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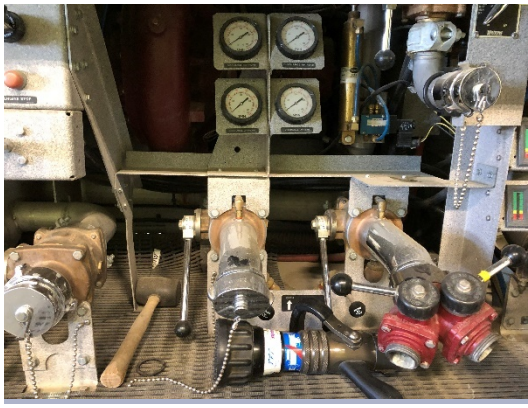
FINAL

REPORT

Fairbanks International Airport Gate 15 AFFF Release Site Characterization

FAIRBANKS, ALASKA



SHANNON & WILSON

October 2021

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Submitted To: Fairbanks International Airport
6450 Airport Way, Suite 1
Fairbanks, Alaska 99709
Attn: Contact Name

Subject: FINAL REPORT , FAIRBANKS INTERNATIONAL AIRPORT
GATE 15 AFFF RELEASE SITE CHARACTERIZATION, FAIRBANKS, ALASKA

Shannon & Wilson prepared this report to document environmental sampling activities at the Fairbanks International Airport (FAI) in response to an accidental release of aqueous film forming form (AFFF) that occurred on September 15, 2020. This report was prepared on behalf of the Alaska Department of Transportation & Public Facilities (DOT&PF) in accordance with the terms and conditions of Shannon & Wilson's proposal dated December 15, 2020 and Professional Services Agreement Number 25-19-1-013 issued by DOT&PF on December 19, 2018. This effort was authorized by Amendment 37, Notices to Proceed (NTPs) 4-15 and 4-16, dated March 21, 2021.

Following your 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

Amber Masters
Environmental Scientist, Author

Ashley Jaramillo
Chemist, Project Manager

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ACRONYMS

µg/kg	micrograms per kilogram
AAC	Alaska Administrative Code
AFFF	aqueous film forming foam
ARFF	Aircraft Rescue and Firefighting
ASTM	American Society for Testing and Materials
DEC	Alaska Department of Environmental Conservation
DOT&PF	Alaska Department of Transportation & Public Facilities
EPA	Environmental Protection Agency
Eurofins,TestAmerica	Eurofins TestAmerica Laboratories, Sacramento
FAA	Federal Aviation Administration
FAI	Fairbanks International Airport
FAR	field activity reports
IDA	isotope dilution analyte
LOQ	limit of quantitation
MB	method blank
mg/L	milligrams per liter
MTG	migration to groundwater
ng/L	nanograms per liter
NTP	Notice to Proceed
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutanesulfonic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
QA	quality assurance
QC	quality control

1 INTRODUCTION

Shannon & Wilson, Inc. has prepared this report to document environmental sampling activities in response to an accidental release of aqueous film forming foam (AFFF) at the Fairbanks International Airport (FAI) on September 15, 2020. This effort included characterizing water recovered following the release, surface soil and water at the release site, Aircraft Rescue and Firefighting (ARFF) truck flush water, and AFFF. The release occurred on the west side on the airport, near gate 15 adjacent to the intersection of Airport Industrial and Mail Trail Roads (Figure 1).

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

1.1 Purpose and Objectives

The purpose of the soil and water samples described in this report is to characterize per- and polyfluoroalkyl substances (PFAS) that may remain in place following AFFF release response efforts, as requested by the DEC spills division on November 11, 2020. The purpose of the ARFF truck flush water and AFFF samples was to provide information related to the balance of different PFAS compounds encountered at the gate 15 release site.

1.2 Background

AFFF contains PFAS, a category of persistent organic compounds. Perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) are two PFAS commonly found at sites where AFFF was used. These PFAS are referred to as C8 compounds because each molecule has an eight-carbon chain. In response to environmental concerns and risks to human health, in 2017 and 2018 the FAI shifted from the use of C8-based foam which contains high levels of PFOS to C6-based AFFF which the manufacturer claims to be PFOS-free. Airport Police and Fire Personnel flushed the ARFF truck AFFF-dispensing systems with municipal water multiple times before refilling the trucks with C6-based AFFF. The old C8-based AFFF was transported offsite by an environmental disposal contractor. Engines 2 through 5 have been used with both C6 and C8 foam.

The release occurred September 15, 2020 and was reported to DEC later the same day (Spill Number 20309925901, Appendix A). Approximately 10 gallons of Phos-CHEK C6 AFFF concentrate mixed with approximately 300 gallons of water was discharged from an ARFF truck turret to an 800- by 100-foot area of grass and soil, and an adjacent drainage ditch. The release site is identified in Figure 2. Prior to the 2020 release, AFFF was sprayed in this area for testing and training. The site is considered impacted by AFFF use from the 1970s through 1990s.

Exhibit 1-1: AFFF release area

Immediately following the release, Airport Police and Fire responders placed sorbent booms in the impacted drainage ditch and used a Tornado Vac™ vacuum pump to recover mixed foam and water. Approximately 100 gallons of water containing AFFF was recovered from the release and containerized in two 55-gallon drums. The recovered AFFF-water mix was characterized for disposal and PFOS was reported at 1,900 nanograms per liter (ng/L). PFOA was not detected. Results for the recovered AFFF-water are detailed in Table 1. Photos of the release are included in the photo log in Appendix B.

After the initial site response, the Engine 4 truck foam-dispensing system was drained. The residual AFFF-water mixture was containerized and characterized for disposal. Table 2 shows results for the AFFF-water slurry drained from the ARFF truck in September 2020.

Two 55-gallon drums of recovered AFFF-water and two tanks containing approximately 3,000 gallons of AFFF-water are currently in Building 50.

Exhibit 1-2: Sorbent boom

1.3 Contaminants of Concern and Action Levels

PFOS and PFOA are the primary contaminants of concern at the AFFF release site. Exhibit 1-3 includes applicable soil and groundwater cleanup levels published in November 2016. Drinking water sample results are compared to the May 2016 U.S. Environmental Protection

Agency (EPA) lifetime health advisory of 70 ng/L for the sum of PFOS and PFOA. There are no cleanup or other regulatory levels for PFAS other than PFOS and PFOA.

Exhibit 1-3: Applicable Cleanup Levels

Media	Compound	Level
Soil	PFOS	3.0 ug/kg[1]
Groundwater		400 ng/L[2]
Soil	PFOA	1.7 ug/kg[1]
Groundwater		400 ng/L[2]

Notes:

1 DEC migration-to-groundwater soil-cleanup levels are reported in 18 AAC 75, Table B1.

2 DEC groundwater-cleanup levels are reported in 18 AAC 75, Table C.

ug/kg = micrograms per kilogram; ng/L = nanograms per liter.

1.4 Scope of Services

The Scope of Services summarized in this report includes samples collected following the accidental C6-based AFFF release in September 2020. This report includes analytical samples collected following the release and release characterization samples described in Shannon & Wilson's December 15, 2020 proposal.

September 2020 field activities included:

- collection of one sample of AFFF-water recovered from the release site drainage ditch; and
- one sample of AFFF-water drained from the AFFF-dispensing system after the release.

June 2021 activities included:

- collection of four surface-soil samples from the release area;
- collection of one surface-water sample from the drainage ditch;
- collection of five C6-based AFFF samples, one from each of the four ARFF trucks and one of foam reserved for future use;
- collection of four samples of water flushed through the ARFF truck foam-dispensing systems;
- data review and preparation of results tables; and
- preparation of this summary report.

We performed our services in general accordance with relevant DEC guidance documents and 18 AAC 75.335. Our proposal dated December 15, 2020 was submitted to DEC in lieu of a formal work plan. The proposal was approved by DEC via an email sent on June 7, 2021.

This report was prepared for the exclusive use of the FAI and its representatives. This work presents Shannon & Wilson's professional judgment as to the conditions of the site. Information presented here is based on the sampling and analyses field staff performed. This report should not be used for other purposes without Shannon & Wilson's 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, Shannon & Wilson should be retained to review the applicability of our 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 in September 2020 and June 2021. Sampling logs and field notes are included in Appendix C.

Shannon & Wilson staff members Ashley Jaramillo, Chemist; Amber Masters, Environmental Scientist; and Marcy Nadel, Geologist completed field tasks described in this report. These individuals are State of Alaska Qualified Environmental Professionals as defined in 18 AAC 75.333[b].

Soil, water, and AFFF samples were submitted for analysis of 18 PFAS by EPA Method 537.1 modified (see details in Section 3.0).

2.1 Initial AFFF-Water Sampling

Initial AFFF-water sampling included both surface water recovered from the site, and AFFF-water slurry drained from the ARFF truck foam-dispensing system following the Fall 2020 release. On September 24, 2020, Shannon & Wilson used a peristaltic pump to collect a sample from one of two 55-gallon drums containing AFFF-water recovered from the release site immediately following the accidental discharge sample (*FAI Drum*). The water was brown in color and contained organics. We used the same method to sample AFFF-water drained from the ARFF truck foam-dispensing system after the accidental discharge (sample *FAI Tank*). We collected the sample from one of two over 1,000-gallon plastic tanks where the water is stored. AFFF-water slurry samples were collected into laboratory-provided HDPE bottles.

2.2 AFFF Release Site Characterization Activities

Surface soil and surface water sample locations and results are illustrated in Figure 2.

2.2.1 Surface Soil Sampling

Shannon & Wilson collected four primary surface-soil samples and one field-duplicate on June 8, 2021.

Surface soil samples were collected from the AFFF release site, the downward slope towards the drainage ditch adjacent to the area, and sediment from the bottom of the dry ditch. Field staff collected surface soil samples using a new stainless-steel spoon at each sample location, taking care to avoid vegetation and rocks. A small hand trowel was used to remove organic material from the surface. Samples were collected from within one to two inches below the vegetation layer. The soil collected from the site consisted of sandy fill. The soil sample collected from the ditch was organic rich sediment. The trowel was decontaminated using Alconox ™ soap, distilled water, and certified PFAS-free water rinse prior to each sample. Soil samples were spooned into laboratory provided HDPE jars.

Field blank samples are used to assess whether airborne, particulate PFAS may be contaminating analytical samples during collection. We collected a field blank sample at the gate 15 release site by pouring PFAS-free water into a sample jar without changing gloves after soil-sample collection. Field blanks and other quality control samples are described in the Quality Assurance (QA)/Quality Control (QC) Summary section of Appendix D.

2.2.2 Surface Water Sampling

Shannon & Wilson collected a surface water sample and duplicate from the culvert on the north side of the drainage draining on June 8, 2021. At the time of sampling, the drainage ditch was dry and very little water was present in the culvert. Water from the culvert near gate 15 infiltrates to groundwater and drains to the two FAI entrance ponds.

Exhibit 2-1: Condition of the culvert on June 8, 2021

Field staff used a clean, disposable plastic cup to scoop water into laboratory provided sample jars. Due to the minimal amount of water, parameters could not be measured using a YSI multiprobe water quality meter.

2.3 AFFF and ARFF Truck Sampling

Exhibit 2-2: Container of stored foam and sample bottle containing C6 AFFF.

Lieutenant Daniel Pratt of Airport Police and Fire met Marcy Nadel of Shannon & Wilson for a walk-through and sampling of the ARFF trucks on June 7, 2021. The FAI currently has five ARFF trucks, four of which have AFFF response capabilities (see Exhibit 2-3). The three FAA index trucks have been retrofitted with Ecologic no-foam test valves. The Ecologic system allows for proportioner testing during annual FAA inspections without releasing AFFF. Truck piping diagrams are not available for the FAI's ARFF trucks. Photos of the ARFF trucks are included in the photo log in Appendix B. Annotated photographs and sketches are included in Appendix C.

Shannon & Wilson collected samples of C6-based AFFF from the foam tank access port on the top or side of each truck. The AFFF samples were collected using a disposable cup. The AFFF was viscous, light yellow, and had a sweet, chemical smell. These samples are named *Engine 2*, *Engine 3*, *Engine 4*, and *Engine 5*. We also sampled AFFF reserved for future use, from its original 300-gallon container (sample *C6 AFFF*). The same Phos-CHEK C6 AFFF was used to fill the ARFF trucks, although it may have a different manufacture date.

In order to sample water flushed through the ARFF truck foam-dispensing system, Airport Police and Fire filled the pipes by spraying water from the bumper turret of each truck to the paved apron immediately southeast of the ARFF building. This process is equivalent to water sprayed during weekly ARFF truck full system checks. Shannon & Wilson collected flush-water samples from the drain underneath the truck. It was not practical to containerize the flush water due to the high volume required to fill the pipes. Field staff did not observe foaming or any colors or odors during sampling. The flush water samples are named *Engine 2-W01*, *Engine 3-W01*, and *Engine 4-W01*. We were unable to collect a water sample from Engine 5 because turret was inoperable. A field blank sample was collected inside the ARFF building following collection of the final flush-water sample.

Exhibit 2-3: ARFF Truck Summary

Truck	AFFF Use	Model Year	Type
Engine 1	None	N/A	Not for aircraft response (non-index)
Engine 2	Moderate	2000	Aircraft egress protection (index)
Engine 3	Low	2013	Aircraft emergency response (index)
Engine 4	Moderate	2004	Aircraft emergency response (index)
Engine 5	Very low	2007	Not for aircraft response (non-index)

2.4 Deviations from Scope

In general, Shannon & Wilson followed the scope of services as described in the proposal with the following exceptions:

- Due to the minimal amount of water present in the culvert, parameters could not be measured prior to collection of the surface water sample.
- We measured pH using high-sensitivity pH strips, not a YSI model 600XL pH probe.
- Water sprayed from Engines 2, 3, and 4 during flush-water sampling was not containerized. The water sprayed from the ARFF trucks for this task is equivalent to the volume of water sprayed during weekly truck systems checks.

2.5 Sample Custody, Storage, and Shipping

Immediately after collection, soil, water, and AFFF samples were placed in individual Ziploc bags and stored in a designated sample cooler maintained between 0 °C and 6 °C with ice substitute. The AFFF samples were stored and shipped separately from other samples to avoid cross-contamination. The AFFF samples were also double-bagged. Shannon & Wilson maintained custody of the samples until submitting them to the laboratory for analysis.

Shannon & Wilson submitted samples to Eurofins TestAmerica Laboratories, Sacramento (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.

2.6 Investigation-Derived Waste

Investigation derived waste consisted of disposable sampling equipment such as gloves, paper towels, and plastic cups. These items were disposed of at the Fairbanks North Star Borough landfill.

3 ANALYTICAL METHODS AND RESULTS

Analytical methods used for this project are presented here along with results of samples. The AFFF-water, surface soil, surface water, flush-water, and AFFF samples were submitted to Eurofins TestAmerica in West Sacramento, California for analysis of the 18 PFAS listed in EPA Method 537.1M. The laboratory modified Method 537.1M according to the sample matrix. These analytes are shown in Exhibit 3-1.

Exhibit 3-1: Analytical Laboratory Methods

Media	Method	Analytes
Water, Soil, Sediment, and AFFF	EPA 537.1 M	PFOS, PFOA, perfluorohexanesulfonic acid (PFHxS), perfluorobutanesulfonic acid (PFBS), perfluoroheptanoic acid (PFHpA), perfluorononanoic acid (PFNA), perfluorodecanoic acid (PFDA), perfluorododecanoic acid (PFDoA), perfluorohexanoic acid (PFHxA), perfluorotetradecanoic acid (PFTeA),perfluorotridecanoic acid (PFTrDA), perfluoroundecanoic acid (PFUnA), hexafluoropropylene oxide dimer acid (HFPO-DA), N-ethyl perfluorooctane sulfonamidoacetic acid (N-EtFOSAA), N-methyl perfluorooctane sulfonamidoacetic acid (N-MeFOSAA), 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUdS), 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CL-PF3ONS), 4,8-dioxa-3H-perfluorononanoic acid (DONA)

Shannon & Wilson provided a Safety Data Sheet from the manufacturer for Phos-CHEK C6 AFFF prior to submitting the samples. Extreme dilution is required to analyze a pure AFFF sample because of very high PFAS concentrations. The laboratory performed serial dilution of a very small volume of AFFF to identify the appropriate sample aliquot. The analysis was performed using a 0.002 milliliter sample. Dilution elevates the laboratory's detection limit. The laboratory detection limit for the AFFF samples is 125,000 times higher than their typical detection limit for water samples.

Analytical results are summarized in Tables 1 through 6 and Figure 2. Appendix D includes a QA/QC summary, laboratory reports, and DEC Laboratory Data Review Checklists (LDRC) for each work order. Several of the laboratory reports contain analytical samples associated with other FAI tasks, reported separately.

3.1 Post-Release AFFF-Water Samples

AFFF-water recovered from the release site and cleared from the ARFF AFFF-dispensing system were above DEC cleanup levels for PFOS in groundwater. These samples were diluted 250-fold, resulting in elevated reporting limits. The concentration of PFOS in the sample of AFFF-water slurry recovered from the site after the release (*FAI-Drum*) was 1,900 ng/L, over four times greater than groundwater cleanup level. The PFOA reporting limit is above the cleanup level in sample *FAI Drum*. Results for this sample are presented in Table 1.

The concentration of PFOS detected in the AFFF-water sample collected from the ARFF trucks (*FAI-Tank*) was 49,000 ng/L, over 120 times higher than the groundwater cleanup level. PFOA was detected at 660 ng/L in sample *FAI Tank*. Results for this sample are presented in Table 2

PFHxS was detected in the recovered AFFF-water slurry sample at 570 ng/L. PFHxS, PFHxA, and PFBS were detected above 2,000 ng/L in the sample collected from AFFF-water collected from the ARFF trucks.

3.2 Release Site Characterization

PFOS was consistently the highest PFAS detected in the analytical samples collected from the release site. Analytical results for surface soil and surface water collected at the release site are presented in Tables 3 and 4, respectively. Sample locations and results are shown in Figure 2.

3.2.1 Surface Soil Samples

Shannon & Wilson collected four surface soil samples, a field duplicate, and a field blank on June 8, 2021 from the area of the accidental AFFF release. Sample locations are shown in Figure 2. Two samples and a field duplicate sample were collected from the area where the AFFF was released (*SS-21-01*, and field duplicate pair *SS-21-02*/*SS-21-102*). One sample was collected from the ground sloping into the ditch (*SS-21-04*). One sample was collected from the dry bottom of the ditch (*SS-21-03*). Project analytes were not detected in the FB sample associated with these surface soil samples. Results were compared to the DEC migration-to-groundwater (MTG) soil cleanup levels of 3.0 micrograms per kilogram (µg/kg) for PFOS and 1.7 µg/kg for PFOA. Results are presented in Table 3.

The highest PFOS concentrations were found in soil samples *SS-21-01* (53 µg/kg) located directly in the area foam was sprayed and SS-*21-03 (*65 µg/kg), the sediment sample collected from the bottom of the ditch. PFOS results in these samples were over 15 times DEC MTG limits. The PFOS concentration detected in the sample (*SS-21-04*) collected from the slope of the ditch downhill from *SS-21-01* was over three times the regulatory limit. The second sample collected to the far side of the release area (field-duplicate pair *SS-21-02*/*SS-21-102*) contained PFOS at twice the regulatory limit.

PFOS was detected above MTG levels in samples *SS-21-01*, *SS-21-02*/*SS-21-102*, *SS-21-03*, and *SS-21-04*. The PFOS results for two of these samples, *SS-21-01* and *SS-21-03*, are between 17 and 22 times the MTG cleanup level. PFOA was detected below MTG levels in samples *SS-21-02*/*SS-21-102*, and *SS-21-04*. The PFOA reporting limit is above the cleanup level for the other two soil samples. This PFOA analysis is not sensitive enough to detect an exceedance because *SS-21-01* and *SS-21-03* were diluted significantly. Perfluorohexanesulfonic acid (PFHxS) and perfluorodecanoic acid (PFDA) were also detected in soil samples collected from the release site.

3.2.2 Surface Water Samples

A surface water sample and field duplicate sample (*SW-21-01*/*SW-21-101*) were collected from the culvert in the ditch surrounding the release site. Results were compared to the DEC cleanup level of 400 ng/L for PFOS or PFOA. Surface water results are presented in Table 4.

PFOS was detected below regulatory limits in the surface water sample collected from the culvert at the site. Very little water was present at the time of sampling.

PFOS and PFOA were detected in the samples collected from the culvert. PFOS was detected at 280 ng/L and PFOA was detected at 21 ng/L. PFHxS, PFHxA, and PFHpA were detected above 50 ng/L, respectively.

3.3 ARFF Truck Flush Water

Shannon & Wilson collected samples of water that was flushed through the AFFF-dispensing system of three ARFF trucks. These samples did not exceed regulatory limits for PFOS or PFOA. However, PFHxA was detected at 1,000 ng/L in sample Engine 2-W01.

Shannon & Wilson collected samples of water flushed through the foam-dispensing system of three ARFF trucks. Results were compared to the DEC cleanup level of 400 ng/L for PFOS or PFOA. Table 5 summarizes ARFF truck flush-water results.

PFOS was detected in each of the flush-water samples at up to 45 ng/L. PFOA was detected in samples from Engines 3 and 4 at up to 4.5 ng/L. PFHxS and perfluorohexanoic acid (PFHxA) were also detected in the flush water samples. PFHxA was detected at 1,000 ng/L in flush water from Engine 2, two orders of magnitude greater than the next-highest PFAS sample result.

3.4 AFFF Samples

AFFF samples were collected from each of four ARFF trucks and the container of C6 foam reserved for future use. Results of AFFF collected from the ARFF trucks showed high levels of PFOS despite being C6-based AFFF. The sample of C6-based AFFF stored in its original container for future use did not have PFOS above the laboratory reporting limit. C6 PFHxA was detected at 1.5 mg/L and PFHxS was detected at an estimated 0.026 mg/L. PFHxA concentration between the five AFFF samples are comparable, suggesting PFHxA is a primary active ingredient in Phos-CHEK C6 AFFF. Table 6 summarizes AFFF sample results.

At the time of this report, there are no federal or state regulations or recommendations for the PFAS concentrations present in AFFF in use at AFFF sites. The FAI has replaced C8-AFFF, which contains PFOS, with C6-based AFFF.

Analytical PFAS results of C6-AFFF samples were reported in mg/L due to high concentrations. Reporting limits for several PFAS analytes including PFOS and PFOA were elevated to 0.25 mg/L (250,000 ng/L) as a result of sample dilution required prior to analysis. Detections of these analytes below 0.25 mg/L may be reported as not detected.

PFOS was detected in the AFFF samples collected from the ARFF trucks, but not foam in its original container. PFOS concentrations ranged from 1.9 mg/L (1,900,000 ng/L) to 6.9 mg/L (6,900,000 ng/L) in the truck samples. PFHxA, PFHxS and PFBS were also detected in most of the truck samples. Due to an elevated reporting limit of 0.25 mg/L for PFOA, it is unclear whether PFOA is present at lower concentrations in the truck samples.

PFHxS and PFHxA were detected at 0.026 mg/L (26,000 ng/L) and 1.5 mg/L (1,500,000 ng/L) in AFFF in its original container. These two PFAS are C6 compounds. PFOS and PFOA, C8 compounds, were not detected. However, due to elevated reporting limits of 0.25 mg/L for PFOS and PFOA in the C6 AFFF sample, it is unclear whether PFOS and PFOA were present at lower concentrations.

Project analytes were not detected in the FB sample collected at the ARFF building.

4 DISCUSSION AND RECOMMENDATIONS

Shannon & Wilson presents our discussion relevant to PFAS in the samples collected following the gate 15 AFFF release at the FAI.

4.1 Discussion

PFAS detections in samples collected at the gate 15 AFFF release site are attributed to a combination of historical AFFF use and the 2020 release. Results are highest within the footprint of the 2020 release. Despite prompt response to contain and remove AFFF after the accidental discharge, residual PFAS are present at the site.

PFOS was found in samples of AFFF-water recovered from the site, AFFF-water drained from Engine 4 after the release, and AFFF taken from the ARFF trucks. PFOS was not present in the C6 AFFF sample collected from its original container. This indicates PFOS is present in the trucks' AFFF-dispensing system and/or AFFF holding tanks. The residual PFOS appears to be leaching from the trucks into the AFFF mixture as it moves through the system.

Each ARFF-truck's dispensing system is designed differently. Annotated photographs and diagrams are included in Appendix C. The AFFF is stored separately from water when the truck is not in use. When the system is engaged, AFFF is proportioned into the dispensing system at a 3% concentration to achieve optimal foam performance. The trucks are kept filled with water and AFFF in case of an emergency and inspected weekly. Airport Police

and Fire personnel frequently clean the water tank and engine components to remove mineral scale.

Engines 2, 3, and 4 use plate-style foam proportioners where AFFF passes through small orifices in the plate to allow the correct amount of foam to enter the system. After the proportioner, distribution piping flows to each AFFF discharge location, either directly or in sequence. Engine 5 uses an electronic proportioner to inject the precise quantity of AFFF needed for each discharge directly into the distribution piping for that system. AFFF-water mix cannot be stored in the distribution piping without damaging the system. When the engines are on standby the distribution piping is empty.

Engines 2, 3, and 4 are also equipped for batch mixing of AFFF and water. For a very large fire, firefighters would manually add 3% AFFF to the water holding tank (e.g., 100 gallons of AFFF to 3,000 gallons of water) and bypass the foam proportioner. This technique was more common in the past, when C8-based AFFF was used. Airport Police and Fire does not believe these engines have been used for batch mixing.

Each truck is able to discharge water without AFFF by bypassing the foam proportioner. However, when releasing the AFFF-free water, it travels through the same distribution piping used for AFFF-water mixtures. We collected samples of water flushed through the AFFF-dispensing system and from the C6 AFFF holding tank for the same system. PFOS was detected at lower levels in the flush water than the corresponding C6 AFFF samples. This suggests the primary source of leachable PFOS is the AFFF holding tank, or that residual PFOS from past C8 AFFF use has an affinity for the components of C6 AFFF. The contact time between C6 AFFF and the AFFF holding tank is also longer than contact between AFFF-water flushed through the distribution piping. Other potential sources of PFOS are PFAS transformation biproducts (i.e. precursors) in the C6 AFFF product that could be present below reporting limits.

C6 AFFF and flush water from Engine 4 had higher PFOS concentrations than AFFF and flush water from the other trucks. The C6 AFFF from Engine 2 had a similar PFOS concentration to Engine 4. ARFF personnel used C8 AFFF for longer in Engines 2 and 4 than in Engines 3 and 5 because they are older.

PFHxA concentrations in the C6 AFFF from each truck are comparable. However, the flush water from Engine 2 had a higher PFHxA result than the other flush-water samples. Engine 2 is used the most often, PFHxA from C6 AFFF may be leaching from the distribution piping into the water.

Water and AFFF-water mixtures discharged from the ARFF trucks contain PFOS despite the use of modern C6 AFFF. Using the ARFF trucks contributes PFOS and other PFAS to the environment. Flushing the tanks with water prior to shifting to C6-AFFF did not adequately remove residual PFOS from the trucks.

4.2 Recommendations

Based on the results of our field activities in September 2020 and June 2021 and related research, Shannon & Wilson recommends the FAI:

- Conduct additional soil characterization outside the gate 15 AFFF release area to identify primary PFAS source areas at the FAI.
- Include the 2020 release area in future groundwater characterization efforts for the PFAS plume.
- Replace the AFFF tanks and dispensing systems in the engines or conduct PFAS-targeted decontamination procedures of the tanks and piping. Evaluate other potential sources of PFOS and other C8 PFAS in the ARFF-trucks and dispensing systems.
- Continue to refrain from discharging PFAS-containing AFFF to the ground, surface water bodies, and groundwater, where possible.

5 CLOSURE

This report was prepared for the exclusive use of the FAI and its representatives. The characterization data should be re-evaluated if cleanup levels are developed for other PFAS compounds, or if the current cleanup levels for PFOS and PFOA change. This work presents Shannon & Wilson's professional judgment as to the conditions of the site. Information presented here is based on the sampling and analyses field staff performed.

This report should not be used for other purposes without Shannon & Wilson's 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.
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- 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, Shannon & Wilson should be retained to review the applicability of our 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. Shannon & Wilson's recommendations are based on:

- Site conditions observed at the site during the time of the collection.
- Details about the release reported to Shannon & Wilson by the FAI.
- The results of testing performed on soil samples collected the site.
- The results of testing performed on water samples collected from the site and ARFF trucks.
- The results of testing performed on AFFF samples collected from the ARFF trucks and storage.
- Shannon & Wilson's previous experience at the FAI.
- Publicly available literature and data reviewed for this project.
- Shannon & Wilson's understanding of the project and information provided by DOT&PF and other members of the project team.
- The limitations of our approved scope and schedule described in our approved proposals, amendments, and NTPs.

The information included in this report is based on limited sampling and should be considered representative of the times and locations at which the sampling occurred. Regulatory agencies may reach different conclusions than Shannon & Wilson. We have prepared and included the attachment "Important Information about your Geotechnical/Environmental Report" to assist you and others in understanding the use and limitations of this report.

6 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.

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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.

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Table 1- September 2020 AFFF Release Recovered AFFF-water PFAS Results Summary

Analytical Method	Analyte	Action Level	Units	*FAI Drum* *FAI Drum*
EPA 537(Mod)	Perfluorohexanesulfonic acid (PFHxS)	—	ng/L	570
	Perfluorohexanoic acid (PFHxA)	—	ng/L	480 J
	Perfluoroheptanoic acid (PFHpA)	—	ng/L	<500
	Perfluorononanoic acid (PFNA)	—	ng/L	<500
	Perfluorobutanesulfonic acid (PFBS)	—	ng/L	88 J
	Perfluorodecanoic acid (PFDA)	—	ng/L	<500
	Perfluoroundecanoic acid (PFUnA)	—	ng/L	<500
	Perfluorododecanoic acid (PFDoA)	—	ng/L	<500
	Perfluorotridecanoic acid (PFTrDA)	—	ng/L	<500
	Perfluorotetradecanoic acid (PFTeA)	—	ng/L	<500
	N-Methyl perfluorooctane sulfonamidoacetic acid (N-MeFOSAA)	—	ng/L	<1,300
	N-Ethyl perfluorooctane sulfonamidoacetic acid (N-EtFOSAA)	—	ng/L	<1,300
	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)	—	ng/L	<500
	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	—	ng/L	<500
	4,8-Dioxa-3H-perfluorononanoic acid (DONA)	—	ng/L	<500
	Hexafluoropropylene oxide dimer acid (HFPO-DA)	—	ng/L	<1,000
	Perfluorooctanesulfonic acid (PFOS)	400	ng/L	**1,900**
	Perfluorooctanoic acid (PFOA)	400	ng/L	**<500**

Notes: Results reported from Eurofins Environment Testing work order 320-74830-1.
EPA Environmental Protection Agency
PFAS per- and poly-fluoroalkyl substances
mg/L milligrams per liter, equivalent to parts per billion
— No applicable regulatory limit exists for the associated analyte.
< Analyte was not detected; reported as less than the limit of quantitation (<LOQ).
J Estimated concentration, detected greater than the detection limit (DL) and less than the LOQ. Flag applied by the laboratory.

Table 2- September 2020 AFFF Release AFFF-water Drained from ARFF Truck PFAS Results Summary

Analytical Method	Analyte	Action Level	Units	*FAI Tank* *FAI Tank*
EPA 537(Mod)	Perfluorohexanesulfonic acid (PFHxS)	—	ng/L	9,100
	Perfluorohexanoic acid (PFHxA)	—	ng/L	2,800
	Perfluoroheptanoic acid (PFHpA)	—	ng/L	290 J
	Perfluorononanoic acid (PFNA)	—	ng/L	<500
	Perfluorobutanesulfonic acid (PFBS)	—	ng/L	2,300
	Perfluorodecanoic acid (PFDA)	—	ng/L	<500
	Perfluoroundecanoic acid (PFUnA)	—	ng/L	<500
	Perfluorododecanoic acid (PFDoA)	—	ng/L	<500
	Perfluorotridecanoic acid (PFTrDA)	—	ng/L	<500
	Perfluorotetradecanoic acid (PFTeA)	—	ng/L	<500
	N-Methyl perfluorooctane sulfonamidoacetic acid (N-MeFOSAA)	—	ng/L	<1,300
	N-Ethyl perfluorooctane sulfonamidoacetic acid (N-EtFOSAA)	—	ng/L	<1,300
	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)	—	ng/L	<500
	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	—	ng/L	<500
	4,8-Dioxa-3H-perfluorononanoic acid (DONA)	—	ng/L	<500
	Hexafluoropropylene oxide dimer acid (HFPO-DA)	—	ng/L	<1,000
	Perfluorooctanesulfonic acid (PFOS)	400	ng/L	**49,000**
	Perfluorooctanoic acid (PFOA)	400	ng/L	**660**

Notes: Results reported from Eurofins Environment Testing work order 320-74830-1.
EPA Environmental Protection Agency
PFAS per- and poly-fluoroalkyl substances
mg/L milligrams per liter, equivalent to parts per billion
— No applicable regulatory limit exists for the associated analyte.
< Analyte was not detected; reported as less than the limit of quantitation (<LOQ).
J Estimated concentration, detected greater than the detection limit (DL) and less than the LOQ. Flag applied by the laboratory.

Table 3- June 2021 AFFF Release Site Surface Soil PFAS Results Summary

Analytical Method	Analyte	Regulatory Limit	Units	*SS-21-01*	*SS-21-02*		*SS-21-03*	*SS-21-04*
				SS-21-01	Primary	Duplicate	*SS-21-03*	*SS-21-04*
EPA 537(Mod)	Perfluorohexanesulfonic acid (PFHxS)	—	µg/Kg	0.81 J	0.45 J*	0.41 J*	4.0	1.0
	Perfluorohexanoic acid (PFHxA)	—	µg/Kg	<2.2	<0.22 J*	0.31 J*	3.1 J*	0.52
	Perfluoroheptanoic acid (PFHpA)	—	µg/Kg	<2.2	0.13 J	0.12 J	<3.30	0.091 J
	Perfluorononanoic acid (PFNA)	—	µg/Kg	<2.2	0.16 J	0.11 J	<3.3	0.083 J
	Perfluorobutanesulfonic acid (PFBS)	—	µg/Kg	<2.2	<0.22	<0.210	0.56 J	0.15 J
	Perfluorodecanoic acid (PFDA)	—	µg/Kg	0.64 J	0.87	0.77	1.1 J*	0.53
	Perfluoroundecanoic acid (PFUnA)	—	µg/Kg	<2.2	1.2	0.95	<3.3	0.47
	Perfluorododecanoic acid (PFDoA)	—	µg/Kg	<2.2	3.1	2.5	2.1 J	1.9
	Perfluorotridecanoic acid (PFTrDA)	—	µg/Kg	<2.2	0.87	0.71	9.1 J*	0.38
	Perfluorotetradecanoic acid (PFTeA)	—	µg/Kg	<2.2	1.3	1.1	1.7 J	0.83
	N-Methyl perfluorooctane sulfonamidoacetic acid (N-MeFOSAA)	—	µg/Kg	<22	<2.2	<2.10	<33.0	<2.10
	N-Ethyl perfluorooctane sulfonamidoacetic acid (N-EtFOSAA)	—	µg/Kg	<22	<2.2	<2.10	<33.0	<2.10
	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	—	µg/Kg	<2.2	<0.22	<0.210	<3.30	<0.210
	4,8-Dioxa-3H-perfluorononanoic acid (DONA)	—	µg/Kg	<2.2	<0.22	<0.210	<3.30	<0.210
	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)	—	µg/Kg	<2.2	<0.22	<0.210	<3.30	<0.210
	Hexafluoropropylene oxide dimer acid (HFPO-DA)	—	µg/Kg	<2.7	<0.28	<0.260	<4.20	<0.260
	Perfluorooctanesulfonic acid (PFOS)	3.0	µg/Kg	**53**	**6.7**	**5.4**	**65**	**9.4**
	Perfluorooctanoic acid (PFOA)	1.7	µg/Kg	**<2.2**	0.23	0.17 J	**<3.3**	0.18 J

Notes:
Results reported from Eurofins Environment Testing work order 320-74829-1.
EPA Environmental Protection Agency
PFAS per- and poly-fluoroalkyl substances
µg/Kg micrograms per kilogram
— No applicable regulatory limit exists for the associated analyte.
< Analyte was not detected; reported as <LOQ.
<Bold The laboratory's limit of quantitation (LOQ) is greater than the regulatory limit.
Bold The detected concentration exceeds the ADEC cleanup level for the associated analyte.
J Estimated concentration, detected greater than the detection limit (DL) and less than the limit of quantitation (LOQ). Flag applied by the laboratory.
J* Estimated concentration due to quality control failures. Flag applied by Shannon & Wilson, Inc. (*)

Table 4- June 2021 AFFF Release Site Surface Water PFAS Results Summary

Analytical Method	Analyte	Action Level	Units	SW-21-01	
				Primary	Duplicate
EPA 537(Mod)	Perfluorohexanesulfonic acid (PFHxS)	—	ng/L	77	75
	Perfluorohexanoic acid (PFHxA)	—	ng/L	240	220
	Perfluoroheptanoic acid (PFHpA)	—	ng/L	70	54
	Perfluorononanoic acid (PFNA)	—	ng/L	6.9 J	8.4 J*
	Perfluorobutanesulfonic acid (PFBS)	—	ng/L	11 J	8.6 J
	Perfluorodecanoic acid (PFDA)	—	ng/L	<18	6.6 J
	Perfluoroundecanoic acid (PFUnA)	—	ng/L	<18	<18
	Perfluorododecanoic acid (PFDoA)	—	ng/L	<18	<18
	Perfluorotridecanoic acid (PFTrDA)	—	ng/L	<18	<18
	Perfluorotetradecanoic acid (PFTeA)	—	ng/L	<18	<18
	N-Methyl perfluorooctane sulfonamidoacetic acid (N-MeFOSAA)	—	ng/L	<44	<45
	N-Ethyl perfluorooctane sulfonamidoacetic acid (N-EtFOSAA)	—	ng/L	<44	<45
	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)	—	ng/L	<18	<18
	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	—	ng/L	<18	<18
	4,8-Dioxa-3H-perfluorononanoic acid (DONA)	—	ng/L	<18	<18
	Hexafluoropropylene oxide dimer acid (HFPO-DA)	—	ng/L	<35	<36
	Perfluorooctanesulfonic acid (PFOS)	400	ng/L	280	260
	Perfluorooctanoic acid (PFOA)	400	ng/L	21	21

Notes:
Results reported from Eurofins Environment Testing work order 320-74829-1.
EPA Environmental Protection Agency
PFAS per- and poly-fluoroalkyl substances
ng/L nanograms per liter
— No applicable regulatory limit exists for the associated analyte.
< Analyte was not detected; reported as <LOQ.
J Estimated concentration, detected greater than the detection limit (DL) and less than the limit of quantitation (LOQ). Flag applied by the laboratory.
J* Estimated concentration due to quality control failures. Flag applied by Shannon & Wilson, Inc. (*)

Table 5- June 2021 ARFF Truck AFFF-Truck Flush PFAS Results Summary

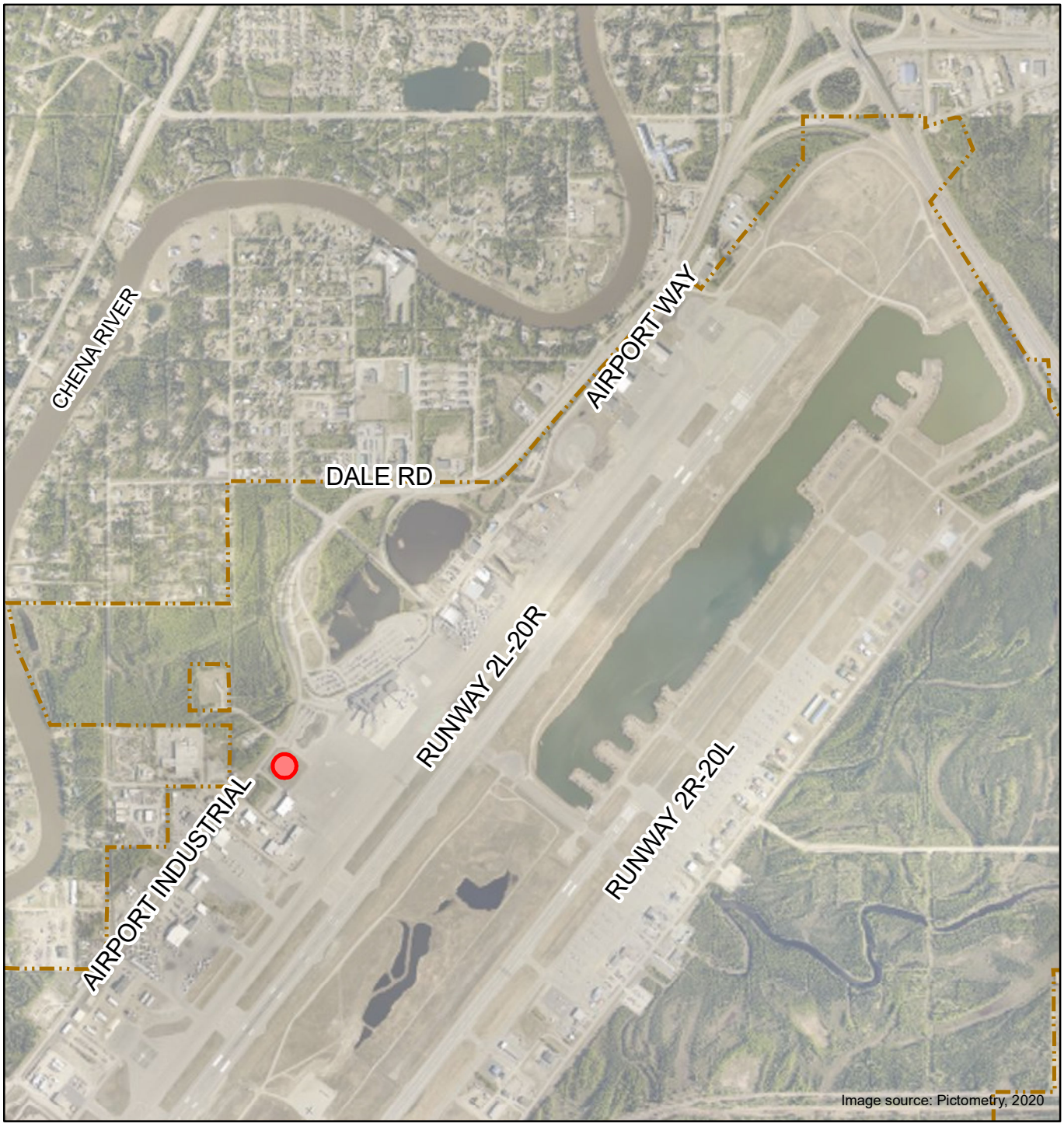
Analytical Method	Analyte	Action Level	Units	*Engine 2-W01*	*Engine 3-W01*	*Engine 4-W01*
				Engine 2-W01	*Engine 3-W01*	*Engine 4-W01*
EPA 537(Mod)	Perfluorohexanesulfonic acid (PFHxS)	—	ng/L	8.2 J	11	7.0
	Perfluorohexanoic acid (PFHxA)	—	ng/L	1,000	8.1	5.9
	Perfluoroheptanoic acid (PFHpA)	—	ng/L	<19	1.7	1.3 J
	Perfluorononanoic acid (PFNA)	—	ng/L	<19	0.80 J	<1.7
	Perfluorobutanesulfonic acid (PFBS)	—	ng/L	2.1 J	2.6	1.7
	Perfluorodecanoic acid (PFDA)	—	ng/L	<19	6.1	<1.7
	Perfluoroundecanoic acid (PFUnA)	—	ng/L	<19	2.2	<1.7
	Perfluorododecanoic acid (PFDoA)	—	ng/L	<19	3.5	<1.7
	Perfluorotridecanoic acid (PFTrDA)	—	ng/L	<19	1.2 J	<1.7
	Perfluorotetradecanoic acid (PFTeA)	—	ng/L	<19	1.0 J	<1.7
	N-Methyl perfluorooctane sulfonamidoacetic acid (N-MeFOSAA)	—	ng/L	<47	<4.3	<4.3
	N-Ethyl perfluorooctane sulfonamidoacetic acid (N-EtFOSAA)	—	ng/L	<47	<4.3	<4.3
	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)	—	ng/L	<19	<1.7	<1.7
	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	—	ng/L	<19	<1.7	<1.7
	4,8-Dioxa-3H-perfluorononanoic acid (DONA)	—	ng/L	<19	<1.7	<1.7
	Hexafluoropropylene oxide dimer acid (HFPO-DA)	—	ng/L	<37	<3.4	<3.4
	Perfluorooctanesulfonic acid (PFOS)	400	ng/L	22	28	45
	Perfluorooctanoic acid (PFOA)	400	ng/L	<19	4.5	3.2

Notes:
Results reported from Eurofins Environment Testing work order 320-74830-1.
EPA Environmental Protection Agency
PFAS per- and poly-fluoroalkyl substances
ng/L nanograms per liter, equivalent to parts per trillion
— No applicable regulatory limit exists for the associated analyte.
< Analyte was not detected; reported as less than the limit of quantitation (<LOQ).
J Estimated concentration, detected greater than the detection limit (DL) and less than the LOQ. Flag applied by the laboratory.

