1209671002-C	HCL to pH < 2	OK			
1209671002-D	HCL to pH < 2	OK			

### Container Condition Glossary

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

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

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

DM - The container was received damaged.

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

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

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

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

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

QN - Insufficient sample quantity provided.

**Laboratory Data Review Checklist**

Completed By:

Amber Masters

Title:

Environmental Scientist

Date:

11/11/2020

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

SGS North America, Inc.

Laboratory Report Number:

1209671

Laboratory Report Date:

10/14/2020

CS Site Name:

Fairbanks DOT&PF PFAS

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

1209671

Laboratory Report Date:

10/14/2020

CS Site Name:

Fairbanks DOT&PF PFAS

**Note: Any N/A or No box checked must have an explanation in the comments box.**

1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

Yes  No  N/A  Comments:

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

Yes  No  N/A  Comments:

All analyses were performed by SGS North America, Inc. in Anchorage, AK.

2. Chain of Custody (CoC)

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

Yes  No  N/A  Comments:

b. Correct analyses requested?

Yes  No  N/A  Comments:

3. Laboratory Sample Receipt Documentation

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

Yes  No  N/A  Comments:

Sample cooler temperature recorded at 2.6° C upon receipt at laboratory in Fairbanks, and 5.8° C upon receipt in Anchorage.

b. Sample preservation acceptable – acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

Yes  No  N/A  Comments:

1209671

Laboratory Report Date:

10/14/2020

CS Site Name:

Fairbanks DOT&PF PFAS

c. Sample condition documented – broken, leaking (Methanol), zero headspace (VOC vials)?

Yes  No  N/A  Comments:

d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

Yes  No  N/A  Comments:

There were no discrepancies identified in the sample receipt documentation.

e. Data quality or usability affected?

Comments:

No, see above.

#### 4. Case Narrative

a. Present and understandable?

Yes  No  N/A  Comments:

b. Discrepancies, errors, or QC failures identified by the lab?

Yes  No  N/A  Comments:

The case narrative does not identify any discrepancies, errors, or QC failures.

c. Were all corrective actions documented?

Yes  No  N/A  Comments:

See above.

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

Comments:

Not applicable, see above.

1209671

Laboratory Report Date:

10/14/2020

CS Site Name:

Fairbanks DOT&PF PFAS

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

Yes  No  N/A  Comments:

b. All applicable holding times met?

Yes  No  N/A  Comments:

c. All soils reported on a dry weight basis?

Yes  No  N/A  Comments:

Soil samples were not submitted with this work order.

d. Are the reported LOQs less than the Cleanup Level or the minimum required detection level for the project?

Yes  No  N/A  Comments:

There are no applicable cleanup levels for the analytes included in this work order.

e. Data quality or usability affected?

No, see above.

6. QC Samples

a. Method Blank

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

Yes  No  N/A  Comments:

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

Yes  No  N/A  Comments:



1209671

Laboratory Report Date:

10/14/2020

CS Site Name:

Fairbanks DOT&PF PFAS

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

Comments:

There were no detections in the method blank samples associated with this work order.

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

Yes  No  N/A  Comments:

See above.

v. Data quality or usability affected?

Comments:

Not applicable, 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  N/A  Comments:

No organic analyses were requested with this work order.

ii. Metals/Inorganics – one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes  No  N/A  Comments:

LCS results were reported for total organic carbon analysis.

LCS results were reported for calcium and magnesium analyses.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes  No  N/A  Comments:

1209671

Laboratory Report Date:

10/14/2020

CS Site Name:

Fairbanks DOT&PF PFAS

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from LCS/LCSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes  No  N/A  Comments:

No LCSD samples were reported.

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

Comments:

Percent recovery was within acceptable limits.

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

Yes  No  N/A  Comments:

See above.

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

Not applicable, see above.

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

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

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

Yes  No  N/A  Comments:

No organic analyses were requested with this work order.

ii. Metals/Inorganics – one MS and one MSD reported per matrix, analysis and 20 samples?

Yes  No  N/A  Comments:

MS/MSD results were reported for total organic carbon analysis.  
MS results were reported for calcium and magnesium analyses.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable?

Yes  No  N/A  Comments:

1209671

Laboratory Report Date:

10/14/2020

CS Site Name:

Fairbanks DOT&PF PFAS

- iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from MS/MSD, and or sample/sample duplicate.

Yes  No  N/A  Comments:

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

Comments:

Not applicable, %Rs and RPDs were within acceptable limits.

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

Yes  No  N/A  Comments:

See above.

- vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

Not applicable, see above.

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

- i. Are surrogate/IDA recoveries reported for organic analyses – field, QC and laboratory samples?

Yes  No  N/A  Comments:

Surrogates are not reported for these analyses.

- ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods 50-150 %R for field samples and 60-120 %R for QC samples; all other analyses see the laboratory report pages)

Yes  No  N/A  Comments:

See above.

- iii. Do the sample results with failed surrogate/IDA recoveries have data flags? If so, are the data flags clearly defined?

Yes  No  N/A  Comments:

See above.

1209671

Laboratory Report Date:

10/14/2020

CS Site Name:

Fairbanks DOT&PF PFAS

iv. Data quality or usability affected?

Comments:

Not applicable, see above.

e. Trip Blanks

i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples? (If not, enter explanation below.)

Yes  No  N/A  Comments:

Analysis for volatile compounds was not requested with this work order. A trip blank is not required.

ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC? (If not, a comment explaining why must be entered below)

Yes  No  N/A  Comments:

See above.

iii. All results less than LOQ and project specified objectives?

Yes  No  N/A  Comments:

See above.

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

Comments:

Not applicable, see above.

v. Data quality or usability affected?

Comments:

Not applicable, see above.

f. Field Duplicate

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

Yes  No  N/A  Comments:

1209671

Laboratory Report Date:

10/14/2020

CS Site Name:

Fairbanks DOT&PF PFAS

ii. Submitted blind to lab?

Yes  No  N/A  Comments:

Field duplicate pair MW-1903-20/MW-2903-20 was submitted with this work order.

iii. Precision – All relative percent differences (RPD) less than specified project objectives?  
(Recommended: 30% water, 50% soil)

$$RPD (\%) = \text{Absolute value of: } \frac{(R_1 - R_2)}{((R_1 + R_2) / 2)} \times 100$$

Where R<sub>1</sub> = Sample Concentration  
R<sub>2</sub> = Field Duplicate Concentration

Yes  No  N/A  Comments:

Relative percent difference was within control limits.

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

Comments:

Not applicable, see above.

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

Yes  No  N/A  Comments:

The project samples were collected using non-reusable equipment. An equipment blank is not required.

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

Yes  No  N/A  Comments:

See above.

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

Comments:

Not applicable, see above.

iii. Data quality or usability affected?

Comments:

Not applicable, see above.

1209671

Laboratory Report Date:

10/14/2020

CS Site Name:

Fairbanks DOT&PF PFAS

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

a. Defined and appropriate?

Yes  No  N/A  Comments:

No other data flags or qualifiers needed.



## Laboratory Report of Analysis

To: Shannon & Wilson-Fairbanks  
2355 Hill Rd  
Fairbanks, AK 99707  
(907)479-0600

Report Number: **1209882**

Client Project: **11-4-06050-656 FAI Plumestop**

Dear Marcy Nadel,

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 Jennifer 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.

---

Jennifer Dawkins  
Project Manager  
Jennifer.Dawkins@sgs.com

Date

## Case Narrative

SGS Client: **Shannon & Wilson-Fairbanks**  
SGS Project: **1209882**  
Project Name/Site: **11-4-06050-656 FAI Plumestop**  
Project Contact: **Marcy Nadel**

Refer to sample receipt form for information on sample condition.

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

Print Date: 01/15/2021 8:43:47AM



### Laboratory Qualifiers

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

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

SGS maintains a formal Quality Assurance/Quality Control (QA/QC) program. A copy of our Quality Assurance Plan (QAP), which outlines this program, is available at your request. The laboratory certification numbers are AK00971 DW Chemistry & Microbiology (Provisionally Certified as of 12/03/2020 for Turbidity by SM2130B, Copper & Mercury by EPA200.8 and Trihalomethanes by EPA 524.2) & 17-021 (CS) for ADEC and 2944.01 for DOD ELAP/ISO17025 (RCRA methods: 1020B, 1311, 3010A, 3050B, 3520C, 3550C, 5030B, 5035A, 6020B, 7470A, 7471B, 8015C, 8021B, 8082A, 8260D, 8270D, 8270D-SIM, 9040C, 9045D, 9056A, 9060A, AK101 and AK102/103). SGS is only certified for the analytes listed on our Drinking Water Certification (DW methods: 200.8, 2130B, 2320B, 2510B, 300.0, 4500-CN-C,E, 4500-H-B, 4500-NO3-F, 4500-P-E and 524.2) and only those analytes will be reported to the State of Alaska for compliance. Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth by the SGS QAP

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

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

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

### Sample Summary

<u>Client Sample ID</u>	<u>Lab Sample ID</u>	<u>Collected</u>	<u>Received</u>	<u>Matrix</u>
MW-1903-20	1209882001	12/22/2020	12/29/2020	Water (Surface, Eff., Ground)
MW-1903-20	1209882002	12/22/2020	12/29/2020	Water (Surface, Eff., Ground)

<u>Method</u>	<u>Method Description</u>
EP200.8	Metals in Water by 200.8 ICP-MS
SM 5310B	Total Organic Carbon

Print Date: 01/15/2021 8:43:52AM

## Detectable Results Summary

Client Sample ID: **MW-1903-20**

Lab Sample ID: 1209882001

**Metals by ICP/MS**

**Waters Department**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Calcium	103000	ug/L
Magnesium	25500	ug/L
Total Organic Carbon	24600	ug/L

Print Date: 01/15/2021 8:43:53AM

## Results of MW-1903-20

Client Sample ID: **MW-1903-20**  
 Client Project ID: **11-4-06050-656 FAI Plumestop**  
 Lab Sample ID: 1209882001  
 Lab Project ID: 1209882

Collection Date: 12/22/20 11:57  
 Received Date: 12/29/20 09:30  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

## Results by Metals by ICP/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Calcium	103000	2500	750	ug/L	1		01/07/21 12:06
Magnesium	25500	250	75.0	ug/L	1		01/07/21 12:06

## Batch Information

Analytical Batch: MMS10981  
 Analytical Method: EP200.8  
 Analyst: DMM  
 Analytical Date/Time: 01/07/21 12:06  
 Container ID: 1209882001-A

Prep Batch: MX33919  
 Prep Method: E200.2  
 Prep Date/Time: 01/05/21 14:03  
 Prep Initial Wt./Vol.: 4 mL  
 Prep Extract Vol: 50 mL



**Results of MW-1903-20**

Client Sample ID: **MW-1903-20**  
Client Project ID: **11-4-06050-656 FAI Plumestop**  
Lab Sample ID: 1209882001  
Lab Project ID: 1209882

Collection Date: 12/22/20 11:57  
Received Date: 12/29/20 09:30  
Matrix: Water (Surface, Eff., Ground)  
Solids (%):  
Location:

**Results by Waters Department**

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Total Organic Carbon	24600	1000	400	ug/L	1		01/13/21 12:22

**Batch Information**

Analytical Batch: WTC3058  
Analytical Method: SM 5310B  
Analyst: EWW  
Analytical Date/Time: 01/13/21 12:22  
Container ID: 1209882001-B

## Method Blank

Blank ID: MB for HBN 1815193 [MXX/33919]  
Blank Lab ID: 1597017

Matrix: Water (Surface, Eff., Ground)

QC for Samples:  
1209882001

## Results by EP200.8

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Calcium	250U	500	150	ug/L
Magnesium	25.0U	50.0	15.0	ug/L

## Batch Information

Analytical Batch: MMS10981  
Analytical Method: EP200.8  
Instrument: Perkin Elmer Nexlon P5  
Analyst: DMM  
Analytical Date/Time: 1/7/2021 11:28:03AM

Prep Batch: MXX33919  
Prep Method: E200.2  
Prep Date/Time: 1/5/2021 2:03:25PM  
Prep Initial Wt./Vol.: 20 mL  
Prep Extract Vol: 50 mL

Print Date: 01/15/2021 8:43:57AM

## Blank Spike Summary

Blank Spike ID: LCS for HBN 1209882 [MXX33919]  
Blank Spike Lab ID: 1597018  
Date Analyzed: 01/07/2021 11:31

Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1209882001

## Results by EP200.8

Parameter	Blank Spike (ug/L)			CL
	Spike	Result	Rec (%)	
Calcium	10000	10400	104	( 85-115 )
Magnesium	10000	10500	105	( 85-115 )

## Batch Information

Analytical Batch: **MMS10981**  
Analytical Method: **EP200.8**  
Instrument: **Perkin Elmer Nexlon P5**  
Analyst: **DMM**

Prep Batch: **MXX33919**  
Prep Method: **E200.2**  
Prep Date/Time: **01/05/2021 14:03**  
Spike Init Wt./Vol.: 10000 ug/L Extract Vol: 50 mL  
Dupe Init Wt./Vol.: Extract Vol:

Print Date: 01/15/2021 8:44:00AM

## Matrix Spike Summary

Original Sample ID: 1597023  
 MS Sample ID: 1597024 MS  
 MSD Sample ID:

Analysis Date: 01/07/2021 11:34  
 Analysis Date: 01/07/2021 11:37  
 Analysis Date:  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1209882001

## Results by EP200.8

Parameter	Sample	Matrix Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Calcium	2830	10000	13100	103				70-130		
Magnesium	488	10000	11100	107				70-130		

## Batch Information

Analytical Batch: MMS10981  
 Analytical Method: EP200.8  
 Instrument: Perkin Elmer Nexlon P5  
 Analyst: DMM  
 Analytical Date/Time: 1/7/2021 11:37:01AM

Prep Batch: MXX33919  
 Prep Method: DW Digest for Metals on ICP-MS  
 Prep Date/Time: 1/5/2021 2:03:25PM  
 Prep Initial Wt./Vol.: 20.00mL  
 Prep Extract Vol: 50.00mL

Print Date: 01/15/2021 8:44:02AM



## Matrix Spike Summary

Original Sample ID: 1597033  
 MS Sample ID: 1597034 MS  
 MSD Sample ID:

Analysis Date: 01/07/2021 11:40  
 Analysis Date: 01/07/2021 11:42  
 Analysis Date:  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1209882001

## Results by EP200.8

Parameter	Sample	Matrix Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Calcium	48400	10000	58100	97			70-130			
Magnesium	34400	10000	44300	98			70-130			

## Batch Information

Analytical Batch: MMS10981  
 Analytical Method: EP200.8  
 Instrument: Perkin Elmer Nexlon P5  
 Analyst: DMM  
 Analytical Date/Time: 1/7/2021 11:42:59AM

Prep Batch: MXX33919  
 Prep Method: DW Digest for Metals on ICP-MS  
 Prep Date/Time: 1/5/2021 2:03:25PM  
 Prep Initial Wt./Vol.: 20.00mL  
 Prep Extract Vol: 50.00mL

Print Date: 01/15/2021 8:44:02AM

## Method Blank

Blank ID: MB for HBN 1815410 [WTC/3058]

Blank Lab ID: 1597818

QC for Samples:  
1209882001

Matrix: Water (Surface, Eff., Ground)

## Results by SM 5310B

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Total Organic Carbon	500U	1000	400	ug/L

## Batch Information

Analytical Batch: WTC3058  
Analytical Method: SM 5310B  
Instrument: TOC Analyzer 2  
Analyst: EWW  
Analytical Date/Time: 1/13/2021 11:37:52AM

Print Date: 01/15/2021 8:44:04AM

## Blank Spike Summary

Blank Spike ID: LCS for HBN 1209882 [WTC3058]

Blank Spike Lab ID: 1597817

Date Analyzed: 01/13/2021 11:22

Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1209882001

## Results by SM 5310B

Parameter	Blank Spike (ug/L)			CL ( 80-120 )
	Spike	Result	Rec (%)	
Total Organic Carbon	75000	74200	99	

## Batch Information

Analytical Batch: **WTC3058**

Analytical Method: **SM 5310B**

Instrument: **TOC Analyzer 2**

Analyst: **EWV**

Print Date: 01/15/2021 8:44:07AM

## Matrix Spike Summary

Original Sample ID: 1210012001  
 MS Sample ID: 1597819 MS  
 MSD Sample ID: 1597820 MSD

Analysis Date: 01/13/2021 12:36  
 Analysis Date: 01/13/2021 12:54  
 Analysis Date: 01/13/2021 13:08  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1209882001

## Results by SM 5310B

Parameter	Sample	Matrix Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Total Organic Carbon	1880	10000	11700	99	10000	11800	99	75-125	0.09	(< 25 )

## Batch Information

Analytical Batch: WTC3058  
 Analytical Method: SM 5310B  
 Instrument: TOC Analyzer 2  
 Analyst: EWW  
 Analytical Date/Time: 1/13/2021 12:54:14PM

## Nelson, Justin (Anchorage)

---

**From:** Marcy Nadel <MDN@shanwil.com>  
**Sent:** Tuesday, December 29, 2020 1:07 PM  
**To:** Nelson, Justin (Anchorage)  
**Cc:** Dawkins, Jennifer A (Fairbanks)  
**Subject:** [EXTERNAL] RE: 1209882

\*\*\* WARNING: this message is from an EXTERNAL SENDER. Please be cautious, particularly with links and attachments. \*\*\*

---

Hi Justin & Jen,

Yes, metals by 200.8 and TOC by SM 5310B. Thanks!

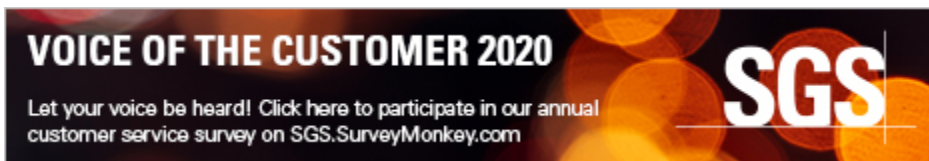
Happy New Year,  
Marcy

---

**From:** Nelson, Justin (Anchorage) <Justin.Nelson@sgs.com>  
**Sent:** Tuesday, December 29, 2020 11:30 AM  
**To:** Marcy Nadel <MDN@shanwil.com>  
**Cc:** Dawkins, Jennifer A (Fairbanks) <Jennifer.Dawkins@sgs.com>  
**Subject:** 1209882

Please let me know what method is needed for Ca/Mg/TOC on this workorder. I'm assuming 200.8 / 5310 unless you say differently. Thanks!

**Justin A. Nelson**  
**Environmental, Health & Safety**  
Client Service Manager, Alaska  
**SGS**  
200 West Potter Drive  
99518 – Anchorage  
Phone: +01 907 562 2343  
Direct: +01 907 550 3205  
E-mail: [Justin.Nelson@sgs.com](mailto:Justin.Nelson@sgs.com)



Information in this email and any attachments is confidential and intended solely for the use of the individual(s) to whom it is addressed or otherwise directed. Please note that any views or opinions presented in this email are solely those of the author and do not necessarily represent those of the Company. Finally, the recipient should check this email and any attachments for the presence of viruses. The Company accepts no liability for any damage caused by any virus transmitted by this email. All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at <https://www.sgs.com/en/terms-and-conditions>

1209882



**SHANNON & WILSON, INC.**  
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

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

www.shannonwilson.com

**CHAIN-C**

**RECORD**

Page 1 of 1

Laboratory SGS

Attn: J. Dawkins

Analytical Methods (include preservative if used)

Total Mg+Ca  
TOC  
DOC (w/ Unfiltered)  
Needs Lab Filtration

Total Number of Containers

Remarks/Matrix  
Composition/Grab?  
Sample Containers

**Turn Around Time:**

Normal  Rush

Please Specify

Quote No:

J-Flags:  Yes  No

Sample Identity	Lab No.	Time	Date Sampled	Total Mg+Ca	TOC	DOC (w/ Unfiltered)	Needs Lab Filtration	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
MW-1903-20	①A-B ②A	1157	12/22/20	X	X	X		3	groundwater

**Project Information**

Number: 11-4-06050-656

Name: FAI Plumstop

Contact: MDN

Ongoing Project? Yes  No

Sampler: ARM

**Sample Receipt**

Total No. of Containers: 3

COC Seals/Intact? Y/N/NA

Received Good Cond./Cold

Temp:

Delivery Method: hand

**Relinquished By: 1.**

Signature: [Signature] Time: 1000

Printed Name: A. Masters Date: 12/23/20

Company: Shannon & Wilson, Inc.

**Relinquished By: 2.**

Signature: [Signature] Time: 1430

Printed Name: Jan Dawkins Date: 12/23/20

Company: SGS

**Relinquished By: 3.**

Signature: [Signature] Time: \_\_\_\_\_

Printed Name: \_\_\_\_\_ Date: \_\_\_\_\_

Company: \_\_\_\_\_

**Notes:**

\* See Attached Change Order

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

**Received By: 1.**

Signature: [Signature] Time: 1000

Printed Name: Jan Dawkins Date: 12/23/20

Company: SGS

**Received By: 2.**

Signature: \_\_\_\_\_ Time: \_\_\_\_\_

Printed Name: \_\_\_\_\_ Date: \_\_\_\_\_

Company: \_\_\_\_\_

**Received By: 3.**

Signature: [Signature] Time: 0950

Printed Name: J. Struway Date: 12/24/20

Company: SGS D30 O.B

P# 350732

WF (1B)

**Dawkins, Jennifer A (Fairbanks)**

---

**From:** Dawkins, Jennifer A (Fairbanks)  
**Sent:** Wednesday, December 23, 2020 10:36 AM  
**To:** Marcy Nadel  
**Cc:** Amber Masters; Dawkins, Jennifer A (Fairbanks)  
**Subject:** 1209882

**1209882**



Marcy – Due to the sample being preserved before filtration, we are unable to run DOC on work order 1209882. We will proceed with TOC, Ca, and Mg.  
Thanks,  
Jen

**VOICE OF THE CUSTOMER 2020**

Let your voice be heard! Click here to participate in our annual customer service survey on [SGS.SurveyMonkey.com](https://www.sgs.com/SurveyMonkey.com)



**Jennifer A-B Dawkins**  
**Environment, Health & Safety**  
**Fairbanks Client Services**  
**Project Manager - Alaska**

**SGS**  
3180 Peger Rd. Ste. 190  
Fairbanks, AK 99709  
907-474-8656  
907-322-8444  
[jennifer.dawkins@sgs.com](mailto:jennifer.dawkins@sgs.com)



e-Sample Receipt Form

SGS Workorder #:

1209882



1 2 0 9 8 8 2

Review Criteria	Condition (Yes, No, N/A)	Exceptions Noted below
<b>Chain of Custody / Temperature Requirements</b>		
Were Custody Seals intact? Note # & location	Yes	Exemption permitted if sampler hand carries/delivers. 1F, 1B
COC accompanied samples?	YES	
DOD: Were samples received in COC corresponding coolers?	N/A	
<input type="checkbox"/> N/A <b>**Exemption permitted if chilled &amp; collected &lt;8 hours ago, or for samples where chilling is not required</b>		
Temperature blank compliant* (i.e., 0-6 °C after CF)?	YES	Cooler ID: 1 @ 0.6 °C Therm. ID: D30
If samples received without a temperature blank, the "cooler temperature" will be documented instead & "COOLER TEMP" will be noted to the right. "ambient" or "chilled" will be noted if neither is available.		Cooler ID: @ °C Therm. ID:
		Cooler ID: @ °C Therm. ID:
		Cooler ID: @ °C Therm. ID:
		Cooler ID: @ °C Therm. ID:
*If >6°C, were samples collected <8 hours ago?	N/A	
If <0°C, were sample containers ice free?	N/A	
Note: Identify containers received at non-compliant temperature . Use form FS-0029 if more space is needed.		
<b>Holding Time / Documentation / Sample Condition Requirements</b>		
Note: Refer to form F-083 "Sample Guide" for specific holding times.		
Were samples received within holding time?	YES	
Do samples match COC** (i.e., sample IDs, dates/times collected)?	YES	
**Note: If times differ <1hr, record details & login per COC. ***Note: If sample information on containers differs from COC, SGS will default to COC information		
Were analytical requests clear? (i.e., method is specified for analyses with multiple option for analysis (Ex: BTEX, Metals))	YES	
Were proper containers (type/mass/volume/preservative***) used?	No	SEE ATTACHED CHANGE ORDER
<input type="checkbox"/> N/A <b>***Exemption permitted for metals (e.g,200.8/6020B).</b>		
<b>Volatile / LL-Hg Requirements</b>		
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	
<b>Note to Client:</b> Any "No", answer above indicates non-compliance with standard procedures and may impact data quality.		
Additional notes (if applicable):		





e-Sample Receipt Form FBK

SGS Workorder #:

1209882

1209882

Review Criteria		Condition (Yes, No, N/A)	Exceptions Noted below	
<b>Chain of Custody / Temperature Requirements</b>			<b>Yes</b>	Exemption permitted if sampler hand carries/delivers.
Were Custody Seals intact? Note # & location		N/A		
COC accompanied samples?		Yes		
DOD: Were samples received in COC corresponding coolers?		N/A		
<input type="checkbox"/> **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 @ 4.1 °C	Therm. ID: D64
If samples received without a temperature blank, the "cooler temperature" will be documented instead & "COOLER TEMP" will be noted to the right. "ambient" or "chilled" will be noted if neither is available.			Cooler ID: @	°C Therm. ID:
			Cooler ID: @	°C Therm. ID:
			Cooler ID: @	°C Therm. ID:
			Cooler ID: @	°C Therm. ID:
*If >6°C, were samples collected <8 hours ago?				
If <0°C, were sample containers ice free?				
Note: Identify containers received at non-compliant temperature . Use form FS-0029 if more space is needed.				
<b>Holding Time / Documentation / Sample Condition Requirements</b>		Note: Refer to form F-083 "Sample Guide" for specific holding times.		
Do samples match COC** (i.e., sample IDs, dates/times collected)?		N/C		
**Note: If times differ <1hr, record details & login per COC.				
***Note: If sample information on containers differs from COC, SGS will default to COC information				
Were samples in good condition (no leaks/cracks/breakage)?		Yes	Change order is attached.	
Were analytical requests clear? (i.e., method is specified for analyses with multiple option for analysis (Ex: BTEX, Metals))		Yes		
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		
For Rush/Short Hold Time, was RUSH/Short HT email sent?		N/A		
<b>Note to Client:</b> Any "No", answer above indicates non-compliance with standard procedures and may impact data quality.				
Additional notes (if applicable):				
<b>SGS Profile #</b>	<b>350732</b>		350732	



### Sample Containers and Preservatives

<u>Container Id</u>	<u>Preservative</u>	<u>Container Condition</u>	<u>Container Id</u>	<u>Preservative</u>	<u>Container Condition</u>
1209882001-A	HNO3 to pH < 2	OK			
1209882001-B	HCL to pH < 2	OK			
1209882002-A	HCL to pH < 2	OK			

#### Container Condition Glossary

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

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

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

DM - The container was received damaged.

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

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

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

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

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

QN - Insufficient sample quantity provided.

**Laboratory Data Review Checklist**

Completed By:

Justin Risley

Title:

Environmental Scientist

Date:

1/20/2021

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

SGS North America, Inc.

Laboratory Report Number:

1209882

Laboratory Report Date:

1/15/2021

CS Site Name:

Fairbanks DOT&PF PFAS

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

1209882

Laboratory Report Date:

1/15/2021

CS Site Name:

Fairbanks DOT&PF PFAS

**Note: Any N/A or No box checked must have an explanation in the comments box.**

1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

Yes  No  N/A  Comments:

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

Yes  No  N/A  Comments:

Analyses were performed by SGS North America, Inc. in Anchorage, AK.

2. Chain of Custody (CoC)

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

Yes  No  N/A  Comments:

b. Correct analyses requested?

Yes  No  N/A  Comments:

3. Laboratory Sample Receipt Documentation

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

Yes  No  N/A  Comments:

Sample cooler temperature recorded at 0.6° C upon receipt at laboratory in Fairbanks, and 4.1° C upon receipt in Anchorage.

b. Sample preservation acceptable – acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

Yes  No  N/A  Comments:

1209882

Laboratory Report Date:

1/15/2021

CS Site Name:

Fairbanks DOT&PF PFAS

c. Sample condition documented – broken, leaking (Methanol), zero headspace (VOC vials)?

Yes  No  N/A  Comments:

d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

Yes  No  N/A  Comments:

The project sample was preserved prior to filtration for the DOC analysis.

e. Data quality or usability affected?

Comments:

The laboratory was unable to analyze the project sample for DOC; this analyte was not reported for the sample set.

4. Case Narrative

a. Present and understandable?

Yes  No  N/A  Comments:

b. Discrepancies, errors, or QC failures identified by the lab?

Yes  No  N/A  Comments:

The case narrative does not identify any discrepancies, errors, or QC failures.

c. Were all corrective actions documented?

Yes  No  N/A  Comments:

N/A, see above.

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

Comments:

The case narrative does not specify an effect on data quality/usability.

1209882

Laboratory Report Date:

1/15/2021

CS Site Name:

Fairbanks DOT&PF PFAS

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

Yes  No  N/A  Comments:

DOC unable to be analyzed; see above.

b. All applicable holding times met?

Yes  No  N/A  Comments:

c. All soils reported on a dry weight basis?

Yes  No  N/A  Comments:

Soil samples were not submitted with this work order.

d. Are the reported LOQs less than the Cleanup Level or the minimum required detection level for the project?

Yes  No  N/A  Comments:

N/A; the requested analytes were detected in the project sample.

e. Data quality or usability affected?

No, see above.

6. QC Samples

a. Method Blank

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

Yes  No  N/A  Comments:

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

Yes  No  N/A  Comments:

1209882

Laboratory Report Date:

1/15/2021

CS Site Name:

Fairbanks DOT&PF PFAS

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

Comments:

There were no detections in the method blank samples associated with this work order.

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

Yes  No  N/A  Comments:

N/A; see above.

v. Data quality or usability affected?

Comments:

No, 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  N/A  Comments:

An LCS was reported for TOC analysis.

ii. Metals/Inorganics – one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes  No  N/A  Comments:

An LCS was reported for calcium and magnesium analyses.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes  No  N/A  Comments:

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from LCS/LCSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes  No  N/A  Comments:

LCSD samples were not reported for TOC, calcium, or magnesium.

1209882

Laboratory Report Date:

1/15/2021

CS Site Name:

Fairbanks DOT&PF PFAS

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

Comments:

Percent recovery was within acceptable limits.

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

Yes  No  N/A  Comments:

N/A; see above.

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

No, see above.

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

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

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

Yes  No  N/A  Comments:

MS/MSD samples were reported for total organic carbon analysis.

ii. Metals/Inorganics – one MS and one MSD reported per matrix, analysis and 20 samples?

Yes  No  N/A  Comments:

Two MS samples were reported for calcium and magnesium analyses.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable?

Yes  No  N/A  Comments:

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from MS/MSD, and or sample/sample duplicate.

Yes  No  N/A  Comments:



1209882

Laboratory Report Date:

1/15/2021

CS Site Name:

Fairbanks DOT&PF PFAS

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

Comments:

Percent recovery and RPD were within acceptable limits.

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

Yes  No  N/A  Comments:

See above.

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

No, see above.

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

i. Are surrogate/IDA recoveries reported for organic analyses – field, QC and laboratory samples?

Yes  No  N/A  Comments:

Surrogates are not reported for these analyses.

ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods 50-150 %R for field samples and 60-120 %R for QC samples; all other analyses see the laboratory report pages)

Yes  No  N/A  Comments:

N/A; see above.

iii. Do the sample results with failed surrogate/IDA recoveries have data flags? If so, are the data flags clearly defined?

Yes  No  N/A  Comments:

N/A; see above.

iv. Data quality or usability affected?

Comments:

No; see above.

1209882

Laboratory Report Date:

1/15/2021

CS Site Name:

Fairbanks DOT&PF PFAS

e. Trip Blanks

- i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples?  
(If not, enter explanation below.)

Yes  No  N/A  Comments:

Analysis for volatile compounds was not requested with this work order. Trip blank is not required.

- ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC?  
(If not, a comment explaining why must be entered below)

Yes  No  N/A  Comments:

N/A; see above.

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

Yes  No  N/A  Comments:

N/A; see above.

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

Comments:

N/A; see above.

- v. Data quality or usability affected?

Comments:

No, see above.

f. Field Duplicate

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

Yes  No  N/A  Comments:

Only one sample was submitted for this work order.

- ii. Submitted blind to lab?

Yes  No  N/A  Comments:

N/A; see above.

1209882

Laboratory Report Date:

1/15/2021

CS Site Name:

Fairbanks DOT&PF PFAS

iii. Precision – All relative percent differences (RPD) less than specified project objectives?  
(Recommended: 30% water, 50% soil)

$$RPD (\%) = \text{Absolute value of: } \frac{(R_1 - R_2)}{((R_1 + R_2) / 2)} \times 100$$

Where  $R_1$  = Sample Concentration  
 $R_2$  = Field Duplicate Concentration

Yes  No  N/A  Comments:

N/A; see above.

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

Comments:

No, see above.

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

Yes  No  N/A  Comments:

The project samples were collected using non-reusable equipment. An equipment blank is not required.

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

Yes  No  N/A  Comments:

See above.

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

Comments:

N/A; see above

iii. Data quality or usability affected?

Comments:

No, see above.

1209882

Laboratory Report Date:

1/15/2021

CS Site Name:

Fairbanks DOT&PF PFAS

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

a. Defined and appropriate?

Yes  No  N/A

Comments:

## ANALYTICAL REPORT

Eurofins TestAmerica, Sacramento  
880 Riverside Parkway  
West Sacramento, CA 95605  
Tel: (916)373-5600

Laboratory Job ID: 320-68386-1  
Client Project/Site: Plume Stop Pilot

For:  
Shannon & Wilson, Inc  
2355 Hill Rd.  
Fairbanks, Alaska 99709-5244

Attn: Marcy Nadel



---

Authorized for release by:  
1/8/2021 2:35:37 PM

David Alltucker, Project Manager I  
(916)374-4383  
[David.Alltucker@Eurofinset.com](mailto:David.Alltucker@Eurofinset.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:  
[www.eurofinsus.com/Env](http://www.eurofinsus.com/Env)

*The test results in this report meet all 2003 NELAC, 2009 TNI, and 2016 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.*

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*



# Table of Contents

Cover Page . . . . .	1
Table of Contents . . . . .	2
Definitions/Glossary . . . . .	3
Case Narrative . . . . .	4
Detection Summary . . . . .	5
Client Sample Results . . . . .	6
Isotope Dilution Summary . . . . .	7
QC Sample Results . . . . .	8
QC Association Summary . . . . .	12
Lab Chronicle . . . . .	13
Certification Summary . . . . .	14
Method Summary . . . . .	15
Sample Summary . . . . .	16
Chain of Custody . . . . .	17
Receipt Checklists . . . . .	19

# Definitions/Glossary

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop Pilot

Job ID: 320-68386-1

## Qualifiers

### LCMS

Qualifier	Qualifier Description
*+	LCS and/or LCSD is outside acceptance limits, high biased.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

# Case Narrative

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop Pilot

Job ID: 320-68386-1

---

**Job ID: 320-68386-1**

---

**Laboratory: Eurofins TestAmerica, Sacramento**

## Narrative

---

### Job Narrative 320-68386-1

#### Receipt

The sample was received on 12/30/2020 2:15 PM; the sample arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 2.5° C.

#### LCMS

Method 537 (modified): The laboratory control sample duplicate (LCSD) for preparation batch 320-447657 and analytical batch 320-447935 recovered outside control limits for the following analyte: 11CI-PF3OUdS. The analyte was biased high in the LCSD and was not detected in the associated samples; therefore, the data have been reported.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### Organic Prep

Method 3535: The following sample was black prior to extraction: MW-1903-20 (320-68386-1).

Method 3535: The following sample contains floating particulates at the bottom of the sample containers prior to extraction: MW-1903-20 (320-68386-1).

