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FINAL

SUMMARY REPORT

July 2021 Through June 2022 Water Supply Well Monitoring

YAKUTAT, ALASKA

May 2023

Shannon & Wilson No: 102986-010

SHANNON & WILSON

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Submitted To: Alaska Department of Transportation & Public Facilities
PO Box 112506
Juneau, AK 99811-2506
Attn: Sammy Cummings and Spencer Gates

Subject: FINAL SUMMARY REPORT, JULY 2021 THROUGH JUNE 2022
WATER SUPPLY WELL MONITORING, YAKUTAT, ALASKA

Shannon & Wilson, Inc. (S&W) has prepared this report to summarize the water supply well (WSW) monitoring efforts performed between July 2021 and June 2022 at the Yakutat Airport (YAK) in Yakutat, Alaska. These services were conducted on behalf of the Alaska Department of Transportation & Public Facilities (DOT&PF). S&W's scope of services was specified in proposals dated February 18, 2021 and June 27, 2022 and authorized on March 23, 2021 and August 26, 2022, respectively, by DOT&PF under *Professional Services Agreement Number 25-19-1-013 Per- and Polyfluoroalkyl Substance (PFAS) Related Environmental & Engineering Services*. This report was prepared for the DOT&PF in accordance with the terms and conditions of S&W's contract, relevant Alaska Department of Environmental Conservation (DEC) guidance documents, and Title 18 of the Alaska Administrative Code Chapter 75.335.

S&W appreciates the opportunity to be of service to the DOT&PF on this project. If there are questions concerning this report, please contact us.

Sincerely,

SHANNON & WILSON, INC.

Ashley Jaramillo
Project Manager/Senior Chemist

AMJ:KRF:CBD/jkr

EXECUTIVE SUMMARY

S&W has prepared this summary report to document WSW monitoring efforts at the (YAK) in Yakutat, Alaska between July 2021 and June 2022. S&W collected analytical samples for PFAS analysis from the sample locations noted below during the following monitoring events.

- July 2021: *33053*, *33059*, *33060*, *33061*, *33064*, *33065*, and *33068*
- October 2021: *33059*, *33060*, *33061*, *33064*, *33065*, and *33068*
- March 2022: *33059*, *33060*, *33061*, *33064*, and *33068*
- June 2022: *33053*, *33056*, *33059*, *33060*, *33061*, *33065*, and *33068*

Between July 2021 and June 2022, sample results were less than the DEC's drinking water action level for PFAS, with the exception of sample location *33065* (Yakutat Costal Airlines) during the June 2022 event. To date, sample locations *33063* (Yakutat Lodge), *33066* (Yakutat Lodge Restaurant), and *33065* (Yakutat Coastal Airlines) exceed DEC's drinking water action level for PFAS.

Based on the results of the WSW monitoring efforts at the YAK to date, S&W recommends continued quarterly and annual monitoring. S&W has been authorized by the DOT&PF for three quarterly events and one annual event to be completed between July 1, 2022 and June 30, 2023.

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ACRONYMS

AAC	Alaska Administrative Code
ADF&G	Alaska Department of Fish & Game
AFB	Yakutat Airforce Base
AFFF	aqueous film-forming foam
ARFF	aircraft rescue and firefighting
bgs	below ground surface
°C	degrees Celsius
CAA	Civil Aeronautics Administration
9Cl-PF3ONS	9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid
11Cl-PF3OUdS	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid
COV	coefficient of variation
DEC	Alaska Department of Environmental Conservation
DONA	4,8-dioxa-3H-perfluorononanoic acid
DOT&PF	Alaska Department of Transportation & Public Facilities
EPA	U.S. Environmental Protection Agency
Eurofins	Eurofins Environment Testing America
FAA	Federal Aviation Administration
HFPO-DA	hexafluoropropylene oxide dimer acid
LDRC	Laboratory Data Review Checklist
LHA	Lifetime Health Advisory
MAROS	Monitoring and Remediation Optimization System
µg/kg	micrograms per kilogram
N-EtFOSAA	N-ethyl perfluorooctane sulfonamidoacetic acid
N-MeFOSSA	N-methyl perfluorooctane sulfonamidoacetic acid
ng/L	nanograms per liter
NOAA	National Oceanic and Atmospheric Administration,
NPS	National Park Service
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDOA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxS	perfluorohexanesulfonic acid
PFHxA	perfluorohexanoic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFTeA	perfluorotetradecanoic acid

ACRONYMS

PFTrDA	perfluorotridecanoic acid
PFUnA	perfluoroundecanoic acid
QA	Quality Assurance
QC	Quality Control
S&W	Shannon & Wilson, Inc.
SREB	snow removal equipment building,
TSA	Transportation Security Administration,
USACE	U.S. Army Corps of Engineers
USFS	United States Forest Service.
USGS	U.S. Geological Survey
WSW	water supply well
WO	work order
YAK	Yakutat Airport

1 INTRODUCTION

Shannon & Wilson, Inc. (S&W) has prepared this summary report to document water supply well (WSW) monitoring efforts at the Yakutat Airport (YAK) in Yakutat, Alaska. This report describes the activities conducted by S&W between July 2021 and June 2022. The YAK is an active, Alaska Department of Environmental Conservation (DEC) listed contaminated site due to the presence of per- and polyfluoroalkyl substances (PFAS) in WSW samples (DEC File Number 1530.38.022, Hazard ID 27090).

1.1 Purpose and Objective

The purpose of the services described in this report was to evaluate the potential for human exposure to PFAS-containing groundwater in WSWs at and near the YAK. S&W's objectives were to collect quarterly and annual analytical groundwater samples from previously sampled WSWs meeting the monitoring criteria discussed in Section 2.7.1. The scope of services implemented to achieve these objectives is defined in Section 1.2 below.

1.2 Scope of Services

S&W's scope of services summarized in this report include four WSW monitoring events and public-outreach support. This report includes data from the WSW sampling events conducted in July 2021, October 2021, March 2022, and June 2022. This project is ongoing; planned future work is summarized in Section 6.

This report was prepared for the exclusive use of the Alaska Department of Transportation & Public Facilities (DOT&PF) and its representatives. This work presents S&W's professional judgment as to the conditions of the site. Information presented here is based on activities S&W performed. This report should not be used for other purposes without S&W's approval or if any of the following occurs:

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

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

1.3 Site Location

The YAK is located at 1 Airport Road in Yakutat, Alaska. The City of Yakutat is located at the mouth of Yakutat Bay. The Borough of Yakutat lies in isolated lowlands along the Gulf of Alaska, 212 miles northwest of Juneau. The geographic coordinates of the YAK terminal are latitude 59.5033° N, longitude -139.9928° W.

1.4 Geology and Hydrology

Yakutat is located on the Yakutat foreland, a gently sloping glacial outwash plain between the Saint Elias Mountains and the Gulf of Alaska. Eight dominant surficial deposits have been mapped in the Yakutat area, including artificial fill, organic, eolian, beach, delta-estuarine, alluvial, outwash, and moraine deposits. Artificial fill is predominant under the airport runways and areas of the YAK that have been extensively modified during construction (U.S. Army Corps of Engineers [USACE], 2008).

The absence of continuous confining layers in the unconsolidated deposits allows the groundwater to move both vertically and horizontally with little impedance to flow. Unconfined groundwater in the Yakutat area has been found to range in depth from within the top 10 feet below ground surface (bgs) to greater than 70 feet bgs. This fluctuation appears to be a function of the surface topography. The groundwater flow also appears to be generally dictated by topography, with flow towards the principal surface water bodies, including streams, lakes, the coastline, and constructed drains (USACE, 2016). The U.S. Geological Survey (USGS) investigated groundwater flow near the YAK (USGS, 1994). Their measurements indicated a shallow water table ranging from 2 to 30 feet bgs with a flow from northeast to southwest.

2 BACKGROUND

This section provides background information regarding PFAS and the YAK.

2.1 Site History

A preliminary review of the Yakutat Airforce Base (AFB) site files and database actions indicates the Yakutat AFB was operated between 1940-1947 during WWII. In 1940, the Civil Aeronautics Administration/Federal Aviation Administration (CAA/FAA) built a radio range and construction began on the Yakutat Landing Field which was completed in 1943. The airfield was re-designated Yakutat Army Air Base in 1944 and placed on caretaker status until the end of the war. The Yakutat Air Base was declared surplus by the Army in December 1945 and the CAA/FAA assumed responsibility for maintenance and operation of the Yakutat Airport, leading to the transfer of the air base and all associated facilities from the Army to CAA/FAA on April 4, 1947. In 1978, the DOT&PF acquired the airport from the FAA.

The YAK meets the requirements defined in Title 14, Code of Federal Regulations, Part 139, which requires specific certification through the FAA. This certification required, among other things, aircraft rescue and firefighting (ARFF) infrastructure and capabilities to ensure safety in air transportation. As part of this certification, Part 139 airports are required to conduct annual training for emergency response situations using aqueous film forming foam (AFFF) and demonstrate compliance with federal regulations. The FAA lifted the requirement to use PFAS-containing AFFF during training exercises at the beginning of 2019; alternate FAA-approved testing units have been implemented to test fire apparatus systems without discharging AFFF.

2.2 AFFF Use at the Yakutat Airport

PFAS-containing AFFF has been known to be stored at the YAK and used for emergency and training purposes in at least one location on the YAK property (Figure 1). AFFF was first used on the YAK property by DOT&PF in the 1990s. Discussions with Robert Lekanof, a DOT&PF YAK foreman, during S&W's initial site visit in June 2019, revealed fire training activities using AFFF have been mostly conducted at the end of Runway 2/20 since 2000. Fire training activities included annual training and triennial training events. During annual events, approximately 500 gallons of 3% mixed AFFF were released and during triennial events, approximately 1,500 gallons of 3% mixed AFFF were released. An unlined burn pit was also located at the airport and used for annual live fire training events near the northern end of Taxiway A. Training at the burn pit occurred between 1996 and 1999. The burn pit has been covered with soil and is currently vegetated.

2.3 PFAS Regulatory History

AFFF contains PFAS, a category of persistent organic compounds considered emerging environmental contaminants with evidence that exposure to PFAS can lead to adverse

health effects. Perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) are two PFAS commonly found at sites where AFFF has been used. Due to their persistence, toxicity, and bioaccumulative potential, these compounds are of increasing concern to environmental and health agencies. Exhibit 2-1 below briefly outlines PFAS drinking water action levels since the start of the YAK WSW monitoring events.

Exhibit 2-1: PFAS Drinking Water Action Levels

Agency	Date	Analytes	Action Level
EPA	May 2016	PFOS + PFOA	70 ng/L[1]
DEC	August 2018	PFOS + PFOA + PFHxS + PFHpA + PFNA	70 ng/L[2]
DEC	April 2019	PFOS + PFOA	70 ng/L[3,4]

Notes:

1 EPA LHA level

2 DEC submitted this action level as proposed regulation. PFAS projects for the State of Alaska adopted the proposed regulatory action level from August 2018 to March 2019, per DEC direction.

3 DEC aligned their PFAS drinking water action level with the EPA LHA.

4 Current DEC drinking water action level for PFAS

DEC = Alaska Department of Environmental Conservation, EPA = U.S. Environmental Protection Agency, LHA = Lifetime Health Advisory, ng/L = nanograms per liter, PFHpA = perfluoroheptanoic acid, PFHxS = perfluorohexanesulfonic acid, PFNA = perfluorononanoic acid, PFOA = perfluorooctanoic acid, PFOS = perfluorooctanesulfonic acid

In June 2022 the Environmental Protection Agency (EPA) published Interim Lifetime Health Advisory (LHA) levels of 0.004 ng/L for PFOA and 0.02 ng/L for PFOS, and Final LHA levels of 2,000 ng/L for perfluorobutanesulfonic acid (PFBS), and 10 ng/L for hexafluoropropylene oxide dimer and its ammonium salt (together referred to as "GenX chemicals"). We understand the DEC is currently evaluating the Interim LHA level released by EPA in June 2022 to determine their impact on DOT&PF PFAS projects and other projects in the State of Alaska.

2.4 Contaminants of Concern and Action Levels

The primary contaminants of concern for the YAK are PFOS and PFOA. PFOS and PFOA are regulated with numeric action levels or cleanup levels, as summarized in Exhibit 2-2 below. For the purposes of this project, samples were submitted for analysis of 18 PFAS: PFOS, PFOA, PFHpA, PFNA, PFHxS, PFBS, perfluorodecanoic acid (PFDA), perfluorododecanoic acid (PFDoA), perfluorohexanoic acid (PFHxA), perfluorotetradecanoic acid (PFTeA), perfluorotridecanoic acid (PFTrDA), perfluoroundecanoic acid (PFUnA), hexafluoropropylene oxide dimer acid (HFPO-DA), N-ethyl perfluorooctane sulfonamidoacetic acid (N-EtFOSAA), N-methyl perfluorooctane sulfonamidoacetic acid (N-MeFOSAA), 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic

acid (11Cl-PF3OUdS), 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS), and 4,8-dioxa-3H-perfluorononanoic acid (DONA).

Exhibit 2-2: Applicable Regulatory Action Levels

Media	Analyte	Action Level
Drinking Water[1]	PFOS + PFOA	70 ng/L
Groundwater[2]	PFOS	400 ng/L
	PFOA	400 ng/L
Soil[3]	PFOS	3.0 µg/kg
	PFOA	1.7 µg/kg

Notes:

1 DEC's drinking water action level reported in DEC's October 2019 Technical Memorandum.

2 DEC's groundwater cleanup level reported in 18 AAC 75.345, Table C.

3 DEC's migration to groundwater soil cleanup levels reported in 18 AAC 75.341, Table B1.

AAC = Alaska Administrative Code, DEC = Alaska Department of Environmental Conservation, µg/kg = micrograms per kilogram, ng/L = nanograms per liter, PFOA = perfluorooctanoic acid, PFOS = perfluorooctanesulfonic acid

2.5 PFAS Discovery at the YAK

In late 2018, as part of a Cooperative Agreement with the EPA, the DEC's Contaminated Sites Program conducted a limited PFAS Site Discovery Investigation. This included identifying potentially PFAS-impacted communities in Alaska, conducting a risk analysis of identified communities, collecting WSW samples for the analysis of PFAS, and reporting those results. The YAK was identified as a potentially PFAS affected site and DEC staff located and sampled 12 WSWs at and near the YAK in February of 2019 (Exhibit 2-3, below). Of the WSWs sampled, one well (YK-08, Yakutat Lodge) had PFAS concentrations exceeding the then DEC PFAS action level for the sum of five PFAS (70 ng/L, PFOS + PFOA + PFHxS + PFHpA + PFNA).

Exhibit 2-3: DEC Limited PFAS Site Discovery Investigation

DEC Sample Name	Address/Location Description	Exceeds DEC Action Level[1]
YK-01	[redacted]	No
YK-02		No
YK-03		No
YK-04		No
YK-05		No
YK-06		No
YK-07		No
YK-08		Yes
YK-09		No
YK-10		No
YK-11		No
YK-12		No

Notes:

1 DEC drinking water action level for the sum of five PFAS (70 ng/L, PFOS + PFOA + PFHxS + PFHpA + PFNA) at time of sampling.

ADF&G = Alaska Department of Fish & Game, ARFF = aircraft rescue and firefighting, DEC = Alaska Department of Environmental Conservation, DOT&PF = Alaska Department of Transportation & Public Facilities, NOAA = National Oceanic and Atmospheric Administration, NPS = National Park Service, ng/L = nanograms per liter, PFAS = per- and polyfluoroalkyl substances, PFHpA = perfluoroheptanoic acid, PFHxS = perfluorohexanesulfonic acid, PFNA = perfluorononanoic acid, PFOA = perfluorooctanoic acid, and PFOS = perfluorooctanesulfonic acid, SREB = snow removal equipment building, TSA = Transportation Security Administration, USFS = United States Forest Service.

S&W reviewed the analytical data provided by DEC and performed an internal quality assurance/quality control (QA/QC) assessment of the analytical data and completed a DEC Laboratory Data Review Checklist (LDRC).

2.6 June 2019 Initial Water Supply Well Search and Sampling Event

In June 2019, S&W staff began the initial WSW search and survey at and near the YAK. Based on the information available and in coordination with the DOT&PF and DEC, a well search area was defined prior to the sampling event. Owners/users of the properties identified in the search area were contacted, where practicable, to determine the presence or absence of a WSW on the property and obtain pertinent information on the well; 21 properties with WSWs were identified as described in Exhibit 2-4 below.

Exhibit 2-4: Water Supply Wells Identified in the Well Search Area

Parcel/Sample ID Number[1]	DEC Sample ID	Address/Location Description	Water Supply Well Category[2]
32606	—	[redacted]	1
32608	—		1
32609	—		1
32615	YK-05		1
32616	YK-04		1
32617	YK-07		1
32618	—		1
33002	YK-02		2
33004	YK-06		1
33045	YK-10		1
33052	—		2
33053	—		4
33056	YK-11		1
33059	—		1
33060	YK-01		2
33061	YK-03		1
33063	YK-08		2
33064	—		2
33065	—		1
33066	YK-09		1
33068	YK-12		1

Notes:

1 Parcel ID numbers were used to represent locations during the water supply well search.

2 See Section 2.6.1 for water supply well category information and descriptions.

ADF&G = Alaska Department of Fish & Game, ARFF = aircraft rescue and firefighting, DEC = Alaska Department of Environmental Conservation, DOT&PF = Alaska Department of Transportation & Public Facilities, NOAA = National Oceanic and Atmospheric Administration, NPS = National Park Service, S&W = Shannon & Wilson, Inc., SREB = snow removal equipment building, TSA = Transportation Security Administration, USFS = United States Forest Service.

During the June 2019 sampling event, an attempt was made to contact the owner and/or occupant of each identified property with a WSW in the search area. If occupants were not present at the time the property was visited, personalized door tags were left in a location where it would be noticed. All 21 wells identified during the initial well search were sampled.

Sample YK-09/*33066* was collected after a carbon filter. The sample did not exceed the action level during the February 2019 event (sum of five PFAS above 70 ng/L, PFOS + PFOA + PFHxS + PFHpA + PFNA). However, the presence of a carbon filter may have artificially biased the detected PFAS concentrations below the DEC action level. This was further verified with comparing the results in subsequent sampling events. Therefore, DOT&PF treats location YK-09/*33066* (Yakutat Lodge Restaurant) as an exceedance.

2.6.1 Water Supply Well Categories

WSWs identified during the well search (June 2019) were categorized by use as follows based on information provided by the WSW owner/user.

- Category 1: WSWs used for drinking or cooking, as reported by owners or occupants.
- Category 2: WSWs used for dish washing, bathing, and other domestic purposes. Homes or businesses where the occupants report they do not drink the water, but where the WSWs lead to kitchen or bathroom faucets, are considered possible future drinking water wells.
- Category 3: WSWs used for vegetable gardening and are not plumbed to indoor faucets or spigots. The well water is not accessed by outdoor plumbing, but the well may be located underneath or inside the structure. These wells are considered non-drinking water wells.
- Category 4: WSWs used for outdoor purposes only, such as irrigation or vehicle washing. These wells are considered non-drinking water wells.
- Category 5: WSWs currently not in use. Wells that have been abandoned in place, are inoperable, disconnected, or intended for future use. These wells are considered non-drinking water wells.

WSWs are categorized in this manner to facilitate sorting of wells by use and provide levels of priority. Wells in Categories 1 and 2 are given a higher priority with respect to alternative water and additional monitoring.

2.6.2 Water Supply Well Monitoring Criteria and Schedule

In coordination with the DOT&PF and DEC, S&W established the following quarterly and annual WSW monitoring criteria after the June 2019 sampling event based on DEC guidance documents and technical memorandums.

- Quarterly Criteria
  - Active category 1 and 2 WSWs with a maximum combined PFOS and PFOA concentration greater than or equal to 35 ng/L during a previous sampling event, per DEC guidance; and

  - Active category 1 and 2 WSWs within 500 lateral feet of WSWs with a combined PFOS and PFOA concentration greater than or equal to 35 ng/L during a previous sampling event.
- Annual Criteria
  - Active category 1 and 2 WSWs with a maximum combined PFOS and PFOA concentration greater than or equal to 17.5 ng/L during a previous sampling event, per DEC guidance; and
  - Active category 1 and 2 WSWs within 500 lateral feet of WSWs with a combined PFOS and PFOA concentration greater than or equal to 17.5 ng/L during a previous sampling event.

Lateral distance was measured from the GPS points collected during the initial round of sampling.

The WSW monitoring criteria established for the YAK after the June 2019 event is shown in Exhibit 2-5 below.

Exhibit 2-5: June 2019 Water Supply Well Monitoring Criteria

Parcel/Sample ID Number[1]	Monitoring Criteria
33053	Q/A
33056	A
33059	Q/A
33060	Q/A
33061	Q/A
33063	Q/A
33064	Q/A
33065	Q/A
33066	Q/A
33068	Q/A

Notes:

1 Parcel ID numbers were used to represent locations during the water supply well search.

A = annual, Q = quarterly

2.7 December 2019 through June 2020 Water Supply Well Monitoring

In December 2019, S&W conducted a quarterly event at the YAK, sampling wells *33060, 33061, 33064,* and *33068*. PFAS did not exceed DEC's drinking water level of 70 ng/L for the sum of PFOS and PFOA. Additional quarterly and annual monitoring events were planned for March 2020 and June 2020, respectively; however, these events were postponed due to the COVID-19 pandemic.

2.7.1 Water Supply Well Monitoring Criteria Modification

Yakutat WSW monitoring criteria were modified after the December 2019 quarterly monitoring event. Wells which previously exceeded the PFAS action level would no longer be sampled. The WSW monitoring criteria established for the YAK after the December 2019 event is shown in Exhibit 2-6 below.

Exhibit 2-6: December 2019 Water Supply Well Monitoring Criteria

Parcel/Sample ID Number[1]	Monitoring Criteria
33053	Q/A
33056	A
33059	Q/A
33060	Q/A
33061	Q/A
33064	Q/A
33065	Q/A
33068	Q/A

Notes:

2 Parcel ID numbers were used to represent locations during the water supply well search.

A = annual, Q = quarterly

2.8 Alternative Water Sources

Interim alternative bottled water has been supplied to well owners/users whose PFAS concentration exceeded the action level at the time of sampling and/or as determined necessary by DOT&PF. DOT&PF has been coordinating deliveries of bottled water with Pure Alaskan Water in Ketchikan, Alaska and/or barged from Costco out of Seattle, Washington.

2.9 Public Information

The DOT&PF hosts a webpage (Alaska PFAS Information, Transportation & Public Facilities, State of Alaska) describing the PFAS water-testing project. The webpage includes simplified regional results maps, a project summary, list of contacts, and links to additional resources. The map is updated after each sampling event following the receipt of analytical data.

3 FIELD ACTIVITIES

This section summarizes activities performed between July 2021 and June 2022.

3.1 Water Supply Well Sampling

S&W conducted four WSW sampling events during the reporting period in July 2021, October 2021, March 2022, and June 2022. The following S&W personnel collected analytical water samples for this project. These individuals are State of Alaska Qualified Samplers as defined in 18 Alaska Administrative Code (AAC) 75.333[b] and 18 AAC 78.088[b].

- Rachel Willis, Environmental Scientist
- Amber Masters, Environmental Scientist
- Marcy Nadel, Geologist
- Kailyn Davis, Geologist

S&W collected WSW samples during the reporting period as noted below.

- July 2021: *33053*, *33059*, *33060*, *33061*, *33064*, *33065*, and *33068*
- October 2021: *33059*, *33060*, *33061*, *33064*, *33065*, and *33068*
- March 2022: *33059*, *33060*, *33061*, *33064*, and *33068*
- June 2022: *33053*, *33056*, *33059*, *33060*, *33061*, *33065*, and *33068*

S&W collected WSW samples from a location in the structure's plumbing upstream of water-treatment systems or water softeners, where possible. For the purposes of this project S&W does not consider small (i.e., less than 18 inches in height) particulate filters to be PFAS treatment systems.

S&W purged the WSW systems prior to sampling by allowing the water to run until water parameters stabilized and the water appeared clear. Purging for approximately 20 minutes, parameters were collected using a multiprobe water quality meter. The parameters pH, temperature, and conductivity were recorded 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, ±0.5 degrees Celsius (°C) temperature, and ±3 percent conductivity (microsiemens per centimeter).

S&W discharged purge water to an indoor sink or to the ground surface. Following parameter stabilization, S&W collected PFAS water samples using laboratory-supplied containers. Copies of the WSW Sampling Logs are included in Appendix B, Field Forms.

3.2 Sample Custody, Storage, and Transport

Immediately after collection, the sample bottles for each WSW were placed in Ziploc bags and stored in a designated sample cooler maintained between 0°C and 6 °C with ice substitute separated from the sample bottles by a liner bag. S&W maintained custody of the samples until submitting them to the laboratory for analysis. Analytical samples and chain-of-custody forms were packaged for shipping in a hard-plastic cooler with an adequate quantity of frozen-ice substitute and packing material to maintain the proper temperature and prevent bottle breakage. S&W field staff applied custody seals to the cooler, which were observed to be intact upon receipt by the laboratory. Field staff shipped sample coolers to Eurofins Environment Testing America (Eurofins) in West Sacramento, California for analysis of PFAS by EPA 537(Mod) PFAS for QSM 5.3, Table B-15 or EPA 537.1 DW.

3.3 Special Considerations for PFAS Sampling

S&W field staff took appropriate precautions to prevent cross contamination during sampling, including discontinuing the use of personal protective equipment and field supplies known to contain PFAS, using liner bags to contain samples before and after sample collection, hand washing, and donning a fresh pair of disposable nitrile gloves before sample collection.

3.4 Notification of Results

Following review and validation of the analytical data, S&W prepared analytical data tables for the project team (DOT&PF, DEC, Department of Health) and then called property owners and occupants to notify them of the results of the PFAS water testing.

S&W also prepared letters for owners and occupants informing them of the results for the sample collected from their well. These letters were tailored to each property and analytical sample, and included the following information:

- sample name;
- comparison of analytical results to DEC's current action levels;
- description of the project; and
- pages of the Eurofins laboratory report that apply to the owner or occupant's WSW sample, including other PFAS results.

Where requested, S&W emailed results letters to owners and/or occupants.

3.5 Deviations

In general, S&W conducted the work in accordance with the sampling procedures noted above and based on ongoing discussion with DEC and DOT&PF. Samples were collected from wells assessable and functional during the time of sampling. Numerous sample collection deviations were noted during sample collection. Further details regarding those deviations are explained in the QA/QC section in Appendix C.

4 ANALYTICAL RESULTS

Quarterly and annual samples were submitted for the analysis of 18 PFAS (PFOS, PFOA, PFHpA, PFNA, PFHxS, PFBS, PFDA, PFDoA, PFHxA, PFTeA, PFTrDA, PFUnA, HFPO-DA, N-EtFOSAA, N-MeFOSAA, 11CL-PF3OUdS, 9CL-PF3ONS and DONA) by EPA 537(Mod) compliant with QSM 5.3, Table B-15 or EPA 537.1 DW. Although all PFAS analytes for the analytical method are reported, PFAS concentrations are only compared to the DEC Drinking Water action level for PFOS and PFOA (70 ng/L).

Table 1 through 4 summarize the PFAS concentrations for samples collected from WSWs during the July 2021, October 2021, March 2022, and June 2022 events. The Eurofins work orders (WOs) are included in chronological order followed by their LDRC in Appendix C. The highest reported WSW PFAS analytical results through June 2022 for all wells sampled associated with this project are shown on Figure 1.

During the June 2022 event, sample *33065* (Yakutat Costal Airlines) concentration for PFAS exceeded the 70 ng/L DEC drinking water action level. Interim alternative bottled water has been supplied to the well owners/users of location 33065. DOT&PF has been coordinating deliveries of bottled water with Pure Alaskan Water in Ketchikan, Alaska and/or barged from Costco out of Seattle, Washington.

No other wells sampled during the reporting period exceeded the DEC drinking water action level.

4.1 Trend Analysis

An evaluation of concentration trends for PFOS, PFOA and their sum in groundwater was completed using a Mann-Kendall statistical analysis of groundwater analytical data and visual inspection of the concentration graphs. Monitoring and Remediation Optimization System (MAROS) software by the Air Force Center for Engineering and the Environment was developed to evaluate concentration trends by evaluating the Mann-Kendall statistical

outputs and the coefficient of variation (COV). The COV is defined as the ratio of a dataset's standard deviation to its mean. S&W uses the ProUCL version 5.1 EPA Software capable of performing the Mann-Kendall test and calculating each dataset's COV for data stored in the project analytical database. The information obtained from the ProUCL software is then used to further evaluate temporal trends using the MAROS decision matrix developed.

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

Exhibit 4-1: MAROS Decision Matrix

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

cov = coefficient of variance

Data from DEC's February 2019 samples were omitted from this analysis. Data collected by S&W through June 2022 was included in this analysis. Sample locations were evaluated for trends if:

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

Our Mann-Kendall nonparametric trend analysis identified the following trends (Exhibit 4-2) for PFOS, PFOA, and DEC's drinking water action level.

The DEC drinking water action level was calculated as follows:

- If both PFOS and PFOA were detected = PFOS + PFOA
- If one is not detected and one detected = detected result
- If both PFOS and PFOA are not detected = minimum reporting limit

Exhibit 4-2: Trend Analysis Through June 2022

Parcel/Sample ID Number[1]	PFOS	PFOA	DEC Drinking Water Action Level
33053	Decreasing	Stable	Decreasing
33059	No Trend	Increasing	No Trend
33060	Stable	Decreasing	Stable
33061	Stable	Decreasing	Stable
33064	Stable	Decreasing	Stable
33065	Increasing	Stable	Increasing
33068	Stable	Stable	Stable

Notes:

3 Parcel ID numbers were used to represent locations during the water supply well search.

PFOA = perfluorooctanoic acid, PFOS = perfluorooctanesulfonic acid

5 QUALITY ASSURANCE AND QUALITY CONTROL

QA/QC procedures assist in producing data of acceptable quality and reliability. S&W reviewed the analytical results provided by Eurofins for laboratory QC samples and conducted our own QA assessment for this project in accordance with the June 2022 DEC approved Data-Validation Program Plan included as a part of our DOT&PF Statewide General Work Plan. S&W completed LDRCs for the PFAS WOs. These LDRCs are included in Appendix B after the corresponding analytical report.