Table 6- June 2021 AFFF PFAS Results Summary

Analytical Method	Analyte	Action Level	Units	*Engine 2*	*Engine 3*	*Engine 4*	*Engine 5*	*C6 AFFF*
				Engine 2	*Engine 3*	*Engine 4*	*Engine 5*	*C6 AFFF*
EPA 537(Mod)	Perfluorohexanesulfonic acid (PFHxS)	—	mg/L	<1.3	0.57	1.5	0.38	0.026 J
	Perfluorohexanoic acid (PFHxA)	—	mg/L	1.9	1.9	1.8	1.7	1.5
	Perfluoroheptanoic acid (PFHpA)	—	mg/L	0.043 J	0.037	<1.3	<0.25	<0.25
	Perfluorononanoic acid (PFNA)	—	mg/L	<0.25	<0.25	<1.3	<0.25	<0.25
	Perfluorobutanesulfonic acid (PFBS)	—	mg/L	0.29	0.13 J	0.22 J	0.097 J	<0.25
	Perfluorodecanoic acid (PFDA)	—	mg/L	<0.25	<0.25	<1.3	<0.25	<0.25
	Perfluoroundecanoic acid (PFUnA)	—	mg/L	<0.25	<0.25	<1.3	<0.25	<0.25
	Perfluorododecanoic acid (PFDoA)	—	mg/L	<0.25	<0.25	<1.3	<0.25	<0.25
	Perfluorotridecanoic acid (PFTrDA)	—	mg/L	<0.25	<0.25	<1.3	<0.25	<0.25
	Perfluorotetradecanoic acid (PFTeA)	—	mg/L	<0.25	<0.25	<1.3	<0.25	<0.25
	N-Methyl perfluorooctane sulfonamidoacetic acid (N-MeFOSAA)	—	mg/L	<2.5	<2.5	<13	<2.5	<2.5
	N-Ethyl perfluorooctane sulfonamidoacetic acid (N-EtFOSAA)	—	mg/L	<2.5	<2.5	<13	<2.5	<2.5
	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)	—	mg/L	<0.25	<0.25	<1.3	<0.25	<0.25
	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	—	mg/L	<0.25	<0.25	<1.3	<0.25	<0.25
	4,8-Dioxa-3H-perfluorononanoic acid (DONA)	—	mg/L	<0.25	<0.25	<1.3	<0.25	<0.25
	Hexafluoropropylene oxide dimer acid (HFPO-DA)	—	mg/L	<0.25	<0.25	<1.3	<0.25	<0.25
	Perfluorooctanesulfonic acid (PFOS)	—	mg/L	6.4 J*	3.7 J*	6.9 J*	1.9 J*	<0.25
	Perfluorooctanoic acid (PFOA)	—	mg/L	<0.25	<0.25	<1.3	<0.25	<0.25

Notes: Results reported from Eurofins Environment Testing work order 320-74830-1.
EPA Environmental Protection Agency
PFAS per- and poly-fluoroalkyl substances
mg/L milligrams per liter, equivalent to parts per billion
— No applicable regulatory limit exists for the associated analyte.
< Analyte was not detected; reported as less than the limit of quantitation (<LOQ).
J Estimated concentration, detected greater than the detection limit (DL) and less than the LOQ. Flag applied by the laboratory.
J* Estimated concentration due to quality control failures. Flag applied by Shannon & Wilson, Inc.



LEGEND

2020 AFFF Release

FAI Boundary

0 2,000 4,000

Feet

N

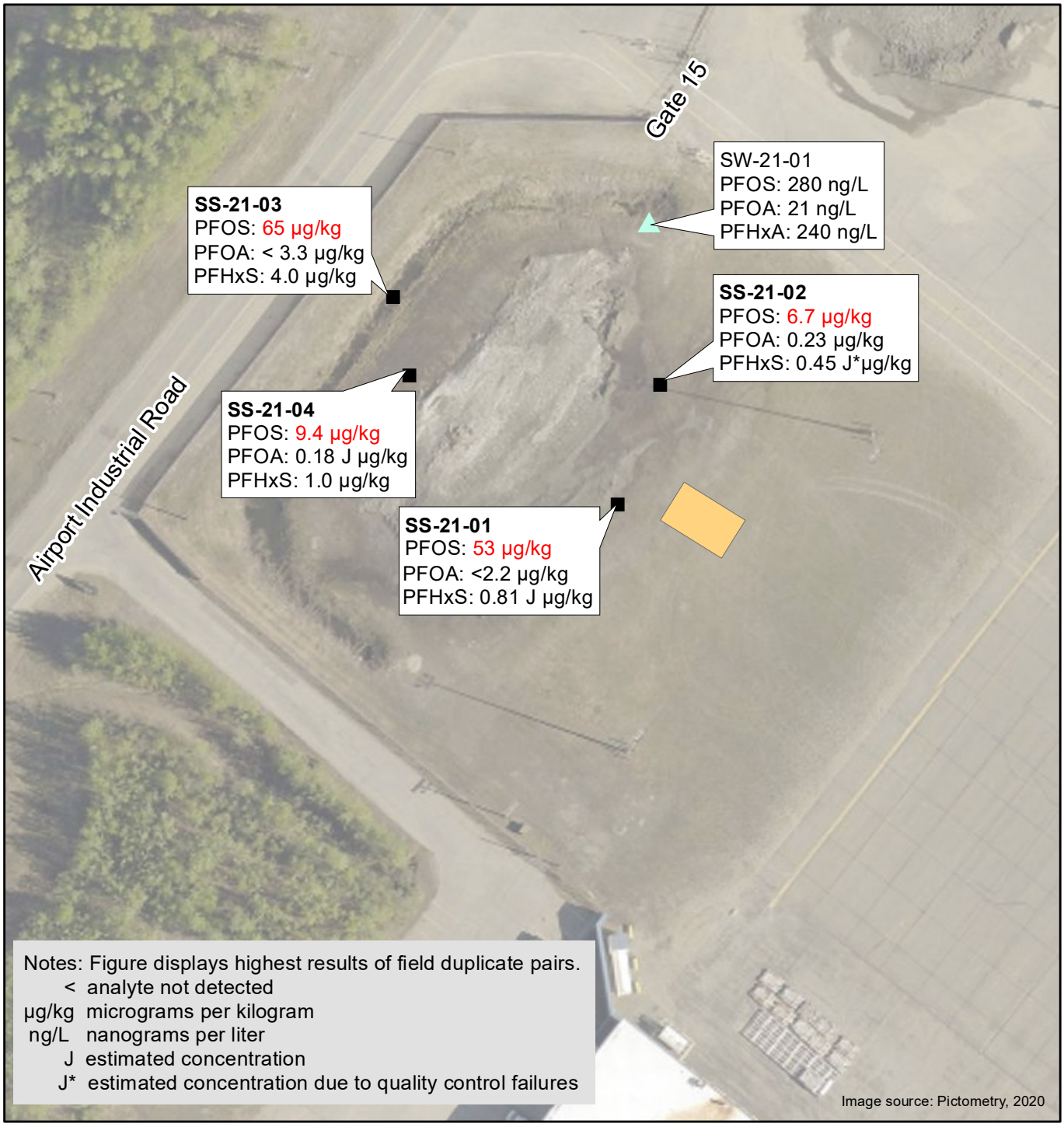
AFFF Release Site Characterization
Fairbanks, Alaska

VICINITY MAP

October 2021 102519

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Figure 1



LEGEND

- ■ Surface Soil
- ▲ Surface Water
- ▭ Approximate Location of ARFF

Bold Sample Name
Red Results exceed applicable action level**

DEC soil migration to groundwater cleanup levels are:
3.0 µg/kg for PFOS
1.7 µg/kg for PFOA.
Groundwater cleanup levels are:
400 ng/L for PFOS or PFOA.

N

0 110 220
Feet

AFFF Release Site Characterization
Fairbanks, Alaska

AFFF RELEASE SAMPLE RESULTS

October 2021 102519

SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Figure 2

APPENDIX A: SPILL REPORTING FORM

Appendix A

Spill Reporting Form

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION

OIL & HAZARDOUS SUBSTANCES SPILL NOTIFICATION FORM

ADEC USE ONLY

ADEC SPILL #:	ADEC FILE #:	ADEC LC:

PERSON REPORTING:	PHONE NUMBER:	REPORTED HOW? (ADEC USE ONLY)
Aaron Danielson	907-474-2530	☐ Phone ☐ Fax ☐ PERS ☐ E-mail
DATE/TIME OF SPILL:	**DATE/TIME DISCOVERED:**	**DATE/TIME REPORTED TO ADEC:**
9/15/2020 ~ 0215	9/15/2020 ~ 0215	9/15/2020 -

INCIDENT LOCATION/ADDRESS:	DATUM: ☐ NAD27 ☐ NAD83 ☐ WGS84 ☐ Other _____	PRODUCT SPILLED:
Fairbanks International Airport, West Side, inside the fence line, adjacent to Airport Industrial rd. and Mail Trail.	LAT. 64°48'57.1"N LONG. 147°52'28.3"W	Phos-CHEK C6 AFFF - 3%

QUANTITY SPILLED:	QUANTITY CONTAINED:	QUANTITY RECOVERED:	QUANTITY DISPOSED:
10 ☑ gallons ☐ pounds	☐ gallons ☐ pounds	☐ gallons ☐ pounds	☐ gallons ☐ pounds

	POTENTIAL RESPONSIBLE PARTY:	OTHER PRP, IF ANY:	VESSEL NAME:
Name/Business:	Fairbanks International Airport		
Mailing Address:	6450 Airport Way, Suite 1		VESSEL NUMBER:
	Fairbanks, AK 99709		
Contact Name:	Aaron Danielson		> 400 GROSS TON VESSEL: ☐ Yes ☐ No
Contact Number:	907-474-2530		

SOURCE OF SPILL:
Airport Rescue Fire Truck

CAUSE OF SPILL: ☒ Under Investigation

Initial report is of accidental activation of the AFFF system on an ARFF truck by the operator

CAUSE CLASSIFICATION:
☐ Accident
☑ Human Factors
☐ Structural/Mechanical
☐ Other

CLEANUP ACTIONS:
Placed booms in impacted waterway, utilizing a Tornado Vac to clean up surface water/foam mix. Cleanup work still ongoing.

DISPOSAL METHODS AND LOCATION:
Utilize commercial disposal after testing of concentration.

AFFECTED AREA SIZE:	SURFACE TYPE: *(gravel, asphalt, name of river etc.)*	RESOURCES AFFECTED/THREATENED: *(Water sources, wildlife, wells, etc.)*
80x100	Grassy soil and drainage ditch	Immediate soil and drainage ditch.

COMMENTS:
Estimated to be upwards to 10 gallons of foam concentrate mixed with approximately 300 gallons of water discharged from an ARFF truck turret after accidental activation from operator.

ADEC USE ONLY

SPILL NAME:	NAME OF DEC STAFF RESPONDING:	C-PLAN MGR NOTIFIED? ☐ Yes ☐ No

DEC RESPONSE:	CASELOAD CODE:	CLEANUP CLOSURE ACTION:
☐ Phone follow-up ☐ Field visit ☐ Took Report	☐ First and Final ☐ Open/No LC ☐ LC Assigned	☐ NFA ☐ Monitoring ☐ Transferred to CS or STP

COMMENTS:

Status of Case: ☐ Open ☐ Closed DATE CASE CLOSED:

REPORT PREPARED BY:	DATE:

APPENDIX B: PHOTO LOGS

Appendix B

Photo Logs

CONTENTS

Photo 1: Site of accidental release.

Photo 2: AFFF-water discharged from ARFF truck on ground surface.

Photo 3: Close-up of AFFF-water slurry on ground surface.

Photo 4: AFFF-water draining to ditch adjacent to site.

Photo 5: AFFF-water in ditch. Upstream view.

Photo 6: AFFF-water in ditch. View downstream towards culvert.

Photo 1: AFFF Sample

Photo 2: AFFF Totes

Photo 3: Engine 2 Bumper Turret

Photo 4: Engine Plate Style AFFF Proportioner

Photo 5: Engine 2 with High Reach Roof Turret

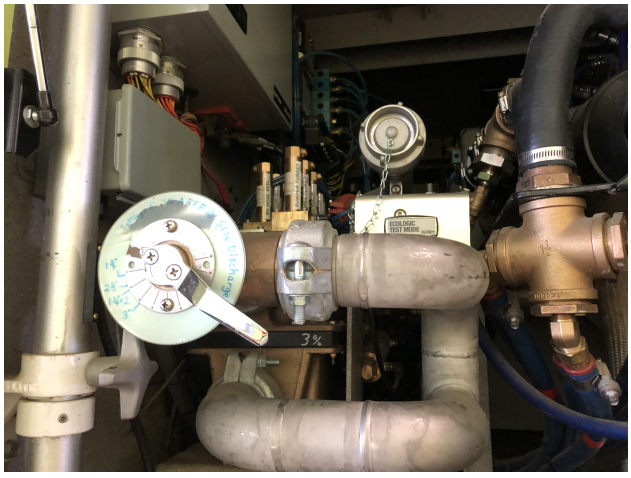


Photo 6: Engine 3 AFFF Proportioner

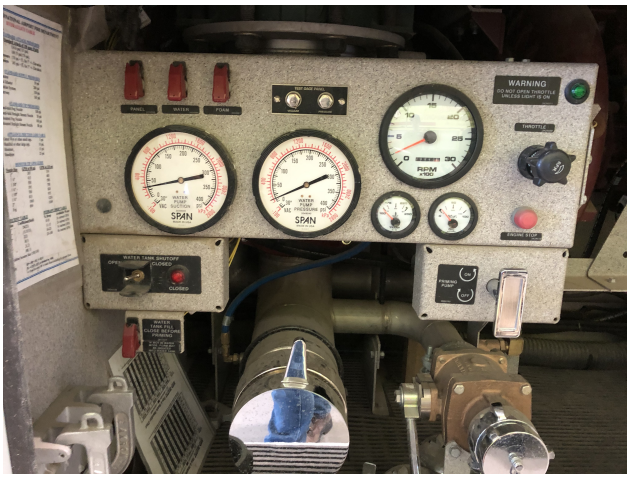


Photo 7: Engine 3 Control Panel

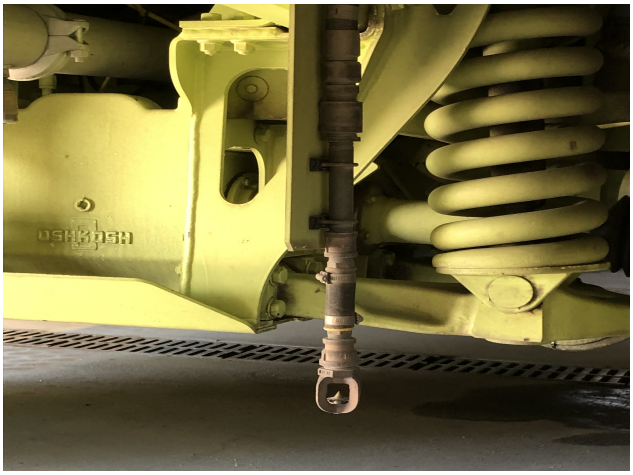


Photo 8: Engine 3 Under Cab Sprinkler Nozzle

Photo 9: Engine 5 Control Panel

Photo 10: Engine 5 Electric AFFF Proportioner Behind Panel

Photo 11: Engines 3, 4, and 5

APPENDIX C: FIELD NOTES

Appendix C

Field Notes

CONTENTS

FIELD ACTIVITIES DAILY LOG

Date 9/24/20
Sheet 1 of 1
Project No. 102519-008,012

Project Name: AFFF Release Drum and Tank Sampling

Field activity subject: Sampling

Description of daily activities and events:

1055 - arrived at FAI Environmental Building to meet Dana Bowen from FAI.

1100 start setting up to sample drum. 2-55 gallon drums were of recovered AFFF/water. Water was brownish with grass in it.

1110 - Collected 'FAI Drum' sample.

1120 - moved to location of tanks - Building 50 - warm storage. 2 white plasitc tanks - one 1500 gallon and one 2500 gallon tank.

1140 - Collected 'FAI Tank sample. Collected extra volume for Aquagga. Water was foamy/bubbly.

1150 - offsite.

Samples were dropped of at Goldstreek 9/24/20 top arrive at Test America on 9/25/20.

Visitors on site: None

Changes from plans/specifications and other special orders and important decisions:
None

Weather conditions: 40 and raining. Sampling was conducted indoors.

Important telephone calls: None

Personnel on site: Ashley Jaramillo

Signature: Date: 9/24/20

FIELD ACTIVITIES DAILY LOG

Date 6/7/21
Sheet 1 of 1
Project No. 102519-017

Project Name: FAI
Field activity subject: AFFF and truck sampling
Description of daily activities and events:

0800 Load equipt for sampling
0930 Meet Lt. Pratt + Chief Danielson @ Police + Fire bldg
Visit Gate 15 AFFF release, large spray area, begins ~50ft in front of truck, flowed downhill to ditch. Volume est was from time ~10 to 30 seconds
Frequent AFFF release area in 70s, 80s, 90s during ~~systems~~ testing. Now snow dump.
Visit Bldg 50: 2 lrg tanks of truck flush water and 2 55-gallon drums labled "awaiting testing"
Envi Bldg: small containers AFFF, & 2020 Jacobs purge water (~1 drum), 2 yellow bags w/ sorbent booms from release response
~1015 Aaron Danielson depart, begin truck walk-through w/ Dan Pratt

Engine 1 No foam capability
Engine 2 Oldest (2000) used most frequently. Dedicated to egress protection. for function test + emerg. response.
Engine 3 2013 ~~or 2015~~ ~~used most after Engine 2~~
Engine 4 2004, ~~basically~~ same as Engine 3
Engine 5 2007, barely uses AFFF. Electric proportioner.

All the trucks build up calcium + mineral scale from water hardness in the water tanks.

1125 Medical emergency, wait in vehicle
Call AMJ re: ditch basins
Lunch w/ fire fighters (Dan + 2 others)
~1200 Return to truck bay, begin AFFF sampling
~~continue walk-through (w)~~
Finish walk through of Engines 4+5
Spray from bumper turret of e/ truck to parking area, only way to collect water. Use cup to fill sample bottle from under truck as it's draining. then allow lines to drain
Sample 300 gall tote of AFFF, collect EB
~1530 Depart FAI

Visitors on site: —

Changes from plans/specifications and other special orders and important decisions:
Unable to sample water from Engine 5. Not practical to contain vehicle flush water, no different from weekly water spray

Weather conditions: mostly clear, 60s/low 70s

Important telephone calls: ø

Personnel on site:
Signature: MDN Date: 6/9/21

FIELD ACTIVITIES DAILY LOG

Date 6/8/2021
Sheet 1 of 1
Project No. 102519-016

Project Name: FAI - AFFF Release
Field activity subject: PFAS
Description of daily activities and events: Call Jason Griswold in am. meet @ Airport Fire bldg. @ 1130.

0900 Pack equip. Confirm details w/ MDN. Call Jason to discuss potential location of missing Jacobs drum

1115 leave for FAI. Meet Jason @ Airport @ 1130.

1145 arrive onsite @ AFFF accidental release area. Collect 4 surface soil samples - inc. one sed. ment sample. take measurments + GPS points. Culvert was very overgrow w/ willows, very little water but took surface water sample + dup. here.

1300 Drive to Env. Bldg. Search for & locate ~~"missing Jacobs Drum"~~ (DRUM-02) Sample Both drums using peri pump. DRUM-01 contained a large amount of sediment / suspended solids + iron clumps/algae)

1400 return to stw; Unpack. ~~clean~~ Paperwork

1600 end work

Visitors on site:

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

Weather conditions: Overcast 60s

Important telephone calls: Jason Griswold

Personnel on site: MDN

Signature: [signature] Date: 6/8/2021

MDN

SAMPLE COLLECTION LOG

Project Number: 102519-017 Project Name: FAI ARFFF trucks Page 1 of 1

Date: 6/7/21

Sampler: MDN

Sample Number	Location	Sample Date	Sample Time	Depth (ft)	Sample Type	PID Reading / pH	Analyses
Engine 2	C6 AFFF from truck tank, access @ top of truck	6/7/21	1202	N/A	ES	N/A	PFAS, high conc.
Engine 3	C6 foam from truck tank, "		1210				
Engine 4	" "		1215				
Engine 5	" smaller foam tank, access from top/side		1220				
C6 AFFF	C6 foam from 300 gallon tote, used to refill trucks when needed					pH=	
Engine 2-W01	water sprayed from engine 2, collect in cup under truck	14~~10~~	1410	N/A		6.4	PFAS x18
Engine 3-W01	" engine 3 "	14~~25~~	1425			6.6	
Engine 4-W01	" engine 4 "	14~~30~~	1430			6.4	
Engine 4-FB	Field blk collected inside ARFF bldg	1435	1435		Blank	—	
Engine 5	Bumper turret not working, no sample						

Sample Type FS = Field screening measurement only ES = Environmental sample FD = Field duplicate TB = Trip blank

SHANNON & WILSON, INC.

SAMPLE COLLECTION LOG

Project Number: 102519-016 Location: Fairbanks Int. Airport Page 1 of 1

Date: 6/8/2021

Sampler: AAM

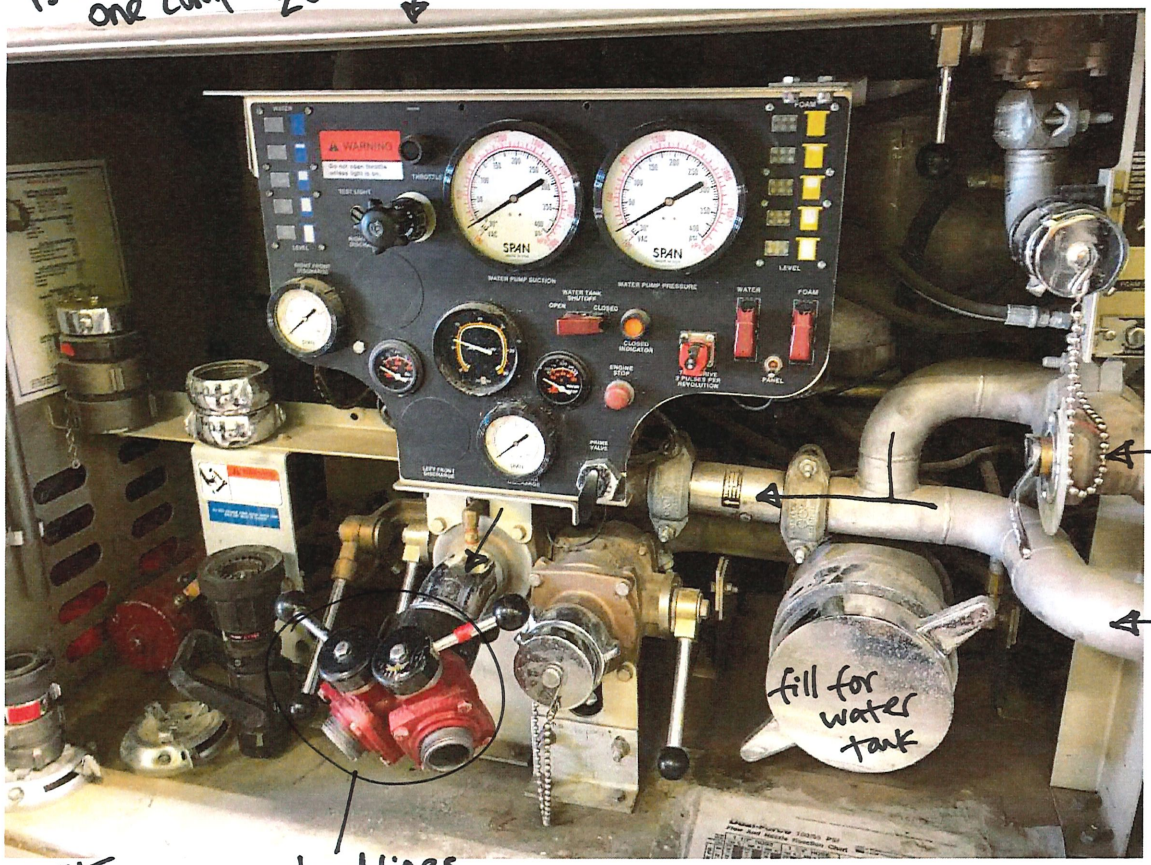
Sample Number	Location	Sample Time	Depth Interval (ft) top	Depth Interval (ft) bottom	Matrix Type	Sampling Method	Sample Type	PID Reading	Analyses
SS-21-01	AFFF release area fill	1220			Soil	Spoon	ES		PFAS x18
SS-21-02	AFFF release area	1212							
SS-21-102	duplicate of SS-21-02	1202					FD		
SS-21-03	ditch/sediment, organic-rich	1232					ES		
SS-21-04	b/t ditch + release area, fill	1237							
SW-21-01	culvert entrance	1220			Water	GRAB			
SW-21-101	dup of SW-21-01	1220					FD		
DRUM-21-01	env. bldg. rear, right corner	1311				Peristaltic	ES		
DRUM-21-02	env. bldg. front left corner	1321					ES		
FB-21-01	Field Blank	1215	N/A		Water	—	FB		Field blank
		2019	purge water		from	Drainage	Pond	and	Hydrant Fuel Sites (interred)
		12/2020	purge water						

Matrix Type		Sampling Method		Sample Type	
AR	Air	B	Bailer/Coliwas	ES	Environmental sample
GW	Groundwater	D	Drill cuttings	ER	Equipment rinsate
PR	Product	G	Grab sampling	FB	Field blank
SB	Subsurf. soil	H	Hand auger	FD	Field duplicate
SE	Sediment	L	Tube liner	FM	Field measurement
SG	Sludge	P	Pump (liquid)	FR	Field replicate
SS	Surface soil	SS	Split spoon	MD	Matrix spike duplicate
SW	Surface water	T	Shelby tube	MS	Matrix spike duplicate
WR	Water	V	Vacuum (gas)	TB	Trip blank
		W	Wipe sampling		

MDW

Airport Indu
Airport Industrial Rd
SD-21-01
SS-21-03
124'
SS-21-04
SS-21-02
123'
145'
121'
130'
SS-21-01
142'
UTIL POLE
UTIL POLE
elect. box

Engine 2



No on-board foam pump, other trucks are used to fill foam tank

Engine 2 and 3, and 4 have option for batch mixing of foam + water, add foam straight in to water tank. ~~Also equipt w/ ha~~

Trucks 2-4 are 45 ft long

AFFF exits:
- bumper turret, 625-1,250 gpm per turret, piercing tip 300-600 gpm.
- roof turret, extendable reel 56, "snozzle"
- under truck ~~nozzles~~ 1" booster line, up to 19 gpm ~~Booster hose~~
- hand lines, x2
- pre-connect hose
- proportioner drain, not used for fire fighting

VEHICLE EXTERIOR ARRANGEMENT

Engine 2

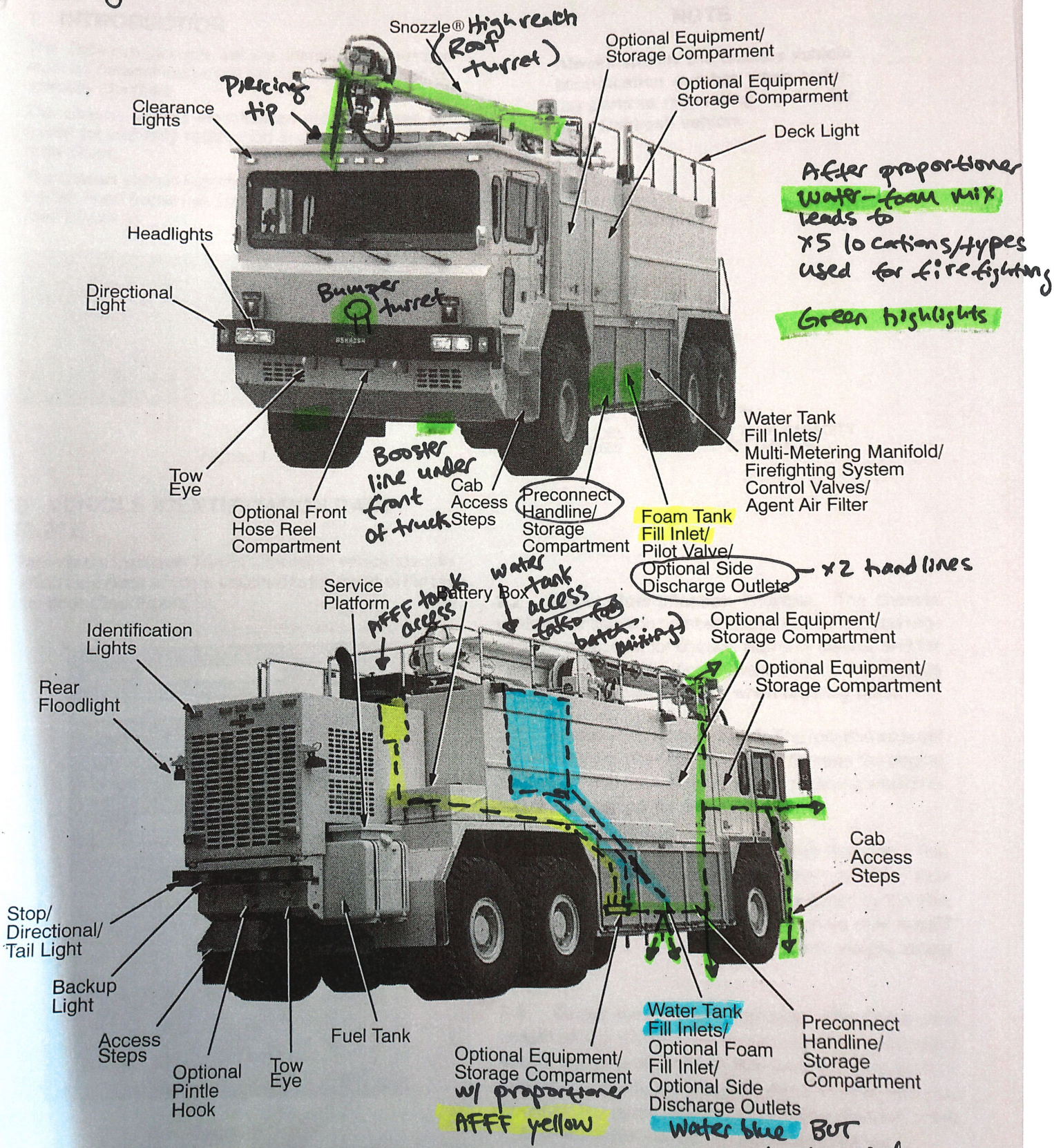
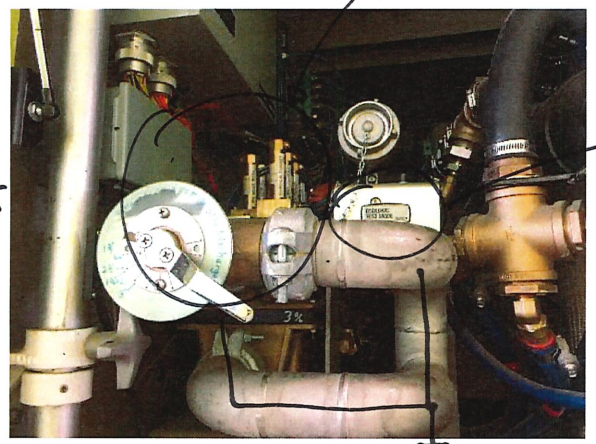


Figure 1. TI-3000 Aircraft Rescue Fire Fighting Vehicle.

