APPENDIX C: LABORATORY REPORTS

APPENDIX C

Laboratory Reports

AND ADEC DATA REVIEW CHECKLISTS

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 320-33294-1
Client Project/Site: FIA

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

Attn: Marcy Nadel

Authorized for release by:
11/20/2017 2:50:51 PM

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Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33294-1

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
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Job ID: 320-33294-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-33294-1

Receipt
The samples were received on 11/14/2017 12:20 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 4.7º C.

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

Organic Prep
Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-194806, method code PFAS_DI_Prep.

Method(s) PFAS Prep: The sample bottles 119938 (320-33294-1), 120405 (320-33294-2), 120014 (320-33294-3), 174491 (320-33294-4), 117005 (320-33294-5), 579645 (320-33294-6), 153575 (320-33294-7), 174785 (320-33294-8), 174793 (320-33294-9), 173541 (320-33294-10) and 151637 (320-33294-11) contain sediment.

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-195286.

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: FIA

TestAmerica Job ID: 320-33294-1

Client Sample ID: 119938 — Lab Sample ID: 320-33294-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	15		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	89		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	15		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	14		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	2.2		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	540		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: 120405 — Lab Sample ID: 320-33294-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	28		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	150		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	22		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	22		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	2.1		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	740		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: 120014 — Lab Sample ID: 320-33294-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	6.7		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	33		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	5.4		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	6.1		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	250		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	0.73	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 174491 — Lab Sample ID: 320-33294-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	9.7		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	27		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	5.5		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	8.6		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: 174491 (Continued) — Lab Sample ID: 320-33294-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanesulfonic acid (PFOS)	120		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	1.0	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 117005 — Lab Sample ID: 320-33294-5

No Detections.

Client Sample ID: 579645 — Lab Sample ID: 320-33294-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	20		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	110		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	8.5		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	4.7		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	5.4		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 153575 — Lab Sample ID: 320-33294-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	26		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	58		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	8.5		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	8.7		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	80		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	1.0	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 174785 — Lab Sample ID: 320-33294-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	11		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	50		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	6.5		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	8.3		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	240		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 174793 — Lab Sample ID: 320-33294-9

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33294-1

Client Sample ID: 174793 (Continued) — Lab Sample ID: 320-33294-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	12		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	49		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	6.5		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	8.1		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	230		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 173541 — Lab Sample ID: 320-33294-10

No Detections.

Client Sample ID: 151637 — Lab Sample ID: 320-33294-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.5	J	2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	3.0		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	0.76	J	2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	5.6		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33294-1

Client Sample ID: 119938
Date Collected: 11/10/17 10:46
Date Received: 11/14/17 12:20

Lab Sample ID: 320-33294-1
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	15		2.0	0.92	ng/L		11/15/17 10:30	11/15/17 15:59	1
Perfluorohexanesulfonic acid (PFHxS)	89		2.0	0.87	ng/L		11/15/17 10:30	11/15/17 15:59	1
Perfluoroheptanoic acid (PFHpA)	15		2.0	0.80	ng/L		11/15/17 10:30	11/15/17 15:59	1
Perfluorooctanoic acid (PFOA)	14		2.0	0.75	ng/L		11/15/17 10:30	11/15/17 15:59	1
Perfluorononanoic acid (PFNA)	2.2		2.0	0.65	ng/L		11/15/17 10:30	11/15/17 15:59	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*100*		*25 - 150*	*11/15/17 10:30*	*11/15/17 15:59*	*1*
13C4-PFHpA	*104*		*25 - 150*	*11/15/17 10:30*	*11/15/17 15:59*	*1*
13C4 PFOA	*101*		*25 - 150*	*11/15/17 10:30*	*11/15/17 15:59*	*1*
13C5 PFNA	*93*		*25 - 150*	*11/15/17 10:30*	*11/15/17 15:59*	*1*

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	540		20	13	ng/L		11/15/17 10:30	11/18/17 09:46	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*102*		*25 - 150*	*11/15/17 10:30*	*11/18/17 09:46*	*10*

Client Sample ID: 120405
Date Collected: 11/10/17 12:17
Date Received: 11/14/17 12:20

Lab Sample ID: 320-33294-2
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	28		2.0	0.92	ng/L		11/17/17 08:35	11/17/17 21:49	1
Perfluorohexanesulfonic acid (PFHxS)	150		2.0	0.87	ng/L		11/17/17 08:35	11/17/17 21:49	1
Perfluoroheptanoic acid (PFHpA)	22		2.0	0.80	ng/L		11/17/17 08:35	11/17/17 21:49	1
Perfluorooctanoic acid (PFOA)	22		2.0	0.75	ng/L		11/17/17 08:35	11/17/17 21:49	1
Perfluorononanoic acid (PFNA)	2.1		2.0	0.65	ng/L		11/17/17 08:35	11/17/17 21:49	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*98*		*25 - 150*	*11/17/17 08:35*	*11/17/17 21:49*	*1*
13C4-PFHpA	*104*		*25 - 150*	*11/17/17 08:35*	*11/17/17 21:49*	*1*
13C4 PFOA	*103*		*25 - 150*	*11/17/17 08:35*	*11/17/17 21:49*	*1*
13C5 PFNA	*98*		*25 - 150*	*11/17/17 08:35*	*11/17/17 21:49*	*1*

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	740		20	13	ng/L		11/15/17 10:30	11/18/17 10:04	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*106*		*25 - 150*	*11/15/17 10:30*	*11/18/17 10:04*	*10*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33294-1

Client Sample ID: 120014
Date Collected: 11/10/17 13:13
Date Received: 11/14/17 12:20

Lab Sample ID: 320-33294-3
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	6.7		2.0	0.92	ng/L		11/17/17 08:35	11/17/17 22:08	1
Perfluorohexanesulfonic acid (PFHxS)	33		2.0	0.87	ng/L		11/17/17 08:35	11/17/17 22:08	1
Perfluoroheptanoic acid (PFHpA)	5.4		2.0	0.80	ng/L		11/17/17 08:35	11/17/17 22:08	1
Perfluorooctanoic acid (PFOA)	6.1		2.0	0.75	ng/L		11/17/17 08:35	11/17/17 22:08	1
Perfluorooctanesulfonic acid (PFOS)	250		2.0	1.3	ng/L		11/17/17 08:35	11/17/17 22:08	1
Perfluorononanoic acid (PFNA)	0.73	J	2.0	0.65	ng/L		11/17/17 08:35	11/17/17 22:08	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*103*		*25 - 150*	*11/17/17 08:35*	*11/17/17 22:08*	*1*
13C4-PFHpA	*110*		*25 - 150*	*11/17/17 08:35*	*11/17/17 22:08*	*1*
13C4 PFOA	*106*		*25 - 150*	*11/17/17 08:35*	*11/17/17 22:08*	*1*
13C4 PFOS	*100*		*25 - 150*	*11/17/17 08:35*	*11/17/17 22:08*	*1*
13C5 PFNA	*102*		*25 - 150*	*11/17/17 08:35*	*11/17/17 22:08*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33294-1

Client Sample ID: 174491
Date Collected: 11/10/17 14:26
Date Received: 11/14/17 12:20

Lab Sample ID: 320-33294-4
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	9.7		2.0	0.92	ng/L		11/17/17 08:35	11/17/17 22:26	1
Perfluorohexanesulfonic acid (PFHxS)	27		2.0	0.87	ng/L		11/17/17 08:35	11/17/17 22:26	1
Perfluoroheptanoic acid (PFHpA)	5.5		2.0	0.80	ng/L		11/17/17 08:35	11/17/17 22:26	1
Perfluorooctanoic acid (PFOA)	8.6		2.0	0.75	ng/L		11/17/17 08:35	11/17/17 22:26	1
Perfluorooctanesulfonic acid (PFOS)	120		2.0	1.3	ng/L		11/17/17 08:35	11/17/17 22:26	1
Perfluorononanoic acid (PFNA)	1.0	J	2.0	0.65	ng/L		11/17/17 08:35	11/17/17 22:26	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*99*		*25 - 150*	*11/17/17 08:35*	*11/17/17 22:26*	*1*
13C4-PFHpA	*102*		*25 - 150*	*11/17/17 08:35*	*11/17/17 22:26*	*1*
13C4 PFOA	*102*		*25 - 150*	*11/17/17 08:35*	*11/17/17 22:26*	*1*
13C4 PFOS	*97*		*25 - 150*	*11/17/17 08:35*	*11/17/17 22:26*	*1*
13C5 PFNA	*100*		*25 - 150*	*11/17/17 08:35*	*11/17/17 22:26*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33294-1

Client Sample ID: 117005
Date Collected: 11/10/17 15:34
Date Received: 11/14/17 12:20

Lab Sample ID: 320-33294-5
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/17 08:35	11/17/17 22:45	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/17/17 08:35	11/17/17 22:45	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/17 08:35	11/17/17 22:45	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/17 08:35	11/17/17 22:45	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/17/17 08:35	11/17/17 22:45	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/17 08:35	11/17/17 22:45	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*100*		*25 - 150*	*11/17/17 08:35*	*11/17/17 22:45*	*1*
13C4-PFHpA	*104*		*25 - 150*	*11/17/17 08:35*	*11/17/17 22:45*	*1*
13C4 PFOA	*100*		*25 - 150*	*11/17/17 08:35*	*11/17/17 22:45*	*1*
13C4 PFOS	*97*		*25 - 150*	*11/17/17 08:35*	*11/17/17 22:45*	*1*
13C5 PFNA	*99*		*25 - 150*	*11/17/17 08:35*	*11/17/17 22:45*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33294-1

Client Sample ID: 579645
Date Collected: 11/10/17 16:21
Date Received: 11/14/17 12:20

Lab Sample ID: 320-33294-6
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**20**		2.0	0.92	ng/L		11/17/17 08:35	11/17/17 23:03	1
Perfluorohexanesulfonic acid (PFHxS)	**110**		2.0	0.87	ng/L		11/17/17 08:35	11/17/17 23:03	1
Perfluoroheptanoic acid (PFHpA)	**8.5**		2.0	0.80	ng/L		11/17/17 08:35	11/17/17 23:03	1
Perfluorooctanoic acid (PFOA)	**4.7**		2.0	0.75	ng/L		11/17/17 08:35	11/17/17 23:03	1
Perfluorooctanesulfonic acid (PFOS)	**5.4**		2.0	1.3	ng/L		11/17/17 08:35	11/17/17 23:03	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/17 08:35	11/17/17 23:03	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*102*		*25 - 150*	*11/17/17 08:35*	*11/17/17 23:03*	*1*
13C4-PFHpA	*101*		*25 - 150*	*11/17/17 08:35*	*11/17/17 23:03*	*1*
13C4 PFOA	*102*		*25 - 150*	*11/17/17 08:35*	*11/17/17 23:03*	*1*
13C4 PFOS	*100*		*25 - 150*	*11/17/17 08:35*	*11/17/17 23:03*	*1*
13C5 PFNA	*102*		*25 - 150*	*11/17/17 08:35*	*11/17/17 23:03*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33294-1

Client Sample ID: 153575
Date Collected: 11/11/17 10:35
Date Received: 11/14/17 12:20

Lab Sample ID: 320-33294-7
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	26		2.0	0.92	ng/L		11/17/17 08:35	11/17/17 23:21	1
Perfluorohexanesulfonic acid (PFHxS)	58		2.0	0.87	ng/L		11/17/17 08:35	11/17/17 23:21	1
Perfluoroheptanoic acid (PFHpA)	8.5		2.0	0.80	ng/L		11/17/17 08:35	11/17/17 23:21	1
Perfluorooctanoic acid (PFOA)	8.7		2.0	0.75	ng/L		11/17/17 08:35	11/17/17 23:21	1
Perfluorooctanesulfonic acid (PFOS)	80		2.0	1.3	ng/L		11/17/17 08:35	11/17/17 23:21	1
Perfluorononanoic acid (PFNA)	1.0	J	2.0	0.65	ng/L		11/17/17 08:35	11/17/17 23:21	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*99*		*25 - 150*	*11/17/17 08:35*	*11/17/17 23:21*	*1*
13C4-PFHpA	*102*		*25 - 150*	*11/17/17 08:35*	*11/17/17 23:21*	*1*
13C4 PFOA	*103*		*25 - 150*	*11/17/17 08:35*	*11/17/17 23:21*	*1*
13C4 PFOS	*97*		*25 - 150*	*11/17/17 08:35*	*11/17/17 23:21*	*1*
13C5 PFNA	*100*		*25 - 150*	*11/17/17 08:35*	*11/17/17 23:21*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33294-1

Client Sample ID: 174785
Date Collected: 11/13/17 10:47
Date Received: 11/14/17 12:20

Lab Sample ID: 320-33294-8
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	11		2.0	0.92	ng/L		11/17/17 08:35	11/17/17 23:40	1
Perfluorohexanesulfonic acid (PFHxS)	50		2.0	0.87	ng/L		11/17/17 08:35	11/17/17 23:40	1
Perfluoroheptanoic acid (PFHpA)	6.5		2.0	0.80	ng/L		11/17/17 08:35	11/17/17 23:40	1
Perfluorooctanoic acid (PFOA)	8.3		2.0	0.75	ng/L		11/17/17 08:35	11/17/17 23:40	1
Perfluorooctanesulfonic acid (PFOS)	240		2.0	1.3	ng/L		11/17/17 08:35	11/17/17 23:40	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/17 08:35	11/17/17 23:40	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*96*		*25 - 150*	*11/17/17 08:35*	*11/17/17 23:40*	*1*
13C4-PFHpA	*101*		*25 - 150*	*11/17/17 08:35*	*11/17/17 23:40*	*1*
13C4 PFOA	*99*		*25 - 150*	*11/17/17 08:35*	*11/17/17 23:40*	*1*
13C4 PFOS	*95*		*25 - 150*	*11/17/17 08:35*	*11/17/17 23:40*	*1*
13C5 PFNA	*99*		*25 - 150*	*11/17/17 08:35*	*11/17/17 23:40*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33294-1

Client Sample ID: 174793
Date Collected: 11/13/17 11:30
Date Received: 11/14/17 12:20

Lab Sample ID: 320-33294-9
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	12		2.0	0.92	ng/L		11/17/17 08:35	11/18/17 00:16	1
Perfluorohexanesulfonic acid (PFHxS)	49		2.0	0.87	ng/L		11/17/17 08:35	11/18/17 00:16	1
Perfluoroheptanoic acid (PFHpA)	6.5		2.0	0.80	ng/L		11/17/17 08:35	11/18/17 00:16	1
Perfluorooctanoic acid (PFOA)	8.1		2.0	0.75	ng/L		11/17/17 08:35	11/18/17 00:16	1
Perfluorooctanesulfonic acid (PFOS)	230		2.0	1.3	ng/L		11/17/17 08:35	11/18/17 00:16	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/17 08:35	11/18/17 00:16	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*100*		*25 - 150*	*11/17/17 08:35*	*11/18/17 00:16*	*1*
13C4-PFHpA	*105*		*25 - 150*	*11/17/17 08:35*	*11/18/17 00:16*	*1*
13C4 PFOA	*105*		*25 - 150*	*11/17/17 08:35*	*11/18/17 00:16*	*1*
13C4 PFOS	*100*		*25 - 150*	*11/17/17 08:35*	*11/18/17 00:16*	*1*
13C5 PFNA	*106*		*25 - 150*	*11/17/17 08:35*	*11/18/17 00:16*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33294-1

Client Sample ID: 173541
Date Collected: 11/13/17 14:06
Date Received: 11/14/17 12:20

Lab Sample ID: 320-33294-10
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/17 08:35	11/18/17 00:35	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/17/17 08:35	11/18/17 00:35	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/17 08:35	11/18/17 00:35	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/17 08:35	11/18/17 00:35	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/17/17 08:35	11/18/17 00:35	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/17 08:35	11/18/17 00:35	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*98*		*25 - 150*	*11/17/17 08:35*	*11/18/17 00:35*	*1*
13C4-PFHpA	*101*		*25 - 150*	*11/17/17 08:35*	*11/18/17 00:35*	*1*
13C4 PFOA	*104*		*25 - 150*	*11/17/17 08:35*	*11/18/17 00:35*	*1*
13C4 PFOS	*99*		*25 - 150*	*11/17/17 08:35*	*11/18/17 00:35*	*1*
13C5 PFNA	*102*		*25 - 150*	*11/17/17 08:35*	*11/18/17 00:35*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33294-1

Client Sample ID: 151637
Date Collected: 11/13/17 15:28
Date Received: 11/14/17 12:20

Lab Sample ID: 320-33294-11
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**1.5**	**J**	2.0	0.92	ng/L		11/17/17 08:35	11/18/17 00:53	1
Perfluorohexanesulfonic acid (PFHxS)	**3.0**		2.0	0.87	ng/L		11/17/17 08:35	11/18/17 00:53	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/17 08:35	11/18/17 00:53	1
Perfluorooctanoic acid (PFOA)	**0.76**	**J**	2.0	0.75	ng/L		11/17/17 08:35	11/18/17 00:53	1
Perfluorooctanesulfonic acid (PFOS)	**5.6**		2.0	1.3	ng/L		11/17/17 08:35	11/18/17 00:53	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/17 08:35	11/18/17 00:53	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*99*		*25 - 150*	*11/17/17 08:35*	*11/18/17 00:53*	*1*
13C4-PFHpA	*103*		*25 - 150*	*11/17/17 08:35*	*11/18/17 00:53*	*1*
13C4 PFOA	*103*		*25 - 150*	*11/17/17 08:35*	*11/18/17 00:53*	*1*
13C4 PFOS	*99*		*25 - 150*	*11/17/17 08:35*	*11/18/17 00:53*	*1*
13C5 PFNA	*104*		*25 - 150*	*11/17/17 08:35*	*11/18/17 00:53*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33294-1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	3O2 PFHx (25-150)	3C4-PFHp (25-150)	3C4 PFO/ (25-150)	3C4 PFOS (25-150)	3C5 PFNA (25-150)			
320-33294-1	119938	100	104	101		93			
320-33294-1 - DL	119938				102				
320-33294-2	120405	98	104	103		98			
320-33294-2 - DL	120405				106				
320-33294-3	120014	103	110	106	100	102			
320-33294-4	174491	99	102	102	97	100			
320-33294-5	117005	100	104	100	97	99			
320-33294-6	579645	102	101	102	100	102			
320-33294-7	153575	99	102	103	97	100			
320-33294-8	174785	96	101	99	95	99			
320-33294-9	174793	100	105	105	100	106			
320-33294-10	173541	98	101	104	99	102			
320-33294-11	151637	99	103	103	99	104			
LCS 320-194806/2-A	Lab Control Sample	94	94	92	96	88			
LCS 320-195286/2-A	Lab Control Sample	107	110	107	108	108			
LCSD 320-194806/3-A	Lab Control Sample Dup	92	91	92	92	89			
LCSD 320-195286/3-A	Lab Control Sample Dup	107	105	102	101	102			
MB 320-194806/1-A	Method Blank	92	95	94	95	91			
MB 320-195286/1-A	Method Blank	100	102	97	97	98			

Surrogate Legend

18O2 PFHxS = 18O2 PFHxS
13C4-PFHpA = 13C4-PFHpA
13C4 PFOA = 13C4 PFOA
13C4 PFOS = 13C4 PFOS
13C5 PFNA = 13C5 PFNA

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-194806/1-A
Matrix: Water
Analysis Batch: 194956

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 194806

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/15/17 10:30	11/15/17 14:46	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/15/17 10:30	11/15/17 14:46	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/15/17 10:30	11/15/17 14:46	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/15/17 10:30	11/15/17 14:46	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/15/17 10:30	11/15/17 14:46	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/15/17 10:30	11/15/17 14:46	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*92*		*25 - 150*	*11/15/17 10:30*	*11/15/17 14:46*	*1*
13C4-PFHpA	*95*		*25 - 150*	*11/15/17 10:30*	*11/15/17 14:46*	*1*
13C4 PFOA	*94*		*25 - 150*	*11/15/17 10:30*	*11/15/17 14:46*	*1*
13C4 PFOS	*95*		*25 - 150*	*11/15/17 10:30*	*11/15/17 14:46*	*1*
13C5 PFNA	*91*		*25 - 150*	*11/15/17 10:30*	*11/15/17 14:46*	*1*

Lab Sample ID: LCS 320-194806/2-A
Matrix: Water
Analysis Batch: 194956

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 194806

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	16.7		ng/L		95	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	17.3		ng/L		95	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	19.5		ng/L		97	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	19.4		ng/L		97	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	18.1		ng/L		98	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	19.9		ng/L		100	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*94*		*25 - 150*
13C4-PFHpA	*94*		*25 - 150*
13C4 PFOA	*92*		*25 - 150*
13C4 PFOS	*96*		*25 - 150*
13C5 PFNA	*88*		*25 - 150*

Lab Sample ID: LCSD 320-194806/3-A
Matrix: Water
Analysis Batch: 194956

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 194806

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	18.4		ng/L		104	72 - 151	9	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	17.9		ng/L		98	73 - 157	3	30
Perfluoroheptanoic acid (PFHpA)			20.0	21.0		ng/L		105	71 - 138	8	30
Perfluorooctanoic acid (PFOA)			20.0	19.5		ng/L		97	70 - 140	0	30
Perfluorooctanesulfonic acid (PFOS)			18.6	19.1		ng/L		103	69 - 144	5	30
Perfluorononanoic acid (PFNA)			20.0	20.2		ng/L		101	73 - 147	2	30

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	92		25 - 150
13C4-PFHpA	91		25 - 150
13C4 PFOA	92		25 - 150
13C4 PFOS	92		25 - 150
13C5 PFNA	89		25 - 150

Lab Sample ID: MB 320-195286/1-A
Matrix: Water
Analysis Batch: 195583

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 195286

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/17 08:35	11/17/17 20:54	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/17/17 08:35	11/17/17 20:54	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/17 08:35	11/17/17 20:54	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/17 08:35	11/17/17 20:54	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/17/17 08:35	11/17/17 20:54	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/17 08:35	11/17/17 20:54	1

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	100		25 - 150	11/17/17 08:35	11/17/17 20:54	1
13C4-PFHpA	102		25 - 150	11/17/17 08:35	11/17/17 20:54	1
13C4 PFOA	97		25 - 150	11/17/17 08:35	11/17/17 20:54	1
13C4 PFOS	97		25 - 150	11/17/17 08:35	11/17/17 20:54	1
13C5 PFNA	98		25 - 150	11/17/17 08:35	11/17/17 20:54	1

Lab Sample ID: LCS 320-195286/2-A
Matrix: Water
Analysis Batch: 195583

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 195286

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	17.6		ng/L		100	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	18.0		ng/L		99	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	20.3		ng/L		102	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	19.3		ng/L		97	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	16.4		ng/L		88	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	19.5		ng/L		97	73 - 147		

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
18O2 PFHxS	107		25 - 150
13C4-PFHpA	110		25 - 150
13C4 PFOA	107		25 - 150
13C4 PFOS	108		25 - 150
13C5 PFNA	108		25 - 150

Lab Sample ID: LCSD 320-195286/3-A
Matrix: Water
Analysis Batch: 195583

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 195286

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	17.3		ng/L		98	72 - 151	2	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	17.9		ng/L		99	73 - 157	0	30

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCSD 320-195286/3-A
Matrix: Water
Analysis Batch: 195583

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 195286

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluoroheptanoic acid (PFHpA)			20.0	20.8		ng/L		104	71 - 138	2	30
Perfluorooctanoic acid (PFOA)			20.0	19.6		ng/L		98	70 - 140	1	30
Perfluorooctanesulfonic acid (PFOS)			18.6	17.0		ng/L		91	69 - 144	3	30
Perfluorononanoic acid (PFNA)			20.0	19.4		ng/L		97	73 - 147	0	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
18O2 PFHxS	*107*		*25 - 150*
13C4-PFHpA	*105*		*25 - 150*
13C4 PFOA	*102*		*25 - 150*
13C4 PFOS	*101*		*25 - 150*
13C5 PFNA	*102*		*25 - 150*

LCMS

Prep Batch: 194806

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33294-1 - DL	119938	Total/NA	Water	PFAS Prep	
320-33294-1	119938	Total/NA	Water	PFAS Prep	
320-33294-2 - DL	120405	Total/NA	Water	PFAS Prep	
MB 320-194806/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-194806/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-194806/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 194956

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33294-1	119938	Total/NA	Water	WS-LC-0025 At1	194806
MB 320-194806/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	194806
LCS 320-194806/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	194806
LCSD 320-194806/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	194806

Prep Batch: 195286

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33294-2	120405	Total/NA	Water	PFAS Prep	
320-33294-3	120014	Total/NA	Water	PFAS Prep	
320-33294-4	174491	Total/NA	Water	PFAS Prep	
320-33294-5	117005	Total/NA	Water	PFAS Prep	
320-33294-6	579645	Total/NA	Water	PFAS Prep	
320-33294-7	153575	Total/NA	Water	PFAS Prep	
320-33294-8	174785	Total/NA	Water	PFAS Prep	
320-33294-9	174793	Total/NA	Water	PFAS Prep	
320-33294-10	173541	Total/NA	Water	PFAS Prep	
320-33294-11	151637	Total/NA	Water	PFAS Prep	
MB 320-195286/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-195286/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-195286/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 195583

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33294-2	120405	Total/NA	Water	WS-LC-0025 At1	195286
320-33294-3	120014	Total/NA	Water	WS-LC-0025 At1	195286
320-33294-4	174491	Total/NA	Water	WS-LC-0025 At1	195286
320-33294-5	117005	Total/NA	Water	WS-LC-0025 At1	195286
320-33294-6	579645	Total/NA	Water	WS-LC-0025 At1	195286
320-33294-7	153575	Total/NA	Water	WS-LC-0025 At1	195286
320-33294-8	174785	Total/NA	Water	WS-LC-0025 At1	195286
320-33294-9	174793	Total/NA	Water	WS-LC-0025 At1	195286
320-33294-10	173541	Total/NA	Water	WS-LC-0025 At1	195286

LCMS (Continued)

Analysis Batch: 195583 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33294-11	151637	Total/NA	Water	WS-LC-0025 At1	195286
MB 320-195286/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	195286
LCS 320-195286/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	195286
LCSD 320-195286/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	195286

Analysis Batch: 195585

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33294-1 - DL	119938	Total/NA	Water	WS-LC-0025 At1	194806
320-33294-2 - DL	120405	Total/NA	Water	WS-LC-0025 At1	194806

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33294-1

Client Sample ID: 119938
Date Collected: 11/10/17 10:46
Date Received: 11/14/17 12:20

Lab Sample ID: 320-33294-1
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	PFAS Prep			1.00 mL	1.66 mL	194806	11/15/17 10:30	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			194956	11/15/17 15:59	CBW	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	194806	11/15/17 10:30	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			195585	11/18/17 09:46	CBW	TAL SAC

Client Sample ID: 120405
Date Collected: 11/10/17 12:17
Date Received: 11/14/17 12:20

Lab Sample ID: 320-33294-2
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	PFAS Prep			1.00 mL	1.66 mL	195286	11/17/17 08:35	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195583	11/17/17 21:49	CBW	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	194806	11/15/17 10:30	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			195585	11/18/17 10:04	CBW	TAL SAC

Client Sample ID: 120014
Date Collected: 11/10/17 13:13
Date Received: 11/14/17 12:20

Lab Sample ID: 320-33294-3
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	PFAS Prep			1.00 mL	1.66 mL	195286	11/17/17 08:35	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195583	11/17/17 22:08	CBW	TAL SAC

Client Sample ID: 174491
Date Collected: 11/10/17 14:26
Date Received: 11/14/17 12:20

Lab Sample ID: 320-33294-4
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	PFAS Prep			1.00 mL	1.66 mL	195286	11/17/17 08:35	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195583	11/17/17 22:26	CBW	TAL SAC

Client Sample ID: 117005
Date Collected: 11/10/17 15:34
Date Received: 11/14/17 12:20

Lab Sample ID: 320-33294-5
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	PFAS Prep			1.00 mL	1.66 mL	195286	11/17/17 08:35	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195583	11/17/17 22:45	CBW	TAL SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33294-1

Client Sample ID: 579645
Date Collected: 11/10/17 16:21
Date Received: 11/14/17 12:20

Lab Sample ID: 320-33294-6
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	PFAS Prep			1.00 mL	1.66 mL	195286	11/17/17 08:35	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195583	11/17/17 23:03	CBW	TAL SAC

Client Sample ID: 153575
Date Collected: 11/11/17 10:35
Date Received: 11/14/17 12:20

Lab Sample ID: 320-33294-7
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	PFAS Prep			1.00 mL	1.66 mL	195286	11/17/17 08:35	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195583	11/17/17 23:21	CBW	TAL SAC

Client Sample ID: 174785
Date Collected: 11/13/17 10:47
Date Received: 11/14/17 12:20

Lab Sample ID: 320-33294-8
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	195286	11/17/17 08:35	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195583	11/17/17 23:40	CBW	TAL SAC

Client Sample ID: 174793
Date Collected: 11/13/17 11:30
Date Received: 11/14/17 12:20

Lab Sample ID: 320-33294-9
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	PFAS Prep			1.00 mL	1.66 mL	195286	11/17/17 08:35	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195583	11/18/17 00:16	CBW	TAL SAC

Client Sample ID: 173541
Date Collected: 11/13/17 14:06
Date Received: 11/14/17 12:20

Lab Sample ID: 320-33294-10
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	PFAS Prep			1.00 mL	1.66 mL	195286	11/17/17 08:35	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195583	11/18/17 00:35	CBW	TAL SAC

Client Sample ID: 151637
Date Collected: 11/13/17 15:28
Date Received: 11/14/17 12:20

Lab Sample ID: 320-33294-11
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	PFAS Prep			1.00 mL	1.66 mL	195286	11/17/17 08:35	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195583	11/18/17 00:53	CBW	TAL SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33294-1

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33294-1

Laboratory: TestAmerica Sacramento

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

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-055	12-18-17
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-18
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-18
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	10-31-17 *
L-A-B	DoD ELAP		L2468	01-20-18
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-18-18
Michigan	State Program	5	9947	01-31-18
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-28-18
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	12-30-17
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
West Virginia (DW)	State Program	3	9930C	12-31-17
Wyoming	State Program	8	8TMS-L	01-28-19

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

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33294-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33294-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-33294-1	119938	Water	11/10/17 10:46	11/14/17 12:20
320-33294-2	120405	Water	11/10/17 12:17	11/14/17 12:20
320-33294-3	120014	Water	11/10/17 13:13	11/14/17 12:20
320-33294-4	174491	Water	11/10/17 14:26	11/14/17 12:20
320-33294-5	117005	Water	11/10/17 15:34	11/14/17 12:20
320-33294-6	579645	Water	11/10/17 16:21	11/14/17 12:20
320-33294-7	153575	Water	11/11/17 10:35	11/14/17 12:20
320-33294-8	174785	Water	11/13/17 10:47	11/14/17 12:20
320-33294-9	174793	Water	11/13/17 11:30	11/14/17 12:20
320-33294-10	173541	Water	11/13/17 14:06	11/14/17 12:20
320-33294-11	151637	Water	11/13/17 15:28	11/14/17 12:20

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

CHAIN-OF-CUSTODY RECORD

Laboratory Test America
Attn: David Althacker

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFAS +6 (WS-LC-0025)						Total Number of Containers	Remarks/Matrix
119938		1046	11/10/17		X	X						2	Ground water
120405		1217			X	X						2	
120014		1313			X	X						2	
174491		1426			X	X						2	
117005		1534			X	X						2	
579645		1621			X	X						2	
153575		1635	11/11/17		X	X						2	
174785		1047	11/13/17		X	X						2	
174793		1130			X	X						2	
173541		1406			X	X						2	

Project Information		Sample Receipt	
Project Number	31-1-20060-001	Total Number of Containers	12
Project Name:	FIA	COC Seals/Intact? Y/N/NA	—
Contact:	MDN	Received Good Cond./Cold	—
Ongoing Project?	Yes ☒ No ☐	Delivery Method:	Hand
Sampler:	CAB	(attach shipping bill, if any)	

Instructions

Requested Turnaround Time: 5 day rush

Special Instructions:
Please bill to: 31-1-20060-001

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

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: [signature] Time: 1600	Signature: Time:	Signature: Time:
Printed Name: Mary Nadel Date: 11/13/17	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: [signature] Time: 1220	Signature: Time:	Signature: Time:
Printed Name: David Alther Date: 11/14/17	Printed Name: Date:	Printed Name: Date:
Company: TT WS	Company:	Company:

F-19-91/UR

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320-33294 Chain of Custody

No. 34417

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

CHAIN-OF-CUSTODY RECORD

Laboratory: Test America
Attn: David Althacker

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	TPAH 16						Total Number of Containers	Remarks/Matrix
151637		1528	11/13/17		X	X	X					2	grandwater

Project Information	Sample Receipt
Project Number: X	Total Number of Containers: 12
Project Name:	COC Seals/Intact? Y/N/NA: F
Contact: See	Received Good Cond./Cold:
Ongoing Project? Yes ☐ No ☐	Delivery Method:
Sampler: PG	(attach shipping bill, if any)

Instructions

Requested Turnaround Time:

Special Instructions:

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

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 1600	Signature: Time:	Signature: Time:
Printed Name: Marcy Nadel Date: 11/13/17	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 1220	Signature: Time:	Signature: Time:
Printed Name: David Hr Date: 11/14/17	Printed Name: Date:	Printed Name: Date:
Company: TALUS	Company:	Company:

F-19-91/UR

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No. 34777

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-33294-1

Login Number: 33294
List Number: 1
Creator: Turpen, Troy

List Source: 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	
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:

Marcy Nadel

Title:

Geologist

Date:

November 21, 2017

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

November 20, 2017

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-33294-1

ADEC File Number:

Hazard Identification Number:

320-33294-1

1. Laboratory

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

   ○ Yes ◉ No Comments:

ADEC has not approved an analytical laboratory for analysis of PFASs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

   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 Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

   ◉ Yes ○ No Comments:

   b. Correct Analyses requested?

