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FINAL

SUMMARY REPORT

July 2020 to June 2021 Water Supply Well Monitoring

YAKUTAT, ALASKA

SHANNON & WILSON

June 2022

Shannon & Wilson No: 102896-007

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

Subject: FINAL SUMMARY REPORT, JULY 2020 TO JUNE 2021 WATER SUPPLY WELL MONITORING, YAKUTAT, ALASKA

Shannon & Wilson prepared this report to summarize the water supply well monitoring efforts performed between July 2020 and June 2021 at the Yakutat Airport in Yakutat, Alaska. These services were conducted on behalf of the Alaska Department of Transportation & Public Facilities (DOT&PF). Shannon & Wilson's scope of services was specified in proposals dated June 11, 2020 and February 18, 2021 and authorized on July 27, 2020 and March 23, 2021, 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 Shannon & Wilson's contract, relevant Alaska Department of Environmental Conservation guidance documents, and Title 18 of the Alaska Administrative Code Chapter 75.335.

Shannon & Wilson 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.

For Veselina Yakimova

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Geologist
Role: Primary Author

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Senior Chemist
Role: Project Manager

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ACRONYMS

AAC	Alaska Administrative Code
AFFF	aqueous film-forming foam
ARFF	aircraft rescue and firefighting
bgs	below ground surface
°C	degrees Celsius
CCV	continuing calibration verification
CFR	Code of Federal Regulations
9Cl-PF3ONS	9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid
11Cl-PF3OUdS	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid
COC	contaminant of concern
COV	coefficient of variation
CSP	Contaminated Sites Program
DEC	Alaska Department of Environmental Conservation
DHSS	Alaska Department of Health & Social Services
DONA	4,8-dioxa-3H-perfluorononanoic acid
DOT&PF	Alaska Department of Transportation & Public Facilities
DQO	data quality objectives
DVPP	Data-Validation Program Plan
EPA	U.S. Environmental Protection Agency
FAA	Federal Aviation Administration
GWP	DOT&PF Statewide PFAS General Work Plan
HFPO-DA	hexafluoropropylene oxide dimer acid
IDA	isotope dilution analyte
LDRC	Laboratory Data Review Checklist
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
LHA	Lifetime Health Advisory
LOD	limit of detection
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
POET	point-of-entry water treatment
PSDI	PFAS Site Discovery Investigation
MAROS	Monitoring and Remediation Optimization System
MS	matrix spike
MSD	matrix spike duplicate
N-EtFOSAA	N-ethyl perfluorooctane sulfonamidoacetic acid
ng/L	nanograms per liter
N-MeFOSSA	N-methyl perfluorooctane sulfonamidoacetic acid
QA	Quality Assurance
QC	Quality Control
RL	Reporting Limit
RPD	relative percent difference
TestAmerica	Eurofins TestAmerica Laboratories
µg/kg	micrograms per kilogram
µS/cm	microsiemens per centimeter
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
WO	work order
YAK	Yakutat Airport
YSI	water quality meter

1 INTRODUCTION

Shannon & Wilson has prepared this summary report to document water supply well monitoring efforts at and near the Yakutat Airport (YAK) in Yakutat, Alaska. This report describes the sampling activities conducted by Shannon & Wilson between July 2020 and June 2021 for this ongoing project. 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 water supply well 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 water supply wells. Shannon & Wilson's objectives were to collect quarterly and annual analytical groundwater samples from previously sampled water supply wells that meet the monitoring criteria discussed in Section 2.5.2. The scope of services implemented to achieve these objectives is defined in Section 1.2 below.

1.2 Scope of Services

Shannon & Wilson's scope of services summarized in this report includes four water supply well monitoring events and public-outreach support. This project is ongoing; planned future work is summarized in Section 6. This report includes data from water supply well sampling events conducted in August 2020, December 2020, March 2021, and May 2021.

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

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

- If the site's regulatory status has changed.

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

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 (Figure 1, Site Vicinity). Figure 1 shows the extent of the YAK property. Figure 2 (Well Search Extent) identifies the well search areas and identifies known aircraft rescue and firefighting (ARFF) sites associated with aqueous film-forming foam (AFFF) releases. 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 discusses the previous activities at the YAK.

2.1 Site History

In the 1940s the YAK was utilized as the Yakutat Army Airfield, which was constructed as part of the United States Army's Alaska long-range defense program. Until the late 1970s, the Federal Aviation Administration (FAA) operated the airport. After this, the State of Alaska took over ownership and management of the YAK.

The YAK meets the requirements defined in Title 14, Code of Federal Regulations (CFR), Part 139, which requires specific certification through the FAA. This certification requires, among other things, ARFF storage and use to ensure safety in air transportation. As part of this certification, Part 139 airports are required to conduct annual ARFF training for emergency response situations using 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 and used for emergency and training purposes at various locations on the YAK property. AFFF was first used on the YAK property by DOT&PF in the 1990s. Discussions with Robert Lekanof, a DOT&PF YAK foreman, during Shannon & Wilson'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 contaminants. 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. The U.S. Environmental Protection Agency (EPA) published a Lifetime Health Advisory (LHA) level for PFOS and PFOA in drinking water in May 2016 of 70 nanograms per liter (ng/L) for the sum of PFOS and PFOA. The DEC Contaminated Sites Program (CSP) published groundwater-cleanup levels for PFOS and

PFOA in November 2016 of 400 ng/L for each compound individually. Prior to the publication of these levels, there were no state-level cleanup levels established for PFAS.

On August 20, 2018, the DEC published a Technical Memorandum outlining a new action level for the sum of five PFAS (PFOS, PFOS, perfluorohexanesulfonic acid [PFHxS], perfluoroheptanoic acid [PFHpA], and perfluorononanoic acid [PFNA]) in drinking water. The action levels proposed in the August 2018 Technical Memorandum were submitted 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.

On April 9, 2019, DEC issued an amendment to its August 20, 2018 Technical Memorandum to align DEC's action level with the EPA LHA of 70 ng/L for the sum of PFOS and PFOA. On October 2, 2019, DEC published a Technical Memorandum amending the April 9, 2019 Technical Memorandum and adding an additional testing requirement to analyze for and report all analytes for the appropriate PFAS analytical method, although the action level remains 70 ng/L for the sum of PFOS and PFOA.

2.4 PFAS Discovery at the YAK

In late 2018, as part of a Cooperative Agreement with the EPA, the DEC's CSP conducted a limited PFAS Site Discovery Investigation (PSDI). The YAK was identified as a potentially PFAS affected community and DEC sampled 12 water supply wells at and near the YAK in February of 2019 (Exhibit 2-1, below). This included identifying potentially PFAS-impacted communities in Alaska, conducting a risk analysis of identified communities, collecting water supply well samples for the analysis of PFAS, and reporting those results. Of the water supply wells sampled, only 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).

Shannon & Wilson 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).

Exhibit 2-1: DEC Limited PFAS Site Discovery Investigation

DEC Sample Name	Address/Location Description	Exceeds DEC Action Level1
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 PFAS action level for the sum of five PFAS (70 ng/L, PFOS + PFOA + PFHxS + PFHpA + PFNA) at the 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

2.5 Shannan & Wilson Water Supply Well Sampling from June 2019 through June 2020

In June 2019, Shannon & Wilson staff began the water supply well survey which involved contacting owners and/or occupants of the 89 properties identified in the search area, as practicable, to determine the presence or absence of a water supply well on the property and obtain pertinent water supply well information. This was accomplished over the telephone, via email, and during the initial sampling event through door-to-door visits using Water Supply Well Sampling Forms. During the door-to-door effort an attempt was made to contact the owner or occupant of each identified property 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. Where unable to make contact in person, public telephone and business records will be used, multiple visits to the property will be made, and/or neighbors will be asked for the owner/occupant contact information.

During the water supply well survey effort, 21 wells were identified as described in Exhibit 2-2 below. The remainder of the properties were either vacant or did not have a water supply well present.

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

Parcel/Sample ID Number1	DEC Sample ID	Address/Location Description	Water Supply Well Category
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 assigned by Shannon & Wilson staff during the water supply well search.

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, SREB = snow removal equipment building, TSA = Transportation Security Administration, USFS = United States Forest Service

2.5.1 Water Supply Well Categories

Water supply wells were categorized by use as follows based on information provided by the water supply well owner/user.

- Category 1: water supply wells used for drinking or cooking, as reported by owners or occupants.

- Category 2: water supply wells 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 water supply wells lead to kitchen or bathroom faucets, are considered possible future drinking water wells.
- Category 3: water supply wells 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: water supply wells used for outdoor purposes only, such as irrigation or vehicle washing. These wells are considered non-drinking water wells.
- Category 5: water supply wells 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.

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

2.5.2 June 2019 Initial Event

During the June 2019 sampling event, no wells exceeded the action level of 70 ng/L for the sum of PFOS and PFOA. However, during the collection of sample *33066* (DEC sample ID *YK-09*) the well owner provided Shannon & Wilson staff details regarding where the original sample was collected by DEC in February 2019. Based on this information from the well owner and upon further investigation by field staff it appears that sample was collected after a carbon filter. Shannon & Wilson staff collected a sample for this location upstream of this filter. Exhibit 2-3, below, compares the results for sample ID 33066 (DEC sample ID YK-09) between February and June 2019.

Exhibit 2-3: YK-09/33066 February and June 2019 Results Comparison

PFAS	February 2019 Results (ng/L)1	June 2019 Result (ng/L)2
PFBS	1.4 J	2.3
PFHpA	2.0 J	4.3
PFNA	ND	ND
PFHxS	9.4	36
PFOA	ND	4.7
PFOS	18	55

Notes:
1 DEC PFAS action level at the time of sample collection = the sum of 2 PFAS (70 ng/L, PFOS + PFOA).
2 DEC PFAS action level at the time of sample collection = the sum of 5 PFAS (70 ng/L, PFOS + PFOA + PFHxS + PFHpA + PFNA).

J = Estimated concentration, flag applied by the laboratory, DEC = Alaska Department of Environmental Conservation, ND = non-detect, PFAS = per- and polyfluoroalkyl substances, PFBS = perfluorobutanesulfonic acid, PFHpA = perfluoroheptanoic acid, PFHxS = perfluorohexanesulfonic acid, PFNA = perfluorononanoic acid, PFOA = perfluorooctanoic acid, PFOS = perfluorooctanesulfonic acid, ng/L = nanograms per liter

Although sample *33066* did not exceed the action level at that time (sum of five PFAS above 70 ng/L, PFOS + PFOA + PFHxS + PFHpA + PFNA), the presence of a carbon filter may have artificially biased the February 2019 detected PFAS concentrations below the DEC PFAS action level at the time of sampling. Therefore, DOT&PF treated location 33066 (Yakutat Lodge Restaurant) as an exceedance. This location has been provided with alternative water.

No wells sampled during the December 2019 quarterly sampling event exceeded the action 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.

2.5.3 Water Supply Well Monitoring Criteria and Schedule

In coordination with the DOT&PF and DEC, Shannon & Wilson established the following quarterly and annual water supply well monitoring criteria after the June 2019 sampling event based on DEC guidance documents and technical memorandums.

- Quarterly Criteria
  - Active category 1 and 2 water supply wells 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 water supply wells within 500 lateral feet of water supply wells 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 water supply wells 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 water supply wells within 500 lateral feet of water supply wells 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.

These criteria were modified after the December 2019 quarterly monitoring event to no longer include wells that previously exceeded the PFAS action level (sample *33063*). The

current quarterly and annual monitoring criteria in place for the YAK is shown in Exhibit 2-4 below.

Exhibit 2-4: Water Supply Well Monitoring Criteria

Parcel ID Number[1]	Sample ID	DEC Sample ID	Monitoring Criteria
33053	33053	—	Q/A
33056	33056	YK-11	A
33059	33059	—	A
33060	33060	YK-01	Q/A
33061	33061	YK-03	Q/A
33063	33063	YK-08	Q/A
33064	33064	—	Q/A
33065	33065	—	Q/A
33068	33068	YK-12	Q/A

Notes:

1 Parcel ID numbers were assigned by Shannon & Wilson staff during the water supply well search.

A = annual, 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, Q = quarterly, TSA = Transportation Security Administration

2.6 Contaminants of Concern and Action Levels

The primary contaminants of concern (COCs) are PFOS and PFOA. The October 2, 2019 DEC Technical Memorandum requires reporting for all PFAS analytes listed in a given analytical method. For the purposes of this project, samples were submitted for analytical method EPA Method 537.1 which includes the list of 18 PFAS described below. Of these contaminants of potential concern, only PFOS and PFOA are regulated by the DEC with numeric action levels or cleanup levels, as summarized in Exhibit 2-5.

- PFOS
- PFOA
- PFHpA
- PFNA
- PFHxS
- perfluorobutanesulfonic acid (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)
- 4,8-dioxa-3H-perfluorononanoic acid (DONA)

Exhibit 2-5: Applicable Regulatory Action Levels

Media	Analyte	Action Level[1]
Drinking Water[2]	PFOS + PFOA	70 ng/L
Groundwater[3]	PFOS	400 ng/L
	PFOA	400 ng/L
Soil[4]	PFOS	3.0 µg/kg
	PFOA	1.7 µg/kg

Notes:
1 ppt is equivalent to ng/L and ng/kg
2 Drinking water action level reported in DEC October 2019 Technical Memorandum.
3 DEC groundwater cleanup level reported in 18 AAC 75.345, Table C.
4 DEC migration to groundwater soil cleanup levels reported in 18 AAC 75.341, Table B1.
µg/kg = micrograms per kilogram, ng/L = nanograms per liter, PFOA = perfluorooctanoic acid, PFOS = perfluorooctanesulfonic acid

2.7 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.

2.8 Public Information

The DOT&PF hosts a webpage (http://dot.alaska.gov/airportwater) 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. Appendix A includes results notification letter templates and other information provided during the sampling period covered by this report.

3 FIELD ACTIVITIES

This section summarizes activities performed between July 2020 and June 2021.

3.1 Water Supply Well Sampling

Shannon & Wilson conducted four water supply well sampling events between July 2020 and June 2021. The following Shannon & Wilson 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
- Adam Wyborny, PE
- Michael Jaramillo, Senior Chemist

Shannon & Wilson sampled nine unique water supply wells during the reporting period; some wells were sampled multiples times over several sampling events. Shannon & Wilson collected water supply well 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 Shannon & Wilson does not consider small (i.e., less than 18 inches in height) particulate filters to be PFAS treatment systems.

Shannon & Wilson purged the water supply well 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 (YSI). 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 [µS/cm]).

Shannon & Wilson discharged purge water to an indoor sink or to the ground surface. At most residences within the YAK search areas, indoor plumbing leads to a private septic system. Following parameter stabilization, Shannon & Wilson collected PFAS water samples

using laboratory-supplied containers. Copies of the Water Supply Well Sampling Logs are included in Appendix B, Field Forms.

3.2 Sample Custody, Storage, and Transport

Immediately after collection, the sample bottles for each water supply well 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. Shannon & Wilson 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 prevent bottle breakage. Shannon & Wilson 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 TestAmerica in West Sacramento, California for analysis of PFAS by EPA Method 537.1.

3.3 Special Considerations for PFAS Sampling

Shannon & Wilson 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 validation of the analytical data, Shannon & Wilson prepared analytical-data tables for the project team (DOT&PF, DEC, Department of Health and Social Services [DHSS]) and then called property owners and occupants to notify them of the results of the PFAS water testing.

Shannon & Wilson 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 or EPA's current action levels;
- description of the project; and
- pages of the TestAmerica laboratory report that apply to the owner or occupant's water supply well sample, including other PFAS results.

Where requested, Shannon & Wilson emailed results letters to owners and/or occupants.

A copy of the letter template used to report results to well owners/users is included in Appendix A.

3.5 Deviations

In general, Shannon & Wilson conducted the work in accordance with the sampling procedures noted above, and based on ongoing discussion with DEC and DOT&PF. There are no deviations from the procedures described in Section 3, unless otherwise noted.

4 ANALYTICAL RESULTS

The 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 Method 537.1. Although all PFAS analytes for the analytical method are reported, PFAS concentrations are only compared to the action level for PFOS and PFOA (70 ng/L).

Table 1 through 4 summarize the PFAS concentrations for samples collected from water supply wells during the August 2020, December 2020, March 2021 and May 2021 quarterly and annual sampling events. During the August 2020 event, the Yakutat Lodge Restaurant sample concentration for PFOS and PFAS exceeded the 70 ng/L LHA. This property is already considered an exceedance (see Section 2.4). No other wells sampled during the reporting period reported exceedances of the LHA.

The TestAmerica work orders (WOs) are included in chronological order followed by their LDRC in Appendix C. The highest reported water supply well PFAS analytical results to date are shown on Figure 3.

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). Shannon & Wilson 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 trends 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 discriminates between "no trend" and a "stable" contaminant concentration by evaluating the COV of a given well's dataset. The COV is defined as the ratio of a dataset's standard deviation to its mean. 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 the table below:

Exhibit 3-1: 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

Only wells with a minimum of four sampling events (the minimum for the statistical test) and at least one detection were assessed.

Table 5, Comparison of Analytical Results, compares the PFOS, PFOA, and LHA combined results for each monitoring location sampled by Shannon & Wilson during the life of the project. Our Mann-Kendall nonparametric trend analysis identified the following trends for PFOS, PFOA, and LHA for the locations which have the minimum amount of data for analysis:

- 33060 - 101 Airport Road – DOT&PF ARFF
  - PFOS: probably decreasing
  - PFOA: decreasing
  - LHA: decreasing
- 33061 - 951 Airport Access Road - NOAA, TSA, and NPS Office
  - PFOS: probably decreasing
  - PFOA: decreasing

  - LHA: decreasing
- 33064 - Delta Western Petroleum - Corner of Endicott and Airport Access
  - PFOS: decreasing
  - PFOA: stable
  - LHA: decreasing
- 33068 - 997 Airport Way - Alaska Airlines
  - PFOS: stable
  - PFOA: probably decreasing
  - LHA: probably decreasing

Data from DEC's February 2019 samples were omitted from this analysis. Data collected by Shannon & Wilson through June 2021 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

The LHA combined was calculated as follows:

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

5 QUALITY ASSURANCE AND QUALITY CONTROL

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

By working in accordance with the proposed scope of services, Shannon & Wilson 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 D for a QA/QC summary of the analytical data.

6 FUTURE WORK

Shannon & Wilson has been authorized by DOT&PF for three quarterly events and one annual event to be completed between July 1, 2021 and June 30, 2022. This schedule is subject to change following guidance by the U.S. Centers for Disease Control and Prevention, DHSS, and City of Yakutat regarding the COVID-19 pandemic.

On May 21, 2020, DOT&PF authorized Shannon & Wilson to begin an Alternative Water Feasibility Study to investigate the viability of four different long-term alternative water options. These options include holding tanks and deliveries from Yakutat Municipal Water, expansion of the Yakutat Municipal Water system, individual point-of-entry water treatment (POET) systems, and a small-scale water distribution system either from an existing or new source. This project is ongoing.

Site characterization activities are anticipated during the summer season of 2022, after the preparation and approval of a DOT&PF Statewide PFAS GWP Addendum.

7 RECOMMENDATIONS

Based on the previously completed work, Shannon & Wilson recommends the DOT&PF continue to:

- work with the DEC and the DHSS 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 Shannon & Wilson. 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

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

Alaska Department of Environmental Conservation (DEC), 2019a, 18 AAC 75, Oil and other hazardous substances pollution control: Juneau, Alaska, Alaska Administrative Code (AAC), Title 18, Chapter 75, January available: http://dec.alaska.gov/commish/regulations/.

Alaska Department of Environmental Conservation (DEC), 2019b, 18 AAC 75.341, Soil cleanup levels: Juneau, Alaska, Alaska Administrative Code (AAC), Title 18, Chapter 75, Section 341, January, available: http://dec.alaska.gov/commish/regulations/.

Alaska Department of Environmental Conservation (DEC), 2019c, 18 AAC 80, Drinking water: Juneau, Alaska, Alaska Administrative Code (AAC), Title 18, Chapter 80, May, available: http://dec.alaska.gov/eh/dw/regulations.

Alaska Department of Environmental Conservation (DEC), 2019d, Field sampling guidance for contaminated sites and leaking underground storage tanks: Juneau, Alaska, DEC Division of Spill Prevention and Response, Contaminated Sites Program, October, available: http://dec.alaska.gov/spar/csp/guidance_forms/csguidance.htm.

Alaska Department of Environmental Conservation (DEC), 2019e, Technical memorandum - action levels for PFAS in water and guidance on sampling groundwater and drinking water (updated): Juneau, Alaska, DEC Division of Spill Prevention and Response Contaminated Sites Program and Division of Environmental Health Drinking Water Program, 4 p., October 2.

U.S. Army Corps of Engineers (USACE), 2008. Military Munitions Response Program Preliminary Assessment for Yakutat Air Base, Yakutat, Alaska, Property Number F10AK0606. July.

U.S. Army Corps of Engineers (USACE), 2016. Environmental Assessment for Yakutat Air Base, Yakutat, Alaska, Property Number F10AK0606. April.

U.S. Environmental Protection Agency (EPA), 2016, Drinking water health advisory for perfluorooctanoic acid (PFOA): Washington, D.C., U.S. EPA Office of Water, Health and Ecological Criteria Division, EPA 822-R-16-005, May, available: https://www.epa.gov/sites/production/files/2016-05/documents/pfoa_health_advisory_final_508.pdf

U. S. Geological Survey (USGS), 1994, Overview of Environmental and Hydrogeologic Conditions at Yakutat, Alaska, and publishing data—all the information necessary for unique identification and library search, Open-file report 94-713.

Table 1 - August 2020 Yakutat Water Supply Well Analytical Results

		Sample Name	*33053*	*33060*	*33061*	*33065*	*33066*		*33068*
		Well Use Category	4	2	1	1	1		1
Analyte	**EPA LHA**	**Units**	8/13/2020	8/13/2020	8/13/2020	8/13/2020	8/13/2020	8/13/2020 (DUP)	8/13/2020
Perfluorohexanesulfonic acid (PFHxS)	NS	ng/L	9.0	4.2	<1.8	32	49	48	<1.7
Perfluorohexanoic acid (PFHxA)	NS	ng/L	2.2	9.1	<1.8	8.4	7.0	7.1	<1.7
Perfluoroheptanoic acid (PFHpA)	NS	ng/L	1.1 J	2.2	<1.8	4.0	2.6	2.7	<1.7
Perfluorononanoic acid (PFNA)	NS	ng/L	0.52 J	0.52 J	<1.8	0.86 J	0.70 J	0.57 J	<1.7
Perfluorobutanesulfonic acid (PFBS)	NS	ng/L	<2.0	0.45 J	<1.8	1.5 J	2.2	2.2	<1.7
Perfluorodecanoic acid (PFDA)	NS	ng/L	<2.0	<1.8	<1.8	0.52 J	<1.8	<1.8	<1.7
Perfluoroundecanoic acid (PFUnA)	NS	ng/L	<2.0	<1.8	<1.8	<1.9	<1.8	<1.8	<1.7
Perfluorododecanoic acid (PFDoA)	NS	ng/L	<2.0	<1.8	<1.8	<1.9	<1.8	<1.8	<1.7
Perfluorotridecanoic acid (PFTrDA)	NS	ng/L	<2.0	<1.8	<1.8	<1.9	<1.8	<1.8	<1.7
Perfluorotetradecanoic acid (PFTeA)	NS	ng/L	<2.0	<1.8	<1.8	<1.9	<1.8	<1.8	<1.7
N-Methyl perfluorooctane sulfonamidoacetic acid (N-MeFOSAA)	NS	ng/L	<2.0	<1.8	<1.8	<1.9	<1.8	<1.8	<1.7
N-Ethyl perfluorooctane sulfonamidoacetic acid (N-EtFOSAA)	NS	ng/L	<2.0	<1.8	<1.8	<1.9	<1.8	<1.8	<1.7
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)	NS	ng/L	<2.0	<1.8	<1.8	<1.9	<1.8	<1.8	<1.7
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	NS	ng/L	<2.0	<1.8	<1.8	<1.9	<1.8	<1.8	<1.7
4,8-Dioxa-3H-perfluorononanoic acid (DONA)	NS	ng/L	<2.0	<1.8	<1.8	<1.9	<1.8	<1.8	<1.7
Hexafluoropropylene oxide dimer acid (HFPO-DA)	NS	ng/L	<2.0	<1.8	<1.8	<1.9	<1.8	<1.8	<1.7
Perfluorooctanesulfonic acid (PFOS)	70†	ng/L	8.1	8.5	0.75 J	24	**71**	68	0.66 J
Perfluorooctanoic acid (PFOA)		ng/L	1.7 J	2.0	<1.8	7.2	5.6	5.4	<1.7
LHA Combined (PFOS + PFOA)	70†	ng/L	9.8 J	11	0.75 J‡	31	**77**	73	0.66 J‡

Notes:

ng/L	nanograms per liter, equivalent to parts per trillion (ppt)
NS	Not specified; action level not established.
EPA	Environmental Protection Agency
LHA	Lifetime Health Advisory
†	EPA LHA level is 70 ppt for PFOS and PFOA combined.
DUP	Field-duplicate sample
BOLD	Analtyes exceeded LHA Combined.
<	Analyte not detected; listed as less than the reporting limit (RL) unless otherwise flagged due to quality-control (QC) failures.
J	Estimated concentration, detected greater than the method detection limit (MDL) and less than the RL. Flag applied by the laboratory.
‡	Minimum concentration, the LHA Combined oconcentration includes one or more result that is not detected greater than the MDL.

Table 2 - December 2020 Yakutat Water Supply Well Analytical Results

			Sample Name	*33059*	*33060*		*33061*	*33064*	*33068*
			Well Use Category	1	2		1	2	1
Analyte	**EPA LHA**	**Units**		12/10/2020	12/10/2020	12/10/2020 (DUP)	12/10/2020	12/10/2020	12/10/2020
Perfluorohexanesulfonic acid (PFHxS)	NS	ng/L		<1.7	4.9	4.6	<1.7	7.1	<1.7
Perfluorohexanoic acid (PFHxA)	NS	ng/L		<1.7	7.0	6.7	<1.7	<1.7	<1.7
Perfluoroheptanoic acid (PFHpA)	NS	ng/L		<1.7	2.0	2.0	<1.7	<1.7	<1.7
Perfluorononanoic acid (PFNA)	NS	ng/L		<1.7	0.66 J	0.48 J	<1.7	<1.7	<1.7
Perfluorobutanesulfonic acid (PFBS)	NS	ng/L		<1.7	0.49 J	0.48 J	<1.7	0.43 J	<1.7
Perfluorodecanoic acid (PFDA)	NS	ng/L		<1.7	0.84 J	0.44 J	<1.7	<1.7	<1.7
Perfluoroundecanoic acid (PFUnA)	NS	ng/L		<1.7	0.63 J	<1.7	0.57 J	<1.7	<1.7
Perfluorododecanoic acid (PFDoA)	NS	ng/L		<1.7	0.68 J	<1.7	0.61 J	<1.7	<1.7
Perfluorotridecanoic acid (PFTrDA)	NS	ng/L		<1.7	0.69 J	<1.7	0.68 J	<1.7	<1.7
Perfluorotetradecanoic acid (PFTeA)	NS	ng/L		<1.7	0.61 J	<1.7	0.68 J	<1.7	<1.7
N-Methyl perfluorooctane sulfonamidoacetic acid (N-MeFOSAA)	NS	ng/L		<1.7	0.72 J	<1.7	0.70 J	<1.7	<1.7
N-Ethyl perfluorooctane sulfonamidoacetic acid (N-EtFOSAA)	NS	ng/L		<1.7	0.95 J	<1.7	0.88 J	<1.7	<1.7
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)	NS	ng/L		<1.7	0.43 J	<1.7	0.43 J	<1.7	<1.7
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	NS	ng/L		<1.7	0.60 J	<1.7	0.55 J	<1.7	<1.7
4,8-Dioxa-3H-perfluorononanoic acid (DONA)	NS	ng/L		<1.7	<1.7	<1.7	<1.7	<1.7	<1.7
Hexafluoropropylene oxide dimer acid (HFPO-DA)	NS	ng/L		<1.7	<1.7	<1.7	<1.7	<1.7	<1.7
Perfluorooctanesulfonic acid (PFOS)	70†	ng/L		<1.7	8.7	8.5	<1.7	4.0	<1.7
Perfluorooctanoic acid (PFOA)		ng/L		<1.7	1.9	1.9	<1.7	<1.7	<1.7
LHA Combined (PFOS + PFOA)	70†	ng/L		n/a	11	10	n/a	4.0 ‡	n/a

Notes:

ng/L	nanograms per liter, equivalent to parts per trillion (ppt)
NS	Not specified; action level not established.
EPA	Environmental Protection Agency
LHA	Lifetime Health Advisory
†	EPA LHA level is 70 ppt for PFOS and PFOA combined.
DUP	Field-duplicate sample
<	Analyte not detected; listed as less than the reporting limit (RL) unless otherwise flagged due to quality-control (QC) failures.
J	Estimated concentration, detected greater than the method detection limit (MDL) and less than the RL. Flag applied by the laboratory.
n/a	Not applicable. The LHA combined concentration could not be calculated because PFOS and PFOA were not detected in the project sample.
‡	Minimum concentration, the LHA Combined oconcentration includes one or more result that is not detected greater than the MDL.