By working in accordance with the proposed scope of services, S&W considers the samples collected to be representative of site conditions at the locations and times they were obtained. The quality of the analytical data for this project does not appear to have been compromised, and those results affected by QC anomalies were qualified with appropriate flags. See Appendix C for a QA/QC summary of the analytical data.

6 FUTURE WORK

S&W has been authorized by DOT&PF for three quarterly events and one annual event to be completed between July 1, 2022 and June 30, 2023. Based on the results of the FY22 events, the quarterly/annual schedule is outlined in Exhibit 6-1 below.

Exhibit 6-1: Proposed Water Supply Well Monitoring Criteria

Parcel/Sample ID Number[1]	Monitoring Criteria
33053	Q/A
33056	Q/A
33059	Q/A
33060	Q/A
33061	Q/A
33064	Q/A
33068	Q/A

Notes:

1 Parcel ID numbers were used to represent locations during the water supply well search.

A = annual, Q = quarterly

7 RECOMMENDATIONS

Based on the previously completed work, S&W recommends the DOT&PF continue to:

- work with the DEC and the Alaska Department of Health to continue educating the public regarding the potential health effects of exposure to PFAS-containing water, as new information becomes available; and
- develop procedures to limit discharges of PFAS-containing AFFF to the ground, surface water bodies or groundwater from ARFF training or equipment testing where possible. This recommendation is not intended to limit or restrict AFFF use in any way during an emergency response.

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 included as an appendix to assist you and others in understanding the use and limitations of this report.

8 REFERENCES

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Table 1 - Summary of July 2021 Water Supply Well Analytical Results - Yakutat

		Sample ID	*33053*	*33059*	*33060*	*33061*	*33064*	*33065*	*93065*	*33068*
		Sample Date	07/27/2021	07/27/2021	07/28/2021	07/27/2021	07/27/2021	07/27/2021		07/27/2021
Analyte	**Action Level**	**Units**	Sample Results							
Perfluorohexanesulfonic acid (PFHxS)	-	ng/L	6.0	<1.8	3.1	<1.9	6.7 J*	26	26	<1.9
Perfluorohexanoic acid (PFHxA)	-	ng/L	0.99 J*	<1.8	3.7	<1.9	2.8 J*	4.9	5.1	<1.9
Perfluoroheptanoic acid (PFHpA)	-	ng/L	0.53 J	<1.8	1.4 J	<1.9	0.54 J*	2.7	2.6	<1.9
Perfluorononanoic acid (PFNA)	-	ng/L	<1.8	<1.8	0.49 J	<1.9	<1.9 J*	1.3 J	1.4 J	<1.9
Perfluorobutanesulfonic acid (PFBS)	-	ng/L	0.23 J	<1.8	0.26 J	<1.9	0.40 J*	0.92 J	0.90 J	<1.9
Perfluorodecanoic acid (PFDA)	-	ng/L	<1.8 J*	0.32 J	0.76 J	<1.9	0.32 J*	0.75 J	0.78 J	<1.9
Perfluoroundecanoic acid (PFUnA)	-	ng/L	<1.8	<1.8	<1.8	<1.9	<1.9 J*	<1.9	<1.9	<1.9
Perfluorododecanoic acid (PFDoA)	-	ng/L	<1.8	<1.8	<1.8	<1.9	<1.9 J*	<1.9	<1.9	<1.9
Perfluorotridecanoic acid (PFTrDA)	-	ng/L	<1.8	<1.8	<1.8	<1.9	<1.9 J*	<1.9	<1.9	<1.9
Perfluorotetradecanoic acid (PFTeA)	-	ng/L	<1.8	<1.8	<1.8	<1.9	<1.9 J*	<1.9	<1.9	<1.9
N-Methyl perfluorooctane sulfonamidoacetic acid (N-MeFOSAA)	-	ng/L	<4.5	<4.4	<4.6	<4.7	<4.7 J*	<4.7	<4.7	<4.6
N-Ethyl perfluorooctane sulfonamidoacetic acid (N-EtFOSAA)	-	ng/L	<4.5	<4.4	<4.6	<4.7	<4.7 J*	<4.7	<4.7	<4.6
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)	-	ng/L	<1.8	<1.8	<1.8	<1.9	<1.9 J*	<1.9	<1.9	<1.9
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	-	ng/L	<1.8	<1.8	<1.8	<1.9	<1.9 J*	<1.9	<1.9	<1.9
4,8-Dioxa-3H-perfluorononanoic acid (DONA)	-	ng/L	<1.8	<1.8	<1.8	<1.9	<1.9 J*	<1.9	<1.9	<1.9
Hexafluoropropylene oxide dimer acid (HFPO-DA)	-	ng/L	<3.6	<3.5	<3.7	<3.8	<3.8 J*	<3.7	<3.8	<3.7
Perfluorooctanesulfonic acid (PFOS)	70†	ng/L	4.1	<1.8	11	<1.9	6.9 J*	23	26	<1.9
Perfluorooctanoic acid (PFOA)		ng/L	1.2 J	<1.8	1.5 J	<1.9	<1.9 J*	4.7	5	<1.9
Action Level Combined (PFOS + PFOA)	70†	ng/L	5.3 J	n/a	13 J	n/a	6.9 J*‡	28	29	n/a

Notes:

Results reported from Eurofins Environment Testing America in West Sacramento, California work order 320-76922-1.

Sample *93065* is a field duplicate of sample *33065* .

† DEC PFAS drinking water action level is 70 ng/L for PFOS and PFOA.

‡ Minimum concentration, the Action Level Combined oconcentration includes one or more result that is not detected greater than the MDL.

< Analyte not detected; listed as less than the RL unless otherwise flagged due to QC failures.

- Action level not established

J Estimated concentration, detected greater than the MDL and less than the RL. Flag applied by the laboratory.

J* Estimated concentration. Flag applied by Shannon & Wilson, Inc.

DEC = Alaska Deparmtnet of Environmenytal Conservation; DUP = field-duplicate; MDL = method detection limt;
n/a = not applicable; ng/L = nanograms per liter; RL = reporting limit; QC = quality control

Table 2 - Summary of October 2021 Water Supply Well Analytical Results - Yakutat

		Sample ID	*33059*	*33060*	*33061*	*33064*	*33065*	*33068*	*43068*
		Sample Date	10/07/2021	10/07/2021	10/07/2021	10/07/2021	10/07/2021	10/07/2021	
Analyte	Action Level	Units	Sample Results						
Perfluorohexanesulfonic acid (PFHxS)	-	ng/L	<1.9 J*	4.2	<1.9	11 J*	28	<1.9	<1.9
Perfluorohexanoic acid (PFHxA)	-	ng/L	<1.9 J*	7.2	<1.9	0.80 J*	4.7	<1.9	<1.9
Perfluoroheptanoic acid (PFHpA)	-	ng/L	<1.9 J*	2.0	<1.9	<2.0 J*	2.5	<1.9	<1.9
Perfluorononanoic acid (PFNA)	-	ng/L	<1.9 J*	<1.9	<1.9	<2.0 J*	1.5 J	<1.9	<1.9
Perfluorobutanesulfonic acid (PFBS)	-	ng/L	<1.9 J*	0.79 J	<1.9	<2.0 J*	1.1 J	<1.9	<1.9
Perfluorodecanoic acid (PFDA)	-	ng/L	<1.9 J*	<1.9	<1.9	<2.0 J*	0.60 J	<1.9	<1.9
Perfluoroundecanoic acid (PFUnA)	-	ng/L	<1.9 J*	<1.9	<1.9	<2.0 J*	<1.9	<1.9	<1.9
Perfluorododecanoic acid (PFDoA)	-	ng/L	<1.9 J*	<1.9	<1.9	<2.0 J*	<1.9	<1.9	<1.9
Perfluorotridecanoic acid (PFTrDA)	-	ng/L	<1.9 J*	<1.9	<1.9	<2.0 J*	<1.9	<1.9	<1.9
Perfluorotetradecanoic acid (PFTeA)	-	ng/L	<1.9 J*	<1.9	<1.9	<2.0 J*	<1.9	<1.9	<1.9
N-Methyl perfluorooctane sulfonamidoacetic acid (N-MeFOSAA)	-	ng/L	<1.9 J*	<1.9	<1.9	<2.0 J*	<1.9	<1.9	<1.9
N-Ethyl perfluorooctane sulfonamidoacetic acid (N-EtFOSAA)	-	ng/L	<1.9 J*	<1.9	<1.9	<2.0 J*	<1.9	<1.9	<1.9
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)	-	ng/L	<1.9 J*	<1.9	<1.9	<2.0 J*	<1.9	<1.9	<1.9
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	-	ng/L	<1.9 J*	<1.9	<1.9	<2.0 J*	<1.9	<1.9	<1.9
4,8-Dioxa-3H-perfluorononanoic acid (DONA)	-	ng/L	<1.9 J*	<1.9	<1.9	<2.0 J*	<1.9	<1.9	<1.9
Hexafluoropropylene oxide dimer acid (HFPO-DA)	-	ng/L	<1.9 J*	<1.9	<1.9	<2.0 J*	<1.9	<1.9	<1.9
Perfluorooctanesulfonic acid (PFOS)	70†	ng/L	<1.9 J*	8.3	<1.9	7.8 J*	28	<1.9	<1.9
Perfluorooctanoic acid (PFOA)		ng/L	<1.9 J*	2.0	<1.9	0.55 J*	4.4	<1.9	<1.9
Action Level Combined (PFOS + PFOA)	70†	ng/L	n/a	10	n/a	8.4 J*	32	n/a	n/a

Notes:
Results reported from Eurofins Environment Testing America in West Sacramento, California work order 320-80231-1.
Sample *43068* is a field duplicate of sample *33065* .
† DEC PFAS drinking water action level is 70 ng/L for PFOS and PFOA.
< Analyte not detected; listed as less than the RL unless otherwise flagged due to QC failures.
- Action level not established
J Estimated concentration, detected greater than the MDL and less than the RL. Flag applied by the laboratory.
J* Estimated concentration. Flag applied by Shannon & Wilson, Inc.
DEC = Alaska Deparmtnet of Environmenytal Conservation; DUP = field-duplicate; MDL = method detection limt;
n/a = not applicable; ng/L = nanograms per liter; RL = reporting limit; QC = quality control

Table 3 - Summary of March 2022 Water Supply Well Analytical Results - Yakutat

		Sample ID	33059	33060		33061	33064	33068	
		Sample Date	3/30/2022	3/30/2022	3/30/2022	3/30/2022	3/30/2022	3/30/2022	3/30/2022
Analyte	Action Level	Units	Sample Results						
Perfluorohexanesulfonic acid (PFHxS)	-	ng/L	<1.8 J*	6.1	6.2	<1.9	11	<1.8	<2.0
Perfluorohexanoic acid (PFHxA)	-	ng/L	<1.8 J*	5.6	5.8	<1.9	2.4	<1.8	<2.0
Perfluoroheptanoic acid (PFHpA)	-	ng/L	<1.8 J*	1.6 J	1.7 J	<1.9	0.87 J	<1.8	<2.0
Perfluorononanoic acid (PFNA)	-	ng/L	<1.8 J*	0.54 J	0.65 J*	<1.9	<1.9	<1.8	<2.0
Perfluorobutanesulfonic acid (PFBS)	-	ng/L	0.18 J*	1.9	1.6 J	<1.9	1.4 J	<1.8	<2.0
Perfluorodecanoic acid (PFDA)	-	ng/L	<1.8 J*	0.59 J	0.78 J	<1.9	<1.9	<1.8	<2.0
Perfluoroundecanoic acid (PFUnA)	-	ng/L	<1.8 J*	<1.9	<1.9	<1.9	<1.9	<1.8	<2.0
Perfluorododecanoic acid (PFDoA)	-	ng/L	<1.8 J*	<1.9	<1.9	<1.9	<1.9	<1.8	<2.0
Perfluorotridecanoic acid (PFTrDA)	-	ng/L	<1.8 J*	<1.9	<1.9	<1.9	<1.9	<1.8	<2.0
Perfluorotetradecanoic acid (PFTeA)	-	ng/L	<1.8 J*	<1.9	<1.9	<1.9	<1.9	<1.8	<2.0
N-Methyl perfluorooctane sulfonamidoacetic acid (N-MeFOSAA)	-	ng/L	<4.6 J*	<4.7	<4.7	<4.7	<4.8	<4.6	<5.0
N-Ethyl perfluorooctane sulfonamidoacetic acid (N-EtFOSAA)	-	ng/L	<4.6 J*	<4.7	<4.7	<4.7	<4.8	<4.6	<5.0
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)	-	ng/L	1.6 J*	<1.9	<1.9	<1.9	<1.9	<1.8	<2.0
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	-	ng/L	<1.8 J*	<1.9	<1.9	<1.9	<1.9	<1.8	<2.0
4,8-Dioxa-3H-perfluorononanoic acid (DONA)	-	ng/L	<1.8 J*	<1.9	<1.9	<1.9	<1.9	<1.8	<2.0
Hexafluoropropylene oxide dimer acid (HFPO-DA)	-	ng/L	<3.7 J*	<3.8	<3.8	<3.7	<3.8	<3.7	<4.0
Perfluorooctanesulfonic acid (PFOS)	70†	ng/L	<1.8 J*	9.5	9.8	<1.9	4.1	<1.8	<2.0
Perfluorooctanoic acid (PFOA)		ng/L	<1.8 J*	2.1	2.1	<1.9	0.97 J	<1.8	<2.0
Action Level Combined (PFOS + PFOA)	70†	ng/L	n/a	12	12 J*	n/a	5.1 J	n/a	n/a

Notes:

Results reported from Eurofins/TestAmerica, Inc. work order 320-86406-1.

Sample 93060 and 93068 are field duplicates of sample 33060 amd 33068, respectively.

† DEC PFAS drinking water action level is 70 ng/L for PFOS and PFOA.

< Analyte not detected; listed as less than the RL unless otherwise flagged due to QC failures.

- Action level not established

J Estimated concentration, detected greater than the MDL and less than the RL. Flag applied by the laboratory.

J* Estimated concentration. Flag applied by Shannon & Wilson, Inc.

DEC = Alaska Deparmtnet of Environmenytal Conservation; DUP = field-duplicate; MDL = method detection limt;
n/a = not applicable; ng/L = nanograms per liter; RL = reporting limit; QC = quality control

Table 4 - Summary of June 2022 Water Supply Well Analytical Results - Yakutat

		Sample ID	*33053*	*33056*	*33059*	*33060*		*33061*	*33065*	*33068*
		Sample Date	6/9/2022	6/9/2022	6/9/2022	6/9/2022	6/9/2022	6/9/2022	6/9/2022	6/9/2022
Analyte	**Action Level**	**Units**	Sample Results							
Perfluorohexanesulfonic acid (PFHxS)	-	ng/L	5.1	10	<1.8 J*	3.1 J*	2.9 J*	<1.7 J*	36	<1.7 J*
Perfluorohexanoic acid (PFHxA)	-	ng/L	1.1 J	9.6	<1.8 J*	2.4 J*	2.2 J*	<1.7 J*	7.1	<1.7 J*
Perfluoroheptanoic acid (PFHpA)	-	ng/L	0.71 J	4.2	<1.8 J*	1.6 J*	1.6 J*	<1.7 J*	3.9	<1.7 J*
Perfluorononanoic acid (PFNA)	-	ng/L	<1.9	1.5 J	<1.8 J*	0.51 J*	0.47 J*	<1.7 J*	3.3	<1.7 J*
Perfluorobutanesulfonic acid (PFBS)	-	ng/L	0.27 J	1.0 J	<1.8 J*	0.33 J*	0.38 J*	<1.7 J*	1.0 J	<1.7 J*
Perfluorodecanoic acid (PFDA)	-	ng/L	<1.9	<1.8	<1.8 J*	<1.8 J*	<1.8 J*	<1.7 J*	2.2	<1.7 J*
Perfluoroundecanoic acid (PFUnA)	-	ng/L	<1.9	<1.8	<1.8 J*	<1.8 J*	<1.8 J*	<1.7 J*	<1.8	<1.7 J*
Perfluorododecanoic acid (PFDoA)	-	ng/L	<1.9	<1.8	<1.8 J*	<1.8 J*	<1.8 J*	<1.7 J*	<1.8	<1.7 J*
Perfluorotridecanoic acid (PFTrDA)	-	ng/L	<1.9	<1.8	<1.8 J*	<1.8 J*	<1.8 J*	<1.7 J*	<1.8	<1.7 J*
Perfluorotetradecanoic acid (PFTeA)	-	ng/L	<1.9	<1.8	<1.8 J*	<1.8 J*	<1.8 J*	<1.7 J*	<1.8	<1.7 J*
N-Methyl perfluorooctane sulfonamidoacetic acid (N-MeFOSAA)	-	ng/L	<4.7	<4.6	<4.5 J*	<4.5 J*	<4.4 J*	<4.4 J*	<4.6	<4.4 J*
N-Ethyl perfluorooctane sulfonamidoacetic acid (N-EtFOSAA)	-	ng/L	<4.7	<4.6	<4.5 J*	<4.5 J*	<4.4 J*	<4.4 J*	<4.6	<4.4 J*
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)	-	ng/L	<1.9	<1.8	<1.8 J*	<1.8 J*	<1.8 J*	<1.7 J*	<1.8	<1.7 J*
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	-	ng/L	<1.9	<1.8	<1.8 J*	<1.8 J*	<1.8 J*	<1.7 J*	<1.8	<1.7 J*
4,8-Dioxa-3H-perfluorononanoic acid (DONA)	-	ng/L	<1.9	<1.8	<1.8 J*	<1.8 J*	<1.8 J*	<1.7 J*	<1.8	<1.7 J*
Hexafluoropropylene oxide dimer acid (HFPO-DA)	-	ng/L	<3.8	<3.7	<3.6 J*	<3.6 J*	<3.6 J*	<3.5 J*	<3.7	<3.5 J*
Perfluorooctanesulfonic acid (PFOS)	70†	ng/L	4.4	11	<1.8 J*	8.5 J*	8.8 J*	<1.7 J*	**70**	<1.7 J*
Perfluorooctanoic acid (PFOA)		ng/L	1.5 J	4.1	<1.8 J*	1.9 J*	1.9 J*	<1.7 J*	5.4	<1.7 J*
Action Level Combined (PFOS + PFOA)	70†	ng/L	5.9 J	15	n/a	10 J*	11 J*	n/a	**75**	n/a

Notes:

Results reported from Eurofins Environment Testing America in West Sacramento, California work order 320-88946-1.

Sample *93060* is a field duplicate of sample *33060* .

† DEC PFAS drinking water action level is 70 ng/L for PFOS and PFOA.

< Analyte not detected; listed as less than the RL unless otherwise flagged due to QC failures.

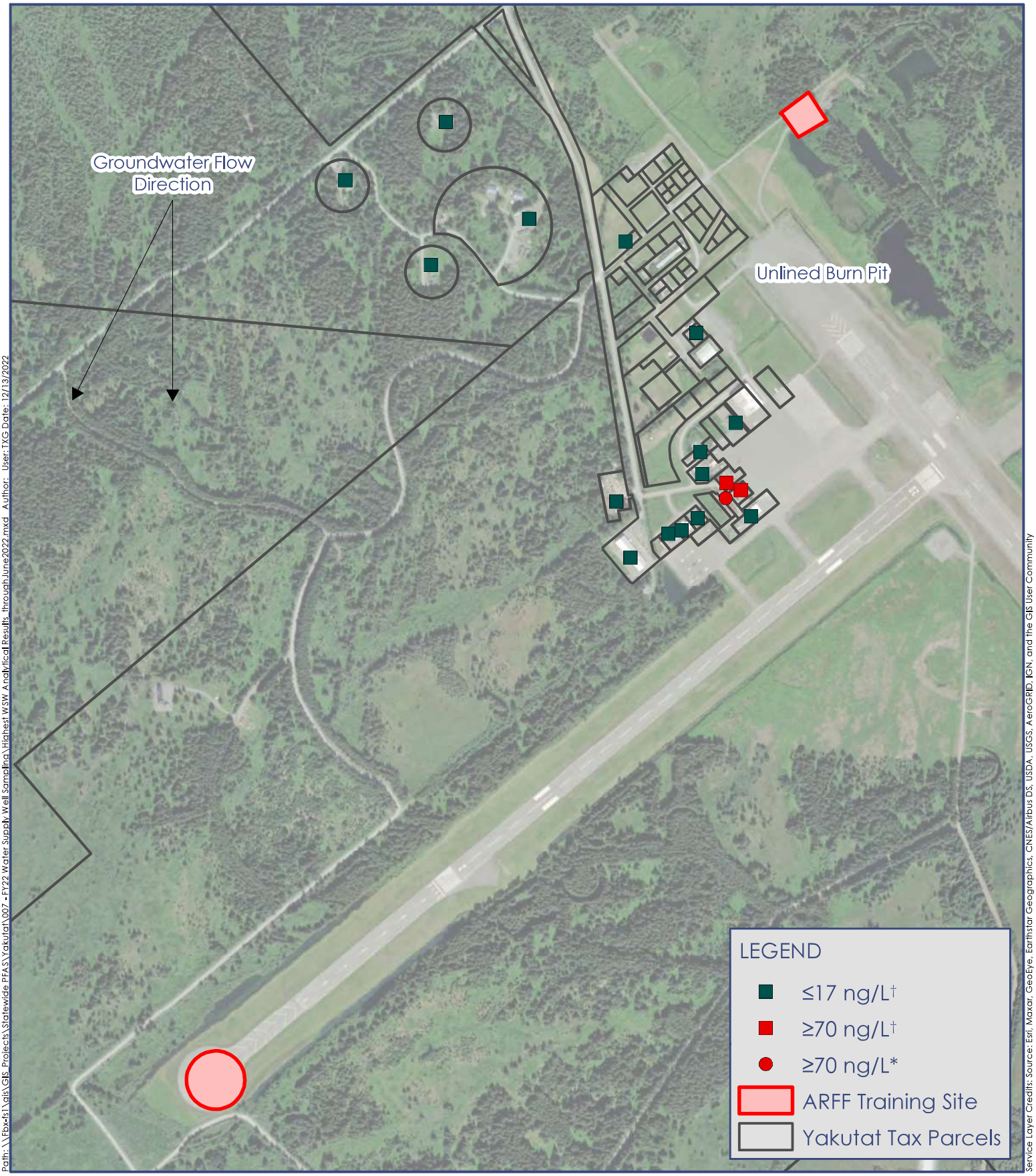
- Action level not established

J Estimated concentration, detected greater than the MDL and less than the RL. Flag applied by the laboratory.

J* Estimated concentration. Flag applied by Shannon & Wilson, Inc.

Result exceeds action level

DEC = Alaska Deparmtnet of Environmenytal Conservation; DUP = field-duplicate; MDL = method detection limt; n/a = not applicable; ng/L = nanograms per liter; RL = reporting limit; QC = quality control



N
0 1,000
Feet

Notes:
† Current action level = Sum of PFOS and PFOA
* Former action level = Sum of PFOS, PFOA,PFHxS, PFHpA, and PFNA
ARFF = aircraft rescue and firefighting; ng/L = nanograms per liter;
PFHpA = perfluoroheptanoic acid; PFHxS = perfluorohexanesulfonic acid;
PFNA = perfluorononanoic acid; PFOA = perfluorooctanoic
acid; PFOS = perfluorooctanesulfonic acid

May 2023
HIGHEST REPORTED WATER SUPPLY WELL RESULTS THROUGH JUNE 2022
Figure 1

APPENDIX A: FIELD FORMS

Appendix A

Field Forms - REDACTED FOR PRIVACY

APPENDIX B: LABORATORY REPORTS AND LDRCS

Appendix B

Laboratory Reports and LDRCs

eurofins | Environment Testing America

ANALYTICAL REPORT

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

Laboratory Job ID: 320-76922-1
Client Project/Site: YAK-DOT+PF PFAS

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

Attn: Ashley Jaramillo

Linda C. Laver

Authorized for release by:
8/13/2021 1:55:25 PM
Linda C. Laver, Senior Project Manager
(916)374-4362
Linda.Laver@Eurofinset.com

Designee for

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

Table of Contents

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: YAK-DOT+PF PFAS

Job ID: 320-76922-1

Qualifiers

LCMS

Qualifier	Qualifier Description
I	Value is EMPC (estimated maximum possible concentration).
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

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

Job ID: 320-76922-1

Laboratory: Eurofins TestAmerica, Sacramento

Narrative

Job Narrative
320-76922-1

Receipt
The samples were received on 7/29/2021 3:33 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 5.2º C.

LCMS
Method EPA 537(Mod): The "I" qualifier means the transition mass ratio for the indicated analyte was outside of the established ratio limit. 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 analytes in the following samples: 33053 (320-76922-6) and 33064 (320-76922-8).

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

Organic Prep
Method 3535: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-511727.

Method 3535: The following samples were yellow-orange and contain a thin layer of sediment at the bottom of the bottle prior to extraction: 33060 (320-76922-1) and 33064 (320-76922-8).

Method 3535: The following samples were yellow prior to extraction: 33068 (320-76922-3), 33059 (320-76922-5) and 33061 (320-76922-7).

Method 3535: Samples arrived in laboratory preserved with Trizma. All samples were tested for pH and Chlorine: 33060 (320-76922-1), 93065 (320-76922-2), 33068 (320-76922-3), 33065 (320-76922-4), 33059 (320-76922-5), 33053 (320-76922-6), 33061 (320-76922-7) and 33064 (320-76922-8). The associated QC was prepared with the addition of Trizma for preparation batch 320-511727.

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: YAK-DOT+PF PFAS

Job ID: 320-76922-1

Client Sample ID: 33060 — Lab Sample ID: 320-76922-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	3.7		1.8	0.53	ng/L	1	EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.4		1.8	0.23	ng/L	1	EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	1.5		1.8	0.78	ng/L	1	EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.49		1.8	0.25	ng/L	1	EPA 537(Mod)	Total/NA
Perfluorodecanoic acid (PFDA)	0.76		1.8	0.28	ng/L	1	EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.26		1.8	0.18	ng/L	1	EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	3.1		1.8	0.52	ng/L	1	EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	11		1.8	0.50	ng/L	1	EPA 537(Mod)	Total/NA

Client Sample ID: 93065 — Lab Sample ID: 320-76922-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	5.1		1.9	0.55	ng/L	1	EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.6		1.9	0.24	ng/L	1	EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	5.0		1.9	0.80	ng/L	1	EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	1.4		1.9	0.25	ng/L	1	EPA 537(Mod)	Total/NA
Perfluorodecanoic acid (PFDA)	0.78		1.9	0.29	ng/L	1	EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.90		1.9	0.19	ng/L	1	EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	26		1.9	0.54	ng/L	1	EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	26		1.9	0.51	ng/L	1	EPA 537(Mod)	Total/NA

Client Sample ID: 33068 — Lab Sample ID: 320-76922-3

No Detections.

Client Sample ID: 33065 — Lab Sample ID: 320-76922-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	4.9		1.9	0.54	ng/L	1	EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.7		1.9	0.23	ng/L	1	EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	4.7		1.9	0.79	ng/L	1	EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	1.3		1.9	0.25	ng/L	1	EPA 537(Mod)	Total/NA
Perfluorodecanoic acid (PFDA)	0.75		1.9	0.29	ng/L	1	EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.92		1.9	0.19	ng/L	1	EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	26		1.9	0.53	ng/L	1	EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	23		1.9	0.50	ng/L	1	EPA 537(Mod)	Total/NA

Client Sample ID: 33059 — Lab Sample ID: 320-76922-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	Method	Prep Type
Perfluorodecanoic acid (PFDA)	0.32		1.8	0.27	ng/L	1	EPA 537(Mod)	Total/NA

Client Sample ID: 33053 — Lab Sample ID: 320-76922-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	0.99	J I	1.8	0.52	ng/L	1	EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.53		1.8	0.22	ng/L	1	EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	1.2		1.8	0.76	ng/L	1	EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.23		1.8	0.18	ng/L	1	EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	6.0		1.8	0.51	ng/L	1	EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	4.1		1.8	0.48	ng/L	1	EPA 537(Mod)	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: YAK-DOT+PF PFAS

Job ID: 320-76922-1

Client Sample ID: 33061 — Lab Sample ID: 320-76922-7

No Detections.

