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FINAL

SUMMARY REPORT

FY2024 Tall Spruce Monitoring Well Sampling

FAIRBANKS, ALASKA

SHANNON & WILSON

April 2024

Shannon & Wilson No: 102519-029

Submitted To: Fairbanks International Airport
6450 Airport Way, Suite 1
Fairbanks, Alaska 99709
Attn: Jake Matter, Environmental Manager

Subject: FINAL SUMMARY REPORT, FY2024 TALL SPRUCE MONITORING WELL SAMPLING, FAIRBANKS, ALASKA

Shannon & Wilson, Inc. (S&W) has prepared this report and participated in this project as a consultant to Alaska Department of Transportation and Public Facilities (DOT&PF) Fairbanks International Airport (FAI). S&W's services were performed as described in our proposal dated February 8, 2023, and authorized in notice to proceed issued on June 19, 2023 by DOT&PF under Professional Services Agreement Number 25-19-013 Per- *and Polyfluorinated Substances (PFAS) Related Environmental & Engineering Services*.

This report presents a summary of S&W's monitoring well sampling efforts which took place in October 2023 and February 2024.

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

Ashley Jaramillo
Senior Chemist
Role: Project Manager

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ACRONYMS

°C	degrees Celsius
11CL-PF3OUdS	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid
AAC	Alaska Administrative Code
ADONA	4,8-dioxa-3H-perfluorononanoic acid
AFFF	aqueous film-forming foam
bgs	below ground surface
CSM	conceptual site model
CUC	College Utilities Corporation
DEC	Alaska Department of Environmental Conservation
DO	dissolved oxygen
DoD	Department of Defense
DOT&PF	Alaska Department of Transportation and Public Facilities
EPA	U.S. Environmental Protection Agency
Eurofins	Eurofins Environment Testing America
FAI	Fairbanks International Airport
GAC	granular activated carbon
GWP	General Work Plan
HFPO-DA	hexafluoropropylene oxide dimer acid
IDW	investigative-derived waste
LDRC	Laboratory Data Review Checklist
LHA	lifetime health advisory level
mg/kg	milligrams per kilogram
mL	milliliter
mV	millivolt
MW	monitoring well
ng/L	nanograms per liter
oz	ounce
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutanesulfonic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonic acid
POC	point of contact
QSM	Quality Systems Manual
S&W	Shannon & Wilson, Inc.

µS/cm	micro-siemens per centimeter
WSW	water supply well
YSI	multiprobe water quality meter

1 INTRODUCTION

Shannon & Wilson, Inc. (S&W) has prepared this report to document the monitoring well (MW) groundwater sampling events in the Tall Spruce neighborhood on the west side of the Chena River near the Fairbanks International Airport (FAI) in Fairbanks, Alaska (Figure 1). This report covers activities performed in October 2023 and February 2024.

The FAI is an active, Alaska Department of Environmental Conservation (DEC) listed contaminated site due to the presence of per- and polyfluoroalkyl substances (PFAS) in groundwater (File Number 100.38.277, Hazard ID 26816). The primary means by which PFAS was introduced into the environment at FAI is the historical use of aqueous film-forming foam (AFFF) for use in training and fire suppression.

Exhibit 1-1: Airport Information

Airport Name:	Fairbanks International Airport
Airport Code:	FAI
DEC File No. / Hazard ID:	100.38.277 / 26816
Airport Address:	6450 Airport Way, Fairbanks, AK 99709
FAI POC:	Jake Matter
DOT&PF PFAS POC:	Melanie Bray
Airport Type:	Current Part 139 Airport
Airport Coordinates (Lat/Long):	64.8130, -147.8731

DEC = Alaska Department of Environmental Conservation, DOT&PF = Alaska Department of Transportation and Public Facilities; FAI= Fairbanks International Airport, PFAS = per- and polyfluoroalkyl substances, POC = point of contact

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

1.1 Purpose and Objectives

DOT&PF requested S&W sample MWs in the Tall Spruce neighborhood as part of ongoing site characterization efforts associated with the PFAS contamination originating from the FAI. The goal was to evaluate changes to groundwater PFAS concentrations in the Tall Spruce neighborhood at variable depths. The information will be used to evaluate the fate and transport of PFAS resulting from the use of AFFF at the FAI.

1.2 Background

Water supply well (WSW) sampling for the presence of PFAS at DOT&PF sites began with the FAI in 2017. Perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) were reported above the respective DEC groundwater cleanup levels in several groundwater MWs on airport property. This led to an off-airport WSW search and sampling event.

Beginning in November 2017, the FAI observed PFOS and PFOA above the applicable action level for drinking water in numerous WSWs in neighborhoods downgradient of the airport. Two WSWs, located on the western side of the Chena River on Tall Spruce Road, were identified as having PFAS concentrations above the applicable action level (Figure 2). Interim alternative water has been provided to the locations with PFAS-impacted WSWs and those who have potentially PFAS-impacted WSWs (i.e. close proximity to PFAS-impacted wells).

Quarterly and annual monitoring of WSWs for PFAS began in February 2018 and continued through February 2019 when FAI made the decision to offer PFAS-impacted WSW owners a connection to College Utilities Corporation (CUC) water system, including Tall Spruce Road. Most of the properties with PFAS-impacted WSWs within the plume area have been connected to the CUC water system, and the wells are no longer in use. As applicable, negotiations are ongoing between FAI and the few remaining properties with PFAS-impacted wells regarding CUC service connections.

PFAS site characterization work began in 2018 by FAI term contractors. Exceedances to the applicable DEC soil and groundwater cleanup levels were observed in samples collected from various locations at the airport. The FAI commenced decommissioning the former fire training pit in 2019 and completed the corrective action effort in 2020 (Figure 1).

1.2.1 2022 Tall Spruce Monitoring Well Installation and Sampling

In September of 2022, GeoTek Alaska, Inc. installed a cluster of four MWs in the Tall Spruce Neighborhood. The MWs were installed to depths of 20 feet below ground surface (bgs), 40 feet bgs, 60 feet bgs, and 80 feet bgs. During installation, six soil samples were collected from the deepest MW boring for PFAS analysis. Soil samples were collected below the water table from 13 feet bgs to 78 feet bgs. None of the soil samples contained detectable concentrations of the target PFAS analytes.

After installation, the wells were developed and sampled for PFAS. Each groundwater sample collected from the MWs contained detectable concentrations of perfluorobutanesulfonic acid (PFBS), perfluorohexanesulfonic acid (PFHxS), PFOA, and

PFOS. Additionally, perfluoroheptanoic acid (PFHpA), perfluorohexanoic acid (PFHxA), and perfluorononanoic acid (PFNA) were also detected in most of the wells. None of the detected concentrations exceeded DEC groundwater cleanup levels.

1.3 Site Location and Boundaries

The Tall Spruce neighborhood is located in the south-west part of Fairbanks, Alaska, on the west side of the Chena River from FAI. The Tall Spruce subdivision road, "Tall Spruce Road," is a publicly dedicated road located outside of a road service area and is therefore privately maintained. The monitoring wells are located within the 30-foot public utility easement on the western side of the road near the parcels identified by the Parcel Account Numbers 407330 and 407348. Parcel boundaries are shown on Figure 3.

1.4 Contaminants of Concern and Action Levels

The primary contaminants of concern are PFOS and PFOA. The current DEC action level for drinking water is 70 nanograms per liter (ng/L) for the sum of PFOS and PFOA. This threshold is detailed in the DEC's April 9, 2019 updated Technical Memorandum: *Action Levels for PFAS in Water and Guidance on Sampling Groundwater and Drinking Water*.

In June of 2022 the U.S. Environmental Protection Agency (EPA) released lifetime health advisory (LHA) levels for two additional PFAS. The advisory level for hexafluoropropylene oxide dimer acid (HFPO-DA) commonly referred to as GenX was set at 10 ng/L while the advisory level for PFBS was set at 2,000 ng/L. On June 15, 2022, the EPA issued updated interim LHAs for PFOS of 0.02 ng/L and for PFOA of 0.004 ng/L. The DEC is still reviewing these interim LHAs and has not yet issued updated guidance for the State of Alaska. Applicable regulatory action levels are outlined in Exhibit 1-2, below.

Exhibit 1-2: Applicable Regulatory Action Levels

Media	Compound	Level
Drinking water	PFOS + PFOA	70 ng/L
	HFPO-DA	10 ng/L
	PFBS	2,000 ng/L
Groundwater	PFOS	400 ng/L
	PFOA	400 ng/L
Soil	PFOS	0.003 mg/kg
	PFOA	0.0017 mg/kg

HFPO-DA = hexafluoropropylene oxide dimer acid; mg/kg = micrograms per kilogram; ng/L = nanograms per liter; PFBS = perfluorobutanesulfonic acid; PFOA = perfluorooctanoic acid; PFOS = perfluorooctanesulfonic acid

On October 2, 2019, DEC published an updated Technical Memorandum requesting samples be submitted for a longer list of PFAS analytes. Samples collected and summarized in this report were submitted for the following 18 PFAS analytes listed in Exhibit 1-3, below,

via a modified EPA Method 537 compliant with the Depart of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories version 5.3 Table B-15.

Exhibit 2-3: Reported PFAS Analytes

EPA 537M PFAS Analytes	
perfluorooctanesulfonic acid (PFOS)	perfluorotetradecanoic acid (PFTeA)
perfluorooctanoic acid (PFOA)	perfluorotridecanoic acid (PFTrDA or PFTriA)
perfluoroheptanoic acid (PFHpA)	perfluoroundecanoic acid (PFUnA)
perfluorononanoic acid (PFNA)	hexafluoropropylene oxide dimer acid (HFPO-DA)
perfluorohexanesulfonic acid (PFHxS)	N-ethyl perfluorooctane sulfonamidoacetic acid (N-EtFOSAA)
perfluorobutanesulfonic acid (PFBS)	N-methyl perfluorooctane sulfonamidoacetic acid (N-MeFOSAA)
perluorodecanoic acid (PFDA)	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUdS)
perluorododecanoic acid (PFDoA)	9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CL-PF3ONS)
perfluorohexanoic acid (PFHxA)	4,8-dioxa-3H-perfluorononanoic acid (DONA or ADONA)

2 FIELD ACTIVITIES

The following sections describe the field activities conducted in October 2023 and February 2024 as a part of MW sampling activities in the Tall Spruce neighborhood. Sampling procedures and analytical methods are described in our *Final General Work Plan (GWP) Addendum 026-FAI-002*, dated August 2023 and approved by DEC October 6, 2023.

S&W personnel who collected analytical samples for this project are State of Alaska Qualified Environmental Professionals as defined in 18 AAC 75.333[b].

2.1 Groundwater Sampling

S&W collected four primary groundwater samples and one field duplicate during each of the sampling events. Field staff purged the MWs using a submersible pump and new, disposable, PFAS-free tubing. Water quality parameters and stabilization criteria were measured prior to sample collection.

Field staff measured these parameters using a multiprobe water quality meter (YSI) and recorded pH, temperature in degrees Celsius (°C), conductivity in micro-Siemens per centimeter (µS/cm), dissolved oxygen (DO) in milligrams per liter, and redox potential in millivolts (mV) approximately once every three minutes until sample collection. The following values were used to indicate stability for a minimum of three consecutive readings: ±0.1 pH, ±3 percent °C, ±10 percent DO, ±3 percent conductivity, and ±10 mV redox. Water clarity (visual) was also recorded. Copies of the Monitoring Well Sampling Logs are included in Appendix A.

The water samples were collected into laboratory-supplied containers immediately after each well was purged. Groundwater samples were collected for PFAS analysis from each MW. A field duplicate sample was collected from MW-TS-1 during both sampling events.

S&W staff treated purge water with granular activated carbon (GAC) before discharging to the ground surface. A post-treatment GAC sample was collected at the end of each sampling event to monitor for PFAS break-through, and an equipment blank was collected to assess the potential for cross-contamination between samples and the re-usable, decontaminated equipment.

Exhibit 2-1: Sample Location Along Tall Spruce Road

2.2 Investigation Derived Waste

Liquid investigation derived waste (IDW) was treated using three in-line five-gallon GAC filters and discharged to the ground surface at least 100 feet from drainage ditches or surface water bodies. An effluent sample was collected from the GAC system following the completion of the sampling events. Results are presented in section 3.1 below.

Other IDW primarily consisted of disposable sampling equipment (nitrile gloves, pump tubing, etc.). These items were disposed of at an onsite dumpster and ultimately the Fairbanks North Star Borough Landfill.

2.3 Sample Custody, Storage, and Transport

Sample containers, preservation, and holding time requirements for samples are outlined in Exhibit 2-3, below. Immediately after collection, the sample bottles were placed in Ziploc bags and stored in a designated sample cooler maintained between 0 °C and 6 °C with ice substitute. S&W maintained custody of the samples until submitting them to the laboratory for analysis.

The analytical samples and chain-of-custody forms were packaged in a hard-plastic cooler with an adequate quantity of frozen-ice substitute and packing materials to prevent bottle breakage during shipping. Staff applied custody seals to the cooler, which were observed to be intact upon receipt by the laboratory.

S&W shipped the sample coolers to Eurofins Environment Testing America (Eurofins) in West Sacramento, California using Alaska Air Cargo's priority overnight service known as Goldstreak. This allowed sufficient time for the laboratory to analyze the samples within the holding time requirements of the analytical method.

Exhibit 2-3: Sample Containers, Preservation, and Holding Time Requirements

Analyte	Method	Media	Container and Sample Volume	Preservation	Holding Time
PFAS	DoD QSM 5.3 Table B-15	Water	2 x 250 mL polycarbonate	0 °C to 6 °C	14 days to extraction, analyzed within 40 days of extraction
		Soil	4-oz polycarbonate	0 °C to 6 °C	

1 °C = degrees Celsius, DoD = Department of Defense, mL = milliliter, oz = ounce, PFAS = per- and polyfluoroalkyl substances, QSM = Quality Systems Manual.

2.4 Deviations

In general, S&W conducted services in accordance with the approved proposals and procedures. The following are deviations from the proposed scope of services:

- During the October 2023 event, two in-line GAC buckets were used instead of the planned three GAC buckets. Freezing conditions made three buckets impracticable. Based on previous GAC effluent sample results, two GAC buckets were sufficient to treat the purge water prior to disposal to the ground surface.

3 ANALYTICAL RESULTS

S&W submitted the groundwater samples to Eurofins for analysis of 18 PFAS compounds using a method compliant with the DoD QSM for Environmental Laboratories version 5.3 Table B-15. These analytes are listed in Exhibit 1-3.

The Eurofins laboratory report and associated DEC Laboratory Data Review Checklists (LDRCs) are included in Appendix B. A quality assurance/quality control assessment of the data is included in Appendix C.

3.1 Groundwater Results

The groundwater samples collected during the October 2023 event contained detectable concentrations of PFOS, PFOA, PFBS, PFHpA, PFHxS, PFHxA, and 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS). The groundwater samples collected during the February 2024 event contained detectable concentrations of PFOS, PFOA, PFBS, PFHpA, PFHxS, PFHxA, 4,8-dioxa-3H-perfluorononanoic acid (ADONA), and 11Cl-PF3OUdS. None

of the detected concentrations exceeded DEC groundwater cleanup levels. A summary of the groundwater results is available in Table 1 (October 2023) and Table 2 (February 2024).

The GAC effluent sample collected during the October 2023 event had an estimated concentration of PFOS (detected below the laboratory reporting limit). The GAC effluent sample collected during the February 2024 event had an estimated concentration of 11Cl-PF3OUdS.

4 REVISED CONCEPTUAL SITE MODEL

A conceptual site model (CSM) describes potential pathways between a contaminant source and possible receptors (i.e., people, animals, and plants) and is used to determine who may be at risk of exposure to those contaminants. A DEC Human Health CSM Graphic Form and Human Health CSM Scoping Form was revised following the receipt of the most recent analytical results. These forms are included in Appendix D.

The groundwater samples collected from the MWs show that PFAS are present at low concentrations below the DEC Groundwater Cleanup Levels and below the current DEC Drinking Water Limits. Note, surface water samples were not collected as part of this project, so potential impacts resulting from exposure to surficial media is unknown.

5 DISCUSSION AND RECOMMENDATIONS

Due to the detections of PFOS and 11Cl-PF3OUdS in the GAC effluent sample, the three 5-gallon bucket GAC filtration set up will be disposed of during the next semi-annual event tentatively planned for late summer early fall 2024.

Based on our sampling efforts completed in October 2023 and February 2024, it does not appear that PFAS are present in the groundwater at concentrations above DEC action levels at the studied location off Tall Spruce Road. The low PFAS concentrations detected in the groundwater samples were consistent across the range of depths sampled in these MWs. This suggests that PFAS concentrations reaching the western bank of the Chena River are mixed/diluted and not stratified based on depth. S&W recommends that the DOT&PF continue to sample the MWs semi-annually to check for lateral PFAS migration and/or changes in concentration.

These recommendations are based on:

- Tall Spruce groundwater conditions inferred through analytical water samples collected for the project.

- Our understanding of the project and information provided by the DOT&PF, FAI, and other members of the project team.
- The current regulatory status of PFAS in groundwater and drinking water in Alaska.
- The limitations of S&W's approved Professional Services Agreement Number 25-19-013.

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 S&W. "Important Information about your Environmental Report" has been prepared and is included, to assist you and others in understanding the use and limitations of this report.

6 REFERENCES

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

Alaska Department of Environmental Conservation (DEC), 2017, 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.

Alaska Department of Environmental Conservation (DEC), 2021, 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), 2021, 18 AAC 75.345 Table C, Groundwater-Cleanup Levels.

U.S. Environmental Protection Agency (EPA) Office of Recourse Conservation and Recovery, Program Implementation and Information Division., 2009, Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance, March.

U.S. Environmental Protection Agency (EPA), 2016, Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA), Document Number 822-R-16-005: Washington, DC, U.S. EPA Office of Water, Health and Ecological Criteria Division, May, available: https://www.epa.gov/sites/production/files/2016-05/documents/pfoa_health_advisory_final_508.pdf

Table 1 — October 2023 PFAS Analytical Results

				Sample Name	MW-TS-1	MW-TS-101	MW-TS-2	MW-TS-3	MW-TS-4	EB-1	GAC
				Well Depth Below Ground Surface (feet)	20	20	40	60	80	--	--
				Collection Date	10/25/2023	10/25/2023	10/25/2023	10/25/2023	10/25/2023	10/25/2023	10/25/2023
				Sample Type	Project	Field Duplicate	Project	Project	Project	Equipment Blank	GAC Effluent
Method	Analyte	Regulatory Limit	Unit		Results	Results	Results	Results	Results	Results	Results
DoD QSM 5.3 Table B-15	Perfluorooctanesulfonic acid (PFOS)	400	ng/L		1.9 J	1.5 J	2.5	2.5	1.1 J	< 2.0	1.0 J
	Perfluorooctanoic acid (PFOA)	400	ng/L		3.7	3.4	4.0	8.8	3.4	< 2.0	< 2.0
	Hexafluoropropylene oxide dimer acid (HFPO-DA)	N/A	ng/L		< 4.1	< 3.7	< 4.2	< 4.2	< 3.8	< 4.0	< 4.0
	Perfluorobutanesulfonic acid (PFBS)	N/A	ng/L		1.2 J	1.1 J	0.75 J	1.5 J	0.44 J	< 2.0	< 2.0
	Perfluorodecanoic acid (PFDA)	N/A	ng/L		< 2.0	< 1.8	< 2.1	< 2.1	< 1.9	< 2.0	< 2.0
	Perfluorododecanoic acid (PFDoA)	N/A	ng/L		< 2.0 J*	< 1.8	< 2.1	< 2.1	< 1.9	< 2.0	< 2.0
	Perfluoroheptanoic acid (PFHpA)	N/A	ng/L		1.3 J	1.1 J	0.50 J	0.58 J	< 1.9	< 2.0	< 2.0
	Perfluorohexanesulfonic acid (PFHxS)	N/A	ng/L		2.7	2.5	4.8	14	5.1	< 2.0	< 2.0
	Perfluorohexanoic acid (PFHxA)	N/A	ng/L		2.5	2.4	2.0 J	4.7	2.0	< 2.0	< 2.0
	Perfluorononanoic acid (PFNA)	N/A	ng/L		< 2.0	< 1.8	< 2.1	< 2.1	< 1.9	< 2.0	< 2.0
	Perfluorotetradecanoic acid (PFTeA)	N/A	ng/L		< 2.0 J*	< 1.8	< 2.1	< 2.1	< 1.9	< 2.0	< 2.0
	Perfluorotridecanoic acid (PFTrDA)	N/A	ng/L		< 2.0 J*	< 1.8	< 2.1	< 2.1	< 1.9	< 2.0	< 2.0
	Perfluoroundecanoic acid (PFUnA)	N/A	ng/L		< 2.0	< 1.8	< 2.1	< 2.1	< 1.9	< 2.0	< 2.0
	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)	N/A	ng/L		< 2.0	< 1.8	< 2.1	< 2.1	< 1.9	< 2.0	< 2.0
	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	N/A	ng/L		< 2.0	< 1.8	< 2.1	0.59 J	< 1.9	< 2.0	< 2.0
	4,8-Dioxa-3H-perfluorononanoic acid (DONA)	N/A	ng/L		< 2.0	< 1.8	< 2.1	< 2.1	< 1.9	< 2.0	< 2.0
	N-Ethyl perfluorooctane sulfonamidoacetic acid (N-EtFOSAA)	N/A	ng/L		< 5.1	< 4.6	< 5.3	< 5.3	< 4.7	< 5.0	< 5.0
	N-Methyl perfluorooctane sulfonamidoacetic acid (N-MeFOSAA)	N/A	ng/L		< 5.1	< 4.6	< 5.3	< 5.3	< 4.7	< 5.0	< 5.0

Notes: Results reported from Eurofins Environment Testing America work order 320-106532-1
Regulatory limits from 18 AAC 75.345 Groundwater Cleanup Levels.

DoD Department of Defense
PFAS per- and polyfluoroalkyl substances
ng/L nanograms per liter
N/A No applicable regulatory limit exists for the associated analyte.
QSM Quality Systems Manual
< Analyte not detected; listed as less than the limit of detection unless otherwise flagged due to quality-control failures.
J Estimated concentration, detected greater than the detection limit and less than the limit of quantitation. Flag applied by the laboratory.
J* Estimated concentration due to quality control failures. Flag applied by Shannon & Wilson, Inc. (*)

Table 2 — February 2024 PFAS Analytical Results

				Sample Name	MW-TS-1	MW-TS-101	MW-TS-2	MW-TS-3	MW-TS-4	EB-1	GAC
				Well Depth Below Ground Surface (feet)	20	20	40	60	80	--	--
				Collection Date	2/22/2024	2/22/2024	2/22/2024	2/22/2024	2/22/2024	2/22/2024	2/22/2024
				Sample Type	Project	Field Duplicate	Project	Project	Project	Equipment Blank	GAC Effluent
Method	Analyte	Regulatory Limit	Unit		Results	Results	Results	Results	Results	Results	Results
DoD QSM 5.3 Table B-15	Perfluorooctanesulfonic acid (PFOS)	400	ng/L		2.1	2.1	1.5 J*	2.0	1.1 J	< 1.8	< 1.8
	Perfluorooctanoic acid (PFOA)	400	ng/L		4.9	4.7	3.9 J*	6.8	3.0	< 1.8	1.1 J
	Hexafluoropropylene oxide dimer acid (HFPO-DA)	N/A	ng/L		< 3.6	< 3.7	< 3.7 J*	< 3.5	< 3.6	< 3.6	< 3.7
	Perfluorobutanesulfonic acid (PFBS)	N/A	ng/L		1.4 J	1.2 J	0.81 J*	1.1 J	0.54 J	< 1.8	< 1.8
	Perfluorodecanoic acid (PFDA)	N/A	ng/L		< 1.8	< 1.9	< 1.8 J*	< 1.8	< 1.8	< 1.8	< 1.8
	Perfluorododecanoic acid (PFDoA)	N/A	ng/L		< 1.8	< 1.9	< 1.8 J*	< 1.8	< 1.8	< 1.8	< 1.8
	Perfluoroheptanoic acid (PFHpA)	N/A	ng/L		1.1 J	1.1 J	0.37 J*	0.44 J*	< 1.8	< 1.8	< 1.8
	Perfluorohexanesulfonic acid (PFHxS)	N/A	ng/L		3.1	2.8	4.9 J*	11	4.4	< 1.8	< 1.8
	Perfluorohexanoic acid (PFHxA)	N/A	ng/L		2.7	2.6	2.0 J*	3.1	1.5 J	< 1.8	< 1.8
	Perfluorononanoic acid (PFNA)	N/A	ng/L		< 1.8	< 1.9	< 1.8 J*	< 1.8	< 1.8	< 1.8	< 1.8
	Perfluorotetradecanoic acid (PFTeA)	N/A	ng/L		< 1.8	< 1.9	< 1.8 J*	< 1.8	< 1.8	< 2.0 N*	< 1.8
	Perfluorotridecanoic acid (PFTrDA)	N/A	ng/L		< 1.8	< 1.9	< 1.8 J*	< 1.8	< 1.8	< 1.8	< 1.8
	Perfluoroundecanoic acid (PFUnA)	N/A	ng/L		< 1.8	< 1.9	< 1.8 J*	< 1.8	< 1.8	< 1.8	< 1.8
	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)	N/A	ng/L		< 1.8	< 1.9	< 1.8 J*	< 1.8	< 1.8	< 1.8	< 1.8
	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	N/A	ng/L		< 1.8	< 1.9	< 1.8 J*	< 1.8	< 1.8	< 1.8	0.29 J
	4,8-Dioxa-3H-perfluorononanoic acid (DONA)	N/A	ng/L		< 1.8	< 1.9	0.43 J*	< 1.8	< 1.8	< 1.8	< 1.8
	N-Ethyl perfluorooctane sulfonamidoacetic acid (N-EtFOSAA)	N/A	ng/L		< 4.5	< 4.7	< 4.6 J*	< 4.4	< 4.4	< 4.5	< 4.6
	N-Methyl perfluorooctane sulfonamidoacetic acid (N-MeFOSAA)	N/A	ng/L		< 4.5	< 4.7	< 4.6 J*	< 4.4	< 4.4	< 4.5	< 4.6

Notes: Results reported from Eurofins Environment Testing America work order 320-110042-1
Regulatory limits from 18 AAC 75.345 Groundwater Cleanup Levels.