Engine 3



AFFF proportioner (plate style)

Ecologic test valve

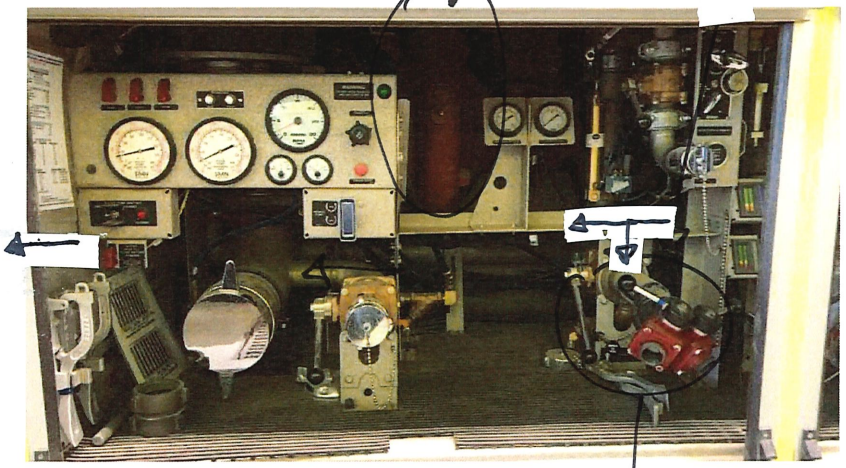
420 gall AFFF tank

to turrets and under cab sprinklers

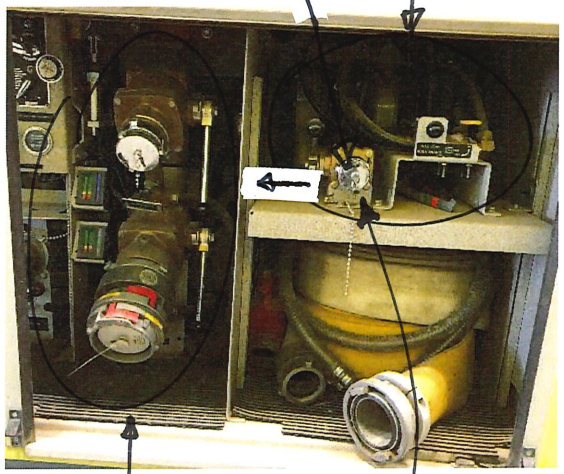
centrifuge 1,900 gpm pump

foam transfer pump (used to fill Engine 2)

pre-connect hose assembly (~45 ft from AFFF tank)



hand lines (~35 ft from AFFF tank)



Water tank fill / inlet

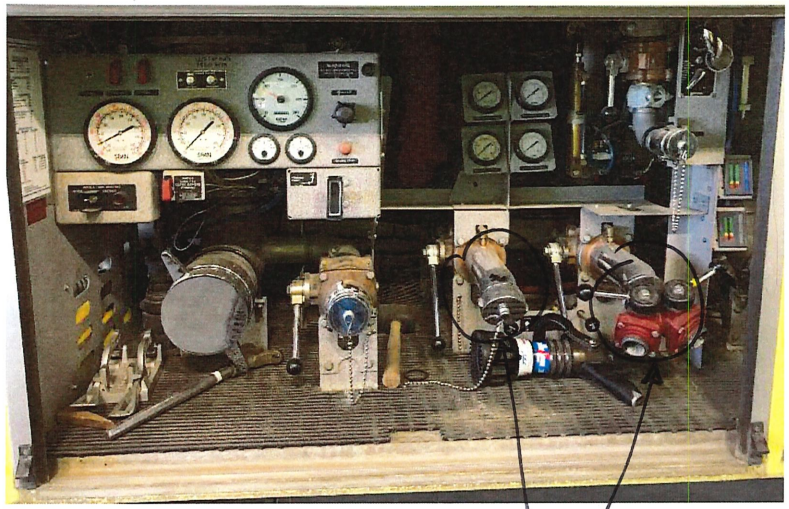
1" hose attachment (~30 ft from AFFF tank)

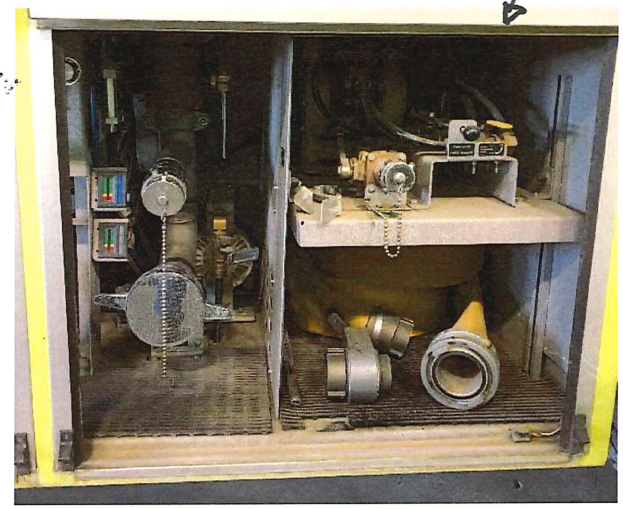
AFFF exits:

- bumper turret < ~~3" piper~~ 625 gpm + 1,250 gpm 4" flow stream
- roof turret: 500 gpm on low, 1,000 gpm on high, also capable of spraying/spreading dry chem 6" diam. flow stream
- under truck sprinkler heads, 3/4" diam, x4 of them, ~19 gpm
- hand lines: 1 3/4" diam
- pre-connect hose — 1" hose attachment, ~~for pure AFFF~~, next to/on foam transfer pump

Engine 4

same as Engine 3 except for extra hand line valve

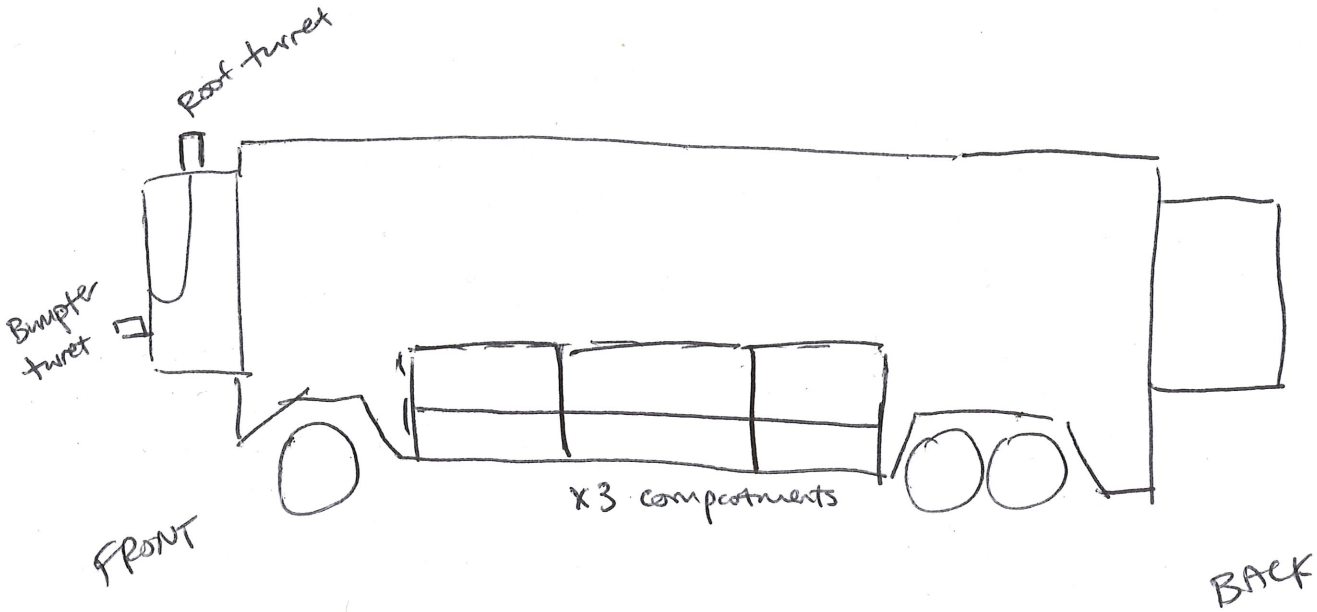


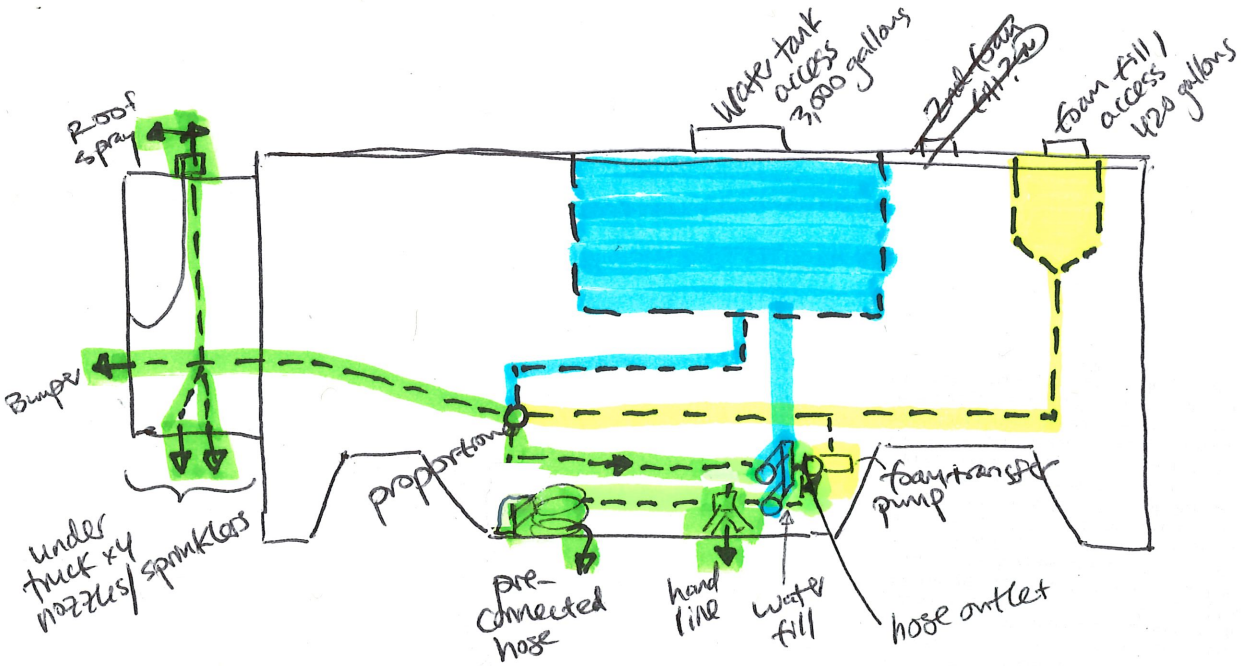


foam transfer pump

hand lines
(x3 exit points)

Engines 3+4 Exterior/Int Sketch

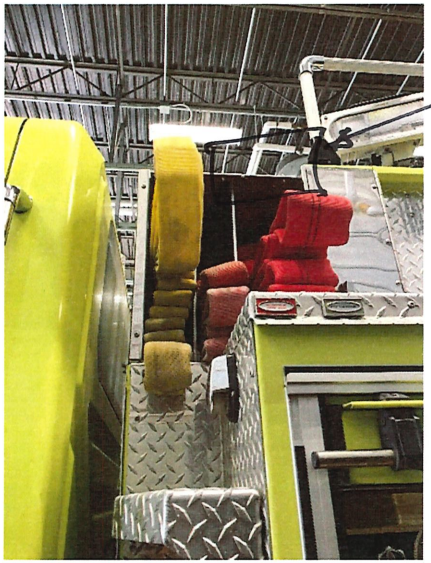




Engine 5

Not an index truck, flow too low (<500gpm). Smaller vehicle.

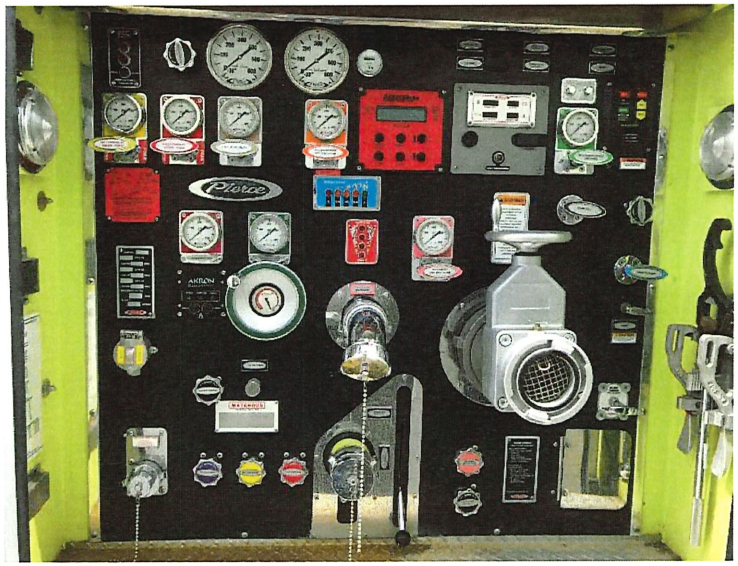
water tank 750 gallons



AFFF tank behind storage on side of truck (smaller than others)

AFFF exits:
- bumper turret 3/4" diam, up to ~300 gpm
- pre-connect hose
- handlines (x2): 1 3/4" diam, 150 gpm

Piping behind pannel covers



pre connect

Very little AFFF use, possibly none through turret (except for @ factory)

Electric foam proportioner, injects AFFF directly into each line, more exacting

APPENDIX D: ANALYTICAL RESULTS

Appendix D

Analytical Results

And QA/QC Summary

CONTENTS

APPENDIX D: ANALYTICAL 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

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, and field blank (FB) samples using laboratory-grade PFAS-free water. 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.

Please note, Eurofins TestAmerica Laboratories, Sacramento (Eurofins TestAmerica) Work Order 320-65103 contains samples for other tasks. These analytical results are reported separately.

Sample Handling

Samples collected by Shannon & Wilson were shipped to Eurofins TestAmerica in Sacramento, California, 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 water, soil, and sediment 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 sample set are considered adequate for report preparation and data analysis, with the following exceptions. The results are bolded as an exceedance in the analytical data table, where applicable.

- Eurofins TestAmerica Work Order 320-74830-1: The MDL for PFOS and PFOA exceeded the groundwater cleanup level due to sample dilution for samples *Engine 2*, *Engine 3*, *Engine 4*, *Engine 5*, and *C6 AFFF* in Table 5.
- Eurofins TestAmerica Work Order 320-65103-1: The RL for PFOS and PFOA exceeded the groundwater cleanup level due to sample dilution for sample *FAI Drum*.
- Eurofins TestAmerica Work Order 320-65077-1: The RL for PFOS and PFOA exceeded the groundwater cleanup level due to sample dilution for sample *FAI Tank*.

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. MB detections did not result in data qualification for samples analyzed as a part of this project. For a detailed discussion including MB detections that did not result in data qualification, please see the associated LDRCs.

FBs are used to assess whether airborne, particulate PFAS may be contaminating water samples during collection. We collected one FB after collecting surface soil samples and one FB after collecting ARFF-flush water samples by pouring PFAS-free water into a sample jar in the same area the project sample was collected. Project analytes were not detected in the FB samples associated with this project.

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 at a frequency of at least 10 percent for surface soil near the gate 15 AFFF release. Field-duplicate samples were not collected for AFFF-water, surface water, AFFF, or truck flush water.

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 and 50 percent for soil samples, where calculable,

except for those noted below. Consequently, the field-duplicate pair results for the noted analytes are considered estimated (no direction of bias) and are flagged 'J' in the corresponding analytical tables.

- EurofinsTestAmerica Work Order 320-74829 Rev1: Field-duplicate pair SS-21-02/SS-21-102 had an RPD failure for PFHxA (Table 3).

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/LSCD, MS/MSD, and laboratory-duplicate sample RPDs were within laboratory acceptance criteria.

Additional Quality Control Discrepancies

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 320-74829 Rev1: PFHxA, PFDA, and PFTriA for SS-21-03, and PFHxS for field duplicate pair SS-21-02/SS-21-102 in Table 3 and PFNA for SW-21-01 in Table 4
- Eurofins TestAmerica Work Order 320-74830 Rev1: PFOS for samples Engine 2, Engine 3, Engine 4, and Engine 5 in Table 6.

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.

eurofins | Environment Testing America

ANALYTICAL REPORT

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

Laboratory Job ID: 320-65103-1
Client Project/Site: Fairbanks Airport

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

Attn: Marcy Nadel

Authorized for release by:
10/9/2020 7:54:58 AM

David Alltucker, Project Manager I
(916)374-4383
David.Alltucker@Eurofinset.com

Table of Contents

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Airport

Job ID: 320-65103-1

Qualifiers

LCMS

Qualifier	Qualifier Description
*5	Isotope dilution analyte is outside acceptance limits.
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
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

Job ID: 320-65103-1

Laboratory: Eurofins TestAmerica, Sacramento

Narrative

Job Narrative
320-65103-1

Receipt
The samples were received on 9/25/2020 10:55 AM; the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 1.7º C.

LCMS
Method 537 (modified): Results for samples FTP-pre-004 (320-65103-2) and FTP-pre-005 (320-65103-3) 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

Method 537 (modified): The concentration of Perfluorohexanesulfonic acid (PFHxS) and Perfluorooctanesulfonic acid (PFOS) associated with the following samples exceeded the instrument calibration range at the maximum dilution the lab is able to perform on an extract: FTP-pre-004 (320-65103-2) and FTP-pre-005 (320-65103-3). These analytes have been qualified; however, the peaks did not saturate the instrument detector. Historical data indicate that for the isotope dilution method, further dilution and re-analysis will not produce significantly different results from those reported above the calibration range.

Method 537 (modified): The Isotope Dilution Analyte (IDA) recovery associated with the following samples is below the method recommended limit for 13C5 PFNA: FTP-pre-004 (320-65103-2) and FTP-pre-005 (320-65103-3). 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 samples.

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 320-416491.

Method 3535: A deviation from the Standard Operating Procedure (SOP) occurred. Details are as follows: due to the matrix, the following samples were prepared using a 1.0 mL aliquot without extracting via the SPE process: FAI Drum (320-65103-6). This is the equivalent of a 250x dilution prior to submitting extracts for analysis

Method 3535: The following samples were yellow prior to extraction: FTP-pre-004 (320-65103-2) and FTP-pre-005 (320-65103-3).

Method 3535: The following samples were black prior to extraction: MW-1903-20 (320-65103-4) and MW-2903-20 (320-65103-5).

Method 3535: The following samples contain floating particulates in the bottles prior to extraction: FTP-pre-004 (320-65103-2), FTP-pre-005 (320-65103-3), MW-1903-20 (320-65103-4) and MW-2903-20 (320-65103-5).

Method 3535: Due the excess amount of particulates, the following samples were centrifuged and decanted into new 250 mL container: MW-1903-20 (320-65103-4) and MW-2903-20 (320-65103-5). After centrifuging and decanting, the samples were fortified with IDA and then extracted.

Method 537.1 DW: The following samples 120774 (320-65103-1) in preparation batch 320-416399 were light yellow prior to extraction.

Method 537.1 DW: The following samples 120774 (320-65103-1) in preparation batch 320-416399 were yellow after extraction and final voluming.

Method 537.1 DW: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-416399.

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: Fairbanks Airport

Job ID: 320-65103-1

Client Sample ID: 120774 — Lab Sample ID: 320-65103-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	2.0		1.9	0.47	ng/L	1		537.1 DW	Total/NA
Perfluorooctanoic acid (PFOA)	1.5	J	1.9	0.47	ng/L	1		537.1 DW	Total/NA
Perfluorobutanesulfonic acid (PFBS)	1.4	J	1.9	0.47	ng/L	1		537.1 DW	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	7.3		1.9	0.47	ng/L	1		537.1 DW	Total/NA
Perfluorooctanesulfonic acid (PFOS)	2.8		1.9	0.47	ng/L	1		537.1 DW	Total/NA

Client Sample ID: FTP-pre-004 — Lab Sample ID: 320-65103-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	30000		180	54	ng/L	100		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	4300		180	23	ng/L	100		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	7100		180	79	ng/L	100		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	770		180	25	ng/L	100		537 (modified)	Total/NA
Perfluorodecanoic acid (PFDA)	280		180	29	ng/L	100		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	14000		180	18	ng/L	100		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	55000	E	180	53	ng/L	100		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1900000	E	180	50	ng/L	100		537 (modified)	Total/NA

Client Sample ID: FTP-pre-005 — Lab Sample ID: 320-65103-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	32000		180	53	ng/L	100		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	4300		180	23	ng/L	100		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	6400		180	78	ng/L	100		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	880		180	25	ng/L	100		537 (modified)	Total/NA
Perfluorodecanoic acid (PFDA)	290		180	29	ng/L	100		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	13000		180	18	ng/L	100		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	55000	E	180	53	ng/L	100		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	2000000	E	180	50	ng/L	100		537 (modified)	Total/NA

Client Sample ID: MW-1903-20 — Lab Sample ID: 320-65103-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	21		4.4	2.1	ng/L	1		537 (modified)	Total/NA
Perfluoropentanoic acid (PFPeA)	4.8		1.7	0.43	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.5	J	1.7	0.47	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonamide (FOSA)	1.2	J	1.7	0.85	ng/L	1		537 (modified)	Total/NA

Client Sample ID: MW-2903-20 — Lab Sample ID: 320-65103-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	21		4.4	2.1	ng/L	1		537 (modified)	Total/NA
Perfluoropentanoic acid (PFPeA)	5.6		1.8	0.43	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	0.53	J	1.8	0.48	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonamide (FOSA)	1.0	J	1.8	0.87	ng/L	1		537 (modified)	Total/NA

Client Sample ID: FAI Drum — Lab Sample ID: 320-65103-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	480	J	500	150	ng/L	1		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	88	J	500	50	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	570		500	140	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1900		500	140	ng/L	1		537 (modified)	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Sacramento

Client Sample ID: 120774
Date Collected: 09/15/20 09:31
Date Received: 09/25/20 10:55

Lab Sample ID: 320-65103-1
Matrix: Water

Method: 537.1 DW - Perfluorinated Alkyl Acids (LC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**2.0**		1.9	0.47	ng/L		09/28/20 12:15	09/29/20 14:12	1
Perfluoroheptanoic acid (PFHpA)	ND		1.9	0.47	ng/L		09/28/20 12:15	09/29/20 14:12	1
Perfluorooctanoic acid (PFOA)	**1.5**	**J**	1.9	0.47	ng/L		09/28/20 12:15	09/29/20 14:12	1
Perfluorononanoic acid (PFNA)	ND		1.9	0.47	ng/L		09/28/20 12:15	09/29/20 14:12	1
Perfluorodecanoic acid (PFDA)	ND		1.9	0.47	ng/L		09/28/20 12:15	09/29/20 14:12	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	0.47	ng/L		09/28/20 12:15	09/29/20 14:12	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.47	ng/L		09/28/20 12:15	09/29/20 14:12	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	0.47	ng/L		09/28/20 12:15	09/29/20 14:12	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.47	ng/L		09/28/20 12:15	09/29/20 14:12	1
Perfluorobutanesulfonic acid (PFBS)	**1.4**	**J**	1.9	0.47	ng/L		09/28/20 12:15	09/29/20 14:12	1
Perfluorohexanesulfonic acid (PFHxS)	**7.3**		1.9	0.47	ng/L		09/28/20 12:15	09/29/20 14:12	1
Perfluorooctanesulfonic acid (PFOS)	**2.8**		1.9	0.47	ng/L		09/28/20 12:15	09/29/20 14:12	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		1.9	0.47	ng/L		09/28/20 12:15	09/29/20 14:12	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		1.9	0.47	ng/L		09/28/20 12:15	09/29/20 14:12	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		1.9	0.47	ng/L		09/28/20 12:15	09/29/20 14:12	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	ND		1.9	0.47	ng/L		09/28/20 12:15	09/29/20 14:12	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		1.9	0.47	ng/L		09/28/20 12:15	09/29/20 14:12	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.47	ng/L		09/28/20 12:15	09/29/20 14:12	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*102*		*70 - 130*	*09/28/20 12:15*	*09/29/20 14:12*	*1*
13C2 PFDA	*101*		*70 - 130*	*09/28/20 12:15*	*09/29/20 14:12*	*1*
d5-NEtFOSAA	*105*		*70 - 130*	*09/28/20 12:15*	*09/29/20 14:12*	*1*
13C3 HFPO-DA	*86*		*70 - 130*	*09/28/20 12:15*	*09/29/20 14:12*	*1*

Client Sample ID: FTP-pre-004
Date Collected: 09/17/20 15:15
Date Received: 09/25/20 10:55

Lab Sample ID: 320-65103-2
Matrix: Water

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**30000**		180	54	ng/L		09/28/20 13:40	10/03/20 16:05	100
Perfluoroheptanoic acid (PFHpA)	**4300**		180	23	ng/L		09/28/20 13:40	10/03/20 16:05	100
Perfluorooctanoic acid (PFOA)	**7100**		180	79	ng/L		09/28/20 13:40	10/03/20 16:05	100
Perfluorononanoic acid (PFNA)	**770**		180	25	ng/L		09/28/20 13:40	10/03/20 16:05	100
Perfluorodecanoic acid (PFDA)	**280**		180	29	ng/L		09/28/20 13:40	10/03/20 16:05	100
Perfluoroundecanoic acid (PFUnA)	ND		180	100	ng/L		09/28/20 13:40	10/03/20 16:05	100
Perfluorododecanoic acid (PFDoA)	ND		180	51	ng/L		09/28/20 13:40	10/03/20 16:05	100
Perfluorotridecanoic acid (PFTriA)	ND		180	120	ng/L		09/28/20 13:40	10/03/20 16:05	100
Perfluorotetradecanoic acid (PFTeA)	ND		180	68	ng/L		09/28/20 13:40	10/03/20 16:05	100
Perfluorobutanesulfonic acid (PFBS)	**14000**		180	18	ng/L		09/28/20 13:40	10/03/20 16:05	100
Perfluorohexanesulfonic acid (PFHxS)	**55000**	**E**	180	53	ng/L		09/28/20 13:40	10/03/20 16:05	100
Perfluorooctanesulfonic acid (PFOS)	**1900000**	**E**	180	50	ng/L		09/28/20 13:40	10/03/20 16:05	100
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		460	110	ng/L		09/28/20 13:40	10/03/20 16:05	100
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		460	120	ng/L		09/28/20 13:40	10/03/20 16:05	100
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		180	22	ng/L		09/28/20 13:40	10/03/20 16:05	100
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		370	140	ng/L		09/28/20 13:40	10/03/20 16:05	100
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		180	30	ng/L		09/28/20 13:40	10/03/20 16:05	100
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		180	37	ng/L		09/28/20 13:40	10/03/20 16:05	100

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*97*		*25 - 150*	*09/28/20 13:40*	*10/03/20 16:05*	*100*
13C4 PFHpA	*63*		*25 - 150*	*09/28/20 13:40*	*10/03/20 16:05*	*100*
13C4 PFOA	*63*		*25 - 150*	*09/28/20 13:40*	*10/03/20 16:05*	*100*
13C5 PFNA	*24*	**5*	*25 - 150*	*09/28/20 13:40*	*10/03/20 16:05*	*100*
13C2 PFDA	*60*		*25 - 150*	*09/28/20 13:40*	*10/03/20 16:05*	*100*
13C2 PFUnA	*76*		*25 - 150*	*09/28/20 13:40*	*10/03/20 16:05*	*100*
13C2 PFDoA	*62*		*25 - 150*	*09/28/20 13:40*	*10/03/20 16:05*	*100*
13C2 PFTeDA	*37*		*25 - 150*	*09/28/20 13:40*	*10/03/20 16:05*	*100*
13C3 PFBS	*88*		*25 - 150*	*09/28/20 13:40*	*10/03/20 16:05*	*100*
18O2 PFHxS	*91*		*25 - 150*	*09/28/20 13:40*	*10/03/20 16:05*	*100*
13C4 PFOS	*27*		*25 - 150*	*09/28/20 13:40*	*10/03/20 16:05*	*100*
d3-NMeFOSAA	*77*		*25 - 150*	*09/28/20 13:40*	*10/03/20 16:05*	*100*
d5-NEtFOSAA	*114*		*25 - 150*	*09/28/20 13:40*	*10/03/20 16:05*	*100*
13C3 HFPO-DA	*71*		*25 - 150*	*09/28/20 13:40*	*10/03/20 16:05*	*100*

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Airport

Job ID: 320-65103-1

Client Sample ID: FTP-pre-005
Date Collected: 09/17/20 15:05
Date Received: 09/25/20 10:55

Lab Sample ID: 320-65103-3
Matrix: Water

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**32000**		180	53	ng/L		09/28/20 13:40	10/03/20 16:14	100
Perfluoroheptanoic acid (PFHpA)	**4300**		180	23	ng/L		09/28/20 13:40	10/03/20 16:14	100
Perfluorooctanoic acid (PFOA)	**6400**		180	78	ng/L		09/28/20 13:40	10/03/20 16:14	100
Perfluorononanoic acid (PFNA)	**880**		180	25	ng/L		09/28/20 13:40	10/03/20 16:14	100
Perfluorodecanoic acid (PFDA)	**290**		180	29	ng/L		09/28/20 13:40	10/03/20 16:14	100
Perfluoroundecanoic acid (PFUnA)	ND		180	100	ng/L		09/28/20 13:40	10/03/20 16:14	100
Perfluorododecanoic acid (PFDoA)	ND		180	51	ng/L		09/28/20 13:40	10/03/20 16:14	100
Perfluorotridecanoic acid (PFTriA)	ND		180	120	ng/L		09/28/20 13:40	10/03/20 16:14	100
Perfluorotetradecanoic acid (PFTeA)	ND		180	67	ng/L		09/28/20 13:40	10/03/20 16:14	100
Perfluorobutanesulfonic acid (PFBS)	**13000**		180	18	ng/L		09/28/20 13:40	10/03/20 16:14	100
Perfluorohexanesulfonic acid (PFHxS)	**55000**	**E**	180	53	ng/L		09/28/20 13:40	10/03/20 16:14	100
Perfluorooctanesulfonic acid (PFOS)	**2000000**	**E**	180	50	ng/L		09/28/20 13:40	10/03/20 16:14	100
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		460	110	ng/L		09/28/20 13:40	10/03/20 16:14	100
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		460	120	ng/L		09/28/20 13:40	10/03/20 16:14	100
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		180	22	ng/L		09/28/20 13:40	10/03/20 16:14	100
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		370	140	ng/L		09/28/20 13:40	10/03/20 16:14	100
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		180	30	ng/L		09/28/20 13:40	10/03/20 16:14	100
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		180	37	ng/L		09/28/20 13:40	10/03/20 16:14	100

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*97*		*25 - 150*	*09/28/20 13:40*	*10/03/20 16:14*	*100*
13C4 PFHpA	*63*		*25 - 150*	*09/28/20 13:40*	*10/03/20 16:14*	*100*
13C4 PFOA	*71*		*25 - 150*	*09/28/20 13:40*	*10/03/20 16:14*	*100*
13C5 PFNA	*22*	**5*	*25 - 150*	*09/28/20 13:40*	*10/03/20 16:14*	*100*
13C2 PFDA	*53*		*25 - 150*	*09/28/20 13:40*	*10/03/20 16:14*	*100*
13C2 PFUnA	*65*		*25 - 150*	*09/28/20 13:40*	*10/03/20 16:14*	*100*
13C2 PFDoA	*49*		*25 - 150*	*09/28/20 13:40*	*10/03/20 16:14*	*100*
13C2 PFTeDA	*34*		*25 - 150*	*09/28/20 13:40*	*10/03/20 16:14*	*100*
13C3 PFBS	*91*		*25 - 150*	*09/28/20 13:40*	*10/03/20 16:14*	*100*
18O2 PFHxS	*94*		*25 - 150*	*09/28/20 13:40*	*10/03/20 16:14*	*100*
13C4 PFOS	*26*		*25 - 150*	*09/28/20 13:40*	*10/03/20 16:14*	*100*
d3-NMeFOSAA	*63*		*25 - 150*	*09/28/20 13:40*	*10/03/20 16:14*	*100*
d5-NEtFOSAA	*90*		*25 - 150*	*09/28/20 13:40*	*10/03/20 16:14*	*100*
13C3 HFPO-DA	*85*		*25 - 150*	*09/28/20 13:40*	*10/03/20 16:14*	*100*

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Airport

Job ID: 320-65103-1

Client Sample ID: MW-1903-20

Date Collected: 09/17/20 13:15
Date Received: 09/25/20 10:55

Lab Sample ID: 320-65103-4

Matrix: Water

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	**21**		4.4	2.1	ng/L		09/28/20 13:40	10/03/20 15:55	1
Perfluorohexanoic acid (PFHxA)	ND		1.7	0.50	ng/L		09/28/20 13:40	10/03/20 15:55	1
Perfluoroheptanoic acid (PFHpA)	ND		1.7	0.22	ng/L		09/28/20 13:40	10/03/20 15:55	1
Perfluoropentanoic acid (PFPeA)	**4.8**		1.7	0.43	ng/L		09/28/20 13:40	10/03/20 15:55	1
Perfluorooctanoic acid (PFOA)	ND		1.7	0.74	ng/L		09/28/20 13:40	10/03/20 15:55	1
Perfluorononanoic acid (PFNA)	ND		1.7	0.23	ng/L		09/28/20 13:40	10/03/20 15:55	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.27	ng/L		09/28/20 13:40	10/03/20 15:55	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.96	ng/L		09/28/20 13:40	10/03/20 15:55	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.48	ng/L		09/28/20 13:40	10/03/20 15:55	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	1.1	ng/L		09/28/20 13:40	10/03/20 15:55	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.64	ng/L		09/28/20 13:40	10/03/20 15:55	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.7	0.17	ng/L		09/28/20 13:40	10/03/20 15:55	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.7	0.50	ng/L		09/28/20 13:40	10/03/20 15:55	1
Perfluorooctanesulfonic acid (PFOS)	**1.5**	**J**	1.7	0.47	ng/L		09/28/20 13:40	10/03/20 15:55	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.4	1.1	ng/L		09/28/20 13:40	10/03/20 15:55	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.4	1.0	ng/L		09/28/20 13:40	10/03/20 15:55	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		1.7	0.17	ng/L		09/28/20 13:40	10/03/20 15:55	1
Perfluorodecanesulfonic acid (PFDS)	ND		1.7	0.28	ng/L		09/28/20 13:40	10/03/20 15:55	1
Perfluorooctanesulfonamide (FOSA)	**1.2**	**J**	1.7	0.85	ng/L		09/28/20 13:40	10/03/20 15:55	1
6:2 FTS	ND		4.4	2.2	ng/L		09/28/20 13:40	10/03/20 15:55	1
8:2 FTS	ND		1.7	0.40	ng/L		09/28/20 13:40	10/03/20 15:55	1
9Cl-PF3ONS	ND		1.7	0.21	ng/L		09/28/20 13:40	10/03/20 15:55	1
HFPO-DA (GenX)	ND		3.5	1.3	ng/L		09/28/20 13:40	10/03/20 15:55	1
11Cl-PF3OUdS	ND		1.7	0.28	ng/L		09/28/20 13:40	10/03/20 15:55	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.7	0.35	ng/L		09/28/20 13:40	10/03/20 15:55	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*73*		*25 - 150*	*09/28/20 13:40*	*10/03/20 15:55*	*1*
13C4 PFHpA	*76*		*25 - 150*	*09/28/20 13:40*	*10/03/20 15:55*	*1*
13C4 PFOA	*71*		*25 - 150*	*09/28/20 13:40*	*10/03/20 15:55*	*1*
13C5 PFNA	*66*		*25 - 150*	*09/28/20 13:40*	*10/03/20 15:55*	*1*
13C2 PFDA	*63*		*25 - 150*	*09/28/20 13:40*	*10/03/20 15:55*	*1*
13C2 PFUnA	*67*		*25 - 150*	*09/28/20 13:40*	*10/03/20 15:55*	*1*
13C8 FOSA	*65*		*25 - 150*	*09/28/20 13:40*	*10/03/20 15:55*	*1*
13C2 PFDoA	*61*		*25 - 150*	*09/28/20 13:40*	*10/03/20 15:55*	*1*
13C4 PFBA	*68*		*25 - 150*	*09/28/20 13:40*	*10/03/20 15:55*	*1*
13C2 PFTeDA	*40*		*25 - 150*	*09/28/20 13:40*	*10/03/20 15:55*	*1*
13C5 PFPeA	*72*		*25 - 150*	*09/28/20 13:40*	*10/03/20 15:55*	*1*
13C3 PFBS	*75*		*25 - 150*	*09/28/20 13:40*	*10/03/20 15:55*	*1*
18O2 PFHxS	*76*		*25 - 150*	*09/28/20 13:40*	*10/03/20 15:55*	*1*
13C4 PFOS	*76*		*25 - 150*	*09/28/20 13:40*	*10/03/20 15:55*	*1*
d3-NMeFOSAA	*70*		*25 - 150*	*09/28/20 13:40*	*10/03/20 15:55*	*1*
d5-NEtFOSAA	*78*		*25 - 150*	*09/28/20 13:40*	*10/03/20 15:55*	*1*
M2-6:2 FTS	*96*		*25 - 150*	*09/28/20 13:40*	*10/03/20 15:55*	*1*
M2-8:2 FTS	*90*		*25 - 150*	*09/28/20 13:40*	*10/03/20 15:55*	*1*
13C3 HFPO-DA	*69*		*25 - 150*	*09/28/20 13:40*	*10/03/20 15:55*	*1*

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Airport

Job ID: 320-65103-1

Client Sample ID: MW-2903-20

Date Collected: 09/17/20 13:05
Date Received: 09/25/20 10:55

Lab Sample ID: 320-65103-5

Matrix: Water

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	**21**		4.4	2.1	ng/L		09/28/20 13:40	10/06/20 14:35	1
Perfluorohexanoic acid (PFHxA)	ND		1.8	0.51	ng/L		09/28/20 13:40	10/06/20 14:35	1
Perfluoroheptanoic acid (PFHpA)	ND		1.8	0.22	ng/L		09/28/20 13:40	10/06/20 14:35	1
Perfluoropentanoic acid (PFPeA)	**5.6**		1.8	0.43	ng/L		09/28/20 13:40	10/06/20 14:35	1
Perfluorooctanoic acid (PFOA)	ND		1.8	0.75	ng/L		09/28/20 13:40	10/06/20 14:35	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.24	ng/L		09/28/20 13:40	10/06/20 14:35	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.27	ng/L		09/28/20 13:40	10/06/20 14:35	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.97	ng/L		09/28/20 13:40	10/06/20 14:35	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.49	ng/L		09/28/20 13:40	10/06/20 14:35	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		09/28/20 13:40	10/06/20 14:35	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.65	ng/L		09/28/20 13:40	10/06/20 14:35	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.8	0.18	ng/L		09/28/20 13:40	10/06/20 14:35	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.8	0.50	ng/L		09/28/20 13:40	10/06/20 14:35	1
Perfluorooctanesulfonic acid (PFOS)	**0.53**	**J**	1.8	0.48	ng/L		09/28/20 13:40	10/06/20 14:35	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.4	1.2	ng/L		09/28/20 13:40	10/06/20 14:35	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.4	1.1	ng/L		09/28/20 13:40	10/06/20 14:35	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		1.8	0.17	ng/L		09/28/20 13:40	10/06/20 14:35	1
Perfluorodecanesulfonic acid (PFDS)	ND		1.8	0.28	ng/L		09/28/20 13:40	10/06/20 14:35	1
Perfluorooctanesulfonamide (FOSA)	**1.0**	**J**	1.8	0.87	ng/L		09/28/20 13:40	10/06/20 14:35	1
6:2 FTS	ND		4.4	2.2	ng/L		09/28/20 13:40	10/06/20 14:35	1
8:2 FTS	ND		1.8	0.41	ng/L		09/28/20 13:40	10/06/20 14:35	1
9Cl-PF3ONS	ND		1.8	0.21	ng/L		09/28/20 13:40	10/06/20 14:35	1
HFPO-DA (GenX)	ND		3.5	1.3	ng/L		09/28/20 13:40	10/06/20 14:35	1
11Cl-PF3OUdS	ND		1.8	0.28	ng/L		09/28/20 13:40	10/06/20 14:35	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.35	ng/L		09/28/20 13:40	10/06/20 14:35	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*69*		*25 - 150*	*09/28/20 13:40*	*10/06/20 14:35*	*1*
13C4 PFHpA	*73*		*25 - 150*	*09/28/20 13:40*	*10/06/20 14:35*	*1*
13C4 PFOA	*71*		*25 - 150*	*09/28/20 13:40*	*10/06/20 14:35*	*1*
13C5 PFNA	*76*		*25 - 150*	*09/28/20 13:40*	*10/06/20 14:35*	*1*
13C2 PFDA	*74*		*25 - 150*	*09/28/20 13:40*	*10/06/20 14:35*	*1*
13C2 PFUnA	*72*		*25 - 150*	*09/28/20 13:40*	*10/06/20 14:35*	*1*
13C8 FOSA	*63*		*25 - 150*	*09/28/20 13:40*	*10/06/20 14:35*	*1*
13C2 PFDoA	*52*		*25 - 150*	*09/28/20 13:40*	*10/06/20 14:35*	*1*
13C4 PFBA	*62*		*25 - 150*	*09/28/20 13:40*	*10/06/20 14:35*	*1*
13C2 PFTeDA	*32*		*25 - 150*	*09/28/20 13:40*	*10/06/20 14:35*	*1*
13C5 PFPeA	*69*		*25 - 150*	*09/28/20 13:40*	*10/06/20 14:35*	*1*
13C3 PFBS	*68*		*25 - 150*	*09/28/20 13:40*	*10/06/20 14:35*	*1*
18O2 PFHxS	*70*		*25 - 150*	*09/28/20 13:40*	*10/06/20 14:35*	*1*
13C4 PFOS	*70*		*25 - 150*	*09/28/20 13:40*	*10/06/20 14:35*	*1*
d3-NMeFOSAA	*74*		*25 - 150*	*09/28/20 13:40*	*10/06/20 14:35*	*1*
d5-NEtFOSAA	*76*		*25 - 150*	*09/28/20 13:40*	*10/06/20 14:35*	*1*
M2-6:2 FTS	*93*		*25 - 150*	*09/28/20 13:40*	*10/06/20 14:35*	*1*
M2-8:2 FTS	*93*		*25 - 150*	*09/28/20 13:40*	*10/06/20 14:35*	*1*
13C3 HFPO-DA	*69*		*25 - 150*	*09/28/20 13:40*	*10/06/20 14:35*	*1*

Client Sample ID: FAI Drum

Date Collected: 09/24/20 11:10
Date Received: 09/25/20 10:55

Lab Sample ID: 320-65103-6

Matrix: Water

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**480**	**J**	500	150	ng/L		09/28/20 14:52	09/29/20 20:59	1
Perfluoroheptanoic acid (PFHpA)	ND		500	63	ng/L		09/28/20 14:52	09/29/20 20:59	1
Perfluorooctanoic acid (PFOA)	ND		500	210	ng/L		09/28/20 14:52	09/29/20 20:59	1
Perfluorononanoic acid (PFNA)	ND		500	68	ng/L		09/28/20 14:52	09/29/20 20:59	1
Perfluorodecanoic acid (PFDA)	ND		500	78	ng/L		09/28/20 14:52	09/29/20 20:59	1
Perfluoroundecanoic acid (PFUnA)	ND		500	280	ng/L		09/28/20 14:52	09/29/20 20:59	1
Perfluorododecanoic acid (PFDoA)	ND		500	140	ng/L		09/28/20 14:52	09/29/20 20:59	1
Perfluorotridecanoic acid (PFTriA)	ND		500	330	ng/L		09/28/20 14:52	09/29/20 20:59	1
Perfluorotetradecanoic acid (PFTeA)	ND		500	180	ng/L		09/28/20 14:52	09/29/20 20:59	1
Perfluorobutanesulfonic acid (PFBS)	**88**	**J**	500	50	ng/L		09/28/20 14:52	09/29/20 20:59	1
Perfluorohexanesulfonic acid (PFHxS)	**570**		500	140	ng/L		09/28/20 14:52	09/29/20 20:59	1
Perfluorooctanesulfonic acid (PFOS)	**1900**		500	140	ng/L		09/28/20 14:52	09/29/20 20:59	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		1300	300	ng/L		09/28/20 14:52	09/29/20 20:59	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		1300	330	ng/L		09/28/20 14:52	09/29/20 20:59	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		500	60	ng/L		09/28/20 14:52	09/29/20 20:59	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		1000	380	ng/L		09/28/20 14:52	09/29/20 20:59	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		500	80	ng/L		09/28/20 14:52	09/29/20 20:59	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		500	100	ng/L		09/28/20 14:52	09/29/20 20:59	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*95*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:59*	*1*
13C4 PFHpA	*94*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:59*	*1*
13C4 PFOA	*89*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:59*	*1*
13C5 PFNA	*101*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:59*	*1*
13C2 PFDA	*87*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:59*	*1*
13C2 PFUnA	*102*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:59*	*1*
13C2 PFDoA	*96*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:59*	*1*
13C2 PFTeDA	*102*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:59*	*1*
13C3 PFBS	*102*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:59*	*1*
18O2 PFHxS	*101*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:59*	*1*
13C4 PFOS	*101*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:59*	*1*
d3-NMeFOSAA	*101*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:59*	*1*
d5-NEtFOSAA	*104*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:59*	*1*
13C3 HFPO-DA	*92*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:59*	*1*