Client Sample ID: 33064 — Lab Sample ID: 320-76922-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	2.8		1.9	0.55	ng/L	1	EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.54		1.9	0.24	ng/L	1	EPA 537(Mod)	Total/NA
Perfluorodecanoic acid (PFDA)	0.32	J I	1.9	0.29	ng/L	1	EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.40		1.9	0.19	ng/L	1	EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	6.7		1.9	0.54	ng/L	1	EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	6.9		1.9	0.51	ng/L	1	EPA 537(Mod)	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: YAK-DOT+PF PFAS

Job ID: 320-76922-1

Client Sample ID: 33060
Date Collected: 07/28/21 09:37
Date Received: 07/29/21 15:33

Lab Sample ID: 320-76922-1
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)	**3.7**		1.8	0.53	ng/L		07/30/21 13:03	08/08/21 14:04	1
Perfluoroheptanoic acid (PFHpA)	**1.4**	**J**	1.8	0.23	ng/L		07/30/21 13:03	08/08/21 14:04	1
Perfluorooctanoic acid (PFOA)	**1.5**	**J**	1.8	0.78	ng/L		07/30/21 13:03	08/08/21 14:04	1
Perfluorononanoic acid (PFNA)	**0.49**	**J**	1.8	0.25	ng/L		07/30/21 13:03	08/08/21 14:04	1
Perfluorodecanoic acid (PFDA)	**0.76**	**J**	1.8	0.28	ng/L		07/30/21 13:03	08/08/21 14:04	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	1.0	ng/L		07/30/21 13:03	08/08/21 14:04	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.50	ng/L		07/30/21 13:03	08/08/21 14:04	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		07/30/21 13:03	08/08/21 14:04	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.67	ng/L		07/30/21 13:03	08/08/21 14:04	1
Perfluorobutanesulfonic acid (PFBS)	**0.26**	**J**	1.8	0.18	ng/L		07/30/21 13:03	08/08/21 14:04	1
Perfluorohexanesulfonic acid (PFHxS)	**3.1**		1.8	0.52	ng/L		07/30/21 13:03	08/08/21 14:04	1
Perfluorooctanesulfonic acid (PFOS)	**11**		1.8	0.50	ng/L		07/30/21 13:03	08/08/21 14:04	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.6	1.1	ng/L		07/30/21 13:03	08/08/21 14:04	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.6	1.2	ng/L		07/30/21 13:03	08/08/21 14:04	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		07/30/21 13:03	08/08/21 14:04	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.7	1.4	ng/L		07/30/21 13:03	08/08/21 14:04	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		07/30/21 13:03	08/08/21 14:04	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.37	ng/L		07/30/21 13:03	08/08/21 14:04	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*10*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:04*	
13C4 PFHpA	*89*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:04*	
13C4 PFOA	*99*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:04*	
13C5 PFNA	*91*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:04*	
13C2 PFDA	*105*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:04*	
13C2 PFUnA	*101*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:04*	
13C2 PFDoA	*105*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:04*	
13C2 PFTeDA	*91*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:04*	
13C3 PFBS	*15*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:04*	
18O2 PFHxS	*97*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:04*	
13C4 PFOS	*10*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:04*	
d3-NMeFOSAA	*80*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:04*	
d5-NEtFOSAA	*77*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:04*	
13C3 HFPO-DA	*91*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:04*	

Client: Shannon & Wilson, Inc
Project/Site: YAK-DOT+PF PFAS

Job ID: 320-76922-1

Client Sample ID: 93065
Date Collected: 07/27/21 14:01
Date Received: 07/29/21 15:33

Lab Sample ID: 320-76922-2
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)	**5.1**		1.9	0.55	ng/L		07/30/21 13:03	08/08/21 14:14	1
Perfluoroheptanoic acid (PFHpA)	**2.6**		1.9	0.24	ng/L		07/30/21 13:03	08/08/21 14:14	1
Perfluorooctanoic acid (PFOA)	**5.0**		1.9	0.80	ng/L		07/30/21 13:03	08/08/21 14:14	1
Perfluorononanoic acid (PFNA)	**1.4**	**J**	1.9	0.25	ng/L		07/30/21 13:03	08/08/21 14:14	1
Perfluorodecanoic acid (PFDA)	**0.78**	**J**	1.9	0.29	ng/L		07/30/21 13:03	08/08/21 14:14	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	1.0	ng/L		07/30/21 13:03	08/08/21 14:14	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.52	ng/L		07/30/21 13:03	08/08/21 14:14	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	1.2	ng/L		07/30/21 13:03	08/08/21 14:14	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.69	ng/L		07/30/21 13:03	08/08/21 14:14	1
Perfluorobutanesulfonic acid (PFBS)	**0.90**	**J**	1.9	0.19	ng/L		07/30/21 13:03	08/08/21 14:14	1
Perfluorohexanesulfonic acid (PFHxS)	**26**		1.9	0.54	ng/L		07/30/21 13:03	08/08/21 14:14	1
Perfluorooctanesulfonic acid (PFOS)	**26**		1.9	0.51	ng/L		07/30/21 13:03	08/08/21 14:14	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.7	1.1	ng/L		07/30/21 13:03	08/08/21 14:14	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.7	1.2	ng/L		07/30/21 13:03	08/08/21 14:14	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.9	0.23	ng/L		07/30/21 13:03	08/08/21 14:14	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.8	1.4	ng/L		07/30/21 13:03	08/08/21 14:14	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.9	0.30	ng/L		07/30/21 13:03	08/08/21 14:14	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.38	ng/L		07/30/21 13:03	08/08/21 14:14	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*103*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:14*	
13C4 PFHpA	*95*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:14*	
13C4 PFOA	*87*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:14*	
13C5 PFNA	*91*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:14*	
13C2 PFDA	*103*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:14*	
13C2 PFUnA	*92*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:14*	
13C2 PFDoA	*88*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:14*	
13C2 PFTeDA	*83*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:14*	
13C3 PFBS	*106*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:14*	
18O2 PFHxS	*92*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:14*	
13C4 PFOS	*95*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:14*	
d3-NMeFOSAA	*68*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:14*	
d5-NEtFOSAA	*73*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:14*	
13C3 HFPO-DA	*87*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:14*	

Client: Shannon & Wilson, Inc
Project/Site: YAK-DOT+PF PFAS

Job ID: 320-76922-1

Client Sample ID: 33068
Date Collected: 07/27/21 14:43
Date Received: 07/29/21 15:33

Lab Sample ID: 320-76922-3
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		1.9	0.54	ng/L		07/30/21 13:03	08/08/21 14:23	1
Perfluoroheptanoic acid (PFHpA)	ND		1.9	0.23	ng/L		07/30/21 13:03	08/08/21 14:23	1
Perfluorooctanoic acid (PFOA)	ND		1.9	0.79	ng/L		07/30/21 13:03	08/08/21 14:23	1
Perfluorononanoic acid (PFNA)	ND		1.9	0.25	ng/L		07/30/21 13:03	08/08/21 14:23	1
Perfluorodecanoic acid (PFDA)	ND		1.9	0.29	ng/L		07/30/21 13:03	08/08/21 14:23	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	1.0	ng/L		07/30/21 13:03	08/08/21 14:23	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.51	ng/L		07/30/21 13:03	08/08/21 14:23	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	1.2	ng/L		07/30/21 13:03	08/08/21 14:23	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.68	ng/L		07/30/21 13:03	08/08/21 14:23	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.9	0.19	ng/L		07/30/21 13:03	08/08/21 14:23	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.9	0.53	ng/L		07/30/21 13:03	08/08/21 14:23	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.9	0.50	ng/L		07/30/21 13:03	08/08/21 14:23	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.6	1.1	ng/L		07/30/21 13:03	08/08/21 14:23	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.6	1.2	ng/L		07/30/21 13:03	08/08/21 14:23	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.9	0.22	ng/L		07/30/21 13:03	08/08/21 14:23	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.7	1.4	ng/L		07/30/21 13:03	08/08/21 14:23	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.9	0.30	ng/L		07/30/21 13:03	08/08/21 14:23	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.37	ng/L		07/30/21 13:03	08/08/21 14:23	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*105*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:23*	
13C4 PFHpA	*92*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:23*	
13C4 PFOA	*91*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:23*	
13C5 PFNA	*93*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:23*	
13C2 PFDA	*102*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:23*	
13C2 PFUnA	*94*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:23*	
13C2 PFDoA	*90*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:23*	
13C2 PFTeDA	*84*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:23*	
13C3 PFBS	*15*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:23*	
18O2 PFHxS	*98*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:23*	
13C4 PFOS	*104*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:23*	
d3-NMeFOSAA	*78*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:23*	
d5-NEtFOSAA	*71*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:23*	
13C3 HFPO-DA	*92*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:23*	

Client: Shannon & Wilson, Inc
Project/Site: YAK-DOT+PF PFAS

Job ID: 320-76922-1

Client Sample ID: 33065
Date Collected: 07/27/21 14:11
Date Received: 07/29/21 15:33

Lab Sample ID: 320-76922-4
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**4.9**		1.9	0.54	ng/L		07/30/21 13:03	08/08/21 14:32	1
Perfluoroheptanoic acid (PFHpA)	**2.7**		1.9	0.23	ng/L		07/30/21 13:03	08/08/21 14:32	1
Perfluorooctanoic acid (PFOA)	**4.7**		1.9	0.79	ng/L		07/30/21 13:03	08/08/21 14:32	1
Perfluorononanoic acid (PFNA)	**1.3**	**J**	1.9	0.25	ng/L		07/30/21 13:03	08/08/21 14:32	1
Perfluorodecanoic acid (PFDA)	**0.75**	**J**	1.9	0.29	ng/L		07/30/21 13:03	08/08/21 14:32	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	1.0	ng/L		07/30/21 13:03	08/08/21 14:32	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.51	ng/L		07/30/21 13:03	08/08/21 14:32	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	1.2	ng/L		07/30/21 13:03	08/08/21 14:32	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.68	ng/L		07/30/21 13:03	08/08/21 14:32	1
Perfluorobutanesulfonic acid (PFBS)	**0.92**	**J**	1.9	0.19	ng/L		07/30/21 13:03	08/08/21 14:32	1
Perfluorohexanesulfonic acid (PFHxS)	**26**		1.9	0.53	ng/L		07/30/21 13:03	08/08/21 14:32	1
Perfluorooctanesulfonic acid (PFOS)	**23**		1.9	0.50	ng/L		07/30/21 13:03	08/08/21 14:32	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.7	1.1	ng/L		07/30/21 13:03	08/08/21 14:32	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.7	1.2	ng/L		07/30/21 13:03	08/08/21 14:32	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.9	0.22	ng/L		07/30/21 13:03	08/08/21 14:32	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.7	1.4	ng/L		07/30/21 13:03	08/08/21 14:32	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.9	0.30	ng/L		07/30/21 13:03	08/08/21 14:32	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.37	ng/L		07/30/21 13:03	08/08/21 14:32	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*102*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:32*	
13C4 PFHpA	*85*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:32*	
13C4 PFOA	*89*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:32*	
13C5 PFNA	*91*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:32*	
13C2 PFDA	*101*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:32*	
13C2 PFUnA	*93*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:32*	
13C2 PFDoA	*90*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:32*	
13C2 PFTeDA	*86*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:32*	
13C3 PFBS	*108*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:32*	
18O2 PFHxS	*85*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:32*	
13C4 PFOS	*101*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:32*	
d3-NMeFOSAA	*73*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:32*	
d5-NEtFOSAA	*73*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:32*	
13C3 HFPO-DA	*91*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:32*	

Client: Shannon & Wilson, Inc
Project/Site: YAK-DOT+PF PFAS

Job ID: 320-76922-1

Client Sample ID: 33059
Date Collected: 07/27/21 13:18
Date Received: 07/29/21 15:33

Lab Sample ID: 320-76922-5
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)	ND		1.8	0.51	ng/L		07/30/21 13:03	08/08/21 14:42	1
Perfluoroheptanoic acid (PFHpA)	ND		1.8	0.22	ng/L		07/30/21 13:03	08/08/21 14:42	1
Perfluorooctanoic acid (PFOA)	ND		1.8	0.75	ng/L		07/30/21 13:03	08/08/21 14:42	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.24	ng/L		07/30/21 13:03	08/08/21 14:42	1
Perfluorodecanoic acid (PFDA)	**0.32**	**J**	1.8	0.27	ng/L		07/30/21 13:03	08/08/21 14:42	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.97	ng/L		07/30/21 13:03	08/08/21 14:42	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.49	ng/L		07/30/21 13:03	08/08/21 14:42	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		07/30/21 13:03	08/08/21 14:42	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.65	ng/L		07/30/21 13:03	08/08/21 14:42	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.8	0.18	ng/L		07/30/21 13:03	08/08/21 14:42	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.8	0.50	ng/L		07/30/21 13:03	08/08/21 14:42	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.8	0.48	ng/L		07/30/21 13:03	08/08/21 14:42	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.4	1.1	ng/L		07/30/21 13:03	08/08/21 14:42	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.4	1.2	ng/L		07/30/21 13:03	08/08/21 14:42	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.21	ng/L		07/30/21 13:03	08/08/21 14:42	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.5	1.3	ng/L		07/30/21 13:03	08/08/21 14:42	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.28	ng/L		07/30/21 13:03	08/08/21 14:42	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.35	ng/L		07/30/21 13:03	08/08/21 14:42	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*105*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:42*	
13C4 PFHpA	*93*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:42*	
13C4 PFOA	*91*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:42*	
13C5 PFNA	*95*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:42*	
13C2 PFDA	*101*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:42*	
13C2 PFUnA	*97*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:42*	
13C2 PFDoA	*91*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:42*	
13C2 PFTeDA	*80*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:42*	
13C3 PFBS	*12*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:42*	
18O2 PFHxS	*94*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:42*	
13C4 PFOS	*101*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:42*	
d3-NMeFOSAA	*74*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:42*	
d5-NEtFOSAA	*72*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:42*	
13C3 HFPO-DA	*97*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:42*	

Client: Shannon & Wilson, Inc
Project/Site: YAK-DOT+PF PFAS

Job ID: 320-76922-1

Client Sample ID: 33053
Date Collected: 07/27/21 15:13
Date Received: 07/29/21 15:33

Lab Sample ID: 320-76922-6
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)	**0.99**	**J I**	1.8	0.52	ng/L		07/30/21 13:03	08/08/21 14:51	1
Perfluoroheptanoic acid (PFHpA)	**0.53**	**J**	1.8	0.22	ng/L		07/30/21 13:03	08/08/21 14:51	1
Perfluorooctanoic acid (PFOA)	**1.2**	**J**	1.8	0.76	ng/L		07/30/21 13:03	08/08/21 14:51	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.24	ng/L		07/30/21 13:03	08/08/21 14:51	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		07/30/21 13:03	08/08/21 14:51	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.98	ng/L		07/30/21 13:03	08/08/21 14:51	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.49	ng/L		07/30/21 13:03	08/08/21 14:51	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		07/30/21 13:03	08/08/21 14:51	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.65	ng/L		07/30/21 13:03	08/08/21 14:51	1
Perfluorobutanesulfonic acid (PFBS)	**0.23**	**J**	1.8	0.18	ng/L		07/30/21 13:03	08/08/21 14:51	1
Perfluorohexanesulfonic acid (PFHxS)	**6.0**		1.8	0.51	ng/L		07/30/21 13:03	08/08/21 14:51	1
Perfluorooctanesulfonic acid (PFOS)	**4.1**		1.8	0.48	ng/L		07/30/21 13:03	08/08/21 14:51	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		07/30/21 13:03	08/08/21 14:51	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		07/30/21 13:03	08/08/21 14:51	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.21	ng/L		07/30/21 13:03	08/08/21 14:51	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.3	ng/L		07/30/21 13:03	08/08/21 14:51	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		07/30/21 13:03	08/08/21 14:51	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		07/30/21 13:03	08/08/21 14:51	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA			*50 - 150*	*07/30/21 13:03*	*08/08/21 14:51*	
13C4 PFHpA	*100*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:51*	
13C4 PFOA	*96*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:51*	
13C5 PFNA	*95*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:51*	
13C2 PFDA	*103*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:51*	
13C2 PFUnA	*99*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:51*	
13C2 PFDoA	*92*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:51*	
13C2 PFTeDA	*85*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:51*	
13C3 PFBS	*17*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:51*	
18O2 PFHxS	*99*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:51*	
13C4 PFOS	*107*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:51*	
d3-NMeFOSAA	*69*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:51*	
d5-NEtFOSAA	*74*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:51*	
13C3 HFPO-DA	*91*		*50 - 150*	*07/30/21 13:03*	*08/08/21 14:51*	

Client: Shannon & Wilson, Inc
Project/Site: YAK-DOT+PF PFAS

Job ID: 320-76922-1

Client Sample ID: 33061
Date Collected: 07/27/21 16:28
Date Received: 07/29/21 15:33

Lab Sample ID: 320-76922-7
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		1.9	0.55	ng/L		07/30/21 13:03	08/08/21 15:01	1
Perfluoroheptanoic acid (PFHpA)	ND		1.9	0.24	ng/L		07/30/21 13:03	08/08/21 15:01	1
Perfluorooctanoic acid (PFOA)	ND		1.9	0.81	ng/L		07/30/21 13:03	08/08/21 15:01	1
Perfluorononanoic acid (PFNA)	ND		1.9	0.26	ng/L		07/30/21 13:03	08/08/21 15:01	1
Perfluorodecanoic acid (PFDA)	ND		1.9	0.29	ng/L		07/30/21 13:03	08/08/21 15:01	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	1.0	ng/L		07/30/21 13:03	08/08/21 15:01	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.52	ng/L		07/30/21 13:03	08/08/21 15:01	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	1.2	ng/L		07/30/21 13:03	08/08/21 15:01	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.69	ng/L		07/30/21 13:03	08/08/21 15:01	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.9	0.19	ng/L		07/30/21 13:03	08/08/21 15:01	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.9	0.54	ng/L		07/30/21 13:03	08/08/21 15:01	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.9	0.51	ng/L		07/30/21 13:03	08/08/21 15:01	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.7	1.1	ng/L		07/30/21 13:03	08/08/21 15:01	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.7	1.2	ng/L		07/30/21 13:03	08/08/21 15:01	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.9	0.23	ng/L		07/30/21 13:03	08/08/21 15:01	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.8	1.4	ng/L		07/30/21 13:03	08/08/21 15:01	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.9	0.30	ng/L		07/30/21 13:03	08/08/21 15:01	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.38	ng/L		07/30/21 13:03	08/08/21 15:01	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*108*		*50 - 150*	*07/30/21 13:03*	*08/08/21 15:01*	
13C4 PFHpA	*90*		*50 - 150*	*07/30/21 13:03*	*08/08/21 15:01*	
13C4 PFOA	*97*		*50 - 150*	*07/30/21 13:03*	*08/08/21 15:01*	
13C5 PFNA	*91*		*50 - 150*	*07/30/21 13:03*	*08/08/21 15:01*	
13C2 PFDA	*105*		*50 - 150*	*07/30/21 13:03*	*08/08/21 15:01*	
13C2 PFUnA	*101*		*50 - 150*	*07/30/21 13:03*	*08/08/21 15:01*	
13C2 PFDoA	*95*		*50 - 150*	*07/30/21 13:03*	*08/08/21 15:01*	
13C2 PFTeDA	*90*		*50 - 150*	*07/30/21 13:03*	*08/08/21 15:01*	
13C3 PFBS	*106*		*50 - 150*	*07/30/21 13:03*	*08/08/21 15:01*	
18O2 PFHxS	*100*		*50 - 150*	*07/30/21 13:03*	*08/08/21 15:01*	
13C4 PFOS	*104*		*50 - 150*	*07/30/21 13:03*	*08/08/21 15:01*	
d3-NMeFOSAA	*79*		*50 - 150*	*07/30/21 13:03*	*08/08/21 15:01*	
d5-NEtFOSAA	*79*		*50 - 150*	*07/30/21 13:03*	*08/08/21 15:01*	
13C3 HFPO-DA	*97*		*50 - 150*	*07/30/21 13:03*	*08/08/21 15:01*	

Client: Shannon & Wilson, Inc
Project/Site: YAK-DOT+PF PFAS

Job ID: 320-76922-1

Client Sample ID: 33064
Date Collected: 07/27/21 16:05
Date Received: 07/29/21 15:33

Lab Sample ID: 320-76922-8
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**2.8**		1.9	0.55	ng/L		07/30/21 13:03	08/08/21 15:29	1
Perfluoroheptanoic acid (PFHpA)	**0.54**	**J**	1.9	0.24	ng/L		07/30/21 13:03	08/08/21 15:29	1
Perfluorooctanoic acid (PFOA)	ND		1.9	0.80	ng/L		07/30/21 13:03	08/08/21 15:29	1
Perfluorononanoic acid (PFNA)	ND		1.9	0.25	ng/L		07/30/21 13:03	08/08/21 15:29	1
Perfluorodecanoic acid (PFDA)	**0.32**	**J I**	1.9	0.29	ng/L		07/30/21 13:03	08/08/21 15:29	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	1.0	ng/L		07/30/21 13:03	08/08/21 15:29	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.52	ng/L		07/30/21 13:03	08/08/21 15:29	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	1.2	ng/L		07/30/21 13:03	08/08/21 15:29	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.69	ng/L		07/30/21 13:03	08/08/21 15:29	1
Perfluorobutanesulfonic acid (PFBS)	**0.40**	**J**	1.9	0.19	ng/L		07/30/21 13:03	08/08/21 15:29	1
Perfluorohexanesulfonic acid (PFHxS)	**6.7**		1.9	0.54	ng/L		07/30/21 13:03	08/08/21 15:29	1
Perfluorooctanesulfonic acid (PFOS)	**6.9**		1.9	0.51	ng/L		07/30/21 13:03	08/08/21 15:29	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.7	1.1	ng/L		07/30/21 13:03	08/08/21 15:29	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.7	1.2	ng/L		07/30/21 13:03	08/08/21 15:29	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.9	0.23	ng/L		07/30/21 13:03	08/08/21 15:29	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.8	1.4	ng/L		07/30/21 13:03	08/08/21 15:29	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.9	0.30	ng/L		07/30/21 13:03	08/08/21 15:29	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.38	ng/L		07/30/21 13:03	08/08/21 15:29	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*13*		*50 - 150*	*07/30/21 13:03*	*08/08/21 15:29*	
13C4 PFHpA	*96*		*50 - 150*	*07/30/21 13:03*	*08/08/21 15:29*	
13C4 PFOA	*102*		*50 - 150*	*07/30/21 13:03*	*08/08/21 15:29*	
13C5 PFNA	*95*		*50 - 150*	*07/30/21 13:03*	*08/08/21 15:29*	
13C2 PFDA	*14*		*50 - 150*	*07/30/21 13:03*	*08/08/21 15:29*	
13C2 PFUnA	*98*		*50 - 150*	*07/30/21 13:03*	*08/08/21 15:29*	
13C2 PFDoA	*95*		*50 - 150*	*07/30/21 13:03*	*08/08/21 15:29*	
13C2 PFTeDA	*91*		*50 - 150*	*07/30/21 13:03*	*08/08/21 15:29*	
13C3 PFBS	*12*		*50 - 150*	*07/30/21 13:03*	*08/08/21 15:29*	
18O2 PFHxS	*103*		*50 - 150*	*07/30/21 13:03*	*08/08/21 15:29*	
13C4 PFOS	*18*		*50 - 150*	*07/30/21 13:03*	*08/08/21 15:29*	
d3-NMeFOSAA	*78*		*50 - 150*	*07/30/21 13:03*	*08/08/21 15:29*	
d5-NEtFOSAA	*87*		*50 - 150*	*07/30/21 13:03*	*08/08/21 15:29*	
13C3 HFPO-DA	*98*		*50 - 150*	*07/30/21 13:03*	*08/08/21 15:29*	

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: YAK-DOT+PF PFAS

Job ID: 320-76922-1

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

Matrix: Water

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFHxA (50-150)	C4PFHA (50-150)	PFOA (50-150)	PFNA (50-150)	PFDA (50-150)	PFUnA (50-150)	PFDoA (50-150)	PFTDA (50-150)
320-76922-1	33060	110	89	99	91	105	101	105	91
320-76922-2	93065	103	95	87	91	103	92	88	83
320-76922-3	33068	105	92	91	93	102	94	90	84
320-76922-4	33065	102	85	89	91	101	93	90	86
320-76922-5	33059	105	93	91	95	101	97	91	80
320-76922-6	33053	111	100	96	95	103	99	92	85
320-76922-7	33061	108	90	97	91	105	101	95	90
320-76922-8	33064	113	96	102	95	114	98	95	91
LCS 320-511727/2-A	Lab Control Sample	112	104	93	102	109	100	98	92
LCSD 320-511727/3-A	Lab Control Sample Dup	99	90	88	91	100	92	94	89
MB 320-511727/1-A	Method Blank	102	103	95	96	102	97	97	92

		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)		
320-76922-1	33060	115	97	110	80	77	91		
320-76922-2	93065	106	92	95	68	73	87		
320-76922-3	33068	115	98	104	78	71	92		
320-76922-4	33065	108	85	101	73	73	91		
320-76922-5	33059	112	94	101	74	72	97		
320-76922-6	33053	117	99	107	69	74	91		
320-76922-7	33061	106	100	104	79	79	97		
320-76922-8	33064	112	103	118	78	87	98		
LCS 320-511727/2-A	Lab Control Sample	124	107	113	79	83	98		
LCSD 320-511727/3-A	Lab Control Sample Dup	107	92	99	81	77	91		
MB 320-511727/1-A	Method Blank	113	101	109	81	84	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 320-511727/1-A
Matrix: Water
Analysis Batch: 514309

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 511727

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		07/30/21 13:03	08/08/21 13:36	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		07/30/21 13:03	08/08/21 13:36	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		07/30/21 13:03	08/08/21 13:36	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		07/30/21 13:03	08/08/21 13:36	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		07/30/21 13:03	08/08/21 13:36	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		07/30/21 13:03	08/08/21 13:36	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		07/30/21 13:03	08/08/21 13:36	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		07/30/21 13:03	08/08/21 13:36	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		07/30/21 13:03	08/08/21 13:36	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		07/30/21 13:03	08/08/21 13:36	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		07/30/21 13:03	08/08/21 13:36	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		07/30/21 13:03	08/08/21 13:36	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		07/30/21 13:03	08/08/21 13:36	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		07/30/21 13:03	08/08/21 13:36	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.0	0.24	ng/L		07/30/21 13:03	08/08/21 13:36	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.0	1.5	ng/L		07/30/21 13:03	08/08/21 13:36	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.0	0.32	ng/L		07/30/21 13:03	08/08/21 13:36	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		07/30/21 13:03	08/08/21 13:36	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*102*		*50 - 150*	*07/30/21 13:03*	*08/08/21 13:36*	
13C4 PFHpA	*103*		*50 - 150*	*07/30/21 13:03*	*08/08/21 13:36*	
13C4 PFOA	*95*		*50 - 150*	*07/30/21 13:03*	*08/08/21 13:36*	
13C5 PFNA	*96*		*50 - 150*	*07/30/21 13:03*	*08/08/21 13:36*	
13C2 PFDA	*102*		*50 - 150*	*07/30/21 13:03*	*08/08/21 13:36*	
13C2 PFUnA	*97*		*50 - 150*	*07/30/21 13:03*	*08/08/21 13:36*	
13C2 PFDoA	*97*		*50 - 150*	*07/30/21 13:03*	*08/08/21 13:36*	
13C2 PFTeDA	*92*		*50 - 150*	*07/30/21 13:03*	*08/08/21 13:36*	
13C3 PFBS	*13*		*50 - 150*	*07/30/21 13:03*	*08/08/21 13:36*	
18O2 PFHxS	*101*		*50 - 150*	*07/30/21 13:03*	*08/08/21 13:36*	
13C4 PFOS	*109*		*50 - 150*	*07/30/21 13:03*	*08/08/21 13:36*	
d3-NMeFOSAA	*81*		*50 - 150*	*07/30/21 13:03*	*08/08/21 13:36*	
d5-NEtFOSAA	*84*		*50 - 150*	*07/30/21 13:03*	*08/08/21 13:36*	
13C3 HFPO-DA	*97*		*50 - 150*	*07/30/21 13:03*	*08/08/21 13:36*	

Lab Sample ID: LCS 320-511727/2-A
Matrix: Water
Analysis Batch: 514309

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 511727

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorohexanoic acid (PFHxA)	40.0	36.8		ng/L		92	72 - 129
Perfluoroheptanoic acid (PFHpA)	40.0	39.6		ng/L		99	72 - 130
Perfluorooctanoic acid (PFOA)	40.0	39.5		ng/L		99	71 - 133
Perfluorononanoic acid (PFNA)	40.0	36.4		ng/L		91	69 - 130

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

Lab Sample ID: LCS 320-511727/2-A
Matrix: Water
Analysis Batch: 514309

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 511727

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorodecanoic acid (PFDA)	40.0	35.8		ng/L		90	71 - 129
Perfluoroundecanoic acid (PFUnA)	40.0	41.0		ng/L		103	69 - 133
Perfluorododecanoic acid (PFDoA)	40.0	37.1		ng/L		93	72 - 134
Perfluorotridecanoic acid (PFTriA)	40.0	39.5		ng/L		99	65 - 144
Perfluorotetradecanoic acid (PFTeA)	40.0	35.4		ng/L		88	71 - 132
Perfluorobutanesulfonic acid (PFBS)	35.4	27.5		ng/L		78	72 - 130
Perfluorohexanesulfonic acid (PFHxS)	36.4	32.3		ng/L		89	68 - 131
Perfluorooctanesulfonic acid (PFOS)	37.1	34.1		ng/L		92	65 - 140
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	40.7		ng/L		102	65 - 136
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	38.4		ng/L		96	61 - 135
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	37.3	33.5		ng/L		90	77 - 137
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	40.0	39.7		ng/L		99	72 - 132
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	37.7	38.7		ng/L		103	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.7	32.2		ng/L		85	81 - 141

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*12*		*50 - 150*
13C4 PFHpA	*104*		*50 - 150*
13C4 PFOA	*93*		*50 - 150*
13C5 PFNA	*102*		*50 - 150*
13C2 PFDA	*109*		*50 - 150*
13C2 PFUnA	*100*		*50 - 150*
13C2 PFDoA	*98*		*50 - 150*
13C2 PFTeDA	*92*		*50 - 150*
13C3 PFBS	*124*		*50 - 150*
18O2 PFHxS	*107*		*50 - 150*
13C4 PFOS	*13*		*50 - 150*
d3-NMeFOSAA	*79*		*50 - 150*
d5-NEtFOSAA	*83*		*50 - 150*
13C3 HFPO-DA	*98*		*50 - 150*

Lab Sample ID: LCSD 320-511727/3-A
Matrix: Water
Analysis Batch: 514309

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 511727

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	40.0	37.0		ng/L		93	72 - 129	1	30
Perfluoroheptanoic acid (PFHpA)	40.0	37.0		ng/L		92	72 - 130	7	30
Perfluorooctanoic acid (PFOA)	40.0	39.6		ng/L		99	71 - 133	0	30

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

Lab Sample ID: LCSD 320-511727/3-A
Matrix: Water
Analysis Batch: 514309

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 511727

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorononanoic acid (PFNA)			40.0	37.7		ng/L		94	69 - 130	4	30
Perfluorodecanoic acid (PFDA)			40.0	35.6		ng/L		89	71 - 129	1	30
Perfluoroundecanoic acid (PFUnA)			40.0	43.4		ng/L		109	69 - 133	6	30
Perfluorododecanoic acid (PFDoA)			40.0	39.2		ng/L		98	72 - 134	5	30
Perfluorotridecanoic acid (PFTriA)			40.0	38.2		ng/L		96	65 - 144	3	30
Perfluorotetradecanoic acid (PFTeA)			40.0	38.6		ng/L		96	71 - 132	9	30
Perfluorobutanesulfonic acid (PFBS)			35.4	28.9		ng/L		82	72 - 130	5	30
Perfluorohexanesulfonic acid (PFHxS)			36.4	34.4		ng/L		95	68 - 131	6	30
Perfluorooctanesulfonic acid (PFOS)			37.1	37.0		ng/L		100	65 - 140	8	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			40.0	40.9		ng/L		102	65 - 136	0	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			40.0	39.3		ng/L		98	61 - 135	2	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid			37.3	35.7		ng/L		96	77 - 137	6	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			40.0	34.9		ng/L		87	72 - 132	13	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid			37.7	39.6		ng/L		105	76 - 136	2	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			37.7	32.7		ng/L		87	81 - 141	2	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFHxA	*99*		*50 - 150*
13C4 PFHpA	*90*		*50 - 150*
13C4 PFOA	*88*		*50 - 150*
13C5 PFNA	*91*		*50 - 150*
13C2 PFDA	*100*		*50 - 150*
13C2 PFUnA	*92*		*50 - 150*
13C2 PFDoA	*94*		*50 - 150*
13C2 PFTeDA	*89*		*50 - 150*
13C3 PFBS	*107*		*50 - 150*
18O2 PFHxS	*92*		*50 - 150*
13C4 PFOS	*99*		*50 - 150*
d3-NMeFOSAA	*81*		*50 - 150*
d5-NEtFOSAA	*77*		*50 - 150*
13C3 HFPO-DA	*91*		*50 - 150*