Table 3 - March 2021 Yakutat Water Supply Well Analytical Results

	Sample Name		*33059*		*33060*	*33061*	*33064*	*33068*
	Well Use Category		1		2	1	2	1
Analyte	**EPA LHA**	**Units**	3/24/2021	3/24/2021 (DUP)	3/24/2021	3/24/2021	3/24/2021	3/24/2021
Perfluorohexanesulfonic acid (PFHxS)	NS	ng/L	<1.7	<1.7	4.7	<1.7	1.3 J	<1.8
Perfluorohexanoic acid (PFHxA)	NS	ng/L	<1.7	<1.7	1.8	<1.7	<1.7	<1.8
Perfluoroheptanoic acid (PFHpA)	NS	ng/L	<1.7	<1.7	0.92 J	<1.7	<1.7	<1.8
Perfluorononanoic acid (PFNA)	NS	ng/L	<1.7	<1.7	0.51 J	<1.7	<1.7	<1.8
Perfluorobutanesulfonic acid (PFBS)	NS	ng/L	<1.7	<1.7	0.63 J	<1.7	<1.7	<1.8
Perfluorodecanoic acid (PFDA)	NS	ng/L	<1.7	<1.7	<1.8	<1.7	<1.7	<1.8
Perfluoroundecanoic acid (PFUnA)	NS	ng/L	<1.7	<1.7	<1.8	<1.7	<1.7	<1.8
Perfluorododecanoic acid (PFDoA)	NS	ng/L	<1.7	<1.7	<1.8	<1.7	<1.7	<1.8
Perfluorotridecanoic acid (PFTrDA)	NS	ng/L	<1.7	<1.7	<1.8	<1.7	<1.7	<1.8
Perfluorotetradecanoic acid (PFTeA)	NS	ng/L	<1.7	<1.7	<1.8	<1.7	<1.7	<1.8
N-Methyl perfluorooctane sulfonamidoacetic acid (N-MeFOSAA)	NS	ng/L	<4.3	<4.4	<4.4	<4.4	<4.4	<4.5
N-Ethyl perfluorooctane sulfonamidoacetic acid (N-EtFOSAA)	NS	ng/L	<4.3	<4.4	<4.4	<4.4	<4.4	<4.5
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)	NS	ng/L	<1.7	<1.7	<1.8	<1.7	<1.7	<1.8
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	NS	ng/L	<1.7	<1.7	<1.8	<1.7	<1.7	<1.8
4,8-Dioxa-3H-perfluorononanoic acid (DONA)	NS	ng/L	<1.7	<1.7	<1.8	<1.7	<1.7	<1.8
Hexafluoropropylene oxide dimer acid (HFPO-DA)	NS	ng/L	<3.5	<3.5	<3.5	<3.5	<3.5	<3.6
Perfluorooctanesulfonic acid (PFOS)	70†	ng/L	<1.7	<1.7	6.6	<1.7	2.3	<1.8
Perfluorooctanoic acid (PFOA)		ng/L	<1.7	<1.7	1.5 J	<1.7	<1.7	<1.8
LHA Combined (PFOS + PFOA)	70†	ng/L	n/a	n/a	8.1 J	n/a	2.3 ‡	n/a

Notes:

ng/L nanograms per liter, equivalent to parts per trillion (ppt)
NS Not specified; action level not established.
EPA Environmental Protection Agency
LHA Lifetime Health Advisory
† EPA LHA level is 70 ppt for PFOS and PFOA combined.
DUP Field-duplicate sample
< Analyte not detected; listed as less than the reporting limit (RL) unless otherwise flagged due to quality-control (QC) failures.
J Estimated concentration, detected greater than the method detection limit (MDL) and less than the RL. Flag applied by the laboratory.
n/a Not applicable. The LHA combined concentration could not be calculated because PFOS and PFOA were not detected in the project sample.
‡ Minimum concentration, the LHA Combined oconcentration includes one or more result that is not detected greater than the MDL.

Table 4 - May 2021 Yakutat Water Supply Well Analytical Results

			Sample Name	33053	33056	33059	33060		33061	33064	33068
			Well Use Category	4	1	1	2		1	2	1
Analyte	EPA LHA	Units		5/15/2021	5/15/2021	5/17/2021	5/16/2021 (DUP)		5/15/2021	5/17/2021	5/15/2021
Perfluorohexanesulfonic acid (PFHxS)	NS	ng/L		9.2	9.6 J*	<1.7	3.0	3.4	<1.6	1.3 J	<1.7
Perfluorohexanoic acid (PFHxA)	NS	ng/L		1.7	3.8 J*	0.57 J	6.9	7.0	<1.6	<1.8	<1.7
Perfluoroheptanoic acid (PFHpA)	NS	ng/L		0.90 J	2.1 J*	<1.7	1.6 J	1.6 J	<1.6	<1.8	<1.7
Perfluorononanoic acid (PFNA)	NS	ng/L		0.54 J	1.6 J*	<1.7	0.44 J	0.47 J	<1.6	<1.8	<1.7
Perluorobutanesulfonic acid (PFBS)	NS	ng/L		<1.7	0.75 J*	<1.7	<1.8	<1.7	<1.6	<1.8	<1.7
Perfluorodecanoic acid (PFDA)	NS	ng/L		<1.7	0.51 J*	<1.7	<1.8	<1.7	<1.6	<1.8	<1.7
Perfluoroundecanoic acid (PFUnA)	NS	ng/L		<1.7	<1.6 J*	<1.7	<1.8	<1.7	<1.6	<1.8	<1.7
Perfluorododecanoic acid (PFDoA)	NS	ng/L		<1.7	<1.6 J*	<1.7	<1.8	<1.7	<1.6	<1.8	<1.7
Perfluorotridecanoic acid (PFTrDA)	NS	ng/L		<1.7	<1.6 J*	<1.7	<1.8	<1.7	<1.6	<1.8	<1.7
Perfluorotetradecanoic acid (PFTeA)	NS	ng/L		<1.7	<1.6 J*	<1.7	<1.8	<1.7	<1.6	<1.8	<1.7
N-Methyl perfluorooctane sulfonamidoacetic acid (N-MeFOSAA)	NS	ng/L		<1.7	<1.6 J*	<1.7	<1.8	<1.7	<1.6	<1.8	<1.7
N-Ehtyl perfluorooctane sulfonamidoacetic acid (N-EtFOSAA)	NS	ng/L		<1.7	<1.6 J*	<1.7	<1.8	<1.7	<1.6	<1.8	<1.7
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)	NS	ng/L		<1.7	<1.6 J*	<1.7	<1.8	<1.7	<1.6	<1.8	<1.7
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	NS	ng/L		<1.7	<1.6 J*	<1.7	<1.8	<1.7	<1.6	<1.8	<1.7
4,8-Dioxa-3H-perfluorononanoic acid (DONA)	NS	ng/L		<1.7	<1.6 J*	<1.7	<1.8	<1.7	<1.6	<1.8	<1.7
Hexafluoropropylene oxide dimer acid (HFPO-DA)	NS	ng/L		<1.7	<1.6 J*	<1.7	<1.8	<1.7	<1.6	<1.8	<1.7
Perfluorooctanesulfonic acid (PFOS)	70†	ng/L		5.5	12 J*	<1.7	5.4	5.7	<1.6	1.9	<1.7
Perfluorooctanoic acid (PFOA)		ng/L		1.3 J	3.2 J*	<1.7	1.8	2.1	<1.6	<1.8	<1.7
LHA Combined (PFOS + PFOA)	70†	ng/L		6.8 J	15 J*	n/a	7.2	7.8	n/a	1.9 ‡	n/a

Notes:

ng/L	nanograms per liter, equivalent to parts per trillion (ppt)
NS	Not specified; action level not established.
EPA	Environmental Protection Agency
LHA	Lifetime Health Advisory
†	EPA LHA level is 70 ppt for PFOS and PFOA combined.
DUP	Field-duplicate sample
<	Analyte not detected; listed as less than the reporting limit (RL) unless otherwise flagged due to quality-control (QC) failures.
Bold	Concentration exceeds LHA level.
J	Estimated concentration, detected greater than the method detection limit (MDL) and less than the RL. Flag applied by the laboratory.
J*	Estimated concentration due to quality control failures. Flag applied by Shannon & Wilson, Inc.
n/a	Not applicable. The LHA combined concentration could not be calculated because PFOS and PFOA were not detected in the project sample.
‡	Minimum concentration, the LHA Combined oconcentration includes one or more result that is not detected greater than the MDL.

Table 5 - Comparison of Analytical Results

Sample Name	Sample Date	PFOA ng/L	PFOS ng/L	LHA Combined (PFOS + PFOA)	Exceed LHA Level?†	Trends^
33053	Jun 2019	1.5 J	9.7	11 J	No	Insufficient data
	Aug 2020	1.7 J	8.1	9.8 J		
	May 2021	1.3 J	5.5	6.8 J		
33056	Jun 2019	3.8	12	16	No	Insufficient data
	May 2021	3.2 J*	12 J*	15.2 J*		
33059	Jun 2019	1.1 J*	4.6	5.7 J*	No	Insufficient detected results
	Dec 2020	<1.7	<1.7	NA		
	Mar 2021	<1.7	<1.7	NA		
	May 2021	<1.7	<1.7	NA		
33060	Jun 2019	2.6	13	16	No	Stable trend for PFOA; Statistically significant evidence of a decreasing trend for PFOS and LHA
	Dec 2019	4.1	11	15		
	Aug 2020	2.0	8.5	11		
	Dec 2020	1.9	8.7	11		
	Mar 2021	1.5 J	6.6	8.1 J		
	May 2021	2.1	5.7	7.8		
33061	Jun 2019	<2	<2	NA	No	Insufficient detected results
	Dec 2019	<1.9	<1.9	NA		
	Aug 2020	<1.8	0.75 J	0.75 J‡		
	Dec 2020	<1.7	<1.7	NA		
	Mar 2021	<1.7	<1.7	NA		
	May 2021	<1.6	<1.6	NA		
33063	Jun 2019	3.5	28	32	**No***	Insufficient data
33064	Jun 2019	2	8	10	No	Insufficient detected results for PFOA; Statistically significant evidence of a decreasing trend for PFOS and LHA
	Dec 2019	<2	5.8	5.8 ‡		
	Dec 2020	<1.7	4	4.0 ‡		
	Mar 2021	<1.7	2.3	2.3 ‡		
	May 2021	<1.8	1.9	1.9 ‡		
33065	Jun 2019	6.3	15	21	No	Insufficient data
	Aug 2020	7.2	24	31		
	Jul 2021	5.0	26	31		
33066	Jun 2019	4.7	55	60	**Yes**	Insufficient data
	Aug 2020	5.6	**71**	**77**		
33068	Jun 2019	<2	<2	NA	No	Insufficient detected results
	Dec 2019	<1.9	<1.9	NA		
	Aug 2020	<1.7	0.66 J	0.66 J‡		
	Dec 2020	<1.7	<1.7	NA		
	Mar 2021	<1.8	<1.8	NA		
	May 2021	<1.7	<1.7	NA		

Notes:

J Estimated concentration, detected greater than the method detection limit (MDL) and less than the reporting limit (RL). Flag applied by the laboratory.

J* Estimated concentration due to quality control failures. Flag applied by Shannon & Wilson, Inc.

< Analyte not detected; listed as less than the RL unless otherwise flagged due to quality-control (QC) failures.

Bold Concentration exceeds action level

N/A Not applicable. The LHA combined concentration could not be calculated because PFOS and PFOA were not detected in the project sample.

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

† LHA level is 70 ng/L for PFOS and PFOA combined; following DEC guidance results are compared to 65 ng/L.

^ Mann-Kendall Trends Analysis with MAROS decision matrix.

* PFAS action level at the time of sample collection = the sum of 5 PFAS (70 ng/L, PFOS + PFOA + PFHxS + PFHpA + PFNA)

ARFF = aircraft rescue and firefighting, DEC = Alaska Department of Environmental Conservation, DOT&PF = Alaska Department of Transportation & Public Facilities, LHA = Lifetime Health Advisory, MAROS = Monitoring and Remediation Optimization System NA = not applicable, ng/L = nanograms per liter, NOAA = National Oceanic and Atmospheric Administration, NPS = National Park Service, PFAS = per- and polyfluoroalkyl substances, PFBS = perfluorobutanesulfonic acid, PFHpA = perfluoroheptanoic acid, PFHxS = perfluorohexanesulfonic acid, PFNA = perfluorononanoic acid, PFOA = perfluorooctanoic acid, PFOS = perfluorooctanesulfonic, TSA = Transportation Security Administration

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

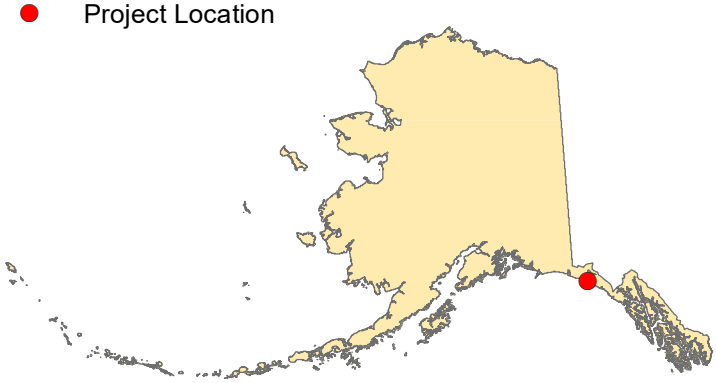
LEGEND

Airport Property Boundary

Project Location

0 2

Miles



N

July 2020 to June 2021 Water Supply Well Summary Report Yakutat, Alaska

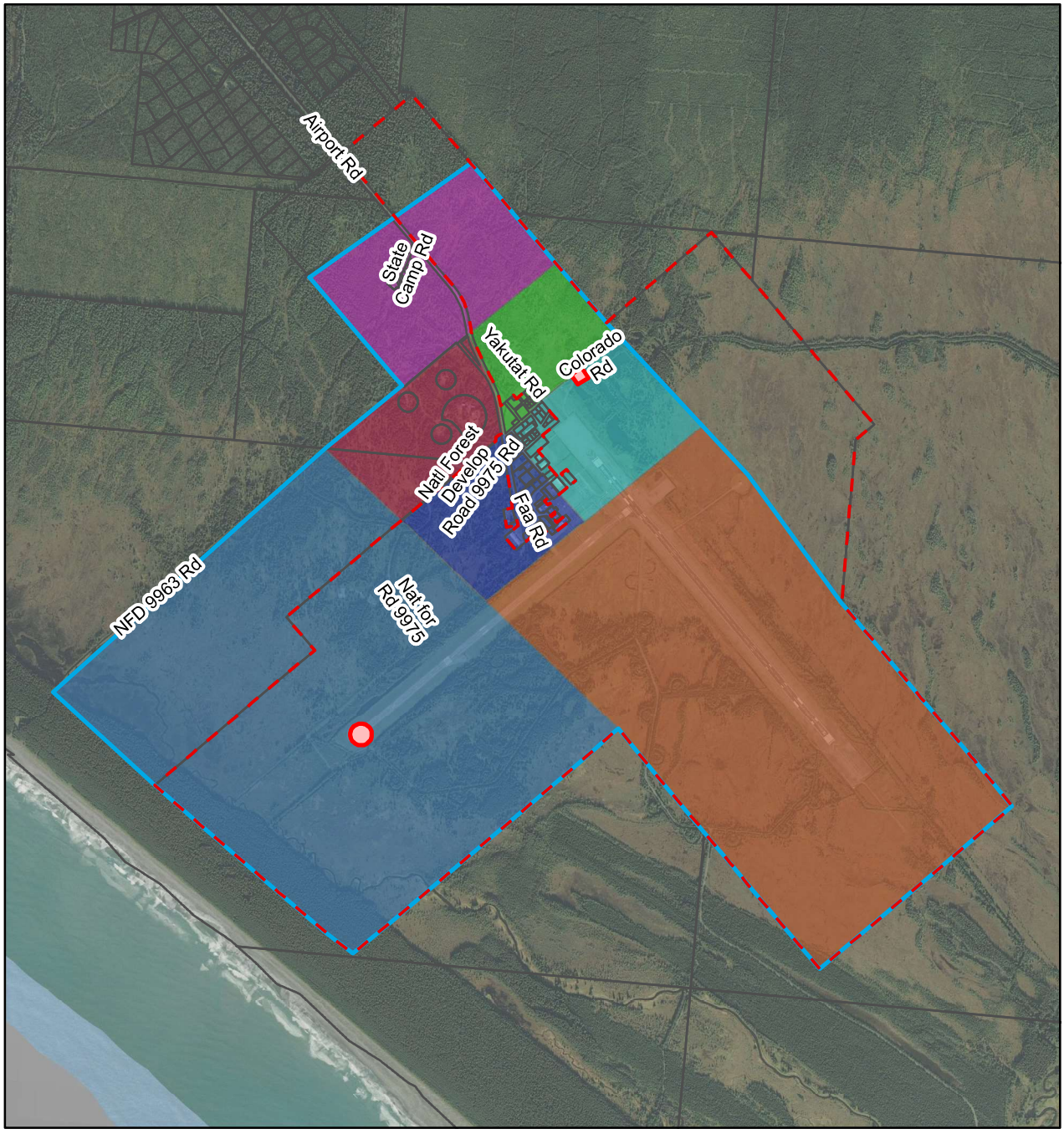
SITE VICINITY

June 2022

102896-007

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Figure 1



Map adapted from aerial and satellite imagery provided through the Alaska Department of Natural Resources. (Satellite Imagery: Spot 5 © CNES, SPOT 6 & 7 © Airbus DS).

LEGEND

- Well Search Area
- Airport Property Boundary
- Yakutat Tax Parcels
- Aircraft Rescue and Firefighting (ARFF) Site
- Extent 1
- Extent 2
- Extent 3
- Extent 4
- Extent 5
- Extent 6
- Extent 7

0 1 2

Miles

N

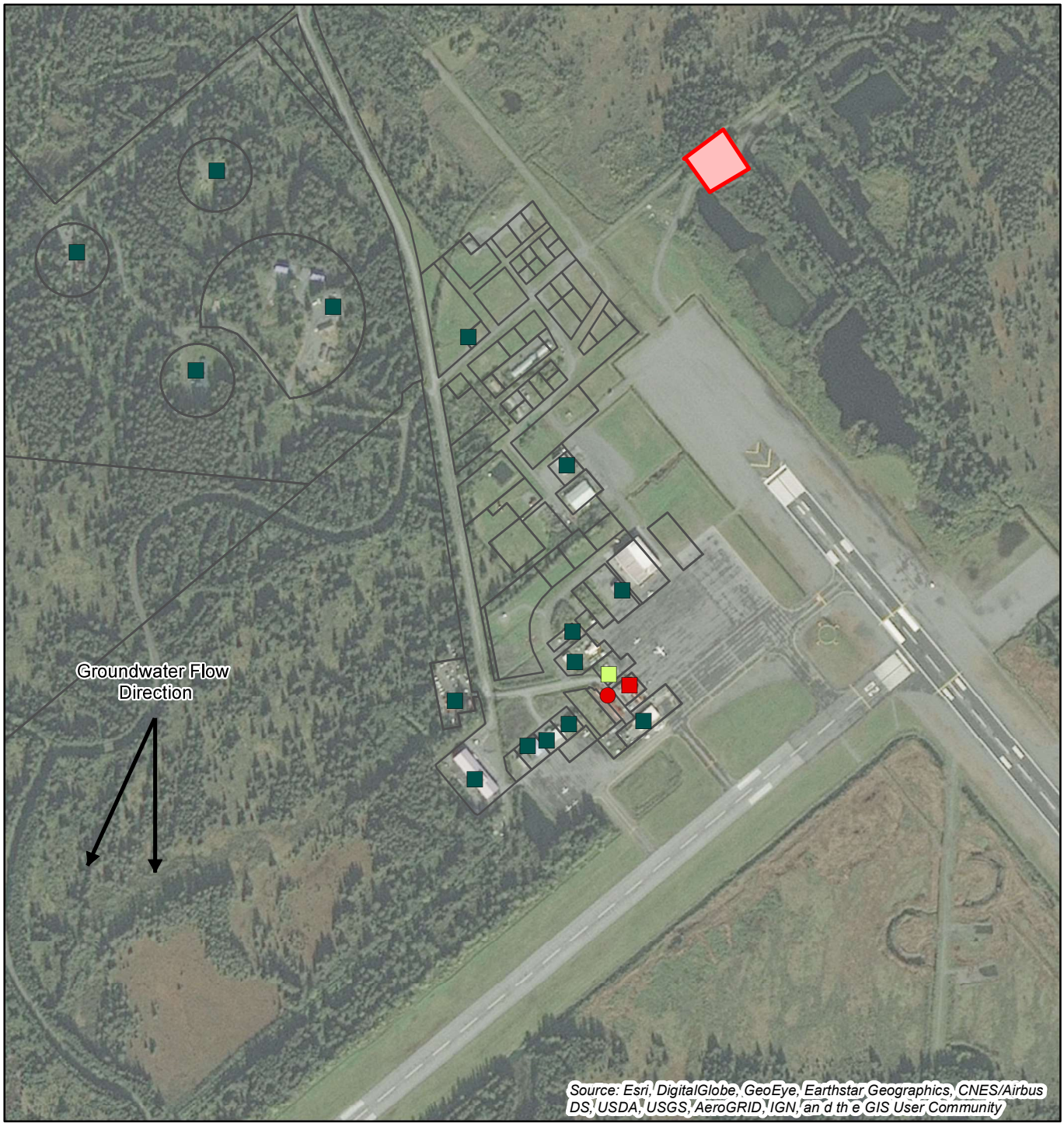
July 2020 to June 2021 Water Supply Well Summary Report Yakutat, Alaska

WELL SEARCH EXTENT

June 2022 102896-007

SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Figure 2



Legend

- ≤17 parts per trillion (ppt) †
- 18 to 69 ppt †
- ≥70 ppt †
- ≥70 ppt (over former action level*)
- Aircraft Rescue and Firefighting (ARFF) Training Site
- Yakutat Tax Parcels

†Sum of PFOS and PFOA
*Sum of PFOS, PFOA, PFHxS, PFHpA, and PFNA

0 0.15 0.3
Miles

N

Water Supply Well Monitoring
Yakutat, Alaska

HIGHEST WATER SUPPLY WELL ANALYTICAL RESULTS THROUGH MAY 2021

June 2022 102896-007

SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Figure 3

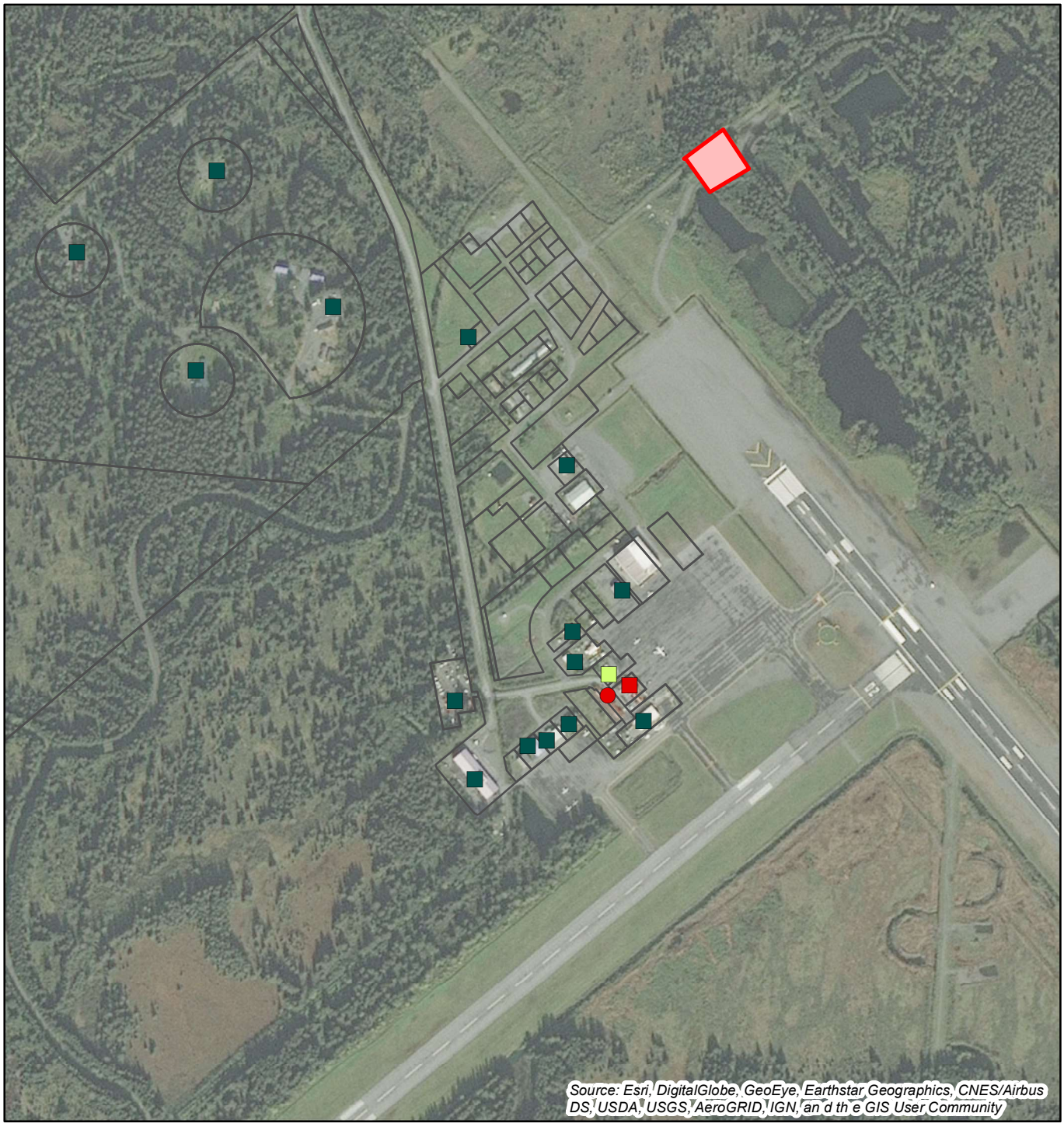
Note: Highest concentration for each well is presented on this map.