Surrogate Summary

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Airport

Job ID: 320-65103-1

Method: 537.1 DW - Perfluorinated Alkyl Acids (LC/MS)

Matrix: Water

Prep Type: Total/NA

		Percent Surrogate Recovery (Acceptance Limits)			
Lab Sample ID	Client Sample ID	PFHxA (70-130)	PFDA (70-130)	d5NEFOS (70-130)	HFPODA (70-130)
320-65103-1	120774	102	101	105	86
LCS 320-416399/2-A	Lab Control Sample	102	99	98	86
LCSD 320-416399/3-A	Lab Control Sample Dup	101	103	104	91
MB 320-416399/1-A	Method Blank	92	91	90	76

Surrogate Legend

PFHxA = 13C2 PFHxA
PFDA = 13C2 PFDA
d5NEFOS = d5-NEtFOSAA
HFPODA = 13C3 HFPO-DA

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Airport

Job ID: 320-65103-1

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)	PFDoA (25-150)	PFTDA (25-150)
320-65103-2	FTP-pre-004	97	63	63	24 *5	60	76	62	37
320-65103-3	FTP-pre-005	97	63	71	22 *5	53	65	49	34
320-65103-4	MW-1903-20	73	76	71	66	63	67	61	40
320-65103-5	MW-2903-20	69	73	71	76	74	72	52	32
320-65103-6	FAI Drum	95	94	89	101	87	102	96	102
LCS 320-416469/2-A	Lab Control Sample	66	77	72	78	65	67	59	72
LCS 320-416491/2-A	Lab Control Sample	99	98	96	100	97	102	90	85
LCSD 320-416469/3-A	Lab Control Sample Dup	58	62	61	64	62	64	57	70
LCSD 320-416491/3-A	Lab Control Sample Dup	92	90	87	89	92	87	93	87
MB 320-416469/1-A	Method Blank	77	78	72	76	80	87	63	94
MB 320-416491/1-A	Method Blank	97	97	93	101	99	95	98	99

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	C3PFBS (25-150)	PFHxS (25-150)	PFOS (25-150)	d3NMFOS (25-150)	PFOSA (25-150)	d5NEFOS (25-150)	PFBA (25-150)	HFPODA (25-150)
320-65103-2	FTP-pre-004	88	91	27	77		114		71
320-65103-3	FTP-pre-005	91	94	26	63		90		85
320-65103-4	MW-1903-20	75	76	76	70	65	78	68	69
320-65103-5	MW-2903-20	68	70	70	74	63	76	62	69
320-65103-6	FAI Drum	102	101	101	101		104		92
LCS 320-416469/2-A	Lab Control Sample	68	71	73	69		67		67
LCS 320-416491/2-A	Lab Control Sample	103	104	98	106		103		95
LCSD 320-416469/3-A	Lab Control Sample Dup	61	64	66	60	58	62	55	54
LCSD 320-416491/3-A	Lab Control Sample Dup	94	98	90	96		98		88
MB 320-416469/1-A	Method Blank	73	76	79	73		76		70
MB 320-416491/1-A	Method Blank	104	96	98	105		104		98

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFPeA (25-150)	M262FTS (25-150)	M282FTS (25-150)					
320-65103-2	FTP-pre-004								
320-65103-3	FTP-pre-005								
320-65103-4	MW-1903-20	72	96	90					
320-65103-5	MW-2903-20	69	93	93					
320-65103-6	FAI Drum								
LCS 320-416469/2-A	Lab Control Sample								
LCS 320-416491/2-A	Lab Control Sample								
LCSD 320-416469/3-A	Lab Control Sample Dup	60	72	89					
LCSD 320-416491/3-A	Lab Control Sample Dup								
MB 320-416469/1-A	Method Blank								
MB 320-416491/1-A	Method Blank								

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

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Airport

Job ID: 320-65103-1

C3PFBS = 13C3 PFBS
PFHxS = 18O2 PFHxS
PFOS = 13C4 PFOS
d3NMFOS = d3-NMeFOSAA
PFOSA = 13C8 FOSA
d5NEFOS = d5-NEtFOSAA
PFBA = 13C4 PFBA
HFPODA = 13C3 HFPO-DA
PFPeA = 13C5 PFPeA
M262FTS = M2-6:2 FTS
M282FTS = M2-8:2 FTS

Method: 537 (modified) - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-416469/1-A
Matrix: Water
Analysis Batch: 416862

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 416469

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		09/28/20 13:40	09/29/20 22:05	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		09/28/20 13:40	09/29/20 22:05	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		09/28/20 13:40	09/29/20 22:05	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		09/28/20 13:40	09/29/20 22:05	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		09/28/20 13:40	09/29/20 22:05	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		09/28/20 13:40	09/29/20 22:05	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		09/28/20 13:40	09/29/20 22:05	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		09/28/20 13:40	09/29/20 22:05	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		09/28/20 13:40	09/29/20 22:05	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		09/28/20 13:40	09/29/20 22:05	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		09/28/20 13:40	09/29/20 22:05	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		09/28/20 13:40	09/29/20 22:05	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		09/28/20 13:40	09/29/20 22:05	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		09/28/20 13:40	09/29/20 22:05	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.0	0.24	ng/L		09/28/20 13:40	09/29/20 22:05	1
9Cl-PF3ONS	ND		2.0	0.24	ng/L		09/28/20 13:40	09/29/20 22:05	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.0	1.5	ng/L		09/28/20 13:40	09/29/20 22:05	1
HFPO-DA (GenX)	ND		4.0	1.5	ng/L		09/28/20 13:40	09/29/20 22:05	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.0	0.32	ng/L		09/28/20 13:40	09/29/20 22:05	1
11Cl-PF3OUdS	ND		2.0	0.32	ng/L		09/28/20 13:40	09/29/20 22:05	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		09/28/20 13:40	09/29/20 22:05	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*77*		*25 - 150*	*09/28/20 13:40*	*09/29/20 22:05*	*1*
13C4 PFHpA	*78*		*25 - 150*	*09/28/20 13:40*	*09/29/20 22:05*	*1*
13C4 PFOA	*72*		*25 - 150*	*09/28/20 13:40*	*09/29/20 22:05*	*1*
13C5 PFNA	*76*		*25 - 150*	*09/28/20 13:40*	*09/29/20 22:05*	*1*
13C2 PFDA	*80*		*25 - 150*	*09/28/20 13:40*	*09/29/20 22:05*	*1*
13C2 PFUnA	*87*		*25 - 150*	*09/28/20 13:40*	*09/29/20 22:05*	*1*
13C2 PFDoA	*63*		*25 - 150*	*09/28/20 13:40*	*09/29/20 22:05*	*1*
13C2 PFTeDA	*94*		*25 - 150*	*09/28/20 13:40*	*09/29/20 22:05*	*1*
13C3 PFBS	*73*		*25 - 150*	*09/28/20 13:40*	*09/29/20 22:05*	*1*
18O2 PFHxS	*76*		*25 - 150*	*09/28/20 13:40*	*09/29/20 22:05*	*1*
13C4 PFOS	*79*		*25 - 150*	*09/28/20 13:40*	*09/29/20 22:05*	*1*
d3-NMeFOSAA	*73*		*25 - 150*	*09/28/20 13:40*	*09/29/20 22:05*	*1*
d5-NEtFOSAA	*76*		*25 - 150*	*09/28/20 13:40*	*09/29/20 22:05*	*1*
13C3 HFPO-DA	*70*		*25 - 150*	*09/28/20 13:40*	*09/29/20 22:05*	*1*

Lab Sample ID: LCS 320-416469/2-A
Matrix: Water
Analysis Batch: 416862

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 416469

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorohexanoic acid (PFHxA)			40.0	46.8		ng/L		117	73 - 133		

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

Lab Sample ID: LCS 320-416469/2-A
Matrix: Water
Analysis Batch: 416862

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 416469

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluoroheptanoic acid (PFHpA)	40.0	40.9		ng/L		102	72 - 132
Perfluorooctanoic acid (PFOA)	40.0	41.5		ng/L		104	70 - 130
Perfluorononanoic acid (PFNA)	40.0	39.2		ng/L		98	75 - 135
Perfluorodecanoic acid (PFDA)	40.0	51.2		ng/L		128	76 - 136
Perfluoroundecanoic acid (PFUnA)	40.0	45.5		ng/L		114	68 - 128
Perfluorododecanoic acid (PFDoA)	40.0	48.7		ng/L		122	71 - 131
Perfluorotridecanoic acid (PFTriA)	40.0	50.5		ng/L		126	71 - 131
Perfluorotetradecanoic acid (PFTeA)	40.0	37.8		ng/L		94	70 - 130
Perfluorobutanesulfonic acid (PFBS)	35.4	37.9		ng/L		107	67 - 127
Perfluorohexanesulfonic acid (PFHxS)	36.4	36.7		ng/L		101	59 - 119
Perfluorooctanesulfonic acid (PFOS)	37.1	39.0		ng/L		105	70 - 130
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	37.3	40.0		ng/L		107	75 - 135
9Cl-PF3ONS	37.3	40.0		ng/L		107	75 - 135
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	40.0	42.4		ng/L		106	51 - 173
HFPO-DA (GenX)	40.0	42.4		ng/L		106	51 - 173
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	37.7	35.9		ng/L		95	54 - 114
11Cl-PF3OUdS	37.7	35.9		ng/L		95	54 - 114
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.7	40.2		ng/L		107	79 - 139

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*66*		*25 - 150*
13C4 PFHpA	*77*		*25 - 150*
13C4 PFOA	*72*		*25 - 150*
13C5 PFNA	*78*		*25 - 150*
13C2 PFDA	*65*		*25 - 150*
13C2 PFUnA	*67*		*25 - 150*
13C2 PFDoA	*59*		*25 - 150*
13C2 PFTeDA	*72*		*25 - 150*
13C3 PFBS	*68*		*25 - 150*
18O2 PFHxS	*71*		*25 - 150*
13C4 PFOS	*73*		*25 - 150*
d3-NMeFOSAA	*69*		*25 - 150*
d5-NEtFOSAA	*67*		*25 - 150*
13C3 HFPO-DA	*67*		*25 - 150*

Lab Sample ID: LCSD 320-416469/3-A
Matrix: Water
Analysis Batch: 416862

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 416469

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanoic acid (PFBA)	40.0	45.0		ng/L		113	76 - 136	2	30

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

Lab Sample ID: LCSD 320-416469/3-A
Matrix: Water
Analysis Batch: 416862

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 416469

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)			40.0	44.3		ng/L		111	73 - 133	6	30
Perfluoroheptanoic acid (PFHpA)			40.0	42.5		ng/L		106	72 - 132	4	30
Perfluoropentanoic acid (PFPeA)			40.0	37.9		ng/L		95	71 - 131	3	30
Perfluorooctanoic acid (PFOA)			40.0	39.9		ng/L		100	70 - 130	4	30
Perfluorononanoic acid (PFNA)			40.0	44.1		ng/L		110	75 - 135	12	30
Perfluorodecanoic acid (PFDA)			40.0	42.2		ng/L		105	76 - 136	19	30
Perfluoroundecanoic acid (PFUnA)			40.0	48.5		ng/L		121	68 - 128	6	30
Perfluorododecanoic acid (PFDoA)			40.0	47.0		ng/L		118	71 - 131	4	30
Perfluorotridecanoic acid (PFTriA)			40.0	41.9		ng/L		105	71 - 131	19	30
Perfluorotetradecanoic acid (PFTeA)			40.0	38.9		ng/L		97	70 - 130	3	30
Perfluorobutanesulfonic acid (PFBS)			35.4	38.4		ng/L		109	67 - 127	1	30
Perfluorohexanesulfonic acid (PFHxS)			36.4	36.0		ng/L		99	59 - 119	2	30
Perfluorooctanesulfonic acid (PFOS)			37.1	38.8		ng/L		105	70 - 130	0	30
Perfluoroheptanesulfonic Acid (PFHpS)			38.1	39.9		ng/L		105	76 - 136	3	30
Perfluorodecanesulfonic acid (PFDS)			38.6	38.4		ng/L		100	71 - 131	3	30
Perfluorooctanesulfonamide (FOSA)			40.0	43.6		ng/L		109	73 - 133	0	30
6:2 FTS			37.9	40.2		ng/L		106	59 - 175	2	30
8:2 FTS			38.3	40.3		ng/L		105	75 - 135	5	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid			37.3	39.5		ng/L		106	75 - 135	1	30
9Cl-PF3ONS			37.3	39.5		ng/L		106	75 - 135	1	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			40.0	45.6		ng/L		114	51 - 173	7	30
HFPO-DA (GenX)			40.0	45.6		ng/L		114	51 - 173	7	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid			37.7	36.0		ng/L		96	54 - 114	0	30
11Cl-PF3OUdS			37.7	36.0		ng/L		96	54 - 114	0	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			37.7	38.1		ng/L		101	79 - 139	5	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFHxA	*58*		*25 - 150*
13C4 PFHpA	*62*		*25 - 150*
13C4 PFOA	*61*		*25 - 150*
13C5 PFNA	*64*		*25 - 150*
13C2 PFDA	*62*		*25 - 150*
13C2 PFUnA	*64*		*25 - 150*
13C8 FOSA	*58*		*25 - 150*
13C2 PFDoA	*57*		*25 - 150*
13C4 PFBA	*55*		*25 - 150*
13C2 PFTeDA	*70*		*25 - 150*
13C5 PFPeA	*60*		*25 - 150*

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

Lab Sample ID: LCSD 320-416469/3-A
Matrix: Water
Analysis Batch: 416862

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 416469

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
13C3 PFBS	61		25 - 150
18O2 PFHxS	64		25 - 150
13C4 PFOS	66		25 - 150
d3-NMeFOSAA	60		25 - 150
d5-NEtFOSAA	62		25 - 150
M2-6:2 FTS	72		25 - 150
M2-8:2 FTS	89		25 - 150
13C3 HFPO-DA	54		25 - 150

Lab Sample ID: MB 320-416491/1-A
Matrix: Water
Analysis Batch: 416886

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 416491

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		09/28/20 14:52	09/29/20 20:22	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		09/28/20 14:52	09/29/20 20:22	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		09/28/20 14:52	09/29/20 20:22	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		09/28/20 14:52	09/29/20 20:22	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		09/28/20 14:52	09/29/20 20:22	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		09/28/20 14:52	09/29/20 20:22	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		09/28/20 14:52	09/29/20 20:22	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		09/28/20 14:52	09/29/20 20:22	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		09/28/20 14:52	09/29/20 20:22	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		09/28/20 14:52	09/29/20 20:22	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		09/28/20 14:52	09/29/20 20:22	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		09/28/20 14:52	09/29/20 20:22	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		09/28/20 14:52	09/29/20 20:22	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		09/28/20 14:52	09/29/20 20:22	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.0	0.24	ng/L		09/28/20 14:52	09/29/20 20:22	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.0	1.5	ng/L		09/28/20 14:52	09/29/20 20:22	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.0	0.32	ng/L		09/28/20 14:52	09/29/20 20:22	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		09/28/20 14:52	09/29/20 20:22	1

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFHxA	97		25 - 150	09/28/20 14:52	09/29/20 20:22	1
13C4 PFHpA	97		25 - 150	09/28/20 14:52	09/29/20 20:22	1
13C4 PFOA	93		25 - 150	09/28/20 14:52	09/29/20 20:22	1
13C5 PFNA	101		25 - 150	09/28/20 14:52	09/29/20 20:22	1
13C2 PFDA	99		25 - 150	09/28/20 14:52	09/29/20 20:22	1
13C2 PFUnA	95		25 - 150	09/28/20 14:52	09/29/20 20:22	1
13C2 PFDoA	98		25 - 150	09/28/20 14:52	09/29/20 20:22	1
13C2 PFTeDA	99		25 - 150	09/28/20 14:52	09/29/20 20:22	1
13C3 PFBS	104		25 - 150	09/28/20 14:52	09/29/20 20:22	1
18O2 PFHxS	96		25 - 150	09/28/20 14:52	09/29/20 20:22	1

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

Lab Sample ID: MB 320-416491/1-A
Matrix: Water
Analysis Batch: 416886

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 416491

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFOS	98		25 - 150	09/28/20 14:52	09/29/20 20:22	1
d3-NMeFOSAA	105		25 - 150	09/28/20 14:52	09/29/20 20:22	1
d5-NEtFOSAA	104		25 - 150	09/28/20 14:52	09/29/20 20:22	1
13C3 HFPO-DA	98		25 - 150	09/28/20 14:52	09/29/20 20:22	1

Lab Sample ID: LCS 320-416491/2-A
Matrix: Water
Analysis Batch: 416886

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 416491

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorohexanoic acid (PFHxA)	40.0	42.1		ng/L		105	73 - 133
Perfluoroheptanoic acid (PFHpA)	40.0	40.0		ng/L		100	72 - 132
Perfluorooctanoic acid (PFOA)	40.0	39.8		ng/L		99	70 - 130
Perfluorononanoic acid (PFNA)	40.0	40.9		ng/L		102	75 - 135
Perfluorodecanoic acid (PFDA)	40.0	40.9		ng/L		102	76 - 136
Perfluoroundecanoic acid (PFUnA)	40.0	37.9		ng/L		95	68 - 128
Perfluorododecanoic acid (PFDoA)	40.0	43.6		ng/L		109	71 - 131
Perfluorotridecanoic acid (PFTriA)	40.0	41.1		ng/L		103	71 - 131
Perfluorotetradecanoic acid (PFTeA)	40.0	43.2		ng/L		108	70 - 130
Perfluorobutanesulfonic acid (PFBS)	35.4	36.7		ng/L		104	67 - 127
Perfluorohexanesulfonic acid (PFHxS)	36.4	34.9		ng/L		96	59 - 119
Perfluorooctanesulfonic acid (PFOS)	37.1	40.2		ng/L		108	70 - 130
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	37.3	40.9		ng/L		110	75 - 135
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	40.0	41.2		ng/L		103	51 - 173
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	37.7	40.0		ng/L		106	54 - 114
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.7	38.5		ng/L		102	79 - 139

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
13C2 PFHxA	99		25 - 150
13C4 PFHpA	98		25 - 150
13C4 PFOA	96		25 - 150
13C5 PFNA	100		25 - 150
13C2 PFDA	97		25 - 150
13C2 PFUnA	102		25 - 150
13C2 PFDoA	90		25 - 150
13C2 PFTeDA	85		25 - 150
13C3 PFBS	103		25 - 150
18O2 PFHxS	104		25 - 150
13C4 PFOS	98		25 - 150
d3-NMeFOSAA	106		25 - 150
d5-NEtFOSAA	103		25 - 150

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

Lab Sample ID: LCS 320-416491/2-A
Matrix: Water
Analysis Batch: 416886

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 416491

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
13C3 HFPO-DA	95		25 - 150

Lab Sample ID: LCSD 320-416491/3-A
Matrix: Water
Analysis Batch: 416886

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 416491

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)			40.0	43.3		ng/L		108	73 - 133	3	30
Perfluoroheptanoic acid (PFHpA)			40.0	41.8		ng/L		104	72 - 132	4	30
Perfluorooctanoic acid (PFOA)			40.0	40.2		ng/L		100	70 - 130	1	30
Perfluorononanoic acid (PFNA)			40.0	41.7		ng/L		104	75 - 135	2	30
Perfluorodecanoic acid (PFDA)			40.0	40.4		ng/L		101	76 - 136	1	30
Perfluoroundecanoic acid (PFUnA)			40.0	41.5		ng/L		104	68 - 128	9	30
Perfluorododecanoic acid (PFDoA)			40.0	41.5		ng/L		104	71 - 131	5	30
Perfluorotridecanoic acid (PFTriA)			40.0	36.2		ng/L		91	71 - 131	13	30
Perfluorotetradecanoic acid (PFTeA)			40.0	39.7		ng/L		99	70 - 130	8	30
Perfluorobutanesulfonic acid (PFBS)			35.4	38.4		ng/L		109	67 - 127	5	30
Perfluorohexanesulfonic acid (PFHxS)			36.4	35.2		ng/L		97	59 - 119	1	30
Perfluorooctanesulfonic acid (PFOS)			37.1	40.3		ng/L		109	70 - 130	0	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid			37.3	41.7		ng/L		112	75 - 135	2	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			40.0	41.9		ng/L		105	51 - 173	2	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid			37.7	42.8		ng/L		114	54 - 114	7	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			37.7	40.7		ng/L		108	79 - 139	6	30

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
13C2 PFHxA	92		25 - 150
13C4 PFHpA	90		25 - 150
13C4 PFOA	87		25 - 150
13C5 PFNA	89		25 - 150
13C2 PFDA	92		25 - 150
13C2 PFUnA	87		25 - 150
13C2 PFDoA	93		25 - 150
13C2 PFTeDA	87		25 - 150
13C3 PFBS	94		25 - 150
18O2 PFHxS	98		25 - 150
13C4 PFOS	90		25 - 150
d3-NMeFOSAA	96		25 - 150
d5-NEtFOSAA	98		25 - 150
13C3 HFPO-DA	88		25 - 150

Method: 537.1 DW - Perfluorinated Alkyl Acids (LC/MS)

Lab Sample ID: MB 320-416399/1-A
Matrix: Water
Analysis Batch: 416751

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 416399

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.50	ng/L		09/28/20 12:15	09/29/20 11:53	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.50	ng/L		09/28/20 12:15	09/29/20 11:53	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.50	ng/L		09/28/20 12:15	09/29/20 11:53	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.50	ng/L		09/28/20 12:15	09/29/20 11:53	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.50	ng/L		09/28/20 12:15	09/29/20 11:53	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	0.50	ng/L		09/28/20 12:15	09/29/20 11:53	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.50	ng/L		09/28/20 12:15	09/29/20 11:53	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	0.50	ng/L		09/28/20 12:15	09/29/20 11:53	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.50	ng/L		09/28/20 12:15	09/29/20 11:53	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.50	ng/L		09/28/20 12:15	09/29/20 11:53	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.50	ng/L		09/28/20 12:15	09/29/20 11:53	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.50	ng/L		09/28/20 12:15	09/29/20 11:53	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		2.0	0.50	ng/L		09/28/20 12:15	09/29/20 11:53	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		2.0	0.50	ng/L		09/28/20 12:15	09/29/20 11:53	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		2.0	0.50	ng/L		09/28/20 12:15	09/29/20 11:53	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	ND		2.0	0.50	ng/L		09/28/20 12:15	09/29/20 11:53	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		2.0	0.50	ng/L		09/28/20 12:15	09/29/20 11:53	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.50	ng/L		09/28/20 12:15	09/29/20 11:53	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*92*		*70 - 130*	*09/28/20 12:15*	*09/29/20 11:53*	*1*
13C2 PFDA	*91*		*70 - 130*	*09/28/20 12:15*	*09/29/20 11:53*	*1*
d5-NEtFOSAA	*90*		*70 - 130*	*09/28/20 12:15*	*09/29/20 11:53*	*1*
13C3 HFPO-DA	*76*		*70 - 130*	*09/28/20 12:15*	*09/29/20 11:53*	*1*

Lab Sample ID: LCS 320-416399/2-A
Matrix: Water
Analysis Batch: 416802

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 416399

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorohexanoic acid (PFHxA)	160	155		ng/L		97	70 - 130
Perfluoroheptanoic acid (PFHpA)	160	173		ng/L		108	70 - 130
Perfluorooctanoic acid (PFOA)	160	162		ng/L		101	70 - 130
Perfluorononanoic acid (PFNA)	160	172		ng/L		107	70 - 130
Perfluorodecanoic acid (PFDA)	160	167		ng/L		104	70 - 130
Perfluoroundecanoic acid (PFUnA)	160	162		ng/L		101	70 - 130
Perfluorododecanoic acid (PFDoA)	160	159		ng/L		100	70 - 130
Perfluorotridecanoic acid (PFTriA)	160	166		ng/L		104	70 - 130
Perfluorotetradecanoic acid (PFTeA)	160	160		ng/L		100	70 - 130
Perfluorobutanesulfonic acid (PFBS)	141	159		ng/L		112	70 - 130

Method: 537.1 DW - Perfluorinated Alkyl Acids (LC/MS) (Continued)

Lab Sample ID: LCS 320-416399/2-A
Matrix: Water
Analysis Batch: 416802

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 416399

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorohexanesulfonic acid (PFHxS)			146	169		ng/L		116	70 - 130		
Perfluorooctanesulfonic acid (PFOS)			148	166		ng/L		112	70 - 130		
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			160	154		ng/L		97	70 - 130		
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			160	157		ng/L		98	70 - 130		
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O			149	170		ng/L		114	70 - 130		
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF			151	175		ng/L		116	70 - 130		
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			160	136		ng/L		85	70 - 130		
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			151	145		ng/L		96	70 - 130		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*102*		*70 - 130*
13C2 PFDA	*99*		*70 - 130*
d5-NEtFOSAA	*98*		*70 - 130*
13C3 HFPO-DA	*86*		*70 - 130*

Lab Sample ID: LCSD 320-416399/3-A
Matrix: Water
Analysis Batch: 416802

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 416399

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)			160	161		ng/L		101	70 - 130	3	30
Perfluoroheptanoic acid (PFHpA)			160	185		ng/L		115	70 - 130	7	30
Perfluorooctanoic acid (PFOA)			160	171		ng/L		107	70 - 130	5	30
Perfluorononanoic acid (PFNA)			160	178		ng/L		111	70 - 130	4	30
Perfluorodecanoic acid (PFDA)			160	177		ng/L		111	70 - 130	6	30
Perfluoroundecanoic acid (PFUnA)			160	167		ng/L		104	70 - 130	3	30
Perfluorododecanoic acid (PFDoA)			160	170		ng/L		106	70 - 130	6	30
Perfluorotridecanoic acid (PFTriA)			160	179		ng/L		112	70 - 130	7	30
Perfluorotetradecanoic acid (PFTeA)			160	173		ng/L		108	70 - 130	8	30
Perfluorobutanesulfonic acid (PFBS)			141	170		ng/L		120	70 - 130	6	30
Perfluorohexanesulfonic acid (PFHxS)			146	179		ng/L		123	70 - 130	6	30
Perfluorooctanesulfonic acid (PFOS)			148	175		ng/L		118	70 - 130	5	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			160	166		ng/L		104	70 - 130	7	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			160	168		ng/L		105	70 - 130	7	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O			149	182		ng/L		122	70 - 130	7	30

Method: 537.1 DW - Perfluorinated Alkyl Acids (LC/MS) (Continued)

Lab Sample ID: LCSD 320-416399/3-A
Matrix: Water
Analysis Batch: 416802

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 416399

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF			151	182		ng/L		121	70 - 130	4	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			160	148		ng/L		92	70 - 130	8	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			151	157		ng/L		104	70 - 130	8	30

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFHxA	*101*		*70 - 130*
13C2 PFDA	*103*		*70 - 130*
d5-NEtFOSAA	*104*		*70 - 130*
13C3 HFPO-DA	*91*		*70 - 130*

LCMS

Prep Batch: 416399

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-65103-1	120774	Total/NA	Water	537.1 DW	
MB 320-416399/1-A	Method Blank	Total/NA	Water	537.1 DW	
LCS 320-416399/2-A	Lab Control Sample	Total/NA	Water	537.1 DW	
LCSD 320-416399/3-A	Lab Control Sample Dup	Total/NA	Water	537.1 DW	

Prep Batch: 416469

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-65103-2	FTP-pre-004	Total/NA	Water	3535	
320-65103-3	FTP-pre-005	Total/NA	Water	3535	
320-65103-4	MW-1903-20	Total/NA	Water	3535	
320-65103-5	MW-2903-20	Total/NA	Water	3535	
MB 320-416469/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-416469/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-416469/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Prep Batch: 416491

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-65103-6	FAI Drum	Total/NA	Water	3535	
MB 320-416491/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-416491/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-416491/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Analysis Batch: 416751

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 320-416399/1-A	Method Blank	Total/NA	Water	537.1 DW	416399

Analysis Batch: 416802

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-65103-1	120774	Total/NA	Water	537.1 DW	416399
LCS 320-416399/2-A	Lab Control Sample	Total/NA	Water	537.1 DW	416399
LCSD 320-416399/3-A	Lab Control Sample Dup	Total/NA	Water	537.1 DW	416399

Analysis Batch: 416862

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 320-416469/1-A	Method Blank	Total/NA	Water	537 (modified)	416469
LCS 320-416469/2-A	Lab Control Sample	Total/NA	Water	537 (modified)	416469
LCSD 320-416469/3-A	Lab Control Sample Dup	Total/NA	Water	537 (modified)	416469

Analysis Batch: 416886

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-65103-6	FAI Drum	Total/NA	Water	537 (modified)	416491
MB 320-416491/1-A	Method Blank	Total/NA	Water	537 (modified)	416491
LCS 320-416491/2-A	Lab Control Sample	Total/NA	Water	537 (modified)	416491
LCSD 320-416491/3-A	Lab Control Sample Dup	Total/NA	Water	537 (modified)	416491

Analysis Batch: 418441

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-65103-2	FTP-pre-004	Total/NA	Water	537 (modified)	416469
320-65103-3	FTP-pre-005	Total/NA	Water	537 (modified)	416469
320-65103-4	MW-1903-20	Total/NA	Water	537 (modified)	416469

LCMS

Analysis Batch: 419223

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-65103-5	MW-2903-20	Total/NA	Water	537 (modified)	416469

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Airport

Job ID: 320-65103-1

Client Sample ID: 120774
Date Collected: 09/15/20 09:31
Date Received: 09/25/20 10:55

Lab Sample ID: 320-65103-1
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	537.1 DW			265.4 mL	1.00 mL	416399	09/28/20 12:15	EH	TAL SAC
Total/NA	Analysis	537.1 DW		1			416802	09/29/20 14:12	SK	TAL SAC

Client Sample ID: FTP-pre-004
Date Collected: 09/17/20 15:15
Date Received: 09/25/20 10:55

Lab Sample ID: 320-65103-2
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			270.3 mL	10.00 mL	416469	09/28/20 13:40	LA	TAL SAC
Total/NA	Analysis	537 (modified)		100			418441	10/03/20 16:05	S1M	TAL SAC

Client Sample ID: FTP-pre-005
Date Collected: 09/17/20 15:05
Date Received: 09/25/20 10:55

Lab Sample ID: 320-65103-3
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			271.1 mL	10.00 mL	416469	09/28/20 13:40	LA	TAL SAC
Total/NA	Analysis	537 (modified)		100			418441	10/03/20 16:14	S1M	TAL SAC

Client Sample ID: MW-1903-20
Date Collected: 09/17/20 13:15
Date Received: 09/25/20 10:55

Lab Sample ID: 320-65103-4
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			287.3 mL	10.00 mL	416469	09/28/20 13:40	LA	TAL SAC
Total/NA	Analysis	537 (modified)		1			418441	10/03/20 15:55	S1M	TAL SAC

Client Sample ID: MW-2903-20
Date Collected: 09/17/20 13:05
Date Received: 09/25/20 10:55

Lab Sample ID: 320-65103-5
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			282.6 mL	10.00 mL	416469	09/28/20 13:40	LA	TAL SAC
Total/NA	Analysis	537 (modified)		1			419223	10/06/20 14:35	JCN	TAL SAC

Client Sample ID: FAI Drum
Date Collected: 09/24/20 11:10
Date Received: 09/25/20 10:55

Lab Sample ID: 320-65103-6
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			1 mL	10.00 mL	416491	09/28/20 14:52	LA	TAL SAC
Total/NA	Analysis	537 (modified)		1			416886	09/29/20 20:59	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: Fairbanks Airport

Job ID: 320-65103-1

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	10-31-20
Louisiana	NELAP	01944	06-30-21
Maine	State	CA00004	04-14-22
Michigan	State	9947	08-03-23
Nevada	State	CA000442021-1	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: Fairbanks Airport

Job ID: 320-65103-1

Method	Method Description	Protocol	Laboratory
537 (modified)	Fluorinated Alkyl Substances	EPA	TAL SAC
537.1 DW	Perfluorinated Alkyl Acids (LC/MS)	EPA	TAL SAC
3535	Solid-Phase Extraction (SPE)	SW846	TAL SAC
537.1 DW	Extraction of Perfluorinated Alkyl Acids	EPA	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: Fairbanks Airport

Job ID: 320-65103-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
320-65103-1	120774	Water	09/15/20 09:31	09/25/20 10:55	
320-65103-2	FTP-pre-004	Water	09/17/20 15:15	09/25/20 10:55	
320-65103-3	FTP-pre-005	Water	09/17/20 15:05	09/25/20 10:55	
320-65103-4	MW-1903-20	Water	09/17/20 13:15	09/25/20 10:55	
320-65103-5	MW-2903-20	Water	09/17/20 13:05	09/25/20 10:55	
320-65103-6	FAI Drum	Water	09/24/20 11:10	09/25/20 10:55	

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

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

CHAIN-OF-CUSTODY RECORD

Page 1 of ____

Laboratory TestAmerica Eurofins
Attn: David Althueter

Turn Around Time: [X] Normal [ ] Rush — Please Specify

Quote No: —

J-Flags: [X] Yes [ ] No

Analytical Methods (include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	x18 PFAS by EPA 537.1 (Tentative)	x18 PFAS by EPA 537.1	x25 PFAS by 537.1 (see attached)	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
~~2102~~ 120774		0931	9/15/20	✓			2	GW used as drinking water
FTP-pre004		1515	9/17/20		✓		2	surface water
FTP-pre005		1505	9/17/20		✓		2	surface water
MW-1903-20		1315	9/17/20			✓	2	groundwater
MW-2903-20		1305	9/17/20			✓	2	groundwater
FAI DRUM		1110	9/24/20		x		2	may be highly PFAS concentrated

320-65103 Chain of Custody

Project Information	
Number:	102519
Name:	Fairbanks Airport
Contact:	MDW
Ongoing Project?	Yes [X] No [ ]
Sampler:	MDW/VTY

Sample Receipt	
Total No. of Containers:	
COC Seals/Intact? Y/N/NA	
Received Good Cond./Cold	
Temp:	
Delivery Method:	Goldstreak

Notes:

102519-008, 005 & 012
FAI Drum - recoverd AFFF/water mix

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 1250	Signature: Time:	Signature: Time:
Printed Name: Ashley Jaramillo Date: 9/24/20	Printed Name: Date:	Printed Name: Date:
Company: SWI	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 1655	Signature: Time:	Signature: Time:
Printed Name: Jennifer Darlington Date: 25/sept/20	Printed Name: Date:	Printed Name: Date:
Company: GAU Sac	Company:	Company:

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

1.7°c

No. 411428

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-65103-1

Login Number: 65103
List Number: 1
Creator: Nuval, Mark-Anthony M

List Source: Eurofins TestAmerica, Sacramento

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	N/A	
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 <6mm (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:

Amber Masters

Title:

Environmental Scientist

Date:

10/9/2020

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

Eurofins TestAmerica, Sacramento

Laboratory Report Number:

320-65103-1

Laboratory Report Date:

10/9/2020

CS Site Name:

Fairbanks DOT&PF PFAS

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-65103-1

Laboratory Report Date:

10/9/2020

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 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:

   Sample cooler temperature recorded at 1.7° C upon receipt at laboratory.

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

   Yes☒ No☐ N/A☐ Comments:

320-65103-1

Laboratory Report Date:

10/9/2020

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:

See above.

e. Data quality or usability affected?

Comments:

Data quality and/or usability is not affected; see above.

4. Case Narrative

a. Present and understandable?

Yes☒ No☐ N/A☐ Comments:

320-65103-1

Laboratory Report Date:

10/9/2020

CS Site Name:

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

Yes☒ No☐ N/A☐ Comments:

Results for samples *FTP-pre-004* and *FTP-pre-005* 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.

The concentration of Perfluorohexanesulfonic acid (PFHxS) and Perfluorooctanesulfonic acid (PFOS) associated with the following samples exceeded the instrument calibration range at the maximum dilution the lab is able to perform on an extract: *FTP-pre-004* and *FTP-pre-005*. These analytes have been qualified; however, the peaks did not saturate the instrument detector. Historical data indicate that for the isotope dilution method, further dilution and re-analysis will not produce significantly different results from those reported above the calibration range. Consequently, the PFHxS and PFOS results for these samples are considered estimates and have been flagged 'J'.

The Isotope Dilution Analyte (IDA) recovery associated with the following samples is below the method recommended limit for 13C5 PFNA: *FTP-pre-004* and *FTP-pre-005*. 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 samples. See section 6.d.ii for for details.

Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-416491.

A deviation from the Standard Operating Procedure (SOP) occurred. Details are as follows: due to the matrix, the following samples were prepared using a 1.0 mL aliquot without extracting via the SPE process: *FAI Drum*. This is the equivalent of a 250x dilution prior to submitting extracts for analysis.

The following samples were yellow prior to extraction: *FTP-pre-004* and *FTP-pre-005*.

The following samples were black prior to extraction: *MW-1903-20* and *MW-2903-20*.

The following samples contain floating particulates in the bottles prior to extraction: *FTP-pre-004, FTP-pre-005, MW-1903-20 and MW-2903-20.*Due the excess amount of particulates, the following samples were centrifuged and decanted into new 250 mL container: *MW-1903-20 and MW-2903-20*. After centrifuging and decanting, the samples were fortified with IDA and then extracted.

320-65103-1

Laboratory Report Date:

10/9/2020

CS Site Name:

The following sample *120774* in preparation batch 320-416399 were light yellow prior to extraction.

The following sample *120774* in preparation batch 320-416399 were yellow after extraction and final voluming.

Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-416399.

c. Were all corrective actions documented?

Yes☒ No☐ N/A☐ Comments:

Where necessary.

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

Comments:

The case narrative does not discuss an impact to data quality.

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:

320-65103-1

Laboratory Report Date:

10/9/2020

CS Site Name:

e. Data quality or usability affected?

Data quality and/or usability were 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:

No analytes were detected in the method blank.

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

Comments:

Not applicable, 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:

320-65103-1

Laboratory Report Date:

10/9/2020

CS Site Name:

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

Yes☐ No☐ N/A☒ Comments:

Metals and 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:

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

Comments:

Not applicable; analytical accuracy and precision 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:

The data quality and/or usability were 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:

An MS/MSD was not reported in this work order, see the LCS/LCSD section for an evaluation of analytical accuracy and precision.

320-65103-1

Laboratory Report Date:

10/9/2020

CS Site Name:

ii. Metals/Inorganics – one MS and one MSD reported per matrix, analysis and 20 samples?

Yes☐ No☐ N/A☒ Comments:

See above.

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.

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:

320-65103-1

Laboratory Report Date:

10/9/2020

CS Site Name:

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:

PFAS IDA 13C5 PFNA was recovered below the lower control limit in sample *FTP-pre-004 and FTP-pre-005*. The laboratory noted that 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 samples. Consequently, the PFNA results in the samples are not considered affected.

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.

iv. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected.

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:

No volatile analyses were requested as a part of this work order; 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:

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:

No samples were affected.

320-65103-1

Laboratory Report Date:

10/9/2020

CS Site Name:

v. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected.

f. Field Duplicate

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

Yes☒ No☐ N/A☐ Comments:

ii. Submitted blind to lab?

Yes☒ No☐ N/A☐ Comments:

Field duplicate pairs *FTP-pre-004/FTP-pre-005* and *MW-1903-20/MW-2903-20* were submitted with this work order.

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

RPD (%) = 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:

The field duplicate RPDs were within the recommended DQO of 30% for water, where calculable, with the exception of PFOS in samples *MW-1903-20/MW-2903-20.* The field duplicate RPDs for these analytes did not meet the recommended DQO. The sample results are considered estimated with no direction of bias and have been flagged 'J'.

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

Comments:

See above.

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

Yes☐ No☐ N/A☒ Comments:

Samples were not collected using reusable equipment; therefore, an equipment blank was not required for this project.

320-65103-1

Laboratory Report Date:

10/9/2020

CS Site Name:

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:

The 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:

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

eurofins | Environment Testing America

ANALYTICAL REPORT

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

Laboratory Job ID: 320-65077-1
Client Project/Site: ARFF Flush

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

Attn: Marcy Nadel

Authorized for release by:
9/30/2020 2:17:10 PM

David Alltucker, Project Manager I
(916)374-4383
David.Alltucker@Eurofinset.com

Table of Contents

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: ARFF Flush

Job ID: 320-65077-1

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.
¤	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

Job ID: 320-65077-1

Laboratory: Eurofins TestAmerica, Sacramento

Narrative

Job Narrative
320-65077-1

Receipt
The sample was received on 9/25/2020 10:55 AM; the sample arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 1.7º C.