DoD Department of Defense
PFAS per- and polyfluoroalkyl substances
ng/L nanograms per liter
N/A No applicable regulatory limit exists for the associated analyte.
QSM Quality Systems Manual
< Analyte not detected; listed as less than the limit of detection unless otherwise flagged due to quality-control failures.
J Estimated concentration, detected greater than the detection limit and less than the limit of quantitation. Flag applied by the laboratory.
J* Estimated concentration due to quality control failures. Flag applied by Shannon & Wilson, Inc. (*)
N* Estimated concentration due to quality control failures. Flag applied by Shannon & Wilson, Inc. (*)

Path: T:\GIS_Projects\FAI\Tall Spruce Addendum\Fig 1_Vicinity Map_2023.mxd Author: BRL User: NWL Date: 4/2/2024

Map adapted from aerial imagery provided by Pictometry International Corporation, 2022. Available: https://gisportal.fnsb.gov/image/rest/services.

0 2,000 Feet

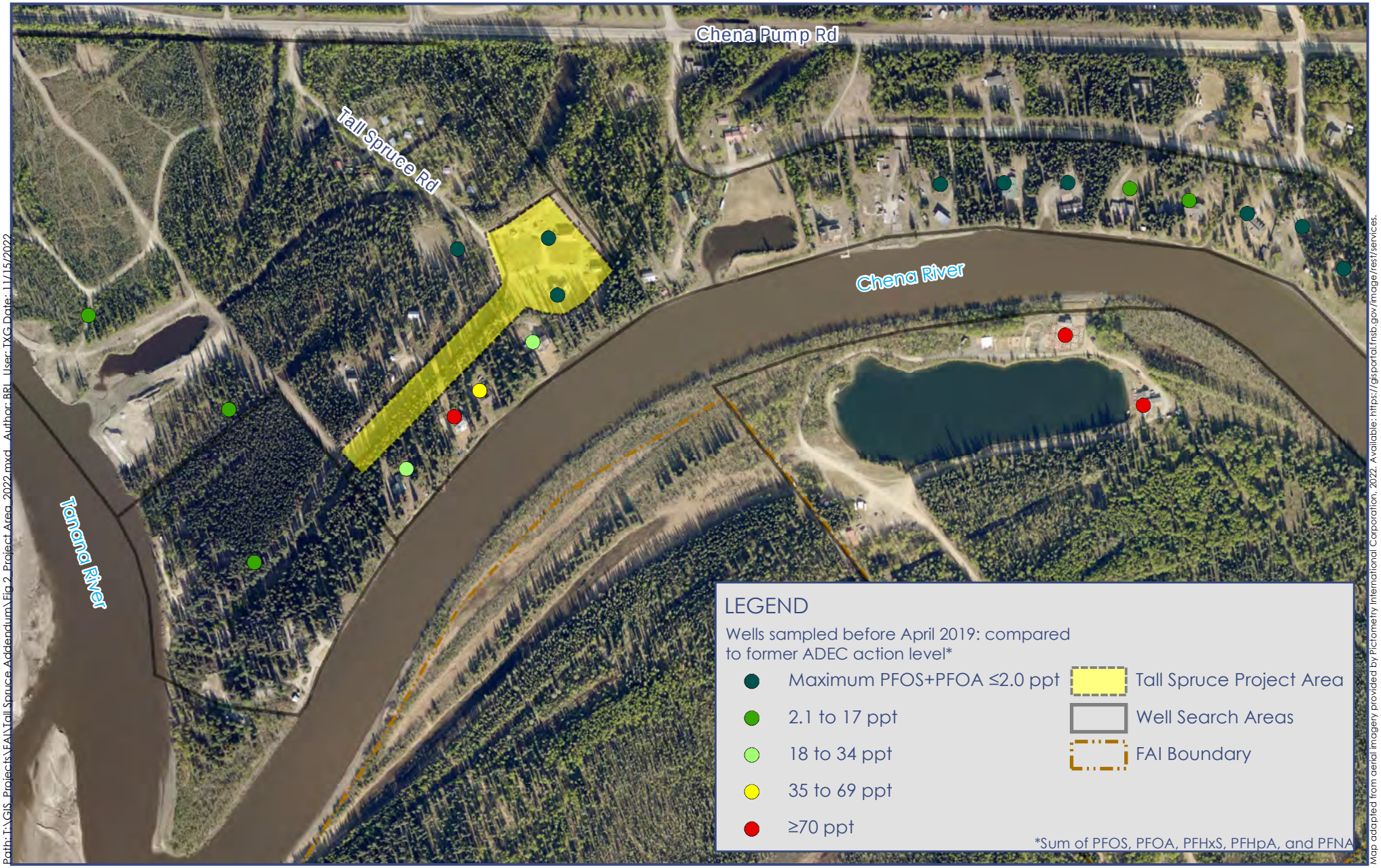
Notes:

1. Boundaries are approximate
ARFF = Aircraft Rescue and Firefighting

April 2024

FAIRBANKS INTERNATIONAL AIRPORT VICINITY

Figure 1



N

0 1,000 Feet

Notes:

1. Boundaries are approximate
FAI = Fairbanks International Airport

April 2024

PROJECT AREA WEST OF THE CHENA RIVER

Figure 2

Notes:

1. Boundaries and locations are approximate
MW = monitoring well; TS = Tall Spruce

April 2024

MONITORING WELL LOCATIONS

Figure 3

APPENDIX A: FIELD NOTES

Appendix A

Field Notes

CONTENTS

FIELD ACTIVITIES DAILY LOG

Date 10/25/2023
Sheet 1 of 1
Project No. 102514-029

Project Name: Tall Spruce
Field activity subject: PFAS
Description of daily activities and events:

0800 arrive at office, pack gear, calibrate YSI
0930 leave office for 2712 Tall Spruce
Use Metal detector to locate MW. First well was not clearly labeled. determined well ID by depth (compared to other wells later) Purged & sampled → MW-TS-2.
Set up GAC in 1 in truck, 1 outside, 1 in ditch. Hoses quickly froze & became unuse-able. attempted to set up 3 GACs in truck but was not successful.
Set up GAC 1 to drain into bucket which I poured in to GAC 2. Moved GAC 2 in & out of truck to keep from freezing.
Located MW-TS-4, purged + sampled.
Located MW-TS-3 purged + sampled. Had neighbor stop + ask about work. Very brief.
Located MW-TS-1. Pump stopped working & I noted the clip had broken on 1 side. Put together a temporary fix to finish the purge + sample.
After pulling up pump, other side of the plug disconnected. Could not use the pump for de-ion but cleaned thoroughly without.
TOOK EB sample!
Maneuvered GACs for a long, struggling hour or two trying to combat the cold!
TOOK GAC-1 effluent sample. Cleaned up site & headed back to office.
Unpacked quickly due to meeting.
Finished unpacking in a.m. on 10/26

* Did not write well ID on other wells (only TS-4) because of frost/snow

Visitors on site: —

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

—

Weather conditions: cold, 20's, overcast

Important telephone calls: —

Personnel on site:
Signature: A Masters Date: 10/26/23

Reviewed, revised, and initialed electronically by the Project Manager

MONITORING WELL SAMPLING LOG

Owner/Client: DOT&PF - Fairbanks International Airport
Location: Tall Spruce Road
Sampling Personnel: AMW
Weather Conditions: Overcast, 20s Air Temp. (°F): 20

Project No.: 102519-029
Date: 10/25/23
Well: MW-TS-1
Time started: 1500
Time completed: 1606

Sample No.: MW-TS-1 Time: ~~1532~~ 1532
Duplicate: MW-TS-101 Time: ~~1522~~ 1522
Equipment Blank: EB-1 Time: ~~1600~~ 1600
GAC-1

↑ this froze to my clipboard (AW)

Pump: Hurricane B
Purging Method: *portable* / *dedicated pump*
Pumping Start: 1514
Purge Rate (gal./min.): 1
Pumping End: 1582

Pump Set Depth Below MP (ft.): ~~15~~ 15
KuriTec Tubing (ft.): ~~20~~ 25
TruPoly Tubing (ft.): —

Diameter and Type of Casing: 2" PVC
Approximate Total Depth of Well Below MP (ft.): 20
Measured Total Depth of Well Below MP (ft.): 19.6 + 0.75 = 20.35
Depth to Water Below MP (ft.): 7.08
Depth to Ice (if frozen) Below MP (ft.): —
Feet of Water in Well: 13.27
Gallons per foot: 0.17
Gallons in Well: 2.3 × 3 = 6.8
Purge Water Volume (gal.): ~~14.4~~ 18
Purge Water Disposal: GAC to ground surface

Monument Condition: good
Casing Condition: good

Wiring Condition (dedicated pumps): Not applicable

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

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

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

- [x] Lock present and operational: NA
- [x] Well name legible on outside of well: No
- [x] Evidence of frost-jacking: No

Notes: None

WELL CASING VOLUMES

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

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MONITORING WELL SAMPLING LOG

Field Parameter Instrument _____ Circle one: *Parameters stabilized or >3 well volumes purged*

Sample Observations None

Notes None

FIELD PARAMETERS [stabilization criteria]

Time	Temp. (°C) [± 3%]	Dissolved Oxygen (mg/L) [±10%]	Conductivity (µS/cm) [± 3%]	pH [± 0.1]	ORP (mV) [± 10 mV]	Water Clarity (visual)
1514	2.0	4.93	3	6.30	133.2	silty gray / brown
1517	2.2	0.74	4-9.6	6.29	137.2	
1520	2.2	0.78 X	426.4	6.31	136.2	
1523	2.1	1.01	423.7	6.35	135.0	
1526	2.3	1.00	425.1	6.35	134.0	
1529	2.3	1.00	423.8	6.37	133.2	
1532	SAMPLE					
1527	DUP					

Laboratory Eurofins

	Analysis	Sample Containers		Preservatives	Dup
☒	PFAS x 18	2	250 mL	—	☒
☒	PFAS x 18	2	250 mL	None	☒ EB EB-1
☒	PFAS x 18	2	250 mL	None	☒ GAC-1
☐					☐
☐					☐
☐					☐

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Well No. MW-TS-1

MONITORING WELL SAMPLING LOG

Owner/Client: DOT&PF - Fairbanks International Airport
Location: Tall Spruce Road
Sampling Personnel: AMaster's
Weather Conditions: overcast, cold Air Temp. (°F): 3.8

Project No.: 102519-029
Date: 10/25/23
Well: MW-TS-2
Time started: 1100
Time completed: 1150

Sample No.: MW-TS-2 Time: 1141
Duplicate: — Time: —
Equipment Blank: — Time: —

Pump: Hurricane B
Purging Method: *portable* / *dedicated* *pump*
Pumping Start: 1115
Purge Rate (gal./min.): ~~0.5~~ 1
Pumping End: 1148

Pump Set Depth Below MP (ft.): 38.5
KuriTec Tubing (ft.): 242
TruPoly Tubing (ft.): —

Diameter and Type of Casing: 2" PVC
Approximate Total Depth of Well Below MP (ft.): 40
Measured Total Depth of Well Below MP (ft.): 39.13 + 0.75 = 39.88
Depth to Water Below MP (ft.): 7.19
Depth to Ice (if frozen) Below MP (ft.): —
Feet of Water in Well: 32.69
Gallons per foot: 0.17
Gallons in Well: 5.5 x 3 = 16.7
Purge Water Volume (gal.): ~~20.8~~ 26
Purge Water Disposal: GAC → Ground

Monument Condition: good
Casing Condition: good
Wiring Condition (dedicated pumps): N/A

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

Top-of-casing to monument (ft.): 0.38
Monument to ground surface (ft.): —

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

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

Notes: None

WELL CASING VOLUMES

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

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MONITORING WELL SAMPLING LOG

Field Parameter Instrument _____ Circle one: *Parameters stabilized or >3 well volumes purged*

Sample Observations None

Notes None

FIELD PARAMETERS [stabilization criteria]

Time	Temp. (°C) [± 3%]	Dissolved Oxygen (mg/L) [±10%]	Conductivity (µS/cm) [± 3%]	pH [± 0.1]	ORP (mV) [± 10 mV]	Water Clarity (visual)
1119	2.0	3.61	209.1	5.61	187.5	silty/gray
1122	1.9	1.48	211.1	5.73	183.9	clear
1125	1.9	0.97	214.9	5.89	179.2	clear
1128	1.9	0.78	218.9	5.97	176.6	"
1131	1.9	0.79	222.0	6.03	173.9	"
1135	2.0	0.77	225.3	6.10	170.5	"
1138	2.0	0.73	226.2	6.12	169.0	"
1141		SAMPLE				

Laboratory Eurofins

	Analysis	Sample Containers	Preservatives	Dup
☒	PFAs x18	(2) 250 mL	—	☐
☐				☐
☐				☐
☐				☐
☐				☐
☐				☐

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Well No. MW-15-2

MONITORING WELL SAMPLING LOG

Owner/Client: DOT&PF - Fairbanks International Airport
Location: Tall Spruce Road
Sampling Personnel: A. Masters
Weather Conditions: Clear, cold Air Temp. (°F): 27

Project No.: 102519-029
Date: 10/25/23
Well: MW-TS-3
Time started: 1330
Time completed: 1400

Sample No.: MW-TS-3 Time: 1357
Duplicate: — Time: —
Equipment Blank: — Time: —

Pump: Hurricane A
Purging Method: *portable* / *dedicated* *pump*
Pumping Start: 1346
Purge Rate (gal./min.): ~~0.8~~ 1
Pumping End: 1357

Pump Set Depth Below MP (ft.): 57.
KuriTec Tubing (ft.): 68
TruPoly Tubing (ft.): —

Diameter and Type of Casing: 2" PVC
Approximate Total Depth of Well Below MP (ft.): 60
Measured Total Depth of Well Below MP (ft.): 58.68+0.75= 59.43
Depth to Water Below MP (ft.): 7.42
Depth to Ice (if frozen) Below MP (ft.): —
Feet of Water in Well: 52.01
Gallons per foot: 0.17
Gallons in Well: 8.8 x3 = 26.5
Purge Water Volume (gal.): ~~13.6~~ 11
Purge Water Disposal: GAC → ground surface

Monument Condition: good
Casing Condition: good
Wiring Condition (dedicated pumps): N/A

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

Top-of-casing to monument (ft.): 0.36
Monument to ground surface (ft.): —

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

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

Notes: None

WELL CASING VOLUMES

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

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MONITORING WELL SAMPLING LOG

Field Parameter Instrument _____ Circle one: *Parameters stabilized or >3 well volumes purged*

Sample Observations None

Notes None

FIELD PARAMETERS [stabilization criteria]

Time	Temp. (°C) [± 3%]	Dissolved Oxygen (mg/L) [±10%]	Conductivity (µS/cm) [± 3%]	pH [± 0.1]	ORP (mV) [± 10 mV]	Water Clarity (visual)
1341	3.0	6.10	183.5	6.30	135.3	silty gray
1345	2.4	0.56	187.1	6.44	130.3	silty
1348	2.4	0.55	187.0	6.50	128.7	gray silt
1351	2.3	0.50	186.3	6.53	127.3	clearer gray
1354	2.3	0.50	186.0	6.55	126.4	clear
1357 SAMPLE						

Laboratory Eurofins

	Analysis	Sample Containers	Preservatives	Dup
☒	PFAS x18	2 x 250mL	—	☐
☐				☐
☐				☐
☐				☐
☐				☐
☐				☐

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Well No. MW-TS-3

MONITORING WELL SAMPLING LOG

Owner/Client: DOT&PF - Fairbanks International Airport
Location: Tall Spruce Road
Sampling Personnel: A. Masters
Weather Conditions: cold, overcast Air Temp. (°F): 28

Project No.: 102519-029
Date: 10/25/23
Well: MW-TS-4
Time started: 1200
Time completed: 1240

Sample No.: MW-TS-4 Time: 1234
Duplicate: — Time: —
Equipment Blank: — Time: —

Pump: Hurricane B
Purging Method: *portable / dedicated* pump
Pumping Start: 1210
Purge Rate (gal./min.): ~~0.0 0.0~~ 1
Pumping End: 1234

Pump Set Depth Below MP (ft.): ~76
KuriTec Tubing (ft.): ~80
TruPoly Tubing (ft.): —

Diameter and Type of Casing: 2" PVC
Approximate Total Depth of Well Below MP (ft.): 80
Measured Total Depth of Well Below MP (ft.): 79.6 + 0.75 = 7885
Depth to Water Below MP (ft.): 7.74
Depth to Ice (if frozen) Below MP (ft.): —
Feet of Water in Well: 71.1
Gallons per foot: 0.17
Gallons in Well: 12.1 x3 = 36.
Purge Water Volume (gal.): 24
Purge Water Disposal: GAC → Ground surface

Monument Condition: good
Casing Condition: good
Wiring Condition (dedicated pumps): N/A

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

Top-of-casing to monument (ft.): 0.33
Monument to ground surface (ft.): —

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

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

Notes: Wrote MW-TS-4 on inside of casing.

WELL CASING VOLUMES

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

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Well No. MW-TS-4

MONITORING WELL SAMPLING LOG

Field Parameter Instrument _____ Circle one: *Parameters stabilized* or *>3 well volumes purged*

Sample Observations None

Notes None

FIELD PARAMETERS [stabilization criteria]

Time	Temp. (°C) [± 3%]	Dissolved Oxygen (mg/L) [±10%]	Conductivity (µS/cm) [± 3%]	pH [± 0.1]	ORP (mV) [± 10 mV]	Water Clarity (visual)
1215	2.4	2.95	177.8	6.23	164.7	clear/gray
1219	2.6	0.56	180.5	6.29	155.9	clear/gray
1222	2.5	0.57	180.2	6.32	154.0	clear
1225	2.7	0.50	180.7	6.35	150.7	"
1228	2.8	0.50	181.0	6.36	149.4	"
1231	2.8	0.48	181.2	6.38	147.7	
1234	SAMPLE					

Laboratory Eurofins

	Analysis	Sample Containers	Preservatives	Dup
☒	PFAS x18	2 x 250 mL	—	☐
☐				☐
☐				☐
☐				☐
☐				☐
☐				☐

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Well No. MW-TS-U

SHANNON & WILSON

FIELD ACTIVITIES DAILY LOG

Date 2/22/24

Sheet 1 of 1

Project No. 102519-029

Project Name: FY24 Tall Spruce October Sampling Event

Field Activity Subject: Monitoring well sampling

Calibration: YSI B

Safety: High vis.

Description of daily activities and events:

0815 - Calibrate YSI B and finish packing up truck

0946 - Arrive at Tall Spruce, tentatively set up GACs + other materials

1000 - Start MW-TS-4, set up GAC system fully during purge, had to fix a few leaky ~~connects~~ connections, GAC 1 on cab roof, GAC 2 in cab, GAC 3 on ground outside.

1115 - Start GAC, will be continuous all day

1155 - Start MW-TS-3, Hurricane pump started surging + not pumping at continuous rate, had text conversation w/RLL to see if something can be figured out. Pump set at higher rate at control box seemed to work

1345 - Start at MW-TS-2. Pump still finicky but still working, along w/ MW sample, GAC sample was taken as well.

1530 - Start at MW-TS-1, at this well a dup (MW-TS-101) + equip Blank (EB-1) were taken. Pump started surging again, but stopped when placed in plastic bag on snow.

1645 - Finished with monitoring wells, kept eye on GAC to finish with all the purge water, worked on paperwork

1845 - Back in office, de-mob.

Visitors on site: —

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

Weather conditions: Overcast 30°ish

Important telephone calls: —

Personnel on site: SDK

QC: KRF

Signature: [signature] Date: 2/22/24

Rev. 3/14/23

MONITORING WELL SAMPLING LOG

Owner/Client DOT&PF - Fairbanks International Airport
Location Tall Spruce Road
Sampling Personnel SDK
Weather Conditions Overcast   Air Temp. (°F) 27°

Project No. 102519-029
Date 2/22/24
Well MW-TS-1
Time started 1530
Time completed 1645

Sample No. MW-TS-1   Time 1615
Duplicate MW-TS-101   Time 1605
Equipment Blank EB-1   Time 1630

Pump Hurricane
Purging Method portable / dedicated pump
Pumping Start 1542
Purge Rate (gal./min.) ~2 gal/min
Pumping End 1618

Pump Set Depth Below MP (ft.) ~17
KuriTec Tubing (ft.) 25
TruPoly Tubing (ft.) —

Diameter and Type of Casing 2" PVC
Approximate Total Depth of Well Below MP (ft.) 19.35 + 0.98
Measured Total Depth of Well Below MP (ft.) 20.33
Depth to Water Below MP (ft.) 7.56
Depth to Ice (if frozen) Below MP (ft.) —
Feet of Water in Well 12.73
Gallons per foot 0.17
Gallons in Well 2.1
Purge Water Volume (gal.) ~31 gallons
Purge Water Disposal GAC to ground

Monument Condition good

Casing Condition good

Wiring Condition —
(dedicated pumps)

Measuring Point (MP) Top of Casing (TOC)

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

Top-of-casing to monument (ft.) 0.48
Monument to ground surface (ft.) —

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

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

Notes —

WELL CASING VOLUMES

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

Well No. MW-TS-1

MONITORING WELL SAMPLING LOG

Field Parameter Instrument ____ Circle one: *Parameters stabilized* or *>3 well volumes purged*

Sample Observations —

Notes —

FIELD PARAMETERS [stabilization criteria]

Time	Temp. (°C) [± 3%]	Dissolved Oxygen (mg/L) [±10%]	Conductivity (µS/cm) [± 3%]	pH [± 0.1]	ORP (mV) [± 10 mV]	Water Clarity (visual)
1547	1.9	3.52	218.41	6.98	113.7	Dark Black tint
1550	1.8	1.94	314.5	6.97	111.0	
1554	1.6	0.73	396.8	6.96	109.0	
1557	1.6	0.29	394.0	6.97	108.2	Lighter Black Brown tint
1601	1.6	0.15	393.6	6.96	105.9	Brown tint
1604	1.6	0.14	392.4	6.98	102.2	light Brown tint
1607	1.7	0.13	392.3	6.96	102.4	↓
Samples	1615	MW-TS-1				
	1605	MW-TS-101				
	1630	EB-1				

Laboratory Eurofins

	Analysis	Sample Containers	Preservatives	Dup
☑	PFAS.	2x250 HDPE	—	☑
☐				☐
☐				☐
☐				☐
☐				☐
☐				☐

EB ☐

KCF

Well No. MW-TS-1

MONITORING WELL SAMPLING LOG

Owner/Client: DOT&PF - Fairbanks International Airport
Location: Tall Spruce Road
Sampling Personnel: SDK
Weather Conditions: Overcast Air Temp. (°F): 29

Project No.: 102519-029
Date: 2/22/24
Well: ~~TS~~ MW-TS-2
Time started: 1345
Time completed: 1455

Sample No.: MW-TS-2 Time: 1437
~~Duplicate~~: GAC-1 Time: 1452 * post-GAC use sample
Equipment Blank: — Time: —

Pump: Horiba
Purging Method: *portable / dedicated pump*
Pumping Start: ~~1415~~
Purge Rate (gal./min.): ~0.8
Pumping End: 1440

Pump Set Depth Below MP (ft.): ~36
KuriTec Tubing (ft.): 43
TruPoly Tubing (ft.): —

Diameter and Type of Casing: 2" PVC
Approximate Total Depth of Well Below MP (ft.): 38.85-0.98
Measured Total Depth of Well Below MP (ft.): 38.83
Depth to Water Below MP (ft.): 7.69
Depth to Ice (if frozen) Below MP (ft.): —
Feet of Water in Well: 32.14
Gallons per foot: 0.17
Gallons in Well: 5.46
Purge Water Volume (gal.): ~20 gallons
Purge Water Disposal: GAC to ground

Monument Condition: good
Casing Condition: good

Wiring Condition (dedicated pumps): N/A

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

Top-of-casing to monument (ft.): 0.40
Monument to ground surface (ft.):

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

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

Notes: —

WELL CASING VOLUMES

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

MONITORING WELL SAMPLING LOG

Field Parameter Instrument —
Circle one: *Parameters stabilized* or *>3 well volumes purged*
Sample Observations —
Notes —

FIELD PARAMETERS [stabilization criteria]

Time	Temp. (°C) [± 3%]	Dissolved Oxygen (mg/L) [±10%]	Conductivity (µS/cm) [± 3%]	pH [± 0.1]	ORP (mV) [± 10 mV]	Water Clarity (visual)
1416	2.5	1.09	242.5	7.16	94.8	Black tint
1419	2.5	0.72	248.6	7.20	91.6	↓
1422	2.5	0.36	270.2	7.22	86.1	↓
1425	2.5	0.32	269.3	7.25	85.4	Grey/Brown tint
1428	2.6	0.26	269.4	7.25	81.6	↓
1431	2.5	0.25	267.5	7.25	79.4	↓
Sample at 1437 - MW-TS-2						
GAC Sample at 1452 - GAC-1						

Laboratory Eurofins

	Analysis	Sample Containers	Preservatives	Dup
☑	PFAS	2x250 HDPE	—	☐
☐				☐
☑	GAC-1 (PFAS)	" "	—	☐
☐				☐
☐				☐
☐				☐

KEF

Well No. MW-TS-2

MONITORING WELL SAMPLING LOG

Owner/Client: DOT&PF - Fairbanks International Airport
Location: Tall Spruce Road
Sampling Personnel: SDK
Weather Conditions: Overcast Air Temp. (°F): 30

Project No.: 102519-029
Date: 2/22/24
Well: MW-TS-3
Time started: 1155
Time completed: 1350

Sample No.: MW-TS-3 Time: 1305
Duplicate: — Time: —
Equipment Blank: — Time: —

Pump: Hurricane
Purging Method: *portable* / *dedicated* *pump*
Pumping Start: ~~1220~~
Purge Rate (gal./min.): ~0.8
Pumping End: ~~1308~~