APPENDIX A: PUBLIC COMMUNICATION MATERIALS

Appendix A

Public Communication Materials

CONTENTS



LEGEND

Wells sampled before April 2019: compared to former DEC action level*

- ≤17 parts per trillion (ppt)
- 18 to 69 ppt
- ≥70 ppt (over former action level)

Wells sampled after April 2019; compared to EPA health advisory level (sum of PFOS and PFOA)

- ≤17 parts per trillion (ppt)
- 18 to 69 ppt
- ≥70 ppt (over former action level)
- Aircraft Rescue and Firefighting (ARFF) Training Site

*Sum of PFOS, PFOA, PFHxS, PFHpA, and PFNA

0 0.15 0.3

Miles

N

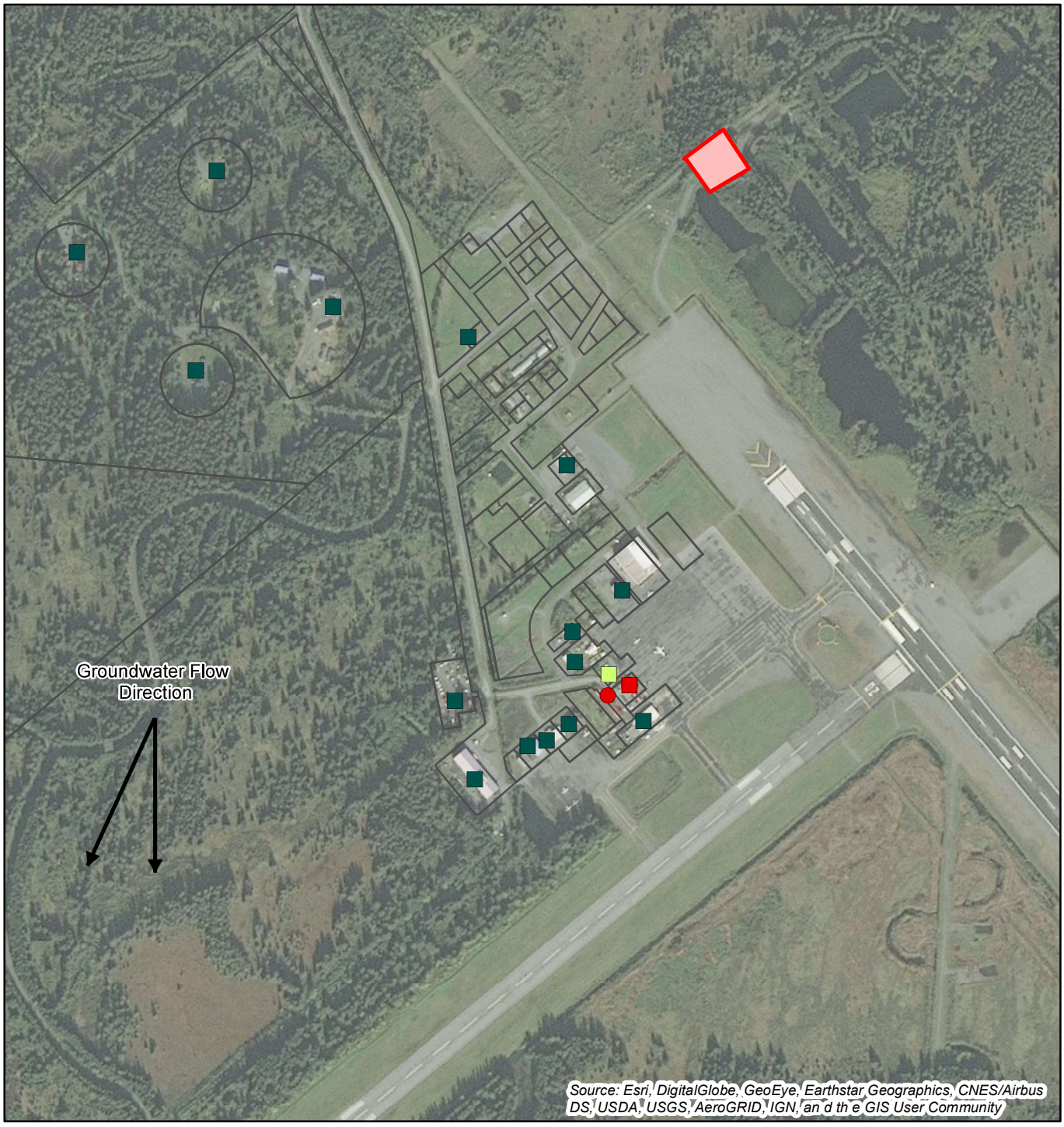
August 2020
Water Supply Well Monitoring
Yakutat, Alaska

Highest Water Supply Well Analytical Results through August 2020

August 2020 102896-006

SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Figure 1



Legend

- ≤17 parts per trillion (ppt) †
- 18 to 69 ppt †
- ≥70 ppt †
- ≥70 ppt (over former action level*)
- Aircraft Rescue and Firefighting (ARFF) Training Site
- Yakutat Tax Parcels

†Sum of PFOS and PFOA
*Sum of PFOS, PFOA, PFHxS, PFHpA, and PFNA

0 0.15 0.3
Miles

N

Water Supply Well Monitoring
Yakutat, Alaska

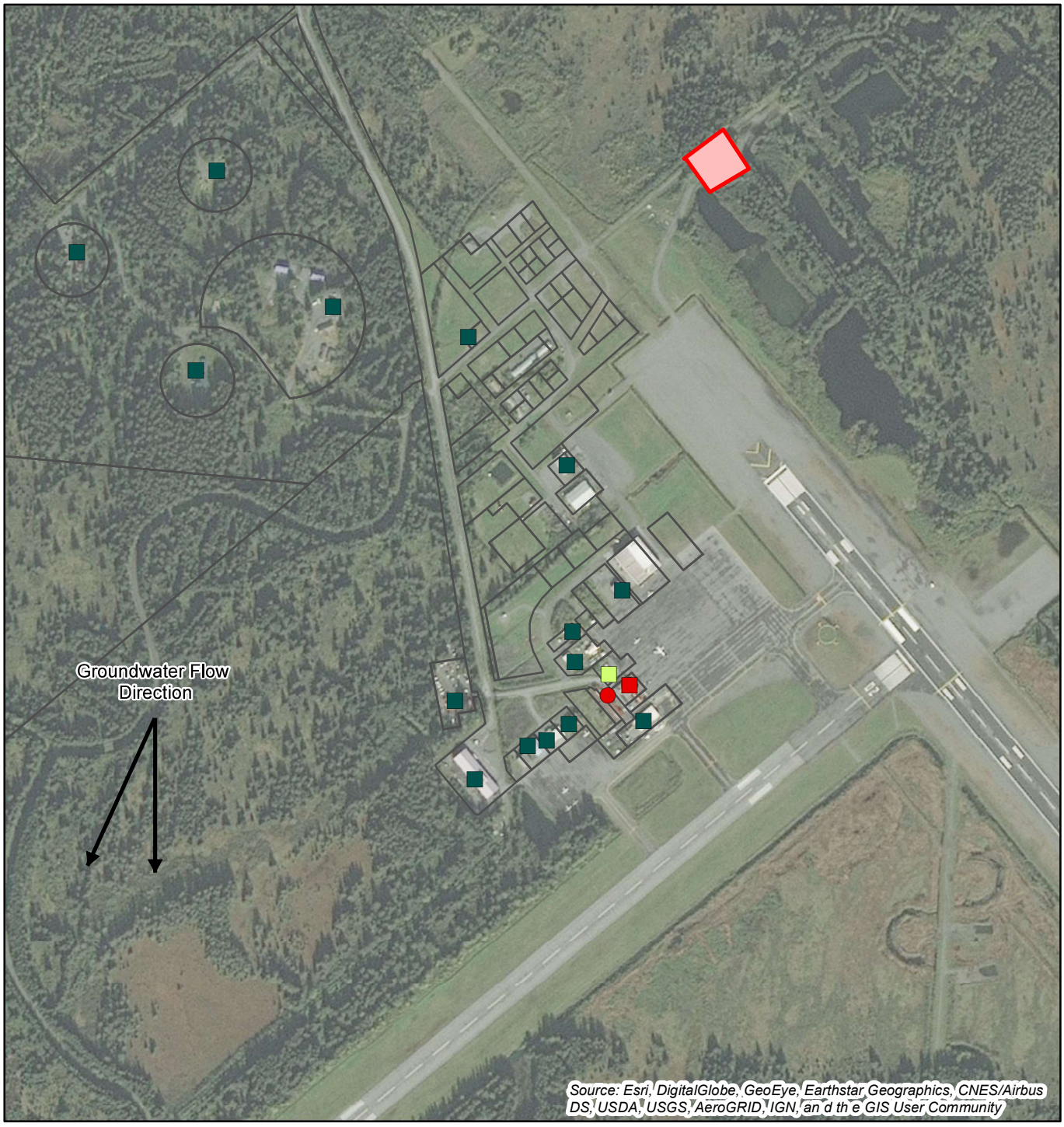
Highest Water Supply Well Analytical Results through December 2020

December 2020 102896-006

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Figure 1

Note: Highest concentration for each well is presented on this map.



Legend

- ≤17 parts per trillion (ppt) †
- 18 to 69 ppt †
- ≥70 ppt †
- ≥70 ppt (over former action level*)
- Aircraft Rescue and Firefighting (ARFF) Training Site
- Yakutat Tax Parcels

†Sum of PFOS and PFOA
*Sum of PFOS, PFOA, PFHxS, PFHpA, and PFNA

0 0.15 0.3
Miles

N

Water Supply Well Monitoring
Yakutat, Alaska

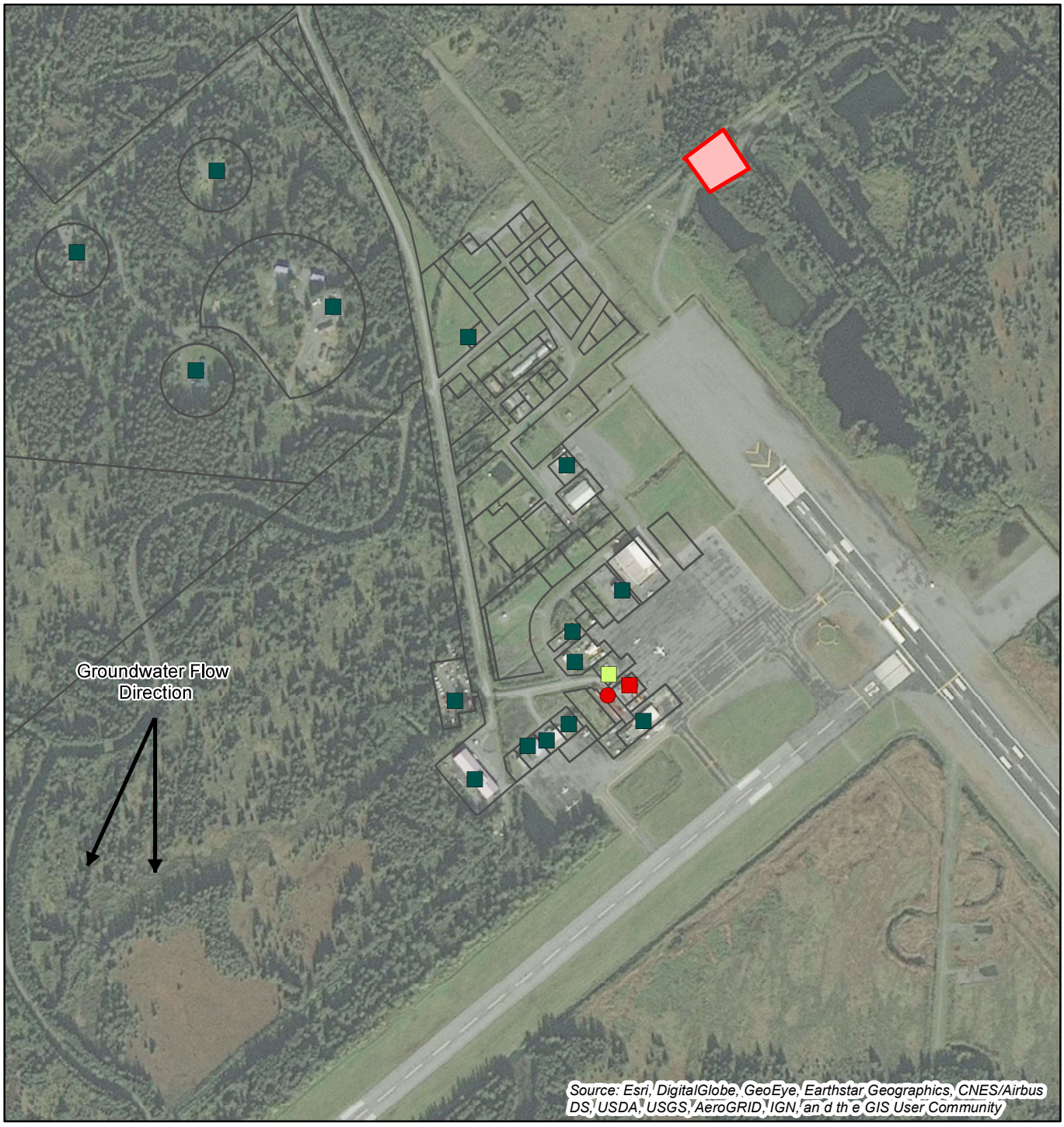
Highest Water Supply Well Analytical Results through March 2021

March 2021 102896-006

SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Figure 1

Note: Highest concentration for each well is presented on this map.



Legend

- ≤17 parts per trillion (ppt) †
- 18 to 69 ppt †
- ≥70 ppt †
- ≥70 ppt (over former action level*)
- Aircraft Rescue and Firefighting (ARFF) Training Site
- Yakutat Tax Parcels

†Sum of PFOS and PFOA
*Sum of PFOS, PFOA, PFHxS, PFHpA, and PFNA

0 0.15 0.3
Miles

N

Note: Highest concentration for each well is presented on this map.

Water Supply Well Monitoring
Yakutat, Alaska

Highest Water Supply Well Analytical Results through May 2021

June 2021

102896-006

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Figure 1

THE STATE of ALASKA
GOVERNOR MIKE DUNLEAVY

Department of Transportation and Public Facilities

DIVISION OF STATEWIDE AVIATION

P.O. Box 196900, 99519-6900
4111 Aviation Avenue, 99502
Anchorage, AK
Main: 907.269.0730
Fax: 907.269.0489
dot.state.ak.us

PFAS Fact Sheet – Yakutat Airport

January 2021

Per- and polyfluoroalkyl substances (PFAS) are a group of manmade chemicals used for a wide variety of residential, commercial, and industrial uses. PFAS are considered emerging environmental contaminants and the health effects are not well known.

The presumed source of PFAS in groundwater in your community is the use of a fire-fighting foam called aqueous film forming foam (AFFF). Airport firefighters used the foam to extinguish petroleum fires during training exercises and emergency events.

The Alaska Department of Transportation & Public Facilities (DOT&PF) has hired Shannon & Wilson to test private wells for perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), and other PFAS compounds.

The U.S. Environmental Protection Agency (EPA) lifetime health advisory (LHA) level for drinking water is **70 parts per trillion** for the sum of PFOS and PFOA.

We advise residents with test results above this level not to use their water for drinking or cooking. If your well is considered affected, you can continue to shower, clean, and do laundry.

Test results are typically available within four to five weeks of sample collection. If your well is found to have PFAS above the EPA LHA, DOT&PF will assist with access to an alternate source of drinking water.

For results and sampling area map:
www.dot.alaska.gov/airportwater/

For questions about well testing:
Shannon & Wilson, Inc.
Ashley Jaramillo, Project Manager
Phone: 907-458- 3118
Email: amj@shanwil.comm

For regulatory questions:
Alaska Dept. of Environmental Conservation
Jamie Grant, Contaminated Sites Program
Phone: 907-334-5939
Email: jamie.grant@alaska.gov

For questions about PFAS and health effects:
Alaska Dept. of Health & Social Services
Sarah Yoder, Health Program Manager
Phone: 907-269-8054
Email: sarah.yoder@alaska.gov

Stacey Cooper, Epidemiology Specialist
Phone: 907-269-8016
Email: stacey.cooper@alaska.gov

To file an insurance claim:
Division of Risk Management
Ken Simpson, Claims Administrator
Phone: 907-465-2183
Email: ken.simpson@alaska.gov

For questions about fire training & other:
DOT&PF – Statewide Aviation
Sammy Cummings, PFAS Program Manager
Phone: 907-888-5671
Email: airportwater@alaska.gov

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Month Day, Year

Full Name/s
PO Box
Yakutat, AK 99689

RE: RESULTS OF MONTH YEAR PFAS WATER SUPPLY WELL SAMPLING, YAKUTAT AIRPORT

Thank you for participating in our well sampling program to evaluate the potential presence of per- and polyfluoroalkyl substances (PFAS) in groundwater near the Yakutat Airport. Shannon & Wilson, Inc. collected a water sample on Month Day, Year, from your well. Enclosed are the analytical results for the sample from your water supply well.

The well-water sample was analyzed for perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), and other PFAS compounds. We compare these concentrations to the U.S. Environmental Protection Agency's (EPA) health advisory level for drinking water. The lifetime health advisory level is 70 parts per trillion (ppt) for the sum of PFOS and PFOA. Please note that these units are equivalent to nanograms per liter (ng/L). With the release of the EPA's PFAS action plan in February 2019, the state's multi-agency response effort now aligns with the EPA's LHA level. Previous analytical results for your well were compared to the former Alaska Department of Environmental Conservation action level.

Results of the analysis conducted by TestAmerica Laboratories, Inc. indicate that PFOS was not/was detected at X ppt, and PFOA was not/was detected at X ppt in the water sample from your well. The sum of these PFOS and PFOA concentrations is less than/greater than the lifetime health advisory level. The portions of the original laboratory report that apply to your well (sample number *XXXXXX* and field-duplicate sample *XXXXXX*) are enclosed for your records.

The Alaska Department of Transportation and Public Facilities (DOT&PF) is providing an alternate source of drinking water to the occupants of homes and businesses whose well water exceeds the health advisory level, and who use their water for drinking or cooking.

2355 HILL ROAD
FAIRBANKS, ALASKA 99709-5326
907-479-0600 • FAX 907-479-5691

We sampled 21 water supply wells near the Yakutat Airport on behalf of DOT&PF. Please see the enclosed PFAS fact sheet for a link to the DOT&PF project website, as requests are received, we will update the website map. Feel free to contact us if you have questions regarding your results.

Sincerely,

SHANNON & WILSON, INC.

Name
Title

Enc: Select Pages of Test America Laboratory Report No. XXX-XXXXX-X
Yakutat PFAS Fact Sheet

2355 HILL ROAD
FAIRBANKS, ALASKA 99709-5326
907-479-0600 • FAX 907-479-5691

APPENDIX B: FIELD FORMS

Appendix B

Field Forms - REDACTED FOR PRIVACY

CONTENTS

APPENDIX C: LABORATORY REPORTS AND LDRCS

Appendix C

Laboratory Reports and LDRCs

CONTENTS

eurofins | Environment Testing America

ANALYTICAL REPORT

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

Laboratory Job ID: 320-63799-1
Client Project/Site: Yakutat Quarterly
Revision: 1

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

Attn: Michael X Jaramillo

Authorized for release by:
8/24/2020 12:04:29 PM

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

Table of Contents

Definitions/Glossary

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

Job ID: 320-63799-1

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: 320-63799-1

Laboratory: Eurofins TestAmerica, Sacramento

Narrative

Job Narrative
320-63799-1

Revision 8-24-2020: This report has been revised to update units to ng/L

Receipt
The samples were received on 8/18/2020 4:00 PM; the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 1.2º C.

Receipt Exceptions
Samples have a little bit of discoloration. 33068 (320-63799-2), 33061 (320-63799-3) and 33060 (320-63799-7)

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 320-405325.

Method 537.1 DW: The following samples contain a thin layer of sediment at the bottom of the bottle prior to extraction: 33068 (320-63799-2) and 33060 (320-63799-7).

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

Detection Summary

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

Job ID: 320-63799-1

Client Sample ID: 33065 — Lab Sample ID: 320-63799-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	8.4		1.9	0.47	ng/L	1		537.1 DW	Total/NA
Perfluoroheptanoic acid (PFHpA)	4.0		1.9	0.47	ng/L	1		537.1 DW	Total/NA
Perfluorooctanoic acid (PFOA)	7.2		1.9	0.47	ng/L	1		537.1 DW	Total/NA
Perfluorononanoic acid (PFNA)	0.86	J	1.9	0.47	ng/L	1		537.1 DW	Total/NA
Perfluorodecanoic acid (PFDA)	0.52	J	1.9	0.47	ng/L	1		537.1 DW	Total/NA
Perfluorobutanesulfonic acid (PFBS)	1.5	J	1.9	0.47	ng/L	1		537.1 DW	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	32		1.9	0.47	ng/L	1		537.1 DW	Total/NA
Perfluorooctanesulfonic acid (PFOS)	24		1.9	0.47	ng/L	1		537.1 DW	Total/NA

Client Sample ID: 33068 — Lab Sample ID: 320-63799-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanesulfonic acid (PFOS)	0.66	J	1.7	0.43	ng/L	1		537.1 DW	Total/NA

Client Sample ID: 33061 — Lab Sample ID: 320-63799-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanesulfonic acid (PFOS)	0.75	J	1.8	0.46	ng/L	1		537.1 DW	Total/NA

Client Sample ID: 33053 — Lab Sample ID: 320-63799-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	2.2		2.0	0.50	ng/L	1		537.1 DW	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.1	J	2.0	0.50	ng/L	1		537.1 DW	Total/NA
Perfluorooctanoic acid (PFOA)	1.7	J	2.0	0.50	ng/L	1		537.1 DW	Total/NA
Perfluorononanoic acid (PFNA)	0.52	J	2.0	0.50	ng/L	1		537.1 DW	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	9.0		2.0	0.50	ng/L	1		537.1 DW	Total/NA
Perfluorooctanesulfonic acid (PFOS)	8.1		2.0	0.50	ng/L	1		537.1 DW	Total/NA

Client Sample ID: 33066 — Lab Sample ID: 320-63799-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	7.1		1.8	0.46	ng/L	1		537.1 DW	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.7		1.8	0.46	ng/L	1		537.1 DW	Total/NA
Perfluorooctanoic acid (PFOA)	5.4		1.8	0.46	ng/L	1		537.1 DW	Total/NA
Perfluorononanoic acid (PFNA)	0.57	J	1.8	0.46	ng/L	1		537.1 DW	Total/NA
Perfluorobutanesulfonic acid (PFBS)	2.2		1.8	0.46	ng/L	1		537.1 DW	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	48		1.8	0.46	ng/L	1		537.1 DW	Total/NA
Perfluorooctanesulfonic acid (PFOS)	68		1.8	0.46	ng/L	1		537.1 DW	Total/NA

Client Sample ID: 93066 — Lab Sample ID: 320-63799-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	7.0		1.8	0.46	ng/L	1		537.1 DW	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.6		1.8	0.46	ng/L	1		537.1 DW	Total/NA
Perfluorooctanoic acid (PFOA)	5.6		1.8	0.46	ng/L	1		537.1 DW	Total/NA
Perfluorononanoic acid (PFNA)	0.70	J	1.8	0.46	ng/L	1		537.1 DW	Total/NA
Perfluorobutanesulfonic acid (PFBS)	2.2		1.8	0.46	ng/L	1		537.1 DW	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	49		1.8	0.46	ng/L	1		537.1 DW	Total/NA
Perfluorooctanesulfonic acid (PFOS)	71		1.8	0.46	ng/L	1		537.1 DW	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

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

Job ID: 320-63799-1

Client Sample ID: 33060

Lab Sample ID: 320-63799-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	9.1		1.8	0.45	ng/L	1		537.1 DW	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.2		1.8	0.45	ng/L	1		537.1 DW	Total/NA
Perfluorooctanoic acid (PFOA)	2.0		1.8	0.45	ng/L	1		537.1 DW	Total/NA
Perfluorononanoic acid (PFNA)	0.52	J	1.8	0.45	ng/L	1		537.1 DW	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.45	J	1.8	0.45	ng/L	1		537.1 DW	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	4.2		1.8	0.45	ng/L	1		537.1 DW	Total/NA
Perfluorooctanesulfonic acid (PFOS)	8.5		1.8	0.45	ng/L	1		537.1 DW	Total/NA

This Detection Summary does not include radiochemical test results.

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

Job ID: 320-63799-1

Client Sample ID: 33065
Date Collected: 08/13/20 09:54
Date Received: 08/18/20 16:00

Lab Sample ID: 320-63799-1
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)	**8.4**		1.9	0.47	ng/L		08/20/20 11:48	08/21/20 10:00	1
Perfluoroheptanoic acid (PFHpA)	**4.0**		1.9	0.47	ng/L		08/20/20 11:48	08/21/20 10:00	1
Perfluorooctanoic acid (PFOA)	**7.2**		1.9	0.47	ng/L		08/20/20 11:48	08/21/20 10:00	1
Perfluorononanoic acid (PFNA)	**0.86**	**J**	1.9	0.47	ng/L		08/20/20 11:48	08/21/20 10:00	1
Perfluorodecanoic acid (PFDA)	**0.52**	**J**	1.9	0.47	ng/L		08/20/20 11:48	08/21/20 10:00	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	0.47	ng/L		08/20/20 11:48	08/21/20 10:00	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.47	ng/L		08/20/20 11:48	08/21/20 10:00	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	0.47	ng/L		08/20/20 11:48	08/21/20 10:00	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.47	ng/L		08/20/20 11:48	08/21/20 10:00	1
Perfluorobutanesulfonic acid (PFBS)	**1.5**	**J**	1.9	0.47	ng/L		08/20/20 11:48	08/21/20 10:00	1
Perfluorohexanesulfonic acid (PFHxS)	**32**		1.9	0.47	ng/L		08/20/20 11:48	08/21/20 10:00	1
Perfluorooctanesulfonic acid (PFOS)	**24**		1.9	0.47	ng/L		08/20/20 11:48	08/21/20 10:00	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		1.9	0.47	ng/L		08/20/20 11:48	08/21/20 10:00	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		1.9	0.47	ng/L		08/20/20 11:48	08/21/20 10:00	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		1.9	0.47	ng/L		08/20/20 11:48	08/21/20 10:00	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	ND		1.9	0.47	ng/L		08/20/20 11:48	08/21/20 10:00	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		1.9	0.47	ng/L		08/20/20 11:48	08/21/20 10:00	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.47	ng/L		08/20/20 11:48	08/21/20 10:00	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*88*		*70 - 130*	*08/20/20 11:48*	*08/21/20 10:00*	*1*
13C2 PFDA	*84*		*70 - 130*	*08/20/20 11:48*	*08/21/20 10:00*	*1*
d5-NEtFOSAA	*81*		*70 - 130*	*08/20/20 11:48*	*08/21/20 10:00*	*1*
13C3 HFPO-DA	*76*		*70 - 130*	*08/20/20 11:48*	*08/21/20 10:00*	*1*

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

Job ID: 320-63799-1

Client Sample ID: 33068
Date Collected: 08/13/20 13:13
Date Received: 08/18/20 16:00

Lab Sample ID: 320-63799-2
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		1.7	0.43	ng/L		08/20/20 11:48	08/21/20 10:46	1
Perfluoroheptanoic acid (PFHpA)	ND		1.7	0.43	ng/L		08/20/20 11:48	08/21/20 10:46	1
Perfluorooctanoic acid (PFOA)	ND		1.7	0.43	ng/L		08/20/20 11:48	08/21/20 10:46	1
Perfluorononanoic acid (PFNA)	ND		1.7	0.43	ng/L		08/20/20 11:48	08/21/20 10:46	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.43	ng/L		08/20/20 11:48	08/21/20 10:46	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.43	ng/L		08/20/20 11:48	08/21/20 10:46	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.43	ng/L		08/20/20 11:48	08/21/20 10:46	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	0.43	ng/L		08/20/20 11:48	08/21/20 10:46	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.43	ng/L		08/20/20 11:48	08/21/20 10:46	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.7	0.43	ng/L		08/20/20 11:48	08/21/20 10:46	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.7	0.43	ng/L		08/20/20 11:48	08/21/20 10:46	1
Perfluorooctanesulfonic acid (PFOS)	**0.66**	**J**	1.7	0.43	ng/L		08/20/20 11:48	08/21/20 10:46	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		1.7	0.43	ng/L		08/20/20 11:48	08/21/20 10:46	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		1.7	0.43	ng/L		08/20/20 11:48	08/21/20 10:46	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		1.7	0.43	ng/L		08/20/20 11:48	08/21/20 10:46	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	ND		1.7	0.43	ng/L		08/20/20 11:48	08/21/20 10:46	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		1.7	0.43	ng/L		08/20/20 11:48	08/21/20 10:46	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.7	0.43	ng/L		08/20/20 11:48	08/21/20 10:46	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*88*		*70 - 130*	*08/20/20 11:48*	*08/21/20 10:46*	*1*
13C2 PFDA	*84*		*70 - 130*	*08/20/20 11:48*	*08/21/20 10:46*	*1*
d5-NEtFOSAA	*86*		*70 - 130*	*08/20/20 11:48*	*08/21/20 10:46*	*1*
13C3 HFPO-DA	*79*		*70 - 130*	*08/20/20 11:48*	*08/21/20 10:46*	*1*

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

Job ID: 320-63799-1

Client Sample ID: 33061
Date Collected: 08/13/20 14:24
Date Received: 08/18/20 16:00

Lab Sample ID: 320-63799-3
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		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 10:54	1
Perfluoroheptanoic acid (PFHpA)	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 10:54	1
Perfluorooctanoic acid (PFOA)	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 10:54	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 10:54	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 10:54	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 10:54	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 10:54	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 10:54	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 10:54	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 10:54	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 10:54	1
Perfluorooctanesulfonic acid (PFOS)	**0.75**	**J**	1.8	0.46	ng/L		08/20/20 11:48	08/21/20 10:54	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 10:54	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 10:54	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 10:54	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 10:54	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 10:54	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 10:54	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*90*		*70 - 130*	*08/20/20 11:48*	*08/21/20 10:54*	*1*
13C2 PFDA	*84*		*70 - 130*	*08/20/20 11:48*	*08/21/20 10:54*	*1*
d5-NEtFOSAA	*83*		*70 - 130*	*08/20/20 11:48*	*08/21/20 10:54*	*1*
13C3 HFPO-DA	*80*		*70 - 130*	*08/20/20 11:48*	*08/21/20 10:54*	*1*

Client Sample ID: 33053
Date Collected: 08/13/20 16:11
Date Received: 08/18/20 16:00

Lab Sample ID: 320-63799-4
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)	**2.2**		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 11:02	1
Perfluoroheptanoic acid (PFHpA)	**1.1**	**J**	2.0	0.50	ng/L		08/20/20 11:48	08/21/20 11:02	1
Perfluorooctanoic acid (PFOA)	**1.7**	**J**	2.0	0.50	ng/L		08/20/20 11:48	08/21/20 11:02	1
Perfluorononanoic acid (PFNA)	**0.52**	**J**	2.0	0.50	ng/L		08/20/20 11:48	08/21/20 11:02	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 11:02	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 11:02	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 11:02	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 11:02	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 11:02	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 11:02	1
Perfluorohexanesulfonic acid (PFHxS)	**9.0**		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 11:02	1
Perfluorooctanesulfonic acid (PFOS)	**8.1**		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 11:02	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 11:02	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 11:02	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 11:02	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	ND		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 11:02	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 11:02	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 11:02	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*98*		*70 - 130*	*08/20/20 11:48*	*08/21/20 11:02*	*1*
13C2 PFDA	*101*		*70 - 130*	*08/20/20 11:48*	*08/21/20 11:02*	*1*
d5-NEtFOSAA	*104*		*70 - 130*	*08/20/20 11:48*	*08/21/20 11:02*	*1*
13C3 HFPO-DA	*92*		*70 - 130*	*08/20/20 11:48*	*08/21/20 11:02*	*1*

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

Job ID: 320-63799-1

Client Sample ID: 33066
Date Collected: 08/13/20 17:21
Date Received: 08/18/20 16:00

