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FINAL

SUMMARY REPORT

Tall Spruce Monitoring Well Installation

FAIRBANKS, ALASKA

SHANNON & WILSON

January 2023

Shannon & Wilson No: 102519-023

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Submitted To: Fairbanks International Airport
6450 Airport Way, Suite 1
Fairbanks, Alaska 99709
Attn: Elise Thomas and Sammy Cummings

Subject: SUMMARY REPORT, TALL SPRUCE MONITORING WELL INSTALLATION, FAIRBANKS, ALASKA

Shannon & Wilson, Inc. (S&W) has prepared this report and participated in this project as a consultant to Alaska Department of Transportation and Public Facilities (DOT&PF) Fairbanks International Airport (FAI). S&W's services were performed as described in our proposals dated August 12, 2021, and June 23, 2022, and authorized in notices to proceed issued on September 27, 2021, and August 26, 2022, respectively, 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 installation and sampling effort which took place in September 2022.

S&W appreciates the opportunity to be of service to you on this project.

Ashley Jaramillo
Senior Environmental Chemist
Role: Project Manager

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ACRONYMS

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

ACRONYMS

QA	quality assurance
QC	quality control
QSM	Quality Systems Manual
S&W	Shannon & Wilson, Inc.
µS	micro-siemens
YSI	multiprobe water quality meter

1 INTRODUCTION

Shannon & Wilson, Inc. (S&W) has prepared this report to document the monitoring well (MW) installation and groundwater sampling in the Tall Spruce neighborhood on the west side of the Chena River near the Fairbanks International Airport (FAI) in Fairbanks, Alaska (Figure 1). This report covers activities performed in September 2022.

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:	Elise Thomas
DOT&PF PFAS POC:	Sammy Cummings
Airport Type:	Current Part 139 Airport
Airport Coordinates (Lat/Long):	64.8130, -147.8731

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

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

1.1 Purpose and Objectives

DOT&PF requested S&W install and 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 sampling for the presence of PFAS at DOT&PF sites began with the FAI in 2017. The FAI encountered perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) above the respective DEC groundwater cleanup levels in temporary monitoring wells on airport property. This led to off-airport water supply well sampling. Two water supply wells located on the western side of the Chena River on Tall Spruce Road were identified as having PFAS concentrations above the applicable action level (Figure 2).

Interim alternative water has been provided to the locations with PFAS-impacted water supply wells and those who have potentially PFAS-impacted water supply wells (i.e. close proximity to PFAS-impacted wells). Quarterly and annual monitoring of water supply wells for PFAS began in February 2018 and continued through February 2019 when FAI made the decision to offer water supply well owners within the PFAS plume a connection to College Utilities Corporation (CUC) water system, including Tall Spruce Road. Most of the properties with water supply wells within the plume area have been connected to the CUC water system, and the wells are no longer in use. Negotiations are ongoing between FAI and the few remaining properties with PFAS-impacted wells regarding CUC service connections.

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

1.2.1 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 (Figure 1). 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 work area was located within the 30-foot public utility easement on the western side of the road near the parcels identified by the Property Account Numbers (PANs) 407330 and 407348. The boundaries of the project are shown on Figure 3.

1.3 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 health advisory 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 perfluorobutanesulfonic acid (PFBS) was set at 2,000 ng/L. On June 15, 2022, the EPA issued updated interim drinking water lifetime health advisory levels (LHAs) for PFOS of 0.02 ng/L and for PFOA of 0.004 ng/L. The DEC is still reviewing these interim LHAs and has not yet issued updated guidance for the State of Alaska.

The DEC groundwater-cleanup level for PFOS or PFOA is 400 ng/L. The soil cleanup levels for PFOS and PFOA are listed as 0.003 milligrams per kilogram (mg/kg) and 0.0017 mg/kg respectively in 18 AAC 75.340 Table B1 Method Two - Soil Cleanup Levels Table (Migration to Groundwater).

Exhibit 1-2: Applicable Regulatory Action Levels

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

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

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

Exhibit 1-3: Reported PFAS Analytes

EPA 537M PFAS Analytes	
PFOS	perfluorotetradecanoic acid (PFTeA)
PFOA	perfluorotridecanoic acid (PFTrDA or PFTriA)
perfluoroheptanoic acid (PFHpA)	perfluoroundecanoic acid (PFUnA)
perfluorononanoic acid (PFNA)	HFPO-DA
perfluorohexanesulfonic acid (PFHxS)	N-ethyl perfluorooctane sulfonamidoacetic acid (N-EtFOSAA)
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 2022 as a part of MW installation and sampling activities in the Tall Spruce neighborhood. Sampling procedures and analytical methods are described our General Work Plan (GWP) Addendum 009-FAI-01, dated April 2022 and approved by DEC June 6, 2022.

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

2.1 Permitting and Locates

S&W coordinated with the Federal Aviation Administration (FAA) to determine the need for a 7460-1 airspace permit prior to drilling activities. On December 21, 2021, the FAA issued a Determination of No Hazard to Air Navigation for Temporary Structure.

Utilities clearance was determined in coordination with the Alaska Digline and the FAI Environmental Manager. A map of drilling locations was provided to the Alaska Digline and FAI Environmental Manager and no conflicts were reported.

2.2 Subsurface Soil Exploration and Sampling

On behalf of DOT&PF, S&W retained the services of GeoTek Alaska, Inc. (GeoTek) to advance a soil boring and install four long-term groundwater MWs off Tall Spruce Road. The boring was denoted SB-TS-4 and extended from the ground surface to 80 feet below ground surface (bgs).

GeoTek used a Geoprobe Model 8040 DT track-mounted drill rig. This drill is equipped with Dual-Core tooling, a solid barrel (4-inch outside diameter) direct-push device for collecting continuous core samples of unconsolidated material. At roughly 35 feet bgs, GeoTek switched to Macro-Core tooling with a 2-inch diameter solid barrel.

A S&W geologist was onsite to describe and log recovered soil for the purpose of determining subsurface lithology and collected analytical soil samples from the boring. Appendix A presents a descriptive log of soil conditions and an explanation of the symbols and terminology used along with copies of our Soil Sample Collection Logs.

Exhibit 2-1: GeoProbe 8040 DT setting a monitoring well using 4-inch dual core

S&W collected six laboratory analytical soil samples from the boring for PFAS analysis. The samples were collected at variable depths below the groundwater table ranging between 13 feet bgs to 78 feet bgs. Soils predominantly consisted of grey, poorly graded sand with gravel and trace silt.

2.3 Monitoring Well Installation

GeoTek installed the cluster of four MWs to the depths detailed below:

- MW-TS-1 was installed to a total depth of 20 feet bgs, with a 10-foot screen installed from the terminal depth to 10 feet bgs;
- MW-TS-2 was installed to a total depth of 40 feet bgs, with a 5-foot screen installed from the terminal depth to 35 feet bgs;
- MW-TS-3 was installed to a total depth of 60 feet bgs, with a 5-foot screen installed from the terminal depth to 55 feet bgs; and
- MW-TS-4 was installed to a total depth of 80 feet bgs, with a 5-foot screen installed from the terminal depth to 75 feet bgs.

GeoTek completed the wells using flush-mount monuments. The wells were constructed using two-inch inside-diameter schedule 40 polyvinyl chloride material. The screens are

pre-pack 0.010-inch slotted screen with 20/40 sand and threaded end caps. The filter pack within the annular space at and around the screened interval is 10/20 silica sand. A bentonite chip seal followed by pea gravel or natural slough fills the remaining annul space and the wells are capped with approximately one foot of concrete. The individual Monitoring Well Construction Details field forms are included in Appendix A.

2.4 Monitoring Well Development and Sampling

The MWs were developed using an inertial pump and tubing with a foot value and surge block to agitate the water column and remove sediment. Development proceeded until there was a significant improvement in the clarity of the water. Purge water generated during development was containerized in 55-gallon drums and treated with granular activated carbon (GAC) prior to being discharged to the ground surface. Copies of our Well Development Logs are included in Appendix A.

Exhibit 2-2: Developing a monitoring well and containing purge water

Following development, a peristaltic pump was used to purge the well until the water parameters stabilized or a total of three well volumes had been purged. Field staff measured these parameters using a multiprobe water quality meter (YSI) and recorded pH, temperature in degrees Celsius (°C), conductivity in micro-Siemens (µS), dissolved oxygen (DO) in milligrams per liter (mg/L), 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 our 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-4.

2.5 Investigation Derived Waste

Investigative-derived waste (IDW) for this project consisted of soil cuttings, MW development and purge water, decontamination rinsate water, and disposable sampling equipment.

Soil cuttings were combined in a 55-gallon drum and are stored in warm storage at the FAI. In spring 2023, the soil cuttings will be spread on the ground surface at the site due to there being no PFAS detections.

Liquids were 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 event. This effluent sample exhibited no PFAS detections.

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

2.6 Sample Custody, Storage, and Transport

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. For shipping, 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. Staff applied custody seals to the cooler, which were observed to be intact upon receipt by the laboratory.

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

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

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

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

2.7 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:

- A field duplicate sample was not collected for the soil matrix while sampling boring SB-TS-4.
- The screen for the shallow monitoring well MW-TS-1 does not span the water table. The top of the screen is located approximately 10 feet bgs, while the groundwater table was observed to be at roughly 6.5 feet bgs at the time of sampling.

3 ANALYTICAL RESULTS

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

The Eurofins laboratory report, associated DEC Laboratory Data Review Checklist (LDRC), and a summary of our Quality Assurance/Quality Control (QA/QC) assessment are included in Appendix B.

3.1 Subsurface Soil Results

The six subsurface soil samples were collected at depths of 13 feet, 26 feet, 44 feet, 53 feet, 62 feet, and 78 feet bgs. None of the soil samples contained detectable concentrations of the target PFAS analytes. A summary of the soil results is provided in Table 1.

3.2 Groundwater Results

The groundwater samples collected from the monitoring wells all contained detectable concentrations of PFBS, PFHxS, PFOA, and PFOS. Additionally, PFHpA, PFHxA, and PFNA were also detected in most of the wells. None of the detected concentrations exceeded DEC groundwater cleanup levels. The highest observed concentration for the sum of PFOS and PFOA was 5.1 ng/L in MW-TS-4. A summary of the groundwater results is available in Table 2.

4 REVISED CONCEPTUAL SITE MODEL

A conceptual site model (CSM) describes potential pathways between a contaminant source and possible receptors (i.e., people, animals, and plants) and is used to determine who may

be at risk of exposure to those contaminants. A DEC Human Health CSM Graphic Form and Human Health CSM Scoping Form was completed based on the preliminary understanding of site conditions and revised following the receipt of the analytical results. These forms are included in Appendix C.

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

5 DISCUSSION AND RECOMMENDATIONS

Based on our sampling efforts completed in September 2022, it does not appear that PFAS are present in the soil and groundwater at concentrations above state 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 the monitoring wells. 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 newly installed monitoring wells semi-annually to check for lateral PFAS migrations and/or changes in concentration.

These recommendations are based on:

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

The information included in this report is based on limited sampling and should be considered representative of the times and locations at which the sampling occurred. Regulatory agencies may reach different conclusions than S&W. "Important Information about your Environmental Report" has been prepared and is included, to assist you and others in understanding the use and limitations of this report.

6 REFERENCES

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

Alaska Department of Environmental Conservation (DEC), 2017, Field Sampling Guidance: Juneau, Alaska, DEC Division of Spill Prevention and Response, Contaminated Sites Program, August, available: http://dec.alaska.gov/spar/csp/guidance_forms/csguidance.htm.

Alaska Department of Environmental Conservation (DEC), 2021, 18 AAC 75: Oil and other hazardous substances pollution control: Juneau, Alaska, July, available: http://dec.alaska.gov/commish/regulations/.

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

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

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

Table 1 — Tall Spruce Subsurface Soil Results

Analytical Method	Analyte	Regulatory Limit	Units	SB-TS-4-1 9/15/22 9:12 13' bgs	SB-TS-4-2 9/15/22 9:57 26' bgs	SB-TS-4-3 9/15/22 12:45 44' bgs	SB-TS-4-4 9/15/22 14:31 53' bgs	SB-TS-4-5 9/15/22 16:08 62' bgs	SB-TS-4-6 9/15/22 18:28 78' bgs
EPA 537(Mod)	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	—	µg/kg	<0.23	<0.23	<0.20	<0.22	<0.23	<0.23
	4,8-Dioxa-3H-perfluorononanoic acid (DONA)	—	µg/kg	<0.23	<0.23	<0.20	<0.22	<0.23	<0.23
	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)	—	µg/kg	<0.23	<0.23	<0.20	<0.22	<0.23	<0.23
	Hexafluoropropylene oxide dimer acid (HFPO-DA)	—	µg/kg	<0.23	<0.23	<0.20	<0.22	<0.23	<0.23
	N-Ethyl perfluorooctane sulfonamidoacetic acid (N-EtFOSAA)	—	µg/kg	<0.23	<0.23	<0.20	<0.22	<0.23	<0.23
	N-Methyl perfluorooctane sulfonamidoacetic acid (N-MeFOSAA)	—	µg/kg	<0.23	<0.23	<0.20	<0.22	<0.23	<0.23
	Perfluorobutanesulfonic acid (PFBS)	—	µg/kg	<0.23	<0.23	<0.20	<0.22	<0.23	<0.23
	Perfluorodecanoic acid (PFDA)	—	µg/kg	<0.23	<0.23	<0.20	<0.22	<0.23	<0.23
	Perfluorododecanoic acid (PFDoA)	—	µg/kg	<0.23	<0.23	<0.20	<0.22	<0.23	<0.23
	Perfluoroheptanoic acid (PFHpA)	—	µg/kg	<0.23	<0.23	<0.20	<0.22	<0.23	<0.23
	Perfluorohexanesulfonic acid (PFHxS)	—	µg/kg	<0.23	<0.23	<0.20	<0.22	<0.23	<0.23
	Perfluorohexanoic acid (PFHxA)	—	µg/kg	<0.23	<0.23	<0.20	<0.22	<0.23	<0.23
	Perfluorononanoic acid (PFNA)	—	µg/kg	<0.23	<0.23	<0.20	<0.22	<0.23	<0.23
	Perfluorooctanesulfonic acid (PFOS)	3.0	µg/kg	<0.23	<0.23	<0.20	<0.22	<0.23	<0.23
	Perfluorooctanoic acid (PFOA)	1.7	µg/kg	<0.23	<0.23	<0.20	<0.22	<0.23	<0.23
	Perfluorotetradecanoic acid (PFTeA)	—	µg/kg	<0.23	<0.23	<0.20	<0.22	<0.23	<0.23
	Perfluorotridecanoic acid (PFTrDA)	—	µg/kg	<0.23	<0.23	<0.20	<0.22	<0.23	<0.23
	Perfluoroundecanoic acid (PFUnA)	—	µg/kg	<0.23	<0.23	<0.20	<0.22	<0.23	<0.23

Notes:
Results reported from Eurofins Environment Testing America work order 320-92292-1.
Regulatory limits from 18 AAC 75.341 Table B1 Method Two - Soil Cleanup Levels Table (Migration to Groundwater).
EPA United States Environmental Protection Agency
µg/kg micrograms per kilogram
— No applicable regulatory limit exists for the associated analyte.
< Analyte not detected; listed as less than the reporting limit (RL) unless otherwise flagged due to quality-control failures.

Table 2 — Tall Spruce Groundwater Results

Analytical Method	Analyte	Regulatory Limit	Units	MW-TS-1 9/19/22 12:41	MW-TS-2 9/19/22 14:25	MW-TS-3 9/19/22 16:48	MW-TS-4 9/19/22 18:47	MW-TS-4 Field Duplicate
EPA 537(Mod)	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	—	ng/L	<1.9	<1.8	<1.8	<1.9	<1.8
	4,8-Dioxa-3H-perfluorononanoic acid (DONA)	—	ng/L	<1.9	<1.8	<1.8	<1.9	<1.8
	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)	—	ng/L	<1.9	<1.8	<1.8	<1.9	<1.8
	Hexafluoropropylene oxide dimer acid (HFPO-DA)	—	ng/L	<3.8	<3.7	<3.6	<3.7	<3.7
	N-Ethyl perfluorooctane sulfonamidoacetic acid (N-EtFOSAA)	—	ng/L	<4.7	<4.6	<4.5	<4.7	<4.6
	N-Methyl perfluorooctane sulfonamidoacetic acid (N-MeFOSAA)	—	ng/L	<4.7	<4.6	<4.5	<4.7	<4.6
	Perfluorobutanesulfonic acid (PFBS)	—	ng/L	0.66 J	0.69 J	0.31 J	1.8 J	1.5 J
	Perfluorodecanoic acid (PFDA)	—	ng/L	<1.9	<1.8	<1.8	<1.9	<1.8
	Perfluorododecanoic acid (PFDoA)	—	ng/L	<1.9	<1.8	<1.8	<1.9	<1.8
	Perfluoroheptanoic acid (PFHpA)	—	ng/L	1.6 J	<1.8	<1.8	1.3 J	0.99 J
	Perfluorohexanesulfonic acid (PFHxS)	—	ng/L	2.1	2.6	2.3	3.2	3.4
	Perfluorohexanoic acid (PFHxA)	—	ng/L	2.2	1.7 J	<1.8	3.5	3.1
	Perfluorononanoic acid (PFNA)	—	ng/L	<1.9	<1.8	<1.8	0.42 J	0.37 J
	Perfluorooctanesulfonic acid (PFOS)	400	ng/L	1.1 J	1.8	1.7 J	1.8 J	1.6 J
	Perfluorooctanoic acid (PFOA)	400	ng/L	3.4	2.3	2.2	3.3	2.9
	Perfluorotetradecanoic acid (PFTeA)	—	ng/L	<1.9	<1.8	<1.8	<1.9	<1.8
	Perfluorotridecanoic acid (PFTrDA)	—	ng/L	<1.9	<1.8	<1.8	<1.9	<1.8
	Perfluoroundecanoic acid (PFUnA)	—	ng/L	<1.9	<1.8	<1.8	<1.9	<1.8

Notes:
Results reported from Eurofins Environment Testing America work order 320-92292-1.
Regulatory limits from 18 AAC 75.345 Table C - Groundwater Cleanup Levels.
EPA United States Environmental Protection Agency
ng/L nanograms per liter
— No applicable regulatory limit exists for the associated analyte.
< Analyte not detected; listed as less than the reporting limit (RL) unless otherwise flagged due to quality-control failures.
J Estimated concentration, detected greater than the method detection limit (MDL) and less than the reporting limit (RL). Flag applied by the laboratory.

Path: T:\GIS_Projects\FAI\Tall Spruce Addendum\Fig 1_Vicinity Map_2022.mxd Author: BRL User: TXG Date: 11/14/2022

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

0 2,000 Feet

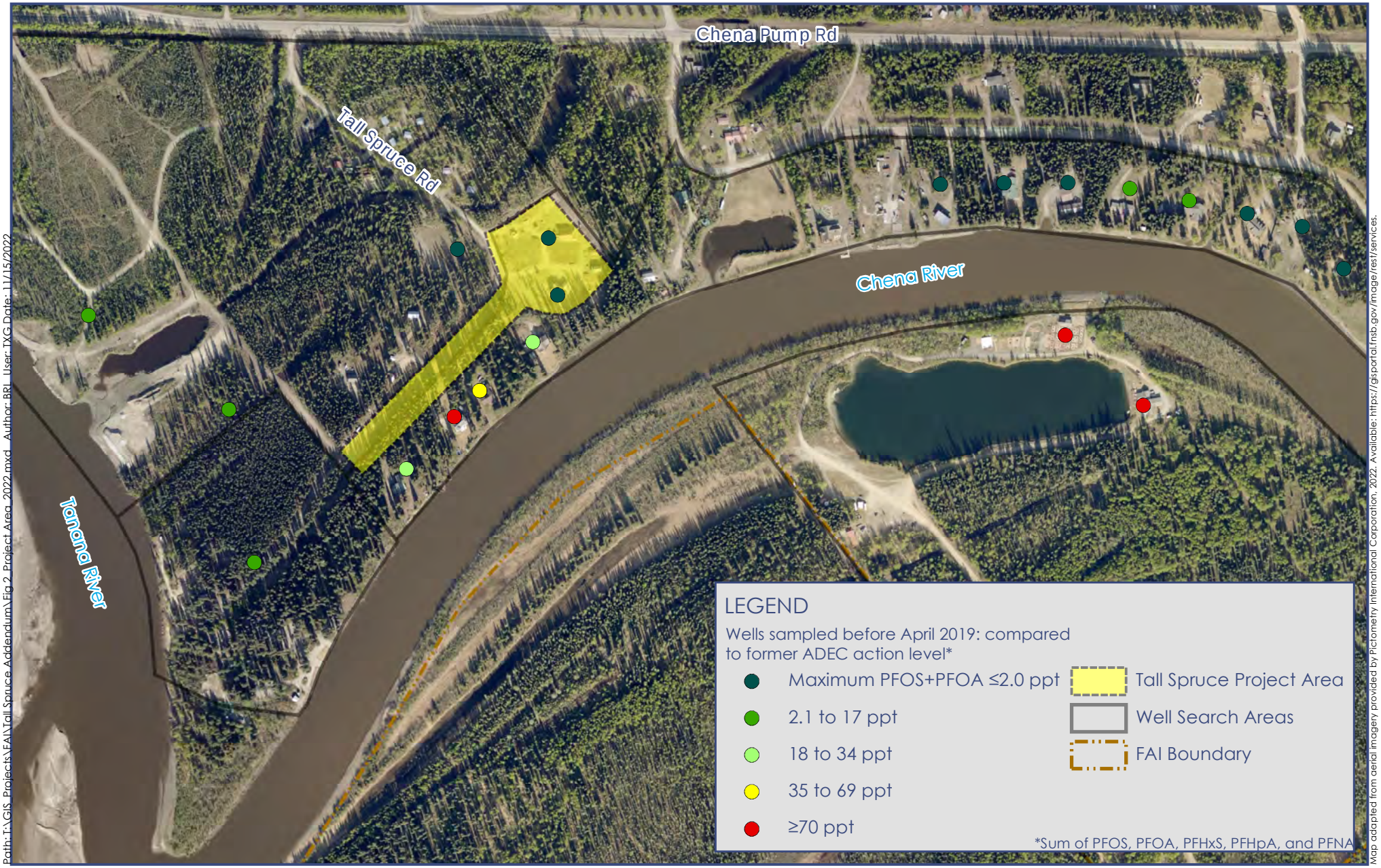
Notes:

1. Boundaries are approximate
ARFF = Aircraft Rescue and Firefighting

January 2023

FAIRBANKS INTERNATIONAL AIRPORT VICINITY

Figure 1



N

0 1,000 Feet

Notes:

1. Boundaries are approximate
FAI = Fairbanks International Airport

January 2023

PROJECT AREA WEST OF THE CHENA RIVER

Figure 2

Notes:

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

January 2023

MONITORING WELL LOCATIONS

Figure 3

APPENDIX A: FIELD NOTES

Appendix A

Field Notes

CONTENTS

LOG OF GEOPROBE

Date Started *9/15/22*	**Location** *Tall Spruce Rd.*	**Ground Elevation:** *Approx. NA feet*	
Date Completed *9/15/22*		**Typical Run Length** *5 feet*	
Total Depth (ft) *20.0*	**Drilling Company:** *GeoTek Alaska, Inc.*	**Hole Diameter:** *4.5 inches*	

Depth (ft)	Probe Run	Soil Description	Depth, ft.	Symbol	PID, ppm	Ground Water	Sample Number and Description.	Depth (ft)
0		Light brown, *Poorly Graded Gravel with Silt and Sand (GP-GM)*; moist.	0.5					0
		Brown, *Poorly Graded Sand with Silt and Gravel (SP-SM)*; moist.	2.0					
5		Interbedded brown and gray, *Sandy Silt to Silt with Sand (ML)*; organics present at 2.4 feet bgs, moist to 5.5 feet bgs, wet below.				▽ During Drilling		5
		Brown to gray, *Poorly Graded Sand with Silt and Gravel*; wet.	7.1					
10		Gray, *Poorly Graded Gravel with Silt and Sand (GP-GM)*; wet.	10.0					10
		Gray, *Poorly Graded Sand with Silt and Gravel (SP-SM)*; wet.	12.1				SB-TS-4-1	
15								15
20			20.0					20
		Boring Completed 9/15/2022 MW-TS-1 Completed 9/16/2022 Screen interval: 10 to 20 feet bgs Flushmount 2-inch diameter riser pipe 10/20 gradation sandpack Slot size: 0.010 inches						
25								25
30								30
35								35
40								40
45								45

NOTES

1. In some cases where recovery was low in the upper part of the run, the soil sample may have slid down in the tube prior to removal from the ground.
2. Groundwater level, if indicated above, was estimated during probing and should be considered approximate.
3. Refer to KEY for definitions and explanation of symbols.

