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FINAL

SUMMARY REPORT

FY2025 Tall Spruce Monitoring Well Sampling

FAIRBANKS, ALASKA

SHANNON & WILSON

April 2025

Shannon & Wilson No: 102519-031

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

Subject: FINAL SUMMARY REPORT, FY2025 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. S&W's services were performed as described in our proposal dated May 7, 2024, and authorized in notice to proceed issued on July 9, 2024 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 September 2024 and February 2025.

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
9CL-PF3ONS	9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid
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
COV	coefficient of variant
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
MAROS	Monitoring and Remediation Optimization System
MCL	Maximum Contaminant Level
µS/cm	micro-siemens per centimeter
µg/kg	micrograms per kilogram
mL	milliliter
mV	millivolt
MW	monitoring well
N-EtFOSAA	N-ethyl perfluorooctane sulfonamidoacetic acid
ng/L	nanograms per liter
N-MeFOSAA	N-methyl perfluorooctane sulfonamidoacetic acid
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutanesulfonic acid
PFDA	perluorodecanoic acid
PFDoA	perluorododecanoic acid
PFHpA	perfluoroheptanoic acid

PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonic acid
PFTeA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnA	perfluoroundecanoic acid
POC	point of contact
QSM	Quality Systems Manual
S&W	Shannon & Wilson, Inc.
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 field activities performed in September 2024 and February 2025.

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) FAI 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 concentrations exceeding the applicable drinking water action level and those within close proximity to WSWs exceeding the drinking water action level.

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

1.2.2 FY2024 Monitoring

FY2024 Tall Spruce monitoring events occurred in October of 2023 and February of 2024. S&W collected four primary groundwater samples from MW-TS-1, MW-TS-2, MW-TS-3, and MW-TS-4 and one field duplicate from MW-TS-1 during each of the sampling events. 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.

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. In April 2024, the EPA finalized the regulatory limits for the six compounds, setting Maximum Contaminant Levels (MCLs) of 4.0 ng/L for PFOS and PFOA, 10.0 ng/L for PFHxS, PFNA, and HFPO-DA, and 2,000 ng/L for PFBS. The DEC currently utilizes the 2016 EPA LHA as the PFAS drinking water action level for Alaska but is expected to reduce their action level following submittal through their regulatory process.

Current DEC soil cleanup levels are 3.0 micrograms per kilogram (µg/kg) for PFOS and 1.7 µg/kg for PFOA. Current DEC groundwater cleanup levels are 400 ng/L for PFOS and PFOA individually.

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	3.0 µg/kg
	PFOA	1.7 µg/kg

HFPO-DA = hexafluoropropylene oxide dimer acid; µg/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 1-3: 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 September 2024 and February 2025 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 028-FAI-03*, dated August 2024 and approved by DEC August 26, 2024.

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 the September 2024 event. Due to a frozen well during the February 2025 event, S&W collected three primary groundwater samples and no field duplicate. During the September 2024 event, field staff purged the MWs using a submersible pump and new, disposable, PFAS-free tubing. During the February 2025 event, field staff purged the MWs using a peristaltic pump and new, disposable PFAS fee tubing. During both events, 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 the September 2024 sampling event. Due to MW-TS-1 being frozen during the February 2025 event, a field duplicate sample was not collected.

S&W staff treated purge water with granular activated carbon (GAC) before discharging to the ground surface. During the September 2024 event, an equipment blank was collected to assess the potential for cross-contamination between samples and the re-usable, decontaminated equipment. Samples were collected using a peristaltic pump during the February 2025 event so an equipment blank was not required for this event.

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 a S&W office 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.

S&W shipped the sample coolers to Eurofins Environment Testing America (Eurofins) in West Sacramento, California using FedEx. 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	537M	Water	2 x 250 mL polycarbonate	0 °C to 6 °C	14 days to extraction, analyzed within 40 days of extraction

°C = degrees Celsius, mL = milliliter, PFAS = per- and polyfluoroalkyl substances

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:

- Samples were collected in September 2024 instead of in August 2024 like outlined in the GWP Addendum.
- During the February 2025 event, MW-TS-1 was frozen and was unable to be sampled. Additionally, this MW is sampled last due to historical concentrations and was the designated well to collect a field duplicate from, therefore a field duplicate sample was not collected during the February 2025 event.
- An equipment blank was not collected during the February 2025 event as a peristaltic pump was employed for sample collection and no reusable equipment was used.

3 ANALYTICAL RESULTS

S&W submitted the groundwater samples to Eurofins for analysis of 18 PFAS compounds using method 537M which is 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 September 2024 event contained detectable concentrations of PFOS, PFOA, PFBS, PFHpA, PFHxS, PFHxA, and PFNA. The groundwater samples collected during the February 2025 event contained detectable concentrations of PFOS, PFOA, PFBS, PFHpA, PFHxS, and PFHxA. None of the detected concentrations exceeded DEC groundwater cleanup levels. A summary of the groundwater results is available in Table 1 (September 2024) and Table 2 (February 2025).

The GAC effluent sample collected during the September 2024 event had an estimated concentration of PFOS (detected below the laboratory reporting limit). The GAC effluent sample collected during the February 2025 event had an estimated detection of PFHxA

below the reporting limit that was attributed to method blank contamination. The result is considered not detected, reported as less than the reporting limit and flagged 'B*' to denote the method blank detection.

4 TREND ANALYSIS

An evaluation of concentration trends for the 18 PFAS listed in Exhibit 1-3 in groundwater was completed using a Mann-Kendall statistical analysis of groundwater analytical data and visual inspection of the concentration graphs. Monitoring and Remediation Optimization System (MAROS) software by the Air Force Center for Engineering and the Environment was developed to evaluate concentration trends by evaluating the Mann-Kendall statistical outputs and the coefficient of variation (COV). The COV is defined as the ratio of a dataset's standard deviation to its mean. S&W uses the ProUCL version 5.1 EPA Software capable of performing the Mann-Kendall test and calculating each dataset's COV for collected data. The information obtained from the ProUCL software is then used to further evaluate temporal trends using the MAROS decision matrix developed.

The MAROS decision matrix of concentration trend depends on the result of a Mann-Kendall trend analysis, coupled with information about the COV. A statistically significant increasing or decreasing trend is identified by the Mann-Kendall analysis if the probability of a false-negative assessment is less than 5 percent (i.e., $p < 0.05$); MAROS refers to this condition as a "confidence in trend" above 95 percent. MAROS also discriminates between "no trend" and a "stable" contaminant concentration by evaluating the COV of a given well's dataset. COV values less than or near one indicate that data form a relatively close group around the mean value; values larger than one indicate data exhibit a greater degree of scatter around the mean. The MAROS decision matrix is presented in Exhibit 4-1 below:

Exhibit 4-1: MAROS Decision Matrix

Mann-Kendall Statistic (S)	Confidence in Trend	Concentration lin Trend
S > 0	> 95 percent	Increasing
	90 – 95 percent	Probably Increasing
	< 90 percent	No Trend
S ≤ 0	< 90 percent and COV ≥ 1	No Trend
	< 90 percent and COV < 1	Stable
S < 0	90 – 95 percent	Probably Decreasing
	> 95 percent	Decreasing

COV = coefficient of variance

Data collected by S&W from September 2022 through February 2025 was included in this analysis. Sample locations/analytes were evaluated for trends if:

- A minimum of four sample results are reported for the given location
- At least 50% detected results for a given analyte

Sample locations that did not meet the above criteria were excluded from the trend analysis. With the current data set, we conducted the trend analysis for sample locations MW-TS-1, MW-TS-2, MW-TS-3, and MW-TS-4. A full summary of the trend analysis is provided in Table 3.

Our Mann-Kendall nonparametric trend analysis identified the following trends for the data set (Exhibit 4-2).

Exhibit 4-2: Trend Analysis Through February 2025

MW	PFBS	PFHpA	PFHxS	PFHxA	PFOS	PFOA
MW-TS-1	No Trend	Decreasing	No Trend	No Trend	Increasing	No Trend
MW-TS-2	Increasing	Stable	Increasing	Increasing	No Trend	Increasing
MW-TS-3	No Trend	Stable	No Trend	No Trend	No Trend	No Trend
MW-TS-4	Stable	NA	No Trend	Stable	Stable	Stable

MW = monitoring well; NA = Insufficient detections for a meaningful statistical analysis; PFBS = perfluorobutanesulfonic acid; PFHpA = perfluoroheptanoic acid; PFHxA = perfluorohexanoic acid; PFHxS = perfluorohexanesulfonic acid; PFOA = perfluorooctanoic acid; PFOS = perfluorooctanesulfonic acid

5 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 is included. No changes were made 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 Action Level. Note, surface water samples were not collected as part of this project, so potential impacts resulting from exposure to surficial media is unknown.

6 DISCUSSION AND RECOMMENDATIONS

Based on our sampling efforts completed in September 2024 and February 2025, 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 and perform an annual statistical analysis of the data to assess trends in PFAS concentrations.

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.

7 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), 2024, Field Sampling Guidance: Juneau, Alaska, DEC Division of Spill Prevention and Response, Contaminated Sites Program, October, available: http://dec.alaska.gov/spar/csp/guidance_forms/csguidance.htm.

Alaska Department of Environmental Conservation (DEC), 2023, 18 AAC 75: Oil and Other Hazardous Substances Pollution Control: Juneau, Alaska, October, available: http://dec.alaska.gov/commish/regulations/.

Alaska Department of Environmental Conservation (DEC), 2023, 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 — September 2024 PFAS Analytical Results

				Sample Name	MW-TS-1	MW-TS-101	MW-TS-2	MW-TS-3	MW-TS-4	EB-1
				Well Depth Below Ground Surface (feet)	20	20	40	60	80	--
				Collection Date	9/16/2024	9/16/2024	9/16/2024	9/16/2024	9/16/2024	9/16/2024
				Sample Type	Field Duplicate Pair		Project	Project	Project	Equipment Blank
Method	Analyte	Regulatory Limit	Unit		Results	Results	Results	Results	Results	Results
537M	Perfluorooctanesulfonic acid (PFOS)	400	ng/L		2.4	2.0	2.9	2.3	0.86 J	< 1.8
	Perfluorooctanoic acid (PFOA)	400	ng/L		4.0	4.1	9.3	7.3	2.5	< 1.8
	Hexafluoropropylene oxide dimer acid (HFPO-DA)	N/A	ng/L		< 3.5	< 3.6	< 3.6	< 3.6	< 3.6	< 3.5
	Perfluorobutanesulfonic acid (PFBS)	N/A	ng/L		1.1 J	1.2 J	1.8	1.1 J	0.45 J	< 1.8
	Perfluorodecanoic acid (PFDA)	N/A	ng/L		< 1.7	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
	Perfluorododecanoic acid (PFDoA)	N/A	ng/L		< 1.7	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
	Perfluoroheptanoic acid (PFHpA)	N/A	ng/L		0.89 J	0.89 J	0.58 J	0.40 J	< 1.80	< 1.8
	Perfluorohexanesulfonic acid (PFHxS)	N/A	ng/L		3.0	3.0	14	9.5	3.4	< 1.8
	Perfluorohexanoic acid (PFHxA)	N/A	ng/L		1.9	2.2	3.9	2.7	1.0 J	< 1.8
	Perfluorononanoic acid (PFNA)	N/A	ng/L		1.2 J	1.4 J	6.8 J*	7.9	1.8 J*	< 1.8
	Perfluorotetradecanoic acid (PFTeA)	N/A	ng/L		< 1.7	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
	Perfluorotridecanoic acid (PFTrDA)	N/A	ng/L		< 1.7	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
	Perfluoroundecanoic acid (PFUnA)	N/A	ng/L		< 1.7	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)	N/A	ng/L		< 1.7	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	N/A	ng/L		< 1.7	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
	4,8-Dioxa-3H-perfluorononanoic acid (DONA)	N/A	ng/L		< 1.7	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
	N-Ethyl perfluorooctane sulfonamidoacetic acid (N-EtFOSAA)	N/A	ng/L		< 4.4	< 4.6	< 4.5	< 4.5	< 4.5	< 4.4
	N-Methyl perfluorooctane sulfonamidoacetic acid (N-MeFOSAA)	N/A	ng/L		< 4.4	< 4.6	< 4.5	< 4.5	< 4.5	< 4.4

Notes: Results reported from Eurofins Environment Testing America work order 320-115520-1.
Regulatory limits from 18 AAC 75.345 Groundwater Cleanup Levels.

PFAS per- and polyfluoroalkyl substances
ng/L nanograms per liter
N/A No applicable regulatory limit exists for the associated analyte.
< 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 1 — September 2024 PFAS Analytical Results

			Sample Name	GAC-1
			Well Depth Below Ground Surface (feet)	--
			Collection Date	9/16/2024
			Sample Type	GAC Effluent
Method	Analyte	Regulatory Limit	Unit	Results
537M	Perfluorooctanesulfonic acid (PFOS)	400	ng/L	0.62 J
	Perfluorooctanoic acid (PFOA)	400	ng/L	< 1.8
	Hexafluoropropylene oxide dimer acid (HFPO-DA)	N/A	ng/L	< 3.6
	Perfluorobutanesulfonic acid (PFBS)	N/A	ng/L	< 1.8
	Perfluorodecanoic acid (PFDA)	N/A	ng/L	< 1.8
	Perfluorododecanoic acid (PFDoA)	N/A	ng/L	< 1.8
	Perfluoroheptanoic acid (PFHpA)	N/A	ng/L	< 1.8
	Perfluorohexanesulfonic acid (PFHxS)	N/A	ng/L	< 1.8
	Perfluorohexanoic acid (PFHxA)	N/A	ng/L	< 1.8
	Perfluorononanoic acid (PFNA)	N/A	ng/L	< 1.8
	Perfluorotetradecanoic acid (PFTeA)	N/A	ng/L	< 1.8
	Perfluorotridecanoic acid (PFTrDA)	N/A	ng/L	< 1.8
	Perfluoroundecanoic acid (PFUnA)	N/A	ng/L	< 1.8
	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)	N/A	ng/L	< 1.8
	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	N/A	ng/L	< 1.8
	4,8-Dioxa-3H-perfluorononanoic acid (DONA)	N/A	ng/L	< 1.8
	N-Ethyl perfluorooctane sulfonamidoacetic acid (N-EtFOSAA)	N/A	ng/L	< 4.4
	N-Methyl perfluorooctane sulfonamidoacetic acid (N-MeFOSAA)	N/A	ng/L	< 4.4

Notes:
Results reported from Eurofins Environment Testing America work order 320-115520-1.
Regulatory limits from 18 AAC 75.345 Groundwater Cleanup Levels.
PFAS per- and polyfluoroalkyl substances
ng/L nanograms per liter
N/A No applicable regulatory limit exists for the associated analyte.
< 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 2025 PFAS Analytical Results

				Sample Name	MW-TS-2	MW-TS-3	MW-TS-4	GAC-1
				Well Depth Below Ground Surface (feet)	40	60	80	--
				Collection Date	2/19/2025	2/19/2025	2/19/2025	2/19/2025
				Sample Type	Project	Project	Project	GAC Effluent
Method	Analyte	Regulatory Limit	Unit		Results	Results	Results	Results
537M	Perfluorooctanesulfonic acid (PFOS)	400	ng/L		4.3	3.4	1.5 J	<1.9
	Perfluorooctanoic acid (PFOA)	400	ng/L		19	13	4.2	<1.9
	Hexafluoropropylene oxide dimer acid (HFPO-DA)	N/A	ng/L		<3.7	<3.6	<3.6	<3.7
	Perfluorobutanesulfonic acid (PFBS)	N/A	ng/L		3.1	2.4	1.5 J	<1.9
	Perfluorodecanoic acid (PFDA)	N/A	ng/L		<1.8	<1.8	<1.8	<1.9
	Perfluorododecanoic acid (PFDoA)	N/A	ng/L		<1.8	<1.8	<1.8	<1.9
	Perfluoroheptanoic acid (PFHpA)	N/A	ng/L		0.94 J	0.57 J	<1.8	<1.9
	Perfluorohexanesulfonic acid (PFHxS)	N/A	ng/L		29	21	6.2	<1.9
	Perfluorohexanoic acid (PFHxA)	N/A	ng/L		8.2	5.9	2.3 JH*	<1.9 B*
	Perfluorononanoic acid (PFNA)	N/A	ng/L		<1.8	<1.8	<1.8	<1.9
	Perfluorotetradecanoic acid (PFTeA)	N/A	ng/L		<1.8	<1.8	<1.8	<1.9
	Perfluorotridecanoic acid (PFTrDA)	N/A	ng/L		<1.8	<1.8	<1.8	<1.9
	Perfluoroundecanoic acid (PFUnA)	N/A	ng/L		<1.8	<1.8	<1.8	<1.9
	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)	N/A	ng/L		<1.8	<1.8	<1.8	<1.9
	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	N/A	ng/L		<1.8	<1.8	<1.8	<1.9
	4,8-Dioxa-3H-perfluorononanoic acid (DONA)	N/A	ng/L		<1.8	<1.8	<1.8	<1.9
	N-Ethyl perfluorooctane sulfonamidoacetic acid (N-EtFOSAA)	N/A	ng/L		<4.6	<4.5	<4.5	<4.6
	N-Methyl perfluorooctane sulfonamidoacetic acid (N-MeFOSAA)	N/A	ng/L		<4.6	<4.5	<4.5	<4.6

Notes: Results reported from Eurofins Environment Testing America work order 320-119292-1.
Regulatory limits from 18 AAC 75.345 Groundwater Cleanup Levels.

PFAS per- and polyfluoroalkyl substances
ng/L nanograms per liter
N/A No applicable regulatory limit exists for the associated analyte.
< 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.
B* Result is included in the same preparatory batch as a blank detection for the associated analyte. Flag applied by Shannon & Wilson, Inc. (*)
J* Estimated concentration due to quality control failures. Flag applied by Shannon & Wilson, Inc. (*)
JH* Estimated concentration, biased high due to quality control failures. Flag applied by Shannon & Wilson, Inc. (*)

Table 3 - Summary of Mann-Kendall Trend Analysis

Location	Analyte	%ND	N	No. of Detects	S	p-value	Confidence	COV	Trend?
MW-TS-1	11Cl-PF3OUdS	100.00%	4	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-2	11Cl-PF3OUdS	100.00%	5	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-3	11Cl-PF3OUdS	80.00%	5	1	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-4	11Cl-PF3OUdS	100.00%	5	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-1	DONA	100.00%	4	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-2	DONA	80.00%	5	1	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-3	DONA	100.00%	5	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-4	DONA	100.00%	5	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-1	9Cl-PF3ONS	100.00%	4	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-2	9Cl-PF3ONS	100.00%	5	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-3	9Cl-PF3ONS	100.00%	5	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-4	9Cl-PF3ONS	100.00%	5	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-1	HFPO-DA	100.00%	4	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-2	HFPO-DA	100.00%	5	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-3	HFPO-DA	100.00%	5	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-4	HFPO-DA	100.00%	5	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-1	N-EtFOSAA	100.00%	4	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-2	N-EtFOSAA	100.00%	5	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-3	N-EtFOSAA	100.00%	5	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-4	N-EtFOSAA	100.00%	5	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-1	N-MeFOSAA	100.00%	4	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-2	N-MeFOSAA	100.00%	5	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-3	N-MeFOSAA	100.00%	5	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-4	N-MeFOSAA	100.00%	5	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-1	PFBS	0.00%	4	4	3	0.375	62.5%	0.285	No Trend
MW-TS-2	PFBS	0.00%	5	5	10	0.008	99.2%	0.727	Increasing

Table 3 - Summary of Mann-Kendall Trend Analysis

Location	Analyte	%ND	N	No. of Detects	S	p-value	Confidence	COV	Trend?
MW-TS-3	PFBS	0.00%	5	5	5	0.242	75.8%	0.593	No Trend
MW-TS-4	PFBS	0.00%	5	5	0	0.592	40.8%	0.69	Stable
MW-TS-1	PFDA	100.00%	4	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-2	PFDA	100.00%	5	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-3	PFDA	100.00%	5	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-4	PFDA	100.00%	5	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-1	PFDoA	100.00%	4	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-2	PFDoA	100.00%	5	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-3	PFDoA	100.00%	5	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-4	PFDoA	100.00%	5	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-1	PFHpA	0.00%	4	4	-6	0.042	95.8%	0.247	Decreasing
MW-TS-2	PFHpA	20.00%	5	4	0	0.592	40.8%	0.69	Stable
MW-TS-3	PFHpA	20.00%	5	4	-6	0.117	88.3%	0.775	Stable
MW-TS-4	PFHpA	80.00%	5	1	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-1	PFHxS	0.00%	4	4	4	0.167	83.3%	0.165	No Trend
MW-TS-2	PFHxS	0.00%	5	5	10	0.008	99.2%	0.99	Increasing
MW-TS-3	PFHxS	0.00%	5	5	4	0.242	75.8%	0.589	No Trend
MW-TS-4	PFHxS	0.00%	5	5	3	0.408	59.2%	0.265	No Trend
MW-TS-1	PFHxA	0.00%	4	4	1	0.625	37.5%	0.102	No Trend
MW-TS-2	PFHxA	0.00%	5	5	9	0.042	95.8%	0.769	Increasing
MW-TS-3	PFHxA	20.00%	5	4	4	0.242	75.8%	0.451	No Trend
MW-TS-4	PFHxA	0.00%	5	5	-4	0.242	75.8%	0.459	Stable
MW-TS-1	PFNA	75.00%	4	1	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-2	PFNA	80.00%	5	1	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-3	PFNA	80.00%	5	1	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-4	PFNA	60.00%	5	2	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.