Lab Sample ID: 320-63799-5
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)	**7.1**		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:09	1
Perfluoroheptanoic acid (PFHpA)	**2.7**		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:09	1
Perfluorooctanoic acid (PFOA)	**5.4**		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:09	1
Perfluorononanoic acid (PFNA)	**0.57**	**J**	1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:09	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:09	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:09	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:09	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:09	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:09	1
Perfluorobutanesulfonic acid (PFBS)	**2.2**		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:09	1
Perfluorohexanesulfonic acid (PFHxS)	**48**		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:09	1
Perfluorooctanesulfonic acid (PFOS)	**68**		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:09	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:09	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:09	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:09	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:09	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:09	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:09	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*91*		*70 - 130*	*08/20/20 11:48*	*08/21/20 11:09*	*1*
13C2 PFDA	*85*		*70 - 130*	*08/20/20 11:48*	*08/21/20 11:09*	*1*
d5-NEtFOSAA	*86*		*70 - 130*	*08/20/20 11:48*	*08/21/20 11:09*	*1*
13C3 HFPO-DA	*79*		*70 - 130*	*08/20/20 11:48*	*08/21/20 11:09*	*1*

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

Job ID: 320-63799-1

Client Sample ID: 93066
Date Collected: 08/13/20 17:11
Date Received: 08/18/20 16:00

Lab Sample ID: 320-63799-6
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)	**7.0**		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:17	1
Perfluoroheptanoic acid (PFHpA)	**2.6**		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:17	1
Perfluorooctanoic acid (PFOA)	**5.6**		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:17	1
Perfluorononanoic acid (PFNA)	**0.70**	**J**	1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:17	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:17	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:17	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:17	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:17	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:17	1
Perfluorobutanesulfonic acid (PFBS)	**2.2**		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:17	1
Perfluorohexanesulfonic acid (PFHxS)	**49**		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:17	1
Perfluorooctanesulfonic acid (PFOS)	**71**		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:17	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:17	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:17	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:17	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:17	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:17	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.46	ng/L		08/20/20 11:48	08/21/20 11:17	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*92*		*70 - 130*	*08/20/20 11:48*	*08/21/20 11:17*	*1*
13C2 PFDA	*82*		*70 - 130*	*08/20/20 11:48*	*08/21/20 11:17*	*1*
d5-NEtFOSAA	*88*		*70 - 130*	*08/20/20 11:48*	*08/21/20 11:17*	*1*
13C3 HFPO-DA	*83*		*70 - 130*	*08/20/20 11:48*	*08/21/20 11:17*	*1*

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

Job ID: 320-63799-1

Client Sample ID: 33060
Date Collected: 08/13/20 10:17
Date Received: 08/18/20 16:00

Lab Sample ID: 320-63799-7
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)	**9.1**		1.8	0.45	ng/L		08/20/20 11:48	08/21/20 11:25	1
Perfluoroheptanoic acid (PFHpA)	**2.2**		1.8	0.45	ng/L		08/20/20 11:48	08/21/20 11:25	1
Perfluorooctanoic acid (PFOA)	**2.0**		1.8	0.45	ng/L		08/20/20 11:48	08/21/20 11:25	1
Perfluorononanoic acid (PFNA)	**0.52**	**J**	1.8	0.45	ng/L		08/20/20 11:48	08/21/20 11:25	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.45	ng/L		08/20/20 11:48	08/21/20 11:25	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.45	ng/L		08/20/20 11:48	08/21/20 11:25	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.45	ng/L		08/20/20 11:48	08/21/20 11:25	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	0.45	ng/L		08/20/20 11:48	08/21/20 11:25	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.45	ng/L		08/20/20 11:48	08/21/20 11:25	1
Perfluorobutanesulfonic acid (PFBS)	**0.45**	**J**	1.8	0.45	ng/L		08/20/20 11:48	08/21/20 11:25	1
Perfluorohexanesulfonic acid (PFHxS)	**4.2**		1.8	0.45	ng/L		08/20/20 11:48	08/21/20 11:25	1
Perfluorooctanesulfonic acid (PFOS)	**8.5**		1.8	0.45	ng/L		08/20/20 11:48	08/21/20 11:25	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		1.8	0.45	ng/L		08/20/20 11:48	08/21/20 11:25	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		1.8	0.45	ng/L		08/20/20 11:48	08/21/20 11:25	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		1.8	0.45	ng/L		08/20/20 11:48	08/21/20 11:25	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	ND		1.8	0.45	ng/L		08/20/20 11:48	08/21/20 11:25	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		1.8	0.45	ng/L		08/20/20 11:48	08/21/20 11:25	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.45	ng/L		08/20/20 11:48	08/21/20 11:25	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*93*		*70 - 130*	*08/20/20 11:48*	*08/21/20 11:25*	*1*
13C2 PFDA	*89*		*70 - 130*	*08/20/20 11:48*	*08/21/20 11:25*	*1*
d5-NEtFOSAA	*94*		*70 - 130*	*08/20/20 11:48*	*08/21/20 11:25*	*1*
13C3 HFPO-DA	*82*		*70 - 130*	*08/20/20 11:48*	*08/21/20 11:25*	*1*

Surrogate Summary

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

Job ID: 320-63799-1

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

Matrix: Water

Prep Type: Total/NA

		Percent Surrogate Recovery (Acceptance Limits)			
Lab Sample ID	Client Sample ID	PFHxA (70-130)	PFDA (70-130)	d5NEFOS (70-130)	HFPODA (70-130)
320-63799-1	33065	88	84	81	76
320-63799-2	33068	88	84	86	79
320-63799-3	33061	90	84	83	80
320-63799-4	33053	98	101	104	92
320-63799-5	33066	91	85	86	79
320-63799-6	93066	92	82	88	83
320-63799-7	33060	93	89	94	82
LLCS 320-405325/2-A	Lab Control Sample	92	92	94	83
LLCSD 320-405325/3-A	Lab Control Sample Dup	88	90	99	81
MB 320-405325/1-A	Method Blank	90	89	93	80

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 320-405325/1-A
Matrix: Water
Analysis Batch: 405522

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 405325

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 09:06	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 09:06	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 09:06	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 09:06	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 09:06	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 09:06	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 09:06	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 09:06	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 09:06	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 09:06	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 09:06	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 09:06	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 09:06	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 09:06	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 09:06	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	ND		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 09:06	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 09:06	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.50	ng/L		08/20/20 11:48	08/21/20 09:06	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*90*		*70 - 130*	*08/20/20 11:48*	*08/21/20 09:06*	*1*
13C2 PFDA	*89*		*70 - 130*	*08/20/20 11:48*	*08/21/20 09:06*	*1*
d5-NEtFOSAA	*93*		*70 - 130*	*08/20/20 11:48*	*08/21/20 09:06*	*1*
13C3 HFPO-DA	*80*		*70 - 130*	*08/20/20 11:48*	*08/21/20 09:06*	*1*

Lab Sample ID: LLCS 320-405325/2-A
Matrix: Water
Analysis Batch: 405522

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 405325

Analyte	Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorohexanoic acid (PFHxA)	4.00	3.74		ng/L		93	50 - 150
Perfluoroheptanoic acid (PFHpA)	4.00	3.87		ng/L		97	50 - 150
Perfluorooctanoic acid (PFOA)	4.00	3.97		ng/L		99	50 - 150
Perfluorononanoic acid (PFNA)	4.00	3.94		ng/L		98	50 - 150
Perfluorodecanoic acid (PFDA)	4.00	3.74		ng/L		94	50 - 150
Perfluoroundecanoic acid (PFUnA)	4.00	3.72		ng/L		93	50 - 150
Perfluorododecanoic acid (PFDoA)	4.00	3.83		ng/L		96	50 - 150
Perfluorotridecanoic acid (PFTriA)	4.00	3.73		ng/L		93	50 - 150
Perfluorotetradecanoic acid (PFTeA)	4.00	3.42		ng/L		86	50 - 150
Perfluorobutanesulfonic acid (PFBS)	3.54	3.28		ng/L		93	50 - 150

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

Lab Sample ID: LLCS 320-405325/2-A
Matrix: Water
Analysis Batch: 405522

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 405325

Analyte			Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorohexanesulfonic acid (PFHxS)			3.64	3.40		ng/L		93	50 - 150		
Perfluorooctanesulfonic acid (PFOS)			3.71	3.50		ng/L		94	50 - 150		
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			4.00	3.91		ng/L		98	50 - 150		
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			4.00	3.78		ng/L		95	50 - 150		
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O			3.73	3.65		ng/L		98	50 - 150		
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF			3.77	3.47		ng/L		92	50 - 150		
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			4.00	3.48		ng/L		87	50 - 150		
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			3.77	3.63		ng/L		96	50 - 150		

Surrogate	*LLCS %Recovery*	*LLCS Qualifier*	*Limits*
13C2 PFHxA	*92*		*70 - 130*
13C2 PFDA	*92*		*70 - 130*
d5-NEtFOSAA	*94*		*70 - 130*
13C3 HFPO-DA	*83*		*70 - 130*

Lab Sample ID: LLCSD 320-405325/3-A
Matrix: Water
Analysis Batch: 405522

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 405325

Analyte			Spike Added	LLCSD Result	LLCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)			4.00	3.60		ng/L		90	50 - 150	4	50
Perfluoroheptanoic acid (PFHpA)			4.00	3.61		ng/L		90	50 - 150	7	50
Perfluorooctanoic acid (PFOA)			4.00	3.85		ng/L		96	50 - 150	3	50
Perfluorononanoic acid (PFNA)			4.00	3.77		ng/L		94	50 - 150	4	50
Perfluorodecanoic acid (PFDA)			4.00	3.64		ng/L		91	50 - 150	3	50
Perfluoroundecanoic acid (PFUnA)			4.00	3.80		ng/L		95	50 - 150	2	50
Perfluorododecanoic acid (PFDoA)			4.00	3.63		ng/L		91	50 - 150	5	50
Perfluorotridecanoic acid (PFTriA)			4.00	3.70		ng/L		93	50 - 150	0.6	50
Perfluorotetradecanoic acid (PFTeA)			4.00	3.29		ng/L		82	50 - 150	4	50
Perfluorobutanesulfonic acid (PFBS)			3.54	3.07		ng/L		87	50 - 150	7	50
Perfluorohexanesulfonic acid (PFHxS)			3.64	3.48		ng/L		96	50 - 150	2	50
Perfluorooctanesulfonic acid (PFOS)			3.71	3.59		ng/L		97	50 - 150	3	50
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			4.00	3.81		ng/L		95	50 - 150	3	50
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			4.00	3.76		ng/L		94	50 - 150	0.6	50
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O			3.73	3.57		ng/L		96	50 - 150	2	50

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

Lab Sample ID: LLCSD 320-405325/3-A
Matrix: Water
Analysis Batch: 405522

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 405325

Analyte			Spike Added	LLCSD Result	LLCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF			3.77	3.41		ng/L		91	50 - 150	2	50
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			4.00	3.24		ng/L		81	50 - 150	7	50
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			3.77	3.53		ng/L		94	50 - 150	3	50

Surrogate	*LLCSD %Recovery*	*LLCSD Qualifier*	*Limits*
13C2 PFHxA	*88*		*70 - 130*
13C2 PFDA	*90*		*70 - 130*
d5-NEtFOSAA	*99*		*70 - 130*
13C3 HFPO-DA	*81*		*70 - 130*

LCMS

Prep Batch: 405325

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-63799-1	33065	Total/NA	Water	537.1 DW	
320-63799-2	33068	Total/NA	Water	537.1 DW	
320-63799-3	33061	Total/NA	Water	537.1 DW	
320-63799-4	33053	Total/NA	Water	537.1 DW	
320-63799-5	33066	Total/NA	Water	537.1 DW	
320-63799-6	93066	Total/NA	Water	537.1 DW	
320-63799-7	33060	Total/NA	Water	537.1 DW	
MB 320-405325/1-A	Method Blank	Total/NA	Water	537.1 DW	
LLCS 320-405325/2-A	Lab Control Sample	Total/NA	Water	537.1 DW	
LLCSD 320-405325/3-A	Lab Control Sample Dup	Total/NA	Water	537.1 DW	

Analysis Batch: 405522

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-63799-1	33065	Total/NA	Water	537.1 DW	405325
MB 320-405325/1-A	Method Blank	Total/NA	Water	537.1 DW	405325
LLCS 320-405325/2-A	Lab Control Sample	Total/NA	Water	537.1 DW	405325
LLCSD 320-405325/3-A	Lab Control Sample Dup	Total/NA	Water	537.1 DW	405325

Analysis Batch: 405524

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-63799-2	33068	Total/NA	Water	537.1 DW	405325
320-63799-3	33061	Total/NA	Water	537.1 DW	405325
320-63799-4	33053	Total/NA	Water	537.1 DW	405325
320-63799-5	33066	Total/NA	Water	537.1 DW	405325
320-63799-6	93066	Total/NA	Water	537.1 DW	405325
320-63799-7	33060	Total/NA	Water	537.1 DW	405325

Lab Chronicle

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

Job ID: 320-63799-1

Client Sample ID: 33065
Date Collected: 08/13/20 09:54
Date Received: 08/18/20 16:00

Lab Sample ID: 320-63799-1
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537.1 DW			265 mL	1.00 mL	405325	08/20/20 11:48	LN	TAL SAC
Total/NA	Analysis	537.1 DW		1			405522	08/21/20 10:00	SK	TAL SAC

Client Sample ID: 33068
Date Collected: 08/13/20 13:13
Date Received: 08/18/20 16:00

Lab Sample ID: 320-63799-2
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			289.7 mL	1.00 mL	405325	08/20/20 11:48	LN	TAL SAC
Total/NA	Analysis	537.1 DW		1			405524	08/21/20 10:46	SK	TAL SAC

Client Sample ID: 33061
Date Collected: 08/13/20 14:24
Date Received: 08/18/20 16:00

Lab Sample ID: 320-63799-3
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			273.2 mL	1.00 mL	405325	08/20/20 11:48	LN	TAL SAC
Total/NA	Analysis	537.1 DW		1			405524	08/21/20 10:54	SK	TAL SAC

Client Sample ID: 33053
Date Collected: 08/13/20 16:11
Date Received: 08/18/20 16:00

Lab Sample ID: 320-63799-4
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			251.6 mL	1.00 mL	405325	08/20/20 11:48	LN	TAL SAC
Total/NA	Analysis	537.1 DW		1			405524	08/21/20 11:02	SK	TAL SAC

Client Sample ID: 33066
Date Collected: 08/13/20 17:21
Date Received: 08/18/20 16:00

Lab Sample ID: 320-63799-5
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			274.3 mL	1.00 mL	405325	08/20/20 11:48	LN	TAL SAC
Total/NA	Analysis	537.1 DW		1			405524	08/21/20 11:09	SK	TAL SAC

Client Sample ID: 93066
Date Collected: 08/13/20 17:11
Date Received: 08/18/20 16:00

Lab Sample ID: 320-63799-6
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			273.1 mL	1.00 mL	405325	08/20/20 11:48	LN	TAL SAC
Total/NA	Analysis	537.1 DW		1			405524	08/21/20 11:17	SK	TAL SAC

Lab Chronicle

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

Job ID: 320-63799-1

Client Sample ID: 33060

Date Collected: 08/13/20 10:17
Date Received: 08/18/20 16:00

Lab Sample ID: 320-63799-7

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			278.7 mL	1.00 mL	405325	08/20/20 11:48	LN	TAL SAC
Total/NA	Analysis	537.1 DW		1			405524	08/21/20 11:25	SK	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 Quarterly

Job ID: 320-63799-1

Laboratory: Eurofins TestAmerica, Sacramento

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	17-020	01-20-21
ANAB	Dept. of Defense ELAP	L2468	01-20-21
ANAB	Dept. of Energy	L2468.01	01-20-21
ANAB	ISO/IEC 17025	L2468	01-20-21
Arizona	State	AZ0708	08-11-21
Arkansas DEQ	State	88-0691	06-17-21
California	State	2897	01-31-22
Colorado	State	CA0004	08-31-20
Connecticut	State	PH-0691	06-30-21
Florida	NELAP	E87570	06-30-21
Georgia	State	4040	01-30-21
Hawaii	State	<cert No.>	01-29-21
Illinois	NELAP	200060	03-17-21
Kansas	NELAP	E-10375	10-31-20
Louisiana	NELAP	01944	06-30-21
Maine	State	CA00004	04-14-22
Michigan	State	9947	08-03-23
Nevada	State	CA000442021-1	07-31-21
New Hampshire	NELAP	2997	04-18-21
New Jersey	NELAP	CA005	06-30-21
New York	NELAP	11666	04-01-21
Oregon	NELAP	4040	01-29-21
Pennsylvania	NELAP	68-01272	03-31-21
Texas	NELAP	T104704399-19-13	06-01-21
US Fish & Wildlife	US Federal Programs	58448	07-31-21
USDA	US Federal Programs	P330-18-00239	07-31-21
Utah	NELAP	CA000442019-01	02-28-21
Vermont	State	VT-4040	04-16-21
Virginia	NELAP	460278	03-14-21
Washington	State	C581	05-05-21
West Virginia (DW)	State	9930C	12-31-20
Wyoming	State Program	8TMS-L	01-28-19 *

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Method Summary

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

Job ID: 320-63799-1

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 Quarterly

Job ID: 320-63799-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
320-63799-1	33065	Water	08/13/20 09:54	08/18/20 16:00	
320-63799-2	33068	Water	08/13/20 13:13	08/18/20 16:00	
320-63799-3	33061	Water	08/13/20 14:24	08/18/20 16:00	
320-63799-4	33053	Water	08/13/20 16:11	08/18/20 16:00	
320-63799-5	33066	Water	08/13/20 17:21	08/18/20 16:00	
320-63799-6	93066	Water	08/13/20 17:11	08/18/20 16:00	
320-63799-7	33060	Water	08/13/20 10:17	08/18/20 16:00	

CHAIN-OF-CUSTODY RECORD

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
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www.shannonwilson.com

Laboratory TEST AMERICA
Attn:

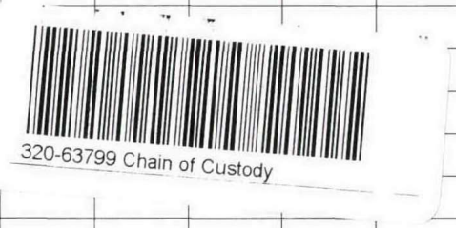
Turn Around Time: [X] Normal [ ] Rush — Please Specify

Quote No:

J-Flags: [X] Yes [X] No RLW

Analytical Methods (include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	PFAS + Trizma (537.1)	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
33065		954	8/13/20	X	2	GROUNDWATER
33068		1313	8/13/20	X	2	
33061		1424	8/13/20	X	2	
33053		1611	8/13/20	X	2	
33066		1721	8/13/20	X	2	
93066		1711	8/13/20	X	2	
33060		1017	8/13/20	X	2	



Project Information	
Number:	102896-006
Name:	YAKUTAT QUARTERLY
Contact:	AMJ
Ongoing Project?	Yes [X] No [ ]
Sampler:	RLW

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

Reliquished By: 1.	Reliquished By: 2.	Reliquished By: 3.
Signature: Time: 1200	Signature: Time: 1600	Signature: Time:
Printed Name: Rachel Willis Date: 8/17/20	Printed Name: Salvador Aragon Date: 8/18/20	Printed Name: Date:
Company: Shannon + Wilson Inc	Company: Eurofins 0.8 cm/1.2	Company:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: Time:	Signature: Time:	Signature: Time:
Printed Name: Date:	Printed Name: Date:	Printed Name: Date:
Company:	Company:	Company:

Notes:

PFAS x 18

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

No. 36279

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-63799-1

Login Number: 63799
List Number: 1
Creator: Thompson, Sarah W

List Source: Eurofins TestAmerica, Sacramento

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	1028104
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	GEL PACKS
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:

Veselina Yakimova

Title:

Geologist

Date:

8/24/2020

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

Eurofins TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-63799-1 Revision 1

Laboratory Report Date:

8/24/2020

CS Site Name:

ADOT&PF Yakutat Airport Sitewide PFAS

ADEC File Number:

1530.38.022

Hazard Identification Number:

27090

320-63799-1 Revision 1

Laboratory Report Date:

8/24/2020

CS Site Name:

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

1. Laboratory

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

   Yes☒ No☐ N/A☐ Comments:

   TestAmerica/Eurofins Laboratories West Sacramento, CA is CS certified for the analysis of perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) by method 537.

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

   Yes☐ No☐ N/A☒ Comments:

   Samples were not transferred to another laboratory.

2. Chain of Custody (CoC)

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

   Yes☒ No☐ N/A☐ Comments:

   b. Correct analyses requested?

   Yes☒ No☐ N/A☐ Comments:

3. Laboratory Sample Receipt Documentation

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

   Yes☒ No☐ N/A☐ Comments:

   Sample cooler temperature recorded at 1.2° C upon receipt at laboratory.

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

   Yes☒ No☐ N/A☐ Comments:

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Laboratory Report Date:

8/24/2020

CS Site Name:

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

Yes☒ No☐ N/A☐ Comments:

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

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

Yes☐ No☐ N/A☒ Comments:

See above.

e. Data quality or usability affected?

Comments:

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

4. Case Narrative

a. Present and understandable?

Yes☒ No☐ N/A☐ Comments:

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

Yes☒ No☐ N/A☐ Comments:

Samples *33068* and *33060* were noted to contain a thin layer of sediments at the bottom of the bottle prior to extraction.

Samples *33068, 33061* and *33060* have a little bit of discoloration.

There was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) associated with preparation batch 320-405325.

c. Were all corrective actions documented?

Yes☐ No☐ N/A☒ Comments:

No corrective actions were required.

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Laboratory Report Date:

8/24/2020

CS Site Name:

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

Comments:

The case narrative does not note an effect on data quality.

5. Samples Results

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

Yes☒ No☐ N/A☐ Comments:

b. All applicable holding times met?

Yes☒ No☐ N/A☐ Comments:

c. All soils reported on a dry weight basis?

Yes☐ No☐ N/A☒ Comments:

Soil samples were not submitted with this work order.

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

Yes☒ No☐ N/A☐ Comments:

e. Data quality or usability affected?

Data quality and/or usability were not affected.

6. QC Samples

a. Method Blank

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

Yes☒ No☐ N/A☐ Comments:

Laboratory Report Date:

8/24/2020

CS Site Name:

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

Yes☒ No☐ N/A☐ Comments:

No analytes were detected in the method blank.

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

Comments:

Not applicable, see above.

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

Yes☒ No☐ N/A☐ Comments:

See above.

v. Data quality or usability affected?

Comments:

No, see above.

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

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

Yes☒ No☐ N/A☐ Comments:

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

Yes☐ No☐ N/A☒ Comments:

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

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

Yes☒ No☐ N/A☐ Comments:

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

Yes☒ No☐ N/A☐ Comments:

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

Comments:

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

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

The data quality and/or usability were not affected.

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

Note: Leave blank if not required for project

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

Yes☐ No☒ N/A☐ Comments:

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:

See above.

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

Not applicable, see above.

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

Data quality and/or usability was not affected.

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

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

Yes☒ No☐ N/A☐ Comments:

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

Yes☒ No☐ N/A☐ Comments:

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

Yes☐ No☐ N/A☒ Comments:

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

iv. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected.

e. Trip Blanks

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

Yes☐ No☐ N/A☒ Comments:

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

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

No samples were affected.

v. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected.

f. Field Duplicate

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

Yes☒ No☐ N/A☐ Comments:

ii. Submitted blind to lab?

Yes☒ No☐ N/A☐ Comments:

The field-duplicate pair submitted with this work order are *33066/93066*.

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

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

Where R_1 = Sample Concentration
R_2 = Field Duplicate Concentration

Yes☒ No☐ N/A☐ Comments:

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

Comments:

The data quality and/or usability was not affected.

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

Yes☐ No☐ N/A☒ Comments:

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

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

Not applicable, see above.

iii. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected.

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

a. Defined and appropriate?

Yes☐ No☐ N/A☒ Comments:

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

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Laboratory Report Date:

8/24/2020

CS Site Name:

eurofins | Environment Testing America

ANALYTICAL REPORT

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

Laboratory Job ID: 320-67967-1
Client Project/Site: Yakutat PFAS

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

Attn: Ashley Jaramillo

Authorized for release by:
12/18/2020 3:14:14 PM

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

Table of Contents

Definitions/Glossary

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

Job ID: 320-67967-1

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: 320-67967-1

Laboratory: Eurofins TestAmerica, Sacramento

Narrative

Job Narrative
320-67967-1

Receipt
The samples were received on 12/16/2020 11:15 AM; the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 3.4º 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 320-443568.

Method 537.1 DW: The following samples are yellow prior to extraction: 33059 (320-67967-1), 33061 (320-67967-2), 33060 (320-67967-3), 43060 (320-67967-4), 33064 (320-67967-5) and 33068 (320-67967-6).

Method 537.1 DW: The following samples are yellow after final voluming: 33059 (320-67967-1), 33061 (320-67967-2), 33060 (320-67967-3), 43060 (320-67967-4), 33064 (320-67967-5) and 33068 (320-67967-6).

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 PFAS

Job ID: 320-67967-1

Client Sample ID: 33059 — Lab Sample ID: 320-67967-1

No Detections.

Client Sample ID: 33061 — Lab Sample ID: 320-67967-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluoroundecanoic acid (PFUnA)	0.57	J	1.7	0.43	ng/L	1		537.1 DW	Total/NA
Perfluorododecanoic acid (PFDoA)	0.61	J	1.7	0.43	ng/L	1		537.1 DW	Total/NA
Perfluorotridecanoic acid (PFTriA)	0.68	J	1.7	0.43	ng/L	1		537.1 DW	Total/NA
Perfluorotetradecanoic acid (PFTeA)	0.68	J	1.7	0.43	ng/L	1		537.1 DW	Total/NA
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	0.70	J	1.7	0.43	ng/L	1		537.1 DW	Total/NA
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	0.88	J	1.7	0.43	ng/L	1		537.1 DW	Total/NA
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	0.43	J	1.7	0.43	ng/L	1		537.1 DW	Total/NA
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	0.55	J	1.7	0.43	ng/L	1		537.1 DW	Total/NA

Client Sample ID: 33060 — Lab Sample ID: 320-67967-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	6.7		1.7	0.42	ng/L	1		537.1 DW	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.0		1.7	0.42	ng/L	1		537.1 DW	Total/NA
Perfluorooctanoic acid (PFOA)	1.9		1.7	0.42	ng/L	1		537.1 DW	Total/NA
Perfluorononanoic acid (PFNA)	0.48	J	1.7	0.42	ng/L	1		537.1 DW	Total/NA
Perfluorodecanoic acid (PFDA)	0.44	J	1.7	0.42	ng/L	1		537.1 DW	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.48	J	1.7	0.42	ng/L	1		537.1 DW	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	4.6		1.7	0.42	ng/L	1		537.1 DW	Total/NA
Perfluorooctanesulfonic acid (PFOS)	8.5		1.7	0.42	ng/L	1		537.1 DW	Total/NA

Client Sample ID: 43060 — Lab Sample ID: 320-67967-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	7.0		1.7	0.43	ng/L	1		537.1 DW	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.0		1.7	0.43	ng/L	1		537.1 DW	Total/NA
Perfluorooctanoic acid (PFOA)	1.9		1.7	0.43	ng/L	1		537.1 DW	Total/NA
Perfluorononanoic acid (PFNA)	0.66	J	1.7	0.43	ng/L	1		537.1 DW	Total/NA
Perfluorodecanoic acid (PFDA)	0.84	J	1.7	0.43	ng/L	1		537.1 DW	Total/NA
Perfluoroundecanoic acid (PFUnA)	0.63	J	1.7	0.43	ng/L	1		537.1 DW	Total/NA
Perfluorododecanoic acid (PFDoA)	0.68	J	1.7	0.43	ng/L	1		537.1 DW	Total/NA
Perfluorotridecanoic acid (PFTriA)	0.69	J	1.7	0.43	ng/L	1		537.1 DW	Total/NA
Perfluorotetradecanoic acid (PFTeA)	0.61	J	1.7	0.43	ng/L	1		537.1 DW	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.49	J	1.7	0.43	ng/L	1		537.1 DW	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	4.9		1.7	0.43	ng/L	1		537.1 DW	Total/NA
Perfluorooctanesulfonic acid (PFOS)	8.7		1.7	0.43	ng/L	1		537.1 DW	Total/NA
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	0.72	J	1.7	0.43	ng/L	1		537.1 DW	Total/NA
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	0.95	J	1.7	0.43	ng/L	1		537.1 DW	Total/NA
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	0.43	J	1.7	0.43	ng/L	1		537.1 DW	Total/NA
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	0.60	J	1.7	0.43	ng/L	1		537.1 DW	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

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

Job ID: 320-67967-1

Client Sample ID: 33064 — Lab Sample ID: 320-67967-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	0.43	J	1.7	0.43	ng/L	1		537.1 DW	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	7.1		1.7	0.43	ng/L	1		537.1 DW	Total/NA
Perfluorooctanesulfonic acid (PFOS)	4.0		1.7	0.43	ng/L	1		537.1 DW	Total/NA

Client Sample ID: 33068 — Lab Sample ID: 320-67967-6

No Detections.

This Detection Summary does not include radiochemical test results.