LEGEND

▽ Estimated Water Level

DOT&PF Statewide PFAS
Tall Spruce Monitoring Well Installation
Fairbanks, Alaska

LOG OF GEOPROBE SB-TS-1

November 2022 102519-023

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. 1

REV 2

GEOPROBE - AK 102519-023.GPJ 21-16604.GPJ 12/5/22 Log: MSC Rev: Typ: MSC

LOG OF GEOPROBE

Date Started 9/15/22	**Location** Tall Spruce Rd.	**Ground Elevation:** Approx. NA feet
Date Completed 9/15/22		**Typical Run Length** 5 feet
Total Depth (ft) 40.0	**Drilling Company:** GeoTek Alaska, Inc.	**Hole Diameter:** 4.5 inches

Depth (ft)	Probe Run	Soil Description	Depth, ft.	Symbol	PID, ppm	Ground Water	Sample Number and Description.	Depth (ft)
		Refer to the report text for a proper understanding of the subsurface materials and probing methods. The stratification lines indicated below represent the approximate boundaries between soil types. Actual boundaries may be different if soil shifted inside sample tubes during extraction.						
		Light brown, *Poorly Graded Gravel with Silt and Sand (GP-GM)*; moist.	0.5					
		Brown, *Poorly Graded Sand with Silt and Gravel (SP-SM)*; moist.	2.0					
5		Interbedded brown and gray, *Sandy Silt to Silt with Sand (ML)*; organics present at 2.4 feet bgs, moist to 5.5 feet bgs, wet below.				▽ During Drilling		5
		Brown to gray, *Poorly Graded Sand with Silt and Gravel (SP-SM)*; wet.	7.1					
10		Gray, *Poorly Graded Gravel with Silt and Sand (GP-GM)*; wet.	10.0					10
		Gray, *Poorly Graded Sand with Silt and Gravel to Poorly Graded Sand with Silt (SP-SM)*; wet.	12.1				SB-TS-4-1	
15								15
20								20
25							SB-TS-4-2	25
		Gray, *Poorly Graded Gravel with Sand (GP)* with 6-inch-bed of *Poorly Graded Sand with Silt and Gravel (SP-SM)* at 31.5 feet bgs; wet.	27.4					
30								30
35		Gray, *Poorly Graded Sand (SP),* ; wet.	35.0					35
		Gray, *Poorly Graded Sand with Silt and Gravel (SP-SM)*; wet.	36.2					
		Gray, *Poorly Graded Sand (SP)*; wet.	37.5					
40			40.0					40
		Boring Completed 9/15/2022 MW-TS-2 Completed 9/17/2022 Screen interval: 35 to 40 feet bgs Flushmount 2-inch diameter riser pipe 10/20 gradation sandpack						
45								45

CONTINUED NEXT PAGE

NOTES

1. In some cases where recovery was low in the upper part of the run, the soil sample may have slid down in the tube prior to removal from the ground.
2. Groundwater level, if indicated above, was estimated during probing and should be considered approximate.
3. Refer to KEY for definitions and explanation of symbols.

LEGEND

▽ Estimated Water Level

DOT&PF Statewide PFAS
Tall Spruce Monitoring Well Installation
Fairbanks, Alaska

LOG OF GEOPROBE SB-TS-2

November 2022 102519-023

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FIG. 2
Sheet 1 of 2

REV 2

GEOPROBE - AK 102519-023.GPJ 21-16604.GPJ 12/5/22 Log: MSC Rev: Typ: MSC

LOG OF GEOPROBE

Date Started *9/15/22*	**Location** *Tall Spruce Rd.*	**Ground Elevation:** *Approx. NA feet*	
Date Completed *9/15/22*		**Typical Run Length** *5 feet*	
Total Depth (ft) *40.0*	**Drilling Company:** *GeoTek Alaska, Inc.*	**Hole Diameter:** *4.5 inches*	

Depth (ft)	Probe Run	Soil Description *Refer to the report text for a proper understanding of the subsurface materials and probing methods. The stratification lines indicated below represent the approximate boundaries between soil types. Actual boundaries may be different if soil shifted inside sample tubes during extraction.*	Depth, ft.	Symbol	PID, ppm	Ground Water	Sample Number and Description.	Depth (ft)
		Slot size: 0.010 inches						
55								55
60								60
65								65
70								70
75								75
80								80
85								85
90								90
95								95

NOTES

1. In some cases where recovery was low in the upper part of the run, the soil sample may have slid down in the tube prior to removal from the ground.
2. Groundwater level, if indicated above, was estimated during probing and should be considered approximate.
3. Refer to KEY for definitions and explanation of symbols.

LEGEND

▽ Estimated Water Level

DOT&PF Statewide PFAS
Tall Spruce Monitoring Well Installation
Fairbanks, Alaska

LOG OF GEOPROBE SB-TS-2

November 2022 102519-023

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FIG. 2
Sheet 2 of 2

REV 2

GEOPROBE - AK 102519-023.GPJ 21-16604.GPJ 12/5/22 Log: MSC Rev: Typ: MSC

LOG OF GEOPROBE

Date Started 9/15/22	**Location** Tall Spruce Rd.	**Ground Elevation:** Approx. NA feet
Date Completed 9/15/22		**Typical Run Length** 5 feet
Total Depth (ft) 60.0	**Drilling Company:** GeoTek Alaska, Inc.	**Hole Diameter:** 4.5 inches

Depth (ft)	Probe Run	Soil Description	Depth, ft.	Symbol	PID, ppm	Ground Water	Sample Number and Description.	Depth (ft)
		Refer to the report text for a proper understanding of the subsurface materials and probing methods. The stratification lines indicated below represent the approximate boundaries between soil types. Actual boundaries may be different if soil shifted inside sample tubes during extraction.						
		Light brown, *Poorly Graded Gravel with Silt and Sand (GP-GM)*; moist.	0.5					
		Brown, *Poorly Graded Sand with Silt and Gravel (SP-SM)*; moist.	2.0					
5		Interbedded brown and gray, *Sandy Silt to Silt with Sand (ML)*; organics present at 2.4 feet bgs, moist to 5.5 feet bgs, wet below.				▽ During Drilling		5
		Brown to gray, *Poorly Graded Sand with Silt and Gravel (SP-SM)*; wet.	7.1					
10		Gray, *Poorly Graded Gravel with Silt and Sand (GP-GM)*; wet.	10.0					10
		Gray, *Poorly Graded Sand with Silt and Gravel to Poorly Graded Sand with Silt (SP-SM)*; wet.	12.1				SB-TS-4-1	
15								15
20								20
25							SB-TS-4-2	25
		Gray, *Poorly Graded Gravel with Sand (GP)* with 6-inch-bed of *Poorly Graded Sand with Silt and Gravel (SP-SM)* at 31.5 feet bgs; wet.	27.4					
30								30
35		Gray, *Poorly Graded Sand (SP)*; wet.	35.0					35
		Gray, *Poorly Graded Sand with Silt and Gravel (SP-SM)*; wet.	36.2					
40		Gray, *Poorly Graded Sand to Poorly Graded Sand with Gravel (SP)*; wet.	37.5					40
							SB-TS-4-3	
45		Gray, *Poorly Graded Gravel with Sand (GP)*; wet.	45.0					45

CONTINUED NEXT PAGE

NOTES

1. In some cases where recovery was low in the upper part of the run, the soil sample may have slid down in the tube prior to removal from the ground.
2. Groundwater level, if indicated above, was estimated during probing and should be considered approximate.
3. Refer to KEY for definitions and explanation of symbols.

LEGEND

▽ Estimated Water Level

DOT&PF Statewide PFAS
Tall Spruce Monitoring Well Installation
Fairbanks, Alaska

LOG OF GEOPROBE SB-TS-3

November 2022 102519-023

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FIG. 3
Sheet 1 of 2

REV 2

GEOPROBE - AK 102519-023.GPJ 21-16604.GPJ 12/5/22 Log: MSC Rev: Typ: MSC

LOG OF GEOPROBE

Date Started *9/15/22*	**Location** *Tall Spruce Rd.*	**Ground Elevation:** *Approx. NA feet*	
Date Completed *9/15/22*		**Typical Run Length** *5 feet*	
Total Depth (ft) *60.0*	**Drilling Company:** *GeoTek Alaska, Inc.*	**Hole Diameter:** *4.5 inches*	

Depth (ft)	Probe Run	Soil Description	Depth, ft.	Symbol	PID, ppm	Ground Water	Sample Number and Description.	Depth (ft)
		Gray, *Poorly Graded Sand (SP)*; wet.	50.0					
		Gray, *Poorly Graded Gravel with Silt and Sand (GP-GM)*; wet.	52.9				SB-TS-4-4	
55		Gray-brown, *Silty Sand (SM)*; wet.	53.4					55
		Gray, *Poorly Graded Sand (SP)* with 6-inch-bed *Poorly Graded Gravel with Sand (GP)* from 56.7 to 57.3 feet bgs; wet.	55.0					
60		Gray, *Silty Gravel with Sand (GM)*; wet.	58.1					60
			60.0					
		Boring Completed 9/15/2022						
		MW-TS-3 Completed 9/16/2022						
65		Screen interval: 54 to 59 feet bgs						65
		Flushmount						
		2-inch diameter riser pipe						
70		10/20 gradation sandpack						70
		Slot size: 0.010 inches						
75								75
80								80
85								85
90								90
95								95

NOTES

1. In some cases where recovery was low in the upper part of the run, the soil sample may have slid down in the tube prior to removal from the ground.
2. Groundwater level, if indicated above, was estimated during probing and should be considered approximate.
3. Refer to KEY for definitions and explanation of symbols.

LEGEND

▽ Estimated Water Level

DOT&PF Statewide PFAS
Tall Spruce Monitoring Well Installation
Fairbanks, Alaska

LOG OF GEOPROBE SB-TS-3

November 2022 102519-023

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FIG. 3
Sheet 2 of 2

REV 2

GEOPROBE - AK 102519-023.GPJ 21-16604.GPJ 12/5/22 Log: MSC Rev: Typ: MSC

LOG OF GEOPROBE

Date Started 9/15/22	**Location** Tall Spruce Rd.	**Ground Elevation:** Approx. NA feet
Date Completed 9/15/22		**Typical Run Length** 5 feet
Total Depth (ft) 80.0	**Drilling Company:** GeoTek Alaska, Inc.	**Hole Diameter:** 4.5 inches

Depth (ft)	Probe Run	Soil Description	Depth, ft.	Symbol	PID, ppm	Ground Water	Sample Number and Description.	Depth (ft)
		Refer to the report text for a proper understanding of the subsurface materials and probing methods. The stratification lines indicated below represent the approximate boundaries between soil types. Actual boundaries may be different if soil shifted inside sample tubes during extraction.						
		Light brown, *Poorly Graded Gravel with Silt and Sand (GP-GM)*; moist.	0.5					
		Brown, *Poorly Graded Sand with Silt and Gravel (SP-SM)*; moist.	2.0					
5		Interbedded brown and gray, *Sandy Silt to Silt with Sand (ML)*; organics present at 2.4 feet bgs, moist to 5.5 feet bgs, wet below.				▽ During Drilling		5
		Brown to gray, *Poorly Graded Sand with Silt and Gravel (SP-SM)*; wet.	7.1					
10		Gray, *Poorly Graded Gravel with Silt and Sand (GP-GM)*; wet.	10.0					10
		Gray, *Poorly Graded Sand with Silt and Gravel to Poorly Graded Sand with Silt (SP-SM)*; wet.	12.1				SB-TS-4-1	
15								15
20								20
25							SB-TS-4-2	25
		Gray, *Poorly Graded Gravel with Sand (GP)* with 6-inch-bed of *Poorly Graded Sand with Silt and Gravel (SP-SM)* at 31.5 feet bgs; wet.	27.4					
30								30
35		Gray, *Poorly Graded Sand (SP)*; wet.	35.0					35
		Gray, *Poorly Graded Sand with Silt and Gravel (SP-SM)*; wet.	36.2					
40		Gray, *Poorly Graded Sand to Poorly Graded Sand with Gravel (SP)*; wet.	37.5					40
							SB-TS-4-3	
45		Gray, *Poorly Graded Gravel with Sand (GP)*; wet.	45.0					45

CONTINUED NEXT PAGE

NOTES

1. In some cases where recovery was low in the upper part of the run, the soil sample may have slid down in the tube prior to removal from the ground.
2. Groundwater level, if indicated above, was estimated during probing and should be considered approximate.
3. Refer to KEY for definitions and explanation of symbols.

LEGEND

▽ Estimated Water Level

DOT&PF Statewide PFAS
Tall Spruce Monitoring Well Installation
Fairbanks, Alaska

LOG OF GEOPROBE SB-TS-4

November 2022 102519-023

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FIG. 4
Sheet 1 of 2

REV 2

GEOPROBE - AK 102519-023.GPJ 21-16604.GPJ 12/5/22 Log: MSC Rev: Typ: MSC

LOG OF GEOPROBE

Date Started 9/15/22	**Location** Tall Spruce Rd.	**Ground Elevation:** Approx. NA feet	
Date Completed 9/15/22		**Typical Run Length** 5 feet	
Total Depth (ft) 80.0	**Drilling Company:** GeoTek Alaska, Inc.	**Hole Diameter:** 4.5 inches	

Depth (ft)	Probe Run	Soil Description	Depth, ft.	Symbol	PID, ppm	Ground Water	Sample Number and Description.	Depth (ft)
		Gray, *Poorly Graded Sand (SP)*; wet.	50.0					
		Gray, *Poorly Graded Gravel with Silt and Sand (GP-GM)*; wet.	52.9				SB-TS-4-4	
		Gray-brown, *Silty Sand (SM)*; wet.	53.4					
55		Gray, *Poorly Graded Sand (SP)* with 6-inch-bed *Poorly Graded Gravel with Sand (GP)* from 56.7 to 57.3 feet bgs; wet.	55.0					55
		Gray, *Silty Gravel with Sand (GM)*; wet.	58.1					
60		Gray, *Poorly Graded Sand (SP)*; wet.	60.0					60
		Gray, *Poorly Graded Gravel with Sand (GP)*; wet.	62.5				SB-TS-5-5	
65			65.0					65
70		Gray, *Poorly Graded Sand with Gravel to Poorly Graded Sand (SP)*; wet.	70.0					70
75								75
		Gray, *Poorly Graded Gravel with Sand (GP)*; wet.	78.4				SB-TS-6-5	
80			80.0					80
		Boring Completed 9/15/2022						
		Boring Completed 9/17/2022						
85		Screen interval: 74 to 79 feet bgs						85
		Flushmount						
		2-inch diameter riser pipe						
90		10/20 gradation sandpack						90
		Slot size: 0.010 inches						
		65 to 70 feet bgs: liner was stuffed in rod						
95								95

NOTES

1. In some cases where recovery was low in the upper part of the run, the soil sample may have slid down in the tube prior to removal from the ground.
2. Groundwater level, if indicated above, was estimated during probing and should be considered approximate.
3. Refer to KEY for definitions and explanation of symbols.

LEGEND

▽ Estimated Water Level

DOT&PF Statewide PFAS
Tall Spruce Monitoring Well Installation
Fairbanks, Alaska

LOG OF GEOPROBE SB-TS-4

November 2022 102519-023

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. 4
Sheet 2 of 2

REV 2

GEOPROBE - AK 102519-023.GPJ 21-16604.GPJ 12/5/22 Log: MSC Rev: Typ: MSC

SHANNON & WILSON, INC.

SAMPLE COLLECTION LOG

Project Number: 102819-023 Location: Tall Spruce Rd. Page 1 of 1

Date: 9-15-22

Sampler: MSL

Sample Number	Location	Sample Time	Depth Interval (ft) top	Depth Interval (ft) bottom	Matrix Type	Sampling Method	Sample Type	PID Reading	Analyses
SB-TS-4-1	SB-TS-4	0912	13	13.5	SB	L	ES		PFAS
SB-TS-4-2	↓	0957	26	26.5	↓	↓	↓	X	↓
SB-TS-4-3		1245	44	44.5					
SB-TS-4-4		1431	52.7	53.2					
SB-TS-5-5		1608	62	62.5					
SB-TS-6-5		1828	78	78.5					

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

MONITORING WELL CONSTRUCTION DETAILS

Monitoring Well No. MW-TS-1
Project Name Tall Spruce
Project Number 102519-023

Date Installed 9-16-22
Logged By MSC
Driller GeoTek

I. TOP SECTION (CASING)

Initial Pipe Length: 5
Cuttoff Length: -
Add-on Length: -
Total Length: 5

II. MID SECTION (CASING)

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

5		

\+

Sum of Lengths: 5

III. SCREENED SECTION(S)

Joint Length: 0.17
Screened Length: 4.77+2
Joint Length: 0.17
End Cap Length: 0.24
Pointed ☒ Flat ☐

\+

Total Pipe Length: 10.12

BOW to BOS: 0.41

=

TOC to BOW: 20.12

IV. WELL DATA

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

V. BACKFILL

	Depth Below GS Bottom	Top	
CEM (No Pipe)	-	-	
CEM_PB	1	0	
*SLUF_PB/FIL_PB	4	1	pea gravel
BCH_PB	-	-	
*SLUF_PB/FIL_PB	-	-	
BGR_PB	8	4	bent chips
*SLUF_PB/FIL_PB	-	-	
*SLUF_PS/FIL_PS	20	8	
*SLUF/FIL (No Pipe)	80	20	
*SLUF_PB/FIL_PB	-	-	
Filter Pack Type or Gradation	10/20 sandpack	20/40	

VI. MONUMENTS

Stuckup ☐ Flushmount ☒
TOM to GS: -
TOM to TOC: -0.5
^TOC to GS: -0.5
Lock type: -

VII. MOISTURE CONTENT

Depth to Water Below GS: ~5.5

Frozen Soil Below GS	Bottom	Top
Seasonal 1		
Seasonal 2		
Permafrost 1		
Permafrost 2		

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

VIII. CALCULATIONS BELOW GROUND SURFACE

TOC to BOW: 20.12
- BOW to BOS: 0.41
= TOC to BOS: 19.71

TOC to BOS: 19.71
- Screened Length: 9.54
= TOC to TOS: 10.17

TOC to BOW	20.12
- TOC to GS	+0.5
BOW bgs	20.62
TOC to TOS	10.17
- TOC to GS	+0.5
TOS bgs	10.67
TOC to BOS	19.71
- TOC to GS	+0.5
BOS bgs	20.21

MONITORING WELL CONSTRUCTION DETAILS

Monitoring Well No. MW-TS-2
Project Name Tall Spruce
Project Number 102519-023

Date Installed 9-16-22
Logged By MSC
Driller GeoTek

I. TOP SECTION (CASING)

Initial Pipe Length 5
Cuttoff Length -0.45
Add-on Length –
Total Length 4.55

II. MID SECTION (CASING)

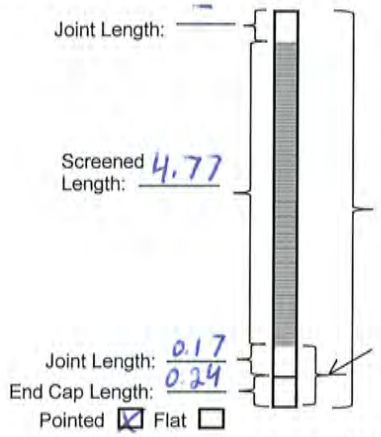
Number of Blank Sections 6
Length of Section(s):

5		

+

Sum of Lengths: 30

III. SCREENED SECTION(S)



+

Total Pipe Length: 5.18

=

TOC to BOW: 39.73

IV. WELL DATA

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

V. BACKFILL

	Depth Below GS Bottom	Top	
CEM (No Pipe)	–	–	
CEM_PB	1	0	
*SLUF_PB/FIL_PB	4	1	6-ul
BCH_PB	28	4	Bentchips + Slurry
*SLUF_PB/FIL_PB	–	–	
BGR_PB	31.5	28	Pel plug
*SLUF_PB/FIL_PB	–		
*SLUF_PS/FIL_PS	40	31.5	
*SLUF/FIL (No Pipe)	–	–	
*SLUF_PB/FIL_PB	–	–	

Filter Pack Type or Gradation 10/20 Sandpack 20/40

VI. MONUMENTS

Stuckup ☐ Flushmount ☒
TOM to GS –
TOM to TOC -0.32
^TOC to GS -0.32
Lock type –

VII. MOISTURE CONTENT

Depth to Water Below GS ~5.5

	Frozen Soil Below GS Bottom	Top
Seasonal 1		
Seasonal 2		
Permafrost 1		
Permafrost 2		