   ◉ Yes ○ No Comments:

3. Laboratory Sample Receipt Documentation

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

   ◉ Yes ○ No Comments:

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

   ◉ Yes ○ No Comments:

Analysis of PFASs does not require a preservative other than temperature control.

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

   ◉ Yes ○ No 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 Comments:

There were no discrepancies identified in the sample receipt documentation.

e. Data quality or usability affected?

Comments:

The data quality and usability were unaffected; see above.

4. Case Narrative

a. Present and understandable?

◉ Yes ○ No Comments:

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

◉ Yes ○ No Comments:

The case narrative notes the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 4.7º C.

The case narrative notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) associated with preparation batch 320-194806.

The case narrative notes that the project samples included in this work order contained sediment.

c. Were all corrective actions documented?

◉ Yes ○ No Comments:

A laboratory control sample (LCS) and a LCS duplicate (LCSD) were extracted with each preparation and analysis batch to demonstrate analytical method accuracy and precision.

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

Comments:

The case narrative does not specify an effect on data quality or usability.

5. Samples Results

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

◉ Yes ○ No Comments:

b. All applicable holding times met?

(•) Yes ( ) No Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

( ) Yes (•) No Comments:

N/A; 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 Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

( ) Yes (•) No Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

(•) Yes ( ) No Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

(•) Yes ( ) No Comments:

iii. If above LOQ, what samples are affected?

Comments:

None; PFAS compounds were not detected in method blank samples 320-194806 and 195286.

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

( ) Yes (•) No Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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 Comments:

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

( ) Yes (●) No 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

(●) Yes ( ) No Comments:

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

(●) Yes ( ) No Comments:

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

Comments:

N/A; 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 Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

(•) Yes ( ) No Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a 13C-isotope of each target analyte and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

(•) Yes ( ) No Comments:

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

( ) Yes (•) No Comments:

Qualification of the results was not required; IDA recoveries were within acceptance criteria.

iv. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

( ) Yes (•) No Comments:

PFASs are not volatile compounds; 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 Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

○ Yes ◉ No Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not submitted with this work order.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

◉ Yes ○ No Comments:

A field-duplicate pair was not submitted with the analytical samples included in this work order. However, field-duplicate samples are submitted with the appropriate frequency for the overall project.

ii. Submitted blind to lab?

○ Yes ◉ No Comments:

N/A; a field-duplicate pair was not submitted with this work order.

iii. Precision – All relative percent differences (RPD) less than specified DQOs? (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 Comments:

N/A; a field-duplicate pair was not submitted.

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

Comments:

The data quality and usability were not affected.

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

○ Yes ○ No ◉ Not Applicable

Samples for this project are not collected with reusable equipment, therefore a practical potential for equipment based cross-contamination does not exist.

i. All results less than LOQ?

○ Yes ◉ No Comments:

N/A; an equipment blank was not submitted.

ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

a. Defined and appropriate?

○ Yes ◉ No Comments:

No other data flags and/or qualifiers were required.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 320-33369-1
Client Project/Site: FIA Well Seach
Revision: 1

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

Attn: Marcy Nadel

Authorized for release by:
11/27/2017 7:44:20 AM

David Alltucker, Project Manager I
(916)374-4383
david.alltucker@testamericainc.com

Table of Contents

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
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Job ID: 320-33369-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-33369-1

Receipt
The samples were received on 11/16/2017 11:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 4.7º C.

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

Organic Prep
Method(s) PFAS Prep: The following samples 117170 (320-33369-1), 117270 (320-33369-2), 119849 (320-33369-3), 174483 (320-33369-4), 173908 (320-33369-8), 175005 (320-33369-9), 173916 (320-33369-10), 153338 (320-33369-11), 120286 (320-33369-12), 510220.1 (320-33369-13), 150320.1 (320-33369-14), 174998 (320-33369-16), 120316 (320-33369-17), 117048 (320-33369-18), 176397 (320-33369-19) and 483541 (320-33369-20) have sediment present. A subsample was filtered prior to analysis.

Method(s) PFAS Prep: Sediment is present in the following samples: 174769 (320-33369-21), 120324 (320-33369-22), 117129 (320-33369-23), 120057 (320-33369-24) and 176222 (320-33369-25) A subsample was filtered prior to analysis.

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-195299

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-195308.

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: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Client Sample ID: 117170 — Lab Sample ID: 320-33369-1

No Detections.

Client Sample ID: 117270 — Lab Sample ID: 320-33369-2

No Detections.

Client Sample ID: 119849 — Lab Sample ID: 320-33369-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	5.8		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	26		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	4.7		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	4.6		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	140		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 174483 — Lab Sample ID: 320-33369-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	9.5		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	26		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	5.2		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	8.5		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	120		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	1.1	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 367870 — Lab Sample ID: 320-33369-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	5.9		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	31		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	5.6		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	5.2		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	190		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	0.74	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 367770 — Lab Sample ID: 320-33369-6

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Client Sample ID: 367770 (Continued) — Lab Sample ID: 320-33369-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	6.4		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	33		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	5.9		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	5.5		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	200		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	0.76	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 483532 — Lab Sample ID: 320-33369-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.4	J	2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	1.9	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.4	J	2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 173908 — Lab Sample ID: 320-33369-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	45		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	170		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	14		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	7.3		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	6.7		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 175005 — Lab Sample ID: 320-33369-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	14		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	56		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	7.5		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	9.2		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	0.89	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	320		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: 173916 — Lab Sample ID: 320-33369-10

This Detection Summary does not include radiochemical test results.

Client Sample ID: 173916 (Continued) — Lab Sample ID: 320-33369-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	2.0		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.7	J	2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 153338 — Lab Sample ID: 320-33369-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	31		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	51		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	11		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	12		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	51		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 120286 — Lab Sample ID: 320-33369-12

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	21		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	120		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	19		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	18		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	2.0		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	630		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: 510220.1 — Lab Sample ID: 320-33369-13

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	38		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	160		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	20		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	56		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	120		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 510320.1 — Lab Sample ID: 320-33369-14

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	39		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: 510320.1 (Continued) — Lab Sample ID: 320-33369-14

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	160		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	19		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	55		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	120		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 510220.2 — Lab Sample ID: 320-33369-15

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	48		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	210		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	26		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	74		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	160		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 174998 — Lab Sample ID: 320-33369-16

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	19		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	61		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	8.0		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	10		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	240		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 120316 — Lab Sample ID: 320-33369-17

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	30		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	130		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	13		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	15		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	0.90	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	480		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: 117048 — Lab Sample ID: 320-33369-18

No Detections.

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Client Sample ID: 176397 — Lab Sample ID: 320-33369-19

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	10		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	88		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	57		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	32		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	26		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	40		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 483541 — Lab Sample ID: 320-33369-20

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	26		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	92		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	7.7		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	4.3		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	4.2		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 174769 — Lab Sample ID: 320-33369-21

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	16		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	72		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	8.8		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	12		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	280		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	0.76	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 120324 — Lab Sample ID: 320-33369-22

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	12		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	62		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	9.1		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	11		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	1.1	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: 120324 (Continued) — Lab Sample ID: 320-33369-22

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanesulfonic acid (PFOS) - DL	440		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: 117129 — Lab Sample ID: 320-33369-23

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	1.8	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	1.2	J	2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 120057 — Lab Sample ID: 320-33369-24

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	3.6		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	18		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	3.5		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	3.5		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	100		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 176222 — Lab Sample ID: 320-33369-25

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.4	J	2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	9.3		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.5		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	4.9		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	5.3		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Client Sample ID: 117170
Date Collected: 11/13/17 15:12
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-1
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/17 09:12	11/18/17 15:17	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/17/17 09:12	11/18/17 15:17	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/17 09:12	11/18/17 15:17	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/17 09:12	11/18/17 15:17	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/17/17 09:12	11/18/17 15:17	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/17 09:12	11/18/17 15:17	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*100*		*25 - 150*	*11/17/17 09:12*	*11/18/17 15:17*	*1*
13C4-PFHpA	*100*		*25 - 150*	*11/17/17 09:12*	*11/18/17 15:17*	*1*
13C4 PFOA	*99*		*25 - 150*	*11/17/17 09:12*	*11/18/17 15:17*	*1*
13C4 PFOS	*98*		*25 - 150*	*11/17/17 09:12*	*11/18/17 15:17*	*1*
13C5 PFNA	*100*		*25 - 150*	*11/17/17 09:12*	*11/18/17 15:17*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Client Sample ID: 117270
Date Collected: 11/13/17 15:02
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-2
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/17 09:12	11/18/17 15:35	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/17/17 09:12	11/18/17 15:35	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/17 09:12	11/18/17 15:35	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/17 09:12	11/18/17 15:35	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/17/17 09:12	11/18/17 15:35	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/17 09:12	11/18/17 15:35	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*102*		*25 - 150*	*11/17/17 09:12*	*11/18/17 15:35*	*1*
13C4-PFHpA	*104*		*25 - 150*	*11/17/17 09:12*	*11/18/17 15:35*	*1*
13C4 PFOA	*103*		*25 - 150*	*11/17/17 09:12*	*11/18/17 15:35*	*1*
13C4 PFOS	*100*		*25 - 150*	*11/17/17 09:12*	*11/18/17 15:35*	*1*
13C5 PFNA	*102*		*25 - 150*	*11/17/17 09:12*	*11/18/17 15:35*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Client Sample ID: 119849
Date Collected: 11/13/17 16:45
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-3
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**5.8**		2.0	0.92	ng/L		11/17/17 09:12	11/18/17 15:53	1
Perfluorohexanesulfonic acid (PFHxS)	**26**		2.0	0.87	ng/L		11/17/17 09:12	11/18/17 15:53	1
Perfluoroheptanoic acid (PFHpA)	**4.7**		2.0	0.80	ng/L		11/17/17 09:12	11/18/17 15:53	1
Perfluorooctanoic acid (PFOA)	**4.6**		2.0	0.75	ng/L		11/17/17 09:12	11/18/17 15:53	1
Perfluorooctanesulfonic acid (PFOS)	**140**		2.0	1.3	ng/L		11/17/17 09:12	11/18/17 15:53	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/17 09:12	11/18/17 15:53	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*96*		*25 - 150*	*11/17/17 09:12*	*11/18/17 15:53*	*1*
13C4-PFHpA	*99*		*25 - 150*	*11/17/17 09:12*	*11/18/17 15:53*	*1*
13C4 PFOA	*95*		*25 - 150*	*11/17/17 09:12*	*11/18/17 15:53*	*1*
13C4 PFOS	*92*		*25 - 150*	*11/17/17 09:12*	*11/18/17 15:53*	*1*
13C5 PFNA	*95*		*25 - 150*	*11/17/17 09:12*	*11/18/17 15:53*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Client Sample ID: 174483
Date Collected: 11/14/17 13:42
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-4
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	9.5		2.0	0.92	ng/L		11/17/17 09:12	11/18/17 16:12	1
Perfluorohexanesulfonic acid (PFHxS)	26		2.0	0.87	ng/L		11/17/17 09:12	11/18/17 16:12	1
Perfluoroheptanoic acid (PFHpA)	5.2		2.0	0.80	ng/L		11/17/17 09:12	11/18/17 16:12	1
Perfluorooctanoic acid (PFOA)	8.5		2.0	0.75	ng/L		11/17/17 09:12	11/18/17 16:12	1
Perfluorooctanesulfonic acid (PFOS)	120		2.0	1.3	ng/L		11/17/17 09:12	11/18/17 16:12	1
Perfluorononanoic acid (PFNA)	1.1	J	2.0	0.65	ng/L		11/17/17 09:12	11/18/17 16:12	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*94*		*25 - 150*	*11/17/17 09:12*	*11/18/17 16:12*	*1*
13C4-PFHpA	*95*		*25 - 150*	*11/17/17 09:12*	*11/18/17 16:12*	*1*
13C4 PFOA	*93*		*25 - 150*	*11/17/17 09:12*	*11/18/17 16:12*	*1*
13C4 PFOS	*90*		*25 - 150*	*11/17/17 09:12*	*11/18/17 16:12*	*1*
13C5 PFNA	*91*		*25 - 150*	*11/17/17 09:12*	*11/18/17 16:12*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Client Sample ID: 367870
Date Collected: 11/14/17 14:42
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-5
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	5.9		2.0	0.92	ng/L		11/17/17 09:12	11/18/17 16:30	1
Perfluorohexanesulfonic acid (PFHxS)	31		2.0	0.87	ng/L		11/17/17 09:12	11/18/17 16:30	1
Perfluoroheptanoic acid (PFHpA)	5.6		2.0	0.80	ng/L		11/17/17 09:12	11/18/17 16:30	1
Perfluorooctanoic acid (PFOA)	5.2		2.0	0.75	ng/L		11/17/17 09:12	11/18/17 16:30	1
Perfluorooctanesulfonic acid (PFOS)	190		2.0	1.3	ng/L		11/17/17 09:12	11/18/17 16:30	1
Perfluorononanoic acid (PFNA)	0.74	J	2.0	0.65	ng/L		11/17/17 09:12	11/18/17 16:30	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*109*		*25 - 150*	*11/17/17 09:12*	*11/18/17 16:30*	*1*
13C4-PFHpA	*106*		*25 - 150*	*11/17/17 09:12*	*11/18/17 16:30*	*1*
13C4 PFOA	*107*		*25 - 150*	*11/17/17 09:12*	*11/18/17 16:30*	*1*
13C4 PFOS	*105*		*25 - 150*	*11/17/17 09:12*	*11/18/17 16:30*	*1*
13C5 PFNA	*104*		*25 - 150*	*11/17/17 09:12*	*11/18/17 16:30*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Client Sample ID: 367770
Date Collected: 11/14/17 14:37
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-6
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	6.4		2.0	0.92	ng/L		11/17/17 09:12	11/18/17 16:48	1
Perfluorohexanesulfonic acid (PFHxS)	33		2.0	0.87	ng/L		11/17/17 09:12	11/18/17 16:48	1
Perfluoroheptanoic acid (PFHpA)	5.9		2.0	0.80	ng/L		11/17/17 09:12	11/18/17 16:48	1
Perfluorooctanoic acid (PFOA)	5.5		2.0	0.75	ng/L		11/17/17 09:12	11/18/17 16:48	1
Perfluorooctanesulfonic acid (PFOS)	200		2.0	1.3	ng/L		11/17/17 09:12	11/18/17 16:48	1
Perfluorononanoic acid (PFNA)	0.76	J	2.0	0.65	ng/L		11/17/17 09:12	11/18/17 16:48	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*94*		*25 - 150*	*11/17/17 09:12*	*11/18/17 16:48*	*1*
13C4-PFHpA	*95*		*25 - 150*	*11/17/17 09:12*	*11/18/17 16:48*	*1*
13C4 PFOA	*95*		*25 - 150*	*11/17/17 09:12*	*11/18/17 16:48*	*1*
13C4 PFOS	*94*		*25 - 150*	*11/17/17 09:12*	*11/18/17 16:48*	*1*
13C5 PFNA	*94*		*25 - 150*	*11/17/17 09:12*	*11/18/17 16:48*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Client Sample ID: 483532
Date Collected: 11/14/17 15:25
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-7
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**1.4**	**J**	2.0	0.92	ng/L		11/17/17 09:12	11/18/17 17:07	1
Perfluorohexanesulfonic acid (PFHxS)	**1.9**	**J**	2.0	0.87	ng/L		11/17/17 09:12	11/18/17 17:07	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/17 09:12	11/18/17 17:07	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/17 09:12	11/18/17 17:07	1
Perfluorooctanesulfonic acid (PFOS)	**1.4**	**J**	2.0	1.3	ng/L		11/17/17 09:12	11/18/17 17:07	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/17 09:12	11/18/17 17:07	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*91*		*25 - 150*	*11/17/17 09:12*	*11/18/17 17:07*	*1*
13C4-PFHpA	*92*		*25 - 150*	*11/17/17 09:12*	*11/18/17 17:07*	*1*
13C4 PFOA	*89*		*25 - 150*	*11/17/17 09:12*	*11/18/17 17:07*	*1*
13C4 PFOS	*87*		*25 - 150*	*11/17/17 09:12*	*11/18/17 17:07*	*1*
13C5 PFNA	*92*		*25 - 150*	*11/17/17 09:12*	*11/18/17 17:07*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Client Sample ID: 173908
Date Collected: 11/14/17 16:08
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-8
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**45**		2.0	0.92	ng/L		11/17/17 09:12	11/18/17 17:44	1
Perfluorohexanesulfonic acid (PFHxS)	**170**		2.0	0.87	ng/L		11/17/17 09:12	11/18/17 17:44	1
Perfluoroheptanoic acid (PFHpA)	**14**		2.0	0.80	ng/L		11/17/17 09:12	11/18/17 17:44	1
Perfluorooctanoic acid (PFOA)	**7.3**		2.0	0.75	ng/L		11/17/17 09:12	11/18/17 17:44	1
Perfluorooctanesulfonic acid (PFOS)	**6.7**		2.0	1.3	ng/L		11/17/17 09:12	11/18/17 17:44	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/17 09:12	11/18/17 17:44	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*101*		*25 - 150*	*11/17/17 09:12*	*11/18/17 17:44*	*1*
13C4-PFHpA	*101*		*25 - 150*	*11/17/17 09:12*	*11/18/17 17:44*	*1*
13C4 PFOA	*99*		*25 - 150*	*11/17/17 09:12*	*11/18/17 17:44*	*1*
13C4 PFOS	*99*		*25 - 150*	*11/17/17 09:12*	*11/18/17 17:44*	*1*
13C5 PFNA	*100*		*25 - 150*	*11/17/17 09:12*	*11/18/17 17:44*	*1*

Client Sample ID: 175005
Date Collected: 11/14/17 10:29
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-9
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	14		2.0	0.92	ng/L		11/17/17 09:12	11/18/17 18:02	1
Perfluorohexanesulfonic acid (PFHxS)	56		2.0	0.87	ng/L		11/17/17 09:12	11/18/17 18:02	1
Perfluoroheptanoic acid (PFHpA)	7.5		2.0	0.80	ng/L		11/17/17 09:12	11/18/17 18:02	1
Perfluorooctanoic acid (PFOA)	9.2		2.0	0.75	ng/L		11/17/17 09:12	11/18/17 18:02	1
Perfluorononanoic acid (PFNA)	0.89	J	2.0	0.65	ng/L		11/17/17 09:12	11/18/17 18:02	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*95*		*25 - 150*	*11/17/17 09:12*	*11/18/17 18:02*	*1*
13C4-PFHpA	*97*		*25 - 150*	*11/17/17 09:12*	*11/18/17 18:02*	*1*
13C4 PFOA	*96*		*25 - 150*	*11/17/17 09:12*	*11/18/17 18:02*	*1*
13C5 PFNA	*97*		*25 - 150*	*11/17/17 09:12*	*11/18/17 18:02*	*1*

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	320		20	13	ng/L		11/17/17 09:12	11/22/17 11:02	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*94*		*25 - 150*	*11/17/17 09:12*	*11/22/17 11:02*	*10*

Client: Shannon & Wilson, Inc
Project/Site: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Client Sample ID: 173916
Date Collected: 11/14/17 11:36
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-10
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/17 09:12	11/18/17 18:20	1
Perfluorohexanesulfonic acid (PFHxS)	**2.0**		2.0	0.87	ng/L		11/17/17 09:12	11/18/17 18:20	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/17 09:12	11/18/17 18:20	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/17 09:12	11/18/17 18:20	1
Perfluorooctanesulfonic acid (PFOS)	**1.7**	**J**	2.0	1.3	ng/L		11/17/17 09:12	11/18/17 18:20	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/17 09:12	11/18/17 18:20	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*96*		*25 - 150*	*11/17/17 09:12*	*11/18/17 18:20*	*1*
13C4-PFHpA	*96*		*25 - 150*	*11/17/17 09:12*	*11/18/17 18:20*	*1*
13C4 PFOA	*95*		*25 - 150*	*11/17/17 09:12*	*11/18/17 18:20*	*1*
13C4 PFOS	*94*		*25 - 150*	*11/17/17 09:12*	*11/18/17 18:20*	*1*
13C5 PFNA	*97*		*25 - 150*	*11/17/17 09:12*	*11/18/17 18:20*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Client Sample ID: 153338
Date Collected: 11/14/17 13:20
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-11
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	31		2.0	0.92	ng/L		11/17/17 09:12	11/18/17 18:39	1
Perfluorohexanesulfonic acid (PFHxS)	51		2.0	0.87	ng/L		11/17/17 09:12	11/18/17 18:39	1
Perfluoroheptanoic acid (PFHpA)	11		2.0	0.80	ng/L		11/17/17 09:12	11/18/17 18:39	1
Perfluorooctanoic acid (PFOA)	12		2.0	0.75	ng/L		11/17/17 09:12	11/18/17 18:39	1
Perfluorooctanesulfonic acid (PFOS)	51		2.0	1.3	ng/L		11/17/17 09:12	11/18/17 18:39	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/17 09:12	11/18/17 18:39	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*97*		*25 - 150*	*11/17/17 09:12*	*11/18/17 18:39*	*1*
13C4-PFHpA	*96*		*25 - 150*	*11/17/17 09:12*	*11/18/17 18:39*	*1*
13C4 PFOA	*96*		*25 - 150*	*11/17/17 09:12*	*11/18/17 18:39*	*1*
13C4 PFOS	*94*		*25 - 150*	*11/17/17 09:12*	*11/18/17 18:39*	*1*
13C5 PFNA	*96*		*25 - 150*	*11/17/17 09:12*	*11/18/17 18:39*	*1*

Client Sample ID: 120286
Date Collected: 11/14/17 14:39
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-12
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	21		2.0	0.92	ng/L		11/17/17 09:12	11/18/17 18:57	1
Perfluorohexanesulfonic acid (PFHxS)	120		2.0	0.87	ng/L		11/17/17 09:12	11/18/17 18:57	1
Perfluoroheptanoic acid (PFHpA)	19		2.0	0.80	ng/L		11/17/17 09:12	11/18/17 18:57	1
Perfluorooctanoic acid (PFOA)	18		2.0	0.75	ng/L		11/17/17 09:12	11/18/17 18:57	1
Perfluorononanoic acid (PFNA)	2.0		2.0	0.65	ng/L		11/17/17 09:12	11/18/17 18:57	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*99*		*25 - 150*	*11/17/17 09:12*	*11/18/17 18:57*	*1*
13C4-PFHpA	*99*		*25 - 150*	*11/17/17 09:12*	*11/18/17 18:57*	*1*
13C4 PFOA	*99*		*25 - 150*	*11/17/17 09:12*	*11/18/17 18:57*	*1*
13C5 PFNA	*95*		*25 - 150*	*11/17/17 09:12*	*11/18/17 18:57*	*1*

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	630		20	13	ng/L		11/17/17 09:12	11/22/17 11:21	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*95*		*25 - 150*	*11/17/17 09:12*	*11/22/17 11:21*	*10*

Client: Shannon & Wilson, Inc
Project/Site: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Client Sample ID: 510220.1
Date Collected: 11/14/17 15:52
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-13
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	38		2.0	0.92	ng/L		11/17/17 09:12	11/18/17 19:15	1
Perfluorohexanesulfonic acid (PFHxS)	160		2.0	0.87	ng/L		11/17/17 09:12	11/18/17 19:15	1
Perfluoroheptanoic acid (PFHpA)	20		2.0	0.80	ng/L		11/17/17 09:12	11/18/17 19:15	1
Perfluorooctanoic acid (PFOA)	56		2.0	0.75	ng/L		11/17/17 09:12	11/18/17 19:15	1
Perfluorooctanesulfonic acid (PFOS)	120		2.0	1.3	ng/L		11/17/17 09:12	11/18/17 19:15	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/17 09:12	11/18/17 19:15	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*95*		*25 - 150*	*11/17/17 09:12*	*11/18/17 19:15*	*1*
13C4-PFHpA	*93*		*25 - 150*	*11/17/17 09:12*	*11/18/17 19:15*	*1*
13C4 PFOA	*96*		*25 - 150*	*11/17/17 09:12*	*11/18/17 19:15*	*1*
13C4 PFOS	*93*		*25 - 150*	*11/17/17 09:12*	*11/18/17 19:15*	*1*
13C5 PFNA	*97*		*25 - 150*	*11/17/17 09:12*	*11/18/17 19:15*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Client Sample ID: 510320.1
Date Collected: 11/14/17 16:02
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-14
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	39		2.0	0.92	ng/L		11/17/17 09:12	11/18/17 19:34	1
Perfluorohexanesulfonic acid (PFHxS)	160		2.0	0.87	ng/L		11/17/17 09:12	11/18/17 19:34	1
Perfluoroheptanoic acid (PFHpA)	19		2.0	0.80	ng/L		11/17/17 09:12	11/18/17 19:34	1
Perfluorooctanoic acid (PFOA)	55		2.0	0.75	ng/L		11/17/17 09:12	11/18/17 19:34	1
Perfluorooctanesulfonic acid (PFOS)	120		2.0	1.3	ng/L		11/17/17 09:12	11/18/17 19:34	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/17 09:12	11/18/17 19:34	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*93*		*25 - 150*	*11/17/17 09:12*	*11/18/17 19:34*	*1*
13C4-PFHpA	*96*		*25 - 150*	*11/17/17 09:12*	*11/18/17 19:34*	*1*
13C4 PFOA	*97*		*25 - 150*	*11/17/17 09:12*	*11/18/17 19:34*	*1*
13C4 PFOS	*93*		*25 - 150*	*11/17/17 09:12*	*11/18/17 19:34*	*1*
13C5 PFNA	*95*		*25 - 150*	*11/17/17 09:12*	*11/18/17 19:34*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Client Sample ID: 510220.2
Date Collected: 11/14/17 16:30
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-15
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**48**		2.0	0.92	ng/L		11/17/17 09:12	11/18/17 19:52	1
Perfluorohexanesulfonic acid (PFHxS)	**210**		2.0	0.87	ng/L		11/17/17 09:12	11/18/17 19:52	1
Perfluoroheptanoic acid (PFHpA)	**26**		2.0	0.80	ng/L		11/17/17 09:12	11/18/17 19:52	1
Perfluorooctanoic acid (PFOA)	**74**		2.0	0.75	ng/L		11/17/17 09:12	11/18/17 19:52	1
Perfluorooctanesulfonic acid (PFOS)	**160**		2.0	1.3	ng/L		11/17/17 09:12	11/18/17 19:52	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/17 09:12	11/18/17 19:52	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*99*		*25 - 150*	*11/17/17 09:12*	*11/18/17 19:52*	*1*
13C4-PFHpA	*96*		*25 - 150*	*11/17/17 09:12*	*11/18/17 19:52*	*1*
13C4 PFOA	*97*		*25 - 150*	*11/17/17 09:12*	*11/18/17 19:52*	*1*
13C4 PFOS	*97*		*25 - 150*	*11/17/17 09:12*	*11/18/17 19:52*	*1*
13C5 PFNA	*98*		*25 - 150*	*11/17/17 09:12*	*11/18/17 19:52*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Client Sample ID: 174998
Date Collected: 11/14/17 10:40
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-16
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**19**		2.0	0.92	ng/L		11/17/17 09:12	11/18/17 20:10	1
Perfluorohexanesulfonic acid (PFHxS)	**61**		2.0	0.87	ng/L		11/17/17 09:12	11/18/17 20:10	1
Perfluoroheptanoic acid (PFHpA)	**8.0**		2.0	0.80	ng/L		11/17/17 09:12	11/18/17 20:10	1
Perfluorooctanoic acid (PFOA)	**10**		2.0	0.75	ng/L		11/17/17 09:12	11/18/17 20:10	1
Perfluorooctanesulfonic acid (PFOS)	**240**		2.0	1.3	ng/L		11/17/17 09:12	11/18/17 20:10	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/17 09:12	11/18/17 20:10	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*106*		*25 - 150*	*11/17/17 09:12*	*11/18/17 20:10*	*1*
13C4-PFHpA	*104*		*25 - 150*	*11/17/17 09:12*	*11/18/17 20:10*	*1*
13C4 PFOA	*105*		*25 - 150*	*11/17/17 09:12*	*11/18/17 20:10*	*1*
13C4 PFOS	*104*		*25 - 150*	*11/17/17 09:12*	*11/18/17 20:10*	*1*
13C5 PFNA	*103*		*25 - 150*	*11/17/17 09:12*	*11/18/17 20:10*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Client Sample ID: 120316
Date Collected: 11/14/17 11:55
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-17
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	30		2.0	0.92	ng/L		11/17/17 09:20	11/18/17 20:29	1
Perfluorohexanesulfonic acid (PFHxS)	130		2.0	0.87	ng/L		11/17/17 09:20	11/18/17 20:29	1
Perfluoroheptanoic acid (PFHpA)	13		2.0	0.80	ng/L		11/17/17 09:20	11/18/17 20:29	1
Perfluorooctanoic acid (PFOA)	15		2.0	0.75	ng/L		11/17/17 09:20	11/18/17 20:29	1
Perfluorononanoic acid (PFNA)	0.90	J	2.0	0.65	ng/L		11/17/17 09:20	11/18/17 20:29	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*103*		*25 - 150*	*11/17/17 09:20*	*11/18/17 20:29*	*1*
13C4-PFHpA	*102*		*25 - 150*	*11/17/17 09:20*	*11/18/17 20:29*	*1*
13C4 PFOA	*102*		*25 - 150*	*11/17/17 09:20*	*11/18/17 20:29*	*1*
13C5 PFNA	*98*		*25 - 150*	*11/17/17 09:20*	*11/18/17 20:29*	*1*

