SHANNON & WILSON

August 20, 2021

Marcus Zimmerman and Sammy Cummings
DOT&PF Southcoast Region
P.O. Box 196900
Anchorage, AK 99519

RE: YAKUTAT AIRPORT, SEGMENTED CIRCLE AND BEACON SOIL SAMPLE COLLECTION RESULTS, LETTER REPORT

Shannon & Wilson has prepared this letter report to document our soil sample collection efforts at the Yakutat Airport (YAK) in Yakutat, Alaska. This letter briefly addresses field activities conducted by Shannon & Wilson, Inc. (S&W), and analytical results compared to applicable regulatory levels. These services were conducted on behalf of the Alaska Department of Transportation & Public Facilities (DOT&PF), under Notice to Proceed P7-4-2021 and in accordance with DOT&PF's Professional Services Agreement Number 25-19-1-013 *Per- and Polyfluoroalkyl Substance (PFAS) Related Environmental & Engineering Services*.

BACKGROUND

The YAK is an active, DEC listed contaminated site due to the presence of PFAS in water supply well samples (DEC File Number 1530.38.022, Hazard ID 27090). DOT&PF requested S&W collect PFAS samples of other media (e.g., surface water, surface soil, etc.) at the YAK during routine water supply well monitoring events when there is available budget (i.e., when we are not able to sample each of the planned water supply well locations). The purpose of collecting these samples is to help guide planning for future construction projects at the YAK with respect to PFAS.

FIELD ACTIVITIES

In July 2021 S&W personnel, Amber Masters, traveled to Yakutat to perform the fiscal year (FY) 2022 routine quarterly PFAS monitoring event at the YAK. During the monitoring event, Ms. Masters collected one soil sample from the ground surface adjacent to the airport beacon, and one sample each from the existing and proposed segmented circle locations (Figure 1, enclosed). Soil samples were collected following the procedures outlined in the *DOT&PF Statewide PFAS General Work Plan* (GWP), approved by DEC in August 2020.

Ms. Maters is a State of Alaska Qualified Sampler per 18 AAC 75.333[b] and 18 AAC 78.088[b].

2355 Hill Road ▪ Fairbanks, Alaska 99709-5326 ▪ 907 479-0600 ▪ Fax 907 479-5691
▪ www.shannonwilson.com ▪

ANALYTICAL RESULTS

Analytical samples collected for this project were submitted to Eurofins TestAmerica Laboratories, Inc. (TestAmerica) in West Sacramento, California, for determination of 18 PFAS. The laboratory maintains current certifications approved by DEC Contaminated Sites to conduct the requested analyses.

Perfluorononanoic acid (PFNA), perfluorotridecanoic acid (PFTrDA), and perfluorooctanesulfonic acid (PFOS) were detected at estimated concentrations below the laboratory reporting limit (RL) in sample *Beacon-21*.

Perfluoroheptanoic acid (PFHpA), PFNA, perfluorodecanoic acid (PFDA), perfluoroundecanoic acid (PFUnA), perfluorododecanoic acid (PFDoA), PFTrDA, PFOS, and perfluorooctanoic acid (PFOA) were detected in sample *Ex. Circle-21.*

No PFAS analytes were detected in sample Prop. Circle-21.

PFAS analytical results are enclosed in Table 1.

S&W reviewed the analytical data following the procedures detailed in our Data Validation Program Plan (DVPP) included in the GWP. Based on our review, the data are valid and acceptable for use for their intended purpose. By working in accordance with our proposed scope of services, we consider the samples we collected to be representative of site conditions at the locations and times they were obtained. The analytical laboratory report and corresponding DEC Laboratory Data Review Checklist (LDRC) are also enclosed.

COMPARISON TO REGULATORY LIMITS AND DISCUSSION

Soil results were compared to Alaska's 18 AAC 75.341 *Tables B1 Method Two – Migration to Groundwater and B2, Method Two – Under 40-Inch Zone Migration to Groundwater*. PFOS and PFOA were not detected above DECs regulatory limit for soil.

RECOMMENDATION

We recommend DOT&PF makes these data available to contractors working in these areas.

DATA LIMITATIONS

We collected a single grab sample that is representative of the date and location it was collected. PFAS may be present in the vicinity at concentrations greater than reported in the

samples we collected. PFAS or other contaminants at locations we did not sample. Our work was intended as a screening effort, not as a definitive characterization of the area.

We appreciate the opportunity to support you with this project. If you have questions, please contact me at 907-251-7534.