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

Job ID: 320-67967-1

Client Sample ID: 33059
Date Collected: 12/10/20 08:40
Date Received: 12/16/20 11:15

Lab Sample ID: 320-67967-1
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)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:10	1
Perfluoroheptanoic acid (PFHpA)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:10	1
Perfluorooctanoic acid (PFOA)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:10	1
Perfluorononanoic acid (PFNA)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:10	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:10	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:10	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:10	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:10	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:10	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:10	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:10	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:10	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:10	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:10	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:10	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:10	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:10	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:10	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*97*		*70 - 130*	*12/17/20 18:42*	*12/18/20 11:10*	*1*
13C2 PFDA	*96*		*70 - 130*	*12/17/20 18:42*	*12/18/20 11:10*	*1*
d5-NEtFOSAA	*89*		*70 - 130*	*12/17/20 18:42*	*12/18/20 11:10*	*1*
13C3 HFPO-DA	*91*		*70 - 130*	*12/17/20 18:42*	*12/18/20 11:10*	*1*

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

Job ID: 320-67967-1

Client Sample ID: 33061
Date Collected: 12/10/20 10:31
Date Received: 12/16/20 11:15

Lab Sample ID: 320-67967-2
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		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:17	1
Perfluoroheptanoic acid (PFHpA)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:17	1
Perfluorooctanoic acid (PFOA)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:17	1
Perfluorononanoic acid (PFNA)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:17	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:17	1
Perfluoroundecanoic acid (PFUnA)	**0.57**	**J**	1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:17	1
Perfluorododecanoic acid (PFDoA)	**0.61**	**J**	1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:17	1
Perfluorotridecanoic acid (PFTriA)	**0.68**	**J**	1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:17	1
Perfluorotetradecanoic acid (PFTeA)	**0.68**	**J**	1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:17	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:17	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:17	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:17	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	**0.70**	**J**	1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:17	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	**0.88**	**J**	1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:17	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	**0.43**	**J**	1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:17	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	**0.55**	**J**	1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:17	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:17	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:17	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*93*		*70 - 130*	*12/17/20 18:42*	*12/18/20 11:17*	*1*
13C2 PFDA	*91*		*70 - 130*	*12/17/20 18:42*	*12/18/20 11:17*	*1*
d5-NEtFOSAA	*90*		*70 - 130*	*12/17/20 18:42*	*12/18/20 11:17*	*1*
13C3 HFPO-DA	*87*		*70 - 130*	*12/17/20 18:42*	*12/18/20 11:17*	*1*

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

Job ID: 320-67967-1

Client Sample ID: 33060

Date Collected: 12/10/20 11:12
Date Received: 12/16/20 11:15

Lab Sample ID: 320-67967-3

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)	**6.7**		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:25	1
Perfluoroheptanoic acid (PFHpA)	**2.0**		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:25	1
Perfluorooctanoic acid (PFOA)	**1.9**		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:25	1
Perfluorononanoic acid (PFNA)	**0.48**	**J**	1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:25	1
Perfluorodecanoic acid (PFDA)	**0.44**	**J**	1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:25	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:25	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:25	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:25	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:25	1
Perfluorobutanesulfonic acid (PFBS)	**0.48**	**J**	1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:25	1
Perfluorohexanesulfonic acid (PFHxS)	**4.6**		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:25	1
Perfluorooctanesulfonic acid (PFOS)	**8.5**		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:25	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:25	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:25	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:25	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	ND		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:25	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:25	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:25	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*93*		*70 - 130*	*12/17/20 18:42*	*12/18/20 11:25*	*1*
13C2 PFDA	*87*		*70 - 130*	*12/17/20 18:42*	*12/18/20 11:25*	*1*
d5-NEtFOSAA	*86*		*70 - 130*	*12/17/20 18:42*	*12/18/20 11:25*	*1*
13C3 HFPO-DA	*84*		*70 - 130*	*12/17/20 18:42*	*12/18/20 11:25*	*1*

Client Sample ID: 43060

Date Collected: 12/10/20 11:02
Date Received: 12/16/20 11:15

Lab Sample ID: 320-67967-4

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)	7.0		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:33	1
Perfluoroheptanoic acid (PFHpA)	2.0		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:33	1
Perfluorooctanoic acid (PFOA)	1.9		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:33	1
Perfluorononanoic acid (PFNA)	0.66	J	1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:33	1
Perfluorodecanoic acid (PFDA)	0.84	J	1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:33	1
Perfluoroundecanoic acid (PFUnA)	0.63	J	1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:33	1
Perfluorododecanoic acid (PFDoA)	0.68	J	1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:33	1
Perfluorotridecanoic acid (PFTriA)	0.69	J	1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:33	1
Perfluorotetradecanoic acid (PFTeA)	0.61	J	1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:33	1
Perfluorobutanesulfonic acid (PFBS)	0.49	J	1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:33	1
Perfluorohexanesulfonic acid (PFHxS)	4.9		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:33	1
Perfluorooctanesulfonic acid (PFOS)	8.7		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:33	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	0.72	J	1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:33	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	0.95	J	1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:33	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	0.43	J	1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:33	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	0.60	J	1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:33	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:33	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:33	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*96*		*70 - 130*	*12/17/20 18:42*	*12/18/20 11:33*	*1*
13C2 PFDA	*92*		*70 - 130*	*12/17/20 18:42*	*12/18/20 11:33*	*1*
d5-NEtFOSAA	*86*		*70 - 130*	*12/17/20 18:42*	*12/18/20 11:33*	*1*
13C3 HFPO-DA	*87*		*70 - 130*	*12/17/20 18:42*	*12/18/20 11:33*	*1*

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

Job ID: 320-67967-1

Client Sample ID: 33064
Date Collected: 12/10/20 14:10
Date Received: 12/16/20 11:15

Lab Sample ID: 320-67967-5
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		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:40	1
Perfluoroheptanoic acid (PFHpA)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:40	1
Perfluorooctanoic acid (PFOA)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:40	1
Perfluorononanoic acid (PFNA)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:40	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:40	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:40	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:40	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:40	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:40	1
Perfluorobutanesulfonic acid (PFBS)	**0.43**	**J**	1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:40	1
Perfluorohexanesulfonic acid (PFHxS)	**7.1**		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:40	1
Perfluorooctanesulfonic acid (PFOS)	**4.0**		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:40	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:40	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:40	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:40	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:40	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:40	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.7	0.43	ng/L		12/17/20 18:42	12/18/20 11:40	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*98*		*70 - 130*	*12/17/20 18:42*	*12/18/20 11:40*	*1*
13C2 PFDA	*94*		*70 - 130*	*12/17/20 18:42*	*12/18/20 11:40*	*1*
d5-NEtFOSAA	*86*		*70 - 130*	*12/17/20 18:42*	*12/18/20 11:40*	*1*
13C3 HFPO-DA	*89*		*70 - 130*	*12/17/20 18:42*	*12/18/20 11:40*	*1*

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

Job ID: 320-67967-1

Client Sample ID: 33068
Date Collected: 12/10/20 14:45
Date Received: 12/16/20 11:15

Lab Sample ID: 320-67967-6
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)	ND		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:48	1
Perfluoroheptanoic acid (PFHpA)	ND		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:48	1
Perfluorooctanoic acid (PFOA)	ND		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:48	1
Perfluorononanoic acid (PFNA)	ND		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:48	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:48	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:48	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:48	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:48	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:48	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:48	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:48	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:48	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:48	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:48	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:48	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	ND		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:48	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:48	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.7	0.42	ng/L		12/17/20 18:42	12/18/20 11:48	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*95*		*70 - 130*	*12/17/20 18:42*	*12/18/20 11:48*	*1*
13C2 PFDA	*93*		*70 - 130*	*12/17/20 18:42*	*12/18/20 11:48*	*1*
d5-NEtFOSAA	*83*		*70 - 130*	*12/17/20 18:42*	*12/18/20 11:48*	*1*
13C3 HFPO-DA	*87*		*70 - 130*	*12/17/20 18:42*	*12/18/20 11:48*	*1*

Surrogate Summary

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

Job ID: 320-67967-1

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)
320-67967-1	33059	97	96	89	91
320-67967-2	33061	93	91	90	87
320-67967-3	33060	93	87	86	84
320-67967-4	43060	96	92	86	87
320-67967-5	33064	98	94	86	89
320-67967-6	33068	95	93	83	87
LLCS 320-443568/2-A	Lab Control Sample	88	85	85	81
LLCSD 320-443568/3-A	Lab Control Sample Dup	94	92	88	84
MB 320-443568/1-A	Method Blank	90	91	84	82

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 320-443568/1-A
Matrix: Water
Analysis Batch: 443779

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 443568

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.50	ng/L		12/17/20 18:42	12/18/20 11:02	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.50	ng/L		12/17/20 18:42	12/18/20 11:02	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.50	ng/L		12/17/20 18:42	12/18/20 11:02	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.50	ng/L		12/17/20 18:42	12/18/20 11:02	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.50	ng/L		12/17/20 18:42	12/18/20 11:02	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	0.50	ng/L		12/17/20 18:42	12/18/20 11:02	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.50	ng/L		12/17/20 18:42	12/18/20 11:02	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	0.50	ng/L		12/17/20 18:42	12/18/20 11:02	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.50	ng/L		12/17/20 18:42	12/18/20 11:02	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.50	ng/L		12/17/20 18:42	12/18/20 11:02	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.50	ng/L		12/17/20 18:42	12/18/20 11:02	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.50	ng/L		12/17/20 18:42	12/18/20 11:02	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		2.0	0.50	ng/L		12/17/20 18:42	12/18/20 11:02	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		2.0	0.50	ng/L		12/17/20 18:42	12/18/20 11:02	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		2.0	0.50	ng/L		12/17/20 18:42	12/18/20 11:02	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	ND		2.0	0.50	ng/L		12/17/20 18:42	12/18/20 11:02	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		2.0	0.50	ng/L		12/17/20 18:42	12/18/20 11:02	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.50	ng/L		12/17/20 18:42	12/18/20 11:02	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*90*		*70 - 130*	*12/17/20 18:42*	*12/18/20 11:02*	*1*
13C2 PFDA	*91*		*70 - 130*	*12/17/20 18:42*	*12/18/20 11:02*	*1*
d5-NEtFOSAA	*84*		*70 - 130*	*12/17/20 18:42*	*12/18/20 11:02*	*1*
13C3 HFPO-DA	*82*		*70 - 130*	*12/17/20 18:42*	*12/18/20 11:02*	*1*

Lab Sample ID: LLCS 320-443568/2-A
Matrix: Water
Analysis Batch: 443779

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 443568

Analyte	Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorohexanoic acid (PFHxA)	4.00	3.20		ng/L		80	50 - 150
Perfluoroheptanoic acid (PFHpA)	4.00	3.45		ng/L		86	50 - 150
Perfluorooctanoic acid (PFOA)	4.00	3.66		ng/L		91	50 - 150
Perfluorononanoic acid (PFNA)	4.00	3.35		ng/L		84	50 - 150
Perfluorodecanoic acid (PFDA)	4.00	3.28		ng/L		82	50 - 150
Perfluoroundecanoic acid (PFUnA)	4.00	3.45		ng/L		86	50 - 150
Perfluorododecanoic acid (PFDoA)	4.00	3.44		ng/L		86	50 - 150
Perfluorotridecanoic acid (PFTriA)	4.00	3.31		ng/L		83	50 - 150
Perfluorotetradecanoic acid (PFTeA)	4.00	3.44		ng/L		86	50 - 150
Perfluorobutanesulfonic acid (PFBS)	3.54	3.14		ng/L		89	50 - 150

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

Lab Sample ID: LLCS 320-443568/2-A
Matrix: Water
Analysis Batch: 443779

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 443568

Analyte			Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorohexanesulfonic acid (PFHxS)			3.64	3.44		ng/L		95	50 - 150		
Perfluorooctanesulfonic acid (PFOS)			3.71	3.39		ng/L		91	50 - 150		
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			4.00	3.19		ng/L		80	50 - 150		
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			4.00	3.42		ng/L		86	50 - 150		
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O			3.73	3.14		ng/L		84	50 - 150		
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF			3.77	3.24		ng/L		86	50 - 150		
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			4.00	3.36		ng/L		84	50 - 150		
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			3.77	3.20		ng/L		85	50 - 150		

Surrogate	*LLCS %Recovery*	*LLCS Qualifier*	*Limits*
13C2 PFHxA	*88*		*70 - 130*
13C2 PFDA	*85*		*70 - 130*
d5-NEtFOSAA	*85*		*70 - 130*
13C3 HFPO-DA	*81*		*70 - 130*

Lab Sample ID: LLCSD 320-443568/3-A
Matrix: Water
Analysis Batch: 443779

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 443568

Analyte			Spike Added	LLCSD Result	LLCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)			4.00	3.38		ng/L		84	50 - 150	5	50
Perfluoroheptanoic acid (PFHpA)			4.00	3.56		ng/L		89	50 - 150	3	50
Perfluorooctanoic acid (PFOA)			4.00	3.68		ng/L		92	50 - 150	0.5	50
Perfluorononanoic acid (PFNA)			4.00	3.86		ng/L		97	50 - 150	14	50
Perfluorodecanoic acid (PFDA)			4.00	3.36		ng/L		84	50 - 150	2	50
Perfluoroundecanoic acid (PFUnA)			4.00	3.39		ng/L		85	50 - 150	2	50
Perfluorododecanoic acid (PFDoA)			4.00	3.55		ng/L		89	50 - 150	3	50
Perfluorotridecanoic acid (PFTriA)			4.00	3.67		ng/L		92	50 - 150	10	50
Perfluorotetradecanoic acid (PFTeA)			4.00	3.60		ng/L		90	50 - 150	4	50
Perfluorobutanesulfonic acid (PFBS)			3.54	3.24		ng/L		92	50 - 150	3	50
Perfluorohexanesulfonic acid (PFHxS)			3.64	3.34		ng/L		92	50 - 150	3	50
Perfluorooctanesulfonic acid (PFOS)			3.71	3.33		ng/L		90	50 - 150	2	50
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			4.00	3.37		ng/L		84	50 - 150	5	50
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			4.00	3.58		ng/L		89	50 - 150	4	50
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O			3.73	3.22		ng/L		86	50 - 150	2	50

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

Lab Sample ID: LLCSD 320-443568/3-A
Matrix: Water
Analysis Batch: 443779

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 443568

Analyte			Spike Added	LLCSD Result	LLCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF			3.77	3.19		ng/L		85	50 - 150	2	50
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			4.00	3.59		ng/L		90	50 - 150	7	50
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			3.77	3.41		ng/L		90	50 - 150	6	50

Surrogate	*LLCSD %Recovery*	*LLCSD Qualifier*	*Limits*
13C2 PFHxA	*94*		*70 - 130*
13C2 PFDA	*92*		*70 - 130*
d5-NEtFOSAA	*88*		*70 - 130*
13C3 HFPO-DA	*84*		*70 - 130*

LCMS

Prep Batch: 443568

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-67967-1	33059	Total/NA	Water	537.1 DW	
320-67967-2	33061	Total/NA	Water	537.1 DW	
320-67967-3	33060	Total/NA	Water	537.1 DW	
320-67967-4	43060	Total/NA	Water	537.1 DW	
320-67967-5	33064	Total/NA	Water	537.1 DW	
320-67967-6	33068	Total/NA	Water	537.1 DW	
MB 320-443568/1-A	Method Blank	Total/NA	Water	537.1 DW	
LLCS 320-443568/2-A	Lab Control Sample	Total/NA	Water	537.1 DW	
LLCSD 320-443568/3-A	Lab Control Sample Dup	Total/NA	Water	537.1 DW	

Analysis Batch: 443779

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-67967-1	33059	Total/NA	Water	537.1 DW	443568
320-67967-2	33061	Total/NA	Water	537.1 DW	443568
320-67967-3	33060	Total/NA	Water	537.1 DW	443568
320-67967-4	43060	Total/NA	Water	537.1 DW	443568
320-67967-5	33064	Total/NA	Water	537.1 DW	443568
320-67967-6	33068	Total/NA	Water	537.1 DW	443568
MB 320-443568/1-A	Method Blank	Total/NA	Water	537.1 DW	443568
LLCS 320-443568/2-A	Lab Control Sample	Total/NA	Water	537.1 DW	443568
LLCSD 320-443568/3-A	Lab Control Sample Dup	Total/NA	Water	537.1 DW	443568

Lab Chronicle

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

Job ID: 320-67967-1

Client Sample ID: 33059
Date Collected: 12/10/20 08:40
Date Received: 12/16/20 11:15

Lab Sample ID: 320-67967-1
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			290.2 mL	1.00 mL	443568	12/17/20 18:42	PV	TAL SAC
Total/NA	Analysis	537.1 DW		1			443779	12/18/20 11:10	SK	TAL SAC

Client Sample ID: 33061
Date Collected: 12/10/20 10:31
Date Received: 12/16/20 11:15

Lab Sample ID: 320-67967-2
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			290 mL	1.00 mL	443568	12/17/20 18:42	PV	TAL SAC
Total/NA	Analysis	537.1 DW		1			443779	12/18/20 11:17	SK	TAL SAC

Client Sample ID: 33060
Date Collected: 12/10/20 11:12
Date Received: 12/16/20 11:15

Lab Sample ID: 320-67967-3
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			296.4 mL	1.00 mL	443568	12/17/20 18:42	PV	TAL SAC
Total/NA	Analysis	537.1 DW		1			443779	12/18/20 11:25	SK	TAL SAC

Client Sample ID: 43060
Date Collected: 12/10/20 11:02
Date Received: 12/16/20 11:15

Lab Sample ID: 320-67967-4
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			292.6 mL	1.00 mL	443568	12/17/20 18:42	PV	TAL SAC
Total/NA	Analysis	537.1 DW		1			443779	12/18/20 11:33	SK	TAL SAC

Client Sample ID: 33064
Date Collected: 12/10/20 14:10
Date Received: 12/16/20 11:15

Lab Sample ID: 320-67967-5
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			287.9 mL	1.00 mL	443568	12/17/20 18:42	PV	TAL SAC
Total/NA	Analysis	537.1 DW		1			443779	12/18/20 11:40	SK	TAL SAC

Client Sample ID: 33068
Date Collected: 12/10/20 14:45
Date Received: 12/16/20 11:15

Lab Sample ID: 320-67967-6
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			300.2 mL	1.00 mL	443568	12/17/20 18:42	PV	TAL SAC
Total/NA	Analysis	537.1 DW		1			443779	12/18/20 11:48	SK	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 PFAS

Job ID: 320-67967-1

Laboratory: Eurofins TestAmerica, Sacramento

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	17-020	01-20-21
ANAB	Dept. of Defense ELAP	L2468	01-20-21
ANAB	Dept. of Energy	L2468.01	01-20-21
ANAB	ISO/IEC 17025	L2468	01-20-21
Arizona	State	AZ0708	08-11-21
Arkansas DEQ	State	88-0691	06-17-21
California	State	2897	01-31-22
Colorado	State	CA0004	08-31-21
Connecticut	State	PH-0691	06-30-21
Florida	NELAP	E87570	06-30-21
Georgia	State	4040	01-30-21
Hawaii	State	<cert No.>	01-29-21
Illinois	NELAP	200060	03-17-21
Kansas	NELAP	E-10375	10-31-20 *
Louisiana	NELAP	01944	06-30-21
Maine	State	CA00004	04-14-22
Michigan	State	9947	08-03-23
Nevada	State	CA000442021-2	07-31-21
New Hampshire	NELAP	2997	04-18-21
New Jersey	NELAP	CA005	06-30-21
New York	NELAP	11666	04-01-21
Oregon	NELAP	4040	01-29-21
Pennsylvania	NELAP	68-01272	03-31-21
Texas	NELAP	T104704399-19-13	06-01-21
US Fish & Wildlife	US Federal Programs	58448	07-31-21
USDA	US Federal Programs	P330-18-00239	07-31-21
Utah	NELAP	CA000442019-01	02-28-21
Vermont	State	VT-4040	04-16-21
Virginia	NELAP	460278	03-14-21
Washington	State	C581	05-05-21
West Virginia (DW)	State	9930C	12-31-20
Wisconsin	State	998204680	08-31-21
Wyoming	State Program	8TMS-L	01-28-19 *

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Method Summary

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

Job ID: 320-67967-1

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 PFAS

Job ID: 320-67967-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
320-67967-1	33059	Water	12/10/20 08:40	12/16/20 11:15	
320-67967-2	33061	Water	12/10/20 10:31	12/16/20 11:15	
320-67967-3	33060	Water	12/10/20 11:12	12/16/20 11:15	
320-67967-4	43060	Water	12/10/20 11:02	12/16/20 11:15	
320-67967-5	33064	Water	12/10/20 14:10	12/16/20 11:15	
320-67967-6	33068	Water	12/10/20 14:45	12/16/20 11:15	

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 Test America
Attn: D. Alltucker

Analytical Methods (include preservative if used)

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

Sample Identity	Lab No.	Time	Date Sampled	PFAS	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
33059		0840	12/10/20	X	2	groundwater + Trizma
33061		1031	12/10/20	X	2	
33060		1112		X	2	
43060		1102		X	2	
33064		1410		X	2	
33068		1445		X	2	

320-67967 Chain of Custody

Project Information		Sample Receipt	
Number:	102986-006	Total No. of Containers:	12
Name:	# Yakutat PFAS	COC Seals/Intact? Y/N/NA	Y
Contact:	AMJ	Received Good Cond./Cold	Y
Ongoing Project?	Yes [X] No [ ]	Temp:	3.4°C
Sampler:	ARM	Delivery Method:	Goldstreak

Notes:

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 1200	Signature: Time:	Signature: Time:
Printed Name: Sheila Hinckley Date: 12/14/20	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson, Inc	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 1415	Signature: Time:	Signature: Time:
Printed Name: Date: 12/14/20	Printed Name: Date:	Printed Name: Date:
Company: ETAW Sac	Company:	Company:

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

3.1°C

No. 36191

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-67967-1

Login Number: 67967
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	Seals
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	Only gel packs
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:

Veselina Yakimova

Title:

Geologist

Date:

12/21/2020

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

Eurofins TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-67967-1

Laboratory Report Date:

12/18/2020

CS Site Name:

ADOT&PF Yakutat Airport Sitewide PFAS

ADEC File Number:

1530.38.022

Hazard Identification Number:

27090

320-67967-1

Laboratory Report Date:

12/18/2020

CS Site Name:

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

1. Laboratory

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

   Yes☒ No☐ N/A☐ Comments:

   TestAmerica/Eurofins Laboratories West Sacramento, CA is CS certified for the analysis of perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) by method 537.

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

   Yes☐ No☐ N/A☒ Comments:

   Samples were not transferred to another laboratory.

2. Chain of Custody (CoC)

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

   Yes☒ No☐ N/A☐ Comments:

   b. Correct analyses requested?

   Yes☒ No☐ N/A☐ Comments:

3. Laboratory Sample Receipt Documentation

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

   Yes☒ No☐ N/A☐ Comments:

   Sample cooler temperature recorded at 3.4° C upon receipt at laboratory.

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

   Yes☒ No☐ N/A☐ Comments:

320-67967-1

Laboratory Report Date:

12/18/2020

CS Site Name:

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

Yes☒ No☐ N/A☐ Comments:

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

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

Yes☐ No☐ N/A☒ Comments:

See above.

e. Data quality or usability affected?

Comments:

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

4. Case Narrative

a. Present and understandable?

Yes☒ No☐ N/A☐ Comments:

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

Yes☒ No☐ N/A☐ Comments:

Samples *33059, 33061, 33064, 33068, 43060* and *33060* were noted to be yellow prior to extraction and after final voluming.

There was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) associated with preparation batch 320-443568.

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:

The case narrative does not note an effect on data quality.

320-67967-1

Laboratory Report Date:

12/18/2020

CS Site Name:

5. Samples Results

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

Yes☒ No☐ N/A☐ Comments:

b. All applicable holding times met?

Yes☒ No☐ N/A☐ Comments:

c. All soils reported on a dry weight basis?

Yes☐ No☐ N/A☒ Comments:

Soil samples were not submitted with this work order.

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

Yes☒ No☐ N/A☐ Comments:

e. Data quality or usability affected?

Data quality and/or usability were not affected.

6. QC Samples

a. Method Blank

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

Yes☒ No☐ N/A☐ Comments:

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.

320-67967-1

Laboratory Report Date:

12/18/2020

CS Site Name:

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

Comments:

Not applicable, see above.

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

Yes☒ No☐ N/A☐ Comments:

See above.

v. Data quality or usability affected?

Comments:

No, see above.

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

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

Yes☒ No☐ N/A☐ Comments:

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

Yes☐ No☐ N/A☒ Comments:

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

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

Yes☒ No☐ N/A☐ Comments:

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:

320-67967-1

Laboratory Report Date:

12/18/2020

CS Site Name:

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

Comments:

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

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

The data quality and/or usability were not affected.

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

Note: Leave blank if not required for project

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

Yes☐ No☒ N/A☐ Comments:

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:

See above.

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Yes☐ No☐ N/A☒ Comments:

See above.

320-67967-1

Laboratory Report Date:

12/18/2020

CS Site Name:

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

Comments:

Not applicable, see above.

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

Data quality and/or usability was not affected.

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

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

Yes☒ No☐ N/A☐ Comments:

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

Yes☒ No☐ N/A☐ Comments:

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

Yes☐ No☐ N/A☒ Comments:

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

iv. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected.

320-67967-1

Laboratory Report Date:

12/18/2020

CS Site Name:

e. Trip Blanks

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

Yes☐ No☐ N/A☒ Comments:

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

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

No samples were affected.

v. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected.

f. Field Duplicate

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

Yes☒ No☐ N/A☐ Comments:

ii. Submitted blind to lab?

Yes☒ No☐ N/A☐ Comments:

The field-duplicate pair submitted with this work order are *33060/43060*.

320-67967-1

Laboratory Report Date:

12/18/2020

CS Site Name:

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

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

Where R_1 = Sample Concentration
R_2 = Field Duplicate Concentration

Yes☐ No☒ N/A☐ Comments:

The RPD was calculated above 30% for PFNA and PFDA. These analytes were detected at estimated concentrations below the reporting limit for the duplicate pair. The concentrations are flagged "J" by the laboratory to note estimated result; no further flags have been applied for the RPD failure. PFUnA, PFDoA, PFTriA, PFTeA, NMeFOSAA, NEtFOSAA, 9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid, and 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid were detected in sample *43060* below the LOQ and were not detected in sample *33060.* RPDs could not be calculated for these analytes.

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

Comments:

The data quality and/or usability was not affected.

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

Yes☐ No☐ N/A☒ Comments:

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

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

Not applicable, see above.

iii. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected.

320-67967-1

Laboratory Report Date:

12/18/2020

CS Site Name:

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

a. Defined and appropriate?

Yes☐ No☐ N/A☒ Comments:

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

eurofins | Environment Testing America

ANALYTICAL REPORT

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

Laboratory Job ID: 320-71904-1
Client Project/Site: Yakutat Airport

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

Attn: Ashley Jaramillo

Authorized for release by:
4/8/2021 10:05:42 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: 320-71904-1

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: 320-71904-1

Laboratory: Eurofins TestAmerica, Sacramento

Narrative

Job Narrative
320-71904-1

Receipt
The samples were received on 3/31/2021 3:19 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 2.8º C.

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

Organic Prep
Method 3535: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-476044.

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: 320-71904-1

Client Sample ID: 43059 — Lab Sample ID: 320-71904-1

No Detections.

Client Sample ID: 33059 — Lab Sample ID: 320-71904-2

No Detections.

Client Sample ID: 33061 — Lab Sample ID: 320-71904-3

No Detections.

Client Sample ID: 33064 — Lab Sample ID: 320-71904-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	1.3		1.7	0.50	ng/L	1	EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	2.3		1.7	0.47	ng/L	1	EPA 537(Mod)	Total/NA

Client Sample ID: 33060 — Lab Sample ID: 320-71904-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	1.8		1.8	0.51	ng/L	1	EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.92		1.8	0.22	ng/L	1	EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	1.5		1.8	0.75	ng/L	1	EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.51		1.8	0.24	ng/L	1	EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.63		1.8	0.18	ng/L	1	EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	4.7		1.8	0.50	ng/L	1	EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	6.6		1.8	0.48	ng/L	1	EPA 537(Mod)	Total/NA

Client Sample ID: 33068 — Lab Sample ID: 320-71904-6

No Detections.

This Detection Summary does not include radiochemical test results.