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	480		20	13	ng/L		11/17/17 09:20	11/22/17 11:39	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*104*		*25 - 150*	*11/17/17 09:20*	*11/22/17 11:39*	*10*

Client: Shannon & Wilson, Inc
Project/Site: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Client Sample ID: 117048
Date Collected: 11/14/17 12:49
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-18
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/17 09:20	11/18/17 21:05	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/17/17 09:20	11/18/17 21:05	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/17 09:20	11/18/17 21:05	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/17 09:20	11/18/17 21:05	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/17/17 09:20	11/18/17 21:05	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/17 09:20	11/18/17 21:05	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*93*		*25 - 150*	*11/17/17 09:20*	*11/18/17 21:05*	*1*
13C4-PFHpA	*94*		*25 - 150*	*11/17/17 09:20*	*11/18/17 21:05*	*1*
13C4 PFOA	*94*		*25 - 150*	*11/17/17 09:20*	*11/18/17 21:05*	*1*
13C4 PFOS	*93*		*25 - 150*	*11/17/17 09:20*	*11/18/17 21:05*	*1*
13C5 PFNA	*94*		*25 - 150*	*11/17/17 09:20*	*11/18/17 21:05*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Client Sample ID: 176397
Date Collected: 11/14/17 16:23
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-19
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	10		2.0	0.92	ng/L		11/17/17 09:20	11/18/17 21:24	1
Perfluorohexanesulfonic acid (PFHxS)	88		2.0	0.87	ng/L		11/17/17 09:20	11/18/17 21:24	1
Perfluoroheptanoic acid (PFHpA)	57		2.0	0.80	ng/L		11/17/17 09:20	11/18/17 21:24	1
Perfluorooctanoic acid (PFOA)	32		2.0	0.75	ng/L		11/17/17 09:20	11/18/17 21:24	1
Perfluorooctanesulfonic acid (PFOS)	26		2.0	1.3	ng/L		11/17/17 09:20	11/18/17 21:24	1
Perfluorononanoic acid (PFNA)	40		2.0	0.65	ng/L		11/17/17 09:20	11/18/17 21:24	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*94*		*25 - 150*	*11/17/17 09:20*	*11/18/17 21:24*	*1*
13C4-PFHpA	*92*		*25 - 150*	*11/17/17 09:20*	*11/18/17 21:24*	*1*
13C4 PFOA	*96*		*25 - 150*	*11/17/17 09:20*	*11/18/17 21:24*	*1*
13C4 PFOS	*95*		*25 - 150*	*11/17/17 09:20*	*11/18/17 21:24*	*1*
13C5 PFNA	*94*		*25 - 150*	*11/17/17 09:20*	*11/18/17 21:24*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Client Sample ID: 483541
Date Collected: 11/15/17 16:20
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-20
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**26**		2.0	0.92	ng/L		11/17/17 09:20	11/18/17 21:42	1
Perfluorohexanesulfonic acid (PFHxS)	**92**		2.0	0.87	ng/L		11/17/17 09:20	11/18/17 21:42	1
Perfluoroheptanoic acid (PFHpA)	**7.7**		2.0	0.80	ng/L		11/17/17 09:20	11/18/17 21:42	1
Perfluorooctanoic acid (PFOA)	**4.3**		2.0	0.75	ng/L		11/17/17 09:20	11/18/17 21:42	1
Perfluorooctanesulfonic acid (PFOS)	**4.2**		2.0	1.3	ng/L		11/17/17 09:20	11/18/17 21:42	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/17 09:20	11/18/17 21:42	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*101*		*25 - 150*	*11/17/17 09:20*	*11/18/17 21:42*	*1*
13C4-PFHpA	*98*		*25 - 150*	*11/17/17 09:20*	*11/18/17 21:42*	*1*
13C4 PFOA	*101*		*25 - 150*	*11/17/17 09:20*	*11/18/17 21:42*	*1*
13C4 PFOS	*98*		*25 - 150*	*11/17/17 09:20*	*11/18/17 21:42*	*1*
13C5 PFNA	*97*		*25 - 150*	*11/17/17 09:20*	*11/18/17 21:42*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Client Sample ID: 174769
Date Collected: 11/15/17 13:50
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-21
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	16		2.0	0.92	ng/L		11/17/17 09:26	11/19/17 03:12	1
Perfluorohexanesulfonic acid (PFHxS)	72		2.0	0.87	ng/L		11/17/17 09:26	11/19/17 03:12	1
Perfluoroheptanoic acid (PFHpA)	8.8		2.0	0.80	ng/L		11/17/17 09:26	11/19/17 03:12	1
Perfluorooctanoic acid (PFOA)	12		2.0	0.75	ng/L		11/17/17 09:26	11/19/17 03:12	1
Perfluorooctanesulfonic acid (PFOS)	280		2.0	1.3	ng/L		11/17/17 09:26	11/19/17 03:12	1
Perfluorononanoic acid (PFNA)	0.76	J	2.0	0.65	ng/L		11/17/17 09:26	11/19/17 03:12	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*101*		*25 - 150*	*11/17/17 09:26*	*11/19/17 03:12*	*1*
13C4-PFHpA	*99*		*25 - 150*	*11/17/17 09:26*	*11/19/17 03:12*	*1*
13C4 PFOA	*99*		*25 - 150*	*11/17/17 09:26*	*11/19/17 03:12*	*1*
13C4 PFOS	*96*		*25 - 150*	*11/17/17 09:26*	*11/19/17 03:12*	*1*
13C5 PFNA	*95*		*25 - 150*	*11/17/17 09:26*	*11/19/17 03:12*	*1*

Client Sample ID: 120324
Date Collected: 11/15/17 11:37
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-22
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	12		2.0	0.92	ng/L		11/17/17 09:26	11/19/17 03:31	1
Perfluorohexanesulfonic acid (PFHxS)	62		2.0	0.87	ng/L		11/17/17 09:26	11/19/17 03:31	1
Perfluoroheptanoic acid (PFHpA)	9.1		2.0	0.80	ng/L		11/17/17 09:26	11/19/17 03:31	1
Perfluorooctanoic acid (PFOA)	11		2.0	0.75	ng/L		11/17/17 09:26	11/19/17 03:31	1
Perfluorononanoic acid (PFNA)	1.1	J	2.0	0.65	ng/L		11/17/17 09:26	11/19/17 03:31	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*98*		*25 - 150*	*11/17/17 09:26*	*11/19/17 03:31*	*1*
13C4-PFHpA	*97*		*25 - 150*	*11/17/17 09:26*	*11/19/17 03:31*	*1*
13C4 PFOA	*98*		*25 - 150*	*11/17/17 09:26*	*11/19/17 03:31*	*1*
13C5 PFNA	*96*		*25 - 150*	*11/17/17 09:26*	*11/19/17 03:31*	*1*

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	440		20	13	ng/L		11/17/17 09:26	11/22/17 11:57	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*99*		*25 - 150*	*11/17/17 09:26*	*11/22/17 11:57*	*10*

Client: Shannon & Wilson, Inc
Project/Site: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Client Sample ID: 117129
Date Collected: 11/15/17 14:37
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-23
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/17 09:26	11/19/17 03:49	1
Perfluorohexanesulfonic acid (PFHxS)	**1.8**	**J**	2.0	0.87	ng/L		11/17/17 09:26	11/19/17 03:49	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/17 09:26	11/19/17 03:49	1
Perfluorooctanoic acid (PFOA)	**1.2**	**J**	2.0	0.75	ng/L		11/17/17 09:26	11/19/17 03:49	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/17/17 09:26	11/19/17 03:49	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/17 09:26	11/19/17 03:49	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*99*		*25 - 150*	*11/17/17 09:26*	*11/19/17 03:49*	*1*
13C4-PFHpA	*98*		*25 - 150*	*11/17/17 09:26*	*11/19/17 03:49*	*1*
13C4 PFOA	*98*		*25 - 150*	*11/17/17 09:26*	*11/19/17 03:49*	*1*
13C4 PFOS	*98*		*25 - 150*	*11/17/17 09:26*	*11/19/17 03:49*	*1*
13C5 PFNA	*99*		*25 - 150*	*11/17/17 09:26*	*11/19/17 03:49*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Client Sample ID: 120057
Date Collected: 11/15/17 15:58
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-24
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**3.6**		2.0	0.92	ng/L		11/17/17 09:26	11/19/17 04:07	1
Perfluorohexanesulfonic acid (PFHxS)	**18**		2.0	0.87	ng/L		11/17/17 09:26	11/19/17 04:07	1
Perfluoroheptanoic acid (PFHpA)	**3.5**		2.0	0.80	ng/L		11/17/17 09:26	11/19/17 04:07	1
Perfluorooctanoic acid (PFOA)	**3.5**		2.0	0.75	ng/L		11/17/17 09:26	11/19/17 04:07	1
Perfluorooctanesulfonic acid (PFOS)	**100**		2.0	1.3	ng/L		11/17/17 09:26	11/19/17 04:07	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/17 09:26	11/19/17 04:07	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*105*		*25 - 150*	*11/17/17 09:26*	*11/19/17 04:07*	*1*
13C4-PFHpA	*101*		*25 - 150*	*11/17/17 09:26*	*11/19/17 04:07*	*1*
13C4 PFOA	*105*		*25 - 150*	*11/17/17 09:26*	*11/19/17 04:07*	*1*
13C4 PFOS	*100*		*25 - 150*	*11/17/17 09:26*	*11/19/17 04:07*	*1*
13C5 PFNA	*103*		*25 - 150*	*11/17/17 09:26*	*11/19/17 04:07*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Client Sample ID: 176222
Date Collected: 11/15/17 13:00
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-25
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**1.4**	**J**	2.0	0.92	ng/L		11/17/17 09:26	11/19/17 04:26	1
Perfluorohexanesulfonic acid (PFHxS)	**9.3**		2.0	0.87	ng/L		11/17/17 09:26	11/19/17 04:26	1
Perfluoroheptanoic acid (PFHpA)	**2.5**		2.0	0.80	ng/L		11/17/17 09:26	11/19/17 04:26	1
Perfluorooctanoic acid (PFOA)	**4.9**		2.0	0.75	ng/L		11/17/17 09:26	11/19/17 04:26	1
Perfluorooctanesulfonic acid (PFOS)	**5.3**		2.0	1.3	ng/L		11/17/17 09:26	11/19/17 04:26	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/17 09:26	11/19/17 04:26	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*102*		*25 - 150*	*11/17/17 09:26*	*11/19/17 04:26*	*1*
13C4-PFHpA	*96*		*25 - 150*	*11/17/17 09:26*	*11/19/17 04:26*	*1*
13C4 PFOA	*99*		*25 - 150*	*11/17/17 09:26*	*11/19/17 04:26*	*1*
13C4 PFOS	*98*		*25 - 150*	*11/17/17 09:26*	*11/19/17 04:26*	*1*
13C5 PFNA	*100*		*25 - 150*	*11/17/17 09:26*	*11/19/17 04:26*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)				
		3O2 PFHx	3C4-PFHp	3C4 PFO/	3C4 PFOS	3C5 PFNA
Lab Sample ID	Client Sample ID	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)
320-33369-1	117170	100	100	99	98	100
320-33369-2	117270	102	104	103	100	102
320-33369-3	119849	96	99	95	92	95
320-33369-4	174483	94	95	93	90	91
320-33369-5	367870	109	106	107	105	104
320-33369-6	367770	94	95	95	94	94
320-33369-7	483532	91	92	89	87	92
320-33369-8	173908	101	101	99	99	100
320-33369-9	175005	95	97	96		97
320-33369-9 - DL	175005				94	
320-33369-10	173916	96	96	95	94	97
320-33369-11	153338	97	96	96	94	96
320-33369-12	120286	99	99	99		95
320-33369-12 - DL	120286				95	
320-33369-13	510220.1	95	93	96	93	97
320-33369-14	510320.1	93	96	97	93	95
320-33369-15	510220.2	99	96	97	97	98
320-33369-16	174998	106	104	105	104	103
320-33369-17	120316	103	102	102		98
320-33369-17 - DL	120316				104	
320-33369-18	117048	93	94	94	93	94
320-33369-19	176397	94	92	96	95	94
320-33369-20	483541	101	98	101	98	97
320-33369-21	174769	101	99	99	96	95
320-33369-22	120324	98	97	98		96
320-33369-22 - DL	120324				99	
320-33369-23	117129	99	98	98	98	99
320-33369-24	120057	105	101	105	100	103
320-33369-25	176222	102	96	99	98	100
LCS 320-195299/2-A	Lab Control Sample	96	96	93	95	94
LCS 320-195308/2-A	Lab Control Sample	96	96	93	94	94
LCSD 320-195299/3-A	Lab Control Sample Dup	97	100	94	95	93
LCSD 320-195308/3-A	Lab Control Sample Dup	96	95	93	94	92
MB 320-195299/1-A	Method Blank	95	96	93	91	91
MB 320-195308/1-A	Method Blank	99	102	94	97	97

Surrogate Legend

18O2 PFHxS = 18O2 PFHxS
13C4-PFHpA = 13C4-PFHpA
13C4 PFOA = 13C4 PFOA
13C4 PFOS = 13C4 PFOS
13C5 PFNA = 13C5 PFNA

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-195299/1-A
Matrix: Water
Analysis Batch: 195588

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 195299

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/17 09:12	11/18/17 14:22	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/17/17 09:12	11/18/17 14:22	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/17 09:12	11/18/17 14:22	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/17 09:12	11/18/17 14:22	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/17/17 09:12	11/18/17 14:22	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/17 09:12	11/18/17 14:22	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*95*		*25 - 150*	*11/17/17 09:12*	*11/18/17 14:22*	*1*
13C4-PFHpA	*96*		*25 - 150*	*11/17/17 09:12*	*11/18/17 14:22*	*1*
13C4 PFOA	*93*		*25 - 150*	*11/17/17 09:12*	*11/18/17 14:22*	*1*
13C4 PFOS	*91*		*25 - 150*	*11/17/17 09:12*	*11/18/17 14:22*	*1*
13C5 PFNA	*91*		*25 - 150*	*11/17/17 09:12*	*11/18/17 14:22*	*1*

Lab Sample ID: LCS 320-195299/2-A
Matrix: Water
Analysis Batch: 195588

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 195299

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorobutanesulfonic acid (PFBS)	17.7	18.0		ng/L		102	72 - 151
Perfluorohexanesulfonic acid (PFHxS)	18.2	18.1		ng/L		99	73 - 157
Perfluoroheptanoic acid (PFHpA)	20.0	20.3		ng/L		101	71 - 138
Perfluorooctanoic acid (PFOA)	20.0	19.5		ng/L		98	70 - 140
Perfluorooctanesulfonic acid (PFOS)	18.6	17.0		ng/L		91	69 - 144
Perfluorononanoic acid (PFNA)	20.0	19.5		ng/L		97	73 - 147

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*96*		*25 - 150*
13C4-PFHpA	*96*		*25 - 150*
13C4 PFOA	*93*		*25 - 150*
13C4 PFOS	*95*		*25 - 150*
13C5 PFNA	*94*		*25 - 150*

Lab Sample ID: LCSD 320-195299/3-A
Matrix: Water
Analysis Batch: 195588

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 195299

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)	17.7	18.5		ng/L		104	72 - 151	2	30
Perfluorohexanesulfonic acid (PFHxS)	18.2	19.0		ng/L		104	73 - 157	5	30
Perfluoroheptanoic acid (PFHpA)	20.0	20.4		ng/L		102	71 - 138	0	30
Perfluorooctanoic acid (PFOA)	20.0	20.2		ng/L		101	70 - 140	3	30
Perfluorooctanesulfonic acid (PFOS)	18.6	18.4		ng/L		99	69 - 144	8	30
Perfluorononanoic acid (PFNA)	20.0	21.0		ng/L		105	73 - 147	8	30

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	97		25 - 150
13C4-PFHpA	100		25 - 150
13C4 PFOA	94		25 - 150
13C4 PFOS	95		25 - 150
13C5 PFNA	93		25 - 150

Lab Sample ID: MB 320-195308/1-A
Matrix: Water
Analysis Batch: 195590

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 195308

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/17 09:26	11/18/17 22:19	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/17/17 09:26	11/18/17 22:19	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/17 09:26	11/18/17 22:19	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/17 09:26	11/18/17 22:19	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/17/17 09:26	11/18/17 22:19	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/17 09:26	11/18/17 22:19	1

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	99		25 - 150	11/17/17 09:26	11/18/17 22:19	1
13C4-PFHpA	102		25 - 150	11/17/17 09:26	11/18/17 22:19	1
13C4 PFOA	94		25 - 150	11/17/17 09:26	11/18/17 22:19	1
13C4 PFOS	97		25 - 150	11/17/17 09:26	11/18/17 22:19	1
13C5 PFNA	97		25 - 150	11/17/17 09:26	11/18/17 22:19	1

Lab Sample ID: LCS 320-195308/2-A
Matrix: Water
Analysis Batch: 195590

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 195308

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorobutanesulfonic acid (PFBS)	17.7	18.6		ng/L		105	72 - 151
Perfluorohexanesulfonic acid (PFHxS)	18.2	18.7		ng/L		103	73 - 157
Perfluoroheptanoic acid (PFHpA)	20.0	20.8		ng/L		104	71 - 138
Perfluorooctanoic acid (PFOA)	20.0	21.1		ng/L		105	70 - 140
Perfluorooctanesulfonic acid (PFOS)	18.6	17.8		ng/L		96	69 - 144
Perfluorononanoic acid (PFNA)	20.0	21.6		ng/L		108	73 - 147

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
18O2 PFHxS	96		25 - 150
13C4-PFHpA	96		25 - 150
13C4 PFOA	93		25 - 150
13C4 PFOS	94		25 - 150
13C5 PFNA	94		25 - 150

Lab Sample ID: LCSD 320-195308/3-A
Matrix: Water
Analysis Batch: 195590

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 195308

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)	17.7	17.9		ng/L		101	72 - 151	4	30
Perfluorohexanesulfonic acid (PFHxS)	18.2	18.2		ng/L		100	73 - 157	3	30

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCSD 320-195308/3-A
Matrix: Water
Analysis Batch: 195590

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 195308

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluoroheptanoic acid (PFHpA)			20.0	21.5		ng/L		107	71 - 138	3	30
Perfluorooctanoic acid (PFOA)			20.0	19.4		ng/L		97	70 - 140	8	30
Perfluorooctanesulfonic acid (PFOS)			18.6	16.9		ng/L		91	69 - 144	6	30
Perfluorononanoic acid (PFNA)			20.0	19.9		ng/L		99	73 - 147	8	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
18O2 PFHxS	*96*		*25 - 150*
13C4-PFHpA	*95*		*25 - 150*
13C4 PFOA	*93*		*25 - 150*
13C4 PFOS	*94*		*25 - 150*
13C5 PFNA	*92*		*25 - 150*

LCMS

Prep Batch: 195299

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33369-1	117170	Total/NA	Water	PFAS Prep	
320-33369-2	117270	Total/NA	Water	PFAS Prep	
320-33369-3	119849	Total/NA	Water	PFAS Prep	
320-33369-4	174483	Total/NA	Water	PFAS Prep	
320-33369-5	367870	Total/NA	Water	PFAS Prep	
320-33369-6	367770	Total/NA	Water	PFAS Prep	
320-33369-7	483532	Total/NA	Water	PFAS Prep	
320-33369-8	173908	Total/NA	Water	PFAS Prep	
320-33369-9 - DL	175005	Total/NA	Water	PFAS Prep	
320-33369-9	175005	Total/NA	Water	PFAS Prep	
320-33369-10	173916	Total/NA	Water	PFAS Prep	
320-33369-11	153338	Total/NA	Water	PFAS Prep	
320-33369-12	120286	Total/NA	Water	PFAS Prep	
320-33369-12 - DL	120286	Total/NA	Water	PFAS Prep	
320-33369-13	510220.1	Total/NA	Water	PFAS Prep	
320-33369-14	510320.1	Total/NA	Water	PFAS Prep	
320-33369-15	510220.2	Total/NA	Water	PFAS Prep	
320-33369-16	174998	Total/NA	Water	PFAS Prep	
320-33369-17 - DL	120316	Total/NA	Water	PFAS Prep	
320-33369-17	120316	Total/NA	Water	PFAS Prep	
320-33369-18	117048	Total/NA	Water	PFAS Prep	
320-33369-19	176397	Total/NA	Water	PFAS Prep	
320-33369-20	483541	Total/NA	Water	PFAS Prep	
MB 320-195299/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-195299/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-195299/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Prep Batch: 195308

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33369-21	174769	Total/NA	Water	PFAS Prep	
320-33369-22	120324	Total/NA	Water	PFAS Prep	
320-33369-22 - DL	120324	Total/NA	Water	PFAS Prep	
320-33369-23	117129	Total/NA	Water	PFAS Prep	
320-33369-24	120057	Total/NA	Water	PFAS Prep	
320-33369-25	176222	Total/NA	Water	PFAS Prep	
MB 320-195308/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-195308/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-195308/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 195588

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33369-1	117170	Total/NA	Water	WS-LC-0025 At1	195299
320-33369-2	117270	Total/NA	Water	WS-LC-0025 At1	195299
320-33369-3	119849	Total/NA	Water	WS-LC-0025 At1	195299
320-33369-4	174483	Total/NA	Water	WS-LC-0025 At1	195299
320-33369-5	367870	Total/NA	Water	WS-LC-0025 At1	195299

LCMS (Continued)

Analysis Batch: 195588 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33369-6	367770	Total/NA	Water	WS-LC-0025 At1	195299
320-33369-7	483532	Total/NA	Water	WS-LC-0025 At1	195299
320-33369-8	173908	Total/NA	Water	WS-LC-0025 At1	195299
320-33369-9	175005	Total/NA	Water	WS-LC-0025 At1	195299
320-33369-10	173916	Total/NA	Water	WS-LC-0025 At1	195299
320-33369-11	153338	Total/NA	Water	WS-LC-0025 At1	195299
320-33369-12	120286	Total/NA	Water	WS-LC-0025 At1	195299
320-33369-13	510220.1	Total/NA	Water	WS-LC-0025 At1	195299
320-33369-14	510320.1	Total/NA	Water	WS-LC-0025 At1	195299
320-33369-15	510220.2	Total/NA	Water	WS-LC-0025 At1	195299
320-33369-16	174998	Total/NA	Water	WS-LC-0025 At1	195299
320-33369-17	120316	Total/NA	Water	WS-LC-0025 At1	195299
320-33369-18	117048	Total/NA	Water	WS-LC-0025 At1	195299
320-33369-19	176397	Total/NA	Water	WS-LC-0025 At1	195299
320-33369-20	483541	Total/NA	Water	WS-LC-0025 At1	195299
MB 320-195299/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	195299
LCS 320-195299/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	195299
LCSD 320-195299/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	195299

Analysis Batch: 195590

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33369-21	174769	Total/NA	Water	WS-LC-0025 At1	195308
320-33369-22	120324	Total/NA	Water	WS-LC-0025 At1	195308
320-33369-23	117129	Total/NA	Water	WS-LC-0025 At1	195308
320-33369-24	120057	Total/NA	Water	WS-LC-0025 At1	195308
320-33369-25	176222	Total/NA	Water	WS-LC-0025 At1	195308
MB 320-195308/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	195308
LCS 320-195308/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	195308
LCSD 320-195308/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	195308

LCMS (Continued)

Analysis Batch: 196249

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33369-9 - DL	175005	Total/NA	Water	WS-LC-0025 At1	195299
320-33369-12 - DL	120286	Total/NA	Water	WS-LC-0025 At1	195299
320-33369-17 - DL	120316	Total/NA	Water	WS-LC-0025 At1	195299
320-33369-22 - DL	120324	Total/NA	Water	WS-LC-0025 At1	195308

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Client Sample ID: 117170
Date Collected: 11/13/17 15:12
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-1
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	PFAS Prep			1.00 mL	1.66 mL	195299	11/17/17 09:12	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195588	11/18/17 15:17	CBW	TAL SAC

Client Sample ID: 117270
Date Collected: 11/13/17 15:02
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-2
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	PFAS Prep			1.00 mL	1.66 mL	195299	11/17/17 09:12	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195588	11/18/17 15:35	CBW	TAL SAC

Client Sample ID: 119849
Date Collected: 11/13/17 16:45
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-3
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	PFAS Prep			1.00 mL	1.66 mL	195299	11/17/17 09:12	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195588	11/18/17 15:53	CBW	TAL SAC

Client Sample ID: 174483
Date Collected: 11/14/17 13:42
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-4
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	PFAS Prep			1.00 mL	1.66 mL	195299	11/17/17 09:12	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195588	11/18/17 16:12	CBW	TAL SAC

Client Sample ID: 367870
Date Collected: 11/14/17 14:42
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-5
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	PFAS Prep			1.00 mL	1.66 mL	195299	11/17/17 09:12	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195588	11/18/17 16:30	CBW	TAL SAC

Client Sample ID: 367770
Date Collected: 11/14/17 14:37
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-6
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	PFAS Prep			1.00 mL	1.66 mL	195299	11/17/17 09:12	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195588	11/18/17 16:48	CBW	TAL SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Client Sample ID: 483532
Date Collected: 11/14/17 15:25
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-7
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	PFAS Prep			1.00 mL	1.66 mL	195299	11/17/17 09:12	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195588	11/18/17 17:07	CBW	TAL SAC

Client Sample ID: 173908
Date Collected: 11/14/17 16:08
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-8
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	195299	11/17/17 09:12	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195588	11/18/17 17:44	CBW	TAL SAC

Client Sample ID: 175005
Date Collected: 11/14/17 10:29
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-9
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	PFAS Prep			1.00 mL	1.66 mL	195299	11/17/17 09:12	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195588	11/18/17 18:02	CBW	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	195299	11/17/17 09:12	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			196249	11/22/17 11:02	CBW	TAL SAC

Client Sample ID: 173916
Date Collected: 11/14/17 11:36
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-10
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	PFAS Prep			1.00 mL	1.66 mL	195299	11/17/17 09:12	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195588	11/18/17 18:20	CBW	TAL SAC

Client Sample ID: 153338
Date Collected: 11/14/17 13:20
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-11
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	PFAS Prep			1.00 mL	1.66 mL	195299	11/17/17 09:12	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195588	11/18/17 18:39	CBW	TAL SAC

Client Sample ID: 120286
Date Collected: 11/14/17 14:39
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-12
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	PFAS Prep			1.00 mL	1.66 mL	195299	11/17/17 09:12	CCB	TAL SAC

Client Sample ID: 120286
Date Collected: 11/14/17 14:39
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-12
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	WS-LC-0025 At1		1			195588	11/18/17 18:57	CBW	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	195299	11/17/17 09:12	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			196249	11/22/17 11:21	CBW	TAL SAC

Client Sample ID: 510220.1
Date Collected: 11/14/17 15:52
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-13
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	PFAS Prep			1.00 mL	1.66 mL	195299	11/17/17 09:12	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195588	11/18/17 19:15	CBW	TAL SAC

Client Sample ID: 510320.1
Date Collected: 11/14/17 16:02
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-14
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	PFAS Prep			1.00 mL	1.66 mL	195299	11/17/17 09:12	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195588	11/18/17 19:34	CBW	TAL SAC

Client Sample ID: 510220.2
Date Collected: 11/14/17 16:30
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-15
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	PFAS Prep			1.00 mL	1.66 mL	195299	11/17/17 09:12	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195588	11/18/17 19:52	CBW	TAL SAC

Client Sample ID: 174998
Date Collected: 11/14/17 10:40
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-16
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	PFAS Prep			1.00 mL	1.66 mL	195299	11/17/17 09:12	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195588	11/18/17 20:10	CBW	TAL SAC

Client Sample ID: 120316
Date Collected: 11/14/17 11:55
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-17
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	PFAS Prep			1.00 mL	1.66 mL	195299	11/17/17 09:20	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195588	11/18/17 20:29	CBW	TAL SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	195299	11/17/17 09:20	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			196249	11/22/17 11:39	CBW	TAL SAC

Client Sample ID: 117048
Date Collected: 11/14/17 12:49
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-18
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	PFAS Prep			1.00 mL	1.66 mL	195299	11/17/17 09:20	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195588	11/18/17 21:05	CBW	TAL SAC

Client Sample ID: 176397
Date Collected: 11/14/17 16:23
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-19
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	PFAS Prep			1.00 mL	1.66 mL	195299	11/17/17 09:20	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195588	11/18/17 21:24	CBW	TAL SAC

Client Sample ID: 483541
Date Collected: 11/15/17 16:20
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-20
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	PFAS Prep			1.00 mL	1.66 mL	195299	11/17/17 09:20	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195588	11/18/17 21:42	CBW	TAL SAC

Client Sample ID: 174769
Date Collected: 11/15/17 13:50
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-21
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	PFAS Prep			1.00 mL	1.66 mL	195308	11/17/17 09:26	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195590	11/19/17 03:12	CBW	TAL SAC

Client Sample ID: 120324
Date Collected: 11/15/17 11:37
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-22
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	PFAS Prep			1.00 mL	1.66 mL	195308	11/17/17 09:26	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195590	11/19/17 03:31	CBW	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	195308	11/17/17 09:26	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			196249	11/22/17 11:57	CBW	TAL SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Client Sample ID: 117129

Date Collected: 11/15/17 14:37
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-23