Pump Set Depth Below MP (ft.): ~57
KuriTec Tubing (ft.): ~~64~~
TruPoly Tubing (ft.): —

Diameter and Type of Casing: 2" PVC
Approximate Total Depth of Well Below MP (ft.): 58.5 ±0.5ft
Measured Total Depth of Well Below MP (ft.): 59.48
Depth to Water Below MP (ft.): 7.85
Depth to Ice (if frozen) Below MP (ft.): —
Feet of Water in Well: 51.63
Gallons per foot: 0.17
Gallons in Well: 8.78
Purge Water Volume (gal.): ~33 gallons
Purge Water Disposal: GAC to ground

Monument Condition: good
Casing Condition: good

Wiring Condition (dedicated pumps): N/A

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

Top-of-casing to monument (ft.): 0.35
Monument to ground surface (ft.): —

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

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

Notes: Pump started to surge at this well, turned up flow rate and it kept it from stopping the flow

WELL CASING VOLUMES

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

MONITORING WELL SAMPLING LOG

Field Parameter Instrument _____ Circle one: *Parameters stabilized* or *>3 well volumes purged*

Sample Observations —

Notes —

FIELD PARAMETERS [stabilization criteria]

Time	Temp. (°C) [± 3%]	Dissolved Oxygen (mg/L) [±10%]	Conductivity (µS/cm) [± 3%]	pH [± 0.1]	ORP (mV) [± 10 mV]	Water Clarity (visual)
1240	2.8	0.15	188.0	7.19	108.6	~~Brk~~ Black tint
1243	2.9	0.14	188.5	7.21	107.5	Clear
~~1247~~	2.9	0.16	188.6	7.22	105.4	
1251	2.9	0.15	187.5	7.23	104.1	
1254	3.0	0.15	190.2	7.22	98.2	
~~1258~~	3.1	0.12	189.9	7.24	96.5	
1301	3.1	0.11	190.0	7.23	97.4	
Sample at 1305 MW-TS-3						

Laboratory Eurofins

	Analysis	Sample Containers	Preservatives	Dup
☑	PFAS	2x HDPE	—	☐
☐				☐
☐				☐
☐				☐
☐				☐
☐				☐

KLF

Well No. MW-TS-3

MONITORING WELL SAMPLING LOG

Owner/Client: DOT&PF - Fairbanks International Airport
Location: Tall Spruce Road
Sampling Personnel: SDK
Weather Conditions: Overcast Air Temp. (°F): 30°

Project No.: 102519-029
Date: 2/22/24
Well: MW-TS-4
Time started: 1000
Time completed: 1120

Sample No.: MW-TS-4 Time: 1108
Duplicate: — Time: —
Equipment Blank: — Time: —

Pump: Hurricane
Purging Method: *portable / dedicated pump*
Pumping Start: 1040
Purge Rate (gal./min.): ~0.8
Pumping End: 1110

Pump Set Depth Below MP (ft.): ~76
KuriTec Tubing (ft.): ~85
TruPoly Tubing (ft.): —

Diameter and Type of Casing: 2" PVC
Approximate Total Depth of Well Below MP (ft.): 79.50, 0.98
Measured Total Depth of Well Below MP (ft.): 80.48
Depth to Water Below MP (ft.): 8.11
Depth to Ice (if frozen) Below MP (ft.): —
Feet of Water in Well: 72.37
Gallons per foot: 0.17
Gallons in Well: 12.30
Purge Water Volume (gal.): ~25 gallons
Purge Water Disposal: GAC to ground

Monument Condition: good
Casing Condition: good

Wiring Condition (dedicated pumps): — N/A

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

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

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

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

Notes: —

WELL CASING VOLUMES

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

MONITORING WELL SAMPLING LOG

Field Parameter Instrument _____ Circle one: *Parameters stabilized or >3 well volumes purged*

Sample Observations _____

Notes _____

FIELD PARAMETERS [stabilization criteria]

Time	Temp. (°C) [± 3%]	Dissolved Oxygen (mg/L) [±10%]	Conductivity (µS/cm) [± 3%]	pH [± 0.1]	ORP (mV) [± 10 mV]	Water Clarity (visual)
1041	3.2	1.00	186.7	6.62	176.0	Clear w/orange tint
1044	3.3	0.71	188.4	6.76	163.4	Clear w/ grey tint
1048	3.3	0.58	187.9	6.89	149.8	↓
1051	3.3	0.53	187.7	6.98	138.8	↓
1054	3.3	0.51	187.7	7.01	133.5	↓
1057	3.4	0.48	187.5	7.09	129.9	Clear
1100	3.4	0.47	187.6	7.10	125.2	↓
1103	3.4	0.44	187.0	7.13	121.4	↓
Sampl	at 1108					

Laboratory _____

	Analysis	Sample Containers	Preservatives	Dup
☒	PFAS	2X HDPE	—	☐
☐				☐
☐				☐
☐				☐
☐				☐
☐				☐

KRF

Well No. MW-TS-4

APPENDIX B: ANALYTICAL RESULTS

Appendix B

Analytical Results

CONTENTS

eurofins | Environment Testing

ANALYTICAL REPORT

PREPARED FOR

Attn: Michael X Jaramillo
Shannon & Wilson, Inc
2355 Hill Rd.
Fairbanks, Alaska 99709-5244

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JOB DESCRIPTION

Tall Spruce

JOB NUMBER

320-106532-1

Eurofins Sacramento
880 Riverside Parkway
West Sacramento CA 95605

See page two for job notes and contact information.

Job Notes

This report may not be reproduced except in full, and with written approval from the laboratory. The results relate only to the samples tested. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing Northern California, LLC Project Manager.

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Table of Contents

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: Tall Spruce

Job ID: 320-106532-1

Qualifiers

LCMS

Qualifier	Qualifier Description
*5-	Isotope dilution analyte is outside acceptance limits, low biased.
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: 320-106532-1

Laboratory: Eurofins Sacramento

Narrative

Job Narrative
320-106532-1

Receipt
The samples were received on 10/31/2023 2:55 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 1.0º C.

LCMS
Method EPA 537(Mod): The continuing calibration verification (CCV) associated with batch 320-720994 recovered above the upper control limit for isotope dilution analyte (IDA) d3-NMeFOSAA and d5-NEtFOSAA. The associated target analytes N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA) and N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA) were within control limits in the CCV; therefore, the data is reported: MW-TS-1 (320-106532-1), MW-TS-2 (320-106532-3), MW-TS-3 (320-106532-4), EB-1 (320-106532-6), GAC-1 (320-106532-7) and (CCV 320-720994/1).

Method EPA 537(Mod): The continuing calibration verification (CCV) associated with batch 320-720994 recovered above the upper control limit for isotope dilution analyte (IDA) d5-NEtFOSAA. The associated target analytes N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA) were within control limits in the CCV; therefore, the data is reported: MW-TS-1 (320-106532-1), MW-TS-2 (320-106532-3), MW-TS-3 (320-106532-4), EB-1 (320-106532-6), GAC-1 (320-106532-7) and (CCV 320-720994/12).

Method EPA 537(Mod): The Isotope Dilution Analyte (IDA) recovery associated with the following sample is below the method recommended limit: MW-TS-1 (320-106532-1). Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the sample(s).

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

Organic Prep
Method 3535: The following samples in preparation batch 320-718877 were observed to have a thin layer of sediment present in the bottom of the bottle prior to extraction. MW-TS-1 (320-106532-1), MW-TS-2 (320-106532-3), MW-TS-3 (320-106532-4) and GAC-1 (320-106532-7)

Method 3535: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-718877.

Method 3535: During the solid phase extraction process, the following samples contain non-settleable particulates which clogged the solid phase extraction column: MW-TS-1 (320-106532-1), MW-TS-3 (320-106532-4) and GAC-1 (320-106532-7).
preparation batch 320-718877

Method 3535: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-719042.

Method 3535: The following samples in preparation batch 320-719042 were observed to have a thin layer of sediment present in the bottom of the bottle prior to extraction. MW-TS-101 (320-106532-2) and MW-TS-4 (320-106532-5)

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: Tall Spruce

Job ID: 320-106532-1

Client Sample ID: MW-TS-1 — Lab Sample ID: 320-106532-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	2.5		2.0	0.59	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.3	J	2.0	0.25	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	3.7		2.0	0.86	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	1.2	J	2.0	0.20	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	2.7		2.0	0.58	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.9	J	2.0	0.55	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-TS-101 — Lab Sample ID: 320-106532-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	2.4		1.8	0.53	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.1	J	1.8	0.23	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	3.4		1.8	0.78	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	1.1	J	1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	2.5		1.8	0.52	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.5	J	1.8	0.49	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-TS-2 — Lab Sample ID: 320-106532-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	2.0	J	2.1	0.61	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.50	J	2.1	0.26	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	4.0		2.1	0.89	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.75	J	2.1	0.21	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	4.8		2.1	0.60	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	2.5		2.1	0.57	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-TS-3 — Lab Sample ID: 320-106532-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	4.7		2.1	0.61	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.58	J	2.1	0.27	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	8.8		2.1	0.90	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	1.5	J	2.1	0.21	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	14		2.1	0.60	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	2.5		2.1	0.57	ng/L	1		EPA 537(Mod)	Total/NA
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	0.59	J	2.1	0.34	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-TS-4 — Lab Sample ID: 320-106532-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	2.0		1.9	0.55	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	3.4		1.9	0.80	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.44	J	1.9	0.19	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	5.1		1.9	0.54	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.1	J	1.9	0.51	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: EB-1 — Lab Sample ID: 320-106532-6

No Detections.

This Detection Summary does not include radiochemical test results.

Eurofins Sacramento

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: Tall Spruce

Job ID: 320-106532-1

Client Sample ID: GAC-1

Lab Sample ID: 320-106532-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanesulfonic acid (PFOS)	1.0	J	2.0	0.54	ng/L	1		EPA 537(Mod)	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: Tall Spruce

Job ID: 320-106532-1

Client Sample ID: MW-TS-1
Date Collected: 10/25/23 15:32
Date Received: 10/31/23 14:55

Lab Sample ID: 320-106532-1
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)	**2.5**		2.0	0.59	ng/L		11/08/23 11:39	11/16/23 22:08	1
Perfluoroheptanoic acid (PFHpA)	**1.3**	**J**	2.0	0.25	ng/L		11/08/23 11:39	11/16/23 22:08	1
Perfluorooctanoic acid (PFOA)	**3.7**		2.0	0.86	ng/L		11/08/23 11:39	11/16/23 22:08	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		11/08/23 11:39	11/16/23 22:08	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		11/08/23 11:39	11/16/23 22:08	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		11/08/23 11:39	11/16/23 22:08	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.56	ng/L		11/08/23 11:39	11/16/23 22:08	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		11/08/23 11:39	11/16/23 22:08	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.74	ng/L		11/08/23 11:39	11/16/23 22:08	1
Perfluorobutanesulfonic acid (PFBS)	**1.2**	**J**	2.0	0.20	ng/L		11/08/23 11:39	11/16/23 22:08	1
Perfluorohexanesulfonic acid (PFHxS)	**2.7**		2.0	0.58	ng/L		11/08/23 11:39	11/16/23 22:08	1
Perfluorooctanesulfonic acid (PFOS)	**1.9**	**J**	2.0	0.55	ng/L		11/08/23 11:39	11/16/23 22:08	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.1	1.2	ng/L		11/08/23 11:39	11/16/23 22:08	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.1	1.3	ng/L		11/08/23 11:39	11/16/23 22:08	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.0	0.24	ng/L		11/08/23 11:39	11/16/23 22:08	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.1	1.5	ng/L		11/08/23 11:39	11/16/23 22:08	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.0	0.32	ng/L		11/08/23 11:39	11/16/23 22:08	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.41	ng/L		11/08/23 11:39	11/16/23 22:08	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*79*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:08*	*1*
13C4 PFHpA	*89*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:08*	*1*
13C4 PFOA	*86*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:08*	*1*
13C5 PFNA	*79*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:08*	*1*
13C2 PFDA	*76*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:08*	*1*
13C2 PFUnA	*64*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:08*	*1*
13C2 PFDoA	*44*	**5-*	*50 - 150*	*11/08/23 11:39*	*11/16/23 22:08*	*1*
13C2 PFTeDA	*42*	**5-*	*50 - 150*	*11/08/23 11:39*	*11/16/23 22:08*	*1*
13C3 PFBS	*75*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:08*	*1*
18O2 PFHxS	*86*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:08*	*1*
13C4 PFOS	*75*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:08*	*1*
d3-NMeFOSAA	*77*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:08*	*1*
d5-NEtFOSAA	*85*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:08*	*1*
13C3 HFPO-DA	*90*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:08*	*1*

Client: Shannon & Wilson, Inc
Project/Site: Tall Spruce

Job ID: 320-106532-1

Client Sample ID: MW-TS-101
Date Collected: 10/25/23 15:22
Date Received: 10/31/23 14:55

Lab Sample ID: 320-106532-2
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)	**2.4**		1.8	0.53	ng/L		11/08/23 20:00	11/18/23 03:49	1
Perfluoroheptanoic acid (PFHpA)	**1.1**	**J**	1.8	0.23	ng/L		11/08/23 20:00	11/18/23 03:49	1
Perfluorooctanoic acid (PFOA)	**3.4**		1.8	0.78	ng/L		11/08/23 20:00	11/18/23 03:49	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.25	ng/L		11/08/23 20:00	11/18/23 03:49	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		11/08/23 20:00	11/18/23 03:49	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	1.0	ng/L		11/08/23 20:00	11/18/23 03:49	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.50	ng/L		11/08/23 20:00	11/18/23 03:49	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		11/08/23 20:00	11/18/23 03:49	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.67	ng/L		11/08/23 20:00	11/18/23 03:49	1
Perfluorobutanesulfonic acid (PFBS)	**1.1**	**J**	1.8	0.18	ng/L		11/08/23 20:00	11/18/23 03:49	1
Perfluorohexanesulfonic acid (PFHxS)	**2.5**		1.8	0.52	ng/L		11/08/23 20:00	11/18/23 03:49	1
Perfluorooctanesulfonic acid (PFOS)	**1.5**	**J**	1.8	0.49	ng/L		11/08/23 20:00	11/18/23 03:49	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.6	1.1	ng/L		11/08/23 20:00	11/18/23 03:49	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.6	1.2	ng/L		11/08/23 20:00	11/18/23 03:49	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		11/08/23 20:00	11/18/23 03:49	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.7	1.4	ng/L		11/08/23 20:00	11/18/23 03:49	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		11/08/23 20:00	11/18/23 03:49	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.37	ng/L		11/08/23 20:00	11/18/23 03:49	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*100*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:49*	*1*
13C4 PFHpA	*94*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:49*	*1*
13C4 PFOA	*101*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:49*	*1*
13C5 PFNA	*94*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:49*	*1*
13C2 PFDA	*97*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:49*	*1*
13C2 PFUnA	*89*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:49*	*1*
13C2 PFDoA	*77*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:49*	*1*
13C2 PFTeDA	*83*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:49*	*1*
13C3 PFBS	*89*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:49*	*1*
18O2 PFHxS	*97*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:49*	*1*
13C4 PFOS	*97*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:49*	*1*
d3-NMeFOSAA	*79*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:49*	*1*
d5-NEtFOSAA	*88*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:49*	*1*
13C3 HFPO-DA	*82*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:49*	*1*

Client: Shannon & Wilson, Inc
Project/Site: Tall Spruce

Job ID: 320-106532-1

Client Sample ID: MW-TS-2

Date Collected: 10/25/23 11:41
Date Received: 10/31/23 14:55

Lab Sample ID: 320-106532-3

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)	**2.0**	**J**	2.1	0.61	ng/L		11/08/23 11:39	11/16/23 22:31	1
Perfluoroheptanoic acid (PFHpA)	**0.50**	**J**	2.1	0.26	ng/L		11/08/23 11:39	11/16/23 22:31	1
Perfluorooctanoic acid (PFOA)	**4.0**		2.1	0.89	ng/L		11/08/23 11:39	11/16/23 22:31	1
Perfluorononanoic acid (PFNA)	ND		2.1	0.28	ng/L		11/08/23 11:39	11/16/23 22:31	1
Perfluorodecanoic acid (PFDA)	ND		2.1	0.33	ng/L		11/08/23 11:39	11/16/23 22:31	1
Perfluoroundecanoic acid (PFUnA)	ND		2.1	1.2	ng/L		11/08/23 11:39	11/16/23 22:31	1
Perfluorododecanoic acid (PFDoA)	ND		2.1	0.58	ng/L		11/08/23 11:39	11/16/23 22:31	1
Perfluorotridecanoic acid (PFTriA)	ND		2.1	1.4	ng/L		11/08/23 11:39	11/16/23 22:31	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.1	0.77	ng/L		11/08/23 11:39	11/16/23 22:31	1
Perfluorobutanesulfonic acid (PFBS)	**0.75**	**J**	2.1	0.21	ng/L		11/08/23 11:39	11/16/23 22:31	1
Perfluorohexanesulfonic acid (PFHxS)	**4.8**		2.1	0.60	ng/L		11/08/23 11:39	11/16/23 22:31	1
Perfluorooctanesulfonic acid (PFOS)	**2.5**		2.1	0.57	ng/L		11/08/23 11:39	11/16/23 22:31	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.3	1.3	ng/L		11/08/23 11:39	11/16/23 22:31	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.3	1.4	ng/L		11/08/23 11:39	11/16/23 22:31	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.1	0.25	ng/L		11/08/23 11:39	11/16/23 22:31	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.2	1.6	ng/L		11/08/23 11:39	11/16/23 22:31	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.1	0.34	ng/L		11/08/23 11:39	11/16/23 22:31	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.1	0.42	ng/L		11/08/23 11:39	11/16/23 22:31	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*98*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:31*	*1*
13C4 PFHpA	*111*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:31*	*1*
13C4 PFOA	*101*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:31*	*1*
13C5 PFNA	*92*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:31*	*1*
13C2 PFDA	*96*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:31*	*1*
13C2 PFUnA	*81*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:31*	*1*
13C2 PFDoA	*65*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:31*	*1*
13C2 PFTeDA	*71*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:31*	*1*
13C3 PFBS	*87*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:31*	*1*
18O2 PFHxS	*103*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:31*	*1*
13C4 PFOS	*87*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:31*	*1*
d3-NMeFOSAA	*109*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:31*	*1*
d5-NEtFOSAA	*103*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:31*	*1*
13C3 HFPO-DA	*114*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:31*	*1*

Client: Shannon & Wilson, Inc
Project/Site: Tall Spruce

Job ID: 320-106532-1

Client Sample ID: MW-TS-3

Date Collected: 10/25/23 13:57
Date Received: 10/31/23 14:55

Lab Sample ID: 320-106532-4

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)	**4.7**		2.1	0.61	ng/L		11/08/23 11:39	11/16/23 22:43	1
Perfluoroheptanoic acid (PFHpA)	**0.58**	**J**	2.1	0.27	ng/L		11/08/23 11:39	11/16/23 22:43	1
Perfluorooctanoic acid (PFOA)	**8.8**		2.1	0.90	ng/L		11/08/23 11:39	11/16/23 22:43	1
Perfluorononanoic acid (PFNA)	ND		2.1	0.29	ng/L		11/08/23 11:39	11/16/23 22:43	1
Perfluorodecanoic acid (PFDA)	ND		2.1	0.33	ng/L		11/08/23 11:39	11/16/23 22:43	1
Perfluoroundecanoic acid (PFUnA)	ND		2.1	1.2	ng/L		11/08/23 11:39	11/16/23 22:43	1
Perfluorododecanoic acid (PFDoA)	ND		2.1	0.58	ng/L		11/08/23 11:39	11/16/23 22:43	1
Perfluorotridecanoic acid (PFTriA)	ND		2.1	1.4	ng/L		11/08/23 11:39	11/16/23 22:43	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.1	0.77	ng/L		11/08/23 11:39	11/16/23 22:43	1
Perfluorobutanesulfonic acid (PFBS)	**1.5**	**J**	2.1	0.21	ng/L		11/08/23 11:39	11/16/23 22:43	1
Perfluorohexanesulfonic acid (PFHxS)	**14**		2.1	0.60	ng/L		11/08/23 11:39	11/16/23 22:43	1
Perfluorooctanesulfonic acid (PFOS)	**2.5**		2.1	0.57	ng/L		11/08/23 11:39	11/16/23 22:43	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.3	1.3	ng/L		11/08/23 11:39	11/16/23 22:43	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.3	1.4	ng/L		11/08/23 11:39	11/16/23 22:43	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.1	0.25	ng/L		11/08/23 11:39	11/16/23 22:43	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.2	1.6	ng/L		11/08/23 11:39	11/16/23 22:43	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	**0.59**	**J**	2.1	0.34	ng/L		11/08/23 11:39	11/16/23 22:43	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.1	0.42	ng/L		11/08/23 11:39	11/16/23 22:43	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*85*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:43*	*1*
13C4 PFHpA	*94*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:43*	*1*
13C4 PFOA	*91*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:43*	*1*
13C5 PFNA	*83*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:43*	*1*
13C2 PFDA	*80*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:43*	*1*
13C2 PFUnA	*72*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:43*	*1*
13C2 PFDoA	*62*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:43*	*1*
13C2 PFTeDA	*52*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:43*	*1*
13C3 PFBS	*84*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:43*	*1*
18O2 PFHxS	*86*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:43*	*1*
13C4 PFOS	*73*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:43*	*1*
d3-NMeFOSAA	*95*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:43*	*1*
d5-NEtFOSAA	*92*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:43*	*1*
13C3 HFPO-DA	*99*		*50 - 150*	*11/08/23 11:39*	*11/16/23 22:43*	*1*

Client: Shannon & Wilson, Inc
Project/Site: Tall Spruce

Job ID: 320-106532-1

Client Sample ID: MW-TS-4

Date Collected: 10/25/23 12:34
Date Received: 10/31/23 14:55

Lab Sample ID: 320-106532-5

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)	**2.0**		1.9	0.55	ng/L		11/08/23 20:00	11/18/23 03:59	1
Perfluoroheptanoic acid (PFHpA)	ND		1.9	0.24	ng/L		11/08/23 20:00	11/18/23 03:59	1
Perfluorooctanoic acid (PFOA)	**3.4**		1.9	0.80	ng/L		11/08/23 20:00	11/18/23 03:59	1
Perfluorononanoic acid (PFNA)	ND		1.9	0.25	ng/L		11/08/23 20:00	11/18/23 03:59	1
Perfluorodecanoic acid (PFDA)	ND		1.9	0.29	ng/L		11/08/23 20:00	11/18/23 03:59	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	1.0	ng/L		11/08/23 20:00	11/18/23 03:59	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.52	ng/L		11/08/23 20:00	11/18/23 03:59	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	1.2	ng/L		11/08/23 20:00	11/18/23 03:59	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.69	ng/L		11/08/23 20:00	11/18/23 03:59	1
Perfluorobutanesulfonic acid (PFBS)	**0.44**	**J**	1.9	0.19	ng/L		11/08/23 20:00	11/18/23 03:59	1
Perfluorohexanesulfonic acid (PFHxS)	**5.1**		1.9	0.54	ng/L		11/08/23 20:00	11/18/23 03:59	1
Perfluorooctanesulfonic acid (PFOS)	**1.1**	**J**	1.9	0.51	ng/L		11/08/23 20:00	11/18/23 03:59	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.7	1.1	ng/L		11/08/23 20:00	11/18/23 03:59	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.7	1.2	ng/L		11/08/23 20:00	11/18/23 03:59	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.9	0.23	ng/L		11/08/23 20:00	11/18/23 03:59	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.8	1.4	ng/L		11/08/23 20:00	11/18/23 03:59	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.9	0.30	ng/L		11/08/23 20:00	11/18/23 03:59	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.38	ng/L		11/08/23 20:00	11/18/23 03:59	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*89*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:59*	*1*
13C4 PFHpA	*95*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:59*	*1*
13C4 PFOA	*101*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:59*	*1*
13C5 PFNA	*92*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:59*	*1*
13C2 PFDA	*93*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:59*	*1*
13C2 PFUnA	*87*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:59*	*1*
13C2 PFDoA	*84*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:59*	*1*
13C2 PFTeDA	*81*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:59*	*1*
13C3 PFBS	*94*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:59*	*1*
18O2 PFHxS	*93*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:59*	*1*
13C4 PFOS	*94*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:59*	*1*
d3-NMeFOSAA	*81*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:59*	*1*
d5-NEtFOSAA	*83*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:59*	*1*
13C3 HFPO-DA	*85*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:59*	*1*