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

Job ID: 320-71904-1

Client Sample ID: 43059
Date Collected: 03/24/21 10:20
Date Received: 03/31/21 15:19

Lab Sample ID: 320-71904-1
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		1.7	0.50	ng/L		04/02/21 05:08	04/04/21 20:50	1
Perfluoroheptanoic acid (PFHpA)	ND		1.7	0.22	ng/L		04/02/21 05:08	04/04/21 20:50	1
Perfluorooctanoic acid (PFOA)	ND		1.7	0.73	ng/L		04/02/21 05:08	04/04/21 20:50	1
Perfluorononanoic acid (PFNA)	ND		1.7	0.23	ng/L		04/02/21 05:08	04/04/21 20:50	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.27	ng/L		04/02/21 05:08	04/04/21 20:50	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.95	ng/L		04/02/21 05:08	04/04/21 20:50	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.48	ng/L		04/02/21 05:08	04/04/21 20:50	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	1.1	ng/L		04/02/21 05:08	04/04/21 20:50	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.63	ng/L		04/02/21 05:08	04/04/21 20:50	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.7	0.17	ng/L		04/02/21 05:08	04/04/21 20:50	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.7	0.49	ng/L		04/02/21 05:08	04/04/21 20:50	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.7	0.47	ng/L		04/02/21 05:08	04/04/21 20:50	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.3	1.0	ng/L		04/02/21 05:08	04/04/21 20:50	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.3	1.1	ng/L		04/02/21 05:08	04/04/21 20:50	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.7	0.21	ng/L		04/02/21 05:08	04/04/21 20:50	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.5	1.3	ng/L		04/02/21 05:08	04/04/21 20:50	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.7	0.28	ng/L		04/02/21 05:08	04/04/21 20:50	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.7	0.35	ng/L		04/02/21 05:08	04/04/21 20:50	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*90*		*50 - 150*	*04/02/21 05:08*	*04/04/21 20:50*	*1*
13C4 PFHpA	*98*		*50 - 150*	*04/02/21 05:08*	*04/04/21 20:50*	*1*
13C4 PFOA	*97*		*50 - 150*	*04/02/21 05:08*	*04/04/21 20:50*	*1*
13C5 PFNA	*93*		*50 - 150*	*04/02/21 05:08*	*04/04/21 20:50*	*1*
13C2 PFDA	*85*		*50 - 150*	*04/02/21 05:08*	*04/04/21 20:50*	*1*
13C2 PFUnA	*86*		*50 - 150*	*04/02/21 05:08*	*04/04/21 20:50*	*1*
13C2 PFDoA	*100*		*50 - 150*	*04/02/21 05:08*	*04/04/21 20:50*	*1*
13C2 PFTeDA	*108*		*50 - 150*	*04/02/21 05:08*	*04/04/21 20:50*	*1*
13C3 PFBS	*89*		*50 - 150*	*04/02/21 05:08*	*04/04/21 20:50*	*1*
18O2 PFHxS	*94*		*50 - 150*	*04/02/21 05:08*	*04/04/21 20:50*	*1*
13C4 PFOS	*87*		*50 - 150*	*04/02/21 05:08*	*04/04/21 20:50*	*1*
d3-NMeFOSAA	*91*		*50 - 150*	*04/02/21 05:08*	*04/04/21 20:50*	*1*
d5-NEtFOSAA	*86*		*50 - 150*	*04/02/21 05:08*	*04/04/21 20:50*	*1*
13C3 HFPO-DA	*106*		*50 - 150*	*04/02/21 05:08*	*04/04/21 20:50*	*1*

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

Job ID: 320-71904-1

Client Sample ID: 33059
Date Collected: 03/24/21 10:30
Date Received: 03/31/21 15:19

Lab Sample ID: 320-71904-2
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		1.7	0.51	ng/L		04/02/21 05:08	04/04/21 21:00	1
Perfluoroheptanoic acid (PFHpA)	ND		1.7	0.22	ng/L		04/02/21 05:08	04/04/21 21:00	1
Perfluorooctanoic acid (PFOA)	ND		1.7	0.74	ng/L		04/02/21 05:08	04/04/21 21:00	1
Perfluorononanoic acid (PFNA)	ND		1.7	0.24	ng/L		04/02/21 05:08	04/04/21 21:00	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.27	ng/L		04/02/21 05:08	04/04/21 21:00	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.96	ng/L		04/02/21 05:08	04/04/21 21:00	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.48	ng/L		04/02/21 05:08	04/04/21 21:00	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	1.1	ng/L		04/02/21 05:08	04/04/21 21:00	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.64	ng/L		04/02/21 05:08	04/04/21 21:00	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.7	0.17	ng/L		04/02/21 05:08	04/04/21 21:00	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.7	0.50	ng/L		04/02/21 05:08	04/04/21 21:00	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.7	0.47	ng/L		04/02/21 05:08	04/04/21 21:00	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.4	1.0	ng/L		04/02/21 05:08	04/04/21 21:00	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.4	1.1	ng/L		04/02/21 05:08	04/04/21 21:00	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.7	0.21	ng/L		04/02/21 05:08	04/04/21 21:00	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.5	1.3	ng/L		04/02/21 05:08	04/04/21 21:00	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.7	0.28	ng/L		04/02/21 05:08	04/04/21 21:00	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.7	0.35	ng/L		04/02/21 05:08	04/04/21 21:00	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*91*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:00*	*1*
13C4 PFHpA	*89*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:00*	*1*
13C4 PFOA	*96*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:00*	*1*
13C5 PFNA	*95*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:00*	*1*
13C2 PFDA	*91*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:00*	*1*
13C2 PFUnA	*84*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:00*	*1*
13C2 PFDoA	*90*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:00*	*1*
13C2 PFTeDA	*107*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:00*	*1*
13C3 PFBS	*84*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:00*	*1*
18O2 PFHxS	*97*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:00*	*1*
13C4 PFOS	*87*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:00*	*1*
d3-NMeFOSAA	*81*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:00*	*1*
d5-NEtFOSAA	*85*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:00*	*1*
13C3 HFPO-DA	*98*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:00*	*1*

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

Job ID: 320-71904-1

Client Sample ID: 33061
Date Collected: 03/24/21 11:35
Date Received: 03/31/21 15:19

Lab Sample ID: 320-71904-3
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		04/02/21 05:08	04/04/21 21:09	1
Perfluoroheptanoic acid (PFHpA)	ND		1.7	0.22	ng/L		04/02/21 05:08	04/04/21 21:09	1
Perfluorooctanoic acid (PFOA)	ND		1.7	0.74	ng/L		04/02/21 05:08	04/04/21 21:09	1
Perfluorononanoic acid (PFNA)	ND		1.7	0.24	ng/L		04/02/21 05:08	04/04/21 21:09	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.27	ng/L		04/02/21 05:08	04/04/21 21:09	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.96	ng/L		04/02/21 05:08	04/04/21 21:09	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.48	ng/L		04/02/21 05:08	04/04/21 21:09	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	1.1	ng/L		04/02/21 05:08	04/04/21 21:09	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.64	ng/L		04/02/21 05:08	04/04/21 21:09	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.7	0.17	ng/L		04/02/21 05:08	04/04/21 21:09	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.7	0.50	ng/L		04/02/21 05:08	04/04/21 21:09	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.7	0.47	ng/L		04/02/21 05:08	04/04/21 21:09	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.4	1.0	ng/L		04/02/21 05:08	04/04/21 21:09	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.4	1.1	ng/L		04/02/21 05:08	04/04/21 21:09	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.7	0.21	ng/L		04/02/21 05:08	04/04/21 21:09	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.5	1.3	ng/L		04/02/21 05:08	04/04/21 21:09	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.7	0.28	ng/L		04/02/21 05:08	04/04/21 21:09	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.7	0.35	ng/L		04/02/21 05:08	04/04/21 21:09	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*89*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:09*	
13C4 PFHpA	*91*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:09*	
13C4 PFOA	*84*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:09*	
13C5 PFNA	*89*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:09*	
13C2 PFDA	*82*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:09*	
13C2 PFUnA	*86*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:09*	
13C2 PFDoA	*89*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:09*	
13C2 PFTeDA	*108*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:09*	
13C3 PFBS	*76*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:09*	
18O2 PFHxS	*87*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:09*	
13C4 PFOS	*80*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:09*	
d3-NMeFOSAA	*79*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:09*	
d5-NEtFOSAA	*80*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:09*	
13C3 HFPO-DA	*101*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:09*	

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

Job ID: 320-71904-1

Client Sample ID: 33064
Date Collected: 03/24/21 12:35
Date Received: 03/31/21 15:19

Lab Sample ID: 320-71904-4
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		1.7	0.51	ng/L		04/02/21 05:08	04/04/21 21:18	1
Perfluoroheptanoic acid (PFHpA)	ND		1.7	0.22	ng/L		04/02/21 05:08	04/04/21 21:18	1
Perfluorooctanoic acid (PFOA)	ND		1.7	0.74	ng/L		04/02/21 05:08	04/04/21 21:18	1
Perfluorononanoic acid (PFNA)	ND		1.7	0.24	ng/L		04/02/21 05:08	04/04/21 21:18	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.27	ng/L		04/02/21 05:08	04/04/21 21:18	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.96	ng/L		04/02/21 05:08	04/04/21 21:18	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.48	ng/L		04/02/21 05:08	04/04/21 21:18	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	1.1	ng/L		04/02/21 05:08	04/04/21 21:18	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.64	ng/L		04/02/21 05:08	04/04/21 21:18	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.7	0.17	ng/L		04/02/21 05:08	04/04/21 21:18	1
Perfluorohexanesulfonic acid (PFHxS)	**1.3**	**J**	1.7	0.50	ng/L		04/02/21 05:08	04/04/21 21:18	1
Perfluorooctanesulfonic acid (PFOS)	**2.3**		1.7	0.47	ng/L		04/02/21 05:08	04/04/21 21:18	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.4	1.0	ng/L		04/02/21 05:08	04/04/21 21:18	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.4	1.1	ng/L		04/02/21 05:08	04/04/21 21:18	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.7	0.21	ng/L		04/02/21 05:08	04/04/21 21:18	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.5	1.3	ng/L		04/02/21 05:08	04/04/21 21:18	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.7	0.28	ng/L		04/02/21 05:08	04/04/21 21:18	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.7	0.35	ng/L		04/02/21 05:08	04/04/21 21:18	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*94*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:18*	
13C4 PFHpA	*88*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:18*	
13C4 PFOA	*93*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:18*	
13C5 PFNA	*88*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:18*	
13C2 PFDA	*81*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:18*	
13C2 PFUnA	*83*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:18*	
13C2 PFDoA	*86*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:18*	
13C2 PFTeDA	*99*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:18*	
13C3 PFBS	*83*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:18*	
18O2 PFHxS	*86*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:18*	
13C4 PFOS	*86*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:18*	
d3-NMeFOSAA	*82*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:18*	
d5-NEtFOSAA	*84*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:18*	
13C3 HFPO-DA	*83*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:18*	

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

Job ID: 320-71904-1

Client Sample ID: 33060
Date Collected: 03/24/21 14:30
Date Received: 03/31/21 15:19

Lab Sample ID: 320-71904-5
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)	**1.8**		1.8	0.51	ng/L		04/02/21 05:08	04/04/21 21:28	1
Perfluoroheptanoic acid (PFHpA)	**0.92**	**J**	1.8	0.22	ng/L		04/02/21 05:08	04/04/21 21:28	1
Perfluorooctanoic acid (PFOA)	**1.5**	**J**	1.8	0.75	ng/L		04/02/21 05:08	04/04/21 21:28	1
Perfluorononanoic acid (PFNA)	**0.51**	**J**	1.8	0.24	ng/L		04/02/21 05:08	04/04/21 21:28	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.27	ng/L		04/02/21 05:08	04/04/21 21:28	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.97	ng/L		04/02/21 05:08	04/04/21 21:28	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.49	ng/L		04/02/21 05:08	04/04/21 21:28	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		04/02/21 05:08	04/04/21 21:28	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.65	ng/L		04/02/21 05:08	04/04/21 21:28	1
Perfluorobutanesulfonic acid (PFBS)	**0.63**	**J**	1.8	0.18	ng/L		04/02/21 05:08	04/04/21 21:28	1
Perfluorohexanesulfonic acid (PFHxS)	**4.7**		1.8	0.50	ng/L		04/02/21 05:08	04/04/21 21:28	1
Perfluorooctanesulfonic acid (PFOS)	**6.6**		1.8	0.48	ng/L		04/02/21 05:08	04/04/21 21:28	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.4	1.1	ng/L		04/02/21 05:08	04/04/21 21:28	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.4	1.2	ng/L		04/02/21 05:08	04/04/21 21:28	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.21	ng/L		04/02/21 05:08	04/04/21 21:28	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.5	1.3	ng/L		04/02/21 05:08	04/04/21 21:28	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.28	ng/L		04/02/21 05:08	04/04/21 21:28	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.35	ng/L		04/02/21 05:08	04/04/21 21:28	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*85*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:28*	
13C4 PFHpA	*92*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:28*	
13C4 PFOA	*92*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:28*	
13C5 PFNA	*88*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:28*	
13C2 PFDA	*82*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:28*	
13C2 PFUnA	*83*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:28*	
13C2 PFDoA	*92*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:28*	
13C2 PFTeDA	*100*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:28*	
13C3 PFBS	*78*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:28*	
18O2 PFHxS	*89*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:28*	
13C4 PFOS	*81*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:28*	
d3-NMeFOSAA	*78*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:28*	
d5-NEtFOSAA	*73*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:28*	
13C3 HFPO-DA	*86*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:28*	

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

Job ID: 320-71904-1

Client Sample ID: 33068
Date Collected: 03/24/21 15:15
Date Received: 03/31/21 15:19

Lab Sample ID: 320-71904-6
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		1.8	0.52	ng/L		04/02/21 05:08	04/04/21 21:37	1
Perfluoroheptanoic acid (PFHpA)	ND		1.8	0.22	ng/L		04/02/21 05:08	04/04/21 21:37	1
Perfluorooctanoic acid (PFOA)	ND		1.8	0.76	ng/L		04/02/21 05:08	04/04/21 21:37	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.24	ng/L		04/02/21 05:08	04/04/21 21:37	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		04/02/21 05:08	04/04/21 21:37	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.99	ng/L		04/02/21 05:08	04/04/21 21:37	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.49	ng/L		04/02/21 05:08	04/04/21 21:37	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		04/02/21 05:08	04/04/21 21:37	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.66	ng/L		04/02/21 05:08	04/04/21 21:37	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.8	0.18	ng/L		04/02/21 05:08	04/04/21 21:37	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.8	0.51	ng/L		04/02/21 05:08	04/04/21 21:37	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.8	0.49	ng/L		04/02/21 05:08	04/04/21 21:37	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		04/02/21 05:08	04/04/21 21:37	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		04/02/21 05:08	04/04/21 21:37	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		04/02/21 05:08	04/04/21 21:37	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.3	ng/L		04/02/21 05:08	04/04/21 21:37	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		04/02/21 05:08	04/04/21 21:37	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		04/02/21 05:08	04/04/21 21:37	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*97*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:37*	
13C4 PFHpA	*100*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:37*	
13C4 PFOA	*97*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:37*	
13C5 PFNA	*104*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:37*	
13C2 PFDA	*86*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:37*	
13C2 PFUnA	*86*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:37*	
13C2 PFDoA	*96*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:37*	
13C2 PFTeDA	*104*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:37*	
13C3 PFBS	*90*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:37*	
18O2 PFHxS	*99*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:37*	
13C4 PFOS	*90*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:37*	
d3-NMeFOSAA	*90*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:37*	
d5-NEtFOSAA	*85*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:37*	
13C3 HFPO-DA	*99*		*50 - 150*	*04/02/21 05:08*	*04/04/21 21:37*	

Isotope Dilution Summary

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

Job ID: 320-71904-1

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

Matrix: Water

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)							
		PFHxA	C4PFHA	PFOA	PFNA	PFDA	PFUnA	PFDoA	PFTDA
Lab Sample ID	Client Sample ID	(50-150)	(50-150)	(50-150)	(50-150)	(50-150)	(50-150)	(50-150)	(50-150)
320-71904-1	43059	90	98	97	93	85	86	100	108
320-71904-2	33059	91	89	96	95	91	84	90	107
320-71904-3	33061	89	91	84	89	82	86	89	108
320-71904-4	33064	94	88	93	88	81	83	86	99
320-71904-5	33060	85	92	92	88	82	83	92	100
320-71904-6	33068	97	100	97	104	86	86	96	104
LCS 320-476044/2-A	Lab Control Sample	90	86	90	81	77	79	86	100
LCSD 320-476044/3-A	Lab Control Sample Dup	91	99	86	86	82	86	85	97
MB 320-476044/1-A	Method Blank	90	94	93	91	84	83	90	101

		Percent Isotope Dilution Recovery (Acceptance Limits)							
		C3PFBS	PFHxS	PFOS	d3NMFOS	d5NEFOS	HFPODA		
Lab Sample ID	Client Sample ID	(50-150)	(50-150)	(50-150)	(50-150)	(50-150)	(50-150)		
320-71904-1	43059	89	94	87	91	86	106		
320-71904-2	33059	84	97	87	81	85	98		
320-71904-3	33061	76	87	80	79	80	101		
320-71904-4	33064	83	86	86	82	84	83		
320-71904-5	33060	78	89	81	78	73	86		
320-71904-6	33068	90	99	90	90	85	99		
LCS 320-476044/2-A	Lab Control Sample	90	90	79	76	83	98		
LCSD 320-476044/3-A	Lab Control Sample Dup	86	93	83	77	79	98		
MB 320-476044/1-A	Method Blank	91	99	82	83	85	95		

Surrogate Legend

PFHxA = 13C2 PFHxA
C4PFHA = 13C4 PFHpA
PFOA = 13C4 PFOA
PFNA = 13C5 PFNA
PFDA = 13C2 PFDA
PFUnA = 13C2 PFUnA
PFDoA = 13C2 PFDoA
PFTDA = 13C2 PFTeDA
C3PFBS = 13C3 PFBS
PFHxS = 18O2 PFHxS
PFOS = 13C4 PFOS
d3NMFOS = d3-NMeFOSAA
d5NEFOS = d5-NEtFOSAA
HFPODA = 13C3 HFPO-DA

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

Lab Sample ID: MB 320-476044/1-A
Matrix: Water
Analysis Batch: 476511

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 476044

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		04/02/21 05:08	04/04/21 20:22	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		04/02/21 05:08	04/04/21 20:22	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		04/02/21 05:08	04/04/21 20:22	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		04/02/21 05:08	04/04/21 20:22	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		04/02/21 05:08	04/04/21 20:22	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		04/02/21 05:08	04/04/21 20:22	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		04/02/21 05:08	04/04/21 20:22	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		04/02/21 05:08	04/04/21 20:22	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		04/02/21 05:08	04/04/21 20:22	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		04/02/21 05:08	04/04/21 20:22	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		04/02/21 05:08	04/04/21 20:22	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		04/02/21 05:08	04/04/21 20:22	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		04/02/21 05:08	04/04/21 20:22	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		04/02/21 05:08	04/04/21 20:22	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.0	0.24	ng/L		04/02/21 05:08	04/04/21 20:22	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.0	1.5	ng/L		04/02/21 05:08	04/04/21 20:22	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.0	0.32	ng/L		04/02/21 05:08	04/04/21 20:22	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		04/02/21 05:08	04/04/21 20:22	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*90*		*50 - 150*	*04/02/21 05:08*	*04/04/21 20:22*	
13C4 PFHpA	*94*		*50 - 150*	*04/02/21 05:08*	*04/04/21 20:22*	
13C4 PFOA	*93*		*50 - 150*	*04/02/21 05:08*	*04/04/21 20:22*	
13C5 PFNA	*91*		*50 - 150*	*04/02/21 05:08*	*04/04/21 20:22*	
13C2 PFDA	*84*		*50 - 150*	*04/02/21 05:08*	*04/04/21 20:22*	
13C2 PFUnA	*83*		*50 - 150*	*04/02/21 05:08*	*04/04/21 20:22*	
13C2 PFDoA	*90*		*50 - 150*	*04/02/21 05:08*	*04/04/21 20:22*	
13C2 PFTeDA	*101*		*50 - 150*	*04/02/21 05:08*	*04/04/21 20:22*	
13C3 PFBS	*91*		*50 - 150*	*04/02/21 05:08*	*04/04/21 20:22*	
18O2 PFHxS	*99*		*50 - 150*	*04/02/21 05:08*	*04/04/21 20:22*	
13C4 PFOS	*82*		*50 - 150*	*04/02/21 05:08*	*04/04/21 20:22*	
d3-NMeFOSAA	*83*		*50 - 150*	*04/02/21 05:08*	*04/04/21 20:22*	
d5-NEtFOSAA	*85*		*50 - 150*	*04/02/21 05:08*	*04/04/21 20:22*	
13C3 HFPO-DA	*95*		*50 - 150*	*04/02/21 05:08*	*04/04/21 20:22*	

Lab Sample ID: LCS 320-476044/2-A
Matrix: Water
Analysis Batch: 476511

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 476044

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorohexanoic acid (PFHxA)	40.0	46.2		ng/L		115	72 - 129
Perfluoroheptanoic acid (PFHpA)	40.0	49.2		ng/L		123	72 - 130
Perfluorooctanoic acid (PFOA)	40.0	46.2		ng/L		115	71 - 133
Perfluorononanoic acid (PFNA)	40.0	46.6		ng/L		117	69 - 130

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

Lab Sample ID: LCS 320-476044/2-A
Matrix: Water
Analysis Batch: 476511

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 476044

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorodecanoic acid (PFDA)	40.0	45.8		ng/L		114	71 - 129
Perfluoroundecanoic acid (PFUnA)	40.0	53.3		ng/L		133	69 - 133
Perfluorododecanoic acid (PFDoA)	40.0	43.1		ng/L		108	72 - 134
Perfluorotridecanoic acid (PFTriA)	40.0	47.3		ng/L		118	65 - 144
Perfluorotetradecanoic acid (PFTeA)	40.0	43.1		ng/L		108	71 - 132
Perfluorobutanesulfonic acid (PFBS)	35.4	36.0		ng/L		102	72 - 130
Perfluorohexanesulfonic acid (PFHxS)	36.4	40.1		ng/L		110	68 - 131
Perfluorooctanesulfonic acid (PFOS)	37.1	38.3		ng/L		103	65 - 140
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	42.8		ng/L		107	65 - 136
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	42.5		ng/L		106	61 - 135
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	37.3	46.3		ng/L		124	77 - 137
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	40.0	41.7		ng/L		104	72 - 132
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	37.7	44.5		ng/L		118	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.7	46.2		ng/L		123	81 - 141

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*90*		*50 - 150*
13C4 PFHpA	*86*		*50 - 150*
13C4 PFOA	*90*		*50 - 150*
13C5 PFNA	*81*		*50 - 150*
13C2 PFDA	*77*		*50 - 150*
13C2 PFUnA	*79*		*50 - 150*
13C2 PFDoA	*86*		*50 - 150*
13C2 PFTeDA	*100*		*50 - 150*
13C3 PFBS	*90*		*50 - 150*
18O2 PFHxS	*90*		*50 - 150*
13C4 PFOS	*79*		*50 - 150*
d3-NMeFOSAA	*76*		*50 - 150*
d5-NEtFOSAA	*83*		*50 - 150*
13C3 HFPO-DA	*98*		*50 - 150*

Lab Sample ID: LCSD 320-476044/3-A
Matrix: Water
Analysis Batch: 476511

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 476044

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	40.0	45.0		ng/L		112	72 - 129	3	30
Perfluoroheptanoic acid (PFHpA)	40.0	46.5		ng/L		116	72 - 130	6	30
Perfluorooctanoic acid (PFOA)	40.0	45.6		ng/L		114	71 - 133	1	30

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

Lab Sample ID: LCSD 320-476044/3-A
Matrix: Water
Analysis Batch: 476511

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 476044

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorononanoic acid (PFNA)	40.0	48.3		ng/L		121	69 - 130	4	30
Perfluorodecanoic acid (PFDA)	40.0	48.9		ng/L		122	71 - 129	6	30
Perfluoroundecanoic acid (PFUnA)	40.0	48.2		ng/L		120	69 - 133	10	30
Perfluorododecanoic acid (PFDoA)	40.0	40.6		ng/L		102	72 - 134	6	30
Perfluorotridecanoic acid (PFTriA)	40.0	44.1		ng/L		110	65 - 144	7	30
Perfluorotetradecanoic acid (PFTeA)	40.0	44.9		ng/L		112	71 - 132	4	30
Perfluorobutanesulfonic acid (PFBS)	35.4	39.6		ng/L		112	72 - 130	9	30
Perfluorohexanesulfonic acid (PFHxS)	36.4	43.3		ng/L		119	68 - 131	8	30
Perfluorooctanesulfonic acid (PFOS)	37.1	35.4		ng/L		95	65 - 140	8	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	44.9		ng/L		112	65 - 136	5	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	38.6		ng/L		97	61 - 135	9	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	37.3	44.7		ng/L		120	77 - 137	4	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	40.0	44.1		ng/L		110	72 - 132	6	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	37.7	42.2		ng/L		112	76 - 136	5	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.7	46.0		ng/L		122	81 - 141	1	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFHxA	*91*		*50 - 150*
13C4 PFHpA	*99*		*50 - 150*
13C4 PFOA	*86*		*50 - 150*
13C5 PFNA	*86*		*50 - 150*
13C2 PFDA	*82*		*50 - 150*
13C2 PFUnA	*86*		*50 - 150*
13C2 PFDoA	*85*		*50 - 150*
13C2 PFTeDA	*97*		*50 - 150*
13C3 PFBS	*86*		*50 - 150*
18O2 PFHxS	*93*		*50 - 150*
13C4 PFOS	*83*		*50 - 150*
d3-NMeFOSAA	*77*		*50 - 150*
d5-NEtFOSAA	*79*		*50 - 150*
13C3 HFPO-DA	*98*		*50 - 150*

LCMS

Prep Batch: 476044

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-71904-1	43059	Total/NA	Water	3535	
320-71904-2	33059	Total/NA	Water	3535	
320-71904-3	33061	Total/NA	Water	3535	
320-71904-4	33064	Total/NA	Water	3535	
320-71904-5	33060	Total/NA	Water	3535	
320-71904-6	33068	Total/NA	Water	3535	
MB 320-476044/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-476044/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-476044/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Analysis Batch: 476511

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-71904-1	43059	Total/NA	Water	EPA 537(Mod)	476044
320-71904-2	33059	Total/NA	Water	EPA 537(Mod)	476044
320-71904-3	33061	Total/NA	Water	EPA 537(Mod)	476044
320-71904-4	33064	Total/NA	Water	EPA 537(Mod)	476044
320-71904-5	33060	Total/NA	Water	EPA 537(Mod)	476044
320-71904-6	33068	Total/NA	Water	EPA 537(Mod)	476044
MB 320-476044/1-A	Method Blank	Total/NA	Water	EPA 537(Mod)	476044
LCS 320-476044/2-A	Lab Control Sample	Total/NA	Water	EPA 537(Mod)	476044
LCSD 320-476044/3-A	Lab Control Sample Dup	Total/NA	Water	EPA 537(Mod)	476044

Lab Chronicle

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

Job ID: 320-71904-1

Client Sample ID: 43059
Date Collected: 03/24/21 10:20
Date Received: 03/31/21 15:19

Lab Sample ID: 320-71904-1
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			289.4 mL	10.00 mL	476044	04/02/21 05:08	MA	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			476511	04/04/21 20:50	S1M	TAL SAC

Client Sample ID: 33059
Date Collected: 03/24/21 10:30
Date Received: 03/31/21 15:19

Lab Sample ID: 320-71904-2
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			286.1 mL	10.00 mL	476044	04/02/21 05:08	MA	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			476511	04/04/21 21:00	S1M	TAL SAC

Client Sample ID: 33061
Date Collected: 03/24/21 11:35
Date Received: 03/31/21 15:19

Lab Sample ID: 320-71904-3
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			286.1 mL	10.00 mL	476044	04/02/21 05:08	MA	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			476511	04/04/21 21:09	S1M	TAL SAC

Client Sample ID: 33064
Date Collected: 03/24/21 12:35
Date Received: 03/31/21 15:19

Lab Sample ID: 320-71904-4
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			286.2 mL	10.00 mL	476044	04/02/21 05:08	MA	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			476511	04/04/21 21:18	S1M	TAL SAC

Client Sample ID: 33060
Date Collected: 03/24/21 14:30
Date Received: 03/31/21 15:19

Lab Sample ID: 320-71904-5
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			282.4 mL	10.00 mL	476044	04/02/21 05:08	MA	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			476511	04/04/21 21:28	S1M	TAL SAC

Client Sample ID: 33068
Date Collected: 03/24/21 15:15
Date Received: 03/31/21 15:19

Lab Sample ID: 320-71904-6
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			278 mL	10.00 mL	476044	04/02/21 05:08	MA	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			476511	04/04/21 21:37	S1M	TAL SAC

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

Accreditation/Certification Summary

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

Job ID: 320-71904-1

Laboratory: Eurofins TestAmerica, Sacramento

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	17-020	02-20-24
ANAB	Dept. of Defense ELAP	L2468	01-20-24
ANAB	Dept. of Energy	L2468.01	01-20-24
ANAB	ISO/IEC 17025	L2468	01-20-24
Arizona	State	AZ0708	08-11-21
Arkansas DEQ	State	88-0691	06-17-21
California	State	2897	01-31-22
Colorado	State	CA0004	08-31-21
Connecticut	State	PH-0691	06-30-21
Florida	NELAP	E87570	06-30-21
Georgia	State	4040	01-29-22
Hawaii	State	<cert No.>	01-29-22
Illinois	NELAP	200060	03-18-22
Kansas	NELAP	E-10375	10-31-21
Louisiana	NELAP	01944	06-30-21
Maine	State	CA00004	04-14-22
Michigan	State	9947	01-29-22
Nevada	State	CA000442021-2	07-31-21
New Hampshire	NELAP	2997	04-18-21
New Jersey	NELAP	CA005	06-30-21
New York	NELAP	11666	04-01-22
Ohio	State	41252	01-29-22
Oregon	NELAP	4040	01-30-23
Texas	NELAP	T104704399-19-13	06-01-21
US Fish & Wildlife	US Federal Programs	58448	07-31-21
USDA	US Federal Programs	P330-18-00239	07-31-21
Utah	NELAP	CA000442021-12	02-28-21 *
Vermont	State	VT-4040	04-16-21
Virginia	NELAP	460278	03-14-22
Washington	State	C581	05-05-21
West Virginia (DW)	State	9930C	12-31-21
Wisconsin	State	998204680	08-31-21
Wyoming	State Program	8TMS-L	01-28-19 *

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Method Summary

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

Job ID: 320-71904-1

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: Yakutat Airport

Job ID: 320-71904-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
320-71904-1	43059	Water	03/24/21 10:20	03/31/21 15:19	
320-71904-2	33059	Water	03/24/21 10:30	03/31/21 15:19	
320-71904-3	33061	Water	03/24/21 11:35	03/31/21 15:19	
320-71904-4	33064	Water	03/24/21 12:35	03/31/21 15:19	
320-71904-5	33060	Water	03/24/21 14:30	03/31/21 15:19	
320-71904-6	33068	Water	03/24/21 15:15	03/31/21 15:19	

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 Test America
Attn: David Alltucker

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 EPA 537.1 M	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
43059		10:20	3/24/21	X	2	Groundwater Grab sample
33059		10:30		X	2	
33061		11:35		X	2	
33064		12:35		X	2	
33060		14:30		X	2	
33068		15:15		X	2	

320-71904 Chain of Custody

Project Information	
Number:	102986-006
Name:	Yakutat Airport
Contact:	AMJ
Ongoing Project?	Yes [X] No [ ]
Sampler:	APW

Sample Receipt	
Total No. of Containers:	6
COC Seals/Intact? Y/N/NA	
Received Good Cond./Cold	
Temp:	2.6 C
Delivery Method:	Goldstreak

Notes:

Reliquished By: 1.	Reliquished By: 2.	Reliquished By: 3.
Signature: Adam Wyborny Time: 1430	Signature: Time:	Signature: Time:
Printed Name: Adam Wyborny Date: 3/31/21	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson, Inc.	Company:	Company:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: Time: 1518	Signature: Time:	Signature: Time:
Printed Name: David Alltucker Date: 3/31/21	Printed Name: Date:	Printed Name: Date:
Company: EPAS	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. 36366

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-71904-1

Login Number: 71904
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	SEAL
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:

Justin Risley

Title:

Engineering Staff

Date:

4/9/2021

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

Eurofins TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-71904-1

Laboratory Report Date:

4/8/2021

CS Site Name:

ADOT&PF Yakutat Airport Sitewide PFAS

ADEC File Number:

1530.38.022

Hazard Identification Number:

27090

320-71904-1

Laboratory Report Date:

4/8/2021

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:

   TestAmerica/Eurofins Laboratories West Sacramento, CA is CS certified for the analysis of perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) by method 537.