Table 3 - Summary of Mann-Kendall Trend Analysis

Location	Analyte	%ND	N	No. of Detects	S	p-value	Confidence	COV	Trend?
MW-TS-1	PFOS	0.00%	4	4	6	0.042	95.8%	0.297	Increasing
MW-TS-2	PFOS	0.00%	5	5	6	0.117	88.3%	0.423	No Trend
MW-TS-3	PFOS	0.00%	5	5	6	0.117	88.3%	0.271	No Trend
MW-TS-4	PFOS	0.00%	5	5	-3	0.408	59.2%	0.294	Stable
MW-TS-1	PFOA	0.00%	4	4	4	0.167	83.3%	0.161	No Trend
MW-TS-2	PFOA	0.00%	5	5	8	0.042	95.8%	0.889	Increasing
MW-TS-3	PFOA	0.00%	5	5	6	0.117	88.3%	0.51	No Trend
MW-TS-4	PFOA	0.00%	5	5	0	0.592	40.8%	0.19	Stable
MW-TS-1	PFTeA	100.00%	4	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-2	PFTeA	100.00%	5	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-3	PFTeA	100.00%	5	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-4	PFTeA	100.00%	5	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-1	PFTrDA	100.00%	4	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-2	PFTrDA	100.00%	5	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-3	PFTrDA	100.00%	5	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-4	PFTrDA	100.00%	5	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-1	PFUnA	100.00%	4	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-2	PFUnA	100.00%	5	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-3	PFUnA	100.00%	5	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.
MW-TS-4	PFUnA	100.00%	5	0	NA	NA	NA	NA	Insufficient detections for a meaningful statistical analysis.

Notes: Highest detected results for field duplicate sample pairs used for statistical evaluation.
N number of observations
%ND percent non-detect results
S Mann-Kendall Statistic
COV coefficient of variation

Path: T:\GIS_Projects\FAI\Tall Spruce Addendum\TS2025\TS2025.aprx Author: User.SDK Date: 3/18/2025

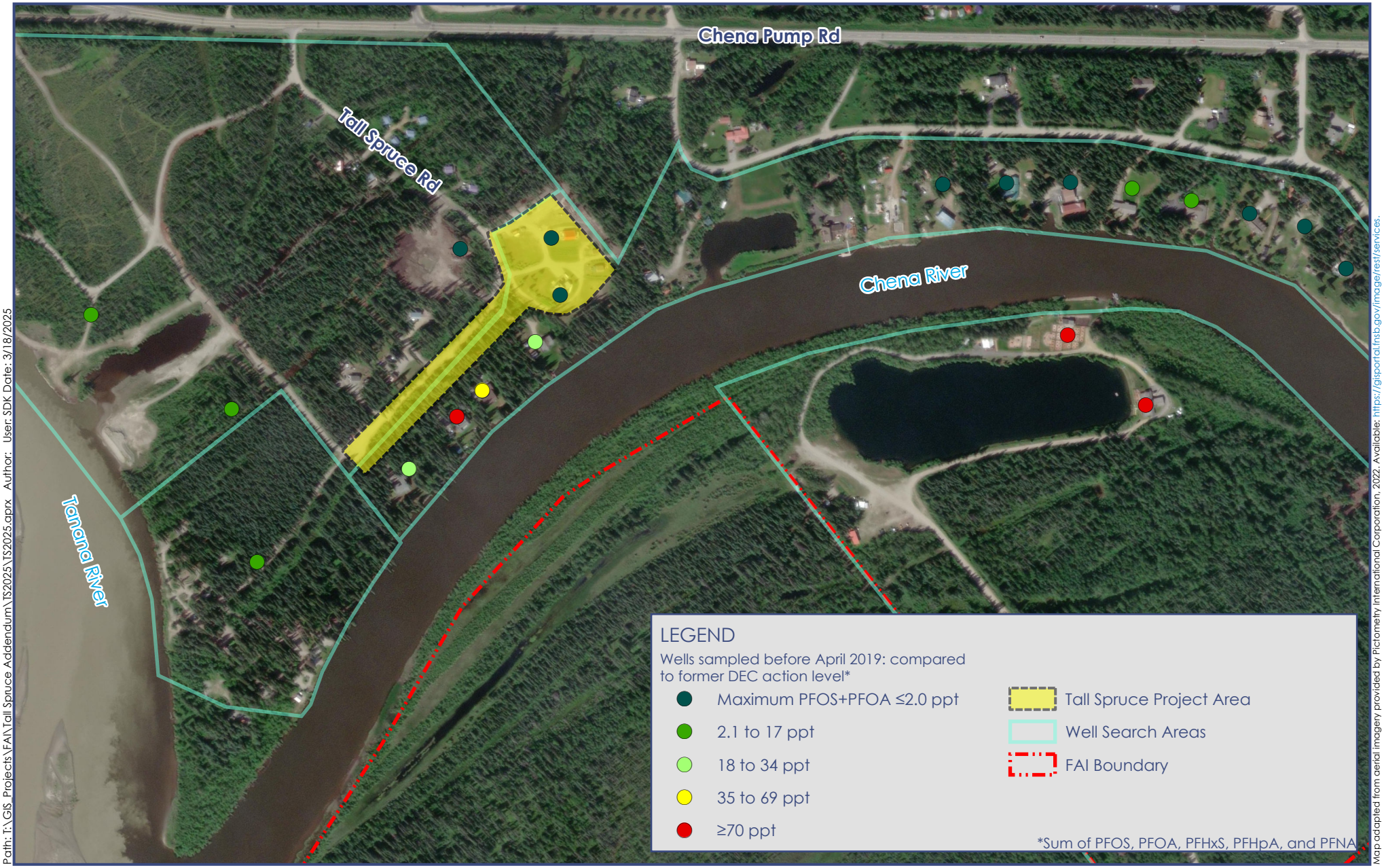
Map adapted from aerial imagery provided by Pictometry International Corporation, 2022. Available: https://gisportal.fnsb.gov/image/rest/services.

Notes:
1. Boundaries are approximate
FAI = Fairbanks International Airport

April 2025

FAIRBANKS INTERNATIONAL AIRPORT VICINITY

Figure 1



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

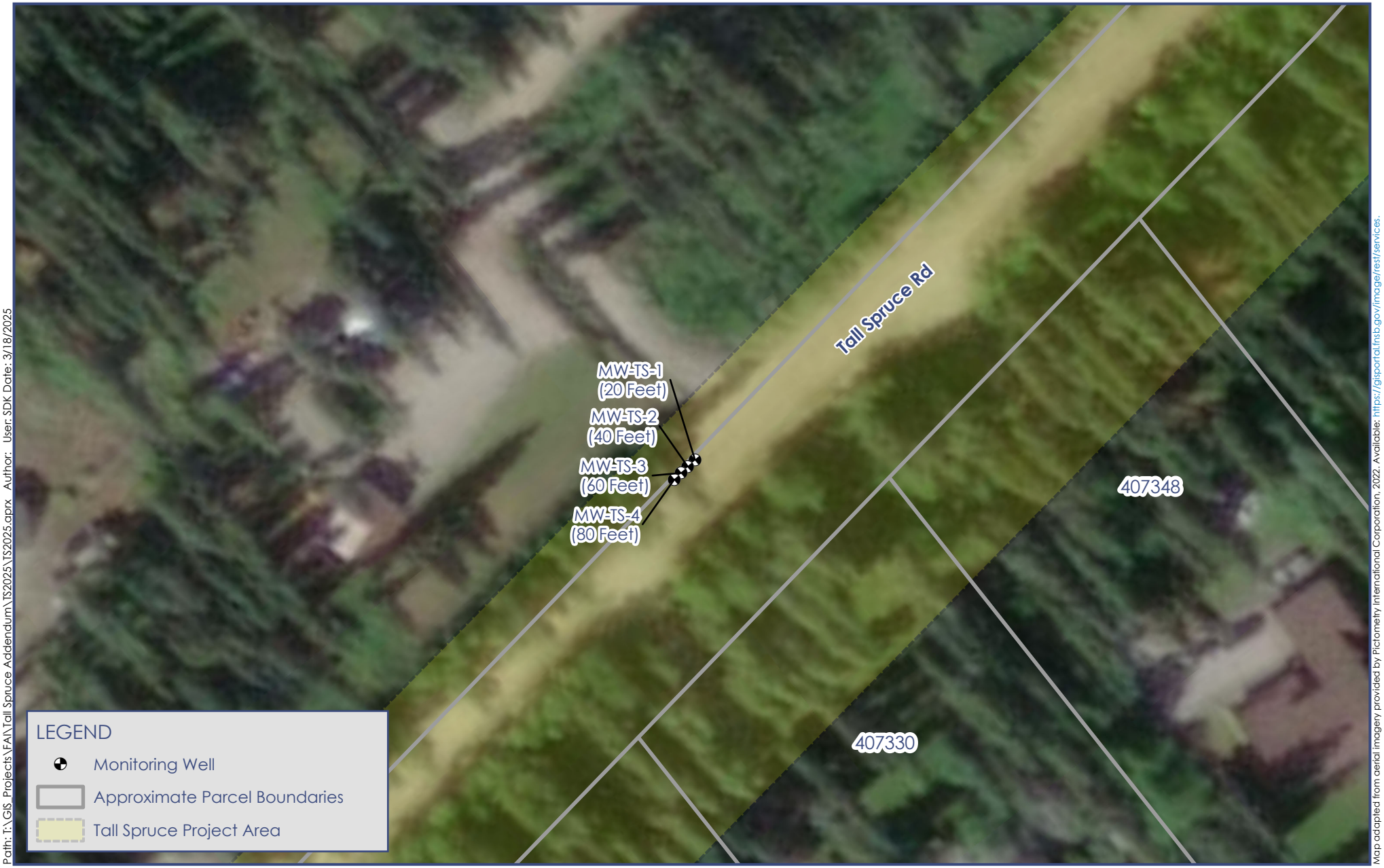
0 1,000 Feet

Notes:
1. Boundaries are approximate
FAI = Fairbanks International Airport

April 2025

PROJECT AREA WEST OF THE CHENA RIVER

Figure 2



Path: T:\GIS_Projects\FAI\Tall Spruce Addendum\TS2025\TS2025.aprx Author: User: SDK Date: 3/18/2025

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

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

April 2025

MONITORING WELL LOCATIONS

Figure 3

APPENDIX A: FIELD NOTES

Appendix A

Field Notes

CONTENTS

SHANNON & WILSON

FIELD ACTIVITIES DAILY LOG

Date 9/16/2024

Sheet 1 of 1

Project No. 102519-031

Project Name: September 2024 Tall Spruce Monitoring Event

Field Activity Subject: Ground Water Sampling

Calibration: YSI C

Safety: Hi Vis, Steel-toe,

Description of daily activities and events:

0746 KZR calibrated YSI C, packed equipment
0905 KZR departed Shannon & Wilson office
0920 KZR arrived at Tall Spruce sampling location (MW cluster, located the four flushmount monuments & removed debris (leaves & sediment from roadway). Set up equipment & GAC series
1029 KZR sampled MW-TS-1 & duplicate MW-TS-101
1117 Sampled MW-TS-2
1159 Sampled MW-TS-3
1315 Sampled MW-TS-4
1330 Collected Equipment Blank, EB-1
1338 Collected GAC effluent sample
1345 Finished decontaminating equipment, completed field forms, waited for GAC to process & drain, packed up
1600 Departed site, returned to office & demobilized

Visitors on site: —

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

Weather conditions: Overcast to rain, ~45°F

Important telephone calls: —

Personnel on site: KZR

QC: NWL

Signature: Katie Ring

Date: 9/16/24

Rev. 3/14/23

MONITORING WELL SAMPLING LOG

Owner/Client: DOT&PF - Fairbanks International Airport
Location: Tall Spruce Road
Sampling Personnel: KZR
Weather Conditions: RAIN Air Temp. (°F): 45

Project No.: 102519-029
Date: 9-16-2024
Well: MW-TS-1
Time started: 0948
Time completed: 1045

Sample No.: MS-TS-1 Time: 1029
Duplicate: MS-TS-101 Time: 1019
Equipment Blank: ~ Time: —

Pump: HURRICANE XL A
Purging Method: ~~portable~~ / *dedicated pump*
Pumping Start: 0958
Purge Rate (gal./min.): 0.5
Pumping End: 1030

Diameter and Type of Casing: 2" PVC
Approximate Total Depth of Well Below MP (ft.): 20
Measured Total Depth of Well Below MP (ft.): 20.32
Depth to Water Below MP (ft.): 5.38
Depth to Ice (if frozen) Below MP (ft.): —
Feet of Water in Well: 14.94
Gallons per foot: 0.17
Gallons in Well: 2.54
Purge Water Volume (gal.): 16
Purge Water Disposal: GAC

Pump Set Depth Below MP (ft.): 19
KuriTec Tubing (ft.): 30 +20 FOR GAC SET UP
TruPoly Tubing (ft.): —

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.): 0.54
Monument to ground surface (ft.): —

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

☒ NA Lock present and operational
☒ NA Well name legible on outside of well
☐ Evidence of frost-jacking NONE

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)
1001	2.7	0.67	429.9	5.68	132.6	Slightly cloudy brown
1005	2.7	0.49	426.9	5.96	122.0	CLEAR
1009	2.7	0.49	420.3	6.17	114.9	↓
1012	2.7	0.68	413.6	6.30	110.2	↓
1015	2.7	0.95	411.9	6.35	108.3	↓
1018	2.7	0.99	410.6	6.43	105.2	↓
1021	2.7	0.94	410.6	6.48	103.5	↓
1024	2.7	0.90	409.6	6.50	102.4	↓
1027	2.7	0.87	405.7	6.53	101.3	↓
1029	SAMPLED MW-TS-1					
1019	SAMPLED DUP, MW-TS-101					

Laboratory EUROFINS

	Analysis	Sample Containers	Preservatives	Dup
☐	PFAS x18	2x 250 ml plastic Bottle	—	☒
☐				☐
☐				☐
☐				☐
☐				☐
☐				☐

Well No. MW-TS-1

MONITORING WELL SAMPLING LOG

Owner/Client: DOT&PF - Fairbanks International Airport
Location: Tall Spruce Road
Sampling Personnel: KZR
Weather Conditions: RAIN Air Temp. (°F): 45

Project No.: 102519-029
Date: 9/16/24
Well: MW-TS-2
Time started: 1045
Time completed: 1130

Sample No.: MW-TS-2 Time: 1117
Duplicate: — Time: —
Equipment Blank: — Time: —

Pump: HURRICANE XL-B
Purging Method: portable / dedicated pump
Pumping Start: 1052
Purge Rate (gal./min.): 0.5
Pumping End: 1118

Diameter and Type of Casing: 2" PVC
Approximate Total Depth of Well Below MP (ft.): 40
Measured Total Depth of Well Below MP (ft.): 39.86
Depth to Water Below MP (ft.): 5.59
Depth to Ice (if frozen) Below MP (ft.): —

Pump Set Depth Below MP (ft.): 38
KuriTec Tubing (ft.): 46
TruPoly Tubing (ft.): —

Feet of Water in Well: 34.27
Gallons per foot: 0.17
Gallons in Well: 5.82
Purge Water Volume (gal.): 13
Purge Water Disposal: GAL

Monument Condition: good

Casing Condition: good

Wiring Condition (dedicated pumps): NA

Measuring Point (MP): Top of Casing (TOC)

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

Top-of-casing to monument (ft.): 0.34
Monument to ground surface (ft.): —

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

☒ NA Lock present and operational
☒ NA Well name legible on outside of well
☑ Evidence of frost-jacking NONE

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)
1054	2.9	0.94	213.4	6.78	78.2	slightly cloudy, brown
1057	2.9	0.60	210.2	6.87	77.4	CIGAR
1100	3.0	0.55	210.7	6.91	76.8	↓
1103	3.0	0.48	210.9	6.93	76.0	
1106	2.9	0.46	211.8	6.95	75.1	
1109	3.0	0.44	212.5	6.97	74.2	
1112	3.0	0.40	212.9	6.99	73.5	
1115	3.0	0.41	213.4	7.00	72.6	↓
1117	SAMPLED MW-TS-2					

Laboratory EUROFINS

	Analysis	Sample Containers	Preservatives	Dup
☑	PFAS x18	2x 250mL plastic Bottle	—	☐
☐				☐
☐				☐
☐				☐
☐				☐
☐				☐

Well No. MW-TS-2

MONITORING WELL SAMPLING LOG

Owner/Client: DOT&PF - Fairbanks International Airport
Location: Tall Spruce Road
Sampling Personnel: KZR
Weather Conditions: RAIN Air Temp. (°F): 45

Project No.: 102519-029
Date: 9/16/24
Well: MW-TS-3
Time started: 1130
Time completed: 1210

Sample No.: MW-TS-3 Time: 1159
Duplicate: — Time: —
Equipment Blank: — Time: —

Pump: HURRICANE XL A
Purging Method: (portable) / dedicated pump
Pumping Start: 1140
Purge Rate (gal./min.): 0.5
Pumping End: 1200

Pump Set Depth Below MP (ft.): 58
KuriTec Tubing (ft.): 60
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.): 59.45
Depth to Water Below MP (ft.): 5.76
Depth to Ice (if frozen) Below MP (ft.): —
Feet of Water in Well: 53.69
Gallons per foot: 0.17
Gallons in Well: 9.13
Purge Water Volume (gal.): 10
Purge Water Disposal: GAL

Monument Condition: good
Casing Condition: good
Wiring Condition (dedicated pumps): NA

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

Top-of-casing to monument (ft.): 0.34
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: NONE

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)
1144	3.1	0.42	188.9	7.02	75.4	CLEAR
1147	3.1	0.36	188.5	7.07	72.1	↓
1150	3.2	0.36	188.0	7.08	70.4	
1154	3.2	0.36	187.8	7.09	69.5	
1157	3.2	0.35	188.6	7.10	68.2	
1159	SAMPLED MW-TS-3					