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

VIII. CALCULATIONS BELOW GROUND SURFACE

TOC to BOW 39.73
- BOW to BOS 0.41
= TOC to BOS 39.32

TOC to BOS 39.32
- Screened Length 5.18
= TOC to TOS 34.14

TOC to BOW	39.73
- TOC to GS	+0.32
BOW bgs	40.05
TOC to TOS	34.14
- TOC to GS	+ 0.32
TOS bgs	34.46
TOC to BOS	39.32
- TOC to GS	+ 0.32
BOS bgs	39.64

MONITORING WELL CONSTRUCTION DETAILS

Monitoring Well No. MW-TS-3
Project Name Tall Spruce
Project Number 102519-023

Date Installed 9-16-22
Logged By MSC
Driller GeoTek

I. TOP SECTION (CASING)

Initial Pipe Length	5
Cuttoff Length	-0.9
Add-on Length	-
Total Length	4.1

II. MID SECTION (CASING)

Number of Blank Sections: 10

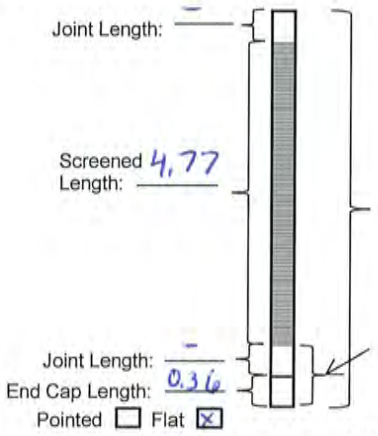
Length of Section(s):

5		

+

Sum of Lengths: 50

III. SCREENED SECTION(S)



+

Total Pipe Length: 5.13

=

TOC to BOW: 59.23

IV. WELL DATA

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

V. BACKFILL

	Depth Below GS Bottom	Top	
CEM (No Pipe)	-	-	
CEM_PB	1	0	
*SLUF_PB/FIL_PB	4	1	GRVL
BCH_PB	47	4	Bent chips + slurry
*SLUF_PB/FIL_PB	-	-	
BGR_PB	51.5	47	pel plug
*SLUF_PB/FIL_PB	-	-	
*SLUF_PS/FIL_PS	60	51.5	
*SLUF/FIL (No Pipe)	-	-	
*SLUF_PB/FIL_PB	-	-	

Filter Pack Type or Gradation: 10/20 Sandpack 20/40

VI. MONUMENTS

Stuckup ☐ Flushmount ☒

TOM to GS	-
TOM to TOC	-0.34
^TOC to GS	-0.34
Lock type	-

VII. MOISTURE CONTENT

Depth to Water Below GS: ~5.5

Frozen Soil Below GS

	Bottom	Top
Seasonal 1		
Seasonal 2		
Permafrost 1		
Permafrost 2		

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

VIII. CALCULATIONS BELOW GROUND SURFACE

TOC to BOW	59.23
- BOW to BOS	0.36
= TOC to BOS	58.87
TOC to BOS	58.87
- Screened Length	5.13
= TOC to TOS	53.74

TOC to BOW	59.23
- TOC to GS	+0.34
BOW bgs	59.57
TOC to TOS	53.74
- TOC to GS	+0.34
TOS bgs	54.08
TOC to BOS	58.87
- TOC to GS	+0.34
BOS bgs	59.21

MONITORING WELL CONSTRUCTION DETAILS

Monitoring Well No. MW-TS-4
Project Name Tall Spruce
Project Number 102519-023

Date Installed 9-17-22
Logged By MSC
Driller GeoTek

I. TOP SECTION (CASING)

Initial Pipe Length	10
Cuttoff Length	-0.65
Add-on Length	-
Total Length	9.35

II. MID SECTION (CASING)

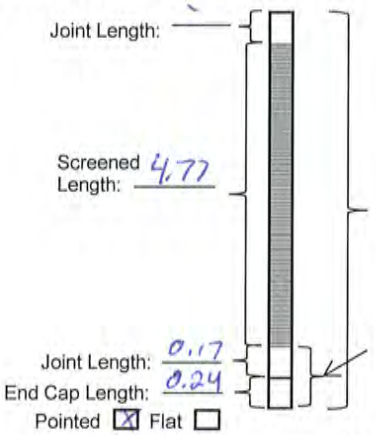
Number of Blank Sections: 9
Length of Section(s):

5	5	
4	10	

+

Sum of Lengths: 65

III. SCREENED SECTION(S)



+

Total Pipe Length: 5.18

=

TOC to BOW: 79.53

IV. WELL DATA

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

V. BACKFILL

	Depth Below GS Bottom	Top	
CEM (No Pipe)	-	-	
CEM_PB	1	0	
*SLUF_PB/FIL_PB	5	1	Grout
BCH_PB	-	-	
*SLUF_PB/FIL_PB	-	-	
BGR_PB	10	5	Pel plug
*SLUF_PB/FIL_PB	75	10	slurry + pel plug
*SLUF_PS/FIL_PS	80	75	
*SLUF/FIL (No Pipe)	-	-	
*SLUF_PB/FIL_PB	-	-	

Filter Pack Type or Gradation: 10/20 sand pre pack 20/40

VI. MONUMENTS

Stuckup ☐ Flushmount ☒

TOM to GS	-
TOM to TOC	-0.25
^TOC to GS	-0.25
Lock type	-

VII. MOISTURE CONTENT

Depth to Water Below GS: ~5.5

Frozen Soil Below GS	Bottom	Top
Seasonal 1		
Seasonal 2		
Permafrost 1		
Permafrost 2		

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

VIII. CALCULATIONS BELOW GROUND SURFACE

TOC to BOW	79.53
- BOW to BOS	0.41
= TOC to BOS	79.12
TOC to BOS	79.12
- Screened Length	5.18
= TOC to TOS	73.94

TOC to BOW	79.53
- TOC to GS	+0.25
BOW bgs	79.78
TOC to TOS	73.94
- TOC to GS	+0.25
TOS bgs	74.19
TOC to BOS	79.12
- TOC to GS	+0.25
BOS bgs	79.37

WELL DEVELOPMENT LOG

Owner-Client: FAI
Location: Tall Spruce Rd.
Weather: Overcast
Development Personnel: MSC

Well No. ~~102519-023~~ MW-TS-1
Project No: 102519-023
Date: 9-19-22

Diameter and Type of Casing: 2"
Total Depth of Well **Before** Development (feet below top of casing): 20.23
Depth to Water **Before** Development (feet below top of casing): 6.45
Depth to Screen Top and Bottom (from Construction Log): Top: 10 Bottom: 20

Development Details

Feet of water in well: 13.90
Gallons per foot: 0.17
Gallons in well: 2.36
Surge method: Surge block
Pump used: Waterra
Tubing used (ft): 30

Time pumping started: 10:37
Flow rate (gal/min): 0.75 gal/min
Flow-rate measurement method: Cup + timer
Time pumping ended: 11:52
Gallons Pumped: ~56.25
Disposal: GAC

Depth to Water **After** Development (feet below top of casing): 6.47
Total Depth of Well **After** Development (feet below top of casing): 20.43

Observations

Time	Water Clarity (Visual)
10:43	Turbid
10:48	" "
10:53	" "
10:58	" "
11:03	" "
11:08	" "
11:18	" "
11:27	" "
11:32	Cloudy
11:37	" "

Time	Water Clarity (Visual)
11:52	Slightly cloudy to clear

NOTES:

WELL CASING VOLUMES

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

WELL DEVELOPMENT LOG

Owner-Client: FAI
Location: Tall Spruce Rd.
Weather: Overcast
Development Personnel: MSC

Well No.: MW-TS-2
Project No: 102519-023
Date: 9-19-22

Diameter and Type of Casing: 2"
Total Depth of Well **Before** Development (feet below top of casing): 39.89
Depth to Water **Before** Development (feet below top of casing): 6.61
Depth to Screen Top and Bottom (from Construction Log): Top: 35 Bottom: 40

Development Details

Feet of water in well: 33.28
Gallons per foot: 0.17
Gallons in well: 5.66
Surge method: Surge block
Pump used: Waterra
Tubing used (ft): 55

Time pumping started: 1314
Flow rate (gal/min): 0.75
Flow-rate measurement method: Cup + timer
Time pumping ended: 1346
Gallons Pumped: 24
Disposal: GAC

Depth to Water **After** Development (feet below top of casing): 6.64
Total Depth of Well **After** Development (feet below top of casing): 39.89

Observations

Time	Water Clarity (Visual)
1319	Turbid
1324	Cloudy
1329	Cloudy
1334	~~Cloudy~~ Clear
1339	Clear
1346	Clear

Time	Water Clarity (Visual)

NOTES:

WELL CASING VOLUMES

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

WELL DEVELOPMENT LOG

Owner-Client: FAI
Location: Tall Spruce Rd.
Weather: Overcast
Development Personnel: MSC

Well No.: MW-TS-3
Project No: 102519-023
Date: 9-19-22

Diameter and Type of Casing: 2"
Total Depth of Well **Before** Development (feet below top of casing): 59.44
Depth to Water **Before** Development (feet below top of casing): 6.85
Depth to Screen Top and Bottom (from Construction Log): Top: 55 Bottom: 60

Development Details

Feet of water in well: 52.59
Gallons per foot: 0.17
Gallons in well: 8.94
Surge method: Surge block
Pump used: Waterra
Tubing used (ft): 85

Time pumping started: 15:47
Flow rate (gal/min): 0.75
Flow-rate measurement method: Cup + timer
Time pumping ended: 16:15
Gallons Pumped: ~21
Disposal: GAC

Depth to Water **After** Development (feet below top of casing): 6.87
Total Depth of Well **After** Development (feet below top of casing): 58.69 + .75 = 59.44

Observations

Time	Water Clarity (Visual)
15:52	Turbid
15:57	Turbid
16:02	Cloudy
16:07	Slightly Cloudy
16:12	Clear
16:15	Clear

Time	Water Clarity (Visual)

NOTES:

WELL CASING VOLUMES

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

WELL DEVELOPMENT LOG

Owner-Client: FAI
Location: Tall Spruce Rd.
Weather: Rain
Development Personnel: MSC

Well No.: MW-TS-4
Project No: 102519-023
Date: 9-19-22

Diameter and Type of Casing: 2"
Total Depth of Well **Before** Development (feet below top of casing): 80.35
Depth to Water **Before** Development (feet below top of casing): 7.01
Depth to Screen Top and Bottom (from Construction Log): Top: 75 Bottom: 80

Development Details

Feet of water in well: 73.34
Gallons per foot: 0.17
Gallons in well: 12.47
Surge method: Surge block
Pump used: Waterra
Tubing used (ft): 115

Time pumping started: 17:26
Flow rate (gal/min): 0.75
Flow-rate measurement method: Cup + timer
Time pumping ended: 18:03
Gallons Pumped: ~28
Disposal: GAC

Depth to Water **After** Development (feet below top of casing): 7.02
Total Depth of Well **After** Development (feet below top of casing): 80.35

Observations

Time	Water Clarity (Visual)
1735	Turbid
1740	Cloudy
1745	Cloudy
1750	Slightly Cloudy
1755	" "
1805	" "

Time	Water Clarity (Visual)

NOTES:

WELL CASING VOLUMES

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

MONITORING WELL SAMPLING LOG

Owner/Client: FAI
Location: Tall Spruce Rd.
Sampling Personnel: MSC
Weather Conditions: Overcast Air Temp. (°F): 50

Project No.: 102519-023
Date: 9-19-22
Well: MW-TS-1
Time started: 1210
Time completed: 1243

Sample No.: MW-TS-1 Time: 1241
Duplicate: — Time: —
Equipment Blank: — Time: —

Pump: Peri B
Purging Method: ~~portable~~ / *dedicated pump*
Pumping Start: 1224
Purge Rate (gal./min.): 0.2
Pumping End: 1241

Pump Set Depth Below MP (ft.): 20
KuriTec Tubing (ft.): —
TruPoly Tubing (ft.): ~~30~~ 3.7 0.6

Diameter and Type of Casing: 2"
Approximate Total Depth of Well Below MP (ft.): 20
Measured Total Depth of Well Below MP (ft.): 20.43
Depth to Water Below MP (ft.): 6.47
Depth to Ice (if frozen) Below MP (ft.): —
Feet of Water in Well: 13.96
Gallons per foot: 0.17
Gallons in Well: 2.37
Purge Water Volume (gal.): 3.5
Purge Water Disposal: GAC

Monument Condition: good
Casing Condition: good

Wiring Condition (dedicated pumps): —

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

Top-of-casing to monument (ft.): -.46
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: No

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 YSI B Circle one: *Parameters stabilized or >3 well volumes purged*

Sample Observations (Post development

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)
1226	2.0	0.77	406.5	6.92	108.3	Slightly Cloudy
1229	2.0	0.79	402.9	6.97	86.7	Clear
1232	2.0	0.66	402.5	7.04	70.6	" "
1235	2.0	0.60	402.9	7.06	58.9	" "
1238	2.0	0.53	404.2	7.08	51.1	" "
1241	Sample					

Laboratory SGS

	Analysis	Sample Containers	Preservatives	Dup
☑	PFAS			☐
☐				☐
☐				☐
☐				☐
☐				☐
☐				☐

Well No.
MW-TS-1

MONITORING WELL SAMPLING LOG

Owner/Client: FAI
Location: Tall Spruce Rd.
Sampling Personnel: MSC
Weather Conditions: Overcast Air Temp. (°F): 50

Project No.: 102519-023
Date: 9-19-22
Well: MW-TS-2
Time started: 1357
Time completed: 1430

Sample No.: MW-TS-2 Time: 1425
Duplicate: — Time: —
Equipment Blank: — Time: —

Pump: Peri
Purging Method: ~~portable~~ / dedicated pump
Pumping Start: 1409
Purge Rate (gal./min.): 0.2
Pumping End: 1425

Pump Set Depth Below MP (ft.): 39
KuriTec Tubing (ft.): —
TruPoly Tubing (ft.): 50
Sili 0.5

Diameter and Type of Casing: 2"
Approximate Total Depth of Well Below MP (ft.): 40
Measured Total Depth of Well Below MP (ft.): 39.89
Depth to Water Below MP (ft.): 6.64
Depth to Ice (if frozen) Below MP (ft.): —
Feet of Water in Well: 33.25
Gallons per foot: 0.17
Gallons in Well: 5.65
Purge Water Volume (gal.): 5.5
Purge Water Disposal: GAC

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

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

Top-of-casing to monument (ft.): -0.39
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: No

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: YSI B Circle one: *Parameters stabilized or >3 well volumes purged*

Sample Observations: post development

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)
1410	2.3	5.08	298.5	7.03	90.0	Clear
1413	2.3	2.25	303.0	7.15	67.8	" "
1416	2.4	1.55	304.9	7.24	50.6	" "
1419	2.4	0.56	305.8	7.29	36.4	" "
1422	2.4	0.51	304.7	7.32	23.2	" "
1425	Samp					

Laboratory: SGS

	Analysis	Sample Containers	Preservatives	Dup
☐ ✓	PFAS			☐
☐				☐
☐				☐
☐				☐
☐				☐
☐				☐

MW-TS-2

Well No.

MONITORING WELL SAMPLING LOG

Owner/Client: FAI
Location: Tall Spruce Rd
Sampling Personnel: MSC
Weather Conditions: Overcast
Air Temp. (°F): 50

Project No.: 102519-023
Date: 9-19-22
Well: MW-TS-3
Time started: 1623
Time completed: 1655

Sample No.: MW-TS-3 — Time: 1648
Duplicate: — — Time: —
Equipment Blank: — — Time: —

Pump: Peri
Purging Method: portable / dedicated pump
Pumping Start: 1632
Purge Rate (gal./min.): 0.2
Pumping End: 1648

Pump Set Depth Below MP (ft.): 59
KuriTec Tubing (ft.): —
TruPoly Tubing (ft.): 70
5:1: 0.5

Diameter and Type of Casing: 2"
Approximate Total Depth of Well Below MP (ft.): 60
Measured Total Depth of Well Below MP (ft.): 59.44
Depth to Water Below MP (ft.): 6.87
Depth to Ice (if frozen) Below MP (ft.): —
Feet of Water in Well: 52.57
Gallons per foot: 0.17
Gallons in Well: 8.94
Purge Water Volume (gal.): 3.5
Purge Water Disposal: GAC

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

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

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

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

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

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

RO

MONITORING WELL SAMPLING LOG

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

Sample Observations Post development

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)
1633	2.9	8.32	208.5	7.74	135.8	Slightly cloudy
1636	2.9	4.05	203.8	7.14	96.5	" "
1639	2.9	0.85	203.9	7.63	46.2	" "
1642	2.9	0.60	202.2	7.58	12.2	" "
1645	2.9	0.54	201.7	7.54	-14.8	" "
1648	Sample					

Laboratory SGS

	Analysis	Sample Containers	Preservatives	Dup
☑	PFAS			☐
☐				☐
☐				☐
☐				☐
☐				☐
☐				☐

MW-TS-3
Well No.

MONITORING WELL SAMPLING LOG

Owner/Client FAI
Location Tall Spruce
Sampling Personnel MSC
Weather Conditions Rain Air Temp. (°F) 45

Project No. 10259-023
Date 9-19-22
Well MW-TS-4
Time started 1818
Time completed 1900

Sample No. MW-TS-4 Time 1847
Duplicate MW-TS-104 Time 1837
Equipment Blank ~~EB-TS-4~~ Time —

Pump PLS
Purging Method portable / dedicated pump
Pumping Start 1831
Purge Rate (gal./min.) 0.2
Pumping End 1847

Pump Set Depth Below MP (ft.) 80
KuriTec Tubing (ft.) —
TruPoly Tubing (ft.) 90
Still 0.5

Diameter and Type of Casing 2"
Approximate Total Depth of Well Below MP (ft.) 80
Measured Total Depth of Well Below MP (ft.) 80.35
Depth to Water Below MP (ft.) 7.02
Depth to Ice (if frozen) Below MP (ft.) —
Feet of Water in Well 73.33
Gallons per foot 0.17
Gallons in Well 12.47
Purge Water Volume (gal.) 3.5
Purge Water Disposal GAC

Monument Condition good
Casing Condition good

Wiring Condition (dedicated pumps) —

Measuring Point (MP) Top of Casing (TOC)

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

Top-of-casing to monument (ft.) -0.30
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 No

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

MW-TS-4
Well No.

MONITORING WELL SAMPLING LOG

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

Sample Observations: Post development

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)
1832	3.4	9.07	203.1	7.53	113.0	Slightly cloudy
1835	3.5	5.09	196.7	7.39	83.7	" "
1838	3.4	4.07	192.9	7.35	66.9	" "
1841	3.4	3.19	192.1	7.32	51.5	" "
1844	3.4	1.95	190.4	7.31	37.0	Clear
1847	Sample					

Laboratory: SGS

	Analysis	Sample Containers	Preservatives	Dup
☑	PFAS			☑
☐				☐
☐				☐
☐				☐
☐				☐
☐				☐

MW-TS-4
Well No.

FIELD ACTIVITIES DAILY LOG

Date 9-15-22

Sheet 1 of 1

Project No. 102S19-023

Project Name: Tall Spruce

Field Activity Subject: MW Installation

Calibration: N/A

Description of daily activities and events:

6:15 MSC arrives at office to pack truck for drilling activities

7:15 MSC and GeoTek arrive onsite

8:33 Drilling begins

10:12 Switch from dual core to macrocore at 35'

10:40 Continue drilling

18:06 Finish drilling hole SB-TS-4, collapsed to WT ~5.5ft, pea gravel + Concrete mix to top

19:17 Leave Site

Visitors on site:

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

Weather conditions: Overcast

Important telephone calls:

Personnel on site:

Signature: Mason D. Cukan Date: 9-15-22

Rev. 5-9-22

FIELD ACTIVITIES DAILY LOG

Date 9-16-22

Sheet 1 of 1

Project No. 102519-023

Project Name: Tall Spruce

Field Activity Subject: MW installation

Calibration: N/A

Description of daily activities and events:

7:45 leave office

8:00 arrive onsite

8:50 begin drilling MW-TS-1

9:55 Finish MW-TS-1 to bent chips, grvl + cement at EOD

10:20 begin drilling MW-TS-1 to bent chips, grvl + cement at EOD

11:40 Finish MW-TS-2 to bent chips, grvl + cement at EOD

12:50 begin drilling MW-TS-3

14:45 Finish MW-TS-3 to bent chips, grvl + cement at EOD

16:55 Finish cementing all 3 wells

17:00 leave site

Visitors on site:

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

Weather conditions: Overcast

Important telephone calls:

Personnel on site:

Signature: Mason D. Crabb

Date: 9-16-22

Rev. 5-9-22

FIELD ACTIVITIES DAILY LOG

Date 9-17-22

Sheet 1 of 1

Project No. 102519-023

Project Name: Tall Spruce

Field Activity Subject: MW install

Calibration: N/A

Description of daily activities and events:

7:15 arrive at office

8:00 arrive onsite

9:00 Start MW-TS-4

9:50 Stop drilling

11:45 Wells complete and finished cleaning up the site

12:00 leave site

12:20 return to office

Visitors on site:

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

Weather conditions: overcast

Important telephone calls:

Personnel on site:

Signature: Mason S. Cahn Date: 9-17-22

Rev. 5-9-22

FIELD ACTIVITIES DAILY LOG

Date 9-19-22

Sheet 1 of 1

Project No. 10259-023

Project Name: Tall Spruce

Field Activity Subject: MW Sampling

Calibration: Calibrated YSI prior to leaving the office

Description of daily activities and events:

7:30 arrive at SW office and begin packing

9:00 arrive onsite

9:25 begin development of MW-TS-1

12:43 finish Sampling MW-TS-1

12:50 begin MW-TS-2

14:30 finish sampling MW-TS-2

15:10 begin MW-TS-3

16:55 finish sampling MW-TS-3

17:00 begin MW-TS-4

19:00 finish Sampling MW-TS-4

20:20 leave Site

Visitors on site:

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

Weather conditions: Rain

Important telephone calls:

Personnel on site:

Signature: Mason S. Crafton Date: 9-19-22

Rev. 5-9-22

FIELD ACTIVITIES DAILY LOG

Date 9-20-22

Sheet 1 of 1

Project No. 102519-023

Project Name: Tall Spruce

Field Activity Subject: MW Installation

Calibration: N/A

Description of daily activities and events:

7:15 arrive at office

8:30 arrive onsite and begin GACing

10:00 leave site, head to SW office to unpack and do paperwork

Visitors on site:

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

Weather conditions: Overcast

Important telephone calls:

Personnel on site:

Signature: Warren S. Craker

Date: 9-20-22

Rev. 5-9-22

APPENDIX B: ANALYTICAL RESULTS

Appendix B

Analytical Results

CONTENTS

APPENDIX B: ANALYTICAL RESULTS

QA/QC SUMMARY

Quality Assurance/Quality Control (QA/QC) procedures assist in producing data of acceptable quality and reliability. Shannon & Wilson, Inc. (S&W) conducted a Level II review of the laboratory deliverables, following the Alaska Department of Environmental Conservation's (DEC) Laboratory Data Review Checklist (LDRC). Staff reviewed the chain-of-custody records and laboratory-receipt forms to verify custody was not breached, sample holding-times were met, and the samples were properly handled from the point of collection through analysis by the laboratory. QA review procedures document the accuracy and precision of the analytical data, as well as check the analyses were sufficiently sensitive to detect analytes at levels below regulatory standards. Our review of laboratory QC procedures included evaluating surrogate recovery, method blank detections, and analyte recovery in laboratory control samples/duplicate samples to assess method accuracy and precision.