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	PFAS Prep			1.00 mL	1.66 mL	195308	11/17/17 09:26	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195590	11/19/17 03:49	CBW	TAL SAC

Client Sample ID: 120057

Date Collected: 11/15/17 15:58
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-24

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	PFAS Prep			1.00 mL	1.66 mL	195308	11/17/17 09:26	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195590	11/19/17 04:07	CBW	TAL SAC

Client Sample ID: 176222

Date Collected: 11/15/17 13:00
Date Received: 11/16/17 11:00

Lab Sample ID: 320-33369-25

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	PFAS Prep			1.00 mL	1.66 mL	195308	11/17/17 09:26	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			195590	11/19/17 04:26	CBW	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Laboratory: TestAmerica Sacramento

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

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-055	12-18-17
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-18
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-18
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	10-31-17 *
L-A-B	DoD ELAP		L2468	01-20-18
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-18-18
Michigan	State Program	5	9947	01-31-18
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-28-18
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	12-30-17
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
West Virginia (DW)	State Program	3	9930C	12-31-17
Wyoming	State Program	8	8TMS-L	01-28-19

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

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: FIA Well Seach

TestAmerica Job ID: 320-33369-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-33369-1	117170	Water	11/13/17 15:12	11/16/17 11:00
320-33369-2	117270	Water	11/13/17 15:02	11/16/17 11:00
320-33369-3	119849	Water	11/13/17 16:45	11/16/17 11:00
320-33369-4	174483	Water	11/14/17 13:42	11/16/17 11:00
320-33369-5	367870	Water	11/14/17 14:42	11/16/17 11:00
320-33369-6	367770	Water	11/14/17 14:37	11/16/17 11:00
320-33369-7	483532	Water	11/14/17 15:25	11/16/17 11:00
320-33369-8	173908	Water	11/14/17 16:08	11/16/17 11:00
320-33369-9	175005	Water	11/14/17 10:29	11/16/17 11:00
320-33369-10	173916	Water	11/14/17 11:36	11/16/17 11:00
320-33369-11	153338	Water	11/14/17 13:20	11/16/17 11:00
320-33369-12	120286	Water	11/14/17 14:39	11/16/17 11:00
320-33369-13	510220.1	Water	11/14/17 15:52	11/16/17 11:00
320-33369-14	510320.1	Water	11/14/17 16:02	11/16/17 11:00
320-33369-15	510220.2	Water	11/14/17 16:30	11/16/17 11:00
320-33369-16	174998	Water	11/14/17 10:40	11/16/17 11:00
320-33369-17	120316	Water	11/14/17 11:55	11/16/17 11:00
320-33369-18	117048	Water	11/14/17 12:49	11/16/17 11:00
320-33369-19	176397	Water	11/14/17 16:23	11/16/17 11:00
320-33369-20	483541	Water	11/15/17 16:20	11/16/17 11:00
320-33369-21	174769	Water	11/15/17 13:50	11/16/17 11:00
320-33369-22	120324	Water	11/15/17 11:37	11/16/17 11:00
320-33369-23	117129	Water	11/15/17 14:37	11/16/17 11:00
320-33369-24	120057	Water	11/15/17 15:58	11/16/17 11:00
320-33369-25	176222	Water	11/15/17 13:00	11/16/17 11:00

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

CHAIN-OF-CUSTODY RECORD

Laboratory Test America
Attn: David Alltucker

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

Analysis Parameters/Sample Container Description

320-33369 Chain of Custody

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFAS x6						# of containers	Remarks/Matrix
117170		1512	11/13/2017		X	X						2	Groundwater
117270		1502	↓		X	X						2	↓
119849		1645	↓		X	X						2	↓
174483		1342	11/14/17		X	X						2	↓
367870		1442	↓		X	X						2	↓
367770		1437	↓		X	X						2	↓
483532		1525	↓		X	X						2	↓
173908		1606	↓		X	X						2	↓
175005		1029	↓		X	X						2	↓
173916		1136	↓		X	X						2	↓

Project Information		Sample Receipt	
Project Number:	31-1-20060-001	Total Number of Containers	50
Project Name:	FIA Well Search	COC Seals/Intact? Y/N/NA	—
Contact:	MDN	Received Good Cond./Cold	—
Ongoing Project?	Yes ☒ No ☐	Delivery Method:	Goldstreak
Sampler:	CAB, SMH, MDN	(attach shipping bill, if any)	

Instructions	
Requested Turnaround Time:	5-day rush
Special Instructions:	Please bill to: 31-1-20060-001

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 1700	Signature: Time:	Signature: Time:
Printed Name: Date: 11/15/17 Mary Nadel	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 11:00	Signature: Time:	Signature: Time:
Printed Name: Date: 11-16-17 Michael	Printed Name: Date:	Printed Name: Date:
Company: TAWS	Company:	Company:

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

F-19-91/UR

4.7 C

No. 34779

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

CHAIN-OF-CUSTODY RECORD

Laboratory Test America
Attn: David Alltucker

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2043 Westport Center Drive
St. Louis, MO 63146-3564
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2705 Saint Andrews Loop, Suite A
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(509) 946-6309

2355 Hill Road
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(907) 479-0600

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFAS x6 (AWS-LC-0015)						Total Number of Containers	Remarks/Matrix
153338		1320	11/14/17		X	X						2	Groundwater
120278		1439			X	X						2	
510220.1		1552			X	X						2	
510320.1		1602			X	X						2	
510220.2		1630			X	X						2	
174998		1040			X	X						2	
120316		1155			X	X						2	
117048		1249			X	X						2	
176397		1623			X	X						2	
483541		1620	11/15/17		X	X						2	

Project Information	Sample Receipt
Project Number: Please	Total Number of Containers
Project Name:	COC Seals/Intact? Y/N/NA
Contact:	Received Good Cond./Cold
Ongoing Project? Yes ☐ No ☐	Delivery Method: See
Sampler: Page	(attach shipping bill, if any)

Instructions

Requested Turnaround Time:

Special Instructions:

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Marcy Nadel Time: 1700	Signature: Time:	Signature: Time:
Printed Name: Marcy Nadel Date: 11/15/17	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson	Company:	Company:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: Michael Brown Time: 11:00	Signature: Time:	Signature: Time:
Printed Name: Michael Brown Date: 11-16-17	Printed Name: Date:	Printed Name: Date:
Company: JAWS	Company:	Company:

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

F-19-91/UR

4.7c

No. 34778

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

CHAIN-OF-CUSTODY RECORD

Laboratory Test America
Attn: David Alltucker

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	x6 VOCs RFAS (WS-LC-0025)						Total Number of Containers	Remarks/Matrix
174769		1350	11/15/17		X	X						2	groundwate
120324		1137			X	X							
117129		1437			X	X							
120073		1558			X	X							
176222		1300			X	X							

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

Instructions
Requested Turnaround Time:
Special Instructions:

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: AM Madel Time: 1700	Signature: Time:	Signature: Time:
Printed Name: Mary Nadel Date: 11/15/17	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson	Company:	Company:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: Michael Brown Time: 11:00	Signature: Time:	Signature: Time:
Printed Name: Michael Brown Date: 11-16-17	Printed Name: Date:	Printed Name: Date:
Company: TAWS	Company:	Company:

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

F-19-91/UR

4.7 c

No. 34786

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-33369-1

Login Number: 33369
List Number: 1
Creator: Nelson, Kym D

List Source: 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	
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	AWB 027-6008 8836
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:

Marcy Nadel

Title:

Geologist

Date:

November 27, 2017

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

November 27, 2017

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-33369-1 REV01

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

1. Laboratory

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

   ○ Yes ◉ No Comments:

ADEC has not approved an analytical laboratory for analysis of PFASs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

   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 Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

   ◉ Yes ○ No Comments:

   b. Correct Analyses requested?

   ◉ Yes ○ No Comments:

3. Laboratory Sample Receipt Documentation

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

   ◉ Yes ○ No Comments:

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

   ◉ Yes ○ No Comments:

Analysis of PFASs does not require a preservative other than temperature control.

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

   ◉ Yes ○ No 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 Comments:

There were no discrepancies identified in the sample receipt documentation.

e. Data quality or usability affected?

Comments:

The data quality and usability were unaffected; see above.

4. Case Narrative

a. Present and understandable?

◉ Yes ○ No Comments:

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

◉ Yes ○ No Comments:

The case narrative notes the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 4.7º C.

The case narrative notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) associated with preparation batches 320-195299 and 195308.

The case narrative notes that most of the project samples included in this work order contained sediment and were filtered prior to analysis.

c. Were all corrective actions documented?

◉ Yes ○ No Comments:

A laboratory control sample (LCS) and a LCS duplicate (LCSD) were extracted with each preparation and analysis batch to demonstrate analytical method accuracy and precision.

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

Comments:

The case narrative does not specify an effect on data quality or usability.

5. Samples Results

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

◉ Yes ○ No Comments:

b. All applicable holding times met?

(●) Yes ( ) No Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

( ) Yes (●) No Comments:

N/A; 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 Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

( ) Yes (●) No Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

(●) Yes ( ) No Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

(●) Yes ( ) No Comments:

iii. If above LOQ, what samples are affected?

Comments:

None; PFAS compounds were not detected in method blank samples batches 320-195299 and 195308.

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

( ) Yes (●) No Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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 Comments:

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

○ Yes ◉ No 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

◉ Yes ○ No Comments:

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

◉ Yes ○ No Comments:

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

Comments:

N/A; 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 Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

(•) Yes ( ) No Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a 13C-isotope of each target analyte and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

(•) Yes ( ) No Comments:

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

( ) Yes (•) No Comments:

Qualification of the results was not required; IDA recoveries were within acceptance criteria.

iv. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

( ) Yes (•) No Comments:

PFASs are not volatile compounds; 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 Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

○ Yes ◉ No Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not submitted with this work order.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

◉ Yes ○ No Comments:

Three field-duplicate pairs were submitted with the analytical samples included in this work order. Field-duplicate samples are submitted with the appropriate frequency for the overall project.

ii. Submitted blind to lab?

◉ Yes ○ No Comments:

Field-duplicate pairs 117170 / 117270, 367770 / 367870, and 510220.1 / 510320.1 were submitted with this work order.

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

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

Where R_1 = Sample Concentration
R_2 = Field Duplicate Concentration

◉ Yes ○ No Comments:

Yes, the field-duplicates RPD are within the DQOs, where calculable for detected analytes.

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

Comments:

The data quality and usability were not affected.

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

○ Yes ○ No ◉ Not Applicable

Samples for this project are not collected with reusable equipment, therefore a practical potential for equipment based cross-contamination does not exist.

i. All results less than LOQ?

○ Yes ◉ No Comments:

N/A; an equipment blank was not submitted.

ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

a. Defined and appropriate?

○ Yes ◉ No Comments:

No other data flags and/or qualifiers were required.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 320-33497-1
Client Project/Site: FAI

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

Attn: Marcy Nadel

Authorized for release by:
11/30/2017 11:46:24 AM

David Alltucker, Project Manager I
(916)374-4383
david.alltucker@testamericainc.com

Table of Contents

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
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Job ID: 320-33497-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-33497-1

Receipt
The samples were received on 11/21/2017 11:12 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.5º C.

LCMS
Method(s) WS-LC-0025 At1: The following samples were diluted to bring the concentration of Perfluorohexanesulfonic acid (PFHxS) and Perfluorooctanesulfonic acid (PFOS) within the calibration range: 176265 (320-33497-10) and 176044.1 (320-33497-13). Elevated reporting limits (RLs) are provided.

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

Organic Prep
Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-196237, method code PFAS_DI_Prep.

Method(s) PFAS Prep: The following samples: 550116 (320-33497-1), 550132 (320-33497-2), 550232 (320-33497-3), 150843 (320-33497-4), 173975 (320-33497-5), 120189 (320-33497-6) and 176435 (320-33497-8) contain sediment.

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-196239, method code PFAS_DI_Prep.

Method(s) PFAS Prep: The following samples 521809 (320-33497-9), 176265 (320-33497-10), 176044 (320-33497-12), 176044.1 (320-33497-13), 151530 (320-33497-14), 173860 (320-33497-15), 367788 (320-33497-16), 176095 (320-33497-17), 173363 (320-33497-18) and 569712 (320-33497-20) contain sediment.

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: FAI

TestAmerica Job ID: 320-33497-1

Client Sample ID: 550116 — Lab Sample ID: 320-33497-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	8.2		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	33		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	4.5		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	4.7		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	12		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 550132 — Lab Sample ID: 320-33497-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	2.4		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	12		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	2.7		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	8.5		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 550232 — Lab Sample ID: 320-33497-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	2.4		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	11		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	2.7		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	8.7		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 150843 — Lab Sample ID: 320-33497-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	5.8		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	18		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	3.1		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	2.9		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	68		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 173975 — Lab Sample ID: 320-33497-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	2.0		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: 173975 (Continued) — Lab Sample ID: 320-33497-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanesulfonic acid (PFOS)	2.0		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 120189 — Lab Sample ID: 320-33497-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	14		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	68		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	9.2		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	12		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	1.2	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	450		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: 550124 — Lab Sample ID: 320-33497-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	4.8		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	28		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	15		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	17		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	16		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	50		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 176435 — Lab Sample ID: 320-33497-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	9.8		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	41		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.6		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	3.5		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	7.3		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 521809 — Lab Sample ID: 320-33497-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	4.2		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: 521809 (Continued) — Lab Sample ID: 320-33497-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	27		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	9.9		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	17		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	23		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 176265 — Lab Sample ID: 320-33497-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	36		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	110		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	100		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS) - DL	290		20	8.7	ng/L	10		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	500		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: 153648 — Lab Sample ID: 320-33497-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	45		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	42		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	15		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	15		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	51		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	1.2	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 176044 — Lab Sample ID: 320-33497-12

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	2.9		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	20		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	8.9		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	10		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	25		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 176044.1 — Lab Sample ID: 320-33497-13

This Detection Summary does not include radiochemical test results.

Client Sample ID: 176044.1 (Continued) — Lab Sample ID: 320-33497-13

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	45		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	120		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	110		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS) - DL	360		20	8.7	ng/L	10		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	490		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: 151530 — Lab Sample ID: 320-33497-14

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	7.7		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	21		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	4.2		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	6.3		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	63		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	0.70	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 173860 — Lab Sample ID: 320-33497-15

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	41		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	31		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	4.7		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	2.7		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	6.2		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 367788 — Lab Sample ID: 320-33497-16

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	2.3		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	11		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.3		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	3.7		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	66		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-33497-1

Client Sample ID: 176095 — Lab Sample ID: 320-33497-17

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.2	J	2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	5.7		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.8	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	3.6		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	3.5		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 173363 — Lab Sample ID: 320-33497-18

No Detections.

Client Sample ID: 117188 — Lab Sample ID: 320-33497-19

No Detections.

Client Sample ID: 569712 — Lab Sample ID: 320-33497-20

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	39		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	130		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	11		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	5.8		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	6.0		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	1.3	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-33497-1

Client Sample ID: 550116
Date Collected: 11/16/17 15:26
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-1
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	8.2		2.0	0.92	ng/L		11/22/17 10:03	11/25/17 03:22	1
Perfluorohexanesulfonic acid (PFHxS)	33		2.0	0.87	ng/L		11/22/17 10:03	11/25/17 03:22	1
Perfluoroheptanoic acid (PFHpA)	4.5		2.0	0.80	ng/L		11/22/17 10:03	11/25/17 03:22	1
Perfluorooctanoic acid (PFOA)	4.7		2.0	0.75	ng/L		11/22/17 10:03	11/25/17 03:22	1
Perfluorooctanesulfonic acid (PFOS)	12		2.0	1.3	ng/L		11/22/17 10:03	11/25/17 03:22	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/22/17 10:03	11/25/17 03:22	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*105*		*25 - 150*	*11/22/17 10:03*	*11/25/17 03:22*	*1*
13C4-PFHpA	*107*		*25 - 150*	*11/22/17 10:03*	*11/25/17 03:22*	*1*
13C4 PFOA	*111*		*25 - 150*	*11/22/17 10:03*	*11/25/17 03:22*	*1*
13C4 PFOS	*103*		*25 - 150*	*11/22/17 10:03*	*11/25/17 03:22*	*1*
13C5 PFNA	*110*		*25 - 150*	*11/22/17 10:03*	*11/25/17 03:22*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-33497-1

Client Sample ID: 550132
Date Collected: 11/16/17 14:31
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-2
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**2.4**		2.0	0.92	ng/L		11/22/17 10:03	11/25/17 03:59	1
Perfluorohexanesulfonic acid (PFHxS)	**12**		2.0	0.87	ng/L		11/22/17 10:03	11/25/17 03:59	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/22/17 10:03	11/25/17 03:59	1
Perfluorooctanoic acid (PFOA)	**2.7**		2.0	0.75	ng/L		11/22/17 10:03	11/25/17 03:59	1
Perfluorooctanesulfonic acid (PFOS)	**8.5**		2.0	1.3	ng/L		11/22/17 10:03	11/25/17 03:59	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/22/17 10:03	11/25/17 03:59	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*101*		*25 - 150*	*11/22/17 10:03*	*11/25/17 03:59*	*1*
13C4-PFHpA	*103*		*25 - 150*	*11/22/17 10:03*	*11/25/17 03:59*	*1*
13C4 PFOA	*101*		*25 - 150*	*11/22/17 10:03*	*11/25/17 03:59*	*1*
13C4 PFOS	*100*		*25 - 150*	*11/22/17 10:03*	*11/25/17 03:59*	*1*
13C5 PFNA	*104*		*25 - 150*	*11/22/17 10:03*	*11/25/17 03:59*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-33497-1

Client Sample ID: 550232
Date Collected: 11/16/17 14:21
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-3
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**2.4**		2.0	0.92	ng/L		11/22/17 10:03	11/25/17 04:17	1
Perfluorohexanesulfonic acid (PFHxS)	**11**		2.0	0.87	ng/L		11/22/17 10:03	11/25/17 04:17	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/22/17 10:03	11/25/17 04:17	1
Perfluorooctanoic acid (PFOA)	**2.7**		2.0	0.75	ng/L		11/22/17 10:03	11/25/17 04:17	1
Perfluorooctanesulfonic acid (PFOS)	**8.7**		2.0	1.3	ng/L		11/22/17 10:03	11/25/17 04:17	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/22/17 10:03	11/25/17 04:17	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*99*		*25 - 150*	*11/22/17 10:03*	*11/25/17 04:17*	*1*
13C4-PFHpA	*100*		*25 - 150*	*11/22/17 10:03*	*11/25/17 04:17*	*1*
13C4 PFOA	*101*		*25 - 150*	*11/22/17 10:03*	*11/25/17 04:17*	*1*
13C4 PFOS	*98*		*25 - 150*	*11/22/17 10:03*	*11/25/17 04:17*	*1*
13C5 PFNA	*102*		*25 - 150*	*11/22/17 10:03*	*11/25/17 04:17*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-33497-1

Client Sample ID: 150843
Date Collected: 11/16/17 16:41
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-4
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**5.8**		2.0	0.92	ng/L		11/22/17 10:03	11/25/17 04:36	1
Perfluorohexanesulfonic acid (PFHxS)	**18**		2.0	0.87	ng/L		11/22/17 10:03	11/25/17 04:36	1
Perfluoroheptanoic acid (PFHpA)	**3.1**		2.0	0.80	ng/L		11/22/17 10:03	11/25/17 04:36	1
Perfluorooctanoic acid (PFOA)	**2.9**		2.0	0.75	ng/L		11/22/17 10:03	11/25/17 04:36	1
Perfluorooctanesulfonic acid (PFOS)	**68**		2.0	1.3	ng/L		11/22/17 10:03	11/25/17 04:36	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/22/17 10:03	11/25/17 04:36	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*97*		*25 - 150*	*11/22/17 10:03*	*11/25/17 04:36*	*1*
13C4-PFHpA	*101*		*25 - 150*	*11/22/17 10:03*	*11/25/17 04:36*	*1*
13C4 PFOA	*102*		*25 - 150*	*11/22/17 10:03*	*11/25/17 04:36*	*1*
13C4 PFOS	*94*		*25 - 150*	*11/22/17 10:03*	*11/25/17 04:36*	*1*
13C5 PFNA	*103*		*25 - 150*	*11/22/17 10:03*	*11/25/17 04:36*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-33497-1

Client Sample ID: 173975
Date Collected: 11/16/17 14:31
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-5
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/22/17 10:03	11/25/17 04:54	1
Perfluorohexanesulfonic acid (PFHxS)	**2.0**		2.0	0.87	ng/L		11/22/17 10:03	11/25/17 04:54	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/22/17 10:03	11/25/17 04:54	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/22/17 10:03	11/25/17 04:54	1
Perfluorooctanesulfonic acid (PFOS)	**2.0**		2.0	1.3	ng/L		11/22/17 10:03	11/25/17 04:54	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/22/17 10:03	11/25/17 04:54	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*98*		*25 - 150*	*11/22/17 10:03*	*11/25/17 04:54*	*1*
13C4-PFHpA	*99*		*25 - 150*	*11/22/17 10:03*	*11/25/17 04:54*	*1*
13C4 PFOA	*101*		*25 - 150*	*11/22/17 10:03*	*11/25/17 04:54*	*1*
13C4 PFOS	*98*		*25 - 150*	*11/22/17 10:03*	*11/25/17 04:54*	*1*
13C5 PFNA	*102*		*25 - 150*	*11/22/17 10:03*	*11/25/17 04:54*	*1*

Client Sample ID: 120189
Date Collected: 11/17/17 10:30
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-6
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	14		2.0	0.92	ng/L		11/22/17 10:03	11/25/17 05:12	1
Perfluorohexanesulfonic acid (PFHxS)	68		2.0	0.87	ng/L		11/22/17 10:03	11/25/17 05:12	1
Perfluoroheptanoic acid (PFHpA)	9.2		2.0	0.80	ng/L		11/22/17 10:03	11/25/17 05:12	1
Perfluorooctanoic acid (PFOA)	12		2.0	0.75	ng/L		11/22/17 10:03	11/25/17 05:12	1
Perfluorononanoic acid (PFNA)	1.2	J	2.0	0.65	ng/L		11/22/17 10:03	11/25/17 05:12	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*100*		*25 - 150*	*11/22/17 10:03*	*11/25/17 05:12*	*1*
13C4-PFHpA	*102*		*25 - 150*	*11/22/17 10:03*	*11/25/17 05:12*	*1*
13C4 PFOA	*103*		*25 - 150*	*11/22/17 10:03*	*11/25/17 05:12*	*1*
13C5 PFNA	*100*		*25 - 150*	*11/22/17 10:03*	*11/25/17 05:12*	*1*

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	450		20	13	ng/L		11/22/17 10:03	11/28/17 13:51	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*103*		*25 - 150*	*11/22/17 10:03*	*11/28/17 13:51*	*10*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-33497-1

Client Sample ID: 550124
Date Collected: 11/17/17 12:00
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-7
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	4.8		2.0	0.92	ng/L		11/22/17 10:03	11/25/17 05:31	1
Perfluorohexanesulfonic acid (PFHxS)	28		2.0	0.87	ng/L		11/22/17 10:03	11/25/17 05:31	1
Perfluoroheptanoic acid (PFHpA)	15		2.0	0.80	ng/L		11/22/17 10:03	11/25/17 05:31	1
Perfluorooctanoic acid (PFOA)	17		2.0	0.75	ng/L		11/22/17 10:03	11/25/17 05:31	1
Perfluorooctanesulfonic acid (PFOS)	16		2.0	1.3	ng/L		11/22/17 10:03	11/25/17 05:31	1
Perfluorononanoic acid (PFNA)	50		2.0	0.65	ng/L		11/22/17 10:03	11/25/17 05:31	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*107*		*25 - 150*	*11/22/17 10:03*	*11/25/17 05:31*	*1*
13C4-PFHpA	*110*		*25 - 150*	*11/22/17 10:03*	*11/25/17 05:31*	*1*
13C4 PFOA	*111*		*25 - 150*	*11/22/17 10:03*	*11/25/17 05:31*	*1*
13C4 PFOS	*107*		*25 - 150*	*11/22/17 10:03*	*11/25/17 05:31*	*1*
13C5 PFNA	*114*		*25 - 150*	*11/22/17 10:03*	*11/25/17 05:31*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-33497-1

Client Sample ID: 176435
Date Collected: 11/17/17 13:55
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-8
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**9.8**		2.0	0.92	ng/L		11/22/17 10:03	11/25/17 05:49	1
Perfluorohexanesulfonic acid (PFHxS)	**41**		2.0	0.87	ng/L		11/22/17 10:03	11/25/17 05:49	1
Perfluoroheptanoic acid (PFHpA)	**2.6**		2.0	0.80	ng/L		11/22/17 10:03	11/25/17 05:49	1
Perfluorooctanoic acid (PFOA)	**3.5**		2.0	0.75	ng/L		11/22/17 10:03	11/25/17 05:49	1
Perfluorooctanesulfonic acid (PFOS)	**7.3**		2.0	1.3	ng/L		11/22/17 10:03	11/25/17 05:49	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/22/17 10:03	11/25/17 05:49	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*103*		*25 - 150*	*11/22/17 10:03*	*11/25/17 05:49*	*1*
13C4-PFHpA	*107*		*25 - 150*	*11/22/17 10:03*	*11/25/17 05:49*	*1*
13C4 PFOA	*106*		*25 - 150*	*11/22/17 10:03*	*11/25/17 05:49*	*1*
13C4 PFOS	*102*		*25 - 150*	*11/22/17 10:03*	*11/25/17 05:49*	*1*
13C5 PFNA	*107*		*25 - 150*	*11/22/17 10:03*	*11/25/17 05:49*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-33497-1

Client Sample ID: 521809
Date Collected: 11/17/17 15:30
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-9
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	4.2		2.0	0.92	ng/L		11/22/17 10:10	11/23/17 05:42	1
Perfluorohexanesulfonic acid (PFHxS)	27		2.0	0.87	ng/L		11/22/17 10:10	11/23/17 05:42	1
Perfluoroheptanoic acid (PFHpA)	9.9		2.0	0.80	ng/L		11/22/17 10:10	11/23/17 05:42	1
Perfluorooctanoic acid (PFOA)	17		2.0	0.75	ng/L		11/22/17 10:10	11/23/17 05:42	1
Perfluorooctanesulfonic acid (PFOS)	23		2.0	1.3	ng/L		11/22/17 10:10	11/23/17 05:42	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/22/17 10:10	11/23/17 05:42	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*105*		*25 - 150*	*11/22/17 10:10*	*11/23/17 05:42*	*1*
13C4-PFHpA	*109*		*25 - 150*	*11/22/17 10:10*	*11/23/17 05:42*	*1*
13C4 PFOA	*110*		*25 - 150*	*11/22/17 10:10*	*11/23/17 05:42*	*1*
13C4 PFOS	*105*		*25 - 150*	*11/22/17 10:10*	*11/23/17 05:42*	*1*
13C5 PFNA	*110*		*25 - 150*	*11/22/17 10:10*	*11/23/17 05:42*	*1*

Client Sample ID: 176265
Date Collected: 11/17/17 16:00
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-10
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**36**		2.0	0.92	ng/L		11/22/17 10:10	11/23/17 06:01	1
Perfluoroheptanoic acid (PFHpA)	**110**		2.0	0.80	ng/L		11/22/17 10:10	11/23/17 06:01	1
Perfluorooctanoic acid (PFOA)	**100**		2.0	0.75	ng/L		11/22/17 10:10	11/23/17 06:01	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/22/17 10:10	11/23/17 06:01	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*100*		*25 - 150*	*11/22/17 10:10*	*11/23/17 06:01*	*1*
13C4-PFHpA	*100*		*25 - 150*	*11/22/17 10:10*	*11/23/17 06:01*	*1*
13C4 PFOA	*100*		*25 - 150*	*11/22/17 10:10*	*11/23/17 06:01*	*1*
13C4 PFOS	*99*		*25 - 150*	*11/22/17 10:10*	*11/23/17 06:01*	*1*
13C5 PFNA	*102*		*25 - 150*	*11/22/17 10:10*	*11/23/17 06:01*	*1*

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanesulfonic acid (PFHxS)	**290**		20	8.7	ng/L		11/22/17 10:10	11/24/17 23:42	10
Perfluorooctanesulfonic acid (PFOS)	**500**		20	13	ng/L		11/22/17 10:10	11/24/17 23:42	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*103*		*25 - 150*	*11/22/17 10:10*	*11/24/17 23:42*	*10*
13C4 PFOS	*100*		*25 - 150*	*11/22/17 10:10*	*11/24/17 23:42*	*10*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-33497-1

Client Sample ID: 153648
Date Collected: 11/18/17 14:30
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-11
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	45		2.0	0.92	ng/L		11/22/17 10:10	11/23/17 06:38	1
Perfluorohexanesulfonic acid (PFHxS)	42		2.0	0.87	ng/L		11/22/17 10:10	11/23/17 06:38	1
Perfluoroheptanoic acid (PFHpA)	15		2.0	0.80	ng/L		11/22/17 10:10	11/23/17 06:38	1
Perfluorooctanoic acid (PFOA)	15		2.0	0.75	ng/L		11/22/17 10:10	11/23/17 06:38	1
Perfluorooctanesulfonic acid (PFOS)	51		2.0	1.3	ng/L		11/22/17 10:10	11/23/17 06:38	1
Perfluorononanoic acid (PFNA)	1.2	J	2.0	0.65	ng/L		11/22/17 10:10	11/23/17 06:38	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*102*		*25 - 150*	*11/22/17 10:10*	*11/23/17 06:38*	*1*
13C4-PFHpA	*102*		*25 - 150*	*11/22/17 10:10*	*11/23/17 06:38*	*1*
13C4 PFOA	*102*		*25 - 150*	*11/22/17 10:10*	*11/23/17 06:38*	*1*
13C4 PFOS	*99*		*25 - 150*	*11/22/17 10:10*	*11/23/17 06:38*	*1*
13C5 PFNA	*102*		*25 - 150*	*11/22/17 10:10*	*11/23/17 06:38*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-33497-1

Client Sample ID: 176044
Date Collected: 11/18/17 15:32
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-12
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**2.9**		2.0	0.92	ng/L		11/22/17 10:10	11/23/17 06:56	1
Perfluorohexanesulfonic acid (PFHxS)	**20**		2.0	0.87	ng/L		11/22/17 10:10	11/23/17 06:56	1
Perfluoroheptanoic acid (PFHpA)	**8.9**		2.0	0.80	ng/L		11/22/17 10:10	11/23/17 06:56	1
Perfluorooctanoic acid (PFOA)	**10**		2.0	0.75	ng/L		11/22/17 10:10	11/23/17 06:56	1
Perfluorooctanesulfonic acid (PFOS)	**25**		2.0	1.3	ng/L		11/22/17 10:10	11/23/17 06:56	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/22/17 10:10	11/23/17 06:56	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*101*		*25 - 150*	*11/22/17 10:10*	*11/23/17 06:56*	*1*
13C4-PFHpA	*103*		*25 - 150*	*11/22/17 10:10*	*11/23/17 06:56*	*1*
13C4 PFOA	*102*		*25 - 150*	*11/22/17 10:10*	*11/23/17 06:56*	*1*
13C4 PFOS	*98*		*25 - 150*	*11/22/17 10:10*	*11/23/17 06:56*	*1*
13C5 PFNA	*104*		*25 - 150*	*11/22/17 10:10*	*11/23/17 06:56*	*1*