Laboratory EUROFINS

	Analysis	Sample Containers	Preservatives	Dup
☒	PFAS ×18	2 × 250 ml plastic bottle	—	☐
☐				☐
☐				☐
☐				☐
☐				☐
☐				☐

Well No. MW-TS-3

MONITORING WELL SAMPLING LOG

Owner/Client: DOT&PF - Fairbanks International Airport
Location: Tall Spruce Road
Sampling Personnel: KZR
Weather Conditions: RAIN Air Temp. (°F): 45

Project No.: 102519-029
Date: 9/16/24
Well: MW-TS-4
Time started: 1210
Time completed: 1345

Sample No.: MW-TS-4 Time: 1315
Duplicate: — Time: —
Equipment Blank: EB-1 Time: 1330
GAC EFFLUENT: GAC-1 Time 1338

Pump: HURRICANE XL A
Purging Method: *portable* / *dedicated* pump
Pumping Start: 1228
Purge Rate (gal./min.): 0.5
Pumping End: 1316

Diameter and Type of Casing: 2" PVC
Approximate Total Depth of Well Below MP (ft.): 80
Measured Total Depth of Well Below MP (ft.): 80.44
Depth to Water Below MP (ft.): 5.97
Depth to Ice (if frozen) Below MP (ft.): —

Pump Set Depth Below MP (ft.): 70
KuriTec Tubing (ft.): 90
TruPoly Tubing (ft.): —

Feet of Water in Well: 74.47
Gallons per foot: 0.17
Gallons in Well: 12.666
Purge Water Volume (gal.): 24

Purge Water Disposal: GAC

Monument Condition: good

Casing Condition: good

Wiring Condition (dedicated pumps): NA

Measuring Point (MP): *Top of Casing (TOC)*

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

Top-of-casing to monument (ft.): 0.24
Monument to ground surface (ft.): —

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

NA Lock present and operational
NA Well name legible on outside of well
☐ Evidence of frost-jacking: NONE

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)
1232	3.2	1.01	104.4	6.93	55.5	cloudy, brown
1236	3.4	0.39	148.1	6.97	67.6	↓
1239	3.3	0.34	152.5	7.05	66.3	↓
1242	3.3	0.34	149.9	7.09	64.6	↓
1246	3.3	0.36	147.9	7.11	63.3	slightly cloudy, brown
1250	3.3	0.41	146.6	7.13	62.0	↓
1254	2.8	0.56	146.0	7.14	61.2	↓
1257	3.6	0.33	151.3	7.14	60.1	↓
1300	3.5	0.33	161.6	7.13	60.4	↓
1303	3.5	0.31	169.2	7.13	60.3	CLEAR
1306	3.5	0.29	173.9	7.13	59.9	↓
1310	3.5	0.29	175.5	7.14	59.3	↓
1313	3.5	0.29	176.0	7.14	58.9	↓
1315	SAMPLED MW-TS-4					
1330	SAMPLED EB-1					
1338	SAMPLED GAC-1					

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	Analysis	Sample Containers	Preservatives	Dup	EB	GAC
☑	PFAS x18	2x 250 mL PLASTIC BOTTLE		☐	☑	☑
☐				☐		
☐				☐		
☐				☐		
☐				☐		
☐				☐		

Well No. MW-TS-4

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FIELD ACTIVITIES DAILY LOG

Date 2/19/25

Sheet 1 of 1

Project No. 102519-031

Project Name: September 2024 Tall Spruce Monitoring Event

Field Activity Subject: GW Sampling

Calibration: YSI C

Safety: High vis, cold weather

Description of daily activities and events:

0930 - SDK packs truck for sampling.

1045 - SDK calibrates YSI, heads to site

1045 - Begin well location, wells are under ice & snow.

1140 - Start purging & sampling MW-TS-3

1315 - Start purging & sampling MW-TS-4

1410 - Start purging & sampling MW-TS-2

1515 - Start at MW-TS-1. Finds it frozen at 4.32 ft bgs. SDK calls KZR to bring chimney sticks to try & break through. When ice was broken through it refroze before total well depth tape could be deployed

1530 - SDK calls KRF to inform that MW-TS-1 could not be sampled, which meant the field duplicate would need to be taken at an already sampled well by purging again or to hold off on the field duplicate. SDK will hold off.

1550 - SDK takes GAC effluent sample GAC-1

1650 - SDK returns to office

Visitors on site: KZR - to bring chimney sticks

Changes from plans/specifications and other special orders and important decisions: Sample MW-TS-1 & field duplicate MW-TS-101 were not taken due to frozen well, KMS will decide on 2/24 if a resample attempt will take place. No equipment blank was taken as no re-usable pump was used

Weather conditions: Sunny, 20°F

Important telephone calls: KRF due to frozen well/field dup. issue

Personnel on site: SDK, KZR

QC: VDK

Signature: [signature] Date: 2/19/25

Rev. 3/14/23

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MONITORING WELL SAMPLING LOG

Owner/Client: Fairbanks International Airport
Location: Tall Spruce Neighborhood
Sampling Personnel: SDF
Weather Conditions: Sunny Air Temp. (°F): 10

Project No.: 102519-031
Date: 2/19/25
Well: MW-TS-1
Time started: ~~1442~~ 1515
Time completed: 1610

Sample No.: — Time: —
Duplicate: — Time: —
~~Equipment Blank~~: GAC-1 Time: 1550
GAC effluent sample

Pump: —
Purging Method: *portable*
Pumping Start: —
Purge Rate (gal./min.): —
Pumping End: —

Diameter and Type of Casing: 2" PVC
Approximate Total Depth of Well Below MP (ft.): —
Measured Total Depth of Well Below MP (ft.): —
Depth to Water Below MP (ft.): —
Depth to Ice (if frozen) Below MP (ft.): 4.32

Pump/Tubing Set Depth Below MP (ft.):
KuriTec Tubing (ft.):
TruPoly Tubing (ft.):
Silicone Tubing (ft.):

Feet of Water in Well:
Gallons per foot:
Gallons in Well:
3 Well-Volumes:
Purge Water Volume (gal.):

Purge Water Disposal: —

Monument Condition: good
Casing Condition: good

Locate: *Survey / GPS / ~~Field Maps~~ / Swingties* (circle one)
(If locate is not known, take one.)

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

Top-of-casing to monument (ft.): 0.42
Monument to ground surface (ft.): —

- ☒ NDA Lock present and operational
- ☑ Well name legible ~~on outside of well~~ KEEP (INSIDE WELL)
- ☐ Evidence of frost-jacking

Notes: Well frozen

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	0.65	1.5	2.6

QC: KAR

Well No.: MW-TS-~~2~~1

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MONITORING WELL SAMPLING LOG

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

Sample Observations _____

Notes _____

FIELD PARAMETERS [stabilization criteria]

Time	(°C) [± 3%]	Oxygen (mg/L) [±10%]	Conductivity (µS/cm) [± 3%]	pH [± 0.1]	ORP (mV) [± 10 mV]	Water Clarity (visual)

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GAC effluent

	Analysis	Sample Containers	Preservatives	Dup	E.B.
☑	PFAS		None	☐	☑
☐				☐	☐
☐				☐	☐
☐				☐	☐
☐				☐	☐
☐				☐	☐

QC: KTR

Well No.: MW-ES-1

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MONITORING WELL SAMPLING LOG

Owner/Client: Fairbanks International Airport
Location: Tall Spruce Neighborhood
Sampling Personnel: SDF
Weather Conditions: Sunny Air Temp. (°F): 20

Project No.: 102519-031
Date: 2/19/25
Well: MW-TS-2
Time started: 1410
Time completed: 1455

Sample No.: MW-TS-2 Time: 1447
Duplicate: — Time: —
Equipment Blank: — Time: —

Pump: Peri pump
Purging Method: portable
Pumping Start: 14.22
Purge Rate (gal./min.): 0.16
Pumping End: 1447

Diameter and Type of Casing: 2" PVC
Approximate Total Depth of Well Below MP (ft.): 40'
Measured Total Depth of Well Below MP (ft.): 39.09 + 0.70 = 39.79
Depth to Water Below MP (ft.): 7.44
Depth to Ice (if frozen) Below MP (ft.):

Pump/Tubing Set Depth Below MP (ft.): ~39.2
KuriTec Tubing (ft.): —
TruPoly Tubing (ft.): 43
Silicone Tubing (ft.): 0.5

Feet of Water in Well: 32.35
Gallons per foot: 0.17
Gallons in Well: 5.50
3 Well-Volumes: 16.50
Purge Water Volume (gal.): ≥1.0

Purge Water Disposal: GAC to ground

Monument Condition: good
Casing Condition: good
Locate: *Survey / GPS / Field Maps / Swingties* (circle one)
(If locate is not known, take one.)

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

Top-of-casing to monument (ft.): 0.41
Monument to ground surface (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	0.65	1.5	2.6

QC: KZR

Well No.: MW-TS-2

SHANNON & WILSON

MONITORING WELL SAMPLING LOG

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

Sample Observations —

Notes —

FIELD PARAMETERS [stabilization criteria]

Time	(°C) [± 3%]	Oxygen (mg/L) [±10%]	Conductivity (µS/cm) [± 3%]	pH [± 0.1]	ORP (mV) [± 10 mV]	Water Clarity (visual)
1425	2.1	1.19	203.2	7.09	23.0	Clear
1428	2.1	0.66	203.3	7.26	-5.7	Clear
1431	2.2	0.57	207.0	7.30	-35.8	
1434	2.2	0.49	208.4	7.30	-52.9	
1437	2.2	0.44	208.5	7.31	-59.4	
1440	2.1	0.41	209.7	7.34	-63.7	
1443	2.1	0.43	208.1	7.34	-69.2	
Sample at 1447						

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	Analysis	Sample Containers	Preservatives	Dup	E.B.
☑	PFAS		NONE	☐	☐
☐				☐	☐
☐				☐	☐
☐				☐	☐
☐				☐	☐
☐				☐	☐

QC: FR

Well No.: MW-TS-2

SHANNON & WILSON

MONITORING WELL SAMPLING LOG

Owner/Client: Fairbanks International Airport
Location: Tall Spruce Neighborhood
Sampling Personnel: SDK
Weather Conditions: Sunny Air Temp. (°F): 10°

Project No.: 102519-031
Date: 2/19/25
Well: MW-TS-3
Time started: 1140
Time completed: 1307

Sample No.: MW-TS-3 Time: 1252
Duplicate: — Time: —
Equipment Blank: — Time: —

Pump: Peri pump
Purging Method: portable
Pumping Start: 1217
Purge Rate (gal./min.): 0.13
Pumping End: 1252

Diameter and Type of Casing: 2" PVC
Approximate Total Depth of Well Below MP (ft.): 60
Measured Total Depth of Well Below MP (ft.): ~~58.79~~ +0.70 = 59.49
Depth to Water Below MP (ft.): 7.33
Depth to Ice (if frozen) Below MP (ft.): —
Feet of Water in Well: 52.27
Gallons per foot: 0.17
Gallons in Well: 8.89
3 Well-Volumes: 24.66
Purge Water Volume (gal.): ~4.5.

Pump/Tubing Set Depth Below MP (ft.): 59
KuriTec Tubing (ft.): —
TruPoly Tubing (ft.): 64
Silicone Tubing (ft.): 0.5

Purge Water Disposal: GAC to ground

Monument Condition: good
Casing Condition: good
Locate: *Survey / GPS / Field Maps / Swingties* (circle one)
(If locate is not known, take one.)

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

Top-of-casing to monument (ft.): 0.34
Monument to ground surface (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	0.65	1.5	2.6

QC: MR

Well No.: MW-TS-3

SHANNON & WILSON

MONITORING WELL SAMPLING LOG

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

Sample Observations —

Notes —

FIELD PARAMETERS [stabilization criteria]

Time	(°C) [± 3%]	Oxygen (mg/L) [±10%]	Conductivity (µS/cm) [± 3%]	pH [± 0.1]	ORP (mV) [± 10 mV]	Water Clarity (visual)
1220	2.3	3.06	175.4	6.04	141.0	clear
1225	2.4	2.03	176.4	6.36	112.5	
1228	2.5	1.80	176.5	6.68	73.2	
1231	2.4	1.51	178.6	6.73	51.4	
1234	2.5	1.49	177.4	6.74	42.1	
1237	2.5	1.40	178.1	6.79	37.4	
1240	2.5	1.37	177.5	6.88	33.2	
1243	2.5	1.30	177.2	6.98	30.7	
1246	2.5	1.27	176.4	7.01	27.9	
1249	2.5	1.22	177.5	7.03	25.2	
Sample at 1252						

Laboratory Eurofins

✓	Analysis	Sample Containers	Preservatives	Dup	E.B.
☑	PFAS			☐	☐
☐				☐	☐
☐				☐	☐
☐				☐	☐
☐				☐	☐
☐				☐	☐

QC: WDE

Well No.: MW-TS-3

SHANNON & WILSON

MONITORING WELL SAMPLING LOG

Owner/Client: Fairbanks International Airport
Location: Tall Spruce Neighborhood
Sampling Personnel: SDK
Weather Conditions: Sunny Air Temp. (°F): 10

Project No.: 102519-031
Date: 12/19/25
Well: MW-TS-4
Time started: 1315
Time completed: 1400

Sample No.: MW-TS-4 Time: 1348
Duplicate: — Time: —
~~Equipment Blank~~: — Time: —
~~GAC effluent sample~~

Pump: Peri pump
Purging Method: portable
Pumping Start: 1324
Purge Rate (gal./min.): 0.15
Pumping End: 1348

Diameter and Type of Casing: 2" PVC
Approximate Total Depth of Well Below MP (ft.): 80
Measured Total Depth of Well Below MP (ft.): 79.77 + 0.7 = 80.47
Depth to Water Below MP (ft.): 7.99
Depth to Ice (if frozen) Below MP (ft.):
Feet of Water in Well: 72.48
Gallons per foot: 0.17
Gallons in Well: 12.32
3 Well-Volumes: 36.94
Purge Water Volume (gal.): 3.5

Pump/Tubing Set Depth Below MP (ft.): 79
KuriTec Tubing (ft.): —
TruPoly Tubing (ft.): 83
Silicone Tubing (ft.): 05

Purge Water Disposal: GAC to ground

Monument Condition: good

Casing Condition: good

Locate: *Survey / GPS / ~~Field Maps~~ / Swingties* (circle one)
(If locate is not known, take one.)

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

Top-of-casing to monument (ft.): —
Monument to ground surface (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	0.65	1.5	2.6

QC: KER

Well No.: MW-TS-4

SHANNON & WILSON

MONITORING WELL SAMPLING LOG

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

Sample Observations —

Notes —

FIELD PARAMETERS [stabilization criteria]

Time	(°C) [± 3%]	Oxygen (mg/L) [±10%]	Conductivity (µS/cm) [± 3%]	pH [± 0.1]	ORP (mV) [± 10 mV]	Water Clarity (visual)
1329	2.5	0.87	174.4	7.05	-21.6	clear
1332	2.7	0.54	177.5	7.22	-42.0	↓
1335	2.7	0.48	178.1	7.25	-50.0	↓
1338	2.7	0.55	178.1	7.26	-60.7	↓
1341	2.7	0.53	177.4	7.24	-63.4	↓
1344	2.8	0.56	177.3	7.27	-68.8	↓
Sample at 1348						

Laboratory Eurofins

	Analysis	Sample Containers	Preservatives	Dup	E.B.
☑	PFAS		NONE	☐	☐
☐				☐	☐
☐				☐	☐
☐				☐	☐
☐				☐	☐
☐				☐	☐

QC: KTR

Well No.: MW-TS-4

APPENDIX B: ANALYTICAL RESULTS

Appendix B

Analytical Results

CONTENTS

eurofins | Environment Testing

ANALYTICAL REPORT

PREPARED FOR

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

Generated 9/26/2024 2:01:00 PM

JOB DESCRIPTION

FY25 Tall Spruce

JOB NUMBER

320-115520-1

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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Authorized for release by
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(916)374-4383

Table of Contents

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: FY25 Tall Spruce

Job ID: 320-115520-1

Qualifiers

LCMS

Qualifier	Qualifier Description
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 ID: 320-115520-1 — Eurofins Sacramento

Job Narrative
320-115520-1

Receipt
The samples were received on 9/19/2024 9:00 AM. 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 4.9º C.

Comments:
For field samples the sample bottles have MW at the start of the ID's while the CoC has the sample IDs starting with MS. Per client feedback the samples have been logged in based on the bottle labels.

Job Narrative
320-115520-1

Receipt
The samples were received on 9/19/2024 9:00 AM. 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 4.9º C.

LCMS
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-2 (320-115520-3) and MW-TS-4 (320-115520-5).

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 320-801579 were light orange in color and were observed to have a thin layer of sediment present in the bottom of the bottle prior to extraction: MW-TS-1 (320-115520-1), MW-TS-101 (320-115520-2), MW-TS-2 (320-115520-3), MW-TS-3 (320-115520-4) and MW-TS-4 (320-115520-5).

Method 3535: The following samples in preparation batch 320-801579 were observed to have a thin layer of sediment present in the bottom of the bottle prior to extraction: GAC-1 (320-115520-7).

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: FY25 Tall Spruce

Job ID: 320-115520-1

Client Sample ID: MW-TS-1 — Lab Sample ID: 320-115520-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	1.9		1.7	0.51	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.89	J	1.7	0.22	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	4.0		1.7	0.74	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	1.2	J	1.7	0.24	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	1.1	J	1.7	0.17	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	3.0		1.7	0.50	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	2.4		1.7	0.47	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-TS-101 — Lab Sample ID: 320-115520-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	2.2		1.8	0.53	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.89	J	1.8	0.23	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	4.1		1.8	0.77	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	1.4	J	1.8	0.25	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	1.2	J	1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	3.0		1.8	0.52	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	2.0		1.8	0.49	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-TS-2 — Lab Sample ID: 320-115520-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	3.9		1.8	0.53	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.58	J	1.8	0.23	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	9.3		1.8	0.77	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	6.8	I	1.8	0.24	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	1.8		1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	14		1.8	0.52	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	2.9		1.8	0.49	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-TS-3 — Lab Sample ID: 320-115520-4

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)	0.40	J	1.8	0.22	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	7.3		1.8	0.76	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	7.9		1.8	0.24	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)	9.5		1.8	0.51	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	2.3		1.8	0.48	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-TS-4 — Lab Sample ID: 320-115520-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	1.0	J	1.8	0.52	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	2.5		1.8	0.77	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	1.8	I	1.8	0.24	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.45	J	1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	3.4		1.8	0.52	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	0.86	J	1.8	0.49	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: EB-1 — Lab Sample ID: 320-115520-6

No Detections.

This Detection Summary does not include radiochemical test results.