Our review of the laboratory deliverables identified minor discrepancies with the laboratory's matrix spike and matrix spike duplicate. However, these discrepancies did not have an effect on the project sample results.

The laboratory applied the J-flag to detections reported at concentrations below the reporting limit but greater than the method detection limit; these "flagged" datum are considered estimated concentrations due to them being too low for the instrument to accurately quantify. No other qualifiers were applied to the project samples.

By working in general accordance with the proposed scope of services, S&W considers the samples collected for this project to be representative of site conditions at the locations and times they were obtained. Based on the QA review, no samples were rejected as unusable due to QC failures. In general, the quality of the analytical data for this project does not appear to have been compromised by analytical irregularities and is adequate for the purposes of the assessment.

eurofins | Environment Testing

ANALYTICAL REPORT

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

Laboratory Job ID: 320-92292-1
Client Project/Site: Tall Spruce

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

Attn: Ashley Jaramillo

Authorized for release by:
11/7/2022 2:45:57 PM

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

Table of Contents

Definitions/Glossary

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

Job ID: 320-92292-1

Qualifiers

LCMS

Qualifier	Qualifier Description
*5-	Isotope dilution analyte is outside acceptance limits, low biased.
F1	MS and/or MSD recovery exceeds control limits.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	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: 320-92292-1

Laboratory: Eurofins Sacramento

Narrative

Job Narrative
320-92292-1

Receipt
The samples were received on 9/21/2022 3:10 PM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 5.8º C.

LCMS
Method EPA 537(Mod): The "I" qualifier means the transition mass ratio for the indicated analyte was above the established ratio limits. The qualitative identification of the analyte has some degree of uncertainty, and the reported value may have some high bias. However, analyst judgment was used to positively identify the analyte. (320-91846-B-5-A)

Method EPA 537(Mod): The Isotope Dilution Analyte (IDA) recovery associated with the following samples is below the method recommended limit: SB-TS-4-4 (320-92292-10), (320-92292-A-10-E MS) and (320-92292-A-10-F MSD). Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the samples.

Method EPA 537(Mod): The Isotope Dilution Analyte (IDA) recovery associated with the following samples is below the method recommended limit: (320-91846-B-5-A), (320-91846-B-5-B MS) and (320-91846-B-5-C MSD). Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the samples.

Method EPA 537(Mod): The matrix spike / matrix spike duplicate (MS/MSD) recoveries for preparation batch 320-620634 and analytical batch 320-621578 were outside control limits. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits.

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

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

Organic Prep
Method 3535: The following samples in preparation batch 320-620634 were observed to have a thin layer of sediment present in the bottom of the bottle prior to extraction. MW-TS-1 (320-92292-1), MW-TS-2 (320-92292-2), MW-TS-3 (320-92292-3), MW-TS-4 (320-92292-4), MW-TS-104 (320-92292-5) and GAC (320-92292-6)

Method 3535: During the solid phase extraction process, the following samples contain non-settable particulates which clogged the solid phase extraction column: MW-TS-1 (320-92292-1), MW-TS-2 (320-92292-2), MW-TS-3 (320-92292-3), MW-TS-4 (320-92292-4), MW-TS-104 (320-92292-5) and GAC (320-92292-6).
preparation batch 320-620634

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: 320-92292-1

Client Sample ID: MW-TS-1 — Lab Sample ID: 320-92292-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	2.2		1.9	0.55	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.6	J	1.9	0.24	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	3.4		1.9	0.80	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.66	J	1.9	0.19	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	2.1		1.9	0.54	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.1	J	1.9	0.51	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-TS-2 — Lab Sample ID: 320-92292-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	1.7	J	1.8	0.54	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	2.3		1.8	0.79	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.69	J	1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	2.6		1.8	0.53	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.8		1.8	0.50	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-TS-3 — Lab Sample ID: 320-92292-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	2.2		1.8	0.77	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.31	J	1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	2.3		1.8	0.52	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.7	J	1.8	0.49	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-TS-4 — Lab Sample ID: 320-92292-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	3.5		1.9	0.54	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.3	J	1.9	0.23	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	3.3		1.9	0.79	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.42	J	1.9	0.25	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	1.8	J	1.9	0.19	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	3.2		1.9	0.53	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.8	J	1.9	0.51	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-TS-104 — Lab Sample ID: 320-92292-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	3.1		1.8	0.53	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.99	J	1.8	0.23	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	2.9		1.8	0.78	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.37	J	1.8	0.25	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	1.5	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)	1.6	J	1.8	0.49	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: GAC — Lab Sample ID: 320-92292-6

No Detections.

Client Sample ID: SB-TS-4-1 — Lab Sample ID: 320-92292-7

No Detections.

This Detection Summary does not include radiochemical test results.

Eurofins Sacramento

Detection Summary

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

Job ID: 320-92292-1

Client Sample ID: SB-TS-4-2 — Lab Sample ID: 320-92292-8

No Detections.

Client Sample ID: SB-TS-4-3 — Lab Sample ID: 320-92292-9

No Detections.

Client Sample ID: SB-TS-4-4 — Lab Sample ID: 320-92292-10

No Detections.

Client Sample ID: SB-TS-4-5 — Lab Sample ID: 320-92292-11

No Detections.

Client Sample ID: SB-TS-4-6 — Lab Sample ID: 320-92292-12

No Detections.

This Detection Summary does not include radiochemical test results.

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

Job ID: 320-92292-1

Client Sample ID: MW-TS-1

Date Collected: 09/19/22 12:41
Date Received: 09/21/22 15:10

Lab Sample ID: 320-92292-1

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)	**2.2**		1.9	0.55	ng/L		09/28/22 05:33	09/30/22 02:24	1
Perfluoroheptanoic acid (PFHpA)	**1.6**	**J**	1.9	0.24	ng/L		09/28/22 05:33	09/30/22 02:24	1
Perfluorooctanoic acid (PFOA)	**3.4**		1.9	0.80	ng/L		09/28/22 05:33	09/30/22 02:24	1
Perfluorononanoic acid (PFNA)	ND		1.9	0.26	ng/L		09/28/22 05:33	09/30/22 02:24	1
Perfluorodecanoic acid (PFDA)	ND		1.9	0.29	ng/L		09/28/22 05:33	09/30/22 02:24	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	1.0	ng/L		09/28/22 05:33	09/30/22 02:24	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.52	ng/L		09/28/22 05:33	09/30/22 02:24	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	1.2	ng/L		09/28/22 05:33	09/30/22 02:24	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.69	ng/L		09/28/22 05:33	09/30/22 02:24	1
Perfluorobutanesulfonic acid (PFBS)	**0.66**	**J**	1.9	0.19	ng/L		09/28/22 05:33	09/30/22 02:24	1
Perfluorohexanesulfonic acid (PFHxS)	**2.1**		1.9	0.54	ng/L		09/28/22 05:33	09/30/22 02:24	1
Perfluorooctanesulfonic acid (PFOS)	**1.1**	**J**	1.9	0.51	ng/L		09/28/22 05:33	09/30/22 02:24	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.7	1.1	ng/L		09/28/22 05:33	09/30/22 02:24	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.7	1.2	ng/L		09/28/22 05:33	09/30/22 02:24	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.9	0.23	ng/L		09/28/22 05:33	09/30/22 02:24	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.8	1.4	ng/L		09/28/22 05:33	09/30/22 02:24	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.9	0.30	ng/L		09/28/22 05:33	09/30/22 02:24	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.38	ng/L		09/28/22 05:33	09/30/22 02:24	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*67*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:24*	*1*
13C4 PFHpA	*62*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:24*	*1*
13C4 PFOA	*68*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:24*	*1*
13C5 PFNA	*65*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:24*	*1*
13C2 PFDA	*71*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:24*	*1*
13C2 PFUnA	*68*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:24*	*1*
13C2 PFDoA	*67*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:24*	*1*
13C2 PFTeDA	*63*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:24*	*1*
13C3 PFBS	*60*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:24*	*1*
18O2 PFHxS	*70*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:24*	*1*
13C4 PFOS	*67*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:24*	*1*
d3-NMeFOSAA	*76*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:24*	*1*
d5-NEtFOSAA	*65*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:24*	*1*
13C3 HFPO-DA	*64*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:24*	*1*

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

Job ID: 320-92292-1

Client Sample ID: MW-TS-2

Date Collected: 09/19/22 14:25
Date Received: 09/21/22 15:10

Lab Sample ID: 320-92292-2

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**1.7**	**J**	1.8	0.54	ng/L		09/28/22 05:33	09/30/22 02:34	1
Perfluoroheptanoic acid (PFHpA)	ND		1.8	0.23	ng/L		09/28/22 05:33	09/30/22 02:34	1
Perfluorooctanoic acid (PFOA)	**2.3**		1.8	0.79	ng/L		09/28/22 05:33	09/30/22 02:34	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.25	ng/L		09/28/22 05:33	09/30/22 02:34	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.29	ng/L		09/28/22 05:33	09/30/22 02:34	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	1.0	ng/L		09/28/22 05:33	09/30/22 02:34	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.51	ng/L		09/28/22 05:33	09/30/22 02:34	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		09/28/22 05:33	09/30/22 02:34	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.68	ng/L		09/28/22 05:33	09/30/22 02:34	1
Perfluorobutanesulfonic acid (PFBS)	**0.69**	**J**	1.8	0.18	ng/L		09/28/22 05:33	09/30/22 02:34	1
Perfluorohexanesulfonic acid (PFHxS)	**2.6**		1.8	0.53	ng/L		09/28/22 05:33	09/30/22 02:34	1
Perfluorooctanesulfonic acid (PFOS)	**1.8**		1.8	0.50	ng/L		09/28/22 05:33	09/30/22 02:34	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.6	1.1	ng/L		09/28/22 05:33	09/30/22 02:34	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.6	1.2	ng/L		09/28/22 05:33	09/30/22 02:34	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		09/28/22 05:33	09/30/22 02:34	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.7	1.4	ng/L		09/28/22 05:33	09/30/22 02:34	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.30	ng/L		09/28/22 05:33	09/30/22 02:34	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.37	ng/L		09/28/22 05:33	09/30/22 02:34	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*82*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:34*	*1*
13C4 PFHpA	*79*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:34*	*1*
13C4 PFOA	*88*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:34*	*1*
13C5 PFNA	*80*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:34*	*1*
13C2 PFDA	*84*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:34*	*1*
13C2 PFUnA	*82*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:34*	*1*
13C2 PFDoA	*81*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:34*	*1*
13C2 PFTeDA	*78*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:34*	*1*
13C3 PFBS	*79*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:34*	*1*
18O2 PFHxS	*88*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:34*	*1*
13C4 PFOS	*81*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:34*	*1*
d3-NMeFOSAA	*89*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:34*	*1*
d5-NEtFOSAA	*81*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:34*	*1*
13C3 HFPO-DA	*85*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:34*	*1*

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

Job ID: 320-92292-1

Client Sample ID: MW-TS-3

Date Collected: 09/19/22 16:48
Date Received: 09/21/22 15:10

Lab Sample ID: 320-92292-3

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)	ND		1.8	0.52	ng/L		09/28/22 05:33	09/30/22 02:45	1
Perfluoroheptanoic acid (PFHpA)	ND		1.8	0.23	ng/L		09/28/22 05:33	09/30/22 02:45	1
Perfluorooctanoic acid (PFOA)	**2.2**		1.8	0.77	ng/L		09/28/22 05:33	09/30/22 02:45	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.24	ng/L		09/28/22 05:33	09/30/22 02:45	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		09/28/22 05:33	09/30/22 02:45	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.99	ng/L		09/28/22 05:33	09/30/22 02:45	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.50	ng/L		09/28/22 05:33	09/30/22 02:45	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		09/28/22 05:33	09/30/22 02:45	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.66	ng/L		09/28/22 05:33	09/30/22 02:45	1
Perfluorobutanesulfonic acid (PFBS)	**0.31**	**J**	1.8	0.18	ng/L		09/28/22 05:33	09/30/22 02:45	1
Perfluorohexanesulfonic acid (PFHxS)	**2.3**		1.8	0.52	ng/L		09/28/22 05:33	09/30/22 02:45	1
Perfluorooctanesulfonic acid (PFOS)	**1.7**	**J**	1.8	0.49	ng/L		09/28/22 05:33	09/30/22 02:45	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		09/28/22 05:33	09/30/22 02:45	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		09/28/22 05:33	09/30/22 02:45	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		09/28/22 05:33	09/30/22 02:45	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.4	ng/L		09/28/22 05:33	09/30/22 02:45	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		09/28/22 05:33	09/30/22 02:45	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		09/28/22 05:33	09/30/22 02:45	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*78*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:45*	*1*
13C4 PFHpA	*70*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:45*	*1*
13C4 PFOA	*78*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:45*	*1*
13C5 PFNA	*71*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:45*	*1*
13C2 PFDA	*76*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:45*	*1*
13C2 PFUnA	*72*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:45*	*1*
13C2 PFDoA	*68*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:45*	*1*
13C2 PFTeDA	*68*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:45*	*1*
13C3 PFBS	*74*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:45*	*1*
18O2 PFHxS	*76*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:45*	*1*
13C4 PFOS	*67*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:45*	*1*
d3-NMeFOSAA	*78*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:45*	*1*
d5-NEtFOSAA	*77*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:45*	*1*
13C3 HFPO-DA	*76*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:45*	*1*

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

Job ID: 320-92292-1

Client Sample ID: MW-TS-4

Date Collected: 09/19/22 18:47
Date Received: 09/21/22 15:10

Lab Sample ID: 320-92292-4

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)	**3.5**		1.9	0.54	ng/L		09/28/22 05:33	09/30/22 02:55	1
Perfluoroheptanoic acid (PFHpA)	**1.3**	**J**	1.9	0.23	ng/L		09/28/22 05:33	09/30/22 02:55	1
Perfluorooctanoic acid (PFOA)	**3.3**		1.9	0.79	ng/L		09/28/22 05:33	09/30/22 02:55	1
Perfluorononanoic acid (PFNA)	**0.42**	**J**	1.9	0.25	ng/L		09/28/22 05:33	09/30/22 02:55	1
Perfluorodecanoic acid (PFDA)	ND		1.9	0.29	ng/L		09/28/22 05:33	09/30/22 02:55	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	1.0	ng/L		09/28/22 05:33	09/30/22 02:55	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.51	ng/L		09/28/22 05:33	09/30/22 02:55	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	1.2	ng/L		09/28/22 05:33	09/30/22 02:55	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.68	ng/L		09/28/22 05:33	09/30/22 02:55	1
Perfluorobutanesulfonic acid (PFBS)	**1.8**	**J**	1.9	0.19	ng/L		09/28/22 05:33	09/30/22 02:55	1
Perfluorohexanesulfonic acid (PFHxS)	**3.2**		1.9	0.53	ng/L		09/28/22 05:33	09/30/22 02:55	1
Perfluorooctanesulfonic acid (PFOS)	**1.8**	**J**	1.9	0.51	ng/L		09/28/22 05:33	09/30/22 02:55	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.7	1.1	ng/L		09/28/22 05:33	09/30/22 02:55	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.7	1.2	ng/L		09/28/22 05:33	09/30/22 02:55	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.9	0.22	ng/L		09/28/22 05:33	09/30/22 02:55	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.7	1.4	ng/L		09/28/22 05:33	09/30/22 02:55	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.9	0.30	ng/L		09/28/22 05:33	09/30/22 02:55	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.37	ng/L		09/28/22 05:33	09/30/22 02:55	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*93*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:55*	*1*
13C4 PFHpA	*88*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:55*	*1*
13C4 PFOA	*91*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:55*	*1*
13C5 PFNA	*86*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:55*	*1*
13C2 PFDA	*87*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:55*	*1*
13C2 PFUnA	*84*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:55*	*1*
13C2 PFDoA	*74*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:55*	*1*
13C2 PFTeDA	*74*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:55*	*1*
13C3 PFBS	*85*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:55*	*1*
18O2 PFHxS	*93*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:55*	*1*
13C4 PFOS	*83*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:55*	*1*
d3-NMeFOSAA	*86*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:55*	*1*
d5-NEtFOSAA	*84*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:55*	*1*
13C3 HFPO-DA	*86*		*50 - 150*	*09/28/22 05:33*	*09/30/22 02:55*	*1*

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

Job ID: 320-92292-1

Client Sample ID: MW-TS-104
Date Collected: 09/19/22 18:37
Date Received: 09/21/22 15:10

Lab Sample ID: 320-92292-5
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)	**3.1**		1.8	0.53	ng/L		09/28/22 05:33	09/30/22 03:05	1
Perfluoroheptanoic acid (PFHpA)	**0.99**	**J**	1.8	0.23	ng/L		09/28/22 05:33	09/30/22 03:05	1
Perfluorooctanoic acid (PFOA)	**2.9**		1.8	0.78	ng/L		09/28/22 05:33	09/30/22 03:05	1
Perfluorononanoic acid (PFNA)	**0.37**	**J**	1.8	0.25	ng/L		09/28/22 05:33	09/30/22 03:05	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		09/28/22 05:33	09/30/22 03:05	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	1.0	ng/L		09/28/22 05:33	09/30/22 03:05	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.50	ng/L		09/28/22 05:33	09/30/22 03:05	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		09/28/22 05:33	09/30/22 03:05	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.67	ng/L		09/28/22 05:33	09/30/22 03:05	1
Perfluorobutanesulfonic acid (PFBS)	**1.5**	**J**	1.8	0.18	ng/L		09/28/22 05:33	09/30/22 03:05	1
Perfluorohexanesulfonic acid (PFHxS)	**3.4**		1.8	0.52	ng/L		09/28/22 05:33	09/30/22 03:05	1
Perfluorooctanesulfonic acid (PFOS)	**1.6**	**J**	1.8	0.49	ng/L		09/28/22 05:33	09/30/22 03:05	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.6	1.1	ng/L		09/28/22 05:33	09/30/22 03:05	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.6	1.2	ng/L		09/28/22 05:33	09/30/22 03:05	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		09/28/22 05:33	09/30/22 03:05	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.7	1.4	ng/L		09/28/22 05:33	09/30/22 03:05	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		09/28/22 05:33	09/30/22 03:05	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.37	ng/L		09/28/22 05:33	09/30/22 03:05	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*82*		*50 - 150*	*09/28/22 05:33*	*09/30/22 03:05*	*1*
13C4 PFHpA	*75*		*50 - 150*	*09/28/22 05:33*	*09/30/22 03:05*	*1*
13C4 PFOA	*83*		*50 - 150*	*09/28/22 05:33*	*09/30/22 03:05*	*1*
13C5 PFNA	*79*		*50 - 150*	*09/28/22 05:33*	*09/30/22 03:05*	*1*
13C2 PFDA	*80*		*50 - 150*	*09/28/22 05:33*	*09/30/22 03:05*	*1*
13C2 PFUnA	*76*		*50 - 150*	*09/28/22 05:33*	*09/30/22 03:05*	*1*
13C2 PFDoA	*68*		*50 - 150*	*09/28/22 05:33*	*09/30/22 03:05*	*1*
13C2 PFTeDA	*70*		*50 - 150*	*09/28/22 05:33*	*09/30/22 03:05*	*1*
13C3 PFBS	*76*		*50 - 150*	*09/28/22 05:33*	*09/30/22 03:05*	*1*
18O2 PFHxS	*77*		*50 - 150*	*09/28/22 05:33*	*09/30/22 03:05*	*1*
13C4 PFOS	*68*		*50 - 150*	*09/28/22 05:33*	*09/30/22 03:05*	*1*
d3-NMeFOSAA	*83*		*50 - 150*	*09/28/22 05:33*	*09/30/22 03:05*	*1*
d5-NEtFOSAA	*75*		*50 - 150*	*09/28/22 05:33*	*09/30/22 03:05*	*1*
13C3 HFPO-DA	*81*		*50 - 150*	*09/28/22 05:33*	*09/30/22 03:05*	*1*

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

Job ID: 320-92292-1

Client Sample ID: GAC

Date Collected: 09/20/22 09:30
Date Received: 09/21/22 15:10

Lab Sample ID: 320-92292-6

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	0.53	ng/L		09/28/22 05:33	09/30/22 03:15	1
Perfluoroheptanoic acid (PFHpA)	ND		1.8	0.23	ng/L		09/28/22 05:33	09/30/22 03:15	1
Perfluorooctanoic acid (PFOA)	ND		1.8	0.78	ng/L		09/28/22 05:33	09/30/22 03:15	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.25	ng/L		09/28/22 05:33	09/30/22 03:15	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		09/28/22 05:33	09/30/22 03:15	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	1.0	ng/L		09/28/22 05:33	09/30/22 03:15	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.51	ng/L		09/28/22 05:33	09/30/22 03:15	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		09/28/22 05:33	09/30/22 03:15	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.67	ng/L		09/28/22 05:33	09/30/22 03:15	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.8	0.18	ng/L		09/28/22 05:33	09/30/22 03:15	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.8	0.52	ng/L		09/28/22 05:33	09/30/22 03:15	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.8	0.50	ng/L		09/28/22 05:33	09/30/22 03:15	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.6	1.1	ng/L		09/28/22 05:33	09/30/22 03:15	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.6	1.2	ng/L		09/28/22 05:33	09/30/22 03:15	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		09/28/22 05:33	09/30/22 03:15	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.7	1.4	ng/L		09/28/22 05:33	09/30/22 03:15	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		09/28/22 05:33	09/30/22 03:15	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.37	ng/L		09/28/22 05:33	09/30/22 03:15	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*85*		*50 - 150*	*09/28/22 05:33*	*09/30/22 03:15*	*1*
13C4 PFHpA	*88*		*50 - 150*	*09/28/22 05:33*	*09/30/22 03:15*	*1*
13C4 PFOA	*85*		*50 - 150*	*09/28/22 05:33*	*09/30/22 03:15*	*1*
13C5 PFNA	*80*		*50 - 150*	*09/28/22 05:33*	*09/30/22 03:15*	*1*
13C2 PFDA	*85*		*50 - 150*	*09/28/22 05:33*	*09/30/22 03:15*	*1*
13C2 PFUnA	*81*		*50 - 150*	*09/28/22 05:33*	*09/30/22 03:15*	*1*
13C2 PFDoA	*79*		*50 - 150*	*09/28/22 05:33*	*09/30/22 03:15*	*1*
13C2 PFTeDA	*84*		*50 - 150*	*09/28/22 05:33*	*09/30/22 03:15*	*1*
13C3 PFBS	*76*		*50 - 150*	*09/28/22 05:33*	*09/30/22 03:15*	*1*
18O2 PFHxS	*82*		*50 - 150*	*09/28/22 05:33*	*09/30/22 03:15*	*1*
13C4 PFOS	*74*		*50 - 150*	*09/28/22 05:33*	*09/30/22 03:15*	*1*
d3-NMeFOSAA	*92*		*50 - 150*	*09/28/22 05:33*	*09/30/22 03:15*	*1*
d5-NEtFOSAA	*85*		*50 - 150*	*09/28/22 05:33*	*09/30/22 03:15*	*1*
13C3 HFPO-DA	*85*		*50 - 150*	*09/28/22 05:33*	*09/30/22 03:15*	*1*