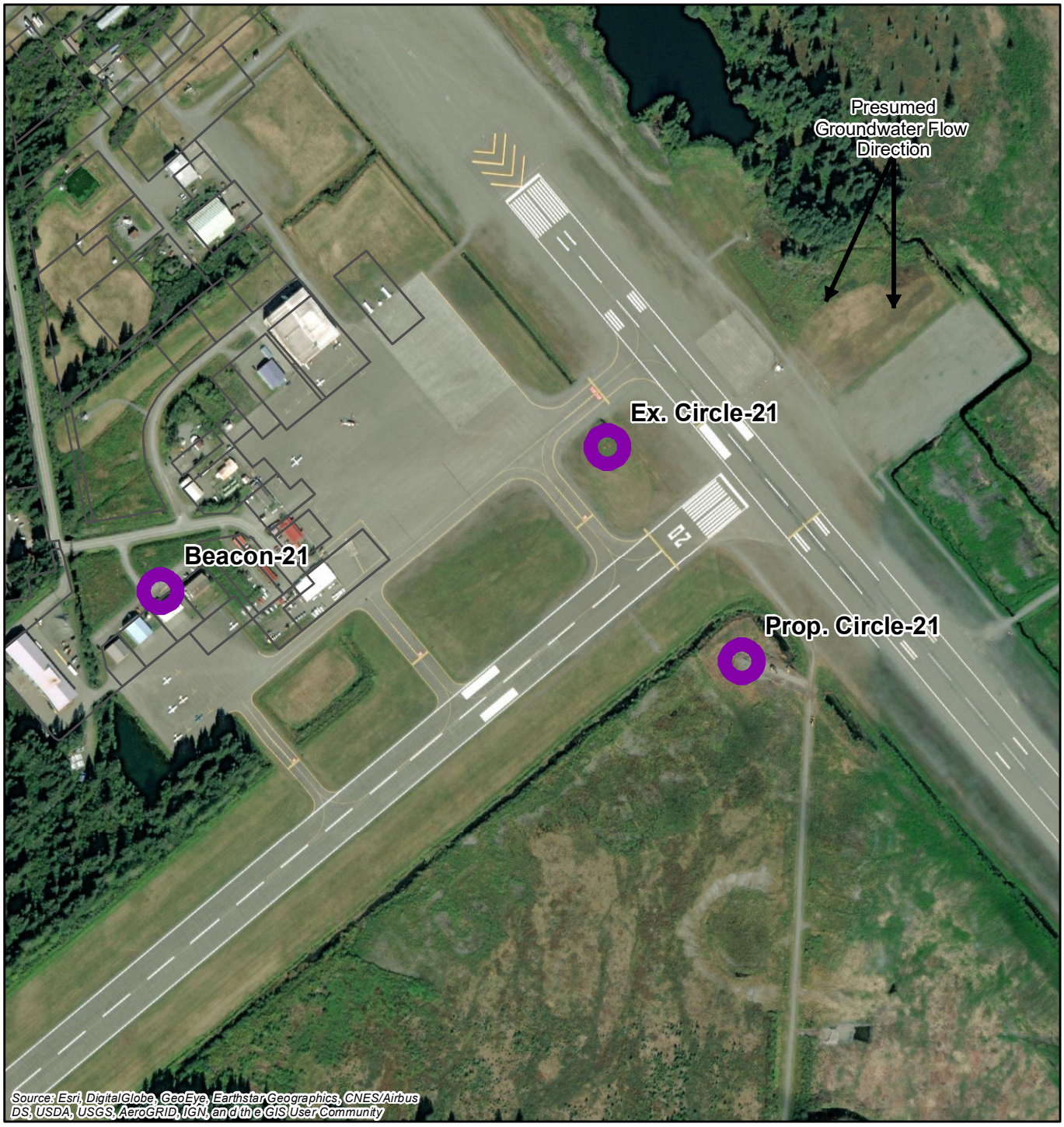
Sincerely,

SHANNON & WILSON

Ashley Jaramillo
Senior Chemist/Project Manager

AMJ:KRF:CBD/amj

Enc. Figure 1 - July 2021 Soil Sample Results Map
Table 1. Summary of July 2021 Soil Analytical Results
TestAmerica Lab Report 320-76916-1
Laboratory Data Review Checklist 320-76916-1



LEGEND

Locations

Yakutat Tax Parcels

0 250 500 750 1,000

Feet

N

Yakutat Airport
Site Characterization Activities
Yakutat, Alaska

JULY 2021 OTHER MEDIA SAMPLING MAP

August 2021

102896-007

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Figure 1

Table 1 - Summary of July 2021 Soil Analytical Results

				Sample ID	*Beacon-21*	*Ex. Circle-21*	*Prop. Circle-21*
Analytical Method	**Analyte**	**Cleanup Level†**	**Units**		07/28/2021	07/28/2021	07/28/2021
EPA 537M (PFAS)	Perfluorohexanesulfonic acid (PFHxS)	-	µg/kg		<0.19	<0.20	<0.19
	Perfluorohexanoic acid (PFHxA)	-	µg/kg		<0.19	<0.20	<0.19
	Perfluoroheptanoic acid (PFHpA)	-	µg/kg		<0.19	0.065 J*	<0.19
	Perfluorononanoic acid (PFNA)	-	µg/kg		0.028 J	0.10 J	<0.19
	Perfluorobutanesulfonic acid (PFBS)	-	µg/kg		<0.19	<0.20	<0.19
	Perfluorodecanoic acid (PFDA)	-	µg/kg		<0.19	0.12 J	<0.19
	Perfluoroundecanoic acid (PFUnA)	-	µg/kg		<0.19	0.27	<0.19
	Perfluorododecanoic acid (PFDoA)	-	µg/kg		<0.19	0.057 J	<0.19
	Perfluorotridecanoic acid (PFTrDA)	-	µg/kg		0.028 J	0.13 J	<0.19
	Perfluorotetradecanoic acid (PFTeA)	-	µg/kg		<0.19	<0.20	<0.19
	N-Methyl perfluorooctane sulfonamidoacetic acid (N-MeFOSAA)	-	µg/kg		<0.19	<0.20	<0.19
	N-Ethyl perfluorooctane sulfonamidoacetic acid (N-EtFOSAA)	-	µg/kg		<0.19	<0.20	<0.19
	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)	-	µg/kg		<0.19	<0.20	<0.19
	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	-	µg/kg		<0.19	<0.20	<0.19
	4,8-Dioxa-3H-perfluorononanoic acid (DONA)	-	µg/kg		<0.19	<0.20	<0.19
	Hexafluoropropylene oxide dimer acid (HFPO-DA)	-	µg/kg		<0.19	<0.20	<0.19
	Perfluorooctanesulfonic acid (PFOS)	3.0	µg/kg		0.069 J*	0.13 J*	<0.19
	Perfluorooctanoic acid (PFOA)	1.7	µg/kg		<0.19	0.056 J	<0.19

Notes:
Results reported from Eurofins TestAmerica work order 320-76916-1.
† DEC Cleanup Levels from 18 AAC 75.341 Table B1 Method Two - Soil Cleanup Levels Table (Migration to Groundwater).
— No applicable regulatory limit exists for the associated analyte.
< Analyte was not detected; reported as <LOD.
J Estimated concentration, detected greater than the detection limit (DL) and less than the limit of quantitation (LOQ). Flag applied by the laboratory.
J* Estimated concentration due to quality control failures. Flag applied by Shannon & Wilson, Inc. (*)
DEC = Alaska Department of Environmental Conservation; µg/kg = micrograms per kilogram; PFAS = per- and polyfluorinated alkyl substances

eurofins | Environment Testing America

ANALYTICAL REPORT

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

Laboratory Job ID: 320-76916-1
Client Project/Site: Yak-DOT+PF PFAS

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

Attn: Ashley Jaramillo

Authorized for release by:
8/12/2021 4:35:42 PM
Jill Kellmann, Client Service Manager
(916)374-4402
Jill.Kellmann@Eurofinset.com

Designee for

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

Table of Contents

Definitions/Glossary

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

Job ID: 320-76916-1

Qualifiers

LCMS

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

Glossary

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

Case Narrative

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

Job ID: 320-76916-1

Job ID: 320-76916-1

Laboratory: Eurofins TestAmerica, Sacramento

Narrative

Receipt
The samples were received on 7/29/2021 3:33 PM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 5.2º C.