Client: Shannon & Wilson, Inc
Project/Site: Tall Spruce

Job ID: 320-106532-1

Client Sample ID: EB-1

Date Collected: 10/25/23 16:00
Date Received: 10/31/23 14:55

Lab Sample ID: 320-106532-6

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)	ND		2.0	0.58	ng/L		11/08/23 11:39	11/16/23 23:06	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		11/08/23 11:39	11/16/23 23:06	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.86	ng/L		11/08/23 11:39	11/16/23 23:06	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		11/08/23 11:39	11/16/23 23:06	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		11/08/23 11:39	11/16/23 23:06	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		11/08/23 11:39	11/16/23 23:06	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		11/08/23 11:39	11/16/23 23:06	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		11/08/23 11:39	11/16/23 23:06	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.74	ng/L		11/08/23 11:39	11/16/23 23:06	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		11/08/23 11:39	11/16/23 23:06	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		11/08/23 11:39	11/16/23 23:06	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		11/08/23 11:39	11/16/23 23:06	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		11/08/23 11:39	11/16/23 23:06	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		11/08/23 11:39	11/16/23 23:06	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.0	0.24	ng/L		11/08/23 11:39	11/16/23 23:06	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.0	1.5	ng/L		11/08/23 11:39	11/16/23 23:06	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.0	0.32	ng/L		11/08/23 11:39	11/16/23 23:06	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		11/08/23 11:39	11/16/23 23:06	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*89*		*50 - 150*	*11/08/23 11:39*	*11/16/23 23:06*	*1*
13C4 PFHpA	*102*		*50 - 150*	*11/08/23 11:39*	*11/16/23 23:06*	*1*
13C4 PFOA	*100*		*50 - 150*	*11/08/23 11:39*	*11/16/23 23:06*	*1*
13C5 PFNA	*92*		*50 - 150*	*11/08/23 11:39*	*11/16/23 23:06*	*1*
13C2 PFDA	*106*		*50 - 150*	*11/08/23 11:39*	*11/16/23 23:06*	*1*
13C2 PFUnA	*108*		*50 - 150*	*11/08/23 11:39*	*11/16/23 23:06*	*1*
13C2 PFDoA	*94*		*50 - 150*	*11/08/23 11:39*	*11/16/23 23:06*	*1*
13C2 PFTeDA	*87*		*50 - 150*	*11/08/23 11:39*	*11/16/23 23:06*	*1*
13C3 PFBS	*92*		*50 - 150*	*11/08/23 11:39*	*11/16/23 23:06*	*1*
18O2 PFHxS	*95*		*50 - 150*	*11/08/23 11:39*	*11/16/23 23:06*	*1*
13C4 PFOS	*84*		*50 - 150*	*11/08/23 11:39*	*11/16/23 23:06*	*1*
d3-NMeFOSAA	*115*		*50 - 150*	*11/08/23 11:39*	*11/16/23 23:06*	*1*
d5-NEtFOSAA	*140*		*50 - 150*	*11/08/23 11:39*	*11/16/23 23:06*	*1*
13C3 HFPO-DA	*107*		*50 - 150*	*11/08/23 11:39*	*11/16/23 23:06*	*1*

Client: Shannon & Wilson, Inc
Project/Site: Tall Spruce

Job ID: 320-106532-1

Client Sample ID: GAC-1

Date Collected: 10/25/23 17:00
Date Received: 10/31/23 14:55

Lab Sample ID: 320-106532-7

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)	ND		2.0	0.58	ng/L		11/08/23 11:39	11/16/23 23:17	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		11/08/23 11:39	11/16/23 23:17	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		11/08/23 11:39	11/16/23 23:17	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		11/08/23 11:39	11/16/23 23:17	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		11/08/23 11:39	11/16/23 23:17	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		11/08/23 11:39	11/16/23 23:17	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		11/08/23 11:39	11/16/23 23:17	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		11/08/23 11:39	11/16/23 23:17	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		11/08/23 11:39	11/16/23 23:17	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		11/08/23 11:39	11/16/23 23:17	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		11/08/23 11:39	11/16/23 23:17	1
Perfluorooctanesulfonic acid (PFOS)	**1.0**	**J**	2.0	0.54	ng/L		11/08/23 11:39	11/16/23 23:17	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		11/08/23 11:39	11/16/23 23:17	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		11/08/23 11:39	11/16/23 23:17	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.0	0.24	ng/L		11/08/23 11:39	11/16/23 23:17	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.0	1.5	ng/L		11/08/23 11:39	11/16/23 23:17	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.0	0.32	ng/L		11/08/23 11:39	11/16/23 23:17	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		11/08/23 11:39	11/16/23 23:17	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*83*		*50 - 150*	*11/08/23 11:39*	*11/16/23 23:17*	*1*
13C4 PFHpA	*84*		*50 - 150*	*11/08/23 11:39*	*11/16/23 23:17*	*1*
13C4 PFOA	*86*		*50 - 150*	*11/08/23 11:39*	*11/16/23 23:17*	*1*
13C5 PFNA	*82*		*50 - 150*	*11/08/23 11:39*	*11/16/23 23:17*	*1*
13C2 PFDA	*72*		*50 - 150*	*11/08/23 11:39*	*11/16/23 23:17*	*1*
13C2 PFUnA	*66*		*50 - 150*	*11/08/23 11:39*	*11/16/23 23:17*	*1*
13C2 PFDoA	*55*		*50 - 150*	*11/08/23 11:39*	*11/16/23 23:17*	*1*
13C2 PFTeDA	*59*		*50 - 150*	*11/08/23 11:39*	*11/16/23 23:17*	*1*
13C3 PFBS	*79*		*50 - 150*	*11/08/23 11:39*	*11/16/23 23:17*	*1*
18O2 PFHxS	*86*		*50 - 150*	*11/08/23 11:39*	*11/16/23 23:17*	*1*
13C4 PFOS	*63*		*50 - 150*	*11/08/23 11:39*	*11/16/23 23:17*	*1*
d3-NMeFOSAA	*80*		*50 - 150*	*11/08/23 11:39*	*11/16/23 23:17*	*1*
d5-NEtFOSAA	*87*		*50 - 150*	*11/08/23 11:39*	*11/16/23 23:17*	*1*
13C3 HFPO-DA	*96*		*50 - 150*	*11/08/23 11:39*	*11/16/23 23:17*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: Tall Spruce

Job ID: 320-106532-1

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

Matrix: Water

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFHxA (50-150)	C4PFHA (50-150)	PFOA (50-150)	PFNA (50-150)	PFDA (50-150)	PFUnA (50-150)	PFDoA (50-150)	PFTDA (50-150)
320-106532-1	MW-TS-1	79	89	86	79	76	64	44 *5-	42 *5-
320-106532-2	MW-TS-101	100	94	101	94	97	89	77	83
320-106532-3	MW-TS-2	98	111	101	92	96	81	65	71
320-106532-4	MW-TS-3	85	94	91	83	80	72	62	52
320-106532-5	MW-TS-4	89	95	101	92	93	87	84	81
320-106532-6	EB-1	89	102	100	92	106	108	94	87
320-106532-7	GAC-1	83	84	86	82	72	66	55	59
LCS 320-718877/2-A	Lab Control Sample	98	106	103	93	93	104	96	99
LCS 320-719042/2-A	Lab Control Sample	91	102	106	96	98	93	93	95
LCSD 320-718877/3-A	Lab Control Sample Dup	102	111	110	100	107	109	101	100
LCSD 320-719042/3-A	Lab Control Sample Dup	82	93	97	92	90	85	90	91
MB 320-718877/1-A	Method Blank	97	96	97	87	97	97	97	93
MB 320-719042/1-A	Method Blank	92	97	107	104	108	109	94	99

		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)		
320-106532-1	MW-TS-1	75	86	75	77	85	90		
320-106532-2	MW-TS-101	89	97	97	79	88	82		
320-106532-3	MW-TS-2	87	103	87	109	103	114		
320-106532-4	MW-TS-3	84	86	73	95	92	99		
320-106532-5	MW-TS-4	94	93	94	81	83	85		
320-106532-6	EB-1	92	95	84	115	140	107		
320-106532-7	GAC-1	79	86	63	80	87	96		
LCS 320-718877/2-A	Lab Control Sample	95	100	88	122	131	111		
LCS 320-719042/2-A	Lab Control Sample	105	105	102	83	91	86		
LCSD 320-718877/3-A	Lab Control Sample Dup	102	110	97	130	140	113		
LCSD 320-719042/3-A	Lab Control Sample Dup	94	98	95	78	83	81		
MB 320-718877/1-A	Method Blank	91	99	81	126	140	108		
MB 320-719042/1-A	Method Blank	105	106	106	90	104	95		

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 320-718877/1-A
Matrix: Water
Analysis Batch: 720994

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 718877

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		11/08/23 11:39	11/16/23 21:34	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		11/08/23 11:39	11/16/23 21:34	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		11/08/23 11:39	11/16/23 21:34	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		11/08/23 11:39	11/16/23 21:34	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		11/08/23 11:39	11/16/23 21:34	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		11/08/23 11:39	11/16/23 21:34	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		11/08/23 11:39	11/16/23 21:34	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		11/08/23 11:39	11/16/23 21:34	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		11/08/23 11:39	11/16/23 21:34	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		11/08/23 11:39	11/16/23 21:34	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		11/08/23 11:39	11/16/23 21:34	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		11/08/23 11:39	11/16/23 21:34	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		11/08/23 11:39	11/16/23 21:34	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		11/08/23 11:39	11/16/23 21:34	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.0	0.24	ng/L		11/08/23 11:39	11/16/23 21:34	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.0	1.5	ng/L		11/08/23 11:39	11/16/23 21:34	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.0	0.32	ng/L		11/08/23 11:39	11/16/23 21:34	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		11/08/23 11:39	11/16/23 21:34	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*97*		*50 - 150*	*11/08/23 11:39*	*11/16/23 21:34*	*1*
13C4 PFHpA	*96*		*50 - 150*	*11/08/23 11:39*	*11/16/23 21:34*	*1*
13C4 PFOA	*97*		*50 - 150*	*11/08/23 11:39*	*11/16/23 21:34*	*1*
13C5 PFNA	*87*		*50 - 150*	*11/08/23 11:39*	*11/16/23 21:34*	*1*
13C2 PFDA	*97*		*50 - 150*	*11/08/23 11:39*	*11/16/23 21:34*	*1*
13C2 PFUnA	*97*		*50 - 150*	*11/08/23 11:39*	*11/16/23 21:34*	*1*
13C2 PFDoA	*97*		*50 - 150*	*11/08/23 11:39*	*11/16/23 21:34*	*1*
13C2 PFTeDA	*93*		*50 - 150*	*11/08/23 11:39*	*11/16/23 21:34*	*1*
13C3 PFBS	*91*		*50 - 150*	*11/08/23 11:39*	*11/16/23 21:34*	*1*
18O2 PFHxS	*99*		*50 - 150*	*11/08/23 11:39*	*11/16/23 21:34*	*1*
13C4 PFOS	*81*		*50 - 150*	*11/08/23 11:39*	*11/16/23 21:34*	*1*
d3-NMeFOSAA	*126*		*50 - 150*	*11/08/23 11:39*	*11/16/23 21:34*	*1*
d5-NEtFOSAA	*140*		*50 - 150*	*11/08/23 11:39*	*11/16/23 21:34*	*1*
13C3 HFPO-DA	*108*		*50 - 150*	*11/08/23 11:39*	*11/16/23 21:34*	*1*

Lab Sample ID: LCS 320-718877/2-A
Matrix: Water
Analysis Batch: 720994

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 718877

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorohexanoic acid (PFHxA)	40.0	39.3		ng/L		98	72 - 129
Perfluoroheptanoic acid (PFHpA)	40.0	36.7		ng/L		92	72 - 130
Perfluorooctanoic acid (PFOA)	40.0	37.2		ng/L		93	71 - 133
Perfluorononanoic acid (PFNA)	40.0	40.9		ng/L		102	69 - 130

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

Lab Sample ID: LCS 320-718877/2-A
Matrix: Water
Analysis Batch: 720994

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 718877

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorodecanoic acid (PFDA)	40.0	38.7		ng/L		97	71 - 129
Perfluoroundecanoic acid (PFUnA)	40.0	38.1		ng/L		95	69 - 133
Perfluorododecanoic acid (PFDoA)	40.0	42.6		ng/L		107	72 - 134
Perfluorotridecanoic acid (PFTriA)	40.0	37.9		ng/L		95	65 - 144
Perfluorotetradecanoic acid (PFTeA)	40.0	36.9		ng/L		92	71 - 132
Perfluorobutanesulfonic acid (PFBS)	35.5	33.3		ng/L		94	72 - 130
Perfluorohexanesulfonic acid (PFHxS)	36.5	32.7		ng/L		90	68 - 131
Perfluorooctanesulfonic acid (PFOS)	37.2	40.3		ng/L		108	65 - 140
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	39.7		ng/L		99	65 - 136
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	39.8		ng/L		99	61 - 135
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	37.4	38.1		ng/L		102	77 - 137
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	40.0	35.6		ng/L		89	72 - 132
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	37.8	39.4		ng/L		104	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.8	41.7		ng/L		110	81 - 141

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*98*		*50 - 150*
13C4 PFHpA	*106*		*50 - 150*
13C4 PFOA	*103*		*50 - 150*
13C5 PFNA	*93*		*50 - 150*
13C2 PFDA	*93*		*50 - 150*
13C2 PFUnA	*104*		*50 - 150*
13C2 PFDoA	*96*		*50 - 150*
13C2 PFTeDA	*99*		*50 - 150*
13C3 PFBS	*95*		*50 - 150*
18O2 PFHxS	*100*		*50 - 150*
13C4 PFOS	*88*		*50 - 150*
d3-NMeFOSAA	*122*		*50 - 150*
d5-NEtFOSAA	*131*		*50 - 150*
13C3 HFPO-DA	*111*		*50 - 150*

Lab Sample ID: LCSD 320-718877/3-A
Matrix: Water
Analysis Batch: 720994

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 718877

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	40.0	41.3		ng/L		103	72 - 129	5	30
Perfluoroheptanoic acid (PFHpA)	40.0	40.8		ng/L		102	72 - 130	10	30
Perfluorooctanoic acid (PFOA)	40.0	38.3		ng/L		96	71 - 133	3	30

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

Lab Sample ID: LCSD 320-718877/3-A
Matrix: Water
Analysis Batch: 720994

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 718877

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorononanoic acid (PFNA)			40.0	42.3		ng/L		106	69 - 130	3	30
Perfluorodecanoic acid (PFDA)			40.0	36.4		ng/L		91	71 - 129	6	30
Perfluoroundecanoic acid (PFUnA)			40.0	39.8		ng/L		99	69 - 133	4	30
Perfluorododecanoic acid (PFDoA)			40.0	43.2		ng/L		108	72 - 134	1	30
Perfluorotridecanoic acid (PFTriA)			40.0	38.0		ng/L		95	65 - 144	0	30
Perfluorotetradecanoic acid (PFTeA)			40.0	39.8		ng/L		99	71 - 132	7	30
Perfluorobutanesulfonic acid (PFBS)			35.5	34.5		ng/L		97	72 - 130	3	30
Perfluorohexanesulfonic acid (PFHxS)			36.5	31.7		ng/L		87	68 - 131	3	30
Perfluorooctanesulfonic acid (PFOS)			37.2	41.5		ng/L		112	65 - 140	3	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			40.0	41.2		ng/L		103	65 - 136	4	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			40.0	41.7		ng/L		104	61 - 135	5	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid			37.4	39.4		ng/L		105	77 - 137	3	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			40.0	38.6		ng/L		96	72 - 132	8	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid			37.8	39.0		ng/L		103	76 - 136	1	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			37.8	39.3		ng/L		104	81 - 141	6	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFHxA	*102*		*50 - 150*
13C4 PFHpA	*111*		*50 - 150*
13C4 PFOA	*110*		*50 - 150*
13C5 PFNA	*100*		*50 - 150*
13C2 PFDA	*107*		*50 - 150*
13C2 PFUnA	*109*		*50 - 150*
13C2 PFDoA	*101*		*50 - 150*
13C2 PFTeDA	*100*		*50 - 150*
13C3 PFBS	*102*		*50 - 150*
18O2 PFHxS	*110*		*50 - 150*
13C4 PFOS	*97*		*50 - 150*
d3-NMeFOSAA	*130*		*50 - 150*
d5-NEtFOSAA	*140*		*50 - 150*
13C3 HFPO-DA	*113*		*50 - 150*

Lab Sample ID: MB 320-719042/1-A
Matrix: Water
Analysis Batch: 721186

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 719042

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		11/08/23 20:00	11/18/23 03:19	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		11/08/23 20:00	11/18/23 03:19	1

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

Lab Sample ID: MB 320-719042/1-A
Matrix: Water
Analysis Batch: 721186

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 719042

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		11/08/23 20:00	11/18/23 03:19	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		11/08/23 20:00	11/18/23 03:19	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		11/08/23 20:00	11/18/23 03:19	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		11/08/23 20:00	11/18/23 03:19	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		11/08/23 20:00	11/18/23 03:19	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		11/08/23 20:00	11/18/23 03:19	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		11/08/23 20:00	11/18/23 03:19	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		11/08/23 20:00	11/18/23 03:19	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		11/08/23 20:00	11/18/23 03:19	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		11/08/23 20:00	11/18/23 03:19	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		11/08/23 20:00	11/18/23 03:19	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		11/08/23 20:00	11/18/23 03:19	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.0	0.24	ng/L		11/08/23 20:00	11/18/23 03:19	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.0	1.5	ng/L		11/08/23 20:00	11/18/23 03:19	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.0	0.32	ng/L		11/08/23 20:00	11/18/23 03:19	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		11/08/23 20:00	11/18/23 03:19	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*92*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:19*	*1*
13C4 PFHpA	*97*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:19*	*1*
13C4 PFOA	*107*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:19*	*1*
13C5 PFNA	*104*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:19*	*1*
13C2 PFDA	*108*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:19*	*1*
13C2 PFUnA	*109*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:19*	*1*
13C2 PFDoA	*94*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:19*	*1*
13C2 PFTeDA	*99*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:19*	*1*
13C3 PFBS	*105*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:19*	*1*
18O2 PFHxS	*106*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:19*	*1*
13C4 PFOS	*106*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:19*	*1*
d3-NMeFOSAA	*90*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:19*	*1*
d5-NEtFOSAA	*104*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:19*	*1*
13C3 HFPO-DA	*95*		*50 - 150*	*11/08/23 20:00*	*11/18/23 03:19*	*1*

Lab Sample ID: LCS 320-719042/2-A
Matrix: Water
Analysis Batch: 721186

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 719042

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorohexanoic acid (PFHxA)	40.0	41.3		ng/L		103	72 - 129
Perfluoroheptanoic acid (PFHpA)	40.0	39.5		ng/L		99	72 - 130
Perfluorooctanoic acid (PFOA)	40.0	36.2		ng/L		91	71 - 133
Perfluorononanoic acid (PFNA)	40.0	40.9		ng/L		102	69 - 130
Perfluorodecanoic acid (PFDA)	40.0	39.6		ng/L		99	71 - 129
Perfluoroundecanoic acid (PFUnA)	40.0	41.0		ng/L		103	69 - 133

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

Lab Sample ID: LCS 320-719042/2-A
Matrix: Water
Analysis Batch: 721186

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 719042

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Perfluorododecanoic acid (PFDoA)			40.0	40.5		ng/L		101	72 - 134		
Perfluorotridecanoic acid (PFTriA)			40.0	38.6		ng/L		97	65 - 144		
Perfluorotetradecanoic acid (PFTeA)			40.0	39.1		ng/L		98	71 - 132		
Perfluorobutanesulfonic acid (PFBS)			35.5	36.6		ng/L		103	72 - 130		
Perfluorohexanesulfonic acid (PFHxS)			36.5	34.8		ng/L		95	68 - 131		
Perfluorooctanesulfonic acid (PFOS)			37.2	36.7		ng/L		99	65 - 140		
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			40.0	42.3		ng/L		106	65 - 136		
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			40.0	42.4		ng/L		106	61 - 135		
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid			37.4	34.7		ng/L		93	77 - 137		
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			40.0	41.3		ng/L		103	72 - 132		
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid			37.8	33.7		ng/L		89	76 - 136		
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			37.8	40.0		ng/L		106	81 - 141		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*91*		*50 - 150*
13C4 PFHpA	*102*		*50 - 150*
13C4 PFOA	*106*		*50 - 150*
13C5 PFNA	*96*		*50 - 150*
13C2 PFDA	*98*		*50 - 150*
13C2 PFUnA	*93*		*50 - 150*
13C2 PFDoA	*93*		*50 - 150*
13C2 PFTeDA	*95*		*50 - 150*
13C3 PFBS	*105*		*50 - 150*
18O2 PFHxS	*105*		*50 - 150*
13C4 PFOS	*102*		*50 - 150*
d3-NMeFOSAA	*83*		*50 - 150*
d5-NEtFOSAA	*91*		*50 - 150*
13C3 HFPO-DA	*86*		*50 - 150*

Lab Sample ID: LCSD 320-719042/3-A
Matrix: Water
Analysis Batch: 721186

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 719042

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)			40.0	44.4		ng/L		111	72 - 129	7	30
Perfluoroheptanoic acid (PFHpA)			40.0	40.3		ng/L		101	72 - 130	2	30
Perfluorooctanoic acid (PFOA)			40.0	38.9		ng/L		97	71 - 133	7	30
Perfluorononanoic acid (PFNA)			40.0	40.6		ng/L		102	69 - 130	1	30
Perfluorodecanoic acid (PFDA)			40.0	40.5		ng/L		101	71 - 129	2	30

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

Lab Sample ID: LCSD 320-719042/3-A
Matrix: Water
Analysis Batch: 721186

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 719042

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluoroundecanoic acid (PFUnA)			40.0	43.6		ng/L		109	69 - 133	6	30
Perfluorododecanoic acid (PFDoA)			40.0	40.2		ng/L		100	72 - 134	1	30
Perfluorotridecanoic acid (PFTriA)			40.0	40.6		ng/L		101	65 - 144	5	30
Perfluorotetradecanoic acid (PFTeA)			40.0	43.8		ng/L		110	71 - 132	11	30
Perfluorobutanesulfonic acid (PFBS)			35.5	36.8		ng/L		104	72 - 130	0	30
Perfluorohexanesulfonic acid (PFHxS)			36.5	34.8		ng/L		95	68 - 131	0	30
Perfluorooctanesulfonic acid (PFOS)			37.2	37.2		ng/L		100	65 - 140	1	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			40.0	41.1		ng/L		103	65 - 136	3	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			40.0	45.6		ng/L		114	61 - 135	7	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid			37.4	33.4		ng/L		89	77 - 137	4	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			40.0	43.1		ng/L		108	72 - 132	4	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid			37.8	33.9		ng/L		90	76 - 136	1	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			37.8	39.4		ng/L		104	81 - 141	2	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFHxA	*82*		*50 - 150*
13C4 PFHpA	*93*		*50 - 150*
13C4 PFOA	*97*		*50 - 150*
13C5 PFNA	*92*		*50 - 150*
13C2 PFDA	*90*		*50 - 150*
13C2 PFUnA	*85*		*50 - 150*
13C2 PFDoA	*90*		*50 - 150*
13C2 PFTeDA	*91*		*50 - 150*
13C3 PFBS	*94*		*50 - 150*
18O2 PFHxS	*98*		*50 - 150*
13C4 PFOS	*95*		*50 - 150*
d3-NMeFOSAA	*78*		*50 - 150*
d5-NEtFOSAA	*83*		*50 - 150*
13C3 HFPO-DA	*81*		*50 - 150*

LCMS

Prep Batch: 718877

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-106532-1	MW-TS-1	Total/NA	Water	3535	
320-106532-3	MW-TS-2	Total/NA	Water	3535	
320-106532-4	MW-TS-3	Total/NA	Water	3535	
320-106532-6	EB-1	Total/NA	Water	3535	
320-106532-7	GAC-1	Total/NA	Water	3535	
MB 320-718877/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-718877/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-718877/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Prep Batch: 719042

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-106532-2	MW-TS-101	Total/NA	Water	3535	
320-106532-5	MW-TS-4	Total/NA	Water	3535	
MB 320-719042/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-719042/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-719042/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Analysis Batch: 720994

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-106532-1	MW-TS-1	Total/NA	Water	EPA 537(Mod)	718877
320-106532-3	MW-TS-2	Total/NA	Water	EPA 537(Mod)	718877
320-106532-4	MW-TS-3	Total/NA	Water	EPA 537(Mod)	718877
320-106532-6	EB-1	Total/NA	Water	EPA 537(Mod)	718877
320-106532-7	GAC-1	Total/NA	Water	EPA 537(Mod)	718877
MB 320-718877/1-A	Method Blank	Total/NA	Water	EPA 537(Mod)	718877
LCS 320-718877/2-A	Lab Control Sample	Total/NA	Water	EPA 537(Mod)	718877
LCSD 320-718877/3-A	Lab Control Sample Dup	Total/NA	Water	EPA 537(Mod)	718877

Analysis Batch: 721186

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-106532-2	MW-TS-101	Total/NA	Water	EPA 537(Mod)	719042
320-106532-5	MW-TS-4	Total/NA	Water	EPA 537(Mod)	719042
MB 320-719042/1-A	Method Blank	Total/NA	Water	EPA 537(Mod)	719042
LCS 320-719042/2-A	Lab Control Sample	Total/NA	Water	EPA 537(Mod)	719042
LCSD 320-719042/3-A	Lab Control Sample Dup	Total/NA	Water	EPA 537(Mod)	719042

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: Tall Spruce

Job ID: 320-106532-1

Client Sample ID: MW-TS-1
Date Collected: 10/25/23 15:32
Date Received: 10/31/23 14:55

Lab Sample ID: 320-106532-1
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			246.8 mL	10.0 mL	718877	11/08/23 11:39	FXY	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	720994	11/16/23 22:08	AP1	EET SAC

Client Sample ID: MW-TS-101
Date Collected: 10/25/23 15:22
Date Received: 10/31/23 14:55

Lab Sample ID: 320-106532-2
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			273.4 mL	10.0 mL	719042	11/08/23 20:00	FX	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	721186	11/18/23 03:49	AP1	EET SAC

Client Sample ID: MW-TS-2
Date Collected: 10/25/23 11:41
Date Received: 10/31/23 14:55

Lab Sample ID: 320-106532-3
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			237.9 mL	10.0 mL	718877	11/08/23 11:39	FXY	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	720994	11/16/23 22:31	AP1	EET SAC

Client Sample ID: MW-TS-3
Date Collected: 10/25/23 13:57
Date Received: 10/31/23 14:55

Lab Sample ID: 320-106532-4
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			235.8 mL	10.0 mL	718877	11/08/23 11:39	FXY	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	720994	11/16/23 22:43	AP1	EET SAC

Client Sample ID: MW-TS-4
Date Collected: 10/25/23 12:34
Date Received: 10/31/23 14:55

Lab Sample ID: 320-106532-5
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			265.9 mL	10.0 mL	719042	11/08/23 20:00	FX	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	721186	11/18/23 03:59	AP1	EET SAC

Client Sample ID: EB-1
Date Collected: 10/25/23 16:00
Date Received: 10/31/23 14:55

Lab Sample ID: 320-106532-6
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			248.2 mL	10.0 mL	718877	11/08/23 11:39	FXY	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	720994	11/16/23 23:06	AP1	EET SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: Tall Spruce

Job ID: 320-106532-1

Client Sample ID: GAC-1

Date Collected: 10/25/23 17:00
Date Received: 10/31/23 14:55

Lab Sample ID: 320-106532-7

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			251 mL	10.0 mL	718877	11/08/23 11:39	FXY	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	720994	11/16/23 23:17	AP1	EET SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: Tall Spruce

Job ID: 320-106532-1

Laboratory: Eurofins 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: Tall Spruce

Job ID: 320-106532-1

Method	Method Description	Protocol	Laboratory
EPA 537(Mod)	PFAS for QSM 5.3, Table B-15	EPA	EET SAC
3535	Solid-Phase Extraction (SPE)	SW846	EET 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:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: Tall Spruce

Job ID: 320-106532-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-106532-1	MW-TS-1	Water	10/25/23 15:32	10/31/23 14:55
320-106532-2	MW-TS-101	Water	10/25/23 15:22	10/31/23 14:55
320-106532-3	MW-TS-2	Water	10/25/23 11:41	10/31/23 14:55
320-106532-4	MW-TS-3	Water	10/25/23 13:57	10/31/23 14:55
320-106532-5	MW-TS-4	Water	10/25/23 12:34	10/31/23 14:55
320-106532-6	EB-1	Water	10/25/23 16:00	10/31/23 14:55
320-106532-7	GAC-1	Water	10/25/23 17:00	10/31/23 14:55

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

CHAIN-OF-CUSTODY RECORD

Laboratory Eurofins
Attn: D Altucker

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

Analytical Methods (include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	DOD table B-15 PFAS x18	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
MW-TS-1		1532	10/25/23	X	2	Groundwater
MW-TS-101		1522		X	2	
MW-TS-2		1141		X	2	
MW-TS-3		1357		X	2	
MW-TS-4		1234		X	2	
EB-1		1600		X	2	Equipment Blank
GAC-1		1700		X	2	GAC Effluent

Project Information	
Number:	102519-026
Name:	Tall Spruce
Contact:	Ashley Jaramillo
Ongoing Project?	Yes [X] No [ ]
Sampler:	A. Mastas

Sample Receipt	
Total No. of Containers:	14
COC Seals/Intact? Y/N/NA	
Received Good Cond./Cold	
Temp:	
Delivery Method:	

320-106532 Chain of Custody

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 1330	Signature: Time:	Signature: Time:
Printed Name: Silvia Krebs Date: 10/30/23	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 1455	Signature: Time:	Signature: Time:
Printed Name: Sandy P Date: 10/31/23	Printed Name: Date:	Printed Name: Date:
Company: EETCA 1.0c	Company:	Company:

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

eurofins | Environment Testing

Sacramento Sample Receiving Notes (SSRN)

Loc: 320
106532

Tracking # : 027 7020 6334

Job: _____

SO / PO / FO / SAT / 2-Day / Ground / UPS / CDO / Courier
GSL / OnTrac / Goldstreak / USPS / Other _____

Use this form to record Sample Custody Seal, Cooler Custody Seal, Temperature & corrected Temperature & other observations.
File in the job folder with the COC.