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

Organic Prep
Method 3535: nt sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-416491.

Method 3535: A deviation from the Standard Operating Procedure (SOP) occurred. Details are as follows: due to the matrix, the following sample was prepared using a 1.0 mL aliquot without extracting via the SPE process: FAI Tank (320-65077-1). This is the equivalent of a 250x dilution prior to submitting extracts for analysis

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: ARFF Flush

Job ID: 320-65077-1

Client Sample ID: FAI Tank

Lab Sample ID: 320-65077-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	2800		500	150	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	290	J	500	63	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	660		500	210	ng/L	1		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	2300		500	50	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	9100		500	140	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	49000		500	140	ng/L	1		537 (modified)	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: FAI Tank

Date Collected: 09/24/20 11:40
Date Received: 09/25/20 10:55

Lab Sample ID: 320-65077-1

Matrix: Water

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**2800**		500	150	ng/L		09/28/20 14:52	09/29/20 20:49	1
Perfluoroheptanoic acid (PFHpA)	**290**	**J**	500	63	ng/L		09/28/20 14:52	09/29/20 20:49	1
Perfluorooctanoic acid (PFOA)	**660**		500	210	ng/L		09/28/20 14:52	09/29/20 20:49	1
Perfluorononanoic acid (PFNA)	ND		500	68	ng/L		09/28/20 14:52	09/29/20 20:49	1
Perfluorodecanoic acid (PFDA)	ND		500	78	ng/L		09/28/20 14:52	09/29/20 20:49	1
Perfluoroundecanoic acid (PFUnA)	ND		500	280	ng/L		09/28/20 14:52	09/29/20 20:49	1
Perfluorododecanoic acid (PFDoA)	ND		500	140	ng/L		09/28/20 14:52	09/29/20 20:49	1
Perfluorotridecanoic acid (PFTriA)	ND		500	330	ng/L		09/28/20 14:52	09/29/20 20:49	1
Perfluorotetradecanoic acid (PFTeA)	ND		500	180	ng/L		09/28/20 14:52	09/29/20 20:49	1
Perfluorobutanesulfonic acid (PFBS)	**2300**		500	50	ng/L		09/28/20 14:52	09/29/20 20:49	1
Perfluorohexanesulfonic acid (PFHxS)	**9100**		500	140	ng/L		09/28/20 14:52	09/29/20 20:49	1
Perfluorooctanesulfonic acid (PFOS)	**49000**		500	140	ng/L		09/28/20 14:52	09/29/20 20:49	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		1300	300	ng/L		09/28/20 14:52	09/29/20 20:49	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		1300	330	ng/L		09/28/20 14:52	09/29/20 20:49	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		500	60	ng/L		09/28/20 14:52	09/29/20 20:49	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		1000	380	ng/L		09/28/20 14:52	09/29/20 20:49	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		500	80	ng/L		09/28/20 14:52	09/29/20 20:49	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		500	100	ng/L		09/28/20 14:52	09/29/20 20:49	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*126*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:49*	*1*
13C4 PFHpA	*126*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:49*	*1*
13C4 PFOA	*95*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:49*	*1*
13C5 PFNA	*125*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:49*	*1*
13C2 PFDA	*81*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:49*	*1*
13C2 PFUnA	*120*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:49*	*1*
13C2 PFDoA	*121*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:49*	*1*
13C2 PFTeDA	*111*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:49*	*1*
13C3 PFBS	*128*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:49*	*1*
18O2 PFHxS	*125*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:49*	*1*
13C4 PFOS	*123*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:49*	*1*
d3-NMeFOSAA	*121*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:49*	*1*
d5-NEtFOSAA	*125*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:49*	*1*
13C3 HFPO-DA	*98*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:49*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: ARFF Flush

Job ID: 320-65077-1

Method: 537 (modified) - Fluorinated Alkyl Substances

Matrix: Water

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)							
		PFHxA	C4PFHA	PFOA	PFNA	PFDA	PFUnA	PFDoA	PFTDA
Lab Sample ID	Client Sample ID	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)
320-65077-1	FAI Tank	126	126	95	125	81	120	121	111
LCS 320-416491/2-A	Lab Control Sample	99	98	96	100	97	102	90	85
LCSD 320-416491/3-A	Lab Control Sample Dup	92	90	87	89	92	87	93	87
MB 320-416491/1-A	Method Blank	97	97	93	101	99	95	98	99

		Percent Isotope Dilution Recovery (Acceptance Limits)							
		C3PFBS	PFHxS	PFOS	d3NMFOS	d5NEFOS	HFPODA		
Lab Sample ID	Client Sample ID	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)		
320-65077-1	FAI Tank	128	125	123	121	125	98		
LCS 320-416491/2-A	Lab Control Sample	103	104	98	106	103	95		
LCSD 320-416491/3-A	Lab Control Sample Dup	94	98	90	96	98	88		
MB 320-416491/1-A	Method Blank	104	96	98	105	104	98		

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

Method: 537 (modified) - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-416491/1-A
Matrix: Water
Analysis Batch: 416886

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 416491

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		09/28/20 14:52	09/29/20 20:22	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		09/28/20 14:52	09/29/20 20:22	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		09/28/20 14:52	09/29/20 20:22	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		09/28/20 14:52	09/29/20 20:22	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		09/28/20 14:52	09/29/20 20:22	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		09/28/20 14:52	09/29/20 20:22	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		09/28/20 14:52	09/29/20 20:22	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		09/28/20 14:52	09/29/20 20:22	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		09/28/20 14:52	09/29/20 20:22	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		09/28/20 14:52	09/29/20 20:22	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		09/28/20 14:52	09/29/20 20:22	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		09/28/20 14:52	09/29/20 20:22	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		09/28/20 14:52	09/29/20 20:22	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		09/28/20 14:52	09/29/20 20:22	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.0	0.24	ng/L		09/28/20 14:52	09/29/20 20:22	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.0	1.5	ng/L		09/28/20 14:52	09/29/20 20:22	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.0	0.32	ng/L		09/28/20 14:52	09/29/20 20:22	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		09/28/20 14:52	09/29/20 20:22	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*97*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:22*	*1*
13C4 PFHpA	*97*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:22*	*1*
13C4 PFOA	*93*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:22*	*1*
13C5 PFNA	*101*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:22*	*1*
13C2 PFDA	*99*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:22*	*1*
13C2 PFUnA	*95*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:22*	*1*
13C2 PFDoA	*98*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:22*	*1*
13C2 PFTeDA	*99*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:22*	*1*
13C3 PFBS	*104*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:22*	*1*
18O2 PFHxS	*96*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:22*	*1*
13C4 PFOS	*98*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:22*	*1*
d3-NMeFOSAA	*105*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:22*	*1*
d5-NEtFOSAA	*104*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:22*	*1*
13C3 HFPO-DA	*98*		*25 - 150*	*09/28/20 14:52*	*09/29/20 20:22*	*1*

Lab Sample ID: LCS 320-416491/2-A
Matrix: Water
Analysis Batch: 416886

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 416491

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorohexanoic acid (PFHxA)	40.0	42.1		ng/L		105	73 - 133
Perfluoroheptanoic acid (PFHpA)	40.0	40.0		ng/L		100	72 - 132
Perfluorooctanoic acid (PFOA)	40.0	39.8		ng/L		99	70 - 130
Perfluorononanoic acid (PFNA)	40.0	40.9		ng/L		102	75 - 135

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

Lab Sample ID: LCS 320-416491/2-A
Matrix: Water
Analysis Batch: 416886

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 416491

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorodecanoic acid (PFDA)	40.0	40.9		ng/L		102	76 - 136
Perfluoroundecanoic acid (PFUnA)	40.0	37.9		ng/L		95	68 - 128
Perfluorododecanoic acid (PFDoA)	40.0	43.6		ng/L		109	71 - 131
Perfluorotridecanoic acid (PFTriA)	40.0	41.1		ng/L		103	71 - 131
Perfluorotetradecanoic acid (PFTeA)	40.0	43.2		ng/L		108	70 - 130
Perfluorobutanesulfonic acid (PFBS)	35.4	36.7		ng/L		104	67 - 127
Perfluorohexanesulfonic acid (PFHxS)	36.4	34.9		ng/L		96	59 - 119
Perfluorooctanesulfonic acid (PFOS)	37.1	40.2		ng/L		108	70 - 130
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	37.3	40.9		ng/L		110	75 - 135
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	40.0	41.2		ng/L		103	51 - 173
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	37.7	40.0		ng/L		106	54 - 114
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.7	38.5		ng/L		102	79 - 139

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*99*		*25 - 150*
13C4 PFHpA	*98*		*25 - 150*
13C4 PFOA	*96*		*25 - 150*
13C5 PFNA	*100*		*25 - 150*
13C2 PFDA	*97*		*25 - 150*
13C2 PFUnA	*102*		*25 - 150*
13C2 PFDoA	*90*		*25 - 150*
13C2 PFTeDA	*85*		*25 - 150*
13C3 PFBS	*103*		*25 - 150*
18O2 PFHxS	*104*		*25 - 150*
13C4 PFOS	*98*		*25 - 150*
d3-NMeFOSAA	*106*		*25 - 150*
d5-NEtFOSAA	*103*		*25 - 150*
13C3 HFPO-DA	*95*		*25 - 150*

Lab Sample ID: LCSD 320-416491/3-A
Matrix: Water
Analysis Batch: 416886

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 416491

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	40.0	43.3		ng/L		108	73 - 133	3	30
Perfluoroheptanoic acid (PFHpA)	40.0	41.8		ng/L		104	72 - 132	4	30
Perfluorooctanoic acid (PFOA)	40.0	40.2		ng/L		100	70 - 130	1	30
Perfluorononanoic acid (PFNA)	40.0	41.7		ng/L		104	75 - 135	2	30
Perfluorodecanoic acid (PFDA)	40.0	40.4		ng/L		101	76 - 136	1	30
Perfluoroundecanoic acid (PFUnA)	40.0	41.5		ng/L		104	68 - 128	9	30

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

Lab Sample ID: LCSD 320-416491/3-A
Matrix: Water
Analysis Batch: 416886

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 416491

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorododecanoic acid (PFDoA)			40.0	41.5		ng/L		104	71 - 131	5	30
Perfluorotridecanoic acid (PFTriA)			40.0	36.2		ng/L		91	71 - 131	13	30
Perfluorotetradecanoic acid (PFTeA)			40.0	39.7		ng/L		99	70 - 130	8	30
Perfluorobutanesulfonic acid (PFBS)			35.4	38.4		ng/L		109	67 - 127	5	30
Perfluorohexanesulfonic acid (PFHxS)			36.4	35.2		ng/L		97	59 - 119	1	30
Perfluorooctanesulfonic acid (PFOS)			37.1	40.3		ng/L		109	70 - 130	0	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid			37.3	41.7		ng/L		112	75 - 135	2	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			40.0	41.9		ng/L		105	51 - 173	2	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid			37.7	42.8		ng/L		114	54 - 114	7	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			37.7	40.7		ng/L		108	79 - 139	6	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFHxA	*92*		*25 - 150*
13C4 PFHpA	*90*		*25 - 150*
13C4 PFOA	*87*		*25 - 150*
13C5 PFNA	*89*		*25 - 150*
13C2 PFDA	*92*		*25 - 150*
13C2 PFUnA	*87*		*25 - 150*
13C2 PFDoA	*93*		*25 - 150*
13C2 PFTeDA	*87*		*25 - 150*
13C3 PFBS	*94*		*25 - 150*
18O2 PFHxS	*98*		*25 - 150*
13C4 PFOS	*90*		*25 - 150*
d3-NMeFOSAA	*96*		*25 - 150*
d5-NEtFOSAA	*98*		*25 - 150*
13C3 HFPO-DA	*88*		*25 - 150*

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: ARFF Flush

Job ID: 320-65077-1

LCMS

Prep Batch: 416491

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-65077-1	FAI Tank	Total/NA	Water	3535	
MB 320-416491/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-416491/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-416491/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Analysis Batch: 416886

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-65077-1	FAI Tank	Total/NA	Water	537 (modified)	416491
MB 320-416491/1-A	Method Blank	Total/NA	Water	537 (modified)	416491
LCS 320-416491/2-A	Lab Control Sample	Total/NA	Water	537 (modified)	416491
LCSD 320-416491/3-A	Lab Control Sample Dup	Total/NA	Water	537 (modified)	416491

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: ARFF Flush

Job ID: 320-65077-1

Client Sample ID: FAI Tank

Date Collected: 09/24/20 11:40
Date Received: 09/25/20 10:55

Lab Sample ID: 320-65077-1

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			1 mL	10.00 mL	416491	09/28/20 14:52	LA	TAL SAC
Total/NA	Analysis	537 (modified)		1			416886	09/29/20 20:49	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: ARFF Flush

Job ID: 320-65077-1

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	10-31-20
Louisiana	NELAP	01944	06-30-21
Maine	State	CA00004	04-14-22
Michigan	State	9947	08-03-23
Nevada	State	CA000442021-1	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: ARFF Flush

Job ID: 320-65077-1

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: ARFF Flush

Job ID: 320-65077-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
320-65077-1	FAI Tank	Water	09/24/20 11:40	09/25/20 10:55	

Shannon & Wilson, Inc.
400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020
1150 Olive Blvd., Suite 276
St. Louis, MO 63141
(314) 872-8170
2355 Hill Road
Fairbanks, AK 99707
(907) 479-0600
5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

Chain of Custody Record

Laboratory Test America
Attn:

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

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFASx18 537.1						Total Number of Containers	Remarks/Matrix
FAI Tank		1140	9/24/20		X	X						2	may be highly PFAS concentrated

320-65077 Chain of Custody

Project Information		Sample Receipt	
Project Number: 102519-008		Total Number of Containers	2
Project Name: ARFF Flush		COC Seals/Intact? Y/N/NA	
Contact: MDN		Received Good Cond./Cold	
Ongoing Project? Yes ☐ No ☒		Delivery Method:	
Sampler: AMJ		(attach shipping bill, if any)	

Instructions
Requested Turn Around Time: Standard
Special Instructions:

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 1250	Signature: Time:	Signature: Time:
Printed Name: Ashley Jaramillo Date: 9/24/20	Printed Name: Date:	Printed Name: Date:
Company: SWI	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 1055	Signature: Time:	Signature: Time:
Printed Name: Jennifer Darlington Date: 25 Sept 20	Printed Name: Date:	Printed Name: Date:
Company: ETAW Sac	Company:	Company:

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

F-19-91/UR

1.7°c

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-65077-1

Login Number: 65077
List Number: 1
Creator: Thompson, Sarah W

List Source: Eurofins TestAmerica, Sacramento

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	N/A	
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 <6mm (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:

Amber Masters

Title:

Environmental Scientist

Date:

10/9/2020

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

Eurofins TestAmerica, Sacramento

Laboratory Report Number:

320-65077-1

Laboratory Report Date:

9/30/2020

CS Site Name:

Fairbanks DOT&PF PFAS

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-65077-1

Laboratory Report Date:

9/30/2020

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 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:

   Sample cooler temperature recorded at 1.7° C upon receipt at laboratory.

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

   Yes☒ No☐ N/A☐ Comments:

320-65077-1

Laboratory Report Date:

9/30/2020

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:

See above.

e. Data quality or usability affected?

Comments:

Data quality and/or usability is not affected; 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:

There was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) associated with preparation batch 320-416491.

A deviation from the Standard Operating Procedure (SOP) occurred. Details are as follows: due to the matrix, the following sample was prepared using a 1.0 mL aliquot without extracting via the SPE process: FAI Tank (320-65077-1). This is the equivalent of a 250x dilution prior to submitting extracts for analysis.

c. Were all corrective actions documented?

Yes☐ No☐ N/A☒ Comments:

No corrective actions were required.

320-65077-1

Laboratory Report Date:

9/30/2020

CS Site Name:

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☐ 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:

e. Data quality or usability affected?

Data quality and/or usability were not affected.

6. QC Samples

a. Method Blank

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

Yes☒ No☐ N/A☐ Comments:

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Laboratory Report Date:

9/30/2020

CS Site Name:

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

Yes☒ No☐ N/A☐ Comments:

No analytes were detected in the method blank.

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

Comments:

Not applicable, 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 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:

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Laboratory Report Date:

9/30/2020

CS Site Name:

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; analytical accuracy and precision 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:

The data quality and/or usability were 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:

An MS/MSD was not reported in this work order, see the LCS/LCSD section for an evaluation of analytical accuracy and precision.

ii. Metals/Inorganics – one MS and one MSD reported per matrix, analysis and 20 samples?

Yes☐ No☐ N/A☒ Comments:

See above.

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.

320-65077-1

Laboratory Report Date:

9/30/2020

CS Site Name:

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.

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 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.

320-65077-1

Laboratory Report Date:

9/30/2020

CS Site Name:

iv. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected.

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:

No volatile analyses were requested as a part of this work order; 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:

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:

No samples were affected.

v. Data quality or usability affected?

Comments:

The data quality and/or usability was 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 pair was not submitted as a part of the work order.

ii. Submitted blind to lab?

Yes☐ No☐ N/A☒ Comments:

320-65077-1

Laboratory Report Date:

9/30/2020

CS Site Name:

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

RPD (%) = 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:

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

Comments:

The data quality and/or usability was not affected.

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

Yes☐ No☐ N/A☒ Comments:

Samples were not collected using reusable equipment; therefore, an equipment blank was not required for this project.

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:

The 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:

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

320-65077-1

Laboratory Report Date:

9/30/2020

CS Site Name:

eurofins | Environment Testing America

ANALYTICAL REPORT

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

Laboratory Job ID: 320-74829-1
Client Project/Site: FAI-AFFF
Revision: 1

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

Attn: Marcy Nadel

Authorized for release by:
7/1/2021 2:42:19 PM

David Alltucker, Project Manager I
(916)374-4383
David.Alltucker@Eurofinset.com

Table of Contents

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: FAI-AFFF

Job ID: 320-74829-1

Qualifiers

LCMS

Qualifier	Qualifier Description
*5-	Isotope dilution analyte is outside acceptance limits, low biased.
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
F1	MS and/or MSD recovery exceeds control limits.
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.
¤	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: FAI-AFFF

Job ID: 320-74829-1

Job ID: 320-74829-1

Laboratory: Eurofins TestAmerica, Sacramento

Narrative

Revision 7/1/2021: This report has been reviesed to correct sample IDs

Receipt
The samples were received on 6/10/2021 3:35 PM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 1.8º C.

LCMS
Method EPA 537(Mod): 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 have some degree of uncertainty, and the reported values may have some high bias. However, analyst judgment was used to positively identify the analytes.

Method EPA 537(Mod): Due to the high concentration of Perfluorooctanoic acid (PFOA), the matrix spike / matrix spike duplicate (MS/MSD) for preparation batch 320-499582 and analytical batch 320-500616 could not be evaluated for accuracy. The associated laboratory control sample (LCS) met acceptance criteria.

Method EPA 537(Mod): The matrix spike (MS) recovery for preparation batch 320-499582 and analytical batch 320-500616 was outside control limits for several analytes. 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): The matrix spike duplicate (MSD) recovery for preparation batch 320-499582 and analytical batch 320-500616 was outside control limits for Perfluorooctanoic acid (PFOA) and Perfluoroundecanoic acid (PFUnA). 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): The following samples were diluted due to high target and the nature of the sample matrix: SS-21-03 (320-74829-2), (320-74829-A-2-B MS) and (320-74829-A-2-C MSD). Because of this dilution, the surrogate spike and matrix spike concentration in the sample was reduced to a level where the recovery calculation does not provide useful information.

Method EPA 537(Mod): Results for samples SW-21-101 (320-74829-7) and SW-21-01 (320-74829-8) were reported from the analysis of a diluted extract due to matrix interference 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

Method EPA 537(Mod): The Isotope Dilution Analyte (IDA) recovery associated with the following samples are below the method recommended limit: SS-21-03 (320-74829-2) and (320-74829-A-2-B MS). 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.

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

Organic Prep
Method SHAKE: The following samples were light yellow after final extraction/volume: SS-21-03 (320-74829-2), SS-21-04 (320-74829-5), (320-74829-A-2 MS) and (320-74829-A-2 MSD)

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-AFFF

Job ID: 320-74829-1

Client Sample ID: FB-21-01 — Lab Sample ID: 320-74829-1

No Detections.

Client Sample ID: SS-21-03 — Lab Sample ID: 320-74829-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	3.1	J I	3.3	0.70	ug/Kg	10	☼	EPA 537(Mod)	Total/NA
Perfluorodecanoic acid (PFDA)	1.1	J I	3.3	0.37	ug/Kg	10	☼	EPA 537(Mod)	Total/NA
Perfluorododecanoic acid (PFDoA)	2.1	J	3.3	1.1	ug/Kg	10	☼	EPA 537(Mod)	Total/NA
Perfluorotridecanoic acid (PFTriA)	9.1	I F1	3.3	0.85	ug/Kg	10	☼	EPA 537(Mod)	Total/NA
Perfluorotetradecanoic acid (PFTeA)	1.7	J	3.3	0.90	ug/Kg	10	☼	EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.56	J	3.3	0.42	ug/Kg	10	☼	EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	4.0		3.3	0.52	ug/Kg	10	☼	EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	65		8.3	3.3	ug/Kg	10	☼	EPA 537(Mod)	Total/NA

Client Sample ID: SS-21-01 — Lab Sample ID: 320-74829-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorodecanoic acid (PFDA)	0.64	J	2.2	0.24	ug/Kg	10	☼	EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	0.81	J	2.2	0.34	ug/Kg	10	☼	EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	53		5.5	2.2	ug/Kg	10	☼	EPA 537(Mod)	Total/NA

Client Sample ID: SS-21-02 — Lab Sample ID: 320-74829-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluoroheptanoic acid (PFHpA)	0.13	J	0.22	0.032	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	0.23		0.22	0.095	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.16	J	0.22	0.040	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorodecanoic acid (PFDA)	0.87		0.22	0.024	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluoroundecanoic acid (PFUnA)	1.2		0.22	0.040	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorododecanoic acid (PFDoA)	3.1		0.22	0.074	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorotridecanoic acid (PFTriA)	0.87		0.22	0.056	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorotetradecanoic acid (PFTeA)	1.3		0.22	0.060	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	0.45	I	0.22	0.034	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	6.7		0.55	0.22	ug/Kg	1	☼	EPA 537(Mod)	Total/NA

Client Sample ID: SS-21-04 — Lab Sample ID: 320-74829-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	0.52		0.21	0.043	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.091	J	0.21	0.030	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	0.18	J	0.21	0.089	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.083	J	0.21	0.037	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorodecanoic acid (PFDA)	0.53		0.21	0.023	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluoroundecanoic acid (PFUnA)	0.47		0.21	0.037	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorododecanoic acid (PFDoA)	1.9		0.21	0.069	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorotridecanoic acid (PFTriA)	0.38		0.21	0.053	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorotetradecanoic acid (PFTeA)	0.83		0.21	0.056	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.15	J	0.21	0.026	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	1.0		0.21	0.032	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	9.4		0.52	0.21	ug/Kg	1	☼	EPA 537(Mod)	Total/NA

Client Sample ID: SS-21-102 — Lab Sample ID: 320-74829-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	0.31	I	0.21	0.044	ug/Kg	1	☼	EPA 537(Mod)	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Sacramento

Client Sample ID: SS-21-102 (Continued)

Lab Sample ID: 320-74829-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluoroheptanoic acid (PFHpA)	0.12	J	0.21	0.030	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	0.17	J	0.21	0.089	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.11	J	0.21	0.037	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorodecanoic acid (PFDA)	0.77		0.21	0.023	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluoroundecanoic acid (PFUnA)	0.95		0.21	0.037	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorododecanoic acid (PFDoA)	2.5		0.21	0.069	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorotridecanoic acid (PFTriA)	0.71		0.21	0.053	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorotetradecanoic acid (PFTeA)	1.1		0.21	0.056	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	0.41	I	0.21	0.032	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	5.4		0.52	0.21	ug/Kg	1	☼	EPA 537(Mod)	Total/NA

Client Sample ID: SW-21-101

Lab Sample ID: 320-74829-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	240		18	5.1	ng/L	10		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	70		18	2.2	ng/L	10		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	21		18	7.5	ng/L	10		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	6.9	J	18	2.4	ng/L	10		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	11	J	18	1.8	ng/L	10		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	77		18	5.0	ng/L	10		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	280		18	4.7	ng/L	10		EPA 537(Mod)	Total/NA

Client Sample ID: SW-21-01

Lab Sample ID: 320-74829-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	220		18	5.2	ng/L	10		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	54		18	2.3	ng/L	10		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	21		18	7.7	ng/L	10		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	8.4	J I	18	2.4	ng/L	10		EPA 537(Mod)	Total/NA
Perfluorodecanoic acid (PFDA)	6.6	J	18	2.8	ng/L	10		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	8.6	J	18	1.8	ng/L	10		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	75		18	5.1	ng/L	10		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	260		18	4.9	ng/L	10		EPA 537(Mod)	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: FAI-AFFF

Job ID: 320-74829-1

Client Sample ID: FB-21-01

Date Collected: 06/08/21 12:15
Date Received: 06/10/21 15:35

Lab Sample ID: 320-74829-1

Matrix: Water

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		06/15/21 19:34	06/22/21 19:05	1
Perfluoroheptanoic acid (PFHpA)	ND		1.8	0.22	ng/L		06/15/21 19:34	06/22/21 19:05	1
Perfluorooctanoic acid (PFOA)	ND		1.8	0.75	ng/L		06/15/21 19:34	06/22/21 19:05	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.24	ng/L		06/15/21 19:34	06/22/21 19:05	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.27	ng/L		06/15/21 19:34	06/22/21 19:05	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.97	ng/L		06/15/21 19:34	06/22/21 19:05	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.48	ng/L		06/15/21 19:34	06/22/21 19:05	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.1	ng/L		06/15/21 19:34	06/22/21 19:05	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.64	ng/L		06/15/21 19:34	06/22/21 19:05	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.8	0.18	ng/L		06/15/21 19:34	06/22/21 19:05	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.8	0.50	ng/L		06/15/21 19:34	06/22/21 19:05	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.8	0.48	ng/L		06/15/21 19:34	06/22/21 19:05	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.4	1.1	ng/L		06/15/21 19:34	06/22/21 19:05	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.4	1.1	ng/L		06/15/21 19:34	06/22/21 19:05	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.21	ng/L		06/15/21 19:34	06/22/21 19:05	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.5	1.3	ng/L		06/15/21 19:34	06/22/21 19:05	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.28	ng/L		06/15/21 19:34	06/22/21 19:05	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.35	ng/L		06/15/21 19:34	06/22/21 19:05	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*98*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:05*	*1*
13C4 PFHpA	*94*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:05*	*1*
13C4 PFOA	*100*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:05*	*1*
13C5 PFNA	*97*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:05*	*1*
13C2 PFDA	*104*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:05*	*1*
13C2 PFUnA	*105*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:05*	*1*
13C2 PFDoA	*107*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:05*	*1*
13C2 PFTeDA	*103*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:05*	*1*
13C3 PFBS	*101*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:05*	*1*
18O2 PFHxS	*97*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:05*	*1*
13C4 PFOS	*93*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:05*	*1*
d3-NMeFOSAA	*92*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:05*	*1*
d5-NEtFOSAA	*101*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:05*	*1*
13C3 HFPO-DA	*93*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:05*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI-AFFF

Job ID: 320-74829-1

Client Sample ID: SS-21-03

Date Collected: 06/08/21 12:32
Date Received: 06/10/21 15:35

Lab Sample ID: 320-74829-2

Matrix: Solid
Percent Solids: 58.0

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)	**3.1**	**J I**	3.3	0.70	ug/Kg	☼	06/18/21 12:26	06/23/21 04:39	10
Perfluoroheptanoic acid (PFHpA)	ND		3.3	0.48	ug/Kg	☼	06/18/21 12:26	06/23/21 04:39	10
Perfluorooctanoic acid (PFOA)	ND	F1	3.3	1.4	ug/Kg	☼	06/18/21 12:26	06/23/21 04:39	10
Perfluorononanoic acid (PFNA)	ND		3.3	0.60	ug/Kg	☼	06/18/21 12:26	06/23/21 04:39	10
Perfluorodecanoic acid (PFDA)	**1.1**	**J I**	3.3	0.37	ug/Kg	☼	06/18/21 12:26	06/23/21 04:39	10
Perfluoroundecanoic acid (PFUnA)	ND	F1	3.3	0.60	ug/Kg	☼	06/18/21 12:26	06/23/21 04:39	10
Perfluorododecanoic acid (PFDoA)	**2.1**	**J**	3.3	1.1	ug/Kg	☼	06/18/21 12:26	06/23/21 04:39	10
Perfluorotridecanoic acid (PFTriA)	**9.1**	**I F1**	3.3	0.85	ug/Kg	☼	06/18/21 12:26	06/23/21 04:39	10
Perfluorotetradecanoic acid (PFTeA)	**1.7**	**J**	3.3	0.90	ug/Kg	☼	06/18/21 12:26	06/23/21 04:39	10
Perfluorobutanesulfonic acid (PFBS)	**0.56**	**J**	3.3	0.42	ug/Kg	☼	06/18/21 12:26	06/23/21 04:39	10
Perfluorohexanesulfonic acid (PFHxS)	**4.0**		3.3	0.52	ug/Kg	☼	06/18/21 12:26	06/23/21 04:39	10
Perfluorooctanesulfonic acid (PFOS)	**65**		8.3	3.3	ug/Kg	☼	06/18/21 12:26	06/23/21 04:39	10
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		33	6.5	ug/Kg	☼	06/18/21 12:26	06/23/21 04:39	10
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		33	6.2	ug/Kg	☼	06/18/21 12:26	06/23/21 04:39	10
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		3.3	0.45	ug/Kg	☼	06/18/21 12:26	06/23/21 04:39	10
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.2	1.8	ug/Kg	☼	06/18/21 12:26	06/23/21 04:39	10
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		3.3	0.37	ug/Kg	☼	06/18/21 12:26	06/23/21 04:39	10
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		3.3	0.30	ug/Kg	☼	06/18/21 12:26	06/23/21 04:39	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*78*		*50 - 150*	*06/18/21 12:26*	*06/23/21 04:39*	*10*
13C4 PFHpA	*74*		*50 - 150*	*06/18/21 12:26*	*06/23/21 04:39*	*10*
13C4 PFOA	*77*		*50 - 150*	*06/18/21 12:26*	*06/23/21 04:39*	*10*
13C5 PFNA	*78*		*50 - 150*	*06/18/21 12:26*	*06/23/21 04:39*	*10*
13C2 PFDA	*69*		*50 - 150*	*06/18/21 12:26*	*06/23/21 04:39*	*10*
13C2 PFUnA	*64*		*50 - 150*	*06/18/21 12:26*	*06/23/21 04:39*	*10*
13C2 PFDoA	*71*		*50 - 150*	*06/18/21 12:26*	*06/23/21 04:39*	*10*
13C2 PFTeDA	*67*		*50 - 150*	*06/18/21 12:26*	*06/23/21 04:39*	*10*
13C3 PFBS	*88*		*50 - 150*	*06/18/21 12:26*	*06/23/21 04:39*	*10*
18O2 PFHxS	*79*		*50 - 150*	*06/18/21 12:26*	*06/23/21 04:39*	*10*
13C4 PFOS	*72*		*50 - 150*	*06/18/21 12:26*	*06/23/21 04:39*	*10*
d3-NMeFOSAA	*48*	**5-*	*50 - 150*	*06/18/21 12:26*	*06/23/21 04:39*	*10*
d5-NEtFOSAA	*47*	**5-*	*50 - 150*	*06/18/21 12:26*	*06/23/21 04:39*	*10*
13C3 HFPO-DA	*70*		*50 - 150*	*06/18/21 12:26*	*06/23/21 04:39*	*10*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**42.0**		0.1	0.1	%			06/15/21 13:11	1
Percent Solids	**58.0**		0.1	0.1	%			06/15/21 13:11	1

Client: Shannon & Wilson, Inc
Project/Site: FAI-AFFF

Job ID: 320-74829-1

Client Sample ID: SS-21-01

Date Collected: 06/08/21 12:01
Date Received: 06/10/21 15:35

Lab Sample ID: 320-74829-3

Matrix: Solid
Percent Solids: 87.8

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		2.2	0.46	ug/Kg	☼	06/18/21 12:26	06/23/21 05:07	10
Perfluoroheptanoic acid (PFHpA)	ND		2.2	0.32	ug/Kg	☼	06/18/21 12:26	06/23/21 05:07	10
Perfluorooctanoic acid (PFOA)	ND		2.2	0.94	ug/Kg	☼	06/18/21 12:26	06/23/21 05:07	10
Perfluorononanoic acid (PFNA)	ND		2.2	0.40	ug/Kg	☼	06/18/21 12:26	06/23/21 05:07	10
Perfluorodecanoic acid (PFDA)	**0.64**	**J**	2.2	0.24	ug/Kg	☼	06/18/21 12:26	06/23/21 05:07	10
Perfluoroundecanoic acid (PFUnA)	ND		2.2	0.40	ug/Kg	☼	06/18/21 12:26	06/23/21 05:07	10
Perfluorododecanoic acid (PFDoA)	ND		2.2	0.74	ug/Kg	☼	06/18/21 12:26	06/23/21 05:07	10
Perfluorotridecanoic acid (PFTriA)	ND		2.2	0.56	ug/Kg	☼	06/18/21 12:26	06/23/21 05:07	10
Perfluorotetradecanoic acid (PFTeA)	ND		2.2	0.59	ug/Kg	☼	06/18/21 12:26	06/23/21 05:07	10
Perfluorobutanesulfonic acid (PFBS)	ND		2.2	0.27	ug/Kg	☼	06/18/21 12:26	06/23/21 05:07	10
Perfluorohexanesulfonic acid (PFHxS)	**0.81**	**J**	2.2	0.34	ug/Kg	☼	06/18/21 12:26	06/23/21 05:07	10
Perfluorooctanesulfonic acid (PFOS)	**53**		5.5	2.2	ug/Kg	☼	06/18/21 12:26	06/23/21 05:07	10
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		22	4.3	ug/Kg	☼	06/18/21 12:26	06/23/21 05:07	10
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		22	4.1	ug/Kg	☼	06/18/21 12:26	06/23/21 05:07	10
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.2	0.30	ug/Kg	☼	06/18/21 12:26	06/23/21 05:07	10
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		2.7	1.2	ug/Kg	☼	06/18/21 12:26	06/23/21 05:07	10
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.2	0.24	ug/Kg	☼	06/18/21 12:26	06/23/21 05:07	10
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.2	0.20	ug/Kg	☼	06/18/21 12:26	06/23/21 05:07	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*79*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:07*	*10*
13C4 PFHpA	*80*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:07*	*10*
13C4 PFOA	*88*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:07*	*10*
13C5 PFNA	*88*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:07*	*10*
13C2 PFDA	*80*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:07*	*10*
13C2 PFUnA	*82*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:07*	*10*
13C2 PFDoA	*86*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:07*	*10*
13C2 PFTeDA	*76*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:07*	*10*
13C3 PFBS	*91*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:07*	*10*
18O2 PFHxS	*80*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:07*	*10*
13C4 PFOS	*86*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:07*	*10*
d3-NMeFOSAA	*84*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:07*	*10*
d5-NEtFOSAA	*85*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:07*	*10*
13C3 HFPO-DA	*74*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:07*	*10*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**12.2**		0.1	0.1	%			06/15/21 13:11	1
Percent Solids	**87.8**		0.1	0.1	%			06/15/21 13:11	1

Client Sample ID: SS-21-02
Date Collected: 06/08/21 12:12
Date Received: 06/10/21 15:35

Lab Sample ID: 320-74829-4
Matrix: Solid
Percent Solids: 87.9

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		0.22	0.046	ug/Kg	☼	06/18/21 12:26	06/23/21 05:16	1
Perfluoroheptanoic acid (PFHpA)	**0.13**	**J**	0.22	0.032	ug/Kg	☼	06/18/21 12:26	06/23/21 05:16	1
Perfluorooctanoic acid (PFOA)	**0.23**		0.22	0.095	ug/Kg	☼	06/18/21 12:26	06/23/21 05:16	1
Perfluorononanoic acid (PFNA)	**0.16**	**J**	0.22	0.040	ug/Kg	☼	06/18/21 12:26	06/23/21 05:16	1
Perfluorodecanoic acid (PFDA)	**0.87**		0.22	0.024	ug/Kg	☼	06/18/21 12:26	06/23/21 05:16	1
Perfluoroundecanoic acid (PFUnA)	**1.2**		0.22	0.040	ug/Kg	☼	06/18/21 12:26	06/23/21 05:16	1
Perfluorododecanoic acid (PFDoA)	**3.1**		0.22	0.074	ug/Kg	☼	06/18/21 12:26	06/23/21 05:16	1
Perfluorotridecanoic acid (PFTriA)	**0.87**		0.22	0.056	ug/Kg	☼	06/18/21 12:26	06/23/21 05:16	1
Perfluorotetradecanoic acid (PFTeA)	**1.3**		0.22	0.060	ug/Kg	☼	06/18/21 12:26	06/23/21 05:16	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.22	0.028	ug/Kg	☼	06/18/21 12:26	06/23/21 05:16	1
Perfluorohexanesulfonic acid (PFHxS)	**0.45**	**I**	0.22	0.034	ug/Kg	☼	06/18/21 12:26	06/23/21 05:16	1
Perfluorooctanesulfonic acid (PFOS)	**6.7**		0.55	0.22	ug/Kg	☼	06/18/21 12:26	06/23/21 05:16	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		2.2	0.43	ug/Kg	☼	06/18/21 12:26	06/23/21 05:16	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		2.2	0.41	ug/Kg	☼	06/18/21 12:26	06/23/21 05:16	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.22	0.030	ug/Kg	☼	06/18/21 12:26	06/23/21 05:16	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.28	0.12	ug/Kg	☼	06/18/21 12:26	06/23/21 05:16	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.22	0.024	ug/Kg	☼	06/18/21 12:26	06/23/21 05:16	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.22	0.020	ug/Kg	☼	06/18/21 12:26	06/23/21 05:16	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*75*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:16*	*1*
13C4 PFHpA	*75*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:16*	*1*
13C4 PFOA	*78*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:16*	*1*
13C5 PFNA	*79*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:16*	*1*
13C2 PFDA	*70*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:16*	*1*
13C2 PFUnA	*66*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:16*	*1*
13C2 PFDoA	*79*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:16*	*1*
13C2 PFTeDA	*75*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:16*	*1*
13C3 PFBS	*86*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:16*	*1*
18O2 PFHxS	*79*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:16*	*1*
13C4 PFOS	*73*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:16*	*1*
d3-NMeFOSAA	*56*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:16*	*1*
d5-NEtFOSAA	*65*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:16*	*1*
13C3 HFPO-DA	*64*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:16*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**12.1**		0.1	0.1	%			06/15/21 13:11	1
Percent Solids	**87.9**		0.1	0.1	%			06/15/21 13:11	1

Client: Shannon & Wilson, Inc
Project/Site: FAI-AFFF

Job ID: 320-74829-1

Client Sample ID: SS-21-04
Date Collected: 06/08/21 12:37
Date Received: 06/10/21 15:35