Method 3535: The following sample was gray after final volume: MW-1903-20 (320-68386-1).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



# Detection Summary

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop Pilot

Job ID: 320-68386-1

**Client Sample ID: MW-1903-20**

**Lab Sample ID: 320-68386-1**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	21		4.6	2.2	ng/L	1		537 (modified)	Total/NA
Perfluoropentanoic acid (PFPeA)	12		1.8	0.45	ng/L	1		537 (modified)	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Sacramento

# Client Sample Results

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop Pilot

Job ID: 320-68386-1

**Client Sample ID: MW-1903-20**

**Lab Sample ID: 320-68386-1**

**Date Collected: 12/22/20 11:57**

**Matrix: Water**

**Date Received: 12/30/20 14:15**

**Method: 537 (modified) - Fluorinated Alkyl Substances**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Perfluorobutanoic acid (PFBA)</b>	<b>21</b>		4.6	2.2	ng/L		12/31/20 12:36	01/03/21 15:40	1
Perfluorohexanoic acid (PFHxA)	ND		1.8	0.53	ng/L		12/31/20 12:36	01/03/21 15:40	1
Perfluoroheptanoic acid (PFHpA)	ND		1.8	0.23	ng/L		12/31/20 12:36	01/03/21 15:40	1
<b>Perfluoropentanoic acid (PFPeA)</b>	<b>12</b>		1.8	0.45	ng/L		12/31/20 12:36	01/03/21 15:40	1
Perfluorooctanoic acid (PFOA)	ND		1.8	0.78	ng/L		12/31/20 12:36	01/03/21 15:40	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.25	ng/L		12/31/20 12:36	01/03/21 15:40	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		12/31/20 12:36	01/03/21 15:40	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	1.0	ng/L		12/31/20 12:36	01/03/21 15:40	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.50	ng/L		12/31/20 12:36	01/03/21 15:40	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		12/31/20 12:36	01/03/21 15:40	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.67	ng/L		12/31/20 12:36	01/03/21 15:40	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.8	0.18	ng/L		12/31/20 12:36	01/03/21 15:40	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.8	0.52	ng/L		12/31/20 12:36	01/03/21 15:40	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.8	0.49	ng/L		12/31/20 12:36	01/03/21 15:40	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.6	1.2	ng/L		12/31/20 12:36	01/03/21 15:40	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.6	1.1	ng/L		12/31/20 12:36	01/03/21 15:40	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		1.8	0.17	ng/L		12/31/20 12:36	01/03/21 15:40	1
Perfluorodecanesulfonic acid (PFDS)	ND		1.8	0.29	ng/L		12/31/20 12:36	01/03/21 15:40	1
Perfluorooctanesulfonamide (FOSA)	ND		1.8	0.90	ng/L		12/31/20 12:36	01/03/21 15:40	1
6:2 FTS	ND		4.6	2.3	ng/L		12/31/20 12:36	01/03/21 15:40	1
8:2 FTS	ND		1.8	0.42	ng/L		12/31/20 12:36	01/03/21 15:40	1
9CI-PF3ONS	ND		1.8	0.22	ng/L		12/31/20 12:36	01/03/21 15:40	1
HFPO-DA (GenX)	ND		3.7	1.4	ng/L		12/31/20 12:36	01/03/21 15:40	1
11CI-PF3OUdS	ND	*+	1.8	0.29	ng/L		12/31/20 12:36	01/03/21 15:40	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.37	ng/L		12/31/20 12:36	01/03/21 15:40	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFHxA	110		25 - 150	12/31/20 12:36	01/03/21 15:40	1
13C4 PFHpA	109		25 - 150	12/31/20 12:36	01/03/21 15:40	1
13C4 PFOA	108		25 - 150	12/31/20 12:36	01/03/21 15:40	1
13C5 PFNA	108		25 - 150	12/31/20 12:36	01/03/21 15:40	1
13C2 PFDA	112		25 - 150	12/31/20 12:36	01/03/21 15:40	1
13C2 PFUnA	118		25 - 150	12/31/20 12:36	01/03/21 15:40	1
13C8 FOSA	104		25 - 150	12/31/20 12:36	01/03/21 15:40	1
13C2 PFDoA	109		25 - 150	12/31/20 12:36	01/03/21 15:40	1
13C4 PFBA	108		25 - 150	12/31/20 12:36	01/03/21 15:40	1
13C2 PFTeDA	104		25 - 150	12/31/20 12:36	01/03/21 15:40	1
13C5 PFPeA	85		25 - 150	12/31/20 12:36	01/03/21 15:40	1
13C3 PFBS	100		25 - 150	12/31/20 12:36	01/03/21 15:40	1
18O2 PFHxS	99		25 - 150	12/31/20 12:36	01/03/21 15:40	1
13C4 PFOS	100		25 - 150	12/31/20 12:36	01/03/21 15:40	1
d3-NMeFOSAA	97		25 - 150	12/31/20 12:36	01/03/21 15:40	1
d5-NEtFOSAA	100		25 - 150	12/31/20 12:36	01/03/21 15:40	1
M2-6:2 FTS	88		25 - 150	12/31/20 12:36	01/03/21 15:40	1
M2-8:2 FTS	100		25 - 150	12/31/20 12:36	01/03/21 15:40	1
13C3 HFPO-DA	102		25 - 150	12/31/20 12:36	01/03/21 15:40	1

Eurofins TestAmerica, Sacramento

# Isotope Dilution Summary

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop Pilot

Job ID: 320-68386-1

## Method: 537 (modified) - Fluorinated Alkyl Substances

Matrix: Water

Prep Type: Total/NA

### Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	PFHxA (25-150)	C4PFHA (25-150)	PFOA (25-150)	PFNA (25-150)	PFDA (25-150)	PFUnA (25-150)	PFOSA (25-150)	PFDaA (25-150)
320-68386-1	MW-1903-20	110	109	108	108	112	118	104	109
LCS 320-447657/2-A	Lab Control Sample	90	92	91	89	91	88	88	88
LCSD 320-447657/3-A	Lab Control Sample Dup	85	86	88	85	86	86	79	91
MB 320-447657/1-A	Method Blank	88	91	92	86	95	90	83	96

### Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	PFBA (25-150)	PFTDA (25-150)	PFPeA (25-150)	C3PFBS (25-150)	PFHxS (25-150)	PFOS (25-150)	d3NMFOS (25-150)	d5NEFOS (25-150)
320-68386-1	MW-1903-20	108	104	85	100	99	100	97	100
LCS 320-447657/2-A	Lab Control Sample	83	108	78	84	89	88	86	87
LCSD 320-447657/3-A	Lab Control Sample Dup	79	97	76	78	82	83	82	80
MB 320-447657/1-A	Method Blank	80	90	77	83	84	88	81	84

### Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	M262FTS (25-150)	M282FTS (25-150)	HFPODA (25-150)
320-68386-1	MW-1903-20	88	100	102
LCS 320-447657/2-A	Lab Control Sample	78	85	88
LCSD 320-447657/3-A	Lab Control Sample Dup	73	84	84
MB 320-447657/1-A	Method Blank	81	86	84

### Surrogate Legend

PFHxA = 13C2 PFHxA  
C4PFHA = 13C4 PFHpA  
PFOA = 13C4 PFOA  
PFNA = 13C5 PFNA  
PFDA = 13C2 PFDA  
PFUnA = 13C2 PFUnA  
PFOSA = 13C8 FOSA  
PFDaA = 13C2 PFDaA  
PFBA = 13C4 PFBA  
PFTDA = 13C2 PFTeDA  
PFPeA = 13C5 PFPeA  
C3PFBS = 13C3 PFBS  
PFHxS = 18O2 PFHxS  
PFOS = 13C4 PFOS  
d3NMFOS = d3-NMeFOSAA  
d5NEFOS = d5-NEtFOSAA  
M262FTS = M2-6:2 FTS  
M282FTS = M2-8:2 FTS  
HFPODA = 13C3 HFPO-DA

# QC Sample Results

Client: Shannon & Wilson, Inc  
 Project/Site: Plume Stop Pilot

Job ID: 320-68386-1

## Method: 537 (modified) - Fluorinated Alkyl Substances

**Lab Sample ID: MB 320-447657/1-A**  
**Matrix: Water**  
**Analysis Batch: 447935**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 447657**

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Perfluorobutanoic acid (PFBA)	ND		5.0	2.4	ng/L		12/31/20 12:36	01/03/21 15:12	1
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		12/31/20 12:36	01/03/21 15:12	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		12/31/20 12:36	01/03/21 15:12	1
Perfluoropentanoic acid (PFPeA)	ND		2.0	0.49	ng/L		12/31/20 12:36	01/03/21 15:12	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		12/31/20 12:36	01/03/21 15:12	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		12/31/20 12:36	01/03/21 15:12	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		12/31/20 12:36	01/03/21 15:12	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		12/31/20 12:36	01/03/21 15:12	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		12/31/20 12:36	01/03/21 15:12	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		12/31/20 12:36	01/03/21 15:12	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		12/31/20 12:36	01/03/21 15:12	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		12/31/20 12:36	01/03/21 15:12	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		12/31/20 12:36	01/03/21 15:12	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		12/31/20 12:36	01/03/21 15:12	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		12/31/20 12:36	01/03/21 15:12	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		12/31/20 12:36	01/03/21 15:12	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		2.0	0.19	ng/L		12/31/20 12:36	01/03/21 15:12	1
Perfluorodecanesulfonic acid (PFDS)	ND		2.0	0.32	ng/L		12/31/20 12:36	01/03/21 15:12	1
Perfluorooctanesulfonamide (FOSA)	ND		2.0	0.98	ng/L		12/31/20 12:36	01/03/21 15:12	1
6:2 FTS	ND		5.0	2.5	ng/L		12/31/20 12:36	01/03/21 15:12	1
8:2 FTS	ND		2.0	0.46	ng/L		12/31/20 12:36	01/03/21 15:12	1
9Cl-PF3ONS	ND		2.0	0.24	ng/L		12/31/20 12:36	01/03/21 15:12	1
HFPO-DA (GenX)	ND		4.0	1.5	ng/L		12/31/20 12:36	01/03/21 15:12	1
11Cl-PF3OUdS	ND		2.0	0.32	ng/L		12/31/20 12:36	01/03/21 15:12	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		12/31/20 12:36	01/03/21 15:12	1

Isotope Dilution	MB	MB	Limits	Prepared	Analyzed	Dil Fac
	%Recovery	Qualifier				
13C2 PFHxA	88		25 - 150	12/31/20 12:36	01/03/21 15:12	1
13C4 PFHpA	91		25 - 150	12/31/20 12:36	01/03/21 15:12	1
13C4 PFOA	92		25 - 150	12/31/20 12:36	01/03/21 15:12	1
13C5 PFNA	86		25 - 150	12/31/20 12:36	01/03/21 15:12	1
13C2 PFDA	95		25 - 150	12/31/20 12:36	01/03/21 15:12	1
13C2 PFUnA	90		25 - 150	12/31/20 12:36	01/03/21 15:12	1
13C8 FOSA	83		25 - 150	12/31/20 12:36	01/03/21 15:12	1
13C2 PFDoA	96		25 - 150	12/31/20 12:36	01/03/21 15:12	1
13C4 PFBA	80		25 - 150	12/31/20 12:36	01/03/21 15:12	1
13C2 PFTeDA	90		25 - 150	12/31/20 12:36	01/03/21 15:12	1
13C5 PFPeA	77		25 - 150	12/31/20 12:36	01/03/21 15:12	1
13C3 PFBS	83		25 - 150	12/31/20 12:36	01/03/21 15:12	1
18O2 PFHxS	84		25 - 150	12/31/20 12:36	01/03/21 15:12	1
13C4 PFOS	88		25 - 150	12/31/20 12:36	01/03/21 15:12	1
d3-NMeFOSAA	81		25 - 150	12/31/20 12:36	01/03/21 15:12	1
d5-NEtFOSAA	84		25 - 150	12/31/20 12:36	01/03/21 15:12	1
M2-6:2 FTS	81		25 - 150	12/31/20 12:36	01/03/21 15:12	1
M2-8:2 FTS	86		25 - 150	12/31/20 12:36	01/03/21 15:12	1

Eurofins TestAmerica, Sacramento

# QC Sample Results

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop Pilot

Job ID: 320-68386-1

## Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

**Lab Sample ID: MB 320-447657/1-A**  
**Matrix: Water**  
**Analysis Batch: 447935**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 447657**

Isotope Dilution	MB MB		Limits	Prepared		Dil Fac
	%Recovery	Qualifier		12/31/20 12:36	01/03/21 15:12	
13C3 HFPO-DA	84		25 - 150			1

**Lab Sample ID: LCS 320-447657/2-A**  
**Matrix: Water**  
**Analysis Batch: 447935**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 447657**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec.
							Limits
Perfluorobutanoic acid (PFBA)	40.0	36.2		ng/L		90	76 - 136
Perfluorohexanoic acid (PFHxA)	40.0	37.3		ng/L		93	73 - 133
Perfluoroheptanoic acid (PFHpA)	40.0	37.0		ng/L		93	72 - 132
Perfluoropentanoic acid (PFPeA)	40.0	35.8		ng/L		90	71 - 131
Perfluorooctanoic acid (PFOA)	40.0	34.1		ng/L		85	70 - 130
Perfluorononanoic acid (PFNA)	40.0	36.8		ng/L		92	75 - 135
Perfluorodecanoic acid (PFDA)	40.0	37.4		ng/L		94	76 - 136
Perfluoroundecanoic acid (PFUnA)	40.0	34.1		ng/L		85	68 - 128
Perfluorododecanoic acid (PFDoA)	40.0	38.7		ng/L		97	71 - 131
Perfluorotridecanoic acid (PFTriA)	40.0	46.9		ng/L		117	71 - 131
Perfluorotetradecanoic acid (PFTeA)	40.0	35.1		ng/L		88	70 - 130
Perfluorobutanesulfonic acid (PFBS)	35.4	32.9		ng/L		93	67 - 127
Perfluorohexanesulfonic acid (PFHxS)	36.4	32.2		ng/L		88	59 - 119
Perfluorooctanesulfonic acid (PFOS)	37.1	34.4		ng/L		93	70 - 130
Perfluoroheptanesulfonic Acid (PFHpS)	38.1	34.5		ng/L		91	76 - 136
Perfluorodecanesulfonic acid (PFDS)	38.6	38.3		ng/L		99	71 - 131
Perfluorooctanesulfonamide (FOSA)	40.0	39.5		ng/L		99	73 - 133
6:2 FTS	37.9	34.0		ng/L		90	59 - 175
8:2 FTS	38.3	36.0		ng/L		94	75 - 135
9CI-PF3ONS	37.3	39.9		ng/L		107	75 - 135
HFPO-DA (GenX)	40.0	39.3		ng/L		98	51 - 173
11CI-PF3OUdS	37.7	39.7		ng/L		105	54 - 114
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.7	39.3		ng/L		104	79 - 139

Isotope Dilution	LCS LCS		Limits
	%Recovery	Qualifier	
13C2 PFHxA	90		25 - 150
13C4 PFHpA	92		25 - 150
13C4 PFOA	91		25 - 150
13C5 PFNA	89		25 - 150
13C2 PFDA	91		25 - 150
13C2 PFUnA	88		25 - 150
13C8 FOSA	88		25 - 150
13C2 PFDoA	88		25 - 150
13C4 PFBA	83		25 - 150

Eurofins TestAmerica, Sacramento

# QC Sample Results

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop Pilot

Job ID: 320-68386-1

## Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

**Lab Sample ID: LCS 320-447657/2-A**  
**Matrix: Water**  
**Analysis Batch: 447935**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 447657**

<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
13C2 PFTeDA	108		25 - 150
13C5 PFPeA	78		25 - 150
13C3 PFBS	84		25 - 150
18O2 PFHxS	89		25 - 150
13C4 PFOS	88		25 - 150
d3-NMeFOSAA	86		25 - 150
d5-NEtFOSAA	87		25 - 150
M2-6:2 FTS	78		25 - 150
M2-8:2 FTS	85		25 - 150
13C3 HFPO-DA	88		25 - 150

**Lab Sample ID: LCSD 320-447657/3-A**  
**Matrix: Water**  
**Analysis Batch: 447935**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 447657**

<i>Analyte</i>	<i>Spike Added</i>	<i>LCSD Result</i>	<i>LCSD Qualifier</i>	<i>Unit</i>	<i>D</i>	<i>%Rec</i>	<i>%Rec. Limits</i>	<i>RPD</i>	<i>RPD Limit</i>
Perfluorobutanoic acid (PFBA)	40.0	40.2		ng/L		100	76 - 136	11	30
Perfluorohexanoic acid (PFHxA)	40.0	40.3		ng/L		101	73 - 133	8	30
Perfluoroheptanoic acid (PFHpA)	40.0	42.3		ng/L		106	72 - 132	13	30
Perfluoropentanoic acid (PFPeA)	40.0	39.1		ng/L		98	71 - 131	9	30
Perfluorooctanoic acid (PFOA)	40.0	40.4		ng/L		101	70 - 130	17	30
Perfluorononanoic acid (PFNA)	40.0	42.8		ng/L		107	75 - 135	15	30
Perfluorodecanoic acid (PFDA)	40.0	37.3		ng/L		93	76 - 136	0	30
Perfluoroundecanoic acid (PFUnA)	40.0	35.7		ng/L		89	68 - 128	5	30
Perfluorododecanoic acid (PFDoA)	40.0	40.7		ng/L		102	71 - 131	5	30
Perfluorotridecanoic acid (PFTriA)	40.0	41.9		ng/L		105	71 - 131	11	30
Perfluorotetradecanoic acid (PFTeA)	40.0	43.0		ng/L		107	70 - 130	20	30
Perfluorobutanesulfonic acid (PFBS)	35.4	37.1		ng/L		105	67 - 127	12	30
Perfluorohexanesulfonic acid (PFHxS)	36.4	36.6		ng/L		100	59 - 119	13	30
Perfluorooctanesulfonic acid (PFOS)	37.1	37.1		ng/L		100	70 - 130	8	30
Perfluoroheptanesulfonic Acid (PFHpS)	38.1	39.2		ng/L		103	76 - 136	13	30
Perfluorodecanesulfonic acid (PFDS)	38.6	41.3		ng/L		107	71 - 131	8	30
Perfluorooctanesulfonamide (FOSA)	40.0	44.4		ng/L		111	73 - 133	12	30
6:2 FTS	37.9	38.4		ng/L		101	59 - 175	12	30
8:2 FTS	38.3	41.4		ng/L		108	75 - 135	14	30
9CI-PF3ONS	37.3	44.2		ng/L		119	75 - 135	10	30
HFPO-DA (GenX)	40.0	41.0		ng/L		102	51 - 173	4	30
11CI-PF3OUdS	37.7	45.2	*+	ng/L		120	54 - 114	13	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.7	45.2		ng/L		120	79 - 139	14	30

# QC Sample Results

Client: Shannon & Wilson, Inc  
 Project/Site: Plume Stop Pilot

Job ID: 320-68386-1

## Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

<i>Isotope Dilution</i>	<i>LCS D LCS D</i>		<i>Limits</i>
	<i>%Recovery</i>	<i>Qualifier</i>	
13C2 PFHxA	85		25 - 150
13C4 PFHpA	86		25 - 150
13C4 PFOA	88		25 - 150
13C5 PFNA	85		25 - 150
13C2 PFDA	86		25 - 150
13C2 PFUnA	86		25 - 150
13C8 FOSA	79		25 - 150
13C2 PFDoA	91		25 - 150
13C4 PFBA	79		25 - 150
13C2 PFTeDA	97		25 - 150
13C5 PFPeA	76		25 - 150
13C3 PFBS	78		25 - 150
18O2 PFHxS	82		25 - 150
13C4 PFOS	83		25 - 150
d3-NMeFOSAA	82		25 - 150
d5-NEtFOSAA	80		25 - 150
M2-6:2 FTS	73		25 - 150
M2-8:2 FTS	84		25 - 150
13C3 HFPO-DA	84		25 - 150



# QC Association Summary

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop Pilot

Job ID: 320-68386-1

## LCMS

### Prep Batch: 447657

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-68386-1	MW-1903-20	Total/NA	Water	3535	
MB 320-447657/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-447657/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-447657/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

### Analysis Batch: 447935

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-68386-1	MW-1903-20	Total/NA	Water	537 (modified)	447657
MB 320-447657/1-A	Method Blank	Total/NA	Water	537 (modified)	447657
LCS 320-447657/2-A	Lab Control Sample	Total/NA	Water	537 (modified)	447657
LCSD 320-447657/3-A	Lab Control Sample Dup	Total/NA	Water	537 (modified)	447657



# Lab Chronicle

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop Pilot

Job ID: 320-68386-1

**Client Sample ID: MW-1903-20**

**Lab Sample ID: 320-68386-1**

**Date Collected: 12/22/20 11:57**

**Matrix: Water**

**Date Received: 12/30/20 14:15**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			273.1 mL	10.00 mL	447657	12/31/20 12:36	LA	TAL SAC
Total/NA	Analysis	537 (modified)		1			447935	01/03/21 15:40	S1M	TAL SAC

**Laboratory References:**

TAL SAC = Eurofins TestAmerica, Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15

# Accreditation/Certification Summary

Client: Shannon & Wilson, Inc  
 Project/Site: Plume Stop Pilot

Job ID: 320-68386-1

## Laboratory: Eurofins TestAmerica, Sacramento

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	17-020	01-20-21
ANAB	Dept. of Defense ELAP	L2468	01-20-21
ANAB	Dept. of Energy	L2468.01	01-20-21
ANAB	ISO/IEC 17025	L2468	01-20-21
Arizona	State	AZ0708	08-11-21
Arkansas DEQ	State	88-0691	06-17-21
California	State	2897	01-31-22
Colorado	State	CA0004	08-31-21
Connecticut	State	PH-0691	06-30-21
Florida	NELAP	E87570	06-30-21
Georgia	State	4040	01-30-21
Hawaii	State	<cert No.>	01-29-21
Illinois	NELAP	200060	03-17-21
Kansas	NELAP	E-10375	02-01-21
Louisiana	NELAP	01944	06-30-21
Maine	State	CA00004	04-14-22
Michigan	State	9947	08-03-23
Nevada	State	CA000442021-2	07-31-21
New Hampshire	NELAP	2997	04-18-21
New Jersey	NELAP	CA005	06-30-21
New York	NELAP	11666	04-01-21
Oregon	NELAP	4040	01-29-21
Pennsylvania	NELAP	68-01272	03-31-21
Texas	NELAP	T104704399-19-13	06-01-21
US Fish & Wildlife	US Federal Programs	58448	07-31-21
USDA	US Federal Programs	P330-18-00239	07-31-21
Utah	NELAP	CA000442019-01	02-28-21
Vermont	State	VT-4040	04-16-21
Virginia	NELAP	460278	03-14-21
Washington	State	C581	05-05-21
West Virginia (DW)	State	9930C	12-31-20 *
Wisconsin	State	998204680	08-31-21
Wyoming	State Program	8TMS-L	01-28-19 *

\* Accreditation/Certification renewal pending - accreditation/certification considered valid.

# Method Summary

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop Pilot

Job ID: 320-68386-1

Method	Method Description	Protocol	Laboratory
537 (modified)	Fluorinated Alkyl Substances	EPA	TAL SAC
3535	Solid-Phase Extraction (SPE)	SW846	TAL SAC

**Protocol References:**

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

**Laboratory References:**

TAL SAC = Eurofins TestAmerica, Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600



# Sample Summary

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop Pilot

Job ID: 320-68386-1

---

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
320-68386-1	MW-1903-20	Water	12/22/20 11:57	12/30/20 14:15	

---

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

# CHAIN-OF-CUSTODY RECORD

Laboratory Page 1 of 1  
 Affn: Test America  
D. all trucks

Analytical Methods (include preservative if used)

Quote No:                       
 J-Flags:  Yes  No

Turn Around Time:  
 Normal  Rush  
 Please Specify

Lab No.	Time	Date Sampled	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
MW-1903-20	11:57	12/21/20	2	groundwater



**Project Information**  
 Number: 102519-005  
 Name: Plume Stop P: lot  
 Contact: MDN  
 Ongoing Project? Yes  No   
 Sampler: ARM

**Sample Receipt**  
 Total No. of Containers: 2  
 COC Seals/Intact? YN/NA  
 Received Good Cond./Cold: YCS  
 Temp: 2.5C  
 Delivery Method: Goldstreet

**Notes:**

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

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: <u>M. Madel</u> Printed Name: <u>Mary Madel</u> Company: <u>Shannon &amp; Wilson</u>	Signature: _____ Printed Name: _____ Company: _____	Signature: _____ Printed Name: _____ Company: _____
Time: <u>1630</u> Date: <u>12/21/20</u>	Time: _____ Date: _____	Time: _____ Date: _____
Received By: 1. Signature: <u>[Signature]</u> Printed Name: <u>Jennifer Hillyer</u> Company: <u>EAWS Inc</u>	Received By: 2. Signature: _____ Printed Name: _____ Company: _____	Received By: 3. Signature: _____ Printed Name: _____ Company: _____
Time: <u>1415</u> Date: <u>12/21/20</u>	Time: _____ Date: _____	Time: _____ Date: _____

## PFAS Analyte List for MW-1903-20

PFC_IDA	PFAS, Method 537 List + addons	MDL	RL	
	11Cl-PF3OUdS	0.32	2	ng/L
	4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	0.4	2	ng/L
	6:2 FTS	2.5	5	ng/L
	8:2 FTS	0.46	2	ng/L
	9Cl-PF3ONS	0.24	2	ng/L
	HFPO-DA (GenX)	1.5	4	ng/L
	N-ethylperfluorooctanesulfonamidoacetic ac (NEtFOSAA)	1.3	5	ng/L
	N-methylperfluorooctanesulfonamidoacetic ac (NMeFOSAA)	1.2	5	ng/L
	Perfluorobutanesulfonic acid (PFBS)	0.2	2	ng/L
	Perfluorobutanoic acid (PFBA)	2.4	5	ng/L
	Perfluorodecanesulfonic acid (PFDS)	0.32	2	ng/L
	Perfluorodecanoic acid (PFDA)	0.31	2	ng/L
	Perfluorododecanoic acid (PFDoA)	0.55	2	ng/L
	Perfluoroheptanesulfonic Acid (PFHpS)	0.19	2	ng/L
	Perfluoroheptanoic acid (PFHpA)	0.25	2	ng/L
	Perfluorohexanesulfonic acid (PFHxS)	0.57	2	ng/L
	Perfluorohexanoic acid (PFHxA)	0.58	2	ng/L
	Perfluorononanoic acid (PFNA)	0.27	2	ng/L
	Perfluorooctanesulfonamide (FOSA)	0.98	2	ng/L
	Perfluorooctanesulfonic acid (PFOS)	0.54	2	ng/L
	Perfluorooctanoic acid (PFOA)	0.85	2	ng/L
	Perfluoropentanoic acid (PFPeA)	0.49	2	ng/L
	Perfluorotetradecanoic acid (PFTeA)	0.73	2	ng/L
	Perfluorotridecanoic acid (PFTriA)	1.3	2	ng/L
	Perfluoroundecanoic acid (PFUnA)	1.1	2	ng/L



## Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-68386-1

**Login Number: 68386**

**List Source: Eurofins TestAmerica, Sacramento**

**List Number: 1**

**Creator: Her, David A**

Question	Answer	Comment
Radioactivity wasn't checked or is <math>\leq</math> background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	Seals
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

## Laboratory Data Review Checklist

Completed By:

Justin Risley

Title:

Environmental Scientist

Date:

January 13, 2021

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

Eurofins / TestAmerica Laboratories, Inc. (TestAmerica)

Laboratory Report Number:

320-68386-1

Laboratory Report Date:

January 8, 2021

CS Site Name:

DOT&PF Fairbanks International PFAS PlumeStop Monitoring

ADEC File Number:

100.38.277

Hazard Identification Number:

26816



Laboratory Report Date:

**Note: Any N/A or No box checked must have an explanation in the comments box.**

1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

Yes  No  N/A  Comments:

The DEC certified TestAmerica of West Sacramento, CA for the analysis of perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) on February 6, 2018 by method 537. These compounds were included in the DEC's Contaminated Sites Laboratory Approval 17-020.

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  N/A  Comments:

The requested analyses were conducted by TestAmerica of West Sacramento, CA.

2. Chain of Custody (CoC)

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

Yes  No  N/A  Comments:

b. Correct analyses requested?

Yes  No  N/A  Comments:

3. Laboratory Sample Receipt Documentation

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

Yes  No  N/A  Comments:

b. Sample preservation acceptable – acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

Yes  No  N/A  Comments:

Samples do not require preservation other than temperature.

c. Sample condition documented – broken, leaking (Methanol), zero headspace (VOC vials)?

Yes  No  N/A  Comments:

The sample receipt form notes that the samples were received in good condition.

Laboratory Report Date:

- d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

Yes  No  N/A  Comments:

The sample receipt form notes no discrepancies.

- e. Data quality or usability affected?

Comments:

Data quality and/or usability were not affected.

#### 4. Case Narrative

- a. Present and understandable?

Yes  No  N/A  Comments:

- b. Discrepancies, errors, or QC failures identified by the lab?

Yes  No  N/A  Comments:

The case narrative indicates the following:

The samples arrived in good condition and properly preserved. The temperature of the sample cooler received with this shipment was 2.5 ° C upon arrival at the laboratory.

The laboratory control sample duplicate (LCSD) for preparation batch 320-447657 and analytical batch 320-447935 recovered outside control limits for the following analyte: 11-Chloroeicosfluoro-3-oxaundecane-1-sulfonic acid. This analyte was biased high in the LCSD, but was not detected in the associated samples. The results are unaffected.

The following sample was black prior to extraction: *MW-1903-20*

The following samples contain floating particulates in the bottles prior to extraction: *MW-1903-20*

The following sample was gray after final volume: *MW-1903-20*

- c. Were all corrective actions documented?

Yes  No  N/A  Comments:

No corrective actions necessary.

Laboratory Report Date:

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

Comments:

The results are unaffected.

## 5. Samples Results

- a. Correct analyses performed/reported as requested on COC?

Yes  No  N/A  Comments:

- b. All applicable holding times met?

Yes  No  N/A  Comments:

- c. All soils reported on a dry weight basis?

Yes  No  N/A  Comments:

Soil samples were not submitted with this work order.

- d. Are the reported LOQs less than the Cleanup Level or the minimum required detection level for the project?

Yes  No  N/A  Comments:

The reporting limit (RL) is less than the applicable DEC regulatory limit for the project.

- e. Data quality or usability affected?

The data quality and/or usability were not affected; see above.

## 6. QC Samples

- a. Method Blank

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

Yes  No  N/A  Comments:

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

Yes  No  N/A  Comments:

There were no detections in the method blank sample associated with this project sample.

Laboratory Report Date:

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

Comments:

N/A; see above.

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

Yes  No  N/A  Comments:

v. Data quality or usability affected?

Comments:

No; 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  N/A  Comments:

ii. Metals/Inorganics – one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes  No  N/A  Comments:

Metals and/or inorganics were not analyzed as part of this work order.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes  No  N/A  Comments:

LCSD recovery for 11-Chloroeicosafuoro-3-oxaundecane-1-sulfonic acid is above laboratory limits.

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from LCS/LCSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes  No  N/A  Comments:

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

Comments:

11-Chloroeicosafuoro-3-oxaundecane-1-sulfonic acid was not detected in the project sample in the associated preparatory batch.

Laboratory Report Date:

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

Yes  No  N/A  Comments:

11-Chloroeicosafuoro-3-oxaundecane-1-sulfonic acid was not detected in the associated project sample, therefore the data is not affected. Qualification of the data was not required.

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

The data quality and/or usability were not affected; see above.

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

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

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

Yes  No  N/A  Comments:

MS and MSD samples were not analyzed for this work order. See LCS/LCSD for an assessment of the laboratory accuracy and precision.

ii. Metals/Inorganics – one MS and one MSD reported per matrix, analysis and 20 samples?

Yes  No  N/A  Comments:

Metals and/or inorganics were not analyzed as part of this work order.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable?

Yes  No  N/A  Comments:

MS and MSD samples were not analyzed for this work order.

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from MS/MSD, and or sample/sample duplicate.

Yes  No  N/A  Comments:

MS and MSD samples were not analyzed for this work order.

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

Comments:

NA; MS and MSD samples were not analyzed for this work order.

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

Yes  No  N/A  Comments:

MS and MSD samples were not analyzed for this work order.

Laboratory Report Date:

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

The data quality and/or usability were not affected; see above.

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

i. Are surrogate/IDA recoveries reported for organic analyses – field, QC and laboratory samples?

Yes  No  N/A  Comments:

ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods 50-150 %R for field samples and 60-120 %R for QC samples; all other analyses see the laboratory report pages)

Yes  No  N/A  Comments:

iii. Do the sample results with failed surrogate/IDA recoveries have data flags? If so, are the data flags clearly defined?

Yes  No  N/A  Comments:

There were no IDA recovery failures associated with this work order.

iv. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected; see above.

e. Trip Blanks

i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples? (If not, enter explanation below.)

Yes  No  N/A  Comments:

PFAS are not volatile compounds. A trip blank is not required for the requested analysis.

ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC? (If not, a comment explaining why must be entered below)

Yes  No  N/A  Comments:

A trip blank is not required for the requested analysis.

iii. All results less than LOQ and project specified objectives?

Yes  No  N/A  Comments:

A trip blank is not required for the requested analysis.

Laboratory Report Date:

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

Comments:

NA; a trip blank is not required for the requested analysis.

v. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected; see above.

f. Field Duplicate

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

Yes  No  N/A  Comments:

Only one project sample was submitted.

ii. Submitted blind to lab?

Yes  No  N/A  Comments:

Only one project sample was submitted.

iii. Precision – All relative percent differences (RPD) less than specified project objectives?  
(Recommended: 30% water, 50% soil)

$$\text{RPD (\%)} = \text{Absolute value of: } \frac{(R_1 - R_2)}{((R_1 + R_2)/2)} \times 100$$

Where  $R_1$  = Sample Concentration $R_2$  = Field Duplicate ConcentrationYes  No  N/A  Comments:

N/A; only one sample was submitted.

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

Comments:

N/A; see above.

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

Yes  No  N/A  Comments:

Reusable equipment was not used for sample collection. Therefore, decontamination or equipment blank samples were not required. A peri-pump was used to collect the requested analytes.

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

Yes  No  N/A  Comments:

See above.

Laboratory Report Date:

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

Comments:

N/A; see above.

iii. Data quality or usability affected?

Comments:

No; see above.

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

a. Defined and appropriate?

Yes  No  N/A

Comments:





## Laboratory Report of Analysis

To: Shannon & Wilson-Fairbanks  
2355 Hill Rd  
Fairbanks, AK 99707  
(907)479-0600

Report Number: **1211184**

Client Project: **102519-005 Plum Stop**

Dear Marcy Nadel,

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 Jennifer 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.

---

Jennifer Dawkins  
Project Manager  
Jennifer.Dawkins@sgs.com

Date

## Case Narrative

SGS Client: **Shannon & Wilson-Fairbanks**

SGS Project: **1211184**

Project Name/Site: **102519-005 Plum Stop**

Project Contact: **Marcy Nadel**

Refer to sample receipt form for information on sample condition.

### **MW-1903-20 (1211184001) PS**

200.8- Metals- The LOQs are elevated due to matrix interference.

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

Print Date: 03/25/2021 2:45:30PM

## Laboratory Qualifiers

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

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

SGS maintains a formal Quality Assurance/Quality Control (QA/QC) program. A copy of our Quality Assurance Plan (QAP), which outlines this program, is available at your request. The laboratory certification numbers are AK00971 (DW Chemistry & Microbiology) & 17-021 (CS) for ADEC and 2944.01 for DOD ELAP/ISO17025 (RCRA methods: 1020B, 1311, 3010A, 3050B, 3520C, 3550C, 5030B, 5035A, 6020B, 7470A, 7471B, 8015C, 8021B, 8082A, 8260D, 8270D, 8270D-SIM, 9040C, 9045D, 9056A, 9060A, AK101 and AK102/103). SGS is only certified for the analytes listed on our Drinking Water Certification (DW methods: 200.8, 2130B, 2320B, 2510B, 300.0, 4500-CN-C,E, 4500-H-B, 4500-NO3-F, 4500-P-E and 524.2) and only those analytes will be reported to the State of Alaska for compliance. Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth by the SGS QAP and, when applicable, other regulatory authorities.

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

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

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

## Sample Summary

<u>Client Sample ID</u>	<u>Lab Sample ID</u>	<u>Collected</u>	<u>Received</u>	<u>Matrix</u>
MW-1903-20	1211184001	03/16/2021	03/18/2021	Water (Surface, Eff., Ground)

<u>Method</u>	<u>Method Description</u>
SM 5310B	Dissolved Organic Carbon
EP200.8	Metals in Water by 200.8 ICP-MS
SM 5310B	Total Organic Carbon

Print Date: 03/25/2021 2:45:34PM

## Detectable Results Summary

Client Sample ID: **MW-1903-20**

Lab Sample ID: 1211184001

**Metals by ICP/MS**

**Waters Department**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Calcium	83700J	ug/L
Magnesium	20900	ug/L
TOC Average, Dissolved	3580	ug/L
Total Organic Carbon Average	9350	ug/L

Print Date: 03/25/2021 2:45:36PM

## Results of MW-1903-20

Client Sample ID: **MW-1903-20**  
 Client Project ID: **102519-005 Plum Stop**  
 Lab Sample ID: 1211184001  
 Lab Project ID: 1211184

Collection Date: 03/16/21 14:26  
 Received Date: 03/18/21 09:05  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

## Results by Metals by ICP/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Calcium	83700 J	125000	37500	ug/L	50		03/23/21 18:52
Magnesium	20900	12500	3750	ug/L	50		03/23/21 18:52

## Batch Information

Analytical Batch: MMS11044  
 Analytical Method: EP200.8  
 Analyst: DMM  
 Analytical Date/Time: 03/23/21 18:52  
 Container ID: 1211184001-C

Prep Batch: MX34043  
 Prep Method: E200.2  
 Prep Date/Time: 03/22/21 10:25  
 Prep Initial Wt./Vol.: 4 mL  
 Prep Extract Vol: 50 mL

## Results of MW-1903-20

Client Sample ID: **MW-1903-20**  
 Client Project ID: **102519-005 Plum Stop**  
 Lab Sample ID: 1211184001  
 Lab Project ID: 1211184

Collection Date: 03/16/21 14:26  
 Received Date: 03/18/21 09:05  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

## Results by Waters Department

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
TOC Average, Dissolved	3580		1000	400	ug/L	1		03/24/21 19:07
Total Organic Carbon Average	9350		1000	400	ug/L	1		03/24/21 17:08

## Batch Information

Analytical Batch: WTC3080  
 Analytical Method: SM 5310B  
 Analyst: IJV  
 Analytical Date/Time: 03/24/21 17:08  
 Container ID: 1211184001-A

Analytical Batch: WTC3080  
 Analytical Method: SM 5310B  
 Analyst: IJV  
 Analytical Date/Time: 03/24/21 19:07  
 Container ID: 1211184001-B

## Method Blank

Blank ID: MB for HBN 1817051 [MXX/34043]

Blank Lab ID: 1603509

QC for Samples:

1211184001

Matrix: Water (Surface, Eff., Ground)

## Results by EP200.8

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Calcium	250U	500	150	ug/L
Magnesium	25.0U	50.0	15.0	ug/L

## Batch Information

Analytical Batch: MMS11044

Analytical Method: EP200.8

Instrument: Perkin Elmer Nexlon P5

Analyst: DMM

Analytical Date/Time: 3/23/2021 6:03:44PM

Prep Batch: MXX34043

Prep Method: E200.2

Prep Date/Time: 3/22/2021 10:25:50AM

Prep Initial Wt./Vol.: 20 mL

Prep Extract Vol: 50 mL



## Blank Spike Summary

Blank Spike ID: LCS for HBN 1211184 [MXX34043]  
 Blank Spike Lab ID: 1603510  
 Date Analyzed: 03/23/2021 18:06

Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1211184001

## Results by EP200.8

Parameter	Blank Spike (ug/L)			CL ( 85-115 )
	Spike	Result	Rec (%)	
Calcium	10000	10000	100	( 85-115 )
Magnesium	10000	10500	105	( 85-115 )

## Batch Information

Analytical Batch: **MMS11044**  
 Analytical Method: **EP200.8**  
 Instrument: **Perkin Elmer Nexlon P5**  
 Analyst: **DMM**

Prep Batch: **MXX34043**  
 Prep Method: **E200.2**  
 Prep Date/Time: **03/22/2021 10:25**  
 Spike Init Wt./Vol.: 10000 ug/L Extract Vol: 50 mL  
 Dupe Init Wt./Vol.: Extract Vol:

## Matrix Spike Summary

Original Sample ID: 1603587  
 MS Sample ID: 1603592 MS  
 MSD Sample ID:

Analysis Date: 03/23/2021 18:09  
 Analysis Date: 03/23/2021 18:12  
 Analysis Date:  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1211184001

## Results by EP200.8

Parameter	Sample	Matrix Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Calcium	50600	10000	62000	114				70-130		
Magnesium	14700	10000	24900	102				70-130		

## Batch Information

Analytical Batch: MMS11044  
 Analytical Method: EP200.8  
 Instrument: Perkin Elmer Nexlon P5  
 Analyst: DMM  
 Analytical Date/Time: 3/23/2021 6:12:47PM

Prep Batch: MXX34043  
 Prep Method: DW Digest for Metals on ICP-MS  
 Prep Date/Time: 3/22/2021 10:25:50AM  
 Prep Initial Wt./Vol.: 20.00mL  
 Prep Extract Vol: 50.00mL

Print Date: 03/25/2021 2:45:47PM

## Method Blank

Blank ID: MB for HBN 1817159 [WTC/3080]

Blank Lab ID: 1603954

QC for Samples:

1211184001

Matrix: Water (Surface, Eff., Ground)

## Results by SM 5310B

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Total Organic Carbon Average	500U	1000	400	ug/L

## Batch Information

Analytical Batch: WTC3080

Analytical Method: SM 5310B

Instrument: TOC Analyzer 2

Analyst: IJV

Analytical Date/Time: 3/24/2021 12:34:44PM

## Blank Spike Summary

Blank Spike ID: LCS for HBN 1211184 [WTC3080]  
 Blank Spike Lab ID: 1603952  
 Date Analyzed: 03/24/2021 12:20

Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1211184001

## Results by SM 5310B

Parameter	Blank Spike (ug/L)			CL ( 80-120 )
	Spike	Result	Rec (%)	
Total Organic Carbon Average	75000	73400	98	

## Batch Information

Analytical Batch: **WTC3080**  
 Analytical Method: **SM 5310B**  
 Instrument: **TOC Analyzer 2**  
 Analyst: **IJV**

## Matrix Spike Summary

Original Sample ID: 1211135002  
 MS Sample ID: 1603967 MS  
 MSD Sample ID: 1603968 MSD

Analysis Date: 03/24/2021 13:37  
 Analysis Date: 03/24/2021 13:51  
 Analysis Date: 03/24/2021 14:06  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1211184001

## Results by SM 5310B

Parameter	Sample	Matrix Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Total Organic Carbon Average	500U	10000	9670	97	10000	9740	97	75-125	0.67	(< 25 )

## Batch Information

Analytical Batch: WTC3080  
 Analytical Method: SM 5310B  
 Instrument: TOC Analyzer 2  
 Analyst: IJV  
 Analytical Date/Time: 3/24/2021 1:51:39PM

# CHAIN-OF-CUSTODY RECORD

Analytical Methods (include preservative if used)

**1211184**



TOC Sm 5310B  
 DOC Sm 5310B  
 Total Mg + Ca EP200.8

**Turn Around Time:**  
 Normal  Rush  
 Please Specify

Quote No: \_\_\_\_\_

J-Flags:  Yes  No

Sample Identity	Lab No.	Time	Date Sampled	Analytical Methods							Total N	Remarks/Composition/Grab? Sample Containers
MW-1903-20	(IA-C)	14:26	3-16-21	X	X	X					3	Groundwater

**Project Information**  
 Number: 102519-005  
 Name: Plum Step  
 Contact: MDN  
 Ongoing Project? Yes  No   
 Sampler: JKR

**Sample Receipt**  
 Total No. of Containers: 3  
 COC Seals/Intact? Y/N/NA  
 Received Good Cond./Cold  
 Temp: 5.6  
 Delivery Method:

**Relinquished By: 1.**  
 Signature: Justin Ristey Time: 13:45  
 Printed Name: Justin Ristey Date: 3-17-21  
 Company: Shannon & Wilson, Inc.

**Relinquished By: 2.**  
 Signature: Jen Dawkins Time: 14:00  
 Printed Name: Jen Dawkins Date: 3-17-21  
 Company: SES

**Relinquished By: 3.**  
 Signature: \_\_\_\_\_ Time: \_\_\_\_\_  
 Printed Name: \_\_\_\_\_ Date: \_\_\_\_\_  
 Company: \_\_\_\_\_

**Notes:**  
 \_\_\_\_\_  
 \_\_\_\_\_

**Received By: 1.**  
 Signature: Jen Dawkins Time: 13:52  
 Printed Name: Jen Dawkins Date: 3-17-21  
 Company: SES

**Received By: 2.**  
 Signature: \_\_\_\_\_ Time: \_\_\_\_\_  
 Printed Name: \_\_\_\_\_ Date: \_\_\_\_\_  
 Company: \_\_\_\_\_

**Received By: 3.**  
 Signature: Amly Time: 09:05  
 Printed Name: Saraswati Date: 03/18/21  
 Company: intact: 1F, 1B  
CO

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




e-Sample Receipt Form FBK

SGS Workorder #:

S&W

S & W

Review Criteria		Condition (Yes, No, N/A)	Exceptions Noted below	
<b>Chain of Custody / Temperature Requirements</b>			Exemption permitted if sampler hand carries/delivers.	
Were Custody Seals intact? Note # & location	<input checked="" type="checkbox"/>	Yes		
COC accompanied samples?	<input checked="" type="checkbox"/>	Yes		
DOD: Were samples received in COC corresponding coolers?	<input checked="" type="checkbox"/>	N/A		
<input type="checkbox"/> **Exemption permitted if chilled & collected <8 hours ago, or for samples where chilling is not required				
Temperature blank compliant* (i.e., 0-6 °C after CF)?	<input checked="" type="checkbox"/>	Yes	Cooler ID: 1	@ 5.6 °C Therm. ID: D50
If samples received without a temperature blank, the "cooler temperature" will be documented instead & "COOLER TEMP" will be noted to the right. "ambient" or "chilled" will be noted if neither is available.	<input type="checkbox"/>		Cooler ID:	@ °C Therm. ID:
	<input type="checkbox"/>		Cooler ID:	@ °C Therm. ID:
	<input type="checkbox"/>		Cooler ID:	@ °C Therm. ID:
	<input type="checkbox"/>		Cooler ID:	@ °C Therm. ID:
*If >6°C, were samples collected <8 hours ago? <input type="checkbox"/>				
If <0°C, were sample containers ice free? <input type="checkbox"/>				
Note: Identify containers received at non-compliant temperature . Use form FS-0029 if more space is needed.				
<b>Holding Time / Documentation / Sample Condition Requirements</b>		Note: Refer to form F-083 "Sample Guide" for specific holding times.		
Do samples match COC** (i.e., sample IDs, dates/times collected)?	<input checked="" type="checkbox"/>	N/C		
**Note: If times differ <1hr, record details & login per COC.				
***Note: If sample information on containers differs from COC, SGS will default to COC information				
Were samples in good condition (no leaks/cracks/breakage)?	<input checked="" type="checkbox"/>	Yes		
Were analytical requests clear? (i.e., method is specified for analyses with multiple option for analysis (Ex: BTEX, Metals))	<input checked="" type="checkbox"/>	Yes		
Were Trip Blanks (i.e., VOAs, LL-Hg) in cooler with samples?	<input checked="" type="checkbox"/>	N/A		
Were all water VOA vials free of headspace (i.e., bubbles ≤ 6mm)?	<input checked="" type="checkbox"/>	N/A		
Were all soil VOAs field extracted with MeOH+BFB?	<input checked="" type="checkbox"/>	N/A		
For Rush/Short Hold Time, was RUSH/Short HT email sent?	<input checked="" type="checkbox"/>	N/A		
Note to Client: Any "No", answer above indicates non-compliance with standard procedures and may impact data quality.				
Additional notes (if applicable):				
<b>SGS Profile #</b>	<b>350732</b>		<b>350732</b>	
<b>1211184</b>				
				



e-Sample Receipt Form

SGS Workorder #:

1211184



1 2 1 1 1 8 4

Review Criteria	Condition (Yes, No, N/A)	Exceptions Noted below
<b>Chain of Custody / Temperature Requirements</b>		
Were Custody Seals intact? Note # & location	Yes	1F, 1B
COC accompanied samples?	Yes	
DOD: Were samples received in COC corresponding coolers?	N/A	
N/A **Exemption permitted if chilled & collected <8 hours ago, or for samples where chilling is not required		
Temperature blank compliant* (i.e., 0-6 °C after CF)?	Yes	Cooler ID: 1 @ 1.2 °C Therm. ID: D45
		Cooler ID: @ °C Therm. ID:
		Cooler ID: @ °C Therm. ID:
		Cooler ID: @ °C Therm. ID:
		Cooler ID: @ °C Therm. ID:
*If >6°C, were samples collected <8 hours ago?	N/A	
If <0°C, were sample containers ice free?	N/A	
Note: Identify containers received at non-compliant temperature . Use form FS-0029 if more space is needed.		
<b>Holding Time / Documentation / Sample Condition Requirements</b>		
Note: Refer to form F-083 "Sample Guide" for specific holding times.		
Were samples received within holding time?	Yes	
Do samples match COC** (i.e., sample IDs, dates/times collected)?	Yes	
**Note: If times differ <1hr, record details & login per COC.		
***Note: If sample information on containers differs from COC, SGS will default to COC information		
Were analytical requests clear? (i.e., method is specified for analyses with multiple option for analysis (Ex: BTEX, Metals))	Yes	
Were proper containers (type/mass/volume/preservative***) used?	No	N/A ***Exemption permitted for metals (e.g, 200.8/6020B). DOC container was field filtered and preserved by client. Proceed with test as per PM.
<b>Volatile / LL-Hg Requirements</b>		
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	
<b>Note to Client:</b> Any "No", answer above indicates non-compliance with standard procedures and may impact data quality.		
Additional notes (if applicable):		





## Sample Containers and Preservatives

<u>Container Id</u>	<u>Preservative</u>	<u>Container Condition</u>	<u>Container Id</u>	<u>Preservative</u>	<u>Container Condition</u>
1211184001-A	HCL to pH < 2	OK			
1211184001-B	HCL to pH < 2	OK			
1211184001-C	HNO3 to pH < 2	OK			

### Container Condition Glossary

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

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

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

DM - The container was received damaged.