Client Sample ID: 176044.1
Date Collected: 11/18/17 16:00
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-13
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	45		2.0	0.92	ng/L		11/22/17 10:10	11/23/17 07:14	1
Perfluoroheptanoic acid (PFHpA)	120		2.0	0.80	ng/L		11/22/17 10:10	11/23/17 07:14	1
Perfluorooctanoic acid (PFOA)	110		2.0	0.75	ng/L		11/22/17 10:10	11/23/17 07:14	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/22/17 10:10	11/23/17 07:14	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*99*		*25 - 150*	*11/22/17 10:10*	*11/23/17 07:14*	*1*
13C4-PFHpA	*102*		*25 - 150*	*11/22/17 10:10*	*11/23/17 07:14*	*1*
13C4 PFOA	*104*		*25 - 150*	*11/22/17 10:10*	*11/23/17 07:14*	*1*
13C4 PFOS	*97*		*25 - 150*	*11/22/17 10:10*	*11/23/17 07:14*	*1*
13C5 PFNA	*101*		*25 - 150*	*11/22/17 10:10*	*11/23/17 07:14*	*1*

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanesulfonic acid (PFHxS)	360		20	8.7	ng/L		11/22/17 10:10	11/25/17 00:00	10
Perfluorooctanesulfonic acid (PFOS)	490		20	13	ng/L		11/22/17 10:10	11/25/17 00:00	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*108*		*25 - 150*	*11/22/17 10:10*	*11/25/17 00:00*	*10*
13C4 PFOS	*105*		*25 - 150*	*11/22/17 10:10*	*11/25/17 00:00*	*10*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-33497-1

Client Sample ID: 151530
Date Collected: 11/16/17 09:24
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-14
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	7.7		2.0	0.92	ng/L		11/22/17 10:10	11/23/17 07:33	1
Perfluorohexanesulfonic acid (PFHxS)	21		2.0	0.87	ng/L		11/22/17 10:10	11/23/17 07:33	1
Perfluoroheptanoic acid (PFHpA)	4.2		2.0	0.80	ng/L		11/22/17 10:10	11/23/17 07:33	1
Perfluorooctanoic acid (PFOA)	6.3		2.0	0.75	ng/L		11/22/17 10:10	11/23/17 07:33	1
Perfluorooctanesulfonic acid (PFOS)	63		2.0	1.3	ng/L		11/22/17 10:10	11/23/17 07:33	1
Perfluorononanoic acid (PFNA)	0.70	J	2.0	0.65	ng/L		11/22/17 10:10	11/23/17 07:33	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*107*		*25 - 150*	*11/22/17 10:10*	*11/23/17 07:33*	*1*
13C4-PFHpA	*109*		*25 - 150*	*11/22/17 10:10*	*11/23/17 07:33*	*1*
13C4 PFOA	*111*		*25 - 150*	*11/22/17 10:10*	*11/23/17 07:33*	*1*
13C4 PFOS	*104*		*25 - 150*	*11/22/17 10:10*	*11/23/17 07:33*	*1*
13C5 PFNA	*109*		*25 - 150*	*11/22/17 10:10*	*11/23/17 07:33*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-33497-1

Client Sample ID: 173860
Date Collected: 11/16/17 13:36
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-15
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**41**		2.0	0.92	ng/L		11/22/17 10:10	11/23/17 07:51	1
Perfluorohexanesulfonic acid (PFHxS)	**31**		2.0	0.87	ng/L		11/22/17 10:10	11/23/17 07:51	1
Perfluoroheptanoic acid (PFHpA)	**4.7**		2.0	0.80	ng/L		11/22/17 10:10	11/23/17 07:51	1
Perfluorooctanoic acid (PFOA)	**2.7**		2.0	0.75	ng/L		11/22/17 10:10	11/23/17 07:51	1
Perfluorooctanesulfonic acid (PFOS)	**6.2**		2.0	1.3	ng/L		11/22/17 10:10	11/23/17 07:51	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/22/17 10:10	11/23/17 07:51	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*108*		*25 - 150*	*11/22/17 10:10*	*11/23/17 07:51*	*1*
13C4-PFHpA	*110*		*25 - 150*	*11/22/17 10:10*	*11/23/17 07:51*	*1*
13C4 PFOA	*111*		*25 - 150*	*11/22/17 10:10*	*11/23/17 07:51*	*1*
13C4 PFOS	*106*		*25 - 150*	*11/22/17 10:10*	*11/23/17 07:51*	*1*
13C5 PFNA	*111*		*25 - 150*	*11/22/17 10:10*	*11/23/17 07:51*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-33497-1

Client Sample ID: 367788
Date Collected: 11/16/17 16:46
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-16
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	2.3		2.0	0.92	ng/L		11/22/17 10:10	11/23/17 08:09	1
Perfluorohexanesulfonic acid (PFHxS)	11		2.0	0.87	ng/L		11/22/17 10:10	11/23/17 08:09	1
Perfluoroheptanoic acid (PFHpA)	2.3		2.0	0.80	ng/L		11/22/17 10:10	11/23/17 08:09	1
Perfluorooctanoic acid (PFOA)	3.7		2.0	0.75	ng/L		11/22/17 10:10	11/23/17 08:09	1
Perfluorooctanesulfonic acid (PFOS)	66		2.0	1.3	ng/L		11/22/17 10:10	11/23/17 08:09	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/22/17 10:10	11/23/17 08:09	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*108*		*25 - 150*	*11/22/17 10:10*	*11/23/17 08:09*	*1*
13C4-PFHpA	*110*		*25 - 150*	*11/22/17 10:10*	*11/23/17 08:09*	*1*
13C4 PFOA	*110*		*25 - 150*	*11/22/17 10:10*	*11/23/17 08:09*	*1*
13C4 PFOS	*107*		*25 - 150*	*11/22/17 10:10*	*11/23/17 08:09*	*1*
13C5 PFNA	*109*		*25 - 150*	*11/22/17 10:10*	*11/23/17 08:09*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-33497-1

Client Sample ID: 176095
Date Collected: 11/17/17 11:15
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-17
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	1.2	J	2.0	0.92	ng/L		11/22/17 10:10	11/23/17 08:28	1
Perfluorohexanesulfonic acid (PFHxS)	5.7		2.0	0.87	ng/L		11/22/17 10:10	11/23/17 08:28	1
Perfluoroheptanoic acid (PFHpA)	1.8	J	2.0	0.80	ng/L		11/22/17 10:10	11/23/17 08:28	1
Perfluorooctanoic acid (PFOA)	3.6		2.0	0.75	ng/L		11/22/17 10:10	11/23/17 08:28	1
Perfluorooctanesulfonic acid (PFOS)	3.5		2.0	1.3	ng/L		11/22/17 10:10	11/23/17 08:28	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/22/17 10:10	11/23/17 08:28	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*102*		*25 - 150*	*11/22/17 10:10*	*11/23/17 08:28*	*1*
13C4-PFHpA	*105*		*25 - 150*	*11/22/17 10:10*	*11/23/17 08:28*	*1*
13C4 PFOA	*106*		*25 - 150*	*11/22/17 10:10*	*11/23/17 08:28*	*1*
13C4 PFOS	*99*		*25 - 150*	*11/22/17 10:10*	*11/23/17 08:28*	*1*
13C5 PFNA	*105*		*25 - 150*	*11/22/17 10:10*	*11/23/17 08:28*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-33497-1

Client Sample ID: 173363
Date Collected: 11/17/17 12:34
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-18
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/22/17 10:10	11/23/17 08:46	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/22/17 10:10	11/23/17 08:46	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/22/17 10:10	11/23/17 08:46	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/22/17 10:10	11/23/17 08:46	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/22/17 10:10	11/23/17 08:46	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/22/17 10:10	11/23/17 08:46	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*102*		*25 - 150*	*11/22/17 10:10*	*11/23/17 08:46*	*1*
13C4-PFHpA	*104*		*25 - 150*	*11/22/17 10:10*	*11/23/17 08:46*	*1*
13C4 PFOA	*103*		*25 - 150*	*11/22/17 10:10*	*11/23/17 08:46*	*1*
13C4 PFOS	*101*		*25 - 150*	*11/22/17 10:10*	*11/23/17 08:46*	*1*
13C5 PFNA	*104*		*25 - 150*	*11/22/17 10:10*	*11/23/17 08:46*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-33497-1

Client Sample ID: 117188
Date Collected: 11/17/17 15:36
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-19
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/22/17 10:10	11/23/17 09:04	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/22/17 10:10	11/23/17 09:04	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/22/17 10:10	11/23/17 09:04	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/22/17 10:10	11/23/17 09:04	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/22/17 10:10	11/23/17 09:04	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/22/17 10:10	11/23/17 09:04	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*100*		*25 - 150*	*11/22/17 10:10*	*11/23/17 09:04*	*1*
13C4-PFHpA	*101*		*25 - 150*	*11/22/17 10:10*	*11/23/17 09:04*	*1*
13C4 PFOA	*101*		*25 - 150*	*11/22/17 10:10*	*11/23/17 09:04*	*1*
13C4 PFOS	*98*		*25 - 150*	*11/22/17 10:10*	*11/23/17 09:04*	*1*
13C5 PFNA	*100*		*25 - 150*	*11/22/17 10:10*	*11/23/17 09:04*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-33497-1

Client Sample ID: 569712
Date Collected: 11/17/17 16:11
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-20
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	39		2.0	0.92	ng/L		11/22/17 10:10	11/23/17 09:23	1
Perfluorohexanesulfonic acid (PFHxS)	130		2.0	0.87	ng/L		11/22/17 10:10	11/23/17 09:23	1
Perfluoroheptanoic acid (PFHpA)	11		2.0	0.80	ng/L		11/22/17 10:10	11/23/17 09:23	1
Perfluorooctanoic acid (PFOA)	5.8		2.0	0.75	ng/L		11/22/17 10:10	11/23/17 09:23	1
Perfluorooctanesulfonic acid (PFOS)	6.0		2.0	1.3	ng/L		11/22/17 10:10	11/23/17 09:23	1
Perfluorononanoic acid (PFNA)	1.3	J	2.0	0.65	ng/L		11/22/17 10:10	11/23/17 09:23	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*103*		*25 - 150*	*11/22/17 10:10*	*11/23/17 09:23*	*1*
13C4-PFHpA	*101*		*25 - 150*	*11/22/17 10:10*	*11/23/17 09:23*	*1*
13C4 PFOA	*103*		*25 - 150*	*11/22/17 10:10*	*11/23/17 09:23*	*1*
13C4 PFOS	*102*		*25 - 150*	*11/22/17 10:10*	*11/23/17 09:23*	*1*
13C5 PFNA	*101*		*25 - 150*	*11/22/17 10:10*	*11/23/17 09:23*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-33497-1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)				
		3O2 PFHx	3C4-PFHp	3C4 PFO/	3C4 PFOS	3C5 PFNA
Lab Sample ID	Client Sample ID	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)
320-33497-1	550116	105	107	111	103	110
320-33497-2	550132	101	103	101	100	104
320-33497-3	550232	99	100	101	98	102
320-33497-4	150843	97	101	102	94	103
320-33497-5	173975	98	99	101	98	102
320-33497-6	120189	100	102	103		100
320-33497-6 - DL	120189				103	
320-33497-7	550124	107	110	111	107	114
320-33497-8	176435	103	107	106	102	107
320-33497-9	521809	105	109	110	105	110
320-33497-10	176265	100	100	100	99	102
320-33497-10 - DL	176265	103			100	
320-33497-11	153648	102	102	102	99	102
320-33497-12	176044	101	103	102	98	104
320-33497-13	176044.1	99	102	104	97	101
320-33497-13 - DL	176044.1	108			105	
320-33497-14	151530	107	109	111	104	109
320-33497-15	173860	108	110	111	106	111
320-33497-16	367788	108	110	110	107	109
320-33497-17	176095	102	105	106	99	105
320-33497-18	173363	102	104	103	101	104
320-33497-19	117188	100	101	101	98	100
320-33497-20	569712	103	101	103	102	101
LCS 320-196237/2-A	Lab Control Sample	98	102	98	96	98
LCS 320-196239/2-A	Lab Control Sample	99	99	97	97	98
LCSD 320-196237/3-A	Lab Control Sample Dup	97	103	99	98	96
LCSD 320-196239/3-A	Lab Control Sample Dup	108	110	106	107	105
MB 320-196237/1-A	Method Blank	97	101	96	96	98
MB 320-196239/1-A	Method Blank	101	106	101	99	101

Surrogate Legend

18O2 PFHxS = 18O2 PFHxS
13C4-PFHpA = 13C4-PFHpA
13C4 PFOA = 13C4 PFOA
13C4 PFOS = 13C4 PFOS
13C5 PFNA = 13C5 PFNA

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-196237/1-A
Matrix: Water
Analysis Batch: 196609

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 196237

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/22/17 10:03	11/25/17 00:37	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/22/17 10:03	11/25/17 00:37	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/22/17 10:03	11/25/17 00:37	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/22/17 10:03	11/25/17 00:37	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/22/17 10:03	11/25/17 00:37	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/22/17 10:03	11/25/17 00:37	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*97*		*25 - 150*	*11/22/17 10:03*	*11/25/17 00:37*	*1*
13C4-PFHpA	*101*		*25 - 150*	*11/22/17 10:03*	*11/25/17 00:37*	*1*
13C4 PFOA	*96*		*25 - 150*	*11/22/17 10:03*	*11/25/17 00:37*	*1*
13C4 PFOS	*96*		*25 - 150*	*11/22/17 10:03*	*11/25/17 00:37*	*1*
13C5 PFNA	*98*		*25 - 150*	*11/22/17 10:03*	*11/25/17 00:37*	*1*

Lab Sample ID: LCS 320-196237/2-A
Matrix: Water
Analysis Batch: 196609

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 196237

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	17.6		ng/L		100	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	17.5		ng/L		96	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	20.0		ng/L		100	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	19.4		ng/L		97	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	17.4		ng/L		94	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	20.0		ng/L		100	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*98*		*25 - 150*
13C4-PFHpA	*102*		*25 - 150*
13C4 PFOA	*98*		*25 - 150*
13C4 PFOS	*96*		*25 - 150*
13C5 PFNA	*98*		*25 - 150*

Lab Sample ID: LCSD 320-196237/3-A
Matrix: Water
Analysis Batch: 196609

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 196237

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	18.4		ng/L		104	72 - 151	4	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	18.7		ng/L		102	73 - 157	6	30
Perfluoroheptanoic acid (PFHpA)			20.0	20.1		ng/L		101	71 - 138	1	30
Perfluorooctanoic acid (PFOA)			20.0	19.9		ng/L		100	70 - 140	3	30
Perfluorooctanesulfonic acid (PFOS)			18.6	17.5		ng/L		94	69 - 144	1	30
Perfluorononanoic acid (PFNA)			20.0	21.0		ng/L		105	73 - 147	5	30

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	97		25 - 150
13C4-PFHpA	103		25 - 150
13C4 PFOA	99		25 - 150
13C4 PFOS	98		25 - 150
13C5 PFNA	96		25 - 150

Lab Sample ID: MB 320-196239/1-A
Matrix: Water
Analysis Batch: 196432

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 196239

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/22/17 10:10	11/23/17 04:47	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/22/17 10:10	11/23/17 04:47	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/22/17 10:10	11/23/17 04:47	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/22/17 10:10	11/23/17 04:47	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/22/17 10:10	11/23/17 04:47	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/22/17 10:10	11/23/17 04:47	1

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	101		25 - 150	11/22/17 10:10	11/23/17 04:47	1
13C4-PFHpA	106		25 - 150	11/22/17 10:10	11/23/17 04:47	1
13C4 PFOA	101		25 - 150	11/22/17 10:10	11/23/17 04:47	1
13C4 PFOS	99		25 - 150	11/22/17 10:10	11/23/17 04:47	1
13C5 PFNA	101		25 - 150	11/22/17 10:10	11/23/17 04:47	1

Lab Sample ID: LCS 320-196239/2-A
Matrix: Water
Analysis Batch: 196432

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 196239

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	17.9		ng/L		101	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	17.9		ng/L		98	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	20.3		ng/L		101	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	19.3		ng/L		97	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	17.1		ng/L		92	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	19.8		ng/L		99	73 - 147		

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
18O2 PFHxS	99		25 - 150
13C4-PFHpA	99		25 - 150
13C4 PFOA	97		25 - 150
13C4 PFOS	97		25 - 150
13C5 PFNA	98		25 - 150

Lab Sample ID: LCSD 320-196239/3-A
Matrix: Water
Analysis Batch: 196432

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 196239

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	17.0		ng/L		96	72 - 151	5	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	17.0		ng/L		93	73 - 157	5	30

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCSD 320-196239/3-A
Matrix: Water
Analysis Batch: 196432

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 196239

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluoroheptanoic acid (PFHpA)			20.0	19.7		ng/L		99	71 - 138	3	30
Perfluorooctanoic acid (PFOA)			20.0	18.7		ng/L		93	70 - 140	3	30
Perfluorooctanesulfonic acid (PFOS)			18.6	16.9		ng/L		91	69 - 144	1	30
Perfluorononanoic acid (PFNA)			20.0	19.1		ng/L		95	73 - 147	4	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
18O2 PFHxS	*108*		*25 - 150*
13C4-PFHpA	*110*		*25 - 150*
13C4 PFOA	*106*		*25 - 150*
13C4 PFOS	*107*		*25 - 150*
13C5 PFNA	*105*		*25 - 150*

LCMS

Prep Batch: 196237

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33497-1	550116	Total/NA	Water	PFAS Prep	
320-33497-2	550132	Total/NA	Water	PFAS Prep	
320-33497-3	550232	Total/NA	Water	PFAS Prep	
320-33497-4	150843	Total/NA	Water	PFAS Prep	
320-33497-5	173975	Total/NA	Water	PFAS Prep	
320-33497-6	120189	Total/NA	Water	PFAS Prep	
320-33497-6 - DL	120189	Total/NA	Water	PFAS Prep	
320-33497-7	550124	Total/NA	Water	PFAS Prep	
320-33497-8	176435	Total/NA	Water	PFAS Prep	
MB 320-196237/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-196237/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-196237/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Prep Batch: 196239

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33497-9	521809	Total/NA	Water	PFAS Prep	
320-33497-10 - DL	176265	Total/NA	Water	PFAS Prep	
320-33497-10	176265	Total/NA	Water	PFAS Prep	
320-33497-11	153648	Total/NA	Water	PFAS Prep	
320-33497-12	176044	Total/NA	Water	PFAS Prep	
320-33497-13	176044.1	Total/NA	Water	PFAS Prep	
320-33497-13 - DL	176044.1	Total/NA	Water	PFAS Prep	
320-33497-14	151530	Total/NA	Water	PFAS Prep	
320-33497-15	173860	Total/NA	Water	PFAS Prep	
320-33497-16	367788	Total/NA	Water	PFAS Prep	
320-33497-17	176095	Total/NA	Water	PFAS Prep	
320-33497-18	173363	Total/NA	Water	PFAS Prep	
320-33497-19	117188	Total/NA	Water	PFAS Prep	
320-33497-20	569712	Total/NA	Water	PFAS Prep	
MB 320-196239/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-196239/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-196239/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 196432

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33497-9	521809	Total/NA	Water	WS-LC-0025 At1	196239
320-33497-10	176265	Total/NA	Water	WS-LC-0025 At1	196239
320-33497-11	153648	Total/NA	Water	WS-LC-0025 At1	196239
320-33497-12	176044	Total/NA	Water	WS-LC-0025 At1	196239
320-33497-13	176044.1	Total/NA	Water	WS-LC-0025 At1	196239
320-33497-14	151530	Total/NA	Water	WS-LC-0025 At1	196239
320-33497-15	173860	Total/NA	Water	WS-LC-0025 At1	196239
320-33497-16	367788	Total/NA	Water	WS-LC-0025 At1	196239
320-33497-17	176095	Total/NA	Water	WS-LC-0025 At1	196239

LCMS (Continued)

Analysis Batch: 196432 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33497-18	173363	Total/NA	Water	WS-LC-0025 At1	196239
320-33497-19	117188	Total/NA	Water	WS-LC-0025 At1	196239
320-33497-20	569712	Total/NA	Water	WS-LC-0025 At1	196239
MB 320-196239/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	196239
LCS 320-196239/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	196239
LCSD 320-196239/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	196239

Analysis Batch: 196607

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33497-10 - DL	176265	Total/NA	Water	WS-LC-0025 At1	196239
320-33497-13 - DL	176044.1	Total/NA	Water	WS-LC-0025 At1	196239

Analysis Batch: 196609

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33497-1	550116	Total/NA	Water	WS-LC-0025 At1	196237
320-33497-2	550132	Total/NA	Water	WS-LC-0025 At1	196237
320-33497-3	550232	Total/NA	Water	WS-LC-0025 At1	196237
320-33497-4	150843	Total/NA	Water	WS-LC-0025 At1	196237
320-33497-5	173975	Total/NA	Water	WS-LC-0025 At1	196237
320-33497-6	120189	Total/NA	Water	WS-LC-0025 At1	196237
320-33497-7	550124	Total/NA	Water	WS-LC-0025 At1	196237
320-33497-8	176435	Total/NA	Water	WS-LC-0025 At1	196237
MB 320-196237/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	196237
LCS 320-196237/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	196237
LCSD 320-196237/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	196237

Analysis Batch: 196930

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33497-6 - DL	120189	Total/NA	Water	WS-LC-0025 At1	196237

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-33497-1

Client Sample ID: 550116
Date Collected: 11/16/17 15:26
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-1
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	PFAS Prep			1.00 mL	1.66 mL	196237	11/22/17 10:03	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			196609	11/25/17 03:22	CBW	TAL SAC

Client Sample ID: 550132
Date Collected: 11/16/17 14:31
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-2
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	PFAS Prep			1.00 mL	1.66 mL	196237	11/22/17 10:03	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			196609	11/25/17 03:59	CBW	TAL SAC

Client Sample ID: 550232
Date Collected: 11/16/17 14:21
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-3
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	PFAS Prep			1.00 mL	1.66 mL	196237	11/22/17 10:03	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			196609	11/25/17 04:17	CBW	TAL SAC

Client Sample ID: 150843
Date Collected: 11/16/17 16:41
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-4
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	PFAS Prep			1.00 mL	1.66 mL	196237	11/22/17 10:03	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			196609	11/25/17 04:36	CBW	TAL SAC

Client Sample ID: 173975
Date Collected: 11/16/17 14:31
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-5
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	PFAS Prep			1.00 mL	1.66 mL	196237	11/22/17 10:03	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			196609	11/25/17 04:54	CBW	TAL SAC

Client Sample ID: 120189
Date Collected: 11/17/17 10:30
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-6
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	PFAS Prep			1.00 mL	1.66 mL	196237	11/22/17 10:03	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			196609	11/25/17 05:12	CBW	TAL SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-33497-1

Client Sample ID: 120189
Date Collected: 11/17/17 10:30
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-6
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	PFAS Prep	DL		1.00 mL	1.66 mL	196237	11/22/17 10:03	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			196930	11/28/17 13:51	CBW	TAL SAC

Client Sample ID: 550124
Date Collected: 11/17/17 12:00
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-7
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	PFAS Prep			1.00 mL	1.66 mL	196237	11/22/17 10:03	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			196609	11/25/17 05:31	CBW	TAL SAC

Client Sample ID: 176435
Date Collected: 11/17/17 13:55
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-8
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	196237	11/22/17 10:03	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			196609	11/25/17 05:49	CBW	TAL SAC

Client Sample ID: 521809
Date Collected: 11/17/17 15:30
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-9
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	PFAS Prep			1.00 mL	1.66 mL	196239	11/22/17 10:10	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			196432	11/23/17 05:42	AAR	TAL SAC

Client Sample ID: 176265
Date Collected: 11/17/17 16:00
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-10
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	PFAS Prep			1.00 mL	1.66 mL	196239	11/22/17 10:10	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			196432	11/23/17 06:01	AAR	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	196239	11/22/17 10:10	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			196607	11/24/17 23:42	AAR	TAL SAC

Client Sample ID: 153648
Date Collected: 11/18/17 14:30
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-11
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	PFAS Prep			1.00 mL	1.66 mL	196239	11/22/17 10:10	TON	TAL SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-33497-1

Client Sample ID: 153648
Date Collected: 11/18/17 14:30
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-11
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	WS-LC-0025 At1		1			196432	11/23/17 06:38	AAR	TAL SAC

Client Sample ID: 176044
Date Collected: 11/18/17 15:32
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-12
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	PFAS Prep			1.00 mL	1.66 mL	196239	11/22/17 10:10	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			196432	11/23/17 06:56	AAR	TAL SAC

Client Sample ID: 176044.1
Date Collected: 11/18/17 16:00
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-13
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	PFAS Prep			1.00 mL	1.66 mL	196239	11/22/17 10:10	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			196432	11/23/17 07:14	AAR	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	196239	11/22/17 10:10	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			196607	11/25/17 00:00	AAR	TAL SAC

Client Sample ID: 151530
Date Collected: 11/16/17 09:24
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-14
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	PFAS Prep			1.00 mL	1.66 mL	196239	11/22/17 10:10	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			196432	11/23/17 07:33	AAR	TAL SAC

Client Sample ID: 173860
Date Collected: 11/16/17 13:36
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-15
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	PFAS Prep			1.00 mL	1.66 mL	196239	11/22/17 10:10	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			196432	11/23/17 07:51	AAR	TAL SAC

Client Sample ID: 367788
Date Collected: 11/16/17 16:46
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-16
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	PFAS Prep			1.00 mL	1.66 mL	196239	11/22/17 10:10	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			196432	11/23/17 08:09	AAR	TAL SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-33497-1

Client Sample ID: 176095
Date Collected: 11/17/17 11:15
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-17
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	PFAS Prep			1.00 mL	1.66 mL	196239	11/22/17 10:10	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			196432	11/23/17 08:28	AAR	TAL SAC

Client Sample ID: 173363
Date Collected: 11/17/17 12:34
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-18
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	PFAS Prep			1.00 mL	1.66 mL	196239	11/22/17 10:10	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			196432	11/23/17 08:46	AAR	TAL SAC

Client Sample ID: 117188
Date Collected: 11/17/17 15:36
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-19
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	PFAS Prep			1.00 mL	1.66 mL	196239	11/22/17 10:10	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			196432	11/23/17 09:04	AAR	TAL SAC

Client Sample ID: 569712
Date Collected: 11/17/17 16:11
Date Received: 11/21/17 11:12

Lab Sample ID: 320-33497-20
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	PFAS Prep			1.00 mL	1.66 mL	196239	11/22/17 10:10	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			196432	11/23/17 09:23	AAR	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-33497-1

Laboratory: TestAmerica Sacramento

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

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-055	12-18-17
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-18
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-18
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	12-31-17
L-A-B	DoD ELAP		L2468	01-20-18
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-18-18
Michigan	State Program	5	9947	01-31-18
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-28-18
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	12-30-17
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
West Virginia (DW)	State Program	3	9930C	12-31-17
Wyoming	State Program	8	8TMS-L	01-28-19

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-33497-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-33497-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-33497-1	550116	Water	11/16/17 15:26	11/21/17 11:12
320-33497-2	550132	Water	11/16/17 14:31	11/21/17 11:12
320-33497-3	550232	Water	11/16/17 14:21	11/21/17 11:12
320-33497-4	150843	Water	11/16/17 16:41	11/21/17 11:12
320-33497-5	173975	Water	11/16/17 14:31	11/21/17 11:12
320-33497-6	120189	Water	11/17/17 10:30	11/21/17 11:12
320-33497-7	550124	Water	11/17/17 12:00	11/21/17 11:12
320-33497-8	176435	Water	11/17/17 13:55	11/21/17 11:12
320-33497-9	521809	Water	11/17/17 15:30	11/21/17 11:12
320-33497-10	176265	Water	11/17/17 16:00	11/21/17 11:12
320-33497-11	153648	Water	11/18/17 14:30	11/21/17 11:12
320-33497-12	176044	Water	11/18/17 15:32	11/21/17 11:12
320-33497-13	176044.1	Water	11/18/17 16:00	11/21/17 11:12
320-33497-14	151530	Water	11/16/17 09:24	11/21/17 11:12
320-33497-15	173860	Water	11/16/17 13:36	11/21/17 11:12
320-33497-16	367788	Water	11/16/17 16:46	11/21/17 11:12
320-33497-17	176095	Water	11/17/17 11:15	11/21/17 11:12
320-33497-18	173363	Water	11/17/17 12:34	11/21/17 11:12
320-33497-19	117188	Water	11/17/17 15:36	11/21/17 11:12
320-33497-20	569712	Water	11/17/17 16:11	11/21/17 11:12

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5430 Fairbanks Street, Suite 3
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(907) 561-2120

1321 Bannock Street, Suite 200
Denver, CO 80204
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320-33497 Chain of Custody

STODY RECORD

Laboratory Test America
Attn: David Alltucker

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFAS x 6 WS-LC-0025						Total Number of Containers	Remarks/Matrix
550116		1526	11/16/17		x	2						2	GW
550132		1431	11/16/17		x	2						2	
550232		1421	11/16/17		x	2						2	
150843		1641	11/16/17		x	x						2	
173975		1431	11/16/17		x	x						2	
120189		1030	11/17/17		x	2						2	
550124		1200	11/17/17		x	2						2	
176435		1355	11/17/17		x	2						2	
521809		1530	11/17/17		x	2						2	
176265		1600	11/17/17		x	2						2	

Project Information		Sample Receipt	
Project Number:	20060-001	Total Number of Containers	20
Project Name:	PAI	COC Seals/Intact? Y/N/NA	—
Contact:	MDN	Received Good Cond./Cold	—
Ongoing Project?	Yes ☒ No ☐	Delivery Method:	Goldstreak
Sampler:	SMH, CAB, MDN	(attach shipping bill, if any)	

Instructions	
Requested Turnaround Time:	5-day rush
Special Instructions:	Please bill to: 31-1-20060-001

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

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Marcy Nadel Time: 1500	Signature: Time:	Signature: Time:
Printed Name: Marcy Nadel Date: 11/29/17	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 1612	Signature: Time:	Signature: Time:
Printed Name: David Her Date: 11/30/17	Printed Name: Date:	Printed Name: Date:
Company: TA-WS	Company:	Company:

F-19-91/UR

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No. 34788

SHANNON & WILSON, INC.
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(509) 946-6309

CHAIN-OF-CUSTODY RECORD

Laboratory Test America
Attn: David Althacker

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFAS x 6 WS-LC-0025						Total Number of Containers	Remarks/Matrix
153648		1430	11/18/17		X	2						2	Groundwater
176044		1532	11/18/17		X	2						2	
176044.1		1600	11/18/17		X	2						2	
151530		0924	11/~~20~~16/17		X	2						2	
173860		1336	11/16/17		X	2						2	
367788		1646	11/16/17		X	2						2	
176095		1115	11/17/17		X	2						2	
173363		1234	11/17/17		X	2						2	
117188		1536	11/17/17		X	2						2	
569712		1611	11/17/17		X	2						2	

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

Instructions

Requested Turnaround Time:

Special Instructions:

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 1800	Signature: Time:	Signature: Time:
Printed Name: Marcy Nadel Date: 11/29/17	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson, Inc	Company:	Company:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: Time: 11:12	Signature: Time:	Signature: Time:
Printed Name: David Her Date: 11/29/17	Printed Name: Date:	Printed Name: Date:
Company: TALWS	Company:	Company:

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

F-19-91/UR

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No. 34789

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-33497-1
SDG Number:

Login Number: 33497
List Number: 1
Creator: Nelson, Kym D

List Source: 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	
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:

Kristen Freiburger

Title:

Senior Chemist

Date:

November 30, 2017

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

November 30, 2017

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-33497-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-33497-1

1. Laboratory

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

   ☐ Yes ☒ No Comments:

ADEC has not approved an analytical laboratory for analysis of PFASs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

   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 Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

   ☒ Yes ☐ No Comments:

   b. Correct Analyses requested?