Eurofins Sacramento

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: FY25 Tall Spruce

Job ID: 320-115520-1

Client Sample ID: GAC-1

Lab Sample ID: 320-115520-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanesulfonic acid (PFOS)	0.62	J	1.8	0.48	ng/L	1		EPA 537(Mod)	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: FY25 Tall Spruce

Job ID: 320-115520-1

Client Sample ID: MW-TS-1
Date Collected: 09/16/24 10:29
Date Received: 09/19/24 09:00

Lab Sample ID: 320-115520-1
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**1.9**		1.7	0.51	ng/L		09/24/24 03:43	09/25/24 01:41	1
Perfluoroheptanoic acid (PFHpA)	**0.89**	**J**	1.7	0.22	ng/L		09/24/24 03:43	09/25/24 01:41	1
Perfluorooctanoic acid (PFOA)	**4.0**		1.7	0.74	ng/L		09/24/24 03:43	09/25/24 01:41	1
Perfluorononanoic acid (PFNA)	**1.2**	**J**	1.7	0.24	ng/L		09/24/24 03:43	09/25/24 01:41	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.27	ng/L		09/24/24 03:43	09/25/24 01:41	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.96	ng/L		09/24/24 03:43	09/25/24 01:41	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.48	ng/L		09/24/24 03:43	09/25/24 01:41	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	1.1	ng/L		09/24/24 03:43	09/25/24 01:41	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.64	ng/L		09/24/24 03:43	09/25/24 01:41	1
Perfluorobutanesulfonic acid (PFBS)	**1.1**	**J**	1.7	0.17	ng/L		09/24/24 03:43	09/25/24 01:41	1
Perfluorohexanesulfonic acid (PFHxS)	**3.0**		1.7	0.50	ng/L		09/24/24 03:43	09/25/24 01:41	1
Perfluorooctanesulfonic acid (PFOS)	**2.4**		1.7	0.47	ng/L		09/24/24 03:43	09/25/24 01:41	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.4	1.0	ng/L		09/24/24 03:43	09/25/24 01:41	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.4	1.1	ng/L		09/24/24 03:43	09/25/24 01:41	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.7	0.21	ng/L		09/24/24 03:43	09/25/24 01:41	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.5	1.3	ng/L		09/24/24 03:43	09/25/24 01:41	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.7	0.28	ng/L		09/24/24 03:43	09/25/24 01:41	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.7	0.35	ng/L		09/24/24 03:43	09/25/24 01:41	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*110*		*50 - 150*	*09/24/24 03:43*	*09/25/24 01:41*	*1*
13C4 PFHpA	*110*		*50 - 150*	*09/24/24 03:43*	*09/25/24 01:41*	*1*
13C4 PFOA	*110*		*50 - 150*	*09/24/24 03:43*	*09/25/24 01:41*	*1*
13C5 PFNA	*107*		*50 - 150*	*09/24/24 03:43*	*09/25/24 01:41*	*1*
13C2 PFDA	*116*		*50 - 150*	*09/24/24 03:43*	*09/25/24 01:41*	*1*
13C2 PFUnA	*105*		*50 - 150*	*09/24/24 03:43*	*09/25/24 01:41*	*1*
13C2 PFDoA	*90*		*50 - 150*	*09/24/24 03:43*	*09/25/24 01:41*	*1*
13C2 PFTeDA	*93*		*50 - 150*	*09/24/24 03:43*	*09/25/24 01:41*	*1*
13C3 PFBS	*94*		*50 - 150*	*09/24/24 03:43*	*09/25/24 01:41*	*1*
18O2 PFHxS	*105*		*50 - 150*	*09/24/24 03:43*	*09/25/24 01:41*	*1*
13C4 PFOS	*100*		*50 - 150*	*09/24/24 03:43*	*09/25/24 01:41*	*1*
d3-NMeFOSAA	*113*		*50 - 150*	*09/24/24 03:43*	*09/25/24 01:41*	*1*
d5-NEtFOSAA	*106*		*50 - 150*	*09/24/24 03:43*	*09/25/24 01:41*	*1*
13C3 HFPO-DA	*96*		*50 - 150*	*09/24/24 03:43*	*09/25/24 01:41*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FY25 Tall Spruce

Job ID: 320-115520-1

Client Sample ID: MW-TS-101
Date Collected: 09/16/24 10:19
Date Received: 09/19/24 09:00

Lab Sample ID: 320-115520-2
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)	**2.2**		1.8	0.53	ng/L		09/24/24 03:43	09/25/24 01:55	1
Perfluoroheptanoic acid (PFHpA)	**0.89**	**J**	1.8	0.23	ng/L		09/24/24 03:43	09/25/24 01:55	1
Perfluorooctanoic acid (PFOA)	**4.1**		1.8	0.77	ng/L		09/24/24 03:43	09/25/24 01:55	1
Perfluorononanoic acid (PFNA)	**1.4**	**J**	1.8	0.25	ng/L		09/24/24 03:43	09/25/24 01:55	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		09/24/24 03:43	09/25/24 01:55	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	1.0	ng/L		09/24/24 03:43	09/25/24 01:55	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.50	ng/L		09/24/24 03:43	09/25/24 01:55	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		09/24/24 03:43	09/25/24 01:55	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.66	ng/L		09/24/24 03:43	09/25/24 01:55	1
Perfluorobutanesulfonic acid (PFBS)	**1.2**	**J**	1.8	0.18	ng/L		09/24/24 03:43	09/25/24 01:55	1
Perfluorohexanesulfonic acid (PFHxS)	**3.0**		1.8	0.52	ng/L		09/24/24 03:43	09/25/24 01:55	1
Perfluorooctanesulfonic acid (PFOS)	**2.0**		1.8	0.49	ng/L		09/24/24 03:43	09/25/24 01:55	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.6	1.1	ng/L		09/24/24 03:43	09/25/24 01:55	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.6	1.2	ng/L		09/24/24 03:43	09/25/24 01:55	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		09/24/24 03:43	09/25/24 01:55	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.4	ng/L		09/24/24 03:43	09/25/24 01:55	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		09/24/24 03:43	09/25/24 01:55	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		09/24/24 03:43	09/25/24 01:55	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*103*		*50 - 150*	*09/24/24 03:43*	*09/25/24 01:55*	*1*
13C4 PFHpA	*106*		*50 - 150*	*09/24/24 03:43*	*09/25/24 01:55*	*1*
13C4 PFOA	*104*		*50 - 150*	*09/24/24 03:43*	*09/25/24 01:55*	*1*
13C5 PFNA	*105*		*50 - 150*	*09/24/24 03:43*	*09/25/24 01:55*	*1*
13C2 PFDA	*107*		*50 - 150*	*09/24/24 03:43*	*09/25/24 01:55*	*1*
13C2 PFUnA	*110*		*50 - 150*	*09/24/24 03:43*	*09/25/24 01:55*	*1*
13C2 PFDoA	*91*		*50 - 150*	*09/24/24 03:43*	*09/25/24 01:55*	*1*
13C2 PFTeDA	*92*		*50 - 150*	*09/24/24 03:43*	*09/25/24 01:55*	*1*
13C3 PFBS	*87*		*50 - 150*	*09/24/24 03:43*	*09/25/24 01:55*	*1*
18O2 PFHxS	*97*		*50 - 150*	*09/24/24 03:43*	*09/25/24 01:55*	*1*
13C4 PFOS	*94*		*50 - 150*	*09/24/24 03:43*	*09/25/24 01:55*	*1*
d3-NMeFOSAA	*109*		*50 - 150*	*09/24/24 03:43*	*09/25/24 01:55*	*1*
d5-NEtFOSAA	*107*		*50 - 150*	*09/24/24 03:43*	*09/25/24 01:55*	*1*
13C3 HFPO-DA	*93*		*50 - 150*	*09/24/24 03:43*	*09/25/24 01:55*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FY25 Tall Spruce

Job ID: 320-115520-1

Client Sample ID: MW-TS-2

Date Collected: 09/16/24 11:17
Date Received: 09/19/24 09:00

Lab Sample ID: 320-115520-3

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)	**3.9**		1.8	0.53	ng/L		09/24/24 03:43	09/25/24 02:09	1
Perfluoroheptanoic acid (PFHpA)	**0.58**	**J**	1.8	0.23	ng/L		09/24/24 03:43	09/25/24 02:09	1
Perfluorooctanoic acid (PFOA)	**9.3**		1.8	0.77	ng/L		09/24/24 03:43	09/25/24 02:09	1
Perfluorononanoic acid (PFNA)	**6.8**	**I**	1.8	0.24	ng/L		09/24/24 03:43	09/25/24 02:09	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		09/24/24 03:43	09/25/24 02:09	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	1.0	ng/L		09/24/24 03:43	09/25/24 02:09	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.50	ng/L		09/24/24 03:43	09/25/24 02:09	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		09/24/24 03:43	09/25/24 02:09	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.66	ng/L		09/24/24 03:43	09/25/24 02:09	1
Perfluorobutanesulfonic acid (PFBS)	**1.8**		1.8	0.18	ng/L		09/24/24 03:43	09/25/24 02:09	1
Perfluorohexanesulfonic acid (PFHxS)	**14**		1.8	0.52	ng/L		09/24/24 03:43	09/25/24 02:09	1
Perfluorooctanesulfonic acid (PFOS)	**2.9**		1.8	0.49	ng/L		09/24/24 03:43	09/25/24 02:09	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		09/24/24 03:43	09/25/24 02:09	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		09/24/24 03:43	09/25/24 02:09	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		09/24/24 03:43	09/25/24 02:09	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.4	ng/L		09/24/24 03:43	09/25/24 02:09	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		09/24/24 03:43	09/25/24 02:09	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		09/24/24 03:43	09/25/24 02:09	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*108*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:09*	*1*
13C4 PFHpA	*109*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:09*	*1*
13C4 PFOA	*104*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:09*	*1*
13C5 PFNA	*104*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:09*	*1*
13C2 PFDA	*107*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:09*	*1*
13C2 PFUnA	*104*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:09*	*1*
13C2 PFDoA	*94*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:09*	*1*
13C2 PFTeDA	*85*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:09*	*1*
13C3 PFBS	*91*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:09*	*1*
18O2 PFHxS	*98*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:09*	*1*
13C4 PFOS	*92*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:09*	*1*
d3-NMeFOSAA	*103*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:09*	*1*
d5-NEtFOSAA	*104*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:09*	*1*
13C3 HFPO-DA	*97*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:09*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FY25 Tall Spruce

Job ID: 320-115520-1

Client Sample ID: MW-TS-3
Date Collected: 09/16/24 11:59
Date Received: 09/19/24 09:00

Lab Sample ID: 320-115520-4
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)	**2.7**		1.8	0.52	ng/L		09/24/24 03:43	09/25/24 02:23	1
Perfluoroheptanoic acid (PFHpA)	**0.40**	**J**	1.8	0.22	ng/L		09/24/24 03:43	09/25/24 02:23	1
Perfluorooctanoic acid (PFOA)	**7.3**		1.8	0.76	ng/L		09/24/24 03:43	09/25/24 02:23	1
Perfluorononanoic acid (PFNA)	**7.9**		1.8	0.24	ng/L		09/24/24 03:43	09/25/24 02:23	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		09/24/24 03:43	09/25/24 02:23	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.99	ng/L		09/24/24 03:43	09/25/24 02:23	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.49	ng/L		09/24/24 03:43	09/25/24 02:23	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		09/24/24 03:43	09/25/24 02:23	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.65	ng/L		09/24/24 03:43	09/25/24 02:23	1
Perfluorobutanesulfonic acid (PFBS)	**1.1**	**J**	1.8	0.18	ng/L		09/24/24 03:43	09/25/24 02:23	1
Perfluorohexanesulfonic acid (PFHxS)	**9.5**		1.8	0.51	ng/L		09/24/24 03:43	09/25/24 02:23	1
Perfluorooctanesulfonic acid (PFOS)	**2.3**		1.8	0.48	ng/L		09/24/24 03:43	09/25/24 02:23	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		09/24/24 03:43	09/25/24 02:23	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		09/24/24 03:43	09/25/24 02:23	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		09/24/24 03:43	09/25/24 02:23	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.3	ng/L		09/24/24 03:43	09/25/24 02:23	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		09/24/24 03:43	09/25/24 02:23	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		09/24/24 03:43	09/25/24 02:23	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*101*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:23*	*1*
13C4 PFHpA	*103*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:23*	*1*
13C4 PFOA	*101*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:23*	*1*
13C5 PFNA	*100*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:23*	*1*
13C2 PFDA	*104*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:23*	*1*
13C2 PFUnA	*97*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:23*	*1*
13C2 PFDoA	*82*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:23*	*1*
13C2 PFTeDA	*81*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:23*	*1*
13C3 PFBS	*88*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:23*	*1*
18O2 PFHxS	*95*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:23*	*1*
13C4 PFOS	*87*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:23*	*1*
d3-NMeFOSAA	*96*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:23*	*1*
d5-NEtFOSAA	*97*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:23*	*1*
13C3 HFPO-DA	*94*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:23*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FY25 Tall Spruce

Job ID: 320-115520-1

Client Sample ID: MW-TS-4

Date Collected: 09/16/24 13:15
Date Received: 09/19/24 09:00

Lab Sample ID: 320-115520-5

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)	**1.0**	**J**	1.8	0.52	ng/L		09/24/24 03:43	09/25/24 02:37	1
Perfluoroheptanoic acid (PFHpA)	ND		1.8	0.23	ng/L		09/24/24 03:43	09/25/24 02:37	1
Perfluorooctanoic acid (PFOA)	**2.5**		1.8	0.77	ng/L		09/24/24 03:43	09/25/24 02:37	1
Perfluorononanoic acid (PFNA)	**1.8**	**I**	1.8	0.24	ng/L		09/24/24 03:43	09/25/24 02:37	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		09/24/24 03:43	09/25/24 02:37	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	1.0	ng/L		09/24/24 03:43	09/25/24 02:37	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.50	ng/L		09/24/24 03:43	09/25/24 02:37	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		09/24/24 03:43	09/25/24 02:37	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.66	ng/L		09/24/24 03:43	09/25/24 02:37	1
Perfluorobutanesulfonic acid (PFBS)	**0.45**	**J**	1.8	0.18	ng/L		09/24/24 03:43	09/25/24 02:37	1
Perfluorohexanesulfonic acid (PFHxS)	**3.4**		1.8	0.52	ng/L		09/24/24 03:43	09/25/24 02:37	1
Perfluorooctanesulfonic acid (PFOS)	**0.86**	**J**	1.8	0.49	ng/L		09/24/24 03:43	09/25/24 02:37	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		09/24/24 03:43	09/25/24 02:37	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		09/24/24 03:43	09/25/24 02:37	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		09/24/24 03:43	09/25/24 02:37	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.4	ng/L		09/24/24 03:43	09/25/24 02:37	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		09/24/24 03:43	09/25/24 02:37	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		09/24/24 03:43	09/25/24 02:37	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*106*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:37*	*1*
13C4 PFHpA	*110*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:37*	*1*
13C4 PFOA	*102*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:37*	*1*
13C5 PFNA	*103*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:37*	*1*
13C2 PFDA	*103*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:37*	*1*
13C2 PFUnA	*98*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:37*	*1*
13C2 PFDoA	*85*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:37*	*1*
13C2 PFTeDA	*85*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:37*	*1*
13C3 PFBS	*85*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:37*	*1*
18O2 PFHxS	*91*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:37*	*1*
13C4 PFOS	*87*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:37*	*1*
d3-NMeFOSAA	*100*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:37*	*1*
d5-NEtFOSAA	*103*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:37*	*1*
13C3 HFPO-DA	*97*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:37*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FY25 Tall Spruce

Job ID: 320-115520-1

Client Sample ID: EB-1
Date Collected: 09/16/24 13:30
Date Received: 09/19/24 09:00

Lab Sample ID: 320-115520-6
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		1.8	0.51	ng/L		09/24/24 03:43	09/25/24 02:51	1
Perfluoroheptanoic acid (PFHpA)	ND		1.8	0.22	ng/L		09/24/24 03:43	09/25/24 02:51	1
Perfluorooctanoic acid (PFOA)	ND		1.8	0.75	ng/L		09/24/24 03:43	09/25/24 02:51	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.24	ng/L		09/24/24 03:43	09/25/24 02:51	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.27	ng/L		09/24/24 03:43	09/25/24 02:51	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.97	ng/L		09/24/24 03:43	09/25/24 02:51	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.49	ng/L		09/24/24 03:43	09/25/24 02:51	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.1	ng/L		09/24/24 03:43	09/25/24 02:51	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.64	ng/L		09/24/24 03:43	09/25/24 02:51	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.8	0.18	ng/L		09/24/24 03:43	09/25/24 02:51	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.8	0.50	ng/L		09/24/24 03:43	09/25/24 02:51	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.8	0.48	ng/L		09/24/24 03:43	09/25/24 02:51	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.4	1.1	ng/L		09/24/24 03:43	09/25/24 02:51	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.4	1.1	ng/L		09/24/24 03:43	09/25/24 02:51	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.21	ng/L		09/24/24 03:43	09/25/24 02:51	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.5	1.3	ng/L		09/24/24 03:43	09/25/24 02:51	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.28	ng/L		09/24/24 03:43	09/25/24 02:51	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.35	ng/L		09/24/24 03:43	09/25/24 02:51	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*111*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:51*	*1*
13C4 PFHpA	*109*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:51*	*1*
13C4 PFOA	*107*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:51*	*1*
13C5 PFNA	*109*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:51*	*1*
13C2 PFDA	*113*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:51*	*1*
13C2 PFUnA	*111*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:51*	*1*
13C2 PFDoA	*101*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:51*	*1*
13C2 PFTeDA	*104*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:51*	*1*
13C3 PFBS	*101*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:51*	*1*
18O2 PFHxS	*117*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:51*	*1*
13C4 PFOS	*109*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:51*	*1*
d3-NMeFOSAA	*102*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:51*	*1*
d5-NEtFOSAA	*110*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:51*	*1*
13C3 HFPO-DA	*98*		*50 - 150*	*09/24/24 03:43*	*09/25/24 02:51*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FY25 Tall Spruce

Job ID: 320-115520-1

Client Sample ID: GAC-1
Date Collected: 09/16/24 13:38
Date Received: 09/19/24 09:00

Lab Sample ID: 320-115520-7
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	0.52	ng/L		09/24/24 03:43	09/25/24 03:05	1
Perfluoroheptanoic acid (PFHpA)	ND		1.8	0.22	ng/L		09/24/24 03:43	09/25/24 03:05	1
Perfluorooctanoic acid (PFOA)	ND		1.8	0.76	ng/L		09/24/24 03:43	09/25/24 03:05	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.24	ng/L		09/24/24 03:43	09/25/24 03:05	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		09/24/24 03:43	09/25/24 03:05	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.98	ng/L		09/24/24 03:43	09/25/24 03:05	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.49	ng/L		09/24/24 03:43	09/25/24 03:05	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		09/24/24 03:43	09/25/24 03:05	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.65	ng/L		09/24/24 03:43	09/25/24 03:05	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.8	0.18	ng/L		09/24/24 03:43	09/25/24 03:05	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.8	0.51	ng/L		09/24/24 03:43	09/25/24 03:05	1
Perfluorooctanesulfonic acid (PFOS)	**0.62**	**J**	1.8	0.48	ng/L		09/24/24 03:43	09/25/24 03:05	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.4	1.1	ng/L		09/24/24 03:43	09/25/24 03:05	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.4	1.2	ng/L		09/24/24 03:43	09/25/24 03:05	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.21	ng/L		09/24/24 03:43	09/25/24 03:05	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.3	ng/L		09/24/24 03:43	09/25/24 03:05	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.28	ng/L		09/24/24 03:43	09/25/24 03:05	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		09/24/24 03:43	09/25/24 03:05	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*100*		*50 - 150*	*09/24/24 03:43*	*09/25/24 03:05*	*1*
13C4 PFHpA	*112*		*50 - 150*	*09/24/24 03:43*	*09/25/24 03:05*	*1*
13C4 PFOA	*103*		*50 - 150*	*09/24/24 03:43*	*09/25/24 03:05*	*1*
13C5 PFNA	*108*		*50 - 150*	*09/24/24 03:43*	*09/25/24 03:05*	*1*
13C2 PFDA	*110*		*50 - 150*	*09/24/24 03:43*	*09/25/24 03:05*	*1*
13C2 PFUnA	*108*		*50 - 150*	*09/24/24 03:43*	*09/25/24 03:05*	*1*
13C2 PFDoA	*96*		*50 - 150*	*09/24/24 03:43*	*09/25/24 03:05*	*1*
13C2 PFTeDA	*97*		*50 - 150*	*09/24/24 03:43*	*09/25/24 03:05*	*1*
13C3 PFBS	*98*		*50 - 150*	*09/24/24 03:43*	*09/25/24 03:05*	*1*
18O2 PFHxS	*109*		*50 - 150*	*09/24/24 03:43*	*09/25/24 03:05*	*1*
13C4 PFOS	*109*		*50 - 150*	*09/24/24 03:43*	*09/25/24 03:05*	*1*
d3-NMeFOSAA	*101*		*50 - 150*	*09/24/24 03:43*	*09/25/24 03:05*	*1*
d5-NEtFOSAA	*107*		*50 - 150*	*09/24/24 03:43*	*09/25/24 03:05*	*1*
13C3 HFPO-DA	*103*		*50 - 150*	*09/24/24 03:43*	*09/25/24 03:05*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: FY25 Tall Spruce