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

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

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

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

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

QN - Insufficient sample quantity provided.

**Laboratory Data Review Checklist**

Completed By:

Justin Risley

Title:

Environmental Scientist

Date:

3/30/2021

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

SGS North America, Inc.

Laboratory Report Number:

1211184

Laboratory Report Date:

3/25/2021

CS Site Name:

Fairbanks DOT&PF PFAS

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

1211184

Laboratory Report Date:

3/25/2021

CS Site Name:

Fairbanks DOT&PF PFAS

**Note: Any N/A or No box checked must have an explanation in the comments box.**

1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

Yes  No  N/A  Comments:

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

Yes  No  N/A  Comments:

Analyses were performed by SGS North America, Inc. in Anchorage, AK.

2. Chain of Custody (CoC)

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

Yes  No  N/A  Comments:

b. Correct analyses requested?

Yes  No  N/A  Comments:

3. Laboratory Sample Receipt Documentation

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

Yes  No  N/A  Comments:

Sample cooler temperature recorded at 1.2° C upon receipt at laboratory in Fairbanks, and 5.6° C upon receipt in Anchorage.

b. Sample preservation acceptable – acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

Yes  No  N/A  Comments:

1211184

Laboratory Report Date:

3/25/2021

CS Site Name:

Fairbanks DOT&PF PFAS

c. Sample condition documented – broken, leaking (Methanol), zero headspace (VOC vials)?

Yes  No  N/A  Comments:

d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

Yes  No  N/A  Comments:

The project sample was preserved prior to filtration for the DOC analysis.

e. Data quality or usability affected?

Comments:

No, see above.

4. Case Narrative

a. Present and understandable?

Yes  No  N/A  Comments:

b. Discrepancies, errors, or QC failures identified by the lab?

Yes  No  N/A  Comments:

200.8- Metals- The LOQs are elevated due to matrix interference.

c. Were all corrective actions documented?

Yes  No  N/A  Comments:

N/A, see above.

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

Comments:

The case narrative does not specify an effect on data quality/usability.

1211184

Laboratory Report Date:

3/25/2021

CS Site Name:

Fairbanks DOT&PF PFAS

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

Yes  No  N/A  Comments:

b. All applicable holding times met?

Yes  No  N/A  Comments:

c. All soils reported on a dry weight basis?

Yes  No  N/A  Comments:

Soil samples were not submitted with this work order.

d. Are the reported LOQs less than the Cleanup Level or the minimum required detection level for the project?

Yes  No  N/A  Comments:

N/A; the requested analytes were detected in the project sample.

e. Data quality or usability affected?

No, see above.

6. QC Samples

a. Method Blank

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

Yes  No  N/A  Comments:

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

Yes  No  N/A  Comments:

1211184

Laboratory Report Date:

3/25/2021

CS Site Name:

Fairbanks DOT&PF PFAS

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

Comments:

There were no detections in the method blank samples associated with this work order.

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

Yes  No  N/A  Comments:

N/A; see above.

v. Data quality or usability affected?

Comments:

No, 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  N/A  Comments:

An LCS was reported for TOC analysis.

ii. Metals/Inorganics – one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes  No  N/A  Comments:

An LCS was reported for calcium and magnesium analyses.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes  No  N/A  Comments:

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from LCS/LCSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes  No  N/A  Comments:

LCSD samples were not reported for TOC, calcium, or magnesium.

1211184

Laboratory Report Date:

3/25/2021

CS Site Name:

Fairbanks DOT&PF PFAS

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

Comments:

Percent recoveries were within acceptable limits.

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

Yes  No  N/A  Comments:

N/A; see above.

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

No, see above.

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

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

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

Yes  No  N/A  Comments:

MS/MSD samples were reported for total organic carbon analysis.

ii. Metals/Inorganics – one MS and one MSD reported per matrix, analysis and 20 samples?

Yes  No  N/A  Comments:

One MS sample was reported for calcium and magnesium analyses. We do not have a measure of analytical precision for these analyses.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable?

Yes  No  N/A  Comments:

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from MS/MSD, and or sample/sample duplicate.

Yes  No  N/A  Comments:

1211184

Laboratory Report Date:

3/25/2021

CS Site Name:

Fairbanks DOT&PF PFAS

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

Comments:

Percent recovery and RPD were within acceptable limits.

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

Yes  No  N/A  Comments:

N/A; see above.

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

No, see above.

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

i. Are surrogate/IDA recoveries reported for organic analyses – field, QC and laboratory samples?

Yes  No  N/A  Comments:

Surrogates are not reported for these analyses.

ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods 50-150 %R for field samples and 60-120 %R for QC samples; all other analyses see the laboratory report pages)

Yes  No  N/A  Comments:

N/A; see above.

iii. Do the sample results with failed surrogate/IDA recoveries have data flags? If so, are the data flags clearly defined?

Yes  No  N/A  Comments:

N/A; see above.

iv. Data quality or usability affected?

Comments:

No; see above.



1211184

Laboratory Report Date:

3/25/2021

CS Site Name:

Fairbanks DOT&PF PFAS

e. Trip Blanks

- i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples?  
(If not, enter explanation below.)

Yes  No  N/A  Comments:

Analysis for volatile compounds was not requested with this work order. Trip blank is not required.

- ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC?  
(If not, a comment explaining why must be entered below)

Yes  No  N/A  Comments:

N/A; see above.

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

Yes  No  N/A  Comments:

N/A; see above.

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

Comments:

N/A; see above.

- v. Data quality or usability affected?

Comments:

No, see above.

f. Field Duplicate

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

Yes  No  N/A  Comments:

Only one sample was submitted for this work order.

- ii. Submitted blind to lab?

Yes  No  N/A  Comments:

N/A; see above.

1211184

Laboratory Report Date:

3/25/2021

CS Site Name:

Fairbanks DOT&PF PFAS

iii. Precision – All relative percent differences (RPD) less than specified project objectives?  
(Recommended: 30% water, 50% soil)

$$RPD (\%) = \text{Absolute value of: } \frac{(R_1 - R_2)}{((R_1 + R_2) / 2)} \times 100$$

Where R<sub>1</sub> = Sample Concentration  
R<sub>2</sub> = Field Duplicate Concentration

Yes  No  N/A  Comments:

N/A; see above.

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

Comments:

No, see above.

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

Yes  No  N/A  Comments:

The project samples were collected using non-reusable equipment. An equipment blank is not required.

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

Yes  No  N/A  Comments:

See above.

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

Comments:

N/A; see above

iii. Data quality or usability affected?

Comments:

No, see above.

1211184

Laboratory Report Date:

3/25/2021

CS Site Name:

Fairbanks DOT&PF PFAS

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

a. Defined and appropriate?

Yes  No  N/A

Comments:

## ANALYTICAL REPORT

Eurofins TestAmerica, Sacramento  
880 Riverside Parkway  
West Sacramento, CA 95605  
Tel: (916)373-5600

Laboratory Job ID: 320-71497-1  
Client Project/Site: Plume Stop  
Revision: 1

For:  
Shannon & Wilson, Inc  
2355 Hill Rd.  
Fairbanks, Alaska 99709-5244

Attn: Marcy Nadel



Authorized for release by:  
3/31/2021 4:52:39 PM

David Alltucker, Project Manager I  
(916)374-4383  
[David.Alltucker@Eurofinset.com](mailto:David.Alltucker@Eurofinset.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:  
[www.eurofinsus.com/Env](http://www.eurofinsus.com/Env)

*The test results in this report meet all 2003 NELAC, 2009 TNI, and 2016 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.*

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*



# Table of Contents

Cover Page . . . . .	1
Table of Contents . . . . .	2
Definitions/Glossary . . . . .	3
Case Narrative . . . . .	4
Detection Summary . . . . .	5
Client Sample Results . . . . .	6
Isotope Dilution Summary . . . . .	8
QC Sample Results . . . . .	9
QC Association Summary . . . . .	15
Lab Chronicle . . . . .	16
Certification Summary . . . . .	17
Method Summary . . . . .	18
Sample Summary . . . . .	19
Chain of Custody . . . . .	20
Receipt Checklists . . . . .	23

# Definitions/Glossary

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop

Job ID: 320-71497-1

## Qualifiers

### LCMS

Qualifier	Qualifier Description
F1	MS and/or MSD recovery exceeds control limits.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

# Case Narrative

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop

Job ID: 320-71497-1

---

**Job ID: 320-71497-1**

---

**Laboratory: Eurofins TestAmerica, Sacramento**

## Narrative

---

### Job Narrative 320-71497-1

#### Receipt

The sample was received on 3/19/2021 1:30 PM. Unless otherwise noted below, the sample arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 5.4° C.

#### LCMS

Method EPA 537(Mod): The matrix spike recovery for preparation batch 320-473069 and analytical batch 320-474121 was outside control limits for Perfluorooctanesulfonamide (FOSA). Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits.

Method EPA 537(Mod): Isotope Dilution Analyte (IDA) recovery is above the method recommended limit for 13C2 PFTeDA in the following continuing calibration verification (CCV): (CCV 320-474121/13). Quantitation by isotope dilution generally precludes any adverse effect on data quality due to elevated IDA recoveries.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### Organic Prep

Method 3535: The following sample contains a black sediments at the bottom of the bottle prior to extraction:MW-1903-20 (320-71497-1).

Method 3535: During the solid phase extraction process,the following samples contain non-settable particulates which clogged the solid phase extraction column:MW-1903-20 (320-71497-1).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

# Detection Summary

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop

Job ID: 320-71497-1

**Client Sample ID: MW-1903-20**

**Lab Sample ID: 320-71497-1**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	0.29	J	1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanoic acid (PFBA)	22		4.4	2.1	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoropentanoic acid (PFPeA)	23		1.8	0.43	ng/L	1		EPA 537(Mod)	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Sacramento



# Client Sample Results

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop

Job ID: 320-71497-1

**Client Sample ID: MW-1903-20**

**Lab Sample ID: 320-71497-1**

Date Collected: 03/16/21 14:26

Matrix: Water

Date Received: 03/19/21 13:30

**Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		1.8	0.51	ng/L		03/23/21 12:35	03/26/21 06:14	1
Perfluoroheptanoic acid (PFHpA)	ND		1.8	0.22	ng/L		03/23/21 12:35	03/26/21 06:14	1
Perfluorooctanoic acid (PFOA)	ND		1.8	0.75	ng/L		03/23/21 12:35	03/26/21 06:14	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.24	ng/L		03/23/21 12:35	03/26/21 06:14	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.27	ng/L		03/23/21 12:35	03/26/21 06:14	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.97	ng/L		03/23/21 12:35	03/26/21 06:14	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.49	ng/L		03/23/21 12:35	03/26/21 06:14	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.1	ng/L		03/23/21 12:35	03/26/21 06:14	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.65	ng/L		03/23/21 12:35	03/26/21 06:14	1
<b>Perfluorobutanesulfonic acid (PFBS)</b>	<b>0.29</b>	<b>J</b>	1.8	0.18	ng/L		03/23/21 12:35	03/26/21 06:14	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.8	0.50	ng/L		03/23/21 12:35	03/26/21 06:14	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.8	0.48	ng/L		03/23/21 12:35	03/26/21 06:14	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.4	1.1	ng/L		03/23/21 12:35	03/26/21 06:14	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.4	1.1	ng/L		03/23/21 12:35	03/26/21 06:14	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.21	ng/L		03/23/21 12:35	03/26/21 06:14	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.5	1.3	ng/L		03/23/21 12:35	03/26/21 06:14	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.28	ng/L		03/23/21 12:35	03/26/21 06:14	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.35	ng/L		03/23/21 12:35	03/26/21 06:14	1
Perfluorodecanesulfonic acid (PFDS)	ND		1.8	0.28	ng/L		03/23/21 12:35	03/26/21 06:14	1
6:2 FTS	ND		4.4	2.2	ng/L		03/23/21 12:35	03/26/21 06:14	1
8:2 FTS	ND		1.8	0.41	ng/L		03/23/21 12:35	03/26/21 06:14	1
<b>Perfluorobutanoic acid (PFBA)</b>	<b>22</b>		4.4	2.1	ng/L		03/23/21 12:35	03/26/21 06:14	1
<b>Perfluoropentanoic acid (PFPeA)</b>	<b>23</b>		1.8	0.43	ng/L		03/23/21 12:35	03/26/21 06:14	1
Perfluorooctanesulfonamide (FOSA)	ND		1.8	0.87	ng/L		03/23/21 12:35	03/26/21 06:14	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		1.8	0.17	ng/L		03/23/21 12:35	03/26/21 06:14	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFHxA	85		50 - 150	03/23/21 12:35	03/26/21 06:14	1
13C4 PFHpA	90		50 - 150	03/23/21 12:35	03/26/21 06:14	1
13C4 PFOA	86		50 - 150	03/23/21 12:35	03/26/21 06:14	1
13C5 PFNA	89		50 - 150	03/23/21 12:35	03/26/21 06:14	1
13C2 PFDA	89		50 - 150	03/23/21 12:35	03/26/21 06:14	1
13C2 PFUnA	77		50 - 150	03/23/21 12:35	03/26/21 06:14	1
13C2 PFDoA	82		50 - 150	03/23/21 12:35	03/26/21 06:14	1
13C2 PFTeDA	112		50 - 150	03/23/21 12:35	03/26/21 06:14	1
13C3 PFBS	78		50 - 150	03/23/21 12:35	03/26/21 06:14	1
18O2 PFHxS	86		50 - 150	03/23/21 12:35	03/26/21 06:14	1
13C4 PFOS	81		50 - 150	03/23/21 12:35	03/26/21 06:14	1
d3-NMeFOSAA	90		50 - 150	03/23/21 12:35	03/26/21 06:14	1
d5-NEtFOSAA	90		50 - 150	03/23/21 12:35	03/26/21 06:14	1
13C3 HFPO-DA	90		50 - 150	03/23/21 12:35	03/26/21 06:14	1
13C8 FOSA	76		50 - 150	03/23/21 12:35	03/26/21 06:14	1
M2-6:2 FTS	90		50 - 150	03/23/21 12:35	03/26/21 06:14	1
13C5 PFPeA	78		50 - 150	03/23/21 12:35	03/26/21 06:14	1

Eurofins TestAmerica, Sacramento

# Client Sample Results

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop

Job ID: 320-71497-1

**Client Sample ID: MW-1903-20**

**Lab Sample ID: 320-71497-1**

**Date Collected: 03/16/21 14:26**

**Matrix: Water**

**Date Received: 03/19/21 13:30**

**Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)**

<u>Isotope Dilution</u>	<u>%Recovery</u>	<u>Qualifier</u>	<u>Limits</u>	<u>Prepared</u>	<u>Analyzed</u>	<u>Dil Fac</u>
M2-8:2 FTS	87		50 - 150	03/23/21 12:35	03/26/21 06:14	1
13C4 PFBA	78		50 - 150	03/23/21 12:35	03/26/21 06:14	1

# Isotope Dilution Summary

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop

Job ID: 320-71497-1

## Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Matrix: Water

Prep Type: Total/NA

### Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	PFHxA (50-150)	C4PFHA (50-150)	PFOA (50-150)	PFNA (50-150)	PFDA (50-150)	PFUnA (50-150)	PFDoA (50-150)	PFTDA (50-150)
320-71489-A-1-A MS	Matrix Spike	97	101	97	97	92	91	96	125
320-71489-A-1-B MSD	Matrix Spike Duplicate	96	101	94	98	95	86	85	122
320-71497-1	MW-1903-20	85	90	86	89	89	77	82	112
LCS 320-473069/2-A	Lab Control Sample	96	100	96	97	95	85	92	130
MB 320-473069/1-A	Method Blank	86	103	94	94	98	87	93	133

### Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	C3PFBS (50-150)	PFHxS (50-150)	PFOS (50-150)	d3NMFOS (50-150)	d5NEFOS (50-150)	HFPODA (50-150)	PFOSA (50-150)	M262FTS (50-150)
320-71489-A-1-A MS	Matrix Spike	84	93	85	95	93	96	81	100
320-71489-A-1-B MSD	Matrix Spike Duplicate	80	94	82	98	93	99	83	99
320-71497-1	MW-1903-20	78	86	81	90	90	90	76	90
LCS 320-473069/2-A	Lab Control Sample	81	94	89	94	98	93	88	98
MB 320-473069/1-A	Method Blank	84	94	92	104	95	77	82	110

### Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	PFPeA (50-150)	M282FTS (50-150)	PFBA (50-150)
320-71489-A-1-A MS	Matrix Spike	85	85	81
320-71489-A-1-B MSD	Matrix Spike Duplicate	95	80	87
320-71497-1	MW-1903-20	78	87	78
LCS 320-473069/2-A	Lab Control Sample	89	97	93
MB 320-473069/1-A	Method Blank	82	94	87

#### Surrogate Legend

- PFHxA = 13C2 PFHxA
- C4PFHA = 13C4 PFHpA
- PFOA = 13C4 PFOA
- PFNA = 13C5 PFNA
- PFDA = 13C2 PFDA
- PFUnA = 13C2 PFUnA
- PFDoA = 13C2 PFDoA
- PFTDA = 13C2 PFTeDA
- C3PFBS = 13C3 PFBS
- PFHxS = 18O2 PFHxS
- PFOS = 13C4 PFOS
- d3NMFOS = d3-NMeFOSAA
- d5NEFOS = d5-NEtFOSAA
- HFPODA = 13C3 HFPO-DA
- PFOSA = 13C8 FOSA
- M262FTS = M2-6:2 FTS
- PFPeA = 13C5 PFPeA
- M282FTS = M2-8:2 FTS
- PFBA = 13C4 PFBA

# QC Sample Results

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop

Job ID: 320-71497-1

## Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

**Lab Sample ID: MB 320-473069/1-A**  
**Matrix: Water**  
**Analysis Batch: 474121**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 473069**

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		03/23/21 12:35	03/26/21 05:00	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		03/23/21 12:35	03/26/21 05:00	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		03/23/21 12:35	03/26/21 05:00	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		03/23/21 12:35	03/26/21 05:00	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		03/23/21 12:35	03/26/21 05:00	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		03/23/21 12:35	03/26/21 05:00	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		03/23/21 12:35	03/26/21 05:00	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		03/23/21 12:35	03/26/21 05:00	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		03/23/21 12:35	03/26/21 05:00	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		03/23/21 12:35	03/26/21 05:00	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		03/23/21 12:35	03/26/21 05:00	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		03/23/21 12:35	03/26/21 05:00	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		03/23/21 12:35	03/26/21 05:00	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		03/23/21 12:35	03/26/21 05:00	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.0	0.24	ng/L		03/23/21 12:35	03/26/21 05:00	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.0	1.5	ng/L		03/23/21 12:35	03/26/21 05:00	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.0	0.32	ng/L		03/23/21 12:35	03/26/21 05:00	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		03/23/21 12:35	03/26/21 05:00	1
Perfluorodecanesulfonic acid (PFDS)	ND		2.0	0.32	ng/L		03/23/21 12:35	03/26/21 05:00	1
6:2 FTS	ND		5.0	2.5	ng/L		03/23/21 12:35	03/26/21 05:00	1
8:2 FTS	ND		2.0	0.46	ng/L		03/23/21 12:35	03/26/21 05:00	1
Perfluorobutanoic acid (PFBA)	ND		5.0	2.4	ng/L		03/23/21 12:35	03/26/21 05:00	1
Perfluoropentanoic acid (PFPeA)	ND		2.0	0.49	ng/L		03/23/21 12:35	03/26/21 05:00	1
Perfluorooctanesulfonamide (FOSA)	ND		2.0	0.98	ng/L		03/23/21 12:35	03/26/21 05:00	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		2.0	0.19	ng/L		03/23/21 12:35	03/26/21 05:00	1

Isotope Dilution	MB	MB	Limits	Prepared	Analyzed	Dil Fac
	%Recovery	Qualifier				
13C2 PFHxA	86		50 - 150	03/23/21 12:35	03/26/21 05:00	1
13C4 PFHpA	103		50 - 150	03/23/21 12:35	03/26/21 05:00	1
13C4 PFOA	94		50 - 150	03/23/21 12:35	03/26/21 05:00	1
13C5 PFNA	94		50 - 150	03/23/21 12:35	03/26/21 05:00	1
13C2 PFDA	98		50 - 150	03/23/21 12:35	03/26/21 05:00	1
13C2 PFUnA	87		50 - 150	03/23/21 12:35	03/26/21 05:00	1
13C2 PFDoA	93		50 - 150	03/23/21 12:35	03/26/21 05:00	1
13C2 PFTeDA	133		50 - 150	03/23/21 12:35	03/26/21 05:00	1
13C3 PFBS	84		50 - 150	03/23/21 12:35	03/26/21 05:00	1
18O2 PFHxS	94		50 - 150	03/23/21 12:35	03/26/21 05:00	1
13C4 PFOS	92		50 - 150	03/23/21 12:35	03/26/21 05:00	1
d3-NMeFOSAA	104		50 - 150	03/23/21 12:35	03/26/21 05:00	1
d5-NEtFOSAA	95		50 - 150	03/23/21 12:35	03/26/21 05:00	1
13C3 HFPO-DA	77		50 - 150	03/23/21 12:35	03/26/21 05:00	1
13C8 FOSA	82		50 - 150	03/23/21 12:35	03/26/21 05:00	1
M2-6:2 FTS	110		50 - 150	03/23/21 12:35	03/26/21 05:00	1

Eurofins TestAmerica, Sacramento

# QC Sample Results

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop

Job ID: 320-71497-1

## Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

**Lab Sample ID: MB 320-473069/1-A**  
**Matrix: Water**  
**Analysis Batch: 474121**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 473069**

Isotope Dilution	MB MB		Limits	Prepared	Analyzed	Dil Fac
	%Recovery	Qualifier				
13C5 PFPeA	82		50 - 150	03/23/21 12:35	03/26/21 05:00	1
M2-8:2 FTS	94		50 - 150	03/23/21 12:35	03/26/21 05:00	1
13C4 PFBA	87		50 - 150	03/23/21 12:35	03/26/21 05:00	1

**Lab Sample ID: LCS 320-473069/2-A**  
**Matrix: Water**  
**Analysis Batch: 474121**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 473069**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Perfluorohexanoic acid (PFHxA)	40.0	41.7		ng/L		104	72 - 129
Perfluoroheptanoic acid (PFHpA)	40.0	41.2		ng/L		103	72 - 130
Perfluorooctanoic acid (PFOA)	40.0	41.7		ng/L		104	71 - 133
Perfluorononanoic acid (PFNA)	40.0	42.2		ng/L		105	69 - 130
Perfluorodecanoic acid (PFDA)	40.0	43.1		ng/L		108	71 - 129
Perfluoroundecanoic acid (PFUnA)	40.0	51.3		ng/L		128	69 - 133
Perfluorododecanoic acid (PFDoA)	40.0	39.2		ng/L		98	72 - 134
Perfluorotridecanoic acid (PFTriA)	40.0	46.7		ng/L		117	65 - 144
Perfluorotetradecanoic acid (PFTeA)	40.0	37.7		ng/L		94	71 - 132
Perfluorobutanesulfonic acid (PFBS)	35.4	39.3		ng/L		111	72 - 130
Perfluorohexanesulfonic acid (PFHxS)	36.4	39.6		ng/L		109	68 - 131
Perfluorooctanesulfonic acid (PFOS)	37.1	36.5		ng/L		98	65 - 140
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	42.3		ng/L		106	65 - 136
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	38.8		ng/L		97	61 - 135
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	37.3	40.6		ng/L		109	77 - 137
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	40.0	41.0		ng/L		103	72 - 132
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	37.7	42.3		ng/L		112	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.7	43.3		ng/L		115	81 - 141
Perfluorodecanesulfonic acid (PFDS)	38.6	37.4		ng/L		97	53 - 142
6:2 FTS	37.9	43.3		ng/L		114	64 - 140
8:2 FTS	38.3	43.3		ng/L		113	67 - 138
Perfluorobutanoic acid (PFBA)	40.0	41.0		ng/L		102	73 - 129
Perfluoropentanoic acid (PFPeA)	40.0	40.7		ng/L		102	72 - 129
Perfluorooctanesulfonamide (FOSA)	40.0	45.5		ng/L		114	67 - 137
Perfluoroheptanesulfonic Acid (PFHpS)	38.1	42.8		ng/L		112	69 - 134

Isotope Dilution	LCS LCS		Limits
	%Recovery	Qualifier	
13C2 PFHxA	96		50 - 150

Eurofins TestAmerica, Sacramento

# QC Sample Results

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop

Job ID: 320-71497-1

## Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

**Lab Sample ID: LCS 320-473069/2-A**  
**Matrix: Water**  
**Analysis Batch: 474121**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 473069**

<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>LCS Qualifier</i>	<i>Limits</i>
13C4 PFHpA	100		50 - 150
13C4 PFOA	96		50 - 150
13C5 PFNA	97		50 - 150
13C2 PFDA	95		50 - 150
13C2 PFUnA	85		50 - 150
13C2 PFDaA	92		50 - 150
13C2 PFTeDA	130		50 - 150
13C3 PFBS	81		50 - 150
18O2 PFHxS	94		50 - 150
13C4 PFOS	89		50 - 150
d3-NMeFOSAA	94		50 - 150
d5-NEtFOSAA	98		50 - 150
13C3 HFPO-DA	93		50 - 150
13C8 FOSA	88		50 - 150
M2-6:2 FTS	98		50 - 150
13C5 PFPeA	89		50 - 150
M2-8:2 FTS	97		50 - 150
13C4 PFBA	93		50 - 150

**Lab Sample ID: 320-71489-A-1-A MS**  
**Matrix: Water**  
**Analysis Batch: 474121**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 473069**

<i>Analyte</i>	<i>Sample Result</i>	<i>Sample Qualifier</i>	<i>Spike Added</i>	<i>MS Result</i>	<i>MS Qualifier</i>	<i>Unit</i>	<i>D</i>	<i>%Rec</i>	<i>Limits</i>
Perfluorohexanoic acid (PFHxA)	0.57	J	35.3	38.6		ng/L		108	72 - 129
Perfluoroheptanoic acid (PFHpA)	ND		35.3	37.5		ng/L		106	72 - 130
Perfluorooctanoic acid (PFOA)	ND		35.3	41.1		ng/L		117	71 - 133
Perfluorononanoic acid (PFNA)	ND		35.3	39.6		ng/L		112	69 - 130
Perfluorodecanoic acid (PFDA)	ND		35.3	39.3		ng/L		111	71 - 129
Perfluoroundecanoic acid (PFUnA)	ND		35.3	39.5		ng/L		112	69 - 133
Perfluorododecanoic acid (PFDaA)	ND		35.3	32.8		ng/L		93	72 - 134
Perfluorotridecanoic acid (PFTriA)	ND		35.3	36.2		ng/L		103	65 - 144
Perfluorotetradecanoic acid (PFTeA)	ND		35.3	36.5		ng/L		103	71 - 132
Perfluorobutanesulfonic acid (PFBS)	ND		31.2	33.3		ng/L		107	72 - 130
Perfluorohexanesulfonic acid (PFHxS)	ND		32.1	33.8		ng/L		105	68 - 131
Perfluorooctanesulfonic acid (PFOS)	7.3		32.7	37.1		ng/L		91	65 - 140
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		35.3	35.9		ng/L		102	65 - 136
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		35.3	32.9		ng/L		93	61 - 135
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		32.9	34.1		ng/L		104	77 - 137
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		35.3	35.6		ng/L		101	72 - 132

Eurofins TestAmerica, Sacramento

# QC Sample Results

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop

Job ID: 320-71497-1

## Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

**Lab Sample ID: 320-71489-A-1-A MS**  
**Matrix: Water**  
**Analysis Batch: 474121**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 473069**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
11-Chloroeicosfluoro-3-oxaundecane-1-sulfonic acid	ND		33.2	33.4		ng/L		101	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		33.2	40.7		ng/L		122	81 - 141
Perfluorodecanesulfonic acid (PFDS)	ND		34.0	27.9		ng/L		82	53 - 142
6:2 FTS	24		33.4	59.4		ng/L		107	64 - 140
8:2 FTS	4.9		33.8	38.5		ng/L		100	67 - 138
Perfluorobutanoic acid (PFBA)	ND		35.3	35.4		ng/L		101	73 - 129
Perfluoropentanoic acid (PFPeA)	ND		35.3	35.1		ng/L		100	72 - 129
Perfluorooctanesulfonamide (FOSA)	ND	F1	35.3	49.8	F1	ng/L		141	67 - 137
Perfluoroheptanesulfonic Acid (PFHpS)	ND		33.6	38.4		ng/L		114	69 - 134

Isotope Dilution	%Recovery	MS Qualifier	MS Limits
13C2 PFHxA	97		50 - 150
13C4 PFHpA	101		50 - 150
13C4 PFOA	97		50 - 150
13C5 PFNA	97		50 - 150
13C2 PFDA	92		50 - 150
13C2 PFUnA	91		50 - 150
13C2 PFDoA	96		50 - 150
13C2 PFTeDA	125		50 - 150
13C3 PFBS	84		50 - 150
18O2 PFHxS	93		50 - 150
13C4 PFOS	85		50 - 150
d3-NMeFOSAA	95		50 - 150
d5-NEtFOSAA	93		50 - 150
13C3 HFPO-DA	96		50 - 150
13C8 FOSA	81		50 - 150
M2-6:2 FTS	100		50 - 150
13C5 PFPeA	85		50 - 150
M2-8:2 FTS	85		50 - 150
13C4 PFBA	81		50 - 150

**Lab Sample ID: 320-71489-A-1-B MSD**  
**Matrix: Water**  
**Analysis Batch: 474121**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 473069**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	0.57	J	36.9	38.2		ng/L		102	72 - 129	1	30
Perfluoroheptanoic acid (PFHpA)	ND		36.9	41.9		ng/L		114	72 - 130	11	30
Perfluorooctanoic acid (PFOA)	ND		36.9	39.9		ng/L		108	71 - 133	3	30
Perfluorononanoic acid (PFNA)	ND		36.9	42.5		ng/L		115	69 - 130	7	30
Perfluorodecanoic acid (PFDA)	ND		36.9	37.4		ng/L		101	71 - 129	5	30
Perfluoroundecanoic acid (PFUnA)	ND		36.9	43.5		ng/L		118	69 - 133	10	30
Perfluorododecanoic acid (PFDoA)	ND		36.9	38.6		ng/L		105	72 - 134	16	30

Eurofins TestAmerica, Sacramento

# QC Sample Results

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop

Job ID: 320-71497-1

## Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

**Lab Sample ID: 320-71489-A-1-B MSD**

**Matrix: Water**

**Analysis Batch: 474121**

**Client Sample ID: Matrix Spike Duplicate**

**Prep Type: Total/NA**

**Prep Batch: 473069**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorotridecanoic acid (PFTriA)	ND		36.9	43.6		ng/L		118	65 - 144	18	30
Perfluorotetradecanoic acid (PFTeA)	ND		36.9	36.4		ng/L		99	71 - 132	0	30
Perfluorobutanesulfonic acid (PFBS)	ND		32.6	37.0		ng/L		114	72 - 130	11	30
Perfluorohexanesulfonic acid (PFHxS)	ND		33.6	37.5		ng/L		112	68 - 131	10	30
Perfluorooctanesulfonic acid (PFOS)	7.3		34.2	39.3		ng/L		94	65 - 140	6	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		36.9	36.3		ng/L		98	65 - 136	1	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		36.9	34.7		ng/L		94	61 - 135	5	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		34.4	36.9		ng/L		107	77 - 137	8	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		36.9	36.1		ng/L		98	72 - 132	1	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		34.7	35.5		ng/L		102	76 - 136	6	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		34.7	43.5		ng/L		125	81 - 141	7	30
Perfluorodecanesulfonic acid (PFDS)	ND		35.5	31.6		ng/L		89	53 - 142	13	30
6:2 FTS	24		35.0	59.5		ng/L		103	64 - 140	0	30
8:2 FTS	4.9		35.3	43.9		ng/L		110	67 - 138	13	30
Perfluorobutanoic acid (PFBA)	ND		36.9	36.4		ng/L		99	73 - 129	3	30
Perfluoropentanoic acid (PFPeA)	ND		36.9	34.8		ng/L		94	72 - 129	1	30
Perfluorooctanesulfonamide (FOSA)	ND	F1	36.9	45.8		ng/L		124	67 - 137	8	30
Perfluoroheptanesulfonic Acid (PFHpS)	ND		35.1	43.3		ng/L		123	69 - 134	12	30

Isotope Dilution	MSD %Recovery	MSD Qualifier	MSD Limits
13C2 PFHxA	96		50 - 150
13C4 PFHpA	101		50 - 150
13C4 PFOA	94		50 - 150
13C5 PFNA	98		50 - 150
13C2 PFDA	95		50 - 150
13C2 PFUnA	86		50 - 150
13C2 PFDoA	85		50 - 150
13C2 PFTeDA	122		50 - 150
13C3 PFBS	80		50 - 150
18O2 PFHxS	94		50 - 150
13C4 PFOS	82		50 - 150
d3-NMeFOSAA	98		50 - 150
d5-NEtFOSAA	93		50 - 150
13C3 HFPO-DA	99		50 - 150
13C8 FOSA	83		50 - 150
M2-6:2 FTS	99		50 - 150
13C5 PFPeA	95		50 - 150
M2-8:2 FTS	80		50 - 150

Eurofins TestAmerica, Sacramento



# QC Sample Results

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop

Job ID: 320-71497-1

## Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: 320-71489-A-1-B MSD

Client Sample ID: Matrix Spike Duplicate

Matrix: Water

Prep Type: Total/NA

Analysis Batch: 474121

Prep Batch: 473069

<i>Isotope Dilution</i>	<i>MSD</i>	<i>MSD</i>	<i>Limits</i>
	<i>%Recovery</i>	<i>Qualifier</i>	
13C4 PFBA	87		50 - 150

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

# QC Association Summary

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop

Job ID: 320-71497-1

## LCMS

### Prep Batch: 473069

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-71497-1	MW-1903-20	Total/NA	Water	3535	
MB 320-473069/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-473069/2-A	Lab Control Sample	Total/NA	Water	3535	
320-71489-A-1-A MS	Matrix Spike	Total/NA	Water	3535	
320-71489-A-1-B MSD	Matrix Spike Duplicate	Total/NA	Water	3535	

### Analysis Batch: 474121

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-71497-1	MW-1903-20	Total/NA	Water	EPA 537(Mod)	473069
MB 320-473069/1-A	Method Blank	Total/NA	Water	EPA 537(Mod)	473069
LCS 320-473069/2-A	Lab Control Sample	Total/NA	Water	EPA 537(Mod)	473069
320-71489-A-1-A MS	Matrix Spike	Total/NA	Water	EPA 537(Mod)	473069
320-71489-A-1-B MSD	Matrix Spike Duplicate	Total/NA	Water	EPA 537(Mod)	473069

# Lab Chronicle

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop

Job ID: 320-71497-1

**Client Sample ID: MW-1903-20**

**Lab Sample ID: 320-71497-1**

**Date Collected: 03/16/21 14:26**

**Matrix: Water**

**Date Received: 03/19/21 13:30**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			282.7 mL	10.00 mL	473069	03/23/21 12:35	LA	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			474121	03/26/21 06:14	JY1	TAL SAC

**Laboratory References:**

TAL SAC = Eurofins TestAmerica, Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15

# Accreditation/Certification Summary

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop

Job ID: 320-71497-1

## Laboratory: Eurofins TestAmerica, Sacramento

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	17-020	02-20-24
ANAB	Dept. of Defense ELAP	L2468	01-20-24
ANAB	Dept. of Energy	L2468.01	01-20-24
ANAB	ISO/IEC 17025	L2468	01-20-24
Arizona	State	AZ0708	08-11-21
Arkansas DEQ	State	88-0691	06-17-21
California	State	2897	01-31-22
Colorado	State	CA0004	08-31-21
Connecticut	State	PH-0691	06-30-21
Florida	NELAP	E87570	06-30-21
Georgia	State	4040	01-29-22
Hawaii	State	<cert No.>	01-29-22
Illinois	NELAP	200060	03-18-22
Kansas	NELAP	E-10375	10-31-21
Louisiana	NELAP	01944	06-30-21
Maine	State	CA00004	04-14-22
Michigan	State	9947	01-29-22
Nevada	State	CA000442021-2	07-31-21
New Hampshire	NELAP	2997	04-18-21
New Jersey	NELAP	CA005	06-30-21
New York	NELAP	11666	04-01-21
Ohio	State	41252	01-29-22
Oregon	NELAP	4040	01-30-23
Pennsylvania	NELAP	68-01272	03-31-21
Texas	NELAP	T104704399-19-13	06-01-21
US Fish & Wildlife	US Federal Programs	58448	07-31-21
USDA	US Federal Programs	P330-18-00239	07-31-21
Utah	NELAP	CA000442021-12	02-28-21 *
Vermont	State	VT-4040	04-16-21
Virginia	NELAP	460278	03-14-22
Washington	State	C581	05-05-21
West Virginia (DW)	State	9930C	12-31-21
Wisconsin	State	998204680	08-31-21
Wyoming	State Program	8TMS-L	01-28-19 *

\* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Eurofins TestAmerica, Sacramento

# Method Summary

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop

Job ID: 320-71497-1

Method	Method Description	Protocol	Laboratory
EPA 537(Mod) 3535	PFAS for QSM 5.3, Table B-15 Solid-Phase Extraction (SPE)	EPA SW846	TAL SAC TAL SAC

**Protocol References:**

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

**Laboratory References:**

TAL SAC = Eurofins TestAmerica, Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15

# Sample Summary

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop

Job ID: 320-71497-1

---

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
320-71497-1	MW-1903-20	Water	03/16/21 14:26	03/19/21 13:30	

---

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

# CHAIN-OF-CUSTODY RECORD

Analytical Methods (include preservative if used)

537-Addons  
 PFAS  
 Total Number of Containers: 2  
 Remarks/Matrix Composition/Grab? Sample Containers: Ground water

Quote No: \_\_\_\_\_  
 J-Flags:  Yes  No

Turn Around Time:  
 Normal  Rush  
 Please Specify \_\_\_\_\_

Sample Identity	Lab No.	Time	Date Sampled	Remarks/Matrix Composition/Grab? Sample Containers
MW-1903-20		14:26	3-16-21	Ground water



**Project Information**  
 Number: 102519-005  
 Name: Plumb & Stop  
 Contact: MDN  
 Ongoing Project? Yes  No   
 Sampler: JKR

**Sample Receipt**  
 Total No. of Containers: 2  
 COC Seals/Intact? Y/N/A  
 Received Good Cond./Cold \_\_\_\_\_  
 Temp: \_\_\_\_\_  
 Delivery Method: \_\_\_\_\_