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

Job ID: 320-92292-1

Client Sample ID: SB-TS-4-1

Date Collected: 09/15/22 09:12
Date Received: 09/21/22 15:10

Lab Sample ID: 320-92292-7

Matrix: Solid
Percent Solids: 82.0

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		0.23	0.036	ug/Kg	☼	09/25/22 18:55	09/26/22 15:51	1
Perfluoroheptanoic acid (PFHpA)	ND		0.23	0.044	ug/Kg	☼	09/25/22 18:55	09/26/22 15:51	1
Perfluorooctanoic acid (PFOA)	ND		0.23	0.061	ug/Kg	☼	09/25/22 18:55	09/26/22 15:51	1
Perfluorononanoic acid (PFNA)	ND		0.23	0.026	ug/Kg	☼	09/25/22 18:55	09/26/22 15:51	1
Perfluorodecanoic acid (PFDA)	ND		0.23	0.056	ug/Kg	☼	09/25/22 18:55	09/26/22 15:51	1
Perfluoroundecanoic acid (PFUnA)	ND		0.23	0.049	ug/Kg	☼	09/25/22 18:55	09/26/22 15:51	1
Perfluorododecanoic acid (PFDoA)	ND		0.23	0.035	ug/Kg	☼	09/25/22 18:55	09/26/22 15:51	1
Perfluorotridecanoic acid (PFTriA)	ND		0.23	0.024	ug/Kg	☼	09/25/22 18:55	09/26/22 15:51	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.23	0.043	ug/Kg	☼	09/25/22 18:55	09/26/22 15:51	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.23	0.044	ug/Kg	☼	09/25/22 18:55	09/26/22 15:51	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.23	0.034	ug/Kg	☼	09/25/22 18:55	09/26/22 15:51	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.23	0.050	ug/Kg	☼	09/25/22 18:55	09/26/22 15:51	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.23	0.027	ug/Kg	☼	09/25/22 18:55	09/26/22 15:51	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.23	0.056	ug/Kg	☼	09/25/22 18:55	09/26/22 15:51	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.23	0.041	ug/Kg	☼	09/25/22 18:55	09/26/22 15:51	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.23	0.048	ug/Kg	☼	09/25/22 18:55	09/26/22 15:51	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.23	0.036	ug/Kg	☼	09/25/22 18:55	09/26/22 15:51	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.23	0.045	ug/Kg	☼	09/25/22 18:55	09/26/22 15:51	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*92*		*50 - 150*	*09/25/22 18:55*	*09/26/22 15:51*	*1*
13C4 PFHpA	*93*		*50 - 150*	*09/25/22 18:55*	*09/26/22 15:51*	*1*
13C4 PFOA	*88*		*50 - 150*	*09/25/22 18:55*	*09/26/22 15:51*	*1*
13C5 PFNA	*93*		*50 - 150*	*09/25/22 18:55*	*09/26/22 15:51*	*1*
13C2 PFDA	*94*		*50 - 150*	*09/25/22 18:55*	*09/26/22 15:51*	*1*
13C2 PFUnA	*96*		*50 - 150*	*09/25/22 18:55*	*09/26/22 15:51*	*1*
13C2 PFDoA	*100*		*50 - 150*	*09/25/22 18:55*	*09/26/22 15:51*	*1*
13C2 PFTeDA	*98*		*50 - 150*	*09/25/22 18:55*	*09/26/22 15:51*	*1*
13C3 PFBS	*84*		*50 - 150*	*09/25/22 18:55*	*09/26/22 15:51*	*1*
18O2 PFHxS	*87*		*50 - 150*	*09/25/22 18:55*	*09/26/22 15:51*	*1*
13C4 PFOS	*86*		*50 - 150*	*09/25/22 18:55*	*09/26/22 15:51*	*1*
d3-NMeFOSAA	*89*		*50 - 150*	*09/25/22 18:55*	*09/26/22 15:51*	*1*
d5-NEtFOSAA	*94*		*50 - 150*	*09/25/22 18:55*	*09/26/22 15:51*	*1*
13C3 HFPO-DA	*90*		*50 - 150*	*09/25/22 18:55*	*09/26/22 15:51*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture (ASTM D 2216)	**18.0**		0.1	0.1	%			09/23/22 10:44	1
Percent Solids (ASTM D 2216)	**82.0**		0.1	0.1	%			09/23/22 10:44	1

Client Sample ID: SB-TS-4-2

Date Collected: 09/15/22 09:57
Date Received: 09/21/22 15:10

Lab Sample ID: 320-92292-8

Matrix: Solid
Percent Solids: 82.5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		0.23	0.036	ug/Kg	☼	09/25/22 18:55	09/26/22 16:01	1
Perfluoroheptanoic acid (PFHpA)	ND		0.23	0.044	ug/Kg	☼	09/25/22 18:55	09/26/22 16:01	1
Perfluorooctanoic acid (PFOA)	ND		0.23	0.062	ug/Kg	☼	09/25/22 18:55	09/26/22 16:01	1
Perfluorononanoic acid (PFNA)	ND		0.23	0.026	ug/Kg	☼	09/25/22 18:55	09/26/22 16:01	1
Perfluorodecanoic acid (PFDA)	ND		0.23	0.056	ug/Kg	☼	09/25/22 18:55	09/26/22 16:01	1
Perfluoroundecanoic acid (PFUnA)	ND		0.23	0.049	ug/Kg	☼	09/25/22 18:55	09/26/22 16:01	1
Perfluorododecanoic acid (PFDoA)	ND		0.23	0.035	ug/Kg	☼	09/25/22 18:55	09/26/22 16:01	1
Perfluorotridecanoic acid (PFTriA)	ND		0.23	0.024	ug/Kg	☼	09/25/22 18:55	09/26/22 16:01	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.23	0.043	ug/Kg	☼	09/25/22 18:55	09/26/22 16:01	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.23	0.044	ug/Kg	☼	09/25/22 18:55	09/26/22 16:01	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.23	0.034	ug/Kg	☼	09/25/22 18:55	09/26/22 16:01	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.23	0.050	ug/Kg	☼	09/25/22 18:55	09/26/22 16:01	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.23	0.027	ug/Kg	☼	09/25/22 18:55	09/26/22 16:01	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.23	0.056	ug/Kg	☼	09/25/22 18:55	09/26/22 16:01	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.23	0.041	ug/Kg	☼	09/25/22 18:55	09/26/22 16:01	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.23	0.048	ug/Kg	☼	09/25/22 18:55	09/26/22 16:01	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.23	0.036	ug/Kg	☼	09/25/22 18:55	09/26/22 16:01	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.23	0.045	ug/Kg	☼	09/25/22 18:55	09/26/22 16:01	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*91*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:01*	*1*
13C4 PFHpA	*89*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:01*	*1*
13C4 PFOA	*87*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:01*	*1*
13C5 PFNA	*89*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:01*	*1*
13C2 PFDA	*88*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:01*	*1*
13C2 PFUnA	*90*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:01*	*1*
13C2 PFDoA	*95*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:01*	*1*
13C2 PFTeDA	*95*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:01*	*1*
13C3 PFBS	*82*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:01*	*1*
18O2 PFHxS	*85*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:01*	*1*
13C4 PFOS	*83*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:01*	*1*
d3-NMeFOSAA	*82*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:01*	*1*
d5-NEtFOSAA	*94*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:01*	*1*
13C3 HFPO-DA	*88*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:01*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture (ASTM D 2216)	**17.5**		0.1	0.1	%			09/23/22 10:44	1
Percent Solids (ASTM D 2216)	**82.5**		0.1	0.1	%			09/23/22 10:44	1

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

Job ID: 320-92292-1

Client Sample ID: SB-TS-4-3

Date Collected: 09/15/22 12:45
Date Received: 09/21/22 15:10

Lab Sample ID: 320-92292-9

Matrix: Solid
Percent Solids: 95.4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		0.20	0.031	ug/Kg	☼	09/25/22 18:55	09/26/22 16:11	1
Perfluoroheptanoic acid (PFHpA)	ND		0.20	0.038	ug/Kg	☼	09/25/22 18:55	09/26/22 16:11	1
Perfluorooctanoic acid (PFOA)	ND		0.20	0.053	ug/Kg	☼	09/25/22 18:55	09/26/22 16:11	1
Perfluorononanoic acid (PFNA)	ND		0.20	0.022	ug/Kg	☼	09/25/22 18:55	09/26/22 16:11	1
Perfluorodecanoic acid (PFDA)	ND		0.20	0.048	ug/Kg	☼	09/25/22 18:55	09/26/22 16:11	1
Perfluoroundecanoic acid (PFUnA)	ND		0.20	0.042	ug/Kg	☼	09/25/22 18:55	09/26/22 16:11	1
Perfluorododecanoic acid (PFDoA)	ND		0.20	0.030	ug/Kg	☼	09/25/22 18:55	09/26/22 16:11	1
Perfluorotridecanoic acid (PFTriA)	ND		0.20	0.021	ug/Kg	☼	09/25/22 18:55	09/26/22 16:11	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.20	0.037	ug/Kg	☼	09/25/22 18:55	09/26/22 16:11	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.20	0.038	ug/Kg	☼	09/25/22 18:55	09/26/22 16:11	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.20	0.029	ug/Kg	☼	09/25/22 18:55	09/26/22 16:11	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.20	0.043	ug/Kg	☼	09/25/22 18:55	09/26/22 16:11	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.20	0.023	ug/Kg	☼	09/25/22 18:55	09/26/22 16:11	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.20	0.048	ug/Kg	☼	09/25/22 18:55	09/26/22 16:11	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.20	0.035	ug/Kg	☼	09/25/22 18:55	09/26/22 16:11	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.20	0.041	ug/Kg	☼	09/25/22 18:55	09/26/22 16:11	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.20	0.031	ug/Kg	☼	09/25/22 18:55	09/26/22 16:11	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.20	0.039	ug/Kg	☼	09/25/22 18:55	09/26/22 16:11	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*89*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:11*	*1*
13C4 PFHpA	*88*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:11*	*1*
13C4 PFOA	*90*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:11*	*1*
13C5 PFNA	*92*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:11*	*1*
13C2 PFDA	*91*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:11*	*1*
13C2 PFUnA	*94*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:11*	*1*
13C2 PFDoA	*98*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:11*	*1*
13C2 PFTeDA	*97*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:11*	*1*
13C3 PFBS	*78*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:11*	*1*
18O2 PFHxS	*81*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:11*	*1*
13C4 PFOS	*78*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:11*	*1*
d3-NMeFOSAA	*83*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:11*	*1*
d5-NEtFOSAA	*95*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:11*	*1*
13C3 HFPO-DA	*90*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:11*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture (ASTM D 2216)	**4.6**		0.1	0.1	%			09/23/22 10:44	1
Percent Solids (ASTM D 2216)	**95.4**		0.1	0.1	%			09/23/22 10:44	1

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

Job ID: 320-92292-1

Client Sample ID: SB-TS-4-4

Date Collected: 09/15/22 14:31
Date Received: 09/21/22 15:10

Lab Sample ID: 320-92292-10

Matrix: Solid
Percent Solids: 88.7

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		0.22	0.035	ug/Kg	☼	09/25/22 18:55	09/26/22 16:21	1
Perfluoroheptanoic acid (PFHpA)	ND		0.22	0.043	ug/Kg	☼	09/25/22 18:55	09/26/22 16:21	1
Perfluorooctanoic acid (PFOA)	ND		0.22	0.060	ug/Kg	☼	09/25/22 18:55	09/26/22 16:21	1
Perfluorononanoic acid (PFNA)	ND		0.22	0.025	ug/Kg	☼	09/25/22 18:55	09/26/22 16:21	1
Perfluorodecanoic acid (PFDA)	ND		0.22	0.054	ug/Kg	☼	09/25/22 18:55	09/26/22 16:21	1
Perfluoroundecanoic acid (PFUnA)	ND		0.22	0.047	ug/Kg	☼	09/25/22 18:55	09/26/22 16:21	1
Perfluorododecanoic acid (PFDoA)	ND		0.22	0.034	ug/Kg	☼	09/25/22 18:55	09/26/22 16:21	1
Perfluorotridecanoic acid (PFTriA)	ND		0.22	0.024	ug/Kg	☼	09/25/22 18:55	09/26/22 16:21	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.22	0.042	ug/Kg	☼	09/25/22 18:55	09/26/22 16:21	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.22	0.043	ug/Kg	☼	09/25/22 18:55	09/26/22 16:21	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.22	0.033	ug/Kg	☼	09/25/22 18:55	09/26/22 16:21	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.22	0.048	ug/Kg	☼	09/25/22 18:55	09/26/22 16:21	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.22	0.026	ug/Kg	☼	09/25/22 18:55	09/26/22 16:21	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.22	0.054	ug/Kg	☼	09/25/22 18:55	09/26/22 16:21	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.22	0.039	ug/Kg	☼	09/25/22 18:55	09/26/22 16:21	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.22	0.046	ug/Kg	☼	09/25/22 18:55	09/26/22 16:21	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.22	0.035	ug/Kg	☼	09/25/22 18:55	09/26/22 16:21	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.22	0.044	ug/Kg	☼	09/25/22 18:55	09/26/22 16:21	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*90*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:21*	*1*
13C4 PFHpA	*91*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:21*	*1*
13C4 PFOA	*90*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:21*	*1*
13C5 PFNA	*93*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:21*	*1*
13C2 PFDA	*87*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:21*	*1*
13C2 PFUnA	*93*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:21*	*1*
13C2 PFDoA	*95*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:21*	*1*
13C2 PFTeDA	*94*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:21*	*1*
13C3 PFBS	*83*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:21*	*1*
18O2 PFHxS	*85*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:21*	*1*
13C4 PFOS	*83*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:21*	*1*
d3-NMeFOSAA	*85*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:21*	*1*
d5-NEtFOSAA	*94*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:21*	*1*
13C3 HFPO-DA	*89*		*50 - 150*	*09/25/22 18:55*	*09/26/22 16:21*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture (ASTM D 2216)	**11.3**		0.1	0.1	%			09/23/22 10:44	1
Percent Solids (ASTM D 2216)	**88.7**		0.1	0.1	%			09/23/22 10:44	1

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

Job ID: 320-92292-1

Client Sample ID: SB-TS-4-5

Date Collected: 09/15/22 16:08
Date Received: 09/21/22 15:10

Lab Sample ID: 320-92292-11

Matrix: Solid
Percent Solids: 85.3

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		0.23	0.035	ug/Kg	☼	09/28/22 11:18	10/19/22 09:50	1
Perfluoroheptanoic acid (PFHpA)	ND		0.23	0.043	ug/Kg	☼	09/28/22 11:18	10/19/22 09:50	1
Perfluorooctanoic acid (PFOA)	ND		0.23	0.060	ug/Kg	☼	09/28/22 11:18	10/19/22 09:50	1
Perfluorononanoic acid (PFNA)	ND		0.23	0.025	ug/Kg	☼	09/28/22 11:18	10/19/22 09:50	1
Perfluorodecanoic acid (PFDA)	ND		0.23	0.054	ug/Kg	☼	09/28/22 11:18	10/19/22 09:50	1
Perfluoroundecanoic acid (PFUnA)	ND		0.23	0.047	ug/Kg	☼	09/28/22 11:18	10/19/22 09:50	1
Perfluorododecanoic acid (PFDoA)	ND		0.23	0.034	ug/Kg	☼	09/28/22 11:18	10/19/22 09:50	1
Perfluorotridecanoic acid (PFTriA)	ND		0.23	0.024	ug/Kg	☼	09/28/22 11:18	10/19/22 09:50	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.23	0.042	ug/Kg	☼	09/28/22 11:18	10/19/22 09:50	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.23	0.043	ug/Kg	☼	09/28/22 11:18	10/19/22 09:50	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.23	0.033	ug/Kg	☼	09/28/22 11:18	10/19/22 09:50	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.23	0.049	ug/Kg	☼	09/28/22 11:18	10/19/22 09:50	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.23	0.026	ug/Kg	☼	09/28/22 11:18	10/19/22 09:50	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.23	0.054	ug/Kg	☼	09/28/22 11:18	10/19/22 09:50	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.23	0.040	ug/Kg	☼	09/28/22 11:18	10/19/22 09:50	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.23	0.046	ug/Kg	☼	09/28/22 11:18	10/19/22 09:50	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.23	0.035	ug/Kg	☼	09/28/22 11:18	10/19/22 09:50	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.23	0.044	ug/Kg	☼	09/28/22 11:18	10/19/22 09:50	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*81*		*50 - 150*	*09/28/22 11:18*	*10/19/22 09:50*	*1*
13C4 PFHpA	*86*		*50 - 150*	*09/28/22 11:18*	*10/19/22 09:50*	*1*
13C4 PFOA	*83*		*50 - 150*	*09/28/22 11:18*	*10/19/22 09:50*	*1*
13C5 PFNA	*81*		*50 - 150*	*09/28/22 11:18*	*10/19/22 09:50*	*1*
13C2 PFDA	*78*		*50 - 150*	*09/28/22 11:18*	*10/19/22 09:50*	*1*
13C2 PFUnA	*74*		*50 - 150*	*09/28/22 11:18*	*10/19/22 09:50*	*1*
13C2 PFDoA	*69*		*50 - 150*	*09/28/22 11:18*	*10/19/22 09:50*	*1*
13C2 PFTeDA	*69*		*50 - 150*	*09/28/22 11:18*	*10/19/22 09:50*	*1*
13C3 PFBS	*82*		*50 - 150*	*09/28/22 11:18*	*10/19/22 09:50*	*1*
18O2 PFHxS	*85*		*50 - 150*	*09/28/22 11:18*	*10/19/22 09:50*	*1*
13C4 PFOS	*79*		*50 - 150*	*09/28/22 11:18*	*10/19/22 09:50*	*1*
d3-NMeFOSAA	*67*		*50 - 150*	*09/28/22 11:18*	*10/19/22 09:50*	*1*
d5-NEtFOSAA	*67*		*50 - 150*	*09/28/22 11:18*	*10/19/22 09:50*	*1*
13C3 HFPO-DA	*76*		*50 - 150*	*09/28/22 11:18*	*10/19/22 09:50*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture (ASTM D 2216)	**14.7**		0.1	0.1	%			09/23/22 10:44	1
Percent Solids (ASTM D 2216)	**85.3**		0.1	0.1	%			09/23/22 10:44	1

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

Job ID: 320-92292-1

Client Sample ID: SB-TS-4-6
Date Collected: 09/15/22 18:28
Date Received: 09/21/22 15:10

Lab Sample ID: 320-92292-12
Matrix: Solid
Percent Solids: 80.1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		0.23	0.035	ug/Kg	☼	09/28/22 11:18	10/19/22 10:00	1
Perfluoroheptanoic acid (PFHpA)	ND		0.23	0.043	ug/Kg	☼	09/28/22 11:18	10/19/22 10:00	1
Perfluorooctanoic acid (PFOA)	ND		0.23	0.060	ug/Kg	☼	09/28/22 11:18	10/19/22 10:00	1
Perfluorononanoic acid (PFNA)	ND		0.23	0.025	ug/Kg	☼	09/28/22 11:18	10/19/22 10:00	1
Perfluorodecanoic acid (PFDA)	ND		0.23	0.055	ug/Kg	☼	09/28/22 11:18	10/19/22 10:00	1
Perfluoroundecanoic acid (PFUnA)	ND		0.23	0.048	ug/Kg	☼	09/28/22 11:18	10/19/22 10:00	1
Perfluorododecanoic acid (PFDoA)	ND		0.23	0.034	ug/Kg	☼	09/28/22 11:18	10/19/22 10:00	1
Perfluorotridecanoic acid (PFTriA)	ND		0.23	0.024	ug/Kg	☼	09/28/22 11:18	10/19/22 10:00	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.23	0.042	ug/Kg	☼	09/28/22 11:18	10/19/22 10:00	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.23	0.043	ug/Kg	☼	09/28/22 11:18	10/19/22 10:00	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.23	0.033	ug/Kg	☼	09/28/22 11:18	10/19/22 10:00	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.23	0.049	ug/Kg	☼	09/28/22 11:18	10/19/22 10:00	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.23	0.026	ug/Kg	☼	09/28/22 11:18	10/19/22 10:00	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.23	0.055	ug/Kg	☼	09/28/22 11:18	10/19/22 10:00	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.23	0.040	ug/Kg	☼	09/28/22 11:18	10/19/22 10:00	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.23	0.047	ug/Kg	☼	09/28/22 11:18	10/19/22 10:00	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.23	0.035	ug/Kg	☼	09/28/22 11:18	10/19/22 10:00	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.23	0.045	ug/Kg	☼	09/28/22 11:18	10/19/22 10:00	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*82*		*50 - 150*	*09/28/22 11:18*	*10/19/22 10:00*	*1*
13C4 PFHpA	*87*		*50 - 150*	*09/28/22 11:18*	*10/19/22 10:00*	*1*
13C4 PFOA	*83*		*50 - 150*	*09/28/22 11:18*	*10/19/22 10:00*	*1*
13C5 PFNA	*84*		*50 - 150*	*09/28/22 11:18*	*10/19/22 10:00*	*1*
13C2 PFDA	*77*		*50 - 150*	*09/28/22 11:18*	*10/19/22 10:00*	*1*
13C2 PFUnA	*75*		*50 - 150*	*09/28/22 11:18*	*10/19/22 10:00*	*1*
13C2 PFDoA	*69*		*50 - 150*	*09/28/22 11:18*	*10/19/22 10:00*	*1*
13C2 PFTeDA	*73*		*50 - 150*	*09/28/22 11:18*	*10/19/22 10:00*	*1*
13C3 PFBS	*79*		*50 - 150*	*09/28/22 11:18*	*10/19/22 10:00*	*1*
18O2 PFHxS	*86*		*50 - 150*	*09/28/22 11:18*	*10/19/22 10:00*	*1*
13C4 PFOS	*82*		*50 - 150*	*09/28/22 11:18*	*10/19/22 10:00*	*1*
d3-NMeFOSAA	*73*		*50 - 150*	*09/28/22 11:18*	*10/19/22 10:00*	*1*
d5-NEtFOSAA	*68*		*50 - 150*	*09/28/22 11:18*	*10/19/22 10:00*	*1*
13C3 HFPO-DA	*86*		*50 - 150*	*09/28/22 11:18*	*10/19/22 10:00*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture (ASTM D 2216)	**19.9**		0.1	0.1	%			09/23/22 10:44	1
Percent Solids (ASTM D 2216)	**80.1**		0.1	0.1	%			09/23/22 10:44	1