Therm. ID: 209 Corr. Factor: (+ / -) 0 °C

Ice _____ Wet _____ Gel X Other _____

Cooler Custody Seal: SEAL

Cooler ID: _____

Temp Observed: 1.0 °C Corrected: 1.0 °C

From: Temp Blank ☒ Sample ☐

Opening/Processing The Shipment	Yes	No	NA
Cooler compromised/tampered with?	☐	☒	☐
Cooler Temperature is acceptable?	☒	☐	☐
Frozen samples show signs of thaw?	☐	☐	☒

Initials: SP Date: 10-31-23

Unpacking/Labeling The Samples	Yes	No	NA
Containers are not broken or leaking?	☒	☐	☐
Samples compromised/tampered with?	☐	☒	☐
COC is complete w/o discrepancies	☒	☐	☐
Sample custody seal?	☐	☐	☒
Sample containers have legible labels?	☒	☐	☐
Sample date/times are provided?	☒	☐	☐
Appropriate containers are used?	☒	☐	☐
Sample bottles are completely filled?	☒	☐	☐
Sample preservatives verified?	☐	☐	☒
Is the Field Sampler's name on COC?	☒	☐	☐
Samples w/o discrepancies?	☒	☐	☐
Zero headspace?*	☐	☐	☒
Alkalinity has no headspace?	☐	☐	☒
Perchlorate has headspace? (Methods 314, 331, 6850)	☐	☐	☒
Multiphasic samples are not present?	☒	☐	☐

Containers requiring zero headspace have no headspace, or bubble < 6 mm (1/4")

Initials: DM Date: 10/31/23

Notes: _____

Trizma Lot #(s): _____

Ammonium Acetate Lot #(s): _____

Login Completion	Yes	No	NA
Receipt Temperature on COC?	☒	☐	☐
NCM Filed?	☐	☐	☒
Samples received within hold time?	☒	☐	☐
Log Release checked in TALS?	☒	☐	☐

Initials: DM Date: 10/31/23

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-106532-1

Login Number: 106532
List Number: 1
Creator: Pratali, Sandra A

List Source: Eurofins Sacramento

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

ADEC Contaminated Sites Program Laboratory Data Review Checklist

Completed By:	Nathan Lenhard	**CS Site Name:**	FIA – Sitewide PFAS	**Lab Name:**	Eurofins Environment Testing
Title:	Environmental Scientist	**ADEC File No.:**	100.38.277	**Lab Report No.:**	320-106532-1
Consulting Firm:	Shannon & Wilson, Inc.	**Hazard ID No.:**	26816	**Lab Report Date:**	11/20/2023

Note: *Any N/A or No box checked must have an explanation in the comments box.*

1. **Laboratory**

   a. Did an ADEC Contaminated Sites Laboratory Approval Program (CS-LAP) approved laboratory receive and perform all of the submitted sample analyses?
   Yes ☒ No ☐ N/A ☐
   Comments: Project samples were sent to Eurofins Environment Testing (Eurofins) in Sacramento, California. Eurofins analyzed project samples for PFAS by EPA 537(Mod), a LCMSMS method compliant with the DoD QSM Version 5.3 Table B-15, under DEC approval 17-020 dated 2/21/24, expiring 2/20/2027.

   b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses CS-LAP approved?
   Yes ☐ No ☐ N/A ☒
   Comments: Project samples were not transferred to another 'network' laboratory or sub-contracted to an alternate laboratory.

2. **Chain of Custody (CoC)**

   a. Is the CoC information completed, signed, and dated (including released/received by)?
   Yes ☒ No ☐ N/A ☐
   Comments:

   b. Were the correct analyses requested?
   Yes ☒ No ☐ N/A ☐
   Analyses requested: PFAS by EPA 537(Mod), compliant with DoD QSM 5.3 Table B-15.
   Comments: Analysis was performed as requested.

3. Laboratory Sample Receipt Documentation

a. Is the sample/cooler temperature documented and within range at receipt (0° to 6° C)?
Yes ☒ No ☐ N/A ☐
Cooler temperature(s): Cooler temperature was not reported by the laboratory.
Sample temperature(s): A temperature blank was included with the samples in the cooler and is used to access temperature preservation. The COC can sample receiving notes indicate the temperature blank was 1.0°C at sample login.
Comments: The temperature blank was within the acceptable temperature range of 0°C to 6°C.

b. Is the sample preservation acceptable – acidified waters, methanol preserved soil (GRO, BTEX, VOCs, etc.)?
Yes ☐ No ☐ N/A ☒
Comments: Sample preservation outside of temperature control is not required for PFAS analysis.

c. Is the sample condition documented – broken, leaking, zero headspace (VOA vials); canister vacuum/pressure checked and no open valves, etc.?
Yes ☒ No ☐ N/A ☐
Comments: The laboratory sample receipt form notes that project samples arrived in acceptable condition, properly preserved, and within an acceptable temperature range.

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, canister not holding a vacuum, etc.?
Yes ☐ No ☐ N/A ☒
Comments: No sample discrepancies are noted on the laboratory sample receipt form.

e. Is the data quality or usability affected?
Yes ☐ No ☒ N/A ☐
Comments: See above.

4. Case Narrative

a. Is the case narrative present and understandable?
Yes ☒ No ☐ N/A ☐
Comments:

b. Are there discrepancies, errors, or QC failures identified by the lab?
Yes ☒ No ☐ N/A ☐
Comments:
The continuing calibration verification (CCV) associated with preparation batch 320-720994 recovered above the upper control limit for isotope dilution analyte (IDA) d3-NMeFOSAA and d5-NEtFOSAA. The associated target analytes N-methylperflorooctanesulfonamidoacetic acid (NMeFOSAA) and N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA) were within control limits in the CCV; therefore, the data is reported for samples *MW-TS-1*, *MW-TS-2*, *MW-TS-3*, *EB-1*, *GAC-1*, and (CCV320-720994/1). These analytes were not detected in project samples. Data quality and/or usability not affected.

The CCV associated with preparation batch 320-720994 recovered above the upper control limit for IDA d5-NEtFOSAA. The associated target analytes NMeFOSAA and NEtFOSAA were within control limits in the CCV; therefore, the data is reported for samples *MW-TS-1*, *MW-TS-2*, *MW-TS-3*, *EP-1*, *GAC-1*, and (CCV320-720994/12). These analytes were not detected in project samples. Data quality and/or usability not affected.

The Isotope Dilution Analyte (IDA) recovery associated with the following sample is below the method recommended limit: MW-TS-1. Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the sample(s). See Section 6.d for details regarding impacts to data quality and/or usability, as applicable.

Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batches 320-718877 and 320-719042. See section 6.c. for details regarding data quality/usability as applicable.

Samples *MW-TS-1*, *MW-TS-2*, *MW-TS-4*, and *GAC-1* associated with preparation batch 320-718877 were observed to have a thin layer of sediment present in the bottom of the bottle prior to extraction. Data quality and/or usability not affected.

During the solid phase extraction process, the following samples contain non-settleable particualtes which clogged the solid phase extraction column: *MW-TS-1*, *MW-TS-3*, and *GAC-1* from preparation batch 320-718877. Data quality and/or usability not affected.

Samples *MW-TS-101* and *MW-TS-4* associated with preparation batch 320-719042 were observed to have a thin layer of sediment present in the bottom of the bottle prior to extraction. Data quality and/or usability not affected.

c. Were all the corrective actions documented?
Yes ☐ No ☐ N/A ☒
Comments: Corrective actions not required.

d. What is the effect on data quality/usability according to the case narrative?
Comments: The effects on data quality/usability noted in the case narrative are discussed in section 4.b., above, or elsewhere in this checklist.

5. Sample Results

a. Are the correct analyses performed/reported as requested on CoC?
Yes ☒ No ☐ N/A ☐
Comments:

b. Are all applicable holding times met?
Yes ☒ No ☐ N/A ☐
Comments:

c. Are all soils reported on a dry weight basis?
Yes ☐ No ☐ N/A ☒
Comments: Soil samples were not included in this work order.

d. Are the reported limits of quantitation (LoQ) or limits of detections (LOD), or reporting limits (RL) less than the Cleanup Level or the action level for the project?
Yes ☒ No ☐ N/A ☐
Comments:

e. Is the data quality or usability affected?
Yes ☐ No ☒ N/A ☐
Comments: See above.

6. QC Samples

a. Method Blank

i. Was one method blank reported per matrix, analysis, and 20 samples?
Yes ☒ No ☐ N/A ☐
Comments:

ii. Are all method blank results less than LOQ (or RL)?
Yes ☒ No ☐
Comments: No analytes are detected in method blank samples.

iii. If above LoQ or RL, 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?
Yes ☐ No ☒ N/A ☐
Comments: See above.

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

i. Organics – Are 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 – Are one LCS and one sample duplicate reported per matrix, analysis and 20 samples?
Yes ☐ No ☐ N/A ☒
Comments: Metals/inorganic analyses were not included in this work order.

iii. Accuracy – Are 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 – Are all relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? Was the RPD reported from LCS/LCSD, and or sample/sample duplicate? (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)
Yes ☒ No ☐ N/A ☐
Comments:

v. If %R or RPD is outside of acceptable limits, what samples are affected?
Comments: Not applicable, see above.

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?
Yes ☐ No ☐ N/A ☒
Comments: See above.

vii. Is the data quality or usability affected?
Yes ☐ No ☒ N/A ☐
Comments: Data quality/usability is not affected, see above.

c. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

i. Organics – Are one MS/MSD reported per matrix, analysis and 20 samples?
Yes ☐ No ☒ N/A ☐
Comments: Insufficient sample was available to perform an MS/MSD associated with preparation batches 320-718877 and 320-719042. Batch accuracy and precision is evaluated using the LCS/LCSD samples associated with these respective batches. See section 6.b., above. Data quality/usability is not affected.

ii. Metals/Inorganics – Are one MS/MSD reported per matrix, analysis and 20 samples?
Yes ☐ No ☐ N/A ☒
Comments: Metals/inorganic analyses were not requested for samples included in the work order.

iii. Accuracy – Are 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 – Are 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. Is the data quality or usability affected?
Yes ☐ No ☒ N/A ☐
Comments: 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 – Are 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 IDAs 13C2 PFDoA and 13C2 PFTeDA were recovered low in sample MW-TS-1 associated with preparatory batch 320-718877. Associated analytes PFDoA, PFTriA, and PFTeA were not detected in the noted sample. Consequently, the result of the aforementioned analytes in sample *MW-TS-1* are considered estimates, no direction of bias, and flagged 'J*' in the analytical table. The data is considered affected as noted, however, the data is considered usable with applied flags.

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. Is the data quality or usability affected?
Yes ☒ No ☐ N/A ☐
Comments: See above.

e. Trip Blanks

i. Is one trip blank reported per matrix, analysis, and for each cooler containing volatile samples? Yes ☐ No ☒ N/A ☐
Comments: No volatile samples were included in this work order. No trip blank needed.

ii. Are all results less than LoQ or RL?
Yes ☐ No ☐ N/A ☒
Comments: See above.

iii. If above LoQ or RL, what samples are affected?
Comments: Not applicable, see above.

iv. Is the data quality or usability affected?
Yes ☐ No ☒ N/A ☐

Comments: See above.

f. Field Duplicate

i. Are one field duplicate submitted per matrix, analysis, and 10 project samples?
Yes ☒ No ☐ N/A ☐
Comments: Sample *MW-TS-101* is a duplicate of corresponding sample *MW-TS-1*.

ii. Was the duplicate submitted blind to lab?
Yes ☒ No ☐ N/A ☐
Comments:

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

$$RPD\ (\%) = \left| \frac{R_1 - R_2}{\left(\frac{R_1 + R_2}{2}\right)} \right| X\ 100$$

Where R_1 = Sample Concentration

R_2 = Field Duplicate Concentration

Is the data quality or usability affected? (Explain)

Yes ☒ No ☐ N/A ☐
Comments: Where calculable, analytical results met the comparison criterion (≤ 30% for water) for the field duplicate pair.

iv. Is the data quality or usability affected? (Explain)
Yes ☐ No ☒ N/A ☐
Comments: Data quality/usability is not affected, see above.

g. Decontamination or Equipment Blanks

i. Were decontamination or equipment blanks collected?
Yes ☒ No ☐ N/A ☐
Comments: An equipment blank sample designated *EB-1* was included with the work order.

ii. Are all results less than LoQ or RL?
Yes ☒ No ☐ N/A ☐
Comments: No analytes are detected in the equipment blank sample.

iii. If above LoQ or RL, specify what samples are affected.

Comments: Not applicable, see above.

iv. Are data quality or usability affected?
Yes ☐ No ☒ N/A ☐
Comments: See above.

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

a. Are they defined and appropriate?
Yes ☐ No ☐ N/A ☒
Comments: No other data flags/qualifiers are observed.

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

ANALYTICAL REPORT

PREPARED FOR

Attn: Ashley Jaramillo
Shannon & Wilson, Inc
2355 Hill Rd.
Fairbanks, Alaska 99709-5244

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JOB DESCRIPTION

DOT P:F, FAI Tallspruce

JOB NUMBER

320-110042-1

Eurofins Sacramento
880 Riverside Parkway
West Sacramento CA 95605

See page two for job notes and contact information.

myEOL

Job Notes

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Authorization

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Authorized for release by
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Table of Contents

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: DOT P:F, FAI Tallspruce

Job ID: 320-110042-1

Qualifiers

LCMS

Qualifier	Qualifier Description
*5-	Isotope dilution analyte is outside acceptance limits, low biased.
H	Sample was prepped or analyzed beyond the specified holding time. This does not meet regulatory requirements.
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

Job Narrative
320-110042-1

Receipt
The samples were received on 2/27/2024 3:03 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 0.3º C.

LCMS
Method EPA 537(Mod): The Isotope Dilution Analyte (IDA) recovery associated with the following sample is below the method recommended limit: MW-TS-2 (320-110042-3). 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 sample.

Method EPA 537(Mod): The "I" qualifier means the transition mass ratio for the indicated analyte was outside the established ratio limits. The qualitative identification of the analyte has some degree of uncertainty. However, analyst judgment was used to positively identify the analyte: MW-TS-3 (320-110042-2).

Method EPA 537(Mod): Internal standard (ISTD) response for the following sample was outside control limits: MW-TS-2 (320-110042-3). The sample was re-analyzed and ISTD response was still outside control limits. The ISTD is not used to calculate analyte concentration therefor there is no adverse impact from this anomaly.

Method EPA 537(Mod): The following Equipment Blank (EB) sample: EB-1 (320-110042-7) was re-extracted past holding time due to suspected lab contamination for Perfluorotetradecanoic acid (PFTeA) detected above the 1/2RL. The re-extraction data analysis was non-detect. Therefore both sets of data were reported.

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

Organic Prep
Method 3535: The following samples in preparation batch 320-743326 were yellow in color prior to extraction. MW-TS-4 (320-110042-1), MW-TS-3 (320-110042-2), MW-TS-2 (320-110042-3), GAC-1 (320-110042-4), MW-TS-1 (320-110042-5) and MW-TS-101 (320-110042-6)

Method 3535: The following samples in preparation batch 320-743326 were observed to have floating particulates present in the sample bottle. MW-TS-4 (320-110042-1), MW-TS-3 (320-110042-2), MW-TS-2 (320-110042-3), GAC-1 (320-110042-4), MW-TS-1 (320-110042-5) and MW-TS-101 (320-110042-6)

Method 3535: The following samples in preparation batch 320-743326 were yellow in color following extraction. MW-TS-2 (320-110042-3), MW-TS-1 (320-110042-5) and MW-TS-101 (320-110042-6)

Method 3535: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-746513.

Method 3535: The following sample was re-prepared outside of preparation holding time due to blank hit confirmation: EB-1 (320-110042-7).

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: DOT P:F, FAI Tallspruce

Job ID: 320-110042-1

Client Sample ID: MW-TS-4 — Lab Sample ID: 320-110042-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	1.5	J	1.8	0.52	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	3.0		1.8	0.76	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.54	J	1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	4.4		1.8	0.51	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.1	J	1.8	0.48	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-TS-3 — Lab Sample ID: 320-110042-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	3.1		1.8	0.51	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.44	J I	1.8	0.22	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	6.8		1.8	0.75	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	1.1	J	1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	11		1.8	0.50	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	2.0		1.8	0.48	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-TS-2 — Lab Sample ID: 320-110042-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	2.0		1.8	0.54	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.37	J	1.8	0.23	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	3.9		1.8	0.79	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.81	J	1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	4.9		1.8	0.53	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.5	J	1.8	0.50	ng/L	1		EPA 537(Mod)	Total/NA
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	0.43	J	1.8	0.37	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: GAC-1 — Lab Sample ID: 320-110042-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	1.1	J	1.8	0.78	ng/L	1		EPA 537(Mod)	Total/NA
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	0.29	J	1.8	0.29	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-TS-1 — Lab Sample ID: 320-110042-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	2.7		1.8	0.52	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.1	J	1.8	0.23	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	4.9		1.8	0.77	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	1.4	J	1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	3.1		1.8	0.51	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	2.1		1.8	0.49	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-TS-101 — Lab Sample ID: 320-110042-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	2.6		1.9	0.54	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.1	J	1.9	0.23	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	4.7		1.9	0.80	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	1.2	J	1.9	0.19	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	2.8		1.9	0.53	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	2.1		1.9	0.51	ng/L	1		EPA 537(Mod)	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins Sacramento

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: DOT P:F, FAI Tallspruce

Job ID: 320-110042-1

Client Sample ID: EB-1

Lab Sample ID: 320-110042-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorotetradecanoic acid (PFTeA)	1.3	J	1.8	0.66	ng/L	1		EPA 537(Mod)	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: DOT P:F, FAI Tallspruce

Job ID: 320-110042-1

Client Sample ID: MW-TS-4
Date Collected: 02/22/24 11:08
Date Received: 02/27/24 15:03

Lab Sample ID: 320-110042-1
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)	**1.5**	**J**	1.8	0.52	ng/L		02/28/24 12:06	03/09/24 22:43	1
Perfluoroheptanoic acid (PFHpA)	ND		1.8	0.22	ng/L		02/28/24 12:06	03/09/24 22:43	1
Perfluorooctanoic acid (PFOA)	**3.0**		1.8	0.76	ng/L		02/28/24 12:06	03/09/24 22:43	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.24	ng/L		02/28/24 12:06	03/09/24 22:43	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		02/28/24 12:06	03/09/24 22:43	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.98	ng/L		02/28/24 12:06	03/09/24 22:43	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.49	ng/L		02/28/24 12:06	03/09/24 22:43	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		02/28/24 12:06	03/09/24 22:43	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.65	ng/L		02/28/24 12:06	03/09/24 22:43	1
Perfluorobutanesulfonic acid (PFBS)	**0.54**	**J**	1.8	0.18	ng/L		02/28/24 12:06	03/09/24 22:43	1
Perfluorohexanesulfonic acid (PFHxS)	**4.4**		1.8	0.51	ng/L		02/28/24 12:06	03/09/24 22:43	1
Perfluorooctanesulfonic acid (PFOS)	**1.1**	**J**	1.8	0.48	ng/L		02/28/24 12:06	03/09/24 22:43	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.4	1.1	ng/L		02/28/24 12:06	03/09/24 22:43	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.4	1.2	ng/L		02/28/24 12:06	03/09/24 22:43	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.21	ng/L		02/28/24 12:06	03/09/24 22:43	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.3	ng/L		02/28/24 12:06	03/09/24 22:43	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.28	ng/L		02/28/24 12:06	03/09/24 22:43	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		02/28/24 12:06	03/09/24 22:43	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*100*		*50 - 150*	*02/28/24 12:06*	*03/09/24 22:43*	*1*
13C4 PFHpA	*99*		*50 - 150*	*02/28/24 12:06*	*03/09/24 22:43*	*1*
13C4 PFOA	*102*		*50 - 150*	*02/28/24 12:06*	*03/09/24 22:43*	*1*
13C5 PFNA	*123*		*50 - 150*	*02/28/24 12:06*	*03/09/24 22:43*	*1*
13C2 PFDA	*104*		*50 - 150*	*02/28/24 12:06*	*03/09/24 22:43*	*1*
13C2 PFUnA	*88*		*50 - 150*	*02/28/24 12:06*	*03/09/24 22:43*	*1*
13C2 PFDoA	*103*		*50 - 150*	*02/28/24 12:06*	*03/09/24 22:43*	*1*
13C2 PFTeDA	*94*		*50 - 150*	*02/28/24 12:06*	*03/09/24 22:43*	*1*
13C3 PFBS	*78*		*50 - 150*	*02/28/24 12:06*	*03/09/24 22:43*	*1*
18O2 PFHxS	*99*		*50 - 150*	*02/28/24 12:06*	*03/09/24 22:43*	*1*
13C4 PFOS	*100*		*50 - 150*	*02/28/24 12:06*	*03/09/24 22:43*	*1*
d3-NMeFOSAA	*107*		*50 - 150*	*02/28/24 12:06*	*03/09/24 22:43*	*1*
d5-NEtFOSAA	*123*		*50 - 150*	*02/28/24 12:06*	*03/09/24 22:43*	*1*
13C3 HFPO-DA	*90*		*50 - 150*	*02/28/24 12:06*	*03/09/24 22:43*	*1*

Client: Shannon & Wilson, Inc
Project/Site: DOT P:F, FAI Tallspruce

Job ID: 320-110042-1

Client Sample ID: MW-TS-3
Date Collected: 02/22/24 13:05
Date Received: 02/27/24 15:03

Lab Sample ID: 320-110042-2
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)	**3.1**		1.8	0.51	ng/L		02/28/24 12:06	03/09/24 22:54	1
Perfluoroheptanoic acid (PFHpA)	**0.44**	**J I**	1.8	0.22	ng/L		02/28/24 12:06	03/09/24 22:54	1
Perfluorooctanoic acid (PFOA)	**6.8**		1.8	0.75	ng/L		02/28/24 12:06	03/09/24 22:54	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.24	ng/L		02/28/24 12:06	03/09/24 22:54	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.27	ng/L		02/28/24 12:06	03/09/24 22:54	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.97	ng/L		02/28/24 12:06	03/09/24 22:54	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.48	ng/L		02/28/24 12:06	03/09/24 22:54	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.1	ng/L		02/28/24 12:06	03/09/24 22:54	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.64	ng/L		02/28/24 12:06	03/09/24 22:54	1
Perfluorobutanesulfonic acid (PFBS)	**1.1**	**J**	1.8	0.18	ng/L		02/28/24 12:06	03/09/24 22:54	1
Perfluorohexanesulfonic acid (PFHxS)	**11**		1.8	0.50	ng/L		02/28/24 12:06	03/09/24 22:54	1
Perfluorooctanesulfonic acid (PFOS)	**2.0**		1.8	0.48	ng/L		02/28/24 12:06	03/09/24 22:54	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.4	1.1	ng/L		02/28/24 12:06	03/09/24 22:54	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.4	1.1	ng/L		02/28/24 12:06	03/09/24 22:54	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.21	ng/L		02/28/24 12:06	03/09/24 22:54	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.5	1.3	ng/L		02/28/24 12:06	03/09/24 22:54	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.28	ng/L		02/28/24 12:06	03/09/24 22:54	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.35	ng/L		02/28/24 12:06	03/09/24 22:54	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*100*		*50 - 150*	*02/28/24 12:06*	*03/09/24 22:54*	*1*
13C4 PFHpA	*104*		*50 - 150*	*02/28/24 12:06*	*03/09/24 22:54*	*1*
13C4 PFOA	*103*		*50 - 150*	*02/28/24 12:06*	*03/09/24 22:54*	*1*
13C5 PFNA	*113*		*50 - 150*	*02/28/24 12:06*	*03/09/24 22:54*	*1*
13C2 PFDA	*108*		*50 - 150*	*02/28/24 12:06*	*03/09/24 22:54*	*1*
13C2 PFUnA	*94*		*50 - 150*	*02/28/24 12:06*	*03/09/24 22:54*	*1*
13C2 PFDoA	*96*		*50 - 150*	*02/28/24 12:06*	*03/09/24 22:54*	*1*
13C2 PFTeDA	*94*		*50 - 150*	*02/28/24 12:06*	*03/09/24 22:54*	*1*
13C3 PFBS	*80*		*50 - 150*	*02/28/24 12:06*	*03/09/24 22:54*	*1*
18O2 PFHxS	*97*		*50 - 150*	*02/28/24 12:06*	*03/09/24 22:54*	*1*
13C4 PFOS	*105*		*50 - 150*	*02/28/24 12:06*	*03/09/24 22:54*	*1*
d3-NMeFOSAA	*107*		*50 - 150*	*02/28/24 12:06*	*03/09/24 22:54*	*1*
d5-NEtFOSAA	*110*		*50 - 150*	*02/28/24 12:06*	*03/09/24 22:54*	*1*
13C3 HFPO-DA	*91*		*50 - 150*	*02/28/24 12:06*	*03/09/24 22:54*	*1*