Job ID: 320-115520-1

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

Matrix: Water

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)							
		PFHxA	C4PFHA	PFOA	PFNA	PFDA	PFUnA	PFDoA	PFTDA
Lab Sample ID	Client Sample ID	(50-150)	(50-150)	(50-150)	(50-150)	(50-150)	(50-150)	(50-150)	(50-150)
320-115478-A-4-B MS	Matrix Spike	108	114	111	111	111	108	94	99
320-115478-A-4-C MSD	Matrix Spike Duplicate	105	106	105	105	109	104	95	97
320-115520-1	MW-TS-1	110	110	110	107	116	105	90	93
320-115520-2	MW-TS-101	103	106	104	105	107	110	91	92
320-115520-3	MW-TS-2	108	109	104	104	107	104	94	85
320-115520-4	MW-TS-3	101	103	101	100	104	97	82	81
320-115520-5	MW-TS-4	106	110	102	103	103	98	85	85
320-115520-6	EB-1	111	109	107	109	113	111	101	104
320-115520-7	GAC-1	100	112	103	108	110	108	96	97
LCS 320-801579/2-A	Lab Control Sample	107	114	106	106	108	111	99	99
LCSD 320-801579/3-A	Lab Control Sample Dup	104	110	109	105	112	108	91	95
MB 320-801579/1-A	Method Blank	107	112	109	109	113	110	100	103

		Percent Isotope Dilution Recovery (Acceptance Limits)							
		C3PFBS	PFHxS	PFOS	d3NMFOS	d5NEFOS	HFPODA		
Lab Sample ID	Client Sample ID	(50-150)	(50-150)	(50-150)	(50-150)	(50-150)	(50-150)		
320-115478-A-4-B MS	Matrix Spike	98	111	103	101	109	103		
320-115478-A-4-C MSD	Matrix Spike Duplicate	97	111	103	97	103	99		
320-115520-1	MW-TS-1	94	105	100	113	106	96		
320-115520-2	MW-TS-101	87	97	94	109	107	93		
320-115520-3	MW-TS-2	91	98	92	103	104	97		
320-115520-4	MW-TS-3	88	95	87	96	97	94		
320-115520-5	MW-TS-4	85	91	87	100	103	97		
320-115520-6	EB-1	101	117	109	102	110	98		
320-115520-7	GAC-1	98	109	109	101	107	103		
LCS 320-801579/2-A	Lab Control Sample	100	111	107	101	107	99		
LCSD 320-801579/3-A	Lab Control Sample Dup	96	108	105	102	95	104		
MB 320-801579/1-A	Method Blank	104	113	108	108	108	103		

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 320-801579/1-A
Matrix: Water
Analysis Batch: 801916

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 801579

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		09/24/24 03:43	09/24/24 22:52	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		09/24/24 03:43	09/24/24 22:52	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		09/24/24 03:43	09/24/24 22:52	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		09/24/24 03:43	09/24/24 22:52	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		09/24/24 03:43	09/24/24 22:52	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		09/24/24 03:43	09/24/24 22:52	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		09/24/24 03:43	09/24/24 22:52	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		09/24/24 03:43	09/24/24 22:52	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		09/24/24 03:43	09/24/24 22:52	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		09/24/24 03:43	09/24/24 22:52	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		09/24/24 03:43	09/24/24 22:52	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		09/24/24 03:43	09/24/24 22:52	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		09/24/24 03:43	09/24/24 22:52	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		09/24/24 03:43	09/24/24 22:52	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.0	0.24	ng/L		09/24/24 03:43	09/24/24 22:52	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.0	1.5	ng/L		09/24/24 03:43	09/24/24 22:52	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.0	0.32	ng/L		09/24/24 03:43	09/24/24 22:52	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		09/24/24 03:43	09/24/24 22:52	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*107*		*50 - 150*	*09/24/24 03:43*	*09/24/24 22:52*	*1*
13C4 PFHpA	*112*		*50 - 150*	*09/24/24 03:43*	*09/24/24 22:52*	*1*
13C4 PFOA	*109*		*50 - 150*	*09/24/24 03:43*	*09/24/24 22:52*	*1*
13C5 PFNA	*109*		*50 - 150*	*09/24/24 03:43*	*09/24/24 22:52*	*1*
13C2 PFDA	*113*		*50 - 150*	*09/24/24 03:43*	*09/24/24 22:52*	*1*
13C2 PFUnA	*110*		*50 - 150*	*09/24/24 03:43*	*09/24/24 22:52*	*1*
13C2 PFDoA	*100*		*50 - 150*	*09/24/24 03:43*	*09/24/24 22:52*	*1*
13C2 PFTeDA	*103*		*50 - 150*	*09/24/24 03:43*	*09/24/24 22:52*	*1*
13C3 PFBS	*104*		*50 - 150*	*09/24/24 03:43*	*09/24/24 22:52*	*1*
18O2 PFHxS	*113*		*50 - 150*	*09/24/24 03:43*	*09/24/24 22:52*	*1*
13C4 PFOS	*108*		*50 - 150*	*09/24/24 03:43*	*09/24/24 22:52*	*1*
d3-NMeFOSAA	*108*		*50 - 150*	*09/24/24 03:43*	*09/24/24 22:52*	*1*
d5-NEtFOSAA	*108*		*50 - 150*	*09/24/24 03:43*	*09/24/24 22:52*	*1*
13C3 HFPO-DA	*103*		*50 - 150*	*09/24/24 03:43*	*09/24/24 22:52*	*1*

Lab Sample ID: LCS 320-801579/2-A
Matrix: Water
Analysis Batch: 801916

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 801579

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorohexanoic acid (PFHxA)	40.0	31.4		ng/L		79	72 - 129
Perfluoroheptanoic acid (PFHpA)	40.0	36.4		ng/L		91	72 - 130
Perfluorooctanoic acid (PFOA)	40.0	38.7		ng/L		97	71 - 133
Perfluorononanoic acid (PFNA)	40.0	42.6		ng/L		107	69 - 130

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

Lab Sample ID: LCS 320-801579/2-A
Matrix: Water
Analysis Batch: 801916

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 801579

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorodecanoic acid (PFDA)	40.0	40.9		ng/L		102	71 - 129
Perfluoroundecanoic acid (PFUnA)	40.0	39.6		ng/L		99	69 - 133
Perfluorododecanoic acid (PFDoA)	40.0	42.5		ng/L		106	72 - 134
Perfluorotridecanoic acid (PFTriA)	40.0	37.2		ng/L		93	65 - 144
Perfluorotetradecanoic acid (PFTeA)	40.0	42.5		ng/L		106	71 - 132
Perfluorobutanesulfonic acid (PFBS)	35.5	37.8		ng/L		106	72 - 130
Perfluorohexanesulfonic acid (PFHxS)	36.5	29.3		ng/L		80	68 - 131
Perfluorooctanesulfonic acid (PFOS)	37.2	38.5		ng/L		103	65 - 140
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	38.9		ng/L		97	65 - 136
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	40.6		ng/L		101	61 - 135
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	37.4	36.6		ng/L		98	77 - 137
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	40.0	37.7		ng/L		94	72 - 132
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	37.8	35.5		ng/L		94	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.8	32.8		ng/L		87	81 - 141

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*107*		*50 - 150*
13C4 PFHpA	*114*		*50 - 150*
13C4 PFOA	*106*		*50 - 150*
13C5 PFNA	*106*		*50 - 150*
13C2 PFDA	*108*		*50 - 150*
13C2 PFUnA	*111*		*50 - 150*
13C2 PFDoA	*99*		*50 - 150*
13C2 PFTeDA	*99*		*50 - 150*
13C3 PFBS	*100*		*50 - 150*
18O2 PFHxS	*111*		*50 - 150*
13C4 PFOS	*107*		*50 - 150*
d3-NMeFOSAA	*101*		*50 - 150*
d5-NEtFOSAA	*107*		*50 - 150*
13C3 HFPO-DA	*99*		*50 - 150*

Lab Sample ID: LCSD 320-801579/3-A
Matrix: Water
Analysis Batch: 801916

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 801579

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	40.0	32.9		ng/L		82	72 - 129	5	30
Perfluoroheptanoic acid (PFHpA)	40.0	37.1		ng/L		93	72 - 130	2	30
Perfluorooctanoic acid (PFOA)	40.0	36.4		ng/L		91	71 - 133	6	30

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

Lab Sample ID: LCSD 320-801579/3-A
Matrix: Water
Analysis Batch: 801916

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 801579

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorononanoic acid (PFNA)	40.0	40.4		ng/L		101	69 - 130	5	30
Perfluorodecanoic acid (PFDA)	40.0	40.0		ng/L		100	71 - 129	2	30
Perfluoroundecanoic acid (PFUnA)	40.0	40.4		ng/L		101	69 - 133	2	30
Perfluorododecanoic acid (PFDoA)	40.0	43.6		ng/L		109	72 - 134	3	30
Perfluorotridecanoic acid (PFTriA)	40.0	36.7		ng/L		92	65 - 144	2	30
Perfluorotetradecanoic acid (PFTeA)	40.0	40.0		ng/L		100	71 - 132	6	30
Perfluorobutanesulfonic acid (PFBS)	35.5	39.0		ng/L		110	72 - 130	3	30
Perfluorohexanesulfonic acid (PFHxS)	36.5	29.6		ng/L		81	68 - 131	1	30
Perfluorooctanesulfonic acid (PFOS)	37.2	37.2		ng/L		100	65 - 140	3	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	34.7		ng/L		87	65 - 136	11	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	41.1		ng/L		103	61 - 135	1	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	37.4	36.1		ng/L		97	77 - 137	1	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	40.0	37.5		ng/L		94	72 - 132	1	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	37.8	34.3		ng/L		91	76 - 136	4	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.8	33.8		ng/L		89	81 - 141	3	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFHxA	*104*		*50 - 150*
13C4 PFHpA	*110*		*50 - 150*
13C4 PFOA	*109*		*50 - 150*
13C5 PFNA	*105*		*50 - 150*
13C2 PFDA	*112*		*50 - 150*
13C2 PFUnA	*108*		*50 - 150*
13C2 PFDoA	*91*		*50 - 150*
13C2 PFTeDA	*95*		*50 - 150*
13C3 PFBS	*96*		*50 - 150*
18O2 PFHxS	*108*		*50 - 150*
13C4 PFOS	*105*		*50 - 150*
d3-NMeFOSAA	*102*		*50 - 150*
d5-NEtFOSAA	*95*		*50 - 150*
13C3 HFPO-DA	*104*		*50 - 150*

Lab Sample ID: 320-115478-A-4-B MS
Matrix: Water
Analysis Batch: 801916

Client Sample ID: Matrix Spike
Prep Type: Total/NA
Prep Batch: 801579

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorohexanoic acid (PFHxA)	ND		34.1	28.0		ng/L		82	72 - 129
Perfluoroheptanoic acid (PFHpA)	ND		34.1	31.4		ng/L		92	72 - 130

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

Lab Sample ID: 320-115478-A-4-B MS
Matrix: Water
Analysis Batch: 801916

Client Sample ID: Matrix Spike
Prep Type: Total/NA
Prep Batch: 801579

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorooctanoic acid (PFOA)	ND		34.1	30.9		ng/L		91	71 - 133
Perfluorononanoic acid (PFNA)	ND		34.1	34.3		ng/L		101	69 - 130
Perfluorodecanoic acid (PFDA)	ND		34.1	34.0		ng/L		100	71 - 129
Perfluoroundecanoic acid (PFUnA)	ND		34.1	34.9		ng/L		103	69 - 133
Perfluorododecanoic acid (PFDoA)	ND		34.1	36.5		ng/L		107	72 - 134
Perfluorotridecanoic acid (PFTriA)	ND		34.1	33.2		ng/L		97	65 - 144
Perfluorotetradecanoic acid (PFTeA)	ND		34.1	34.0		ng/L		100	71 - 132
Perfluorobutanesulfonic acid (PFBS)	ND		30.2	33.8		ng/L		112	72 - 130
Perfluorohexanesulfonic acid (PFHxS)	0.46	J	31.1	26.1		ng/L		82	68 - 131
Perfluorooctanesulfonic acid (PFOS)	ND		31.7	33.1		ng/L		105	65 - 140
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		34.1	30.7		ng/L		90	65 - 136
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		34.1	31.7		ng/L		93	61 - 135
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		31.8	31.2		ng/L		98	77 - 137
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		34.1	33.1		ng/L		97	72 - 132
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		32.2	29.6		ng/L		92	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		32.2	29.6		ng/L		92	81 - 141

Isotope Dilution	*MS %Recovery*	*MS Qualifier*	*Limits*
13C2 PFHxA	*108*		*50 - 150*
13C4 PFHpA	*114*		*50 - 150*
13C4 PFOA	*111*		*50 - 150*
13C5 PFNA	*111*		*50 - 150*
13C2 PFDA	*111*		*50 - 150*
13C2 PFUnA	*108*		*50 - 150*
13C2 PFDoA	*94*		*50 - 150*
13C2 PFTeDA	*99*		*50 - 150*
13C3 PFBS	*98*		*50 - 150*
18O2 PFHxS	*111*		*50 - 150*
13C4 PFOS	*103*		*50 - 150*
d3-NMeFOSAA	*101*		*50 - 150*
d5-NEtFOSAA	*109*		*50 - 150*
13C3 HFPO-DA	*103*		*50 - 150*

Lab Sample ID: 320-115478-A-4-C MSD
Matrix: Water
Analysis Batch: 801916

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA
Prep Batch: 801579

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	ND		35.5	28.4		ng/L		80	72 - 129	2	30

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

Lab Sample ID: 320-115478-A-4-C MSD
Matrix: Water
Analysis Batch: 801916

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA
Prep Batch: 801579

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluoroheptanoic acid (PFHpA)	ND		35.5	33.8		ng/L		95	72 - 130	7	30
Perfluorooctanoic acid (PFOA)	ND		35.5	34.9		ng/L		98	71 - 133	12	30
Perfluorononanoic acid (PFNA)	ND		35.5	35.2		ng/L		99	69 - 130	3	30
Perfluorodecanoic acid (PFDA)	ND		35.5	35.5		ng/L		100	71 - 129	4	30
Perfluoroundecanoic acid (PFUnA)	ND		35.5	35.9		ng/L		101	69 - 133	3	30
Perfluorododecanoic acid (PFDoA)	ND		35.5	38.2		ng/L		107	72 - 134	4	30
Perfluorotridecanoic acid (PFTriA)	ND		35.5	32.2		ng/L		91	65 - 144	3	30
Perfluorotetradecanoic acid (PFTeA)	ND		35.5	35.2		ng/L		99	71 - 132	3	30
Perfluorobutanesulfonic acid (PFBS)	ND		31.6	34.1		ng/L		108	72 - 130	1	30
Perfluorohexanesulfonic acid (PFHxS)	0.46	J	32.4	25.4		ng/L		77	68 - 131	2	30
Perfluorooctanesulfonic acid (PFOS)	ND		33.1	34.4		ng/L		104	65 - 140	4	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		35.5	30.4		ng/L		85	65 - 136	1	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		35.5	32.5		ng/L		92	61 - 135	3	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		33.2	31.6		ng/L		95	77 - 137	1	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		35.5	32.7		ng/L		92	72 - 132	1	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		33.6	31.2		ng/L		93	76 - 136	5	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		33.6	29.6		ng/L		88	81 - 141	0	30

Isotope Dilution	*MSD %Recovery*	*MSD Qualifier*	*Limits*
13C2 PFHxA	*105*		*50 - 150*
13C4 PFHpA	*106*		*50 - 150*
13C4 PFOA	*105*		*50 - 150*
13C5 PFNA	*105*		*50 - 150*
13C2 PFDA	*109*		*50 - 150*
13C2 PFUnA	*104*		*50 - 150*
13C2 PFDoA	*95*		*50 - 150*
13C2 PFTeDA	*97*		*50 - 150*
13C3 PFBS	*97*		*50 - 150*
18O2 PFHxS	*111*		*50 - 150*
13C4 PFOS	*103*		*50 - 150*
d3-NMeFOSAA	*97*		*50 - 150*
d5-NEtFOSAA	*103*		*50 - 150*
13C3 HFPO-DA	*99*		*50 - 150*

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: FY25 Tall Spruce

Job ID: 320-115520-1

LCMS

Prep Batch: 801579

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-115520-1	MW-TS-1	Total/NA	Water	3535	
320-115520-2	MW-TS-101	Total/NA	Water	3535	
320-115520-3	MW-TS-2	Total/NA	Water	3535	
320-115520-4	MW-TS-3	Total/NA	Water	3535	
320-115520-5	MW-TS-4	Total/NA	Water	3535	
320-115520-6	EB-1	Total/NA	Water	3535	
320-115520-7	GAC-1	Total/NA	Water	3535	
MB 320-801579/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-801579/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-801579/3-A	Lab Control Sample Dup	Total/NA	Water	3535	
320-115478-A-4-B MS	Matrix Spike	Total/NA	Water	3535	
320-115478-A-4-C MSD	Matrix Spike Duplicate	Total/NA	Water	3535	

Analysis Batch: 801916

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-115520-1	MW-TS-1	Total/NA	Water	EPA 537(Mod)	801579
320-115520-2	MW-TS-101	Total/NA	Water	EPA 537(Mod)	801579
320-115520-3	MW-TS-2	Total/NA	Water	EPA 537(Mod)	801579
320-115520-4	MW-TS-3	Total/NA	Water	EPA 537(Mod)	801579
320-115520-5	MW-TS-4	Total/NA	Water	EPA 537(Mod)	801579
320-115520-6	EB-1	Total/NA	Water	EPA 537(Mod)	801579
320-115520-7	GAC-1	Total/NA	Water	EPA 537(Mod)	801579
MB 320-801579/1-A	Method Blank	Total/NA	Water	EPA 537(Mod)	801579
LCS 320-801579/2-A	Lab Control Sample	Total/NA	Water	EPA 537(Mod)	801579
LCSD 320-801579/3-A	Lab Control Sample Dup	Total/NA	Water	EPA 537(Mod)	801579
320-115478-A-4-B MS	Matrix Spike	Total/NA	Water	EPA 537(Mod)	801579
320-115478-A-4-C MSD	Matrix Spike Duplicate	Total/NA	Water	EPA 537(Mod)	801579

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FY25 Tall Spruce

Job ID: 320-115520-1

Client Sample ID: MW-TS-1
Date Collected: 09/16/24 10:29
Date Received: 09/19/24 09:00

Lab Sample ID: 320-115520-1
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			287 mL	10.0 mL	801579	09/24/24 03:43	GAT	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	801916	09/25/24 01:41	AP1	EET SAC

Client Sample ID: MW-TS-101
Date Collected: 09/16/24 10:19
Date Received: 09/19/24 09:00

Lab Sample ID: 320-115520-2
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			274.6 mL	10.0 mL	801579	09/24/24 03:43	GAT	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	801916	09/25/24 01:55	AP1	EET SAC

Client Sample ID: MW-TS-2
Date Collected: 09/16/24 11:17
Date Received: 09/19/24 09:00

Lab Sample ID: 320-115520-3
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			275.6 mL	10.0 mL	801579	09/24/24 03:43	GAT	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	801916	09/25/24 02:09	AP1	EET SAC