Relinquished By:	Relinquished By:	Relinquished By:
Signature: <u>Justin Risky</u> Printed Name: <u>Justin Risky</u> Company: <u>Shannon &amp; Wilson, Inc.</u>	Signature: _____ Printed Name: _____ Company: _____	Signature: _____ Printed Name: _____ Company: _____
Time: <u>10:30</u> Date: <u>3-18-21</u>	Time: _____ Date: _____	Time: _____ Date: _____
Received By: <u>[Signature]</u> Signature: _____ Printed Name: <u>Darvith</u> Company: <u>PFAS</u>	Received By: <u>[Signature]</u> Signature: _____ Printed Name: _____ Company: _____	Received By: <u>[Signature]</u> Signature: _____ Printed Name: _____ Company: _____
Time: <u>13:50</u> Date: _____	Time: _____ Date: _____	Time: _____ Date: _____

**Notes:**  
See list of PFAS addons


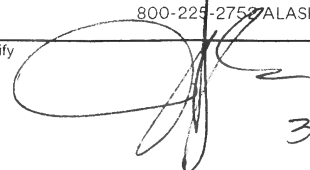
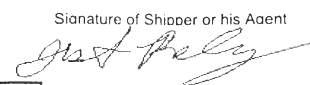
Distribution: White - w/shipment - returned to Shannon & Wilson w/ laboratory report  
 Yellow - w/shipment - for consignee files  
 Pink - Shannon & Wilson - job file

## PFAS Analyte List for MW-1903-20

PFC_IDA	PFAS, Method 537 List + addons	MDL	RL	
	11CI-PF3OUdS	0.32	2	ng/L
	4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	0.4	2	ng/L
	6:2 FTS	2.5	5	ng/L
	8:2 FTS	0.46	2	ng/L
	9CI-PF3ONS	0.24	2	ng/L
	HFPO-DA (GenX)	1.5	4	ng/L
	N-ethylperfluorooctanesulfonamidoacetic ac (NEtFOSAA)	1.3	5	ng/L
	N-methylperfluorooctanesulfonamidoacetic ac (NMeFOSAA)	1.2	5	ng/L
	Perfluorobutanesulfonic acid (PFBS)	0.2	2	ng/L
	Perfluorobutanoic acid (PFBA)	2.4	5	ng/L
	Perfluorodecanesulfonic acid (PFDS)	0.32	2	ng/L
	Perfluorodecanoic acid (PFDA)	0.31	2	ng/L
	Perfluorododecanoic acid (PFDoA)	0.55	2	ng/L
	Perfluoroheptanesulfonic Acid (PFHpS)	0.19	2	ng/L
	Perfluoroheptanoic acid (PFHpA)	0.25	2	ng/L
	Perfluorohexanesulfonic acid (PFHxS)	0.57	2	ng/L
	Perfluorohexanoic acid (PFHxA)	0.58	2	ng/L
	Perfluorononanoic acid (PFNA)	0.27	2	ng/L
	Perfluorooctanesulfonamide (FOSA)	0.98	2	ng/L
	Perfluorooctanesulfonic acid (PFOS)	0.54	2	ng/L
	Perfluorooctanoic acid (PFOA)	0.85	2	ng/L
	Perfluoropentanoic acid (PFPeA)	0.49	2	ng/L
	Perfluorotetradecanoic acid (PFTeA)	0.73	2	ng/L
	Perfluorotridecanoic acid (PFTriA)	1.3	2	ng/L
	Perfluoroundecanoic acid (PFUnA)	1.1	2	ng/L



- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15

Shipper's Name and Address Shannon and Wilson Inc 2355 Hill Rd Fairbanks, AK 99712 USA Tel: 907-479-0600		Shipper's Account Number 27400200733 Customer's ID Number 10926		Not Negotiable <b>Air Waybill</b> Issued By  P.O. BOX 68900 SEATTLE, WA 98168 800-225-2757 ALASKACARGO.COM					
Consignee's Name and Address DAVID ALLTUCKER TEST AMERICA LABORATORIES 880 RIVER WEST SACRAMENTO, CA 95605 USA Tel: 916 373 5600		Consignee's Account Number		Also notify  ETAS 3-19-20 13:30 Tel:					
Issuing Carrier's Agent and City Fairbanks		Accounting Information Shannon and Wilson Inc 2355 Hill Rd Fairbanks, AK 99712 USA SRN/411592 GoldStreak		10926					
Agent's IATA Code		Account No.		Declared Value For Carriage NVD					
Airport of Departure (Addr. of First Carrier) and Requested Routing Fairbanks		Currency USD		WT/VAL PX X		Other X		Declared Value For Customs NCV	
To By First Carrier SEA Alaska Airlines		To / By SMF AS		Flight/Date AS 234/19		Flight/Date AS 883/19		Amount of Insurance XXX	
Airport of Destination SACRAMENTO		Flight/Date AS 234/19		Flight/Date AS 883/19		Currency USD		Amount of Insurance XXX	
Handling Information STORE IN COOLER WHEN POSSIBLE PERISHABLE CARGO (NON - FOOD)									
SCI									
No of Pieces	Gross Weight	kg	lb	Commodity Item No.	Chargeable Weight	Rate / Charge	Total	Nature and Quantity of Goods (Incl. Dimensions or Volume)	
1	12.0	L			12.0		67.00	CHILL WATER SAMPLES	
								Dims: 15 x 10 x14 x 1	
1	12.0						67.00	GSX COL PER Volume: 1.215	
Prepaid Weight Charge 67.00		Collect Other Charges XBC 10.00							
Valuation Charge									
Tax 2.10									
Total Other Charges Due Agent		Shipper certifies that the particulars on the face hereof are correct and that insofar as any part of the consignment contains dangerous goods, such part is properly described by name and is in proper condition for carriage by air according to the applicable Dangerous Goods Regulations. I consent to the inspection of this cargo.							
Total Other Charges Due Carrier 10.00		For: Shannon and Wilson Inc Signature of Shipper or his Agent 							
Total Prepaid 79.10		Total Collect		<input checked="" type="checkbox"/> THIS SHIPMENT DOES NOT CONTAIN DANGEROUS GOODS <input type="checkbox"/> THIS SHIPMENT DOES CONTAIN DANGEROUS GOODS					
				Executed On (Date) 18 Mar 2021 11:26		at (Place) Fairbanks		Signature of Issuing Carrier or its Agent Alaska Airlines	

# Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-71497-1

**Login Number: 71497**

**List Source: Eurofins TestAmerica, Sacramento**

**List Number: 1**

**Creator: Oropeza, Salvador**

Question	Answer	Comment
Radioactivity wasn't checked or is <math>\leq</math> background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	1029922/1029923
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	GEL PACKS ONLY
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

## Laboratory Data Review Checklist

Completed By:

Justin Risley

Title:

Environmental Scientist

Date:

3/31/2021

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

Eurofins / TestAmerica Laboratories, Inc. (TestAmerica)

Laboratory Report Number:

320-71497-1 Revision 1

Laboratory Report Date:

3/31/2021

CS Site Name:

DOT&PF Fairbanks International PFAS PlumeStop Monitoring

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

Laboratory Report Date:

**Note: Any N/A or No box checked must have an explanation in the comments box.**

1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

Yes  No  N/A  Comments:

The DEC certified TestAmerica of West Sacramento, CA for the analysis of perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) on February 6, 2018 by method 537. These compounds were included in the DEC's Contaminated Sites Laboratory Approval 17-020.

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  N/A  Comments:

The requested analyses were conducted by TestAmerica of West Sacramento, CA.

2. Chain of Custody (CoC)

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

Yes  No  N/A  Comments:

b. Correct analyses requested?

Yes  No  N/A  Comments:

3. Laboratory Sample Receipt Documentation

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

Yes  No  N/A  Comments:

The temperature of the cooler at receipt was 5.4° C.

b. Sample preservation acceptable – acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

Yes  No  N/A  Comments:

Samples do not require preservation other than temperature.

c. Sample condition documented – broken, leaking (Methanol), zero headspace (VOC vials)?

Yes  No  N/A  Comments:

The sample receipt form notes that the samples were received in good condition.

Laboratory Report Date:

- d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

Yes  No  N/A  Comments:

The sample receipt form notes no discrepancies.

- e. Data quality or usability affected?

Comments:

Data quality and/or usability were not affected.

#### 4. Case Narrative

- a. Present and understandable?

Yes  No  N/A  Comments:

- b. Discrepancies, errors, or QC failures identified by the lab?

Yes  No  N/A  Comments:

The case narrative indicates the following:

The matrix spike recovery for preparation batch 320-473069 and analytical batch 320-474121 was outside control limits for Perfluorooctanesulfonamide (FOSA). Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits.

Isotope Dilution Analyte (IDA) recovery is above the method recommended limit for <sup>13</sup>C<sub>2</sub> PFTeDA in the following continuing calibration verification (CCV): (CCV 320-474121/13). Quantitation by isotope dilution generally precludes any adverse effect on data quality due to elevated IDA recoveries.

The following sample contains black sediments at the bottom of the bottle prior to extraction: *MW-1903-20*

During the solid phase extraction process, the following samples contain non-settable particulates which clogged the solid phase extraction column: *MW-1903-20*.

- c. Were all corrective actions documented?

Yes  No  N/A  Comments:

No corrective actions necessary.

Laboratory Report Date:

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

Comments:

The results are unaffected; see the following sections for additional information.

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

Yes  No  N/A  Comments:

b. All applicable holding times met?

Yes  No  N/A  Comments:

c. All soils reported on a dry weight basis?

Yes  No  N/A  Comments:

Soil samples were not submitted with this work order.

d. Are the reported LOQs less than the Cleanup Level or the minimum required detection level for the project?

Yes  No  N/A  Comments:

The reporting limit (RL) is less than the applicable DEC regulatory limit for the project.

e. Data quality or usability affected?

The data quality and/or usability were not affected; see above.

6. QC Samples

a. Method Blank

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

Yes  No  N/A  Comments:

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

Yes  No  N/A  Comments:

There were no detections in the method blank sample associated with this project sample.

Laboratory Report Date:

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

Comments:

N/A; see above.

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

Yes  No  N/A  Comments:

See above.

v. Data quality or usability affected?

Comments:

No; 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  N/A  Comments:

An LCS was reported for the project sample.

ii. Metals/Inorganics – one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes  No  N/A  Comments:

Metals and/or inorganics were not analyzed as part of this work order.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes  No  N/A  Comments:

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from LCS/LCSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes  No  N/A  Comments:

No LCSD.

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

Comments:

N/A; see above.

Laboratory Report Date:

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

Yes  No  N/A  Comments:

See above.

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

The data quality and/or usability were not affected; see above.

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

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

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

Yes  No  N/A  Comments:

MS and MSD samples were reported for PFAS analysis.

ii. Metals/Inorganics – one MS and one MSD reported per matrix, analysis and 20 samples?

Yes  No  N/A  Comments:

Metals and/or inorganics were not analyzed as part of this work order.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable?

Yes  No  N/A  Comments:

MS and MSD samples were within limits with the exception of the MS %R for FOSA which was recovered above the upper laboratory limit.

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from MS/MSD, and or sample/sample duplicate.

Yes  No  N/A  Comments:

RPDs were within limits.

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

Comments:

None. The original sample used to conduct the matrix spike analysis is not a project sample.

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

Yes  No  N/A  Comments:

N/A; see above.



Laboratory Report Date:

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

The data quality and/or usability were not affected; see above.

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

i. Are surrogate/IDA recoveries reported for organic analyses – field, QC and laboratory samples?

Yes  No  N/A  Comments:

ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods 50-150 %R for field samples and 60-120 %R for QC samples; all other analyses see the laboratory report pages)

Yes  No  N/A  Comments:

iii. Do the sample results with failed surrogate/IDA recoveries have data flags? If so, are the data flags clearly defined?

Yes  No  N/A  Comments:

There were no IDA recovery failures associated with this work order. We note an IDA failure is described in the case narrative for a CCV sample. Since the IDAs were within limits for the associated project sample, the results are unaffected by the CCV failure.

iv. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected; see above.

e. Trip Blanks

i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples? (If not, enter explanation below.)

Yes  No  N/A  Comments:

PFAS are not volatile compounds. A trip blank is not required for the requested analysis.

ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC? (If not, a comment explaining why must be entered below)

Yes  No  N/A  Comments:

A trip blank is not required for the requested analysis.

iii. All results less than LOQ and project specified objectives?

Yes  No  N/A  Comments:

A trip blank is not required for the requested analysis.

Laboratory Report Date:

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

Comments:

NA; a trip blank is not required for the requested analysis.

v. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected; see above.

f. Field Duplicate

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

Yes  No  N/A  Comments:

Only one project sample was submitted.

ii. Submitted blind to lab?

Yes  No  N/A  Comments:

Only one project sample was submitted.

iii. Precision – All relative percent differences (RPD) less than specified project objectives?  
(Recommended: 30% water, 50% soil)

$$\text{RPD (\%)} = \text{Absolute value of: } \frac{(R_1 - R_2)}{((R_1 + R_2)/2)} \times 100$$

Where  $R_1$  = Sample Concentration $R_2$  = Field Duplicate ConcentrationYes  No  N/A  Comments:

N/A; only one sample was submitted.

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

Comments:

N/A; see above.

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

Yes  No  N/A  Comments:

Reusable equipment was not used for sample collection. Therefore, decontamination or equipment blank samples were not required. A peri-pump was used to collect the requested analytes.

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

Yes  No  N/A  Comments:

See above.

Laboratory Report Date:

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

Comments:

N/A; see above.

iii. Data quality or usability affected?

Comments:

No; see above.

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

a. Defined and appropriate?

Yes  No  N/A

Comments:



## Laboratory Report of Analysis

To: Shannon & Wilson-Fairbanks  
2355 Hill Rd  
Fairbanks, AK 99707  
(907)479-0600

Report Number: **1213480**

Client Project: **102519-005 Plume Stop MW**

Dear Marcy Nadel,

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 Jennifer 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.

---

Jennifer Dawkins  
Project Manager  
Jennifer.Dawkins@sgs.com

Date

## Case Narrative

SGS Client: **Shannon & Wilson-Fairbanks**  
SGS Project: **1213480**  
Project Name/Site: **102519-005 Plume Stop MW**  
Project Contact: **Marcy Nadel**

Refer to sample receipt form for information on sample condition.

### **1213526001(1618408MS) (1618409) MS**

200.8- Metals MS recovery calcium does not meet the QC criteria. The concentration of the PS is four times greater than the spike level.

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

Print Date: 07/09/2021 9:02:09AM

### Laboratory Qualifiers

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

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

SGS maintains a formal Quality Assurance/Quality Control (QA/QC) program. A copy of our Quality Assurance Plan (QAP), which outlines this program, is available at your request. The laboratory certification numbers are AK00971 DW Chemistry (Provisionally Certified as of 05/27/2021 for Mercury by EPA200.8, Nitrate as N by SM 4500NO3-F and VOCs by EPA 524.2) & Microbiology & 17-021 (CS) for ADEC and 2944.01 for DOD ELAP/ISO17025 (RCRA methods: 1020B, 1311, 3010A, 3050B, 3520C, 3550C, 5030B, 5035A, 6020B, 7470A, 7471B, 8015C, 8021B, 8082A, 8260D, 8270D, 8270D-SIM, 9040C, 9045D, 9056A, 9060A, AK101 and AK102/103). SGS is only certified for the analytes listed on our Drinking Water Certification (DW methods: 200.8, 2130B, 2320B, 2510B, 300.0, 4500-CN-C,E, 4500-H-B, 4500-NO3-F, 4500-P-E and 524.2) and only those analytes will be reported to the State of Alaska for compliance. Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth by the

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

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

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

### Sample Summary

<u>Client Sample ID</u>	<u>Lab Sample ID</u>	<u>Collected</u>	<u>Received</u>	<u>Matrix</u>
MW-1903-20	1213480001	06/17/2021	06/19/2021	Water (Surface, Eff., Ground)
Trip Blanks	1213480002	06/17/2021	06/19/2021	Water (Surface, Eff., Ground)

<u>Method</u>	<u>Method Description</u>
SW8021B	BTEX 8021
SM 5310B	Dissolved Organic Carbon
AK102	DRO/RRO Low Volume Water
AK103	DRO/RRO Low Volume Water
AK101	Gasoline Range Organics (W)
EP200.8	Metals in Water by 200.8 ICP-MS
SM 5310B	Total Organic Carbon

Print Date: 07/09/2021 9:02:12AM

### Detectable Results Summary

Client Sample ID: **MW-1903-20**

Lab Sample ID: 1213480001

**Metals by ICP/MS**

**Waters Department**

Client Sample ID: **Trip Blanks**

Lab Sample ID: 1213480002

**Volatile Fuels**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Calcium	109000	ug/L
Magnesium	25600	ug/L
TOC Average, Dissolved	3140	ug/L
Total Organic Carbon Average	6270	ug/L

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Gasoline Range Organics	0.0387J	mg/L



## Results of MW-1903-20

Client Sample ID: **MW-1903-20**  
 Client Project ID: **102519-005 Plume Stop MW**  
 Lab Sample ID: 1213480001  
 Lab Project ID: 1213480

Collection Date: 06/17/21 14:00  
 Received Date: 06/19/21 13:11  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

## Results by Metals by ICP/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Calcium	109000	2500	750	ug/L	1		06/26/21 17:02
Magnesium	25600	250	75.0	ug/L	1		06/26/21 17:02

## Batch Information

Analytical Batch: MMS11163  
 Analytical Method: EP200.8  
 Analyst: DSD  
 Analytical Date/Time: 06/26/21 17:02  
 Container ID: 1213480001-F

Prep Batch: MX34326  
 Prep Method: E200.2  
 Prep Date/Time: 06/24/21 12:50  
 Prep Initial Wt./Vol.: 4 mL  
 Prep Extract Vol: 50 mL



Results of MW-1903-20

Client Sample ID: MW-1903-20
Client Project ID: 102519-005 Plume Stop MW
Lab Sample ID: 1213480001
Lab Project ID: 1213480

Collection Date: 06/17/21 14:00
Received Date: 06/19/21 13:11
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Semivolatile Organic Fuels

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row: Diesel Range Organics, 0.288 U, 0.577, 0.173, mg/L, 1, 06/29/21 15:55

Surrogates

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row: 5a Androstane (surr), 83, 50-150, %, 1, 06/29/21 15:55

Batch Information

Analytical Batch: XFC15977
Analytical Method: AK102
Analyst: IVM
Analytical Date/Time: 06/29/21 15:55
Container ID: 1213480001-A

Prep Batch: XXX45064
Prep Method: SW3520C
Prep Date/Time: 06/28/21 16:33
Prep Initial Wt./Vol.: 260 mL
Prep Extract Vol: 1 mL

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row: Residual Range Organics, 0.240 U, 0.481, 0.144, mg/L, 1, 06/29/21 15:55

Surrogates

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row: n-Triacontane-d62 (surr), 95.7, 50-150, %, 1, 06/29/21 15:55

Batch Information

Analytical Batch: XFC15977
Analytical Method: AK103
Analyst: IVM
Analytical Date/Time: 06/29/21 15:55
Container ID: 1213480001-A

Prep Batch: XXX45064
Prep Method: SW3520C
Prep Date/Time: 06/28/21 16:33
Prep Initial Wt./Vol.: 260 mL
Prep Extract Vol: 1 mL



Results of MW-1903-20

Client Sample ID: MW-1903-20
Client Project ID: 102519-005 Plume Stop MW
Lab Sample ID: 1213480001
Lab Project ID: 1213480

Collection Date: 06/17/21 14:00
Received Date: 06/19/21 13:11
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Volatile Fuels

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row: Gasoline Range Organics, 0.0500 U, 0.100, 0.0310, mg/L, 1, 06/24/21 22:31

Surrogates

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row: 4-Bromofluorobenzene (surr), 67.9, 50-150, %, 1, 06/24/21 22:31

Batch Information

Analytical Batch: VFC15674
Analytical Method: AK101
Analyst: IJV
Analytical Date/Time: 06/24/21 22:31
Container ID: 1213480001-G

Prep Batch: VXX37303
Prep Method: SW5030B
Prep Date/Time: 06/24/21 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

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

Surrogates

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row: 1,4-Difluorobenzene (surr), 83.6, 77-115, %, 1, 06/24/21 22:31

Batch Information

Analytical Batch: VFC15674
Analytical Method: SW8021B
Analyst: IJV
Analytical Date/Time: 06/24/21 22:31
Container ID: 1213480001-G

Prep Batch: VXX37303
Prep Method: SW5030B
Prep Date/Time: 06/24/21 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL



**Results of MW-1903-20**

Client Sample ID: **MW-1903-20**  
Client Project ID: **102519-005 Plume Stop MW**  
Lab Sample ID: 1213480001  
Lab Project ID: 1213480

Collection Date: 06/17/21 14:00  
Received Date: 06/19/21 13:11  
Matrix: Water (Surface, Eff., Ground)  
Solids (%):  
Location:

**Results by Waters Department**

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
TOC Average, Dissolved	3140	1000	400	ug/L	1		06/23/21 22:05
Total Organic Carbon Average	6270	1000	400	ug/L	1		06/23/21 17:57

**Batch Information**

Analytical Batch: WTC3101  
Analytical Method: SM 5310B  
Analyst: EWW  
Analytical Date/Time: 06/23/21 17:57  
Container ID: 1213480001-C

Analytical Batch: WTC3101  
Analytical Method: SM 5310B  
Analyst: EWW  
Analytical Date/Time: 06/23/21 22:05  
Container ID: 1213480001-D



**Results of Trip Blanks**

Client Sample ID: **Trip Blanks**  
Client Project ID: **102519-005 Plume Stop MW**  
Lab Sample ID: 1213480002  
Lab Project ID: 1213480

Collection Date: 06/17/21 14:00  
Received Date: 06/19/21 13:11  
Matrix: Water (Surface, Eff., Ground)  
Solids (%):  
Location:

**Results by Volatile Fuels**

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Gasoline Range Organics	0.0387 J	0.100	0.0310	mg/L	1		06/25/21 10:30

**Surrogates**

4-Bromofluorobenzene (surr)	96	50-150		%	1		06/25/21 10:30
-----------------------------	----	--------	--	---	---	--	----------------

**Batch Information**

Analytical Batch: VFC15672  
Analytical Method: AK101  
Analyst: IJV  
Analytical Date/Time: 06/25/21 10:30  
Container ID: 1213480002-A

Prep Batch: VXX37301  
Prep Method: SW5030B  
Prep Date/Time: 06/24/21 06:00  
Prep Initial Wt./Vol.: 5 mL  
Prep Extract Vol: 5 mL

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Benzene	0.250 U	0.500	0.150	ug/L	1		06/25/21 10:30
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		06/25/21 10:30
o-Xylene	0.500 U	1.00	0.310	ug/L	1		06/25/21 10:30
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		06/25/21 10:30
Toluene	0.500 U	1.00	0.310	ug/L	1		06/25/21 10:30
Xylenes (total)	1.50 U	3.00	0.930	ug/L	1		06/25/21 10:30

**Surrogates**

1,4-Difluorobenzene (surr)	99.9	77-115		%	1		06/25/21 10:30
----------------------------	------	--------	--	---	---	--	----------------

**Batch Information**

Analytical Batch: VFC15672  
Analytical Method: SW8021B  
Analyst: IJV  
Analytical Date/Time: 06/25/21 10:30  
Container ID: 1213480002-A

Prep Batch: VXX37301  
Prep Method: SW5030B  
Prep Date/Time: 06/24/21 06:00  
Prep Initial Wt./Vol.: 5 mL  
Prep Extract Vol: 5 mL

## Method Blank

Blank ID: MB for HBN 1821263 [MXX/34326]

Blank Lab ID: 1618293

QC for Samples:  
1213480001

Matrix: Water (Surface, Eff., Ground)

## Results by EP200.8

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Calcium	250U	500	150	ug/L
Magnesium	25.0U	50.0	15.0	ug/L

## Batch Information

Analytical Batch: MMS11163  
Analytical Method: EP200.8  
Instrument: Perkin Elmer Nexlon P5  
Analyst: DSD  
Analytical Date/Time: 6/26/2021 4:35:00PM

Prep Batch: MXX34326  
Prep Method: E200.2  
Prep Date/Time: 6/24/2021 12:50:23PM  
Prep Initial Wt./Vol.: 20 mL  
Prep Extract Vol: 50 mL

Print Date: 07/09/2021 9:02:17AM

## Blank Spike Summary

Blank Spike ID: LCS for HBN 1213480 [MXX34326]  
 Blank Spike Lab ID: 1618294  
 Date Analyzed: 06/26/2021 16:38

Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1213480001

## Results by EP200.8

Parameter	Blank Spike (ug/L)			CL
	Spike	Result	Rec (%)	
Calcium	10000	11400	114	( 85-115 )
Magnesium	10000	11500	115	( 85-115 )

## Batch Information

Analytical Batch: **MMS11163**  
 Analytical Method: **EP200.8**  
 Instrument: **Perkin Elmer Nexlon P5**  
 Analyst: **DSD**

Prep Batch: **MXX34326**  
 Prep Method: **E200.2**  
 Prep Date/Time: **06/24/2021 12:50**  
 Spike Init Wt./Vol.: 10000 ug/L Extract Vol: 50 mL  
 Dupe Init Wt./Vol.: Extract Vol:

## Matrix Spike Summary

Original Sample ID: 1618408  
 MS Sample ID: 1618409 MS  
 MSD Sample ID:

Analysis Date: 06/26/2021 16:44  
 Analysis Date: 06/26/2021 16:47  
 Analysis Date:  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1213480001

## Results by EP200.8

Parameter	Sample	Matrix Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Calcium	118000	10000	123000	53	*			70-130		
Magnesium	23400	10000	32600	92				70-130		

## Batch Information

Analytical Batch: MMS11163  
 Analytical Method: EP200.8  
 Instrument: Perkin Elmer Nexlon P5  
 Analyst: DSD  
 Analytical Date/Time: 6/26/2021 4:47:00PM

Prep Batch: MXX34326  
 Prep Method: DW Digest for Metals on ICP-MS  
 Prep Date/Time: 6/24/2021 12:50:23PM  
 Prep Initial Wt./Vol.: 20.00mL  
 Prep Extract Vol: 50.00mL



## Method Blank

Blank ID: MB for HBN 1821360 [VXX/37301]  
 Blank Lab ID: 1618745

Matrix: Water (Surface, Eff., Ground)

QC for Samples:  
 1213480002

## Results by AK101

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Benzene	0.000250U	0.000500	0.000150	mg/L
Ethylbenzene	0.000500U	0.00100	0.000310	mg/L
Gasoline Range Organics	0.0500U	0.100	0.0310	mg/L
o-Xylene	0.000500U	0.00100	0.000310	mg/L
P & M -Xylene	0.00100U	0.00200	0.000620	mg/L
Toluene	0.000500U	0.00100	0.000310	mg/L
Xylenes (total)	0.00150U	0.00300	0.000930	mg/L
<b>Surrogates</b>				
1,4-Difluorobenzene (surr)	99.9	77-115		%
4-Bromofluorobenzene (surr)	99.1	50-150		%

## Batch Information

Analytical Batch: VFC15672  
 Analytical Method: AK101  
 Instrument: Agilent 7890A PID/FID  
 Analyst: IJV  
 Analytical Date/Time: 6/24/2021 1:58:00PM

Prep Batch: VXX37301  
 Prep Method: SW5030B  
 Prep Date/Time: 6/24/2021 6:00:00AM  
 Prep Initial Wt./Vol.: 5 mL  
 Prep Extract Vol: 5 mL

## Blank Spike Summary

Blank Spike ID: LCS for HBN 1213480 [VXX37301]  
 Blank Spike Lab ID: 1618746  
 Date Analyzed: 06/24/2021 14:35

Spike Duplicate ID: LCSD for HBN 1213480 [VXX37301]  
 Spike Duplicate Lab ID: 1618747  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1213480002

## Results by AK101

Parameter	Blank Spike (mg/L)			Spike Duplicate (mg/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Benzene	0.100	0.104	104	0.100	0.102	102	( 80-120 )	1.60	(< 20 )
Ethylbenzene	0.100	0.100	100	0.100	0.0941	94	( 75-125 )	6.50	(< 20 )
o-Xylene	0.100	0.103	103	0.100	0.0961	96	( 80-120 )	7.30	(< 20 )
P & M -Xylene	0.200	0.203	101	0.200	0.189	95	( 75-130 )	7.00	(< 20 )
Toluene	0.100	0.0996	100	0.100	0.0963	96	( 75-120 )	3.40	(< 20 )
Xylenes (total)	0.300	0.306	102	0.300	0.285	95	( 79-121 )	7.10	(< 20 )

## Surrogates

1,4-Difluorobenzene (surr)	0.0500		104	0.0500		106	( 77-115 )	1.70	
----------------------------	--------	--	-----	--------	--	-----	------------	------	--

## Batch Information

Analytical Batch: **VFC15672**  
 Analytical Method: **AK101**  
 Instrument: **Agilent 7890A PID/FID**  
 Analyst: **IJV**

Prep Batch: **VXX37301**  
 Prep Method: **SW5030B**  
 Prep Date/Time: **06/24/2021 06:00**  
 Spike Init Wt./Vol.: 0.100 mg/L Extract Vol: 5 mL  
 Dupe Init Wt./Vol.: 0.100 mg/L Extract Vol: 5 mL

## Blank Spike Summary

Blank Spike ID: LCS for HBN 1213480 [VXX37301]  
 Blank Spike Lab ID: 1618748  
 Date Analyzed: 06/24/2021 14:53

Spike Duplicate ID: LCSD for HBN 1213480 [VXX37301]  
 Spike Duplicate Lab ID: 1618749  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1213480002

## Results by AK101

Parameter	Blank Spike (mg/L)			Spike Duplicate (mg/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Gasoline Range Organics	1.00	1.05	105	1.00	0.993	99	( 60-120 )	5.80	(< 20 )

### Surrogates

4-Bromofluorobenzene (surr)	0.0500		119	0.0500		113	( 50-150 )	5.50	
-----------------------------	--------	--	-----	--------	--	-----	------------	------	--

## Batch Information

Analytical Batch: **VFC15672**  
 Analytical Method: **AK101**  
 Instrument: **Agilent 7890A PID/FID**  
 Analyst: **IJV**

Prep Batch: **VXX37301**  
 Prep Method: **SW5030B**  
 Prep Date/Time: **06/24/2021 06:00**  
 Spike Init Wt./Vol.: 1.00 mg/L Extract Vol: 5 mL  
 Dupe Init Wt./Vol.: 1.00 mg/L Extract Vol: 5 mL

Print Date: 07/09/2021 9:02:25AM

## Method Blank

Blank ID: MB for HBN 1821360 [VXX/37301]  
 Blank Lab ID: 1618745

Matrix: Water (Surface, Eff., Ground)

QC for Samples:  
 1213480002

## Results by SW8021B

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Benzene	0.250U	0.500	0.150	ug/L
Ethylbenzene	0.500U	1.00	0.310	ug/L
o-Xylene	0.500U	1.00	0.310	ug/L
P & M -Xylene	1.00U	2.00	0.620	ug/L
Toluene	0.500U	1.00	0.310	ug/L
Xylenes (total)	1.50U	3.00	0.930	ug/L
<b>Surrogates</b>				
1,4-Difluorobenzene (surr)	99.9	77-115		%

## Batch Information

Analytical Batch: VFC15672  
 Analytical Method: SW8021B  
 Instrument: Agilent 7890A PID/FID  
 Analyst: IJV  
 Analytical Date/Time: 6/24/2021 1:58:00PM

Prep Batch: VXX37301  
 Prep Method: SW5030B  
 Prep Date/Time: 6/24/2021 6:00:00AM  
 Prep Initial Wt./Vol.: 5 mL  
 Prep Extract Vol: 5 mL

## Blank Spike Summary

Blank Spike ID: LCS for HBN 1213480 [VXX37301]  
 Blank Spike Lab ID: 1618746  
 Date Analyzed: 06/24/2021 14:35

Spike Duplicate ID: LCSD for HBN 1213480 [VXX37301]  
 Spike Duplicate Lab ID: 1618747  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1213480002

## Results by SW8021B

Parameter	Blank Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Benzene	100	104	104	100	102	102	( 80-120 )	1.60	(< 20 )
Ethylbenzene	100	100	100	100	94.1	94	( 75-125 )	6.50	(< 20 )
o-Xylene	100	103	103	100	96.1	96	( 80-120 )	7.30	(< 20 )
P & M -Xylene	200	203	101	200	189	95	( 75-130 )	7.00	(< 20 )
Toluene	100	99.6	100	100	96.3	96	( 75-120 )	3.40	(< 20 )
Xylenes (total)	300	306	102	300	285	95	( 79-121 )	7.10	(< 20 )
<b>Surrogates</b>									
1,4-Difluorobenzene (surr)	50		104	50		106	( 77-115 )	1.70	

## Batch Information

Analytical Batch: **VFC15672**  
 Analytical Method: **SW8021B**  
 Instrument: **Agilent 7890A PID/FID**  
 Analyst: **IJV**

Prep Batch: **VXX37301**  
 Prep Method: **SW5030B**  
 Prep Date/Time: **06/24/2021 06:00**  
 Spike Init Wt./Vol.: 100 ug/L Extract Vol: 5 mL  
 Dupe Init Wt./Vol.: 100 ug/L Extract Vol: 5 mL

## Method Blank

Blank ID: MB for HBN 1821364 [VXX/37303]  
 Blank Lab ID: 1618768

Matrix: Water (Surface, Eff., Ground)

QC for Samples:  
 1213480001

## Results by AK101

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Benzene	0.000250U	0.000500	0.000150	mg/L
Ethylbenzene	0.000500U	0.00100	0.000310	mg/L
Gasoline Range Organics	0.0500U	0.100	0.0310	mg/L
o-Xylene	0.000500U	0.00100	0.000310	mg/L
P & M -Xylene	0.00100U	0.00200	0.000620	mg/L
Toluene	0.000500U	0.00100	0.000310	mg/L
Xylenes (total)	0.00150U	0.00300	0.000930	mg/L
<b>Surrogates</b>				
1,4-Difluorobenzene (surr)	84.9	77-115		%
4-Bromofluorobenzene (surr)	76	50-150		%

## Batch Information

Analytical Batch: VFC15674  
 Analytical Method: AK101  
 Instrument: Agilent 7890 PID/FID  
 Analyst: IJV  
 Analytical Date/Time: 6/24/2021 11:07:00AM

Prep Batch: VXX37303  
 Prep Method: SW5030B  
 Prep Date/Time: 6/24/2021 6:00:00AM  
 Prep Initial Wt./Vol.: 5 mL  
 Prep Extract Vol: 5 mL



### Blank Spike Summary

Blank Spike ID: LCS for HBN 1213480 [VXX37303]  
 Blank Spike Lab ID: 1618769  
 Date Analyzed: 06/24/2021 11:43

Spike Duplicate ID: LCSD for HBN 1213480 [VXX37303]  
 Spike Duplicate Lab ID: 1618770  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1213480001

### Results by AK101

Parameter	Blank Spike (mg/L)			Spike Duplicate (mg/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Benzene	0.100	0.110	110	0.100	0.109	109	( 80-120 )	1.50	(< 20 )
Ethylbenzene	0.100	0.102	102	0.100	0.0980	98	( 75-125 )	3.50	(< 20 )
o-Xylene	0.100	0.0948	95	0.100	0.0888	89	( 80-120 )	6.50	(< 20 )
P & M -Xylene	0.200	0.190	95	0.200	0.184	92	( 75-130 )	3.50	(< 20 )
Toluene	0.100	0.105	105	0.100	0.104	104	( 75-120 )	1.40	(< 20 )
Xylenes (total)	0.300	0.285	95	0.300	0.273	91	( 79-121 )	4.50	(< 20 )
<b>Surrogates</b>									
1,4-Difluorobenzene (surr)	0.0500		95	0.0500		111	( 77-115 )	15.40	

### Batch Information

Analytical Batch: **VFC15674**  
 Analytical Method: **AK101**  
 Instrument: **Agilent 7890 PID/FID**  
 Analyst: **IJV**

Prep Batch: **VXX37303**  
 Prep Method: **SW5030B**  
 Prep Date/Time: **06/24/2021 06:00**  
 Spike Init Wt./Vol.: 0.100 mg/L Extract Vol: 5 mL  
 Dupe Init Wt./Vol.: 0.100 mg/L Extract Vol: 5 mL

Print Date: 07/09/2021 9:02:34AM



### Blank Spike Summary

Blank Spike ID: LCS for HBN 1213480 [VXX37303]  
 Blank Spike Lab ID: 1618771  
 Date Analyzed: 06/24/2021 12:01

Spike Duplicate ID: LCSD for HBN 1213480 [VXX37303]  
 Spike Duplicate Lab ID: 1618772  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1213480001

### Results by AK101

Parameter	Blank Spike (mg/L)			Spike Duplicate (mg/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Gasoline Range Organics	1.00	1.08	108	1.00	1.05	105	( 60-120 )	2.90	(< 20 )

### Surrogates

4-Bromofluorobenzene (surr)	0.0500		94	0.0500		91	( 50-150 )	3.90	
-----------------------------	--------	--	----	--------	--	----	------------	------	--

### Batch Information

Analytical Batch: **VFC15674**  
 Analytical Method: **AK101**  
 Instrument: **Agilent 7890 PID/FID**  
 Analyst: **IJV**

Prep Batch: **VXX37303**  
 Prep Method: **SW5030B**  
 Prep Date/Time: **06/24/2021 06:00**  
 Spike Init Wt./Vol.: 1.00 mg/L Extract Vol: 5 mL  
 Dupe Init Wt./Vol.: 1.00 mg/L Extract Vol: 5 mL

Print Date: 07/09/2021 9:02:34AM



## Method Blank

Blank ID: MB for HBN 1821364 [VXX/37303]  
 Blank Lab ID: 1618768

Matrix: Water (Surface, Eff., Ground)

QC for Samples:  
 1213480001

## Results by SW8021B

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Benzene	0.250U	0.500	0.150	ug/L
Ethylbenzene	0.500U	1.00	0.310	ug/L
o-Xylene	0.500U	1.00	0.310	ug/L
P & M -Xylene	1.00U	2.00	0.620	ug/L
Toluene	0.500U	1.00	0.310	ug/L
Xylenes (total)	1.50U	3.00	0.930	ug/L
<b>Surrogates</b>				
1,4-Difluorobenzene (surr)	84.9	77-115		%

## Batch Information

Analytical Batch: VFC15674  
 Analytical Method: SW8021B  
 Instrument: Agilent 7890 PID/FID  
 Analyst: IJV  
 Analytical Date/Time: 6/24/2021 11:07:00AM

Prep Batch: VXX37303  
 Prep Method: SW5030B  
 Prep Date/Time: 6/24/2021 6:00:00AM  
 Prep Initial Wt./Vol.: 5 mL  
 Prep Extract Vol: 5 mL

## Blank Spike Summary

Blank Spike ID: LCS for HBN 1213480 [VXX37303]  
 Blank Spike Lab ID: 1618769  
 Date Analyzed: 06/24/2021 11:43

Spike Duplicate ID: LCSD for HBN 1213480 [VXX37303]  
 Spike Duplicate Lab ID: 1618770  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1213480001

## Results by SW8021B

Parameter	Blank Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Benzene	100	110	110	100	109	109	( 80-120 )	1.50	(< 20 )
Ethylbenzene	100	102	102	100	98.0	98	( 75-125 )	3.50	(< 20 )
o-Xylene	100	94.8	95	100	88.8	89	( 80-120 )	6.50	(< 20 )
P & M -Xylene	200	190	95	200	184	92	( 75-130 )	3.50	(< 20 )
Toluene	100	105	105	100	104	104	( 75-120 )	1.40	(< 20 )
Xylenes (total)	300	285	95	300	273	91	( 79-121 )	4.50	(< 20 )
<b>Surrogates</b>									
1,4-Difluorobenzene (surr)	50		95	50		111	( 77-115 )	15.40	

## Batch Information

Analytical Batch: **VFC15674**  
 Analytical Method: **SW8021B**  
 Instrument: **Agilent 7890 PID/FID**  
 Analyst: **IJV**

Prep Batch: **VXX37303**  
 Prep Method: **SW5030B**  
 Prep Date/Time: **06/24/2021 06:00**  
 Spike Init Wt./Vol.: 100 ug/L Extract Vol: 5 mL  
 Dupe Init Wt./Vol.: 100 ug/L Extract Vol: 5 mL

## Method Blank

Blank ID: MB for HBN 1821308 [WTC/3101]

Blank Lab ID: 1618513

QC for Samples:

1213480001

Matrix: Water (Surface, Eff., Ground)

## Results by SM 5310B

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Total Organic Carbon Average	500U	1000	400	ug/L

## Batch Information

Analytical Batch: WTC3101

Analytical Method: SM 5310B

Instrument: TOC Analyzer 2

Analyst: EWW

Analytical Date/Time: 6/23/2021 1:09:45PM

Print Date: 07/09/2021 9:02:42AM

## Method Blank

Blank ID: MB for HBN 1821308 [WTC/3101]

Blank Lab ID: 1618517

QC for Samples:

1213480001

Matrix: Water (Surface, Eff., Ground)

## Results by SM 5310B

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Total Organic Carbon Average	500U	1000	400	ug/L

## Batch Information

Analytical Batch: WTC3101

Analytical Method: SM 5310B

Instrument: TOC Analyzer 2

Analyst: EWW

Analytical Date/Time: 6/23/2021 7:49:00PM

Print Date: 07/09/2021 9:02:42AM

## Blank Spike Summary

Blank Spike ID: LCS for HBN 1213480 [WTC3101]

Blank Spike Lab ID: 1618512

Date Analyzed: 06/23/2021 12:54

Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1213480001

## Results by SM 5310B

Parameter	Blank Spike (ug/L)			CL ( 80-120 )
	Spike	Result	Rec (%)	
Total Organic Carbon Average	75000	80000	107	

## Batch Information

Analytical Batch: **WTC3101**  
Analytical Method: **SM 5310B**  
Instrument: **TOC Analyzer 2**  
Analyst: **EWV**