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: YAK-DOT+PF PFAS

Job ID: 320-76922-1

LCMS

Prep Batch: 511727

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-76922-1	33060	Total/NA	Water	3535	
320-76922-2	93065	Total/NA	Water	3535	
320-76922-3	33068	Total/NA	Water	3535	
320-76922-4	33065	Total/NA	Water	3535	
320-76922-5	33059	Total/NA	Water	3535	
320-76922-6	33053	Total/NA	Water	3535	
320-76922-7	33061	Total/NA	Water	3535	
320-76922-8	33064	Total/NA	Water	3535	
MB 320-511727/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-511727/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-511727/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Analysis Batch: 514309

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-76922-1	33060	Total/NA	Water	EPA 537(Mod)	511727
320-76922-2	93065	Total/NA	Water	EPA 537(Mod)	511727
320-76922-3	33068	Total/NA	Water	EPA 537(Mod)	511727
320-76922-4	33065	Total/NA	Water	EPA 537(Mod)	511727
320-76922-5	33059	Total/NA	Water	EPA 537(Mod)	511727
320-76922-6	33053	Total/NA	Water	EPA 537(Mod)	511727
320-76922-7	33061	Total/NA	Water	EPA 537(Mod)	511727
320-76922-8	33064	Total/NA	Water	EPA 537(Mod)	511727
MB 320-511727/1-A	Method Blank	Total/NA	Water	EPA 537(Mod)	511727
LCS 320-511727/2-A	Lab Control Sample	Total/NA	Water	EPA 537(Mod)	511727
LCSD 320-511727/3-A	Lab Control Sample Dup	Total/NA	Water	EPA 537(Mod)	511727

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: YAK-DOT+PF PFAS

Job ID: 320-76922-1

Client Sample ID: 33060
Date Collected: 07/28/21 09:37
Date Received: 07/29/21 15:33

Lab Sample ID: 320-76922-1
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			272.7 mL	10.0 mL	511727	07/30/21 13:03	KJW	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			514309	08/08/21 14:04	RS1	TAL SAC

Client Sample ID: 93065
Date Collected: 07/27/21 14:01
Date Received: 07/29/21 15:33

Lab Sample ID: 320-76922-2
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			265.5 mL	10.0 mL	511727	07/30/21 13:03	KJW	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			514309	08/08/21 14:14	RS1	TAL SAC

Client Sample ID: 33068
Date Collected: 07/27/21 14:43
Date Received: 07/29/21 15:33

Lab Sample ID: 320-76922-3
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			270.1 mL	10.0 mL	511727	07/30/21 13:03	KJW	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			514309	08/08/21 14:23	RS1	TAL SAC

Client Sample ID: 33065
Date Collected: 07/27/21 14:11
Date Received: 07/29/21 15:33

Lab Sample ID: 320-76922-4
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			268.8 mL	10.0 mL	511727	07/30/21 13:03	KJW	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			514309	08/08/21 14:32	RS1	TAL SAC

Client Sample ID: 33059
Date Collected: 07/27/21 13:18
Date Received: 07/29/21 15:33

Lab Sample ID: 320-76922-5
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			282.5 mL	10.0 mL	511727	07/30/21 13:03	KJW	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			514309	08/08/21 14:42	RS1	TAL SAC

Client Sample ID: 33053
Date Collected: 07/27/21 15:13
Date Received: 07/29/21 15:33

Lab Sample ID: 320-76922-6
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			279.4 mL	10.0 mL	511727	07/30/21 13:03	KJW	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			514309	08/08/21 14:51	RS1	TAL SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: YAK-DOT+PF PFAS

Job ID: 320-76922-1

Client Sample ID: 33061

Date Collected: 07/27/21 16:28
Date Received: 07/29/21 15:33

Lab Sample ID: 320-76922-7

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			263.8 mL	10.0 mL	511727	07/30/21 13:03	KJW	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			514309	08/08/21 15:01	RS1	TAL SAC

Client Sample ID: 33064

Date Collected: 07/27/21 16:05
Date Received: 07/29/21 15:33

Lab Sample ID: 320-76922-8

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			265.2 mL	10.0 mL	511727	07/30/21 13:03	KJW	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			514309	08/08/21 15:29	RS1	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: YAK-DOT+PF PFAS

Job ID: 320-76922-1

Laboratory: Eurofins TestAmerica, Sacramento

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

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

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: YAK-DOT+PF PFAS

Job ID: 320-76922-1

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

Protocol References:

EPA = US Environmental Protection Agency

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

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: YAK-DOT+PF PFAS

Job ID: 320-76922-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-76922-1	33060	Water	07/28/21 09:37	07/29/21 15:33
320-76922-2	93065	Water	07/27/21 14:01	07/29/21 15:33
320-76922-3	33068	Water	07/27/21 14:43	07/29/21 15:33
320-76922-4	33065	Water	07/27/21 14:11	07/29/21 15:33
320-76922-5	33059	Water	07/27/21 13:18	07/29/21 15:33
320-76922-6	33053	Water	07/27/21 15:13	07/29/21 15:33
320-76922-7	33061	Water	07/27/21 16:28	07/29/21 15:33
320-76922-8	33064	Water	07/27/21 16:05	07/29/21 15:33

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

320-76922 Chain of Custody

DY RECORD

Page 1 of 1

Laboratory Test America
Attn: D. Althueker

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

Quote No:

J-Flags: [X] Yes [ ] No

Analytical Methods (include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	PFAS x16	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
33060		0937	7/28/21	X	2	Groundwater
93065		1401	7/27/21	X	2	
33068		1443	7/27/21	X	2	
33065		1411	7/27/21	X	2	
33059		1318	7/27/21	X	2	
33053		1513	7/27/21	X	2	
33061		1628	7/27/21	X	2	
33064		1605	7/27/21	X	2	

Project Information
Number: 102896-007
Name: YAK - DOT&PF PFAS
Contact: AMS
Ongoing Project? Yes [X] No [ ]
Sampler: ARM

Sample Receipt
Total No. of Containers:
COC Seals/Intact? Y/N/NA
Received Good Cond./Cold
Temp: 5.2
Delivery Method:

Notes:

Reliquished By: 1.	Reliquished By: 2.	Reliquished By: 3.
Signature: Time: 1200	Signature: Time:	Signature: Time:
Printed Name: A. Masters Date: 7/28/21	Printed Name: Date:	Printed Name: Date:
Company: Shannon + Wilson Inc	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 1557	Signature: Time:	Signature: Time:
Printed Name: Daniel Ter Date: 7/28/21	Printed Name: Date:	Printed Name: Date:
Company: ETTS	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. 36474

8/13/2021

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-76922-1

Login Number: 76922
List Number: 1
Creator: Her, David A

List Source: Eurofins TestAmerica, Sacramento

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	1094818/1094819
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Laboratory Data Review Checklist

Completed By:

Reviewed and Validated by - Ashley Jaramillo

Title:

Senior Chemist

Date:

August 16, 2021

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

Eurofins TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-76922-1

Laboratory Report Date:

August 13, 2021

CS Site Name:

ADOT&PF Yakutat Airport Sitewide PFAS

ADEC File Number:

1530.38.022

Hazard Identification Number:

27090

320-76922-1

Laboratory Report Date:

August 13, 2021

CS Site Name:

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

1. Laboratory

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

   Yes☒ No☐ N/A☐ Comments:

   The DEC certified TestAmerica of West Sacramento, CA for the analysis of per- and polyfluorinated alkyl substances (PFAS) on February 11, 2021 by LCMSMS compliant with QSM Version 5.3 Table B-15. These reported analytes were included in the DEC's Contaminated Sites Laboratory Approval 17-020.

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

   Yes☐ No☐ N/A☒ Comments:

   Samples were not transferred to another "network" laboratory or sub-contracted to an alternate laboratory

2. Chain of Custody (CoC)

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

   Yes☒ No☐ N/A☐ Comments:

   b. Correct analyses requested?

   Yes☒ No☐ N/A☐ Comments:

3. Laboratory Sample Receipt Documentation

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

   Yes☒ No☐ N/A☐ Comments:

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

   Yes☒ No☐ N/A☐ Comments:

320-76922-1

Laboratory Report Date:

August 13, 2021

CS Site Name:

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

Yes☒ No☐ N/A☐ Comments:

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

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

Yes☐ No☐ N/A☒ Comments:

See above.

e. Data quality or usability affected?

Comments:

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

4. Case Narrative

a. Present and understandable?

Yes☒ No☐ N/A☐ Comments:

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

Yes☒ No☐ N/A☐ Comments:

The "I" qualifier means the transition mass ratio for the indicated analyte was outside of the established ratio limit. 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 analytes. Consequently, the PFHxA result in sample *33053* and PFDA result in sample *33064* are considered estimates, with no direction of bias, and have been flagged 'J*' in the analytical reporting table.

Insufficient sample volume was available to perform a MS/MSD associated with preparation batch 320-511727.

The following samples were yellow-orange and contain a thin layer of sediment at the bottom of the bottle prior to extraction: *33060* and *33064*.

The following samples were yellow prior to extraction: *33068*, *33059*, and *33061*.

320-76922-1

Laboratory Report Date:

August 13, 2021

CS Site Name:

c. Were all corrective actions documented?

Yes☐ No☐ N/A☒ Comments:

No corrective actions were required.

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

Comments:

Case narrative does not discuss effect on data quality, it only discusses discrepancies and what was done in light of them, as applicable. Any notable data quality issues mentioned in the case narrative are discussed above in 4b or elsewhere within this DEC checklist.

5. Samples Results

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

Yes☒ No☐ N/A☐ Comments:

b. All applicable holding times met?

Yes☒ No☐ N/A☐ Comments:

c. All soils reported on a dry weight basis?

Yes☐ No☐ N/A☒ Comments:

Soil samples were not submitted with this work order.

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

Yes☒ No☐ N/A☐ Comments:

Analytical sensitivity was evaluated to verify that reporting limits met the applicable DEC action level for PFAS for non-detect results, as appropriate.

e. Data quality or usability affected?

Data quality and/or usability were not affected.

320-76922-1

Laboratory Report Date:

August 13, 2021

CS Site Name:

6. QC Samples

a. Method Blank

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

Yes☒ No☐ N/A☐ Comments:

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

Yes☐ No☐ N/A☒ Comments:

No analytes were detected in the method blank sample.

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

Comments:

Not applicable, see above.

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

Yes☐ No☐ N/A☒ Comments:

See above.

v. Data quality or usability affected?

Comments:

No, see above.

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

i. Organics – One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

Yes☒ No☐ N/A☐ Comments:

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

Yes☐ No☐ N/A☒ Comments:

Metals and inorganics were not analyzed as part of this work order.

320-76922-1

Laboratory Report Date:

August 13, 2021

CS Site Name:

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes☒ No☐ N/A☐ Comments:

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from LCS/LCSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes☒ No☐ N/A☐ Comments:

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

Comments:

Not applicable; analytical accuracy and precision were within acceptable limits.

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

Not applicable, See above.

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

Note: Leave blank if not required for project

i. Organics – One MS/MSD reported per matrix, analysis and 20 samples?

Yes☐ No☒ N/A☐ Comments:

There was not a sufficient amount of sample volume available to perform an MS/MSD. See LCS/LCSD discussion for evaluation of analytical accuracy and precision.

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

Yes☐ No☐ N/A☒ Comments:

Metals and inorganics were not analyzed as part of this work order.

320-76922-1

Laboratory Report Date:

August 13, 2021

CS Site Name:

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable?

Yes☐ No☐ N/A☒ Comments:

See above.

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from MS/MSD, and or sample/sample duplicate.

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

Not applicable, see above.

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

Not applicable, see above.

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

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

Yes☒ No☐ N/A☐ Comments:

ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods 50-150 %R for field samples and 60-120 %R for QC samples; all other analyses see the laboratory report pages)

Yes☒ No☐ N/A☐ Comments:

320-76922-1

Laboratory Report Date:

August 13, 2021

CS Site Name:

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

Yes☐ No☐ N/A☒ Comments:

There were no IDA recovery failures associated with this work order.

iv. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected.

e. Trip Blanks

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

Yes☐ No☐ N/A☒ Comments:

No volatile analyses were requested as a part of this work order; a trip blank is not required.

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

Not applicable, see above.

v. Data quality or usability affected?

Comments:

Not applicable, see above.

f. Field Duplicate

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

Yes☒ No☐ N/A☐ Comments:

320-76922-1

Laboratory Report Date:

August 13, 2021

CS Site Name:

ii. Submitted blind to lab?

Yes☒ No☐ N/A☒ Comments:

The field-duplicate pair submitted with this work order are *33065/93065*.

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

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

Where R_1 = Sample Concentration
R_2 = Field Duplicate Concentration

Yes☒ No☐ N/A☐ Comments:

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

Comments:

Not applicable, see above.

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

Yes☐ No☐ N/A☒ Comments:

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

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

Not applicable, see above.

iii. Data quality or usability affected?

Comments:

Not applicable, see above.

320-76922-1

Laboratory Report Date:

August 13, 2021

CS Site Name:

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

a. Defined and appropriate?

Yes☒ No☐ N/A☐ Comments:

Sample *33064* was collected prior to parameter stabilization due to well pump functionality issues. Results for this sample are considered estimated, no direction of bias, and have been flagged 'J*'.

See section 4.b, above.

eurofins | Environment Testing America

ANALYTICAL REPORT

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

Laboratory Job ID: 320-80231-1
Client Project/Site: Yakutat Airport

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

Attn: Ashley Jaramillo

Authorized for release by:
10/22/2021 8:54:34 AM

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

Table of Contents

Definitions/Glossary

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

Job ID: 320-80231-1

Qualifiers

LCMS

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

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

Job ID: 320-80231-1

Laboratory: Eurofins TestAmerica, Sacramento

Narrative

Job Narrative
320-80231-1

Receipt
The samples were received on 10/12/2021 4:08 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 5.1º C.

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

Organic Prep
Method 537.1 DW: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-534029.

Method 537.1 DW: The following samples 33060 (320-80231-1), 33059 (320-80231-2), 43068 (320-80231-3), 33068 (320-80231-4), 33061 (320-80231-5) and 33064 (320-80231-6) in preparation batch 320-534029 were light yellow with a thin layer of sediment at the bottom of the bottle

Method 537.1 DW: The following samples 33060 (320-80231-1), 33059 (320-80231-2), 43068 (320-80231-3), 33068 (320-80231-4) and 33061 (320-80231-5) in preparation batch 320-534029 were light yellow after extraction and final voluming.

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: Yakutat Airport

Job ID: 320-80231-1

Client Sample ID: 33060 — Lab Sample ID: 320-80231-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	7.2		1.9	0.48	ng/L	1		537.1 DW	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.0		1.9	0.48	ng/L	1		537.1 DW	Total/NA
Perfluorooctanoic acid (PFOA)	2.0		1.9	0.48	ng/L	1		537.1 DW	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.79	J	1.9	0.48	ng/L	1		537.1 DW	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	4.2		1.9	0.48	ng/L	1		537.1 DW	Total/NA
Perfluorooctanesulfonic acid (PFOS)	8.3		1.9	0.48	ng/L	1		537.1 DW	Total/NA

Client Sample ID: 33059 — Lab Sample ID: 320-80231-2

No Detections.

Client Sample ID: 43068 — Lab Sample ID: 320-80231-3

No Detections.

Client Sample ID: 33068 — Lab Sample ID: 320-80231-4

No Detections.

Client Sample ID: 33061 — Lab Sample ID: 320-80231-5

No Detections.

Client Sample ID: 33064 — Lab Sample ID: 320-80231-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	0.80	J	2.0	0.50	ng/L	1		537.1 DW	Total/NA
Perfluorooctanoic acid (PFOA)	0.55	J	2.0	0.50	ng/L	1		537.1 DW	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	11		2.0	0.50	ng/L	1		537.1 DW	Total/NA
Perfluorooctanesulfonic acid (PFOS)	7.8		2.0	0.50	ng/L	1		537.1 DW	Total/NA

Client Sample ID: 33065 — Lab Sample ID: 320-80231-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	4.7		1.9	0.47	ng/L	1		537.1 DW	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.5		1.9	0.47	ng/L	1		537.1 DW	Total/NA
Perfluorooctanoic acid (PFOA)	4.4		1.9	0.47	ng/L	1		537.1 DW	Total/NA
Perfluorononanoic acid (PFNA)	1.5	J	1.9	0.47	ng/L	1		537.1 DW	Total/NA
Perfluorodecanoic acid (PFDA)	0.60	J	1.9	0.47	ng/L	1		537.1 DW	Total/NA
Perfluorobutanesulfonic acid (PFBS)	1.1	J	1.9	0.47	ng/L	1		537.1 DW	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	28		1.9	0.47	ng/L	1		537.1 DW	Total/NA
Perfluorooctanesulfonic acid (PFOS)	28		1.9	0.47	ng/L	1		537.1 DW	Total/NA

This Detection Summary does not include radiochemical test results.

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

Job ID: 320-80231-1

Client Sample ID: 33060
Date Collected: 10/07/21 09:32
Date Received: 10/12/21 16:08

Lab Sample ID: 320-80231-1
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**7.2**		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:49	1
Perfluoroheptanoic acid (PFHpA)	**2.0**		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:49	1
Perfluorooctanoic acid (PFOA)	**2.0**		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:49	1
Perfluorononanoic acid (PFNA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:49	1
Perfluorodecanoic acid (PFDA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:49	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:49	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:49	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:49	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:49	1
Perfluorobutanesulfonic acid (PFBS)	**0.79**	**J**	1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:49	1
Perfluorohexanesulfonic acid (PFHxS)	**4.2**		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:49	1
Perfluorooctanesulfonic acid (PFOS)	**8.3**		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:49	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:49	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:49	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:49	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:49	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:49	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:49	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*80*		*70 - 130*	*10/14/21 13:19*	*10/15/21 10:49*	*1*
13C2 PFDA	*79*		*70 - 130*	*10/14/21 13:19*	*10/15/21 10:49*	*1*
d5-NEtFOSAA	*81*		*70 - 130*	*10/14/21 13:19*	*10/15/21 10:49*	*1*
13C3 HFPO-DA	*75*		*70 - 130*	*10/14/21 13:19*	*10/15/21 10:49*	*1*

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

Job ID: 320-80231-1

Client Sample ID: 33059
Date Collected: 10/07/21 10:29
Date Received: 10/12/21 16:08

Lab Sample ID: 320-80231-2
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:57	1
Perfluoroheptanoic acid (PFHpA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:57	1
Perfluorooctanoic acid (PFOA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:57	1
Perfluorononanoic acid (PFNA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:57	1
Perfluorodecanoic acid (PFDA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:57	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:57	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:57	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:57	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:57	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:57	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:57	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:57	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:57	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:57	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:57	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:57	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:57	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 10:57	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*78*		*70 - 130*	*10/14/21 13:19*	*10/15/21 10:57*	
13C2 PFDA	*82*		*70 - 130*	*10/14/21 13:19*	*10/15/21 10:57*	
d5-NEtFOSAA	*70*		*70 - 130*	*10/14/21 13:19*	*10/15/21 10:57*	
13C3 HFPO-DA	*75*		*70 - 130*	*10/14/21 13:19*	*10/15/21 10:57*	

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

Job ID: 320-80231-1

Client Sample ID: 43068
Date Collected: 10/07/21 11:00
Date Received: 10/12/21 16:08

Lab Sample ID: 320-80231-3
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:04	1
Perfluoroheptanoic acid (PFHpA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:04	1
Perfluorooctanoic acid (PFOA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:04	1
Perfluorononanoic acid (PFNA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:04	1
Perfluorodecanoic acid (PFDA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:04	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:04	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:04	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:04	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:04	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:04	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:04	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:04	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:04	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:04	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:04	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:04	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:04	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:04	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*79*		*70 - 130*	*10/14/21 13:19*	*10/15/21 11:04*	
13C2 PFDA	*83*		*70 - 130*	*10/14/21 13:19*	*10/15/21 11:04*	
d5-NEtFOSAA	*80*		*70 - 130*	*10/14/21 13:19*	*10/15/21 11:04*	
13C3 HFPO-DA	*75*		*70 - 130*	*10/14/21 13:19*	*10/15/21 11:04*	

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

Job ID: 320-80231-1

Client Sample ID: 33068
Date Collected: 10/07/21 11:04
Date Received: 10/12/21 16:08

Lab Sample ID: 320-80231-4
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 11:12	1
Perfluoroheptanoic acid (PFHpA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 11:12	1
Perfluorooctanoic acid (PFOA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 11:12	1
Perfluorononanoic acid (PFNA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 11:12	1
Perfluorodecanoic acid (PFDA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 11:12	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 11:12	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 11:12	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 11:12	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 11:12	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 11:12	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 11:12	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 11:12	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 11:12	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 11:12	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 11:12	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 11:12	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 11:12	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.48	ng/L		10/14/21 13:19	10/15/21 11:12	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*79*		*70 - 130*	*10/14/21 13:19*	*10/15/21 11:12*	
13C2 PFDA	*78*		*70 - 130*	*10/14/21 13:19*	*10/15/21 11:12*	
d5-NEtFOSAA	*72*		*70 - 130*	*10/14/21 13:19*	*10/15/21 11:12*	
13C3 HFPO-DA	*76*		*70 - 130*	*10/14/21 13:19*	*10/15/21 11:12*	

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

Job ID: 320-80231-1

Client Sample ID: 33061
Date Collected: 10/07/21 12:14
Date Received: 10/12/21 16:08

Lab Sample ID: 320-80231-5
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:20	1
Perfluoroheptanoic acid (PFHpA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:20	1
Perfluorooctanoic acid (PFOA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:20	1
Perfluorononanoic acid (PFNA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:20	1
Perfluorodecanoic acid (PFDA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:20	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:20	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:20	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:20	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:20	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:20	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:20	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:20	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:20	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:20	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:20	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:20	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:20	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/15/21 11:20	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*80*		*70 - 130*	*10/14/21 13:19*	*10/15/21 11:20*	
13C2 PFDA	*80*		*70 - 130*	*10/14/21 13:19*	*10/15/21 11:20*	
d5-NEtFOSAA	*75*		*70 - 130*	*10/14/21 13:19*	*10/15/21 11:20*	
13C3 HFPO-DA	*78*		*70 - 130*	*10/14/21 13:19*	*10/15/21 11:20*	

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

Job ID: 320-80231-1

Client Sample ID: 33064
Date Collected: 10/07/21 14:05
Date Received: 10/12/21 16:08

Lab Sample ID: 320-80231-6
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**0.80**	**J**	2.0	0.50	ng/L		10/14/21 13:19	10/19/21 19:04	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.50	ng/L		10/14/21 13:19	10/19/21 19:04	1
Perfluorooctanoic acid (PFOA)	**0.55**	**J**	2.0	0.50	ng/L		10/14/21 13:19	10/19/21 19:04	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.50	ng/L		10/14/21 13:19	10/19/21 19:04	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.50	ng/L		10/14/21 13:19	10/19/21 19:04	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	0.50	ng/L		10/14/21 13:19	10/19/21 19:04	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.50	ng/L		10/14/21 13:19	10/19/21 19:04	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	0.50	ng/L		10/14/21 13:19	10/19/21 19:04	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.50	ng/L		10/14/21 13:19	10/19/21 19:04	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.50	ng/L		10/14/21 13:19	10/19/21 19:04	1
Perfluorohexanesulfonic acid (PFHxS)	**11**		2.0	0.50	ng/L		10/14/21 13:19	10/19/21 19:04	1
Perfluorooctanesulfonic acid (PFOS)	**7.8**		2.0	0.50	ng/L		10/14/21 13:19	10/19/21 19:04	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		2.0	0.50	ng/L		10/14/21 13:19	10/19/21 19:04	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		2.0	0.50	ng/L		10/14/21 13:19	10/19/21 19:04	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		2.0	0.50	ng/L		10/14/21 13:19	10/19/21 19:04	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	ND		2.0	0.50	ng/L		10/14/21 13:19	10/19/21 19:04	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		2.0	0.50	ng/L		10/14/21 13:19	10/19/21 19:04	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.50	ng/L		10/14/21 13:19	10/19/21 19:04	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*80*		*70 - 130*	*10/14/21 13:19*	*10/19/21 19:04*	
13C2 PFDA	*77*		*70 - 130*	*10/14/21 13:19*	*10/19/21 19:04*	
d5-NEtFOSAA	*70*		*70 - 130*	*10/14/21 13:19*	*10/19/21 19:04*	
13C3 HFPO-DA	*76*		*70 - 130*	*10/14/21 13:19*	*10/19/21 19:04*	

Client Sample ID: 33065
Date Collected: 10/07/21 14:50
Date Received: 10/12/21 16:08

Lab Sample ID: 320-80231-7
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**4.7**		1.9	0.47	ng/L		10/14/21 13:19	10/19/21 19:12	1
Perfluoroheptanoic acid (PFHpA)	**2.5**		1.9	0.47	ng/L		10/14/21 13:19	10/19/21 19:12	1
Perfluorooctanoic acid (PFOA)	**4.4**		1.9	0.47	ng/L		10/14/21 13:19	10/19/21 19:12	1
Perfluorononanoic acid (PFNA)	**1.5**	**J**	1.9	0.47	ng/L		10/14/21 13:19	10/19/21 19:12	1
Perfluorodecanoic acid (PFDA)	**0.60**	**J**	1.9	0.47	ng/L		10/14/21 13:19	10/19/21 19:12	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/19/21 19:12	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/19/21 19:12	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/19/21 19:12	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/19/21 19:12	1
Perfluorobutanesulfonic acid (PFBS)	**1.1**	**J**	1.9	0.47	ng/L		10/14/21 13:19	10/19/21 19:12	1
Perfluorohexanesulfonic acid (PFHxS)	**28**		1.9	0.47	ng/L		10/14/21 13:19	10/19/21 19:12	1
Perfluorooctanesulfonic acid (PFOS)	**28**		1.9	0.47	ng/L		10/14/21 13:19	10/19/21 19:12	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/19/21 19:12	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/19/21 19:12	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		1.9	0.47	ng/L		10/14/21 13:19	10/19/21 19:12	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	ND		1.9	0.47	ng/L		10/14/21 13:19	10/19/21 19:12	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/19/21 19:12	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.47	ng/L		10/14/21 13:19	10/19/21 19:12	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*80*		*70 - 130*	*10/14/21 13:19*	*10/19/21 19:12*	
13C2 PFDA	*81*		*70 - 130*	*10/14/21 13:19*	*10/19/21 19:12*	
d5-NEtFOSAA	*80*		*70 - 130*	*10/14/21 13:19*	*10/19/21 19:12*	
13C3 HFPO-DA	*78*		*70 - 130*	*10/14/21 13:19*	*10/19/21 19:12*	

Surrogate Summary

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

Job ID: 320-80231-1

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

Matrix: Water

Prep Type: Total/NA

		Percent Surrogate Recovery (Acceptance Limits)			
		PFHxA	PFDA	d5NEFOS	HFPODA
Lab Sample ID	Client Sample ID	(70-130)	(70-130)	(70-130)	(70-130)
320-80231-1	33060	80	79	81	75
320-80231-2	33059	78	82	70	75
320-80231-3	43068	79	83	80	75
320-80231-4	33068	79	78	72	76
320-80231-5	33061	80	80	75	78
320-80231-6	33064	80	77	70	76
320-80231-7	33065	80	81	80	78
LCS 320-534029/2-A	Lab Control Sample	78	82	79	74
LCSD 320-534029/3-A	Lab Control Sample Dup	78	83	75	74
MB 320-534029/1-A	Method Blank	76	80	78	71

Surrogate Legend

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

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

Lab Sample ID: MB 320-534029/1-A
Matrix: Water
Analysis Batch: 534259

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 534029

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.50	ng/L		10/14/21 13:19	10/15/21 10:41	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.50	ng/L		10/14/21 13:19	10/15/21 10:41	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.50	ng/L		10/14/21 13:19	10/15/21 10:41	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.50	ng/L		10/14/21 13:19	10/15/21 10:41	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.50	ng/L		10/14/21 13:19	10/15/21 10:41	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	0.50	ng/L		10/14/21 13:19	10/15/21 10:41	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.50	ng/L		10/14/21 13:19	10/15/21 10:41	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	0.50	ng/L		10/14/21 13:19	10/15/21 10:41	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.50	ng/L		10/14/21 13:19	10/15/21 10:41	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.50	ng/L		10/14/21 13:19	10/15/21 10:41	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.50	ng/L		10/14/21 13:19	10/15/21 10:41	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.50	ng/L		10/14/21 13:19	10/15/21 10:41	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		2.0	0.50	ng/L		10/14/21 13:19	10/15/21 10:41	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		2.0	0.50	ng/L		10/14/21 13:19	10/15/21 10:41	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		2.0	0.50	ng/L		10/14/21 13:19	10/15/21 10:41	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	ND		2.0	0.50	ng/L		10/14/21 13:19	10/15/21 10:41	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		2.0	0.50	ng/L		10/14/21 13:19	10/15/21 10:41	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.50	ng/L		10/14/21 13:19	10/15/21 10:41	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*76*		*70 - 130*	*10/14/21 13:19*	*10/15/21 10:41*	
13C2 PFDA	*80*		*70 - 130*	*10/14/21 13:19*	*10/15/21 10:41*	
d5-NEtFOSAA	*78*		*70 - 130*	*10/14/21 13:19*	*10/15/21 10:41*	
13C3 HFPO-DA	*71*		*70 - 130*	*10/14/21 13:19*	*10/15/21 10:41*	