   ☒ Yes ☐ No Comments:

3. Laboratory Sample Receipt Documentation

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

   ☒ Yes ☐ No Comments:

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

   ☒ Yes ☐ No Comments:

Analysis of PFASs does not require a preservative other than temperature control.

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

   ☒ Yes ☐ No 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 Comments:

There were no discrepancies identified in the sample receipt documentation.

e. Data quality or usability affected?

Comments:

The data quality and usability were unaffected; see above.

4. Case Narrative

a. Present and understandable?

☒ Yes ☐ No Comments:

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

☒ Yes ☐ No Comments:

The case narrative notes the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 3.5º C.

The case narrative notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) associated with preparation batches 320-196237 and 196239.

The case narrative notes many of the project samples included in this work order contained sediment and were filtered prior to analysis.

c. Were all corrective actions documented?

☒ Yes ☐ No Comments:

A laboratory control sample (LCS) and a LCS duplicate (LCSD) were extracted and analyzed for each preparation and analysis batch to demonstrate analytical method accuracy and precision.

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

Comments:

The case narrative does not specify an effect on data quality or usability, please see the following sections for our assessment.

5. Samples Results

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

☒ Yes ☐ No Comments:

b. All applicable holding times met?

☑ Yes ☐ No Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

☐ Yes ☑ No Comments:

N/A; 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 Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

☐ Yes ☑ No Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

☑ Yes ☐ No Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

☑ Yes ☐ No Comments:

iii. If above LOQ, what samples are affected?

Comments:

None; PFAS compounds were not detected in method blank samples batches 320-196237 and 196239.

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

☐ Yes ☑ No Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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 Comments:

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

☐ Yes ☑ No 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

☑ Yes ☐ No Comments:

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

☑ Yes ☐ No Comments:

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

Comments:

N/A; 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 Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

☑ Yes ☐ No Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a 13C-isotope of each target analyte and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

☑ Yes ☐ No Comments:

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

☐ Yes ☑ No Comments:

Qualification of the results was not required; IDA recoveries were within acceptance criteria.

iv. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

☐ Yes ☑ No Comments:

PFASs are not volatile compounds; 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 Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not submitted with this work order.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

☒ Yes ☐ No Comments:

One field-duplicate pair was submitted with the analytical samples included in this work order.

ii. Submitted blind to lab?

☒ Yes ☐ No Comments:

Field-duplicate pair 550132 / 550232 was submitted with this work order.

iii. Precision – All relative percent differences (RPD) less than specified DQOs?
(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 Comments:

Yes, the field-duplicate RPDs are within the DQOs, where calculable for detected analytes.

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

Comments:

The data quality and usability were not affected.

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

☐ Yes ☐ No ☒ Not Applicable

Samples for this project are not collected with reusable equipment, therefore a practical potential for equipment based cross-contamination does not exist.

i. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; an equipment blank was not submitted.

ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

a. Defined and appropriate?

☐ Yes ☒ No Comments:

No other data flags and/or qualifiers were required.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 320-33636-1
Client Project/Site: Fairbanks Int Airport

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

Attn: Marcy Nadel

Authorized for release by:
12/4/2017 3:17:17 PM

David Alltucker, Project Manager I
(916)374-4383
david.alltucker@testamericainc.com

Table of Contents

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int Airport

TestAmerica Job ID: 320-33636-1

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
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Job ID: 320-33636-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-33636-1

Receipt
The samples were received on 11/28/2017 12:50 PM; the samples arrived in good condition, properly preserved and, where required, 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(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-197193, method code PFAS_DI_Prep.

Method(s) PFAS Prep: The following samples: 174254 (320-33636-1), 120529 (320-33636-2), 176052 (320-33636-3), 176152 (320-33636-4), 119954 (320-33636-5), 120054 (320-33636-6) and 173002 (320-33636-7) contain sediment.

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: Fairbanks Int Airport

TestAmerica Job ID: 320-33636-1

Client Sample ID: 174254 — Lab Sample ID: 320-33636-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	8.9		2.0	0.92	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	23		2.0	0.87	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluoroheptanoic acid (PFHpA)	5.2		2.0	0.80	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorooctanoic acid (PFOA)	8.6		2.0	0.75	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	46		2.0	1.3	ng/L	1		WS-LC-0025 Att1	Total/NA

Client Sample ID: 120529 — Lab Sample ID: 320-33636-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	27		2.0	0.92	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	110		2.0	0.87	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluoroheptanoic acid (PFHpA)	12		2.0	0.80	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorooctanoic acid (PFOA)	16		2.0	0.75	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorononanoic acid (PFNA)	1.1	J	2.0	0.65	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	490		20	13	ng/L	10		WS-LC-0025 Att1	Total/NA

Client Sample ID: 176052 — Lab Sample ID: 320-33636-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	67		2.0	0.92	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluoroheptanoic acid (PFHpA)	190		2.0	0.80	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorooctanoic acid (PFOA)	140		2.0	0.75	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorohexanesulfonic acid (PFHxS) - DL	390		20	8.7	ng/L	10		WS-LC-0025 Att1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	1000		20	13	ng/L	10		WS-LC-0025 Att1	Total/NA

Client Sample ID: 176152 — Lab Sample ID: 320-33636-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	69		2.0	0.92	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluoroheptanoic acid (PFHpA)	180		2.0	0.80	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorooctanoic acid (PFOA)	130		2.0	0.75	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorohexanesulfonic acid (PFHxS) - DL	400		20	8.7	ng/L	10		WS-LC-0025 Att1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	1000		20	13	ng/L	10		WS-LC-0025 Att1	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int Airport

TestAmerica Job ID: 320-33636-1

Client Sample ID: 119954 — Lab Sample ID: 320-33636-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	11		2.0	0.92	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	57		2.0	0.87	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluoroheptanoic acid (PFHpA)	9.7		2.0	0.80	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorooctanoic acid (PFOA)	8.8		2.0	0.75	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorononanoic acid (PFNA)	1.5	J	2.0	0.65	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	360		20	13	ng/L	10		WS-LC-0025 Att1	Total/NA

Client Sample ID: 120054 — Lab Sample ID: 320-33636-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	11		2.0	0.92	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	55		2.0	0.87	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluoroheptanoic acid (PFHpA)	9.5		2.0	0.80	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorooctanoic acid (PFOA)	8.6		2.0	0.75	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorononanoic acid (PFNA)	1.5	J	2.0	0.65	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	360		20	13	ng/L	10		WS-LC-0025 Att1	Total/NA

Client Sample ID: 173002 — Lab Sample ID: 320-33636-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	2.5		2.0	0.92	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	12		2.0	0.87	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.1	J	2.0	0.80	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorooctanoic acid (PFOA)	1.4	J	2.0	0.75	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	3.7		2.0	1.3	ng/L	1		WS-LC-0025 Att1	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int Airport

TestAmerica Job ID: 320-33636-1

Client Sample ID: 174254
Date Collected: 11/21/17 15:15
Date Received: 11/28/17 12:50

Lab Sample ID: 320-33636-1
Matrix: Water

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**8.9**		2.0	0.92	ng/L		11/29/17 09:36	11/29/17 22:38	1
Perfluorohexanesulfonic acid (PFHxS)	**23**		2.0	0.87	ng/L		11/29/17 09:36	11/29/17 22:38	1
Perfluoroheptanoic acid (PFHpA)	**5.2**		2.0	0.80	ng/L		11/29/17 09:36	11/29/17 22:38	1
Perfluorooctanoic acid (PFOA)	**8.6**		2.0	0.75	ng/L		11/29/17 09:36	11/29/17 22:38	1
Perfluorooctanesulfonic acid (PFOS)	**46**		2.0	1.3	ng/L		11/29/17 09:36	11/29/17 22:38	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/29/17 09:36	11/29/17 22:38	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*114*		*25 - 150*	*11/29/17 09:36*	*11/29/17 22:38*	*1*
13C4-PFHpA	*114*		*25 - 150*	*11/29/17 09:36*	*11/29/17 22:38*	*1*
13C4 PFOA	*114*		*25 - 150*	*11/29/17 09:36*	*11/29/17 22:38*	*1*
13C4 PFOS	*109*		*25 - 150*	*11/29/17 09:36*	*11/29/17 22:38*	*1*
13C5 PFNA	*116*		*25 - 150*	*11/29/17 09:36*	*11/29/17 22:38*	*1*

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int Airport

TestAmerica Job ID: 320-33636-1

Client Sample ID: 120529
Date Collected: 11/21/17 14:22
Date Received: 11/28/17 12:50

Lab Sample ID: 320-33636-2
Matrix: Water

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	27		2.0	0.92	ng/L		11/29/17 09:36	11/29/17 22:56	1
Perfluorohexanesulfonic acid (PFHxS)	110		2.0	0.87	ng/L		11/29/17 09:36	11/29/17 22:56	1
Perfluoroheptanoic acid (PFHpA)	12		2.0	0.80	ng/L		11/29/17 09:36	11/29/17 22:56	1
Perfluorooctanoic acid (PFOA)	16		2.0	0.75	ng/L		11/29/17 09:36	11/29/17 22:56	1
Perfluorononanoic acid (PFNA)	1.1	J	2.0	0.65	ng/L		11/29/17 09:36	11/29/17 22:56	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*110*		*25 - 150*	*11/29/17 09:36*	*11/29/17 22:56*	*1*
13C4-PFHpA	*113*		*25 - 150*	*11/29/17 09:36*	*11/29/17 22:56*	*1*
13C4 PFOA	*114*		*25 - 150*	*11/29/17 09:36*	*11/29/17 22:56*	*1*
13C4 PFOS	*100*		*25 - 150*	*11/29/17 09:36*	*11/29/17 22:56*	*1*
13C5 PFNA	*106*		*25 - 150*	*11/29/17 09:36*	*11/29/17 22:56*	*1*

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	490		20	13	ng/L		11/29/17 09:36	12/02/17 04:48	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*109*		*25 - 150*	*11/29/17 09:36*	*12/02/17 04:48*	*10*

Client Sample ID: 176052

Date Collected: 11/21/17 19:08
Date Received: 11/28/17 12:50

Lab Sample ID: 320-33636-3

Matrix: Water

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	67		2.0	0.92	ng/L		11/29/17 09:36	11/29/17 23:15	1
Perfluoroheptanoic acid (PFHpA)	190		2.0	0.80	ng/L		11/29/17 09:36	11/29/17 23:15	1
Perfluorooctanoic acid (PFOA)	140		2.0	0.75	ng/L		11/29/17 09:36	11/29/17 23:15	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/29/17 09:36	11/29/17 23:15	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*101*		*25 - 150*	*11/29/17 09:36*	*11/29/17 23:15*	*1*
13C4-PFHpA	*101*		*25 - 150*	*11/29/17 09:36*	*11/29/17 23:15*	*1*
13C4 PFOA	*105*		*25 - 150*	*11/29/17 09:36*	*11/29/17 23:15*	*1*
13C4 PFOS	*94*		*25 - 150*	*11/29/17 09:36*	*11/29/17 23:15*	*1*
13C5 PFNA	*95*		*25 - 150*	*11/29/17 09:36*	*11/29/17 23:15*	*1*

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanesulfonic acid (PFHxS)	390		20	8.7	ng/L		11/29/17 09:36	12/02/17 05:06	10
Perfluorooctanesulfonic acid (PFOS)	1000		20	13	ng/L		11/29/17 09:36	12/02/17 05:06	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*101*		*25 - 150*	*11/29/17 09:36*	*12/02/17 05:06*	*10*
13C4 PFOS	*97*		*25 - 150*	*11/29/17 09:36*	*12/02/17 05:06*	*10*

Client Sample ID: 176152
Date Collected: 11/21/17 19:12
Date Received: 11/28/17 12:50

Lab Sample ID: 320-33636-4
Matrix: Water

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	69		2.0	0.92	ng/L		11/29/17 09:36	11/29/17 23:33	1
Perfluoroheptanoic acid (PFHpA)	180		2.0	0.80	ng/L		11/29/17 09:36	11/29/17 23:33	1
Perfluorooctanoic acid (PFOA)	130		2.0	0.75	ng/L		11/29/17 09:36	11/29/17 23:33	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/29/17 09:36	11/29/17 23:33	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*98*		*25 - 150*	*11/29/17 09:36*	*11/29/17 23:33*	*1*
13C4-PFHpA	*98*		*25 - 150*	*11/29/17 09:36*	*11/29/17 23:33*	*1*
13C4 PFOA	*102*		*25 - 150*	*11/29/17 09:36*	*11/29/17 23:33*	*1*
13C4 PFOS	*91*		*25 - 150*	*11/29/17 09:36*	*11/29/17 23:33*	*1*
13C5 PFNA	*93*		*25 - 150*	*11/29/17 09:36*	*11/29/17 23:33*	*1*

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanesulfonic acid (PFHxS)	400		20	8.7	ng/L		11/29/17 09:36	12/02/17 05:24	10
Perfluorooctanesulfonic acid (PFOS)	1000		20	13	ng/L		11/29/17 09:36	12/02/17 05:24	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*100*		*25 - 150*	*11/29/17 09:36*	*12/02/17 05:24*	*10*
13C4 PFOS	*97*		*25 - 150*	*11/29/17 09:36*	*12/02/17 05:24*	*10*

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int Airport

TestAmerica Job ID: 320-33636-1

Client Sample ID: 119954
Date Collected: 11/22/17 12:22
Date Received: 11/28/17 12:50

Lab Sample ID: 320-33636-5
Matrix: Water

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	11		2.0	0.92	ng/L		11/29/17 09:36	11/29/17 23:51	1
Perfluorohexanesulfonic acid (PFHxS)	57		2.0	0.87	ng/L		11/29/17 09:36	11/29/17 23:51	1
Perfluoroheptanoic acid (PFHpA)	9.7		2.0	0.80	ng/L		11/29/17 09:36	11/29/17 23:51	1
Perfluorooctanoic acid (PFOA)	8.8		2.0	0.75	ng/L		11/29/17 09:36	11/29/17 23:51	1
Perfluorononanoic acid (PFNA)	1.5	J	2.0	0.65	ng/L		11/29/17 09:36	11/29/17 23:51	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*103*		*25 - 150*	*11/29/17 09:36*	*11/29/17 23:51*	*1*
13C4-PFHpA	*107*		*25 - 150*	*11/29/17 09:36*	*11/29/17 23:51*	*1*
13C4 PFOA	*105*		*25 - 150*	*11/29/17 09:36*	*11/29/17 23:51*	*1*
13C4 PFOS	*98*		*25 - 150*	*11/29/17 09:36*	*11/29/17 23:51*	*1*
13C5 PFNA	*103*		*25 - 150*	*11/29/17 09:36*	*11/29/17 23:51*	*1*

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	360		20	13	ng/L		11/29/17 09:36	12/02/17 05:43	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*108*		*25 - 150*	*11/29/17 09:36*	*12/02/17 05:43*	*10*

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int Airport

TestAmerica Job ID: 320-33636-1

Client Sample ID: 120054
Date Collected: 11/22/17 12:25
Date Received: 11/28/17 12:50

Lab Sample ID: 320-33636-6
Matrix: Water

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	11		2.0	0.92	ng/L		11/29/17 09:36	11/30/17 00:10	1
Perfluorohexanesulfonic acid (PFHxS)	55		2.0	0.87	ng/L		11/29/17 09:36	11/30/17 00:10	1
Perfluoroheptanoic acid (PFHpA)	9.5		2.0	0.80	ng/L		11/29/17 09:36	11/30/17 00:10	1
Perfluorooctanoic acid (PFOA)	8.6		2.0	0.75	ng/L		11/29/17 09:36	11/30/17 00:10	1
Perfluorononanoic acid (PFNA)	1.5	J	2.0	0.65	ng/L		11/29/17 09:36	11/30/17 00:10	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*110*		*25 - 150*	*11/29/17 09:36*	*11/30/17 00:10*	*1*
13C4-PFHpA	*113*		*25 - 150*	*11/29/17 09:36*	*11/30/17 00:10*	*1*
13C4 PFOA	*111*		*25 - 150*	*11/29/17 09:36*	*11/30/17 00:10*	*1*
13C4 PFOS	*102*		*25 - 150*	*11/29/17 09:36*	*11/30/17 00:10*	*1*
13C5 PFNA	*109*		*25 - 150*	*11/29/17 09:36*	*11/30/17 00:10*	*1*

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	360		20	13	ng/L		11/29/17 09:36	12/02/17 06:01	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*100*		*25 - 150*	*11/29/17 09:36*	*12/02/17 06:01*	*10*

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int Airport

TestAmerica Job ID: 320-33636-1

Client Sample ID: 173002
Date Collected: 11/24/17 11:13
Date Received: 11/28/17 12:50

Lab Sample ID: 320-33636-7
Matrix: Water

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	2.5		2.0	0.92	ng/L		11/29/17 09:36	11/30/17 00:28	1
Perfluorohexanesulfonic acid (PFHxS)	12		2.0	0.87	ng/L		11/29/17 09:36	11/30/17 00:28	1
Perfluoroheptanoic acid (PFHpA)	1.1	J	2.0	0.80	ng/L		11/29/17 09:36	11/30/17 00:28	1
Perfluorooctanoic acid (PFOA)	1.4	J	2.0	0.75	ng/L		11/29/17 09:36	11/30/17 00:28	1
Perfluorooctanesulfonic acid (PFOS)	3.7		2.0	1.3	ng/L		11/29/17 09:36	11/30/17 00:28	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/29/17 09:36	11/30/17 00:28	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*105*		*25 - 150*	*11/29/17 09:36*	*11/30/17 00:28*	*1*
13C4-PFHpA	*111*		*25 - 150*	*11/29/17 09:36*	*11/30/17 00:28*	*1*
13C4 PFOA	*111*		*25 - 150*	*11/29/17 09:36*	*11/30/17 00:28*	*1*
13C4 PFOS	*104*		*25 - 150*	*11/29/17 09:36*	*11/30/17 00:28*	*1*
13C5 PFNA	*110*		*25 - 150*	*11/29/17 09:36*	*11/30/17 00:28*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int Airport

TestAmerica Job ID: 320-33636-1

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)				
Lab Sample ID	Client Sample ID	3O2 PFHx (25-150)	3C4-PFHp (25-150)	3C4 PFO/ (25-150)	3C4 PFO$ (25-150)	3C5 PFN/ (25-150)
320-33636-1	174254	114	114	114	109	116
320-33636-2	120529	110	113	114	100	106
320-33636-2 - DL	120529				109	
320-33636-3	176052	101	101	105	94	95
320-33636-3 - DL	176052	101			97	
320-33636-4	176152	98	98	102	91	93
320-33636-4 - DL	176152	100			97	
320-33636-5	119954	103	107	105	98	103
320-33636-5 - DL	119954				108	
320-33636-6	120054	110	113	111	102	109
320-33636-6 - DL	120054				100	
320-33636-7	173002	105	111	111	104	110
LCS 320-197193/2-A	Lab Control Sample	95	97	92	91	93
LCSD 320-197193/3-A	Lab Control Sample Dup	101	102	97	96	95
MB 320-197193/1-A	Method Blank	103	104	100	99	101

Surrogate Legend

18O2 PFHxS = 18O2 PFHxS
13C4-PFHpA = 13C4-PFHpA
13C4 PFOA = 13C4 PFOA
13C4 PFOS = 13C4 PFOS
13C5 PFNA = 13C5 PFNA

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-197193/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 197655 — **Prep Batch: 197193**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/29/17 09:36	11/29/17 21:43	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/29/17 09:36	11/29/17 21:43	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/29/17 09:36	11/29/17 21:43	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/29/17 09:36	11/29/17 21:43	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/29/17 09:36	11/29/17 21:43	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/29/17 09:36	11/29/17 21:43	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*103*		*25 - 150*	*11/29/17 09:36*	*11/29/17 21:43*	*1*
13C4-PFHpA	*104*		*25 - 150*	*11/29/17 09:36*	*11/29/17 21:43*	*1*
13C4 PFOA	*100*		*25 - 150*	*11/29/17 09:36*	*11/29/17 21:43*	*1*
13C4 PFOS	*99*		*25 - 150*	*11/29/17 09:36*	*11/29/17 21:43*	*1*
13C5 PFNA	*101*		*25 - 150*	*11/29/17 09:36*	*11/29/17 21:43*	*1*

Lab Sample ID: LCS 320-197193/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 197655 — **Prep Batch: 197193**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorobutanesulfonic acid (PFBS)	17.7	18.4		ng/L		104	72 - 151
Perfluorohexanesulfonic acid (PFHxS)	18.2	18.3		ng/L		100	73 - 157
Perfluoroheptanoic acid (PFHpA)	20.0	20.2		ng/L		101	71 - 138
Perfluorooctanoic acid (PFOA)	20.0	20.1		ng/L		101	70 - 140
Perfluorooctanesulfonic acid (PFOS)	18.6	17.7		ng/L		95	69 - 144
Perfluorononanoic acid (PFNA)	20.0	20.4		ng/L		102	73 - 147

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*95*		*25 - 150*
13C4-PFHpA	*97*		*25 - 150*
13C4 PFOA	*92*		*25 - 150*
13C4 PFOS	*91*		*25 - 150*
13C5 PFNA	*93*		*25 - 150*

Lab Sample ID: LCSD 320-197193/3-A — **Client Sample ID: Lab Control Sample Dup**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 197655 — **Prep Batch: 197193**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)	17.7	17.8		ng/L		101	72 - 151	3	30
Perfluorohexanesulfonic acid (PFHxS)	18.2	17.6		ng/L		97	73 - 157	4	30
Perfluoroheptanoic acid (PFHpA)	20.0	19.5		ng/L		97	71 - 138	4	30
Perfluorooctanoic acid (PFOA)	20.0	19.6		ng/L		98	70 - 140	3	30
Perfluorooctanesulfonic acid (PFOS)	18.6	17.6		ng/L		95	69 - 144	1	30
Perfluorononanoic acid (PFNA)	20.0	20.2		ng/L		101	73 - 147	1	30

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int Airport

TestAmerica Job ID: 320-33636-1

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	101		25 - 150
13C4-PFHpA	102		25 - 150
13C4 PFOA	97		25 - 150
13C4 PFOS	96		25 - 150
13C5 PFNA	95		25 - 150

LCMS

Prep Batch: 197193

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33636-1	174254	Total/NA	Water	PFAS Prep	
320-33636-2	120529	Total/NA	Water	PFAS Prep	
320-33636-2 - DL	120529	Total/NA	Water	PFAS Prep	
320-33636-3 - DL	176052	Total/NA	Water	PFAS Prep	
320-33636-3	176052	Total/NA	Water	PFAS Prep	
320-33636-4	176152	Total/NA	Water	PFAS Prep	
320-33636-4 - DL	176152	Total/NA	Water	PFAS Prep	
320-33636-5 - DL	119954	Total/NA	Water	PFAS Prep	
320-33636-5	119954	Total/NA	Water	PFAS Prep	
320-33636-6	120054	Total/NA	Water	PFAS Prep	
320-33636-6 - DL	120054	Total/NA	Water	PFAS Prep	
320-33636-7	173002	Total/NA	Water	PFAS Prep	
MB 320-197193/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-197193/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-197193/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 197655

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33636-1	174254	Total/NA	Water	WS-LC-0025 Att1	197193
320-33636-2	120529	Total/NA	Water	WS-LC-0025 Att1	197193
320-33636-3	176052	Total/NA	Water	WS-LC-0025 Att1	197193
320-33636-4	176152	Total/NA	Water	WS-LC-0025 Att1	197193
320-33636-5	119954	Total/NA	Water	WS-LC-0025 Att1	197193
320-33636-6	120054	Total/NA	Water	WS-LC-0025 Att1	197193
320-33636-7	173002	Total/NA	Water	WS-LC-0025 Att1	197193
MB 320-197193/1-A	Method Blank	Total/NA	Water	WS-LC-0025 Att1	197193
LCS 320-197193/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 Att1	197193
LCSD 320-197193/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 Att1	197193

Analysis Batch: 198059

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33636-2 - DL	120529	Total/NA	Water	WS-LC-0025 Att1	197193
320-33636-3 - DL	176052	Total/NA	Water	WS-LC-0025 Att1	197193
320-33636-4 - DL	176152	Total/NA	Water	WS-LC-0025 Att1	197193
320-33636-5 - DL	119954	Total/NA	Water	WS-LC-0025 Att1	197193
320-33636-6 - DL	120054	Total/NA	Water	WS-LC-0025 Att1	197193

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int Airport

TestAmerica Job ID: 320-33636-1

Client Sample ID: 174254
Date Collected: 11/21/17 15:15
Date Received: 11/28/17 12:50

Lab Sample ID: 320-33636-1
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	PFAS Prep			1.00 mL	1.66 mL	197193	11/29/17 09:36	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1		1			197655	11/29/17 22:38	AAR	TAL SAC

Client Sample ID: 120529
Date Collected: 11/21/17 14:22
Date Received: 11/28/17 12:50

Lab Sample ID: 320-33636-2
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	PFAS Prep			1.00 mL	1.66 mL	197193	11/29/17 09:36	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1		1			197655	11/29/17 22:56	AAR	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	197193	11/29/17 09:36	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1	DL	10			198059	12/02/17 04:48	AAR	TAL SAC

Client Sample ID: 176052
Date Collected: 11/21/17 19:08
Date Received: 11/28/17 12:50

Lab Sample ID: 320-33636-3
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	PFAS Prep			1.00 mL	1.66 mL	197193	11/29/17 09:36	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1		1			197655	11/29/17 23:15	AAR	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	197193	11/29/17 09:36	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1	DL	10			198059	12/02/17 05:06	AAR	TAL SAC

Client Sample ID: 176152
Date Collected: 11/21/17 19:12
Date Received: 11/28/17 12:50

Lab Sample ID: 320-33636-4
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	PFAS Prep			1.00 mL	1.66 mL	197193	11/29/17 09:36	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1		1			197655	11/29/17 23:33	AAR	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	197193	11/29/17 09:36	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1	DL	10			198059	12/02/17 05:24	AAR	TAL SAC

Client Sample ID: 119954
Date Collected: 11/22/17 12:22
Date Received: 11/28/17 12:50

Lab Sample ID: 320-33636-5
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	PFAS Prep			1.00 mL	1.66 mL	197193	11/29/17 09:36	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1		1			197655	11/29/17 23:51	AAR	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	197193	11/29/17 09:36	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1	DL	10			198059	12/02/17 05:43	AAR	TAL SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int Airport

TestAmerica Job ID: 320-33636-1

Client Sample ID: 120054

Date Collected: 11/22/17 12:25
Date Received: 11/28/17 12:50

Lab Sample ID: 320-33636-6

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	PFAS Prep			1.00 mL	1.66 mL	197193	11/29/17 09:36	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1		1			197655	11/30/17 00:10	AAR	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	197193	11/29/17 09:36	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1	DL	10			198059	12/02/17 06:01	AAR	TAL SAC

Client Sample ID: 173002

Date Collected: 11/24/17 11:13
Date Received: 11/28/17 12:50

Lab Sample ID: 320-33636-7

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	PFAS Prep			1.00 mL	1.66 mL	197193	11/29/17 09:36	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1		1			197655	11/30/17 00:28	AAR	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int Airport

TestAmerica Job ID: 320-33636-1

Laboratory: TestAmerica Sacramento

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

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-055	12-18-17
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-18
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-18
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	12-31-17
L-A-B	DoD ELAP		L2468	01-20-18
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-18-18
Michigan	State Program	5	9947	01-31-18
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-28-18
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	12-30-17
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
West Virginia (DW)	State Program	3	9930C	12-31-17
Wyoming	State Program	8	8TMS-L	01-28-19

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int Airport

TestAmerica Job ID: 320-33636-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 Att1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int Airport

TestAmerica Job ID: 320-33636-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-33636-1	174254	Water	11/21/17 15:15	11/28/17 12:50
320-33636-2	120529	Water	11/21/17 14:22	11/28/17 12:50
320-33636-3	176052	Water	11/21/17 19:08	11/28/17 12:50
320-33636-4	176152	Water	11/21/17 19:12	11/28/17 12:50
320-33636-5	119954	Water	11/22/17 12:22	11/28/17 12:50
320-33636-6	120054	Water	11/22/17 12:25	11/28/17 12:50
320-33636-7	173002	Water	11/24/17 11:13	11/28/17 12:50

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Denver, CO 80204
(303) 825-3800

2705 Saint Andrews Loop, Suite A
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CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Laboratory: TEST America
Attn: David Alltucker

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	%E UCMR PFAS (WS-LC-0025)	Total Number of Containers	Remarks/Matrix
174254		1515	11/22/17		X	X	2	Groundwater
120529		1422			X	X	2	
176052		1908			X	X	2	
176152		1912			X	X	2	
119954		1222	11/22/17		X	X	2	
120054		1225			X	X	2	
173002		1113	11/24/17		X	X	2	
					X (TB)			

320-33636 Chain of Custody

Project Information		Sample Receipt	
Project Number:	31-1-20060	Total Number of Containers	14
Project Name:	Fairbanks Int Airport	COC Seals/Intact? Y/N/NA	—
Contact:	MDN	Received Good Cond./Cold	—
Ongoing Project?	Yes ☒ No ☐	Delivery Method:	Gridstream
Sampler:	SHH/MDN	(attach shipping bill, if any)	

Instructions	
Requested Turnaround Time:	5-day rush
Special Instructions:	Please bill to 31-1-20060-001

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: [signature] Time: 0830	Signature: Time:	Signature: Time:
Printed Name: Marcy Nadel Date: 11/27/17	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: [signature] Time: 1250	Signature: Time:	Signature: Time:
Printed Name: Afonso Aguayo Date: 11/28/17	Printed Name: Date:	Printed Name: Date:
Company: TAns 3.1	Company:	Company:

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

F-19-91/UR

No. 34757

12/4/2017

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-33636-1

Login Number: 33636
List Number: 1
Creator: Nelson, Kym D

List Source: 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	
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:

Kristen Freiburger

Title:

Senior Chemist

Date:

December 5, 2017

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

December 4, 2017

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-33636-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-33636-1

1. Laboratory

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

   ☐ Yes ☒ No Comments:

ADEC has not approved an analytical laboratory for analysis of PFASs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

   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 Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

   ☒ Yes ☐ No Comments:

   b. Correct Analyses requested?