Lab Sample ID: 320-74829-5
Matrix: Solid
Percent Solids: 94.7

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)	0.52		0.21	0.043	ug/Kg	☼	06/18/21 12:26	06/23/21 05:25	1
Perfluoroheptanoic acid (PFHpA)	0.091	J	0.21	0.030	ug/Kg	☼	06/18/21 12:26	06/23/21 05:25	1
Perfluorooctanoic acid (PFOA)	0.18	J	0.21	0.089	ug/Kg	☼	06/18/21 12:26	06/23/21 05:25	1
Perfluorononanoic acid (PFNA)	0.083	J	0.21	0.037	ug/Kg	☼	06/18/21 12:26	06/23/21 05:25	1
Perfluorodecanoic acid (PFDA)	0.53		0.21	0.023	ug/Kg	☼	06/18/21 12:26	06/23/21 05:25	1
Perfluoroundecanoic acid (PFUnA)	0.47		0.21	0.037	ug/Kg	☼	06/18/21 12:26	06/23/21 05:25	1
Perfluorododecanoic acid (PFDoA)	1.9		0.21	0.069	ug/Kg	☼	06/18/21 12:26	06/23/21 05:25	1
Perfluorotridecanoic acid (PFTriA)	0.38		0.21	0.053	ug/Kg	☼	06/18/21 12:26	06/23/21 05:25	1
Perfluorotetradecanoic acid (PFTeA)	0.83		0.21	0.056	ug/Kg	☼	06/18/21 12:26	06/23/21 05:25	1
Perfluorobutanesulfonic acid (PFBS)	0.15	J	0.21	0.026	ug/Kg	☼	06/18/21 12:26	06/23/21 05:25	1
Perfluorohexanesulfonic acid (PFHxS)	1.0		0.21	0.032	ug/Kg	☼	06/18/21 12:26	06/23/21 05:25	1
Perfluorooctanesulfonic acid (PFOS)	9.4		0.52	0.21	ug/Kg	☼	06/18/21 12:26	06/23/21 05:25	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		2.1	0.40	ug/Kg	☼	06/18/21 12:26	06/23/21 05:25	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		2.1	0.38	ug/Kg	☼	06/18/21 12:26	06/23/21 05:25	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.21	0.028	ug/Kg	☼	06/18/21 12:26	06/23/21 05:25	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.26	0.11	ug/Kg	☼	06/18/21 12:26	06/23/21 05:25	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.21	0.023	ug/Kg	☼	06/18/21 12:26	06/23/21 05:25	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.21	0.019	ug/Kg	☼	06/18/21 12:26	06/23/21 05:25	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*85*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:25*	*1*
13C4 PFHpA	*87*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:25*	*1*
13C4 PFOA	*82*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:25*	*1*
13C5 PFNA	*84*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:25*	*1*
13C2 PFDA	*79*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:25*	*1*
13C2 PFUnA	*80*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:25*	*1*
13C2 PFDoA	*81*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:25*	*1*
13C2 PFTeDA	*82*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:25*	*1*
13C3 PFBS	*94*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:25*	*1*
18O2 PFHxS	*90*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:25*	*1*
13C4 PFOS	*85*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:25*	*1*
d3-NMeFOSAA	*53*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:25*	*1*
d5-NEtFOSAA	*52*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:25*	*1*
13C3 HFPO-DA	*77*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:25*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	5.3		0.1	0.1	%			06/15/21 13:11	1
Percent Solids	94.7		0.1	0.1	%			06/15/21 13:11	1

Client: Shannon & Wilson, Inc
Project/Site: FAI-AFFF

Job ID: 320-74829-1

Client Sample ID: SS-21-102

Date Collected: 06/08/21 12:02
Date Received: 06/10/21 15:35

Lab Sample ID: 320-74829-6

Matrix: Solid
Percent Solids: 88.1

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)	**0.31**	**I**	0.21	0.044	ug/Kg	☼	06/18/21 12:26	06/23/21 05:34	1
Perfluoroheptanoic acid (PFHpA)	**0.12**	**J**	0.21	0.030	ug/Kg	☼	06/18/21 12:26	06/23/21 05:34	1
Perfluorooctanoic acid (PFOA)	**0.17**	**J**	0.21	0.089	ug/Kg	☼	06/18/21 12:26	06/23/21 05:34	1
Perfluorononanoic acid (PFNA)	**0.11**	**J**	0.21	0.037	ug/Kg	☼	06/18/21 12:26	06/23/21 05:34	1
Perfluorodecanoic acid (PFDA)	**0.77**		0.21	0.023	ug/Kg	☼	06/18/21 12:26	06/23/21 05:34	1
Perfluoroundecanoic acid (PFUnA)	**0.95**		0.21	0.037	ug/Kg	☼	06/18/21 12:26	06/23/21 05:34	1
Perfluorododecanoic acid (PFDoA)	**2.5**		0.21	0.069	ug/Kg	☼	06/18/21 12:26	06/23/21 05:34	1
Perfluorotridecanoic acid (PFTriA)	**0.71**		0.21	0.053	ug/Kg	☼	06/18/21 12:26	06/23/21 05:34	1
Perfluorotetradecanoic acid (PFTeA)	**1.1**		0.21	0.056	ug/Kg	☼	06/18/21 12:26	06/23/21 05:34	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.21	0.026	ug/Kg	☼	06/18/21 12:26	06/23/21 05:34	1
Perfluorohexanesulfonic acid (PFHxS)	**0.41**	**I**	0.21	0.032	ug/Kg	☼	06/18/21 12:26	06/23/21 05:34	1
Perfluorooctanesulfonic acid (PFOS)	**5.4**		0.52	0.21	ug/Kg	☼	06/18/21 12:26	06/23/21 05:34	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		2.1	0.40	ug/Kg	☼	06/18/21 12:26	06/23/21 05:34	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		2.1	0.38	ug/Kg	☼	06/18/21 12:26	06/23/21 05:34	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.21	0.028	ug/Kg	☼	06/18/21 12:26	06/23/21 05:34	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.26	0.11	ug/Kg	☼	06/18/21 12:26	06/23/21 05:34	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.21	0.023	ug/Kg	☼	06/18/21 12:26	06/23/21 05:34	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.21	0.019	ug/Kg	☼	06/18/21 12:26	06/23/21 05:34	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*80*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:34*	*1*
13C4 PFHpA	*78*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:34*	*1*
13C4 PFOA	*78*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:34*	*1*
13C5 PFNA	*78*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:34*	*1*
13C2 PFDA	*69*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:34*	*1*
13C2 PFUnA	*68*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:34*	*1*
13C2 PFDoA	*75*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:34*	*1*
13C2 PFTeDA	*74*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:34*	*1*
13C3 PFBS	*76*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:34*	*1*
18O2 PFHxS	*81*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:34*	*1*
13C4 PFOS	*78*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:34*	*1*
d3-NMeFOSAA	*59*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:34*	*1*
d5-NEtFOSAA	*63*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:34*	*1*
13C3 HFPO-DA	*67*		*50 - 150*	*06/18/21 12:26*	*06/23/21 05:34*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**11.9**		0.1	0.1	%			06/15/21 13:11	1
Percent Solids	**88.1**		0.1	0.1	%			06/15/21 13:11	1

Client: Shannon & Wilson, Inc
Project/Site: FAI-AFFF

Job ID: 320-74829-1

Client Sample ID: SW-21-101

Date Collected: 06/08/21 12:30
Date Received: 06/10/21 15:35

Lab Sample ID: 320-74829-7

Matrix: Water

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)	**240**		18	5.1	ng/L		06/15/21 19:34	06/23/21 21:53	10
Perfluoroheptanoic acid (PFHpA)	**70**		18	2.2	ng/L		06/15/21 19:34	06/23/21 21:53	10
Perfluorooctanoic acid (PFOA)	**21**		18	7.5	ng/L		06/15/21 19:34	06/23/21 21:53	10
Perfluorononanoic acid (PFNA)	**6.9**	**J**	18	2.4	ng/L		06/15/21 19:34	06/23/21 21:53	10
Perfluorodecanoic acid (PFDA)	ND		18	2.7	ng/L		06/15/21 19:34	06/23/21 21:53	10
Perfluoroundecanoic acid (PFUnA)	ND		18	9.7	ng/L		06/15/21 19:34	06/23/21 21:53	10
Perfluorododecanoic acid (PFDoA)	ND		18	4.8	ng/L		06/15/21 19:34	06/23/21 21:53	10
Perfluorotridecanoic acid (PFTriA)	ND		18	11	ng/L		06/15/21 19:34	06/23/21 21:53	10
Perfluorotetradecanoic acid (PFTeA)	ND		18	6.4	ng/L		06/15/21 19:34	06/23/21 21:53	10
Perfluorobutanesulfonic acid (PFBS)	**11**	**J**	18	1.8	ng/L		06/15/21 19:34	06/23/21 21:53	10
Perfluorohexanesulfonic acid (PFHxS)	**77**		18	5.0	ng/L		06/15/21 19:34	06/23/21 21:53	10
Perfluorooctanesulfonic acid (PFOS)	**280**		18	4.7	ng/L		06/15/21 19:34	06/23/21 21:53	10
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		44	11	ng/L		06/15/21 19:34	06/23/21 21:53	10
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		44	11	ng/L		06/15/21 19:34	06/23/21 21:53	10
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		18	2.1	ng/L		06/15/21 19:34	06/23/21 21:53	10
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		35	13	ng/L		06/15/21 19:34	06/23/21 21:53	10
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		18	2.8	ng/L		06/15/21 19:34	06/23/21 21:53	10
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		18	3.5	ng/L		06/15/21 19:34	06/23/21 21:53	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*87*		*50 - 150*	*06/15/21 19:34*	*06/23/21 21:53*	*10*
13C4 PFHpA	*72*		*50 - 150*	*06/15/21 19:34*	*06/23/21 21:53*	*10*
13C4 PFOA	*89*		*50 - 150*	*06/15/21 19:34*	*06/23/21 21:53*	*10*
13C5 PFNA	*83*		*50 - 150*	*06/15/21 19:34*	*06/23/21 21:53*	*10*
13C2 PFDA	*94*		*50 - 150*	*06/15/21 19:34*	*06/23/21 21:53*	*10*
13C2 PFUnA	*99*		*50 - 150*	*06/15/21 19:34*	*06/23/21 21:53*	*10*
13C2 PFDoA	*85*		*50 - 150*	*06/15/21 19:34*	*06/23/21 21:53*	*10*
13C2 PFTeDA	*61*		*50 - 150*	*06/15/21 19:34*	*06/23/21 21:53*	*10*
13C3 PFBS	*92*		*50 - 150*	*06/15/21 19:34*	*06/23/21 21:53*	*10*
18O2 PFHxS	*82*		*50 - 150*	*06/15/21 19:34*	*06/23/21 21:53*	*10*
13C4 PFOS	*80*		*50 - 150*	*06/15/21 19:34*	*06/23/21 21:53*	*10*
d3-NMeFOSAA	*86*		*50 - 150*	*06/15/21 19:34*	*06/23/21 21:53*	*10*
d5-NEtFOSAA	*88*		*50 - 150*	*06/15/21 19:34*	*06/23/21 21:53*	*10*
13C3 HFPO-DA	*75*		*50 - 150*	*06/15/21 19:34*	*06/23/21 21:53*	*10*

Client: Shannon & Wilson, Inc
Project/Site: FAI-AFFF

Job ID: 320-74829-1

Client Sample ID: SW-21-01

Date Collected: 06/08/21 12:40
Date Received: 06/10/21 15:35

Lab Sample ID: 320-74829-8

Matrix: Water

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)	**220**		18	5.2	ng/L		06/15/21 19:34	06/23/21 22:02	10
Perfluoroheptanoic acid (PFHpA)	**54**		18	2.3	ng/L		06/15/21 19:34	06/23/21 22:02	10
Perfluorooctanoic acid (PFOA)	**21**		18	7.7	ng/L		06/15/21 19:34	06/23/21 22:02	10
Perfluorononanoic acid (PFNA)	**8.4**	**J I**	18	2.4	ng/L		06/15/21 19:34	06/23/21 22:02	10
Perfluorodecanoic acid (PFDA)	**6.6**	**J**	18	2.8	ng/L		06/15/21 19:34	06/23/21 22:02	10
Perfluoroundecanoic acid (PFUnA)	ND		18	9.9	ng/L		06/15/21 19:34	06/23/21 22:02	10
Perfluorododecanoic acid (PFDoA)	ND		18	5.0	ng/L		06/15/21 19:34	06/23/21 22:02	10
Perfluorotridecanoic acid (PFTriA)	ND		18	12	ng/L		06/15/21 19:34	06/23/21 22:02	10
Perfluorotetradecanoic acid (PFTeA)	ND		18	6.6	ng/L		06/15/21 19:34	06/23/21 22:02	10
Perfluorobutanesulfonic acid (PFBS)	**8.6**	**J**	18	1.8	ng/L		06/15/21 19:34	06/23/21 22:02	10
Perfluorohexanesulfonic acid (PFHxS)	**75**		18	5.1	ng/L		06/15/21 19:34	06/23/21 22:02	10
Perfluorooctanesulfonic acid (PFOS)	**260**		18	4.9	ng/L		06/15/21 19:34	06/23/21 22:02	10
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		45	11	ng/L		06/15/21 19:34	06/23/21 22:02	10
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		45	12	ng/L		06/15/21 19:34	06/23/21 22:02	10
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		18	2.2	ng/L		06/15/21 19:34	06/23/21 22:02	10
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		36	14	ng/L		06/15/21 19:34	06/23/21 22:02	10
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		18	2.9	ng/L		06/15/21 19:34	06/23/21 22:02	10
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		18	3.6	ng/L		06/15/21 19:34	06/23/21 22:02	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*71*		*50 - 150*	*06/15/21 19:34*	*06/23/21 22:02*	*10*
13C4 PFHpA	*62*		*50 - 150*	*06/15/21 19:34*	*06/23/21 22:02*	*10*
13C4 PFOA	*79*		*50 - 150*	*06/15/21 19:34*	*06/23/21 22:02*	*10*
13C5 PFNA	*65*		*50 - 150*	*06/15/21 19:34*	*06/23/21 22:02*	*10*
13C2 PFDA	*80*		*50 - 150*	*06/15/21 19:34*	*06/23/21 22:02*	*10*
13C2 PFUnA	*77*		*50 - 150*	*06/15/21 19:34*	*06/23/21 22:02*	*10*
13C2 PFDoA	*67*		*50 - 150*	*06/15/21 19:34*	*06/23/21 22:02*	*10*
13C2 PFTeDA	*62*		*50 - 150*	*06/15/21 19:34*	*06/23/21 22:02*	*10*
13C3 PFBS	*79*		*50 - 150*	*06/15/21 19:34*	*06/23/21 22:02*	*10*
18O2 PFHxS	*68*		*50 - 150*	*06/15/21 19:34*	*06/23/21 22:02*	*10*
13C4 PFOS	*76*		*50 - 150*	*06/15/21 19:34*	*06/23/21 22:02*	*10*
d3-NMeFOSAA	*73*		*50 - 150*	*06/15/21 19:34*	*06/23/21 22:02*	*10*
d5-NEtFOSAA	*82*		*50 - 150*	*06/15/21 19:34*	*06/23/21 22:02*	*10*
13C3 HFPO-DA	*77*		*50 - 150*	*06/15/21 19:34*	*06/23/21 22:02*	*10*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI-AFFF

Job ID: 320-74829-1

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Matrix: Solid

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)
320-74829-2	SS-21-03	78	74	77	78	69	64	71	67
320-74829-2 MS	SS-21-03	72	74	72	78	67	66	73	68
320-74829-2 MSD	SS-21-03	87	83	84	83	75	75	78	71
320-74829-3	SS-21-01	79	80	88	88	80	82	86	76
320-74829-4	SS-21-02	75	75	78	79	70	66	79	75
320-74829-5	SS-21-04	85	87	82	84	79	80	81	82
320-74829-6	SS-21-102	80	78	78	78	69	68	75	74
LCS 320-499582/2-A	Lab Control Sample	77	86	83	83	74	82	83	92
MB 320-499582/1-A	Method Blank	82	84	82	82	74	75	82	77

		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)
320-74829-2	SS-21-03	88	79	72	48 *5-	47 *5-	70
320-74829-2 MS	SS-21-03	81	73	73	47 *5-	49 *5-	64
320-74829-2 MSD	SS-21-03	86	85	83	75	79	68
320-74829-3	SS-21-01	91	80	86	84	85	74
320-74829-4	SS-21-02	86	79	73	56	65	64
320-74829-5	SS-21-04	94	90	85	53	52	77
320-74829-6	SS-21-102	76	81	78	59	63	67
LCS 320-499582/2-A	Lab Control Sample	94	86	79	66	68	
MB 320-499582/1-A	Method Blank	89	87	75	68	70	

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

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)
320-74829-1	FB-21-01	98	94	100	97	104	105	107	103
320-74829-7	SW-21-101	87	72	89	83	94	99	85	61
320-74829-8	SW-21-01	71	62	79	65	80	77	67	62
LCS 320-498766/2-A	Lab Control Sample	92	95	101	98	96	106	104	105
LCSD 320-498766/3-A	Lab Control Sample Dup	90	96	93	92	87	96	91	97
MB 320-498766/1-A	Method Blank	92	89	96	94	92	97	95	91

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Job ID: 320-74829-1
Project/Site: FAI-AFFF

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Matrix: Water
Prep Type: Total/NA

		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)		
320-74829-1	FB-21-01	101	97	93	92	101	93		
320-74829-7	SW-21-101	92	82	80	86	88	75		
320-74829-8	SW-21-01	79	68	76	73	82	77		
LCS 320-498766/2-A	Lab Control Sample	105	98	92	89	100	97		
LCSD 320-498766/3-A	Lab Control Sample Dup	93	86	85	90	84	87		
MB 320-498766/1-A	Method Blank	93	96	90	92	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

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Lab Sample ID: MB 320-498766/1-A
Matrix: Water
Analysis Batch: 500660

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 498766

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		06/15/21 19:34	06/22/21 18:27	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		06/15/21 19:34	06/22/21 18:27	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		06/15/21 19:34	06/22/21 18:27	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		06/15/21 19:34	06/22/21 18:27	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		06/15/21 19:34	06/22/21 18:27	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		06/15/21 19:34	06/22/21 18:27	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		06/15/21 19:34	06/22/21 18:27	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		06/15/21 19:34	06/22/21 18:27	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		06/15/21 19:34	06/22/21 18:27	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		06/15/21 19:34	06/22/21 18:27	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		06/15/21 19:34	06/22/21 18:27	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		06/15/21 19:34	06/22/21 18:27	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		06/15/21 19:34	06/22/21 18:27	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		06/15/21 19:34	06/22/21 18:27	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.0	0.24	ng/L		06/15/21 19:34	06/22/21 18:27	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.0	1.5	ng/L		06/15/21 19:34	06/22/21 18:27	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.0	0.32	ng/L		06/15/21 19:34	06/22/21 18:27	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		06/15/21 19:34	06/22/21 18:27	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*92*		*50 - 150*	*06/15/21 19:34*	*06/22/21 18:27*	*1*
13C4 PFHpA	*89*		*50 - 150*	*06/15/21 19:34*	*06/22/21 18:27*	*1*
13C4 PFOA	*96*		*50 - 150*	*06/15/21 19:34*	*06/22/21 18:27*	*1*
13C5 PFNA	*94*		*50 - 150*	*06/15/21 19:34*	*06/22/21 18:27*	*1*
13C2 PFDA	*92*		*50 - 150*	*06/15/21 19:34*	*06/22/21 18:27*	*1*
13C2 PFUnA	*97*		*50 - 150*	*06/15/21 19:34*	*06/22/21 18:27*	*1*
13C2 PFDoA	*95*		*50 - 150*	*06/15/21 19:34*	*06/22/21 18:27*	*1*
13C2 PFTeDA	*91*		*50 - 150*	*06/15/21 19:34*	*06/22/21 18:27*	*1*
13C3 PFBS	*93*		*50 - 150*	*06/15/21 19:34*	*06/22/21 18:27*	*1*
18O2 PFHxS	*96*		*50 - 150*	*06/15/21 19:34*	*06/22/21 18:27*	*1*
13C4 PFOS	*90*		*50 - 150*	*06/15/21 19:34*	*06/22/21 18:27*	*1*
d3-NMeFOSAA	*92*		*50 - 150*	*06/15/21 19:34*	*06/22/21 18:27*	*1*
d5-NEtFOSAA	*94*		*50 - 150*	*06/15/21 19:34*	*06/22/21 18:27*	*1*
13C3 HFPO-DA	*87*		*50 - 150*	*06/15/21 19:34*	*06/22/21 18:27*	*1*

Lab Sample ID: LCS 320-498766/2-A
Matrix: Water
Analysis Batch: 500660

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 498766

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorohexanoic acid (PFHxA)	40.0	43.0		ng/L		107	72 - 129
Perfluoroheptanoic acid (PFHpA)	40.0	41.1		ng/L		103	72 - 130
Perfluorooctanoic acid (PFOA)	40.0	37.5		ng/L		94	71 - 133
Perfluorononanoic acid (PFNA)	40.0	42.1		ng/L		105	69 - 130

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LCS 320-498766/2-A
Matrix: Water
Analysis Batch: 500660

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 498766

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorodecanoic acid (PFDA)	40.0	43.8		ng/L		109	71 - 129
Perfluoroundecanoic acid (PFUnA)	40.0	39.4		ng/L		99	69 - 133
Perfluorododecanoic acid (PFDoA)	40.0	40.4		ng/L		101	72 - 134
Perfluorotridecanoic acid (PFTriA)	40.0	39.0		ng/L		98	65 - 144
Perfluorotetradecanoic acid (PFTeA)	40.0	43.5		ng/L		109	71 - 132
Perfluorobutanesulfonic acid (PFBS)	35.4	32.6		ng/L		92	72 - 130
Perfluorohexanesulfonic acid (PFHxS)	36.4	34.7		ng/L		95	68 - 131
Perfluorooctanesulfonic acid (PFOS)	37.1	38.9		ng/L		105	65 - 140
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	46.7		ng/L		117	65 - 136
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	39.7		ng/L		99	61 - 135
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	37.3	41.0		ng/L		110	77 - 137
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	40.0	39.3		ng/L		98	72 - 132
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	37.7	41.9		ng/L		111	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.7	42.9		ng/L		114	81 - 141

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*92*		*50 - 150*
13C4 PFHpA	*95*		*50 - 150*
13C4 PFOA	*101*		*50 - 150*
13C5 PFNA	*98*		*50 - 150*
13C2 PFDA	*96*		*50 - 150*
13C2 PFUnA	*106*		*50 - 150*
13C2 PFDoA	*104*		*50 - 150*
13C2 PFTeDA	*105*		*50 - 150*
13C3 PFBS	*105*		*50 - 150*
18O2 PFHxS	*98*		*50 - 150*
13C4 PFOS	*92*		*50 - 150*
d3-NMeFOSAA	*89*		*50 - 150*
d5-NEtFOSAA	*100*		*50 - 150*
13C3 HFPO-DA	*97*		*50 - 150*

Lab Sample ID: LCSD 320-498766/3-A
Matrix: Water
Analysis Batch: 500660

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 498766

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	40.0	38.0		ng/L		95	72 - 129	12	30
Perfluoroheptanoic acid (PFHpA)	40.0	37.0		ng/L		92	72 - 130	10	30
Perfluorooctanoic acid (PFOA)	40.0	37.2		ng/L		93	71 - 133	1	30

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LCSD 320-498766/3-A
Matrix: Water
Analysis Batch: 500660

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 498766

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorononanoic acid (PFNA)			40.0	40.3		ng/L		101	69 - 130	4	30
Perfluorodecanoic acid (PFDA)			40.0	40.9		ng/L		102	71 - 129	7	30
Perfluoroundecanoic acid (PFUnA)			40.0	39.4		ng/L		99	69 - 133	0	30
Perfluorododecanoic acid (PFDoA)			40.0	41.6		ng/L		104	72 - 134	3	30
Perfluorotridecanoic acid (PFTriA)			40.0	36.9		ng/L		92	65 - 144	5	30
Perfluorotetradecanoic acid (PFTeA)			40.0	41.8		ng/L		104	71 - 132	4	30
Perfluorobutanesulfonic acid (PFBS)			35.4	32.6		ng/L		92	72 - 130	0	30
Perfluorohexanesulfonic acid (PFHxS)			36.4	35.7		ng/L		98	68 - 131	3	30
Perfluorooctanesulfonic acid (PFOS)			37.1	40.0		ng/L		108	65 - 140	3	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			40.0	39.3		ng/L		98	65 - 136	17	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			40.0	42.4		ng/L		106	61 - 135	7	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid			37.3	39.1		ng/L		105	77 - 137	5	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			40.0	40.1		ng/L		100	72 - 132	2	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid			37.7	38.7		ng/L		103	76 - 136	8	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			37.7	40.6		ng/L		108	81 - 141	5	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFHxA	*90*		*50 - 150*
13C4 PFHpA	*96*		*50 - 150*
13C4 PFOA	*93*		*50 - 150*
13C5 PFNA	*92*		*50 - 150*
13C2 PFDA	*87*		*50 - 150*
13C2 PFUnA	*96*		*50 - 150*
13C2 PFDoA	*91*		*50 - 150*
13C2 PFTeDA	*97*		*50 - 150*
13C3 PFBS	*93*		*50 - 150*
18O2 PFHxS	*86*		*50 - 150*
13C4 PFOS	*85*		*50 - 150*
d3-NMeFOSAA	*90*		*50 - 150*
d5-NEtFOSAA	*84*		*50 - 150*
13C3 HFPO-DA	*87*		*50 - 150*

Lab Sample ID: MB 320-499582/1-A
Matrix: Solid
Analysis Batch: 499992

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 499582

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		0.20	0.042	ug/Kg		06/18/21 12:26	06/21/21 03:28	1
Perfluoroheptanoic acid (PFHpA)	ND		0.20	0.029	ug/Kg		06/18/21 12:26	06/21/21 03:28	1

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: MB 320-499582/1-A
Matrix: Solid
Analysis Batch: 499992

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 499582

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	ND		0.20	0.086	ug/Kg		06/18/21 12:26	06/21/21 03:28	1
Perfluorononanoic acid (PFNA)	ND		0.20	0.036	ug/Kg		06/18/21 12:26	06/21/21 03:28	1
Perfluorodecanoic acid (PFDA)	ND		0.20	0.022	ug/Kg		06/18/21 12:26	06/21/21 03:28	1
Perfluoroundecanoic acid (PFUnA)	ND		0.20	0.036	ug/Kg		06/18/21 12:26	06/21/21 03:28	1
Perfluorododecanoic acid (PFDoA)	ND		0.20	0.067	ug/Kg		06/18/21 12:26	06/21/21 03:28	1
Perfluorotridecanoic acid (PFTriA)	ND		0.20	0.051	ug/Kg		06/18/21 12:26	06/21/21 03:28	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.20	0.054	ug/Kg		06/18/21 12:26	06/21/21 03:28	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.20	0.025	ug/Kg		06/18/21 12:26	06/21/21 03:28	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.20	0.031	ug/Kg		06/18/21 12:26	06/21/21 03:28	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.50	0.20	ug/Kg		06/18/21 12:26	06/21/21 03:28	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		2.0	0.39	ug/Kg		06/18/21 12:26	06/21/21 03:28	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		2.0	0.37	ug/Kg		06/18/21 12:26	06/21/21 03:28	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.20	0.027	ug/Kg		06/18/21 12:26	06/21/21 03:28	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.25	0.11	ug/Kg		06/18/21 12:26	06/21/21 03:28	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.20	0.022	ug/Kg		06/18/21 12:26	06/21/21 03:28	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.20	0.018	ug/Kg		06/18/21 12:26	06/21/21 03:28	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*82*		*50 - 150*	*06/18/21 12:26*	*06/21/21 03:28*	*1*
13C4 PFHpA	*84*		*50 - 150*	*06/18/21 12:26*	*06/21/21 03:28*	*1*
13C4 PFOA	*82*		*50 - 150*	*06/18/21 12:26*	*06/21/21 03:28*	*1*
13C5 PFNA	*82*		*50 - 150*	*06/18/21 12:26*	*06/21/21 03:28*	*1*
13C2 PFDA	*74*		*50 - 150*	*06/18/21 12:26*	*06/21/21 03:28*	*1*
13C2 PFUnA	*75*		*50 - 150*	*06/18/21 12:26*	*06/21/21 03:28*	*1*
13C2 PFDoA	*82*		*50 - 150*	*06/18/21 12:26*	*06/21/21 03:28*	*1*
13C2 PFTeDA	*77*		*50 - 150*	*06/18/21 12:26*	*06/21/21 03:28*	*1*
13C3 PFBS	*89*		*50 - 150*	*06/18/21 12:26*	*06/21/21 03:28*	*1*
18O2 PFHxS	*87*		*50 - 150*	*06/18/21 12:26*	*06/21/21 03:28*	*1*
13C4 PFOS	*75*		*50 - 150*	*06/18/21 12:26*	*06/21/21 03:28*	*1*
d3-NMeFOSAA	*68*		*50 - 150*	*06/18/21 12:26*	*06/21/21 03:28*	*1*
d5-NEtFOSAA	*70*		*50 - 150*	*06/18/21 12:26*	*06/21/21 03:28*	*1*

Lab Sample ID: LCS 320-499582/2-A
Matrix: Solid
Analysis Batch: 499992

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 499582

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorohexanoic acid (PFHxA)	2.00	1.97		ug/Kg		98	70 - 132
Perfluoroheptanoic acid (PFHpA)	2.00	2.01		ug/Kg		101	71 - 131
Perfluorooctanoic acid (PFOA)	2.00	2.20		ug/Kg		110	69 - 133
Perfluorononanoic acid (PFNA)	2.00	2.09		ug/Kg		105	72 - 129
Perfluorodecanoic acid (PFDA)	2.00	2.26		ug/Kg		113	69 - 133
Perfluoroundecanoic acid (PFUnA)	2.00	2.02		ug/Kg		101	64 - 136

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LCS 320-499582/2-A
Matrix: Solid
Analysis Batch: 499992

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 499582

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorododecanoic acid (PFDoA)	2.00	1.95		ug/Kg		97	69 - 135
Perfluorotridecanoic acid (PFTriA)	2.00	1.80		ug/Kg		90	66 - 139
Perfluorotetradecanoic acid (PFTeA)	2.00	1.99		ug/Kg		99	69 - 133
Perfluorobutanesulfonic acid (PFBS)	1.77	1.61		ug/Kg		91	72 - 128
Perfluorohexanesulfonic acid (PFHxS)	1.82	2.03		ug/Kg		112	67 - 130
Perfluorooctanesulfonic acid (PFOS)	1.86	1.86		ug/Kg		100	68 - 136
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	2.00	2.43		ug/Kg		122	63 - 144
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	2.00	2.20		ug/Kg		110	61 - 139
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	1.86	1.84		ug/Kg		99	75 - 135
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	2.00	2.32		ug/Kg		116	77 - 137
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	1.88	1.96		ug/Kg		104	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	1.88	2.08		ug/Kg		110	79 - 139

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*77*		*50 - 150*
13C4 PFHpA	*86*		*50 - 150*
13C4 PFOA	*83*		*50 - 150*
13C5 PFNA	*83*		*50 - 150*
13C2 PFDA	*74*		*50 - 150*
13C2 PFUnA	*82*		*50 - 150*
13C2 PFDoA	*83*		*50 - 150*
13C2 PFTeDA	*92*		*50 - 150*
13C3 PFBS	*94*		*50 - 150*
18O2 PFHxS	*86*		*50 - 150*
13C4 PFOS	*79*		*50 - 150*
d3-NMeFOSAA	*66*		*50 - 150*
d5-NEtFOSAA	*68*		*50 - 150*

Lab Sample ID: 320-74829-2 MS
Matrix: Solid
Analysis Batch: 500616

Client Sample ID: SS-21-03
Prep Type: Total/NA
Prep Batch: 499582

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorohexanoic acid (PFHxA)	3.1	J I	3.13	5.34		ug/Kg	☼	72	70 - 132
Perfluoroheptanoic acid (PFHpA)	ND		3.13	3.71		ug/Kg	☼	118	71 - 131
Perfluorooctanoic acid (PFOA)	ND	F1	3.13	4.58	F1	ug/Kg	☼	146	69 - 133
Perfluorononanoic acid (PFNA)	ND		3.13	3.28		ug/Kg	☼	105	72 - 129
Perfluorodecanoic acid (PFDA)	1.1	J I	3.13	4.47		ug/Kg	☼	107	69 - 133
Perfluoroundecanoic acid (PFUnA)	ND	F1	3.13	4.65	F1	ug/Kg	☼	148	64 - 136

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: 320-74829-2 MS
Matrix: Solid
Analysis Batch: 500616

Client Sample ID: SS-21-03
Prep Type: Total/NA
Prep Batch: 499582

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorododecanoic acid (PFDoA)	2.1	J	3.13	4.94		ug/Kg	☼	91	69 - 135
Perfluorotridecanoic acid (PFTriA)	9.1	I F1	3.13	10.5	F1	ug/Kg	☼	47	66 - 139
Perfluorotetradecanoic acid (PFTeA)	1.7	J	3.13	4.89		ug/Kg	☼	101	69 - 133
Perfluorobutanesulfonic acid (PFBS)	0.56	J	2.77	2.89	J	ug/Kg	☼	84	72 - 128
Perfluorohexanesulfonic acid (PFHxS)	4.0		2.85	6.75		ug/Kg	☼	95	67 - 130
Perfluorooctanesulfonic acid (PFOS)	65		2.91	53.9	4	ug/Kg	☼	-382	68 - 136
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		3.13	ND		ug/Kg	☼	NC	63 - 144
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		3.13	ND		ug/Kg	☼	NC	61 - 139
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.92	2.69	J	ug/Kg	☼	92	75 - 135
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.13	3.30	J	ug/Kg	☼	105	77 - 137
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.95	2.74	J	ug/Kg	☼	93	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.95	3.44		ug/Kg	☼	117	79 - 139

Isotope Dilution	*MS %Recovery*	*MS Qualifier*	*Limits*
13C2 PFHxA	*72*		*50 - 150*
13C4 PFHpA	*74*		*50 - 150*
13C4 PFOA	*72*		*50 - 150*
13C5 PFNA	*78*		*50 - 150*
13C2 PFDA	*67*		*50 - 150*
13C2 PFUnA	*66*		*50 - 150*
13C2 PFDoA	*73*		*50 - 150*
13C2 PFTeDA	*68*		*50 - 150*
13C3 PFBS	*81*		*50 - 150*
18O2 PFHxS	*73*		*50 - 150*
13C4 PFOS	*73*		*50 - 150*
d3-NMeFOSAA	*47*	**5-*	*50 - 150*
d5-NEtFOSAA	*49*	**5-*	*50 - 150*
13C3 HFPO-DA	*64*		*50 - 150*

Lab Sample ID: 320-74829-2 MSD
Matrix: Solid
Analysis Batch: 500616

Client Sample ID: SS-21-03
Prep Type: Total/NA
Prep Batch: 499582

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	3.1	J I	3.20	5.49		ug/Kg	☼	75	70 - 132	3	30
Perfluoroheptanoic acid (PFHpA)	ND		3.20	3.66		ug/Kg	☼	114	71 - 131	1	30
Perfluorooctanoic acid (PFOA)	ND	F1	3.20	4.71	F1	ug/Kg	☼	147	69 - 133	3	30
Perfluorononanoic acid (PFNA)	ND		3.20	3.85		ug/Kg	☼	120	72 - 129	16	30
Perfluorodecanoic acid (PFDA)	1.1	J I	3.20	4.67		ug/Kg	☼	111	69 - 133	4	30

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: 320-74829-2 MSD
Matrix: Solid
Analysis Batch: 500616

Client Sample ID: SS-21-03
Prep Type: Total/NA
Prep Batch: 499582

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluoroundecanoic acid (PFUnA)	ND	F1	3.20	4.87	F1	ug/Kg	☼	152	64 - 136	5	30
Perfluorododecanoic acid (PFDoA)	2.1	J	3.20	5.54		ug/Kg	☼	108	69 - 135	11	30
Perfluorotridecanoic acid (PFTriA)	9.1	I F1	3.20	11.7	I	ug/Kg	☼	82	66 - 139	10	30
Perfluorotetradecanoic acid (PFTeA)	1.7	J	3.20	4.97		ug/Kg	☼	101	69 - 133	2	30
Perfluorobutanesulfonic acid (PFBS)	0.56	J	2.83	3.12	J	ug/Kg	☼	91	72 - 128	8	30
Perfluorohexanesulfonic acid (PFHxS)	4.0		2.91	6.14		ug/Kg	☼	72	67 - 130	9	30
Perfluorooctanesulfonic acid (PFOS)	65		2.97	60.0	4	ug/Kg	☼	-169	68 - 136	11	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		3.20	ND		ug/Kg	☼	NC	63 - 144	NC	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		3.20	ND		ug/Kg	☼	NC	61 - 139	NC	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.98	2.71	J	ug/Kg	☼	91	75 - 135	1	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.20	3.75	J	ug/Kg	☼	117	77 - 137	13	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		3.01	2.51	J	ug/Kg	☼	83	76 - 136	9	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		3.01	3.53		ug/Kg	☼	117	79 - 139	3	30

Isotope Dilution	*MSD %Recovery*	*MSD Qualifier*	*Limits*
13C2 PFHxA	*87*		*50 - 150*
13C4 PFHpA	*83*		*50 - 150*
13C4 PFOA	*84*		*50 - 150*
13C5 PFNA	*83*		*50 - 150*
13C2 PFDA	*75*		*50 - 150*
13C2 PFUnA	*75*		*50 - 150*
13C2 PFDoA	*78*		*50 - 150*
13C2 PFTeDA	*71*		*50 - 150*
13C3 PFBS	*86*		*50 - 150*
18O2 PFHxS	*85*		*50 - 150*
13C4 PFOS	*83*		*50 - 150*
d3-NMeFOSAA	*75*		*50 - 150*
d5-NEtFOSAA	*79*		*50 - 150*
13C3 HFPO-DA	*68*		*50 - 150*

LCMS

Prep Batch: 498766

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-74829-1	FB-21-01	Total/NA	Water	3535	
320-74829-7	SW-21-101	Total/NA	Water	3535	
320-74829-8	SW-21-01	Total/NA	Water	3535	
MB 320-498766/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-498766/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-498766/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Prep Batch: 499582

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-74829-2	SS-21-03	Total/NA	Solid	SHAKE	
320-74829-3	SS-21-01	Total/NA	Solid	SHAKE	
320-74829-4	SS-21-02	Total/NA	Solid	SHAKE	
320-74829-5	SS-21-04	Total/NA	Solid	SHAKE	
320-74829-6	SS-21-102	Total/NA	Solid	SHAKE	
MB 320-499582/1-A	Method Blank	Total/NA	Solid	SHAKE	
LCS 320-499582/2-A	Lab Control Sample	Total/NA	Solid	SHAKE	
320-74829-2 MS	SS-21-03	Total/NA	Solid	SHAKE	
320-74829-2 MSD	SS-21-03	Total/NA	Solid	SHAKE	

Analysis Batch: 499992

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 320-499582/1-A	Method Blank	Total/NA	Solid	EPA 537(Mod)	499582
LCS 320-499582/2-A	Lab Control Sample	Total/NA	Solid	EPA 537(Mod)	499582

Analysis Batch: 500616

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-74829-2	SS-21-03	Total/NA	Solid	EPA 537(Mod)	499582
320-74829-3	SS-21-01	Total/NA	Solid	EPA 537(Mod)	499582
320-74829-4	SS-21-02	Total/NA	Solid	EPA 537(Mod)	499582
320-74829-5	SS-21-04	Total/NA	Solid	EPA 537(Mod)	499582
320-74829-6	SS-21-102	Total/NA	Solid	EPA 537(Mod)	499582
320-74829-2 MS	SS-21-03	Total/NA	Solid	EPA 537(Mod)	499582
320-74829-2 MSD	SS-21-03	Total/NA	Solid	EPA 537(Mod)	499582

Analysis Batch: 500660

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-74829-1	FB-21-01	Total/NA	Water	EPA 537(Mod)	498766
MB 320-498766/1-A	Method Blank	Total/NA	Water	EPA 537(Mod)	498766
LCS 320-498766/2-A	Lab Control Sample	Total/NA	Water	EPA 537(Mod)	498766
LCSD 320-498766/3-A	Lab Control Sample Dup	Total/NA	Water	EPA 537(Mod)	498766

Analysis Batch: 501083

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-74829-7	SW-21-101	Total/NA	Water	EPA 537(Mod)	498766
320-74829-8	SW-21-01	Total/NA	Water	EPA 537(Mod)	498766

General Chemistry

Analysis Batch: 498657

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-74829-2	SS-21-03	Total/NA	Solid	D 2216	

General Chemistry (Continued)

Analysis Batch: 498657 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-74829-3	SS-21-01	Total/NA	Solid	D 2216	
320-74829-4	SS-21-02	Total/NA	Solid	D 2216	
320-74829-5	SS-21-04	Total/NA	Solid	D 2216	
320-74829-6	SS-21-102	Total/NA	Solid	D 2216	

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FAI-AFFF

Job ID: 320-74829-1

Client Sample ID: FB-21-01
Lab Sample ID: 320-74829-1
Date Collected: 06/08/21 12:15
Matrix: Water
Date Received: 06/10/21 15:35

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			284.2 mL	10.00 mL	498766	06/15/21 19:34	VP	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			500660	06/22/21 19:05	K1S	TAL SAC

Client Sample ID: SS-21-03
Lab Sample ID: 320-74829-2
Date Collected: 06/08/21 12:32
Matrix: Solid
Date Received: 06/10/21 15:35

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			498657	06/15/21 13:11	TCS	TAL SAC

Client Sample ID: SS-21-03
Lab Sample ID: 320-74829-2
Date Collected: 06/08/21 12:32
Matrix: Solid
Date Received: 06/10/21 15:35
Percent Solids: 58.0

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.16 g	10.0 mL	499582	06/18/21 12:26	OP	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		10			500616	06/23/21 04:39	JY1	TAL SAC

Client Sample ID: SS-21-01
Lab Sample ID: 320-74829-3
Date Collected: 06/08/21 12:01
Matrix: Solid
Date Received: 06/10/21 15:35

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			498657	06/15/21 13:11	TCS	TAL SAC

Client Sample ID: SS-21-01
Lab Sample ID: 320-74829-3
Date Collected: 06/08/21 12:01
Matrix: Solid
Date Received: 06/10/21 15:35
Percent Solids: 87.8

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.19 g	10.0 mL	499582	06/18/21 12:26	OP	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		10			500616	06/23/21 05:07	JY1	TAL SAC

Client Sample ID: SS-21-02
Lab Sample ID: 320-74829-4
Date Collected: 06/08/21 12:12
Matrix: Solid
Date Received: 06/10/21 15:35

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			498657	06/15/21 13:11	TCS	TAL SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FAI-AFFF

Job ID: 320-74829-1

Client Sample ID: SS-21-02
Date Collected: 06/08/21 12:12
Date Received: 06/10/21 15:35

Lab Sample ID: 320-74829-4
Matrix: Solid
Percent Solids: 87.9

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.14 g	10.0 mL	499582	06/18/21 12:26	OP	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			500616	06/23/21 05:16	JY1	TAL SAC

Client Sample ID: SS-21-04
Date Collected: 06/08/21 12:37
Date Received: 06/10/21 15:35

Lab Sample ID: 320-74829-5
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			498657	06/15/21 13:11	TCS	TAL SAC

Client Sample ID: SS-21-04
Date Collected: 06/08/21 12:37
Date Received: 06/10/21 15:35

Lab Sample ID: 320-74829-5
Matrix: Solid
Percent Solids: 94.7

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.12 g	10.0 mL	499582	06/18/21 12:26	OP	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			500616	06/23/21 05:25	JY1	TAL SAC

Client Sample ID: SS-21-102
Date Collected: 06/08/21 12:02
Date Received: 06/10/21 15:35

Lab Sample ID: 320-74829-6
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			498657	06/15/21 13:11	TCS	TAL SAC

Client Sample ID: SS-21-102
Date Collected: 06/08/21 12:02
Date Received: 06/10/21 15:35

Lab Sample ID: 320-74829-6
Matrix: Solid
Percent Solids: 88.1

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.48 g	10.0 mL	499582	06/18/21 12:26	OP	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			500616	06/23/21 05:34	JY1	TAL SAC

Client Sample ID: SW-21-101
Date Collected: 06/08/21 12:30
Date Received: 06/10/21 15:35

Lab Sample ID: 320-74829-7
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			284.5 mL	10.00 mL	498766	06/15/21 19:34	VP	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		10			501083	06/23/21 21:53	S1M	TAL SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FAI-AFFF

Job ID: 320-74829-1

Client Sample ID: SW-21-01

Date Collected: 06/08/21 12:40
Date Received: 06/10/21 15:35

Lab Sample ID: 320-74829-8

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			277.1 mL	10.00 mL	498766	06/15/21 19:34	VP	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		10			501083	06/23/21 22:02	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: FAI-AFFF

Job ID: 320-74829-1

Laboratory: Eurofins TestAmerica, Sacramento

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	17-020	02-20-24

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
D 2216		Solid	Percent Moisture
D 2216		Solid	Percent Solids

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI-AFFF

Job ID: 320-74829-1

Method	Method Description	Protocol	Laboratory
EPA 537(Mod)	PFAS for QSM 5.3, Table B-15	EPA	TAL SAC
D 2216	Percent Moisture	ASTM	TAL SAC
3535	Solid-Phase Extraction (SPE)	SW846	TAL SAC
SHAKE	Shake Extraction with Ultrasonic Bath Extraction	SW846	TAL SAC

Protocol References:

ASTM = ASTM International

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-AFFF

Job ID: 320-74829-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
320-74829-1	FB-21-01	Water	06/08/21 12:15	06/10/21 15:35	
320-74829-2	SS-21-03	Solid	06/08/21 12:32	06/10/21 15:35	
320-74829-3	SS-21-01	Solid	06/08/21 12:01	06/10/21 15:35	
320-74829-4	SS-21-02	Solid	06/08/21 12:12	06/10/21 15:35	
320-74829-5	SS-21-04	Solid	06/08/21 12:37	06/10/21 15:35	
320-74829-6	SS-21-102	Solid	06/08/21 12:02	06/10/21 15:35	
320-74829-7	SW-21-101	Water	06/08/21 12:30	06/10/21 15:35	
320-74829-8	SW-21-01	Water	06/08/21 12:40	06/10/21 15:35	

CHAIN-OF-CUSTODY RECORD

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600
www.shannonwilson.com

Page 1 of 1

Laboratory Test America
Attn: D. Alltucker

Analytical Methods (include preservative if used)

Turn Around Time:	Quote No:	MSA Number:	J-Flags:
[X] Normal [ ] Rush			[X] Yes [ ] No
Please Specify			

Sample Identity	Lab No.	Time	Date Sampled	ATAS	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
FB-21-01		1215	6/8/21	X	2	Water
SS-21-03		1232		X	1	Soil
SS-21-01		1261		X	1	Soil
SS-21-02		1212		X	1	Soil
SS-21-04		1237		X	1	Soil
SS-21-102		1202		X	1	Soil
SW-21-101		1220		X	2	water (surface)
SW-21-01		1230		X	2	1 grave sediment + organic material
[illegible]						

320-74829 Chain of Custody

Project Information	
Number:	102519-016
Name:	AA1-AFFF
Contact:	MDN
Ongoing Project?	Yes [ ] No [ ]
Sampler:	ARM

Sample Receipt	
Total No. of Containers:	
COC Seals/Intact? Y/N/NA	
Received Good Cond./Cold	
Temp:	
Delivery Method:	

Notes:

Reliquished By: 1.	Reliquished By: 2.	Reliquished By: 3.
Signature: Time: 1200	Signature: Time:	Signature: Time:
Printed Name: A. Masters Date: 6/9/21	Printed Name: Date:	Printed Name: Date:
Company: Shannon + Wilson, Inc	Company:	Company:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: Time: 1535	Signature: Time:	Signature: Time:
Printed Name: Salvador Lopez Date: 6/10/21	Printed Name: Date:	Printed Name: Date:
Company: EnSac	Company:	Company:

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

* Time written over.