Print Date: 07/09/2021 9:02:44AM

## Blank Spike Summary

Blank Spike ID: LCS for HBN 1213480 [WTC3101]

Blank Spike Lab ID: 1618516

Date Analyzed: 06/23/2021 19:35

Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1213480001

## Results by SM 5310B

Parameter	Blank Spike (ug/L)			CL
	Spike	Result	Rec (%)	
Total Organic Carbon Average	75000	79500	106	( 80-120 )

## Batch Information

Analytical Batch: **WTC3101**  
Analytical Method: **SM 5310B**  
Instrument: **TOC Analyzer 2**  
Analyst: **EWV**

Print Date: 07/09/2021 9:02:44AM

## Matrix Spike Summary

Original Sample ID: 1213265001  
 MS Sample ID: 1618514 MS  
 MSD Sample ID: 1618515 MSD

Analysis Date: 06/23/2021 13:43  
 Analysis Date: 06/23/2021 13:59  
 Analysis Date: 06/23/2021 14:15  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1213480001

## Results by SM 5310B

Parameter	Sample	Matrix Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Total Organic Carbon Average	1230	10000	11400	101	10000	11400	102	75-125	0.46	(< 25 )

## Batch Information

Analytical Batch: WTC3101  
 Analytical Method: SM 5310B  
 Instrument: TOC Analyzer 2  
 Analyst: EWW  
 Analytical Date/Time: 6/23/2021 1:59:35PM

## Matrix Spike Summary

Original Sample ID: 1213537006  
 MS Sample ID: 1618518 MS  
 MSD Sample ID: 1618519 MSD

Analysis Date: 06/23/2021 20:03  
 Analysis Date: 06/23/2021 20:19  
 Analysis Date: 06/23/2021 20:33  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1213480001

## Results by SM 5310B

Parameter	Sample	Matrix Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Total Organic Carbon Average	504J	10000	10600	101	10000	10700	102	75-125	0.42	(< 25 )

## Batch Information

Analytical Batch: WTC3101  
 Analytical Method: SM 5310B  
 Instrument: TOC Analyzer 2  
 Analyst: EWW  
 Analytical Date/Time: 6/23/2021 8:19:07PM



## Method Blank

Blank ID: MB for HBN 1821451 [XXX/45064]  
Blank Lab ID: 1619255

Matrix: Water (Surface, Eff., Ground)

QC for Samples:  
1213480001

## Results by AK102

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Diesel Range Organics	0.181J	0.600	0.180	mg/L
<b>Surrogates</b>				
5a Androstane (surr)	93.4	60-120		%

## Batch Information

Analytical Batch: XFC15977  
Analytical Method: AK102  
Instrument: Agilent 7890B F  
Analyst: IVM  
Analytical Date/Time: 6/29/2021 1:57:00PM

Prep Batch: XXX45064  
Prep Method: SW3520C  
Prep Date/Time: 6/28/2021 4:33:36PM  
Prep Initial Wt./Vol.: 250 mL  
Prep Extract Vol: 1 mL

## Blank Spike Summary

Blank Spike ID: LCS for HBN 1213480 [XXX45064]  
 Blank Spike Lab ID: 1619256  
 Date Analyzed: 06/29/2021 14:07

Spike Duplicate ID: LCSD for HBN 1213480  
 [XXX45064]  
 Spike Duplicate Lab ID: 1619257  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1213480001

## Results by AK102

Parameter	Blank Spike (mg/L)			Spike Duplicate (mg/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Diesel Range Organics	20	20.8	104	20	20.4	102	( 75-125 )	2.20	(< 20 )

### Surrogates

5a Androstane (surr)	0.4		101	0.4		103	( 60-120 )	1.60	
----------------------	-----	--	-----	-----	--	-----	------------	------	--

## Batch Information

Analytical Batch: **XFC15977**  
 Analytical Method: **AK102**  
 Instrument: **Agilent 7890B F**  
 Analyst: **IVM**

Prep Batch: **XXX45064**  
 Prep Method: **SW3520C**  
 Prep Date/Time: **06/28/2021 16:33**  
 Spike Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL  
 Dupe Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL

Print Date: 07/09/2021 9:02:49AM

## Method Blank

Blank ID: MB for HBN 1821451 [XXX/45064]

Blank Lab ID: 1619255

QC for Samples:

1213480001

Matrix: Water (Surface, Eff., Ground)

## Results by AK103

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Residual Range Organics	0.250U	0.500	0.150	mg/L
<b>Surrogates</b>				
n-Triacontane-d62 (surr)	102	60-120		%

## Batch Information

Analytical Batch: XFC15977

Analytical Method: AK103

Instrument: Agilent 7890B F

Analyst: IVM

Analytical Date/Time: 6/29/2021 1:57:00PM

Prep Batch: XXX45064

Prep Method: SW3520C

Prep Date/Time: 6/28/2021 4:33:36PM

Prep Initial Wt./Vol.: 250 mL

Prep Extract Vol: 1 mL

## Blank Spike Summary

Blank Spike ID: LCS for HBN 1213480 [XXX45064]  
 Blank Spike Lab ID: 1619256  
 Date Analyzed: 06/29/2021 14:07

Spike Duplicate ID: LCSD for HBN 1213480 [XXX45064]  
 Spike Duplicate Lab ID: 1619257  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1213480001

## Results by AK103

Parameter	Blank Spike (mg/L)			Spike Duplicate (mg/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Residual Range Organics	20	20.9	105	20	20.0	100	( 60-120 )	4.50	(< 20 )
<b>Surrogates</b>									
n-Triacontane-d62 (surr)	0.4		92	0.4		93	( 60-120 )	0.49	

## Batch Information

Analytical Batch: **XFC15977**  
 Analytical Method: **AK103**  
 Instrument: **Agilent 7890B F**  
 Analyst: **IVM**

Prep Batch: **XXX45064**  
 Prep Method: **SW3520C**  
 Prep Date/Time: **06/28/2021 16:33**  
 Spike Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL  
 Dupe Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL





e-Sample Receipt Form FBK

SGS Workorder #:

S&W

S&W

Review Criteria	Condition (Yes, No, N/A)	Exceptions Noted below				
<b>Chain of Custody / Temperature Requirements</b>		Yes	Exemption permitted if sampler hand carries/delivers.			
Were Custody Seals intact? Note # & location	N/A					
COC accompanied samples?	Yes					
DOD: Were samples received in COC corresponding coolers?						
<input checked="" type="checkbox"/> <b>Yes</b> **Exemption permitted if chilled & collected <8 hours ago, or for samples where chilling is not required						
Temperature blank compliant* (i.e., 0-6 °C after CF)?	Yes	Cooler ID: 1	@	4.5 °C	Therm. ID: 21	
		Cooler ID:	@	°C	Therm. ID:	
		Cooler ID:	@	°C	Therm. ID:	
		Cooler ID:	@	°C	Therm. ID:	
<i>*If &gt;6°C, were samples collected &lt;8 hours ago?</i>						
If <0°C, were sample containers ice free?						
Note: Identify containers received at non-compliant temperature . Use form FS-0029 if more space is needed.						
<b>Holding Time / Documentation / Sample Condition Requirements</b>		Note: Refer to form F-083 "Sample Guide" for specific holding times.				
Do samples match COC** (i.e., sample IDs, dates/times collected)?	N/C					
**Note: If times differ <1hr, record details & login per COC.						
***Note: If sample information on containers differs from COC, SGS will default to COC information						
Were samples in good condition (no leaks/cracks/breakage)?	Yes					
Were analytical requests clear? (i.e., method is specified for analyses with multiple option for analysis (Ex: BTEX, Metals)	Yes					
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					
For Rush/Short Hold Time, was RUSH/Short HT email sent?	Yes	14 day hold BTEX				
Note to Client: Any "No", answer above indicates non-compliance with standard procedures and may impact data quality.						
Additional notes (if applicable):						
<b>SGS Profile #</b>			0			



e-Sample Receipt Form

SGS Workorder #:

1213480

1213480

Review Criteria	Condition (Yes, No, N/A)	Exceptions Noted below
<b>Chain of Custody / Temperature Requirements</b>		
Were Custody Seals intact? Note # & location	Yes	N/A Exemption permitted if sampler hand carries/delivers.
COC accompanied samples?	Yes	
DOD: Were samples received in COC corresponding coolers?	N/A	
N/A **Exemption permitted if chilled & collected <8 hours ago, or for samples where chilling is not required		
Temperature blank compliant* (i.e., 0-6 °C after CF)?	Yes	Cooler ID: 1 @ 1.1 °C Therm. ID: D57
If samples received without a temperature blank, the "cooler temperature" will be documented instead & "COOLER TEMP" will be noted to the right. "ambient" or "chilled" will be noted if neither is available.		Cooler ID: @ °C Therm. ID:
		Cooler ID: @ °C Therm. ID:
		Cooler ID: @ °C Therm. ID:
		Cooler ID: @ °C Therm. ID:
*If >6°C, were samples collected <8 hours ago?	N/A	
If <0°C, were sample containers ice free?	N/A	
Note: Identify containers received at non-compliant temperature . Use form FS-0029 if more space is needed.		
<b>Holding Time / Documentation / Sample Condition Requirements</b>		
Note: Refer to form F-083 "Sample Guide" for specific holding times.		
Were samples received within holding time?	Yes	
Do samples match COC** (i.e., sample IDs, dates/times collected)?	Yes	
**Note: If times differ <1hr, record details & login per COC.		
***Note: If sample information on containers differs from COC, SGS will default to COC information		
Were analytical requests clear? (i.e., method is specified for analyses with multiple option for analysis (Ex: BTEX, Metals)	Yes	
Were proper containers (type/mass/volume/preservative***) used?	Yes	Yes ***Exemption permitted for metals (e.g, 200.8/6020B).
<b>Volatile / LL-Hg Requirements</b>		
Were Trip Blanks (i.e., VOAs, LL-Hg) in cooler with samples?	Yes	
Were all water VOA vials free of headspace (i.e., bubbles ≤ 6mm)?	Yes	
Were all soil VOAs field extracted with MeOH+BFB?	N/A	
<b>Note to Client:</b> Any "No", answer above indicates non-compliance with standard procedures and may impact data quality.		
Additional notes (if applicable):		



## Sample Containers and Preservatives

<u>Container Id</u>	<u>Preservative</u>	<u>Container Condition</u>	<u>Container Id</u>	<u>Preservative</u>	<u>Container Condition</u>
1213480001-A	HCL to pH < 2	OK			
1213480001-B	HCL to pH < 2	OK			
1213480001-C	HCL to pH < 2	OK			
1213480001-D	HCL to pH < 2	OK			
1213480001-E	HCL to pH < 2	OK			
1213480001-F	HNO3 to pH < 2	OK			
1213480001-G	HCL to pH < 2	OK			
1213480001-H	HCL to pH < 2	OK			
1213480001-I	HCL to pH < 2	OK			
1213480002-A	HCL to pH < 2	OK			
1213480002-B	HCL to pH < 2	OK			
1213480002-C	HCL to pH < 2	OK			

### Container Condition Glossary

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

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

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

DM - The container was received damaged.

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

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

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

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

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

QN - Insufficient sample quantity provided.



**Laboratory Data Review Checklist**

Completed By:

Rachel Willis

Title:

Environmental Scientist

Date:

July 12, 2021

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

SGS North America, Inc.

Laboratory Report Number:

1213480

Laboratory Report Date:

July 9, 2021

CS Site Name:

DOT&PF Fairbanks International PFAS PlumeStop Monitoring

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

1213480

Laboratory Report Date:

July 9, 2021

CS Site Name:

**Note: Any N/A or No box checked must have an explanation in the comments box.**

1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

Yes  No  N/A  Comments:

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

Yes  No  N/A  Comments:

The requested analyses were conducted by SGS North America, Inc. in Anchorage, AK.

2. Chain of Custody (CoC)

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

Yes  No  N/A  Comments:

b. Correct analyses requested?

Yes  No  N/A  Comments:

3. Laboratory Sample Receipt Documentation

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

Yes  No  N/A  Comments:

The sample cooler was 1.1°C upon receipt in Fairbanks, and 4.5°C upon receipt in Anchorage.

b. Sample preservation acceptable – acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

Yes  No  N/A  Comments:

c. Sample condition documented – broken, leaking (Methanol), zero headspace (VOC vials)?

Yes  No  N/A  Comments:

The sample receipt form notes that the samples were received in good condition.

1213480

Laboratory Report Date:

July 9, 2021

CS Site Name:

d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

Yes  No  N/A  Comments:

The sample receipt form notes no discrepancies.

e. Data quality or usability affected?

Comments:

Data quality and/or usability are not affected.

4. Case Narrative

a. Present and understandable?

Yes  No  N/A  Comments:

b. Discrepancies, errors, or QC failures identified by the lab?

Yes  No  N/A  Comments:

The case narrative indicates the metals MS recovery for calcium does not meet laboratory criteria.

c. Were all corrective actions documented?

Yes  No  N/A  Comments:

No corrective actions necessary.

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

Comments:

The results may be affected; see the following sections for additional information.

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

Yes  No  N/A  Comments:

1213480

Laboratory Report Date:

July 9, 2021

CS Site Name:

b. All applicable holding times met?

Yes  No  N/A  Comments:

c. All soils reported on a dry weight basis?

Yes  No  N/A  Comments:

Soil samples were not included with this work order.

d. Are the reported LOQs less than the Cleanup Level or the minimum required detection level for the project?

Yes  No  N/A  Comments:

e. Data quality or usability affected?

Data quality or usability are not affected.

6. QC Samples

a. Method Blank

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

Yes  No  N/A  Comments:

Method blanks were not reported for GRO preparatory batches VXX37301 and VXX37303. GRO were not detected in the project samples or trip blank; therefore, the results are unaffected by this omission.

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

Yes  No  N/A  Comments:

DRO were detected in the method blank sample at an estimated concentration of 0.181 mg/L.

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

Comments:

DRO were not detected in the project sample associated with the MB detection.

1213480

Laboratory Report Date:

July 9, 2021

CS Site Name:

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

Yes  No  N/A  Comments:

Flags not required; see above

v. Data quality or usability affected?

Comments:

No; 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  N/A  Comments:

Two LCS samples were reported for TOC analysis.  
An LCS/LCSD pair was reported for GRO, DRO, RRO, and BTEX analysis.

ii. Metals/Inorganics – one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes  No  N/A  Comments:

An LCS was reported for calcium and magnesium analyses.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes  No  N/A  Comments:

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from LCS/LCSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes  No  N/A  Comments:

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

Comments:

None; see above.

1213480

Laboratory Report Date:

July 9, 2021

CS Site Name:

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

Yes  No  N/A  Comments:

N/A; see above.

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

The data quality and/or usability were not affected; see above.

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

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

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

Yes  No  N/A  Comments:

Two MS/MSD samples were reported for TOC analysis.

ii. Metals/Inorganics – one MS and one MSD reported per matrix, analysis and 20 samples?

Yes  No  N/A  Comments:

Only an MS was reported for calcium and magnesium analysis; we do not have a measure of analytical precision for these analytes.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable?

Yes  No  N/A  Comments:

Percent recoveries were within laboratory limits for MS/MSD samples with exception of calcium in preparatory batch MXX34326. The native concentration of calcium is over ten times the spiking concentration for the MS. Additionally, the spiked sample is not part of our project sample set.

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from MS/MSD, and or sample/sample duplicate.

Yes  No  N/A  Comments:

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

Comments:

Due to the high concentration of calcium in the native sample, sample *MW-1903-20* is not affected by the MS %R failure.

1213480

Laboratory Report Date:

July 9, 2021

CS Site Name:

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

Yes  No  N/A  Comments:

None; see above.

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

Data quality or usability is not affected.

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

i. Are surrogate/IDA recoveries reported for organic analyses – field, QC and laboratory samples?

Yes  No  N/A  Comments:

Surrogates are reported for GRO, DRO, RRO, and BTEX analytes.

ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods 50-150 %R for field samples and 60-120 %R for QC samples; all other analyses see the laboratory report pages)

Yes  No  N/A  Comments:

iii. Do the sample results with failed surrogate/IDA recoveries have data flags? If so, are the data flags clearly defined?

Yes  No  N/A  Comments:

There were no surrogate recovery failures associated with this work order.

iv. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected; see above.

e. Trip Blanks

i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples? (If not, enter explanation below.)

Yes  No  N/A  Comments:

1213480

Laboratory Report Date:

July 9, 2021

CS Site Name:

ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC?  
(If not, a comment explaining why must be entered below)

Yes  No  N/A  Comments:

Samples were shipped in one cooler. The TB was in the cooler with the project sample.

iii. All results less than LOQ and project specified objectives?

Yes  No  N/A  Comments:

GRO were detected at an estimated concentration of 0.0387 mg/L in the trip blank sample submitted with the order.

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

Comments:

GRO were not detected in the associated project sample; no samples are affected.

v. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected; see above.

f. Field Duplicate

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

Yes  No  N/A  Comments:

Only one project sample was submitted.

ii. Submitted blind to lab?

Yes  No  N/A  Comments:

Only one project sample was submitted.

iii. Precision – All relative percent differences (RPD) less than specified project objectives?  
(Recommended: 30% water, 50% soil)

$$RPD (\%) = \text{Absolute value of: } \frac{(R_1 - R_2)}{((R_1 + R_2) / 2)} \times 100$$

Where R<sub>1</sub> = Sample Concentration  
R<sub>2</sub> = Field Duplicate Concentration

Yes  No  N/A  Comments:

N/A; only one sample was submitted.



1213480

Laboratory Report Date:

July 9, 2021

CS Site Name:

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

Comments:

N/A; see above.

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

Yes  No  N/A  Comments:

Reusable equipment was not used for sample collection. Therefore, decontamination or equipment blank samples were not required. A peri-pump was used to collect the requested analytes.

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

Yes  No  N/A  Comments:

See above.

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

Comments:

N/A; see above.

iii. Data quality or usability affected?

Comments:

No; see above.

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

a. Defined and appropriate?

Yes  No  N/A  Comments:

No additional flags or qualifiers are required.

## ANALYTICAL REPORT

Eurofins TestAmerica, Sacramento  
880 Riverside Parkway  
West Sacramento, CA 95605  
Tel: (916)373-5600

Laboratory Job ID: 320-75271-1  
Client Project/Site: Plume Stop MW

**For:**

Shannon & Wilson, Inc  
2355 Hill Rd.  
Fairbanks, Alaska 99709-5244

Attn: Marcy Nadel



---

*Authorized for release by:  
6/30/2021 10:54:55 AM*

David Alltucker, Project Manager I  
(916)374-4383  
[David.Alltucker@Eurofinset.com](mailto:David.Alltucker@Eurofinset.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:

[www.eurofinsus.com/Env](http://www.eurofinsus.com/Env)

*The test results in this report meet all 2003 NELAC, 2009 TNI, and 2016 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.*

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*



# Table of Contents

Cover Page . . . . .	1
Table of Contents . . . . .	2
Definitions/Glossary . . . . .	3
Case Narrative . . . . .	4
Detection Summary . . . . .	5
Client Sample Results . . . . .	6
Isotope Dilution Summary . . . . .	7
QC Sample Results . . . . .	8
QC Association Summary . . . . .	12
Lab Chronicle . . . . .	13
Certification Summary . . . . .	14
Method Summary . . . . .	15
Sample Summary . . . . .	16
Chain of Custody . . . . .	17
Receipt Checklists . . . . .	18

# Definitions/Glossary

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop MW

Job ID: 320-75271-1

## Qualifiers

### LCMS

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

# Case Narrative

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop MW

Job ID: 320-75271-1

---

**Job ID: 320-75271-1**

---

**Laboratory: Eurofins TestAmerica, Sacramento**

---

## Narrative

---

### Receipt

The sample was received on 6/22/2021 2:38 PM. Unless otherwise noted below, the sample arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 5.4° C.

### LCMS

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

### Organic Prep

Method 3535: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-501199.

Method 3535: The following sample was dark gray prior to extraction: MW-1903-20 (320-75271-1).

Method 3535: The following sample was light yellow prior to extraction: MW-1903-20 (320-75271-1).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

# Detection Summary

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop MW

Job ID: 320-75271-1

**Client Sample ID: MW-1903-20**

**Lab Sample ID: 320-75271-1**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	20		4.6	2.2	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoropentanoic acid (PFPeA)	27		1.8	0.45	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.29	J	1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Sacramento



# Client Sample Results

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop MW

Job ID: 320-75271-1

**Client Sample ID: MW-1903-20**

**Lab Sample ID: 320-75271-1**

Date Collected: 06/17/21 14:00

Matrix: Water

Date Received: 06/22/21 14:38

**Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	20		4.6	2.2	ng/L		06/24/21 04:50	06/24/21 15:16	1
Perfluoropentanoic acid (PFPeA)	27		1.8	0.45	ng/L		06/24/21 04:50	06/24/21 15:16	1
Perfluorohexanoic acid (PFHxA)	ND		1.8	0.53	ng/L		06/24/21 04:50	06/24/21 15:16	1
Perfluoroheptanoic acid (PFHpA)	ND		1.8	0.23	ng/L		06/24/21 04:50	06/24/21 15:16	1
Perfluorooctanoic acid (PFOA)	ND		1.8	0.78	ng/L		06/24/21 04:50	06/24/21 15:16	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.25	ng/L		06/24/21 04:50	06/24/21 15:16	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		06/24/21 04:50	06/24/21 15:16	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	1.0	ng/L		06/24/21 04:50	06/24/21 15:16	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.50	ng/L		06/24/21 04:50	06/24/21 15:16	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		06/24/21 04:50	06/24/21 15:16	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.67	ng/L		06/24/21 04:50	06/24/21 15:16	1
Perfluorobutanesulfonic acid (PFBS)	0.29	J	1.8	0.18	ng/L		06/24/21 04:50	06/24/21 15:16	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.8	0.52	ng/L		06/24/21 04:50	06/24/21 15:16	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		1.8	0.17	ng/L		06/24/21 04:50	06/24/21 15:16	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.8	0.49	ng/L		06/24/21 04:50	06/24/21 15:16	1
Perfluorodecanesulfonic acid (PFDS)	ND		1.8	0.29	ng/L		06/24/21 04:50	06/24/21 15:16	1
Perfluorooctanesulfonamide (FOSA)	ND		1.8	0.89	ng/L		06/24/21 04:50	06/24/21 15:16	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.6	1.1	ng/L		06/24/21 04:50	06/24/21 15:16	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.6	1.2	ng/L		06/24/21 04:50	06/24/21 15:16	1
6:2 FTS	ND		4.6	2.3	ng/L		06/24/21 04:50	06/24/21 15:16	1
8:2 FTS	ND		1.8	0.42	ng/L		06/24/21 04:50	06/24/21 15:16	1
HFPO-DA (GenX)	ND		3.7	1.4	ng/L		06/24/21 04:50	06/24/21 15:16	1
9CI-PF3ONS	ND		1.8	0.22	ng/L		06/24/21 04:50	06/24/21 15:16	1
11CI-PF3OUdS	ND		1.8	0.29	ng/L		06/24/21 04:50	06/24/21 15:16	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.37	ng/L		06/24/21 04:50	06/24/21 15:16	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C8 FOSA	88		50 - 150	06/24/21 04:50	06/24/21 15:16	1
13C4 PFBA	94		50 - 150	06/24/21 04:50	06/24/21 15:16	1
13C5 PFPeA	83		50 - 150	06/24/21 04:50	06/24/21 15:16	1
13C2 PFHxA	93		50 - 150	06/24/21 04:50	06/24/21 15:16	1
13C4 PFHpA	88		50 - 150	06/24/21 04:50	06/24/21 15:16	1
13C4 PFOA	90		50 - 150	06/24/21 04:50	06/24/21 15:16	1
13C5 PFNA	93		50 - 150	06/24/21 04:50	06/24/21 15:16	1
13C2 PFDA	97		50 - 150	06/24/21 04:50	06/24/21 15:16	1
13C2 PFUnA	94		50 - 150	06/24/21 04:50	06/24/21 15:16	1
13C2 PFDoA	93		50 - 150	06/24/21 04:50	06/24/21 15:16	1
13C2 PFTeDA	96		50 - 150	06/24/21 04:50	06/24/21 15:16	1
13C3 PFBS	97		50 - 150	06/24/21 04:50	06/24/21 15:16	1
18O2 PFHxS	83		50 - 150	06/24/21 04:50	06/24/21 15:16	1
13C4 PFOS	82		50 - 150	06/24/21 04:50	06/24/21 15:16	1
d3-NMeFOSAA	101		50 - 150	06/24/21 04:50	06/24/21 15:16	1
d5-NEtFOSAA	93		50 - 150	06/24/21 04:50	06/24/21 15:16	1
M2-6:2 FTS	86		50 - 150	06/24/21 04:50	06/24/21 15:16	1
M2-8:2 FTS	88		50 - 150	06/24/21 04:50	06/24/21 15:16	1
13C3 HFPO-DA	85		50 - 150	06/24/21 04:50	06/24/21 15:16	1

Eurofins TestAmerica, Sacramento

# Isotope Dilution Summary

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop MW

Job ID: 320-75271-1

## Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Matrix: Water

Prep Type: Total/NA

### Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	PFOSA (50-150)	PFBA (50-150)	PFPeA (50-150)	PFHxA (50-150)	C4PFHA (50-150)	PFOA (50-150)	PFNA (50-150)	PFDA (50-150)
320-75271-1	MW-1903-20	88	94	83	93	88	90	93	97
LCS 320-501199/2-A	Lab Control Sample	90	95	84	94	97	93	93	96
LCSD 320-501199/3-A	Lab Control Sample Dup	86	93	85	89	92	93	94	98
MB 320-501199/1-A	Method Blank	92	96	91	90	93	97	97	98

### Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	PFUnA (50-150)	PFDoA (50-150)	PFTDA (50-150)	C3PFBS (50-150)	PFHxS (50-150)	PFOS (50-150)	d3NMFOS (50-150)	d5NEFOS (50-150)
320-75271-1	MW-1903-20	94	93	96	97	83	82	101	93
LCS 320-501199/2-A	Lab Control Sample	92	101	114	107	92	93	98	91
LCSD 320-501199/3-A	Lab Control Sample Dup	94	94	107	103	90	92	96	92
MB 320-501199/1-A	Method Blank	93	97	101	106	91	89	103	92

### Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	M262FTS (50-150)	M282FTS (50-150)	HFPODA (50-150)
320-75271-1	MW-1903-20	86	88	85
LCS 320-501199/2-A	Lab Control Sample	88	90	90
LCSD 320-501199/3-A	Lab Control Sample Dup	98	88	87
MB 320-501199/1-A	Method Blank	98	104	88

#### Surrogate Legend

- PFOSA = 13C8 FOSA
- PFBA = 13C4 PFBA
- PFPeA = 13C5 PFPeA
- PFHxA = 13C2 PFHxA
- C4PFHA = 13C4 PFHpA
- PFOA = 13C4 PFOA
- PFNA = 13C5 PFNA
- PFDA = 13C2 PFDA
- PFUnA = 13C2 PFUnA
- PFDoA = 13C2 PFDoA
- PFTDA = 13C2 PFTeDA
- C3PFBS = 13C3 PFBS
- PFHxS = 18O2 PFHxS
- PFOS = 13C4 PFOS
- d3NMFOS = d3-NMeFOSAA
- d5NEFOS = d5-NEtFOSAA
- M262FTS = M2-6:2 FTS
- M282FTS = M2-8:2 FTS
- HFPODA = 13C3 HFPO-DA



# QC Sample Results

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop MW

Job ID: 320-75271-1

## Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

**Lab Sample ID: MB 320-501199/1-A**  
**Matrix: Water**  
**Analysis Batch: 501370**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 501199**

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Perfluorobutanoic acid (PFBA)	ND		5.0	2.4	ng/L		06/24/21 04:50	06/24/21 14:48	1
Perfluoropentanoic acid (PFPeA)	ND		2.0	0.49	ng/L		06/24/21 04:50	06/24/21 14:48	1
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		06/24/21 04:50	06/24/21 14:48	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		06/24/21 04:50	06/24/21 14:48	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		06/24/21 04:50	06/24/21 14:48	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		06/24/21 04:50	06/24/21 14:48	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		06/24/21 04:50	06/24/21 14:48	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		06/24/21 04:50	06/24/21 14:48	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		06/24/21 04:50	06/24/21 14:48	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		06/24/21 04:50	06/24/21 14:48	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		06/24/21 04:50	06/24/21 14:48	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		06/24/21 04:50	06/24/21 14:48	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		06/24/21 04:50	06/24/21 14:48	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		2.0	0.19	ng/L		06/24/21 04:50	06/24/21 14:48	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		06/24/21 04:50	06/24/21 14:48	1
Perfluorodecanesulfonic acid (PFDS)	ND		2.0	0.32	ng/L		06/24/21 04:50	06/24/21 14:48	1
Perfluorooctanesulfonamide (FOSA)	ND		2.0	0.98	ng/L		06/24/21 04:50	06/24/21 14:48	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		06/24/21 04:50	06/24/21 14:48	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		06/24/21 04:50	06/24/21 14:48	1
6:2 FTS	ND		5.0	2.5	ng/L		06/24/21 04:50	06/24/21 14:48	1
8:2 FTS	ND		2.0	0.46	ng/L		06/24/21 04:50	06/24/21 14:48	1
HFPO-DA (GenX)	ND		4.0	1.5	ng/L		06/24/21 04:50	06/24/21 14:48	1
9CI-PF3ONS	ND		2.0	0.24	ng/L		06/24/21 04:50	06/24/21 14:48	1
11CI-PF3OUdS	ND		2.0	0.32	ng/L		06/24/21 04:50	06/24/21 14:48	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		06/24/21 04:50	06/24/21 14:48	1

Isotope Dilution	MB	MB	Limits	Prepared	Analyzed	Dil Fac
	%Recovery	Qualifier				
13C8 FOSA	92		50 - 150	06/24/21 04:50	06/24/21 14:48	1
13C4 PFBA	96		50 - 150	06/24/21 04:50	06/24/21 14:48	1
13C5 PFPeA	91		50 - 150	06/24/21 04:50	06/24/21 14:48	1
13C2 PFHxA	90		50 - 150	06/24/21 04:50	06/24/21 14:48	1
13C4 PFHpA	93		50 - 150	06/24/21 04:50	06/24/21 14:48	1
13C4 PFOA	97		50 - 150	06/24/21 04:50	06/24/21 14:48	1
13C5 PFNA	97		50 - 150	06/24/21 04:50	06/24/21 14:48	1
13C2 PFDA	98		50 - 150	06/24/21 04:50	06/24/21 14:48	1
13C2 PFUnA	93		50 - 150	06/24/21 04:50	06/24/21 14:48	1
13C2 PFDoA	97		50 - 150	06/24/21 04:50	06/24/21 14:48	1
13C2 PFTeDA	101		50 - 150	06/24/21 04:50	06/24/21 14:48	1
13C3 PFBS	106		50 - 150	06/24/21 04:50	06/24/21 14:48	1
18O2 PFHxS	91		50 - 150	06/24/21 04:50	06/24/21 14:48	1
13C4 PFOS	89		50 - 150	06/24/21 04:50	06/24/21 14:48	1
d3-NMeFOSAA	103		50 - 150	06/24/21 04:50	06/24/21 14:48	1
d5-NEtFOSAA	92		50 - 150	06/24/21 04:50	06/24/21 14:48	1
M2-6:2 FTS	98		50 - 150	06/24/21 04:50	06/24/21 14:48	1
M2-8:2 FTS	104		50 - 150	06/24/21 04:50	06/24/21 14:48	1

Eurofins TestAmerica, Sacramento

# QC Sample Results

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop MW

Job ID: 320-75271-1

## Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

**Lab Sample ID: MB 320-501199/1-A**  
**Matrix: Water**  
**Analysis Batch: 501370**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 501199**

Isotope Dilution	MB MB		Limits	Prepared	Analyzed	Dil Fac
	%Recovery	Qualifier				
13C3 HFPO-DA	88		50 - 150	06/24/21 04:50	06/24/21 14:48	1

**Lab Sample ID: LCS 320-501199/2-A**  
**Matrix: Water**  
**Analysis Batch: 501370**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 501199**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec.
							Limits
Perfluorobutanoic acid (PFBA)	40.0	41.2		ng/L		103	73 - 129
Perfluoropentanoic acid (PFPeA)	40.0	47.8		ng/L		120	72 - 129
Perfluorohexanoic acid (PFHxA)	40.0	42.0		ng/L		105	72 - 129
Perfluoroheptanoic acid (PFHpA)	40.0	42.4		ng/L		106	72 - 130
Perfluorooctanoic acid (PFOA)	40.0	42.7		ng/L		107	71 - 133
Perfluorononanoic acid (PFNA)	40.0	44.0		ng/L		110	69 - 130
Perfluorodecanoic acid (PFDA)	40.0	43.4		ng/L		108	71 - 129
Perfluoroundecanoic acid (PFUnA)	40.0	46.1		ng/L		115	69 - 133
Perfluorododecanoic acid (PFDoA)	40.0	41.5		ng/L		104	72 - 134
Perfluorotridecanoic acid (PFTriA)	40.0	43.4		ng/L		109	65 - 144
Perfluorotetradecanoic acid (PFTeA)	40.0	42.4		ng/L		106	71 - 132
Perfluorobutanesulfonic acid (PFBS)	35.4	32.1		ng/L		91	72 - 130
Perfluorohexanesulfonic acid (PFHxS)	36.4	38.6		ng/L		106	68 - 131
Perfluoroheptanesulfonic Acid (PFHpS)	38.1	40.0		ng/L		105	69 - 134
Perfluorooctanesulfonic acid (PFOS)	37.1	40.9		ng/L		110	65 - 140
Perfluorodecanesulfonic acid (PFDS)	38.6	41.1		ng/L		107	53 - 142
Perfluorooctanesulfonamide (FOSA)	40.0	43.3		ng/L		108	67 - 137
6:2 FTS	37.9	43.9		ng/L		116	64 - 140
8:2 FTS	38.3	42.4		ng/L		111	67 - 138
HFPO-DA (GenX)	40.0	41.4		ng/L		104	72 - 132
9CI-PF3ONS	37.3	41.7		ng/L		112	77 - 137
11CI-PF3OUdS	37.7	42.2		ng/L		112	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.7	40.8		ng/L		108	81 - 141

Isotope Dilution	LCS LCS		Limits
	%Recovery	Qualifier	
13C8 FOSA	90		50 - 150
13C4 PFBA	95		50 - 150
13C5 PFPeA	84		50 - 150
13C2 PFHxA	94		50 - 150
13C4 PFHpA	97		50 - 150
13C4 PFOA	93		50 - 150
13C5 PFNA	93		50 - 150
13C2 PFDA	96		50 - 150
13C2 PFUnA	92		50 - 150

Eurofins TestAmerica, Sacramento

# QC Sample Results

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop MW

Job ID: 320-75271-1

## Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

**Lab Sample ID: LCS 320-501199/2-A**  
**Matrix: Water**  
**Analysis Batch: 501370**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 501199**

<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
13C2 PFDoA	101		50 - 150
13C2 PFTeDA	114		50 - 150
13C3 PFBS	107		50 - 150
18O2 PFHxS	92		50 - 150
13C4 PFOS	93		50 - 150
d3-NMeFOSAA	98		50 - 150
d5-NEtFOSAA	91		50 - 150
M2-6:2 FTS	88		50 - 150
M2-8:2 FTS	90		50 - 150
13C3 HFPO-DA	90		50 - 150

**Lab Sample ID: LCSD 320-501199/3-A**  
**Matrix: Water**  
**Analysis Batch: 501370**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 501199**

<i>Analyte</i>	<i>Spike Added</i>	<i>LCSD Result</i>	<i>LCSD Qualifier</i>	<i>Unit</i>	<i>D</i>	<i>%Rec</i>	<i>%Rec. Limits</i>	<i>RPD</i>	<i>RPD Limit</i>
Perfluorobutanoic acid (PFBA)	40.0	40.3		ng/L		101	73 - 129	2	30
Perfluoropentanoic acid (PFPeA)	40.0	47.5		ng/L		119	72 - 129	1	30
Perfluorohexanoic acid (PFHxA)	40.0	42.3		ng/L		106	72 - 129	1	30
Perfluoroheptanoic acid (PFHpA)	40.0	41.9		ng/L		105	72 - 130	1	30
Perfluorooctanoic acid (PFOA)	40.0	38.0		ng/L		95	71 - 133	12	30
Perfluorononanoic acid (PFNA)	40.0	43.0		ng/L		107	69 - 130	2	30
Perfluorodecanoic acid (PFDA)	40.0	41.7		ng/L		104	71 - 129	4	30
Perfluoroundecanoic acid (PFUnA)	40.0	46.9		ng/L		117	69 - 133	2	30
Perfluorododecanoic acid (PFDoA)	40.0	43.4		ng/L		108	72 - 134	4	30
Perfluorotridecanoic acid (PFTriA)	40.0	44.0		ng/L		110	65 - 144	1	30
Perfluorotetradecanoic acid (PFTeA)	40.0	44.4		ng/L		111	71 - 132	5	30
Perfluorobutanesulfonic acid (PFBS)	35.4	31.7		ng/L		90	72 - 130	1	30
Perfluorohexanesulfonic acid (PFHxS)	36.4	41.0		ng/L		113	68 - 131	6	30
Perfluoroheptanesulfonic Acid (PFHpS)	38.1	40.6		ng/L		107	69 - 134	2	30
Perfluorooctanesulfonic acid (PFOS)	37.1	39.8		ng/L		107	65 - 140	3	30
Perfluorodecanesulfonic acid (PFDS)	38.6	43.0		ng/L		112	53 - 142	5	30
Perfluorooctanesulfonamide (FOSA)	40.0	43.2		ng/L		108	67 - 137	0	30
6:2 FTS	37.9	37.7		ng/L		99	64 - 140	15	30
8:2 FTS	38.3	45.2		ng/L		118	67 - 138	6	30
HFPO-DA (GenX)	40.0	43.5		ng/L		109	72 - 132	5	30
9CI-PF3ONS	37.3	42.3		ng/L		114	77 - 137	1	30
11CI-PF3OUdS	37.7	42.7		ng/L		113	76 - 136	1	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.7	39.3		ng/L		104	81 - 141	4	30

# QC Sample Results

Client: Shannon & Wilson, Inc  
 Project/Site: Plume Stop MW

Job ID: 320-75271-1

## Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

<i>Isotope Dilution</i>	<i>LCS D LCS D</i>		<i>Limits</i>
	<i>%Recovery</i>	<i>Qualifier</i>	
13C8 FOSA	86		50 - 150
13C4 PFBA	93		50 - 150
13C5 PFPeA	85		50 - 150
13C2 PFHxA	89		50 - 150
13C4 PFHpA	92		50 - 150
13C4 PFOA	93		50 - 150
13C5 PFNA	94		50 - 150
13C2 PFDA	98		50 - 150
13C2 PFUnA	94		50 - 150
13C2 PFDoA	94		50 - 150
13C2 PFTeDA	107		50 - 150
13C3 PFBS	103		50 - 150
18O2 PFHxS	90		50 - 150
13C4 PFOS	92		50 - 150
d3-NMeFOSAA	96		50 - 150
d5-NEtFOSAA	92		50 - 150
M2-6:2 FTS	98		50 - 150
M2-8:2 FTS	88		50 - 150
13C3 HFPO-DA	87		50 - 150



# QC Association Summary

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop MW

Job ID: 320-75271-1

## LCMS

### Prep Batch: 501199

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-75271-1	MW-1903-20	Total/NA	Water	3535	
MB 320-501199/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-501199/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-501199/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

### Analysis Batch: 501370

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-75271-1	MW-1903-20	Total/NA	Water	EPA 537(Mod)	501199
MB 320-501199/1-A	Method Blank	Total/NA	Water	EPA 537(Mod)	501199
LCS 320-501199/2-A	Lab Control Sample	Total/NA	Water	EPA 537(Mod)	501199
LCSD 320-501199/3-A	Lab Control Sample Dup	Total/NA	Water	EPA 537(Mod)	501199

# Lab Chronicle

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop MW

Job ID: 320-75271-1

**Client Sample ID: MW-1903-20**

**Lab Sample ID: 320-75271-1**

**Date Collected: 06/17/21 14:00**

**Matrix: Water**

**Date Received: 06/22/21 14:38**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			273.8 mL	10.0 mL	501199	06/24/21 04:50	HK	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			501370	06/24/21 15:16	S1M	TAL SAC

**Laboratory References:**

TAL SAC = Eurofins TestAmerica, Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600



# Accreditation/Certification Summary

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop MW

Job ID: 320-75271-1

## Laboratory: Eurofins TestAmerica, Sacramento

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	17-020	02-20-24

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

# Method Summary

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop MW

Job ID: 320-75271-1

Method	Method Description	Protocol	Laboratory
EPA 537(Mod) 3535	PFAS for QSM 5.3, Table B-15 Solid-Phase Extraction (SPE)	EPA SW846	TAL SAC TAL SAC

**Protocol References:**

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

**Laboratory References:**

TAL SAC = Eurofins TestAmerica, Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600





# Sample Summary

Client: Shannon & Wilson, Inc  
Project/Site: Plume Stop MW

Job ID: 320-75271-1

---

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
320-75271-1	MW-1903-20	Water	06/17/21 14:00	06/22/21 14:38	

---

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

# CHAIN-OF-CUSTODY RECORD

Analytical Methods (include preservative if used)

Turn Around Time:  
 Normal  Rush  
 Please Specify

Quote No.:  
 MSA Number:  
 J-Flags:  Yes  No

Total Number of Containers: 5371  
PFAS x 25

Remarks/Matrix Composition/Grab? Sample Containers

Sample Identity	Lab No.	Time	Date Sampled	Remarks/Matrix Composition/Grab? Sample Containers
<u>MW-1903-20</u>		<u>14:00</u>	<u>6/17/21</u>	<u>2 Groundwater Grab Sample</u>



**Project Information**  
 Number: 102519-005  
 Name: Plume Stop MW  
 Contact: Marcy Nadel  
 Ongoing Project? Yes  No   
 Sampler: VTY

**Sample Receipt**  
 Total No. of Containers: 2  
 COC Seals/Intact? Y/N/NA Y  
 Received Good Cond /Cold Y  
 Temp: 5.0  
 Delivery Method: AK Air Cargo

**Notes:**

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: <u>Adam Wyborny</u> Printed Name: <u>Adam Wyborny</u> Company: <u>Shannon &amp; Wilson, Inc.</u>	Signature: _____ Printed Name: _____ Company: _____	Signature: _____ Printed Name: _____ Company: _____
Time: <u>11:00</u> Date: <u>6/21/21</u>	Time: _____ Date: _____	Time: _____ Date: _____
Received By: <u>[Signature]</u> Time: <u>11:36</u> Date: <u>6/21/21</u>	Received By: <u>[Signature]</u> Time: _____ Date: _____	Received By: <u>[Signature]</u> Time: _____ Date: _____

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

## Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-75271-1

**Login Number: 75271**

**List Source: Eurofins TestAmerica, Sacramento**

**List Number: 1**

**Creator: Her, David A**

Question	Answer	Comment
Radioactivity wasn't checked or is <math>\leq</math> background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	Seals
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	Only gel packs
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

## Laboratory Data Review Checklist

Completed By:

Rachel Willis

Title:

Environmental Scientist

Date:

July 12, 2021

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

Eurofins / TestAmerica Laboratories, Inc. (TestAmerica)

Laboratory Report Number:

320-75271-1

Laboratory Report Date:

June 30, 2021

CS Site Name:

DOT&PF Fairbanks International PFAS PlumeStop Monitoring

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-75271-1

Laboratory Report Date:

June 30, 2021

CS Site Name:

**Note: Any N/A or No box checked must have an explanation in the comments box.**

1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

Yes  No  N/A  Comments:

The DEC certified TestAmerica of West Sacramento, CA for the analysis of per- and polyfluorinated alkyl substances (PFAS) on February 11, 2021 by PFAS by LCMSMS compliant with QSM Version 5.3 Table B-15. These reported analytes were included in the DEC’s Contaminated Sites Laboratory Approval 17-020.