LCMS
Method EPA 537(Mod): The "I" qualifier means the transition mass ratios for the indicated analytes were outside of the established ratio limits. The qualitative identification of the analytes have some degree of uncertainty, and the reported values may have some high bias. However, analyst judgment was used to positively identify the analytes. Beacon-21 (320-76916-1) and Ex. Circle-21 (320-76916-2)

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

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

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

Detection Summary

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

Job ID: 320-76916-1

Client Sample ID: Beacon-21 — Lab Sample ID: 320-76916-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorononanoic acid (PFNA)	0.028	J	0.19	0.021	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorotridecanoic acid (PFTriA)	0.028	J	0.19	0.020	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	0.069	J I	0.19	0.041	ug/Kg	1	☼	EPA 537(Mod)	Total/NA

Client Sample ID: Ex. Circle-21 — Lab Sample ID: 320-76916-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluoroheptanoic acid (PFHpA)	0.065	J I	0.20	0.039	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	0.056	J	0.20	0.054	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.10	J	0.20	0.022	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorodecanoic acid (PFDA)	0.12	J	0.20	0.049	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluoroundecanoic acid (PFUnA)	0.27		0.20	0.043	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorododecanoic acid (PFDoA)	0.057	J	0.20	0.031	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorotridecanoic acid (PFTriA)	0.13	J	0.20	0.021	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	0.13	J I	0.20	0.044	ug/Kg	1	☼	EPA 537(Mod)	Total/NA

Client Sample ID: Prop. Circle-21 — Lab Sample ID: 320-76916-3

No Detections.

This Detection Summary does not include radiochemical test results.

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

Job ID: 320-76916-1

Client Sample ID: Beacon-21

Date Collected: 07/28/21 08:40
Date Received: 07/29/21 15:33

Lab Sample ID: 320-76916-1

Matrix: Solid
Percent Solids: 95.5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		0.19	0.030	ug/Kg	☼	08/01/21 18:57	08/02/21 17:09	1
Perfluoroheptanoic acid (PFHpA)	ND		0.19	0.037	ug/Kg	☼	08/01/21 18:57	08/02/21 17:09	1
Perfluorooctanoic acid (PFOA)	ND		0.19	0.051	ug/Kg	☼	08/01/21 18:57	08/02/21 17:09	1
Perfluorononanoic acid (PFNA)	**0.028**	**J**	0.19	0.021	ug/Kg	☼	08/01/21 18:57	08/02/21 17:09	1
Perfluorodecanoic acid (PFDA)	ND		0.19	0.046	ug/Kg	☼	08/01/21 18:57	08/02/21 17:09	1
Perfluoroundecanoic acid (PFUnA)	ND		0.19	0.040	ug/Kg	☼	08/01/21 18:57	08/02/21 17:09	1
Perfluorododecanoic acid (PFDoA)	ND		0.19	0.029	ug/Kg	☼	08/01/21 18:57	08/02/21 17:09	1
Perfluorotridecanoic acid (PFTriA)	**0.028**	**J**	0.19	0.020	ug/Kg	☼	08/01/21 18:57	08/02/21 17:09	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.19	0.036	ug/Kg	☼	08/01/21 18:57	08/02/21 17:09	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.19	0.037	ug/Kg	☼	08/01/21 18:57	08/02/21 17:09	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.19	0.028	ug/Kg	☼	08/01/21 18:57	08/02/21 17:09	1
Perfluorooctanesulfonic acid (PFOS)	**0.069**	**J I**	0.19	0.041	ug/Kg	☼	08/01/21 18:57	08/02/21 17:09	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.19	0.022	ug/Kg	☼	08/01/21 18:57	08/02/21 17:09	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.19	0.046	ug/Kg	☼	08/01/21 18:57	08/02/21 17:09	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.19	0.034	ug/Kg	☼	08/01/21 18:57	08/02/21 17:09	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.19	0.040	ug/Kg	☼	08/01/21 18:57	08/02/21 17:09	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.19	0.030	ug/Kg	☼	08/01/21 18:57	08/02/21 17:09	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.19	0.038	ug/Kg	☼	08/01/21 18:57	08/02/21 17:09	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*73*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:09*	*1*
13C4 PFHpA	*75*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:09*	*1*
13C4 PFOA	*74*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:09*	*1*
13C5 PFNA	*76*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:09*	*1*
13C2 PFDA	*84*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:09*	*1*
13C2 PFUnA	*83*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:09*	*1*
13C2 PFDoA	*72*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:09*	*1*
13C2 PFTeDA	*70*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:09*	*1*
13C3 PFBS	*69*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:09*	*1*
18O2 PFHxS	*72*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:09*	*1*
13C4 PFOS	*74*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:09*	*1*
d3-NMeFOSAA	*89*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:09*	*1*
d5-NEtFOSAA	*98*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:09*	*1*
13C3 HFPO-DA	*62*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:09*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**4.5**		0.1	0.1	%			07/30/21 12:30	1
Percent Solids	**95.5**		0.1	0.1	%			07/30/21 12:30	1