Client: Shannon & Wilson, Inc
Project/Site: DOT P:F, FAI Tallspruce

Job ID: 320-110042-1

Client Sample ID: MW-TS-2
Date Collected: 02/22/24 14:37
Date Received: 02/27/24 15:03

Lab Sample ID: 320-110042-3
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)	**2.0**		1.8	0.54	ng/L		02/28/24 12:06	03/09/24 23:05	1
Perfluoroheptanoic acid (PFHpA)	**0.37**	**J**	1.8	0.23	ng/L		02/28/24 12:06	03/09/24 23:05	1
Perfluorooctanoic acid (PFOA)	**3.9**		1.8	0.79	ng/L		02/28/24 12:06	03/09/24 23:05	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.25	ng/L		02/28/24 12:06	03/09/24 23:05	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.29	ng/L		02/28/24 12:06	03/09/24 23:05	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	1.0	ng/L		02/28/24 12:06	03/09/24 23:05	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.51	ng/L		02/28/24 12:06	03/09/24 23:05	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		02/28/24 12:06	03/09/24 23:05	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.68	ng/L		02/28/24 12:06	03/09/24 23:05	1
Perfluorobutanesulfonic acid (PFBS)	**0.81**	**J**	1.8	0.18	ng/L		02/28/24 12:06	03/09/24 23:05	1
Perfluorohexanesulfonic acid (PFHxS)	**4.9**		1.8	0.53	ng/L		02/28/24 12:06	03/09/24 23:05	1
Perfluorooctanesulfonic acid (PFOS)	**1.5**	**J**	1.8	0.50	ng/L		02/28/24 12:06	03/09/24 23:05	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.6	1.1	ng/L		02/28/24 12:06	03/09/24 23:05	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.6	1.2	ng/L		02/28/24 12:06	03/09/24 23:05	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		02/28/24 12:06	03/09/24 23:05	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.7	1.4	ng/L		02/28/24 12:06	03/09/24 23:05	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.30	ng/L		02/28/24 12:06	03/09/24 23:05	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	**0.43**	**J**	1.8	0.37	ng/L		02/28/24 12:06	03/09/24 23:05	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*64*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:05*	*1*
13C4 PFHpA	*60*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:05*	*1*
13C4 PFOA	*60*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:05*	*1*
13C5 PFNA	*67*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:05*	*1*
13C2 PFDA	*59*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:05*	*1*
13C2 PFUnA	*51*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:05*	*1*
13C2 PFDoA	*47*	**5-*	*50 - 150*	*02/28/24 12:06*	*03/09/24 23:05*	*1*
13C2 PFTeDA	*50*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:05*	*1*
13C3 PFBS	*53*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:05*	*1*
18O2 PFHxS	*66*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:05*	*1*
13C4 PFOS	*61*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:05*	*1*
d3-NMeFOSAA	*54*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:05*	*1*
d5-NEtFOSAA	*62*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:05*	*1*
13C3 HFPO-DA	*60*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:05*	*1*

Client Sample ID: GAC-1

Date Collected: 02/22/24 14:52
Date Received: 02/27/24 15:03

Lab Sample ID: 320-110042-4

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)	ND		1.8	0.53	ng/L		02/28/24 12:06	03/09/24 23:28	1
Perfluoroheptanoic acid (PFHpA)	ND		1.8	0.23	ng/L		02/28/24 12:06	03/09/24 23:28	1
Perfluorooctanoic acid (PFOA)	**1.1**	**J**	1.8	0.78	ng/L		02/28/24 12:06	03/09/24 23:28	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.25	ng/L		02/28/24 12:06	03/09/24 23:28	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.29	ng/L		02/28/24 12:06	03/09/24 23:28	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	1.0	ng/L		02/28/24 12:06	03/09/24 23:28	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.51	ng/L		02/28/24 12:06	03/09/24 23:28	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		02/28/24 12:06	03/09/24 23:28	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.67	ng/L		02/28/24 12:06	03/09/24 23:28	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.8	0.18	ng/L		02/28/24 12:06	03/09/24 23:28	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.8	0.53	ng/L		02/28/24 12:06	03/09/24 23:28	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.8	0.50	ng/L		02/28/24 12:06	03/09/24 23:28	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.6	1.1	ng/L		02/28/24 12:06	03/09/24 23:28	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.6	1.2	ng/L		02/28/24 12:06	03/09/24 23:28	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		02/28/24 12:06	03/09/24 23:28	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.7	1.4	ng/L		02/28/24 12:06	03/09/24 23:28	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	**0.29**	**J**	1.8	0.29	ng/L		02/28/24 12:06	03/09/24 23:28	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.37	ng/L		02/28/24 12:06	03/09/24 23:28	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*82*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:28*	*1*
13C4 PFHpA	*87*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:28*	*1*
13C4 PFOA	*87*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:28*	*1*
13C5 PFNA	*102*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:28*	*1*
13C2 PFDA	*88*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:28*	*1*
13C2 PFUnA	*69*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:28*	*1*
13C2 PFDoA	*70*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:28*	*1*
13C2 PFTeDA	*70*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:28*	*1*
13C3 PFBS	*71*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:28*	*1*
18O2 PFHxS	*86*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:28*	*1*
13C4 PFOS	*85*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:28*	*1*
d3-NMeFOSAA	*76*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:28*	*1*
d5-NEtFOSAA	*78*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:28*	*1*
13C3 HFPO-DA	*81*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:28*	*1*

Client: Shannon & Wilson, Inc
Project/Site: DOT P:F, FAI Tallspruce

Job ID: 320-110042-1

Client Sample ID: MW-TS-1
Date Collected: 02/22/24 16:15
Date Received: 02/27/24 15:03

Lab Sample ID: 320-110042-5
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)	**2.7**		1.8	0.52	ng/L		02/28/24 12:06	03/09/24 23:40	1
Perfluoroheptanoic acid (PFHpA)	**1.1**	**J**	1.8	0.23	ng/L		02/28/24 12:06	03/09/24 23:40	1
Perfluorooctanoic acid (PFOA)	**4.9**		1.8	0.77	ng/L		02/28/24 12:06	03/09/24 23:40	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.24	ng/L		02/28/24 12:06	03/09/24 23:40	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		02/28/24 12:06	03/09/24 23:40	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.99	ng/L		02/28/24 12:06	03/09/24 23:40	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.50	ng/L		02/28/24 12:06	03/09/24 23:40	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		02/28/24 12:06	03/09/24 23:40	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.66	ng/L		02/28/24 12:06	03/09/24 23:40	1
Perfluorobutanesulfonic acid (PFBS)	**1.4**	**J**	1.8	0.18	ng/L		02/28/24 12:06	03/09/24 23:40	1
Perfluorohexanesulfonic acid (PFHxS)	**3.1**		1.8	0.51	ng/L		02/28/24 12:06	03/09/24 23:40	1
Perfluorooctanesulfonic acid (PFOS)	**2.1**		1.8	0.49	ng/L		02/28/24 12:06	03/09/24 23:40	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		02/28/24 12:06	03/09/24 23:40	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		02/28/24 12:06	03/09/24 23:40	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		02/28/24 12:06	03/09/24 23:40	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.4	ng/L		02/28/24 12:06	03/09/24 23:40	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		02/28/24 12:06	03/09/24 23:40	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		02/28/24 12:06	03/09/24 23:40	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*125*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:40*	*1*
13C4 PFHpA	*127*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:40*	*1*
13C4 PFOA	*123*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:40*	*1*
13C5 PFNA	*142*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:40*	*1*
13C2 PFDA	*131*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:40*	*1*
13C2 PFUnA	*86*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:40*	*1*
13C2 PFDoA	*90*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:40*	*1*
13C2 PFTeDA	*95*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:40*	*1*
13C3 PFBS	*102*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:40*	*1*
18O2 PFHxS	*124*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:40*	*1*
13C4 PFOS	*117*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:40*	*1*
d3-NMeFOSAA	*105*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:40*	*1*
d5-NEtFOSAA	*102*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:40*	*1*
13C3 HFPO-DA	*116*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:40*	*1*

Client: Shannon & Wilson, Inc
Project/Site: DOT P:F, FAI Tallspruce

Job ID: 320-110042-1

Client Sample ID: MW-TS-101
Date Collected: 02/22/24 16:05
Date Received: 02/27/24 15:03

Lab Sample ID: 320-110042-6
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)	**2.6**		1.9	0.54	ng/L		02/28/24 12:06	03/09/24 23:51	1
Perfluoroheptanoic acid (PFHpA)	**1.1**	**J**	1.9	0.23	ng/L		02/28/24 12:06	03/09/24 23:51	1
Perfluorooctanoic acid (PFOA)	**4.7**		1.9	0.80	ng/L		02/28/24 12:06	03/09/24 23:51	1
Perfluorononanoic acid (PFNA)	ND		1.9	0.25	ng/L		02/28/24 12:06	03/09/24 23:51	1
Perfluorodecanoic acid (PFDA)	ND		1.9	0.29	ng/L		02/28/24 12:06	03/09/24 23:51	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	1.0	ng/L		02/28/24 12:06	03/09/24 23:51	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.52	ng/L		02/28/24 12:06	03/09/24 23:51	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	1.2	ng/L		02/28/24 12:06	03/09/24 23:51	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.68	ng/L		02/28/24 12:06	03/09/24 23:51	1
Perfluorobutanesulfonic acid (PFBS)	**1.2**	**J**	1.9	0.19	ng/L		02/28/24 12:06	03/09/24 23:51	1
Perfluorohexanesulfonic acid (PFHxS)	**2.8**		1.9	0.53	ng/L		02/28/24 12:06	03/09/24 23:51	1
Perfluorooctanesulfonic acid (PFOS)	**2.1**		1.9	0.51	ng/L		02/28/24 12:06	03/09/24 23:51	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.7	1.1	ng/L		02/28/24 12:06	03/09/24 23:51	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.7	1.2	ng/L		02/28/24 12:06	03/09/24 23:51	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.9	0.22	ng/L		02/28/24 12:06	03/09/24 23:51	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.7	1.4	ng/L		02/28/24 12:06	03/09/24 23:51	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.9	0.30	ng/L		02/28/24 12:06	03/09/24 23:51	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.37	ng/L		02/28/24 12:06	03/09/24 23:51	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*94*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:51*	*1*
13C4 PFHpA	*98*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:51*	*1*
13C4 PFOA	*98*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:51*	*1*
13C5 PFNA	*95*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:51*	*1*
13C2 PFDA	*99*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:51*	*1*
13C2 PFUnA	*85*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:51*	*1*
13C2 PFDoA	*99*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:51*	*1*
13C2 PFTeDA	*84*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:51*	*1*
13C3 PFBS	*77*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:51*	*1*
18O2 PFHxS	*99*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:51*	*1*
13C4 PFOS	*94*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:51*	*1*
d3-NMeFOSAA	*97*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:51*	*1*
d5-NEtFOSAA	*110*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:51*	*1*
13C3 HFPO-DA	*95*		*50 - 150*	*02/28/24 12:06*	*03/09/24 23:51*	*1*

Client: Shannon & Wilson, Inc
Project/Site: DOT P:F, FAI Tallspruce

Job ID: 320-110042-1

Client Sample ID: EB-1

Date Collected: 02/22/24 16:30
Date Received: 02/27/24 15:03

Lab Sample ID: 320-110042-7

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)	ND		1.8	0.53	ng/L		02/28/24 12:06	03/10/24 00:02	1
Perfluoroheptanoic acid (PFHpA)	ND		1.8	0.23	ng/L		02/28/24 12:06	03/10/24 00:02	1
Perfluorooctanoic acid (PFOA)	ND		1.8	0.77	ng/L		02/28/24 12:06	03/10/24 00:02	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.24	ng/L		02/28/24 12:06	03/10/24 00:02	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		02/28/24 12:06	03/10/24 00:02	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	1.0	ng/L		02/28/24 12:06	03/10/24 00:02	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.50	ng/L		02/28/24 12:06	03/10/24 00:02	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		02/28/24 12:06	03/10/24 00:02	1
Perfluorotetradecanoic acid (PFTeA)	**1.3**	**J**	1.8	0.66	ng/L		02/28/24 12:06	03/10/24 00:02	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.8	0.18	ng/L		02/28/24 12:06	03/10/24 00:02	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.8	0.52	ng/L		02/28/24 12:06	03/10/24 00:02	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.8	0.49	ng/L		02/28/24 12:06	03/10/24 00:02	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		02/28/24 12:06	03/10/24 00:02	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		02/28/24 12:06	03/10/24 00:02	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		02/28/24 12:06	03/10/24 00:02	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.4	ng/L		02/28/24 12:06	03/10/24 00:02	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		02/28/24 12:06	03/10/24 00:02	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		02/28/24 12:06	03/10/24 00:02	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*96*		*50 - 150*	*02/28/24 12:06*	*03/10/24 00:02*	*1*
13C4 PFHpA	*104*		*50 - 150*	*02/28/24 12:06*	*03/10/24 00:02*	*1*
13C4 PFOA	*97*		*50 - 150*	*02/28/24 12:06*	*03/10/24 00:02*	*1*
13C5 PFNA	*106*		*50 - 150*	*02/28/24 12:06*	*03/10/24 00:02*	*1*
13C2 PFDA	*107*		*50 - 150*	*02/28/24 12:06*	*03/10/24 00:02*	*1*
13C2 PFUnA	*90*		*50 - 150*	*02/28/24 12:06*	*03/10/24 00:02*	*1*
13C2 PFDoA	*97*		*50 - 150*	*02/28/24 12:06*	*03/10/24 00:02*	*1*
13C2 PFTeDA	*106*		*50 - 150*	*02/28/24 12:06*	*03/10/24 00:02*	*1*
13C3 PFBS	*80*		*50 - 150*	*02/28/24 12:06*	*03/10/24 00:02*	*1*
18O2 PFHxS	*100*		*50 - 150*	*02/28/24 12:06*	*03/10/24 00:02*	*1*
13C4 PFOS	*101*		*50 - 150*	*02/28/24 12:06*	*03/10/24 00:02*	*1*
d3-NMeFOSAA	*101*		*50 - 150*	*02/28/24 12:06*	*03/10/24 00:02*	*1*
d5-NEtFOSAA	*108*		*50 - 150*	*02/28/24 12:06*	*03/10/24 00:02*	*1*
13C3 HFPO-DA	*90*		*50 - 150*	*02/28/24 12:06*	*03/10/24 00:02*	*1*

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorotetradecanoic acid (PFTeA)	ND	H	2.0	0.72	ng/L		03/13/24 05:27	03/16/24 05:50	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFTeDA	*78*		*50 - 150*	*03/13/24 05:27*	*03/16/24 05:50*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: DOT P:F, FAI Tallspruce

Job ID: 320-110042-1

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

Matrix: Water **Prep Type: Total/NA**

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFHxA (50-150)	C4PFHA (50-150)	PFOA (50-150)	PFNA (50-150)	PFDA (50-150)	PFUnA (50-150)	PFDoA (50-150)	PFTDA (50-150)
320-110023-A-1-B MS	Matrix Spike		107	106	121	102	90	93	86
320-110023-A-1-C MSD	Matrix Spike Duplicate		112	110	122	104	102	95	96
320-110042-1	MW-TS-4	100	99	102	123	104	88	103	94
320-110042-2	MW-TS-3	100	104	103	113	108	94	96	94
320-110042-3	MW-TS-2	64	60	60	67	59	51	47 *5-	50
320-110042-4	GAC-1	82	87	87	102	88	69	70	70
320-110042-5	MW-TS-1	125	127	123	142	131	86	90	95
320-110042-6	MW-TS-101	94	98	98	95	99	85	99	84
320-110042-7	EB-1	96	104	97	106	107	90	97	106
320-110042-7 - RE	EB-1								78
LCS 320-743326/2-A	Lab Control Sample	107	110	103	119	118	99	109	125
LCS 320-746513/2-A	Lab Control Sample								86
LCSD 320-743326/3-A	Lab Control Sample Dup	103	107	103	126	105	96	118	113
LCSD 320-746513/3-A	Lab Control Sample Dup								82
MB 320-743326/1-A	Method Blank	90	93	102	109	107	94	97	111
MB 320-746513/1-A	Method Blank								81

		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)		
320-110023-A-1-B MS	Matrix Spike	88	111	103	114	97	100		
320-110023-A-1-C MSD	Matrix Spike Duplicate	96	114	109	107	110	104		
320-110042-1	MW-TS-4	78	99	100	107	123	90		
320-110042-2	MW-TS-3	80	97	105	107	110	91		
320-110042-3	MW-TS-2	53	66	61	54	62	60		
320-110042-4	GAC-1	71	86	85	76	78	81		
320-110042-5	MW-TS-1	102	124	117	105	102	116		
320-110042-6	MW-TS-101	77	99	94	97	110	95		
320-110042-7	EB-1	80	100	101	101	108	90		
320-110042-7 - RE	EB-1								
LCS 320-743326/2-A	Lab Control Sample	84	107	114	114	113	97		
LCS 320-746513/2-A	Lab Control Sample								
LCSD 320-743326/3-A	Lab Control Sample Dup	80	105	103	113	113	99		
LCSD 320-746513/3-A	Lab Control Sample Dup								
MB 320-743326/1-A	Method Blank	76	100	99	115	101	94		
MB 320-746513/1-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
C3PFBS = 13C3 PFBS
PFHxS = 18O2 PFHxS
PFOS = 13C4 PFOS
d3NMFOS = d3-NMeFOSAA
d5NEFOS = d5-NEtFOSAA

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: DOT P:F, FAI Tallspruce

Job ID: 320-110042-1

HFPODA = 13C3 HFPO-DA

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

Lab Sample ID: MB 320-743326/1-A
Matrix: Water
Analysis Batch: 745422

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 743326

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		02/28/24 12:06	03/09/24 21:23	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		02/28/24 12:06	03/09/24 21:23	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		02/28/24 12:06	03/09/24 21:23	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		02/28/24 12:06	03/09/24 21:23	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		02/28/24 12:06	03/09/24 21:23	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		02/28/24 12:06	03/09/24 21:23	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		02/28/24 12:06	03/09/24 21:23	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		02/28/24 12:06	03/09/24 21:23	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		02/28/24 12:06	03/09/24 21:23	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		02/28/24 12:06	03/09/24 21:23	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		02/28/24 12:06	03/09/24 21:23	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		02/28/24 12:06	03/09/24 21:23	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		02/28/24 12:06	03/09/24 21:23	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		02/28/24 12:06	03/09/24 21:23	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.0	0.24	ng/L		02/28/24 12:06	03/09/24 21:23	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.0	1.5	ng/L		02/28/24 12:06	03/09/24 21:23	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.0	0.32	ng/L		02/28/24 12:06	03/09/24 21:23	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		02/28/24 12:06	03/09/24 21:23	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*90*		*50 - 150*	*02/28/24 12:06*	*03/09/24 21:23*	*1*
13C4 PFHpA	*93*		*50 - 150*	*02/28/24 12:06*	*03/09/24 21:23*	*1*
13C4 PFOA	*102*		*50 - 150*	*02/28/24 12:06*	*03/09/24 21:23*	*1*
13C5 PFNA	*109*		*50 - 150*	*02/28/24 12:06*	*03/09/24 21:23*	*1*
13C2 PFDA	*107*		*50 - 150*	*02/28/24 12:06*	*03/09/24 21:23*	*1*
13C2 PFUnA	*94*		*50 - 150*	*02/28/24 12:06*	*03/09/24 21:23*	*1*
13C2 PFDoA	*97*		*50 - 150*	*02/28/24 12:06*	*03/09/24 21:23*	*1*
13C2 PFTeDA	*111*		*50 - 150*	*02/28/24 12:06*	*03/09/24 21:23*	*1*
13C3 PFBS	*76*		*50 - 150*	*02/28/24 12:06*	*03/09/24 21:23*	*1*
18O2 PFHxS	*100*		*50 - 150*	*02/28/24 12:06*	*03/09/24 21:23*	*1*
13C4 PFOS	*99*		*50 - 150*	*02/28/24 12:06*	*03/09/24 21:23*	*1*
d3-NMeFOSAA	*115*		*50 - 150*	*02/28/24 12:06*	*03/09/24 21:23*	*1*
d5-NEtFOSAA	*101*		*50 - 150*	*02/28/24 12:06*	*03/09/24 21:23*	*1*
13C3 HFPO-DA	*94*		*50 - 150*	*02/28/24 12:06*	*03/09/24 21:23*	*1*

Lab Sample ID: LCS 320-743326/2-A
Matrix: Water
Analysis Batch: 745422

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 743326

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorohexanoic acid (PFHxA)	40.0	39.1		ng/L		98	72 - 129
Perfluoroheptanoic acid (PFHpA)	40.0	40.7		ng/L		102	72 - 130
Perfluorooctanoic acid (PFOA)	40.0	43.8		ng/L		110	71 - 133
Perfluorononanoic acid (PFNA)	40.0	40.5		ng/L		101	69 - 130

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

Lab Sample ID: LCS 320-743326/2-A
Matrix: Water
Analysis Batch: 745422

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 743326

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorodecanoic acid (PFDA)	40.0	38.1		ng/L		95	71 - 129
Perfluoroundecanoic acid (PFUnA)	40.0	46.3		ng/L		116	69 - 133
Perfluorododecanoic acid (PFDoA)	40.0	41.3		ng/L		103	72 - 134
Perfluorotridecanoic acid (PFTriA)	40.0	41.9		ng/L		105	65 - 144
Perfluorotetradecanoic acid (PFTeA)	40.0	36.4		ng/L		91	71 - 132
Perfluorobutanesulfonic acid (PFBS)	35.5	36.9		ng/L		104	72 - 130
Perfluorohexanesulfonic acid (PFHxS)	36.5	33.5		ng/L		92	68 - 131
Perfluorooctanesulfonic acid (PFOS)	37.2	35.5		ng/L		95	65 - 140
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	36.7		ng/L		92	65 - 136
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	41.2		ng/L		103	61 - 135
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	37.4	34.3		ng/L		92	77 - 137
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	40.0	41.3		ng/L		103	72 - 132
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	37.8	35.8		ng/L		95	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.8	35.6		ng/L		94	81 - 141

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*107*		*50 - 150*
13C4 PFHpA	*110*		*50 - 150*
13C4 PFOA	*103*		*50 - 150*
13C5 PFNA	*119*		*50 - 150*
13C2 PFDA	*118*		*50 - 150*
13C2 PFUnA	*99*		*50 - 150*
13C2 PFDoA	*109*		*50 - 150*
13C2 PFTeDA	*125*		*50 - 150*
13C3 PFBS	*84*		*50 - 150*
18O2 PFHxS	*107*		*50 - 150*
13C4 PFOS	*114*		*50 - 150*
d3-NMeFOSAA	*114*		*50 - 150*
d5-NEtFOSAA	*113*		*50 - 150*
13C3 HFPO-DA	*97*		*50 - 150*

Lab Sample ID: LCSD 320-743326/3-A
Matrix: Water
Analysis Batch: 745422

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 743326

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	40.0	39.1		ng/L		98	72 - 129	0	30
Perfluoroheptanoic acid (PFHpA)	40.0	40.2		ng/L		101	72 - 130	1	30
Perfluorooctanoic acid (PFOA)	40.0	41.6		ng/L		104	71 - 133	5	30

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

Lab Sample ID: LCSD 320-743326/3-A
Matrix: Water
Analysis Batch: 745422

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 743326

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorononanoic acid (PFNA)			40.0	37.5		ng/L		94	69 - 130	8	30
Perfluorodecanoic acid (PFDA)			40.0	41.1		ng/L		103	71 - 129	7	30
Perfluoroundecanoic acid (PFUnA)			40.0	42.7		ng/L		107	69 - 133	8	30
Perfluorododecanoic acid (PFDoA)			40.0	40.4		ng/L		101	72 - 134	2	30
Perfluorotridecanoic acid (PFTriA)			40.0	38.0		ng/L		95	65 - 144	10	30
Perfluorotetradecanoic acid (PFTeA)			40.0	36.9		ng/L		92	71 - 132	1	30
Perfluorobutanesulfonic acid (PFBS)			35.5	40.3		ng/L		113	72 - 130	9	30
Perfluorohexanesulfonic acid (PFHxS)			36.5	32.9		ng/L		90	68 - 131	2	30
Perfluorooctanesulfonic acid (PFOS)			37.2	37.0		ng/L		99	65 - 140	4	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			40.0	40.4		ng/L		101	65 - 136	9	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			40.0	39.1		ng/L		98	61 - 135	5	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid			37.4	38.4		ng/L		103	77 - 137	11	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			40.0	41.0		ng/L		102	72 - 132	1	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid			37.8	38.8		ng/L		103	76 - 136	8	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			37.8	38.6		ng/L		102	81 - 141	8	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFHxA	*103*		*50 - 150*
13C4 PFHpA	*107*		*50 - 150*
13C4 PFOA	*103*		*50 - 150*
13C5 PFNA	*126*		*50 - 150*
13C2 PFDA	*105*		*50 - 150*
13C2 PFUnA	*96*		*50 - 150*
13C2 PFDoA	*118*		*50 - 150*
13C2 PFTeDA	*113*		*50 - 150*
13C3 PFBS	*80*		*50 - 150*
18O2 PFHxS	*105*		*50 - 150*
13C4 PFOS	*103*		*50 - 150*
d3-NMeFOSAA	*113*		*50 - 150*
d5-NEtFOSAA	*113*		*50 - 150*
13C3 HFPO-DA	*99*		*50 - 150*