Lab Sample ID: LCS 320-534029/2-A
Matrix: Water
Analysis Batch: 534259

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 534029

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorohexanoic acid (PFHxA)	80.0	69.7		ng/L		87	70 - 130
Perfluoroheptanoic acid (PFHpA)	80.0	73.8		ng/L		92	70 - 130
Perfluorooctanoic acid (PFOA)	80.0	75.8		ng/L		95	70 - 130
Perfluorononanoic acid (PFNA)	80.0	82.2		ng/L		103	70 - 130
Perfluorodecanoic acid (PFDA)	80.0	77.0		ng/L		96	70 - 130
Perfluoroundecanoic acid (PFUnA)	80.0	76.8		ng/L		96	70 - 130
Perfluorododecanoic acid (PFDoA)	80.0	74.2		ng/L		93	70 - 130
Perfluorotridecanoic acid (PFTriA)	80.0	83.2		ng/L		104	70 - 130
Perfluorotetradecanoic acid (PFTeA)	80.0	68.6		ng/L		86	70 - 130
Perfluorobutanesulfonic acid (PFBS)	70.7	75.6		ng/L		107	70 - 130

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

Lab Sample ID: LCS 320-534029/2-A
Matrix: Water
Analysis Batch: 534259

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 534029

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorohexanesulfonic acid (PFHxS)			72.8	79.2		ng/L		109	70 - 130		
Perfluorooctanesulfonic acid (PFOS)			74.2	74.5		ng/L		100	70 - 130		
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			80.0	71.1		ng/L		89	70 - 130		
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			80.0	72.0		ng/L		90	70 - 130		
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O			74.6	77.8		ng/L		104	70 - 130		
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF			75.4	79.1		ng/L		105	70 - 130		
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			80.0	68.0		ng/L		85	70 - 130		
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			75.4	77.1		ng/L		102	70 - 130		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*78*		*70 - 130*
13C2 PFDA	*82*		*70 - 130*
d5-NEtFOSAA	*79*		*70 - 130*
13C3 HFPO-DA	*74*		*70 - 130*

Lab Sample ID: LCSD 320-534029/3-A
Matrix: Water
Analysis Batch: 534259

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 534029

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)			80.0	69.8		ng/L		87	70 - 130	0	30
Perfluoroheptanoic acid (PFHpA)			80.0	75.8		ng/L		95	70 - 130	3	30
Perfluorooctanoic acid (PFOA)			80.0	80.9		ng/L		101	70 - 130	6	30
Perfluorononanoic acid (PFNA)			80.0	78.7		ng/L		98	70 - 130	4	30
Perfluorodecanoic acid (PFDA)			80.0	79.2		ng/L		99	70 - 130	3	30
Perfluoroundecanoic acid (PFUnA)			80.0	74.0		ng/L		92	70 - 130	4	30
Perfluorododecanoic acid (PFDoA)			80.0	76.6		ng/L		96	70 - 130	3	30
Perfluorotridecanoic acid (PFTriA)			80.0	91.0		ng/L		114	70 - 130	9	30
Perfluorotetradecanoic acid (PFTeA)			80.0	77.4		ng/L		97	70 - 130	12	30
Perfluorobutanesulfonic acid (PFBS)			70.7	75.9		ng/L		107	70 - 130	0	30
Perfluorohexanesulfonic acid (PFHxS)			72.8	77.3		ng/L		106	70 - 130	2	30
Perfluorooctanesulfonic acid (PFOS)			74.2	77.5		ng/L		104	70 - 130	4	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			80.0	74.0		ng/L		93	70 - 130	4	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			80.0	71.9		ng/L		90	70 - 130	0	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O			74.6	78.5		ng/L		105	70 - 130	1	30

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

Lab Sample ID: LCSD 320-534029/3-A
Matrix: Water
Analysis Batch: 534259

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 534029

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF			75.4	84.0		ng/L		111	70 - 130	6	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			80.0	70.8		ng/L		89	70 - 130	4	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			75.4	78.0		ng/L		103	70 - 130	1	30

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFHxA	*78*		*70 - 130*
13C2 PFDA	*83*		*70 - 130*
d5-NEtFOSAA	*75*		*70 - 130*
13C3 HFPO-DA	*74*		*70 - 130*

LCMS

Prep Batch: 534029

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-80231-1	33060	Total/NA	Water	537.1 DW	
320-80231-2	33059	Total/NA	Water	537.1 DW	
320-80231-3	43068	Total/NA	Water	537.1 DW	
320-80231-4	33068	Total/NA	Water	537.1 DW	
320-80231-5	33061	Total/NA	Water	537.1 DW	
320-80231-6	33064	Total/NA	Water	537.1 DW	
320-80231-7	33065	Total/NA	Water	537.1 DW	
MB 320-534029/1-A	Method Blank	Total/NA	Water	537.1 DW	
LCS 320-534029/2-A	Lab Control Sample	Total/NA	Water	537.1 DW	
LCSD 320-534029/3-A	Lab Control Sample Dup	Total/NA	Water	537.1 DW	

Analysis Batch: 534259

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-80231-1	33060	Total/NA	Water	537.1 DW	534029
320-80231-2	33059	Total/NA	Water	537.1 DW	534029
320-80231-3	43068	Total/NA	Water	537.1 DW	534029
320-80231-4	33068	Total/NA	Water	537.1 DW	534029
320-80231-5	33061	Total/NA	Water	537.1 DW	534029
MB 320-534029/1-A	Method Blank	Total/NA	Water	537.1 DW	534029
LCS 320-534029/2-A	Lab Control Sample	Total/NA	Water	537.1 DW	534029
LCSD 320-534029/3-A	Lab Control Sample Dup	Total/NA	Water	537.1 DW	534029

Analysis Batch: 535821

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-80231-6	33064	Total/NA	Water	537.1 DW	534029
320-80231-7	33065	Total/NA	Water	537.1 DW	534029

Lab Chronicle

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

Job ID: 320-80231-1

Client Sample ID: 33060
Date Collected: 10/07/21 09:32
Date Received: 10/12/21 16:08

Lab Sample ID: 320-80231-1
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537.1 DW			262.1 mL	1.0 mL	534029	10/14/21 13:19	EH	TAL SAC
Total/NA	Analysis	537.1 DW		1			534259	10/15/21 10:49	JY1	TAL SAC

Client Sample ID: 33059
Date Collected: 10/07/21 10:29
Date Received: 10/12/21 16:08

Lab Sample ID: 320-80231-2
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	537.1 DW			262.5 mL	1.0 mL	534029	10/14/21 13:19	EH	TAL SAC
Total/NA	Analysis	537.1 DW		1			534259	10/15/21 10:57	JY1	TAL SAC

Client Sample ID: 43068
Date Collected: 10/07/21 11:00
Date Received: 10/12/21 16:08

Lab Sample ID: 320-80231-3
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	537.1 DW			266 mL	1.0 mL	534029	10/14/21 13:19	EH	TAL SAC
Total/NA	Analysis	537.1 DW		1			534259	10/15/21 11:04	JY1	TAL SAC

Client Sample ID: 33068
Date Collected: 10/07/21 11:04
Date Received: 10/12/21 16:08

Lab Sample ID: 320-80231-4
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	537.1 DW			261.5 mL	1.0 mL	534029	10/14/21 13:19	EH	TAL SAC
Total/NA	Analysis	537.1 DW		1			534259	10/15/21 11:12	JY1	TAL SAC

Client Sample ID: 33061
Date Collected: 10/07/21 12:14
Date Received: 10/12/21 16:08

Lab Sample ID: 320-80231-5
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	537.1 DW			266.8 mL	1.0 mL	534029	10/14/21 13:19	EH	TAL SAC
Total/NA	Analysis	537.1 DW		1			534259	10/15/21 11:20	JY1	TAL SAC

Client Sample ID: 33064
Date Collected: 10/07/21 14:05
Date Received: 10/12/21 16:08

Lab Sample ID: 320-80231-6
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	537.1 DW			247.9 mL	1.0 mL	534029	10/14/21 13:19	EH	TAL SAC
Total/NA	Analysis	537.1 DW		1			535821	10/19/21 19:04	D1R	TAL SAC

Lab Chronicle

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

Job ID: 320-80231-1

Client Sample ID: 33065

Date Collected: 10/07/21 14:50
Date Received: 10/12/21 16:08

Lab Sample ID: 320-80231-7

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537.1 DW			265.7 mL	1.0 mL	534029	10/14/21 13:19	EH	TAL SAC
Total/NA	Analysis	537.1 DW		1			535821	10/19/21 19:12	D1R	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

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

Job ID: 320-80231-1

Laboratory: Eurofins TestAmerica, Sacramento

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

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

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

Analysis Method	Prep Method	Matrix	Analyte
537.1 DW	537.1 DW	Water	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF
537.1 DW	537.1 DW	Water	4,8-Dioxa-3H-perfluorononanoic acid (ADONA)
537.1 DW	537.1 DW	Water	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O
537.1 DW	537.1 DW	Water	Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)
537.1 DW	537.1 DW	Water	N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)
537.1 DW	537.1 DW	Water	N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)
537.1 DW	537.1 DW	Water	Perfluorobutanesulfonic acid (PFBS)
537.1 DW	537.1 DW	Water	Perfluorodecanoic acid (PFDA)
537.1 DW	537.1 DW	Water	Perfluorododecanoic acid (PFDoA)
537.1 DW	537.1 DW	Water	Perfluoroheptanoic acid (PFHpA)
537.1 DW	537.1 DW	Water	Perfluorohexanesulfonic acid (PFHxS)
537.1 DW	537.1 DW	Water	Perfluorohexanoic acid (PFHxA)
537.1 DW	537.1 DW	Water	Perfluorononanoic acid (PFNA)
537.1 DW	537.1 DW	Water	Perfluorooctanesulfonic acid (PFOS)
537.1 DW	537.1 DW	Water	Perfluorooctanoic acid (PFOA)
537.1 DW	537.1 DW	Water	Perfluorotetradecanoic acid (PFTeA)
537.1 DW	537.1 DW	Water	Perfluorotridecanoic acid (PFTriA)
537.1 DW	537.1 DW	Water	Perfluoroundecanoic acid (PFUnA)

Method Summary

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

Job ID: 320-80231-1

Method	Method Description	Protocol	Laboratory
537.1 DW	Perfluorinated Alkyl Acids (LC/MS)	EPA	TAL SAC
537.1 DW	Extraction of Perfluorinated Alkyl Acids	EPA	TAL SAC

Protocol References:

EPA = US Environmental Protection Agency

Laboratory References:

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

Sample Summary

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

Job ID: 320-80231-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-80231-1	33060	Water	10/07/21 09:32	10/12/21 16:08
320-80231-2	33059	Water	10/07/21 10:29	10/12/21 16:08
320-80231-3	43068	Water	10/07/21 11:00	10/12/21 16:08
320-80231-4	33068	Water	10/07/21 11:04	10/12/21 16:08
320-80231-5	33061	Water	10/07/21 12:14	10/12/21 16:08
320-80231-6	33064	Water	10/07/21 14:05	10/12/21 16:08
320-80231-7	33065	Water	10/07/21 14:50	10/12/21 16:08

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Anchorage, AK 99518
(907) 561-2120

1200 17th Street, Suite 1024
Denver, Co 80202
(303) 825-3800

303 Wellsian Way
Richland, WA 99352
(509) 946-6309

CHAIN-OF-CUSTODY RECORD

Laboratory Eurofins Test America
Attn: David Althacker

Analysis Parameters/Sample Container Description (include preservative if used) (MSA No. TBD)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	X1B PFAS by EPA 537.1	Total Number of Containers	Remarks/Matrix
33060		0932	10/7/21		X	X	2	GW used as duk water
33059		1029			X	X	2	
43068		1100			X	X	2	
33068		1104			X	X	2	
33061		1214			X	X	2	
33064		1405			X	X	2	
33065		1450			X	X	2	

320-80231 Chain of Custody

Project Information		Sample Receipt	
Project Number: 102		Total Number of Containers	14
Project Name: Yakutat Airport		COC Seals/Intact? Y/N/NA	
Contact: AMJ		Received Good Cond./Cold	
Ongoing Project? Yes ☒ No ☐		Delivery Method:	Goldstreak
Sampler: MDN		(attach shipping bill, if any)	

Instructions	
Requested Turnaround Time:	Standard
Special Instructions:	

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: M. Nadel Time: ~~0900~~ 1550	Signature: Time:	Signature: Time:
Printed Name: Marcy Nadel Date: ~~10/8/21~~ 10/11/21	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 1608	Signature: Time:	Signature: Time:
Printed Name: Date: 10/11/21	Printed Name: Date:	Printed Name: Date:
Company: Schlumberger Oilfield	Company:	Company:
Company: ETDSac		

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

F-19-91/UR

5.1°C

No. 31295

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-80231-1

Login Number: 80231
List Number: 1
Creator: Oropeza, Salvador

List Source: Eurofins TestAmerica, Sacramento

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	1504658/1504659
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Laboratory Data Review Checklist

Completed By:

Reviewed and Validated by - Ashley Jaramillo

Title:

Senior Chemist

Date:

October 24, 2021

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

Eurofins TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-80231-1

Laboratory Report Date:

October 22, 2021

CS Site Name:

ADOT&PF Yakutat Airport Sitewide PFAS

ADEC File Number:

1530.38.022

Hazard Identification Number:

27090

320-80231-1

Laboratory Report Date:

October 22, 2021

CS Site Name:

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

1. Laboratory

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

   Yes☒ No☐ N/A☐ Comments:

   The DEC certified TestAmerica of West Sacramento, CA for the analysis of per- and polyfluorinated alkyl substances (PFAS) on February 11, 2021 by LCMSMS compliant with QSM Version 5.3 Table B-15. These reported analytes were included in the DEC's Contaminated Sites Laboratory Approval 17-020.

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

   Yes☐ No☐ N/A☒ Comments:

   Samples were not transferred to another "network" laboratory or sub-contracted to an alternate laboratory

2. Chain of Custody (CoC)

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

   Yes☒ No☐ N/A☐ Comments:

   b. Correct analyses requested?

   Yes☒ No☐ N/A☐ Comments:

3. Laboratory Sample Receipt Documentation

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

   Yes☒ No☐ N/A☐ Comments:

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

   Yes☒ No☐ N/A☐ Comments:

320-80231-1

Laboratory Report Date:

October 22, 2021

CS Site Name:

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

Yes☒ No☐ N/A☐ Comments:

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

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

Yes☐ No☐ N/A☒ Comments:

See above.

e. Data quality or usability affected?

Comments:

Not applicable, see above.

4. Case Narrative

a. Present and understandable?

Yes☒ No☐ N/A☐ Comments:

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

Yes☒ No☐ N/A☐ Comments:

Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-534029. Data quality and/or usability not affected.

The following samples *33060, 33059, 43068, 33068, 33061 and 33064* in preparation batch 320-534029 were light yellow with a thin layer of sediment at the bottom of the bottle. Data quality and/or usability not affected.

The following samples *33060, 33059, 43068, 33068 and 33061* in preparation batch 320-534029 were light yellow after extraction and final voluming. Data quality and/or usability not affected.

c. Were all corrective actions documented?

Yes☐ No☐ N/A☒ Comments:

No corrective actions were required.

320-80231-1

Laboratory Report Date:

October 22, 2021

CS Site Name:

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

Comments:

Case narrative does not discuss effect on data quality, it only discusses discrepancies and what was done in light of them, as applicable. Any notable data quality issues mentioned in the case narrative are discussed above in 4b or elsewhere within this DEC checklist.

5. Samples Results

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

Yes☒ No☐ N/A☐ Comments:

b. All applicable holding times met?

Yes☒ No☐ N/A☐ Comments:

c. All soils reported on a dry weight basis?

Yes☐ No☐ N/A☒ Comments:

Soil samples were not submitted with this work order.

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

Yes☒ No☐ N/A☐ Comments:

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

e. Data quality or usability affected?

Data quality and/or usability were not affected.

6. QC Samples

a. Method Blank

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

Yes☒ No☐ N/A☐ Comments:

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Laboratory Report Date:

October 22, 2021

CS Site Name:

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

Yes☐ No☐ N/A☒ Comments:

No analytes were detected in the method blank sample.

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

Comments:

Not applicable, see above.

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

Yes☐ No☐ N/A☒ Comments:

See above.

v. Data quality or usability affected?

Comments:

Not applicable, see above.

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

i. Organics – One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

Yes☒ No☐ N/A☐ Comments:

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

Yes☐ No☐ N/A☒ Comments:

Metals and inorganics were not analyzed as part of this work order.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes☒ No☐ N/A☐ Comments:

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CS Site Name:

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from LCS/LCSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes☒ No☐ N/A☐ Comments:

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

Comments:

Not applicable; analytical accuracy and precision were within acceptable limits.

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

Not applicable, See above.

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

Note: Leave blank if not required for project

i. Organics – One MS/MSD reported per matrix, analysis and 20 samples?

Yes☐ No☒ N/A☐ Comments:

There was not a sufficient amount of sample volume available to perform an MS/MSD. See LCS/LCSD discussion for evaluation of analytical accuracy and precision.

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

Yes☐ No☐ N/A☒ Comments:

Metals and inorganics were not analyzed as part of this work order.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable?

Yes☐ No☐ N/A☒ Comments:

See above.

320-80231-1

Laboratory Report Date:

October 22, 2021

CS Site Name:

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from MS/MSD, and or sample/sample duplicate.

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

Not applicable, see above.

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

Not applicable, see above.

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

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

Yes☒ No☐ N/A☐ Comments:

ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods 50-150 %R for field samples and 60-120 %R for QC samples; all other analyses see the laboratory report pages)

Yes☒ No☐ N/A☐ Comments:

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

Yes☐ No☐ N/A☒ Comments:

There were no surrogate recovery failures associated with this work order.

iv. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected.

e. Trip Blanks

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

Yes☐ No☐ N/A☒ Comments:

No volatile analyses were requested as a part of this work order; a trip blank is not required.

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

Not applicable, see above.

v. Data quality or usability affected?

Comments:

Not applicable, see above.

f. Field Duplicate

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

Yes☒ No☐ N/A☐ Comments:

ii. Submitted blind to lab?

Yes☒ No☐ N/A☒ Comments:

The field-duplicate pair submitted with this work order are *33068/43068*.

320-80231-1

Laboratory Report Date:

October 22, 2021

CS Site Name:

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

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

Where R_1 = Sample Concentration
R_2 = Field Duplicate Concentration

Yes☒ No☐ N/A☐ Comments:

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

Comments:

Not applicable, see above.

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

Yes☐ No☐ N/A☒ Comments:

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

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

Not applicable, see above.

iii. Data quality or usability affected?

Comments:

Not applicable, see above.

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Laboratory Report Date:

October 22, 2021

CS Site Name:

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

a. Defined and appropriate?

Yes☒ No☐ N/A☐ Comments:

Sample *33064* was collected prior to parameter stabilization due to well pump functionality issues. Results for this sample are considered estimated, no direction of bias, and have been flagged 'J*'

eurofins | Environment Testing America

ANALYTICAL REPORT

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

Laboratory Job ID: 320-86406-1
Client Project/Site: FY22 Yakutat PFAS

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

Attn: Ashley Jaramillo

Authorized for release by:
4/13/2022 10:50:57 AM

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

Table of Contents

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: FY22 Yakutat PFAS

Job ID: 320-86406-1

Qualifiers

LCMS

Qualifier	Qualifier Description
I	Value is EMPC (estimated maximum possible concentration).
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

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

Job ID: 320-86406-1

Laboratory: Eurofins Sacramento

Narrative

Job Narrative
320-86406-1

Receipt
The samples were received on 4/2/2022 1:06 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 2.4º C.

Receipt Exceptions
Samples 4, 5, and 7 were received with 1 of 2 containers filled less than 250mL. 33068 (320-86406-4), 93068 (320-86406-5) and 33064 (320-86406-7).

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. 33060 (320-86406-1)

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

Organic Prep
Method 3535: The following samples 33060 (320-86406-1) and 93060 (320-86406-2) in preparation batch 320-578503 were light yellow prior to extraction.

Method 3535: The following samples 33059 (320-86406-3), 33068 (320-86406-4), 93068 (320-86406-5) and 33061 (320-86406-6) in preparation batch 320-578503 were light yellow and a had a thin layer of sediments at the bottom of the container prior to extraction.

Method 3535: The following sample 33064 (320-86406-7) in preparation batch 320-578503 was light yellow and contained floating particulates in the sample bottle prior to extraction.

Method 3535: The following samples were preserved with trizma: 33060 (320-86406-1), 93060 (320-86406-2), 33059 (320-86406-3), 33068 (320-86406-4), 93068 (320-86406-5), 33061 (320-86406-6) and 33064 (320-86406-7). Thus, the MB, LCS and LCSD also contain trizma.
preparation batch 320-578503

Method 3535: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-578503.

Method 3535: During the solid phase extraction process, the following samples contain non-settable particulates which clogged the solid phase extraction column: 93060 (320-86406-2) and 33061 (320-86406-6).
preparation batch 320-578503

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: FY22 Yakutat PFAS

Job ID: 320-86406-1

Client Sample ID: 33060 — Lab Sample ID: 320-86406-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	5.8		1.9	0.55	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.7	J	1.9	0.24	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	2.1		1.9	0.80	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.65	J I	1.9	0.25	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorodecanoic acid (PFDA)	0.78	J	1.9	0.29	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	1.6	J	1.9	0.19	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	6.2		1.9	0.54	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	9.8		1.9	0.51	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: 93060 — Lab Sample ID: 320-86406-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	5.6		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)	2.1		1.9	0.81	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.54	J	1.9	0.26	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorodecanoic acid (PFDA)	0.59	J	1.9	0.29	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	1.9		1.9	0.19	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	6.1		1.9	0.54	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	9.5		1.9	0.51	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: 33059 — Lab Sample ID: 320-86406-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	0.18	J	1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	1.6	J	1.8	0.22	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: 33068 — Lab Sample ID: 320-86406-4

No Detections.

Client Sample ID: 93068 — Lab Sample ID: 320-86406-5

No Detections.

Client Sample ID: 33061 — Lab Sample ID: 320-86406-6

No Detections.

Client Sample ID: 33064 — Lab Sample ID: 320-86406-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	2.4		1.9	0.55	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.87	J	1.9	0.24	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	0.97	J	1.9	0.81	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	1.4	J	1.9	0.19	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	11		1.9	0.54	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	4.1		1.9	0.51	ng/L	1		EPA 537(Mod)	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins Sacramento

Client: Shannon & Wilson, Inc
Project/Site: FY22 Yakutat PFAS

Job ID: 320-86406-1

Client Sample ID: 33060
Date Collected: 03/30/22 09:41
Date Received: 04/02/22 13:06

Lab Sample ID: 320-86406-1
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)	**5.8**		1.9	0.55	ng/L		04/07/22 12:16	04/09/22 15:19	1
Perfluoroheptanoic acid (PFHpA)	**1.7**	**J**	1.9	0.24	ng/L		04/07/22 12:16	04/09/22 15:19	1
Perfluorooctanoic acid (PFOA)	**2.1**		1.9	0.80	ng/L		04/07/22 12:16	04/09/22 15:19	1
Perfluorononanoic acid (PFNA)	**0.65**	**J I**	1.9	0.25	ng/L		04/07/22 12:16	04/09/22 15:19	1
Perfluorodecanoic acid (PFDA)	**0.78**	**J**	1.9	0.29	ng/L		04/07/22 12:16	04/09/22 15:19	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	1.0	ng/L		04/07/22 12:16	04/09/22 15:19	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.52	ng/L		04/07/22 12:16	04/09/22 15:19	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	1.2	ng/L		04/07/22 12:16	04/09/22 15:19	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.69	ng/L		04/07/22 12:16	04/09/22 15:19	1
Perfluorobutanesulfonic acid (PFBS)	**1.6**	**J**	1.9	0.19	ng/L		04/07/22 12:16	04/09/22 15:19	1
Perfluorohexanesulfonic acid (PFHxS)	**6.2**		1.9	0.54	ng/L		04/07/22 12:16	04/09/22 15:19	1
Perfluorooctanesulfonic acid (PFOS)	**9.8**		1.9	0.51	ng/L		04/07/22 12:16	04/09/22 15:19	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.7	1.1	ng/L		04/07/22 12:16	04/09/22 15:19	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.7	1.2	ng/L		04/07/22 12:16	04/09/22 15:19	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.9	0.23	ng/L		04/07/22 12:16	04/09/22 15:19	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.8	1.4	ng/L		04/07/22 12:16	04/09/22 15:19	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.9	0.30	ng/L		04/07/22 12:16	04/09/22 15:19	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.38	ng/L		04/07/22 12:16	04/09/22 15:19	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*93*		*50 - 150*	*04/07/22 12:16*	*04/09/22 15:19*	*1*
13C4 PFHpA	*95*		*50 - 150*	*04/07/22 12:16*	*04/09/22 15:19*	*1*
13C4 PFOA	*96*		*50 - 150*	*04/07/22 12:16*	*04/09/22 15:19*	*1*
13C5 PFNA	*87*		*50 - 150*	*04/07/22 12:16*	*04/09/22 15:19*	*1*
13C2 PFDA	*86*		*50 - 150*	*04/07/22 12:16*	*04/09/22 15:19*	*1*
13C2 PFUnA	*76*		*50 - 150*	*04/07/22 12:16*	*04/09/22 15:19*	*1*
13C2 PFDoA	*82*		*50 - 150*	*04/07/22 12:16*	*04/09/22 15:19*	*1*
13C2 PFTeDA	*77*		*50 - 150*	*04/07/22 12:16*	*04/09/22 15:19*	*1*
13C3 PFBS	*91*		*50 - 150*	*04/07/22 12:16*	*04/09/22 15:19*	*1*
18O2 PFHxS	*99*		*50 - 150*	*04/07/22 12:16*	*04/09/22 15:19*	*1*
13C4 PFOS	*90*		*50 - 150*	*04/07/22 12:16*	*04/09/22 15:19*	*1*
d3-NMeFOSAA	*82*		*50 - 150*	*04/07/22 12:16*	*04/09/22 15:19*	*1*
d5-NEtFOSAA	*94*		*50 - 150*	*04/07/22 12:16*	*04/09/22 15:19*	*1*
13C3 HFPO-DA	*78*		*50 - 150*	*04/07/22 12:16*	*04/09/22 15:19*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FY22 Yakutat PFAS

Job ID: 320-86406-1

Client Sample ID: 93060
Date Collected: 03/30/22 09:31
Date Received: 04/02/22 13:06

Lab Sample ID: 320-86406-2
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)	**5.6**		1.9	0.55	ng/L		04/07/22 12:16	04/09/22 15:29	1
Perfluoroheptanoic acid (PFHpA)	**1.6**	**J**	1.9	0.24	ng/L		04/07/22 12:16	04/09/22 15:29	1
Perfluorooctanoic acid (PFOA)	**2.1**		1.9	0.81	ng/L		04/07/22 12:16	04/09/22 15:29	1
Perfluorononanoic acid (PFNA)	**0.54**	**J**	1.9	0.26	ng/L		04/07/22 12:16	04/09/22 15:29	1
Perfluorodecanoic acid (PFDA)	**0.59**	**J**	1.9	0.29	ng/L		04/07/22 12:16	04/09/22 15:29	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	1.0	ng/L		04/07/22 12:16	04/09/22 15:29	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.52	ng/L		04/07/22 12:16	04/09/22 15:29	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	1.2	ng/L		04/07/22 12:16	04/09/22 15:29	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.69	ng/L		04/07/22 12:16	04/09/22 15:29	1
Perfluorobutanesulfonic acid (PFBS)	**1.9**		1.9	0.19	ng/L		04/07/22 12:16	04/09/22 15:29	1
Perfluorohexanesulfonic acid (PFHxS)	**6.1**		1.9	0.54	ng/L		04/07/22 12:16	04/09/22 15:29	1
Perfluorooctanesulfonic acid (PFOS)	**9.5**		1.9	0.51	ng/L		04/07/22 12:16	04/09/22 15:29	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.7	1.1	ng/L		04/07/22 12:16	04/09/22 15:29	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.7	1.2	ng/L		04/07/22 12:16	04/09/22 15:29	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.9	0.23	ng/L		04/07/22 12:16	04/09/22 15:29	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.8	1.4	ng/L		04/07/22 12:16	04/09/22 15:29	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.9	0.30	ng/L		04/07/22 12:16	04/09/22 15:29	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.38	ng/L		04/07/22 12:16	04/09/22 15:29	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*85*		*50 - 150*	*04/07/22 12:16*	*04/09/22 15:29*	*1*
13C4 PFHpA	*85*		*50 - 150*	*04/07/22 12:16*	*04/09/22 15:29*	*1*
13C4 PFOA	*83*		*50 - 150*	*04/07/22 12:16*	*04/09/22 15:29*	*1*
13C5 PFNA	*81*		*50 - 150*	*04/07/22 12:16*	*04/09/22 15:29*	*1*
13C2 PFDA	*73*		*50 - 150*	*04/07/22 12:16*	*04/09/22 15:29*	*1*
13C2 PFUnA	*66*		*50 - 150*	*04/07/22 12:16*	*04/09/22 15:29*	*1*
13C2 PFDoA	*68*		*50 - 150*	*04/07/22 12:16*	*04/09/22 15:29*	*1*
13C2 PFTeDA	*61*		*50 - 150*	*04/07/22 12:16*	*04/09/22 15:29*	*1*
13C3 PFBS	*71*		*50 - 150*	*04/07/22 12:16*	*04/09/22 15:29*	*1*
18O2 PFHxS	*92*		*50 - 150*	*04/07/22 12:16*	*04/09/22 15:29*	*1*
13C4 PFOS	*79*		*50 - 150*	*04/07/22 12:16*	*04/09/22 15:29*	*1*
d3-NMeFOSAA	*73*		*50 - 150*	*04/07/22 12:16*	*04/09/22 15:29*	*1*
d5-NEtFOSAA	*76*		*50 - 150*	*04/07/22 12:16*	*04/09/22 15:29*	*1*
13C3 HFPO-DA	*71*		*50 - 150*	*04/07/22 12:16*	*04/09/22 15:29*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FY22 Yakutat PFAS

Job ID: 320-86406-1

Client Sample ID: 33059
Date Collected: 03/30/22 10:26
Date Received: 04/02/22 13:06