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

Job ID: 320-76916-1

Client Sample ID: Ex. Circle-21

Date Collected: 07/28/21 08:51
Date Received: 07/29/21 15:33

Lab Sample ID: 320-76916-2

Matrix: Solid
Percent Solids: 88.4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		0.20	0.032	ug/Kg	☼	08/01/21 18:57	08/02/21 17:37	1
Perfluoroheptanoic acid (PFHpA)	**0.065**	**J I**	0.20	0.039	ug/Kg	☼	08/01/21 18:57	08/02/21 17:37	1
Perfluorooctanoic acid (PFOA)	**0.056**	**J**	0.20	0.054	ug/Kg	☼	08/01/21 18:57	08/02/21 17:37	1
Perfluorononanoic acid (PFNA)	**0.10**	**J**	0.20	0.022	ug/Kg	☼	08/01/21 18:57	08/02/21 17:37	1
Perfluorodecanoic acid (PFDA)	**0.12**	**J**	0.20	0.049	ug/Kg	☼	08/01/21 18:57	08/02/21 17:37	1
Perfluoroundecanoic acid (PFUnA)	**0.27**		0.20	0.043	ug/Kg	☼	08/01/21 18:57	08/02/21 17:37	1
Perfluorododecanoic acid (PFDoA)	**0.057**	**J**	0.20	0.031	ug/Kg	☼	08/01/21 18:57	08/02/21 17:37	1
Perfluorotridecanoic acid (PFTriA)	**0.13**	**J**	0.20	0.021	ug/Kg	☼	08/01/21 18:57	08/02/21 17:37	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.20	0.038	ug/Kg	☼	08/01/21 18:57	08/02/21 17:37	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.20	0.039	ug/Kg	☼	08/01/21 18:57	08/02/21 17:37	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.20	0.030	ug/Kg	☼	08/01/21 18:57	08/02/21 17:37	1
Perfluorooctanesulfonic acid (PFOS)	**0.13**	**J I**	0.20	0.044	ug/Kg	☼	08/01/21 18:57	08/02/21 17:37	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.20	0.023	ug/Kg	☼	08/01/21 18:57	08/02/21 17:37	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.20	0.049	ug/Kg	☼	08/01/21 18:57	08/02/21 17:37	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.20	0.036	ug/Kg	☼	08/01/21 18:57	08/02/21 17:37	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.20	0.042	ug/Kg	☼	08/01/21 18:57	08/02/21 17:37	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.20	0.032	ug/Kg	☼	08/01/21 18:57	08/02/21 17:37	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.20	0.040	ug/Kg	☼	08/01/21 18:57	08/02/21 17:37	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*71*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:37*	*1*
13C4 PFHpA	*67*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:37*	*1*
13C4 PFOA	*75*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:37*	*1*
13C5 PFNA	*82*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:37*	*1*
13C2 PFDA	*84*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:37*	*1*
13C2 PFUnA	*79*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:37*	*1*
13C2 PFDoA	*71*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:37*	*1*
13C2 PFTeDA	*69*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:37*	*1*
13C3 PFBS	*75*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:37*	*1*
18O2 PFHxS	*74*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:37*	*1*
13C4 PFOS	*82*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:37*	*1*
d3-NMeFOSAA	*83*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:37*	*1*
d5-NEtFOSAA	*101*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:37*	*1*
13C3 HFPO-DA	*66*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:37*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**11.6**		0.1	0.1	%			07/30/21 12:30	1
Percent Solids	**88.4**		0.1	0.1	%			07/30/21 12:30	1

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

Job ID: 320-76916-1

Client Sample ID: Prop. Circle-21

Date Collected: 07/28/21 08:57
Date Received: 07/29/21 15:33

Lab Sample ID: 320-76916-3

Matrix: Solid
Percent Solids: 93.4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		0.19	0.030	ug/Kg	☼	08/01/21 18:57	08/02/21 17:47	1
Perfluoroheptanoic acid (PFHpA)	ND		0.19	0.036	ug/Kg	☼	08/01/21 18:57	08/02/21 17:47	1
Perfluorooctanoic acid (PFOA)	ND		0.19	0.051	ug/Kg	☼	08/01/21 18:57	08/02/21 17:47	1
Perfluorononanoic acid (PFNA)	ND		0.19	0.021	ug/Kg	☼	08/01/21 18:57	08/02/21 17:47	1
Perfluorodecanoic acid (PFDA)	ND		0.19	0.046	ug/Kg	☼	08/01/21 18:57	08/02/21 17:47	1
Perfluoroundecanoic acid (PFUnA)	ND		0.19	0.040	ug/Kg	☼	08/01/21 18:57	08/02/21 17:47	1
Perfluorododecanoic acid (PFDoA)	ND		0.19	0.029	ug/Kg	☼	08/01/21 18:57	08/02/21 17:47	1
Perfluorotridecanoic acid (PFTriA)	ND		0.19	0.020	ug/Kg	☼	08/01/21 18:57	08/02/21 17:47	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.19	0.035	ug/Kg	☼	08/01/21 18:57	08/02/21 17:47	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.19	0.036	ug/Kg	☼	08/01/21 18:57	08/02/21 17:47	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.19	0.028	ug/Kg	☼	08/01/21 18:57	08/02/21 17:47	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.19	0.041	ug/Kg	☼	08/01/21 18:57	08/02/21 17:47	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.19	0.022	ug/Kg	☼	08/01/21 18:57	08/02/21 17:47	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.19	0.046	ug/Kg	☼	08/01/21 18:57	08/02/21 17:47	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.19	0.034	ug/Kg	☼	08/01/21 18:57	08/02/21 17:47	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.19	0.039	ug/Kg	☼	08/01/21 18:57	08/02/21 17:47	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.19	0.030	ug/Kg	☼	08/01/21 18:57	08/02/21 17:47	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.19	0.037	ug/Kg	☼	08/01/21 18:57	08/02/21 17:47	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*81*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:47*	*1*
13C4 PFHpA	*80*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:47*	*1*
13C4 PFOA	*87*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:47*	*1*
13C5 PFNA	*85*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:47*	*1*
13C2 PFDA	*83*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:47*	*1*
13C2 PFUnA	*94*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:47*	*1*
13C2 PFDoA	*86*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:47*	*1*
13C2 PFTeDA	*78*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:47*	*1*
13C3 PFBS	*77*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:47*	*1*
18O2 PFHxS	*81*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:47*	*1*
13C4 PFOS	*83*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:47*	*1*
d3-NMeFOSAA	*99*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:47*	*1*
d5-NEtFOSAA	*114*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:47*	*1*
13C3 HFPO-DA	*74*		*50 - 150*	*08/01/21 18:57*	*08/02/21 17:47*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**6.6**		0.1	0.1	%			07/30/21 12:30	1
Percent Solids	**93.4**		0.1	0.1	%			07/30/21 12:30	1