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  N/A  Comments:

The requested analyses were conducted by TestAmerica of West Sacramento, CA.

2. Chain of Custody (CoC)

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

Yes  No  N/A  Comments:

b. Correct analyses requested?

Yes  No  N/A  Comments:

3. Laboratory Sample Receipt Documentation

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

Yes  No  N/A  Comments:

b. Sample preservation acceptable – acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

Yes  No  N/A  Comments:

Samples do not require preservation other than temperature.

320-75271-1

Laboratory Report Date:

June 30, 2021

CS Site Name:

c. Sample condition documented – broken, leaking (Methanol), zero headspace (VOC vials)?

Yes  No  N/A  Comments:

The sample receipt form notes that the samples were received in good condition.

d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

Yes  No  N/A  Comments:

The sample receipt form notes no discrepancies.

e. Data quality or usability affected?

Comments:

Data quality and/or usability are not affected.

#### 4. Case Narrative

a. Present and understandable?

Yes  No  N/A  Comments:

b. Discrepancies, errors, or QC failures identified by the lab?

Yes  No  N/A  Comments:

The case narrative indicates that there was insufficient volume to complete a matrix spike or matrix spike duplicate sample in the prep batch associated with the project sample.

c. Were all corrective actions documented?

Yes  No  N/A  Comments:

No corrective actions necessary.

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

Comments:

The results are unaffected; see the following sections for additional information.

320-75271-1

Laboratory Report Date:

June 30, 2021

CS Site Name:

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

Yes  No  N/A  Comments:

b. All applicable holding times met?

Yes  No  N/A  Comments:

c. All soils reported on a dry weight basis?

Yes  No  N/A  Comments:

Soil samples were not included with this work order.

d. Are the reported LOQs less than the Cleanup Level or the minimum required detection level for the project?

Yes  No  N/A  Comments:

e. Data quality or usability affected?

Data quality or usability are not affected.

6. QC Samples

a. Method Blank

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

Yes  No  N/A  Comments:

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

Yes  No  N/A  Comments:

320-75271-1

Laboratory Report Date:

June 30, 2021

CS Site Name:

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

Comments:

N/A; see above.

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

Yes  No  N/A  Comments:

See above.

v. Data quality or usability affected?

Comments:

No; 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  N/A  Comments:

ii. Metals/Inorganics – one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes  No  N/A  Comments:

Metals and/or inorganics were not analyzed as part of this work order.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes  No  N/A  Comments:

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from LCS/LCSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes  No  N/A  Comments:



320-75271-1

Laboratory Report Date:

June 30, 2021

CS Site Name:

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

Comments:

None; see above.

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

Yes  No  N/A  Comments:

N/A; see above.

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

The data quality and/or usability were not affected; see above.

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

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

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

Yes  No  N/A  Comments:

The laboratory reports there was insufficient sample volume to perform a MS/MSD. Accuracy and precision for the project sample will be evaluated with the LCS/LCSD samples.

ii. Metals/Inorganics – one MS and one MSD reported per matrix, analysis and 20 samples?

Yes  No  N/A  Comments:

Metals and/or inorganics were not analyzed as part of this work order.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable?

Yes  No  N/A  Comments:

See above.

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from MS/MSD, and or sample/sample duplicate.

Yes  No  N/A  Comments:

See above.

320-75271-1

Laboratory Report Date:

June 30, 2021

CS Site Name:

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

Comments:

None; see above.

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

Yes  No  N/A  Comments:

See above.

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

Data quality or usability is not affected.

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

i. Are surrogate/IDA recoveries reported for organic analyses – field, QC and laboratory samples?

Yes  No  N/A  Comments:

ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods 50-150 %R for field samples and 60-120 %R for QC samples; all other analyses see the laboratory report pages)

Yes  No  N/A  Comments:

iii. Do the sample results with failed surrogate/IDA recoveries have data flags? If so, are the data flags clearly defined?

Yes  No  N/A  Comments:

There were no IDA recovery failures associated with this work order.

iv. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected; see above.

320-75271-1

Laboratory Report Date:

June 30, 2021

CS Site Name:

e. Trip Blanks

- i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples?  
(If not, enter explanation below.)

Yes  No  N/A  Comments:

PFAS are not volatile compounds. A trip blank is not required for the requested analysis.

- ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC?  
(If not, a comment explaining why must be entered below)

Yes  No  N/A  Comments:

A trip blank is not required for the requested analysis.

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

Yes  No  N/A  Comments:

A trip blank is not required for the requested analysis.

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

Comments:

A trip blank is not required for the requested analysis.

- v. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected; see above.

f. Field Duplicate

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

Yes  No  N/A  Comments:

Only one project sample was submitted.

- ii. Submitted blind to lab?

Yes  No  N/A  Comments:

Only one project sample was submitted.

320-75271-1

Laboratory Report Date:

June 30, 2021

CS Site Name:

iii. Precision – All relative percent differences (RPD) less than specified project objectives? (Recommended: 30% water, 50% soil)

$$RPD (\%) = \text{Absolute value of: } \frac{(R_1 - R_2)}{((R_1 + R_2) / 2)} \times 100$$

Where R<sub>1</sub> = Sample Concentration  
R<sub>2</sub> = Field Duplicate Concentration

Yes  No  N/A  Comments:

N/A; only one sample was submitted.

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

Comments:

N/A; see above.

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

Yes  No  N/A  Comments:

Reusable equipment was not used for sample collection. Therefore, decontamination or equipment blank samples were not required. A peri-pump was used to collect the requested analytes.

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

Yes  No  N/A  Comments:

See above.

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

Comments:

N/A; see above.

iii. Data quality or usability affected?

Comments:

No; see above.

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

a. Defined and appropriate?

Yes  No  N/A  Comments:

No additional flags or qualifiers are required.

320-75271-1

Laboratory Report Date:

June 30, 2021

CS Site Name:



## Solution Brief

# EnviroFlux Passive Flux Meter

Groundwater sampling that provides the whole picture

### Key Benefits

- Green Technology – No electrical power or pumping required.
- Simultaneous evaluation of both water and contaminant fluxes under natural gradient conditions.
- Cumulative measurement of contaminant flux, making the results less sensitive to daily fluctuations in groundwater flow or contaminant concentrations.
- Only two site visits required.
- Measurement of vertical variations in horizontal fluxes.
- Precise prior knowledge about local aquifer hydraulic conductivities not required.
- Wide range of contaminant analysis.
- USEPA approved technology.

### The Challenge

While groundwater samples will provide localized contaminant concentration data, they provide no insight into whether (or how fast) the contaminants are migrating to other areas of the groundwater system.

### The Solution

EnviroFlux Passive Flux Meters reveal the complexities of contaminant plume behavior, providing both contaminant mass flux and groundwater flow data.

The EnviroFlux Passive Flux Meter® (PFM) is a nylon mesh tube filled with a sorbent/tracer mixture. The PFMs are inserted into groundwater monitoring wells where they passively intercept groundwater flow.

After a specified period of exposure to groundwater flow (usually one to four weeks), the PFM is removed from the well or boring. The sorbent is then extracted to quantify (a) the mass of all contaminants intercepted by the PFM and (b) the residual masses of all resident tracers.

The contaminant masses are used to calculate time-averaged contaminant fluxes, while residual resident tracer masses are used to calculate cumulative groundwater flux. Depth variations of both water and contaminant mass fluxes are measured by a single PFM by vertically segmenting the exposed sorbent mixture and analyzing for resident tracers and contaminants. Thus, the PFM provides a vertical profile of horizontal fluxes.

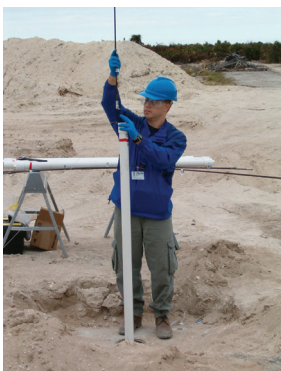


Figure 1) Installing a PFM

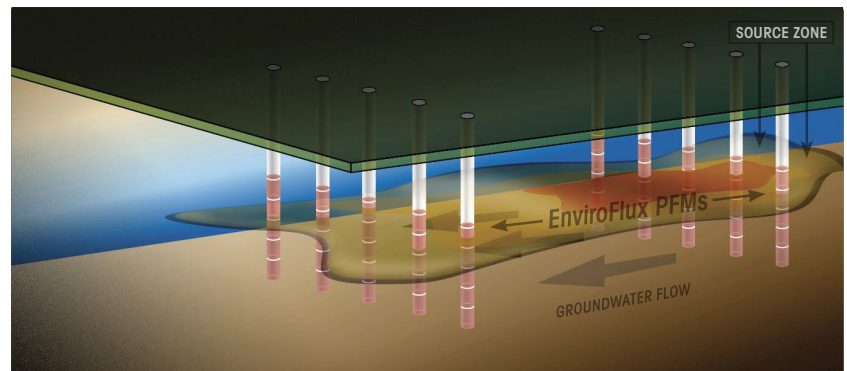


Figure 2) EnviroFlux PFMs are commonly used for site characterization

## Applications

### Mass Flux Based Approach to Site Management:

#### Performance Assessment

Alternative measure of remedial objectives. Reduce mass flux to meet conditions acceptable for site management. Evaluate and compare the pre- and post-remediation mass flux values.

#### Flux-based Natural Attenuation Assessment (mass balance)

Mass flux is useful in assessing the effectiveness of the natural attenuation process. Contaminant mass reduction can be calculated using the differences in total contaminant mass flux across two cross-sections of the contaminant plume.

#### Remedial Design Optimization (target high mass flux zones)

In situ measurements of contaminant flux generate critical data which can be used to optimize the design and assess the performance of proposed remedial systems.

#### Risk Assessment

The concept of risk-based decision making involves using more realistic exposure scenarios and factors to evaluate the relative risks of contaminants to human health and the environment. Depending on these risks, appropriate action may include site closure, monitoring and data collection, active or passive remediation, or institutional controls. Mass flux measurements can be used on the front end to quantify this risk.

#### Site Characterization

Incorporate mass flux measurements into initial site characterization efforts to improve decision making when developing the overall site strategy.

## Services

EnviroFlux offers our clients a turnkey mass flux analysis service. A typical PFM project includes the following steps:

#### Site characterization consultation

- Decide on the number of PFMs based on the monitoring well configuration and screen lengths (PFMs are typically 5 feet long).
- Determine the desired vertical resolution (for example one foot resolution).
- Provide EnviroFlux with well diameters, well construction material (i.e. PVC or stainless steel), and depth to the target well screens.
- Provide EnviroFlux a list of contaminants of interest.

#### Installation, retrieval, and sampling of PFMs

The PFMs are installed, retrieved, and sampled by the client. The PFMs are usually left in the monitoring wells from one to four weeks. In most cases the installation and retrieval/sampling of the PFMs each require only one-day site visits.

#### Lab analysis

The samples are sent to EnviroFlux and analyzed to determine the concentration of contaminants absorbed into the PFM and the amount of tracers leached from the PFM.

#### Report

EnviroFlux provides a detailed data report indicating the mass flux results for all of the zones in which the PFMs were deployed.

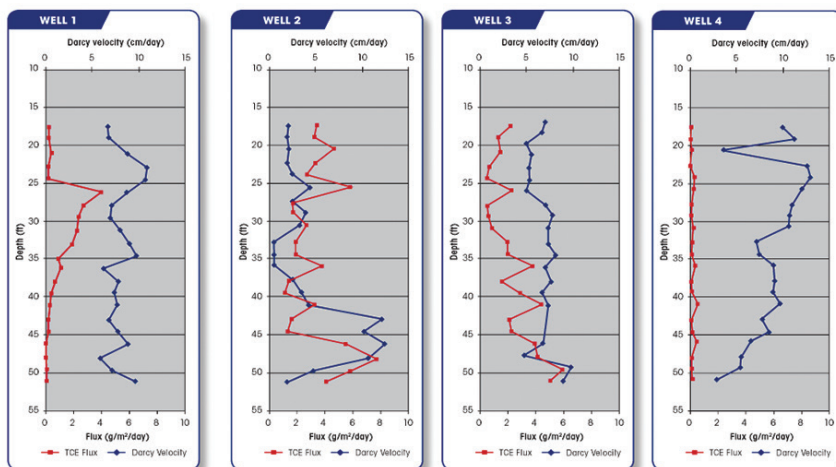


Figure 3) PFM Contaminant Mass Flux Results

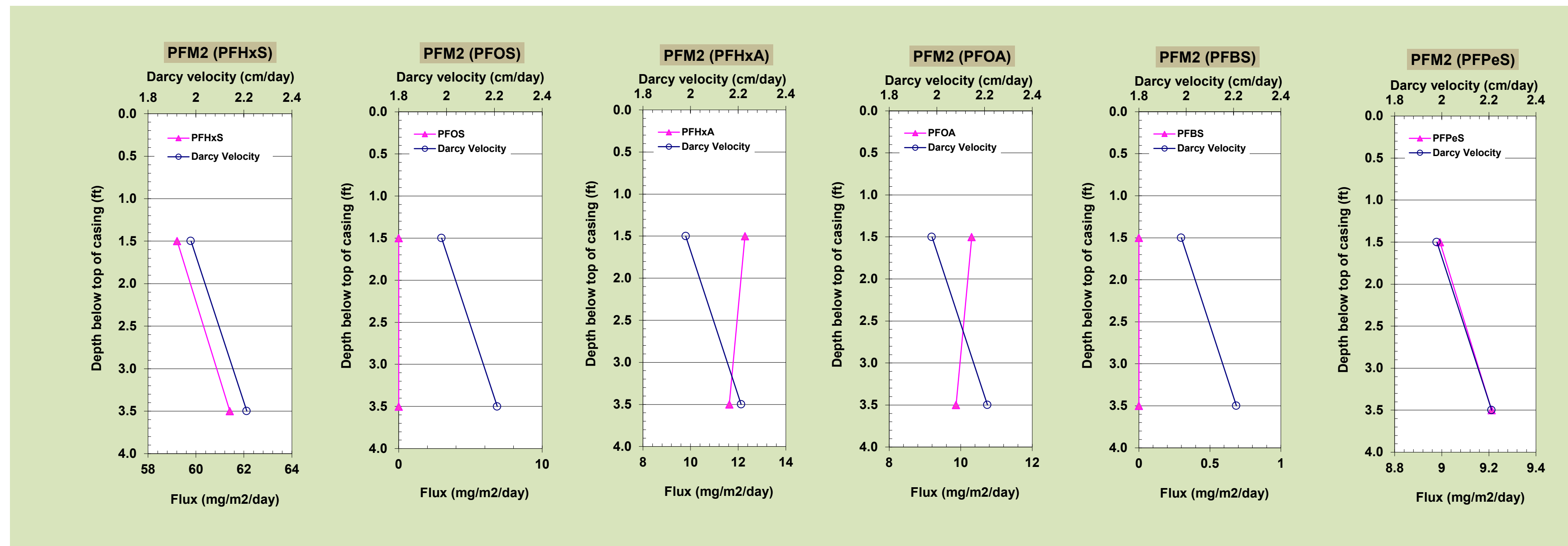
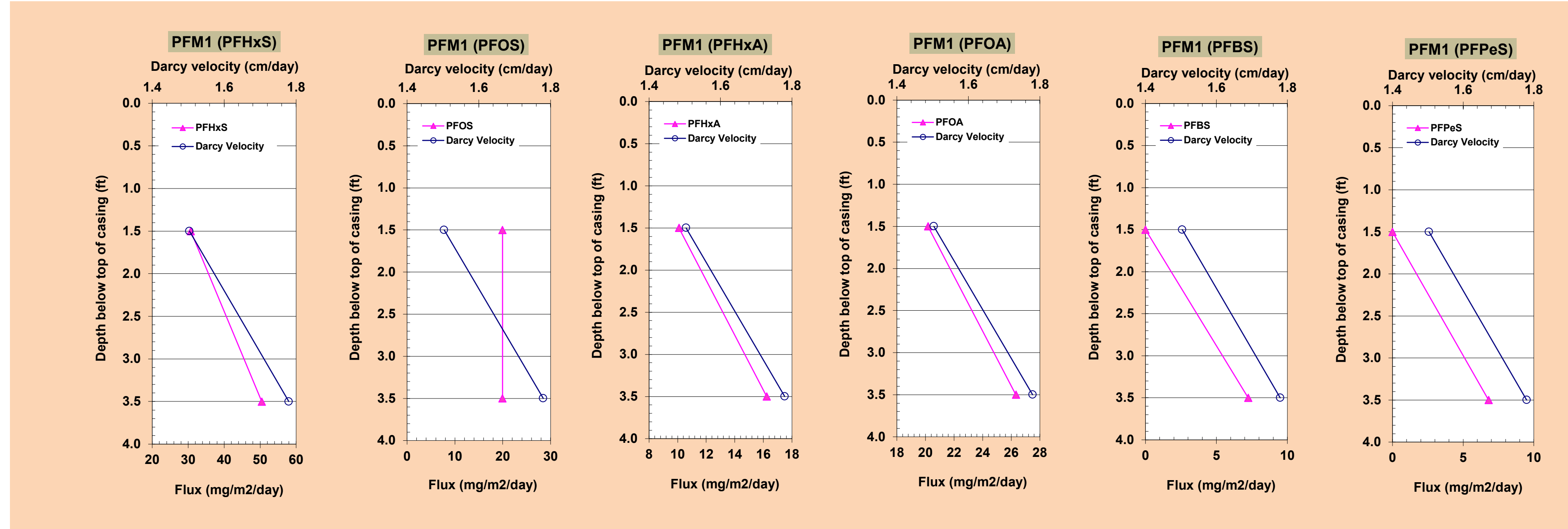
Table1. Summary of flux values for each well

Sample_ID	Depth below top of well casing (ft)	Darcy Velocity (cm/day)	PFHxS flux (ug/m^2/day)	PFOS flux (ug/m^2/day)	PFHxA flux (ug/m^2/day)	PFOA flux (ug/m^2/day)	PFBS flux (ug/m^2/day)	PFPeS flux (ug/m^2/day)
PFM1-03&04	1.5	1.5	30.7	20.0	10.1	20.2	0.0	0.0
PFM1-01&02	3.5	1.8	50.4	20.0	16.2	26.3	7.2	6.8
PFM2-03&04	1.5	2.0	59.2	0.0	12.3	10.3	0.0	9.0
PFM2-01&02	3.5	2.2	61.4	0.0	11.6	9.9	0.0	9.2

Perfluorohexane sulfonic acid (PFHxS)  
 Perfluorooctane sulfonic acid (PFOS)  
 Perfluorohexanoic acid (PFHxA)  
 Perfluorooctanoic acid (PFOA)  
 Perfluorobutane sulfonic acid (PFBS)  
 Perfluoropentane sulfonic acid (PFPeS)

Table2. Summary of flux average contaminant concentration

Sample_ID	Depth below top of well casing (ft)	Darcy Velocity (cm/day)	PFHxS (ng/L)	PFOS (ng/L)	PFHxA (ng/L)	PFOA (ng/L)	PFBS (ng/L)	PFPeS (ng/L)
PFM1-03&04	1.5	1.5	2042	1327	671	1342	0	0
PFM1-01&02	3.5	1.8	2834	1121	912	1479	407	382
PFM2-03&04	1.5	2.0	2992	0	620	521	0	454
PFM2-01&02	3.5	2.2	2776	0	525	446	0	416





**Table 3. Mass discharge per unit width for aquifer of each well**

Well	Darcy Velocity (cm/day)	PFHxS (ug/m/day)	PFOS (ug/m/day)	PFHxA (ug/m/day)	PFOA (ug/m/day)	PFBS (ug/m/day)	PFPeS (ug/m/day)
PFM1	1.6	61.8	30.4	20.1	35.4	5.5	5.2
PFM2	2.1	91.9	0.0	18.2	15.4	0.0	13.9

**Table 4. Well average values of mass flux based on PFMs**

Well	Darcy Velocity (cm/day)	PFHxS flux (ug/m <sup>2</sup> /day)	PFOS flux (ug/m <sup>2</sup> /day)	PFHxA flux (ug/m <sup>2</sup> /day)	PFOA flux (ug/m <sup>2</sup> /day)	PFBS flux (ug/m <sup>2</sup> /day)	PFPeS flux (ug/m <sup>2</sup> /day)
PFM1	1.6	40.6	20.0	13.2	23.2	3.6	3.4
PFM2	2.1	60.3	0.0	12.0	10.1	0.0	9.1

**Table 5. Flux average contaminant concentration**

Well	Darcy Velocity (cm/day)	PFHxS (ng/L)	PFOS (ng/L)	PFHxA (ng/L)	PFOA (ng/L)	PFBS (ng/L)	PFPeS (ng/L)
PFM1	1.6	2438	1224	791	1410	203	191
PFM2	2.1	2884	0	573	483	0	435

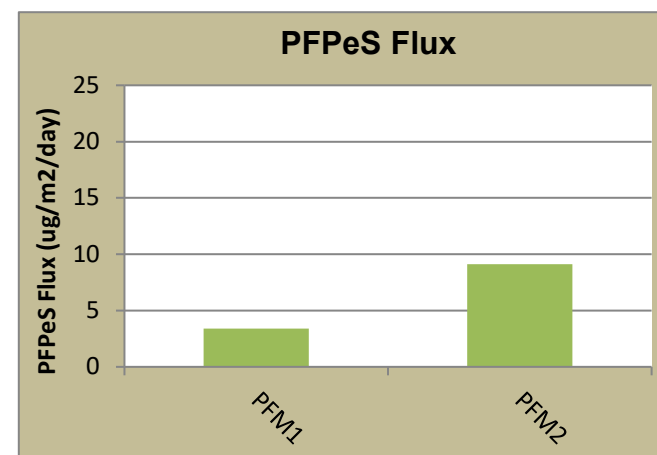
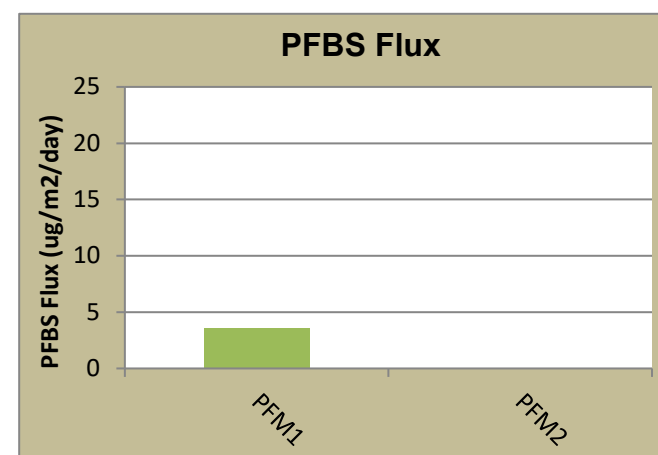
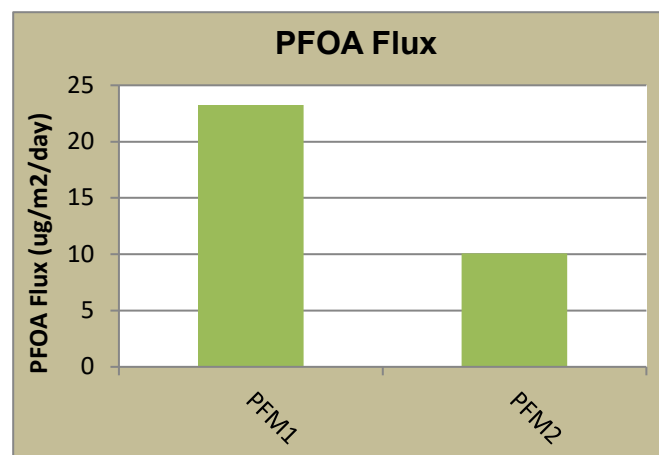
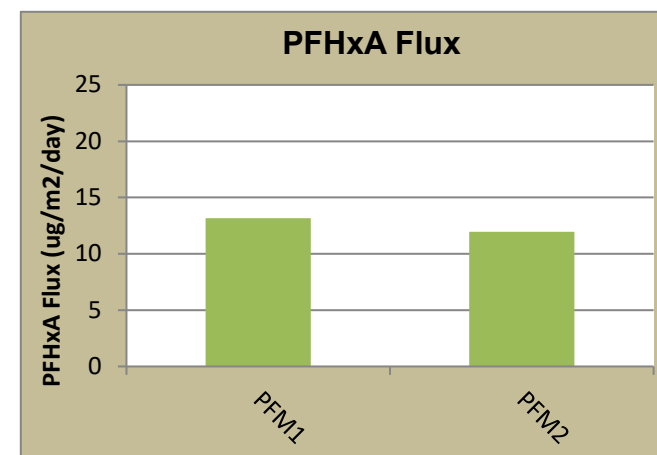
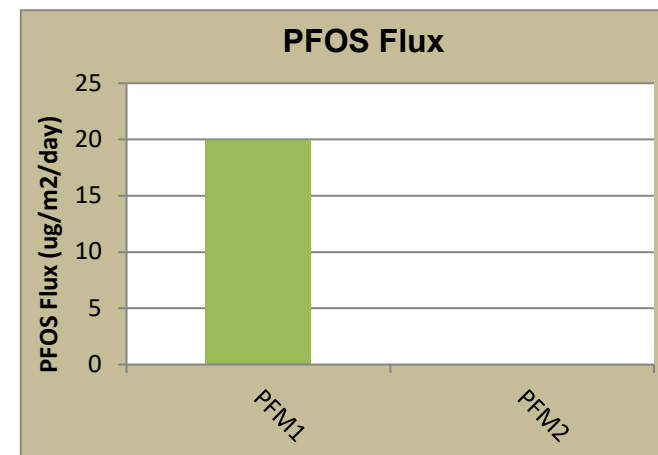
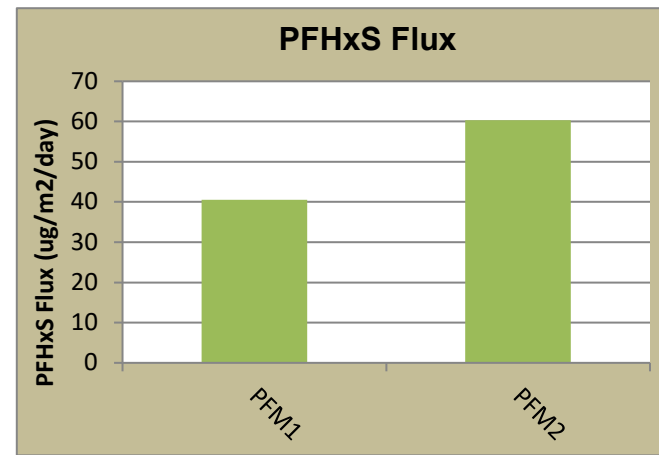
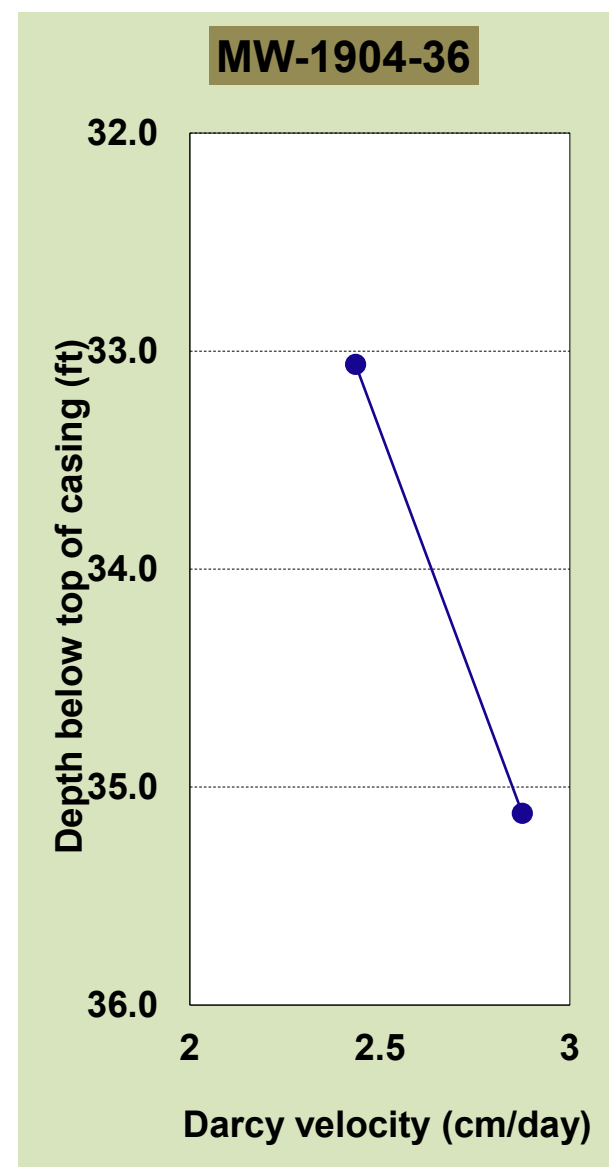
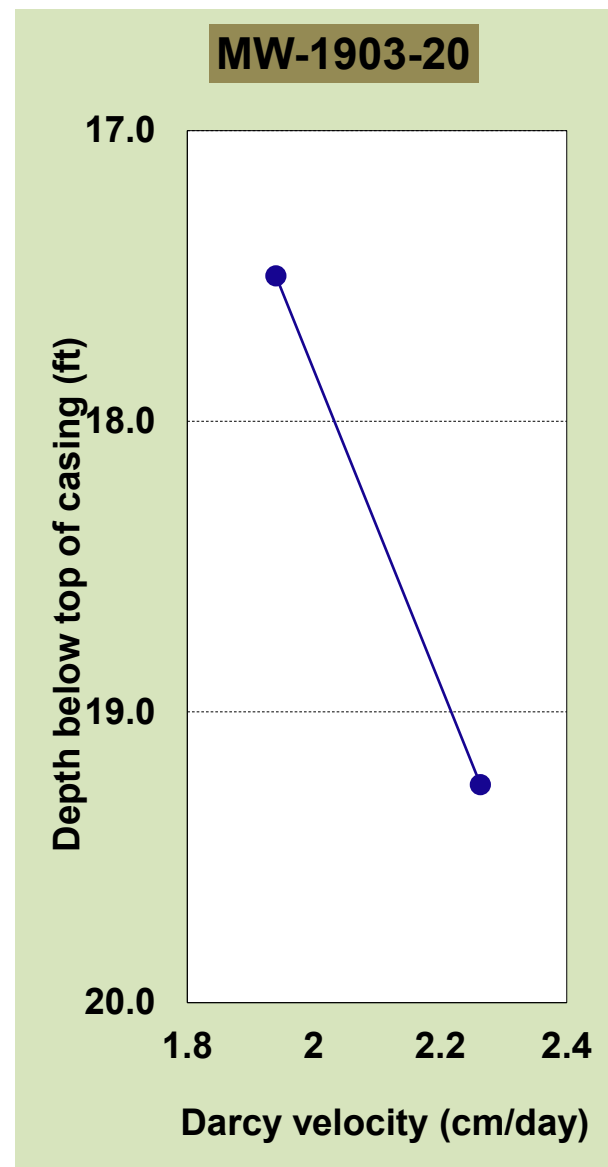


Table. Summary of Darcy velocity for each well

Well_ID	Sample_ID	Approximate depth below top of well casing (distance from top of well casing to segment midpoint) (ft)	Darcy Velocity (cm/day)	PFM Sample Range (ft BGS)
MW-1903-20	PFM1-03	17.50	1.9	16.37' to 18.12'
	PFM1-01	19.25	2.3	18.37' to 20.12'
MW-1904-36	PFM2-03	33.06	2.4	31.99' to 34.12'
	PFM2-01	35.12	2.9	34.32' to 35.92'



Appendix D

# Groundwater Gradient Documents

APPENDIX D: GROUNDWATER GRADIENT DOCUMENTS

**Table D-1: Groundwater Gradient Calculation Data**

Well Name	Measurement Date	Top-of casing Elevation*	Depth to Water	Groundwater Elevation
MW-1903-20	10/29/2019	102.73	7.58	95.15
TWP-1		104.17	8.82	95.35
TWP-2		104.70	9.18	95.52
MW-1903-20	12/15/2019	102.73	7.31	95.42
TWP-1		104.17	8.54	95.63
TWP-2		104.70	8.85	95.85
MW-1903-20	2/18/2020	102.73	8.20	94.53
TWP-1		104.17	9.30	94.87
TWP-2		104.70	9.70	95.00
MW-1903-20	3/12/2020	102.73	8.53	94.20
TWP-1		104.17	9.54	94.63
TWP-2		104.70	10.00	94.70
MW-1903-20	9/17/2020	102.73	5.59	97.14
TWP-1		104.17	6.59	97.58
TWP-2		104.70	7.09	97.61
MW-1903-20	12/22/2020	102.73	6.80	95.93
TWP-1		104.17	7.79	96.38
TWP-2		104.70	8.34	96.36
MW-1903-20	3/16/2021	102.73	7.90	94.83
TWP-1		104.63	9.37	95.26
TWP-2		105.22	9.87	95.35

## Notes:

Measurements are in feet.

\*Elevations are relative to the height of the level. Base ground surface elevation is adjusted to 100 feet.

Appendix E

# PlumeStop® Documents

Injection Information

## CONTENTS

- Regensis 2019 Summary Report
- PlumeStop® Injection Photo Log

December 5, 2019

Marcy Nadel  
Shannon and Wilson, Inc.  
2355 Hill Road  
Fairbanks, AK 99709

**SUBJECT: Application Summary Report for PlumeStop Pilot Testing at the Fairbanks International Airport Site (MW-1903-20)**

Marcy,

RegenesiS and GeoTek Alaska, Inc. (GeoTek) have recently completed a pilot scale *in-situ* injection application of PlumeStop<sup>®</sup> Liquid Activated Carbon<sup>™</sup> (PlumeStop) at the Fairbanks International Airport in the area directly surrounding monitoring well MW-1903-20. PlumeStop consists of activated carbon particles milled to 1 to 2 micrometers in size, approximately the same size as a red blood cell. The particle size and the proprietary surface chemistry allow the carbon particles to be suspended as a colloid and flow as a liquid, allowing the PlumeStop to easily distribute and attach to soil particles once contacted. Activated carbon has been demonstrated to be an effective remediation technology to remove PFAS species from groundwater; however, until recently these implementations have used above ground water treatment facilities with granular activated carbon (GAC) vessels that require frequent carbon change outs and expensive operation and maintenance costs. RegenesiS developed PlumeStop as an innovative technology designed to use the proven technology of GAC filtration and emplace it *in-situ* with direct contact to contaminant mass. The result is that the contaminant residence time in carbon is significantly longer with *in-situ* contact than with above ground GAC vessels, effectively increasing the remediation efficiency of carbon and allowing for removal of contaminant species to very low levels. The goal of this pilot test was to mitigate PFAS species transport in groundwater by sorption to activated carbon, effectively locking the PFAS mass in place for a period of up to five years post-application.

Prior to RegenesiS and GeoTek mobilizing to the site, several tasks were completed by Shannon and Wilson, including monitoring well installation and groundwater sampling. Shannon and Wilson and GeoTek installed MW-1903-20 in July 2019 as a two-inch PVC monitoring well screened in the target treatment zone (TTZ) from 15 to 20 feet below ground surface (ft bgs). The soil in the TTZ ranges from a poorly graded sand with gravel to a poorly graded gravel with sand, both with low clay and silt content (<10%). The August 2019 baseline groundwater sampling event from the pilot test monitoring well MW-1903-20 had detections of nine PFAS species (PFOS, PFOA, PFHxS, PFHxA, PFHpS, PFHpA, PFBS, PFBA, and PFPeA) with the sum total of PFOS and PFOA exceeding the EPA Lifetime Health Advisory Limit of 70 ng/L. Shannon and Wilson deployed a passive flux meter (PFM) into well MW-1903-20 in September 2019 to measure Darcy velocity and PFAS (PFOA, PFOS, PFBS, PFPeS, PFHxA, and PFHxS) mass flux at two vertical intervals (16.4 to 18.1 ft bgs and 18.4 to 20.1 ft bgs). Groundwater seepage velocity is estimated based on the division of the resulting Darcy velocity by the estimated effective porosity of the TTZ soil (effective)

porosity in this case defined as the volume of interconnected pore space present in the principal flux zones within a unit volume of the TTZ).

Seepage velocity and mass flux are critical measurements required to design accurate carbon loading rates. RegenesiS used the internally developed modeling software PlumeForce™ to determine the total carbon needed to capture the PFAS species present at their respective flux rates and relative isotherm values (i.e., affinity for sorption to carbon).

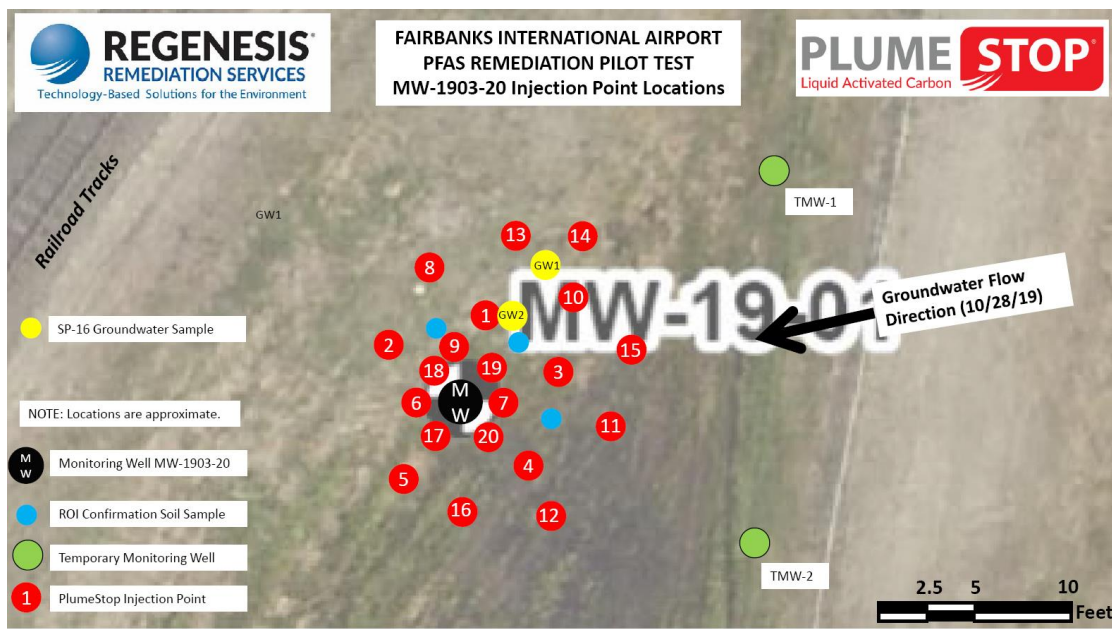
RegenesiS and GeoTek mobilized to the site on October 28, 2019 to conduct Design Verification Testing (DVT) and a PlumeStop injection. The RegenesiS DVT program is standard for all PlumeStop injection programs and is defined as a series of remedial conditions tests used to evaluate the injectability and distribution of PlumeStop. The primary objectives of the DVT were to define local groundwater flow direction and to confirm the previous injection volume estimations were sufficient to achieve relatively homogenous distribution (vertically and laterally) across the TTZ. GeoTek, under direction from RegenesiS, installed two temporary monitoring wells upgradient of well MW-1903-20. The two temporary wells were installed by blind drilling 2.25" probe rods (i.e., no samples collected) and installing within the rods one-inch PVC wells with ten feet of slotted screen from 4 to 14 ft bgs. Pea gravel (3/8") was filled in the well annulus to the surface to provide a filter pack around the well screen. The wells were then developed by purging using a peristaltic pump. After the temporary wells were installed and allowed to sit overnight, RegenesiS surveyed the relative top of casing elevations between the three wells TW1, TW2, and MW-1903-20 and measured depth to groundwater in each well in order to establish a hydraulic gradient and flow direction.