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

   Yes☐ No☐ N/A☒ Comments:

   Samples were not transferred to another laboratory.

2. Chain of Custody (CoC)

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

   Yes☒ No☐ N/A☐ Comments:

   b. Correct analyses requested?

   Yes☒ No☐ N/A☐ Comments:

3. Laboratory Sample Receipt Documentation

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

   Yes☒ No☐ N/A☐ Comments:

   Sample cooler temperature recorded at 2.8° C upon receipt at laboratory.

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

   Yes☒ No☐ N/A☐ Comments:

320-71904-1

Laboratory Report Date:

4/8/2021

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:

Method 3535: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-476044. Laboratory accuracy and precision was determined via LCS/LCSD samples. Data quality and/or usability not affected

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:

The case narrative does not note an effect on data quality.

320-71904-1

Laboratory Report Date:

4/8/2021

CS Site Name:

5. Samples Results

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

Yes☒ No☐ N/A☐ Comments:

b. All applicable holding times met?

Yes☒ No☐ N/A☐ Comments:

c. All soils reported on a dry weight basis?

Yes☐ No☐ N/A☒ Comments:

Soil samples were not submitted with this work order.

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

Yes☒ No☐ N/A☐ Comments:

e. Data quality or usability affected?

Data quality and/or usability were not affected.

6. QC Samples

a. Method Blank

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

Yes☒ No☐ N/A☐ Comments:

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.

320-71904-1

Laboratory Report Date:

4/8/2021

CS Site Name:

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

Comments:

Not applicable, see above.

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

Yes☐ No☐ N/A☒ Comments:

See above.

v. Data quality or usability affected?

Comments:

No, see above.

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

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

Yes☒ No☐ N/A☐ Comments:

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

Yes☐ No☐ N/A☒ Comments:

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

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

Yes☒ No☐ N/A☐ Comments:

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:

320-71904-1

Laboratory Report Date:

4/8/2021

CS Site Name:

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

Comments:

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

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

The data quality and/or usability were not affected.

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

Note: Leave blank if not required for project

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

Yes☐ No☒ N/A☐ Comments:

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.

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.

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Laboratory Report Date:

4/8/2021

CS Site Name:

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

Comments:

N/A; see above.

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

Data quality and/or usability was not affected.

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

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

Yes☒ No☐ N/A☐ Comments:

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

Yes☒ No☐ N/A☐ Comments:

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

Yes☐ No☐ N/A☒ Comments:

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

iv. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected.

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CS Site Name:

e. Trip Blanks

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

Yes☐ No☐ N/A☒ Comments:

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

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

Not applicable, see above.

v. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected.

f. Field Duplicate

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

Yes☒ No☐ N/A☐ Comments:

ii. Submitted blind to lab?

Yes☒ No☐ N/A☐ Comments:

The field-duplicate pair submitted with this work order are *43059/33059*.

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CS Site Name:

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

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

Where R_1 = Sample Concentration
R_2 = Field Duplicate Concentration

Yes☒ No☐ N/A☐ Comments:

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

Comments:

The data quality and/or usability was not affected.

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

Yes☐ No☐ N/A☒ Comments:

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

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

Not applicable, see above.

iii. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected.

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

a. Defined and appropriate?

Yes☐ No☐ N/A☒ Comments:

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

320-71904-1

Laboratory Report Date:

4/8/2021

CS Site Name:

eurofins | Environment Testing America

ANALYTICAL REPORT

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

Laboratory Job ID: 320-73901-1
Client Project/Site: YAK - Quarterly

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

Attn: Ashley Jaramillo

Authorized for release by:
6/2/2021 10:30:28 AM

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

Table of Contents

Definitions/Glossary

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

Job ID: 320-73901-1

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: 320-73901-1

Laboratory: Eurofins TestAmerica, Sacramento

Narrative

Job Narrative
320-73901-1

Receipt
The samples were received on 5/19/2021 3:22 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 2.5º C.

LCMS
Method 537.1 DW: The method blank for preparation batch 320-491957 contained several analytes above 1/3 the reporting limit (RL). None of the samples associated with this method blank was detected for the target compound; therefore, re-extraction and re-analysis of samples were not performed and samples have been reported.

No additional analytical or quality issues were noted, other than those described above or 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 320-491957.

Method 537.1 DW: The following samples were observed to be yellow prior to extraction: 33061 (320-73901-1), 33056 (320-73901-2), 33068 (320-73901-3), 33060 (320-73901-5), 33160 (320-73901-6), 33064 (320-73901-7) and 33059 (320-73901-8).

Method 537.1 DW: The following samples were observed to be light yellow at final volume: 33061 (320-73901-1), 33056 (320-73901-2), 33068 (320-73901-3), 33060 (320-73901-5), 33160 (320-73901-6), 33064 (320-73901-7) and 33059 (320-73901-8).

Method 537.1 DW: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-493149.

Method 537.1 DW: The following samples were observed to be light brown at final volume: 33068 (320-73901-3) and 33060 (320-73901-5).

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

Detection Summary

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

Job ID: 320-73901-1

Client Sample ID: 33061 — Lab Sample ID: 320-73901-1

No Detections.

Client Sample ID: 33056 — Lab Sample ID: 320-73901-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	3.8		1.6	0.40	ng/L	1		537.1 DW	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.1		1.6	0.40	ng/L	1		537.1 DW	Total/NA
Perfluorooctanoic acid (PFOA)	3.2		1.6	0.40	ng/L	1		537.1 DW	Total/NA
Perfluorononanoic acid (PFNA)	1.6		1.6	0.40	ng/L	1		537.1 DW	Total/NA
Perfluorodecanoic acid (PFDA)	0.51	J	1.6	0.40	ng/L	1		537.1 DW	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.75	J	1.6	0.40	ng/L	1		537.1 DW	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	9.6		1.6	0.40	ng/L	1		537.1 DW	Total/NA
Perfluorooctanesulfonic acid (PFOS)	12		1.6	0.40	ng/L	1		537.1 DW	Total/NA

Client Sample ID: 33068 — Lab Sample ID: 320-73901-3

No Detections.

Client Sample ID: 33053 — Lab Sample ID: 320-73901-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	1.7		1.7	0.42	ng/L	1		537.1 DW	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.90	J	1.7	0.42	ng/L	1		537.1 DW	Total/NA
Perfluorooctanoic acid (PFOA)	1.3	J	1.7	0.42	ng/L	1		537.1 DW	Total/NA
Perfluorononanoic acid (PFNA)	0.54	J	1.7	0.42	ng/L	1		537.1 DW	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	9.2		1.7	0.42	ng/L	1		537.1 DW	Total/NA
Perfluorooctanesulfonic acid (PFOS)	5.5		1.7	0.42	ng/L	1		537.1 DW	Total/NA

Client Sample ID: 33060 — Lab Sample ID: 320-73901-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	6.9		1.8	0.44	ng/L	1		537.1 DW	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.6	J	1.8	0.44	ng/L	1		537.1 DW	Total/NA
Perfluorooctanoic acid (PFOA)	1.8		1.8	0.44	ng/L	1		537.1 DW	Total/NA
Perfluorononanoic acid (PFNA)	0.44	J	1.8	0.44	ng/L	1		537.1 DW	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	3.0		1.8	0.44	ng/L	1		537.1 DW	Total/NA
Perfluorooctanesulfonic acid (PFOS)	5.4		1.8	0.44	ng/L	1		537.1 DW	Total/NA

Client Sample ID: 33160 — Lab Sample ID: 320-73901-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	7.0		1.7	0.43	ng/L	1		537.1 DW	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.6	J	1.7	0.43	ng/L	1		537.1 DW	Total/NA
Perfluorooctanoic acid (PFOA)	2.1		1.7	0.43	ng/L	1		537.1 DW	Total/NA
Perfluorononanoic acid (PFNA)	0.47	J	1.7	0.43	ng/L	1		537.1 DW	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	3.4		1.7	0.43	ng/L	1		537.1 DW	Total/NA
Perfluorooctanesulfonic acid (PFOS)	5.7		1.7	0.43	ng/L	1		537.1 DW	Total/NA

Client Sample ID: 33064 — Lab Sample ID: 320-73901-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	1.3	J	1.8	0.44	ng/L	1		537.1 DW	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.9		1.8	0.44	ng/L	1		537.1 DW	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

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

Job ID: 320-73901-1

Client Sample ID: 33059

Lab Sample ID: 320-73901-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	0.57	J	1.7	0.42	ng/L	1		537.1 DW	Total/NA

This Detection Summary does not include radiochemical test results.

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

Job ID: 320-73901-1

Client Sample ID: 33061
Date Collected: 05/15/21 08:20
Date Received: 05/19/21 15:22

Lab Sample ID: 320-73901-1
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)	ND		1.6	0.41	ng/L		05/23/21 19:10	05/24/21 12:09	1
Perfluoroheptanoic acid (PFHpA)	ND		1.6	0.41	ng/L		05/23/21 19:10	05/24/21 12:09	1
Perfluorooctanoic acid (PFOA)	ND		1.6	0.41	ng/L		05/23/21 19:10	05/24/21 12:09	1
Perfluorononanoic acid (PFNA)	ND		1.6	0.41	ng/L		05/23/21 19:10	05/24/21 12:09	1
Perfluorodecanoic acid (PFDA)	ND		1.6	0.41	ng/L		05/23/21 19:10	05/24/21 12:09	1
Perfluoroundecanoic acid (PFUnA)	ND		1.6	0.41	ng/L		05/23/21 19:10	05/24/21 12:09	1
Perfluorododecanoic acid (PFDoA)	ND		1.6	0.41	ng/L		05/23/21 19:10	05/24/21 12:09	1
Perfluorotridecanoic acid (PFTriA)	ND		1.6	0.41	ng/L		05/23/21 19:10	05/24/21 12:09	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.6	0.41	ng/L		05/23/21 19:10	05/24/21 12:09	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.6	0.41	ng/L		05/23/21 19:10	05/24/21 12:09	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.6	0.41	ng/L		05/23/21 19:10	05/24/21 12:09	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.6	0.41	ng/L		05/23/21 19:10	05/24/21 12:09	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		1.6	0.41	ng/L		05/23/21 19:10	05/24/21 12:09	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		1.6	0.41	ng/L		05/23/21 19:10	05/24/21 12:09	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		1.6	0.41	ng/L		05/23/21 19:10	05/24/21 12:09	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	ND		1.6	0.41	ng/L		05/23/21 19:10	05/24/21 12:09	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		1.6	0.41	ng/L		05/23/21 19:10	05/24/21 12:09	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.6	0.41	ng/L		05/23/21 19:10	05/24/21 12:09	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*103*		*70 - 130*	*05/23/21 19:10*	*05/24/21 12:09*	*1*
13C2 PFDA	*109*		*70 - 130*	*05/23/21 19:10*	*05/24/21 12:09*	*1*
d5-NEt FOSAA	*94*		*70 - 130*	*05/23/21 19:10*	*05/24/21 12:09*	*1*
13C3 HFPO-DA	*105*		*70 - 130*	*05/23/21 19:10*	*05/24/21 12:09*	*1*

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

Job ID: 320-73901-1

Client Sample ID: 33056
Date Collected: 05/15/21 09:26
Date Received: 05/19/21 15:22

Lab Sample ID: 320-73901-2
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)	**3.8**		1.6	0.40	ng/L		05/23/21 19:10	05/24/21 12:17	1
Perfluoroheptanoic acid (PFHpA)	**2.1**		1.6	0.40	ng/L		05/23/21 19:10	05/24/21 12:17	1
Perfluorooctanoic acid (PFOA)	**3.2**		1.6	0.40	ng/L		05/23/21 19:10	05/24/21 12:17	1
Perfluorononanoic acid (PFNA)	**1.6**		1.6	0.40	ng/L		05/23/21 19:10	05/24/21 12:17	1
Perfluorodecanoic acid (PFDA)	**0.51**	**J**	1.6	0.40	ng/L		05/23/21 19:10	05/24/21 12:17	1
Perfluoroundecanoic acid (PFUnA)	ND		1.6	0.40	ng/L		05/23/21 19:10	05/24/21 12:17	1
Perfluorododecanoic acid (PFDoA)	ND		1.6	0.40	ng/L		05/23/21 19:10	05/24/21 12:17	1
Perfluorotridecanoic acid (PFTriA)	ND		1.6	0.40	ng/L		05/23/21 19:10	05/24/21 12:17	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.6	0.40	ng/L		05/23/21 19:10	05/24/21 12:17	1
Perfluorobutanesulfonic acid (PFBS)	**0.75**	**J**	1.6	0.40	ng/L		05/23/21 19:10	05/24/21 12:17	1
Perfluorohexanesulfonic acid (PFHxS)	**9.6**		1.6	0.40	ng/L		05/23/21 19:10	05/24/21 12:17	1
Perfluorooctanesulfonic acid (PFOS)	**12**		1.6	0.40	ng/L		05/23/21 19:10	05/24/21 12:17	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		1.6	0.40	ng/L		05/23/21 19:10	05/24/21 12:17	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		1.6	0.40	ng/L		05/23/21 19:10	05/24/21 12:17	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		1.6	0.40	ng/L		05/23/21 19:10	05/24/21 12:17	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	ND		1.6	0.40	ng/L		05/23/21 19:10	05/24/21 12:17	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		1.6	0.40	ng/L		05/23/21 19:10	05/24/21 12:17	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.6	0.40	ng/L		05/23/21 19:10	05/24/21 12:17	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*104*		*70 - 130*	*05/23/21 19:10*	*05/24/21 12:17*	*1*
13C2 PFDA	*115*		*70 - 130*	*05/23/21 19:10*	*05/24/21 12:17*	*1*
d5-NEt FOSAA	*91*		*70 - 130*	*05/23/21 19:10*	*05/24/21 12:17*	*1*
13C3 HFPO-DA	*106*		*70 - 130*	*05/23/21 19:10*	*05/24/21 12:17*	*1*

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

Job ID: 320-73901-1

Client Sample ID: 33068
Date Collected: 05/15/21 10:25
Date Received: 05/19/21 15:22

Lab Sample ID: 320-73901-3
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		1.7	0.42	ng/L		05/26/21 19:19	05/27/21 19:44	1
Perfluoroheptanoic acid (PFHpA)	ND		1.7	0.42	ng/L		05/26/21 19:19	05/27/21 19:44	1
Perfluorooctanoic acid (PFOA)	ND		1.7	0.42	ng/L		05/26/21 19:19	05/27/21 19:44	1
Perfluorononanoic acid (PFNA)	ND		1.7	0.42	ng/L		05/26/21 19:19	05/27/21 19:44	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.42	ng/L		05/26/21 19:19	05/27/21 19:44	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.42	ng/L		05/26/21 19:19	05/27/21 19:44	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.42	ng/L		05/26/21 19:19	05/27/21 19:44	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	0.42	ng/L		05/26/21 19:19	05/27/21 19:44	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.42	ng/L		05/26/21 19:19	05/27/21 19:44	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.7	0.42	ng/L		05/26/21 19:19	05/27/21 19:44	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.7	0.42	ng/L		05/26/21 19:19	05/27/21 19:44	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.7	0.42	ng/L		05/26/21 19:19	05/27/21 19:44	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		1.7	0.42	ng/L		05/26/21 19:19	05/27/21 19:44	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		1.7	0.42	ng/L		05/26/21 19:19	05/27/21 19:44	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		1.7	0.42	ng/L		05/26/21 19:19	05/27/21 19:44	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	ND		1.7	0.42	ng/L		05/26/21 19:19	05/27/21 19:44	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		1.7	0.42	ng/L		05/26/21 19:19	05/27/21 19:44	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.7	0.42	ng/L		05/26/21 19:19	05/27/21 19:44	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*105*		*70 - 130*	*05/26/21 19:19*	*05/27/21 19:44*	*1*
13C2 PFDA	*97*		*70 - 130*	*05/26 /21 19:19*	*05/27/21 19:44*	*1*
d5-NEt FOSAA	*87*		*70 - 130*	*05/26/21 19:19*	*05/27/21 19:44*	*1*
13C3 HFPO-DA	*96*		*70 - 130*	*05/26 /21 19:19*	*05/27/21 19:44*	*1*

Client Sample ID: 33053
Date Collected: 05/15/21 12:16
Date Received: 05/19/21 15:22

Lab Sample ID: 320-73901-4
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)	**1.7**		1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:11	1
Perfluoroheptanoic acid (PFHpA)	**0.90**	**J**	1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:11	1
Perfluorooctanoic acid (PFOA)	**1.3**	**J**	1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:11	1
Perfluorononanoic acid (PFNA)	**0.54**	**J**	1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:11	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:11	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:11	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:11	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:11	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:11	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:11	1
Perfluorohexanesulfonic acid (PFHxS)	**9.2**		1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:11	1
Perfluorooctanesulfonic acid (PFOS)	**5.5**		1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:11	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:11	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:11	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:11	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	ND		1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:11	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:11	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:11	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*102*		*70 - 130*	*05/23/21 19:10*	*05/24/21 13:11*	*1*
13C2 PFDA	*107*		*70 - 130*	*05/23/21 19:10*	*05/24/21 13:11*	*1*
d5-NEt FOSAA	*86*		*70 - 130*	*05/23/21 19:10*	*05/24/21 13:11*	*1*
13C3 HFPO-DA	*106*		*70 - 130*	*05/23/21 19:10*	*05/24/21 13:11*	*1*

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

Job ID: 320-73901-1

Client Sample ID: 33060
Date Collected: 05/16/21 09:58
Date Received: 05/19/21 15:22

Lab Sample ID: 320-73901-5
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)	**6.9**		1.8	0.44	ng/L		05/26/21 19:19	05/27/21 19:51	1
Perfluoroheptanoic acid (PFHpA)	**1.6**	**J**	1.8	0.44	ng/L		05/26/21 19:19	05/27/21 19:51	1
Perfluorooctanoic acid (PFOA)	**1.8**		1.8	0.44	ng/L		05/26/21 19:19	05/27/21 19:51	1
Perfluorononanoic acid (PFNA)	**0.44**	**J**	1.8	0.44	ng/L		05/26/21 19:19	05/27/21 19:51	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.44	ng/L		05/26/21 19:19	05/27/21 19:51	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.44	ng/L		05/26/21 19:19	05/27/21 19:51	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.44	ng/L		05/26/21 19:19	05/27/21 19:51	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	0.44	ng/L		05/26/21 19:19	05/27/21 19:51	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.44	ng/L		05/26/21 19:19	05/27/21 19:51	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.8	0.44	ng/L		05/26/21 19:19	05/27/21 19:51	1
Perfluorohexanesulfonic acid (PFHxS)	**3.0**		1.8	0.44	ng/L		05/26/21 19:19	05/27/21 19:51	1
Perfluorooctanesulfonic acid (PFOS)	**5.4**		1.8	0.44	ng/L		05/26/21 19:19	05/27/21 19:51	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		1.8	0.44	ng/L		05/26/21 19:19	05/27/21 19:51	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		1.8	0.44	ng/L		05/26/21 19:19	05/27/21 19:51	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		1.8	0.44	ng/L		05/26/21 19:19	05/27/21 19:51	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	ND		1.8	0.44	ng/L		05/26/21 19:19	05/27/21 19:51	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		1.8	0.44	ng/L		05/26/21 19:19	05/27/21 19:51	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.44	ng/L		05/26/21 19:19	05/27/21 19:51	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*105*		*70 - 130*	*05/26/21 19:19*	*05/27/21 19:51*	*1*
13C2 PFDA	*99*		*70 - 130*	*05/26/21 19:19*	*05/27/21 19:51*	*1*
d5-NEt FOSAA	*76*		*70 - 130*	*05/26/21 19:19*	*05/27/21 19:51*	*1*
13C3 HFPO-DA	*94*		*70 - 130*	*05/26/21 19:19*	*05/27/21 19:51*	*1*

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

Job ID: 320-73901-1

Client Sample ID: 33160
Date Collected: 05/16/21 10:08
Date Received: 05/19/21 15:22

Lab Sample ID: 320-73901-6
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)	**7.0**		1.7	0.43	ng/L		05/23/21 19:10	05/24/21 13:26	1
Perfluoroheptanoic acid (PFHpA)	**1.6**	**J**	1.7	0.43	ng/L		05/23/21 19:10	05/24/21 13:26	1
Perfluorooctanoic acid (PFOA)	**2.1**		1.7	0.43	ng/L		05/23/21 19:10	05/24/21 13:26	1
Perfluorononanoic acid (PFNA)	**0.47**	**J**	1.7	0.43	ng/L		05/23/21 19:10	05/24/21 13:26	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.43	ng/L		05/23/21 19:10	05/24/21 13:26	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.43	ng/L		05/23/21 19:10	05/24/21 13:26	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.43	ng/L		05/23/21 19:10	05/24/21 13:26	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	0.43	ng/L		05/23/21 19:10	05/24/21 13:26	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.43	ng/L		05/23/21 19:10	05/24/21 13:26	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.7	0.43	ng/L		05/23/21 19:10	05/24/21 13:26	1
Perfluorohexanesulfonic acid (PFHxS)	**3.4**		1.7	0.43	ng/L		05/23/21 19:10	05/24/21 13:26	1
Perfluorooctanesulfonic acid (PFOS)	**5.7**		1.7	0.43	ng/L		05/23/21 19:10	05/24/21 13:26	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		1.7	0.43	ng/L		05/23/21 19:10	05/24/21 13:26	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		1.7	0.43	ng/L		05/23/21 19:10	05/24/21 13:26	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		1.7	0.43	ng/L		05/23/21 19:10	05/24/21 13:26	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	ND		1.7	0.43	ng/L		05/23/21 19:10	05/24/21 13:26	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		1.7	0.43	ng/L		05/23/21 19:10	05/24/21 13:26	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.7	0.43	ng/L		05/23/21 19:10	05/24/21 13:26	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*98*		*70 - 130*	*05/23/21 19:10*	*05/24/21 13:26*	*1*
13C2 PFDA	*108*		*70 - 130*	*05/23/21 19:10*	*05/24/21 13:26*	*1*
d5-NEt FOSAA	*87*		*70 - 130*	*05/23/21 19:10*	*05/24/21 13:26*	*1*
13C3 HFPO-DA	*95*		*70 - 130*	*05/23/21 19:10*	*05/24/21 13:26*	*1*

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

Job ID: 320-73901-1

Client Sample ID: 33064
Date Collected: 05/17/21 07:20
Date Received: 05/19/21 15:22

Lab Sample ID: 320-73901-7
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)	ND		1.8	0.44	ng/L		05/23/21 19:10	05/24/21 13:34	1
Perfluoroheptanoic acid (PFHpA)	ND		1.8	0.44	ng/L		05/23/21 19:10	05/24/21 13:34	1
Perfluorooctanoic acid (PFOA)	ND		1.8	0.44	ng/L		05/23/21 19:10	05/24/21 13:34	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.44	ng/L		05/23/21 19:10	05/24/21 13:34	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.44	ng/L		05/23/21 19:10	05/24/21 13:34	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.44	ng/L		05/23/21 19:10	05/24/21 13:34	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.44	ng/L		05/23/21 19:10	05/24/21 13:34	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	0.44	ng/L		05/23/21 19:10	05/24/21 13:34	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.44	ng/L		05/23/21 19:10	05/24/21 13:34	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.8	0.44	ng/L		05/23/21 19:10	05/24/21 13:34	1
Perfluorohexanesulfonic acid (PFHxS)	**1.3**	**J**	1.8	0.44	ng/L		05/23/21 19:10	05/24/21 13:34	1
Perfluorooctanesulfonic acid (PFOS)	**1.9**		1.8	0.44	ng/L		05/23/21 19:10	05/24/21 13:34	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		1.8	0.44	ng/L		05/23/21 19:10	05/24/21 13:34	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		1.8	0.44	ng/L		05/23/21 19:10	05/24/21 13:34	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		1.8	0.44	ng/L		05/23/21 19:10	05/24/21 13:34	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	ND		1.8	0.44	ng/L		05/23/21 19:10	05/24/21 13:34	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		1.8	0.44	ng/L		05/23/21 19:10	05/24/21 13:34	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.44	ng/L		05/23/21 19:10	05/24/21 13:34	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*102*		*70 - 130*	*05/23/21 19:10*	*05/24/21 13:34*	*1*
13C2 PFDA	*110*		*70 - 130*	*05/23/21 19:10*	*05/24/21 13:34*	*1*
d5-NEt FOSAA	*88*		*70 - 130*	*05/23/21 19:10*	*05/24/21 13:34*	*1*
13C3 HFPO-DA	*107*		*70 - 130*	*05/23/21 19:10*	*05/24/21 13:34*	*1*

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

Job ID: 320-73901-1

Client Sample ID: 33059
Date Collected: 05/17/21 09:32
Date Received: 05/19/21 15:22

Lab Sample ID: 320-73901-8
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)	**0.57**	**J**	1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:42	1
Perfluoroheptanoic acid (PFHpA)	ND		1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:42	1
Perfluorooctanoic acid (PFOA)	ND		1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:42	1
Perfluorononanoic acid (PFNA)	ND		1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:42	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:42	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:42	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:42	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:42	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:42	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:42	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:42	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:42	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:42	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:42	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:42	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	ND		1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:42	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:42	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.7	0.42	ng/L		05/23/21 19:10	05/24/21 13:42	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*102*		*70 - 130*	*05/23/21 19:10*	*05/24/21 13:42*	*1*
13C2 PFDA	*112*		*70 - 130*	*05/23/21 19:10*	*05/24/21 13:42*	*1*
d5-NEt FOSAA	*88*		*70 - 130*	*05/23/21 19:10*	*05/24/21 13:42*	*1*
13C3 HFPO-DA	*107*		*70 - 130*	*05/23/21 19:10*	*05/24/21 13:42*	*1*

Surrogate Summary

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

Job ID: 320-73901-1

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)
320-73901-1	33061	103	109	94	105
320-73901-2	33056	104	115	91	106
320-73901-3	33068	105	97	87	96
320-73901-4	33053	102	107	86	106
320-73901-5	33060	105	99	76	94
320-73901-6	33160	98	108	87	95
320-73901-7	33064	102	110	88	107
320-73901-8	33059	102	112	88	107
LCS 320-491957/2-A	Lab Control Sample	103	107	93	111
LCS 320-493149/2-A	Lab Control Sample	112	107	95	106
LCSD 320-491957/3-A	Lab Control Sample Dup	100	109	92	108
LCSD 320-493149/3-A	Lab Control Sample Dup	101	95	84	95
MB 320-491957/1-A	Method Blank	104	109	95	108
MB 320-493149/1-A	Method Blank	112	106	92	102

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 320-491957/1-A
Matrix: Water
Analysis Batch: 492061