1.8°C

No.

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7/1/2021 (Rev. 1)

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-74829-1

Login Number: 74829
List Number: 1
Creator: Her, David A

List Source: Eurofins TestAmerica, Sacramento

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	10918491/1091848
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.	False	Refer to Job Narrative for details.
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 <6mm (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:

Veselina Yakimova

Title:

Geologist

Date:

July 1, 2021

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

Eurofins / TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-74829-1 Revision 1

Laboratory Report Date:

July 1, 2021

CS Site Name:

FAI Statewide PFAS

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 per- and polyfluorinated alkyl substances (PFAS) on February 11, 2021 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 the TestAmerica laboratory in 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:

   PFAS samples do not require preservation other than temperature control.

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

   Yes☒ No☐ N/A☐ Comments:

   The sample receipt form notes that the samples arrived 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:

No discrepancies were 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; see above.

4. Case Narrative

a. Present and understandable?

Yes☒ No☐ N/A☐ Comments:

Laboratory Report Date:

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

Yes☒ No☐ N/A☐ Comments:

This report has been revised to correct sample IDs from original report.

The laboratory applied an 'I' qualifier to the PFHxA, PFDA, and PFTriA results of sample *SS-21-03,* the PFHxS results of samples *SS-21-02* and *SS-21-102*, and the PFNA result of sample *SW-21-01* to indicate the transition mass ratio was outside established ratio limits.

Due to the high concentration of PFOA, the matrix spike / matrix spike duplicate (MS/MSD) for preparation batch 320-499582 could not be evaluated for accuracy. The associated laboratory control sample (LCS) met acceptance criteria.

The MS recovery for preparation batch 320-499582 was outside control limits for several analytes. Sample matrix interference and/or non-homogeneity are suspected because the associated LCS recovery was within acceptance limits.

The MSD recovery for preparation batch 320-499582 was outside control limits for PFOA and PFUnA. Sample matrix interference and/or non-homogeneity are suspected because the associated LCS recovery was within acceptance limits.

Sample *SS-21-03* and the MS/MSD for preparation batch 320-499582 were diluted due to high concentrations of target analytes and the nature of the sample matrix. Because of this dilution, the surrogate spike and matrix spike concentrations in the samples were reduced to levels where the recovery calculations do not provide useful information.

Results for samples *SW-21-101* and *SW-21-01* were reported from the analysis of a diluted extract due to matrix interference 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.

The Isotope Dilution Analyte (IDA) recovery associated with sample *SS-21-03* and the MS for preparation batch 320-499582 are below the method recommended limit. 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.

Samples *SS-21-03* and *SS-21-04* were light yellow after final extraction/volume.

c. Were all corrective actions documented?

Yes☐ No☐ N/A☒ Comments:

No corrective actions were documented in the case narrative.

Laboratory Report Date:

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

Comments:

The PFHxA, PFDA, and PFTriA results of sample *SS-21-03,* the PFHxS results of samples *SS-21-02* and *SS-21-102*, and the PFNA result of sample *SW-21-01* were reported qualitatively and may have some high bias.

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:

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 limits (RL) are less than the applicable ADEC regulatory limits for the project.

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:

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

Comments:

Target analytes were not detected in the method blank samples.

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:

The data quality/usability is not affected; 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:

And LCS/LCSD pair was reported for preparation batch 320-498766.

An LCS was reported for preparation batch 320-499582.

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

Yes☐ No☐ N/A☒ Comments:

Metals/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:

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

Comments:

N/A; method accuracy and precision was demonstrated to be within acceptable limits.

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:

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 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:

An MS/MSD pair was reported for preparation batch 320-499582.

ii. Metals/Inorganics – one MS and one MSD reported per matrix, analysis and 20 samples?

Yes☐ No☐ N/A☒ Comments:

Metals/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:

The recoveries for PFOA and PFUnA are above their upper control limits in the MS and MSD samples associated with preparation batch 320-499582. Conversely, the recoveries for PFTriA and/or PFOS are below their lower control limits in the MS.

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:

The MS/MSD samples were spiked from the field sample SS-21-03. PFOA and PFUnA were not detected in the parent sample. The sample results are therefore unaffected by the elevated method recovery.

The native concentrations of PFOS and PFTriA in the parent sample are high relative to the spiking concentration added. This disparity may contribute significant uncertainty to the recovery calculations; the MS/MSD recoveries may not be representative of actual method performance for these analytes. In the absence of other guidance, we evaluate the MS/MSD recoveries when the spiking concentration is at least two times greater than the native analyte concentration (USACE 2005). Based on this direction, we do not consider the PFTriA and PFOS results to be affected.

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

Yes☐ No☐ N/A☒ Comments:

Qualification was not required; see above.

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

Comments:

The data quality and/or usability was 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:

The recoveries of the IDAs d3-NMeFOSAA and d5-NEtFOSAA in sample *SS-21-03* and the MS for preparation batch 320-499582 are below the laboratory's lower control 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:

Sample *SS-21-03* and the MS spiked from it were diluted due to high concentrations of target analytes. IDA recovery failures attributed to sample dilution do not affect data quality.

iv. Data quality or usability affected?

Comments:

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

Laboratory Report Date:

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:

N/A; 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:

ii. Submitted blind to lab?

Yes☒ No☐ N/A☐ Comments:

The duplicate pairs *SS-21-02/SS-21-102* and *SW-21-01/SW-21-101* were submitted.

Laboratory Report Date:

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

RPD (%) = 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:

The relative precision demonstrated between the detected results of the field duplicate samples *SS-21-02* and *SS-21-102* was within the recommended DQO of 50% for all analytes except PFHxA.

The relative precision demonstrated between the detected results of the field duplicate samples *SW-21-01* and *SW-21-101* was within the recommended DQO of 30%, where calculable, for all analytes.

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

Comments:

The PFHxA results of the field duplicate samples *SS-21-02* and *SS-21-102* are considered estimated. The non-detect result of sample *SS-21-02* is flagged 'UJ' while the detected result of sample *SS-21-102* is flagged 'J' to identify the imprecision. We note that the PFHxA result of sample *SS-21-102* was affected by a transition mass ratio failure and subsequently derived qualitatively.

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 utilized during the sample collection process for the field samples included in this work order.

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

Yes☐ No☐ N/A☒ Comments:

No equipment blank was submitted with this work order.

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

Comments:

N/A; an equipment blank was not required.

iii. Data quality or usability affected?

Comments:

The data quality/usability is not affected; see above.

Laboratory Report Date:

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

a. Defined and appropriate?

Yes☒ No☐ N/A☐ Comments:

The PFHxA, PFDA, and PFTriA results of sample *SS-21-03,* the PFHxS result of samples *SS-21-02* and *SS-21-102*, and the PFNA result of sample *SW-21-01* are considered estimated and flagged 'J' because the transition mass ratio did not meet laboratory acceptance criteria. The laboratory analyst used professional judgement to identify the analyte but there is some degree of uncertainty in this determination.

eurofins | Environment Testing America

ANALYTICAL REPORT

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

Laboratory Job ID: 320-74830-1
Client Project/Site: Fairbanks Int. Airport
Revision: 1

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

Attn: Marcy Nadel

Authorized for release by:
7/7/2021 11:48:35 AM

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Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int. Airport

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Qualifiers

LCMS

Qualifier	Qualifier Description
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.
¤	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: Fairbanks Int. Airport

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Laboratory: Eurofins TestAmerica, Sacramento

Narrative

Revision 7-7-2021: This report has been revised to include missing case narrative.

Receipt

The samples were received on 6/10/2021 3:35 PM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 5.8º C.

LCMS

Method EPA 537(Mod): The "I" qualifier means the transition mass ratio for the indicated analyte was outside of the established ratio limits. The qualitative identification of the analyte has some degree of uncertainty, and the reported value may have some high bias. However, analyst judgement was used to positively identify the analyte.

Method EPA 537(Mod): Results for sample Engine 2-W01 (320-74830-5) 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.

Method EPA 537(Mod): AFFF samples are processed at various dilutions as concentrations can vary greatly. We perform serial dilutions of a 1 mL aliquot of sample at the bench level. The laboratory reports the most concentrated results it can. The following samples were processed using a 0.002 mL sample aliquot equivalent. Matrix interferences prevented analysis of a larger sample aliquot equivalent. Engine 2 (320-74830-1), Engine 3 (320-74830-2), Engine 4 (320-74830-3), Engine 5 (320-74830-4) and C6 AFFF (320-74830-9).

Method EPA 537(Mod): Results for sample Engine 4 (320-74830-3) 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 3535: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-498766.

Method AFFF Prep: The following samples were observed to be brown and foamy prior to extraction: Engine 2 (320-74830-1), Engine 3 (320-74830-2), Engine 4 (320-74830-3), Engine 5 (320-74830-4) and C6 AFFF (320-74830-9).

Method AFFF Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-498767.

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: Fairbanks Int. Airport

Job ID: 320-74830-1

Client Sample ID: Engine 2 — Lab Sample ID: 320-74830-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	1.9		0.25	0.073	mg/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.043	J	0.25	0.031	mg/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.29		0.25	0.025	mg/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	1.3	B	0.25	0.021	mg/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	6.4	I	0.25	0.068	mg/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: Engine 3 — Lab Sample ID: 320-74830-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	1.9		0.25	0.073	mg/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.037	J	0.25	0.031	mg/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.13	J	0.25	0.025	mg/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	0.57	B	0.25	0.021	mg/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	3.7	I	0.25	0.068	mg/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: Engine 4 — Lab Sample ID: 320-74830-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	1.8		1.3	0.37	mg/L	5		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.22	J	1.3	0.13	mg/L	5		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	1.5	B	1.3	0.11	mg/L	5		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	6.9	I	1.3	0.34	mg/L	5		EPA 537(Mod)	Total/NA

Client Sample ID: Engine 5 — Lab Sample ID: 320-74830-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	1.7		0.25	0.073	mg/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.097	J	0.25	0.025	mg/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	0.38	B	0.25	0.021	mg/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.9	I	0.25	0.068	mg/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: Engine 2-W01 — Lab Sample ID: 320-74830-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	1000		19	5.4	ng/L	10		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	2.1	J	19	1.9	ng/L	10		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	8.2	J	19	5.3	ng/L	10		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	22		19	5.0	ng/L	10		EPA 537(Mod)	Total/NA

Client Sample ID: Engine 3-W01 — Lab Sample ID: 320-74830-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	8.1		1.7	0.49	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.7		1.7	0.21	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	4.5		1.7	0.72	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.80	J	1.7	0.23	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorodecanoic acid (PFDA)	6.1		1.7	0.26	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroundecanoic acid (PFUnA)	2.2		1.7	0.94	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorododecanoic acid (PFDoA)	3.5		1.7	0.47	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorotridecanoic acid (PFTriA)	1.2	J	1.7	1.1	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorotetradecanoic acid (PFTeA)	1.0	J	1.7	0.62	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	2.6		1.7	0.17	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	11		1.7	0.49	ng/L	1		EPA 537(Mod)	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int. Airport

Job ID: 320-74830-1

Client Sample ID: Engine 3-W01 (Continued) — Lab Sample ID: 320-74830-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanesulfonic acid (PFOS)	28		1.7	0.46	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: Engine 4-W01 — Lab Sample ID: 320-74830-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	5.9		1.7	0.50	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.3	J	1.7	0.21	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	3.2		1.7	0.73	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	1.7		1.7	0.17	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	7.0		1.7	0.49	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	45		1.7	0.46	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: Engine 4-FB — Lab Sample ID: 320-74830-8

No Detections.

Client Sample ID: C6 AFFF — Lab Sample ID: 320-74830-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	1.5		0.25	0.073	mg/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	0.026	J B	0.25	0.021	mg/L	1		EPA 537(Mod)	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int. Airport

Job ID: 320-74830-1

Client Sample ID: Engine 2

Date Collected: 06/07/21 12:02
Date Received: 06/10/21 15:35

Lab Sample ID: 320-74830-1

Matrix: Water

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)	**1.9**		0.25	0.073	mg/L		06/15/21 19:47	06/22/21 14:13	1
Perfluoroheptanoic acid (PFHpA)	**0.043**	**J**	0.25	0.031	mg/L		06/15/21 19:47	06/22/21 14:13	1
Perfluorooctanoic acid (PFOA)	ND		0.25	0.11	mg/L		06/15/21 19:47	06/22/21 14:13	1
Perfluorononanoic acid (PFNA)	ND		0.25	0.034	mg/L		06/15/21 19:47	06/22/21 14:13	1
Perfluorodecanoic acid (PFDA)	ND		0.25	0.039	mg/L		06/15/21 19:47	06/22/21 14:13	1
Perfluoroundecanoic acid (PFUnA)	ND		0.25	0.14	mg/L		06/15/21 19:47	06/22/21 14:13	1
Perfluorododecanoic acid (PFDoA)	ND		0.25	0.069	mg/L		06/15/21 19:47	06/22/21 14:13	1
Perfluorotridecanoic acid (PFTriA)	ND		0.25	0.16	mg/L		06/15/21 19:47	06/22/21 14:13	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.25	0.036	mg/L		06/15/21 19:47	06/22/21 14:13	1
Perfluorobutanesulfonic acid (PFBS)	**0.29**		0.25	0.025	mg/L		06/15/21 19:47	06/22/21 14:13	1
Perfluorohexanesulfonic acid (PFHxS)	**1.3**	**B**	0.25	0.021	mg/L		06/15/21 19:47	06/22/21 14:13	1
Perfluorooctanesulfonic acid (PFOS)	**6.4**	**I**	0.25	0.068	mg/L		06/15/21 19:47	06/22/21 14:13	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		2.5	0.39	mg/L		06/15/21 19:47	06/22/21 14:13	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		2.5	0.24	mg/L		06/15/21 19:47	06/22/21 14:13	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.25	0.19	mg/L		06/15/21 19:47	06/22/21 14:13	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.25	0.030	mg/L		06/15/21 19:47	06/22/21 14:13	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.25	0.040	mg/L		06/15/21 19:47	06/22/21 14:13	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.25	0.023	mg/L		06/15/21 19:47	06/22/21 14:13	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*122*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:13*	*1*
13C4 PFHpA	*122*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:13*	*1*
13C4 PFOA	*107*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:13*	*1*
13C5 PFNA	*104*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:13*	*1*
13C2 PFDA	*41*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:13*	*1*
13C2 PFUnA	*109*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:13*	*1*
13C2 PFDoA	*118*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:13*	*1*
13C2 PFTeDA	*122*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:13*	*1*
13C3 PFBS	*112*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:13*	*1*
18O2 PFHxS	*124*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:13*	*1*
13C4 PFOS	*112*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:13*	*1*
d3-NMeFOSAA	*90*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:13*	*1*
d5-NEtFOSAA	*112*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:13*	*1*
13C3 HFPO-DA	*84*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:13*	*1*

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int. Airport

Job ID: 320-74830-1

Client Sample ID: Engine 3

Date Collected: 06/07/21 12:10
Date Received: 06/10/21 15:35

Lab Sample ID: 320-74830-2

Matrix: Water

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)	**1.9**		0.25	0.073	mg/L		06/15/21 19:47	06/22/21 14:23	1
Perfluoroheptanoic acid (PFHpA)	**0.037**	**J**	0.25	0.031	mg/L		06/15/21 19:47	06/22/21 14:23	1
Perfluorooctanoic acid (PFOA)	ND		0.25	0.11	mg/L		06/15/21 19:47	06/22/21 14:23	1
Perfluorononanoic acid (PFNA)	ND		0.25	0.034	mg/L		06/15/21 19:47	06/22/21 14:23	1
Perfluorodecanoic acid (PFDA)	ND		0.25	0.039	mg/L		06/15/21 19:47	06/22/21 14:23	1
Perfluoroundecanoic acid (PFUnA)	ND		0.25	0.14	mg/L		06/15/21 19:47	06/22/21 14:23	1
Perfluorododecanoic acid (PFDoA)	ND		0.25	0.069	mg/L		06/15/21 19:47	06/22/21 14:23	1
Perfluorotridecanoic acid (PFTriA)	ND		0.25	0.16	mg/L		06/15/21 19:47	06/22/21 14:23	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.25	0.036	mg/L		06/15/21 19:47	06/22/21 14:23	1
Perfluorobutanesulfonic acid (PFBS)	**0.13**	**J**	0.25	0.025	mg/L		06/15/21 19:47	06/22/21 14:23	1
Perfluorohexanesulfonic acid (PFHxS)	**0.57**	**B**	0.25	0.021	mg/L		06/15/21 19:47	06/22/21 14:23	1
Perfluorooctanesulfonic acid (PFOS)	**3.7**	**I**	0.25	0.068	mg/L		06/15/21 19:47	06/22/21 14:23	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		2.5	0.39	mg/L		06/15/21 19:47	06/22/21 14:23	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		2.5	0.24	mg/L		06/15/21 19:47	06/22/21 14:23	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.25	0.19	mg/L		06/15/21 19:47	06/22/21 14:23	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.25	0.030	mg/L		06/15/21 19:47	06/22/21 14:23	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.25	0.040	mg/L		06/15/21 19:47	06/22/21 14:23	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.25	0.023	mg/L		06/15/21 19:47	06/22/21 14:23	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*126*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:23*	*1*
13C4 PFHpA	*115*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:23*	*1*
13C4 PFOA	*108*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:23*	*1*
13C5 PFNA	*104*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:23*	*1*
13C2 PFDA	*43*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:23*	*1*
13C2 PFUnA	*112*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:23*	*1*
13C2 PFDoA	*118*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:23*	*1*
13C2 PFTeDA	*114*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:23*	*1*
13C3 PFBS	*119*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:23*	*1*
18O2 PFHxS	*128*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:23*	*1*
13C4 PFOS	*109*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:23*	*1*
d3-NMeFOSAA	*88*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:23*	*1*
d5-NEtFOSAA	*106*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:23*	*1*
13C3 HFPO-DA	*79*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:23*	*1*

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int. Airport

Job ID: 320-74830-1

Client Sample ID: Engine 4

Date Collected: 06/07/21 12:15
Date Received: 06/10/21 15:35

Lab Sample ID: 320-74830-3

Matrix: Water

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)	**1.8**		1.3	0.37	mg/L		06/15/21 19:47	06/23/21 21:06	5
Perfluoroheptanoic acid (PFHpA)	ND		1.3	0.16	mg/L		06/15/21 19:47	06/23/21 21:06	5
Perfluorooctanoic acid (PFOA)	ND		1.3	0.55	mg/L		06/15/21 19:47	06/23/21 21:06	5
Perfluorononanoic acid (PFNA)	ND		1.3	0.17	mg/L		06/15/21 19:47	06/23/21 21:06	5
Perfluorodecanoic acid (PFDA)	ND		1.3	0.20	mg/L		06/15/21 19:47	06/23/21 21:06	5
Perfluoroundecanoic acid (PFUnA)	ND		1.3	0.70	mg/L		06/15/21 19:47	06/23/21 21:06	5
Perfluorododecanoic acid (PFDoA)	ND		1.3	0.35	mg/L		06/15/21 19:47	06/23/21 21:06	5
Perfluorotridecanoic acid (PFTriA)	ND		1.3	0.80	mg/L		06/15/21 19:47	06/23/21 21:06	5
Perfluorotetradecanoic acid (PFTeA)	ND		1.3	0.18	mg/L		06/15/21 19:47	06/23/21 21:06	5
Perfluorobutanesulfonic acid (PFBS)	**0.22**	**J**	1.3	0.13	mg/L		06/15/21 19:47	06/23/21 21:06	5
Perfluorohexanesulfonic acid (PFHxS)	**1.5**	**B**	1.3	0.11	mg/L		06/15/21 19:47	06/23/21 21:06	5
Perfluorooctanesulfonic acid (PFOS)	**6.9**	**I**	1.3	0.34	mg/L		06/15/21 19:47	06/23/21 21:06	5
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		13	2.0	mg/L		06/15/21 19:47	06/23/21 21:06	5
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		13	1.2	mg/L		06/15/21 19:47	06/23/21 21:06	5
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		1.3	0.95	mg/L		06/15/21 19:47	06/23/21 21:06	5
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.3	0.15	mg/L		06/15/21 19:47	06/23/21 21:06	5
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.3	0.20	mg/L		06/15/21 19:47	06/23/21 21:06	5
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.3	0.12	mg/L		06/15/21 19:47	06/23/21 21:06	5

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*110*		*25 - 150*	*06/15/21 19:47*	*06/23/21 21:06*	*5*
13C4 PFHpA	*105*		*25 - 150*	*06/15/21 19:47*	*06/23/21 21:06*	*5*
13C4 PFOA	*104*		*25 - 150*	*06/15/21 19:47*	*06/23/21 21:06*	*5*
13C5 PFNA	*109*		*25 - 150*	*06/15/21 19:47*	*06/23/21 21:06*	*5*
13C2 PFDA	*82*		*25 - 150*	*06/15/21 19:47*	*06/23/21 21:06*	*5*
13C2 PFUnA	*113*		*25 - 150*	*06/15/21 19:47*	*06/23/21 21:06*	*5*
13C2 PFDoA	*121*		*25 - 150*	*06/15/21 19:47*	*06/23/21 21:06*	*5*
13C2 PFTeDA	*120*		*25 - 150*	*06/15/21 19:47*	*06/23/21 21:06*	*5*
13C3 PFBS	*130*		*25 - 150*	*06/15/21 19:47*	*06/23/21 21:06*	*5*
18O2 PFHxS	*106*		*25 - 150*	*06/15/21 19:47*	*06/23/21 21:06*	*5*
13C4 PFOS	*110*		*25 - 150*	*06/15/21 19:47*	*06/23/21 21:06*	*5*
d3-NMeFOSAA	*101*		*25 - 150*	*06/15/21 19:47*	*06/23/21 21:06*	*5*
d5-NEtFOSAA	*118*		*25 - 150*	*06/15/21 19:47*	*06/23/21 21:06*	*5*
13C3 HFPO-DA	*96*		*25 - 150*	*06/15/21 19:47*	*06/23/21 21:06*	*5*

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int. Airport

Job ID: 320-74830-1

Client Sample ID: Engine 5

Date Collected: 06/07/21 12:20
Date Received: 06/10/21 15:35

Lab Sample ID: 320-74830-4

Matrix: Water

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)	**1.7**		0.25	0.073	mg/L		06/15/21 19:47	06/23/21 21:15	1
Perfluoroheptanoic acid (PFHpA)	ND		0.25	0.031	mg/L		06/15/21 19:47	06/23/21 21:15	1
Perfluorooctanoic acid (PFOA)	ND		0.25	0.11	mg/L		06/15/21 19:47	06/23/21 21:15	1
Perfluorononanoic acid (PFNA)	ND		0.25	0.034	mg/L		06/15/21 19:47	06/23/21 21:15	1
Perfluorodecanoic acid (PFDA)	ND		0.25	0.039	mg/L		06/15/21 19:47	06/23/21 21:15	1
Perfluoroundecanoic acid (PFUnA)	ND		0.25	0.14	mg/L		06/15/21 19:47	06/23/21 21:15	1
Perfluorododecanoic acid (PFDoA)	ND		0.25	0.069	mg/L		06/15/21 19:47	06/23/21 21:15	1
Perfluorotridecanoic acid (PFTriA)	ND		0.25	0.16	mg/L		06/15/21 19:47	06/23/21 21:15	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.25	0.036	mg/L		06/15/21 19:47	06/23/21 21:15	1
Perfluorobutanesulfonic acid (PFBS)	**0.097**	**J**	0.25	0.025	mg/L		06/15/21 19:47	06/23/21 21:15	1
Perfluorohexanesulfonic acid (PFHxS)	**0.38**	**B**	0.25	0.021	mg/L		06/15/21 19:47	06/23/21 21:15	1
Perfluorooctanesulfonic acid (PFOS)	**1.9**	**I**	0.25	0.068	mg/L		06/15/21 19:47	06/23/21 21:15	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		2.5	0.39	mg/L		06/15/21 19:47	06/23/21 21:15	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		2.5	0.24	mg/L		06/15/21 19:47	06/23/21 21:15	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.25	0.19	mg/L		06/15/21 19:47	06/23/21 21:15	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.25	0.030	mg/L		06/15/21 19:47	06/23/21 21:15	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.25	0.040	mg/L		06/15/21 19:47	06/23/21 21:15	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.25	0.023	mg/L		06/15/21 19:47	06/23/21 21:15	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*139*		*25 - 150*	*06/15/21 19:47*	*06/23/21 21:15*	*1*
13C4 PFHpA	*123*		*25 - 150*	*06/15/21 19:47*	*06/23/21 21:15*	*1*
13C4 PFOA	*106*		*25 - 150*	*06/15/21 19:47*	*06/23/21 21:15*	*1*
13C5 PFNA	*112*		*25 - 150*	*06/15/21 19:47*	*06/23/21 21:15*	*1*
13C2 PFDA	*43*		*25 - 150*	*06/15/21 19:47*	*06/23/21 21:15*	*1*
13C2 PFUnA	*130*		*25 - 150*	*06/15/21 19:47*	*06/23/21 21:15*	*1*
13C2 PFDoA	*121*		*25 - 150*	*06/15/21 19:47*	*06/23/21 21:15*	*1*
13C2 PFTeDA	*129*		*25 - 150*	*06/15/21 19:47*	*06/23/21 21:15*	*1*
13C3 PFBS	*136*		*25 - 150*	*06/15/21 19:47*	*06/23/21 21:15*	*1*
18O2 PFHxS	*140*		*25 - 150*	*06/15/21 19:47*	*06/23/21 21:15*	*1*
13C4 PFOS	*127*		*25 - 150*	*06/15/21 19:47*	*06/23/21 21:15*	*1*
d3-NMeFOSAA	*96*		*25 - 150*	*06/15/21 19:47*	*06/23/21 21:15*	*1*
d5-NEtFOSAA	*108*		*25 - 150*	*06/15/21 19:47*	*06/23/21 21:15*	*1*
13C3 HFPO-DA	*81*		*25 - 150*	*06/15/21 19:47*	*06/23/21 21:15*	*1*

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int. Airport

Job ID: 320-74830-1

Client Sample ID: Engine 2-W01

Date Collected: 06/07/21 14:10
Date Received: 06/10/21 15:35

Lab Sample ID: 320-74830-5

Matrix: Water

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)	**1000**		19	5.4	ng/L		06/15/21 19:34	06/22/21 20:29	10
Perfluoroheptanoic acid (PFHpA)	ND		19	2.3	ng/L		06/15/21 19:34	06/22/21 20:29	10
Perfluorooctanoic acid (PFOA)	ND		19	7.9	ng/L		06/15/21 19:34	06/22/21 20:29	10
Perfluorononanoic acid (PFNA)	ND		19	2.5	ng/L		06/15/21 19:34	06/22/21 20:29	10
Perfluorodecanoic acid (PFDA)	ND		19	2.9	ng/L		06/15/21 19:34	06/22/21 20:29	10
Perfluoroundecanoic acid (PFUnA)	ND		19	10	ng/L		06/15/21 19:34	06/22/21 20:29	10
Perfluorododecanoic acid (PFDoA)	ND		19	5.1	ng/L		06/15/21 19:34	06/22/21 20:29	10
Perfluorotridecanoic acid (PFTriA)	ND		19	12	ng/L		06/15/21 19:34	06/22/21 20:29	10
Perfluorotetradecanoic acid (PFTeA)	ND		19	6.8	ng/L		06/15/21 19:34	06/22/21 20:29	10
Perfluorobutanesulfonic acid (PFBS)	**2.1**	**J**	19	1.9	ng/L		06/15/21 19:34	06/22/21 20:29	10
Perfluorohexanesulfonic acid (PFHxS)	**8.2**	**J**	19	5.3	ng/L		06/15/21 19:34	06/22/21 20:29	10
Perfluorooctanesulfonic acid (PFOS)	**22**		19	5.0	ng/L		06/15/21 19:34	06/22/21 20:29	10
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		47	11	ng/L		06/15/21 19:34	06/22/21 20:29	10
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		47	12	ng/L		06/15/21 19:34	06/22/21 20:29	10
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		19	2.2	ng/L		06/15/21 19:34	06/22/21 20:29	10
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		37	14	ng/L		06/15/21 19:34	06/22/21 20:29	10
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		19	3.0	ng/L		06/15/21 19:34	06/22/21 20:29	10
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		19	3.7	ng/L		06/15/21 19:34	06/22/21 20:29	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*93*		*50 - 150*	*06/15/21 19:34*	*06/22/21 20:29*	*10*
13C4 PFHpA	*90*		*50 - 150*	*06/15/21 19:34*	*06/22/21 20:29*	*10*
13C4 PFOA	*100*		*50 - 150*	*06/15/21 19:34*	*06/22/21 20:29*	*10*
13C5 PFNA	*95*		*50 - 150*	*06/15/21 19:34*	*06/22/21 20:29*	*10*
13C2 PFDA	*102*		*50 - 150*	*06/15/21 19:34*	*06/22/21 20:29*	*10*
13C2 PFUnA	*108*		*50 - 150*	*06/15/21 19:34*	*06/22/21 20:29*	*10*
13C2 PFDoA	*105*		*50 - 150*	*06/15/21 19:34*	*06/22/21 20:29*	*10*
13C2 PFTeDA	*120*		*50 - 150*	*06/15/21 19:34*	*06/22/21 20:29*	*10*
13C3 PFBS	*92*		*50 - 150*	*06/15/21 19:34*	*06/22/21 20:29*	*10*
18O2 PFHxS	*89*		*50 - 150*	*06/15/21 19:34*	*06/22/21 20:29*	*10*
13C4 PFOS	*100*		*50 - 150*	*06/15/21 19:34*	*06/22/21 20:29*	*10*
d3-NMeFOSAA	*104*		*50 - 150*	*06/15/21 19:34*	*06/22/21 20:29*	*10*
d5-NEtFOSAA	*112*		*50 - 150*	*06/15/21 19:34*	*06/22/21 20:29*	*10*
13C3 HFPO-DA	*82*		*50 - 150*	*06/15/21 19:34*	*06/22/21 20:29*	*10*

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int. Airport

Job ID: 320-74830-1

Client Sample ID: Engine 3-W01

Date Collected: 06/07/21 14:25
Date Received: 06/10/21 15:35

Lab Sample ID: 320-74830-6

Matrix: Water

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)	**8.1**		1.7	0.49	ng/L		06/15/21 19:34	06/22/21 19:33	1
Perfluoroheptanoic acid (PFHpA)	**1.7**		1.7	0.21	ng/L		06/15/21 19:34	06/22/21 19:33	1
Perfluorooctanoic acid (PFOA)	**4.5**		1.7	0.72	ng/L		06/15/21 19:34	06/22/21 19:33	1
Perfluorononanoic acid (PFNA)	**0.80**	**J**	1.7	0.23	ng/L		06/15/21 19:34	06/22/21 19:33	1
Perfluorodecanoic acid (PFDA)	**6.1**		1.7	0.26	ng/L		06/15/21 19:34	06/22/21 19:33	1
Perfluoroundecanoic acid (PFUnA)	**2.2**		1.7	0.94	ng/L		06/15/21 19:34	06/22/21 19:33	1
Perfluorododecanoic acid (PFDoA)	**3.5**		1.7	0.47	ng/L		06/15/21 19:34	06/22/21 19:33	1
Perfluorotridecanoic acid (PFTriA)	**1.2**	**J**	1.7	1.1	ng/L		06/15/21 19:34	06/22/21 19:33	1
Perfluorotetradecanoic acid (PFTeA)	**1.0**	**J**	1.7	0.62	ng/L		06/15/21 19:34	06/22/21 19:33	1
Perfluorobutanesulfonic acid (PFBS)	**2.6**		1.7	0.17	ng/L		06/15/21 19:34	06/22/21 19:33	1
Perfluorohexanesulfonic acid (PFHxS)	**11**		1.7	0.49	ng/L		06/15/21 19:34	06/22/21 19:33	1
Perfluorooctanesulfonic acid (PFOS)	**28**		1.7	0.46	ng/L		06/15/21 19:34	06/22/21 19:33	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.3	1.0	ng/L		06/15/21 19:34	06/22/21 19:33	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.3	1.1	ng/L		06/15/21 19:34	06/22/21 19:33	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.7	0.20	ng/L		06/15/21 19:34	06/22/21 19:33	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.4	1.3	ng/L		06/15/21 19:34	06/22/21 19:33	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.7	0.27	ng/L		06/15/21 19:34	06/22/21 19:33	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.7	0.34	ng/L		06/15/21 19:34	06/22/21 19:33	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*88*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:33*	*1*
13C4 PFHpA	*66*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:33*	*1*
13C4 PFOA	*85*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:33*	*1*
13C5 PFNA	*86*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:33*	*1*
13C2 PFDA	*104*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:33*	*1*
13C2 PFUnA	*101*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:33*	*1*
13C2 PFDoA	*104*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:33*	*1*
13C2 PFTeDA	*122*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:33*	*1*
13C3 PFBS	*79*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:33*	*1*
18O2 PFHxS	*75*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:33*	*1*
13C4 PFOS	*90*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:33*	*1*
d3-NMeFOSAA	*85*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:33*	*1*
d5-NEtFOSAA	*92*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:33*	*1*
13C3 HFPO-DA	*76*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:33*	*1*

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int. Airport

Job ID: 320-74830-1

Client Sample ID: Engine 4-W01

Date Collected: 06/07/21 14:30
Date Received: 06/10/21 15:35

Lab Sample ID: 320-74830-7

Matrix: Water

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)	**5.9**		1.7	0.50	ng/L		06/15/21 19:34	06/22/21 19:43	1
Perfluoroheptanoic acid (PFHpA)	**1.3**	**J**	1.7	0.21	ng/L		06/15/21 19:34	06/22/21 19:43	1
Perfluorooctanoic acid (PFOA)	**3.2**		1.7	0.73	ng/L		06/15/21 19:34	06/22/21 19:43	1
Perfluorononanoic acid (PFNA)	ND		1.7	0.23	ng/L		06/15/21 19:34	06/22/21 19:43	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.27	ng/L		06/15/21 19:34	06/22/21 19:43	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.94	ng/L		06/15/21 19:34	06/22/21 19:43	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.47	ng/L		06/15/21 19:34	06/22/21 19:43	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	1.1	ng/L		06/15/21 19:34	06/22/21 19:43	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.63	ng/L		06/15/21 19:34	06/22/21 19:43	1
Perfluorobutanesulfonic acid (PFBS)	**1.7**		1.7	0.17	ng/L		06/15/21 19:34	06/22/21 19:43	1
Perfluorohexanesulfonic acid (PFHxS)	**7.0**		1.7	0.49	ng/L		06/15/21 19:34	06/22/21 19:43	1
Perfluorooctanesulfonic acid (PFOS)	**45**		1.7	0.46	ng/L		06/15/21 19:34	06/22/21 19:43	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.3	1.0	ng/L		06/15/21 19:34	06/22/21 19:43	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.3	1.1	ng/L		06/15/21 19:34	06/22/21 19:43	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.7	0.21	ng/L		06/15/21 19:34	06/22/21 19:43	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.4	1.3	ng/L		06/15/21 19:34	06/22/21 19:43	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.7	0.27	ng/L		06/15/21 19:34	06/22/21 19:43	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.7	0.34	ng/L		06/15/21 19:34	06/22/21 19:43	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*89*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:43*	*1*
13C4 PFHpA	*71*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:43*	*1*
13C4 PFOA	*90*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:43*	*1*
13C5 PFNA	*84*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:43*	*1*
13C2 PFDA	*104*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:43*	*1*
13C2 PFUnA	*104*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:43*	*1*
13C2 PFDoA	*98*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:43*	*1*
13C2 PFTeDA	*111*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:43*	*1*
13C3 PFBS	*86*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:43*	*1*
18O2 PFHxS	*84*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:43*	*1*
13C4 PFOS	*91*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:43*	*1*
d3-NMeFOSAA	*95*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:43*	*1*
d5-NEtFOSAA	*86*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:43*	*1*
13C3 HFPO-DA	*78*		*50 - 150*	*06/15/21 19:34*	*06/22/21 19:43*	*1*