After the local groundwater flow direction was determined, RegenesiS and GeoTek performed injection testing to assess PlumeStop distribution using the original (pre-field testing) PlumeStop design estimations. Injection was completed by advancing a two-foot multi-port retractable steel injection tool and injecting in one or two-foot lifts ("bottom-up"). GeoTek advanced each injection point using a Geoprobe® 6620T direct push rig. Two injection points were completed at 5-foot center spacings at a vertical depth of between 15 to 20 ft bgs using a 26 gallons/foot (gal/ft) volumetric dosing. A pre- and post-injection soil core was collected at a distance approximately one half the distance between the two completed injection points. Results indicated no PlumeStop was present in the post-injection soil core. The PlumeStop volume was subsequently then increased to 50 gal/ft

TECHNICAL NOTE: For discussion purposes where PlumeStop volume was increased, additional mix water was added to each interval while maintaining the same total pounds of carbon (active ingredient) applied. The net effect of the volume increase is a decrease in the concentration of PlumeStop injected. See Table 1 for the PlumeStop carbon injection concentrations applied per injection point. At a volume of 50 gal/ft PlumeStop was observed in the bottom third of the soil core. The application volume was increased to 100 gal/ft. The associated confirmation soil core indicated that PlumeStop was observed homogeneously throughout the core when applied at 5-foot on center spacings using 100 gal/ft. The final design for the

remainder of the injection points used a conservative 125 gal/ft dosing, or 625 gallons per point (this was further modified to a total injection volume of 650 gallons for simpler batch mixing). A visual presentation of the DVT data collected is presented in Appendix A.

Certified PFAS-free mix water was sourced for the project and routine deliveries of the water were made from a supplier throughout the project. Several injection pumps were evaluated for delivery of the various PlumeStop volumes into the TTZ. These included an air powered diaphragm pump, two stator pumps (Moyno 2L4 and Moyno L8), a centrifugal pump, and a Hydra-Cell H25 pump. The hydraulically powered Moyno 2L4 pump was eventually selected as the main injection pump due to its reliability in low temperature environments and ability to control injection flow rates and pressures. The average injection flow rates and pressures using the Moyno 2L4 pump was 6 gallons per minute (gpm) and 50 pounds per square inch (psi). Injection of PlumeStop was accomplished using one or two injection points at a time. However, most injection points were applied in a single injection point configuration. An injection log documenting the observed application flow rates and pressures for each injection point is presented in Table 1 (attached). The orientation and approximate injection point locations are shown in Figure 1 below.



**Approximate Locations of Direct Push Injection Points**

While assessing the Hydra-Cell H25 injection pump, an undetermined piece of debris or ice was entrained in the system and punctured the main gasket on the pump. The resulting hole caused a leak of up to but not more than 2.0 Liters of pump oil lubricant (10W-40 motor oil) to be inadvertently mixed with the PlumeStop batch and thus injected in the subsurface. Low oil level in the pump was discovered as part of a routine oil level check at the end of the day. It should be noted that that knowledge of the injection oil entrained PlumeStop was not realized until the following day.



Three injection point locations were applied during the period of oil loss/entrainment, these were IP-12 (15 to 17 ft bgs), IP-13 (15 to 17 ft bgs), IP-14 (17 to 20 ft bgs). Injection points IP-13 and IP-14 received most of the volume on that day and groundwater samples were collected in the immediate area around those injection points. Three groundwater samples were collected to assess the total dissolved phase petroleum hydrocarbon concentrations that might be present. Two grab groundwater samples (GW1 and GW2) were collected in the injection area using a 3-ft SP-16 groundwater sampler (15 to 18 ft bgs) and an additional groundwater sample was collected from MW-1903-20. See the figure above for approximate locations of the hydro-punch grab groundwater samples. Groundwater samples mixed with PlumeStop typically cannot be analyzed by a commercial laboratory due to the difficulty in removing the carbon from solution. Thus, groundwater samples were shipped to the RegenesiS corporate laboratory to be pre-treated by centrifuging the samples to settle out the carbon. The resulting PlumeStop free groundwater samples was sent to a commercial laboratory for TPH analysis. In an effort to adsorb the TPH mass inadvertently co-applied with PlumeStop, RegenesiS and Geotek injected an additional 800 pounds of PlumeStop-S (this is a PlumeStop formulation with a higher concentration of active ingredient) into four injection points (IP-17, IP-18, IP-19, and IP-20) located in the immediate vicinity of the performance monitoring well. The remainder of the PlumeStop injection was completed using the hydraulically controlled Moyno 2L4 pump. All samples ground water samples taken from both hydropunch and monitoring wells have come back non-detect for TPH.

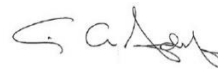
This pilot not only serves as test of treatment and mitigation of PFAS at the Fairbanks International Airport, it also serves as a logistics benchmark for future work on the site. As we assess the data on this site, we look upon the pilot test for lessons learned. These lessons learned include the capacity of aquifer's ability to accept rapid application rates and the need to apply larger volumes in order to achieve adequate and reliable distribution. This also applies to the project's injection set up and selection in terms of pump size and types, manifolds configurations, tankage, and lines. For a full-scale application, RegenesiS and GeoTek have been in contact to design a system to more rapidly inject PlumeStop and safeguard the potential for equipment malfunctions. By making modifications to the systems from the lessons learned in the Pilot Testing program we expect to increase full-scale application production rates by a factor of 3-4x.

RegenesiS greatly appreciates the opportunity to work at this site with Shannon and Wilson. RegenesiS will be available to assist with any questions or concerns.

Sincerely,



Andrew Punsoni  
Northwest Region Technical Manager  
REGENESIS



Craig Sandefur  
VP Applications Development  
REGENESIS

APPENDICES

Appendix A – Design Verification Testing Summary

Table 1 – Injection Log

Attachment: PFM Spec Sheet

# MW-1903-20 Soil Core Collected between IP-1 and IP-2

**26 gal/ft**

*IP-1, IP-2, and MW-1903-20 are located 5 ft apart in a triangle formation. Pre- and post-injection soil cores were co-located and collected directly between IP-1 and IP-2.*



**Pre-Injection**



**Post-Injection at 26 gal/ft**

# MW-1903-20 Soil Core Collected between IP-1 and IP-2

**26 gal/ft**

Left = Pre-Injection  
Right = Post-Injection



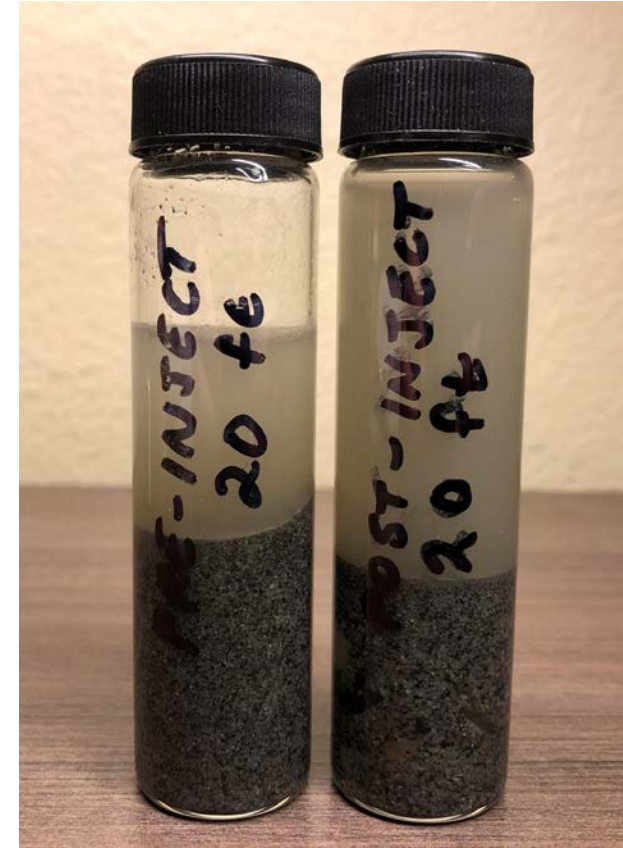
Groundwater sample  
collected from well  
MW-1903-20



15 ft bgs



18 ft bgs



20 ft bgs

# MW-1903-20 Soil Core

## Collected between 2.5 ft away from IP-3

**50 gal/ft**



*40 mL VOAs filled with soil collected at 15, 18, and 20 ft bgs*

**MW-1903-20 Soil Core**  
**Collected between 2.5 ft away from IP-4**  
**100 gal/ft**



*40 mL VOAs filled with soil  
collected at 15 and 18 ft bgs*

## MW-1903-20 Groundwater Sample



***Groundwater sample collected from MW-1903-20 with observed PlumeStop influence after injection at IP-1 to IP-7 (2,310 total gallons applied)***

**TABLE 1**  
**FAIRBANKS INTERNATIONAL AIRPORT PFAS PILOT TEST**  
**PLUMESTOP INJECTION LOG**  
**MW-1903-20 PILOT TEST AREA**

Injection Point	Date	Time	Injection Depth (ft bgs)	Injection Pressure (psi)	Flow Rate (gpm)	Volume of PlumeStop Injected			Total Gallons Per Location	PlumeStop Injection Concentration (ppm)
						Beginning Flow Meter (gal)	Ending Flow Meter (gal)	Gallons Injected Per Interval		
1	10/29/2019	15:20	19-20	110	4.50	0	26	26	130	16,500
		15:40	17-19	60	8.70	26	78	52		
		15:48	15-17	75	9.00	78	130	52		
2	10/29/2019	14:30	19-20	80	7.00	0	26	26	130	16,500
		14:45	17-19	60	6.60	26	78	52		
		14:58	15-17	60	7.70	78	130	52		
3	10/30/2019	10:00	19-20	80	7.00	0	50	50	250	8,500
		10:30	17-19	75	6.00	50	150	100		
		11:00	15-17	60	9.00	150	250	100		
4	10/30/2019	14:20	19-20	65	5.00	0	100	100	500	4,300
		15:00	17-19	65	5.50	100	300	200		
		15:45	15-17	40	5.00	300	500	200		
5	10/31/2019	15:30	19-20	45	7.00	0	100	100	600	3,600
	11/1/2019	15:45	17-19	40	6.50	100	300	200		
		16:00	15-17	40	7.00	300	600	300		
6	11/2/2019	14:00	19-20	100	6.00	0	50	50	600	3,600
		14:30	17-19	100	6.00	50	300	250		
		15:00	15-17	100	6.00	300	600	300		
7	11/2/2019	15:00	19-20	65	6.50	0	50	50	600	3,600
	11/3/2019	10:00	17-19	75	5.50	50	300	250		
		11:00	15-17	25	7.00	300	600	300		
8	11/6/2019	13:00	19-20	65	6.00	0	125	125	625	3,450
		14:00	17-19	45	6.00	125	375	250		
		15:15	15-17	25	7.00	375	625	250		
9	11/6/2019	16:00	19-20	45	6.00	0	125	125	625	3,450
		17:00	17-20	45	7.00	125	375	250		
		18:00	15-17	30	7.00	375	625	250		
10	11/7/2019	11:45	19-20	40	6.50	0	125	125	625	3,450
		14:00	17-19	40	5.00	125	375	250		
		15:00	15-17	40	5.00	375	625	250		
11	11/8/2019	10:45	19-20	50	4.00	0	125	125	625	3,450
		12:30	17-19	40	4.00	125	375	250		
		14:50	15-17	40	4.00	375	625	250		
12	11/9/2019	13:30	19-20	55	3.40	0	125	125	400	3,325
	11/10/2019	14:30	17-19	40	5.00	125	350	225		
		10:00	15-17	40	5.00	350	400	50		
13	11/9/2019	14:30	19-20	35	9.50	0	125	125	650	3,325
		15:00	17-19	35	9.50	125	350	225		
		15:30	15-17	25	10.00	350	430	80		
14	11/10/2019	12:30	19-20	45	7.00	0	125	125	650	3,325
		15:00	17-19	50	7.00	125	350	225		
		11/11/2019	12:00	15-17	65	6.00	350	650		
15	11/11/2019	12:30	19-20	50	7.00	0	125	125	650	3,325
	11/12/2019	12:00	17-19	45	6.00	125	350	225		
		14:00	15-17	45	6.00	350	650	300		
16	11/12/2019	12:30	19-20	50	6.50	0	125	125	650	3,325
		14:00	17-19	50	6.00	125	350	225		
		15:30	15-17	50	6.00	350	650	300		
17	11/13/2019	11:40	19-20	50	5.50	0	8	8	40	83,000
		12:00	17-19	50	4.50	8	24	16		
		12:20	15-17	40	4.00	24	40	16		
18	11/13/2019	12:40	19-20	55	4.50	0	8	8	40	83,000
		13:00	17-19	50	5.00	8	24	16		
		13:20	15-17	40	4.50	24	40	16		
19	11/13/2019	13:40	19-20	50	5.00	0	8	8	40	83,000
		15:00	17-19	50	4.50	8	24	16		
		15:20	15-17	50	4.50	24	40	16		
20	11/13/2019	15:30	19-20	50	5.00	0	8	8	40	83,000
		15:45	17-19	45	5.00	8	24	16		
		16:00	15-17	45	5.00	24	40	16		

Total Gallons	Total PlumeStop Applied
8,470	4,000 lbs PlumeStop Regular 1,600 lbs PlumeStop Stout





## Solution Brief

# EnviroFlux Passive Flux Meter

Groundwater sampling that provides the whole picture

### Key Benefits

- Green Technology – No electrical power or pumping required.
- Simultaneous evaluation of both water and contaminant fluxes under natural gradient conditions.
- Cumulative measurement of contaminant flux, making the results less sensitive to daily fluctuations in groundwater flow or contaminant concentrations.
- Only two site visits required.
- Measurement of vertical variations in horizontal fluxes.
- Precise prior knowledge about local aquifer hydraulic conductivities not required.
- Wide range of contaminant analysis.
- USEPA approved technology.

### The Challenge

While groundwater samples will provide localized contaminant concentration data, they provide no insight into whether (or how fast) the contaminants are migrating to other areas of the groundwater system.

### The Solution

EnviroFlux Passive Flux Meters reveal the complexities of contaminant plume behavior, providing both contaminant mass flux and groundwater flow data.

The EnviroFlux Passive Flux Meter® (PFM) is a nylon mesh tube filled with a sorbent/tracer mixture. The PFMs are inserted into groundwater monitoring wells where they passively intercept groundwater flow.

After a specified period of exposure to groundwater flow (usually one to four weeks), the PFM is removed from the well or boring. The sorbent is then extracted to quantify (a) the mass of all contaminants intercepted by the PFM and (b) the residual masses of all resident tracers.

The contaminant masses are used to calculate time-averaged contaminant fluxes, while residual resident tracer masses are used to calculate cumulative groundwater flux. Depth variations of both water and contaminant mass fluxes are measured by a single PFM by vertically segmenting the exposed sorbent mixture and analyzing for resident tracers and contaminants. Thus, the PFM provides a vertical profile of horizontal fluxes.

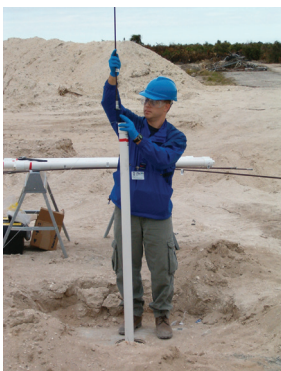


Figure 1) Installing a PFM

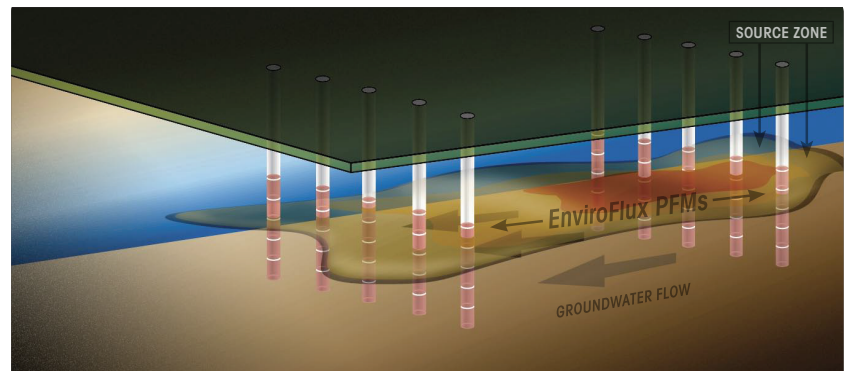


Figure 2) EnviroFlux PFMs are commonly used for site characterization

## Applications

### Mass Flux Based Approach to Site Management:

#### Performance Assessment

Alternative measure of remedial objectives. Reduce mass flux to meet conditions acceptable for site management. Evaluate and compare the pre- and post-remediation mass flux values.

#### Flux-based Natural Attenuation Assessment (mass balance)

Mass flux is useful in assessing the effectiveness of the natural attenuation process. Contaminant mass reduction can be calculated using the differences in total contaminant mass flux across two cross-sections of the contaminant plume.

#### Remedial Design Optimization (target high mass flux zones)

In situ measurements of contaminant flux generate critical data which can be used to optimize the design and assess the performance of proposed remedial systems.

#### Risk Assessment

The concept of risk-based decision making involves using more realistic exposure scenarios and factors to evaluate the relative risks of contaminants to human health and the environment. Depending on these risks, appropriate action may include site closure, monitoring and data collection, active or passive remediation, or institutional controls. Mass flux measurements can be used on the front end to quantify this risk.

#### Site Characterization

Incorporate mass flux measurements into initial site characterization efforts to improve decision making when developing the overall site strategy.

## Services

EnviroFlux offers our clients a turnkey mass flux analysis service. A typical PFM project includes the following steps:

#### Site characterization consultation

- Decide on the number of PFMs based on the monitoring well configuration and screen lengths (PFMs are typically 5 feet long).
- Determine the desired vertical resolution (for example one foot resolution).
- Provide EnviroFlux with well diameters, well construction material (i.e. PVC or stainless steel), and depth to the target well screens.
- Provide EnviroFlux a list of contaminants of interest.

#### Installation, retrieval, and sampling of PFMs

The PFMs are installed, retrieved, and sampled by the client. The PFMs are usually left in the monitoring wells from one to four weeks. In most cases the installation and retrieval/sampling of the PFMs each require only one-day site visits.

#### Lab analysis

The samples are sent to EnviroFlux and analyzed to determine the concentration of contaminants absorbed into the PFM and the amount of tracers leached from the PFM.

#### Report

EnviroFlux provides a detailed data report indicating the mass flux results for all of the zones in which the PFMs were deployed.

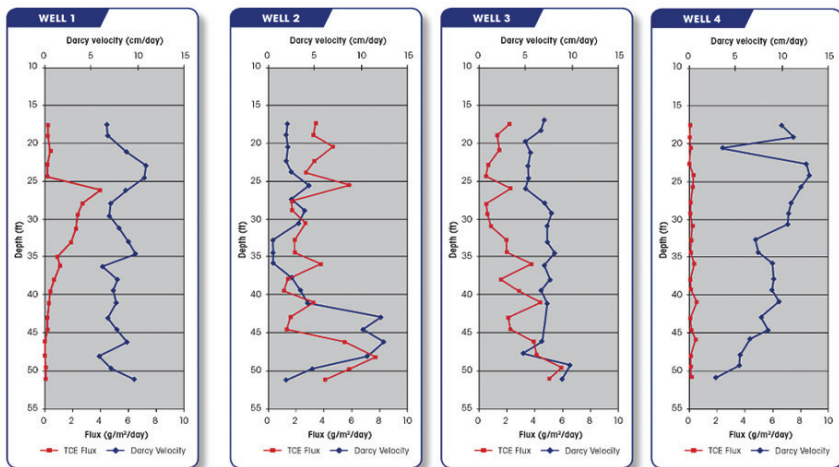


Figure 3) PFM Contaminant Mass Flux Results



Photo 1: GeoTek advancing an injection well, October 29, 2019

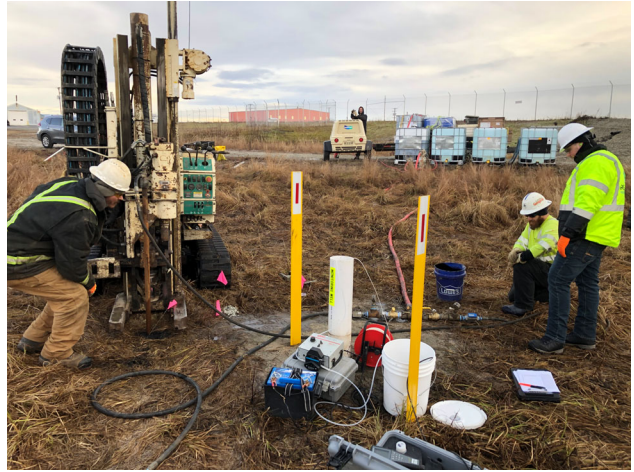


Photo 2: Injection of PlumeStop near MW-1903-20, October 20, 2019



Photo 3: Injection Pump 1, diaphragm pump. October 29, 2019



Photo 4: Injection pump 2, Moyno Pump. November 1, 2019



Photo 5: Injection pump 3, GeoTek pump. November 2, 2019



Photo 6: Injection pump 4, Hydracel pump. November 8, 2019



Photo 7: Liquid PlumeStop solution



Photo 8: PlumeStop injection November 4, 2019

Appendix F

# Permits and Approval Documentation

## CONTENTS

- EPA Injection Permit Application
- FAA 7460-1 Determination Letter
- DEC Approval Letter

April 16, 2019

U.S. Environmental Protection Agency, Region 10  
Underground Injection Control Program  
1200 Sixth Ave., Suite 155, OCE-101  
Seattle, WA 98101

Attn: Mr. Derek Schruhl, EPA Region 10

RE: FAIRBANKS INTERNATIONAL AIRPORT CLASS V INJECTION WELL PERMIT APPLICATION

We are pleased to provide the following information regarding a planned pilot test of PlumeStop® and/or PlumeStop S® liquid activated carbon near two groundwater monitoring wells (MWs) within the Fairbanks International Airport (FAI) per- and polyfluoroalkyl substances (PFAS) plume. Implementation of this pilot test will require the installation of the aforementioned MWs and the use of temporary well points (TWPs) to inject the PlumeStop® slurry at designated locations adjacent to, and upgradient of, the MWs. If the direct injection method proves insufficient, the MWs will be used as alternative injection points.

As PlumeStop® is non-hazardous and would be injected directly into groundwater, we understand the planned implementation falls under the regulation CFR title 40 volume 22 section 144.12 for Class V injection wells. Shannon & Wilson is requesting Environmental Protection Agency (EPA) approval to proceed with the pilot test based on the following parameters.

## MONITORING WELL INSTALLATION

One onsite and one offsite study location are planned for this pilot test, tentatively scheduled for June 2019. The onsite well will be located off Airport Industrial Road near the northwestern corner of the developed airport property, and installed to a depth of 20 feet below ground surface (bgs). The offsite well will be located off King Road and installed to a depth of 35 feet bgs. The pilot study locations are shown in Figure 1.

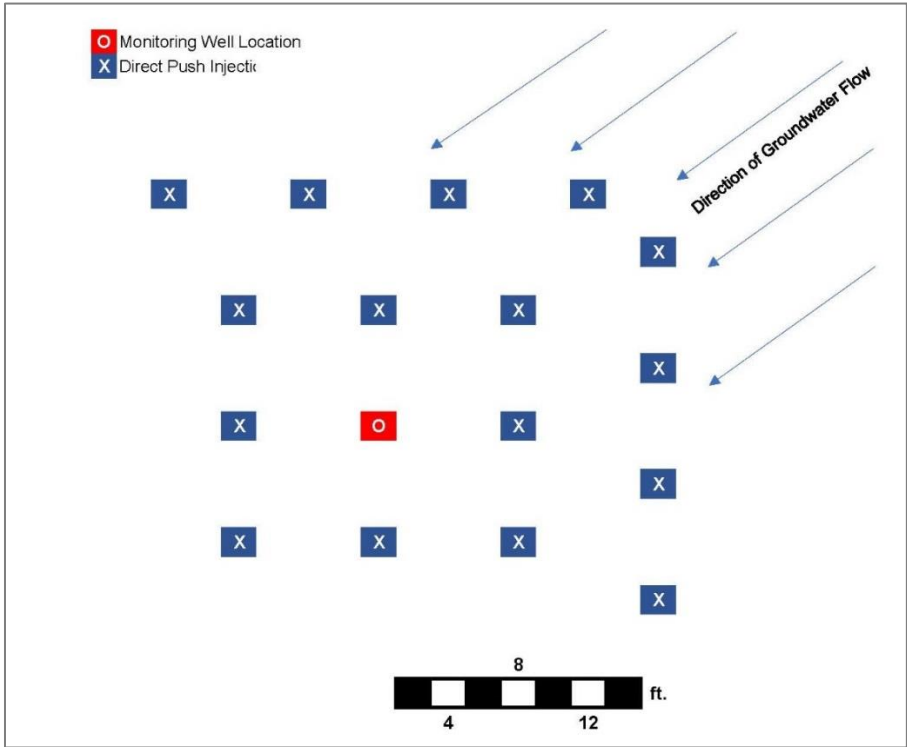
We will install the two groundwater MWs with direct-push Macro-Core tooling to collect subsurface soil samples from the borings. This advances 5-foot-long polyvinyl chloride (PVC)-lined samplers for continuous soil sampling. We will not use drilling aids such as

bentonite, other clay-based agents, or other foreign matter capable of affecting the characteristics of the groundwater. During construction of the wells, precautions shall be used to prevent tampering with the well or entrance of foreign material.

MW casing/riser pipe shall be new, 2- inch nominal internal diameter, schedule 40 flush-joint threaded ASTM D 1785 PVC pipe. This pipe shall also meet the requirements of NSF ANSI/NSF Std 14. A PVC cap that threads or slips onto the top of the well casing shall be provided. The filter pack shall consist of clean, washed, rounded to sub-rounded siliceous material free from calcareous grains or material. A schematic showing MW construction details is included in Figure 2.

### TEMPORARY INJECTION WELL INSTALLATION

Injection points for the PlumeStop® slurry will be advanced via a GeoProbe drill using a direct-push installation method. The GeoProbe will insert a ½ to 1-inch diameter slotted steel casing into the ground such that the screened interval is within the water table. The temporary injection points will be distributed in approximately 8-foot center spacing intervals aligned upgradient and perpendicular to the direction of groundwater flow, as shown below.



We anticipate installing 12 to 17 injection points at each pilot test location. Depending on the outcome, the MW may be used as an alternative injection point.

## PLUMESTOP® SLURRY OVERVIEW

The PlumeStop® liquid activated carbon slurry consists of less-than-two-micron activated carbon particles forming a colloidal solution in water. This solution is then injected into the water table, such that dispersion occurs under normal hydrogeologic conditions. We plan to use either PlumeStop® and/or PlumeStop S® liquid activated carbon, product specifications for both are attached.

We anticipate that roughly 4,400 pounds of PlumeStop® suspended in 6,400 gallons of water will be injected at each of the pilot test locations. The PlumeStop® will be injected via a bottom-up approach utilizing roughly 75 gallons per vertical foot.

## DURATION OF INJECTION WELL OPERATION

We anticipate the injection of PlumeStop® to be accomplished over a span of five to eight days. The temporary injection wells will be decommissioned at the completion of injection activities. The temporary metal casing will be withdrawn from the injection point and the hole will be backfilled from the bottom up with bentonite chips or pellets. The bentonite plug will serve to prevent surface-water infiltration. The MWs will remain in place and be the subject of repeated sampling events throughout the year to assess groundwater conditions.

## CONCLUSION

Shannon & Wilson is targeting the early summer season for the installation of MWs and temporary well points for PlumeStop® slurry injection. We do not anticipate changes in the groundwater flow direction as a result of this pilot test. Please feel free to contact us directly if you have additional questions regarding this proposed study.



Sincerely,

Adam Wyborny, EIT  
Environmental Engineering Staff

Enc. Figure 1, Pilot Study Injection and Monitoring Well Locations  
Figure 2, Standard Monitoring Construction  
PlumeStop® product specifications, SDS  
PlumeStop S® product specifications, SDS

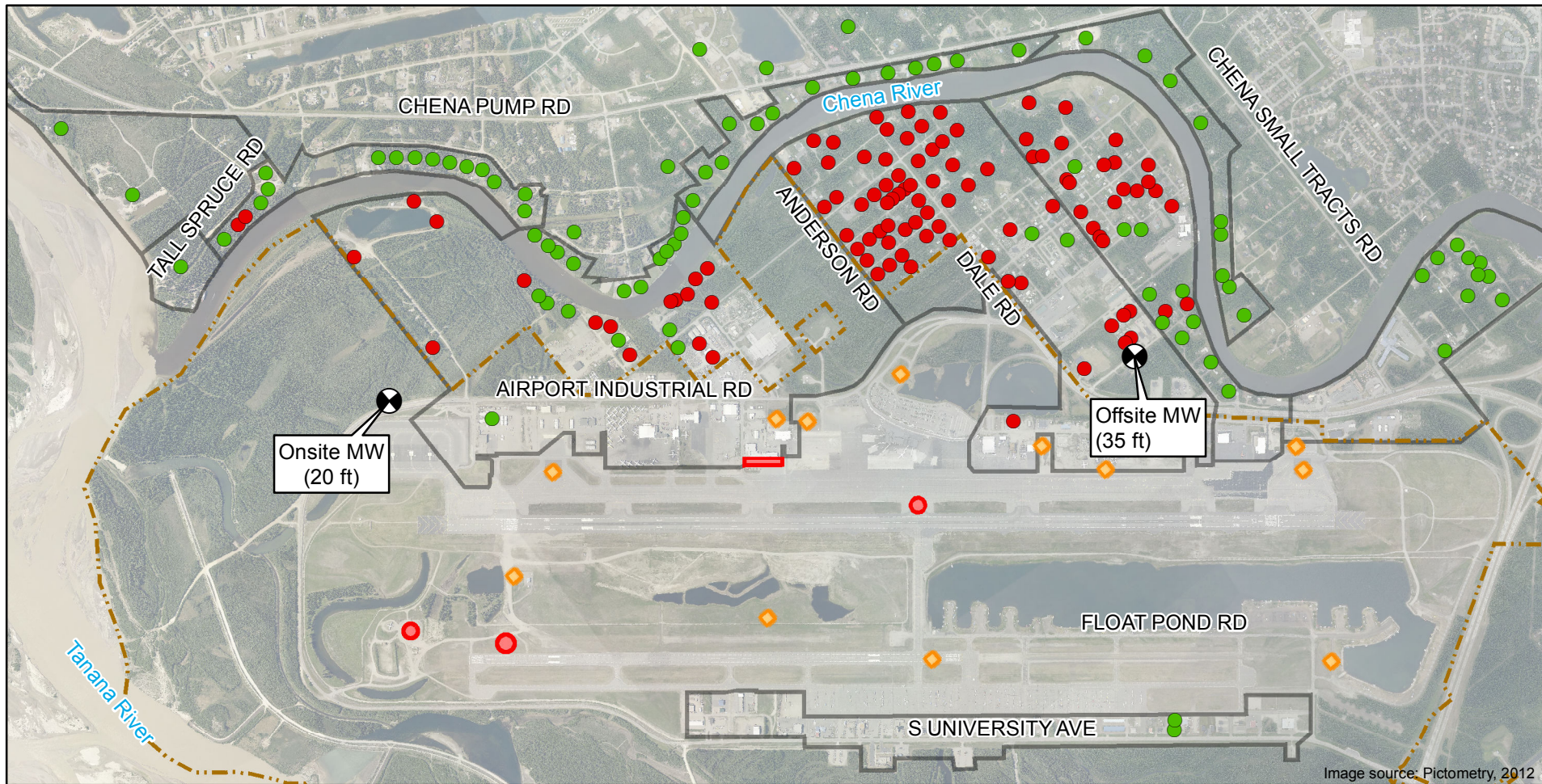







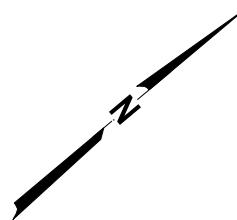
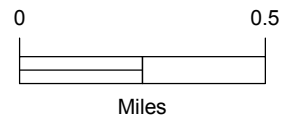


Image source: Pictometry, 2012.

**LEGEND**

-  Planned MW locations
-  Sum of PFOS, PFOA, PFHxS, PFHpA, and PFNA results under ADEC action level (65 ppt)
-  ≥65 ppt
-  FAI Boundary
-  Aircraft Rescue and Firefighting (ARFF) Training Sites
-  ARFF Emergency Response Sites
-  Well Search Areas



Fairbanks International Airport  
Fairbanks, Alaska

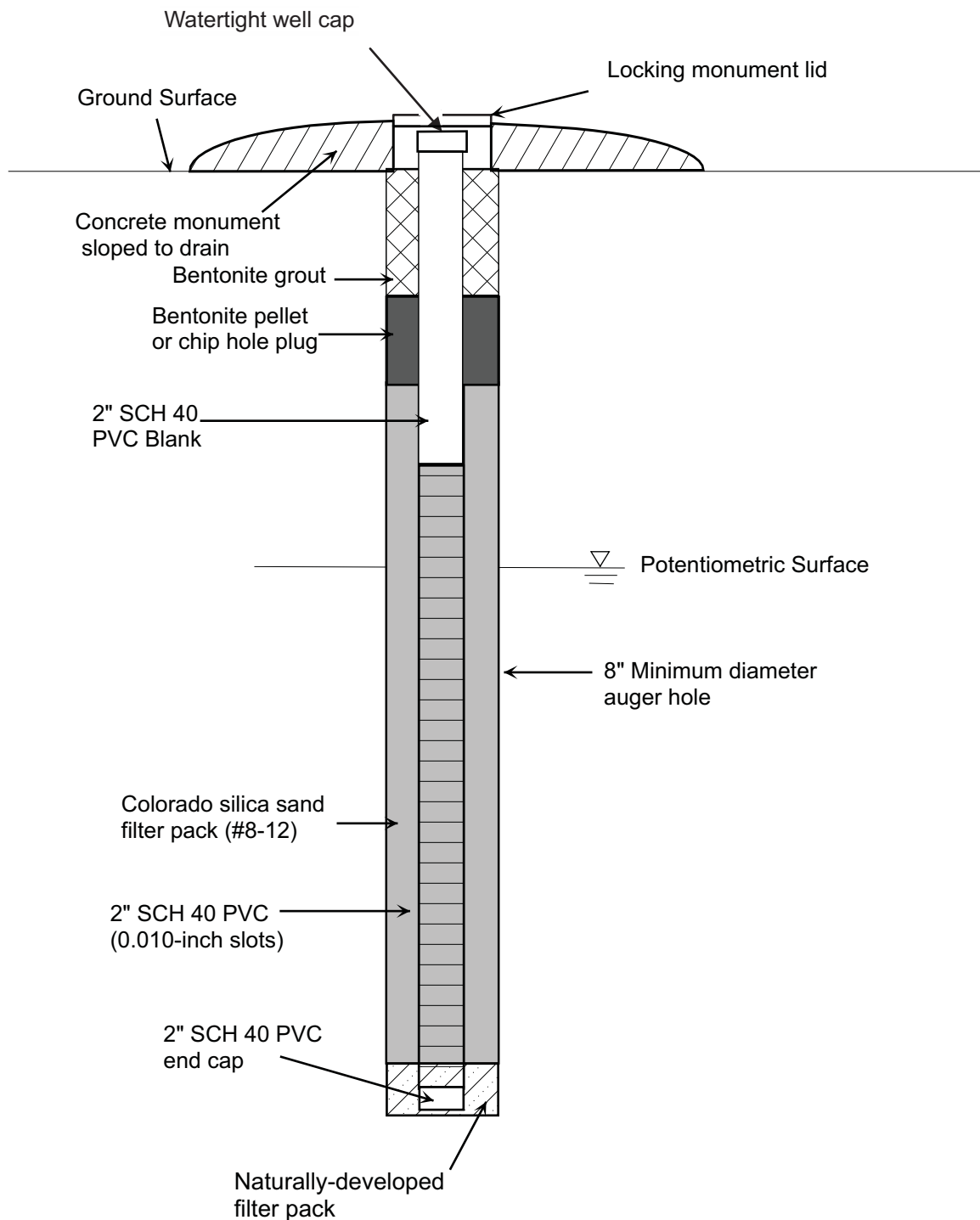
**PILOT STUDY INJECTION AND  
MONITORING WELL LOCATIONS**

March 2019

102519-005

**SHANNON & WILSON, INC.**  
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

**Figure 1**



**FLUSHMOUNT MONUMENT  
MONITORING WELL**

UIC Permit Application  
PlumeStop Pilot Test  
Fairbanks International Airport, Fairbanks, Alaska

**STANDARD  
MONITORING WELL CONSTRUCTION**

April 2019

**SHANNON & WILSON, INC.**  
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Figure 2

**1. Identification**

**Product identifier** PlumeSTOP®  
**Other means of identification** None.  
**Recommended use** Soil and Groundwater Remediation.  
**Recommended restrictions** None known.  
**Manufacturer/Importer/Supplier/Distributor information**  
**Company Name** RegenesiS  
**Address** 1011 Calle Sombra  
 San Clemente, CA 92673  
**Telephone** 949-366-8000  
**E-mail** CustomerService@regenesiS.com  
**Emergency phone number** CHEMTREC® at 1-800-424-9300 (International)

**2. Hazard(s) identification**

**Physical hazards** Not classified.  
**Health hazards** Not classified.  
**OSHA defined hazards** Not classified.  
**Label elements**  
**Hazard symbol** None.  
**Signal word** None.  
**Hazard statement** The mixture does not meet the criteria for classification.  
**Precautionary statement**  
**Prevention** Observe good industrial hygiene practices.  
**Response** Wash hands after handling.  
**Storage** Store away from incompatible materials.  
**Disposal** Dispose of waste and residues in accordance with local authority requirements.  
**Hazard(s) not otherwise classified (HNOC)** None known.

**3. Composition/information on ingredients**
**Mixtures**

Chemical name	CAS number	%
Water	7732-18-5	>75
Colloidal activated carbon ≤2.5 μm	7440-44-0	<25
Proprietary additives		≤2

**Composition comments** All concentrations are in percent by weight unless otherwise indicated.

**4. First-aid measures**

**Inhalation** Move to fresh air. Call a physician if symptoms develop or persist.  
**Skin contact** Wash off with soap and water. Get medical attention if irritation develops and persists.  
**Eye contact** Rinse with water. Get medical attention if irritation develops and persists.  
**Ingestion** Rinse mouth. Get medical attention if symptoms occur.  
**Most important symptoms/effects, acute and delayed** Direct contact with eyes may cause temporary irritation.

<b>Indication of immediate medical attention and special treatment needed</b>	Treat symptomatically.
<b>General information</b>	If you feel unwell, seek medical advice (show the label where possible). Show this safety data sheet to the doctor in attendance.
<b>5. Fire-fighting measures</b>	
<b>Suitable extinguishing media</b>	Carbon dioxide, alcohol-resistant foam, dry chemical, water spray, or water fog.
<b>Unsuitable extinguishing media</b>	None known.
<b>Specific hazards arising from the chemical</b>	During fire, gases hazardous to health may be formed. Combustion products may include: carbon monoxide, carbon dioxide, sodium oxides, metal oxides.
<b>Special protective equipment and precautions for firefighters</b>	Use protective equipment appropriate for surrounding materials.
<b>Fire fighting equipment/instructions</b>	Move containers from fire area if you can do so without risk.
<b>Specific methods</b>	Use standard firefighting procedures and consider the hazards of other involved materials. Use water spray to keep fire-exposed containers cool.
<b>General fire hazards</b>	This material will not burn until the water has evaporated. Residue can burn. When dry may form combustible dust concentrations in air.

## 6. Accidental release measures

<b>Personal precautions, protective equipment and emergency procedures</b>	Keep unnecessary personnel away. Avoid contact with spilled material. For personal protection, see section 8 of the SDS.
<b>Methods and materials for containment and cleaning up</b>	This product is miscible in water.  Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Cover with plastic sheet to prevent spreading. Absorb in vermiculite, dry sand or earth and place into containers. Following product recovery, flush area with water.  Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination.  Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.
<b>Environmental precautions</b>	Avoid discharge into drains, water courses or onto the ground.

## 7. Handling and storage

<b>Precautions for safe handling</b>	Avoid contact with skin and eyes. Avoid prolonged exposure. Observe good industrial hygiene practices. Wash thoroughly after handling. Wear appropriate personal protective equipment (See Section 8).
<b>Conditions for safe storage, including any incompatibilities</b>	Store in original tightly closed container. Store away from incompatible materials (see Section 10 of the SDS). Protect from freezing.

## 8. Exposure controls/personal protection

### Occupational exposure limits

US. OSHA Table Z-3 (29 CFR 1910.1000)

Components	Type	Value	Form
Colloidal activated carbon ≤2.5 µm (CAS 7440-44-0)	TWA	5 mg/m <sup>3</sup>	Respirable fraction.
		15 mg/m <sup>3</sup>	Total dust.

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value	Form
Colloidal activated carbon ≤2.5 µm (CAS 7440-44-0)	TWA	2.5 mg/m <sup>3</sup>	Respirable.

<b>Biological limit values</b>	No biological exposure limits noted for the ingredient(s).
<b>Appropriate engineering controls</b>	Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

**Individual protection measures, such as personal protective equipment**

<b>Eye/face protection</b>	Wear approved chemical safety goggles.
<b>Skin protection</b>	
<b>Hand protection</b>	Rubber, neoprene or PVC gloves are recommended. Wash hands after handling.
<b>Other</b>	Avoid contact with the skin. Wear suitable protective clothing.
<b>Respiratory protection</b>	Not normally needed. In case of insufficient ventilation, wear suitable respiratory equipment. If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn.
<b>Thermal hazards</b>	Wear appropriate thermal protective clothing, when necessary.
<b>General hygiene considerations</b>	Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

**9. Physical and chemical properties****Appearance**

<b>Physical state</b>	Liquid.
<b>Form</b>	Aqueous suspension.
<b>Color</b>	Black.
<b>Odor</b>	Odorless.
<b>Odor threshold</b>	Not available.
<b>pH</b>	8 - 10
<b>Melting point/freezing point</b>	Not available.
<b>Initial boiling point and boiling range</b>	Not available.
<b>Flash point</b>	Not flammable.
<b>Evaporation rate</b>	Not available.
<b>Flammability (solid, gas)</b>	Not applicable.