Isotope Dilution Summary

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

Job ID: 320-76916-1

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

Matrix: Solid

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFHxA (50-150)	C4PFHA (50-150)	PFOA (50-150)	PFNA (50-150)	PFDA (50-150)	PFUnA (50-150)	PFDoA (50-150)	PFTDA (50-150)
320-76916-1	Beacon-21	73	75	74	76	84	83	72	70
320-76916-1 MS	Beacon-21	76	70	77	79	81	84	72	68
320-76916-1 MSD	Beacon-21	76	77	78	83	82	82	73	71
320-76916-2	Ex. Circle-21	71	67	75	82	84	79	71	69
320-76916-3	Prop. Circle-21	81	80	87	85	83	94	86	78
LCS 320-512154/2-A	Lab Control Sample	69	69	67	64	69	67	65	66
MB 320-512154/1-A	Method Blank	67	63	67	63	61	71	65	67

		Percent Isotope Dilution Recovery (Acceptance Limits)					
Lab Sample ID	Client Sample ID	C3PFBS (50-150)	PFHxS (50-150)	PFOS (50-150)	d3NMFOS (50-150)	d5NEFOS (50-150)	HFPODA (50-150)
320-76916-1	Beacon-21	69	72	74	89	98	62
320-76916-1 MS	Beacon-21	74	73	78	91	108	64
320-76916-1 MSD	Beacon-21	78	78	76	92	96	68
320-76916-2	Ex. Circle-21	75	74	82	83	101	66
320-76916-3	Prop. Circle-21	77	81	83	99	114	74
LCS 320-512154/2-A	Lab Control Sample	65	74	66	71	71	65
MB 320-512154/1-A	Method Blank	64	67	61	75	78	58

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 320-512154/1-A
Matrix: Solid
Analysis Batch: 512363

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 512154

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		0.20	0.031	ug/Kg		08/01/21 18:57	08/02/21 16:50	1
Perfluoroheptanoic acid (PFHpA)	ND		0.20	0.038	ug/Kg		08/01/21 18:57	08/02/21 16:50	1
Perfluorooctanoic acid (PFOA)	ND		0.20	0.053	ug/Kg		08/01/21 18:57	08/02/21 16:50	1
Perfluorononanoic acid (PFNA)	ND		0.20	0.022	ug/Kg		08/01/21 18:57	08/02/21 16:50	1
Perfluorodecanoic acid (PFDA)	ND		0.20	0.048	ug/Kg		08/01/21 18:57	08/02/21 16:50	1
Perfluoroundecanoic acid (PFUnA)	ND		0.20	0.042	ug/Kg		08/01/21 18:57	08/02/21 16:50	1
Perfluorododecanoic acid (PFDoA)	ND		0.20	0.030	ug/Kg		08/01/21 18:57	08/02/21 16:50	1
Perfluorotridecanoic acid (PFTriA)	ND		0.20	0.021	ug/Kg		08/01/21 18:57	08/02/21 16:50	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.20	0.037	ug/Kg		08/01/21 18:57	08/02/21 16:50	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.20	0.038	ug/Kg		08/01/21 18:57	08/02/21 16:50	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.20	0.029	ug/Kg		08/01/21 18:57	08/02/21 16:50	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.20	0.043	ug/Kg		08/01/21 18:57	08/02/21 16:50	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.20	0.023	ug/Kg		08/01/21 18:57	08/02/21 16:50	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.20	0.048	ug/Kg		08/01/21 18:57	08/02/21 16:50	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.20	0.035	ug/Kg		08/01/21 18:57	08/02/21 16:50	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.20	0.041	ug/Kg		08/01/21 18:57	08/02/21 16:50	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.20	0.031	ug/Kg		08/01/21 18:57	08/02/21 16:50	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.20	0.039	ug/Kg		08/01/21 18:57	08/02/21 16:50	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*67*		*50 - 150*	*08/01/21 18:57*	*08/02/21 16:50*	*1*
13C4 PFHpA	*63*		*50 - 150*	*08/01/21 18:57*	*08/02/21 16:50*	*1*
13C4 PFOA	*67*		*50 - 150*	*08/01/21 18:57*	*08/02/21 16:50*	*1*
13C5 PFNA	*63*		*50 - 150*	*08/01/21 18:57*	*08/02/21 16:50*	*1*
13C2 PFDA	*61*		*50 - 150*	*08/01/21 18:57*	*08/02/21 16:50*	*1*
13C2 PFUnA	*71*		*50 - 150*	*08/01/21 18:57*	*08/02/21 16:50*	*1*
13C2 PFDoA	*65*		*50 - 150*	*08/01/21 18:57*	*08/02/21 16:50*	*1*
13C2 PFTeDA	*67*		*50 - 150*	*08/01/21 18:57*	*08/02/21 16:50*	*1*
13C3 PFBS	*64*		*50 - 150*	*08/01/21 18:57*	*08/02/21 16:50*	*1*
18O2 PFHxS	*67*		*50 - 150*	*08/01/21 18:57*	*08/02/21 16:50*	*1*
13C4 PFOS	*61*		*50 - 150*	*08/01/21 18:57*	*08/02/21 16:50*	*1*
d3-NMeFOSAA	*75*		*50 - 150*	*08/01/21 18:57*	*08/02/21 16:50*	*1*
d5-NEtFOSAA	*78*		*50 - 150*	*08/01/21 18:57*	*08/02/21 16:50*	*1*
13C3 HFPO-DA	*58*		*50 - 150*	*08/01/21 18:57*	*08/02/21 16:50*	*1*