   ☒ Yes ☐ No Comments:

3. Laboratory Sample Receipt Documentation

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

   ☒ Yes ☐ No Comments:

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

   ☒ Yes ☐ No Comments:

Analysis of PFASs does not require a preservative other than temperature control.

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

   ☒ Yes ☐ No 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 Comments:

There were no discrepancies identified in the sample receipt documentation.

e. Data quality or usability affected?

Comments:

The data quality and usability were unaffected; see above.

4. Case Narrative

a. Present and understandable?

☒ Yes ☐ No Comments:

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

☒ Yes ☐ No Comments:

The case narrative notes the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 3.4º C.

The case narrative notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD).

The case narrative notes many of the project samples included in this work order contained sediment and were filtered prior to analysis.

c. Were all corrective actions documented?

☒ Yes ☐ No Comments:

A laboratory control sample (LCS) and a LCS duplicate (LCSD) were extracted and analyzed to demonstrate analytical method accuracy and precision.

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

Comments:

The case narrative does not specify an effect on data quality or usability, please see the following sections for our assessment.

5. Samples Results

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

☒ Yes ☐ No Comments:

b. All applicable holding times met?

☑ Yes ☐ No Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

☐ Yes ☑ No Comments:

N/A; 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 Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

☐ Yes ☑ No Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

☑ Yes ☐ No Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

☑ Yes ☐ No Comments:

iii. If above LOQ, what samples are affected?

Comments:

None; PFAS compounds were not detected in method blank samples.

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

☐ Yes ☑ No Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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 Comments:

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

☐ Yes ☑ No 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

☑ Yes ☐ No Comments:

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

☑ Yes ☐ No Comments:

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

Comments:

N/A; 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 Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

☑ Yes ☐ No Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a 13C-isotope of each target analyte and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

☑ Yes ☐ No Comments:

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

☐ Yes ☑ No Comments:

Qualification of the results was not required; IDA recoveries were within acceptance criteria.

iv. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

☐ Yes ☑ No Comments:

PFASs are not volatile compounds; 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 Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not submitted with this work order.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

☒ Yes ☐ No Comments:

One field-duplicate pair was submitted with the analytical samples included in this work order.

ii. Submitted blind to lab?

☒ Yes ☐ No Comments:

Field-duplicate pair 176052 / 176152 was submitted with this work order.

iii. Precision – All relative percent differences (RPD) less than specified DQOs?
(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 Comments:

Yes, the field-duplicate RPDs are within the DQOs, where calculable for detected analytes.

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

Comments:

The data quality and usability were not affected.

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

☐ Yes ☐ No ☒ Not Applicable

Samples for this project are not collected with reusable equipment, therefore a practical potential for equipment based cross-contamination does not exist.

i. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; an equipment blank was not submitted.

ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

a. Defined and appropriate?

☐ Yes ☒ No Comments:

No other data flags and/or qualifiers were required.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 320-33637-1
Client Project/Site: Fairbanks Int. Airport

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

Attn: Marcy Nadel

Authorized for release by:
12/5/2017 8:04:19 AM

David Alltucker, Project Manager I
(916)374-4383
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Table of Contents

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int. Airport

TestAmerica Job ID: 320-33637-1

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
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Job ID: 320-33637-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-33637-1

Receipt
The samples were received on 11/28/2017 12:50 PM; the samples arrived in good condition, properly preserved and, where required, 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(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-197193, method code PFAS_DI_Prep.

Method(s) PFAS Prep: The following samples: 174963 (320-33637-1) and 391247 (320-33637-2) contain sediment.

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: Fairbanks Int. Airport

TestAmerica Job ID: 320-33637-1

Client Sample ID: 174963 — Lab Sample ID: 320-33637-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	17		2.0	0.92	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	75		2.0	0.87	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluoroheptanoic acid (PFHpA)	8.9		2.0	0.80	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorooctanoic acid (PFOA)	12		2.0	0.75	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorononanoic acid (PFNA)	0.70	J	2.0	0.65	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	340		20	13	ng/L	10		WS-LC-0025 Att1	Total/NA

Client Sample ID: 391247 — Lab Sample ID: 320-33637-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	2.0		2.0	0.92	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	9.2		2.0	0.87	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.95	J	2.0	0.80	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorooctanoic acid (PFOA)	1.2	J	2.0	0.75	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	3.5		2.0	1.3	ng/L	1		WS-LC-0025 Att1	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int. Airport

TestAmerica Job ID: 320-33637-1

Client Sample ID: 174963
Date Collected: 11/24/17 13:04
Date Received: 11/28/17 12:50

Lab Sample ID: 320-33637-1
Matrix: Water

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	17		2.0	0.92	ng/L		11/29/17 09:36	11/30/17 01:05	1
Perfluorohexanesulfonic acid (PFHxS)	75		2.0	0.87	ng/L		11/29/17 09:36	11/30/17 01:05	1
Perfluoroheptanoic acid (PFHpA)	8.9		2.0	0.80	ng/L		11/29/17 09:36	11/30/17 01:05	1
Perfluorooctanoic acid (PFOA)	12		2.0	0.75	ng/L		11/29/17 09:36	11/30/17 01:05	1
Perfluorononanoic acid (PFNA)	0.70	J	2.0	0.65	ng/L		11/29/17 09:36	11/30/17 01:05	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*101*		*25 - 150*	*11/29/17 09:36*	*11/30/17 01:05*	*1*
13C4-PFHpA	*105*		*25 - 150*	*11/29/17 09:36*	*11/30/17 01:05*	*1*
13C4 PFOA	*103*		*25 - 150*	*11/29/17 09:36*	*11/30/17 01:05*	*1*
13C4 PFOS	*94*		*25 - 150*	*11/29/17 09:36*	*11/30/17 01:05*	*1*
13C5 PFNA	*99*		*25 - 150*	*11/29/17 09:36*	*11/30/17 01:05*	*1*

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	340		20	13	ng/L		11/29/17 09:36	12/02/17 06:19	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*96*		*25 - 150*	*11/29/17 09:36*	*12/02/17 06:19*	*10*

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int. Airport

TestAmerica Job ID: 320-33637-1

Client Sample ID: 391247
Date Collected: 11/24/17 11:54
Date Received: 11/28/17 12:50

Lab Sample ID: 320-33637-2
Matrix: Water

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**2.0**		2.0	0.92	ng/L		11/29/17 09:36	11/30/17 01:23	1
Perfluorohexanesulfonic acid (PFHxS)	**9.2**		2.0	0.87	ng/L		11/29/17 09:36	11/30/17 01:23	1
Perfluoroheptanoic acid (PFHpA)	**0.95**	**J**	2.0	0.80	ng/L		11/29/17 09:36	11/30/17 01:23	1
Perfluorooctanoic acid (PFOA)	**1.2**	**J**	2.0	0.75	ng/L		11/29/17 09:36	11/30/17 01:23	1
Perfluorooctanesulfonic acid (PFOS)	**3.5**		2.0	1.3	ng/L		11/29/17 09:36	11/30/17 01:23	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/29/17 09:36	11/30/17 01:23	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*105*		*25 - 150*	*11/29/17 09:36*	*11/30/17 01:23*	*1*
13C4-PFHpA	*106*		*25 - 150*	*11/29/17 09:36*	*11/30/17 01:23*	*1*
13C4 PFOA	*107*		*25 - 150*	*11/29/17 09:36*	*11/30/17 01:23*	*1*
13C4 PFOS	*102*		*25 - 150*	*11/29/17 09:36*	*11/30/17 01:23*	*1*
13C5 PFNA	*108*		*25 - 150*	*11/29/17 09:36*	*11/30/17 01:23*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int. Airport

TestAmerica Job ID: 320-33637-1

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	3O2 PFHx (25-150)	3C4-PFHp (25-150)	3C4 PFO/ (25-150)	3C4 PFO$ (25-150)	3C5 PFN/ (25-150)			
320-33637-1	174963	101	105	103	94	99			
320-33637-1 - DL	174963				96				
320-33637-2	391247	105	106	107	102	108			
LCS 320-197193/2-A	Lab Control Sample	95	97	92	91	93			
LCSD 320-197193/3-A	Lab Control Sample Dup	101	102	97	96	95			
MB 320-197193/1-A	Method Blank	103	104	100	99	101			

Surrogate Legend

18O2 PFHxS = 18O2 PFHxS
13C4-PFHpA = 13C4-PFHpA
13C4 PFOA = 13C4 PFOA
13C4 PFOS = 13C4 PFOS
13C5 PFNA = 13C5 PFNA

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-197193/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 197655 — **Prep Batch: 197193**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/29/17 09:36	11/29/17 21:43	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/29/17 09:36	11/29/17 21:43	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/29/17 09:36	11/29/17 21:43	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/29/17 09:36	11/29/17 21:43	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/29/17 09:36	11/29/17 21:43	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/29/17 09:36	11/29/17 21:43	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*103*		*25 - 150*	*11/29/17 09:36*	*11/29/17 21:43*	*1*
13C4-PFHpA	*104*		*25 - 150*	*11/29/17 09:36*	*11/29/17 21:43*	*1*
13C4 PFOA	*100*		*25 - 150*	*11/29/17 09:36*	*11/29/17 21:43*	*1*
13C4 PFOS	*99*		*25 - 150*	*11/29/17 09:36*	*11/29/17 21:43*	*1*
13C5 PFNA	*101*		*25 - 150*	*11/29/17 09:36*	*11/29/17 21:43*	*1*

Lab Sample ID: LCS 320-197193/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 197655 — **Prep Batch: 197193**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorobutanesulfonic acid (PFBS)	17.7	18.4		ng/L		104	72 - 151
Perfluorohexanesulfonic acid (PFHxS)	18.2	18.3		ng/L		100	73 - 157
Perfluoroheptanoic acid (PFHpA)	20.0	20.2		ng/L		101	71 - 138
Perfluorooctanoic acid (PFOA)	20.0	20.1		ng/L		101	70 - 140
Perfluorooctanesulfonic acid (PFOS)	18.6	17.7		ng/L		95	69 - 144
Perfluorononanoic acid (PFNA)	20.0	20.4		ng/L		102	73 - 147

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*95*		*25 - 150*
13C4-PFHpA	*97*		*25 - 150*
13C4 PFOA	*92*		*25 - 150*
13C4 PFOS	*91*		*25 - 150*
13C5 PFNA	*93*		*25 - 150*

Lab Sample ID: LCSD 320-197193/3-A — **Client Sample ID: Lab Control Sample Dup**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 197655 — **Prep Batch: 197193**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)	17.7	17.8		ng/L		101	72 - 151	3	30
Perfluorohexanesulfonic acid (PFHxS)	18.2	17.6		ng/L		97	73 - 157	4	30
Perfluoroheptanoic acid (PFHpA)	20.0	19.5		ng/L		97	71 - 138	4	30
Perfluorooctanoic acid (PFOA)	20.0	19.6		ng/L		98	70 - 140	3	30
Perfluorooctanesulfonic acid (PFOS)	18.6	17.6		ng/L		95	69 - 144	1	30
Perfluorononanoic acid (PFNA)	20.0	20.2		ng/L		101	73 - 147	1	30

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int. Airport

TestAmerica Job ID: 320-33637-1

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	101		25 - 150
13C4-PFHpA	102		25 - 150
13C4 PFOA	97		25 - 150
13C4 PFOS	96		25 - 150
13C5 PFNA	95		25 - 150

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int. Airport

TestAmerica Job ID: 320-33637-1

LCMS

Prep Batch: 197193

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33637-1 - DL	174963	Total/NA	Water	PFAS Prep	
320-33637-1	174963	Total/NA	Water	PFAS Prep	
320-33637-2	391247	Total/NA	Water	PFAS Prep	
MB 320-197193/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-197193/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-197193/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 197655

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33637-1	174963	Total/NA	Water	WS-LC-0025 Att1	197193
320-33637-2	391247	Total/NA	Water	WS-LC-0025 Att1	197193
MB 320-197193/1-A	Method Blank	Total/NA	Water	WS-LC-0025 Att1	197193
LCS 320-197193/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 Att1	197193
LCSD 320-197193/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 Att1	197193

Analysis Batch: 198059

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33637-1 - DL	174963	Total/NA	Water	WS-LC-0025 Att1	197193

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int. Airport

TestAmerica Job ID: 320-33637-1

Client Sample ID: 174963

Date Collected: 11/24/17 13:04
Date Received: 11/28/17 12:50

Lab Sample ID: 320-33637-1
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	PFAS Prep			1.00 mL	1.66 mL	197193	11/29/17 09:36	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1		1			197655	11/30/17 01:05	AAR	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	197193	11/29/17 09:36	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1	DL	10			198059	12/02/17 06:19	AAR	TAL SAC

Client Sample ID: 391247

Date Collected: 11/24/17 11:54
Date Received: 11/28/17 12:50

Lab Sample ID: 320-33637-2
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	PFAS Prep			1.00 mL	1.66 mL	197193	11/29/17 09:36	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1		1			197655	11/30/17 01:23	AAR	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int. Airport

TestAmerica Job ID: 320-33637-1

Laboratory: TestAmerica Sacramento

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

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-055	12-18-17
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-18
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-18
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	12-31-17
L-A-B	DoD ELAP		L2468	01-20-18
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-18-18
Michigan	State Program	5	9947	01-31-18
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-28-18
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	12-30-17
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
West Virginia (DW)	State Program	3	9930C	12-31-17
Wyoming	State Program	8	8TMS-L	01-28-19

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int. Airport

TestAmerica Job ID: 320-33637-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 Att1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks Int. Airport

TestAmerica Job ID: 320-33637-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-33637-1	174963	Water	11/24/17 13:04	11/28/17 12:50
320-33637-2	391247	Water	11/24/17 11:54	11/28/17 12:50

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

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(907) 479-0600

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Denver, CO 80204
(303) 825-3800

2705 Saint Andrews Loop, Suite A
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(509) 946-6309

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Laboratory Test America
Attn: David Althaker

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	X6 VCHR PFAS					Total Number of Containers	Remarks/Matrix
174963		1304	11/24/17		X	X					2	groundwater
391247		1154	↓		X	X					2	↓

320-33637 Chain of Custody

Project Information		Sample Receipt	
Project Number:	31-20060	Total Number of Containers	4
Project Name:	FBX Int. Airport	COC Seals/Intact? Y/N/NA	—
Contact:	MDN	Received Good Cond./Cold	—
Ongoing Project? Yes ☒ No ☐		Delivery Method:	Goldstreak
Sampler:	MDN	(attach shipping bill, if any)	

Instructions	
Requested Turnaround Time:	Standard
Special Instructions:	Please bill to 31-20060-001

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

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 0830	Signature: Time:	Signature: Time:
Printed Name: Marcy Nadel Date: 11/27/17	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson	Company:	Company:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: Time: 1250	Signature: Time:	Signature: Time:
Printed Name: Alonso Aguayo Date: 11/28/17	Printed Name: Date:	Printed Name: Date:
Company: TAMS 3.A	Company:	Company:

F-19-91/UR

No. 34791

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-33637-1

Login Number: 33637
List Number: 1
Creator: Nelson, Kym D

List Source: 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	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:

Kristen Freiburger

Title:

Senior Chemist

Date:

December 5, 2017

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

December 5, 2017

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-33637-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-33637-1

1. Laboratory

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

   ☐ Yes ☒ No Comments:

ADEC has not approved an analytical laboratory for analysis of PFASs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

   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 Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

   ☒ Yes ☐ No Comments:

   b. Correct Analyses requested?

   ☒ Yes ☐ No Comments:

3. Laboratory Sample Receipt Documentation

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

   ☒ Yes ☐ No Comments:

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

   ☒ Yes ☐ No Comments:

Analysis of PFASs does not require a preservative other than temperature control.

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

   ☒ Yes ☐ No 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 Comments:

There were no discrepancies identified in the sample receipt documentation.

e. Data quality or usability affected?

Comments:

The data quality and usability were unaffected; see above.

4. Case Narrative

a. Present and understandable?

☒ Yes ☐ No Comments:

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

☒ Yes ☐ No Comments:

The case narrative notes the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 3.4º C.

The case narrative notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD).

The case narrative notes many of the project samples included in this work order contained sediment and were filtered prior to analysis.

c. Were all corrective actions documented?

☒ Yes ☐ No Comments:

A laboratory control sample (LCS) and a LCS duplicate (LCSD) were extracted and analyzed to demonstrate analytical method accuracy and precision.

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

Comments:

The case narrative does not specify an effect on data quality or usability, please see the following sections for our assessment.

5. Samples Results

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

☒ Yes ☐ No Comments:

b. All applicable holding times met?

☑ Yes ☐ No Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

☐ Yes ☑ No Comments:

N/A; 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 Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

☐ Yes ☑ No Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

☑ Yes ☐ No Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

☑ Yes ☐ No Comments:

iii. If above LOQ, what samples are affected?

Comments:

None; PFAS compounds were not detected in method blank samples.

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

☐ Yes ☑ No Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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 Comments:

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

☐ Yes ☑ No 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

☑ Yes ☐ No Comments:

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

☑ Yes ☐ No Comments:

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

Comments:

N/A; 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 Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

☒ Yes ☐ No Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a 13C-isotope of each target analyte and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

☒ Yes ☐ No Comments:

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

☐ Yes ☒ No Comments:

Qualification of the results was not required; IDA recoveries were within acceptance criteria.

iv. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

☐ Yes ☒ No Comments:

PFASs are not volatile compounds; 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 Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not submitted with this work order.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

☒ Yes ☐ No Comments:

A field-duplicate pair was not submitted with this work order. Field duplicates have been submitted at the proper frequency for the overall project.

ii. Submitted blind to lab?

☐ Yes ☒ No Comments:

N/A; see above.

iii. Precision – All relative percent differences (RPD) less than specified DQOs? (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 Comments:

N/A; see above.

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

Comments:

The data quality and usability were not affected.

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

☐ Yes ☐ No ☒ Not Applicable

Samples for this project are not collected with reusable equipment, therefore a practical potential for equipment based cross-contamination does not exist.

i. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; an equipment blank was not submitted.

ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

a. Defined and appropriate?

☐ Yes ☒ No Comments:

No other data flags and/or qualifiers were required.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 320-33768-1
Client Project/Site: FIA

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

Attn: Marcy Nadel

Authorized for release by:
12/7/2017 3:48:23 PM

David Alltucker, Project Manager I
(916)374-4383
david.alltucker@testamericainc.com

Table of Contents

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33768-1

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
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Job ID: 320-33768-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-33768-1

Receipt
The samples were received on 12/1/2017 11:10 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.5º C.

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

Organic Prep
Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-198318, method code PFAS_DI_Prep.

Method(s) PFAS Prep: The sample bottles 120359 (320-33768-1), 174271 (320-33768-2), 120537.1 (320-33768-3), 120537.2 (320-33768-4), 116998 (320-33768-5), 542539 (320-33768-6), 116980 (320-33768-7), 119971 (320-33768-8), 120103 (320-33768-9), 669097 (320-33768-10), 669197 (320-33768-11), 119946 (320-33768-12) and 120046 (320-33768-13) contain sediment.

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: FIA

TestAmerica Job ID: 320-33768-1

Client Sample ID: 120359 — Lab Sample ID: 320-33768-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	17		2.0	0.75	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	99		2.0	0.87	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorononanoic acid (PFNA)	1.1	J	2.0	0.65	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluoroheptanoic acid (PFHpA)	12		2.0	0.80	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorobutanesulfonic acid (PFBS)	25		2.0	0.92	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	400		20	13	ng/L	10		WS-LC-0025 Att1	Total/NA

Client Sample ID: 174271 — Lab Sample ID: 320-33768-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	8.0		2.0	0.75	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	50		2.0	1.3	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	23		2.0	0.87	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorononanoic acid (PFNA)	0.67	J	2.0	0.65	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluoroheptanoic acid (PFHpA)	4.9		2.0	0.80	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorobutanesulfonic acid (PFBS)	11		2.0	0.92	ng/L	1		WS-LC-0025 Att1	Total/NA

Client Sample ID: 120537.1 — Lab Sample ID: 320-33768-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	18		2.0	0.75	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	120		2.0	0.87	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorononanoic acid (PFNA)	1.1	J	2.0	0.65	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluoroheptanoic acid (PFHpA)	13		2.0	0.80	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorobutanesulfonic acid (PFBS)	27		2.0	0.92	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	560		20	13	ng/L	10		WS-LC-0025 Att1	Total/NA

Client Sample ID: 120537.2 — Lab Sample ID: 320-33768-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	11		2.0	0.75	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	68		2.0	0.87	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorononanoic acid (PFNA)	1.1	J	2.0	0.65	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluoroheptanoic acid (PFHpA)	9.1		2.0	0.80	ng/L	1		WS-LC-0025 Att1	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33768-1

Client Sample ID: 120537.2 (Continued) — Lab Sample ID: 320-33768-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	15		2.0	0.92	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	450		20	13	ng/L	10		WS-LC-0025 Att1	Total/NA

Client Sample ID: 116998 — Lab Sample ID: 320-33768-5

No Detections.

Client Sample ID: 542539 — Lab Sample ID: 320-33768-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	77		2.0	0.75	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	5.2		2.0	1.3	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	260		2.0	0.87	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorononanoic acid (PFNA)	0.65	J	2.0	0.65	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluoroheptanoic acid (PFHpA)	62		2.0	0.80	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorobutanesulfonic acid (PFBS)	150		2.0	0.92	ng/L	1		WS-LC-0025 Att1	Total/NA

Client Sample ID: 116980 — Lab Sample ID: 320-33768-7

No Detections.

Client Sample ID: 119971 — Lab Sample ID: 320-33768-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	9.4		2.0	0.75	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	52		2.0	0.87	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorononanoic acid (PFNA)	1.3	J	2.0	0.65	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluoroheptanoic acid (PFHpA)	8.0		2.0	0.80	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorobutanesulfonic acid (PFBS)	10		2.0	0.92	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	400		20	13	ng/L	10		WS-LC-0025 Att1	Total/NA

Client Sample ID: 120103 — Lab Sample ID: 320-33768-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	20		2.0	0.75	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	130		2.0	0.87	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorononanoic acid (PFNA)	2.3		2.0	0.65	ng/L	1		WS-LC-0025 Att1	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: 120103 (Continued) — Lab Sample ID: 320-33768-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluoroheptanoic acid (PFHpA)	19		2.0	0.80	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorobutanesulfonic acid (PFBS)	27		2.0	0.92	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	800		20	13	ng/L	10		WS-LC-0025 Att1	Total/NA

Client Sample ID: 669097 — Lab Sample ID: 320-33768-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	9.1		2.0	0.75	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	79		2.0	1.3	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	62		2.0	0.87	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorononanoic acid (PFNA)	0.73	J	2.0	0.65	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluoroheptanoic acid (PFHpA)	10		2.0	0.80	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorobutanesulfonic acid (PFBS)	45		2.0	0.92	ng/L	1		WS-LC-0025 Att1	Total/NA

Client Sample ID: 669197 — Lab Sample ID: 320-33768-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	8.6		2.0	0.75	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	78		2.0	1.3	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	61		2.0	0.87	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluoroheptanoic acid (PFHpA)	9.7		2.0	0.80	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorobutanesulfonic acid (PFBS)	45		2.0	0.92	ng/L	1		WS-LC-0025 Att1	Total/NA

Client Sample ID: 119946 — Lab Sample ID: 320-33768-12

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	14		2.0	0.75	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	93		2.0	0.87	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorononanoic acid (PFNA)	1.9	J	2.0	0.65	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluoroheptanoic acid (PFHpA)	15		2.0	0.80	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorobutanesulfonic acid (PFBS)	17		2.0	0.92	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	620		20	13	ng/L	10		WS-LC-0025 Att1	Total/NA

Client Sample ID: 120046 — Lab Sample ID: 320-33768-13

This Detection Summary does not include radiochemical test results.

Client Sample ID: 120046 (Continued)

Lab Sample ID: 320-33768-13

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	14		2.0	0.75	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	93		2.0	0.87	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorononanoic acid (PFNA)	1.7	J	2.0	0.65	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluoroheptanoic acid (PFHpA)	15		2.0	0.80	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorobutanesulfonic acid (PFBS)	19		2.0	0.92	ng/L	1		WS-LC-0025 Att1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	630		20	13	ng/L	10		WS-LC-0025 Att1	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: 120359
Date Collected: 11/28/17 11:33
Date Received: 12/01/17 11:10

Lab Sample ID: 320-33768-1
Matrix: Water

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	17		2.0	0.75	ng/L		12/05/17 10:20	12/05/17 16:01	1
Perfluorohexanesulfonic acid (PFHxS)	99		2.0	0.87	ng/L		12/05/17 10:20	12/05/17 16:01	1
Perfluorononanoic acid (PFNA)	1.1	J	2.0	0.65	ng/L		12/05/17 10:20	12/05/17 16:01	1
Perfluoroheptanoic acid (PFHpA)	12		2.0	0.80	ng/L		12/05/17 10:20	12/05/17 16:01	1
Perfluorobutanesulfonic acid (PFBS)	25		2.0	0.92	ng/L		12/05/17 10:20	12/05/17 16:01	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*98*		*25 - 150*	*12/05/17 10:20*	*12/05/17 16:01*	*1*
18O2 PFHxS	*99*		*25 - 150*	*12/05/17 10:20*	*12/05/17 16:01*	*1*
13C5 PFNA	*93*		*25 - 150*	*12/05/17 10:20*	*12/05/17 16:01*	*1*
13C4-PFHpA	*101*		*25 - 150*	*12/05/17 10:20*	*12/05/17 16:01*	*1*

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	400		20	13	ng/L		12/05/17 10:20	12/06/17 16:53	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*91*		*25 - 150*	*12/05/17 10:20*	*12/06/17 16:53*	*10*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33768-1

Client Sample ID: 174271
Date Collected: 11/28/17 13:39
Date Received: 12/01/17 11:10

Lab Sample ID: 320-33768-2
Matrix: Water

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	8.0		2.0	0.75	ng/L		12/05/17 10:20	12/05/17 16:20	1
Perfluorooctanesulfonic acid (PFOS)	50		2.0	1.3	ng/L		12/05/17 10:20	12/05/17 16:20	1
Perfluorohexanesulfonic acid (PFHxS)	23		2.0	0.87	ng/L		12/05/17 10:20	12/05/17 16:20	1
Perfluorononanoic acid (PFNA)	0.67	J	2.0	0.65	ng/L		12/05/17 10:20	12/05/17 16:20	1
Perfluoroheptanoic acid (PFHpA)	4.9		2.0	0.80	ng/L		12/05/17 10:20	12/05/17 16:20	1
Perfluorobutanesulfonic acid (PFBS)	11		2.0	0.92	ng/L		12/05/17 10:20	12/05/17 16:20	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*101*		*25 - 150*	*12/05/17 10:20*	*12/05/17 16:20*	*1*
13C4 PFOS	*91*		*25 - 150*	*12/05/17 10:20*	*12/05/17 16:20*	*1*
18O2 PFHxS	*100*		*25 - 150*	*12/05/17 10:20*	*12/05/17 16:20*	*1*
13C5 PFNA	*99*		*25 - 150*	*12/05/17 10:20*	*12/05/17 16:20*	*1*
13C4-PFHpA	*104*		*25 - 150*	*12/05/17 10:20*	*12/05/17 16:20*	*1*

Client Sample ID: 120537.1
Date Collected: 11/28/17 15:04
Date Received: 12/01/17 11:10

Lab Sample ID: 320-33768-3
Matrix: Water

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	18		2.0	0.75	ng/L		12/05/17 10:20	12/05/17 16:38	1
Perfluorohexanesulfonic acid (PFHxS)	120		2.0	0.87	ng/L		12/05/17 10:20	12/05/17 16:38	1
Perfluorononanoic acid (PFNA)	1.1	J	2.0	0.65	ng/L		12/05/17 10:20	12/05/17 16:38	1
Perfluoroheptanoic acid (PFHpA)	13		2.0	0.80	ng/L		12/05/17 10:20	12/05/17 16:38	1
Perfluorobutanesulfonic acid (PFBS)	27		2.0	0.92	ng/L		12/05/17 10:20	12/05/17 16:38	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*98*		*25 - 150*	*12/05/17 10:20*	*12/05/17 16:38*	*1*
18O2 PFHxS	*99*		*25 - 150*	*12/05/17 10:20*	*12/05/17 16:38*	*1*
13C5 PFNA	*92*		*25 - 150*	*12/05/17 10:20*	*12/05/17 16:38*	*1*
13C4-PFHpA	*102*		*25 - 150*	*12/05/17 10:20*	*12/05/17 16:38*	*1*

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	560		20	13	ng/L		12/05/17 10:20	12/06/17 17:12	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*86*		*25 - 150*	*12/05/17 10:20*	*12/06/17 17:12*	*10*

Client Sample ID: 120537.2
Date Collected: 11/28/17 15:38
Date Received: 12/01/17 11:10

Lab Sample ID: 320-33768-4
Matrix: Water

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	11		2.0	0.75	ng/L		12/05/17 10:20	12/05/17 16:56	1
Perfluorohexanesulfonic acid (PFHxS)	68		2.0	0.87	ng/L		12/05/17 10:20	12/05/17 16:56	1
Perfluorononanoic acid (PFNA)	1.1	J	2.0	0.65	ng/L		12/05/17 10:20	12/05/17 16:56	1
Perfluoroheptanoic acid (PFHpA)	9.1		2.0	0.80	ng/L		12/05/17 10:20	12/05/17 16:56	1
Perfluorobutanesulfonic acid (PFBS)	15		2.0	0.92	ng/L		12/05/17 10:20	12/05/17 16:56	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*99*		*25 - 150*	*12/05/17 10:20*	*12/05/17 16:56*	*1*
18O2 PFHxS	*95*		*25 - 150*	*12/05/17 10:20*	*12/05/17 16:56*	*1*
13C5 PFNA	*89*		*25 - 150*	*12/05/17 10:20*	*12/05/17 16:56*	*1*
13C4-PFHpA	*98*		*25 - 150*	*12/05/17 10:20*	*12/05/17 16:56*	*1*

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	450		20	13	ng/L		12/05/17 10:20	12/06/17 17:30	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*88*		*25 - 150*	*12/05/17 10:20*	*12/06/17 17:30*	*10*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33768-1