Lab Sample ID: 320-86406-3
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	0.54	ng/L		04/07/22 12:16	04/09/22 16:00	1
Perfluoroheptanoic acid (PFHpA)	ND		1.8	0.23	ng/L		04/07/22 12:16	04/09/22 16:00	1
Perfluorooctanoic acid (PFOA)	ND		1.8	0.79	ng/L		04/07/22 12:16	04/09/22 16:00	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.25	ng/L		04/07/22 12:16	04/09/22 16:00	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.29	ng/L		04/07/22 12:16	04/09/22 16:00	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	1.0	ng/L		04/07/22 12:16	04/09/22 16:00	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.51	ng/L		04/07/22 12:16	04/09/22 16:00	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		04/07/22 12:16	04/09/22 16:00	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.67	ng/L		04/07/22 12:16	04/09/22 16:00	1
Perfluorobutanesulfonic acid (PFBS)	**0.18**	**J**	1.8	0.18	ng/L		04/07/22 12:16	04/09/22 16:00	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.8	0.53	ng/L		04/07/22 12:16	04/09/22 16:00	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.8	0.50	ng/L		04/07/22 12:16	04/09/22 16:00	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.6	1.1	ng/L		04/07/22 12:16	04/09/22 16:00	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.6	1.2	ng/L		04/07/22 12:16	04/09/22 16:00	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	**1.6**	**J**	1.8	0.22	ng/L		04/07/22 12:16	04/09/22 16:00	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.7	1.4	ng/L		04/07/22 12:16	04/09/22 16:00	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.30	ng/L		04/07/22 12:16	04/09/22 16:00	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.37	ng/L		04/07/22 12:16	04/09/22 16:00	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*89*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:00*	*1*
13C4 PFHpA	*93*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:00*	*1*
13C4 PFOA	*93*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:00*	*1*
13C5 PFNA	*88*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:00*	*1*
13C2 PFDA	*81*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:00*	*1*
13C2 PFUnA	*75*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:00*	*1*
13C2 PFDoA	*80*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:00*	*1*
13C2 PFTeDA	*81*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:00*	*1*
13C3 PFBS	*85*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:00*	*1*
18O2 PFHxS	*95*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:00*	*1*
13C4 PFOS	*87*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:00*	*1*
d3-NMeFOSAA	*79*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:00*	*1*
d5-NEtFOSAA	*89*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:00*	*1*
13C3 HFPO-DA	*79*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:00*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FY22 Yakutat PFAS

Job ID: 320-86406-1

Client Sample ID: 33068
Date Collected: 03/30/22 11:11
Date Received: 04/02/22 13:06

Lab Sample ID: 320-86406-4
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.57	ng/L		04/07/22 12:16	04/09/22 16:11	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		04/07/22 12:16	04/09/22 16:11	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.84	ng/L		04/07/22 12:16	04/09/22 16:11	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		04/07/22 12:16	04/09/22 16:11	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		04/07/22 12:16	04/09/22 16:11	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		04/07/22 12:16	04/09/22 16:11	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.54	ng/L		04/07/22 12:16	04/09/22 16:11	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		04/07/22 12:16	04/09/22 16:11	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.72	ng/L		04/07/22 12:16	04/09/22 16:11	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		04/07/22 12:16	04/09/22 16:11	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.56	ng/L		04/07/22 12:16	04/09/22 16:11	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		04/07/22 12:16	04/09/22 16:11	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		04/07/22 12:16	04/09/22 16:11	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		04/07/22 12:16	04/09/22 16:11	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.0	0.24	ng/L		04/07/22 12:16	04/09/22 16:11	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.0	1.5	ng/L		04/07/22 12:16	04/09/22 16:11	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.0	0.32	ng/L		04/07/22 12:16	04/09/22 16:11	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		04/07/22 12:16	04/09/22 16:11	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*96*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:11*	*1*
13C4 PFHpA	*99*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:11*	*1*
13C4 PFOA	*95*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:11*	*1*
13C5 PFNA	*91*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:11*	*1*
13C2 PFDA	*83*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:11*	*1*
13C2 PFUnA	*81*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:11*	*1*
13C2 PFDoA	*90*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:11*	*1*
13C2 PFTeDA	*80*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:11*	*1*
13C3 PFBS	*93*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:11*	*1*
18O2 PFHxS	*101*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:11*	*1*
13C4 PFOS	*88*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:11*	*1*
d3-NMeFOSAA	*87*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:11*	*1*
d5-NEtFOSAA	*90*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:11*	*1*
13C3 HFPO-DA	*85*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:11*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FY22 Yakutat PFAS

Job ID: 320-86406-1

Client Sample ID: 93068
Date Collected: 03/30/22 11:01
Date Received: 04/02/22 13:06

Lab Sample ID: 320-86406-5
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)	ND		1.8	0.53	ng/L		04/07/22 12:16	04/09/22 16:21	1
Perfluoroheptanoic acid (PFHpA)	ND		1.8	0.23	ng/L		04/07/22 12:16	04/09/22 16:21	1
Perfluorooctanoic acid (PFOA)	ND		1.8	0.78	ng/L		04/07/22 12:16	04/09/22 16:21	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.25	ng/L		04/07/22 12:16	04/09/22 16:21	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.29	ng/L		04/07/22 12:16	04/09/22 16:21	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	1.0	ng/L		04/07/22 12:16	04/09/22 16:21	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.51	ng/L		04/07/22 12:16	04/09/22 16:21	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		04/07/22 12:16	04/09/22 16:21	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.67	ng/L		04/07/22 12:16	04/09/22 16:21	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.8	0.18	ng/L		04/07/22 12:16	04/09/22 16:21	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.8	0.53	ng/L		04/07/22 12:16	04/09/22 16:21	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.8	0.50	ng/L		04/07/22 12:16	04/09/22 16:21	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.6	1.1	ng/L		04/07/22 12:16	04/09/22 16:21	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.6	1.2	ng/L		04/07/22 12:16	04/09/22 16:21	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		04/07/22 12:16	04/09/22 16:21	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.7	1.4	ng/L		04/07/22 12:16	04/09/22 16:21	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		04/07/22 12:16	04/09/22 16:21	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.37	ng/L		04/07/22 12:16	04/09/22 16:21	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*93*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:21*	*1*
13C4 PFHpA	*93*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:21*	*1*
13C4 PFOA	*95*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:21*	*1*
13C5 PFNA	*89*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:21*	*1*
13C2 PFDA	*86*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:21*	*1*
13C2 PFUnA	*78*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:21*	*1*
13C2 PFDoA	*86*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:21*	*1*
13C2 PFTeDA	*81*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:21*	*1*
13C3 PFBS	*91*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:21*	*1*
18O2 PFHxS	*100*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:21*	*1*
13C4 PFOS	*92*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:21*	*1*
d3-NMeFOSAA	*80*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:21*	*1*
d5-NEtFOSAA	*91*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:21*	*1*
13C3 HFPO-DA	*86*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:21*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FY22 Yakutat PFAS

Job ID: 320-86406-1

Client Sample ID: 33061
Date Collected: 03/30/22 12:22
Date Received: 04/02/22 13:06

Lab Sample ID: 320-86406-6
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		1.9	0.54	ng/L		04/07/22 12:16	04/09/22 16:32	1
Perfluoroheptanoic acid (PFHpA)	ND		1.9	0.23	ng/L		04/07/22 12:16	04/09/22 16:32	1
Perfluorooctanoic acid (PFOA)	ND		1.9	0.80	ng/L		04/07/22 12:16	04/09/22 16:32	1
Perfluorononanoic acid (PFNA)	ND		1.9	0.25	ng/L		04/07/22 12:16	04/09/22 16:32	1
Perfluorodecanoic acid (PFDA)	ND		1.9	0.29	ng/L		04/07/22 12:16	04/09/22 16:32	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	1.0	ng/L		04/07/22 12:16	04/09/22 16:32	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.51	ng/L		04/07/22 12:16	04/09/22 16:32	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	1.2	ng/L		04/07/22 12:16	04/09/22 16:32	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.68	ng/L		04/07/22 12:16	04/09/22 16:32	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.9	0.19	ng/L		04/07/22 12:16	04/09/22 16:32	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.9	0.53	ng/L		04/07/22 12:16	04/09/22 16:32	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.9	0.51	ng/L		04/07/22 12:16	04/09/22 16:32	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.7	1.1	ng/L		04/07/22 12:16	04/09/22 16:32	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.7	1.2	ng/L		04/07/22 12:16	04/09/22 16:32	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.9	0.22	ng/L		04/07/22 12:16	04/09/22 16:32	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.7	1.4	ng/L		04/07/22 12:16	04/09/22 16:32	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.9	0.30	ng/L		04/07/22 12:16	04/09/22 16:32	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.37	ng/L		04/07/22 12:16	04/09/22 16:32	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*90*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:32*	*1*
13C4 PFHpA	*90*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:32*	*1*
13C4 PFOA	*88*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:32*	*1*
13C5 PFNA	*82*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:32*	*1*
13C2 PFDA	*79*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:32*	*1*
13C2 PFUnA	*74*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:32*	*1*
13C2 PFDoA	*75*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:32*	*1*
13C2 PFTeDA	*65*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:32*	*1*
13C3 PFBS	*80*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:32*	*1*
18O2 PFHxS	*93*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:32*	*1*
13C4 PFOS	*87*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:32*	*1*
d3-NMeFOSAA	*77*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:32*	*1*
d5-NEtFOSAA	*77*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:32*	*1*
13C3 HFPO-DA	*76*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:32*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FY22 Yakutat PFAS

Job ID: 320-86406-1

Client Sample ID: 33064
Date Collected: 03/30/22 13:28
Date Received: 04/02/22 13:06

Lab Sample ID: 320-86406-7
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**2.4**		1.9	0.55	ng/L		04/07/22 12:16	04/09/22 16:42	1
Perfluoroheptanoic acid (PFHpA)	**0.87**	**J**	1.9	0.24	ng/L		04/07/22 12:16	04/09/22 16:42	1
Perfluorooctanoic acid (PFOA)	**0.97**	**J**	1.9	0.81	ng/L		04/07/22 12:16	04/09/22 16:42	1
Perfluorononanoic acid (PFNA)	ND		1.9	0.26	ng/L		04/07/22 12:16	04/09/22 16:42	1
Perfluorodecanoic acid (PFDA)	ND		1.9	0.30	ng/L		04/07/22 12:16	04/09/22 16:42	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	1.0	ng/L		04/07/22 12:16	04/09/22 16:42	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.52	ng/L		04/07/22 12:16	04/09/22 16:42	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	1.2	ng/L		04/07/22 12:16	04/09/22 16:42	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.70	ng/L		04/07/22 12:16	04/09/22 16:42	1
Perfluorobutanesulfonic acid (PFBS)	**1.4**	**J**	1.9	0.19	ng/L		04/07/22 12:16	04/09/22 16:42	1
Perfluorohexanesulfonic acid (PFHxS)	**11**		1.9	0.54	ng/L		04/07/22 12:16	04/09/22 16:42	1
Perfluorooctanesulfonic acid (PFOS)	**4.1**		1.9	0.51	ng/L		04/07/22 12:16	04/09/22 16:42	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.8	1.1	ng/L		04/07/22 12:16	04/09/22 16:42	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.8	1.2	ng/L		04/07/22 12:16	04/09/22 16:42	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.9	0.23	ng/L		04/07/22 12:16	04/09/22 16:42	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.8	1.4	ng/L		04/07/22 12:16	04/09/22 16:42	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.9	0.30	ng/L		04/07/22 12:16	04/09/22 16:42	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.38	ng/L		04/07/22 12:16	04/09/22 16:42	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*94*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:42*	
13C4 PFHpA	*101*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:42*	
13C4 PFOA	*98*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:42*	
13C5 PFNA	*97*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:42*	
13C2 PFDA	*89*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:42*	
13C2 PFUnA	*86*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:42*	
13C2 PFDoA	*88*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:42*	
13C2 PFTeDA	*88*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:42*	
13C3 PFBS	*100*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:42*	
18O2 PFHxS	*106*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:42*	
13C4 PFOS	*98*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:42*	
d3-NMeFOSAA	*85*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:42*	
d5-NEtFOSAA	*100*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:42*	
13C3 HFPO-DA	*84*		*50 - 150*	*04/07/22 12:16*	*04/09/22 16:42*	

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: FY22 Yakutat PFAS

Job ID: 320-86406-1

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

Matrix: Water

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFHxA (50-150)	C4PFHA (50-150)	PFOA (50-150)	PFNA (50-150)	PFDA (50-150)	PFUnA (50-150)	PFDoA (50-150)	PFTDA (50-150)
320-86406-1	33060	93	95	96	87	86	76	82	77
320-86406-2	93060	85	85	83	81	73	66	68	61
320-86406-3	33059	89	93	93	88	81	75	80	81
320-86406-4	33068	96	99	95	91	83	81	90	80
320-86406-5	93068	93	93	95	89	86	78	86	81
320-86406-6	33061	90	90	88	82	79	74	75	65
320-86406-7	33064	94	101	98	97	89	86	88	88
LCS 320-578503/2-A	Lab Control Sample	91	95	93	91	86	79	86	84
LCSD 320-578503/3-A	Lab Control Sample Dup	99	94	98	94	90	82	89	88
MB 320-578503/1-A	Method Blank	85	95	95	90	84	83	90	83

		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)		
320-86406-1	33060	91	99	90	82	94	78		
320-86406-2	93060	71	92	79	73	76	71		
320-86406-3	33059	85	95	87	79	89	79		
320-86406-4	33068	93	101	88	87	90	85		
320-86406-5	93068	91	100	92	80	91	86		
320-86406-6	33061	80	93	87	77	77	76		
320-86406-7	33064	100	106	98	85	100	84		
LCS 320-578503/2-A	Lab Control Sample	89	105	88	85	91	84		
LCSD 320-578503/3-A	Lab Control Sample Dup	92	101	95	91	98	85		
MB 320-578503/1-A	Method Blank	90	101	87	85	98	78		

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 320-578503/1-A
Matrix: Water
Analysis Batch: 578993

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 578503

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		04/07/22 12:16	04/09/22 13:55	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		04/07/22 12:16	04/09/22 13:55	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		04/07/22 12:16	04/09/22 13:55	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		04/07/22 12:16	04/09/22 13:55	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		04/07/22 12:16	04/09/22 13:55	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		04/07/22 12:16	04/09/22 13:55	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		04/07/22 12:16	04/09/22 13:55	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		04/07/22 12:16	04/09/22 13:55	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		04/07/22 12:16	04/09/22 13:55	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		04/07/22 12:16	04/09/22 13:55	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		04/07/22 12:16	04/09/22 13:55	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		04/07/22 12:16	04/09/22 13:55	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		04/07/22 12:16	04/09/22 13:55	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		04/07/22 12:16	04/09/22 13:55	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.0	0.24	ng/L		04/07/22 12:16	04/09/22 13:55	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.0	1.5	ng/L		04/07/22 12:16	04/09/22 13:55	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.0	0.32	ng/L		04/07/22 12:16	04/09/22 13:55	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		04/07/22 12:16	04/09/22 13:55	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*85*		*50 - 150*	*04/07/22 12:16*	*04/09/22 13:55*	*1*
13C4 PFHpA	*95*		*50 - 150*	*04/07/22 12:16*	*04/09/22 13:55*	*1*
13C4 PFOA	*95*		*50 - 150*	*04/07/22 12:16*	*04/09/22 13:55*	*1*
13C5 PFNA	*90*		*50 - 150*	*04/07/22 12:16*	*04/09/22 13:55*	*1*
13C2 PFDA	*84*		*50 - 150*	*04/07/22 12:16*	*04/09/22 13:55*	*1*
13C2 PFUnA	*83*		*50 - 150*	*04/07/22 12:16*	*04/09/22 13:55*	*1*
13C2 PFDoA	*90*		*50 - 150*	*04/07/22 12:16*	*04/09/22 13:55*	*1*
13C2 PFTeDA	*83*		*50 - 150*	*04/07/22 12:16*	*04/09/22 13:55*	*1*
13C3 PFBS	*90*		*50 - 150*	*04/07/22 12:16*	*04/09/22 13:55*	*1*
18O2 PFHxS	*101*		*50 - 150*	*04/07/22 12:16*	*04/09/22 13:55*	*1*
13C4 PFOS	*87*		*50 - 150*	*04/07/22 12:16*	*04/09/22 13:55*	*1*
d3-NMeFOSAA	*85*		*50 - 150*	*04/07/22 12:16*	*04/09/22 13:55*	*1*
d5-NEtFOSAA	*98*		*50 - 150*	*04/07/22 12:16*	*04/09/22 13:55*	*1*
13C3 HFPO-DA	*78*		*50 - 150*	*04/07/22 12:16*	*04/09/22 13:55*	*1*

Lab Sample ID: LCS 320-578503/2-A
Matrix: Water
Analysis Batch: 578993

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 578503

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorohexanoic acid (PFHxA)	40.0	42.1		ng/L		105	72 - 129
Perfluoroheptanoic acid (PFHpA)	40.0	42.9		ng/L		107	72 - 130
Perfluorooctanoic acid (PFOA)	40.0	43.9		ng/L		110	71 - 133
Perfluorononanoic acid (PFNA)	40.0	42.6		ng/L		107	69 - 130

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

Lab Sample ID: LCS 320-578503/2-A
Matrix: Water
Analysis Batch: 578993

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 578503

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorodecanoic acid (PFDA)	40.0	43.2		ng/L		108	71 - 129
Perfluoroundecanoic acid (PFUnA)	40.0	46.0		ng/L		115	69 - 133
Perfluorododecanoic acid (PFDoA)	40.0	42.9		ng/L		107	72 - 134
Perfluorotridecanoic acid (PFTriA)	40.0	45.7		ng/L		114	65 - 144
Perfluorotetradecanoic acid (PFTeA)	40.0	44.7		ng/L		112	71 - 132
Perfluorobutanesulfonic acid (PFBS)	35.4	39.5		ng/L		112	72 - 130
Perfluorohexanesulfonic acid (PFHxS)	36.4	33.4		ng/L		92	68 - 131
Perfluorooctanesulfonic acid (PFOS)	37.1	40.5		ng/L		109	65 - 140
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	42.3		ng/L		106	65 - 136
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	40.9		ng/L		102	61 - 135
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	37.3	38.1		ng/L		102	77 - 137
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	40.0	39.1		ng/L		98	72 - 132
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	37.7	37.7		ng/L		100	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.7	47.6		ng/L		126	81 - 141

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*91*		*50 - 150*
13C4 PFHpA	*95*		*50 - 150*
13C4 PFOA	*93*		*50 - 150*
13C5 PFNA	*91*		*50 - 150*
13C2 PFDA	*86*		*50 - 150*
13C2 PFUnA	*79*		*50 - 150*
13C2 PFDoA	*86*		*50 - 150*
13C2 PFTeDA	*84*		*50 - 150*
13C3 PFBS	*89*		*50 - 150*
18O2 PFHxS	*105*		*50 - 150*
13C4 PFOS	*88*		*50 - 150*
d3-NMeFOSAA	*85*		*50 - 150*
d5-NEtFOSAA	*91*		*50 - 150*
13C3 HFPO-DA	*84*		*50 - 150*

Lab Sample ID: LCSD 320-578503/3-A
Matrix: Water
Analysis Batch: 578993

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 578503

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	40.0	41.5		ng/L		104	72 - 129	2	30
Perfluoroheptanoic acid (PFHpA)	40.0	44.7		ng/L		112	72 - 130	4	30
Perfluorooctanoic acid (PFOA)	40.0	43.1		ng/L		108	71 - 133	2	30

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

Lab Sample ID: LCSD 320-578503/3-A
Matrix: Water
Analysis Batch: 578993

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 578503

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorononanoic acid (PFNA)			40.0	43.0		ng/L		108	69 - 130	1	30
Perfluorodecanoic acid (PFDA)			40.0	43.2		ng/L		108	71 - 129	0	30
Perfluoroundecanoic acid (PFUnA)			40.0	47.3		ng/L		118	69 - 133	3	30
Perfluorododecanoic acid (PFDoA)			40.0	42.9		ng/L		107	72 - 134	0	30
Perfluorotridecanoic acid (PFTriA)			40.0	47.6		ng/L		119	65 - 144	4	30
Perfluorotetradecanoic acid (PFTeA)			40.0	45.8		ng/L		115	71 - 132	2	30
Perfluorobutanesulfonic acid (PFBS)			35.4	39.2		ng/L		111	72 - 130	1	30
Perfluorohexanesulfonic acid (PFHxS)			36.4	35.7		ng/L		98	68 - 131	7	30
Perfluorooctanesulfonic acid (PFOS)			37.1	38.0		ng/L		102	65 - 140	6	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			40.0	42.9		ng/L		107	65 - 136	2	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			40.0	39.0		ng/L		97	61 - 135	5	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid			37.3	35.6		ng/L		96	77 - 137	7	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			40.0	41.7		ng/L		104	72 - 132	6	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid			37.7	36.3		ng/L		96	76 - 136	4	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			37.7	45.0		ng/L		119	81 - 141	6	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFHxA	*99*		*50 - 150*
13C4 PFHpA	*94*		*50 - 150*
13C4 PFOA	*98*		*50 - 150*
13C5 PFNA	*94*		*50 - 150*
13C2 PFDA	*90*		*50 - 150*
13C2 PFUnA	*82*		*50 - 150*
13C2 PFDoA	*89*		*50 - 150*
13C2 PFTeDA	*88*		*50 - 150*
13C3 PFBS	*92*		*50 - 150*
18O2 PFHxS	*101*		*50 - 150*
13C4 PFOS	*95*		*50 - 150*
d3-NMeFOSAA	*91*		*50 - 150*
d5-NEtFOSAA	*98*		*50 - 150*
13C3 HFPO-DA	*85*		*50 - 150*

LCMS

Prep Batch: 578503

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-86406-1	33060	Total/NA	Water	3535	
320-86406-2	93060	Total/NA	Water	3535	
320-86406-3	33059	Total/NA	Water	3535	
320-86406-4	33068	Total/NA	Water	3535	
320-86406-5	93068	Total/NA	Water	3535	
320-86406-6	33061	Total/NA	Water	3535	
320-86406-7	33064	Total/NA	Water	3535	
MB 320-578503/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-578503/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-578503/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Analysis Batch: 578993

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-86406-1	33060	Total/NA	Water	EPA 537(Mod)	578503
320-86406-2	93060	Total/NA	Water	EPA 537(Mod)	578503
320-86406-3	33059	Total/NA	Water	EPA 537(Mod)	578503
320-86406-4	33068	Total/NA	Water	EPA 537(Mod)	578503
320-86406-5	93068	Total/NA	Water	EPA 537(Mod)	578503
320-86406-6	33061	Total/NA	Water	EPA 537(Mod)	578503
320-86406-7	33064	Total/NA	Water	EPA 537(Mod)	578503
MB 320-578503/1-A	Method Blank	Total/NA	Water	EPA 537(Mod)	578503
LCS 320-578503/2-A	Lab Control Sample	Total/NA	Water	EPA 537(Mod)	578503
LCSD 320-578503/3-A	Lab Control Sample Dup	Total/NA	Water	EPA 537(Mod)	578503

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FY22 Yakutat PFAS

Job ID: 320-86406-1

Client Sample ID: 33060
Date Collected: 03/30/22 09:41
Date Received: 04/02/22 13:06

Lab Sample ID: 320-86406-1
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			265.2 mL	10.0 mL	578503	04/07/22 12:16	KAA	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			578993	04/09/22 15:19	K1S	TAL SAC

Client Sample ID: 93060
Date Collected: 03/30/22 09:31
Date Received: 04/02/22 13:06

Lab Sample ID: 320-86406-2
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			263.7 mL	10.0 mL	578503	04/07/22 12:16	KAA	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			578993	04/09/22 15:29	K1S	TAL SAC

Client Sample ID: 33059
Date Collected: 03/30/22 10:26
Date Received: 04/02/22 13:06

Lab Sample ID: 320-86406-3
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			270.4 mL	10.0 mL	578503	04/07/22 12:16	KAA	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			578993	04/09/22 16:00	K1S	TAL SAC

Client Sample ID: 33068
Date Collected: 03/30/22 11:11
Date Received: 04/02/22 13:06

Lab Sample ID: 320-86406-4
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			252.3 mL	10.0 mL	578503	04/07/22 12:16	KAA	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			578993	04/09/22 16:11	K1S	TAL SAC

Client Sample ID: 93068
Date Collected: 03/30/22 11:01
Date Received: 04/02/22 13:06

Lab Sample ID: 320-86406-5
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			271.3 mL	10.0 mL	578503	04/07/22 12:16	KAA	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			578993	04/09/22 16:21	K1S	TAL SAC

Client Sample ID: 33061
Date Collected: 03/30/22 12:22
Date Received: 04/02/22 13:06

Lab Sample ID: 320-86406-6
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			267 mL	10.0 mL	578503	04/07/22 12:16	KAA	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			578993	04/09/22 16:32	K1S	TAL SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FY22 Yakutat PFAS

Job ID: 320-86406-1

Client Sample ID: 33064
Date Collected: 03/30/22 13:28
Date Received: 04/02/22 13:06

Lab Sample ID: 320-86406-7
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			262.5 mL	10.0 mL	578503	04/07/22 12:16	KAA	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			578993	04/09/22 16:42	K1S	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: FY22 Yakutat PFAS

Job ID: 320-86406-1

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
EPA 537(Mod)	3535	Water	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid
EPA 537(Mod)	3535	Water	4,8-Dioxa-3H-perfluorononanoic acid (ADONA)
EPA 537(Mod)	3535	Water	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid
EPA 537(Mod)	3535	Water	Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)
EPA 537(Mod)	3535	Water	N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)
EPA 537(Mod)	3535	Water	N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)
EPA 537(Mod)	3535	Water	Perfluorobutanesulfonic acid (PFBS)
EPA 537(Mod)	3535	Water	Perfluorodecanoic acid (PFDA)
EPA 537(Mod)	3535	Water	Perfluorododecanoic acid (PFDoA)
EPA 537(Mod)	3535	Water	Perfluoroheptanoic acid (PFHpA)
EPA 537(Mod)	3535	Water	Perfluorohexanesulfonic acid (PFHxS)
EPA 537(Mod)	3535	Water	Perfluorohexanoic acid (PFHxA)
EPA 537(Mod)	3535	Water	Perfluorononanoic acid (PFNA)
EPA 537(Mod)	3535	Water	Perfluorooctanesulfonic acid (PFOS)
EPA 537(Mod)	3535	Water	Perfluorooctanoic acid (PFOA)
EPA 537(Mod)	3535	Water	Perfluorotetradecanoic acid (PFTeA)
EPA 537(Mod)	3535	Water	Perfluorotridecanoic acid (PFTriA)
EPA 537(Mod)	3535	Water	Perfluoroundecanoic acid (PFUnA)

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: FY22 Yakutat PFAS

Job ID: 320-86406-1

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

Protocol References:

EPA = US Environmental Protection Agency

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

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: FY22 Yakutat PFAS

Job ID: 320-86406-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-86406-1	33060	Water	03/30/22 09:41	04/02/22 13:06
320-86406-2	93060	Water	03/30/22 09:31	04/02/22 13:06
320-86406-3	33059	Water	03/30/22 10:26	04/02/22 13:06
320-86406-4	33068	Water	03/30/22 11:11	04/02/22 13:06
320-86406-5	93068	Water	03/30/22 11:01	04/02/22 13:06
320-86406-6	33061	Water	03/30/22 12:22	04/02/22 13:06
320-86406-7	33064	Water	03/30/22 13:28	04/02/22 13:06

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 TestAmerica
Attn: David Alltucker

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

Analytical Methods (include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	PFAS (+Trizma) 537.1 x18	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
33060		0941	3/30/22	X	2	Drinking Water
93060		0931				
33059		1026				
V 33068		1111				
V 93068		1101				
33061		1222				
V 33064		1328				

320-86406 Chain of Custody

Project Information	Sample Receipt
Number: 102896-007	Total No. of Containers: 14
Name: FY22 Yakutat PFAS	COC Seals/Intact? Y/N/NA
Contact: ashley.jaramillo@shan...com	Received Good Cond./Cold
Ongoing Project? Yes [X] No [ ]	Temp.
Sampler: RLW	Delivery Method:

Reliquished By: 1.	Reliquished By: 2.	Reliquished By: 3.
Signature: [signature] Time: 1600	Signature: Time:	Signature: Time:
Printed Name: Rachel Willis Date: 4/1/22	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson, Inc.	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: [signature] Time: 13:06	Signature: Time:	Signature: Time:
Printed Name: Nicholas Cahill Date: 4/4/22	Printed Name: Date:	Printed Name: Date:
Company: EETSAC	Company:	Company:

Notes:

PFAS x 18 Analytes

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

V: Insufficient volume, 1 of 2 containers, NC 4-2-22

2.4

No.

4/13/2022

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-86406-1

Login Number: 86406
List Number: 1
Creator: Oropeza, Salvador

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.	True	1846478/1846479
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	False	Limited volume received.
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Laboratory Data Review Checklist

Completed By:

Reviewed by Mason Craker/Validated by Ashley Jaramillo

Title:

Geologist/Senior Chemist

Date:

April 13, 2022

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

Eurofins TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-86406-1

Laboratory Report Date:

April 13, 2022

CS Site Name:

ADOT&PF Yakutat Airport Sitewide PFAS

ADEC File Number:

1530.38.022

Hazard Identification Number:

27090

320-86406-1

Laboratory Report Date:

April 13, 2022

CS Site Name:

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

1. Laboratory

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

   Yes☒ No☐ N/A☐ Comments:

   The DEC certified TestAmerica of West Sacramento, CA for the analysis of per- and polyfluorinated alkyl substances (PFAS) on February 11, 2021 by LCMSMS compliant with QSM Version 5.3 Table B-15. These reported analytes were included in the DEC's Contaminated Sites Laboratory Approval 17-020.

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

   Yes☐ No☐ N/A☒ Comments:

   Samples were not transferred to another "network" laboratory or sub-contracted to an alternate laboratory

2. Chain of Custody (CoC)

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

   Yes☒ No☐ N/A☐ Comments:

   b. Correct analyses requested?

   Yes☒ No☐ N/A☐ Comments:

3. Laboratory Sample Receipt Documentation

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

   Yes☒ No☐ N/A☐ Comments:

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

   Yes☒ No☐ N/A☐ Comments:

320-86406-1

Laboratory Report Date:

April 13, 2022

CS Site Name:

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

Yes☒ No☐ N/A☐ Comments:

The sample receipt form notes that the samples were received in good condition. However, samples *330684*, *93068*, and *33064* were received with 1 of 2 containers filled less than 250mL. Sample analysis was conducted on the sample container with sufficient volume. Data quality and/or usability not affected.