Lab Sample ID: LCS 320-512154/2-A
Matrix: Solid
Analysis Batch: 512363

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 512154

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorohexanoic acid (PFHxA)	2.00	2.01		ug/Kg		100	70 - 132
Perfluoroheptanoic acid (PFHpA)	2.00	2.22		ug/Kg		111	71 - 131
Perfluorooctanoic acid (PFOA)	2.00	2.34		ug/Kg		117	69 - 133
Perfluorononanoic acid (PFNA)	2.00	2.23		ug/Kg		112	72 - 129

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

Lab Sample ID: LCS 320-512154/2-A
Matrix: Solid
Analysis Batch: 512363

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 512154

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorodecanoic acid (PFDA)	2.00	1.96		ug/Kg		98	69 - 133
Perfluoroundecanoic acid (PFUnA)	2.00	2.48		ug/Kg		124	64 - 136
Perfluorododecanoic acid (PFDoA)	2.00	2.12		ug/Kg		106	69 - 135
Perfluorotridecanoic acid (PFTriA)	2.00	2.26		ug/Kg		113	66 - 139
Perfluorotetradecanoic acid (PFTeA)	2.00	2.34		ug/Kg		117	69 - 133
Perfluorobutanesulfonic acid (PFBS)	1.77	1.89		ug/Kg		107	72 - 128
Perfluorohexanesulfonic acid (PFHxS)	1.82	1.77		ug/Kg		97	67 - 130
Perfluorooctanesulfonic acid (PFOS)	1.86	1.92		ug/Kg		103	68 - 136
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	2.00	2.55		ug/Kg		127	63 - 144
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	2.00	2.31		ug/Kg		116	61 - 139
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	1.86	2.04		ug/Kg		109	75 - 135
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	2.00	2.21		ug/Kg		110	77 - 137
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	1.88	2.23		ug/Kg		119	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	1.88	2.18		ug/Kg		116	79 - 139

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*69*		*50 - 150*
13C4 PFHpA	*69*		*50 - 150*
13C4 PFOA	*67*		*50 - 150*
13C5 PFNA	*64*		*50 - 150*
13C2 PFDA	*69*		*50 - 150*
13C2 PFUnA	*67*		*50 - 150*
13C2 PFDoA	*65*		*50 - 150*
13C2 PFTeDA	*66*		*50 - 150*
13C3 PFBS	*65*		*50 - 150*
18O2 PFHxS	*74*		*50 - 150*
13C4 PFOS	*66*		*50 - 150*
d3-NMeFOSAA	*71*		*50 - 150*
d5-NEtFOSAA	*71*		*50 - 150*
13C3 HFPO-DA	*65*		*50 - 150*

Lab Sample ID: 320-76916-1 MS
Matrix: Solid
Analysis Batch: 512363

Client Sample ID: Beacon-21
Prep Type: Total/NA
Prep Batch: 512154

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorohexanoic acid (PFHxA)	ND		2.03	2.13		ug/Kg	☼	105	70 - 132
Perfluoroheptanoic acid (PFHpA)	ND		2.03	2.43		ug/Kg	☼	119	71 - 131
Perfluorooctanoic acid (PFOA)	ND		2.03	2.20		ug/Kg	☼	108	69 - 133

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

Lab Sample ID: 320-76916-1 MS
Matrix: Solid
Analysis Batch: 512363

Client Sample ID: Beacon-21
Prep Type: Total/NA
Prep Batch: 512154

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorononanoic acid (PFNA)	0.028	J	2.03	2.03		ug/Kg	☼	98	72 - 129
Perfluorodecanoic acid (PFDA)	ND		2.03	2.16		ug/Kg	☼	106	69 - 133
Perfluoroundecanoic acid (PFUnA)	ND		2.03	2.19		ug/Kg	☼	107	64 - 136
Perfluorododecanoic acid (PFDoA)	ND		2.03	2.13		ug/Kg	☼	105	69 - 135
Perfluorotridecanoic acid (PFTriA)	0.028	J	2.03	1.87		ug/Kg	☼	90	66 - 139
Perfluorotetradecanoic acid (PFTeA)	ND		2.03	2.18		ug/Kg	☼	107	69 - 133
Perfluorobutanesulfonic acid (PFBS)	ND		1.80	1.95		ug/Kg	☼	109	72 - 128
Perfluorohexanesulfonic acid (PFHxS)	ND		1.85	2.00		ug/Kg	☼	108	67 - 130
Perfluorooctanesulfonic acid (PFOS)	0.069	J I	1.89	2.06		ug/Kg	☼	106	68 - 136
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		2.03	2.69		ug/Kg	☼	132	63 - 144
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		2.03	2.11		ug/Kg	☼	104	61 - 139
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.89	2.06		ug/Kg	☼	109	75 - 135
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		2.03	2.39		ug/Kg	☼	117	77 - 137
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.92	1.73		ug/Kg	☼	91	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.92	1.95		ug/Kg	☼	102	79 - 139

Isotope Dilution	*MS %Recovery*	*MS Qualifier*	*Limits*
13C2 PFHxA	*76*		*50 - 150*
13C4 PFHpA	*70*		*50 - 150*
13C4 PFOA	*77*		*50 - 150*
13C5 PFNA	*79*		*50 - 150*
13C2 PFDA	*81*		*50 - 150*
13C2 PFUnA	*84*		*50 - 150*
13C2 PFDoA	*72*		*50 - 150*
13C2 PFTeDA	*68*		*50 - 150*
13C3 PFBS	*74*		*50 - 150*
18O2 PFHxS	*73*		*50 - 150*
13C4 PFOS	*78*		*50 - 150*
d3-NMeFOSAA	*91*		*50 - 150*
d5-NEtFOSAA	*108*		*50 - 150*
13C3 HFPO-DA	*64*		*50 - 150*

Lab Sample ID: 320-76916-1 MSD
Matrix: Solid
Analysis Batch: 512363

Client Sample ID: Beacon-21
Prep Type: Total/NA
Prep Batch: 512154

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	ND		2.07	2.20		ug/Kg	☼	106	70 - 132	3	30
Perfluoroheptanoic acid (PFHpA)	ND		2.07	2.32		ug/Kg	☼	112	71 - 131	4	30