Isotope Dilution Summary

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

Job ID: 320-92292-1

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

Matrix: Solid

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)							
		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)
320-92292-7	SB-TS-4-1	92	93	88	93	94	96	100	98
320-92292-8	SB-TS-4-2	91	89	87	89	88	90	95	95
320-92292-9	SB-TS-4-3	89	88	90	92	91	94	98	97
320-92292-10	SB-TS-4-4	90	91	90	93	87	93	95	94
320-92292-10 MS	SB-TS-4-4	94	94	92	97	97	98	100	100
320-92292-10 MSD	SB-TS-4-4	97	94	94	96	98	99	98	98
320-92292-11	SB-TS-4-5	81	86	83	81	78	74	69	69
320-92292-12	SB-TS-4-6	82	87	83	84	77	75	69	73
320-92292-12 MS	SB-TS-4-6	83	87	81	83	75	78	72	72
320-92292-12 MSD	SB-TS-4-6	84	92	85	87	78	75	74	72
LCS 320-619978/2-A	Lab Control Sample	86	87	85	88	88	92	94	95
LCS 320-620752/2-A	Lab Control Sample	84	88	85	88	80	73	64	69
MB 320-619978/1-A	Method Blank	81	82	81	86	83	85	90	90
MB 320-620752/1-A	Method Blank	86	91	88	87	75	75	72	70

		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)		
320-92292-7	SB-TS-4-1	84	87	86	89	94	90		
320-92292-8	SB-TS-4-2	82	85	83	82	94	88		
320-92292-9	SB-TS-4-3	78	81	78	83	95	90		
320-92292-10	SB-TS-4-4	83	85	83	85	94	89		
320-92292-10 MS	SB-TS-4-4	89	93	93	91	96	95		
320-92292-10 MSD	SB-TS-4-4	93	93	93	88	100	94		
320-92292-11	SB-TS-4-5	82	85	79	67	67	76		
320-92292-12	SB-TS-4-6	79	86	82	73	68	86		
320-92292-12 MS	SB-TS-4-6	78	82	75	68	70	77		
320-92292-12 MSD	SB-TS-4-6	79	92	84	74	69	84		
LCS 320-619978/2-A	Lab Control Sample	86	89	87	85	89	83		
LCS 320-620752/2-A	Lab Control Sample	84	86	78	78	78	82		
MB 320-619978/1-A	Method Blank	83	84	84	80	87	86		
MB 320-620752/1-A	Method Blank	80	90	80	81	81	77		

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

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Job ID: 320-92292-1
Project/Site: Tall Spruce

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

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

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFHxA (50-150)	C4PFHA (50-150)	PFOA (50-150)	PFNA (50-150)	PFDA (50-150)	PFUnA (50-150)	PFDoA (50-150)	PFTDA (50-150)
320-91846-B-5-B MS	Matrix Spike	57	51	64	53	65	60	38 *5-	37 *5-
320-91846-B-5-C MSD	Matrix Spike Duplicate	56	41 *5-	59	45 *5-	57	49 *5-	31 *5-	28 *5-
320-92292-1	MW-TS-1	67	62	68	65	71	68	67	63
320-92292-2	MW-TS-2	82	79	88	80	84	82	81	78
320-92292-3	MW-TS-3	78	70	78	71	76	72	68	68
320-92292-4	MW-TS-4	93	88	91	86	87	84	74	74
320-92292-5	MW-TS-104	82	75	83	79	80	76	68	70
320-92292-6	GAC	85	88	85	80	85	81	79	84
LCS 320-620634/2-A	Lab Control Sample	97	104	99	98	102	100	101	102
LCSD 320-620634/3-A	Lab Control Sample Dup	94	101	96	102	97	99	96	101
MB 320-620634/1-A	Method Blank	99	98	97	98	97	95	98	104

		Percent Isotope Dilution Recovery (Acceptance Limits)					
Lab Sample ID	Client Sample ID	C3PFBS (50-150)	PFHxS (50-150)	PFOS (50-150)	d3NMFOS (50-150)	d5NEFOS (50-150)	HFPODA (50-150)
320-91846-B-5-B MS	Matrix Spike	51	56	46 *5-	33 *5-	48 *5-	60
320-91846-B-5-C MSD	Matrix Spike Duplicate	46 *5-	51	41 *5-	32 *5-	39 *5-	47 *5-
320-92292-1	MW-TS-1	60	70	67	76	65	64
320-92292-2	MW-TS-2	79	88	81	89	81	85
320-92292-3	MW-TS-3	74	76	67	78	77	76
320-92292-4	MW-TS-4	85	93	83	86	84	86
320-92292-5	MW-TS-104	76	77	68	83	75	81
320-92292-6	GAC	76	82	74	92	85	85
LCS 320-620634/2-A	Lab Control Sample	100	100	95	119	117	99
LCSD 320-620634/3-A	Lab Control Sample Dup	101	98	95	114	116	92
MB 320-620634/1-A	Method Blank	90	99	91	114	112	97

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 320-619978/1-A
Matrix: Solid
Analysis Batch: 620100

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 619978

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		0.20	0.031	ug/Kg		09/25/22 18:55	09/26/22 12:49	1
Perfluoroheptanoic acid (PFHpA)	ND		0.20	0.038	ug/Kg		09/25/22 18:55	09/26/22 12:49	1
Perfluorooctanoic acid (PFOA)	ND		0.20	0.053	ug/Kg		09/25/22 18:55	09/26/22 12:49	1
Perfluorononanoic acid (PFNA)	ND		0.20	0.022	ug/Kg		09/25/22 18:55	09/26/22 12:49	1
Perfluorodecanoic acid (PFDA)	ND		0.20	0.048	ug/Kg		09/25/22 18:55	09/26/22 12:49	1
Perfluoroundecanoic acid (PFUnA)	ND		0.20	0.042	ug/Kg		09/25/22 18:55	09/26/22 12:49	1
Perfluorododecanoic acid (PFDoA)	ND		0.20	0.030	ug/Kg		09/25/22 18:55	09/26/22 12:49	1
Perfluorotridecanoic acid (PFTriA)	ND		0.20	0.021	ug/Kg		09/25/22 18:55	09/26/22 12:49	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.20	0.037	ug/Kg		09/25/22 18:55	09/26/22 12:49	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.20	0.038	ug/Kg		09/25/22 18:55	09/26/22 12:49	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.20	0.029	ug/Kg		09/25/22 18:55	09/26/22 12:49	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.20	0.043	ug/Kg		09/25/22 18:55	09/26/22 12:49	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.20	0.023	ug/Kg		09/25/22 18:55	09/26/22 12:49	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.20	0.048	ug/Kg		09/25/22 18:55	09/26/22 12:49	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.20	0.035	ug/Kg		09/25/22 18:55	09/26/22 12:49	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.20	0.041	ug/Kg		09/25/22 18:55	09/26/22 12:49	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.20	0.031	ug/Kg		09/25/22 18:55	09/26/22 12:49	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.20	0.039	ug/Kg		09/25/22 18:55	09/26/22 12:49	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*81*		*50 - 150*	*09/25/22 18:55*	*09/26/22 12:49*	*1*
13C4 PFHpA	*82*		*50 - 150*	*09/25/22 18:55*	*09/26/22 12:49*	*1*
13C4 PFOA	*81*		*50 - 150*	*09/25/22 18:55*	*09/26/22 12:49*	*1*
13C5 PFNA	*86*		*50 - 150*	*09/25/22 18:55*	*09/26/22 12:49*	*1*
13C2 PFDA	*83*		*50 - 150*	*09/25/22 18:55*	*09/26/22 12:49*	*1*
13C2 PFUnA	*85*		*50 - 150*	*09/25/22 18:55*	*09/26/22 12:49*	*1*
13C2 PFDoA	*90*		*50 - 150*	*09/25/22 18:55*	*09/26/22 12:49*	*1*
13C2 PFTeDA	*90*		*50 - 150*	*09/25/22 18:55*	*09/26/22 12:49*	*1*
13C3 PFBS	*83*		*50 - 150*	*09/25/22 18:55*	*09/26/22 12:49*	*1*
18O2 PFHxS	*84*		*50 - 150*	*09/25/22 18:55*	*09/26/22 12:49*	*1*
13C4 PFOS	*84*		*50 - 150*	*09/25/22 18:55*	*09/26/22 12:49*	*1*
d3-NMeFOSAA	*80*		*50 - 150*	*09/25/22 18:55*	*09/26/22 12:49*	*1*
d5-NEtFOSAA	*87*		*50 - 150*	*09/25/22 18:55*	*09/26/22 12:49*	*1*
13C3 HFPO-DA	*86*		*50 - 150*	*09/25/22 18:55*	*09/26/22 12:49*	*1*

Lab Sample ID: LCS 320-619978/2-A
Matrix: Solid
Analysis Batch: 620100

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 619978

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorohexanoic acid (PFHxA)	2.00	1.97		ug/Kg		99	70 - 132
Perfluoroheptanoic acid (PFHpA)	2.00	2.10		ug/Kg		105	71 - 131
Perfluorooctanoic acid (PFOA)	2.00	2.10		ug/Kg		105	69 - 133
Perfluorononanoic acid (PFNA)	2.00	2.07		ug/Kg		104	72 - 129

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

Lab Sample ID: LCS 320-619978/2-A
Matrix: Solid
Analysis Batch: 620100

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 619978

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorodecanoic acid (PFDA)	2.00	2.00		ug/Kg		100	69 - 133
Perfluoroundecanoic acid (PFUnA)	2.00	2.01		ug/Kg		101	64 - 136
Perfluorododecanoic acid (PFDoA)	2.00	2.08		ug/Kg		104	69 - 135
Perfluorotridecanoic acid (PFTriA)	2.00	2.02		ug/Kg		101	66 - 139
Perfluorotetradecanoic acid (PFTeA)	2.00	2.01		ug/Kg		101	69 - 133
Perfluorobutanesulfonic acid (PFBS)	1.78	1.87		ug/Kg		105	72 - 128
Perfluorohexanesulfonic acid (PFHxS)	1.82	1.82		ug/Kg		100	67 - 130
Perfluorooctanesulfonic acid (PFOS)	1.86	1.92		ug/Kg		103	68 - 136
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	2.00	2.04		ug/Kg		102	63 - 144
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	2.00	2.04		ug/Kg		102	61 - 139
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	1.87	1.96		ug/Kg		105	75 - 135
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	2.00	2.03		ug/Kg		102	77 - 137
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	1.89	1.91		ug/Kg		101	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	1.89	1.88		ug/Kg		100	79 - 139

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*86*		*50 - 150*
13C4 PFHpA	*87*		*50 - 150*
13C4 PFOA	*85*		*50 - 150*
13C5 PFNA	*88*		*50 - 150*
13C2 PFDA	*88*		*50 - 150*
13C2 PFUnA	*92*		*50 - 150*
13C2 PFDoA	*94*		*50 - 150*
13C2 PFTeDA	*95*		*50 - 150*
13C3 PFBS	*86*		*50 - 150*
18O2 PFHxS	*89*		*50 - 150*
13C4 PFOS	*87*		*50 - 150*
d3-NMeFOSAA	*85*		*50 - 150*
d5-NEtFOSAA	*89*		*50 - 150*
13C3 HFPO-DA	*83*		*50 - 150*

Lab Sample ID: 320-92292-10 MS
Matrix: Solid
Analysis Batch: 620100

Client Sample ID: SB-TS-4-4
Prep Type: Total/NA
Prep Batch: 619978

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorohexanoic acid (PFHxA)	ND		2.18	2.14		ug/Kg	☼	98	70 - 132
Perfluoroheptanoic acid (PFHpA)	ND		2.18	2.24		ug/Kg	☼	103	71 - 131
Perfluorooctanoic acid (PFOA)	ND		2.18	2.28		ug/Kg	☼	105	69 - 133

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

Lab Sample ID: 320-92292-10 MS
Matrix: Solid
Analysis Batch: 620100

Client Sample ID: SB-TS-4-4
Prep Type: Total/NA
Prep Batch: 619978

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorononanoic acid (PFNA)	ND		2.18	2.24		ug/Kg	☼	103	72 - 129
Perfluorodecanoic acid (PFDA)	ND		2.18	2.23		ug/Kg	☼	102	69 - 133
Perfluoroundecanoic acid (PFUnA)	ND		2.18	2.19		ug/Kg	☼	100	64 - 136
Perfluorododecanoic acid (PFDoA)	ND		2.18	2.21		ug/Kg	☼	101	69 - 135
Perfluorotridecanoic acid (PFTriA)	ND		2.18	2.21		ug/Kg	☼	101	66 - 139
Perfluorotetradecanoic acid (PFTeA)	ND		2.18	2.17		ug/Kg	☼	100	69 - 133
Perfluorobutanesulfonic acid (PFBS)	ND		1.94	2.06		ug/Kg	☼	107	72 - 128
Perfluorohexanesulfonic acid (PFHxS)	ND		1.99	1.96		ug/Kg	☼	99	67 - 130
Perfluorooctanesulfonic acid (PFOS)	ND		2.03	2.10		ug/Kg	☼	103	68 - 136
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		2.18	2.28		ug/Kg	☼	104	63 - 144
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		2.18	2.17		ug/Kg	☼	99	61 - 139
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.04	2.10		ug/Kg	☼	103	75 - 135
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		2.18	2.21		ug/Kg	☼	101	77 - 137
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.06	2.03		ug/Kg	☼	99	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.06	2.18		ug/Kg	☼	106	79 - 139

Isotope Dilution	*MS %Recovery*	*MS Qualifier*	*Limits*
13C2 PFHxA	*94*		*50 - 150*
13C4 PFHpA	*94*		*50 - 150*
13C4 PFOA	*92*		*50 - 150*
13C5 PFNA	*97*		*50 - 150*
13C2 PFDA	*97*		*50 - 150*
13C2 PFUnA	*98*		*50 - 150*
13C2 PFDoA	*100*		*50 - 150*
13C2 PFTeDA	*100*		*50 - 150*
13C3 PFBS	*89*		*50 - 150*
18O2 PFHxS	*93*		*50 - 150*
13C4 PFOS	*93*		*50 - 150*
d3-NMeFOSAA	*91*		*50 - 150*
d5-NEtFOSAA	*96*		*50 - 150*
13C3 HFPO-DA	*95*		*50 - 150*

Lab Sample ID: 320-92292-10 MSD
Matrix: Solid
Analysis Batch: 620100

Client Sample ID: SB-TS-4-4
Prep Type: Total/NA
Prep Batch: 619978

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	ND		2.25	2.16		ug/Kg	☼	96	70 - 132	1	30
Perfluoroheptanoic acid (PFHpA)	ND		2.25	2.40		ug/Kg	☼	106	71 - 131	7	30

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

Lab Sample ID: 320-92292-10 MSD
Matrix: Solid
Analysis Batch: 620100

Client Sample ID: SB-TS-4-4
Prep Type: Total/NA
Prep Batch: 619978

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorooctanoic acid (PFOA)	ND		2.25	2.34		ug/Kg	☼	104	69 - 133	2	30
Perfluorononanoic acid (PFNA)	ND		2.25	2.23		ug/Kg	☼	99	72 - 129	0	30
Perfluorodecanoic acid (PFDA)	ND		2.25	2.23		ug/Kg	☼	99	69 - 133	0	30
Perfluoroundecanoic acid (PFUnA)	ND		2.25	2.18		ug/Kg	☼	97	64 - 136	1	30
Perfluorododecanoic acid (PFDoA)	ND		2.25	2.31		ug/Kg	☼	103	69 - 135	4	30
Perfluorotridecanoic acid (PFTriA)	ND		2.25	2.29		ug/Kg	☼	102	66 - 139	4	30
Perfluorotetradecanoic acid (PFTeA)	ND		2.25	2.24		ug/Kg	☼	100	69 - 133	3	30
Perfluorobutanesulfonic acid (PFBS)	ND		2.00	2.04		ug/Kg	☼	102	72 - 128	1	30
Perfluorohexanesulfonic acid (PFHxS)	ND		2.05	2.01		ug/Kg	☼	98	67 - 130	2	30
Perfluorooctanesulfonic acid (PFOS)	ND		2.09	2.12		ug/Kg	☼	101	68 - 136	1	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		2.25	2.33		ug/Kg	☼	104	63 - 144	2	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		2.25	2.18		ug/Kg	☼	97	61 - 139	0	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.10	2.15		ug/Kg	☼	102	75 - 135	3	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		2.25	2.24		ug/Kg	☼	100	77 - 137	2	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.12	2.03		ug/Kg	☼	95	76 - 136	0	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.12	2.21		ug/Kg	☼	104	79 - 139	2	30

Isotope Dilution	*MSD %Recovery*	*MSD Qualifier*	*Limits*
13C2 PFHxA	*97*		*50 - 150*
13C4 PFHpA	*94*		*50 - 150*
13C4 PFOA	*94*		*50 - 150*
13C5 PFNA	*96*		*50 - 150*
13C2 PFDA	*98*		*50 - 150*
13C2 PFUnA	*99*		*50 - 150*
13C2 PFDoA	*98*		*50 - 150*
13C2 PFTeDA	*98*		*50 - 150*
13C3 PFBS	*93*		*50 - 150*
18O2 PFHxS	*93*		*50 - 150*
13C4 PFOS	*93*		*50 - 150*
d3-NMeFOSAA	*88*		*50 - 150*
d5-NEtFOSAA	*100*		*50 - 150*
13C3 HFPO-DA	*94*		*50 - 150*

Lab Sample ID: MB 320-620634/1-A
Matrix: Water
Analysis Batch: 621578

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 620634

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		09/28/22 05:33	09/29/22 23:52	1

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

Lab Sample ID: MB 320-620634/1-A
Matrix: Water
Analysis Batch: 621578

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 620634

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		09/28/22 05:33	09/29/22 23:52	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		09/28/22 05:33	09/29/22 23:52	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		09/28/22 05:33	09/29/22 23:52	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		09/28/22 05:33	09/29/22 23:52	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		09/28/22 05:33	09/29/22 23:52	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		09/28/22 05:33	09/29/22 23:52	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		09/28/22 05:33	09/29/22 23:52	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		09/28/22 05:33	09/29/22 23:52	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		09/28/22 05:33	09/29/22 23:52	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		09/28/22 05:33	09/29/22 23:52	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		09/28/22 05:33	09/29/22 23:52	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		09/28/22 05:33	09/29/22 23:52	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		09/28/22 05:33	09/29/22 23:52	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.0	0.24	ng/L		09/28/22 05:33	09/29/22 23:52	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.0	1.5	ng/L		09/28/22 05:33	09/29/22 23:52	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.0	0.32	ng/L		09/28/22 05:33	09/29/22 23:52	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		09/28/22 05:33	09/29/22 23:52	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*99*		*50 - 150*	*09/28/22 05:33*	*09/29/22 23:52*	*1*
13C4 PFHpA	*98*		*50 - 150*	*09/28/22 05:33*	*09/29/22 23:52*	*1*
13C4 PFOA	*97*		*50 - 150*	*09/28/22 05:33*	*09/29/22 23:52*	*1*
13C5 PFNA	*98*		*50 - 150*	*09/28/22 05:33*	*09/29/22 23:52*	*1*
13C2 PFDA	*97*		*50 - 150*	*09/28/22 05:33*	*09/29/22 23:52*	*1*
13C2 PFUnA	*95*		*50 - 150*	*09/28/22 05:33*	*09/29/22 23:52*	*1*
13C2 PFDoA	*98*		*50 - 150*	*09/28/22 05:33*	*09/29/22 23:52*	*1*
13C2 PFTeDA	*104*		*50 - 150*	*09/28/22 05:33*	*09/29/22 23:52*	*1*
13C3 PFBS	*90*		*50 - 150*	*09/28/22 05:33*	*09/29/22 23:52*	*1*
18O2 PFHxS	*99*		*50 - 150*	*09/28/22 05:33*	*09/29/22 23:52*	*1*
13C4 PFOS	*91*		*50 - 150*	*09/28/22 05:33*	*09/29/22 23:52*	*1*
d3-NMeFOSAA	*114*		*50 - 150*	*09/28/22 05:33*	*09/29/22 23:52*	*1*
d5-NEtFOSAA	*112*		*50 - 150*	*09/28/22 05:33*	*09/29/22 23:52*	*1*
13C3 HFPO-DA	*97*		*50 - 150*	*09/28/22 05:33*	*09/29/22 23:52*	*1*

Lab Sample ID: LCS 320-620634/2-A
Matrix: Water
Analysis Batch: 621578

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 620634

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorohexanoic acid (PFHxA)	40.0	40.7		ng/L		102	72 - 129
Perfluoroheptanoic acid (PFHpA)	40.0	40.9		ng/L		102	72 - 130
Perfluorooctanoic acid (PFOA)	40.0	43.7		ng/L		109	71 - 133
Perfluorononanoic acid (PFNA)	40.0	41.3		ng/L		103	69 - 130
Perfluorodecanoic acid (PFDA)	40.0	43.0		ng/L		108	71 - 129

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

Job ID: 320-92292-1

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

Lab Sample ID: LCS 320-620634/2-A
Matrix: Water
Analysis Batch: 621578

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 620634

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluoroundecanoic acid (PFUnA)	40.0	42.8		ng/L		107	69 - 133
Perfluorododecanoic acid (PFDoA)	40.0	42.5		ng/L		106	72 - 134
Perfluorotridecanoic acid (PFTriA)	40.0	39.1		ng/L		98	65 - 144
Perfluorotetradecanoic acid (PFTeA)	40.0	41.8		ng/L		104	71 - 132
Perfluorobutanesulfonic acid (PFBS)	35.5	37.9		ng/L		107	72 - 130
Perfluorohexanesulfonic acid (PFHxS)	36.5	34.9		ng/L		96	68 - 131
Perfluorooctanesulfonic acid (PFOS)	37.2	38.9		ng/L		104	65 - 140
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	39.9		ng/L		100	65 - 136
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	37.7		ng/L		94	61 - 135
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	37.4	39.8		ng/L		107	77 - 137
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	40.0	37.3		ng/L		93	72 - 132
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	37.8	38.7		ng/L		102	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.8	41.4		ng/L		110	81 - 141