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 491957

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.50	ng/L		05/23/21 19:10	05/24/21 11:31	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.50	ng/L		05/23/21 19:10	05/24/21 11:31	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.50	ng/L		05/23/21 19:10	05/24/21 11:31	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.50	ng/L		05/23/21 19:10	05/24/21 11:31	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.50	ng/L		05/23/21 19:10	05/24/21 11:31	1
Perfluoroundecanoic acid (PFUnA)	0.978	J	2.0	0.50	ng/L		05/23/21 19:10	05/24/21 11:31	1
Perfluorododecanoic acid (PFDoA)	1.32	J	2.0	0.50	ng/L		05/23/21 19:10	05/24/21 11:31	1
Perfluorotridecanoic acid (PFTriA)	1.43	J	2.0	0.50	ng/L		05/23/21 19:10	05/24/21 11:31	1
Perfluorotetradecanoic acid (PFTeA)	1.28	J	2.0	0.50	ng/L		05/23/21 19:10	05/24/21 11:31	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.50	ng/L		05/23/21 19:10	05/24/21 11:31	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.50	ng/L		05/23/21 19:10	05/24/21 11:31	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.50	ng/L		05/23/21 19:10	05/24/21 11:31	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	0.982	J	2.0	0.50	ng/L		05/23/21 19:10	05/24/21 11:31	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	1.28	J	2.0	0.50	ng/L		05/23/21 19:10	05/24/21 11:31	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		2.0	0.50	ng/L		05/23/21 19:10	05/24/21 11:31	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	0.891	J	2.0	0.50	ng/L		05/23/21 19:10	05/24/21 11:31	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		2.0	0.50	ng/L		05/23/21 19:10	05/24/21 11:31	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.50	ng/L		05/23/21 19:10	05/24/21 11:31	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*104*		*70 - 130*	*05/23/21 19:10*	*05/24/21 11:31*	*1*
13C2 PFDA	*109*		*70 - 130*	*05/23/21 19:10*	*05/24/21 11:31*	*1*
d5-NEtFOSAA	*95*		*70 - 130*	*05/23/21 19:10*	*05/24/21 11:31*	*1*
13C3 HFPO-DA	*108*		*70 - 130*	*05/23/21 19:10*	*05/24/21 11:31*	*1*

Lab Sample ID: LCS 320-491957/2-A
Matrix: Water
Analysis Batch: 492061

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 491957

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorohexanoic acid (PFHxA)	160	164		ng/L		102	70 - 130
Perfluoroheptanoic acid (PFHpA)	160	178		ng/L		111	70 - 130
Perfluorooctanoic acid (PFOA)	160	176		ng/L		110	70 - 130
Perfluorononanoic acid (PFNA)	160	192		ng/L		120	70 - 130
Perfluorodecanoic acid (PFDA)	160	188		ng/L		117	70 - 130
Perfluoroundecanoic acid (PFUnA)	160	181		ng/L		113	70 - 130
Perfluorododecanoic acid (PFDoA)	160	187		ng/L		117	70 - 130
Perfluorotridecanoic acid (PFTriA)	160	198		ng/L		124	70 - 130
Perfluorotetradecanoic acid (PFTeA)	160	184		ng/L		115	70 - 130
Perfluorobutanesulfonic acid (PFBS)	141	139		ng/L		98	70 - 130

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

Lab Sample ID: LCS 320-491957/2-A
Matrix: Water
Analysis Batch: 492061

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 491957

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorohexanesulfonic acid (PFHxS)			146	148		ng/L		102	70 - 130		
Perfluorooctanesulfonic acid (PFOS)			148	141		ng/L		95	70 - 130		
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			160	145		ng/L		90	70 - 130		
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			160	157		ng/L		98	70 - 130		
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O			149	145		ng/L		97	70 - 130		
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF			151	142		ng/L		94	70 - 130		
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			160	179		ng/L		112	70 - 130		
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			151	159		ng/L		105	70 - 130		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*103*		*70 - 130*
13C2 PFDA	*107*		*70 - 130*
d5-NEtFOSAA	*93*		*70 - 130*
13C3 HFPO-DA	*111*		*70 - 130*

Lab Sample ID: LCSD 320-491957/3-A
Matrix: Water
Analysis Batch: 492061

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 491957

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)			160	164		ng/L		102	70 - 130	0	30
Perfluoroheptanoic acid (PFHpA)			160	176		ng/L		110	70 - 130	1	30
Perfluorooctanoic acid (PFOA)			160	163		ng/L		102	70 - 130	8	30
Perfluorononanoic acid (PFNA)			160	182		ng/L		114	70 - 130	6	30
Perfluorodecanoic acid (PFDA)			160	178		ng/L		111	70 - 130	5	30
Perfluoroundecanoic acid (PFUnA)			160	179		ng/L		112	70 - 130	1	30
Perfluorododecanoic acid (PFDoA)			160	194		ng/L		122	70 - 130	4	30
Perfluorotridecanoic acid (PFTriA)			160	199		ng/L		124	70 - 130	1	30
Perfluorotetradecanoic acid (PFTeA)			160	187		ng/L		117	70 - 130	1	30
Perfluorobutanesulfonic acid (PFBS)			141	132		ng/L		93	70 - 130	5	30
Perfluorohexanesulfonic acid (PFHxS)			146	140		ng/L		96	70 - 130	6	30
Perfluorooctanesulfonic acid (PFOS)			148	136		ng/L		92	70 - 130	3	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			160	143		ng/L		89	70 - 130	1	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			160	151		ng/L		94	70 - 130	4	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O			149	140		ng/L		94	70 - 130	3	30

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

Lab Sample ID: LCSD 320-491957/3-A
Matrix: Water
Analysis Batch: 492061

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 491957

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF			151	135		ng/L		90	70 - 130	5	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			160	175		ng/L		110	70 - 130	2	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			151	157		ng/L		104	70 - 130	1	30

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFHxA	*100*		*70 - 130*
13C2 PFDA	*109*		*70 - 130*
d5-NEtFOSAA	*92*		*70 - 130*
13C3 HFPO-DA	*108*		*70 - 130*

Lab Sample ID: MB 320-493149/1-A
Matrix: Water
Analysis Batch: 493665

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 493149

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.50	ng/L		05/26/21 19:19	05/27/21 18:57	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.50	ng/L		05/26/21 19:19	05/27/21 18:57	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.50	ng/L		05/26/21 19:19	05/27/21 18:57	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.50	ng/L		05/26/21 19:19	05/27/21 18:57	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.50	ng/L		05/26/21 19:19	05/27/21 18:57	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	0.50	ng/L		05/26/21 19:19	05/27/21 18:57	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.50	ng/L		05/26/21 19:19	05/27/21 18:57	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	0.50	ng/L		05/26/21 19:19	05/27/21 18:57	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.50	ng/L		05/26/21 19:19	05/27/21 18:57	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.50	ng/L		05/26/21 19:19	05/27/21 18:57	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.50	ng/L		05/26/21 19:19	05/27/21 18:57	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.50	ng/L		05/26/21 19:19	05/27/21 18:57	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		2.0	0.50	ng/L		05/26/21 19:19	05/27/21 18:57	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		2.0	0.50	ng/L		05/26/21 19:19	05/27/21 18:57	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	ND		2.0	0.50	ng/L		05/26/21 19:19	05/27/21 18:57	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	ND		2.0	0.50	ng/L		05/26/21 19:19	05/27/21 18:57	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		2.0	0.50	ng/L		05/26/21 19:19	05/27/21 18:57	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.50	ng/L		05/26/21 19:19	05/27/21 18:57	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*112*		*70 - 130*	*05/26/21 19:19*	*05/27/21 18:57*	*1*
13C2 PFDA	*106*		*70 - 130*	*05/26/21 19:19*	*05/27/21 18:57*	*1*
d5-NEtFOSAA	*92*		*70 - 130*	*05/26/21 19:19*	*05/27/21 18:57*	*1*
13C3 HFPO-DA	*102*		*70 - 130*	*05/26/21 19:19*	*05/27/21 18:57*	*1*

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

Lab Sample ID: LCS 320-493149/2-A
Matrix: Water
Analysis Batch: 493665

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 493149

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorohexanoic acid (PFHxA)	160	169		ng/L		106	70 - 130
Perfluoroheptanoic acid (PFHpA)	160	174		ng/L		109	70 - 130
Perfluorooctanoic acid (PFOA)	160	172		ng/L		108	70 - 130
Perfluorononanoic acid (PFNA)	160	172		ng/L		107	70 - 130
Perfluorodecanoic acid (PFDA)	160	176		ng/L		110	70 - 130
Perfluoroundecanoic acid (PFUnA)	160	161		ng/L		101	70 - 130
Perfluorododecanoic acid (PFDoA)	160	158		ng/L		99	70 - 130
Perfluorotridecanoic acid (PFTriA)	160	163		ng/L		102	70 - 130
Perfluorotetradecanoic acid (PFTeA)	160	156		ng/L		97	70 - 130
Perfluorobutanesulfonic acid (PFBS)	141	138		ng/L		97	70 - 130
Perfluorohexanesulfonic acid (PFHxS)	146	146		ng/L		100	70 - 130
Perfluorooctanesulfonic acid (PFOS)	148	141		ng/L		95	70 - 130
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	160	145		ng/L		91	70 - 130
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	160	137		ng/L		86	70 - 130
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O	149	146		ng/L		98	70 - 130
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF	151	141		ng/L		94	70 - 130
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	160	168		ng/L		105	70 - 130
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	151	169		ng/L		112	70 - 130

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*112*		*70 - 130*
13C2 PFDA	*107*		*70 - 130*
d5-NEtFOSAA	*95*		*70 - 130*
13C3 HFPO-DA	*106*		*70 - 130*

Lab Sample ID: LCSD 320-493149/3-A
Matrix: Water
Analysis Batch: 493665

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 493149

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	160	155		ng/L		97	70 - 130	9	30
Perfluoroheptanoic acid (PFHpA)	160	158		ng/L		99	70 - 130	10	30
Perfluorooctanoic acid (PFOA)	160	157		ng/L		98	70 - 130	10	30
Perfluorononanoic acid (PFNA)	160	155		ng/L		97	70 - 130	10	30
Perfluorodecanoic acid (PFDA)	160	164		ng/L		102	70 - 130	7	30
Perfluoroundecanoic acid (PFUnA)	160	153		ng/L		96	70 - 130	5	30
Perfluorododecanoic acid (PFDoA)	160	153		ng/L		96	70 - 130	3	30

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

Lab Sample ID: LCSD 320-493149/3-A
Matrix: Water
Analysis Batch: 493665

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 493149

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorotridecanoic acid (PFTriA)			160	155		ng/L		97	70 - 130	5	30
Perfluorotetradecanoic acid (PFTeA)			160	144		ng/L		90	70 - 130	7	30
Perfluorobutanesulfonic acid (PFBS)			141	131		ng/L		92	70 - 130	5	30
Perfluorohexanesulfonic acid (PFHxS)			146	139		ng/L		95	70 - 130	5	30
Perfluorooctanesulfonic acid (PFOS)			148	133		ng/L		89	70 - 130	6	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			160	135		ng/L		85	70 - 130	7	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			160	129		ng/L		81	70 - 130	6	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3O			149	142		ng/L		95	70 - 130	3	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF			151	142		ng/L		95	70 - 130	1	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			160	155		ng/L		97	70 - 130	8	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			151	151		ng/L		100	70 - 130	11	30

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFHxA	*101*		*70 - 130*
13C2 PFDA	*95*		*70 - 130*
d5-NEtFOSAA	*84*		*70 - 130*
13C3 HFPO-DA	*95*		*70 - 130*

LCMS

Prep Batch: 491957

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-73901-1	33061	Total/NA	Water	537.1 DW	
320-73901-2	33056	Total/NA	Water	537.1 DW	
320-73901-4	33053	Total/NA	Water	537.1 DW	
320-73901-6	33160	Total/NA	Water	537.1 DW	
320-73901-7	33064	Total/NA	Water	537.1 DW	
320-73901-8	33059	Total/NA	Water	537.1 DW	
MB 320-491957/1-A	Method Blank	Total/NA	Water	537.1 DW	
LCS 320-491957/2-A	Lab Control Sample	Total/NA	Water	537.1 DW	
LCSD 320-491957/3-A	Lab Control Sample Dup	Total/NA	Water	537.1 DW	

Analysis Batch: 492061

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-73901-1	33061	Total/NA	Water	537.1 DW	491957
320-73901-2	33056	Total/NA	Water	537.1 DW	491957
MB 320-491957/1-A	Method Blank	Total/NA	Water	537.1 DW	491957
LCS 320-491957/2-A	Lab Control Sample	Total/NA	Water	537.1 DW	491957
LCSD 320-491957/3-A	Lab Control Sample Dup	Total/NA	Water	537.1 DW	491957

Analysis Batch: 492063

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-73901-4	33053	Total/NA	Water	537.1 DW	491957
320-73901-6	33160	Total/NA	Water	537.1 DW	491957
320-73901-7	33064	Total/NA	Water	537.1 DW	491957
320-73901-8	33059	Total/NA	Water	537.1 DW	491957

Prep Batch: 493149

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-73901-3	33068	Total/NA	Water	537.1 DW	
320-73901-5	33060	Total/NA	Water	537.1 DW	
MB 320-493149/1-A	Method Blank	Total/NA	Water	537.1 DW	
LCS 320-493149/2-A	Lab Control Sample	Total/NA	Water	537.1 DW	
LCSD 320-493149/3-A	Lab Control Sample Dup	Total/NA	Water	537.1 DW	

Analysis Batch: 493665

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-73901-3	33068	Total/NA	Water	537.1 DW	493149
320-73901-5	33060	Total/NA	Water	537.1 DW	493149
MB 320-493149/1-A	Method Blank	Total/NA	Water	537.1 DW	493149
LCS 320-493149/2-A	Lab Control Sample	Total/NA	Water	537.1 DW	493149
LCSD 320-493149/3-A	Lab Control Sample Dup	Total/NA	Water	537.1 DW	493149

Lab Chronicle

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

Job ID: 320-73901-1

Client Sample ID: 33061
Date Collected: 05/15/21 08:20
Date Received: 05/19/21 15:22

Lab Sample ID: 320-73901-1
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			304.3 mL	1.00 mL	491957	05/23/21 19:10	AP	TAL SAC
Total/NA	Analysis	537.1 DW		1			492061	05/24/21 12:09	SS	TAL SAC

Client Sample ID: 33056
Date Collected: 05/15/21 09:26
Date Received: 05/19/21 15:22

Lab Sample ID: 320-73901-2
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			313 mL	1.00 mL	491957	05/23/21 19:10	AP	TAL SAC
Total/NA	Analysis	537.1 DW		1			492061	05/24/21 12:17	SS	TAL SAC

Client Sample ID: 33068
Date Collected: 05/15/21 10:25
Date Received: 05/19/21 15:22

Lab Sample ID: 320-73901-3
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			300.4 mL	1.00 mL	493149	05/26/21 19:19	AP	TAL SAC
Total/NA	Analysis	537.1 DW		1			493665	05/27/21 19:44	D1R	TAL SAC

Client Sample ID: 33053
Date Collected: 05/15/21 12:16
Date Received: 05/19/21 15:22

Lab Sample ID: 320-73901-4
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			294.5 mL	1.00 mL	491957	05/23/21 19:10	AP	TAL SAC
Total/NA	Analysis	537.1 DW		1			492063	05/24/21 13:11	SS	TAL SAC

Client Sample ID: 33060
Date Collected: 05/16/21 09:58
Date Received: 05/19/21 15:22

Lab Sample ID: 320-73901-5
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			282.7 mL	1.00 mL	493149	05/26/21 19:19	AP	TAL SAC
Total/NA	Analysis	537.1 DW		1			493665	05/27/21 19:51	D1R	TAL SAC

Client Sample ID: 33160
Date Collected: 05/16/21 10:08
Date Received: 05/19/21 15:22

Lab Sample ID: 320-73901-6
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			292.4 mL	1.00 mL	491957	05/23/21 19:10	AP	TAL SAC
Total/NA	Analysis	537.1 DW		1			492063	05/24/21 13:26	SS	TAL SAC

Lab Chronicle

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

Job ID: 320-73901-1

Client Sample ID: 33064

Lab Sample ID: 320-73901-7

Date Collected: 05/17/21 07:20

Matrix: Water

Date Received: 05/19/21 15:22

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			283.5 mL	1.00 mL	491957	05/23/21 19:10	AP	TAL SAC
Total/NA	Analysis	537.1 DW		1			492063	05/24/21 13:34	SS	TAL SAC

Client Sample ID: 33059

Lab Sample ID: 320-73901-8

Date Collected: 05/17/21 09:32

Matrix: Water

Date Received: 05/19/21 15:22

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			299.5 mL	1.00 mL	491957	05/23/21 19:10	AP	TAL SAC
Total/NA	Analysis	537.1 DW		1			492063	05/24/21 13:42	SS	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 - Quarterly

Job ID: 320-73901-1

Laboratory: Eurofins TestAmerica, Sacramento

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	17-020	02-20-24
ANAB	Dept. of Defense ELAP	L2468	01-20-24
ANAB	Dept. of Energy	L2468.01	01-20-24
ANAB	ISO/IEC 17025	L2468	01-20-24
Arizona	State	AZ0708	08-11-21
Arkansas DEQ	State	88-0691	06-17-21
California	State	2897	01-31-22
Colorado	State	CA0004	08-31-21
Connecticut	State	PH-0691	06-30-21
Florida	NELAP	E87570	06-30-21
Georgia	State	4040	01-29-22
Hawaii	State	<cert No.>	01-29-22
Illinois	NELAP	200060	03-18-22
Kansas	NELAP	E-10375	10-31-21
Louisiana	NELAP	01944	06-30-21
Maine	State	CA00004	04-14-22
Michigan	State	9947	01-29-22
Nevada	State	CA000442021-2	07-31-21
New Hampshire	NELAP	2997	04-18-22
New Jersey	NELAP	CA005	06-30-21
New York	NELAP	11666	04-01-22
Ohio	State	41252	01-29-22
Oregon	NELAP	4040	01-30-23
Texas	NELAP	T104704399-19-13	05-31-21
US Fish & Wildlife	US Federal Programs	58448	07-31-21
USDA	US Federal Programs	P330-18-00239	07-31-21
Utah	NELAP	CA000442021-12	03-01-22
Virginia	NELAP	460278	03-14-22
West Virginia (DW)	State	9930C	12-31-21
Wisconsin	State	998204680	08-31-21
Wyoming	State Program	8TMS-L	01-28-19 *

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Method Summary

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

Job ID: 320-73901-1

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: YAK - Quarterly

Job ID: 320-73901-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
320-73901-1	33061	Water	05/15/21 08:20	05/19/21 15:22	
320-73901-2	33056	Water	05/15/21 09:26	05/19/21 15:22	
320-73901-3	33068	Water	05/15/21 10:25	05/19/21 15:22	
320-73901-4	33053	Water	05/15/21 12:16	05/19/21 15:22	
320-73901-5	33060	Water	05/16/21 09:58	05/19/21 15:22	
320-73901-6	33160	Water	05/16/21 10:08	05/19/21 15:22	
320-73901-7	33064	Water	05/17/21 07:20	05/19/21 15:22	
320-73901-8	33059	Water	05/17/21 09:32	05/19/21 15:22	

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

CHAIN-OF-CUSTODY RECORD

Laboratory Test America
Attn: David Alltucker

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	EPA 537.1-M PFAS (18 analytes)	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
33061		0820	5/15/21	X	2	MS Groundwater
33056		0926	"	X	2	
33068		1025	"	X	2	
33053		1216	"	X	2	
33060		0958	5/16/21	X	2	
33160		1008	"	X	2	
33064		0720	5/17/21	X	2	
33059		0932	"	X	2	

320-73901 Chain of Custody

Project Information

Number: 102894-004
Name: AMJ
Contact: YAK - Quarterly
Ongoing Project? Yes [X] No [ ] Annual
Sampler: MXJ

Sample Receipt

Total No. of Containers: 16
COC Seals/Intact? Y/N/NA:
Received Good Cond./Cold:
Temp: 2.5°
Delivery Method:

Notes:

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 1330	Signature: Time:	Signature: Time:
Printed Name: Michael Jaramillo Date: 5/18/21	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson, Inc	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 1522	Signature: Time:	Signature: Time:
Printed Name: Cheng Vang Date: 5/19/21	Printed Name: Date:	Printed Name: Date:
Company: ETA SAC	Company:	Company:

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

2.5°C

No. 36395

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-73901-1

Login Number: 73901
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	Seals
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	gel packs only
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:

Justin Risley

Title:

Engineering Staff

Date:

June 2, 2021

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

Eurofins TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-73901-1

Laboratory Report Date:

June 2, 2021

CS Site Name:

ADOT&PF Yakutat Airport Sitewide PFAS

ADEC File Number:

1530.38.022

Hazard Identification Number:

27090

320-73901-1

Laboratory Report Date:

June 2, 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 laboratory.

2. Chain of Custody (CoC)

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

   Yes☒ No☐ N/A☐ Comments:

   b. Correct analyses requested?

   Yes☒ No☐ N/A☐ Comments:

3. Laboratory Sample Receipt Documentation

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

   Yes☒ No☐ N/A☐ Comments:

   Sample cooler temperature recorded at 2.5° C upon receipt at laboratory.

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

   Yes☒ No☐ N/A☐ Comments:

320-73901-1

Laboratory Report Date:

June 2, 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:

Method 537.1 DW: The method blank for preparation batch 320-491957 contained several analytes above 1/3 the reporting limit (RL). None of the samples associated with this method blank was detected for the target compound; therefore, re-extraction and re-analysis of samples were not performed and samples have been reported.

Method 537.1 DW: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-491957 and 320-493149.

Method 537.1 DW: The following samples were observed to be yellow prior to extraction: 33061, 33056, 33068, 33060, 33160, 33064 and 33059.

Method 537.1 DW: The following samples were observed to be light yellow at final volume: 33061, 33056, 33068, 33060, 33160, 33064 and 33059.

Method 537.1 DW: The following samples were observed to be light brown at final volume: 33068 and 33060.

320-73901-1

Laboratory Report Date:

June 2, 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:

The case narrative does not note an effect on data quality.

5. Samples Results

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

Yes☒ No☐ N/A☐ Comments:

b. All applicable holding times met?

Yes☒ No☐ N/A☐ Comments:

c. All soils reported on a dry weight basis?

Yes☐ No☐ N/A☒ Comments:

Soil samples were not submitted with this work order.

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

Yes☒ No☐ N/A☐ Comments:

e. Data quality or usability affected?

Data quality and/or usability were not affected.

320-73901-1

Laboratory Report Date:

June 2, 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:

However, PFUnA, PFDoA, PFTriA, PFTeA, NMeFOSAA, NEtFOSAA, and 11Cl-PF3OUdS were detected in the method blank sample associated with preparatory batch 320-491957. These analytes were not detected in associated project samples, flagging not required. Data quality/usability not affected.

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:

No flags are required; 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.

320-73901-1

Laboratory Report Date:

June 2, 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:

The data quality and/or usability were not affected.

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

Note: Leave blank if not required for project

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

Yes☐ No☒ N/A☐ Comments:

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.

320-73901-1

Laboratory Report Date:

June 2, 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:

N/A; see above.

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

Data quality and/or usability was not affected.

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

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

Yes☒ No☐ N/A☐ Comments:

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

Yes☒ No☐ N/A☐ Comments:

320-73901-1

Laboratory Report Date:

June 2, 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; therefore, a trip blank is not required.

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

Not applicable, see above.

v. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected.

f. Field Duplicate

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

Yes☒ No☐ N/A☐ Comments:

320-73901-1

Laboratory Report Date:

June 2, 2021

CS Site Name:

ii. Submitted blind to lab?

Yes☒ No☐ N/A☐ Comments:

The field-duplicate pair submitted with this work order are *33060/33160*.

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

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

Where R_1 = Sample Concentration
R_2 = Field Duplicate Concentration

Yes☒ No☐ N/A☐ Comments:

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

Comments:

The data quality and/or usability was not affected.

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

Yes☐ No☐ N/A☒ Comments:

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

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

Not applicable, see above.

iii. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected.

320-73901-1

Laboratory Report Date:

June 2, 2021

CS Site Name:

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

a. Defined and appropriate?

Yes☒ No☐ N/A☐ Comments:

Sample 33056 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*.

APPENDIX D: QUALITY ASSURANCE AND QUALITY CONTROL

Appendix D

Quality Assurance and Quality Control Summary

CONTENTS

APPENDIX D: QUALITY ASSURANCE AND QUALITY CONTROL

D.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 2020 through June 2021. The water supply well events are summarized in Section 1.3. Water supply well analytical results tables are presented in Appendix C.

Shannon & Wilson reviewed project and QC analytical data to assess whether the data met the designated quality objectives and were acceptable for project use. The project data were reviewed for deviations to the requirements presented in the DOT&PF Statewide PFAS General Work Plan (GWP). The review included evaluation of the following: sample collection and handling, holding times, blanks (to assess contamination), project sample and laboratory quality control sample duplicates (to assess precision), laboratory control samples (LCSs) and sample surrogate recoveries (to assess accuracy), and matrix spike sample (MS) recoveries (to assess matrix effects). Calibration curves and continuing calibration verification (CCV) 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 (e.g., high LCS recovery associated with non-detect results), are not discussed. More elaborate data quality descriptions are reported in the DEC Laboratory Data Review Checklists (LDRCs), which are included at the end of Appendix C.

Water supply well results and reporting limits (RLs) for non-detect results were compared to the most current cleanup levels presented in Title 18 of the Alaska Administrative Code (AAC) Chapter 75.345, Table C (DEC, 2018) for PFOS and PFOA.

Water supply well data quality is discussed in Section D.2. Applicable data quality indicators are discussed for each method under separate subheadings. Data which did not meet acceptance criteria have been described and the associated samples and data quality implications or qualifications are summarized.

D.1.1 Analytical Methods and Data Quality Objectives

The analytical methods and associated data quality objectives (DQOs) used for this review were established in the GWP and the Data-Validation Program Plan (DVPP). 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, LCS, and MS sample recoveries were used to measure accuracy for this project. LCS and surrogate recovery criteria are defined in the QSM. ◎ 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 were used to measure precision for this project. LCS/LCSD precision criteria are defined in the QSM and field duplicate precision criteria are defined in the DEC LDRC (water: ≤30%).
- 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 (LODs) 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 parameters will lead to a determination of the overall project data completeness.

D.1.2 Summary of Groundwater Samples

A total of 27 groundwater samples were collected from water supply wells at the YAK between June 2020 and July 2021 (including 4 field duplicates).

Project and quality control samples were analyzed by Eurofins TestAmerica Laboratory of West Sacramento, California (TestAmerica). TestAmerica is certified for the analysis of PFAS on February 11, 2021 by LCMS-MS compliant with QSM Version 5.3 Table B-15. The reported analytes were included in the DEC's Contaminated Sites Laboratory Approval 17-020. Prior to February 11, 2021, TestAmerica was certified for the analysis of PFOS and PFOA only by Method 537.

Groundwater samples were shipped via Alaska Airlines Goldstreak service from Yakutat or Fairbanks to the laboratory in West Sacramento, California. The laboratory reports were assigned the following work order (WO) numbers:

- WO 320-63799-1 for August 2020 samples;
- WO 320-67967-1 for December 2020 samples;
- WO 320-71904-1 for March 2021 samples; and
- WO 320-73901-1 for May 2021 samples.

The laboratory reports and associated DEC LDRCs are included in Appendix C. Sample data quality is discussed in Section D.2.

D.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 LDRC in Appendix C for more elaborate data quality descriptions.

D.2.1 Sample Collection

Water supply well sample collection forms were reviewed to ensure that parameters met the stabilization guide identified in the GWP and DEC Field Sampling Guidance. All samples met stabilization criteria with the exceptions noted below:

- Sample *33064* collected on May 17, 2021 from Delta Western Petroleum building did not meet stabilization criteria due to owner concerns about pump damage.

D.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.

D.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. Samples were analyzed in every batch, as required. No analytes were detected which resulted in the qualification of data. See the associated DEC LDRC checklist for a more detailed discussion.

D.2.4 Laboratory Control Samples

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

D.2.5 Matrix Spike Sample and Sample Duplicates

MS samples are typically prepared by adding spike compounds to project samples to assess potential matrix interference. MS/MSD samples were not performed in any WO due to insufficient sample volumes.

D.2.6 Isotope Dilution Analyte Recovery

Isotope dilution analyte (IDA) compounds were added to project samples by the laboratory prior to analysis, in accordance with method requirements. IDA recoveries were then calculated as percentages and reported by the laboratory as a measure of analytical extraction efficiency. IDA recoveries were inside the established control limits and resulted in no qualification of the data.

D.2.7 Field Duplicates

One field duplicate sample was collected and submitted to the laboratory as a blind sample with every WO. Field duplicate samples were collected at a minimum frequency of 10 percent. Field duplicates met the GWP guidelines of 30% for water samples in all WOs and are considered comparable, with the following exceptions

- WO 320-67967-1: The RPD, where calculable was above 30% for PFNA and PFDA in field duplicate pair sample 33060 and 43060. These analytes were detected at estimated concentrations below the reporting limit for the duplicate pair. The concentrations are flagged "J" by the laboratory to note estimated result; no further flags have been applied for the RPD failure. ne-1-sulfonic acid were detected in sample 43060 below the LOQ and were not detected in sample 33060. RPDs could not be calculated for these analytes.

D.2.8 Analytical Sensitivity

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

D.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.

D.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 2020 to June 2021 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.

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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 contractor was not one of the specific persons for whom the report was prepared, and that

IMPORTANT INFORMATION

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