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int. Airport

Job ID: 320-74830-1

Client Sample ID: Engine 4-FB
Date Collected: 06/07/21 14:35
Date Received: 06/10/21 15:35

Lab Sample ID: 320-74830-8
Matrix: Water

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		1.9	0.54	ng/L		06/15/21 19:34	06/20/21 03:36	1
Perfluoroheptanoic acid (PFHpA)	ND		1.9	0.23	ng/L		06/15/21 19:34	06/20/21 03:36	1
Perfluorooctanoic acid (PFOA)	ND		1.9	0.79	ng/L		06/15/21 19:34	06/20/21 03:36	1
Perfluorononanoic acid (PFNA)	ND		1.9	0.25	ng/L		06/15/21 19:34	06/20/21 03:36	1
Perfluorodecanoic acid (PFDA)	ND		1.9	0.29	ng/L		06/15/21 19:34	06/20/21 03:36	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	1.0	ng/L		06/15/21 19:34	06/20/21 03:36	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.51	ng/L		06/15/21 19:34	06/20/21 03:36	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	1.2	ng/L		06/15/21 19:34	06/20/21 03:36	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.68	ng/L		06/15/21 19:34	06/20/21 03:36	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.9	0.19	ng/L		06/15/21 19:34	06/20/21 03:36	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.9	0.53	ng/L		06/15/21 19:34	06/20/21 03:36	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.9	0.50	ng/L		06/15/21 19:34	06/20/21 03:36	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.6	1.1	ng/L		06/15/21 19:34	06/20/21 03:36	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.6	1.2	ng/L		06/15/21 19:34	06/20/21 03:36	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.9	0.22	ng/L		06/15/21 19:34	06/20/21 03:36	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.7	1.4	ng/L		06/15/21 19:34	06/20/21 03:36	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.9	0.30	ng/L		06/15/21 19:34	06/20/21 03:36	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.37	ng/L		06/15/21 19:34	06/20/21 03:36	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*98*		*50 - 150*	*06/15/21 19:34*	*06/20/21 03:36*	*1*
13C4 PFHpA	*89*		*50 - 150*	*06/15/21 19:34*	*06/20/21 03:36*	*1*
13C4 PFOA	*96*		*50 - 150*	*06/15/21 19:34*	*06/20/21 03:36*	*1*
13C5 PFNA	*93*		*50 - 150*	*06/15/21 19:34*	*06/20/21 03:36*	*1*
13C2 PFDA	*101*		*50 - 150*	*06/15/21 19:34*	*06/20/21 03:36*	*1*
13C2 PFUnA	*97*		*50 - 150*	*06/15/21 19:34*	*06/20/21 03:36*	*1*
13C2 PFDoA	*98*		*50 - 150*	*06/15/21 19:34*	*06/20/21 03:36*	*1*
13C2 PFTeDA	*96*		*50 - 150*	*06/15/21 19:34*	*06/20/21 03:36*	*1*
13C3 PFBS	*95*		*50 - 150*	*06/15/21 19:34*	*06/20/21 03:36*	*1*
18O2 PFHxS	*89*		*50 - 150*	*06/15/21 19:34*	*06/20/21 03:36*	*1*
13C4 PFOS	*91*		*50 - 150*	*06/15/21 19:34*	*06/20/21 03:36*	*1*
d3-NMeFOSAA	*92*		*50 - 150*	*06/15/21 19:34*	*06/20/21 03:36*	*1*
d5-NEtFOSAA	*97*		*50 - 150*	*06/15/21 19:34*	*06/20/21 03:36*	*1*
13C3 HFPO-DA	*96*		*50 - 150*	*06/15/21 19:34*	*06/20/21 03:36*	*1*

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int. Airport

Job ID: 320-74830-1

Client Sample ID: C6 AFFF

Date Collected: 06/07/21 14:50
Date Received: 06/10/21 15:35

Lab Sample ID: 320-74830-9

Matrix: Water

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)	**1.5**		0.25	0.073	mg/L		06/15/21 19:47	06/22/21 14:32	1
Perfluoroheptanoic acid (PFHpA)	ND		0.25	0.031	mg/L		06/15/21 19:47	06/22/21 14:32	1
Perfluorooctanoic acid (PFOA)	ND		0.25	0.11	mg/L		06/15/21 19:47	06/22/21 14:32	1
Perfluorononanoic acid (PFNA)	ND		0.25	0.034	mg/L		06/15/21 19:47	06/22/21 14:32	1
Perfluorodecanoic acid (PFDA)	ND		0.25	0.039	mg/L		06/15/21 19:47	06/22/21 14:32	1
Perfluoroundecanoic acid (PFUnA)	ND		0.25	0.14	mg/L		06/15/21 19:47	06/22/21 14:32	1
Perfluorododecanoic acid (PFDoA)	ND		0.25	0.069	mg/L		06/15/21 19:47	06/22/21 14:32	1
Perfluorotridecanoic acid (PFTriA)	ND		0.25	0.16	mg/L		06/15/21 19:47	06/22/21 14:32	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.25	0.036	mg/L		06/15/21 19:47	06/22/21 14:32	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.25	0.025	mg/L		06/15/21 19:47	06/22/21 14:32	1
Perfluorohexanesulfonic acid (PFHxS)	**0.026**	**J B**	0.25	0.021	mg/L		06/15/21 19:47	06/22/21 14:32	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.25	0.068	mg/L		06/15/21 19:47	06/22/21 14:32	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		2.5	0.39	mg/L		06/15/21 19:47	06/22/21 14:32	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		2.5	0.24	mg/L		06/15/21 19:47	06/22/21 14:32	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.25	0.19	mg/L		06/15/21 19:47	06/22/21 14:32	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.25	0.030	mg/L		06/15/21 19:47	06/22/21 14:32	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.25	0.040	mg/L		06/15/21 19:47	06/22/21 14:32	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.25	0.023	mg/L		06/15/21 19:47	06/22/21 14:32	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*133*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:32*	*1*
13C4 PFHpA	*115*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:32*	*1*
13C4 PFOA	*108*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:32*	*1*
13C5 PFNA	*104*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:32*	*1*
13C2 PFDA	*42*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:32*	*1*
13C2 PFUnA	*110*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:32*	*1*
13C2 PFDoA	*122*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:32*	*1*
13C2 PFTeDA	*121*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:32*	*1*
13C3 PFBS	*120*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:32*	*1*
18O2 PFHxS	*122*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:32*	*1*
13C4 PFOS	*118*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:32*	*1*
d3-NMeFOSAA	*95*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:32*	*1*
d5-NEtFOSAA	*103*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:32*	*1*
13C3 HFPO-DA	*84*		*25 - 150*	*06/15/21 19:47*	*06/22/21 14:32*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int. Airport

Job ID: 320-74830-1

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 (25-150)	C4PFHA (25-150)	PFOA (25-150)	PFNA (25-150)	PFDA (25-150)	PFUnA (25-150)	PFDoA (25-150)	PFTDA (25-150)
320-74830-1	Engine 2	122	122	107	104	41	109	118	122
320-74830-2	Engine 3	126	115	108	104	43	112	118	114
320-74830-3	Engine 4	110	105	104	109	82	113	121	120
320-74830-4	Engine 5	139	123	106	112	43	130	121	129
320-74830-9	C6 AFFF	133	115	108	104	42	110	122	121
LCS 320-498767/2-A	Lab Control Sample	108	116	109	107	104	95	108	104
LCSD 320-498767/3-A	Lab Control Sample Dup	111	120	111	111	100	113	113	109
MB 320-498767/1-A	Method Blank	105	107	103	98	100	109	114	99

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	C3PFBS (25-150)	PFHxS (25-150)	PFOS (25-150)	d3NMFOS (25-150)	d5NEFOS (25-150)	HFPODA (25-150)		
320-74830-1	Engine 2	112	124	112	90	112	84		
320-74830-2	Engine 3	119	128	109	88	106	79		
320-74830-3	Engine 4	130	106	110	101	118	96		
320-74830-4	Engine 5	136	140	127	96	108	81		
320-74830-9	C6 AFFF	120	122	118	95	103	84		
LCS 320-498767/2-A	Lab Control Sample	119	108	97	93	104	97		
LCSD 320-498767/3-A	Lab Control Sample Dup	132	117	101	96	105	101		
MB 320-498767/1-A	Method Blank	110	101	94	93	94	90		

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

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)
320-74830-5	Engine 2-W01	93	90	100	95	102	108	105	120
320-74830-6	Engine 3-W01	88	66	85	86	104	101	104	122
320-74830-7	Engine 4-W01	89	71	90	84	104	104	98	111
320-74830-8	Engine 4-FB	98	89	96	93	101	97	98	96
LCS 320-498766/2-A	Lab Control Sample	92	95	101	98	96	106	104	105
LCSD 320-498766/3-A	Lab Control Sample Dup	90	96	93	92	87	96	91	97
MB 320-498766/1-A	Method Blank	92	89	96	94	92	97	95	91

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Job ID: 320-74830-1
Project/Site: Fairbanks Int. Airport

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Matrix: Water
Prep Type: Total/NA

		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)		
320-74830-5	Engine 2-W01	92	89	100	104	112	82		
320-74830-6	Engine 3-W01	79	75	90	85	92	76		
320-74830-7	Engine 4-W01	86	84	91	95	86	78		
320-74830-8	Engine 4-FB	95	89	91	92	97	96		
LCS 320-498766/2-A	Lab Control Sample	105	98	92	89	100	97		
LCSD 320-498766/3-A	Lab Control Sample Dup	93	86	85	90	84	87		
MB 320-498766/1-A	Method Blank	93	96	90	92	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

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Lab Sample ID: MB 320-498766/1-A
Matrix: Water
Analysis Batch: 500660

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 498766

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		06/15/21 19:34	06/22/21 18:27	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		06/15/21 19:34	06/22/21 18:27	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		06/15/21 19:34	06/22/21 18:27	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		06/15/21 19:34	06/22/21 18:27	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		06/15/21 19:34	06/22/21 18:27	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		06/15/21 19:34	06/22/21 18:27	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		06/15/21 19:34	06/22/21 18:27	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		06/15/21 19:34	06/22/21 18:27	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		06/15/21 19:34	06/22/21 18:27	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		06/15/21 19:34	06/22/21 18:27	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		06/15/21 19:34	06/22/21 18:27	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		06/15/21 19:34	06/22/21 18:27	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		06/15/21 19:34	06/22/21 18:27	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		06/15/21 19:34	06/22/21 18:27	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.0	0.24	ng/L		06/15/21 19:34	06/22/21 18:27	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.0	1.5	ng/L		06/15/21 19:34	06/22/21 18:27	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.0	0.32	ng/L		06/15/21 19:34	06/22/21 18:27	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		06/15/21 19:34	06/22/21 18:27	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*92*		*50 - 150*	*06/15/21 19:34*	*06/22/21 18:27*	*1*
13C4 PFHpA	*89*		*50 - 150*	*06/15/21 19:34*	*06/22/21 18:27*	*1*
13C4 PFOA	*96*		*50 - 150*	*06/15/21 19:34*	*06/22/21 18:27*	*1*
13C5 PFNA	*94*		*50 - 150*	*06/15/21 19:34*	*06/22/21 18:27*	*1*
13C2 PFDA	*92*		*50 - 150*	*06/15/21 19:34*	*06/22/21 18:27*	*1*
13C2 PFUnA	*97*		*50 - 150*	*06/15/21 19:34*	*06/22/21 18:27*	*1*
13C2 PFDoA	*95*		*50 - 150*	*06/15/21 19:34*	*06/22/21 18:27*	*1*
13C2 PFTeDA	*91*		*50 - 150*	*06/15/21 19:34*	*06/22/21 18:27*	*1*
13C3 PFBS	*93*		*50 - 150*	*06/15/21 19:34*	*06/22/21 18:27*	*1*
18O2 PFHxS	*96*		*50 - 150*	*06/15/21 19:34*	*06/22/21 18:27*	*1*
13C4 PFOS	*90*		*50 - 150*	*06/15/21 19:34*	*06/22/21 18:27*	*1*
d3-NMeFOSAA	*92*		*50 - 150*	*06/15/21 19:34*	*06/22/21 18:27*	*1*
d5-NEtFOSAA	*94*		*50 - 150*	*06/15/21 19:34*	*06/22/21 18:27*	*1*
13C3 HFPO-DA	*87*		*50 - 150*	*06/15/21 19:34*	*06/22/21 18:27*	*1*

Lab Sample ID: LCS 320-498766/2-A
Matrix: Water
Analysis Batch: 500660

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 498766

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorohexanoic acid (PFHxA)	40.0	43.0		ng/L		107	72 - 129
Perfluoroheptanoic acid (PFHpA)	40.0	41.1		ng/L		103	72 - 130
Perfluorooctanoic acid (PFOA)	40.0	37.5		ng/L		94	71 - 133
Perfluorononanoic acid (PFNA)	40.0	42.1		ng/L		105	69 - 130

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LCS 320-498766/2-A
Matrix: Water
Analysis Batch: 500660

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 498766

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorodecanoic acid (PFDA)	40.0	43.8		ng/L		109	71 - 129
Perfluoroundecanoic acid (PFUnA)	40.0	39.4		ng/L		99	69 - 133
Perfluorododecanoic acid (PFDoA)	40.0	40.4		ng/L		101	72 - 134
Perfluorotridecanoic acid (PFTriA)	40.0	39.0		ng/L		98	65 - 144
Perfluorotetradecanoic acid (PFTeA)	40.0	43.5		ng/L		109	71 - 132
Perfluorobutanesulfonic acid (PFBS)	35.4	32.6		ng/L		92	72 - 130
Perfluorohexanesulfonic acid (PFHxS)	36.4	34.7		ng/L		95	68 - 131
Perfluorooctanesulfonic acid (PFOS)	37.1	38.9		ng/L		105	65 - 140
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	46.7		ng/L		117	65 - 136
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	39.7		ng/L		99	61 - 135
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	37.3	41.0		ng/L		110	77 - 137
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	40.0	39.3		ng/L		98	72 - 132
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	37.7	41.9		ng/L		111	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.7	42.9		ng/L		114	81 - 141

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*92*		*50 - 150*
13C4 PFHpA	*95*		*50 - 150*
13C4 PFOA	*101*		*50 - 150*
13C5 PFNA	*98*		*50 - 150*
13C2 PFDA	*96*		*50 - 150*
13C2 PFUnA	*106*		*50 - 150*
13C2 PFDoA	*104*		*50 - 150*
13C2 PFTeDA	*105*		*50 - 150*
13C3 PFBS	*105*		*50 - 150*
18O2 PFHxS	*98*		*50 - 150*
13C4 PFOS	*92*		*50 - 150*
d3-NMeFOSAA	*89*		*50 - 150*
d5-NEtFOSAA	*100*		*50 - 150*
13C3 HFPO-DA	*97*		*50 - 150*

Lab Sample ID: LCSD 320-498766/3-A
Matrix: Water
Analysis Batch: 500660

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 498766

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	40.0	38.0		ng/L		95	72 - 129	12	30
Perfluoroheptanoic acid (PFHpA)	40.0	37.0		ng/L		92	72 - 130	10	30
Perfluorooctanoic acid (PFOA)	40.0	37.2		ng/L		93	71 - 133	1	30

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LCSD 320-498766/3-A
Matrix: Water
Analysis Batch: 500660

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 498766

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorononanoic acid (PFNA)			40.0	40.3		ng/L		101	69 - 130	4	30
Perfluorodecanoic acid (PFDA)			40.0	40.9		ng/L		102	71 - 129	7	30
Perfluoroundecanoic acid (PFUnA)			40.0	39.4		ng/L		99	69 - 133	0	30
Perfluorododecanoic acid (PFDoA)			40.0	41.6		ng/L		104	72 - 134	3	30
Perfluorotridecanoic acid (PFTriA)			40.0	36.9		ng/L		92	65 - 144	5	30
Perfluorotetradecanoic acid (PFTeA)			40.0	41.8		ng/L		104	71 - 132	4	30
Perfluorobutanesulfonic acid (PFBS)			35.4	32.6		ng/L		92	72 - 130	0	30
Perfluorohexanesulfonic acid (PFHxS)			36.4	35.7		ng/L		98	68 - 131	3	30
Perfluorooctanesulfonic acid (PFOS)			37.1	40.0		ng/L		108	65 - 140	3	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			40.0	39.3		ng/L		98	65 - 136	17	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			40.0	42.4		ng/L		106	61 - 135	7	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid			37.3	39.1		ng/L		105	77 - 137	5	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			40.0	40.1		ng/L		100	72 - 132	2	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid			37.7	38.7		ng/L		103	76 - 136	8	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			37.7	40.6		ng/L		108	81 - 141	5	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFHxA	*90*		*50 - 150*
13C4 PFHpA	*96*		*50 - 150*
13C4 PFOA	*93*		*50 - 150*
13C5 PFNA	*92*		*50 - 150*
13C2 PFDA	*87*		*50 - 150*
13C2 PFUnA	*96*		*50 - 150*
13C2 PFDoA	*91*		*50 - 150*
13C2 PFTeDA	*97*		*50 - 150*
13C3 PFBS	*93*		*50 - 150*
18O2 PFHxS	*86*		*50 - 150*
13C4 PFOS	*85*		*50 - 150*
d3-NMeFOSAA	*90*		*50 - 150*
d5-NEtFOSAA	*84*		*50 - 150*
13C3 HFPO-DA	*87*		*50 - 150*

Lab Sample ID: MB 320-498767/1-A
Matrix: Water
Analysis Batch: 499603

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 498767

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		0.00025	0.000073	mg/L		06/15/21 19:47	06/19/21 00:09	1
Perfluoroheptanoic acid (PFHpA)	ND		0.00025	0.000031	mg/L		06/15/21 19:47	06/19/21 00:09	1

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: MB 320-498767/1-A
Matrix: Water
Analysis Batch: 499603

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 498767

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	ND		0.00025	0.00011	mg/L		06/15/21 19:47	06/19/21 00:09	1
Perfluorononanoic acid (PFNA)	ND		0.00025	0.000034	mg/L		06/15/21 19:47	06/19/21 00:09	1
Perfluorodecanoic acid (PFDA)	ND		0.00025	0.000039	mg/L		06/15/21 19:47	06/19/21 00:09	1
Perfluoroundecanoic acid (PFUnA)	ND		0.00025	0.00014	mg/L		06/15/21 19:47	06/19/21 00:09	1
Perfluorododecanoic acid (PFDoA)	ND		0.00025	0.000069	mg/L		06/15/21 19:47	06/19/21 00:09	1
Perfluorotridecanoic acid (PFTriA)	ND		0.00025	0.00016	mg/L		06/15/21 19:47	06/19/21 00:09	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.00025	0.000036	mg/L		06/15/21 19:47	06/19/21 00:09	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.00025	0.000025	mg/L		06/15/21 19:47	06/19/21 00:09	1
Perfluorohexanesulfonic acid (PFHxS)	0.0000236	J	0.00025	0.000021	mg/L		06/15/21 19:47	06/19/21 00:09	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.00025	0.000068	mg/L		06/15/21 19:47	06/19/21 00:09	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.0025	0.00039	mg/L		06/15/21 19:47	06/19/21 00:09	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.0025	0.00024	mg/L		06/15/21 19:47	06/19/21 00:09	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.00025	0.000030	mg/L		06/15/21 19:47	06/19/21 00:09	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.00025	0.00019	mg/L		06/15/21 19:47	06/19/21 00:09	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.00025	0.000040	mg/L		06/15/21 19:47	06/19/21 00:09	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.00025	0.000023	mg/L		06/15/21 19:47	06/19/21 00:09	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*105*		*25 - 150*	*06/15/21 19:47*	*06/19/21 00:09*	*1*
13C4 PFHpA	*107*		*25 - 150*	*06/15/21 19:47*	*06/19/21 00:09*	*1*
13C4 PFOA	*103*		*25 - 150*	*06/15/21 19:47*	*06/19/21 00:09*	*1*
13C5 PFNA	*98*		*25 - 150*	*06/15/21 19:47*	*06/19/21 00:09*	*1*
13C2 PFDA	*100*		*25 - 150*	*06/15/21 19:47*	*06/19/21 00:09*	*1*
13C2 PFUnA	*109*		*25 - 150*	*06/15/21 19:47*	*06/19/21 00:09*	*1*
13C2 PFDoA	*114*		*25 - 150*	*06/15/21 19:47*	*06/19/21 00:09*	*1*
13C2 PFTeDA	*99*		*25 - 150*	*06/15/21 19:47*	*06/19/21 00:09*	*1*
13C3 PFBS	*110*		*25 - 150*	*06/15/21 19:47*	*06/19/21 00:09*	*1*
18O2 PFHxS	*101*		*25 - 150*	*06/15/21 19:47*	*06/19/21 00:09*	*1*
13C4 PFOS	*94*		*25 - 150*	*06/15/21 19:47*	*06/19/21 00:09*	*1*
d3-NMeFOSAA	*93*		*25 - 150*	*06/15/21 19:47*	*06/19/21 00:09*	*1*
d5-NEtFOSAA	*94*		*25 - 150*	*06/15/21 19:47*	*06/19/21 00:09*	*1*
13C3 HFPO-DA	*90*		*25 - 150*	*06/15/21 19:47*	*06/19/21 00:09*	*1*

Lab Sample ID: LCS 320-498767/2-A
Matrix: Water
Analysis Batch: 499603

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 498767

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorohexanoic acid (PFHxA)	0.00500	0.00490		mg/L		98	50 - 150
Perfluoroheptanoic acid (PFHpA)	0.00500	0.00499		mg/L		100	50 - 150
Perfluorooctanoic acid (PFOA)	0.00500	0.00511		mg/L		102	50 - 150
Perfluorononanoic acid (PFNA)	0.00500	0.00541		mg/L		108	50 - 150
Perfluorodecanoic acid (PFDA)	0.00500	0.00542		mg/L		108	50 - 150
Perfluoroundecanoic acid (PFUnA)	0.00500	0.00626		mg/L		125	50 - 150

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LCS 320-498767/2-A
Matrix: Water
Analysis Batch: 499603

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 498767

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorododecanoic acid (PFDoA)			0.00500	0.00556		mg/L		111	50 - 150		
Perfluorotridecanoic acid (PFTriA)			0.00500	0.00533		mg/L		107	50 - 150		
Perfluorotetradecanoic acid (PFTeA)			0.00500	0.00536		mg/L		107	50 - 150		
Perfluorobutanesulfonic acid (PFBS)			0.00442	0.00430		mg/L		97	50 - 150		
Perfluorohexanesulfonic acid (PFHxS)			0.00455	0.00485		mg/L		107	50 - 150		
Perfluorooctanesulfonic acid (PFOS)			0.00464	0.00517		mg/L		111	50 - 150		
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			0.00500	0.00562		mg/L		112	50 - 150		
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			0.00500	0.00514		mg/L		103	50 - 150		
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid			0.00466	0.00487		mg/L		104	50 - 150		
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			0.00500	0.00546		mg/L		109	50 - 150		
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid			0.00471	0.00550		mg/L		117	50 - 150		
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			0.00471	0.00543		mg/L		115	50 - 150		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*108*		*25 - 150*
13C4 PFHpA	*116*		*25 - 150*
13C4 PFOA	*109*		*25 - 150*
13C5 PFNA	*107*		*25 - 150*
13C2 PFDA	*104*		*25 - 150*
13C2 PFUnA	*95*		*25 - 150*
13C2 PFDoA	*108*		*25 - 150*
13C2 PFTeDA	*104*		*25 - 150*
13C3 PFBS	*119*		*25 - 150*
18O2 PFHxS	*108*		*25 - 150*
13C4 PFOS	*97*		*25 - 150*
d3-NMeFOSAA	*93*		*25 - 150*
d5-NEtFOSAA	*104*		*25 - 150*
13C3 HFPO-DA	*97*		*25 - 150*

Lab Sample ID: LCSD 320-498767/3-A
Matrix: Water
Analysis Batch: 499603

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 498767

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)			0.00500	0.00484		mg/L		97	50 - 150	1	30
Perfluoroheptanoic acid (PFHpA)			0.00500	0.00497		mg/L		99	50 - 150	0	30
Perfluorooctanoic acid (PFOA)			0.00500	0.00529		mg/L		106	50 - 150	3	30
Perfluorononanoic acid (PFNA)			0.00500	0.00552		mg/L		110	50 - 150	2	30
Perfluorodecanoic acid (PFDA)			0.00500	0.00537		mg/L		107	50 - 150	1	30

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LCSD 320-498767/3-A
Matrix: Water
Analysis Batch: 499603

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 498767

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluoroundecanoic acid (PFUnA)			0.00500	0.00522		mg/L		104	50 - 150	18	30
Perfluorododecanoic acid (PFDoA)			0.00500	0.00518		mg/L		104	50 - 150	7	30
Perfluorotridecanoic acid (PFTriA)			0.00500	0.00489		mg/L		98	50 - 150	9	30
Perfluorotetradecanoic acid (PFTeA)			0.00500	0.00494		mg/L		99	50 - 150	8	30
Perfluorobutanesulfonic acid (PFBS)			0.00442	0.00384		mg/L		87	50 - 150	11	30
Perfluorohexanesulfonic acid (PFHxS)			0.00455	0.00460		mg/L		101	50 - 150	5	30
Perfluorooctanesulfonic acid (PFOS)			0.00464	0.00492		mg/L		106	50 - 150	5	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			0.00500	0.00521		mg/L		104	50 - 150	8	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			0.00500	0.00535		mg/L		107	50 - 150	4	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid			0.00466	0.00492		mg/L		106	50 - 150	1	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			0.00500	0.00529		mg/L		106	50 - 150	3	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid			0.00471	0.00579		mg/L		123	50 - 150	5	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			0.00471	0.00546		mg/L		116	50 - 150	1	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFHxA	*111*		*25 - 150*
13C4 PFHpA	*120*		*25 - 150*
13C4 PFOA	*111*		*25 - 150*
13C5 PFNA	*111*		*25 - 150*
13C2 PFDA	*100*		*25 - 150*
13C2 PFUnA	*113*		*25 - 150*
13C2 PFDoA	*113*		*25 - 150*
13C2 PFTeDA	*109*		*25 - 150*
13C3 PFBS	*132*		*25 - 150*
18O2 PFHxS	*117*		*25 - 150*
13C4 PFOS	*101*		*25 - 150*
d3-NMeFOSAA	*96*		*25 - 150*
d5-NEtFOSAA	*105*		*25 - 150*
13C3 HFPO-DA	*101*		*25 - 150*

LCMS

Prep Batch: 498766

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-74830-5	Engine 2-W01	Total/NA	Water	3535	
320-74830-6	Engine 3-W01	Total/NA	Water	3535	
320-74830-7	Engine 4-W01	Total/NA	Water	3535	
320-74830-8	Engine 4-FB	Total/NA	Water	3535	
MB 320-498766/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-498766/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-498766/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Prep Batch: 498767

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-74830-1	Engine 2	Total/NA	Water	AFFF Prep	
320-74830-2	Engine 3	Total/NA	Water	AFFF Prep	
320-74830-3	Engine 4	Total/NA	Water	AFFF Prep	
320-74830-4	Engine 5	Total/NA	Water	AFFF Prep	
320-74830-9	C6 AFFF	Total/NA	Water	AFFF Prep	
MB 320-498767/1-A	Method Blank	Total/NA	Water	AFFF Prep	
LCS 320-498767/2-A	Lab Control Sample	Total/NA	Water	AFFF Prep	
LCSD 320-498767/3-A	Lab Control Sample Dup	Total/NA	Water	AFFF Prep	

Analysis Batch: 499603

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 320-498767/1-A	Method Blank	Total/NA	Water	EPA 537(Mod)	498767
LCS 320-498767/2-A	Lab Control Sample	Total/NA	Water	EPA 537(Mod)	498767
LCSD 320-498767/3-A	Lab Control Sample Dup	Total/NA	Water	EPA 537(Mod)	498767

Analysis Batch: 499870

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-74830-8	Engine 4-FB	Total/NA	Water	EPA 537(Mod)	498766

Analysis Batch: 500645

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-74830-1	Engine 2	Total/NA	Water	EPA 537(Mod)	498767
320-74830-2	Engine 3	Total/NA	Water	EPA 537(Mod)	498767
320-74830-9	C6 AFFF	Total/NA	Water	EPA 537(Mod)	498767

Analysis Batch: 500660

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-74830-5	Engine 2-W01	Total/NA	Water	EPA 537(Mod)	498766
320-74830-6	Engine 3-W01	Total/NA	Water	EPA 537(Mod)	498766
320-74830-7	Engine 4-W01	Total/NA	Water	EPA 537(Mod)	498766
MB 320-498766/1-A	Method Blank	Total/NA	Water	EPA 537(Mod)	498766
LCS 320-498766/2-A	Lab Control Sample	Total/NA	Water	EPA 537(Mod)	498766
LCSD 320-498766/3-A	Lab Control Sample Dup	Total/NA	Water	EPA 537(Mod)	498766

Analysis Batch: 501078

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-74830-3	Engine 4	Total/NA	Water	EPA 537(Mod)	498767
320-74830-4	Engine 5	Total/NA	Water	EPA 537(Mod)	498767

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int. Airport

Job ID: 320-74830-1

Client Sample ID: Engine 2
Date Collected: 06/07/21 12:02
Date Received: 06/10/21 15:35

Lab Sample ID: 320-74830-1
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	AFFF Prep			0.002 mL	10.0 mL	498767	06/15/21 19:47	AP	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			500645	06/22/21 14:13	S1M	TAL SAC

Client Sample ID: Engine 3
Date Collected: 06/07/21 12:10
Date Received: 06/10/21 15:35

Lab Sample ID: 320-74830-2
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	AFFF Prep			0.002 mL	10.0 mL	498767	06/15/21 19:47	AP	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			500645	06/22/21 14:23	S1M	TAL SAC

Client Sample ID: Engine 4
Date Collected: 06/07/21 12:15
Date Received: 06/10/21 15:35

Lab Sample ID: 320-74830-3
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	AFFF Prep			0.002 mL	10.0 mL	498767	06/15/21 19:47	AP	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		5			501078	06/23/21 21:06	S1M	TAL SAC

Client Sample ID: Engine 5
Date Collected: 06/07/21 12:20
Date Received: 06/10/21 15:35

Lab Sample ID: 320-74830-4
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	AFFF Prep			0.002 mL	10.0 mL	498767	06/15/21 19:47	AP	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			501078	06/23/21 21:15	S1M	TAL SAC

Client Sample ID: Engine 2-W01
Date Collected: 06/07/21 14:10
Date Received: 06/10/21 15:35

Lab Sample ID: 320-74830-5
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			268.1 mL	10.00 mL	498766	06/15/21 19:34	VP	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		10			500660	06/22/21 20:29	K1S	TAL SAC

Client Sample ID: Engine 3-W01
Date Collected: 06/07/21 14:25
Date Received: 06/10/21 15:35

Lab Sample ID: 320-74830-6
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			293.4 mL	10.00 mL	498766	06/15/21 19:34	VP	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			500660	06/22/21 19:33	K1S	TAL SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int. Airport

Job ID: 320-74830-1

Client Sample ID: Engine 4-W01

Lab Sample ID: 320-74830-7

Date Collected: 06/07/21 14:30

Matrix: Water

Date Received: 06/10/21 15:35

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			291.6 mL	10.00 mL	498766	06/15/21 19:34	VP	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			500660	06/22/21 19:43	K1S	TAL SAC

Client Sample ID: Engine 4-FB

Lab Sample ID: 320-74830-8

Date Collected: 06/07/21 14:35

Matrix: Water

Date Received: 06/10/21 15:35

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			268.9 mL	10.00 mL	498766	06/15/21 19:34	VP	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			499870	06/20/21 03:36	K1S	TAL SAC

Client Sample ID: C6 AFFF

Lab Sample ID: 320-74830-9

Date Collected: 06/07/21 14:50

Matrix: Water

Date Received: 06/10/21 15:35

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	AFFF Prep			0.002 mL	10.0 mL	498767	06/15/21 19:47	AP	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			500645	06/22/21 14:32	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: Fairbanks Int. Airport

Job ID: 320-74830-1

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

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int. Airport

Job ID: 320-74830-1

Method	Method Description	Protocol	Laboratory
EPA 537(Mod)	PFAS for QSM 5.3, Table B-15	EPA	TAL SAC
3535	Solid-Phase Extraction (SPE)	SW846	TAL SAC
AFFF Prep	Preparation, AFFF	None	TAL SAC

Protocol References:

EPA = US Environmental Protection Agency

None = None

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: Fairbanks Int. Airport

Job ID: 320-74830-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
320-74830-1	Engine 2	Water	06/07/21 12:02	06/10/21 15:35	
320-74830-2	Engine 3	Water	06/07/21 12:10	06/10/21 15:35	
320-74830-3	Engine 4	Water	06/07/21 12:15	06/10/21 15:35	
320-74830-4	Engine 5	Water	06/07/21 12:20	06/10/21 15:35	
320-74830-5	Engine 2-W01	Water	06/07/21 14:10	06/10/21 15:35	
320-74830-6	Engine 3-W01	Water	06/07/21 14:25	06/10/21 15:35	
320-74830-7	Engine 4-W01	Water	06/07/21 14:30	06/10/21 15:35	
320-74830-8	Engine 4-FB	Water	06/07/21 14:35	06/10/21 15:35	
320-74830-9	C6 AFFF	Water	06/07/21 14:50	06/10/21 15:35	

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600
www.shannonwilson.com

CHAIN-OF-CUSTODY RECORD

Laboratory Test America Eurofins
Attn: David Alltucker

Turn Around Time:	Quote No: —	J-Flags:
[X] Normal [ ] Rush		[X] Yes [ ] No
Please Specify		

Analytical Methods (include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	18 PFAS in EPA 537.1 List (Modified Method)	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
Engine 2		1202	6/7/21	X	1	Pure product, C6 AFFF
Engine 3		1210		X	1	↓
Engine 4		1215		X	1	
Engine 5		1220		X	1	
Engine 2-W01		1410		X	2	High-concentration rinse water
Engine 3-W01		1425		X	2	↓
Engine 4-W01		1430		X	2	
Engine 4-FB		1435		X	2	Field Blank
C6 AFFF		1450		X	1	Pure product
				X(2)		

320-74830 Chain of Custody

Project Information	
Number:	102519-017
Name:	Fairbanks Int. Airport
Contact:	MDN
Ongoing Project?	Yes [X] No [ ]
Sampler:	MDN

Sample Receipt	
Total No. of Containers:	13
COC Seals/Intact? Y/N/NA	
Received Good Cond./Cold	
Temp:	
Delivery Method:	Goldstreak

Notes:
Requires dilution
(except for field blank sample Engine4-FB)
Several samples are pure AFFF, 100mL

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 1500	Signature: Time:	Signature: Time:
Printed Name: A. Mastrs Date: 6/9/21	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson, Inc.	Company:	Company:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: Time: 1535	Signature: Time:	Signature: Time:
Printed Name: Salvador Orozco Date: 6/10/21	Printed Name: Date:	Printed Name: Date:
Company: ERDSac	Company:	Company:

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

5.8°C

No. 36423

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-74830-1

Login Number: 74830
List Number: 1
Creator: Her, David A

List Source: Eurofins TestAmerica, Sacramento

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	1091841/1091847
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.	False	
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 <6mm (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:

Amber Masters

Title:

Environmental Scientist

Date:

July 7, 2021

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

Eurofins / TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-74830-1REV.1

Laboratory Report Date:

July 7, 2021

CS Site Name:

FAI Statewide PFAS

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-74830-1REV.1

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 per- and polyfluorinated alkyl substances (PFAS) on February 11, 2021 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 the TestAmerica laboratory in 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:

   PFAS samples do not require preservation other than temperature control.

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

   Yes☒ No☐ N/A☐ Comments:

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 noted that sample bottles were not filled completely. The pure AFFF samples were expected to have high concentrations of PFAS, requiring dilution prior to analysis. The laboratory requested approximately 100mL of liquid for these samples. The results are unaffected by the lowered volume of sample.

e. Data quality or usability affected?

Comments:

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

4. Case Narrative

a. Present and understandable?

Yes☒ No☐ N/A☐ Comments:

Laboratory Report Date:

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

Yes☒ No☐ N/A☐ Comments:

This report has been revised to replace case narrative missing from original report.

The case narrative notes the following:

The laboratory applied an 'I' qualifier to the PFOS results of sample *Engine 2, Engine 3, Engine 4,* and *Engine 5* to indicate the transition mass ratio was outside established ratio limits.

Results for samples *Engine-2-W01* and *Engine 4* 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 counts were within acceptance limits.

AFFF samples are processed at various dilutions as concentrations can vary greatly. We perform serial dilutions of a 1 mL aliquot of sample at the bench level. The laboratory reports the most concentrated results it can. The following samples were processed using a 0.002 mL sample aliquot equivalent. Matrix interferences prevented analysis of a larger sample aliquot equivalent. This was noted for samples *Engine 2*, *Engine 3, Engine 4, Engine 5,* and *C6 AFFF*.

Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-498766 and 320—498-767.

The following samples were observed to be brown and foamy prior to extraction: *Engine 2*, *Engine 3, Engine 4, Engine 5,* and *C6 AFFF*.

c. Were all corrective actions documented?

Yes☐ No☐ N/A☒ 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 qualitative identification of PFOS has some degree of uncertainty. However, analyst judgment was used to positively identify the analyte. Consequently, the PFOS results in the above samples are considered estimates, with no direction of bias, and flagged J* in the following samples: *Engine 2, Engine 3, Engine 4,* and *Engine 5.*

5. Samples Results

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

Yes☒ No☐ N/A☐ Comments:

Laboratory Report Date:

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:

No regulatory value exists for PFAS in an ARFF truck.

e. Data quality or usability affected?

The data quality and usability were 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:

No analytes were detected in method blank samples above the LOQ; however, PFHxS was detected below the LOQ in method blank sample associated with preparatory batch 498767.

PFHxS was detected in the following associated project samples greater than ten times the concentration detected in the method blank sample: *Engine 2*, *Engine 3, Engine 4, Engine 5,* and *C6 AFFF*. The PFHxS results for these samples are not affected.

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

Comments:

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:

The data quality/usability is not affected; 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/LCSD pair was reported for preparation batches 498766 and 498767.

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

Yes☐ No☐ N/A☒ Comments:

Metals/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:

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

Comments:

N/A; method accuracy and precision was 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☐ N/A☒ 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 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 sample volume available to perform an MS/MSD. See LCS/LCSD discussion for evaluation of analytical accuracy and precision.

ii. Metals/Inorganics – one MS and one MSD reported per matrix, analysis and 20 samples?

Yes☐ No☐ N/A☒ Comments:

Metals/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.

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

Comments:

NA; 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:

The data quality and/or usability was 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:

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.

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

Comments:

N/A; 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:

A field duplicate pair was not submitted with this work order.

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)

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

Where R_1 = Sample Concentration
R_2 = Field Duplicate Concentration

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

The data quality and/or usability was 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:

Reusable equipment was not utilized during the sample collection process for the field samples included in this work order. An equipment blank is not required.

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

Yes☐ No☐ N/A☒ Comments:

No equipment blank was submitted with this work order.

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

Comments:

N/A; an equipment blank was not required.

iii. Data quality or usability affected?

Comments:

The data quality/usability is not affected; see above.

Laboratory Report Date:

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

a. Defined and appropriate?

Yes☐ No☐ N/A☒ Comments:

A field blank was also submitted. No analytes were detected in the field blank.

IMPORTANT INFORMATION

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

IMPORTANT INFORMATION

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.

IMPORTANT INFORMATION

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