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*97*		*50 - 150*
13C4 PFHpA	*104*		*50 - 150*
13C4 PFOA	*99*		*50 - 150*
13C5 PFNA	*98*		*50 - 150*
13C2 PFDA	*102*		*50 - 150*
13C2 PFUnA	*100*		*50 - 150*
13C2 PFDoA	*101*		*50 - 150*
13C2 PFTeDA	*102*		*50 - 150*
13C3 PFBS	*100*		*50 - 150*
18O2 PFHxS	*100*		*50 - 150*
13C4 PFOS	*95*		*50 - 150*
d3-NMeFOSAA	*119*		*50 - 150*
d5-NEtFOSAA	*117*		*50 - 150*
13C3 HFPO-DA	*99*		*50 - 150*

Lab Sample ID: LCSD 320-620634/3-A
Matrix: Water
Analysis Batch: 621578

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 620634

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	40.0	39.1		ng/L		98	72 - 129	4	30
Perfluoroheptanoic acid (PFHpA)	40.0	42.2		ng/L		106	72 - 130	3	30
Perfluorooctanoic acid (PFOA)	40.0	44.2		ng/L		111	71 - 133	1	30
Perfluorononanoic acid (PFNA)	40.0	40.6		ng/L		102	69 - 130	2	30

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

Lab Sample ID: LCSD 320-620634/3-A
Matrix: Water
Analysis Batch: 621578

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 620634

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorodecanoic acid (PFDA)	40.0	43.7		ng/L		109	71 - 129	2	30
Perfluoroundecanoic acid (PFUnA)	40.0	41.6		ng/L		104	69 - 133	3	30
Perfluorododecanoic acid (PFDoA)	40.0	43.5		ng/L		109	72 - 134	2	30
Perfluorotridecanoic acid (PFTriA)	40.0	41.7		ng/L		104	65 - 144	6	30
Perfluorotetradecanoic acid (PFTeA)	40.0	43.2		ng/L		108	71 - 132	3	30
Perfluorobutanesulfonic acid (PFBS)	35.5	34.2		ng/L		96	72 - 130	10	30
Perfluorohexanesulfonic acid (PFHxS)	36.5	35.7		ng/L		98	68 - 131	2	30
Perfluorooctanesulfonic acid (PFOS)	37.2	37.9		ng/L		102	65 - 140	3	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	38.9		ng/L		97	65 - 136	3	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	42.0		ng/L		105	61 - 135	11	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	37.4	39.1		ng/L		105	77 - 137	2	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	40.0	38.8		ng/L		97	72 - 132	4	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	37.8	37.8		ng/L		100	76 - 136	2	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.8	43.8		ng/L		116	81 - 141	6	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFHxA	*94*		*50 - 150*
13C4 PFHpA	*101*		*50 - 150*
13C4 PFOA	*96*		*50 - 150*
13C5 PFNA	*102*		*50 - 150*
13C2 PFDA	*97*		*50 - 150*
13C2 PFUnA	*99*		*50 - 150*
13C2 PFDoA	*96*		*50 - 150*
13C2 PFTeDA	*101*		*50 - 150*
13C3 PFBS	*101*		*50 - 150*
18O2 PFHxS	*98*		*50 - 150*
13C4 PFOS	*95*		*50 - 150*
d3-NMeFOSAA	*114*		*50 - 150*
d5-NEtFOSAA	*116*		*50 - 150*
13C3 HFPO-DA	*92*		*50 - 150*

Lab Sample ID: 320-91846-B-5-B MS
Matrix: Water
Analysis Batch: 621578

Client Sample ID: Matrix Spike
Prep Type: Total/NA
Prep Batch: 620634

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorohexanoic acid (PFHxA)	7.3	I	38.9	40.7		ng/L		86	72 - 129
Perfluoroheptanoic acid (PFHpA)	1.8	J	38.9	42.6		ng/L		105	72 - 130
Perfluorooctanoic acid (PFOA)	3.5		38.9	43.2		ng/L		102	71 - 133

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

Lab Sample ID: 320-91846-B-5-B MS
Matrix: Water
Analysis Batch: 621578

Client Sample ID: Matrix Spike
Prep Type: Total/NA
Prep Batch: 620634

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorononanoic acid (PFNA)	ND		38.9	41.7		ng/L		107	69 - 130
Perfluorodecanoic acid (PFDA)	ND		38.9	38.1		ng/L		98	71 - 129
Perfluoroundecanoic acid (PFUnA)	ND		38.9	35.2		ng/L		90	69 - 133
Perfluorododecanoic acid (PFDoA)	ND		38.9	39.7		ng/L		102	72 - 134
Perfluorotridecanoic acid (PFTriA)	ND		38.9	38.3		ng/L		98	65 - 144
Perfluorotetradecanoic acid (PFTeA)	ND		38.9	40.5		ng/L		104	71 - 132
Perfluorobutanesulfonic acid (PFBS)	4.4	I	34.5	47.4		ng/L		124	72 - 130
Perfluorohexanesulfonic acid (PFHxS)	3.4		35.5	42.0		ng/L		109	68 - 131
Perfluorooctanesulfonic acid (PFOS)	6.3		36.2	44.4		ng/L		105	65 - 140
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		38.9	46.6		ng/L		120	65 - 136
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		38.9	35.6		ng/L		91	61 - 135
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND	F1	36.3	53.8	F1	ng/L		148	77 - 137
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		38.9	34.7		ng/L		89	72 - 132
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND	F1	36.7	30.9		ng/L		84	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		36.7	38.4		ng/L		105	81 - 141

Isotope Dilution	*MS %Recovery*	*MS Qualifier*	*Limits*
13C2 PFHxA	*57*		*50 - 150*
13C4 PFHpA	*51*		*50 - 150*
13C4 PFOA	*64*		*50 - 150*
13C5 PFNA	*53*		*50 - 150*
13C2 PFDA	*65*		*50 - 150*
13C2 PFUnA	*60*		*50 - 150*
13C2 PFDoA	*38*	*5-	*50 - 150*
13C2 PFTeDA	*37*	*5-	*50 - 150*
13C3 PFBS	*51*		*50 - 150*
18O2 PFHxS	*56*		*50 - 150*
13C4 PFOS	*46*	*5-	*50 - 150*
d3-NMeFOSAA	*33*	*5-	*50 - 150*
d5-NEtFOSAA	*48*	*5-	*50 - 150*
13C3 HFPO-DA	*60*		*50 - 150*

Lab Sample ID: 320-91846-B-5-C MSD
Matrix: Water
Analysis Batch: 621578

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA
Prep Batch: 620634

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	7.3	I	40.4	44.3		ng/L		91	72 - 129	8	30
Perfluoroheptanoic acid (PFHpA)	1.8	J	40.4	47.7		ng/L		114	72 - 130	11	30

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

Lab Sample ID: 320-91846-B-5-C MSD
Matrix: Water
Analysis Batch: 621578

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA
Prep Batch: 620634

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorooctanoic acid (PFOA)	3.5		40.4	45.7		ng/L		105	71 - 133	6	30
Perfluorononanoic acid (PFNA)	ND		40.4	43.9		ng/L		109	69 - 130	5	30
Perfluorodecanoic acid (PFDA)	ND		40.4	33.2		ng/L		82	71 - 129	14	30
Perfluoroundecanoic acid (PFUnA)	ND		40.4	39.0		ng/L		97	69 - 133	10	30
Perfluorododecanoic acid (PFDoA)	ND		40.4	40.2		ng/L		99	72 - 134	1	30
Perfluorotridecanoic acid (PFTriA)	ND		40.4	35.7		ng/L		88	65 - 144	7	30
Perfluorotetradecanoic acid (PFTeA)	ND		40.4	41.5		ng/L		103	71 - 132	3	30
Perfluorobutanesulfonic acid (PFBS)	4.4	I	35.8	50.5		ng/L		128	72 - 130	6	30
Perfluorohexanesulfonic acid (PFHxS)	3.4		36.8	42.7		ng/L		107	68 - 131	2	30
Perfluorooctanesulfonic acid (PFOS)	6.3		37.5	48.9		ng/L		113	65 - 140	10	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		40.4	50.0		ng/L		124	65 - 136	7	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		40.4	45.5		ng/L		113	61 - 135	24	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND	F1	37.7	54.3	F1	ng/L		144	77 - 137	1	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		40.4	38.7		ng/L		96	72 - 132	11	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND	F1	38.1	27.3	F1	ng/L		72	76 - 136	12	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		38.1	40.9		ng/L		107	81 - 141	6	30

Isotope Dilution	*MSD %Recovery*	*MSD Qualifier*	*Limits*
13C2 PFHxA	*56*		*50 - 150*
13C4 PFHpA	*41*	*5-	*50 - 150*
13C4 PFOA	*59*		*50 - 150*
13C5 PFNA	*45*	*5-	*50 - 150*
13C2 PFDA	*57*		*50 - 150*
13C2 PFUnA	*49*	*5-	*50 - 150*
13C2 PFDoA	*31*	*5-	*50 - 150*
13C2 PFTeDA	*28*	*5-	*50 - 150*
13C3 PFBS	*46*	*5-	*50 - 150*
18O2 PFHxS	*51*		*50 - 150*
13C4 PFOS	*41*	*5-	*50 - 150*
d3-NMeFOSAA	*32*	*5-	*50 - 150*
d5-NEtFOSAA	*39*	*5-	*50 - 150*
13C3 HFPO-DA	*47*	*5-	*50 - 150*

Lab Sample ID: MB 320-620752/1-A
Matrix: Solid
Analysis Batch: 625724

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 620752

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		0.20	0.031	ug/Kg		09/28/22 11:18	10/19/22 05:47	1

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

Lab Sample ID: MB 320-620752/1-A
Matrix: Solid
Analysis Batch: 625724

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 620752

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoroheptanoic acid (PFHpA)	ND		0.20	0.038	ug/Kg		09/28/22 11:18	10/19/22 05:47	1
Perfluorooctanoic acid (PFOA)	ND		0.20	0.053	ug/Kg		09/28/22 11:18	10/19/22 05:47	1
Perfluorononanoic acid (PFNA)	ND		0.20	0.022	ug/Kg		09/28/22 11:18	10/19/22 05:47	1
Perfluorodecanoic acid (PFDA)	ND		0.20	0.048	ug/Kg		09/28/22 11:18	10/19/22 05:47	1
Perfluoroundecanoic acid (PFUnA)	ND		0.20	0.042	ug/Kg		09/28/22 11:18	10/19/22 05:47	1
Perfluorododecanoic acid (PFDoA)	ND		0.20	0.030	ug/Kg		09/28/22 11:18	10/19/22 05:47	1
Perfluorotridecanoic acid (PFTriA)	ND		0.20	0.021	ug/Kg		09/28/22 11:18	10/19/22 05:47	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.20	0.037	ug/Kg		09/28/22 11:18	10/19/22 05:47	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.20	0.038	ug/Kg		09/28/22 11:18	10/19/22 05:47	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.20	0.029	ug/Kg		09/28/22 11:18	10/19/22 05:47	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.20	0.043	ug/Kg		09/28/22 11:18	10/19/22 05:47	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.20	0.023	ug/Kg		09/28/22 11:18	10/19/22 05:47	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.20	0.048	ug/Kg		09/28/22 11:18	10/19/22 05:47	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.20	0.035	ug/Kg		09/28/22 11:18	10/19/22 05:47	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.20	0.041	ug/Kg		09/28/22 11:18	10/19/22 05:47	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.20	0.031	ug/Kg		09/28/22 11:18	10/19/22 05:47	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.20	0.039	ug/Kg		09/28/22 11:18	10/19/22 05:47	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*86*		*50 - 150*	*09/28/22 11:18*	*10/19/22 05:47*	*1*
13C4 PFHpA	*91*		*50 - 150*	*09/28/22 11:18*	*10/19/22 05:47*	*1*
13C4 PFOA	*88*		*50 - 150*	*09/28/22 11:18*	*10/19/22 05:47*	*1*
13C5 PFNA	*87*		*50 - 150*	*09/28/22 11:18*	*10/19/22 05:47*	*1*
13C2 PFDA	*75*		*50 - 150*	*09/28/22 11:18*	*10/19/22 05:47*	*1*
13C2 PFUnA	*75*		*50 - 150*	*09/28/22 11:18*	*10/19/22 05:47*	*1*
13C2 PFDoA	*72*		*50 - 150*	*09/28/22 11:18*	*10/19/22 05:47*	*1*
13C2 PFTeDA	*70*		*50 - 150*	*09/28/22 11:18*	*10/19/22 05:47*	*1*
13C3 PFBS	*80*		*50 - 150*	*09/28/22 11:18*	*10/19/22 05:47*	*1*
18O2 PFHxS	*90*		*50 - 150*	*09/28/22 11:18*	*10/19/22 05:47*	*1*
13C4 PFOS	*80*		*50 - 150*	*09/28/22 11:18*	*10/19/22 05:47*	*1*
d3-NMeFOSAA	*81*		*50 - 150*	*09/28/22 11:18*	*10/19/22 05:47*	*1*
d5-NEtFOSAA	*81*		*50 - 150*	*09/28/22 11:18*	*10/19/22 05:47*	*1*
13C3 HFPO-DA	*77*		*50 - 150*	*09/28/22 11:18*	*10/19/22 05:47*	*1*

Lab Sample ID: LCS 320-620752/2-A
Matrix: Solid
Analysis Batch: 625724

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 620752

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorohexanoic acid (PFHxA)	2.00	2.11		ug/Kg		105	70 - 132
Perfluoroheptanoic acid (PFHpA)	2.00	2.14		ug/Kg		107	71 - 131
Perfluorooctanoic acid (PFOA)	2.00	2.21		ug/Kg		111	69 - 133
Perfluorononanoic acid (PFNA)	2.00	2.09		ug/Kg		104	72 - 129
Perfluorodecanoic acid (PFDA)	2.00	2.14		ug/Kg		107	69 - 133

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

Lab Sample ID: LCS 320-620752/2-A
Matrix: Solid
Analysis Batch: 625724

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 620752

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluoroundecanoic acid (PFUnA)	2.00	2.12		ug/Kg		106	64 - 136
Perfluorododecanoic acid (PFDoA)	2.00	2.11		ug/Kg		105	69 - 135
Perfluorotridecanoic acid (PFTriA)	2.00	2.04		ug/Kg		102	66 - 139
Perfluorotetradecanoic acid (PFTeA)	2.00	2.10		ug/Kg		105	69 - 133
Perfluorobutanesulfonic acid (PFBS)	1.78	1.88		ug/Kg		106	72 - 128
Perfluorohexanesulfonic acid (PFHxS)	1.82	1.89		ug/Kg		104	67 - 130
Perfluorooctanesulfonic acid (PFOS)	1.86	1.99		ug/Kg		107	68 - 136
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	2.00	2.06		ug/Kg		103	63 - 144
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	2.00	1.96		ug/Kg		98	61 - 139
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	1.87	1.80		ug/Kg		96	75 - 135
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	2.00	2.13		ug/Kg		107	77 - 137
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	1.89	1.65		ug/Kg		87	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	1.89	2.45		ug/Kg		130	79 - 139

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*84*		*50 - 150*
13C4 PFHpA	*88*		*50 - 150*
13C4 PFOA	*85*		*50 - 150*
13C5 PFNA	*88*		*50 - 150*
13C2 PFDA	*80*		*50 - 150*
13C2 PFUnA	*73*		*50 - 150*
13C2 PFDoA	*64*		*50 - 150*
13C2 PFTeDA	*69*		*50 - 150*
13C3 PFBS	*84*		*50 - 150*
18O2 PFHxS	*86*		*50 - 150*
13C4 PFOS	*78*		*50 - 150*
d3-NMeFOSAA	*78*		*50 - 150*
d5-NEtFOSAA	*78*		*50 - 150*
13C3 HFPO-DA	*82*		*50 - 150*

Lab Sample ID: 320-92292-12 MS
Matrix: Solid
Analysis Batch: 625724

Client Sample ID: SB-TS-4-6
Prep Type: Total/NA
Prep Batch: 620752

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorohexanoic acid (PFHxA)	ND		2.34	2.30		ug/Kg	☼	98	70 - 132
Perfluoroheptanoic acid (PFHpA)	ND		2.34	2.35		ug/Kg	☼	100	71 - 131
Perfluorooctanoic acid (PFOA)	ND		2.34	2.52		ug/Kg	☼	108	69 - 133
Perfluorononanoic acid (PFNA)	ND		2.34	2.44		ug/Kg	☼	104	72 - 129

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

Lab Sample ID: 320-92292-12 MS
Matrix: Solid
Analysis Batch: 625724

Client Sample ID: SB-TS-4-6
Prep Type: Total/NA
Prep Batch: 620752

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorodecanoic acid (PFDA)	ND		2.34	2.61		ug/Kg	☼	112	69 - 133
Perfluoroundecanoic acid (PFUnA)	ND		2.34	2.39		ug/Kg	☼	102	64 - 136
Perfluorododecanoic acid (PFDoA)	ND		2.34	2.39		ug/Kg	☼	102	69 - 135
Perfluorotridecanoic acid (PFTriA)	ND		2.34	2.36		ug/Kg	☼	101	66 - 139
Perfluorotetradecanoic acid (PFTeA)	ND		2.34	2.32		ug/Kg	☼	99	69 - 133
Perfluorobutanesulfonic acid (PFBS)	ND		2.08	2.30		ug/Kg	☼	111	72 - 128
Perfluorohexanesulfonic acid (PFHxS)	ND		2.13	2.24		ug/Kg	☼	105	67 - 130
Perfluorooctanesulfonic acid (PFOS)	ND		2.17	2.43		ug/Kg	☼	112	68 - 136
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		2.34	2.41		ug/Kg	☼	103	63 - 144
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		2.34	2.42		ug/Kg	☼	104	61 - 139
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.18	2.23		ug/Kg	☼	102	75 - 135
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		2.34	2.60		ug/Kg	☼	111	77 - 137
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.21	2.18		ug/Kg	☼	99	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.21	2.81		ug/Kg	☼	127	79 - 139

Isotope Dilution	*MS %Recovery*	*MS Qualifier*	*Limits*
13C2 PFHxA	*83*		*50 - 150*
13C4 PFHpA	*87*		*50 - 150*
13C4 PFOA	*81*		*50 - 150*
13C5 PFNA	*83*		*50 - 150*
13C2 PFDA	*75*		*50 - 150*
13C2 PFUnA	*78*		*50 - 150*
13C2 PFDoA	*72*		*50 - 150*
13C2 PFTeDA	*72*		*50 - 150*
13C3 PFBS	*78*		*50 - 150*
18O2 PFHxS	*82*		*50 - 150*
13C4 PFOS	*75*		*50 - 150*
d3-NMeFOSAA	*68*		*50 - 150*
d5-NEtFOSAA	*70*		*50 - 150*
13C3 HFPO-DA	*77*		*50 - 150*

Lab Sample ID: 320-92292-12 MSD
Matrix: Solid
Analysis Batch: 625724

Client Sample ID: SB-TS-4-6
Prep Type: Total/NA
Prep Batch: 620752

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	ND		2.26	2.33		ug/Kg	☼	103	70 - 132	1	30
Perfluoroheptanoic acid (PFHpA)	ND		2.26	2.25		ug/Kg	☼	100	71 - 131	4	30
Perfluorooctanoic acid (PFOA)	ND		2.26	2.30		ug/Kg	☼	102	69 - 133	9	30

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

Lab Sample ID: 320-92292-12 MSD
Matrix: Solid
Analysis Batch: 625724

Client Sample ID: SB-TS-4-6
Prep Type: Total/NA
Prep Batch: 620752

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorononanoic acid (PFNA)	ND		2.26	2.32		ug/Kg	☼	103	72 - 129	5	30
Perfluorodecanoic acid (PFDA)	ND		2.26	2.32		ug/Kg	☼	103	69 - 133	12	30
Perfluoroundecanoic acid (PFUnA)	ND		2.26	2.34		ug/Kg	☼	103	64 - 136	2	30
Perfluorododecanoic acid (PFDoA)	ND		2.26	2.27		ug/Kg	☼	100	69 - 135	5	30
Perfluorotridecanoic acid (PFTriA)	ND		2.26	2.02		ug/Kg	☼	89	66 - 139	16	30
Perfluorotetradecanoic acid (PFTeA)	ND		2.26	2.22		ug/Kg	☼	98	69 - 133	4	30
Perfluorobutanesulfonic acid (PFBS)	ND		2.01	2.15		ug/Kg	☼	107	72 - 128	7	30
Perfluorohexanesulfonic acid (PFHxS)	ND		2.06	2.10		ug/Kg	☼	102	67 - 130	7	30
Perfluorooctanesulfonic acid (PFOS)	ND		2.10	2.03		ug/Kg	☼	96	68 - 136	18	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		2.26	2.14		ug/Kg	☼	95	63 - 144	12	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		2.26	2.34		ug/Kg	☼	103	61 - 139	4	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.11	1.86		ug/Kg	☼	88	75 - 135	18	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		2.26	2.42		ug/Kg	☼	107	77 - 137	7	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.14	1.74		ug/Kg	☼	82	76 - 136	22	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.14	2.47		ug/Kg	☼	116	79 - 139	13	30

Isotope Dilution	*MSD %Recovery*	*MSD Qualifier*	*Limits*
13C2 PFHxA	*84*		*50 - 150*
13C4 PFHpA	*92*		*50 - 150*
13C4 PFOA	*85*		*50 - 150*
13C5 PFNA	*87*		*50 - 150*
13C2 PFDA	*78*		*50 - 150*
13C2 PFUnA	*75*		*50 - 150*
13C2 PFDoA	*74*		*50 - 150*
13C2 PFTeDA	*72*		*50 - 150*
13C3 PFBS	*79*		*50 - 150*
18O2 PFHxS	*92*		*50 - 150*
13C4 PFOS	*84*		*50 - 150*
d3-NMeFOSAA	*74*		*50 - 150*
d5-NEtFOSAA	*69*		*50 - 150*
13C3 HFPO-DA	*84*		*50 - 150*

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

Job ID: 320-92292-1

Method: D 2216 - Percent Moisture

Lab Sample ID: 320-92286-A-4 DU
Matrix: Solid
Analysis Batch: 619313

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Percent Moisture	54.7			58.1		%				6	20
Percent Solids	45.3			41.9		%				8	20

LCMS

Prep Batch: 619978

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-92292-7	SB-TS-4-1	Total/NA	Solid	SHAKE	
320-92292-8	SB-TS-4-2	Total/NA	Solid	SHAKE	
320-92292-9	SB-TS-4-3	Total/NA	Solid	SHAKE	
320-92292-10	SB-TS-4-4	Total/NA	Solid	SHAKE	
MB 320-619978/1-A	Method Blank	Total/NA	Solid	SHAKE	
LCS 320-619978/2-A	Lab Control Sample	Total/NA	Solid	SHAKE	
320-92292-10 MS	SB-TS-4-4	Total/NA	Solid	SHAKE	
320-92292-10 MSD	SB-TS-4-4	Total/NA	Solid	SHAKE	