Sample *33059* was collected after a water treatment system. Therefore the results of this sample are considered estimates with no direction of bias and have been flagged 'J*'.

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

Yes☒ No☐ N/A☐ Comments:

See above.

e. Data quality or usability affected?

Comments:

See above.

4. Case Narrative

a. Present and understandable?

Yes☒ No☐ N/A☐ Comments:

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

Yes☒ No☐ N/A☐ Comments:

The "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 PFNA sample *33060*. Therefore, this result will be flagged with a 'J*' as an estimate with no direction of bias.

The following samples *33060* and *93060* in preparation batch 320-578503 were light yellow prior to extraction.

The following samples *33059*, *33068*, *93068* and *33061* in preparation batch 320-578503 were light yellow and a had a thin layer of sediments at the bottom of the container prior to extraction.

320-86406-1

Laboratory Report Date:

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CS Site Name:

The following sample *33064* in preparation batch 320-578503 was light yellow and contained floating particulates in the sample bottle prior to extraction.

The following samples were preserved with trizma: *33060*, *93060*, *33059*, *33068*, *93068*, *33061* and *33064*. Thus, the MB, LCS and LCSD also contain trizma. preparation batch 320-578503.

Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-578503. See section 6.c. for further details.

During the solid phase extraction process, the following samples contain non-settable particulates which clogged the solid phase extraction column: *93060* and *33061* preparation batch 320-578503

c. Were all corrective actions documented?

Yes☐ No☐ N/A☒ Comments:

No corrective actions were required.

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

Comments:

Case narrative does not discuss effect on data quality, it only discusses discrepancies and what was done in light of them, as applicable. Any notable data quality issues mentioned in the case narrative are discussed above in 4b or elsewhere within this DEC checklist.

5. Samples Results

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

Yes☒ No☐ N/A☐ Comments:

b. All applicable holding times met?

Yes☒ No☐ N/A☐ Comments:

c. All soils reported on a dry weight basis?

Yes☐ No☐ N/A☒ Comments:

Soil samples were not submitted with this work order.

320-86406-1

Laboratory Report Date:

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CS Site Name:

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

Yes☒ No☐ N/A☐ Comments:

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

e. Data quality or usability affected?

Data quality and/or usability were not affected.

6. QC Samples

a. Method Blank

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

Yes☒ No☐ N/A☐ Comments:

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

Yes☐ No☐ N/A☒ Comments:

No analytes were detected in the method blank sample.

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

Comments:

Not applicable, see above.

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

Yes☐ No☐ N/A☒ Comments:

See above.

v. Data quality or usability affected?

Comments:

Not applicable, see above.

320-86406-1

Laboratory Report Date:

April 13, 2022

CS Site Name:

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

i. Organics – One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

Yes☒ No☐ N/A☐ Comments:

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

Yes☐ No☐ N/A☒ Comments:

Metals and inorganics were not analyzed as part of this work order.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes☒ No☐ N/A☐ Comments:

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from LCS/LCSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes☒ No☐ N/A☐ Comments:

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

Comments:

Not applicable; analytical accuracy and precision were within acceptable limits.

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

Not applicable, See above.

320-86406-1

Laboratory Report Date:

April 13, 2022

CS Site Name:

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

Note: Leave blank if not required for project

i. Organics – One MS/MSD reported per matrix, analysis and 20 samples?

Yes☐ No☒ N/A☐ Comments:

There was not a sufficient amount of sample volume available to perform an MS/MSD. See section 6.b. LCS/LCSD discussion for evaluation of analytical accuracy and precision.

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

Yes☐ No☐ N/A☒ Comments:

Metals and inorganics were not analyzed as part of this work order.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable?

Yes☐ No☐ N/A☒ Comments:

See above.

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from MS/MSD, and or sample/sample duplicate.

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

Not applicable, see above.

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

Yes☐ No☐ N/A☒ Comments:

See above.

320-86406-1

Laboratory Report Date:

April 13, 2022

CS Site Name:

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

Comments:

Not applicable, see above.

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

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

Yes☒ No☐ N/A☐ Comments:

ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods 50-150 %R for field samples and 60-120 %R for QC samples; all other analyses see the laboratory report pages)

Yes☒ No☐ N/A☐ Comments:

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

Yes☐ No☐ N/A☒ Comments:

There were no surrogate/IDA recovery failures associated with this work order.

iv. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected.

e. Trip Blanks

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

Yes☐ No☐ N/A☒ Comments:

No volatile analyses were requested as a part of this work order; a trip blank is not required.

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

Yes☐ No☐ N/A☒ Comments:

See above.

320-86406-1

Laboratory Report Date:

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CS Site Name:

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

Not applicable, see above.

v. Data quality or usability affected?

Comments:

Not applicable, see above.

f. Field Duplicate

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

Yes☒ No☐ N/A☐ Comments:

ii. Submitted blind to lab?

Yes☒ No☐ N/A☒ Comments:

The field-duplicate pairs submitted with this work order are *33060/93060* and *33068/93068*.

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

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

Where R_1 = Sample Concentration
R_2 = Field Duplicate Concentration

Yes☒ No☐ N/A☐ Comments:

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

Comments:

Not applicable, see above.

320-86406-1

Laboratory Report Date:

April 13, 2022

CS Site Name:

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

Yes☐ No☐ N/A☒ Comments:

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

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

Not applicable, see above.

iii. Data quality or usability affected?

Comments:

Not applicable, see above.

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

a. Defined and appropriate?

Yes☒ No☐ N/A☐ Comments:

See section 4.b

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ANALYTICAL REPORT

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

Laboratory Job ID: 320-88946-1
Client Project/Site: YAK-PFAS-WSW

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

Attn: Ashley Jaramillo

Authorized for release by:
7/5/2022 2:04:32 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: YAK-PFAS-WSW

Job ID: 320-88946-1

Qualifiers

LCMS

Qualifier	Qualifier Description
I	Value is EMPC (estimated maximum possible concentration).
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

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

Job ID: 320-88946-1

Laboratory: Eurofins Sacramento

Narrative

Job Narrative
320-88946-1

Receipt
The samples were received on 6/10/2022 9:10 AM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 7.7º 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. 93060 (320-88946-4)

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

Organic Prep
Method 3535: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-596280.

Method 3535: The following samples in preparation batch 320-596280 were light yellow in color prior to extraction 33060 (320-88946-1), 33059 (320-88946-2), 33061 (320-88946-3), 93060 (320-88946-4) and 33068 (320-88946-8)

Method 3535: The following samples in preparation batch 320-596280 were observed to have a thin layer of sediment present in the bottom of the bottle prior to extraction. 33059 (320-88946-2), 33061 (320-88946-3) and 33068 (320-88946-8)

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: YAK-PFAS-WSW

Job ID: 320-88946-1

Client Sample ID: 33060 — Lab Sample ID: 320-88946-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	2.2		1.8	0.52	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.6	J	1.8	0.22	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	1.9		1.8	0.76	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.47	J	1.8	0.24	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.38	J	1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	2.9		1.8	0.51	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	8.8		1.8	0.48	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: 33059 — Lab Sample ID: 320-88946-2

No Detections.

Client Sample ID: 33061 — Lab Sample ID: 320-88946-3

No Detections.

Client Sample ID: 93060 — Lab Sample ID: 320-88946-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	2.4		1.8	0.52	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.6	J	1.8	0.22	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	1.9		1.8	0.76	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.51	J I	1.8	0.24	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.33	J	1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	3.1		1.8	0.51	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	8.5		1.8	0.48	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: 33053 — Lab Sample ID: 320-88946-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	1.1	J	1.9	0.55	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.71	J	1.9	0.23	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	1.5	J	1.9	0.80	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.27	J	1.9	0.19	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	5.1		1.9	0.54	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	4.4		1.9	0.51	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: 33065 — Lab Sample ID: 320-88946-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	7.1		1.8	0.53	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	3.9		1.8	0.23	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	5.4		1.8	0.78	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	3.3		1.8	0.25	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorodecanoic acid (PFDA)	2.2		1.8	0.29	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	1.0	J	1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	36		1.8	0.53	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	70		1.8	0.50	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: 33056 — Lab Sample ID: 320-88946-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	9.6		1.8	0.53	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	4.2		1.8	0.23	ng/L	1		EPA 537(Mod)	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins Sacramento

Client Sample ID: 33056 (Continued)

Lab Sample ID: 320-88946-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	4.1		1.8	0.78	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	1.5	J	1.8	0.25	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	1.0	J	1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	10		1.8	0.52	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	11		1.8	0.49	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: 33068

Lab Sample ID: 320-88946-8

No Detections.

Client: Shannon & Wilson, Inc
Project/Site: YAK-PFAS-WSW

Job ID: 320-88946-1

Client Sample ID: 33060
Date Collected: 06/09/22 07:25
Date Received: 06/10/22 09:10

Lab Sample ID: 320-88946-1
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**		1.8	0.52	ng/L		06/17/22 12:51	07/02/22 01:27	1
Perfluoroheptanoic acid (PFHpA)	**1.6**	**J**	1.8	0.22	ng/L		06/17/22 12:51	07/02/22 01:27	1
Perfluorooctanoic acid (PFOA)	**1.9**		1.8	0.76	ng/L		06/17/22 12:51	07/02/22 01:27	1
Perfluorononanoic acid (PFNA)	**0.47**	**J**	1.8	0.24	ng/L		06/17/22 12:51	07/02/22 01:27	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		06/17/22 12:51	07/02/22 01:27	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.98	ng/L		06/17/22 12:51	07/02/22 01:27	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.49	ng/L		06/17/22 12:51	07/02/22 01:27	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		06/17/22 12:51	07/02/22 01:27	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.65	ng/L		06/17/22 12:51	07/02/22 01:27	1
Perfluorobutanesulfonic acid (PFBS)	**0.38**	**J**	1.8	0.18	ng/L		06/17/22 12:51	07/02/22 01:27	1
Perfluorohexanesulfonic acid (PFHxS)	**2.9**		1.8	0.51	ng/L		06/17/22 12:51	07/02/22 01:27	1
Perfluorooctanesulfonic acid (PFOS)	**8.8**		1.8	0.48	ng/L		06/17/22 12:51	07/02/22 01:27	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.4	1.1	ng/L		06/17/22 12:51	07/02/22 01:27	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.4	1.2	ng/L		06/17/22 12:51	07/02/22 01:27	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.21	ng/L		06/17/22 12:51	07/02/22 01:27	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.3	ng/L		06/17/22 12:51	07/02/22 01:27	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.28	ng/L		06/17/22 12:51	07/02/22 01:27	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		06/17/22 12:51	07/02/22 01:27	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*93*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:27*	*1*
13C4 PFHpA	*94*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:27*	*1*
13C4 PFOA	*96*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:27*	*1*
13C5 PFNA	*93*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:27*	*1*
13C2 PFDA	*91*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:27*	*1*
13C2 PFUnA	*84*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:27*	*1*
13C2 PFDoA	*79*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:27*	*1*
13C2 PFTeDA	*67*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:27*	*1*
13C3 PFBS	*96*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:27*	*1*
18O2 PFHxS	*91*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:27*	*1*
13C4 PFOS	*82*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:27*	*1*
d3-NMeFOSAA	*81*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:27*	*1*
d5-NEtFOSAA	*84*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:27*	*1*
13C3 HFPO-DA	*97*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:27*	*1*

Client: Shannon & Wilson, Inc
Project/Site: YAK-PFAS-WSW

Job ID: 320-88946-1

Client Sample ID: 33059
Date Collected: 06/09/22 11:45
Date Received: 06/10/22 09:10

Lab Sample ID: 320-88946-2
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)	ND		1.8	0.52	ng/L		06/17/22 12:51	07/02/22 01:37	1
Perfluoroheptanoic acid (PFHpA)	ND		1.8	0.22	ng/L		06/17/22 12:51	07/02/22 01:37	1
Perfluorooctanoic acid (PFOA)	ND		1.8	0.76	ng/L		06/17/22 12:51	07/02/22 01:37	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.24	ng/L		06/17/22 12:51	07/02/22 01:37	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		06/17/22 12:51	07/02/22 01:37	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.98	ng/L		06/17/22 12:51	07/02/22 01:37	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.49	ng/L		06/17/22 12:51	07/02/22 01:37	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		06/17/22 12:51	07/02/22 01:37	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.65	ng/L		06/17/22 12:51	07/02/22 01:37	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.8	0.18	ng/L		06/17/22 12:51	07/02/22 01:37	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.8	0.51	ng/L		06/17/22 12:51	07/02/22 01:37	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.8	0.48	ng/L		06/17/22 12:51	07/02/22 01:37	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		06/17/22 12:51	07/02/22 01:37	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		06/17/22 12:51	07/02/22 01:37	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.21	ng/L		06/17/22 12:51	07/02/22 01:37	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.3	ng/L		06/17/22 12:51	07/02/22 01:37	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		06/17/22 12:51	07/02/22 01:37	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		06/17/22 12:51	07/02/22 01:37	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*85*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:37*	*1*
13C4 PFHpA	*87*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:37*	*1*
13C4 PFOA	*91*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:37*	*1*
13C5 PFNA	*90*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:37*	*1*
13C2 PFDA	*92*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:37*	*1*
13C2 PFUnA	*87*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:37*	*1*
13C2 PFDoA	*93*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:37*	*1*
13C2 PFTeDA	*78*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:37*	*1*
13C3 PFBS	*91*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:37*	*1*
18O2 PFHxS	*83*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:37*	*1*
13C4 PFOS	*84*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:37*	*1*
d3-NMeFOSAA	*80*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:37*	*1*
d5-NEtFOSAA	*84*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:37*	*1*
13C3 HFPO-DA	*85*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:37*	*1*

Client: Shannon & Wilson, Inc
Project/Site: YAK-PFAS-WSW

Job ID: 320-88946-1

Client Sample ID: 33061
Date Collected: 06/09/22 08:50
Date Received: 06/10/22 09:10

Lab Sample ID: 320-88946-3
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		1.7	0.51	ng/L		06/17/22 12:51	07/02/22 01:48	1
Perfluoroheptanoic acid (PFHpA)	ND		1.7	0.22	ng/L		06/17/22 12:51	07/02/22 01:48	1
Perfluorooctanoic acid (PFOA)	ND		1.7	0.74	ng/L		06/17/22 12:51	07/02/22 01:48	1
Perfluorononanoic acid (PFNA)	ND		1.7	0.24	ng/L		06/17/22 12:51	07/02/22 01:48	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.27	ng/L		06/17/22 12:51	07/02/22 01:48	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.96	ng/L		06/17/22 12:51	07/02/22 01:48	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.48	ng/L		06/17/22 12:51	07/02/22 01:48	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	1.1	ng/L		06/17/22 12:51	07/02/22 01:48	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.64	ng/L		06/17/22 12:51	07/02/22 01:48	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.7	0.17	ng/L		06/17/22 12:51	07/02/22 01:48	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.7	0.50	ng/L		06/17/22 12:51	07/02/22 01:48	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.7	0.47	ng/L		06/17/22 12:51	07/02/22 01:48	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.4	1.0	ng/L		06/17/22 12:51	07/02/22 01:48	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.4	1.1	ng/L		06/17/22 12:51	07/02/22 01:48	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.7	0.21	ng/L		06/17/22 12:51	07/02/22 01:48	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.5	1.3	ng/L		06/17/22 12:51	07/02/22 01:48	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.7	0.28	ng/L		06/17/22 12:51	07/02/22 01:48	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.7	0.35	ng/L		06/17/22 12:51	07/02/22 01:48	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*93*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:48*	*1*
13C4 PFHpA	*99*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:48*	*1*
13C4 PFOA	*94*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:48*	*1*
13C5 PFNA	*96*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:48*	*1*
13C2 PFDA	*95*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:48*	*1*
13C2 PFUnA	*85*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:48*	*1*
13C2 PFDoA	*72*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:48*	*1*
13C2 PFTeDA	*57*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:48*	*1*
13C3 PFBS	*94*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:48*	*1*
18O2 PFHxS	*93*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:48*	*1*
13C4 PFOS	*85*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:48*	*1*
d3-NMeFOSAA	*86*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:48*	*1*
d5-NEtFOSAA	*79*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:48*	*1*
13C3 HFPO-DA	*89*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:48*	*1*

Client: Shannon & Wilson, Inc
Project/Site: YAK-PFAS-WSW

Job ID: 320-88946-1

Client Sample ID: 93060
Date Collected: 06/09/22 07:15
Date Received: 06/10/22 09:10

Lab Sample ID: 320-88946-4
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**2.4**		1.8	0.52	ng/L		06/17/22 12:51	07/02/22 01:59	1
Perfluoroheptanoic acid (PFHpA)	**1.6**	**J**	1.8	0.22	ng/L		06/17/22 12:51	07/02/22 01:59	1
Perfluorooctanoic acid (PFOA)	**1.9**		1.8	0.76	ng/L		06/17/22 12:51	07/02/22 01:59	1
Perfluorononanoic acid (PFNA)	**0.51**	**J I**	1.8	0.24	ng/L		06/17/22 12:51	07/02/22 01:59	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		06/17/22 12:51	07/02/22 01:59	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.98	ng/L		06/17/22 12:51	07/02/22 01:59	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.49	ng/L		06/17/22 12:51	07/02/22 01:59	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		06/17/22 12:51	07/02/22 01:59	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.65	ng/L		06/17/22 12:51	07/02/22 01:59	1
Perfluorobutanesulfonic acid (PFBS)	**0.33**	**J**	1.8	0.18	ng/L		06/17/22 12:51	07/02/22 01:59	1
Perfluorohexanesulfonic acid (PFHxS)	**3.1**		1.8	0.51	ng/L		06/17/22 12:51	07/02/22 01:59	1
Perfluorooctanesulfonic acid (PFOS)	**8.5**		1.8	0.48	ng/L		06/17/22 12:51	07/02/22 01:59	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		06/17/22 12:51	07/02/22 01:59	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		06/17/22 12:51	07/02/22 01:59	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.21	ng/L		06/17/22 12:51	07/02/22 01:59	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.3	ng/L		06/17/22 12:51	07/02/22 01:59	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		06/17/22 12:51	07/02/22 01:59	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		06/17/22 12:51	07/02/22 01:59	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*88*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:59*	*1*
13C4 PFHpA	*93*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:59*	*1*
13C4 PFOA	*95*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:59*	*1*
13C5 PFNA	*95*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:59*	*1*
13C2 PFDA	*93*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:59*	*1*
13C2 PFUnA	*89*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:59*	*1*
13C2 PFDoA	*87*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:59*	*1*
13C2 PFTeDA	*75*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:59*	*1*
13C3 PFBS	*89*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:59*	*1*
18O2 PFHxS	*89*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:59*	*1*
13C4 PFOS	*85*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:59*	*1*
d3-NMeFOSAA	*85*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:59*	*1*
d5-NEtFOSAA	*84*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:59*	*1*
13C3 HFPO-DA	*89*		*50 - 150*	*06/17/22 12:51*	*07/02/22 01:59*	*1*

Client: Shannon & Wilson, Inc
Project/Site: YAK-PFAS-WSW

Job ID: 320-88946-1

Client Sample ID: 33053
Date Collected: 06/09/22 12:46
Date Received: 06/10/22 09:10

Lab Sample ID: 320-88946-5
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**1.1**	**J**	1.9	0.55	ng/L		06/17/22 12:51	07/02/22 02:09	1
Perfluoroheptanoic acid (PFHpA)	**0.71**	**J**	1.9	0.23	ng/L		06/17/22 12:51	07/02/22 02:09	1
Perfluorooctanoic acid (PFOA)	**1.5**	**J**	1.9	0.80	ng/L		06/17/22 12:51	07/02/22 02:09	1
Perfluorononanoic acid (PFNA)	ND		1.9	0.25	ng/L		06/17/22 12:51	07/02/22 02:09	1
Perfluorodecanoic acid (PFDA)	ND		1.9	0.29	ng/L		06/17/22 12:51	07/02/22 02:09	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	1.0	ng/L		06/17/22 12:51	07/02/22 02:09	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.52	ng/L		06/17/22 12:51	07/02/22 02:09	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	1.2	ng/L		06/17/22 12:51	07/02/22 02:09	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.69	ng/L		06/17/22 12:51	07/02/22 02:09	1
Perfluorobutanesulfonic acid (PFBS)	**0.27**	**J**	1.9	0.19	ng/L		06/17/22 12:51	07/02/22 02:09	1
Perfluorohexanesulfonic acid (PFHxS)	**5.1**		1.9	0.54	ng/L		06/17/22 12:51	07/02/22 02:09	1
Perfluorooctanesulfonic acid (PFOS)	**4.4**		1.9	0.51	ng/L		06/17/22 12:51	07/02/22 02:09	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.7	1.1	ng/L		06/17/22 12:51	07/02/22 02:09	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.7	1.2	ng/L		06/17/22 12:51	07/02/22 02:09	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.9	0.23	ng/L		06/17/22 12:51	07/02/22 02:09	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.8	1.4	ng/L		06/17/22 12:51	07/02/22 02:09	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.9	0.30	ng/L		06/17/22 12:51	07/02/22 02:09	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.38	ng/L		06/17/22 12:51	07/02/22 02:09	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*90*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:09*	*1*
13C4 PFHpA	*92*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:09*	*1*
13C4 PFOA	*93*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:09*	*1*
13C5 PFNA	*93*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:09*	*1*
13C2 PFDA	*93*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:09*	*1*
13C2 PFUnA	*96*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:09*	*1*
13C2 PFDoA	*93*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:09*	*1*
13C2 PFTeDA	*79*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:09*	*1*
13C3 PFBS	*92*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:09*	*1*
18O2 PFHxS	*87*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:09*	*1*
13C4 PFOS	*88*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:09*	*1*
d3-NMeFOSAA	*89*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:09*	*1*
d5-NEtFOSAA	*84*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:09*	*1*
13C3 HFPO-DA	*90*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:09*	*1*

Client: Shannon & Wilson, Inc
Project/Site: YAK-PFAS-WSW

Job ID: 320-88946-1

Client Sample ID: 33065
Date Collected: 06/09/22 12:19
Date Received: 06/10/22 09:10

Lab Sample ID: 320-88946-6
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)	**7.1**		1.8	0.53	ng/L		06/17/22 12:51	07/02/22 02:20	1
Perfluoroheptanoic acid (PFHpA)	**3.9**		1.8	0.23	ng/L		06/17/22 12:51	07/02/22 02:20	1
Perfluorooctanoic acid (PFOA)	**5.4**		1.8	0.78	ng/L		06/17/22 12:51	07/02/22 02:20	1
Perfluorononanoic acid (PFNA)	**3.3**		1.8	0.25	ng/L		06/17/22 12:51	07/02/22 02:20	1
Perfluorodecanoic acid (PFDA)	**2.2**		1.8	0.29	ng/L		06/17/22 12:51	07/02/22 02:20	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	1.0	ng/L		06/17/22 12:51	07/02/22 02:20	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.51	ng/L		06/17/22 12:51	07/02/22 02:20	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		06/17/22 12:51	07/02/22 02:20	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.67	ng/L		06/17/22 12:51	07/02/22 02:20	1
Perfluorobutanesulfonic acid (PFBS)	**1.0**	**J**	1.8	0.18	ng/L		06/17/22 12:51	07/02/22 02:20	1
Perfluorohexanesulfonic acid (PFHxS)	**36**		1.8	0.53	ng/L		06/17/22 12:51	07/02/22 02:20	1
Perfluorooctanesulfonic acid (PFOS)	**70**		1.8	0.50	ng/L		06/17/22 12:51	07/02/22 02:20	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.6	1.1	ng/L		06/17/22 12:51	07/02/22 02:20	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.6	1.2	ng/L		06/17/22 12:51	07/02/22 02:20	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		06/17/22 12:51	07/02/22 02:20	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.7	1.4	ng/L		06/17/22 12:51	07/02/22 02:20	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		06/17/22 12:51	07/02/22 02:20	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.37	ng/L		06/17/22 12:51	07/02/22 02:20	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*89*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:20*	*1*
13C4 PFHpA	*92*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:20*	*1*
13C4 PFOA	*94*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:20*	*1*
13C5 PFNA	*84*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:20*	*1*
13C2 PFDA	*87*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:20*	*1*
13C2 PFUnA	*92*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:20*	*1*
13C2 PFDoA	*96*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:20*	*1*
13C2 PFTeDA	*77*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:20*	*1*
13C3 PFBS	*93*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:20*	*1*
18O2 PFHxS	*91*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:20*	*1*
13C4 PFOS	*84*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:20*	*1*
d3-NMeFOSAA	*83*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:20*	*1*
d5-NEtFOSAA	*86*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:20*	*1*
13C3 HFPO-DA	*87*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:20*	*1*

Client: Shannon & Wilson, Inc
Project/Site: YAK-PFAS-WSW

Job ID: 320-88946-1

Client Sample ID: 33056
Date Collected: 06/09/22 10:11
Date Received: 06/10/22 09:10

Lab Sample ID: 320-88946-7
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**9.6**		1.8	0.53	ng/L		06/17/22 12:51	07/02/22 02:31	1
Perfluoroheptanoic acid (PFHpA)	**4.2**		1.8	0.23	ng/L		06/17/22 12:51	07/02/22 02:31	1
Perfluorooctanoic acid (PFOA)	**4.1**		1.8	0.78	ng/L		06/17/22 12:51	07/02/22 02:31	1
Perfluorononanoic acid (PFNA)	**1.5**	**J**	1.8	0.25	ng/L		06/17/22 12:51	07/02/22 02:31	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		06/17/22 12:51	07/02/22 02:31	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	1.0	ng/L		06/17/22 12:51	07/02/22 02:31	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.50	ng/L		06/17/22 12:51	07/02/22 02:31	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		06/17/22 12:51	07/02/22 02:31	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.67	ng/L		06/17/22 12:51	07/02/22 02:31	1
Perfluorobutanesulfonic acid (PFBS)	**1.0**	**J**	1.8	0.18	ng/L		06/17/22 12:51	07/02/22 02:31	1
Perfluorohexanesulfonic acid (PFHxS)	**10**		1.8	0.52	ng/L		06/17/22 12:51	07/02/22 02:31	1
Perfluorooctanesulfonic acid (PFOS)	**11**		1.8	0.49	ng/L		06/17/22 12:51	07/02/22 02:31	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.6	1.1	ng/L		06/17/22 12:51	07/02/22 02:31	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.6	1.2	ng/L		06/17/22 12:51	07/02/22 02:31	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		06/17/22 12:51	07/02/22 02:31	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.7	1.4	ng/L		06/17/22 12:51	07/02/22 02:31	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		06/17/22 12:51	07/02/22 02:31	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.37	ng/L		06/17/22 12:51	07/02/22 02:31	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*94*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:31*	*1*
13C4 PFHpA	*96*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:31*	*1*
13C4 PFOA	*97*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:31*	*1*
13C5 PFNA	*95*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:31*	*1*
13C2 PFDA	*96*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:31*	*1*
13C2 PFUnA	*96*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:31*	*1*
13C2 PFDoA	*93*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:31*	*1*
13C2 PFTeDA	*86*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:31*	*1*
13C3 PFBS	*104*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:31*	*1*
18O2 PFHxS	*97*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:31*	*1*
13C4 PFOS	*92*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:31*	*1*
d3-NMeFOSAA	*91*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:31*	*1*
d5-NEtFOSAA	*91*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:31*	*1*
13C3 HFPO-DA	*93*		*50 - 150*	*06/17/22 12:51*	*07/02/22 02:31*	*1*

Client: Shannon & Wilson, Inc
Project/Site: YAK-PFAS-WSW

Job ID: 320-88946-1

Client Sample ID: 33068
Date Collected: 06/09/22 09:30
Date Received: 06/10/22 09:10

Lab Sample ID: 320-88946-8
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		1.7	0.51	ng/L		06/17/22 12:51	07/02/22 03:03	1
Perfluoroheptanoic acid (PFHpA)	ND		1.7	0.22	ng/L		06/17/22 12:51	07/02/22 03:03	1
Perfluorooctanoic acid (PFOA)	ND		1.7	0.74	ng/L		06/17/22 12:51	07/02/22 03:03	1
Perfluorononanoic acid (PFNA)	ND		1.7	0.24	ng/L		06/17/22 12:51	07/02/22 03:03	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.27	ng/L		06/17/22 12:51	07/02/22 03:03	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.96	ng/L		06/17/22 12:51	07/02/22 03:03	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.48	ng/L		06/17/22 12:51	07/02/22 03:03	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	1.1	ng/L		06/17/22 12:51	07/02/22 03:03	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.64	ng/L		06/17/22 12:51	07/02/22 03:03	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.7	0.17	ng/L		06/17/22 12:51	07/02/22 03:03	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.7	0.50	ng/L		06/17/22 12:51	07/02/22 03:03	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.7	0.47	ng/L		06/17/22 12:51	07/02/22 03:03	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.4	1.0	ng/L		06/17/22 12:51	07/02/22 03:03	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.4	1.1	ng/L		06/17/22 12:51	07/02/22 03:03	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.7	0.21	ng/L		06/17/22 12:51	07/02/22 03:03	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.5	1.3	ng/L		06/17/22 12:51	07/02/22 03:03	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.7	0.28	ng/L		06/17/22 12:51	07/02/22 03:03	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.7	0.35	ng/L		06/17/22 12:51	07/02/22 03:03	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*88*		*50 - 150*	*06/17/22 12:51*	*07/02/22 03:03*	*1*
13C4 PFHpA	*96*		*50 - 150*	*06/17/22 12:51*	*07/02/22 03:03*	*1*
13C4 PFOA	*94*		*50 - 150*	*06/17/22 12:51*	*07/02/22 03:03*	*1*
13C5 PFNA	*89*		*50 - 150*	*06/17/22 12:51*	*07/02/22 03:03*	*1*
13C2 PFDA	*92*		*50 - 150*	*06/17/22 12:51*	*07/02/22 03:03*	*1*
13C2 PFUnA	*90*		*50 - 150*	*06/17/22 12:51*	*07/02/22 03:03*	*1*
13C2 PFDoA	*97*		*50 - 150*	*06/17/22 12:51*	*07/02/22 03:03*	*1*
13C2 PFTeDA	*81*		*50 - 150*	*06/17/22 12:51*	*07/02/22 03:03*	*1*
13C3 PFBS	*96*		*50 - 150*	*06/17/22 12:51*	*07/02/22 03:03*	*1*
18O2 PFHxS	*95*		*50 - 150*	*06/17/22 12:51*	*07/02/22 03:03*	*1*
13C4 PFOS	*91*		*50 - 150*	*06/17/22 12:51*	*07/02/22 03:03*	*1*
d3-NMeFOSAA	*88*		*50 - 150*	*06/17/22 12:51*	*07/02/22 03:03*	*1*
d5-NEtFOSAA	*91*		*50 - 150*	*06/17/22 12:51*	*07/02/22 03:03*	*1*
13C3 HFPO-DA	*90*		*50 - 150*	*06/17/22 12:51*	*07/02/22 03:03*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: YAK-PFAS-WSW