Client Sample ID: MW-TS-3
Date Collected: 09/16/24 11:59
Date Received: 09/19/24 09:00

Lab Sample ID: 320-115520-4
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			279 mL	10.0 mL	801579	09/24/24 03:43	GAT	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	801916	09/25/24 02:23	AP1	EET SAC

Client Sample ID: MW-TS-4
Date Collected: 09/16/24 13:15
Date Received: 09/19/24 09:00

Lab Sample ID: 320-115520-5
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			276.2 mL	10.0 mL	801579	09/24/24 03:43	GAT	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	801916	09/25/24 02:37	AP1	EET SAC

Client Sample ID: EB-1
Date Collected: 09/16/24 13:30
Date Received: 09/19/24 09:00

Lab Sample ID: 320-115520-6
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			283 mL	10.0 mL	801579	09/24/24 03:43	GAT	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	801916	09/25/24 02:51	AP1	EET SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FY25 Tall Spruce

Job ID: 320-115520-1

Client Sample ID: GAC-1

Date Collected: 09/16/24 13:38
Date Received: 09/19/24 09:00

Lab Sample ID: 320-115520-7

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			281.1 mL	10.0 mL	801579	09/24/24 03:43	GAT	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	801916	09/25/24 03:05	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: FY25 Tall Spruce

Job ID: 320-115520-1

Laboratory: Eurofins Sacramento

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

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

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: FY25 Tall Spruce

Job ID: 320-115520-1

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: FY25 Tall Spruce

Job ID: 320-115520-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-115520-1	MW-TS-1	Water	09/16/24 10:29	09/19/24 09:00
320-115520-2	MW-TS-101	Water	09/16/24 10:19	09/19/24 09:00
320-115520-3	MW-TS-2	Water	09/16/24 11:17	09/19/24 09:00
320-115520-4	MW-TS-3	Water	09/16/24 11:59	09/19/24 09:00
320-115520-5	MW-TS-4	Water	09/16/24 13:15	09/19/24 09:00
320-115520-6	EB-1	Water	09/16/24 13:30	09/19/24 09:00
320-115520-7	GAC-1	Water	09/16/24 13:38	09/19/24 09:00

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 ALTUCKER

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

Quote No:

MSA No:

J-Flags: [X] Yes [ ] No

Analytical Methods (include preservative if used)

Sample Identity	Lab No	Time	Date Sampled	PFAS x18 (537)	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
MS-TS-1		1029	9/16/24	X	2	GROUND WATER
MS-TS-101		1019	"	X	2	"
MS-TS-2		1117	"	X	2	"
MS-TS-3		1159	"	X	2	"
MS-TS-4		1315	"	X	2	"
EB-1		1330	"	X	2	PFAS-FREE WATER
GAC-1		1338	"	X	2	GAC EFFLUENT WATER

320-115520 Chain of Custody

Project Information	
Number	102519-031
Name	FY25 TallSpruce
Contact	AMJ 907-251-7534
Ongoing Project?	Yes [X] No [ ]
Sampler	KZR

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

Notes:

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Katie Ring Time: 1030	Signature: Time:	Signature: Time:
Printed Name: KATIE RING Date: 9/17/24	Printed Name: Date:	Printed Name: Date:
Company: SHANNON & WILSON, INC	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 900	Signature: Time:	Signature: Time:
Printed Name: Drew Wilkins Date: 9/9/24	Printed Name: Date:	Printed Name: Date:
Company:	Company:	Company:

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

4.9.'6

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Sacramento Sample Receiving Notes (SSRN)

Loc: 320
115520

Tracking # 7786 4417 3539

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 L00 Corr Factor (+ / -) _____ °C

Ice_____ Wet_____ Gel X Other _____

Cooler Custody Seal 2490847

Cooler ID: ~

Temp Observed 4.9 °C Corrected _____ °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: AMW Date 09/19/24

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 VHV Date 9/19/24

Notes:
samples listed on coc doesn't match that of the label.
MS listed on coc, samples labeled MW

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 JF Date 9/19/24

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-115520-1

Login Number: 115520
List Number: 1
Creator: Fisher, Jamyiah L

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:	Ashley Jaramillo	**CS Site Name:**	FIA – Sitewide PFAS	**Lab Name:**	Eurofins Sacramento
Title:	Senior Chemist	**ADEC File No.:**	100.38.277	**Lab Report No.:**	320-115520-1
Consulting Firm:	Shannon & Wilson, Inc.	**Hazard ID No.:**	26816	**Lab Report Date:**	9/26/24

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: 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: Click or tap here to enter text.

   b. Were the correct analyses requested?
   Yes ☐ No ☒ N/A ☐
   Analyses requested: Method 537 was requested on the CoC however method 537M should have been requested as the samples are groundwater samples and not drinking water.

Comments: The laboratory analyzed samples by 537M a LCMSMS method compliant with the DoD QSM Version 5.3 Table B-15, this is the correct method for this project. Data quality and/or usability not affected.

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): A temperature blank was included with the samples in the cooler(s) and is used to access temperature preservation. The temperature blank was 4.9°C at sample login.
Sample temperature(s): Sample temperatures were not reported.
Comments: The temperature blank was within the acceptable temperature range.

b. Is the sample preservation acceptable – acidified waters, methanol preserved soil (GRO, BTEX, VOCs, etc.)?
Yes ☐ No ☐ N/A ☒
Comments: 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 lab noted the samples arrived in good condition.

d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, canister not holding a vacuum, etc.?
Yes ☒ No ☐ N/A ☐
Comments: The lab noted that the samples listed on the CoC doesn't match that of the sample container label. MS was listed on the CoC and sample container labels were noted with MW. After discussions with the lab, the samples were logged in as listed on the sample containers, which are the correct names for the samples. Data quality and/or usability not affected.

e. Is the data quality or usability affected?
Yes ☐ No ☒ N/A ☐
Comments: Aside from the sample naming discrepancy which did not have an effect on data quality and/or usability, no other laboratory sample receipt documentation discrepancies were noted.

4. Case Narrative

a. Is the case narrative present and understandable?
Yes ☒ No ☐ N/A ☐
Comments: Click or tap here to enter text.

b. Are there discrepancies, errors, or QC failures identified by the lab?
Yes ☒ No ☐ N/A ☐
Comments: For field samples the sample bottles have MW at the start of the ID's while the CoC has the sample IDs starting with MS. Per client feedback the samples have been logged in based on the bottle labels. Data quality and/or usability not affected.

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-2 (320-115520-3) and MW-TS-4 (320-115520-5). Consequently, the PFNA results in samples MW-TS-2 and MW-TS-4 are considered estimates, no direction of bias, and are flagged 'J*'. Data quality is considered affected as noted, however, data is considered usable with applied flags.

Method 3535: The following samples in preparation batch 320-801579 were light orange in color and were observed to have a thin layer of sediment present in the bottom of the bottle prior to extraction: MW-TS-1 (320-115520-1), MW-TS-101 (320-115520-2), MW-TS-2 (320-115520-3), MW-TS-3 (320-115520-4) and MW-TS-4 (320-115520-5). Data quality and/or usability not affected.

Method 3535: The following samples in preparation batch 320-801579 were observed to have a thin layer of sediment present in the bottom of the bottle prior to extraction: GAC-1 (320-115520-7). 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: Effect on data quality and/or usability due to discrepancies, errors, or QC failures identified by the lab in the case narrative are either discussed above in Section 4.b. or elsewhere in this checklist.

5. Sample Results

a. Are the correct analyses performed/reported as requested on CoC?
Yes ☒ No ☐ N/A ☐
Comments: Method 537 was requested on the CoC however method 537M should have been requested as the samples are groundwater samples and not drinking water. The laboratory analyzed samples by 537M a LCMSMS method compliant with the DoD QSM Version 5.3 Table B-15, this is the correct method for this project. Data quality and/or usability not affected.

b. Are all applicable holding times met?
Yes ☒ No ☐ N/A ☐
Comments: Click or tap here to enter text.

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

d. Are the reported 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: Analytical sensitivity was evaluated to verify that reporting limits (RLs) met applicable DEC groundwater cleanup levels for non-detect results, as appropriate. All RLs met applicable regulatory levels.

e. Is the data quality or usability affected?
Yes ☐ No ☒ N/A ☐
Comments: Aside from the sample method discrepancy that did not have an effect on data quality and/or usability, no other sample result discrepancies were noted.

6. QC Samples

a. Method Blank

i. Was one method blank reported per matrix, analysis, and 20 samples?
Yes ☒ No ☐ N/A ☐
Comments: Click or tap here to enter text.

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

iii. If above LoQ or RL, what samples are affected?
Comments: Not applicable, no analytes were detected in the method blank sample.

iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?
Yes ☐ No ☐ N/A ☒
Comments: No samples were affected; no analytes were detected in the method blank sample.

v. Data quality or usability affected?
Yes ☐ No ☒ N/A ☐
Comments: No analytes were detected in the method blank sample.

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: Click or tap here to enter text.

ii. Metals/Inorganics – Are one LCS and one sample duplicate reported per matrix, analysis and 20 samples?
Yes ☐ No ☐ N/A ☒
Comments: Metals/inorganics analyses were not requested with 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: Click or tap here to enter text.

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: Click or tap here to enter text.

v. If %R or RPD is outside of acceptable limits, what samples are affected?
Comments: Not applicable, %Rs and RPDs were within acceptable limits.

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?
Yes ☐ No ☐ N/A ☒
Comments: No samples were affected, %Rs and RPDs were within acceptable limits.

vii. Is the data quality or usability affected?
Yes ☐ No ☒ N/A ☐
Comments: %Rs and RPDs were within acceptable limits.

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: Click or tap here to enter text.

ii. Metals/Inorganics – Are one MS/MSD reported per matrix, analysis and 20 samples?
Yes ☐ No ☐ N/A ☒
Comments: Metals/inorganics analyses were not requested with this 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: Click or tap here to enter text.

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: Click or tap here to enter text.

v. If %R or RPD is outside of acceptable limits, what samples are affected?
Comments: Not applicable, %Rs and RPDs were within acceptable limits.

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?
Yes ☐ No ☐ N/A ☒
Comments: No samples were affected, %Rs and RPDs were within acceptable limits.

vii. Is the data quality or usability affected?
Yes ☐ No ☒ N/A ☐
Comments: %Rs and RPDs were within acceptable limits.

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: Click or tap here to enter text.

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: Click or tap here to enter text.

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: No sample results had failed IDA recoveries.

iv. Is the data quality or usability affected?
Yes ☐ No ☒ N/A ☐
Comments: IDA recoveries were within actable limits.

e. Trip Blanks

i. Is one trip blank reported per matrix, analysis, and for each cooler containing volatile samples? Yes ☐ No ☐ N/A ☒
Comments: Volatile samples were not included with this work order. Trip blank sample not required.

ii. Are all results less than LoQ or RL?
Yes ☐ No ☐ N/A ☒
Comments: Volatile samples were not included with this work order. Trip blank sample not required.

iii. If above LoQ or RL, what samples are affected?
Comments: Not applicable, volatile samples were not included with this work order. Trip blank sample not required.

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

Comments: Volatile samples were not included with this work order. Trip blank sample not required.

f. Field Duplicate

i. Are one field duplicate submitted per matrix, analysis, and 10 project samples?
Yes ☒ No ☐ N/A ☐
Comments: Click or tap here to enter text.

ii. Was the duplicate submitted blind to lab?
Yes ☒ No ☐ N/A ☐
Comments: MW-TS-101 is the field duplicate for MW-TS-1.

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 calculate, RPDs were within the 30%.

iv. Is the data quality or usability affected? (Explain)
Yes ☐ No ☒ N/A ☐
Comments: Where calculate, RPDs were within the 30%.

g. Decontamination or Equipment Blanks

i. Were decontamination or equipment blanks collected?
Yes ☒ No ☐ N/A ☐
Comments: EB-1 was collected and submitted with this work order.

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

iii. If above LoQ or RL, specify what samples are affected.
Comments: Not applicable, no analytes were detected in the equipment blank sample.

iv. Are data quality or usability affected?
Yes ☐ No ☒ N/A ☐
Comments: No analytes were detected in the equipment blank sample.

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

a. Are they defined and appropriate?
Yes ☒ No ☐ N/A ☐
Comments: See 4.b. above.

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ANALYTICAL REPORT

PREPARED FOR

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

Generated 3/6/2025 3:46:21 PM

JOB DESCRIPTION

Tall Spruce

JOB NUMBER

320-119292-1

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.

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Authorization

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Authorized for release by
David Alltucker, Project Manager I
David.Alltucker@et.eurofinsus.com
(916)374-4383

Table of Contents

Definitions/Glossary

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

Job ID: 320-119292-1

Qualifiers

LCMS

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

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
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: 320-119292-1 — Eurofins Sacramento

Job Narrative
320-119292-1

Receipt
The samples were received on 2/26/2025 9:45 AM. 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 2.0º C.

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

Organic Prep
Method 3535: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-836810.

Method 3535: The following samples in preparation batch 320-836810 were observed to have a thin layer of sediment present in the bottom of the bottle prior to extraction. MW-TS-3 (320-119292-3) and MW-TS-2 (320-119292-4)

Method 3535: The following samples in preparation batch 320-836810 were yellow in color prior to extraction:MW-TS-4 (320-119292-1), MW-TS-3 (320-119292-3) and MW-TS-2 (320-119292-4)

Method 3535: The following samples in preparation batch 320-836810 were observed to have floating particulates present in the sample bottle:MW-TS-4 (320-119292-1) and GAC-1 (320-119292-2).

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

Detection Summary

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

Job ID: 320-119292-1

Client Sample ID: MW-TS-4 — Lab Sample ID: 320-119292-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	2.3	B	1.8	0.53	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	4.2		1.8	0.45	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	1.5	J	1.8	0.45	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	6.2		1.8	0.52	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.5	J	1.8	0.45	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: GAC-1 — Lab Sample ID: 320-119292-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	0.62	J B	1.9	0.54	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-TS-3 — Lab Sample ID: 320-119292-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	5.9	B	1.8	0.53	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.57	J	1.8	0.45	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	13		1.8	0.45	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	2.4		1.8	0.45	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	21		1.8	0.52	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	3.4		1.8	0.45	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-TS-2 — Lab Sample ID: 320-119292-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	8.2	B	1.8	0.53	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.94	J	1.8	0.46	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	19		1.8	0.46	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	3.1		1.8	0.46	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	29		1.8	0.52	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	4.3		1.8	0.46	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: 320-119292-1

Client Sample ID: MW-TS-4

Date Collected: 02/19/25 13:48
Date Received: 02/26/25 09:45

Lab Sample ID: 320-119292-1

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)	**2.3**	**B**	1.8	0.53	ng/L		03/03/25 04:22	03/04/25 18:29	1
Perfluoroheptanoic acid (PFHpA)	ND		1.8	0.45	ng/L		03/03/25 04:22	03/04/25 18:29	1
Perfluorooctanoic acid (PFOA)	**4.2**		1.8	0.45	ng/L		03/03/25 04:22	03/04/25 18:29	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.45	ng/L		03/03/25 04:22	03/04/25 18:29	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.45	ng/L		03/03/25 04:22	03/04/25 18:29	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.45	ng/L		03/03/25 04:22	03/04/25 18:29	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.50	ng/L		03/03/25 04:22	03/04/25 18:29	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	0.45	ng/L		03/03/25 04:22	03/04/25 18:29	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.66	ng/L		03/03/25 04:22	03/04/25 18:29	1
Perfluorobutanesulfonic acid (PFBS)	**1.5**	**J**	1.8	0.45	ng/L		03/03/25 04:22	03/04/25 18:29	1
Perfluorohexanesulfonic acid (PFHxS)	**6.2**		1.8	0.52	ng/L		03/03/25 04:22	03/04/25 18:29	1
Perfluorooctanesulfonic acid (PFOS)	**1.5**	**J**	1.8	0.45	ng/L		03/03/25 04:22	03/04/25 18:29	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		03/03/25 04:22	03/04/25 18:29	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.1	ng/L		03/03/25 04:22	03/04/25 18:29	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.45	ng/L		03/03/25 04:22	03/04/25 18:29	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	0.91	ng/L		03/03/25 04:22	03/04/25 18:29	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.63	ng/L		03/03/25 04:22	03/04/25 18:29	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.45	ng/L		03/03/25 04:22	03/04/25 18:29	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*89*		*50 - 150*	*03/03/25 04:22*	*03/04/25 18:29*	*1*
13C4 PFHpA	*100*		*50 - 150*	*03/03/25 04:22*	*03/04/25 18:29*	*1*
13C4 PFOA	*92*		*50 - 150*	*03/03/25 04:22*	*03/04/25 18:29*	*1*
13C5 PFNA	*97*		*50 - 150*	*03/03/25 04:22*	*03/04/25 18:29*	*1*
13C2 PFDA	*93*		*50 - 150*	*03/03/25 04:22*	*03/04/25 18:29*	*1*
13C2 PFUnA	*89*		*50 - 150*	*03/03/25 04:22*	*03/04/25 18:29*	*1*
13C2 PFDoA	*91*		*50 - 150*	*03/03/25 04:22*	*03/04/25 18:29*	*1*
13C2 PFTeDA	*89*		*50 - 150*	*03/03/25 04:22*	*03/04/25 18:29*	*1*
13C3 PFBS	*86*		*50 - 150*	*03/03/25 04:22*	*03/04/25 18:29*	*1*
18O2 PFHxS	*84*		*50 - 150*	*03/03/25 04:22*	*03/04/25 18:29*	*1*
13C4 PFOS	*83*		*50 - 150*	*03/03/25 04:22*	*03/04/25 18:29*	*1*
d3-NMeFOSAA	*112*		*50 - 150*	*03/03/25 04:22*	*03/04/25 18:29*	*1*
d5-NEtFOSAA	*91*		*50 - 150*	*03/03/25 04:22*	*03/04/25 18:29*	*1*
13C3 HFPO-DA	*93*		*50 - 150*	*03/03/25 04:22*	*03/04/25 18:29*	*1*