Lab Sample ID: 320-110023-A-1-B MS
Matrix: Water
Analysis Batch: 745422

Client Sample ID: Matrix Spike
Prep Type: Total/NA
Prep Batch: 743326

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluoroheptanoic acid (PFHpA)	20		32.6	54.3		ng/L		105	72 - 130
Perfluorooctanoic acid (PFOA)	2.7		32.6	35.3		ng/L		100	71 - 133

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

Lab Sample ID: 320-110023-A-1-B MS
Matrix: Water
Analysis Batch: 745422

Client Sample ID: Matrix Spike
Prep Type: Total/NA
Prep Batch: 743326

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorononanoic acid (PFNA)	0.33	J	32.6	31.4		ng/L		95	69 - 130
Perfluorodecanoic acid (PFDA)	ND		32.6	32.2		ng/L		99	71 - 129
Perfluoroundecanoic acid (PFUnA)	ND		32.6	37.6		ng/L		115	69 - 133
Perfluorododecanoic acid (PFDoA)	0.57	J	32.6	33.4		ng/L		101	72 - 134
Perfluorotridecanoic acid (PFTriA)	ND		32.6	30.0		ng/L		92	65 - 144
Perfluorotetradecanoic acid (PFTeA)	ND		32.6	28.8		ng/L		88	71 - 132
Perfluorobutanesulfonic acid (PFBS)	0.35	J	29.0	31.0		ng/L		106	72 - 130
Perfluorohexanesulfonic acid (PFHxS)	ND		29.7	26.9		ng/L		91	68 - 131
Perfluorooctanesulfonic acid (PFOS)	1.0	J	30.3	27.9		ng/L		89	65 - 140
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		32.6	33.7		ng/L		103	65 - 136
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		32.6	34.8		ng/L		107	61 - 135
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		30.5	30.5		ng/L		100	77 - 137
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		32.6	33.4		ng/L		102	72 - 132
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		30.8	26.4		ng/L		86	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		30.9	30.9		ng/L		100	81 - 141

Isotope Dilution	*MS %Recovery*	*MS Qualifier*	*Limits*
13C4 PFHpA	*107*		*50 - 150*
13C4 PFOA	*106*		*50 - 150*
13C5 PFNA	*121*		*50 - 150*
13C2 PFDA	*102*		*50 - 150*
13C2 PFUnA	*90*		*50 - 150*
13C2 PFDoA	*93*		*50 - 150*
13C2 PFTeDA	*86*		*50 - 150*
13C3 PFBS	*88*		*50 - 150*
18O2 PFHxS	*111*		*50 - 150*
13C4 PFOS	*103*		*50 - 150*
d3-NMeFOSAA	*114*		*50 - 150*
d5-NEtFOSAA	*97*		*50 - 150*
13C3 HFPO-DA	*100*		*50 - 150*

Lab Sample ID: 320-110023-A-1-C MSD
Matrix: Water
Analysis Batch: 745422

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA
Prep Batch: 743326

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluoroheptanoic acid (PFHpA)	20		32.9	54.1		ng/L		103	72 - 130	0	30
Perfluorooctanoic acid (PFOA)	2.7		32.9	34.5		ng/L		97	71 - 133	2	30
Perfluorononanoic acid (PFNA)	0.33	J	32.9	31.3		ng/L		94	69 - 130	0	30

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

Lab Sample ID: 320-110023-A-1-C MSD
Matrix: Water
Analysis Batch: 745422

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA
Prep Batch: 743326

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorodecanoic acid (PFDA)	ND		32.9	29.5		ng/L		90	71 - 129	9	30
Perfluoroundecanoic acid (PFUnA)	ND		32.9	34.3		ng/L		104	69 - 133	9	30
Perfluorododecanoic acid (PFDoA)	0.57	J	32.9	35.5		ng/L		106	72 - 134	6	30
Perfluorotridecanoic acid (PFTriA)	ND		32.9	34.3		ng/L		104	65 - 144	14	30
Perfluorotetradecanoic acid (PFTeA)	ND		32.9	27.2		ng/L		83	71 - 132	6	30
Perfluorobutanesulfonic acid (PFBS)	0.35	J	29.2	29.0		ng/L		98	72 - 130	7	30
Perfluorohexanesulfonic acid (PFHxS)	ND		30.0	25.4		ng/L		85	68 - 131	6	30
Perfluorooctanesulfonic acid (PFOS)	1.0	J	30.6	29.0		ng/L		91	65 - 140	4	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		32.9	33.8		ng/L		103	65 - 136	0	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		32.9	36.2		ng/L		110	61 - 135	4	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		30.7	30.1		ng/L		98	77 - 137	2	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		32.9	32.6		ng/L		99	72 - 132	2	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		31.0	26.9		ng/L		87	76 - 136	2	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		31.1	32.2		ng/L		103	81 - 141	4	30

Isotope Dilution	*MSD %Recovery*	*MSD Qualifier*	*Limits*
13C4 PFHpA	*112*		*50 - 150*
13C4 PFOA	*110*		*50 - 150*
13C5 PFNA	*122*		*50 - 150*
13C2 PFDA	*104*		*50 - 150*
13C2 PFUnA	*102*		*50 - 150*
13C2 PFDoA	*95*		*50 - 150*
13C2 PFTeDA	*96*		*50 - 150*
13C3 PFBS	*96*		*50 - 150*
18O2 PFHxS	*114*		*50 - 150*
13C4 PFOS	*109*		*50 - 150*
d3-NMeFOSAA	*107*		*50 - 150*
d5-NEtFOSAA	*110*		*50 - 150*
13C3 HFPO-DA	*104*		*50 - 150*

Lab Sample ID: MB 320-746513/1-A
Matrix: Water
Analysis Batch: 747543

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 746513

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		03/13/24 05:27	03/16/24 05:10	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFTeDA	*81*		*50 - 150*	*03/13/24 05:27*	*03/16/24 05:10*	*1*

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

Lab Sample ID: LCS 320-746513/2-A
Matrix: Water
Analysis Batch: 747543

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 746513

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Perfluorotetradecanoic acid (PFTeA)			40.0	42.9		ng/L		107	71 - 132		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFTeDA	*86*		*50 - 150*

Lab Sample ID: LCSD 320-746513/3-A
Matrix: Water
Analysis Batch: 747543

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 746513

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorotetradecanoic acid (PFTeA)			40.0	44.1		ng/L		110	71 - 132	3	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFTeDA	*82*		*50 - 150*

LCMS

Prep Batch: 743326

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-110042-1	MW-TS-4	Total/NA	Water	3535	
320-110042-2	MW-TS-3	Total/NA	Water	3535	
320-110042-3	MW-TS-2	Total/NA	Water	3535	
320-110042-4	GAC-1	Total/NA	Water	3535	
320-110042-5	MW-TS-1	Total/NA	Water	3535	
320-110042-6	MW-TS-101	Total/NA	Water	3535	
320-110042-7	EB-1	Total/NA	Water	3535	
MB 320-743326/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-743326/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-743326/3-A	Lab Control Sample Dup	Total/NA	Water	3535	
320-110023-A-1-B MS	Matrix Spike	Total/NA	Water	3535	
320-110023-A-1-C MSD	Matrix Spike Duplicate	Total/NA	Water	3535	

Analysis Batch: 745422

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-110042-1	MW-TS-4	Total/NA	Water	EPA 537(Mod)	743326
320-110042-2	MW-TS-3	Total/NA	Water	EPA 537(Mod)	743326
320-110042-3	MW-TS-2	Total/NA	Water	EPA 537(Mod)	743326
320-110042-4	GAC-1	Total/NA	Water	EPA 537(Mod)	743326
320-110042-5	MW-TS-1	Total/NA	Water	EPA 537(Mod)	743326
320-110042-6	MW-TS-101	Total/NA	Water	EPA 537(Mod)	743326
320-110042-7	EB-1	Total/NA	Water	EPA 537(Mod)	743326
MB 320-743326/1-A	Method Blank	Total/NA	Water	EPA 537(Mod)	743326
LCS 320-743326/2-A	Lab Control Sample	Total/NA	Water	EPA 537(Mod)	743326
LCSD 320-743326/3-A	Lab Control Sample Dup	Total/NA	Water	EPA 537(Mod)	743326
320-110023-A-1-B MS	Matrix Spike	Total/NA	Water	EPA 537(Mod)	743326
320-110023-A-1-C MSD	Matrix Spike Duplicate	Total/NA	Water	EPA 537(Mod)	743326

Prep Batch: 746513

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-110042-7 - RE	EB-1	Total/NA	Water	3535	
MB 320-746513/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-746513/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-746513/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Analysis Batch: 747543

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-110042-7 - RE	EB-1	Total/NA	Water	EPA 537(Mod)	746513
MB 320-746513/1-A	Method Blank	Total/NA	Water	EPA 537(Mod)	746513
LCS 320-746513/2-A	Lab Control Sample	Total/NA	Water	EPA 537(Mod)	746513
LCSD 320-746513/3-A	Lab Control Sample Dup	Total/NA	Water	EPA 537(Mod)	746513

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: DOT P:F, FAI Tallspruce

Job ID: 320-110042-1

Client Sample ID: MW-TS-4
Date Collected: 02/22/24 11:08
Date Received: 02/27/24 15:03

Lab Sample ID: 320-110042-1
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			281.3 mL	10.0 mL	743326	02/28/24 12:06	ERR	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	745422	03/09/24 22:43	C1P	EET SAC

Client Sample ID: MW-TS-3
Date Collected: 02/22/24 13:05
Date Received: 02/27/24 15:03

Lab Sample ID: 320-110042-2
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			283.7 mL	10.0 mL	743326	02/28/24 12:06	ERR	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	745422	03/09/24 22:54	C1P	EET SAC

Client Sample ID: MW-TS-2
Date Collected: 02/22/24 14:37
Date Received: 02/27/24 15:03

Lab Sample ID: 320-110042-3
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			270.3 mL	10.0 mL	743326	02/28/24 12:06	ERR	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	745422	03/09/24 23:05	C1P	EET SAC

Client Sample ID: GAC-1
Date Collected: 02/22/24 14:52
Date Received: 02/27/24 15:03

Lab Sample ID: 320-110042-4
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			271.3 mL	10.0 mL	743326	02/28/24 12:06	ERR	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	745422	03/09/24 23:28	C1P	EET SAC

Client Sample ID: MW-TS-1
Date Collected: 02/22/24 16:15
Date Received: 02/27/24 15:03

Lab Sample ID: 320-110042-5
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			277.4 mL	10.0 mL	743326	02/28/24 12:06	ERR	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	745422	03/09/24 23:40	C1P	EET SAC

Client Sample ID: MW-TS-101
Date Collected: 02/22/24 16:05
Date Received: 02/27/24 15:03

Lab Sample ID: 320-110042-6
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			266.9 mL	10.0 mL	743326	02/28/24 12:06	ERR	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	745422	03/09/24 23:51	C1P	EET SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: DOT P:F, FAI Tallspruce

Job ID: 320-110042-1

Client Sample ID: EB-1

Date Collected: 02/22/24 16:30
Date Received: 02/27/24 15:03

Lab Sample ID: 320-110042-7

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			275.6 mL	10.0 mL	743326	02/28/24 12:06	ERR	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	745422	03/10/24 00:02	C1P	EET SAC
Total/NA	Prep	3535	RE		255.2 mL	10.0 mL	746513	03/13/24 05:27	HJA	EET SAC
Total/NA	Analysis	EPA 537(Mod)	RE	1			747543	03/16/24 05:50	AP1	EET SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Job ID: 320-110042-1
Project/Site: DOT P:F, FAI Tallspruce

Laboratory: Eurofins Sacramento

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	17-020	02-20-27

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: DOT P:F, FAI Tallspruce

Job ID: 320-110042-1

Method	Method Description	Protocol	Laboratory
EPA 537(Mod)	PFAS for QSM 5.3, Table B-15	EPA	EET SAC
3535	Solid-Phase Extraction (SPE)	SW846	EET 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:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: DOT P:F, FAI Tallspruce

Job ID: 320-110042-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-110042-1	MW-TS-4	Water	02/22/24 11:08	02/27/24 15:03
320-110042-2	MW-TS-3	Water	02/22/24 13:05	02/27/24 15:03
320-110042-3	MW-TS-2	Water	02/22/24 14:37	02/27/24 15:03
320-110042-4	GAC-1	Water	02/22/24 14:52	02/27/24 15:03
320-110042-5	MW-TS-1	Water	02/22/24 16:15	02/27/24 15:03
320-110042-6	MW-TS-101	Water	02/22/24 16:05	02/27/24 15:03
320-110042-7	EB-1	Water	02/22/24 16:30	02/27/24 15:03

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

CHAIN-OF-CUSTODY RECORD

Laboratory Eurofins
Attn: David Althaker

Turn Around Time:	Quote No:
☑ Normal ☐ Rush	MSA Number:
Please Specify	J-Flags: ☑ Yes ☐ No

Analytical Methods (include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	PFAS x 16	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
MW-TS-4		1108	2/22/24	X	2	water
MW-TS-3		1305				
MW-TS-2		1437				
GAC-1		1452				
MW-TS-1		1615				
MW-TS-101		1605				
EB-1		1630				

320-110042 Chain of Custody

Project Information	
Number	102519-029
Name	DOI P'F, FAI Tallsprue
Contact	AMT
Ongoing Project?	Yes ☒ No ☐
Sampler	SDK

Sample Receipt	
Total No of Containers	
COC Seals/Intact? Y/N/NA	
Received Good Cond /Cold	
Temp	0.3°C
Delivery Method	

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature Time 1430	Signature Time	Signature Time
Printed Name Silvija Kreicbergs Date 2/26/24	Printed Name. Date	Printed Name Date
Company Shannon & Wilson	Company	Company
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature Time 1503	Signature Time	Signature Time
Printed Name Dominic Morazzini Date 02/27/24	Printed Name Date	Printed Name Date
Company EESac	Company	Company

Notes:

DOD QSM v 5.3, table B-15

Distribution White - w/shipment - returned to Shannon & Wilson w/ laboratory report
Yellow - Shannon & Wilson - job file

3/22/2024

eurofins | Environment Testing

Sacramento Sample Receiving Notes (SSRN)

Loc: 320
110042

Tracking # : 027-7020649G

Job:_____ _____

SO / PO / FO / SAT / 2-Day / Ground / UPS / CDO / Courier
GSL / OnTrac / Goldstreak / USPS / Other_____

Use this form to record Sample Custody Seal, Cooler Custody Seal, Temperature & corrected Temperature & other observations.
File in the job folder with the COC.

Therm. ID: L06 Corr. Factor: (+ / -) NA °C

Ice_____ Wet_____ Gel ✓ Other _____

Cooler Custody Seal: 1548594

Cooler ID: _____

Temp Observed: 0.3 °C Corrected: 0.3 °C

From: Temp Blank ☒ Sample ☐

Opening/Processing The Shipment	**Yes**	**No**	**NA**
Cooler compromised/tampered with?	☐	☒	☐
Cooler Temperature is acceptable?	☒	☐	☐
Frozen samples show signs of thaw?	☐	☐	☒

Initials: DM Date: 02/27/24

Unpacking/Labeling The Samples	**Yes**	**No**	**NA**
Containers are not broken or leaking?	☒	☐	☐
Samples compromised/tampered with?	☐	☒	☐
COC is complete w/o discrepancies	☒	☐	☐
Sample custody seal?	☐	☐	☒
Sample containers have legible labels?	☒	☐	☐
Sample date/times are provided?	☒	☐	☐
Appropriate containers are used?	☒	☐	☐
Sample bottles are completely filled?	☒	☐	☐
Sample preservatives verified?	☐	☐	☒
Is the Field Sampler's name on COC?	☒	☐	☐
Samples w/o discrepancies?	☒	☐	☐
Zero headspace?*	☐	☐	☒
Alkalinity has no headspace?	☐	☐	☒
Perchlorate has headspace? (Methods 314, 331, 6850)	☐	☐	☒
Multiphasic samples are not present?	☒	☐	☐

Containers requiring zero headspace have no headspace, or bubble < 6 mm (1/4")

Initials: DM Date: 02/27/24

Notes:_____

Trizma Lot #(s): _____

Ammonium
Acetate Lot #(s): _____

Login Completion	**Yes**	**No**	**NA**
Receipt Temperature on COC?	☒	☐	☐
NCM Filed?	☐	☐	☒
Samples received within hold time?	☒	☐	☐
Log Release checked in TALS?	☒	☐	☐

Initials: DM Date: 02/27/24

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-110042-1

Login Number: 110042
List Number: 1
Creator: Morazzini, Dominic S

List Source: Eurofins Sacramento

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

ADEC Contaminated Sites Program Laboratory Data Review Checklist

Completed By:	Silvija Kreilis	**CS Site Name:**	FIA – Sitewide PFAS	**Lab Name:**	Eurofins Environment Testing
Title:	Environmental Scientist	**ADEC File No.:**	100.38.277	**Lab Report No.:**	320-110042-1
Consulting Firm:	Shannon & Wilson, Inc.	**Hazard ID No.:**	26816	**Lab Report Date:**	3/22/2024

Note: *Any N/A or No box checked must have an explanation in the comments box.*

1. **Laboratory**

   a. Did an ADEC Contaminated Sites Laboratory Approval Program (CS-LAP) approved laboratory receive and perform all of the submitted sample analyses?
   Yes ☒ No ☐ N/A ☐
   Comments: Project samples were sent to Eurofins Environment Testing (Eurofins) in Sacramento, California. Eurofins analyzed project samples for PFAS by EPA 537(Mod), a LCMSMS method compliant with the DoD QSM Version 5.3 Table B-15, under DEC approval 17-020 dated 2/21/24, expiring 2/20/2027.

   b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses CS-LAP approved?
   Yes ☐ No ☐ N/A ☒
   Comments: Project samples were not transferred to another 'network' laboratory or sub-contracted to an alternate laboratory.

2. **Chain of Custody (CoC)**

   a. Is the CoC information completed, signed, and dated (including released/received by)?
   Yes ☒ No ☐ N/A ☐
   Comments:

   b. Were the correct analyses requested?
   Yes ☒ No ☐ N/A ☐
   Analyses requested: PFAS by EPA 537(Mod), compliant with DoD QSM 5.3 Table B-15.
   Comments: Analysis was performed as requested.

3. Laboratory Sample Receipt Documentation

a. Is the sample/cooler temperature documented and within range at receipt (0° to 6° C)?
Yes ☒ No ☐ N/A ☐
Cooler temperature(s): Cooler temperature was not reported by the laboratory.
Sample temperature(s): A temperature blank was included with the samples in the cooler and is used to assess temperature preservation. The COC sample receiving notes indicate the temperature blank was 0.3° C at sample login
Comments: The temperature blank was within the acceptable temperature range of 0°C to 6°C.

b. Is the sample preservation acceptable – acidified waters, methanol preserved soil (GRO, BTEX, VOCs, etc.)?
Yes ☐ No ☐ N/A ☒
Comments: Sample preservation outside of temperature control is not required for PFAS analysis.

c. Is the sample condition documented – broken, leaking, zero headspace (VOA vials); canister vacuum/pressure checked and no open valves, etc.?
Yes ☒ No ☐ N/A ☐
Comments: The laboratory sample receipt form notes that project samples arrived in acceptable condition, properly preserved, and within an acceptable temperature range.

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, canister not holding a vacuum, etc.?
Yes ☐ No ☐ N/A ☒
Comments: No sample discrepancies are noted on the laboratory sample receipt form.

e. Is the data quality or usability affected?
Yes ☐ No ☒ N/A ☐
Comments: See above.

4. Case Narrative

a. Is the case narrative present and understandable?
Yes ☒ No ☐ N/A ☐
Comments:

b. Are there discrepancies, errors, or QC failures identified by the lab?
Yes ☒ No ☐ N/A ☐
Comments:

The Isotope Dilution Analyte (IDA) recovery associated with the following sample is below the method recommended limit: *MW-TS-2* (320-110042-3). 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 sample. See section 6.d. for details regarding impacts on data quality and/or usability, as applicable.

The "I" qualifier means the transition mass ratio for the indicated analyte was outside the established ratio limits. The qualitative identification of the analyte has some degree of uncertainty. However, analyst judgment was used to positively identify the analyte: *MW-TS-3* (320-110042-2). See section 7.a. for details regarding impacts on data quality and/or usability, as applicable.

Internal standard (ISTD) response for the following sample was outside control limits: *MW-TS-2* (320-110042-3). The sample was re-analyzed and ISTD response was still outside control limits. The ISTD is not used to calculate analyte concentration therefore there is no adverse impact from this anomaly. Based on the comments in the case narrative, sample *MW-TS-2* may have matrix interference contributing to the ISTD failures. Therefore, the results for the noted sample are considered estimates, no direction of bias and are flagged ‘J*’ in the analytical table. The data is considered affected as noted, however, the data is considered usable with applied flags.

The following Equipment Blank (EB) sample: *EB-1* (320-110042-7) was re-extracted past holding time due to suspected lab contamination for Perfluorotetradecanoic acid (PFTeA) detected above the 1/2RL. The re-extraction data analysis was non-detect. Therefore, both sets of data were reported. See section 5.b and 6.g for details regarding impacts to data quality and/or usability, as applicable.

The following samples in preparation batch 320-743326 were yellow in color prior to extraction. *MW-TS-4* (320-110042-1), *MW-TS-3* (320-110042-2), *MW-TS-2* (320-110042-3), *GAC-1* (320-110042-4), *MW-TS-1* (320-110042-5) and *MW-TS-101* (320-110042-6). Data quality and/or usability not affected.

The following samples in preparation batch 320-743326 were observed to have floating particulates present in the sample bottle. MW-TS-4 (320-110042-1), *MW-TS-3* (320-110042-2), MW-TS-2 (320-110042-3), GAC-1 (320-110042-4), *MW-TS-1* (320-110042-5) and *MW-TS-101* (320-110042-6). Data quality and/or usability not affected.

The following samples in preparation batch 320-743326 were yellow in color following extraction. *MW-TS-2* (320-110042-3), *MW-TS-1* (320-110042-5) and *MW-TS-101* (320-110042-6). Data quality and/or usability not affected.

Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-746513. See section 6.b. for details regarding impacts on data quality and/or usability, as applicable.

The following sample was re-prepared outside of preparation holding time due to blank hit confirmation: *EB-1* (320-110042-7). See section 5.b and 6.g for details regarding impacts to data quality and/or usability, as applicable.

c. Were all the corrective actions documented?
Yes ☒ No ☐ N/A ☐
Comments: See above.

d. What is the effect on data quality/usability according to the case narrative?
Comments: The effects on data quality/usability noted in the case narrative are discussed in section 4.b., above, or elsewhere in this checklist.

5. Sample Results

a. Are the correct analyses performed/reported as requested on CoC?
Yes ☒ No ☐ N/A ☐
Comments:

b. Are all applicable holding times met?
Yes ☐ No ☒ N/A ☐
Comments: The project samples were extracted within holding times; however, *EB-1* was re-extracted past holding time. The laboratory confirmed PFTeA contamination in the original sample and therefore the PFTeA from the extraction outside of hold time is used for reporting purposes. The non-detect result is considered a tentatively identified estimate, no direction of bias and is flagged 'N*' in the analytical data table. The data is considered affected as noted, however, the data is considered usable with applied flags.

c. Are all soils reported on a dry weight basis?
Yes ☐ No ☐ N/A ☒
Comments: Soil samples were not included in this work order.

d. Are the reported limits of quantitation (LOQ) or limits of detections (LOD), or reporting limits (RL) less than the Cleanup Level or the action level for the project?
Yes ☒ No ☐ N/A ☐
Comments:

e. Is the data quality or usability affected?
Yes ☒ No ☒ N/A ☐
Comments: See above.

6. QC Samples

a. Method Blank

i. Was one method blank reported per matrix, analysis, and 20 samples?
Yes ☒ No ☐ N/A ☐
Comments:

ii. Are all method blank results less than LOQ (or RL)?
Yes ☒ No ☐
Comments: No analytes are detected in method blank samples.

iii. If above LOQ or RL, 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?
Yes ☐ No ☒ N/A ☐
Comments: See above.

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

i. Organics – Are 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 – Are one LCS and one sample duplicate reported per matrix, analysis and 20 samples?
Yes ☐ No ☐ N/A ☒
Comments: Metals/inorganic analyses were not included in this work order.

iii. Accuracy – Are 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 – Are all relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? Was the RPD reported from LCS/LCSD, and or sample/sample duplicate? (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)
Yes ☒ No ☐ N/A ☐
Comments:

v. If %R or RPD is outside of acceptable limits, what samples are affected?
Comments: Not applicable, see above.