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

Lab Sample ID: 320-76916-1 MSD
Matrix: Solid
Analysis Batch: 512363

Client Sample ID: Beacon-21
Prep Type: Total/NA
Prep Batch: 512154

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorooctanoic acid (PFOA)	ND		2.07	2.25		ug/Kg	☼	109	69 - 133	2	30
Perfluorononanoic acid (PFNA)	0.028	J	2.07	2.32		ug/Kg	☼	111	72 - 129	14	30
Perfluorodecanoic acid (PFDA)	ND		2.07	2.24		ug/Kg	☼	108	69 - 133	4	30
Perfluoroundecanoic acid (PFUnA)	ND		2.07	2.23		ug/Kg	☼	108	64 - 136	2	30
Perfluorododecanoic acid (PFDoA)	ND		2.07	2.07		ug/Kg	☼	100	69 - 135	3	30
Perfluorotridecanoic acid (PFTriA)	0.028	J	2.07	2.09		ug/Kg	☼	99	66 - 139	11	30
Perfluorotetradecanoic acid (PFTeA)	ND		2.07	2.44		ug/Kg	☼	117	69 - 133	11	30
Perfluorobutanesulfonic acid (PFBS)	ND		1.83	1.88		ug/Kg	☼	103	72 - 128	4	30
Perfluorohexanesulfonic acid (PFHxS)	ND		1.89	1.91		ug/Kg	☼	101	67 - 130	4	30
Perfluorooctanesulfonic acid (PFOS)	0.069	J I	1.92	1.95		ug/Kg	☼	98	68 - 136	6	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		2.07	2.64		ug/Kg	☼	127	63 - 144	2	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		2.07	2.45		ug/Kg	☼	118	61 - 139	15	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.93	2.27		ug/Kg	☼	118	75 - 135	10	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		2.07	2.40		ug/Kg	☼	116	77 - 137	1	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.95	1.93		ug/Kg	☼	99	76 - 136	10	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.95	2.04		ug/Kg	☼	104	79 - 139	4	30

Isotope Dilution	*MSD %Recovery*	*MSD Qualifier*	*Limits*
13C2 PFHxA	*76*		*50 - 150*
13C4 PFHpA	*77*		*50 - 150*
13C4 PFOA	*78*		*50 - 150*
13C5 PFNA	*83*		*50 - 150*
13C2 PFDA	*82*		*50 - 150*
13C2 PFUnA	*82*		*50 - 150*
13C2 PFDoA	*73*		*50 - 150*
13C2 PFTeDA	*71*		*50 - 150*
13C3 PFBS	*78*		*50 - 150*
18O2 PFHxS	*78*		*50 - 150*
13C4 PFOS	*76*		*50 - 150*
d3-NMeFOSAA	*92*		*50 - 150*
d5-NEtFOSAA	*96*		*50 - 150*
13C3 HFPO-DA	*68*		*50 - 150*

QC Association Summary

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

Job ID: 320-76916-1

LCMS

Prep Batch: 512154

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-76916-1	Beacon-21	Total/NA	Solid	SHAKE	
320-76916-2	Ex. Circle-21	Total/NA	Solid	SHAKE	
320-76916-3	Prop. Circle-21	Total/NA	Solid	SHAKE	
MB 320-512154/1-A	Method Blank	Total/NA	Solid	SHAKE	
LCS 320-512154/2-A	Lab Control Sample	Total/NA	Solid	SHAKE	
320-76916-1 MS	Beacon-21	Total/NA	Solid	SHAKE	
320-76916-1 MSD	Beacon-21	Total/NA	Solid	SHAKE	

Analysis Batch: 512363

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-76916-1	Beacon-21	Total/NA	Solid	EPA 537(Mod)	512154
320-76916-2	Ex. Circle-21	Total/NA	Solid	EPA 537(Mod)	512154
320-76916-3	Prop. Circle-21	Total/NA	Solid	EPA 537(Mod)	512154
MB 320-512154/1-A	Method Blank	Total/NA	Solid	EPA 537(Mod)	512154
LCS 320-512154/2-A	Lab Control Sample	Total/NA	Solid	EPA 537(Mod)	512154
320-76916-1 MS	Beacon-21	Total/NA	Solid	EPA 537(Mod)	512154
320-76916-1 MSD	Beacon-21	Total/NA	Solid	EPA 537(Mod)	512154

General Chemistry

Analysis Batch: 511711

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-76916-1	Beacon-21	Total/NA	Solid	D 2216	
320-76916-2	Ex. Circle-21	Total/NA	Solid	D 2216	
320-76916-3	Prop. Circle-21	Total/NA	Solid	D 2216	

Lab Chronicle

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

Job ID: 320-76916-1

Client Sample ID: Beacon-21
Lab Sample ID: 320-76916-1
Date Collected: 07/28/21 08:40
Matrix: Solid
Date Received: 07/29/21 15:33

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			511711	07/30/21 12:30	TCS	TAL SAC

Client Sample ID: Beacon-21
Lab Sample ID: 320-76916-1
Date Collected: 07/28/21 08:40
Matrix: Solid
Date Received: 07/29/21 15:33
Percent Solids: 95.5

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.43 g	10.0 mL	512154	08/01/21 18:57	AM	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			512363	08/02/21 17:09	S1M	TAL SAC

Client Sample ID: Ex. Circle-21
Lab Sample ID: 320-76916-2
Date Collected: 07/28/21 08:51
Matrix: Solid
Date Received: 07/29/21 15:33

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			511711	07/30/21 12:30	TCS	TAL SAC

Client Sample ID: Ex. Circle-21
Lab Sample ID: 320-76916-2
Date Collected: 07/28/21 08:51
Matrix: Solid
Date Received: 07/29/21 15:33
Percent Solids: 88.4

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.54 g	10.0 mL	512154	08/01/21 18:57	AM	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			512363	08/02/21 17:37	S1M	TAL SAC

Client Sample ID: Prop. Circle-21
Lab Sample ID: 320-76916-3
Date Collected: 07/28/21 08:57
Matrix: Solid
Date Received: 07/29/21 15:33

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			511711	07/30/21 12:30	TCS	TAL SAC

Client Sample ID: Prop. Circle-21
Lab Sample ID: 320-76916-3
Date Collected: 07/28/21 08:57
Matrix: Solid
Date Received: 07/29/21 15:33
Percent Solids: 93.4