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

Job ID: 320-119292-1

Client Sample ID: GAC-1

Date Collected: 02/19/25 15:50
Date Received: 02/26/25 09:45

Lab Sample ID: 320-119292-2

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)	**0.62**	**J B**	1.9	0.54	ng/L		03/03/25 04:22	03/04/25 18:43	1
Perfluoroheptanoic acid (PFHpA)	ND		1.9	0.46	ng/L		03/03/25 04:22	03/04/25 18:43	1
Perfluorooctanoic acid (PFOA)	ND		1.9	0.46	ng/L		03/03/25 04:22	03/04/25 18:43	1
Perfluorononanoic acid (PFNA)	ND		1.9	0.46	ng/L		03/03/25 04:22	03/04/25 18:43	1
Perfluorodecanoic acid (PFDA)	ND		1.9	0.46	ng/L		03/03/25 04:22	03/04/25 18:43	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	0.46	ng/L		03/03/25 04:22	03/04/25 18:43	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.51	ng/L		03/03/25 04:22	03/04/25 18:43	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	0.46	ng/L		03/03/25 04:22	03/04/25 18:43	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.68	ng/L		03/03/25 04:22	03/04/25 18:43	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.9	0.46	ng/L		03/03/25 04:22	03/04/25 18:43	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.9	0.53	ng/L		03/03/25 04:22	03/04/25 18:43	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.9	0.46	ng/L		03/03/25 04:22	03/04/25 18:43	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.6	1.2	ng/L		03/03/25 04:22	03/04/25 18:43	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.6	1.2	ng/L		03/03/25 04:22	03/04/25 18:43	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.9	0.46	ng/L		03/03/25 04:22	03/04/25 18:43	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.7	0.93	ng/L		03/03/25 04:22	03/04/25 18:43	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.9	0.64	ng/L		03/03/25 04:22	03/04/25 18:43	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.46	ng/L		03/03/25 04:22	03/04/25 18:43	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*95*		*50 - 150*	*03/03/25 04:22*	*03/04/25 18:43*	*1*
13C4 PFHpA	*104*		*50 - 150*	*03/03/25 04:22*	*03/04/25 18:43*	*1*
13C4 PFOA	*99*		*50 - 150*	*03/03/25 04:22*	*03/04/25 18:43*	*1*
13C5 PFNA	*103*		*50 - 150*	*03/03/25 04:22*	*03/04/25 18:43*	*1*
13C2 PFDA	*105*		*50 - 150*	*03/03/25 04:22*	*03/04/25 18:43*	*1*
13C2 PFUnA	*102*		*50 - 150*	*03/03/25 04:22*	*03/04/25 18:43*	*1*
13C2 PFDoA	*106*		*50 - 150*	*03/03/25 04:22*	*03/04/25 18:43*	*1*
13C2 PFTeDA	*102*		*50 - 150*	*03/03/25 04:22*	*03/04/25 18:43*	*1*
13C3 PFBS	*93*		*50 - 150*	*03/03/25 04:22*	*03/04/25 18:43*	*1*
18O2 PFHxS	*93*		*50 - 150*	*03/03/25 04:22*	*03/04/25 18:43*	*1*
13C4 PFOS	*98*		*50 - 150*	*03/03/25 04:22*	*03/04/25 18:43*	*1*
d3-NMeFOSAA	*117*		*50 - 150*	*03/03/25 04:22*	*03/04/25 18:43*	*1*
d5-NEtFOSAA	*106*		*50 - 150*	*03/03/25 04:22*	*03/04/25 18:43*	*1*
13C3 HFPO-DA	*100*		*50 - 150*	*03/03/25 04:22*	*03/04/25 18:43*	*1*

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

Job ID: 320-119292-1

Client Sample ID: MW-TS-3

Date Collected: 02/19/25 12:52
Date Received: 02/26/25 09:45

Lab Sample ID: 320-119292-3

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)	**5.9**	**B**	1.8	0.53	ng/L		03/03/25 04:22	03/04/25 17:47	1
Perfluoroheptanoic acid (PFHpA)	**0.57**	**J**	1.8	0.45	ng/L		03/03/25 04:22	03/04/25 17:47	1
Perfluorooctanoic acid (PFOA)	**13**		1.8	0.45	ng/L		03/03/25 04:22	03/04/25 17:47	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.45	ng/L		03/03/25 04:22	03/04/25 17:47	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.45	ng/L		03/03/25 04:22	03/04/25 17:47	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.45	ng/L		03/03/25 04:22	03/04/25 17:47	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.50	ng/L		03/03/25 04:22	03/04/25 17:47	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	0.45	ng/L		03/03/25 04:22	03/04/25 17:47	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.66	ng/L		03/03/25 04:22	03/04/25 17:47	1
Perfluorobutanesulfonic acid (PFBS)	**2.4**		1.8	0.45	ng/L		03/03/25 04:22	03/04/25 17:47	1
Perfluorohexanesulfonic acid (PFHxS)	**21**		1.8	0.52	ng/L		03/03/25 04:22	03/04/25 17:47	1
Perfluorooctanesulfonic acid (PFOS)	**3.4**		1.8	0.45	ng/L		03/03/25 04:22	03/04/25 17:47	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		03/03/25 04:22	03/04/25 17:47	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.1	ng/L		03/03/25 04:22	03/04/25 17:47	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.45	ng/L		03/03/25 04:22	03/04/25 17:47	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	0.91	ng/L		03/03/25 04:22	03/04/25 17:47	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.63	ng/L		03/03/25 04:22	03/04/25 17:47	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.45	ng/L		03/03/25 04:22	03/04/25 17:47	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*94*		*50 - 150*	*03/03/25 04:22*	*03/04/25 17:47*	*1*
13C4 PFHpA	*95*		*50 - 150*	*03/03/25 04:22*	*03/04/25 17:47*	*1*
13C4 PFOA	*88*		*50 - 150*	*03/03/25 04:22*	*03/04/25 17:47*	*1*
13C5 PFNA	*89*		*50 - 150*	*03/03/25 04:22*	*03/04/25 17:47*	*1*
13C2 PFDA	*84*		*50 - 150*	*03/03/25 04:22*	*03/04/25 17:47*	*1*
13C2 PFUnA	*79*		*50 - 150*	*03/03/25 04:22*	*03/04/25 17:47*	*1*
13C2 PFDoA	*90*		*50 - 150*	*03/03/25 04:22*	*03/04/25 17:47*	*1*
13C2 PFTeDA	*99*		*50 - 150*	*03/03/25 04:22*	*03/04/25 17:47*	*1*
13C3 PFBS	*72*		*50 - 150*	*03/03/25 04:22*	*03/04/25 17:47*	*1*
18O2 PFHxS	*70*		*50 - 150*	*03/03/25 04:22*	*03/04/25 17:47*	*1*
13C4 PFOS	*72*		*50 - 150*	*03/03/25 04:22*	*03/04/25 17:47*	*1*
d3-NMeFOSAA	*100*		*50 - 150*	*03/03/25 04:22*	*03/04/25 17:47*	*1*
d5-NEtFOSAA	*89*		*50 - 150*	*03/03/25 04:22*	*03/04/25 17:47*	*1*
13C3 HFPO-DA	*99*		*50 - 150*	*03/03/25 04:22*	*03/04/25 17:47*	*1*

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

Job ID: 320-119292-1

Client Sample ID: MW-TS-2

Date Collected: 02/19/25 14:47
Date Received: 02/26/25 09:45

Lab Sample ID: 320-119292-4

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)	**8.2**	**B**	1.8	0.53	ng/L		03/03/25 04:22	03/04/25 19:26	1
Perfluoroheptanoic acid (PFHpA)	**0.94**	**J**	1.8	0.46	ng/L		03/03/25 04:22	03/04/25 19:26	1
Perfluorooctanoic acid (PFOA)	**19**		1.8	0.46	ng/L		03/03/25 04:22	03/04/25 19:26	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.46	ng/L		03/03/25 04:22	03/04/25 19:26	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.46	ng/L		03/03/25 04:22	03/04/25 19:26	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.46	ng/L		03/03/25 04:22	03/04/25 19:26	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.50	ng/L		03/03/25 04:22	03/04/25 19:26	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	0.46	ng/L		03/03/25 04:22	03/04/25 19:26	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.67	ng/L		03/03/25 04:22	03/04/25 19:26	1
Perfluorobutanesulfonic acid (PFBS)	**3.1**		1.8	0.46	ng/L		03/03/25 04:22	03/04/25 19:26	1
Perfluorohexanesulfonic acid (PFHxS)	**29**		1.8	0.52	ng/L		03/03/25 04:22	03/04/25 19:26	1
Perfluorooctanesulfonic acid (PFOS)	**4.3**		1.8	0.46	ng/L		03/03/25 04:22	03/04/25 19:26	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.6	1.1	ng/L		03/03/25 04:22	03/04/25 19:26	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.6	1.1	ng/L		03/03/25 04:22	03/04/25 19:26	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.46	ng/L		03/03/25 04:22	03/04/25 19:26	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.7	0.91	ng/L		03/03/25 04:22	03/04/25 19:26	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.63	ng/L		03/03/25 04:22	03/04/25 19:26	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.46	ng/L		03/03/25 04:22	03/04/25 19:26	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*94*		*50 - 150*	*03/03/25 04:22*	*03/04/25 19:26*	*1*
13C4 PFHpA	*102*		*50 - 150*	*03/03/25 04:22*	*03/04/25 19:26*	*1*
13C4 PFOA	*95*		*50 - 150*	*03/03/25 04:22*	*03/04/25 19:26*	*1*
13C5 PFNA	*99*		*50 - 150*	*03/03/25 04:22*	*03/04/25 19:26*	*1*
13C2 PFDA	*99*		*50 - 150*	*03/03/25 04:22*	*03/04/25 19:26*	*1*
13C2 PFUnA	*90*		*50 - 150*	*03/03/25 04:22*	*03/04/25 19:26*	*1*
13C2 PFDoA	*92*		*50 - 150*	*03/03/25 04:22*	*03/04/25 19:26*	*1*
13C2 PFTeDA	*95*		*50 - 150*	*03/03/25 04:22*	*03/04/25 19:26*	*1*
13C3 PFBS	*82*		*50 - 150*	*03/03/25 04:22*	*03/04/25 19:26*	*1*
18O2 PFHxS	*82*		*50 - 150*	*03/03/25 04:22*	*03/04/25 19:26*	*1*
13C4 PFOS	*87*		*50 - 150*	*03/03/25 04:22*	*03/04/25 19:26*	*1*
d3-NMeFOSAA	*113*		*50 - 150*	*03/03/25 04:22*	*03/04/25 19:26*	*1*
d5-NEtFOSAA	*94*		*50 - 150*	*03/03/25 04:22*	*03/04/25 19:26*	*1*
13C3 HFPO-DA	*101*		*50 - 150*	*03/03/25 04:22*	*03/04/25 19:26*	*1*

Isotope Dilution Summary

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

Job ID: 320-119292-1

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

Matrix: Water

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)							
		PFHxA	C4PFHA	PFOA	PFNA	PFDA	PFUnA	PFDoA	PFTDA
Lab Sample ID	Client Sample ID	(50-150)	(50-150)	(50-150)	(50-150)	(50-150)	(50-150)	(50-150)	(50-150)
320-119292-1	MW-TS-4	89	100	92	97	93	89	91	89
320-119292-2	GAC-1	95	104	99	103	105	102	106	102
320-119292-3	MW-TS-3	94	95	88	89	84	79	90	99
320-119292-4	MW-TS-2	94	102	95	99	99	90	92	95
LCS 320-836810/2-A	Lab Control Sample	97	104	97	101	103	101	107	100
LCSD 320-836810/3-A	Lab Control Sample Dup	97	104	95	105	100	101	102	98
MB 320-836810/1-A	Method Blank	95	104	96	99	102	98	106	105

		Percent Isotope Dilution Recovery (Acceptance Limits)							
		C3PFBS	PFHxS	PFOS	d3NMFOS	d5NEFOS	HFPODA		
Lab Sample ID	Client Sample ID	(50-150)	(50-150)	(50-150)	(50-150)	(50-150)	(50-150)		
320-119292-1	MW-TS-4	86	84	83	112	91	93		
320-119292-2	GAC-1	93	93	98	117	106	100		
320-119292-3	MW-TS-3	72	70	72	100	89	99		
320-119292-4	MW-TS-2	82	82	87	113	94	101		
LCS 320-836810/2-A	Lab Control Sample	92	93	97	119	100	105		
LCSD 320-836810/3-A	Lab Control Sample Dup	92	91	98	115	100	102		
MB 320-836810/1-A	Method Blank	94	96	97	121	99	105		

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 320-836810/1-A
Matrix: Water
Analysis Batch: 837075

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 836810

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	0.589	J	2.0	0.58	ng/L		03/03/25 04:22	03/04/25 16:37	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.50	ng/L		03/03/25 04:22	03/04/25 16:37	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.50	ng/L		03/03/25 04:22	03/04/25 16:37	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.50	ng/L		03/03/25 04:22	03/04/25 16:37	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.50	ng/L		03/03/25 04:22	03/04/25 16:37	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	0.50	ng/L		03/03/25 04:22	03/04/25 16:37	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		03/03/25 04:22	03/04/25 16:37	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	0.50	ng/L		03/03/25 04:22	03/04/25 16:37	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		03/03/25 04:22	03/04/25 16:37	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.50	ng/L		03/03/25 04:22	03/04/25 16:37	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		03/03/25 04:22	03/04/25 16:37	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.50	ng/L		03/03/25 04:22	03/04/25 16:37	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.3	ng/L		03/03/25 04:22	03/04/25 16:37	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		03/03/25 04:22	03/04/25 16:37	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.0	0.50	ng/L		03/03/25 04:22	03/04/25 16:37	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.0	1.0	ng/L		03/03/25 04:22	03/04/25 16:37	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.0	0.69	ng/L		03/03/25 04:22	03/04/25 16:37	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.50	ng/L		03/03/25 04:22	03/04/25 16:37	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*95*		*50 - 150*	*03/03/25 04:22*	*03/04/25 16:37*	*1*
13C4 PFHpA	*104*		*50 - 150*	*03/03/25 04:22*	*03/04/25 16:37*	*1*
13C4 PFOA	*96*		*50 - 150*	*03/03/25 04:22*	*03/04/25 16:37*	*1*
13C5 PFNA	*99*		*50 - 150*	*03/03/25 04:22*	*03/04/25 16:37*	*1*
13C2 PFDA	*102*		*50 - 150*	*03/03/25 04:22*	*03/04/25 16:37*	*1*
13C2 PFUnA	*98*		*50 - 150*	*03/03/25 04:22*	*03/04/25 16:37*	*1*
13C2 PFDoA	*106*		*50 - 150*	*03/03/25 04:22*	*03/04/25 16:37*	*1*
13C2 PFTeDA	*105*		*50 - 150*	*03/03/25 04:22*	*03/04/25 16:37*	*1*
13C3 PFBS	*94*		*50 - 150*	*03/03/25 04:22*	*03/04/25 16:37*	*1*
18O2 PFHxS	*96*		*50 - 150*	*03/03/25 04:22*	*03/04/25 16:37*	*1*
13C4 PFOS	*97*		*50 - 150*	*03/03/25 04:22*	*03/04/25 16:37*	*1*
d3-NMeFOSAA	*121*		*50 - 150*	*03/03/25 04:22*	*03/04/25 16:37*	*1*
d5-NEtFOSAA	*99*		*50 - 150*	*03/03/25 04:22*	*03/04/25 16:37*	*1*
13C3 HFPO-DA	*105*		*50 - 150*	*03/03/25 04:22*	*03/04/25 16:37*	*1*

Lab Sample ID: LCS 320-836810/2-A
Matrix: Water
Analysis Batch: 837075

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 836810

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorohexanoic acid (PFHxA)	40.0	39.7		ng/L		99	72 - 129
Perfluoroheptanoic acid (PFHpA)	40.0	38.9		ng/L		97	72 - 130
Perfluorooctanoic acid (PFOA)	40.0	40.1		ng/L		100	71 - 133
Perfluorononanoic acid (PFNA)	40.0	39.5		ng/L		99	69 - 130

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

Lab Sample ID: LCS 320-836810/2-A
Matrix: Water
Analysis Batch: 837075

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 836810

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorodecanoic acid (PFDA)	40.0	38.0		ng/L		95	71 - 129
Perfluoroundecanoic acid (PFUnA)	40.0	39.6		ng/L		99	69 - 133
Perfluorododecanoic acid (PFDoA)	40.0	35.3		ng/L		88	72 - 134
Perfluorotridecanoic acid (PFTriA)	40.0	35.1		ng/L		88	65 - 144
Perfluorotetradecanoic acid (PFTeA)	40.0	39.8		ng/L		100	71 - 132
Perfluorobutanesulfonic acid (PFBS)	35.5	37.7		ng/L		106	72 - 130
Perfluorohexanesulfonic acid (PFHxS)	36.5	39.3		ng/L		108	68 - 131
Perfluorooctanesulfonic acid (PFOS)	37.2	35.4		ng/L		95	65 - 140
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	30.5		ng/L		76	65 - 136
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	40.0		ng/L		100	61 - 135
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	37.4	36.5		ng/L		98	77 - 137
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	40.0	38.7		ng/L		97	72 - 132
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	37.8	34.6		ng/L		92	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.8	42.2		ng/L		112	81 - 141

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*97*		*50 - 150*
13C4 PFHpA	*104*		*50 - 150*
13C4 PFOA	*97*		*50 - 150*
13C5 PFNA	*101*		*50 - 150*
13C2 PFDA	*103*		*50 - 150*
13C2 PFUnA	*101*		*50 - 150*
13C2 PFDoA	*107*		*50 - 150*
13C2 PFTeDA	*100*		*50 - 150*
13C3 PFBS	*92*		*50 - 150*
18O2 PFHxS	*93*		*50 - 150*
13C4 PFOS	*97*		*50 - 150*
d3-NMeFOSAA	*119*		*50 - 150*
d5-NEtFOSAA	*100*		*50 - 150*
13C3 HFPO-DA	*105*		*50 - 150*

Lab Sample ID: LCSD 320-836810/3-A
Matrix: Water
Analysis Batch: 837075

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 836810

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	40.0	40.8		ng/L		102	72 - 129	3	30
Perfluoroheptanoic acid (PFHpA)	40.0	38.7		ng/L		97	72 - 130	0	30
Perfluorooctanoic acid (PFOA)	40.0	40.7		ng/L		102	71 - 133	2	30

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

Lab Sample ID: LCSD 320-836810/3-A
Matrix: Water
Analysis Batch: 837075

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 836810

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorononanoic acid (PFNA)			40.0	37.8		ng/L		95	69 - 130	4	30
Perfluorodecanoic acid (PFDA)			40.0	40.4		ng/L		101	71 - 129	6	30
Perfluoroundecanoic acid (PFUnA)			40.0	39.9		ng/L		100	69 - 133	1	30
Perfluorododecanoic acid (PFDoA)			40.0	41.4		ng/L		104	72 - 134	16	30
Perfluorotridecanoic acid (PFTriA)			40.0	35.5		ng/L		89	65 - 144	1	30
Perfluorotetradecanoic acid (PFTeA)			40.0	38.0		ng/L		95	71 - 132	5	30
Perfluorobutanesulfonic acid (PFBS)			35.5	38.3		ng/L		108	72 - 130	2	30
Perfluorohexanesulfonic acid (PFHxS)			36.5	40.7		ng/L		112	68 - 131	3	30
Perfluorooctanesulfonic acid (PFOS)			37.2	36.0		ng/L		97	65 - 140	2	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			40.0	33.5		ng/L		84	65 - 136	9	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			40.0	40.8		ng/L		102	61 - 135	2	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid			37.4	38.3		ng/L		102	77 - 137	5	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			40.0	40.5		ng/L		101	72 - 132	5	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid			37.8	36.3		ng/L		96	76 - 136	5	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			37.8	42.9		ng/L		113	81 - 141	2	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFHxA	*97*		*50 - 150*
13C4 PFHpA	*104*		*50 - 150*
13C4 PFOA	*95*		*50 - 150*
13C5 PFNA	*105*		*50 - 150*
13C2 PFDA	*100*		*50 - 150*
13C2 PFUnA	*101*		*50 - 150*
13C2 PFDoA	*102*		*50 - 150*
13C2 PFTeDA	*98*		*50 - 150*
13C3 PFBS	*92*		*50 - 150*
18O2 PFHxS	*91*		*50 - 150*
13C4 PFOS	*98*		*50 - 150*
d3-NMeFOSAA	*115*		*50 - 150*
d5-NEtFOSAA	*100*		*50 - 150*
13C3 HFPO-DA	*102*		*50 - 150*

QC Association Summary

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

Job ID: 320-119292-1

LCMS

Prep Batch: 836810

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-119292-1	MW-TS-4	Total/NA	Water	3535	
320-119292-2	GAC-1	Total/NA	Water	3535	
320-119292-3	MW-TS-3	Total/NA	Water	3535	
320-119292-4	MW-TS-2	Total/NA	Water	3535	
MB 320-836810/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-836810/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-836810/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Analysis Batch: 837075

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-119292-1	MW-TS-4	Total/NA	Water	EPA 537(Mod)	836810
320-119292-2	GAC-1	Total/NA	Water	EPA 537(Mod)	836810
320-119292-3	MW-TS-3	Total/NA	Water	EPA 537(Mod)	836810
320-119292-4	MW-TS-2	Total/NA	Water	EPA 537(Mod)	836810
MB 320-836810/1-A	Method Blank	Total/NA	Water	EPA 537(Mod)	836810
LCS 320-836810/2-A	Lab Control Sample	Total/NA	Water	EPA 537(Mod)	836810
LCSD 320-836810/3-A	Lab Control Sample Dup	Total/NA	Water	EPA 537(Mod)	836810