Analysis Batch: 620100

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-92292-7	SB-TS-4-1	Total/NA	Solid	EPA 537(Mod)	619978
320-92292-8	SB-TS-4-2	Total/NA	Solid	EPA 537(Mod)	619978
320-92292-9	SB-TS-4-3	Total/NA	Solid	EPA 537(Mod)	619978
320-92292-10	SB-TS-4-4	Total/NA	Solid	EPA 537(Mod)	619978
MB 320-619978/1-A	Method Blank	Total/NA	Solid	EPA 537(Mod)	619978
LCS 320-619978/2-A	Lab Control Sample	Total/NA	Solid	EPA 537(Mod)	619978
320-92292-10 MS	SB-TS-4-4	Total/NA	Solid	EPA 537(Mod)	619978
320-92292-10 MSD	SB-TS-4-4	Total/NA	Solid	EPA 537(Mod)	619978

Prep Batch: 620634

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-92292-1	MW-TS-1	Total/NA	Water	3535	
320-92292-2	MW-TS-2	Total/NA	Water	3535	
320-92292-3	MW-TS-3	Total/NA	Water	3535	
320-92292-4	MW-TS-4	Total/NA	Water	3535	
320-92292-5	MW-TS-104	Total/NA	Water	3535	
320-92292-6	GAC	Total/NA	Water	3535	
MB 320-620634/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-620634/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-620634/3-A	Lab Control Sample Dup	Total/NA	Water	3535	
320-91846-B-5-B MS	Matrix Spike	Total/NA	Water	3535	
320-91846-B-5-C MSD	Matrix Spike Duplicate	Total/NA	Water	3535	

Prep Batch: 620752

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-92292-11	SB-TS-4-5	Total/NA	Solid	SHAKE	
320-92292-12	SB-TS-4-6	Total/NA	Solid	SHAKE	
MB 320-620752/1-A	Method Blank	Total/NA	Solid	SHAKE	
LCS 320-620752/2-A	Lab Control Sample	Total/NA	Solid	SHAKE	
320-92292-12 MS	SB-TS-4-6	Total/NA	Solid	SHAKE	
320-92292-12 MSD	SB-TS-4-6	Total/NA	Solid	SHAKE	

Analysis Batch: 621578

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-92292-1	MW-TS-1	Total/NA	Water	EPA 537(Mod)	620634
320-92292-2	MW-TS-2	Total/NA	Water	EPA 537(Mod)	620634
320-92292-3	MW-TS-3	Total/NA	Water	EPA 537(Mod)	620634
320-92292-4	MW-TS-4	Total/NA	Water	EPA 537(Mod)	620634
320-92292-5	MW-TS-104	Total/NA	Water	EPA 537(Mod)	620634
320-92292-6	GAC	Total/NA	Water	EPA 537(Mod)	620634

LCMS (Continued)

Analysis Batch: 621578 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 320-620634/1-A	Method Blank	Total/NA	Water	EPA 537(Mod)	620634
LCS 320-620634/2-A	Lab Control Sample	Total/NA	Water	EPA 537(Mod)	620634
LCSD 320-620634/3-A	Lab Control Sample Dup	Total/NA	Water	EPA 537(Mod)	620634
320-91846-B-5-B MS	Matrix Spike	Total/NA	Water	EPA 537(Mod)	620634
320-91846-B-5-C MSD	Matrix Spike Duplicate	Total/NA	Water	EPA 537(Mod)	620634

Analysis Batch: 625724

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-92292-11	SB-TS-4-5	Total/NA	Solid	EPA 537(Mod)	620752
320-92292-12	SB-TS-4-6	Total/NA	Solid	EPA 537(Mod)	620752
MB 320-620752/1-A	Method Blank	Total/NA	Solid	EPA 537(Mod)	620752
LCS 320-620752/2-A	Lab Control Sample	Total/NA	Solid	EPA 537(Mod)	620752
320-92292-12 MS	SB-TS-4-6	Total/NA	Solid	EPA 537(Mod)	620752
320-92292-12 MSD	SB-TS-4-6	Total/NA	Solid	EPA 537(Mod)	620752

General Chemistry

Analysis Batch: 619313

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-92292-7	SB-TS-4-1	Total/NA	Solid	D 2216	
320-92292-8	SB-TS-4-2	Total/NA	Solid	D 2216	
320-92292-9	SB-TS-4-3	Total/NA	Solid	D 2216	
320-92292-10	SB-TS-4-4	Total/NA	Solid	D 2216	
320-92292-11	SB-TS-4-5	Total/NA	Solid	D 2216	
320-92292-12	SB-TS-4-6	Total/NA	Solid	D 2216	
320-92286-A-4 DU	Duplicate	Total/NA	Solid	D 2216	

Lab Chronicle

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

Job ID: 320-92292-1

Client Sample ID: MW-TS-1
Date Collected: 09/19/22 12:41
Date Received: 09/21/22 15:10

Lab Sample ID: 320-92292-1
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			264.5 mL	10.0 mL	620634	09/28/22 05:33	HK	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	621578	09/30/22 02:24	RS1	EET SAC

Client Sample ID: MW-TS-2
Date Collected: 09/19/22 14:25
Date Received: 09/21/22 15:10

Lab Sample ID: 320-92292-2
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			270.3 mL	10.0 mL	620634	09/28/22 05:33	HK	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	621578	09/30/22 02:34	RS1	EET SAC

Client Sample ID: MW-TS-3
Date Collected: 09/19/22 16:48
Date Received: 09/21/22 15:10

Lab Sample ID: 320-92292-3
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			276.5 mL	10.0 mL	620634	09/28/22 05:33	HK	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	621578	09/30/22 02:45	RS1	EET SAC

Client Sample ID: MW-TS-4
Date Collected: 09/19/22 18:47
Date Received: 09/21/22 15:10

Lab Sample ID: 320-92292-4
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			267.3 mL	10.0 mL	620634	09/28/22 05:33	HK	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	621578	09/30/22 02:55	RS1	EET SAC

Client Sample ID: MW-TS-104
Date Collected: 09/19/22 18:37
Date Received: 09/21/22 15:10

Lab Sample ID: 320-92292-5
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			273.9 mL	10.0 mL	620634	09/28/22 05:33	HK	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	621578	09/30/22 03:05	RS1	EET SAC

Client Sample ID: GAC
Date Collected: 09/20/22 09:30
Date Received: 09/21/22 15:10

Lab Sample ID: 320-92292-6
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			272.2 mL	10.0 mL	620634	09/28/22 05:33	HK	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	621578	09/30/22 03:15	RS1	EET SAC

Lab Chronicle

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

Job ID: 320-92292-1

Client Sample ID: SB-TS-4-1
Date Collected: 09/15/22 09:12
Date Received: 09/21/22 15:10

Lab Sample ID: 320-92292-7
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			619313	09/23/22 10:44	DAN	EET SAC

Client Sample ID: SB-TS-4-1
Date Collected: 09/15/22 09:12
Date Received: 09/21/22 15:10

Lab Sample ID: 320-92292-7
Matrix: Solid
Percent Solids: 82.0

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.26 g	10.0 mL	619978	09/25/22 18:55	FX	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	620100	09/26/22 15:51	D1R	EET SAC

Client Sample ID: SB-TS-4-2
Date Collected: 09/15/22 09:57
Date Received: 09/21/22 15:10

Lab Sample ID: 320-92292-8
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			619313	09/23/22 10:44	DAN	EET SAC

Client Sample ID: SB-TS-4-2
Date Collected: 09/15/22 09:57
Date Received: 09/21/22 15:10

Lab Sample ID: 320-92292-8
Matrix: Solid
Percent Solids: 82.5

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.20 g	10.0 mL	619978	09/25/22 18:55	FX	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	620100	09/26/22 16:01	D1R	EET SAC

Client Sample ID: SB-TS-4-3
Date Collected: 09/15/22 12:45
Date Received: 09/21/22 15:10

Lab Sample ID: 320-92292-9
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			619313	09/23/22 10:44	DAN	EET SAC

Client Sample ID: SB-TS-4-3
Date Collected: 09/15/22 12:45
Date Received: 09/21/22 15:10

Lab Sample ID: 320-92292-9
Matrix: Solid
Percent Solids: 95.4

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.20 g	10.0 mL	619978	09/25/22 18:55	FX	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	620100	09/26/22 16:11	D1R	EET SAC

Client Sample ID: SB-TS-4-4
Date Collected: 09/15/22 14:31
Date Received: 09/21/22 15:10

Lab Sample ID: 320-92292-10
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			619313	09/23/22 10:44	DAN	EET SAC

Lab Chronicle

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

Job ID: 320-92292-1

Client Sample ID: SB-TS-4-4
Lab Sample ID: 320-92292-10
Date Collected: 09/15/22 14:31
Matrix: Solid
Date Received: 09/21/22 15:10
Percent Solids: 88.7

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.02 g	10.0 mL	619978	09/25/22 18:55	FX	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	620100	09/26/22 16:21	D1R	EET SAC

Client Sample ID: SB-TS-4-5
Lab Sample ID: 320-92292-11
Date Collected: 09/15/22 16:08
Matrix: Solid
Date Received: 09/21/22 15:10

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			619313	09/23/22 10:44	DAN	EET SAC

Client Sample ID: SB-TS-4-5
Lab Sample ID: 320-92292-11
Date Collected: 09/15/22 16:08
Matrix: Solid
Date Received: 09/21/22 15:10
Percent Solids: 85.3

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.19 g	10.0 mL	620752	09/28/22 11:18	RAC	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	625724	10/19/22 09:50	K1S	EET SAC

Client Sample ID: SB-TS-4-6
Lab Sample ID: 320-92292-12
Date Collected: 09/15/22 18:28
Matrix: Solid
Date Received: 09/21/22 15:10

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			619313	09/23/22 10:44	DAN	EET SAC

Client Sample ID: SB-TS-4-6
Lab Sample ID: 320-92292-12
Date Collected: 09/15/22 18:28
Matrix: Solid
Date Received: 09/21/22 15:10
Percent Solids: 80.1

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.47 g	10.0 mL	620752	09/28/22 11:18	RAC	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	625724	10/19/22 10:00	K1S	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: 320-92292-1

Laboratory: Eurofins Sacramento

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

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

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

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

Method Summary

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

Job ID: 320-92292-1

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

Protocol References:

ASTM = ASTM International

EPA = US Environmental Protection Agency

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

Laboratory References:

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: 320-92292-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-92292-1	MW-TS-1	Water	09/19/22 12:41	09/21/22 15:10
320-92292-2	MW-TS-2	Water	09/19/22 14:25	09/21/22 15:10
320-92292-3	MW-TS-3	Water	09/19/22 16:48	09/21/22 15:10
320-92292-4	MW-TS-4	Water	09/19/22 18:47	09/21/22 15:10
320-92292-5	MW-TS-104	Water	09/19/22 18:37	09/21/22 15:10
320-92292-6	GAC	Water	09/20/22 09:30	09/21/22 15:10
320-92292-7	SB-TS-4-1	Solid	09/15/22 09:12	09/21/22 15:10
320-92292-8	SB-TS-4-2	Solid	09/15/22 09:57	09/21/22 15:10
320-92292-9	SB-TS-4-3	Solid	09/15/22 12:45	09/21/22 15:10
320-92292-10	SB-TS-4-4	Solid	09/15/22 14:31	09/21/22 15:10
320-92292-11	SB-TS-4-5	Solid	09/15/22 16:08	09/21/22 15:10
320-92292-12	SB-TS-4-6	Solid	09/15/22 18:28	09/21/22 15:10

CHAIN-OF-CUSTODY RECORD

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

Laboratory: Eurofins
Attn: David Alltucker

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

Analytical Methods (include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	537.1 Table B15 & 3	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
MW-TS-1		1241	9-19-22	X	2	water
MW-TS-2		1425	9-19-22	X		
MW-TS-3		1648	9-19-22	X		
MW-TS-4		1847	9-19-22	X		
MW-TS-104		1837	9-19-22	X		
GAC		0930	9-20-22	X		
SB-TS-4-1		0912	9-15-22	X	1	soil
SB-TS-4-2		0957		X		
SB-TS-4-3		1245		X		
SB-TS-4-4	1431	~~1608~~		X		

320-92292 Chain of Custody

Project Information	
Number:	102519-023
Name:	Tall Spruce
Contact:	Ashley Jaramillo
Ongoing Project?	Yes [ ] No [X]
Sampler:	MSC

Sample Receipt	
Total No. of Containers:	
COC Seals/Intact? Y/N/NA	
Received Good Cond./Cold	
Temp:	5.8°C
Delivery Method:	

Notes:

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 1300	Signature: Time:	Signature: Time:
Printed Name: Mason Caker Date: 9-20-22	Printed Name: Date:	Printed Name: Date:
Company: Shannon + Wilson	Company:	Company:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: Time: 15:10	Signature: Time:	Signature: Time:
Printed Name: Nicholas Cahill Date: 9-21-22	Printed Name: Date:	Printed Name: Date:
Company: EETSAC	Company:	Company:

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

11/7/2022

No.

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:	Quote No:
☒ Normal ☐ Rush	J-Flags: ☒ Yes ☐ No
Please Specify	

Analytical Methods (include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	537.1 Table B15 DSMS 3							Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
SB-TS-4-5		1608	9-15-22	x							1	Soil
SB-TS-4-6		1828	↓	x							1	↓

Project Information		Sample Receipt	
Number:	102519-023	Total No. of Containers:	
Name:	Tall Spruce	COC Seals/Intact? Y/N/NA	
Contact:	Ashley Jaramillo	Received Good Cond./Cold	
Ongoing Project?	Yes ☐ No ☒	Temp:	5.8°C
Sampler:	MSC	Delivery Method:	

Notes:

Reliquished By: 1.	Reliquished By: 2.	Reliquished By: 3.
Signature: Mason D. Cr Time: 1300	Signature: Time:	Signature: Time:
Printed Name: Mason Craker Date: 9-20-22	Printed Name: Date:	Printed Name: Date:
Company: Shannon + Wilson	Company:	Company:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: Time: 15:10	Signature: Time:	Signature: Time:
Printed Name: Nicholas Cahill Date: 9-21-22	Printed Name: Date:	Printed Name: Date:
Company: EETSAC	Company:	Company:

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

No.

11/7/2022

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-92292-1

Login Number: 92292
List Number: 1
Creator: Cahill, Nicholas P

List Source: Eurofins Sacramento

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

ADEC Contaminated Sites Program Laboratory Data Review Checklist

Completed By:	Ashley Jaramillo	**CS Site Name:**	FIA – Sitewide PFAS	**Lab Name:**	Eurofins Environment Testing America
Title:	Senior Chemist	**ADEC File No.:**	100.38.277	**Lab Report No.:**	320-92292-1
Consulting Firm:	Shannon & Wilson, Inc.	**Hazard ID No.:**	26816	**Lab Report Date:**	September 7, 2022

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: The DEC certified Eurofins Environment Testing America in West Sacramento, California (Eurofins) for the analysis of PFAS on February 11, 2021 by LCMSMS compliant with QSM Version 5.3 Table B-15. The reported analytes were included in the DEC's Contaminated Sites Laboratory Approval 17-020.

   b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses 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: EPA 537(Mod) PFAS for QSM 5.3, Table B-15
   Comments: Click or tap here to enter text.

3. Laboratory Sample Receipt Documentation

a. Is the sample/cooler temperature documented and within range at receipt (0° to 6° C)?
Yes ☐ No ☐ N/A ☐
Cooler temperature(s): Cooler temperature was not reported by the laboratory.
Sample temperature(s): Sample temperatures were not noted by the laboratory.
Comments: A temperature blank was included with the samples in the cooler and is used to access temperature preservation. The temperature blank was reported at 5.8°C upon arrival at Eurofins laboratory. This temperature is within the acceptable range of 0°C to 6°C.

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

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 sample receipt form notes that the samples were received in good condition.

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

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

4. Case Narrative

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

b. Are there discrepancies, errors, or QC failures identified by the lab?
Yes ☒ No ☐ N/A ☐
Comments: The "I" qualifier means the transition mass ratio for the indicated analytes in MS and/or MSD samples 320-91846-B-5-A and 320-91846-B-5-C above the established ratio limits. The qualitative identification of the analyte has

some degree of uncertainty, and the reported value may have some high bias. However, analyst judgment was used to positively identify the analyte. These samples are not associated with project samples. Data quality and/or usability not affected.

The IDA recovery associated with the following samples is below the method recommended limit: 320-92292-A-10-E MS and 320-92292-A-10-F MSD, parent sample *SB-TS-4-4*. Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the samples. Although this was noted by the laboratory, this discrepancy does not appear in the data provided. Data quality and/or usability not affected.

The IDA recovery associated with the following samples is below the method recommended limit: 320-91846-B-5-A, 320-91846-B-5-B MS and 320-91846-B-5-C MSD. Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the samples. See Section 6.d. for more details regarding data quality and/or usability impacts, if any.

The MS/MSD recoveries for preparation batch 320-620634 and analytical batch 320-621578 were outside control limits. Sample matrix interference and/or non-homogeneity are suspected because the associated LCS recovery was within acceptance limits. See Section 6.c. for more details regarding data quality and/or usability impacts if any.

The following samples in preparation batch 320-620634 were observed to have a thin layer of sediment present in the bottom of the bottle prior to extraction: *MW-TS-1, MW-TS-2, MW-TS-3, MW-TS-4, MW-TS-104*, and *GAC*. Data quality and/or usability not affected.

During the solid phase extraction process, the following samples contain non-settable particulates which clogged the solid phase extraction column: *MW-TS-1, MW-TS-2, MW-TS-3, MW-TS-4, MW-TS-104*, and *GAC.* Data quality and/or usability not affected.

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

d. What is the effect on data quality/usability according to the case narrative?
Comments: The case narrative does not discuss effect on data quality, it only discusses discrepancies and what was done considering them, as applicable. Any notable data quality issues mentioned in the case narrative are discussed above in Section 4.b. or elsewhere within this DEC checklist.

5. Sample Results

a. Are the correct analyses performed/reported as requested on CoC?
Yes ☒ No ☐ N/A ☐
Comments: Click or tap here to enter text.

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

c. Are all soils reported on a dry weight basis?
Yes ☒ No ☐ N/A ☐
Comments:

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

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

6. QC Samples

a. Method Blank

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

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

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

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

v. Data quality or usability affected?
Yes ☐ No ☒ N/A ☐
Comments: See above.

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

i. Organics – Are one LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)
Yes ☐ No ☒ N/A ☐
Comments: LCSs were reported preparatory batches 320-619978 and 320-620752. LCS/LCSDs were reported for preparatory batch 320-620634.

ii. Metals/Inorganics – Are one LCS and one sample duplicate reported per matrix, analysis and 20 samples?
Yes ☐ No ☐ N/A ☒
Comments: Metals/inorganic analyses were not requested.

iii. Accuracy – Are all percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)
Yes ☒ No ☐ N/A ☐
Comments:

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

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

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

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

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

i. Organics – Are one MS/MSD reported per matrix, analysis and 20 samples?
Yes ☐ No ☐ N/A ☐
Comments: MS/MSD samples were reported preparatory batches 320-619978, 320-620752, and 320-620634.

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

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 and/or MSD recoveries, associated with batch 320-620634, for several analytes were recovered outside of laboratory limits. The MS/MSD parent sample is not a project sample. Therefore, data quality and/or usability not affected.

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:

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

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

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

d. Surrogates – Organics Only or Isotope Dilution Analytes (IDA) – Isotope Dilution Methods Only

i. Are surrogate/IDA recoveries reported for organic analyses – field, QC, and laboratory samples?
Yes ☒ No ☐ N/A ☐

Comments:

ii. Accuracy – Are all percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods 50-150 %R for field samples and 60-120 %R for QC samples; all other analyses see the laboratory report pages)
Yes ☐ No ☒ N/A ☐
Comments: IDA recoveries for the MS and/or MSD, associated with batch 320-620634, for several analytes were recovered outside of laboratory limits. The MS/MSD parent sample is not a project sample. Therefore, data quality and/or usability not affected.

iii. Do the sample results with failed surrogate/IDA recoveries have data flags? If so, are the data flags clearly defined?
Yes ☐ No ☐ N/A ☒
Comments: See above.

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

e. Trip Blanks

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

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

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

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

f. Field Duplicate

i. Are one field duplicate submitted per matrix, analysis, and 10 project samples?
Yes ☒ No ☐ N/A ☐
Comments: *MW-TS-104* is the field duplicate of *MW-TS-4*.

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

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

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

Where R_1 = Sample Concentration

R_2 = Field Duplicate Concentration

iv. Is the data quality or usability affected? (Explain)
Yes ☐ No ☒ N/A ☐
Comments: Where calculable, analytical results met the comparison criterion (≤ 30% for water) for the field duplicate pairs. Data quality and/or usability not affected.

g. Decontamination or Equipment Blanks

i. Were decontamination or equipment blanks collected?
Yes ☐ No ☒ N/A ☐
Comments: Reusable equipment was not used to collect samples.

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

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

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

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

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

APPENDIX C: CONCEPTUAL SITE MODEL

Appendix C

Conceptual Site Model

CONTENTS

Print Form

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

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

File Number: 100.38.277 / 26816

Completed by: Shannon & Wilson, Inc.

Introduction

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

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

1. General Information:

Sources *(check potential sources at the site)*

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

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

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

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

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

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

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

* bgs - below ground surface

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

a) Direct Contact -

1. Incidental Soil Ingestion

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

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

Comments:

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

2. Dermal Absorption of Contaminants from Soil

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

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

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

Comments:

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

b) Ingestion -

1. Ingestion of Groundwater

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

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

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

Comments:

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

2. Ingestion of Surface Water

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

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

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

Comments:

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

3. Ingestion of Wild and Farmed Foods

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

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

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

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

Comments:

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

c) Inhalation-

1. Inhalation of Outdoor Air

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

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

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

Comments:

2. Inhalation of Indoor Air

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

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

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

Comments:

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

Dermal Exposure to Contaminants in Groundwater and Surface Water

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

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

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

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

Comments:

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

Inhalation of Volatile Compounds in Tap Water

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

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

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

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

Comments:

Inhalation of Fugitive Dust

Inhalation of fugitive dust may be a complete pathway if:

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

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

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

Comments:

Direct Contact with Sediment

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

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

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

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

Comments:

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

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

HUMAN HEALTH CONCEPTUAL SITE MODEL GRAPHIC FORM

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

Completed By: Shannon & Wilson, Inc.
Date Completed: December 13, 2022

***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

IMPORTANT INFORMATION

such situations, you and your consultant can work together to help reduce their impacts. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

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

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

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

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

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

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

IMPORTANT INFORMATION

READ RESPONSIBILITY CLAUSES CLOSELY.

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

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