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.59 g	10.0 mL	512154	08/01/21 18:57	AM	TAL SAC
Total/NA	Analysis	EPA 537(Mod)		1			512363	08/02/21 17:47	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: Yak-DOT+PF PFAS

Job ID: 320-76916-1

Laboratory: Eurofins TestAmerica, Sacramento

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

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

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

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

Method Summary

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

Job ID: 320-76916-1

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

Protocol References:

ASTM = ASTM International

EPA = US Environmental Protection Agency

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

Laboratory References:

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

Sample Summary

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

Job ID: 320-76916-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-76916-1	Beacon-21	Solid	07/28/21 08:40	07/29/21 15:33
320-76916-2	Ex. Circle-21	Solid	07/28/21 08:51	07/29/21 15:33
320-76916-3	Prop. Circle-21	Solid	07/28/21 08:57	07/29/21 15:33

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

CHAIN OF CUSTODY RECORD

320-76916 Chain of Custody

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Laboratory Test America
Attn: D. Alltucker

Analytical Methods (include preservative if used)

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

Sample Identity	Lab No.	Time	Date Sampled	PKAs x 19	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
Beacon-21		0840	7/28/21	X	1	Soil/Fill
Ex. Circle-21		0851	"	X	1	"
Prop. Circle-21		0857	"	X	1	"

Project Information	
Number:	102896-001
Name:	Eagle - DOT HAF PFAS
Contact:	AMJ
Ongoing Project?	Yes [X] No [ ]
Sampler:	ADLM

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

Notes:

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 1200	Signature: Time:	Signature: Time:
Printed Name: Date: 7/28/21	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson, Inc.	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 0559	Signature: Time:	Signature: Time:
Printed Name: Date: 7/29/21	Printed Name: Date:	Printed Name: Date:
Company: FEDEX	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. 36475

8/12/2021

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-76916-1

Login Number: 76916
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.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Laboratory Data Review Checklist

Completed By:

Ashley Jaramillo

Title:

Senior Chemist

Date:

August 13, 2021

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

Eurofins TestAmerica, Sacramento

Laboratory Report Number:

320-76916-1

Laboratory Report Date:

8/12/2021

CS Site Name:

Yakutat Airport PFAS

ADEC File Number:

1530.38.022

Hazard Identification Number:

27090

320-76916-1

Laboratory Report Date:

8/12/2021

CS Site Name:

Yakutat Airport PFAS

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

1. Laboratory

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

   Yes☒ No☐ N/A☐ Comments:

   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 lab or sub-contracted out.

2. Chain of Custody (CoC)

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

   Yes☒ No☐ N/A☐ Comments:

   b. Correct analyses requested?

   Yes☒ No☐ N/A☐ Comments:

3. Laboratory Sample Receipt Documentation

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

   Yes☒ No☐ N/A☐ Comments:

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

   Yes☐ No☐ N/A☒ Comments:

   PFAS samples do not require preservation outside of the temperature requirement.

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Laboratory Report Date:

8/12/2021

CS Site Name:

Yakutat Airport PFAS

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

Yes☒ No☐ N/A☐ Comments:

The samples were received in good condition, properly preserved and on ice.

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

Yes☐ No☐ N/A☒ Comments:

No discrepancies identified.

e. Data quality or usability affected?

Comments:

Data quality or usability is unaffected.

4. Case Narrative

a. Present and understandable?

Yes☒ No☐ N/A☐ Comments:

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

Yes☒ No☐ N/A☐ Comments:

The "I" qualifier means the transition mass ratios for the indicated analytes were outside of the established ratio limits. The qualitative identification of the analytes has some degree of uncertainty, and the reported values may have some high bias. However, analyst judgment was used to positively identify the noted analytes in the following samples: *Beacon-21* (PFOS) and *Ex. Circle-21* PFHpA and PFOS. Due to this uncertainty these results are considered estimates, with no direction of bias, and have been qualified 'J*' in the analytical table.

c. Were all corrective actions documented?

Yes☐ No☐ N/A☒ Comments:

No corrective actions were necessary.

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Laboratory Report Date:

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CS Site Name:

Yakutat Airport PFAS

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

Comments:

Data quality/usability is not affected.

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:

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 or usability is unaffected; see above.

6. QC Samples

a. Method Blank

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

Yes☒ No☐ N/A☐ Comments:

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Yakutat Airport PFAS

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

Yes☒ No☐ N/A☐ Comments:

No analytes were detected in the method blank sample.

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

Comments:

N/A; 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:

Data quality or usability is unaffected; 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:

An LCS was reported, but not an LCSD.

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

Yes☐ No☐ N/A☒ Comments:

Metals/Inorganics were not submitted with this work order.

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

Yes☒ No☐ N/A☐ Comments:

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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:

Laboratory precision could not be assessed as no LCSD was present.

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 or usability was 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:

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

Yes☐ No☐ N/A☒ Comments:

Metals/Inorganics were not submitted with 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:

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Laboratory Report Date:

8/12/2021

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Yakutat Airport PFAS

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:

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 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 failed surrogate/IDA recoveries reported.

320-76916-1

Laboratory Report Date:

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Yakutat Airport PFAS

iv. Data quality or usability affected?

Comments:

Data quality 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:

PFAS is not a volatile compound, 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:

N/A; see above.

v. Data quality or usability affected?

Comments:

Data quality 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:

Field duplicates were not required for this part of the project.

320-76916-1

Laboratory Report Date:

8/12/2021

CS Site Name:

Yakutat Airport PFAS

ii. Submitted blind to lab?

Yes☐ No☐ N/A☒ Comments:

See above.

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:

See above.

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

Comments:

Data quality 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:

Reusable equipment was not used to collect the samples, therefore an equipment blanks in not required.

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:

N/A; see above.

iii. Data quality or usability affected?

Comments:

Data quality or usability was not affected.

320-76916-1

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CS Site Name:

Yakutat Airport PFAS

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

   a. Defined and appropriate?

      Yes☒ No☐ N/A☐ Comments:

See section 4.b above.