**Upper/lower flammability or explosive limits**

<b>Flammability limit - lower (%)</b>	Not available.
<b>Flammability limit - upper (%)</b>	Not available.
<b>Explosive limit - lower (%)</b>	Not available.
<b>Explosive limit - upper (%)</b>	Not available.

**Vapor pressure** Not available.

**Vapor density** Not available.

**Relative density** 1 - 1.2

**Solubility(ies)**

**Solubility (water)** Miscible

**Partition coefficient (n-octanol/water)** Not available.

**Auto-ignition temperature** Not available.

**Decomposition temperature** Not available.

**Viscosity** Not available.

**10. Stability and reactivity**

**Reactivity** The product is stable and non-reactive under normal conditions of use, storage and transport.

**Chemical stability** Material is stable under normal conditions.

**Possibility of hazardous reactions** No dangerous reaction known under conditions of normal use.

**Conditions to avoid** Contact with incompatible materials. Keep from freezing.

**Incompatible materials** Strong oxidizing agents. Water reactive materials.

**Hazardous decomposition products** Combustion may produce: carbon oxides.

## 11. Toxicological information

### Information on likely routes of exposure

**Inhalation** Prolonged inhalation may be harmful.  
**Skin contact** Prolonged or repeated skin contact may result in minor irritation.  
**Eye contact** Direct contact with eyes may cause temporary irritation.  
**Ingestion** Expected to be a low ingestion hazard.

**Symptoms related to the physical, chemical and toxicological characteristics** Direct contact with eyes may cause temporary irritation.

### Information on toxicological effects

**Acute toxicity** Not expected to be acutely toxic.

Components	Species	Test Results
Colloidal activated carbon $\leq 2.5 \mu\text{m}$ (CAS 7440-44-0)		
<b>Acute</b>		
<i>Inhalation</i>		
LC50	Rat	> 8500 mg/m <sup>3</sup> , air
<i>Oral</i>		
LD50	Rat	> 2000 mg/kg, (Female)

**Skin corrosion/irritation** Prolonged skin contact may cause temporary irritation.

**Serious eye damage/eye irritation** Direct contact with eyes may cause temporary irritation.

### Respiratory or skin sensitization

**Respiratory sensitization** Not a respiratory sensitizer.  
**Skin sensitization** This product is not expected to cause skin sensitization.

**Germ cell mutagenicity** No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

**Carcinogenicity** This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

#### OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

**Reproductive toxicity** This product is not expected to cause reproductive or developmental effects.

**Specific target organ toxicity - single exposure** Not classified.

**Specific target organ toxicity - repeated exposure** Not classified.

**Aspiration hazard** Not an aspiration hazard.

**Chronic effects** Prolonged inhalation may be harmful.

## 12. Ecological information

**Ecotoxicity** The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

**Persistence and degradability** No data is available on the degradability of this product.

**Bioaccumulative potential** No data available.

**Mobility in soil** Expected to be temporarily highly mobile in soil.

**Other adverse effects** None known.

## 13. Disposal considerations

**Disposal instructions** Collect and reclaim or dispose in sealed containers at licensed waste disposal site.

**Local disposal regulations** Dispose in accordance with all applicable regulations.

**Hazardous waste code** The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

**Waste from residues / unused products** Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

**Contaminated packaging** Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

## 14. Transport information

### DOT

Not regulated as dangerous goods.

### IATA

Not regulated as dangerous goods.

### IMDG

Not regulated as dangerous goods.

**Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code** Not established.

## 15. Regulatory information

**US federal regulations** All components are listed on or exempt from the U.S. EPA TSCA Inventory List. This product is not known to be a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

### TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

### OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

### CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

### Superfund Amendments and Reauthorization Act of 1986 (SARA)

**Hazard categories** Immediate Hazard - No  
Delayed Hazard - No  
Fire Hazard - No  
Pressure Hazard - No  
Reactivity Hazard - No

### SARA 302 Extremely hazardous substance

Not listed.

**SARA 311/312 Hazardous chemical** No

### SARA 313 (TRI reporting)

Not regulated.

### Other federal regulations

#### Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

#### Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

**Safe Drinking Water Act (SDWA)** Not regulated.

### US state regulations

#### US. Massachusetts RTK - Substance List

Not regulated.

#### US. New Jersey Worker and Community Right-to-Know Act

Colloidal activated carbon  $\leq 2.5 \mu\text{m}$  (CAS 7440-44-0)

#### US. Pennsylvania Worker and Community Right-to-Know Law

Not listed.

#### US. Rhode Island RTK

Not regulated.



**US. California Proposition 65**

Not Listed.

**International Inventories**

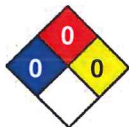
Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	No
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

\*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).

A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

**16. Other information, including date of preparation or last revision**

<b>Issue date</b>	26-February-2015
<b>Revision date</b>	-
<b>Version #</b>	01
<b>Further information</b>	HMIS® is a registered trade and service mark of the American Coatings Association (ACA).
<b>HMIS® ratings</b>	Health: 0 Flammability: 0 Physical hazard: 0

**NFPA ratings****Disclaimer**

Regenesis cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.

**1. Identification**

Product identifier	PlumeSTOP® Nutrients
Other means of identification	None.
Recommended use	Soil and Groundwater Remediation.
Recommended restrictions	None known.
<b>Manufacturer/Importer/Supplier/Distributor information</b>	
Company Name	RegenesiS
Address	1011 Calle Sombra San Clemente, CA 92673
Telephone	949-366-8000
E-mail	CustomerService@regenesiS.com
Emergency phone number	CHEMTREC® at 1-800-424-9300 (International)

**2. Hazard(s) identification**

Physical hazards	Not classified.
Health hazards	Not classified.
OSHA defined hazards	Not classified.
<b>Label elements</b>	
Hazard symbol	None.
Signal word	None.
Hazard statement	The mixture does not meet the criteria for classification.
<b>Precautionary statement</b>	
Prevention	Observe good industrial hygiene practices.
Response	Wash hands after handling.
Storage	Store away from incompatible materials.
Disposal	Dispose of waste and residues in accordance with local authority requirements.
Hazard(s) not otherwise classified (HNOC)	None known.
Supplemental information	None.

**3. Composition/information on ingredients****Mixtures**

The manufacturer lists no ingredients as hazardous according to OSHA 29 CFR 1910.1200.

**4. First-aid measures**

Inhalation	Move to fresh air. Call a physician if symptoms develop or persist.
Skin contact	Wash off with soap and water. Get medical attention if irritation develops and persists.
Eye contact	Do not rub eyes. Rinse with water. Get medical attention if irritation develops and persists.
Ingestion	Rinse mouth. Get medical attention if symptoms occur.
Most important symptoms/effects, acute and delayed	Dusts may irritate the respiratory tract, skin and eyes.
Indication of immediate medical attention and special treatment needed	Treat symptomatically.
General information	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

## 5. Fire-fighting measures

<b>Suitable extinguishing media</b>	Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2). Apply extinguishing media carefully to avoid creating airborne dust.
<b>Unsuitable extinguishing media</b>	None known.
<b>Specific hazards arising from the chemical</b>	During fire, gases hazardous to health may be formed.
<b>Special protective equipment and precautions for firefighters</b>	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
<b>Fire fighting equipment/instructions</b>	Use water spray to cool unopened containers. Avoid dust formation.
<b>Specific methods</b>	Use standard firefighting procedures and consider the hazards of other involved materials.
<b>General fire hazards</b>	No unusual fire or explosion hazards noted.

## 6. Accidental release measures

<b>Personal precautions, protective equipment and emergency procedures</b>	Keep unnecessary personnel away. Wear appropriate protective equipment and clothing during clean-up. Use a NIOSH/MSHA approved respirator if there is a risk of exposure to dust/fume at levels exceeding the exposure limits. For personal protection, see section 8 of the SDS.
<b>Methods and materials for containment and cleaning up</b>	Avoid the generation of dusts during clean-up. Collect dust using a vacuum cleaner equipped with HEPA filter. This product is miscible in water. Stop the flow of material, if this is without risk.  Large Spills: Wet down with water and dike for later disposal. Shovel the material into waste container. Following product recovery, flush area with water.  Small Spills: Sweep up or vacuum up spillage and collect in suitable container for disposal. For waste disposal, see section 13 of the SDS.
<b>Environmental precautions</b>	Avoid discharge into drains, water courses or onto the ground.

## 7. Handling and storage

<b>Precautions for safe handling</b>	Minimize dust generation and accumulation. Provide appropriate exhaust ventilation at places where dust is formed. Practice good housekeeping.
<b>Conditions for safe storage, including any incompatibilities</b>	Store in original tightly closed container. Store in a well-ventilated place. Store away from incompatible materials (see Section 10 of the SDS).

## 8. Exposure controls/personal protection

### Occupational exposure limits

#### US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value	Form
PlumeSTOP® Nutrients (as dust)	PEL	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.

#### US. OSHA Table Z-3 (29 CFR 1910.1000)

Components	Type	Value	Form
PlumeSTOP® Nutrients (as dust)	TWA	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.
		50 mppcf	Total dust.
		15 mppcf	Respirable fraction.

#### US. ACGIH Threshold Limit Values

Components	Type	Value	Form
PlumeSTOP® Nutrients (as dust)	TWA	3 mg/m3	Respirable particles.
		10 mg/m3	Inhalable particles.

<b>Biological limit values</b>	No biological exposure limits noted for the ingredient(s).
<b>Appropriate engineering controls</b>	Ensure adequate ventilation, especially in confined areas. Local exhaust is suggested for use, where possible, in enclosed or confined spaces.

## Individual protection measures, such as personal protective equipment

<b>Eye/face protection</b>	Wear safety glasses with side shields (or goggles). Unvented, tight fitting goggles should be worn in dusty areas.
<b>Skin protection</b>	
<b>Hand protection</b>	Wear appropriate chemical resistant gloves. Suitable gloves can be recommended by the glove supplier.
<b>Skin protection</b>	
<b>Other</b>	Wear suitable protective clothing.
<b>Respiratory protection</b>	In case of inadequate ventilation, use MSHA/NIOSH approved dust respirator.
<b>Thermal hazards</b>	Wear appropriate thermal protective clothing, when necessary.
<b>General hygiene considerations</b>	Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

## 9. Physical and chemical properties

### Appearance

<b>Physical state</b>	Solid.
<b>Form</b>	Powder.
<b>Color</b>	White.
<b>Odor</b>	Odorless.
<b>Odor threshold</b>	Not available.
<b>pH</b>	Not available.
<b>Melting point/freezing point</b>	Not available.
<b>Initial boiling point and boiling range</b>	Not available.
<b>Flash point</b>	Not available.
<b>Evaporation rate</b>	Not available.
<b>Flammability (solid, gas)</b>	The product is non-combustible.
<b>Upper/lower flammability or explosive limits</b>	
<b>Flammability limit - lower (%)</b>	Not available.
<b>Flammability limit - upper (%)</b>	Not available.
<b>Explosive limit - lower (%)</b>	Not available.
<b>Explosive limit - upper (%)</b>	Not available.
<b>Vapor pressure</b>	Not available.
<b>Vapor density</b>	Not available.
<b>Relative density</b>	Not available.
<b>Solubility(ies)</b>	
<b>Solubility (water)</b>	Completely soluble.
<b>Partition coefficient (n-octanol/water)</b>	Not available.
<b>Auto-ignition temperature</b>	Not available.
<b>Decomposition temperature</b>	Not available.
<b>Viscosity</b>	Not available.
<b>Other information</b>	
<b>Explosive properties</b>	Not explosive.
<b>Oxidizing properties</b>	Not oxidizing.

## 10. Stability and reactivity

<b>Reactivity</b>	The product is stable and non-reactive under normal conditions of use, storage and transport.
<b>Chemical stability</b>	Material is stable under normal conditions.

<b>Possibility of hazardous reactions</b>	No dangerous reaction known under conditions of normal use. Ammonia fumes may be released upon heating.
<b>Conditions to avoid</b>	Contact with incompatible materials. Excessive heat.
<b>Incompatible materials</b>	Strong oxidizing agents. Bases.
<b>Hazardous decomposition products</b>	Ammonia fumes may be released upon heating.

## 11. Toxicological information

### Information on likely routes of exposure

<b>Inhalation</b>	Dust may irritate respiratory system.
<b>Skin contact</b>	Dust or powder may irritate the skin.
<b>Eye contact</b>	Dust may irritate the eyes.
<b>Ingestion</b>	Expected to be a low ingestion hazard.

**Symptoms related to the physical, chemical and toxicological characteristics**      Dusts may irritate the respiratory tract, skin and eyes.

### Information on toxicological effects

<b>Acute toxicity</b>	Not expected to be acutely toxic.
<b>Skin corrosion/irritation</b>	Prolonged skin contact may cause temporary irritation.
<b>Serious eye damage/eye irritation</b>	Direct contact with eyes may cause temporary irritation.

### Respiratory or skin sensitization

<b>Respiratory sensitization</b>	Not a respiratory sensitizer.
<b>Skin sensitization</b>	This product is not expected to cause skin sensitization.

**Germ cell mutagenicity**      No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

**Carcinogenicity**      This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

#### IARC Monographs. Overall Evaluation of Carcinogenicity

Not listed.

#### NTP Report on Carcinogens

Not listed.

#### OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not regulated.

**Reproductive toxicity**      This product is not expected to cause reproductive or developmental effects.

**Specific target organ toxicity - single exposure**      Not classified.

**Specific target organ toxicity - repeated exposure**      Not classified.

**Aspiration hazard**      Not an aspiration hazard.

## 12. Ecological information

**Ecotoxicity**      The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

**Persistence and degradability**      No data is available on the degradability of this product.

**Bioaccumulative potential**      No data available.

**Mobility in soil**      This product is completely water soluble and will disperse in soil.

**Other adverse effects**      No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

## 13. Disposal considerations

**Disposal instructions**      Collect and reclaim or dispose in sealed containers at licensed waste disposal site.

**Local disposal regulations**      Dispose in accordance with all applicable regulations.

**Hazardous waste code**      The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

**Waste from residues / unused products** Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

**Contaminated packaging** Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

## 14. Transport information

### DOT

Not regulated as dangerous goods.

### IATA

Not regulated as dangerous goods.

### IMDG

Not regulated as dangerous goods.

**Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code** Not applicable.

## 15. Regulatory information

**US federal regulations** This product is not known to be a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

### TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

### OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not regulated.

### CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

### Superfund Amendments and Reauthorization Act of 1986 (SARA)

**Hazard categories** Immediate Hazard - No  
Delayed Hazard - No  
Fire Hazard - No  
Pressure Hazard - No  
Reactivity Hazard - No

### SARA 302 Extremely hazardous substance

Not listed.

**SARA 311/312 Hazardous chemical** No

### SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
Ammonium sulfate	7783-20-2	40-50

### Other federal regulations

#### Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

#### Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

**Safe Drinking Water Act (SDWA)** Not regulated.

### US state regulations

#### US. Massachusetts RTK - Substance List

Ammonium sulfate (CAS 7783-20-2)

#### US. New Jersey Worker and Community Right-to-Know Act

Not listed.

#### US. Pennsylvania Worker and Community Right-to-Know Law

Ammonium sulfate (CAS 7783-20-2)

#### US. Rhode Island RTK

Not regulated.

## US. California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

### International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	No
Canada	Domestic Substances List (DSL)	No
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	No
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	No
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	No
New Zealand	New Zealand Inventory	No
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	No
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	No

\*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).

A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

## 16. Other information, including date of preparation or last revision

**Issue date** 07-January-2016

**Revision date** -

**Version #** 01

**HMIS® ratings** Health: 1  
Flammability: 0  
Physical hazard: 0

**NFPA ratings**



**Disclaimer**

Regenesis cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.

**1. Identification**

**Product identifier** PlumeSTOP® S  
**Other means of identification** None.  
**Recommended use** Soil and Groundwater Remediation.  
**Recommended restrictions** None known.  
**Manufacturer/Importer/Supplier/Distributor information**  
**Company Name** RegenesiS  
**Address** 1011 Calle Sombra  
 San Clemente, CA 92673  
**Telephone** 949-366-8000  
**E-mail** CustomerService@regenesiS.com  
**Emergency phone number** CHEMTREC® at 1-800-424-9300 (International)

**2. Hazard(s) identification**

**Physical hazards** Not classified.  
**Health hazards** Not classified.  
**OSHA defined hazards** Not classified.  
**Label elements**  
**Hazard symbol** None.  
**Signal word** None.  
**Hazard statement** The mixture does not meet the criteria for classification.  
**Precautionary statement**  
**Prevention** Observe good industrial hygiene practices.  
**Response** Wash hands after handling.  
**Storage** Store away from incompatible materials.  
**Disposal** Dispose of waste and residues in accordance with local authority requirements.  
**Hazard(s) not otherwise classified (HNOC)** None known.

**3. Composition/information on ingredients**
**Mixtures**

Chemical name	CAS number	%
Water	7732-18-5	>75
Colloidal activated carbon ≤2.5 μm	7440-44-0	<25
Proprietary additives		≤2

**Composition comments** All concentrations are in percent by weight unless otherwise indicated.

**4. First-aid measures**

**Inhalation** Move to fresh air. Call a physician if symptoms develop or persist.  
**Skin contact** Wash off with soap and water. Get medical attention if irritation develops and persists.  
**Eye contact** Rinse with water. Get medical attention if irritation develops and persists.  
**Ingestion** Rinse mouth. Get medical attention if symptoms occur.  
**Most important symptoms/effects, acute and delayed** Direct contact with eyes may cause temporary irritation.



<b>Indication of immediate medical attention and special treatment needed</b>	Treat symptomatically.
<b>General information</b>	If you feel unwell, seek medical advice (show the label where possible). Show this safety data sheet to the doctor in attendance.
<b>5. Fire-fighting measures</b>	
<b>Suitable extinguishing media</b>	Carbon dioxide, alcohol-resistant foam, dry chemical, water spray, or water fog.
<b>Unsuitable extinguishing media</b>	None known.
<b>Specific hazards arising from the chemical</b>	During fire, gases hazardous to health may be formed. Combustion products may include: carbon monoxide, carbon dioxide, sodium oxides, metal oxides.
<b>Special protective equipment and precautions for firefighters</b>	Use protective equipment appropriate for surrounding materials.
<b>Fire fighting equipment/instructions</b>	Move containers from fire area if you can do so without risk.
<b>Specific methods</b>	Use standard firefighting procedures and consider the hazards of other involved materials. Use water spray to keep fire-exposed containers cool.
<b>General fire hazards</b>	This material will not burn until the water has evaporated. Residue can burn. When dry may form combustible dust concentrations in air.

## 6. Accidental release measures

<b>Personal precautions, protective equipment and emergency procedures</b>	Keep unnecessary personnel away. Avoid contact with spilled material. For personal protection, see section 8 of the SDS.
<b>Methods and materials for containment and cleaning up</b>	This product is miscible in water.  Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Cover with plastic sheet to prevent spreading. Absorb in vermiculite, dry sand or earth and place into containers. Following product recovery, flush area with water.  Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination.  Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.
<b>Environmental precautions</b>	Avoid discharge into drains, water courses or onto the ground.

## 7. Handling and storage

<b>Precautions for safe handling</b>	Avoid contact with skin and eyes. Avoid prolonged exposure. Observe good industrial hygiene practices. Wash thoroughly after handling. Wear appropriate personal protective equipment (See Section 8).
<b>Conditions for safe storage, including any incompatibilities</b>	Store in original tightly closed container. Store away from incompatible materials (see Section 10 of the SDS). Protect from freezing.

## 8. Exposure controls/personal protection

### Occupational exposure limits

#### US. OSHA Table Z-3 (29 CFR 1910.1000)

Components	Type	Value	Form
Colloidal activated carbon ≤2.5 µm (CAS 7440-44-0)	TWA	5 mg/m <sup>3</sup>	Respirable fraction.
		15 mg/m <sup>3</sup>	Total dust.

#### US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value	Form
Colloidal activated carbon ≤2.5 µm (CAS 7440-44-0)	TWA	2.5 mg/m <sup>3</sup>	Respirable.

<b>Biological limit values</b>	No biological exposure limits noted for the ingredient(s).
<b>Appropriate engineering controls</b>	Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

**Individual protection measures, such as personal protective equipment**

<b>Eye/face protection</b>	Wear approved chemical safety goggles.
<b>Skin protection</b>	
<b>Hand protection</b>	Rubber, neoprene or PVC gloves are recommended. Wash hands after handling.
<b>Other</b>	Avoid contact with the skin. Wear suitable protective clothing.
<b>Respiratory protection</b>	Not normally needed. In case of insufficient ventilation, wear suitable respiratory equipment. If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn.
<b>Thermal hazards</b>	Wear appropriate thermal protective clothing, when necessary.
<b>General hygiene considerations</b>	Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

**9. Physical and chemical properties****Appearance**

<b>Physical state</b>	Liquid.
<b>Form</b>	Aqueous suspension.
<b>Color</b>	Black.
<b>Odor</b>	Odorless.
<b>Odor threshold</b>	Not available.
<b>pH</b>	8 - 10
<b>Melting point/freezing point</b>	Not available.
<b>Initial boiling point and boiling range</b>	Not available.
<b>Flash point</b>	Not flammable.
<b>Evaporation rate</b>	Not available.
<b>Flammability (solid, gas)</b>	Not applicable.

**Upper/lower flammability or explosive limits**

<b>Flammability limit - lower (%)</b>	Not available.
<b>Flammability limit - upper (%)</b>	Not available.
<b>Explosive limit - lower (%)</b>	Not available.
<b>Explosive limit - upper (%)</b>	Not available.

**Vapor pressure** Not available.

**Vapor density** Not available.

**Relative density** 1 - 1.2

**Solubility(ies)**

**Solubility (water)** Miscible

**Partition coefficient (n-octanol/water)** Not available.

**Auto-ignition temperature** Not available.

**Decomposition temperature** Not available.

**Viscosity** Not available.

**10. Stability and reactivity**

**Reactivity** The product is stable and non-reactive under normal conditions of use, storage and transport.

**Chemical stability** Material is stable under normal conditions.

**Possibility of hazardous reactions** No dangerous reaction known under conditions of normal use.

**Conditions to avoid** Contact with incompatible materials. Keep from freezing.

**Incompatible materials** Strong oxidizing agents. Water reactive materials.

**Hazardous decomposition products**                      Combustion may produce: carbon oxides.

## 11. Toxicological information

### Information on likely routes of exposure

**Inhalation**                                      Prolonged inhalation may be harmful.  
**Skin contact**                                   Prolonged or repeated skin contact may result in minor irritation.  
**Eye contact**                                   Direct contact with eyes may cause temporary irritation.  
**Ingestion**                                      Expected to be a low ingestion hazard.

**Symptoms related to the physical, chemical and toxicological characteristics**                      Direct contact with eyes may cause temporary irritation.

### Information on toxicological effects

**Acute toxicity**                                      Not expected to be acutely toxic.

<b>Components</b>	<b>Species</b>	<b>Test Results</b>
Colloidal activated carbon ≤2.5 µm (CAS 7440-44-0)		
<b>Acute</b>		
<i>Inhalation</i>		
LC50	Rat	> 8500 mg/m <sup>3</sup> , air
<i>Oral</i>		
LD50	Rat	> 2000 mg/kg, (Female)

**Skin corrosion/irritation**                      Prolonged skin contact may cause temporary irritation.

**Serious eye damage/eye irritation**                      Direct contact with eyes may cause temporary irritation.

### Respiratory or skin sensitization

**Respiratory sensitization**                      Not a respiratory sensitizer.  
**Skin sensitization**                                      This product is not expected to cause skin sensitization.

**Germ cell mutagenicity**                      No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

**Carcinogenicity**                                      This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

#### OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

**Reproductive toxicity**                      This product is not expected to cause reproductive or developmental effects.

**Specific target organ toxicity - single exposure**                      Not classified.

**Specific target organ toxicity - repeated exposure**                      Not classified.

**Aspiration hazard**                                      Not an aspiration hazard.

**Chronic effects**                                      Prolonged inhalation may be harmful.

## 12. Ecological information

**Ecotoxicity**                                      The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

**Persistence and degradability**                      No data is available on the degradability of this product.

**Bioaccumulative potential**                      No data available.

**Mobility in soil**                                      Expected to be temporarily highly mobile in soil.

**Other adverse effects**                                      None known.

## 13. Disposal considerations

**Disposal instructions**                      Collect and reclaim or dispose in sealed containers at licensed waste disposal site.

**Local disposal regulations**                      Dispose in accordance with all applicable regulations.

**Hazardous waste code**                      The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

**Waste from residues / unused products** Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

**Contaminated packaging** Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

## 14. Transport information

### DOT

Not regulated as dangerous goods.

### IATA

Not regulated as dangerous goods.

### IMDG

Not regulated as dangerous goods.

**Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code** Not established.

## 15. Regulatory information

**US federal regulations** All components are listed on or exempt from the U.S. EPA TSCA Inventory List. This product is not known to be a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

### TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

### OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

### CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

### Superfund Amendments and Reauthorization Act of 1986 (SARA)

#### Hazard categories

Immediate Hazard - No  
Delayed Hazard - No  
Fire Hazard - No  
Pressure Hazard - No  
Reactivity Hazard - No

#### SARA 302 Extremely hazardous substance

Not listed.

**SARA 311/312 Hazardous chemical** No

#### SARA 313 (TRI reporting)

Not regulated.

### Other federal regulations

#### Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

#### Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

**Safe Drinking Water Act (SDWA)** Not regulated.

### US state regulations

#### US. Massachusetts RTK - Substance List

Not regulated.

#### US. New Jersey Worker and Community Right-to-Know Act

Colloidal activated carbon  $\leq 2.5 \mu\text{m}$  (CAS 7440-44-0)

#### US. Pennsylvania Worker and Community Right-to-Know Law

Not listed.

#### US. Rhode Island RTK

Not regulated.

**US. California Proposition 65**

Not Listed.

**International Inventories**

<b>Country(s) or region</b>	<b>Inventory name</b>	<b>On inventory (yes/no)*</b>
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	No
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

\*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).

A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

**16. Other information, including date of preparation or last revision**

<b>Issue date</b>	26-February-2015
<b>Revision date</b>	-
<b>Version #</b>	01
<b>Further information</b>	HMIS® is a registered trade and service mark of the American Coatings Association (ACA).
<b>HMIS® ratings</b>	Health: 0 Flammability: 0 Physical hazard: 0
<b>NFPA ratings</b>	



<b>Disclaimer</b>	Regenesis cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.
-------------------	--

**1. Identification**

<b>Product identifier</b>	PlumeSTOP® Nutrients
<b>Other means of identification</b>	None.
<b>Recommended use</b>	Soil and Groundwater Remediation.
<b>Recommended restrictions</b>	None known.
<b>Manufacturer/Importer/Supplier/Distributor information</b>	
<b>Company Name</b>	RegenesiS
<b>Address</b>	1011 Calle Sombra San Clemente, CA 92673
<b>Telephone</b>	949-366-8000
<b>E-mail</b>	CustomerService@regenesiS.com
<b>Emergency phone number</b>	CHEMTREC® at 1-800-424-9300 (International)

**2. Hazard(s) identification**

<b>Physical hazards</b>	Not classified.
<b>Health hazards</b>	Not classified.
<b>OSHA defined hazards</b>	Not classified.
<b>Label elements</b>	
<b>Hazard symbol</b>	None.
<b>Signal word</b>	None.
<b>Hazard statement</b>	The mixture does not meet the criteria for classification.
<b>Precautionary statement</b>	
<b>Prevention</b>	Observe good industrial hygiene practices.
<b>Response</b>	Wash hands after handling.
<b>Storage</b>	Store away from incompatible materials.
<b>Disposal</b>	Dispose of waste and residues in accordance with local authority requirements.
<b>Hazard(s) not otherwise classified (HNOC)</b>	None known.
<b>Supplemental information</b>	None.

**3. Composition/information on ingredients****Mixtures**

The manufacturer lists no ingredients as hazardous according to OSHA 29 CFR 1910.1200.

**4. First-aid measures**

<b>Inhalation</b>	Move to fresh air. Call a physician if symptoms develop or persist.
<b>Skin contact</b>	Wash off with soap and water. Get medical attention if irritation develops and persists.
<b>Eye contact</b>	Do not rub eyes. Rinse with water. Get medical attention if irritation develops and persists.
<b>Ingestion</b>	Rinse mouth. Get medical attention if symptoms occur.
<b>Most important symptoms/effects, acute and delayed</b>	Dusts may irritate the respiratory tract, skin and eyes.
<b>Indication of immediate medical attention and special treatment needed</b>	Treat symptomatically.
<b>General information</b>	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

## 5. Fire-fighting measures

<b>Suitable extinguishing media</b>	Water fog. Foam. Dry chemical powder. Carbon dioxide (CO <sub>2</sub> ). Apply extinguishing media carefully to avoid creating airborne dust.
<b>Unsuitable extinguishing media</b>	None known.
<b>Specific hazards arising from the chemical</b>	During fire, gases hazardous to health may be formed.
<b>Special protective equipment and precautions for firefighters</b>	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
<b>Fire fighting equipment/instructions</b>	Use water spray to cool unopened containers. Avoid dust formation.
<b>Specific methods</b>	Use standard firefighting procedures and consider the hazards of other involved materials.
<b>General fire hazards</b>	No unusual fire or explosion hazards noted.

## 6. Accidental release measures

<b>Personal precautions, protective equipment and emergency procedures</b>	Keep unnecessary personnel away. Wear appropriate protective equipment and clothing during clean-up. Use a NIOSH/MSHA approved respirator if there is a risk of exposure to dust/fume at levels exceeding the exposure limits. For personal protection, see section 8 of the SDS.
<b>Methods and materials for containment and cleaning up</b>	Avoid the generation of dusts during clean-up. Collect dust using a vacuum cleaner equipped with HEPA filter. This product is miscible in water. Stop the flow of material, if this is without risk.  Large Spills: Wet down with water and dike for later disposal. Shovel the material into waste container. Following product recovery, flush area with water.  Small Spills: Sweep up or vacuum up spillage and collect in suitable container for disposal. For waste disposal, see section 13 of the SDS.
<b>Environmental precautions</b>	Avoid discharge into drains, water courses or onto the ground.

## 7. Handling and storage

<b>Precautions for safe handling</b>	Minimize dust generation and accumulation. Provide appropriate exhaust ventilation at places where dust is formed. Practice good housekeeping.
<b>Conditions for safe storage, including any incompatibilities</b>	Store in original tightly closed container. Store in a well-ventilated place. Store away from incompatible materials (see Section 10 of the SDS).

## 8. Exposure controls/personal protection

### Occupational exposure limits

#### US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value	Form
PlumeSTOP® Nutrients (as dust)	PEL	5 mg/m <sup>3</sup>	Respirable fraction.
		15 mg/m <sup>3</sup>	Total dust.

#### US. OSHA Table Z-3 (29 CFR 1910.1000)

Components	Type	Value	Form
PlumeSTOP® Nutrients (as dust)	TWA	5 mg/m <sup>3</sup>	Respirable fraction.
		15 mg/m <sup>3</sup>	Total dust.
		50 mppcf	Total dust.
		15 mppcf	Respirable fraction.

#### US. ACGIH Threshold Limit Values

Components	Type	Value	Form
PlumeSTOP® Nutrients (as dust)	TWA	3 mg/m <sup>3</sup>	Respirable particles.
		10 mg/m <sup>3</sup>	Inhalable particles.

<b>Biological limit values</b>	No biological exposure limits noted for the ingredient(s).
<b>Appropriate engineering controls</b>	Ensure adequate ventilation, especially in confined areas. Local exhaust is suggested for use, where possible, in enclosed or confined spaces.

## Individual protection measures, such as personal protective equipment

<b>Eye/face protection</b>	Wear safety glasses with side shields (or goggles). Unvented, tight fitting goggles should be worn in dusty areas.
<b>Skin protection</b>	
<b>Hand protection</b>	Wear appropriate chemical resistant gloves. Suitable gloves can be recommended by the glove supplier.
<b>Skin protection</b>	
<b>Other</b>	Wear suitable protective clothing.
<b>Respiratory protection</b>	In case of inadequate ventilation, use MSHA/NIOSH approved dust respirator.
<b>Thermal hazards</b>	Wear appropriate thermal protective clothing, when necessary.
<b>General hygiene considerations</b>	Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

## 9. Physical and chemical properties

### Appearance

<b>Physical state</b>	Solid.
<b>Form</b>	Powder.
<b>Color</b>	White.
<b>Odor</b>	Odorless.
<b>Odor threshold</b>	Not available.
<b>pH</b>	Not available.
<b>Melting point/freezing point</b>	Not available.
<b>Initial boiling point and boiling range</b>	Not available.
<b>Flash point</b>	Not available.
<b>Evaporation rate</b>	Not available.
<b>Flammability (solid, gas)</b>	The product is non-combustible.

### Upper/lower flammability or explosive limits

<b>Flammability limit - lower (%)</b>	Not available.
<b>Flammability limit - upper (%)</b>	Not available.
<b>Explosive limit - lower (%)</b>	Not available.
<b>Explosive limit - upper (%)</b>	Not available.
<b>Vapor pressure</b>	Not available.
<b>Vapor density</b>	Not available.
<b>Relative density</b>	Not available.
<b>Solubility(ies)</b>	
<b>Solubility (water)</b>	Completely soluble.
<b>Partition coefficient (n-octanol/water)</b>	Not available.
<b>Auto-ignition temperature</b>	Not available.
<b>Decomposition temperature</b>	Not available.
<b>Viscosity</b>	Not available.
<b>Other information</b>	
<b>Explosive properties</b>	Not explosive.
<b>Oxidizing properties</b>	Not oxidizing.

## 10. Stability and reactivity

<b>Reactivity</b>	The product is stable and non-reactive under normal conditions of use, storage and transport.
<b>Chemical stability</b>	Material is stable under normal conditions.



<b>Possibility of hazardous reactions</b>	No dangerous reaction known under conditions of normal use. Ammonia fumes may be released upon heating.
<b>Conditions to avoid</b>	Contact with incompatible materials. Excessive heat.
<b>Incompatible materials</b>	Strong oxidizing agents. Bases.
<b>Hazardous decomposition products</b>	Ammonia fumes may be released upon heating.

## 11. Toxicological information

### Information on likely routes of exposure

<b>Inhalation</b>	Dust may irritate respiratory system.
<b>Skin contact</b>	Dust or powder may irritate the skin.
<b>Eye contact</b>	Dust may irritate the eyes.
<b>Ingestion</b>	Expected to be a low ingestion hazard.

**Symptoms related to the physical, chemical and toxicological characteristics**      Dusts may irritate the respiratory tract, skin and eyes.

### Information on toxicological effects

<b>Acute toxicity</b>	Not expected to be acutely toxic.
<b>Skin corrosion/irritation</b>	Prolonged skin contact may cause temporary irritation.
<b>Serious eye damage/eye irritation</b>	Direct contact with eyes may cause temporary irritation.

### Respiratory or skin sensitization

<b>Respiratory sensitization</b>	Not a respiratory sensitizer.
<b>Skin sensitization</b>	This product is not expected to cause skin sensitization.

**Germ cell mutagenicity**      No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

**Carcinogenicity**      This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

#### IARC Monographs. Overall Evaluation of Carcinogenicity

Not listed.

#### NTP Report on Carcinogens

Not listed.

#### OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not regulated.

**Reproductive toxicity**      This product is not expected to cause reproductive or developmental effects.

**Specific target organ toxicity - single exposure**      Not classified.

**Specific target organ toxicity - repeated exposure**      Not classified.

**Aspiration hazard**      Not an aspiration hazard.

## 12. Ecological information

**Ecotoxicity**      The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

**Persistence and degradability**      No data is available on the degradability of this product.

**Bioaccumulative potential**      No data available.

**Mobility in soil**      This product is completely water soluble and will disperse in soil.

**Other adverse effects**      No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

## 13. Disposal considerations

**Disposal instructions**      Collect and reclaim or dispose in sealed containers at licensed waste disposal site.

**Local disposal regulations**      Dispose in accordance with all applicable regulations.

**Hazardous waste code**      The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

**Waste from residues / unused products** Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

**Contaminated packaging** Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

## 14. Transport information

### DOT

Not regulated as dangerous goods.

### IATA

Not regulated as dangerous goods.

### IMDG

Not regulated as dangerous goods.

**Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code** Not applicable.

## 15. Regulatory information

**US federal regulations** This product is not known to be a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

### TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

### OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not regulated.

### CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

### Superfund Amendments and Reauthorization Act of 1986 (SARA)

**Hazard categories** Immediate Hazard - No  
 Delayed Hazard - No  
 Fire Hazard - No  
 Pressure Hazard - No  
 Reactivity Hazard - No

### SARA 302 Extremely hazardous substance

Not listed.

**SARA 311/312 Hazardous chemical** No

### SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
Ammonium sulfate	7783-20-2	40-50

### Other federal regulations

#### Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

#### Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

**Safe Drinking Water Act (SDWA)** Not regulated.

### US state regulations

#### US. Massachusetts RTK - Substance List

Ammonium sulfate (CAS 7783-20-2)

#### US. New Jersey Worker and Community Right-to-Know Act

Not listed.

#### US. Pennsylvania Worker and Community Right-to-Know Law

Ammonium sulfate (CAS 7783-20-2)

#### US. Rhode Island RTK

Not regulated.

## US. California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

### International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	No
Canada	Domestic Substances List (DSL)	No
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	No
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	No
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	No
New Zealand	New Zealand Inventory	No
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	No
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	No

\*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).

A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

### 16. Other information, including date of preparation or last revision

Issue date	07-January-2016
Revision date	-
Version #	01
HMIS® ratings	Health: 1 Flammability: 0 Physical hazard: 0

#### NFPA ratings



#### Disclaimer

Regenesis cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.



Federal Aviation Administration

July 23, 2019

TO:
State of Alaska DOT & PF
Attn: Ashley Jaramillo
6450 Airport Way
Suite 1
Fairbanks, AK 99709
ashley.jaramillo@alaska.gov

CC:
Shannon & Wilson, Inc.
Attn: Adam Wyborny
2355 Hill Road
Fairbanks, AK 99709
apw@shanwil.com

RE: (See attached Table 1 for referenced case(s))
\*\*FINAL DETERMINATION\*\*

Table 1 - Letter Referenced Case(s)

Table with 7 columns: ASN, Prior ASN, Location, Latitude (NAD83), Longitude (NAD83), AGL (Feet), AMSL (Feet). Row 1: 2019-AAL-113-NRA, FAIRBANKS,AK, 64-48-06.85N, 147-53-48.46W, 35, 474

Description: The drill rig to install a monitoring well.

We do not object with conditions to the construction described in this proposal provided:

You comply with the requirements set forth in FAA Advisory Circular 150/5370-2, "Operational Safety on Airports During Construction."

This determination does not constitute FAA approval or disapproval of the physical development involved in the proposal. It is a determination with respect to the safe and efficient use of navigable airspace by aircraft and with respect to the safety of persons and property on the ground.

In making this determination, the FAA has considered matters such as the effects the proposal would have on existing or planned traffic patterns of neighboring airports, the effects it would have on the existing airspace structure and projected programs of the FAA, the effects it would have on the safety of persons and property on the ground, and the effects that existing or proposed manmade objects (on file with the FAA), and known natural objects within the affected area would have on the airport proposal.

This determination expires on January 23, 2021 unless:

- (a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for the completion of construction, or the date the FCC denies the application.

NOTE: Request for extension of the effective period of this determination must be obtained at least 15 days prior to expiration date specified in this letter.

If you have any questions concerning this determination contact Patrick Zettler (907) 271-5446 Patrick.Zettler@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2019-AAL-113-NRA.

Patrick Zettler  
Specialist  
**Signature Control No: 405917874-412140903**



THE STATE  
of ALASKA  
GOVERNOR MICHAEL J. DUNLEAVY

Department of Environmental Conservation

DIVISION OF SPILL PREVENTION AND RESPONSE

Contaminated Sites Program

610 University Avenue  
Fairbanks, AK 99709-3643

Phone: 907-451-2143

Fax: 907-451-2155

[www.dec.alaska.gov](http://www.dec.alaska.gov)

File: 100.38.277

May 29, 2019

Angela Spear  
Alaska Department of Transportation and Public Facilities  
Fairbanks International Airport  
6450 Airport Way, Suite 1  
Fairbanks, AK, 99709

**Re: FIA – Sitewide PFAS; PlumeStop Pilot study**

Dear Ms. Spear,

The Alaska Department of Environmental Conservation (DEC) has reviewed the PlumeStop® Pilot Study overview plan, submitted by Shannon & Wilson, Inc. on March 28, 2019. The DEC provided comments to the original draft on May 7, 2019, and received a revised plan on May 17, 2019. The revised plan adequately addressed DEC comments, and the plan is approved.

Please keep the DEC project manager informed regarding the field schedule for PlumeStop injections.

If you have any questions or concerns please feel free to contact me at (907)451-2153 or via email at [Robert.burgess@alaska.gov](mailto:Robert.burgess@alaska.gov).

Sincerely,

Robert Burgess  
Environmental Program Specialist III  
DEC Contaminated Sites Program

cc (via email): Ashley Jaramillo, FAI  
Marcy Nadel, Shannon & Wilson  
Adam Wyborny, Shannon & Wilson  
Gretchen Caudill, DEC  
Janice Wieggers, DEC

# Important Information

About Your Environmental Report

IMPORTANT INFORMATION

## 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 that 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