Lab Chronicle

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

Job ID: 320-119292-1

Client Sample ID: MW-TS-4
Date Collected: 02/19/25 13:48
Date Received: 02/26/25 09:45

Lab Sample ID: 320-119292-1
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			275.7 mL	10.0 mL	836810	03/03/25 04:22	GAT	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	837075	03/04/25 18:29	RS1	EET SAC

Client Sample ID: GAC-1
Date Collected: 02/19/25 15:50
Date Received: 02/26/25 09:45

Lab Sample ID: 320-119292-2
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			269.9 mL	10.0 mL	836810	03/03/25 04:22	GAT	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	837075	03/04/25 18:43	RS1	EET SAC

Client Sample ID: MW-TS-3
Date Collected: 02/19/25 12:52
Date Received: 02/26/25 09:45

Lab Sample ID: 320-119292-3
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			275.2 mL	10.0 mL	836810	03/03/25 04:22	GAT	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	837075	03/04/25 17:47	RS1	EET SAC

Client Sample ID: MW-TS-2
Date Collected: 02/19/25 14:47
Date Received: 02/26/25 09:45

Lab Sample ID: 320-119292-4
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			273.3 mL	10.0 mL	836810	03/03/25 04:22	GAT	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	837075	03/04/25 19:26	RS1	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: 320-119292-1

Laboratory: Eurofins Sacramento

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

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

Method Summary

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

Job ID: 320-119292-1

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: 320-119292-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-119292-1	MW-TS-4	Water	02/19/25 13:48	02/26/25 09:45
320-119292-2	GAC-1	Water	02/19/25 15:50	02/26/25 09:45
320-119292-3	MW-TS-3	Water	02/19/25 12:52	02/26/25 09:45
320-119292-4	MW-TS-2	Water	02/19/25 14:47	02/26/25 09:45

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 Alltucker

Turn Around Time: ☑ Normal ☐ Rush — Please Specify

Quote No:

MSA No:

J-Flags: ☑ Yes ☐ No

Analytical Methods (include preservative if used)

Sample Identity	Lab No	Time	Date Sampled	PFAS	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
MW-TS-4		1348	2/19/25	X	2	Groundwater
GAC-1		1550	↓	↓	↓	↓
MW-TS-3		1252				
MW-TS-2		1447	↓	↓	↓	↓

320-119292 Chain of Custody

Project Information	
~~Number~~ Name	Tall Spruce
~~Name~~ Number	1025-9-051
Contact	AMJ
Ongoing Project?	Yes ☑ No ☐
Sampler	SDL

Sample Receipt	
Total No of Containers.	8
COC Seals/Intact? Y/N/NA	
Received Good Cond./Cold	
Temp	
Delivery Method	

Notes:

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

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature Time 1020	Signature Time	Signature Time
Printed Name Nathan Lenhard Date 2/24/25	Printed Name Date	Printed Name Date
Company Shannon & Wilson	Company	Company

Received By: 1.	Received By: 2.	Received By: 3.
Signature Time 0945	Signature Time	Signature Time
Printed Name Date 2/24/25	Printed Name Date	Printed Name Date
Company SETSAC 2.0	Company	Company

eurofins | Environment Testing

Sacramento Sample Receiving Notes (SSRN)

Loc: 320
119292

Tracking # 2857 6322 1929

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 L12 Corr Factor (+ / -) _____ °C

Ice_____ Wet_____ Gel ✓ Other _____

Cooler Custody Seal: Intact

Cooler ID _____

Temp Observed 2.0 °C Corrected 2.0 °C

From Temp Blank ☐ Sandwich ☑ Sidewall ☐

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

Initials: DM Date 2/26/25

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 02/26/25

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 02/24/25

ADEC Contaminated Sites Program Laboratory Data Review Checklist

Completed By:	Ashley Jaramillo	**CS Site Name:**	FIA – Sitewide PFAS	**Lab Name:**	Eurofins Sacramento
Title:	Senior Chemist	**ADEC File No.:**	100.38.277	**Lab Report No.:**	320-119292-1
Consulting Firm:	Shannon & Wilson, Inc.	**Hazard ID No.:**	26816	**Lab Report Date:**	3/6/25

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: 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: Click or tap here to enter text.

   b. Were the correct analyses requested?
   Yes ☒ No ☐ N/A ☐
   Analyses requested: PFAS was requested on the CoC with no method specified.
   Comments: The laboratory analyzed samples by 537M a LCMSMS method compliant with the DoD QSM Version 5.3 Table B-15, which is the correct method for this project. Data quality and/or usability are not affected.

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): A temperature blank was included with the samples in the cooler(s) and is used to access temperature preservation. The temperature blank was 2.0°C at sample login.
Sample temperature(s): Sample temperatures were not reported.
Comments: The temperature blank was within the acceptable temperature range.

b. Is the sample preservation acceptable – acidified waters, methanol preserved soil (GRO, BTEX, VOCs, etc.)?
Yes ☐ No ☐ N/A ☒
Comments: 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 lab noted the samples arrived in good condition.

d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, canister not holding a vacuum, etc.?
Yes ☐ No ☐ N/A ☒
Comments: No discrepancies were noted by the laboratory.

e. Is the data quality or usability affected?
Yes ☐ No ☒ N/A ☐
Comments: No laboratory sample receipt documentation discrepancies were noted.

4. Case Narrative

a. Is the case narrative present and understandable?
Yes ☒ No ☐ N/A ☐
Comments: Click or tap here to enter text.

b. Are there discrepancies, errors, or QC failures identified by the lab?
Yes ☒ No ☐ N/A ☐
Comments: Method 3535: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-836810. See Section 6.c. for further assessment.

Method 3535: The following samples in preparation batch 320-836810 were observed to have a thin layer of sediment present in the bottom of the bottle prior to extraction. MW-TS-3 (320-119292-3) and MW-TS-2 (320-119292-4). Data quality and/or usability are not affected.

Method 3535: The following samples in preparation batch 320-836810 were yellow in color prior to extraction:MW-TS-4 (320-119292-1), MW-TS-3 (320-119292-3) and MW-TS-2 (320-119292-4). Data quality and/or usability are not affected.

Method 3535: The following samples in preparation batch 320-836810 were observed to have floating particulates present in the sample bottle:MW-TS-4 (320-119292-1) and GAC-1 (320-119292-2). Data quality and/or usability are 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: Effect on data quality and/or usability due to discrepancies, errors, or QC failures identified by the lab in the case narrative are either discussed above in Section 4.b. or elsewhere in this checklist.

5. Sample Results

a. Are the correct analyses performed/reported as requested on CoC?
Yes ☒ No ☐ N/A ☐
Comments: PFAS was requested on the CoC with no method specified. The laboratory analyzed samples by 537M a LCMSMS method compliant with the DoD QSM Version 5.3 Table B-15, which is the correct method for this project. Data quality and/or usability are not affected.

b. Are all applicable holding times met?
Yes ☒ No ☐ N/A ☐
Comments: Click or tap here to enter text.

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

d. Are the reported 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: Analytical sensitivity was evaluated to verify that reporting limits (RLs) met applicable DEC groundwater cleanup levels for non-detect results, as appropriate. All RLs met applicable regulatory levels.

e. Is the data quality or usability affected?
Yes ☐ No ☒ N/A ☐
Comments: Aside from the sample method discrepancy that did not have an effect on data quality and/or usability, no other sample result discrepancies were noted.

6. QC Samples

a. Method Blank

i. Was one method blank reported per matrix, analysis, and 20 samples?
Yes ☒ No ☐ N/A ☐
Comments: Click or tap here to enter text.

ii. Are all method blank results less than LOQ (or RL)?
Yes ☒ No ☐
Comments: However, PFHxA was detected in the method blank sample for batch 320-836810 at a concentration below the LOQ.
- PFHxA was detected below the LOQ and within ten times the concentration detected in the method blank sample in associated project sample GAC-1. Consequently, the PFHxA result in the noted sample is considered affected by the method blank contamination, biased high, and is flagged 'B*' and reported at the LOQ.
- PFHxA was detected above the LOQ and within ten times the concentration detected in the method blank sample in associated project sample MW-TS-4. Consequently, the PFHxA result in the noted sample is considered an estimate, biased high, and is flagged 'JH*' and reported at the detected result.
- The remaining samples had detections for PFHxA greater than ten times the method blank detect and are not affected.

Data quality is considered affected as noted, however, data is considered usable with applied flags.

iii. If above LoQ or RL, what samples are affected?
Comments: See 6.a.ii., above.

iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?
Yes ☒ No ☐ N/A ☐
Comments: See 6.a.ii., above.

v. Data quality or usability affected?
Yes ☒ No ☐ N/A ☐
Comments: See 6.a.ii., 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: Click or tap here to enter text.

ii. Metals/Inorganics – Are one LCS and one sample duplicate reported per matrix, analysis and 20 samples?
Yes ☐ No ☐ N/A ☒
Comments: Metals/inorganics analyses were not requested with 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: Click or tap here to enter text.

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: Click or tap here to enter text.

v. If %R or RPD is outside of acceptable limits, what samples are affected?
Comments: Not applicable, %Rs and RPDs were within acceptable limits.

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?
Yes ☐ No ☐ N/A ☒
Comments: No samples were affected, %Rs and RPDs were within acceptable limits.

vii. Is the data quality or usability affected?
Yes ☐ No ☒ N/A ☐
Comments: %Rs and RPDs were within acceptable limits.

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: MS/MSD samples were not reported as insufficient sample volume was included for analysis. Accuracy and precision was evaluated using the LCS/LCSD samples, see 6.b., above.

ii. Metals/Inorganics – Are one MS/MSD reported per matrix, analysis and 20 samples?
Yes ☐ No ☐ N/A ☒
Comments: Metals/inorganics analyses were not requested with this 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: MS/MSD samples were not reported.

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: MS/MSD samples were not reported.

v. If %R or RPD is outside of acceptable limits, what samples are affected?
Comments: Not applicable, MS/MSD samples were not reported.

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?
Yes ☐ No ☐ N/A ☒
Comments: MS/MSD samples were not reported.

vii. Is the data quality or usability affected?
Yes ☐ No ☒ N/A ☐
Comments: MS/MSD samples were not reported.

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: Click or tap here to enter text.

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: Click or tap here to enter text.

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: No sample results had failed IDA recoveries.

iv. Is the data quality or usability affected?
Yes ☐ No ☒ N/A ☐
Comments: IDA recoveries were within actable limits.

e. Trip Blanks

i. Is one trip blank reported per matrix, analysis, and for each cooler containing volatile samples? Yes ☐ No ☐ N/A ☒
Comments: Volatile samples were not included with this work order. Trip blank sample not required.

ii. Are all results less than LoQ or RL?
Yes ☐ No ☐ N/A ☒
Comments: Volatile samples were not included with this work order. Trip blank sample not required.

iii. If above LoQ or RL, what samples are affected?
Comments: Not applicable, volatile samples were not included with this work order. Trip blank sample not required.

iv. Is the data quality or usability affected?
Yes ☐ No ☒ N/A ☐
Comments: Volatile samples were not included with this work order. Trip blank sample not required.

f. Field Duplicate

i. Are one field duplicate submitted per matrix, analysis, and 10 project samples?
Yes ☐ No ☒ N/A ☐
Comments: The well the field duplicate sample was to be collected from was frozen and was unable to be sampled. A field duplicate pair was not collected.

ii. Was the duplicate submitted blind to lab?
Yes ☐ No ☐ N/A ☒
Comments: See 6.f.i., above.

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: See 6.f.ii., above.

iv. Is the data quality or usability affected? (Explain)
Yes ☐ No ☒ N/A ☐
Comments: See 6.f.ii., above.

g. Decontamination or Equipment Blanks

i. Were decontamination or equipment blanks collected?
Yes ☐ No ☐ N/A ☒
Comments: Samples were not collected using reusable equipment. No equipment blank was collected.

ii. Are all results less than LoQ or RL?
Yes ☐ No ☐ N/A ☒
Comments: No equipment blank was collected.

iii. If above LoQ or RL, specify what samples are affected.
Comments: Not applicable, no equipment blank was collected.

iv. Are data quality or usability affected?
Yes ☐ No ☒ N/A ☐
Comments: No equipment blank was collected.

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

a. Are they defined and appropriate?
Yes ☐ No ☐ N/A ☒
Comments: Other data flags/qualifiers not required.

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
LOQ	limit of quantitation
MS	matrix spike
MSD	matrix spike duplicate
MW	monitoring well
PFAS	per- and polyfluoroalkyl substances
QA	quality assurance
QC	quality control
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 September 2024 and February 2025.

Shannon & Wilson, Inc. 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 028-FAI-03* (Addendum), dated August 2024 and approved by the Alaska Department of Environmental Conservation (DEC) on August 26, 2024. 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), 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. Data which did not meet acceptance criteria but did not impact data quality have been described and the associated samples and data quality implications or qualifications are reported in the DEC Laboratory Data Review Checklists (LDRC) prepared for each laboratory report. LDRCs and laboratory reports are included in Appendix B.

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. Implementing standardized uniform field procedures for data collection and analysis, as presented in the Addendum achieves adequate representativeness of data. 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. Comparability is achieved by using similar collection and analysis techniques, and reporting in conventional units. 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 eight groundwater samples were collected from MWs on Tall Spruce Road during September 2024 and February 2025. Five samples (including one field duplicate) were collected during the September 2024 event. Due to a frozen MW during the February 2025 event, MW-TS-1, only three samples were collected, no field duplicate was collected. An equipment blank sample was collected during the September 2024 event as reusable equipment was utilized to collect samples. No equipment blank sample was collected during the February 2025 event as no reusable equipment was utilized for sample collection. A granular activated carbon effluent sample was also collected during each event.

Project samples were sent to Eurofins Environment Testing (Eurofins) in Sacramento, California. Groundwater samples were shipped via FedEx 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 September 2024 laboratory report was assigned work order (WO) number 320-115520-1. The February 2025 laboratory report was assigned WO number 320-119292-1.

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. QC deviations that did not impact data quality are not discussed in this summary. Data which did not meet acceptance criteria but did not impact data quality have been described and the associated samples and data quality implications or qualifications are reported in the DEC LDRCs in Appendix B.

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 320-115520-1: The lab noted that the samples listed on the chain-of-custody didn't match that of the sample container label. MS was listed on the chain-of-custody and sample container labels were noted with MW. After discussions with the lab, the samples were logged in as listed on the sample containers, which are the correct names for the samples. Data quality and/or usability are not affected.

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. The following method blank detection was identified.

- WO 320-119292-1: PFHxA was detected in the method blank sample for batch 320-836810 at a concentration below the limit of quantitation (LOQ). PFHxA was detected

below the LOQ and within ten times the concentration detected in the method blank sample in associated project sample GAC-1. Consequently, the PFHxA result in the noted sample is considered affected by the method blank contamination, biased high, and is flagged 'B*' and reported at the LOQ. PFHxA was detected above the LOQ and within ten times the concentration detected in the method blank sample in associated project sample MW-TS-4. Consequently, the PFHxA result in the noted sample is considered an estimate, biased high, and is flagged 'JH*' and reported at the detected result. Data quality is considered affected as noted, however, data is considered usable with applied flags.

C.2.4 Equipment Blanks

Equipment blanks were utilized to detect potential cross-contamination of project samples due to use of reusable sampling equipment. Samples are considered affected if they are detected within ten times the concentration of the detection in the equipment blank. An equipment blank (*EB-1*) was collected with samples from the September 2024 event as reusable equipment was utilized to collect project samples. PFAS analytes were not detected in sample *EB-1*. An equipment blank sample was not collected during the February 2025 event and reusable equipment was not used to collect project samples.

C.2.5 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.2.6 Matrix Spike Sample and Sample Duplicates

MS/MSD samples were reported with work order 320-115530-1. MS/MSD recoveries and/or RPDs were within laboratory and project limits and did not result in qualification of the data. MS/MSD samples were not reported with WO 320-119292-1 due to insufficient sample volumes. Accuracy and precision for samples in WO 320-119292-1 were evaluated using the LCS/LCSD.

C.2.7 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. No IDA discrepancies were identified.

C.2.8 Field Duplicates

One field duplicate sample was collected as a part of this project (*MW-TS-101* for the September 2024 event). A field duplicate sample was not collected during the February 2025 event as the well selected to collect the field duplicate from (MW-TS-1) was frozen. Where calculable, analytical results met the comparison criterion (≤ 30% for water) for the field duplicate pairs.

C.2.9 Additional Quality Control Discrepancies

The following additional quality control discrepancy was identified.

- WO 320-115520-1: 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 the analyte: MW-TS-2 (320-115520-3) and MW-TS-4 (320-115520-5). Consequently, the PFNA results in samples MW-TS-2 and MW-TS-4 are considered estimates, with no direction of bias, and are flagged 'J*'. Data quality is considered affected as noted, however, data is considered usable with applied flags.

C.2.10 Analytical Sensitivity

Analytical sensitivity was evaluated to verify that the reporting limits met the applicable DEC groundwater cleanup levels for non-detect results. Analytes met the minimum required detection level.

C.2.11 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
320-115520-1	*MW-TS-2* *MW-TS-4*	PFNA	J*	Transition mass ratio discrepancy
320-119292-1	*GAC-1*	PFHxA	B*	Method blank detection
	MW-TS-4		JH*	

C.2.12. Completeness

Overall, the data validation process deemed the groundwater data acceptable for use, meeting the completeness goal of 90%. No data was rejected pursuant to the data quality review, and data may be used as applicable for the purposes of the FY2025 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 Sitewide 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 International Airport Sitewide PFAS - Tall Spruce Neighborhood
100.38.277/26816

Completed By: Shannon & Wilson, Inc.
Date Completed: April 16, 2025

***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.*

(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.*

Media	Transport Mechanisms	Exposure Media	Exposure Pathway/Route	Current & Future Receptors: Residents (adults or children)	Commercial or industrial workers	Site visitors, trespassers, or recreational users	Construction workers	Farmers or subsistence harvesters	Subsistence consumers	Other
☐ Surface Soil (0-2 ft bgs)	☐ Direct release to surface soil — check soil	☐ soil	☐ Incidental Soil Ingestion							
	☐ Migration to subsurface — check soil		☐ Dermal Absorption of Contaminants from Soil							
	☐ Migration to groundwater — check groundwater		☐ Inhalation of Fugitive Dust							
	☐ 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	☑ groundwater	☑ Ingestion of Groundwater	C/F	C/F	I	I	I	I	
	☐ Volatilization — check air		☑ Dermal Absorption of Contaminants in Groundwater	C/F	C/F	I	I	I	I	
	☐ Flow to surface water body — check surface water		☐ Inhalation of Volatile Compounds in Tap 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	☐ air	☐ Inhalation of Outdoor Air							
	☐ Volatilization — check air		☐ Inhalation of Indoor Air							
	☐ Sedimentation — check sediment		☐ Inhalation of Fugitive Dust							
	☐ Uptake by plants or animals — check biota									
	☐ Other (list):									
☐ Sediment	☐ Direct release to sediment — check sediment	☐ surface water	☐ Ingestion of Surface Water							
	☐ Resuspension, runoff, or erosion — check surface water		☐ Dermal Absorption of Contaminants in Surface Water							
	☐ Uptake by plants or animals — check biota		☐ Inhalation of Volatile Compounds in Tap Water							
	☐ Other (list):									
		☑ 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

IMPORTANT INFORMATION

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

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

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

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

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

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

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

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

READ RESPONSIBILITY CLAUSES CLOSELY.

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

being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports, and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

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