Job ID: 320-88946-1

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

Matrix: Water

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFHxA (50-150)	C4PFHA (50-150)	PFOA (50-150)	PFNA (50-150)	PFDA (50-150)	PFUnA (50-150)	PFDoA (50-150)	PFTDA (50-150)
320-88946-1	33060	93	94	96	93	91	84	79	67
320-88946-2	33059	85	87	91	90	92	87	93	78
320-88946-3	33061	93	99	94	96	95	85	72	57
320-88946-4	93060	88	93	95	95	93	89	87	75
320-88946-5	33053	90	92	93	93	93	96	93	79
320-88946-6	33065	89	92	94	84	87	92	96	77
320-88946-7	33056	94	96	97	95	96	96	93	86
320-88946-8	33068	88	96	94	89	92	90	97	81
LCS 320-596280/2-A	Lab Control Sample	91	97	94	98	95	89	96	80
LCSD 320-596280/3-A	Lab Control Sample Dup	91	101	96	95	92	93	90	81
MB 320-596280/1-A	Method Blank	91	88	94	93	85	88	90	80

		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)		
320-88946-1	33060	96	91	82	81	84	97		
320-88946-2	33059	91	83	84	80	84	85		
320-88946-3	33061	94	93	85	86	79	89		
320-88946-4	93060	89	89	85	85	84	89		
320-88946-5	33053	92	87	88	89	84	90		
320-88946-6	33065	93	91	84	83	86	87		
320-88946-7	33056	104	97	92	91	91	93		
320-88946-8	33068	96	95	91	88	91	90		
LCS 320-596280/2-A	Lab Control Sample	90	99	85	87	82	88		
LCSD 320-596280/3-A	Lab Control Sample Dup	98	91	90	93	85	91		
MB 320-596280/1-A	Method Blank	80	86	83	85	84	89		

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 320-596280/1-A
Matrix: Water
Analysis Batch: 600122

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 596280

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		06/17/22 12:51	07/02/22 00:55	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		06/17/22 12:51	07/02/22 00:55	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		06/17/22 12:51	07/02/22 00:55	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		06/17/22 12:51	07/02/22 00:55	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		06/17/22 12:51	07/02/22 00:55	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		06/17/22 12:51	07/02/22 00:55	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		06/17/22 12:51	07/02/22 00:55	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		06/17/22 12:51	07/02/22 00:55	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		06/17/22 12:51	07/02/22 00:55	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		06/17/22 12:51	07/02/22 00:55	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		06/17/22 12:51	07/02/22 00:55	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		06/17/22 12:51	07/02/22 00:55	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		06/17/22 12:51	07/02/22 00:55	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		06/17/22 12:51	07/02/22 00:55	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.0	0.24	ng/L		06/17/22 12:51	07/02/22 00:55	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.0	1.5	ng/L		06/17/22 12:51	07/02/22 00:55	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.0	0.32	ng/L		06/17/22 12:51	07/02/22 00:55	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		06/17/22 12:51	07/02/22 00:55	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*91*		*50 - 150*	*06/17/22 12:51*	*07/02/22 00:55*	*1*
13C4 PFHpA	*88*		*50 - 150*	*06/17/22 12:51*	*07/02/22 00:55*	*1*
13C4 PFOA	*94*		*50 - 150*	*06/17/22 12:51*	*07/02/22 00:55*	*1*
13C5 PFNA	*93*		*50 - 150*	*06/17/22 12:51*	*07/02/22 00:55*	*1*
13C2 PFDA	*85*		*50 - 150*	*06/17/22 12:51*	*07/02/22 00:55*	*1*
13C2 PFUnA	*88*		*50 - 150*	*06/17/22 12:51*	*07/02/22 00:55*	*1*
13C2 PFDoA	*90*		*50 - 150*	*06/17/22 12:51*	*07/02/22 00:55*	*1*
13C2 PFTeDA	*80*		*50 - 150*	*06/17/22 12:51*	*07/02/22 00:55*	*1*
13C3 PFBS	*80*		*50 - 150*	*06/17/22 12:51*	*07/02/22 00:55*	*1*
18O2 PFHxS	*86*		*50 - 150*	*06/17/22 12:51*	*07/02/22 00:55*	*1*
13C4 PFOS	*83*		*50 - 150*	*06/17/22 12:51*	*07/02/22 00:55*	*1*
d3-NMeFOSAA	*85*		*50 - 150*	*06/17/22 12:51*	*07/02/22 00:55*	*1*
d5-NEtFOSAA	*84*		*50 - 150*	*06/17/22 12:51*	*07/02/22 00:55*	*1*
13C3 HFPO-DA	*89*		*50 - 150*	*06/17/22 12:51*	*07/02/22 00:55*	*1*

Lab Sample ID: LCS 320-596280/2-A
Matrix: Water
Analysis Batch: 600122

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 596280

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorohexanoic acid (PFHxA)	40.0	40.6		ng/L		102	72 - 129
Perfluoroheptanoic acid (PFHpA)	40.0	40.3		ng/L		101	72 - 130
Perfluorooctanoic acid (PFOA)	40.0	43.6		ng/L		109	71 - 133
Perfluorononanoic acid (PFNA)	40.0	39.5		ng/L		99	69 - 130

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

Lab Sample ID: LCS 320-596280/2-A
Matrix: Water
Analysis Batch: 600122

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 596280

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorodecanoic acid (PFDA)	40.0	42.6		ng/L		107	71 - 129
Perfluoroundecanoic acid (PFUnA)	40.0	46.3		ng/L		116	69 - 133
Perfluorododecanoic acid (PFDoA)	40.0	41.0		ng/L		103	72 - 134
Perfluorotridecanoic acid (PFTriA)	40.0	40.1		ng/L		100	65 - 144
Perfluorotetradecanoic acid (PFTeA)	40.0	46.4		ng/L		116	71 - 132
Perfluorobutanesulfonic acid (PFBS)	35.5	41.9		ng/L		118	72 - 130
Perfluorohexanesulfonic acid (PFHxS)	36.5	36.9		ng/L		101	68 - 131
Perfluorooctanesulfonic acid (PFOS)	37.2	44.5		ng/L		120	65 - 140
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	43.0		ng/L		107	65 - 136
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	45.9		ng/L		115	61 - 135
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	37.4	47.7		ng/L		128	77 - 137
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	40.0	46.0		ng/L		115	72 - 132
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	37.8	43.5		ng/L		115	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.8	45.7		ng/L		121	81 - 141

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*91*		*50 - 150*
13C4 PFHpA	*97*		*50 - 150*
13C4 PFOA	*94*		*50 - 150*
13C5 PFNA	*98*		*50 - 150*
13C2 PFDA	*95*		*50 - 150*
13C2 PFUnA	*89*		*50 - 150*
13C2 PFDoA	*96*		*50 - 150*
13C2 PFTeDA	*80*		*50 - 150*
13C3 PFBS	*90*		*50 - 150*
18O2 PFHxS	*99*		*50 - 150*
13C4 PFOS	*85*		*50 - 150*
d3-NMeFOSAA	*87*		*50 - 150*
d5-NEtFOSAA	*82*		*50 - 150*
13C3 HFPO-DA	*88*		*50 - 150*

Lab Sample ID: LCSD 320-596280/3-A
Matrix: Water
Analysis Batch: 600122

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 596280

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	40.0	42.8		ng/L		107	72 - 129	5	30
Perfluoroheptanoic acid (PFHpA)	40.0	40.0		ng/L		100	72 - 130	1	30
Perfluorooctanoic acid (PFOA)	40.0	41.8		ng/L		105	71 - 133	4	30

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

Lab Sample ID: LCSD 320-596280/3-A
Matrix: Water
Analysis Batch: 600122

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 596280

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorononanoic acid (PFNA)			40.0	41.5		ng/L		104	69 - 130	5	30
Perfluorodecanoic acid (PFDA)			40.0	48.1		ng/L		120	71 - 129	12	30
Perfluoroundecanoic acid (PFUnA)			40.0	43.5		ng/L		109	69 - 133	6	30
Perfluorododecanoic acid (PFDoA)			40.0	42.5		ng/L		106	72 - 134	4	30
Perfluorotridecanoic acid (PFTriA)			40.0	41.3		ng/L		103	65 - 144	3	30
Perfluorotetradecanoic acid (PFTeA)			40.0	43.3		ng/L		108	71 - 132	7	30
Perfluorobutanesulfonic acid (PFBS)			35.5	37.9		ng/L		107	72 - 130	10	30
Perfluorohexanesulfonic acid (PFHxS)			36.5	40.9		ng/L		112	68 - 131	10	30
Perfluorooctanesulfonic acid (PFOS)			37.2	41.9		ng/L		113	65 - 140	6	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			40.0	39.1		ng/L		98	65 - 136	9	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			40.0	42.6		ng/L		106	61 - 135	8	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid			37.4	43.5		ng/L		116	77 - 137	9	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			40.0	43.6		ng/L		109	72 - 132	5	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid			37.8	39.5		ng/L		105	76 - 136	10	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			37.8	43.9		ng/L		116	81 - 141	4	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFHxA	*91*		*50 - 150*
13C4 PFHpA	*101*		*50 - 150*
13C4 PFOA	*96*		*50 - 150*
13C5 PFNA	*95*		*50 - 150*
13C2 PFDA	*92*		*50 - 150*
13C2 PFUnA	*93*		*50 - 150*
13C2 PFDoA	*90*		*50 - 150*
13C2 PFTeDA	*81*		*50 - 150*
13C3 PFBS	*98*		*50 - 150*
18O2 PFHxS	*91*		*50 - 150*
13C4 PFOS	*90*		*50 - 150*
d3-NMeFOSAA	*93*		*50 - 150*
d5-NEtFOSAA	*85*		*50 - 150*
13C3 HFPO-DA	*91*		*50 - 150*

LCMS

Prep Batch: 596280

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-88946-1	33060	Total/NA	Water	3535	
320-88946-2	33059	Total/NA	Water	3535	
320-88946-3	33061	Total/NA	Water	3535	
320-88946-4	93060	Total/NA	Water	3535	
320-88946-5	33053	Total/NA	Water	3535	
320-88946-6	33065	Total/NA	Water	3535	
320-88946-7	33056	Total/NA	Water	3535	
320-88946-8	33068	Total/NA	Water	3535	
MB 320-596280/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-596280/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-596280/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Analysis Batch: 600122

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-88946-1	33060	Total/NA	Water	EPA 537(Mod)	596280
320-88946-2	33059	Total/NA	Water	EPA 537(Mod)	596280
320-88946-3	33061	Total/NA	Water	EPA 537(Mod)	596280
320-88946-4	93060	Total/NA	Water	EPA 537(Mod)	596280
320-88946-5	33053	Total/NA	Water	EPA 537(Mod)	596280
320-88946-6	33065	Total/NA	Water	EPA 537(Mod)	596280
320-88946-7	33056	Total/NA	Water	EPA 537(Mod)	596280
320-88946-8	33068	Total/NA	Water	EPA 537(Mod)	596280
MB 320-596280/1-A	Method Blank	Total/NA	Water	EPA 537(Mod)	596280
LCS 320-596280/2-A	Lab Control Sample	Total/NA	Water	EPA 537(Mod)	596280
LCSD 320-596280/3-A	Lab Control Sample Dup	Total/NA	Water	EPA 537(Mod)	596280

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: YAK-PFAS-WSW

Job ID: 320-88946-1

Client Sample ID: 33060
Date Collected: 06/09/22 07:25
Date Received: 06/10/22 09:10

Lab Sample ID: 320-88946-1
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			280.9 mL	10.0 mL	596280	06/17/22 12:51	KAA	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			600122	07/02/22 01:27	K1S	TAL SAC

Client Sample ID: 33059
Date Collected: 06/09/22 11:45
Date Received: 06/10/22 09:10

Lab Sample ID: 320-88946-2
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			279.2 mL	10.0 mL	596280	06/17/22 12:51	KAA	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			600122	07/02/22 01:37	K1S	TAL SAC

Client Sample ID: 33061
Date Collected: 06/09/22 08:50
Date Received: 06/10/22 09:10

Lab Sample ID: 320-88946-3
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			286.8 mL	10.0 mL	596280	06/17/22 12:51	KAA	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			600122	07/02/22 01:48	K1S	TAL SAC

Client Sample ID: 93060
Date Collected: 06/09/22 07:15
Date Received: 06/10/22 09:10

Lab Sample ID: 320-88946-4
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			279.5 mL	10.0 mL	596280	06/17/22 12:51	KAA	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			600122	07/02/22 01:59	K1S	TAL SAC

Client Sample ID: 33053
Date Collected: 06/09/22 12:46
Date Received: 06/10/22 09:10

Lab Sample ID: 320-88946-5
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			266 mL	10.0 mL	596280	06/17/22 12:51	KAA	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			600122	07/02/22 02:09	K1S	TAL SAC

Client Sample ID: 33065
Date Collected: 06/09/22 12:19
Date Received: 06/10/22 09:10

Lab Sample ID: 320-88946-6
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			271.2 mL	10.0 mL	596280	06/17/22 12:51	KAA	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			600122	07/02/22 02:20	K1S	TAL SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: YAK-PFAS-WSW

Job ID: 320-88946-1

Client Sample ID: 33056

Date Collected: 06/09/22 10:11
Date Received: 06/10/22 09:10

Lab Sample ID: 320-88946-7

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			272.9 mL	10.0 mL	596280	06/17/22 12:51	KAA	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			600122	07/02/22 02:31	K1S	TAL SAC

Client Sample ID: 33068

Date Collected: 06/09/22 09:30
Date Received: 06/10/22 09:10

Lab Sample ID: 320-88946-8

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			286.8 mL	10.0 mL	596280	06/17/22 12:51	KAA	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			600122	07/02/22 03:03	K1S	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: YAK-PFAS-WSW

Job ID: 320-88946-1

Laboratory: Eurofins Sacramento

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

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

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: YAK-PFAS-WSW

Job ID: 320-88946-1

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

Protocol References:

EPA = US Environmental Protection Agency

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

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: YAK-PFAS-WSW

Job ID: 320-88946-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-88946-1	33060	Water	06/09/22 07:25	06/10/22 09:10
320-88946-2	33059	Water	06/09/22 11:45	06/10/22 09:10
320-88946-3	33061	Water	06/09/22 08:50	06/10/22 09:10
320-88946-4	93060	Water	06/09/22 07:15	06/10/22 09:10
320-88946-5	33053	Water	06/09/22 12:46	06/10/22 09:10
320-88946-6	33065	Water	06/09/22 12:19	06/10/22 09:10
320-88946-7	33056	Water	06/09/22 10:11	06/10/22 09:10
320-88946-8	33068	Water	06/09/22 09:30	06/10/22 09:10

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

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

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Laboratory Eurofins
Attn: D. Altricker

Analytical Methods (include preservative if used)

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

Sample Identity	Lab No.	Time	Date Sampled	PFAS x18	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
33060		0725	6/9/22		2	ground water
33059		1145			2	
33061		0850			2	
~~33060~~ 93060		0715			2	
33053		1246			2	
33065		1219			2	
33056		1011			2	
33068		0930			2	

320-88946 Chain of Custody

Project Information		Sample Receipt	
Number:	102896-007	Total No. of Containers:	
Name:	YAK-PFAS-WSW	COC Seals/Intact? Y/N/NA	
Contact:	Ashley Jaramillo	Received Good Cond./Cold	
Ongoing Project?	Yes ☒ No ☐	Temp:	
Sampler:	Amber Masters	Delivery Method:	

Notes:

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 1400	Signature: Time:	Signature: Time:
Printed Name: Amber Masters Date: 6/9/22	Printed Name: Date:	Printed Name: Date:
Company: Shannon + Wilson, Inc	Company:	Company:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: Time: 0710	Signature: Time:	Signature: Time:
Printed Name: Eduardo Cerda Date: 6/10/22	Printed Name: Date:	Printed Name: Date:
Company: CETCO	Company:	Company:

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

7.72

No.

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-88946-1

Login Number: 88946
List Number: 1
Creator: Maldonado, Letzi A

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.	True	1689123/1689122
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Laboratory Data Review Checklist

Completed By:

Reviewed and validated by Ashley Jaramillo

Title:

Senior Chemist

Date:

July 6, 2022

Consultant Firm:

Shannon&Wilson, Inc.

Laboratory Name:

Eurofins Environment Testing America in West Sacramento, California

Laboratory Report Number:

320-88946-1

Laboratory Report Date:

July 5, 2022

CS Site Name:

ADOT&PF Yakutat Airport Sitewide PFAS

ADEC File Number:

1530.38.022

Hazard Identification Number:

27090

320-88946-1

Laboratory Report Date:

July 5, 2022

CS Site Name:

ADOT&PF Yakutat Airport Sitewide PFAS

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

1. Laboratory

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

   Yes☒ No☐ N/A☐ Comments:

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

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

   Yes☐ No☐ N/A☒ Comments:

   Samples were not transferred to another "network" laboratory or sub-contracted to an alternate laboratory.

2. Chain of Custody (CoC)

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

   Yes☒ No☐ N/A☐ Comments:

   b. Correct analyses requested?

   Yes☒ No☐ N/A☐ Comments:

3. Laboratory Sample Receipt Documentation

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

   Yes☐ No☒ N/A☐ Comments:

   The temperature of the cooler at receipt was 7.7º C. Due to the high chemical and biological stability of PFAS, it is unlikely the integrity of the project samples was adversely affected by the slightly-high cooler temperature. Analysis of PFAS does not require a preservative. In an e-mail dated August 3, 2015, one of the ADEC project managers noted that he had spoken with their chemist, who "agrees the high temperature probably would not affect the PFC results." PFAS are also known as PFCs. Data quality and/or usability not affected.

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

Yes☐ No☐ N/A☒ Comments:

Sample preservation, aside from temperature, is not required.

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

Yes☒ No☐ N/A☐ Comments:

Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice.

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

Yes☒ No☐ N/A☐ Comments:

See above.

e. Data quality or usability affected?

Comments:

See above.

4. Case Narrative

a. Present and understandable?

Yes☒ No☐ N/A☐ Comments:

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

Yes☒ No☐ N/A☐ Comments:

The "I" qualifier means the transition mass ratio for the indicated analyte was above the established ratio limits. The qualitative identification of PFNA in sample *93060* has some degree of uncertainty, and the reported value may have some high bias. However, analyst judgment was used to positively identify the analyte. Therefore, the PFNA result in the aforementioned sample is considered an estimate, biased high, and has been qualified 'J*' in the analytical tables.

Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-596280. See Section 6.c. for details.

The following samples were light yellow in color prior to extraction: *33060, 33059, 33061, 93060* and *33068*. Data quality and/or usability not affected.

The following samples were observed to have a thin layer of sediment present in the bottom of the bottle prior to extraction: *33059, 33061* and *33068*. Data quality and/or usability not affected.

c. Were all 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:

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. Samples Results

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

Yes☒ No☐ N/A☐ Comments:

b. All applicable holding times met?

Yes☒ No☐ N/A☐ Comments:

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c. All soils reported on a dry weight basis?

Yes☐ No☐ N/A☒ Comments:

Soil samples were not submitted with this work order.

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

Yes☒ No☐ N/A☐ Comments:

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

e. Data quality or usability affected?

Not applicable, see above.

6. QC Samples

a. Method Blank

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

Yes☒ No☐ N/A☐ Comments:

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

Yes☒ No☐ N/A☐ Comments:

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

Comments:

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.

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v. Data quality or usability affected?

Comments:

Not applicable, see above.

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

i. Organics – One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

Yes☒ No☐ N/A☐ Comments:

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

Yes☐ No☐ N/A☐ Comments:

Metal and/or inorganic analyses were not requested as part of this work order.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes☒ No☐ N/A☐ Comments:

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from LCS/LCSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes☒ No☐ N/A☐ Comments:

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

Comments:

Not applicable, 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.

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

Comments:

Not applicable, see above.

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

Note: Leave blank if not required for project

i. Organics – One MS/MSD reported per matrix, analysis and 20 samples?

Yes☐ No☒ N/A☐ Comments:

There was not a sufficient amount of sample volume available to perform an MS/MSD. See section 6.b. LCS/LCSD discussion for evaluation of analytical accuracy and precision.

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

Yes☐ No☐ N/A☒ Comments:

Metal and/or inorganic analyses were not requested as part of this work order.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable?

Yes☐ No☐ N/A☒ Comments:

See above.

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from MS/MSD, and or sample/sample duplicate.

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

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.

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

Comments:

Not applicable, see above.

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

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

Yes☒ No☐ N/A☐ Comments:

ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods 50-150 %R for field samples and 60-120 %R for QC samples; all other analyses see the laboratory report pages)

Yes☒ No☐ N/A☐ Comments:

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

Yes☐ No☐ N/A☒ Comments:

There were no surrogate/IDA recovery failures associated with this work order.

iv. Data quality or usability affected?

Comments:

Not applicable, see above.

e. Trip Blanks

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

Yes☐ No☐ N/A☒ Comments:

No volatile analyses were requested as a part of this work order; trip blank is not required.

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

Not applicable, see above.

v. Data quality or usability affected?

Comments:

Not applicable, see above.

f. Field Duplicate

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

Yes☒ No☐ N/A☐ Comments:

ii. Submitted blind to lab?

Yes☒ No☐ N/A☐ Comments:

The field-duplicate pairs submitted with this work order are *33060/93060.*

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

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

Where R_1 = Sample Concentration
R_2 = Field Duplicate Concentration

Yes☒ No☐ N/A☐ Comments:

Where calculable, analytical results met the comparison criterion (≤ 30% for water) for the field duplicate pair.

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

Comments:

Not applicable, see above.

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

Yes☐ No☐ N/A☒ Comments:

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

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

Not applicable, see above.

iii. Data quality or usability affected?

Comments:

Not applicable, see above.

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

a. Defined and appropriate?

Yes☒ No☐ N/A☐ Comments:

Sample *33061* was sampled prior to parameter stabilization due to pump damage. Sample *33060* was collected from a large water tank and not directly from the well. This water is considered not to be fresh groundwater. Samples 33068 and 22059 were collected after water treatment. Therefore, the results of these sample are considered estimates with no direction of bias and have been flagged 'J*'.

APPENDIX C: QA/QC SUMMARY

Appendix C

QA/QC Summary

CONTENTS

ACROYNMS

°C	degrees Celsius
DEC	Alaska Department of Environmental Conservation
DQO	data quality objective
GWP	General Work Plan
IDA	isotope dilution analyte
LCS	laboratory control samples
LCSD	LCS duplicate
LDRC	Laboratory Data Review Checklist
MS	matrix spike
MSD	MS duplicate
PFAS	per- and polyfluoroalkyl substances
QA	quality assurance
QC	quality control
QSM	Quality Systems Manual
RL	reporting limit
RPD	relative percent difference
WO	work order
YAK	Yakutat Airport

APPENDIX C: QA/QC SUMMARY

C.1 INTRODUCTION

This quality assurance (QA)/quality control (QC) summary outlines the technical review of analytical results generated in support of water supply well sample collection at the Yakutat Airport (YAK) from July 2021 through June 2022.

Shannon & Wilson, Inc. reviewed project sample and QC analytical data to assess whether the data met the designated quality objectives (DQOs) and were acceptable for project use. The project data were reviewed for deviations to the requirements presented in *Revision 1 - DOT&PF Statewide PFAS General Work Plan* (GWP), approved by the Alaska Department of Environmental Conservation (DEC) in August 2020. As appropriate, the review includes evaluation of sample collection and handling, holding times, blanks, project sample and laboratory quality control sample duplicates, laboratory control samples (LCSs) and sample surrogate or isotope dilution analyte (IDA) recoveries, and matrix spike sample (MS) recoveries. Calibration curves and continuing calibration verification recoveries were not reviewed unless a QC discrepancy was noted by the laboratory in a case narrative. QC deviations that do not impact data quality are not discussed in this summary. Full data quality descriptions are reported in the DEC Laboratory Data Review Checklists (LDRC) prepared for each laboratory report. LDRCs and laboratory reports are included in Appendix B.

Water supply well data quality is discussed in Section C.2. Data which did not meet acceptance criteria have been described and the associated samples and data quality implications or qualifications are summarized.

C.1.1 Analytical Methods and Data Quality Objectives

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

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

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

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

In addition to these criteria for the six DQOs described above, sample collection and handling procedures and blank samples were reviewed to ensure overall data quality. Sample collection forms were reviewed to verify that representative samples were collected, and samples were without headspace (if applicable). Sample handling was reviewed to assess parameters such as chain-of-custody documentation, the use of appropriate sample containers and preservatives, shipment cooler temperature, and method-specified sample holding times. Each of these parameters contributes to the general representativeness and comparability of the project data. The combination of evaluations of the above-mentioned items leads to a determination of the overall project data completeness.

C.1.2 Summary of Groundwater Samples

A total of 30 groundwater samples were collected from water supply wells at the YAK between June 2021 and July 2022 (including 5 field duplicate samples).

Project and field duplicate samples were analyzed by Eurofins Environment Testing America (Eurofins) in West Sacramento, California. The DEC certified Eurofins for the analysis of per- and polyfluoroalkyl substances (PFAS) on February 11, 2021 by LCMSMS compliant with the U.S. Department of Defense Quality Systems Manual (QSM) Version 5.3 Table B-15 in DEC's Contaminated Sites Laboratory Approval 17-020. We note samples were either analyzed via PFAS compliant with QSM Version 5.3 Table B-15 or by similar method EPA 537.1 (Eurofins has not been approved for this method by DEC).

Groundwater samples were shipped via Alaska Airlines Goldstreak service from the YAK or Fairbanks or directly to Eurofins. The laboratory reports were assigned the following work order (WO) numbers:

- WO 320-76922-1 July 2021 samples.
- WO 320-80231-1 October 2021 samples.
- WO 320-86406-1 March 2022 samples.
- WO 320-88946-1 June 2022 samples.

The laboratory reports and associated DEC LDRCs are included in Appendix B. Sample data quality is discussed in Section C.2.

C.2 WATER SUPPLY WELL DATA QUALITY REVIEW

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

C.2.1 Sample Collection

Water supply well sample collection forms (Appendix A) were reviewed to ensure samples were collected as identified in the GWP and DEC Field Sampling Guidance. The following sample collection discrepancies were noted:

- WO 320-76922-1
  - Sample *33064* did not meet stabilization criteria due to pump functionality issues. Therefore, the results of this sample were considered estimated with no direction of bias and flagged 'J*'.
- WO 320-80231-1
  - Sample *33064* did not meet stabilization criteria due to pump functionality issues. Therefore, the results of this sample were considered estimated with no direction of bias and flagged 'J*'.
- WO 320-86406-1
  - Sample *33059* was collected after a water treatment system. Therefore, the results of this sample were considered estimated with no direction of bias and flagged 'J*'.
- WO 320-88946-1
  - Sample *33061* did not meet stabilization criteria due to concerns about pump damage. Therefore, the results of this sample were considered estimated with no direction of bias and flagged 'J*'.

- Sample *33060* was collected from large water tank of well water and not directly from the well. This water is not considered to be "fresh" groundwater. Therefore, the results of this sample were considered estimated with no direction of bias and flagged 'J*'.
- Sample *33059* and *33068* were collected after a water treatment system. Therefore, the results of this sample were considered estimated with no direction of bias and flagged 'J*'.

C.2.2 Sample Handling

The evaluation of proper sample handling procedures includes verification of the following: correct chain-of-custody documentation, appropriate sample containers and preservatives, cooler temperatures maintained within the DEC-recommended temperature range (0 to 6 degrees Celsius [°C]), and sample analyses performed within method-specified holding times. No sample handling discrepancies were noted upon receipt at the laboratory with the exception noted below:

- WO 320-88946-1
  - The sample cooler was received at the laboratory at 7.7 °C. However, due to the high chemical and biological stability of PFAS, it is unlikely that the integrity of the project samples was adversely affected by the slightly high cooler temperature. Data quality and/or usability not affected.

C.2.3 Method Blanks

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

C.2.4 Laboratory Control Samples

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

C.2.5 Matrix Spike Sample and Sample Duplicates

MS/MSD samples were not performed in any WO due to insufficient sample volumes.

C.2.6 Isotope Dilution Analyte or Surrogate Recovery

Surrogates or IDA compounds were added to project samples by the laboratory prior to analysis, in accordance with method requirements. Surrogate or IDA recoveries were then calculated as percentages and reported by the laboratory as a measure of analytical extraction efficiency. Surrogate or IDA recoveries were inside the established control limits and resulted in no qualification of the data.

C.2.7 Field Duplicates

Five field duplicate samples were collected as a part of this project. Where calculable, analytical results met the comparison criterion (≤ 30% for water) for the field duplicate pairs.

C.2.8 Analytical Sensitivity

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

PFAS analysis uses isotope dilution method for analysis. This analytical technique requires the observation of the transition mass ratios. The ratios associated with PFAS analysis were within limit for the project data set with the following exceptions.

- WO 320-76922-1
  - PFHxA result in sample *33053* and PFDA result in sample *33064* are considered estimates, with no direction of bias, and have been flagged 'J*'.
- WO 320-86406-1:
  - PFNA for sample 33060 was considered estimated with no direction of bias and was flagged 'J*'.
- WO 320-88946-1:
  - PFNA for sample 93060 was considered estimated with no direction of bias and was flagged 'J*'.

C.2.9 Summary of Qualified Results

Overall, the data validation process deemed the water supply well project data acceptable for use with the minor exceptions noted above resulting in qualification of the data. We did not reject any analytical results due to failures with laboratory QC samples, sample handling, or other issues. A summary of qualified flags can be found in the associated analytical summary tables.

C.2.10 Completeness

No data were rejected pursuant to the data quality review, and all data may be used, as qualified, for the purposes of the July 2021 to June 2022 Water Supply Well Monitoring Summary Report.

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.

IMPORTANT INFORMATION

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

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

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

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

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

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

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a

IMPORTANT INFORMATION

contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

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

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