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?
Yes ☐ No ☐ N/A ☒
Comments: See above.

vii. Is the data quality or usability affected?
Yes ☐ No ☒ N/A ☐
Comments: Data quality/usability is not affected; see above.

c. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

i. Organics – Are one MS/MSD reported per matrix, analysis and 20 samples?
Yes ☐ No ☒ N/A ☐
Comments: Insufficient sample volume was available to perform a MS/MSD associated with preparation batch 320-746513. Batch accuracy and precision is evaluated using the LCS/LCSD samples associated with these respective batches. See section 6.b., above. Data quality/usability is not affected.

ii. Metals/Inorganics – Are one MS/MSD reported per matrix, analysis and 20 samples?
Yes ☐ No ☐ N/A ☒
Comments: Metals/inorganic analyses were not requested for samples included in the work order.

iii. Accuracy – Are 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 – Are 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. Is the data quality or usability affected?
Yes ☐ No ☒ N/A ☐
Comments: 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 – Are 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 IDA recovery associated with sample *MW-TS-2* (320-110042-3) is below the method recommended limit for 13C2 PFDoA. The associated project sample analytes (PFDoA and PFTriA) are considered estimates, no direction of bias, and are flagged 'J*' in the analytical table. The data is considered affected as noted, however, the data is considered usable with applied flags.

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. Is the data quality or usability affected?
Yes ☒ No ☐ N/A ☐

Comments: See above.

e. Trip Blanks

i. Is one trip blank reported per matrix, analysis, and for each cooler containing volatile samples? Yes ☐ No ☐ N/A ☒
Comments: No volatile samples were included in this work order. No trip blank needed.

ii. Are all results less than LOQ or RL?
Yes ☐ No ☐ N/A ☒
Comments: See above

iii. If above LOQ or RL, what samples are affected?
Comments: Not applicable, see above.

iv. Is the data quality or usability affected?
Yes ☐ No ☒ N/A ☐
Comments: See above.

f. Field Duplicate

i. Are one field duplicate submitted per matrix, analysis, and 10 project samples?
Yes ☒ No ☐ N/A ☐
Comments: Sample *MW-TS-101* is a duplicate of corresponding sample *MW-TS-1*.

ii. Was the duplicate submitted blind to lab?
Yes ☒ No ☐ N/A ☐
Comments:

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

$$RPD\ (\%) = \left| \frac{R_1 - R_2}{\left(\frac{R_1 + R_2}{2}\right)} \right| X\ 100$$

Where R_1 = Sample Concentration

R_2 = Field Duplicate Concentration

Yes ☒ No ☐ N/A ☐
Comments: Where calculable, analytical results met the comparison criterion (≤ 30% for water) for the field duplicate pair.

iv. Is the data quality or usability affected? (Explain)
Yes ☐ No ☒ N/A ☐
Comments: See above.

g. Decontamination or Equipment Blanks

i. Were decontamination or equipment blanks collected?
Yes ☒ No ☐ N/A ☐
Comments: An equipment blank sample designated *EB-1* was included with the work order.

ii. Are all results less than LOQ or RL?
Yes ☒ No ☐ N/A ☐
Comments: Perfluorotetradecanoic acid (PFTeA) was detected at a concentration less than the LOQ in the original batch. It was suspected to be a result of lab contamination and the sample was re-extracted outside of hold time. PFTeA was not detected in the re-extracted sample or any of the associated project samples. Data quality and/or usability not affected.

iii. If above LOQ or RL, specify what samples are affected.
Comments: Not applicable, see above.

iv. Are data quality or usability affected?
Yes ☐ No ☒ N/A ☐
Comments: See above.

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

a. Are they defined and appropriate?
Yes ☒ No ☐ N/A ☐
Comments: The "I" qualifier means the transition mass ratio for the indicated analyte was outside the established ratio limits. The qualitative identification of the analyte has some degree of uncertainty. However, analyst judgment was used to positively identify PFHpA for sample *MW-TS-3* (320-110042-2). The result is considered estimated, no direction of bias, and is flagged 'J*' in the analytical data table. The data is considered affected as noted, however, the data is considered usable with applied flags.

APPENDIX C: QA/QC SUMMARY

Appendix C

QA/QC Summary

CONTENTS

Exhibits

°C	degrees Celsius
DEC	Alaska Department of Environmental Conservation
DQO	data quality objective
Eurofins	Eurofins Environment Testing
IDA	isotope dilution analyte
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
LDRC	Laboratory Data Review Checklist
MS	matrix spike
MSD	MS duplicate
MW	monitoring well
PFAS	per- and polyfluoroalkyl substances
QA	quality assurance
QC	quality control
QSM	Quality Systems Manual
RPD	relative percent difference
WO	work order

APPENDIX C: QA/QC SUMMARY

C.1 INTRODUCTION

This quality assurance (QA)/quality control (QC) summary outlines our technical review of analytical results generated in support of monitoring well (MW) groundwater sampling in the Tall Spruce neighborhood in October 2023 and February 2024.

Shannon & Wilson, Inc (S&W) reviewed project samples and QC analytical data to assess whether the data met the designated data quality objectives (DQOs) and were acceptable for project use. The project data were reviewed for deviations to the requirements presented in *Final General Work Plan Addendum 026-FAI-002* (Addendum), dated August 2023 and approved by the Alaska Department of Environmental Conservation (DEC) on October 6, 2023. As applicable, the review includes evaluation of sample collection and handling, holding times, blanks, project samples and laboratory QC sample duplicates, laboratory control samples (LCSs) and sample surrogate or isotope dilution analyte (IDA) recoveries, and matrix spike sample (MS) recoveries. Calibration curves and continuing calibration verification recoveries were not reviewed unless a QC discrepancy was noted by the laboratory in a case narrative. QC deviations that do not impact data quality are not discussed in this summary. Full data quality descriptions are reported in the DEC Laboratory Data Review Checklists (LDRC) prepared for each laboratory report. LDRCs and laboratory reports are included in Appendix B.

Groundwater sample data quality is discussed in the following sections. Data which did not meet acceptance criteria have been described and the associated samples and data quality implications or qualifications are summarized.

C.1.1 Analytical Methods and Data Quality Objectives

The analytical methods and associated DQOs used for this review were established in the Addendum. The DQOs represent the minimum acceptable QC limits and goals for analytical measurements and are used as comparison criteria during data quality review to determine both the quality and usability of the analytical data.

The six DQOs used for this review were accuracy, precision, representativeness, comparability, sensitivity, and completeness.

- Accuracy measures the correctness, or the closeness, between the true value and the quantity detected. It is measured by calculating the percent recovery of known concentrations of spiked compounds that were introduced into the appropriate sample matrix. Surrogate or IDA, LCS, and MS sample recoveries are used to measure accuracy.

- Precision measures the reproducibility of repetitive measurements. It is measured by calculating the relative percent difference (RPD) between duplicate samples. Laboratory duplicate samples, field duplicate samples, MS and matrix spike duplicate sample (MSD) sample pairs, and LCS and laboratory control sample duplicate (LCSD) pairs are used to measure precision.
- Representativeness describes the degree to which data accurately and precisely represents site characteristics. This is addressed in more detail in the following section(s).
- Comparability describes whether two data sets can be considered equivalent with respect to the project goal. This is addressed in more detail in the following section(s).
- Sensitivity describes the lowest concentration that the analytical method can reliably quantitate and is evaluated by verifying that the detected results and/or limits of detection meet the project-specific cleanup levels and/or screening levels.
- Completeness describes the amount of valid data obtained from the sampling event(s). It is calculated as the percentage of valid measurements compared to the total number of measurements. The completeness goal for this project was set at 90 percent.

In addition to these criteria for the six DQOs described above, sample collection and handling procedures and blank samples were reviewed to ensure overall data quality. Sample collection forms were reviewed to verify that representative samples were collected. Sample handling was reviewed to assess parameters such as chain-of-custody documentation, the use of appropriate sample containers and preservatives, shipment cooler temperature, and method-specified sample holding times. Each of these parameters contributes to the general representativeness and comparability of the project data. The combination of evaluations of the above-mentioned items leads to a determination of the overall project data completeness.

C.1.2 Summary of Groundwater Samples

A total of ten groundwater samples were collected from MWs on Tall Spruce during October 2023 and February 2024. Five samples (including one field duplicate) were collected during the October 2023 event and five samples (including on field duplicate) were collected during the February 2024 event. An equipment blank sample and granular activated carbon effluent sample were also collected during each event.

Project samples were sent to Eurofins Environment Testing (Eurofins) in Sacramento, California. Groundwater samples were shipped via Alaska Airlines Goldstreak service from Fairbanks to Eurofins. Eurofins analyzed project samples for per- and polyfluoroalkyl substances (PFAS) by 537(Mod), compliant with the U.S. Department of Defense Quality

Systems Manual Version 5.3 Table B-15, under DEC approval 17-020 dated February 21, 2024.

The October 2023 laboratory report was assigned the work order (WO) number 320-106532-1. The February 2024 laboratory report was assigned the WO number 320-110042-1.

C.2 GROUNDWATER DATA QUALITY REVIEW

This section presents the findings of the data quality review and the resulting data qualifications for the groundwater samples. See the associated LDRCs in Appendix B for more elaborate data quality assessment descriptions.

C.2.1 Sample Collection

Sample collection forms (Appendix A) were reviewed to confirm samples were collected as identified in the Addendum. No sample collection discrepancies were noted.

C.2.2 Sample Handling

The evaluation of proper sample handling procedures includes verification of the following: correct chain-of-custody documentation, appropriate sample containers and preservatives, cooler temperatures maintained within the DEC-recommended temperature range (0 to 6 degrees Celsius [°C]), and sample analyses performed within method-specified holding times. The following sample handling discrepancy was identified.

- WO 320-110042-1: The project samples were extracted within holding times; however, EB-1 was re-extracted past holding time. The laboratory confirmed PFTeA contamination in the original sample and therefore the PFTeA from the extraction outside of hold time is used for reporting purposes. The non-detect result is considered a tentatively identified estimate, no direction of bias and is flagged 'N*' in the analytical data table. The data is considered affected as noted, however, the data is considered usable with applied flags.

C.2.3 Method Blanks

Method blanks were utilized to detect potential laboratory cross-contamination of project samples. Samples are considered affected if they are detected within ten times the concentration of the detection in the method blank. Blank samples were analyzed in every batch, as required. No project analytes were detected in method blank samples.

C.2.4 Laboratory Control Samples

The LCS/LCSD samples were prepared by adding spike compounds to blank samples to assess laboratory extraction and instrumentation performance. An LCS/LCSD pair was reported in each WO. LCS/LCSD recoveries and/or RPDs were within laboratory and project limits and did not result in qualification of the data.

C.2.5 Matrix Spike Sample and Sample Duplicates

MS/MSD samples were not reported in either WO due to insufficient sample volumes. Accuracy and precision for samples in this WO were evaluated using the LCS/LCSD.

C.2.6 Isotope Dilution Analyte

IDA compounds were added to project samples by the laboratory prior to analysis, in accordance with method requirements. IDA recoveries were then calculated as percentages and reported by the laboratory as a measure of analytical extraction efficiency. The following IDA discrepancies were identified.

- WO 320-106532-1: PFAS IDAs 13C2 PFDoA and 13C2 PFTeDA were recovered low in sample MW-TS-1 associated with preparatory batch 320-718877. Associated analytes PFDoA, PFTriA, and PFTeA were not detected in the noted sample. Consequently, the result of the aforementioned analytes in sample MW-TS-1 are considered estimates, no direction of bias, and flagged 'J*' in the analytical table. The data is considered affected as noted, however, the data is considered usable with applied flags.
- WO 320-110042-1: The IDA recovery associated with sample MW-TS-2 is below the method recommended limit for 13C2 PFDoA. The associated project sample analytes (PFDoA and PFTriA) are considered estimates, no direction of bias, and are flagged 'J*' in the analytical table. The data is considered affected as noted, however, the data is considered usable with applied flags.

C.2.7 Field Duplicates

Two field duplicate samples were collected as a part of this project (MW-TS-101 for both events). Where calculable, analytical results met the comparison criterion (≤ 30% for water) for the field duplicate pairs.

C.2.8 Additional Quality Control Discrepancies

The following additional quality control discrepancies were identified.

WO 320-110042-1: The "I" qualifier means the transition mass ratio for the indicated analyte was outside the established ratio limits. The qualitative identification of the analyte has

some degree of uncertainty. However, analyst judgment was used to positively identify PFHpA for sample MW-TS-3. The result is considered estimated, no direction of bias, and is flagged 'J*' in the analytical data table. The data is considered affected as noted, however, the data is considered usable with applied flags.

WO 320-110042-1: Internal standard (ISTD) response for the following sample was outside control limits: MW-TS-2. The sample was re-analyzed and ISTD response was still outside control limits. The ISTD is not used to calculate analyte concentration therefore there is no adverse impact from this anomaly. Based on the comments in the case narrative, sample MW-TS-2 may have matrix interference contributing to the ISTD failures. Therefore, the results for the noted sample are considered estimates, no direction of bias and are flagged 'J*' in the analytical table. The data is considered affected as noted, however, the data is considered usable with applied flags.

C.2.9 Analytical Sensitivity

Analytical sensitivity was evaluated to verify that the reporting limits met the applicable regulatory levels for non-detect results. All analytes met the minimum required detection level.

C.2.10 Summary of Qualified Results

Overall, the data validation process deemed the groundwater data acceptable for use. The following table summarizes the applied flags.

Exhibit C-1: Summary of Qualified Results

WO	Sample	Analyte	Flag	Explanation
320-106532-1	*MW-TS-1*	PFDoA, PFTriA, and PFTeA	J*	IDA recovery failure
320-110042-1	*MW-TS-2*	PFOS, PFOA, PFHpA, PFNA, PFHxS, PFBS, PFDA, PFDoA, PFHxA, PFTeA, PFTriA, PFUnA, HFPO-DA, N-EtFOSAA, N-MeFOSAA, 11CL-PF3OUdS, 9CL-PF3ONS, and ADONA	J*	Internal standard response discrepancy
	EB-1	PFTeA	N*	Holding time exceedance
	MW-TS-3	PFHpA	J*	Transition mass ratio discrepancy

C.2.11. Completeness

Overall, the data validation process deemed the groundwater data acceptable for use. No data were rejected pursuant to the data quality review, and all data may be used as applicable for the purposes of the FY2024 Tall Spruce Monitoring Well Sampling Summary Report.

APPENDIX D: CONCEPTUAL SITE MODEL

Appendix D

Conceptual Site Model

CONTENTS

Print Form

Appendix A - Human Health Conceptual Site Model Scoping Form and Standardized Graphic

Site Name: Fairbanks Int'l Airport Statewide PFAS - Tall Spruce Neighborhood

File Number: 100.38.277 / 26816

Completed by: Shannon & Wilson, Inc.

Introduction

The form should be used to reach agreement with the Alaska Department of Environmental Conservation (DEC) about which exposure pathways should be further investigated during site characterization. From this information, summary text about the CSM and a graphic depicting exposure pathways should be submitted with the site characterization work plan and updated as needed in later reports.

General Instructions: Follow the italicized instructions in each section below.

1. General Information:

Sources *(check potential sources at the site)*

- ☐ USTs
- ☐ ASTs
- ☐ Dispensers/fuel loading racks
- ☐ Drums
- ☐ Vehicles
- ☐ Landfills
- ☐ Transformers
- ☒ Other: Aqueous Film Forming Foam (AFFF) release upgradient of site

Release Mechanisms *(check potential release mechanisms at the site)*

- ☐ Spills
- ☐ Leaks
- ☐ Direct discharge
- ☐ Burning
- ☒ Other: Migration from upgradient PFAS contamination at FAI

Impacted Media *(check potentially-impacted media at the site)*

- ☐ Surface soil (0-2 feet bgs*)
- ☐ Subsurface soil (>2 feet bgs)
- ☐ Air
- ☐ Sediment
- ☒ Groundwater
- ☐ Surface water
- ☐ Biota
- ☐ Other:

Receptors *(check receptors that could be affected by contamination at the site)*

- ☒ Residents (adult or child)
- ☒ Commercial or industrial worker
- ☒ Construction worker
- ☒ Subsistence harvester (i.e. gathers wild foods)
- ☒ Subsistence consumer (i.e. eats wild foods)
- ☒ Site visitor
- ☒ Trespasser
- ☒ Recreational user
- ☒ Farmer
- ☐ Other:

* bgs - below ground surface

2. Exposure Pathways: *(The answers to the following questions will identify complete exposure pathways at the site. Check each box where the answer to the question is "yes".)*

a) Direct Contact -

1. Incidental Soil Ingestion

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site-specific basis.) ☐

If the box is checked, label this pathway complete: Incomplete

Comments:

Soil contamination was not identified in samples collected while installing monitoring wells off Tall Spruce Road; however, PFAS surface soil contamination is present at FAI.

2. Dermal Absorption of Contaminants from Soil

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site specific basis.) ☐

Can the soil contaminants permeate the skin (see Appendix B in the guidance document)? ☒

If both boxes are checked, label this pathway complete: Incomplete

Comments:

PFAS contamination was not detected in subsurface soil samples spanning depths between 13 feet below ground surface and 78 feet below ground surface.

b) Ingestion -

1. Ingestion of Groundwater

Have contaminants been detected or are they expected to be detected in the groundwater, or are contaminants expected to migrate to groundwater in the future? ☒

Could the potentially affected groundwater be used as a current or future drinking water source? Please note, only leave the box unchecked if DEC has determined the groundwater is not a currently or reasonably expected future source of drinking water according to 18 AAC 75.350. ☒

If both boxes are checked, label this pathway complete: Complete

Comments:

Samples collected from the four monitoring wells installed off Tall Spruce Road indicate that PFAS are present in groundwater at concentrations below the DEC Groundwater Cleanup Level and the current DEC Drinking Water Limits. However, samples collected from drinking water wells roughly 200 linear feet to the east exhibit PFAS concentrations above the DEC Drinking Water Limits.

2. Ingestion of Surface Water

Have contaminants been detected or are they expected to be detected in surface water, or are contaminants expected to migrate to surface water in the future? ☐

Could potentially affected surface water bodies be used, currently or in the future, as a drinking water source? Consider both public water systems and private use (i.e., during residential, recreational or subsistence activities). ☐

If both boxes are checked, label this pathway complete: Incomplete

Comments:

Surface water samples were not collected during the installation of the Tall Spruce neighborhood monitoring wells. Contaminants are not expected to be detected or expected to migrate to surface water.

3. Ingestion of Wild and Farmed Foods

Is the site in an area that is used or reasonably could be used for hunting, fishing, or harvesting of wild or farmed foods? ☒

Do the site contaminants have the potential to bioaccumulate (see Appendix C in the guidance document)? ☒

Are site contaminants located where they would have the potential to be taken up into biota? (i.e. soil within the root zone for plants or burrowing depth for animals, in groundwater that could be connected to surface water, etc.) ☐

If all of the boxes are checked, label this pathway complete: Incomplete

Comments:

Soil within the vadose zone did not contain detectable concentrations of PFAS. Groundwater was encountered at roughly 6.5 feet bgs and contained PFAS concentrations below DEC Groundwater Cleanup Levels and Drinking Water Limits.

c) Inhalation-

1. Inhalation of Outdoor Air

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site specific basis.) ☐

Are the contaminants in soil volatile (see Appendix D in the guidance document)? ☐

If both boxes are checked, label this pathway complete: Incomplete

Comments:

2. Inhalation of Indoor Air

Are occupied buildings on the site or reasonably expected to be occupied or placed on the site in an area that could be affected by contaminant vapors? (within 30 horizontal or vertical feet of petroleum contaminated soil or groundwater; within 100 feet of non-petroleum contaminted soil or groundwater; or subject to "preferential pathways," which promote easy airflow like utility conduits or rock fractures) ☐

Are volatile compounds present in soil or groundwater (see Appendix D in the guidance document)? ☐

If both boxes are checked, label this pathway complete: Incomplete

Comments:

3. **Additional Exposure Pathways:** *(Although there are no definitive questions provided in this section, these exposure pathways should also be considered at each site. Use the guidelines provided below to determine if further evaluation of each pathway is warranted.)*

Dermal Exposure to Contaminants in Groundwater and Surface Water

Dermal exposure to contaminants in groundwater and surface water may be a complete pathway if:

- Climate permits recreational use of waters for swimming.
- Climate permits exposure to groundwater during activities, such as construction.
- Groundwater or surface water is used for household purposes, such as bathing or cleaning.

Generally, DEC groundwater cleanup levels in 18 AAC 75, Table C, are deemed protective of this pathway because dermal absorption is incorporated into the groundwater exposure equation for residential uses.

Check the box if further evaluation of this pathway is needed: ☒

Comments:

PFAS concentrations observed in samples collected from the new monitoring wells were below the DEC Groundwater Cleanup Levels in 18 AAC 75.345 Table C and the current Drinking Water Limits. This pathway has been marked complete because historical private well samples from the nearby properties 2720 Tall Spruce Rd and 2712 Tall Spruce Rd have exhibited PFAS concentrations above or near the Drinking Water Limit.

Inhalation of Volatile Compounds in Tap Water

Inhalation of volatile compounds in tap water may be a complete pathway if:

- The contaminated water is used for indoor household purposes such as showering, laundering, and dish washing.
- The contaminants of concern are volatile (common volatile contaminants are listed in Appendix D in the guidance document.)

DEC groundwater cleanup levels in 18 AAC 75, Table C are protective of this pathway because the inhalation of vapors during normal household activities is incorporated into the groundwater exposure equation.

Check the box if further evaluation of this pathway is needed: ☐

Comments:

Inhalation of Fugitive Dust

Inhalation of fugitive dust may be a complete pathway if:

- Nonvolatile compounds are found in the top 2 centimeters of soil. The top 2 centimeters of soil are likely to be dispersed in the wind as dust particles.
- Dust particles are less than 10 micrometers (Particulate Matter - PM_{10}). Particles of this size are called respirable particles and can reach the pulmonary parts of the lungs when inhaled.

DEC human health soil cleanup levels in Table B1 of 18 AAC 75 are protective of this pathway because the inhalation of particulates is incorporated into the soil exposure equation.

Check the box if further evaluation of this pathway is needed: ☐

Comments:

Direct Contact with Sediment

This pathway involves people's hands being exposed to sediment, such as during some recreational, subsistence, or industrial activity. People then incidentally ingest sediment from normal hand-to-mouth activities. In addition, dermal absorption of contaminants may be of concern if the the contaminants are able to permeate the skin (see Appendix B in the guidance document). This type of exposure should be investigated if:

- Climate permits recreational activities around sediment.
- The community has identified subsistence or recreational activities that would result in exposure to the sediment, such as clam digging.

Generally, DEC direct contact soil cleanup levels in 18 AAC 75, Table B1, are assumed to be protective of direct contact with sediment.

Check the box if further evaluation of this pathway is needed: ☒

Comments:

Sediment samples were not collected during the installation of the Tall Spruce monitoring wells. This pathway has been marked complete because more investigation is needed.

4. Other Comments *(Provide other comments as necessary to support the information provided in this form.)*

HUMAN HEALTH CONCEPTUAL SITE MODEL GRAPHIC FORM

Site: Fairbanks Int'l Airport Statewide PFAS - Tall Spruce Neighborhood
100.38.277 / 26816

Completed By: Shannon & Wilson, Inc.
Date Completed: March 27, 2024

***Instructions*: Follow the numbered directions below. Do not consider contaminant concentrations or engineering/land use controls when describing pathways.**

(1) *Check the media that could be directly affected by the release.*

(2) *For each medium identified in (1), follow the top arrow and check possible transport mechanisms. Check additional media under (1) if the media acts as a secondary source.*

Media	Transport Mechanisms	check
☐ Surface Soil (0-2 ft bgs)	Direct release to surface soil	check soil
	☐ Migration to subsurface	check soil
	☐ Migration to groundwater	check groundwater
	☐ Volatilization	check air
	☐ Runoff or erosion	check surface water
	☐ Uptake by plants or animals	check biota
	☐ Other (list):	
☐ Subsurface Soil (2-15 ft bgs)	Direct release to subsurface soil	check soil
	☐ Migration to groundwater	check groundwater
	☐ Volatilization	check air
	☐ Uptake by plants or animals	check biota
	☐ Other (list):	
☑ Ground-water	Direct release to groundwater	check groundwater
	☐ Volatilization	check air
	☐ Flow to surface water body	check surface water
	☑ Flow to sediment	check sediment
	☑ Uptake by plants or animals	check biota
	☐ Other (list):	
☐ Surface Water	Direct release to surface water	check surface water
	☐ Volatilization	check air
	☐ Sedimentation	check sediment
	☐ Uptake by plants or animals	check biota
	☐ Other (list):	
☐ Sediment	Direct release to sediment	check sediment
	☐ Resuspension, runoff, or erosion	check surface water
	☐ Uptake by plants or animals	check biota
	☐ Other (list):	

(3) *Check all exposure media identified in (2).*

(4) *Check all pathways that could be complete. The pathways identified in this column **must** agree with Sections 2 and 3 of the Human Health CSM Scoping Form.*

(5) *Identify the receptors potentially affected by each exposure pathway: Enter "C" for current receptors, "F" for future receptors, "C/F" for both current and future receptors, or "I" for insignificant exposure.*

Current & Future Receptors

Exposure Media	Exposure Pathway/Route	Residents (adults or children)	Commercial or industrial workers	Site visitors, trespassers, or recreational users	Construction workers	Farmers or subsistence harvesters	Subsistence consumers	Other
☐ soil	☐ Incidental Soil Ingestion							
	☐ Dermal Absorption of Contaminants from Soil							
	☐ Inhalation of Fugitive Dust							
☑ groundwater	☑ Ingestion of Groundwater	C/F	C/F	I	I	I	I	
	☑ Dermal Absorption of Contaminants in Groundwater	C/F	C/F	I	I	I	I	
	☐ Inhalation of Volatile Compounds in Tap Water							
☐ air	☐ Inhalation of Outdoor Air							
	☐ Inhalation of Indoor Air							
	☐ Inhalation of Fugitive Dust							
☐ surface water	☐ Ingestion of Surface Water							
	☐ Dermal Absorption of Contaminants in Surface Water							
	☐ Inhalation of Volatile Compounds in Tap Water							
☑ sediment	☑ Direct Contact with Sediment	C/F	C/F	I	C/F	C/F	C/F	
☑ biota	☑ Ingestion of Wild or Farmed Foods	I	I	I	I	I	I	

Revised, 10/01/2010

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

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your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

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

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

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

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

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

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

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims

IMPORTANT INFORMATION

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