Client Sample ID: 116998
Date Collected: 11/28/17 16:45
Date Received: 12/01/17 11:10

Lab Sample ID: 320-33768-5
Matrix: Water

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/05/17 10:20	12/05/17 17:15	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		12/05/17 10:20	12/05/17 17:15	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		12/05/17 10:20	12/05/17 17:15	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/05/17 10:20	12/05/17 17:15	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/05/17 10:20	12/05/17 17:15	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/05/17 10:20	12/05/17 17:15	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*100*		*25 - 150*	*12/05/17 10:20*	*12/05/17 17:15*	*1*
13C4 PFOS	*87*		*25 - 150*	*12/05/17 10:20*	*12/05/17 17:15*	*1*
18O2 PFHxS	*98*		*25 - 150*	*12/05/17 10:20*	*12/05/17 17:15*	*1*
13C5 PFNA	*95*		*25 - 150*	*12/05/17 10:20*	*12/05/17 17:15*	*1*
13C4-PFHpA	*105*		*25 - 150*	*12/05/17 10:20*	*12/05/17 17:15*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33768-1

Client Sample ID: 542539
Date Collected: 11/29/17 11:30
Date Received: 12/01/17 11:10

Lab Sample ID: 320-33768-6
Matrix: Water

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	77		2.0	0.75	ng/L		12/05/17 10:20	12/05/17 17:33	1
Perfluorooctanesulfonic acid (PFOS)	5.2		2.0	1.3	ng/L		12/05/17 10:20	12/05/17 17:33	1
Perfluorohexanesulfonic acid (PFHxS)	260		2.0	0.87	ng/L		12/05/17 10:20	12/05/17 17:33	1
Perfluorononanoic acid (PFNA)	0.65	J	2.0	0.65	ng/L		12/05/17 10:20	12/05/17 17:33	1
Perfluoroheptanoic acid (PFHpA)	62		2.0	0.80	ng/L		12/05/17 10:20	12/05/17 17:33	1
Perfluorobutanesulfonic acid (PFBS)	150		2.0	0.92	ng/L		12/05/17 10:20	12/05/17 17:33	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*95*		*25 - 150*	*12/05/17 10:20*	*12/05/17 17:33*	*1*
13C4 PFOS	*87*		*25 - 150*	*12/05/17 10:20*	*12/05/17 17:33*	*1*
18O2 PFHxS	*96*		*25 - 150*	*12/05/17 10:20*	*12/05/17 17:33*	*1*
13C5 PFNA	*91*		*25 - 150*	*12/05/17 10:20*	*12/05/17 17:33*	*1*
13C4-PFHpA	*98*		*25 - 150*	*12/05/17 10:20*	*12/05/17 17:33*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33768-1

Client Sample ID: 116980
Date Collected: 11/29/17 12:43
Date Received: 12/01/17 11:10

Lab Sample ID: 320-33768-7
Matrix: Water

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/05/17 10:20	12/05/17 17:52	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		12/05/17 10:20	12/05/17 17:52	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		12/05/17 10:20	12/05/17 17:52	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/05/17 10:20	12/05/17 17:52	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/05/17 10:20	12/05/17 17:52	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/05/17 10:20	12/05/17 17:52	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*101*		*25 - 150*	*12/05/17 10:20*	*12/05/17 17:52*	*1*
13C4 PFOS	*90*		*25 - 150*	*12/05/17 10:20*	*12/05/17 17:52*	*1*
18O2 PFHxS	*101*		*25 - 150*	*12/05/17 10:20*	*12/05/17 17:52*	*1*
13C5 PFNA	*98*		*25 - 150*	*12/05/17 10:20*	*12/05/17 17:52*	*1*
13C4-PFHpA	*105*		*25 - 150*	*12/05/17 10:20*	*12/05/17 17:52*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33768-1

Client Sample ID: 119971
Date Collected: 11/29/17 13:50
Date Received: 12/01/17 11:10

Lab Sample ID: 320-33768-8
Matrix: Water

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	9.4		2.0	0.75	ng/L		12/05/17 10:20	12/05/17 18:28	1
Perfluorohexanesulfonic acid (PFHxS)	52		2.0	0.87	ng/L		12/05/17 10:20	12/05/17 18:28	1
Perfluorononanoic acid (PFNA)	1.3	J	2.0	0.65	ng/L		12/05/17 10:20	12/05/17 18:28	1
Perfluoroheptanoic acid (PFHpA)	8.0		2.0	0.80	ng/L		12/05/17 10:20	12/05/17 18:28	1
Perfluorobutanesulfonic acid (PFBS)	10		2.0	0.92	ng/L		12/05/17 10:20	12/05/17 18:28	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*95*		*25 - 150*	*12/05/17 10:20*	*12/05/17 18:28*	*1*
18O2 PFHxS	*95*		*25 - 150*	*12/05/17 10:20*	*12/05/17 18:28*	*1*
13C5 PFNA	*89*		*25 - 150*	*12/05/17 10:20*	*12/05/17 18:28*	*1*
13C4-PFHpA	*100*		*25 - 150*	*12/05/17 10:20*	*12/05/17 18:28*	*1*

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	400		20	13	ng/L		12/05/17 10:20	12/06/17 17:48	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*87*		*25 - 150*	*12/05/17 10:20*	*12/06/17 17:48*	*10*

Client Sample ID: 120103
Date Collected: 11/29/17 14:27
Date Received: 12/01/17 11:10

Lab Sample ID: 320-33768-9
Matrix: Water

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	20		2.0	0.75	ng/L		12/05/17 10:20	12/05/17 18:47	1
Perfluorohexanesulfonic acid (PFHxS)	130		2.0	0.87	ng/L		12/05/17 10:20	12/05/17 18:47	1
Perfluorononanoic acid (PFNA)	2.3		2.0	0.65	ng/L		12/05/17 10:20	12/05/17 18:47	1
Perfluoroheptanoic acid (PFHpA)	19		2.0	0.80	ng/L		12/05/17 10:20	12/05/17 18:47	1
Perfluorobutanesulfonic acid (PFBS)	27		2.0	0.92	ng/L		12/05/17 10:20	12/05/17 18:47	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*97*		*25 - 150*	*12/05/17 10:20*	*12/05/17 18:47*	*1*
18O2 PFHxS	*97*		*25 - 150*	*12/05/17 10:20*	*12/05/17 18:47*	*1*
13C5 PFNA	*86*		*25 - 150*	*12/05/17 10:20*	*12/05/17 18:47*	*1*
13C4-PFHpA	*98*		*25 - 150*	*12/05/17 10:20*	*12/05/17 18:47*	*1*

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	800		20	13	ng/L		12/05/17 10:20	12/06/17 18:07	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*91*		*25 - 150*	*12/05/17 10:20*	*12/06/17 18:07*	*10*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33768-1

Client Sample ID: 669097
Date Collected: 11/29/17 15:30
Date Received: 12/01/17 11:10

Lab Sample ID: 320-33768-10
Matrix: Water

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	9.1		2.0	0.75	ng/L		12/05/17 10:20	12/05/17 19:05	1
Perfluorooctanesulfonic acid (PFOS)	79		2.0	1.3	ng/L		12/05/17 10:20	12/05/17 19:05	1
Perfluorohexanesulfonic acid (PFHxS)	62		2.0	0.87	ng/L		12/05/17 10:20	12/05/17 19:05	1
Perfluorononanoic acid (PFNA)	0.73	J	2.0	0.65	ng/L		12/05/17 10:20	12/05/17 19:05	1
Perfluoroheptanoic acid (PFHpA)	10		2.0	0.80	ng/L		12/05/17 10:20	12/05/17 19:05	1
Perfluorobutanesulfonic acid (PFBS)	45		2.0	0.92	ng/L		12/05/17 10:20	12/05/17 19:05	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*96*		*25 - 150*	*12/05/17 10:20*	*12/05/17 19:05*	*1*
13C4 PFOS	*91*		*25 - 150*	*12/05/17 10:20*	*12/05/17 19:05*	*1*
18O2 PFHxS	*99*		*25 - 150*	*12/05/17 10:20*	*12/05/17 19:05*	*1*
13C5 PFNA	*94*		*25 - 150*	*12/05/17 10:20*	*12/05/17 19:05*	*1*
13C4-PFHpA	*100*		*25 - 150*	*12/05/17 10:20*	*12/05/17 19:05*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33768-1

Client Sample ID: 669197
Date Collected: 11/29/17 15:40
Date Received: 12/01/17 11:10

Lab Sample ID: 320-33768-11
Matrix: Water

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	**8.6**		2.0	0.75	ng/L		12/05/17 10:20	12/05/17 19:24	1
Perfluorooctanesulfonic acid (PFOS)	**78**		2.0	1.3	ng/L		12/05/17 10:20	12/05/17 19:24	1
Perfluorohexanesulfonic acid (PFHxS)	**61**		2.0	0.87	ng/L		12/05/17 10:20	12/05/17 19:24	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/05/17 10:20	12/05/17 19:24	1
Perfluoroheptanoic acid (PFHpA)	**9.7**		2.0	0.80	ng/L		12/05/17 10:20	12/05/17 19:24	1
Perfluorobutanesulfonic acid (PFBS)	**45**		2.0	0.92	ng/L		12/05/17 10:20	12/05/17 19:24	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*103*		*25 - 150*	*12/05/17 10:20*	*12/05/17 19:24*	*1*
13C4 PFOS	*89*		*25 - 150*	*12/05/17 10:20*	*12/05/17 19:24*	*1*
18O2 PFHxS	*98*		*25 - 150*	*12/05/17 10:20*	*12/05/17 19:24*	*1*
13C5 PFNA	*95*		*25 - 150*	*12/05/17 10:20*	*12/05/17 19:24*	*1*
13C4-PFHpA	*101*		*25 - 150*	*12/05/17 10:20*	*12/05/17 19:24*	*1*

Client Sample ID: 119946
Date Collected: 11/29/17 16:53
Date Received: 12/01/17 11:10

Lab Sample ID: 320-33768-12
Matrix: Water

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	14		2.0	0.75	ng/L		12/05/17 10:20	12/05/17 19:42	1
Perfluorohexanesulfonic acid (PFHxS)	93		2.0	0.87	ng/L		12/05/17 10:20	12/05/17 19:42	1
Perfluorononanoic acid (PFNA)	1.9	J	2.0	0.65	ng/L		12/05/17 10:20	12/05/17 19:42	1
Perfluoroheptanoic acid (PFHpA)	15		2.0	0.80	ng/L		12/05/17 10:20	12/05/17 19:42	1
Perfluorobutanesulfonic acid (PFBS)	17		2.0	0.92	ng/L		12/05/17 10:20	12/05/17 19:42	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*100*		*25 - 150*	*12/05/17 10:20*	*12/05/17 19:42*	*1*
18O2 PFHxS	*98*		*25 - 150*	*12/05/17 10:20*	*12/05/17 19:42*	*1*
13C5 PFNA	*92*		*25 - 150*	*12/05/17 10:20*	*12/05/17 19:42*	*1*
13C4-PFHpA	*102*		*25 - 150*	*12/05/17 10:20*	*12/05/17 19:42*	*1*

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	620		20	13	ng/L		12/05/17 10:20	12/06/17 18:25	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*91*		*25 - 150*	*12/05/17 10:20*	*12/06/17 18:25*	*10*

Client Sample ID: 120046
Date Collected: 11/29/17 17:03
Date Received: 12/01/17 11:10

Lab Sample ID: 320-33768-13
Matrix: Water

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	14		2.0	0.75	ng/L		12/05/17 10:20	12/05/17 20:00	1
Perfluorohexanesulfonic acid (PFHxS)	93		2.0	0.87	ng/L		12/05/17 10:20	12/05/17 20:00	1
Perfluorononanoic acid (PFNA)	1.7	J	2.0	0.65	ng/L		12/05/17 10:20	12/05/17 20:00	1
Perfluoroheptanoic acid (PFHpA)	15		2.0	0.80	ng/L		12/05/17 10:20	12/05/17 20:00	1
Perfluorobutanesulfonic acid (PFBS)	19		2.0	0.92	ng/L		12/05/17 10:20	12/05/17 20:00	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*97*		*25 - 150*	*12/05/17 10:20*	*12/05/17 20:00*	*1*
18O2 PFHxS	*98*		*25 - 150*	*12/05/17 10:20*	*12/05/17 20:00*	*1*
13C5 PFNA	*89*		*25 - 150*	*12/05/17 10:20*	*12/05/17 20:00*	*1*
13C4-PFHpA	*101*		*25 - 150*	*12/05/17 10:20*	*12/05/17 20:00*	*1*

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	630		20	13	ng/L		12/05/17 10:20	12/06/17 18:44	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*88*		*25 - 150*	*12/05/17 10:20*	*12/06/17 18:44*	*10*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33768-1

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	3C4 PFOA (25-150)	3C4 PFOS (25-150)	3O2 PFHx (25-150)	3C5 PFNA (25-150)	3C4-PFHp (25-150)			
320-33768-1	120359	98		99	93	101			
320-33768-1 - DL	120359		91						
320-33768-2	174271	101	91	100	99	104			
320-33768-3	120537.1	98		99	92	102			
320-33768-3 - DL	120537.1		86						
320-33768-4	120537.2	99		95	89	98			
320-33768-4 - DL	120537.2		88						
320-33768-5	116998	100	87	98	95	105			
320-33768-6	542539	95	87	96	91	98			
320-33768-7	116980	101	90	101	98	105			
320-33768-8	119971	95		95	89	100			
320-33768-8 - DL	119971		87						
320-33768-9	120103	97		97	86	98			
320-33768-9 - DL	120103		91						
320-33768-10	669097	96	91	99	94	100			
320-33768-11	669197	103	89	98	95	101			
320-33768-12	119946	100		98	92	102			
320-33768-12 - DL	119946		91						
320-33768-13	120046	97		98	89	101			
320-33768-13 - DL	120046		88						
LCS 320-198318/2-A	Lab Control Sample	91	88	99	89	99			
LCSD 320-198318/3-A	Lab Control Sample Dup	93	89	101	92	102			
MB 320-198318/1-A	Method Blank	97	92	105	91	100			

Surrogate Legend

13C4 PFOA = 13C4 PFOA
13C4 PFOS = 13C4 PFOS
18O2 PFHxS = 18O2 PFHxS
13C5 PFNA = 13C5 PFNA
13C4-PFHpA = 13C4-PFHpA

Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-198318/1-A
Matrix: Water
Analysis Batch: 198501

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 198318

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/05/17 10:20	12/05/17 15:06	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		12/05/17 10:20	12/05/17 15:06	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		12/05/17 10:20	12/05/17 15:06	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/05/17 10:20	12/05/17 15:06	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/05/17 10:20	12/05/17 15:06	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/05/17 10:20	12/05/17 15:06	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*97*		*25 - 150*	*12/05/17 10:20*	*12/05/17 15:06*	*1*
13C4 PFOS	*92*		*25 - 150*	*12/05/17 10:20*	*12/05/17 15:06*	*1*
18O2 PFHxS	*105*		*25 - 150*	*12/05/17 10:20*	*12/05/17 15:06*	*1*
13C5 PFNA	*91*		*25 - 150*	*12/05/17 10:20*	*12/05/17 15:06*	*1*
13C4-PFHpA	*100*		*25 - 150*	*12/05/17 10:20*	*12/05/17 15:06*	*1*

Lab Sample ID: LCS 320-198318/2-A
Matrix: Water
Analysis Batch: 198501

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 198318

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorooctanoic acid (PFOA)	20.0	19.3		ng/L		97	70 - 140
Perfluorooctanesulfonic acid (PFOS)	18.6	17.8		ng/L		96	69 - 144
Perfluorohexanesulfonic acid (PFHxS)	18.2	17.4		ng/L		95	73 - 157
Perfluorononanoic acid (PFNA)	20.0	19.9		ng/L		99	73 - 147
Perfluoroheptanoic acid (PFHpA)	20.0	20.3		ng/L		101	71 - 138
Perfluorobutanesulfonic acid (PFBS)	17.7	17.5		ng/L		99	72 - 151

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C4 PFOA	*91*		*25 - 150*
13C4 PFOS	*88*		*25 - 150*
18O2 PFHxS	*99*		*25 - 150*
13C5 PFNA	*89*		*25 - 150*
13C4-PFHpA	*99*		*25 - 150*

Lab Sample ID: LCSD 320-198318/3-A
Matrix: Water
Analysis Batch: 198501

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 198318

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorooctanoic acid (PFOA)	20.0	20.3		ng/L		102	70 - 140	5	30
Perfluorooctanesulfonic acid (PFOS)	18.6	18.4		ng/L		99	69 - 144	3	30
Perfluorohexanesulfonic acid (PFHxS)	18.2	17.6		ng/L		97	73 - 157	1	30
Perfluorononanoic acid (PFNA)	20.0	21.0		ng/L		105	73 - 147	6	30
Perfluoroheptanoic acid (PFHpA)	20.0	19.9		ng/L		100	71 - 138	2	30
Perfluorobutanesulfonic acid (PFBS)	17.7	17.7		ng/L		100	72 - 151	1	30

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33768-1

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
13C4 PFOA	93		25 - 150
13C4 PFOS	89		25 - 150
18O2 PFHxS	101		25 - 150
13C5 PFNA	92		25 - 150
13C4-PFHpA	102		25 - 150

LCMS

Prep Batch: 198318

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33768-1	120359	Total/NA	Water	PFAS Prep	
320-33768-1 - DL	120359	Total/NA	Water	PFAS Prep	
320-33768-2	174271	Total/NA	Water	PFAS Prep	
320-33768-3	120537.1	Total/NA	Water	PFAS Prep	
320-33768-3 - DL	120537.1	Total/NA	Water	PFAS Prep	
320-33768-4 - DL	120537.2	Total/NA	Water	PFAS Prep	
320-33768-4	120537.2	Total/NA	Water	PFAS Prep	
320-33768-5	116998	Total/NA	Water	PFAS Prep	
320-33768-6	542539	Total/NA	Water	PFAS Prep	
320-33768-7	116980	Total/NA	Water	PFAS Prep	
320-33768-8	119971	Total/NA	Water	PFAS Prep	
320-33768-8 - DL	119971	Total/NA	Water	PFAS Prep	
320-33768-9 - DL	120103	Total/NA	Water	PFAS Prep	
320-33768-9	120103	Total/NA	Water	PFAS Prep	
320-33768-10	669097	Total/NA	Water	PFAS Prep	
320-33768-11	669197	Total/NA	Water	PFAS Prep	
320-33768-12	119946	Total/NA	Water	PFAS Prep	
320-33768-12 - DL	119946	Total/NA	Water	PFAS Prep	
320-33768-13	120046	Total/NA	Water	PFAS Prep	
320-33768-13 - DL	120046	Total/NA	Water	PFAS Prep	
MB 320-198318/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-198318/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-198318/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 198501

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33768-1	120359	Total/NA	Water	WS-LC-0025 Att1	198318
320-33768-2	174271	Total/NA	Water	WS-LC-0025 Att1	198318
320-33768-3	120537.1	Total/NA	Water	WS-LC-0025 Att1	198318
320-33768-4	120537.2	Total/NA	Water	WS-LC-0025 Att1	198318
320-33768-5	116998	Total/NA	Water	WS-LC-0025 Att1	198318
320-33768-6	542539	Total/NA	Water	WS-LC-0025 Att1	198318
320-33768-7	116980	Total/NA	Water	WS-LC-0025 Att1	198318
320-33768-8	119971	Total/NA	Water	WS-LC-0025 Att1	198318
320-33768-9	120103	Total/NA	Water	WS-LC-0025 Att1	198318
320-33768-10	669097	Total/NA	Water	WS-LC-0025 Att1	198318
320-33768-11	669197	Total/NA	Water	WS-LC-0025 Att1	198318
320-33768-12	119946	Total/NA	Water	WS-LC-0025 Att1	198318
320-33768-13	120046	Total/NA	Water	WS-LC-0025 Att1	198318
MB 320-198318/1-A	Method Blank	Total/NA	Water	WS-LC-0025 Att1	198318

LCMS (Continued)

Analysis Batch: 198501 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 320-198318/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 Att1	198318
LCSD 320-198318/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 Att1	198318

Analysis Batch: 198733

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33768-1 - DL	120359	Total/NA	Water	WS-LC-0025 Att1	198318
320-33768-3 - DL	120537.1	Total/NA	Water	WS-LC-0025 Att1	198318
320-33768-4 - DL	120537.2	Total/NA	Water	WS-LC-0025 Att1	198318
320-33768-8 - DL	119971	Total/NA	Water	WS-LC-0025 Att1	198318
320-33768-9 - DL	120103	Total/NA	Water	WS-LC-0025 Att1	198318
320-33768-12 - DL	119946	Total/NA	Water	WS-LC-0025 Att1	198318
320-33768-13 - DL	120046	Total/NA	Water	WS-LC-0025 Att1	198318

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33768-1

Client Sample ID: 120359
Date Collected: 11/28/17 11:33
Date Received: 12/01/17 11:10

Lab Sample ID: 320-33768-1
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	PFAS Prep			1.00 mL	1.66 mL	198318	12/05/17 10:20	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1		1			198501	12/05/17 16:01	AAR	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	198318	12/05/17 10:20	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1	DL	10			198733	12/06/17 16:53	AAR	TAL SAC

Client Sample ID: 174271
Date Collected: 11/28/17 13:39
Date Received: 12/01/17 11:10

Lab Sample ID: 320-33768-2
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	PFAS Prep			1.00 mL	1.66 mL	198318	12/05/17 10:20	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1		1			198501	12/05/17 16:20	AAR	TAL SAC

Client Sample ID: 120537.1
Date Collected: 11/28/17 15:04
Date Received: 12/01/17 11:10

Lab Sample ID: 320-33768-3
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	PFAS Prep			1.00 mL	1.66 mL	198318	12/05/17 10:20	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1		1			198501	12/05/17 16:38	AAR	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	198318	12/05/17 10:20	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1	DL	10			198733	12/06/17 17:12	AAR	TAL SAC

Client Sample ID: 120537.2
Date Collected: 11/28/17 15:38
Date Received: 12/01/17 11:10

Lab Sample ID: 320-33768-4
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	PFAS Prep			1.00 mL	1.66 mL	198318	12/05/17 10:20	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1		1			198501	12/05/17 16:56	AAR	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	198318	12/05/17 10:20	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1	DL	10			198733	12/06/17 17:30	AAR	TAL SAC

Client Sample ID: 116998
Date Collected: 11/28/17 16:45
Date Received: 12/01/17 11:10

Lab Sample ID: 320-33768-5
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	PFAS Prep			1.00 mL	1.66 mL	198318	12/05/17 10:20	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1		1			198501	12/05/17 17:15	AAR	TAL SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33768-1

Client Sample ID: 542539
Date Collected: 11/29/17 11:30
Date Received: 12/01/17 11:10

Lab Sample ID: 320-33768-6
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	PFAS Prep			1.00 mL	1.66 mL	198318	12/05/17 10:20	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1		1			198501	12/05/17 17:33	AAR	TAL SAC

Client Sample ID: 116980
Date Collected: 11/29/17 12:43
Date Received: 12/01/17 11:10

Lab Sample ID: 320-33768-7
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	PFAS Prep			1.00 mL	1.66 mL	198318	12/05/17 10:20	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1		1			198501	12/05/17 17:52	AAR	TAL SAC

Client Sample ID: 119971
Date Collected: 11/29/17 13:50
Date Received: 12/01/17 11:10

Lab Sample ID: 320-33768-8
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	198318	12/05/17 10:20	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1		1			198501	12/05/17 18:28	AAR	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	198318	12/05/17 10:20	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1	DL	10			198733	12/06/17 17:48	AAR	TAL SAC

Client Sample ID: 120103
Date Collected: 11/29/17 14:27
Date Received: 12/01/17 11:10

Lab Sample ID: 320-33768-9
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	PFAS Prep			1.00 mL	1.66 mL	198318	12/05/17 10:20	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1		1			198501	12/05/17 18:47	AAR	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	198318	12/05/17 10:20	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1	DL	10			198733	12/06/17 18:07	AAR	TAL SAC

Client Sample ID: 669097
Date Collected: 11/29/17 15:30
Date Received: 12/01/17 11:10

Lab Sample ID: 320-33768-10
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	PFAS Prep			1.00 mL	1.66 mL	198318	12/05/17 10:20	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1		1			198501	12/05/17 19:05	AAR	TAL SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33768-1

Client Sample ID: 669197

Date Collected: 11/29/17 15:40
Date Received: 12/01/17 11:10

Lab Sample ID: 320-33768-11

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	PFAS Prep			1.00 mL	1.66 mL	198318	12/05/17 10:20	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1		1			198501	12/05/17 19:24	AAR	TAL SAC

Client Sample ID: 119946

Date Collected: 11/29/17 16:53
Date Received: 12/01/17 11:10

Lab Sample ID: 320-33768-12

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	PFAS Prep			1.00 mL	1.66 mL	198318	12/05/17 10:20	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1		1			198501	12/05/17 19:42	AAR	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	198318	12/05/17 10:20	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1	DL	10			198733	12/06/17 18:25	AAR	TAL SAC

Client Sample ID: 120046

Date Collected: 11/29/17 17:03
Date Received: 12/01/17 11:10

Lab Sample ID: 320-33768-13

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	PFAS Prep			1.00 mL	1.66 mL	198318	12/05/17 10:20	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1		1			198501	12/05/17 20:00	AAR	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	198318	12/05/17 10:20	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 Att1	DL	10			198733	12/06/17 18:44	AAR	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33768-1

Laboratory: TestAmerica Sacramento

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

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-055	12-18-17
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-18
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-18
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	12-31-17
L-A-B	DoD ELAP		L2468	01-20-18
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-18-18
Michigan	State Program	5	9947	01-31-18
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-28-18
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	12-30-17
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
West Virginia (DW)	State Program	3	9930C	12-31-17
Wyoming	State Program	8	8TMS-L	01-28-19

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33768-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 Att1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33768-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-33768-1	120359	Water	11/28/17 11:33	12/01/17 11:10
320-33768-2	174271	Water	11/28/17 13:39	12/01/17 11:10
320-33768-3	120537.1	Water	11/28/17 15:04	12/01/17 11:10
320-33768-4	120537.2	Water	11/28/17 15:38	12/01/17 11:10
320-33768-5	116998	Water	11/28/17 16:45	12/01/17 11:10
320-33768-6	542539	Water	11/29/17 11:30	12/01/17 11:10
320-33768-7	116980	Water	11/29/17 12:43	12/01/17 11:10
320-33768-8	119971	Water	11/29/17 13:50	12/01/17 11:10
320-33768-9	120103	Water	11/29/17 14:27	12/01/17 11:10
320-33768-10	669097	Water	11/29/17 15:30	12/01/17 11:10
320-33768-11	669197	Water	11/29/17 15:40	12/01/17 11:10
320-33768-12	119946	Water	11/29/17 16:53	12/01/17 11:10
320-33768-13	120046	Water	11/29/17 17:03	12/01/17 11:10

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

CHAIN-OF-CU

320-33768 Chain of Custody

Page 1 of 2

Laboratory Test America
Attn: David Alltucker

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFAS x6 (LWS-LC-0025)						Total Number of Containers	Remarks/Matrix
120359		1133	11/28/17		X	X						2	Groundwater
174271		1339			X	X						2	
120537.1		1504			X	X						2	
120537.2		1538			X	X						2	
116998		1645			X	X						2	
542539		1130	11/29/17		X	X						2	
116980		1243			X	X						2	
119971		1350			X	X						2	
120103		1427			X	X						2	
669097		1530			X	X						2	

Project Information		Sample Receipt	
Project Number:	31-1-20060-001	Total Number of Containers	26
Project Name:	FIA	COC Seals/Intact? Y/N/NA	—
Contact:	MDN	Received Good Cond./Cold	—
Ongoing Project?	Yes ☑ No ☐	Delivery Method:	Goldstreak
Sampler:	CAB	(attach shipping bill, if any)	

Instructions

Requested Turnaround Time: 5-day rush

Special Instructions: Please bill to:
31-1-20060-001

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

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature:	Signature:	Signature:
Time: 11/29/17	Time:	Time:
Printed Name: Marcy Nadel	Printed Name:	Printed Name:
Date: 1810	Date:	Date:
Company: Shannon & Wilson	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature:	Signature:	Signature:
Time: 1110	Time:	Time:
Printed Name: Alonso Aguayo	Printed Name:	Printed Name:
Date: 12/01/17	Date:	Date:
Company: TAS 5.5	Company:	Company:

F-19-91/UR

No. 34414

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

CHAIN-OF-CUSTODY RECORD

Laboratory Test America
Attn: David Althaker

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFAS 46 (LCS-LL-0075)						Total Number of Containers	Remarks/Matrix
669197		1540	11/29/17		X	X						2	Groundwater
119946		1653	↓		X	X						2	↓
120046		1703	↓		X	X						2	↓

Project Information		Sample Receipt	
Project Number:	31-1-20660-001	Total Number of Containers	26
Project Name:	FIA	COC Seals/Intact? Y/N/NA	—
Contact:	MDN	Received Good Cond./Cold	—
Ongoing Project?	Yes ☑ No ☐	Delivery Method:	Goldstreak
Sampler:	CAB	(attach shipping bill, if any)	

Instructions

Requested Turnaround Time: 5-day rush

Special Instructions: Please see Page 1

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: [signature] Time: 1810	Signature: Time:	Signature: Time:
Printed Name: Marcy Nadel Date: 11/29/17	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson	Company:	Company:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: [signature] Time: 1110	Signature: Time:	Signature: Time:
Printed Name: Alonso Aguayo Date: 12/01/17	Printed Name: Date:	Printed Name: Date:
Company: TAWS 5.5	Company:	Company:

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

F-19-91/UR

No. 34418

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-33768-1

Login Number: 33768
List Number: 1
Creator: Nelson, Kym D

List Source: 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/31-1-20060
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	5.5 C
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:

Kristen Freiburger

Title:

Senior Chemist

Date:

December 8, 2017

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

December 7, 2017

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-33768-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-33768-1

1. Laboratory

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

   ☐ Yes ☒ No Comments:

ADEC has not approved an analytical laboratory for analysis of PFASs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

   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 Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

   ☒ Yes ☐ No Comments:

   b. Correct Analyses requested?

   ☒ Yes ☐ No Comments:

3. Laboratory Sample Receipt Documentation

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

   ☒ Yes ☐ No Comments:

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

   ☒ Yes ☐ No Comments:

Analysis of PFASs does not require a preservative other than temperature control.

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

   ☒ Yes ☐ No 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 Comments:

There were no discrepancies identified in the sample receipt documentation.

e. Data quality or usability affected?

Comments:

The data quality and usability were unaffected; see above.

4. Case Narrative

a. Present and understandable?

☒ Yes ☐ No Comments:

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

☒ Yes ☐ No Comments:

The case narrative notes the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 5.5º C.

The case narrative notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD).

The case narrative notes many of the project samples included in this work order contained sediment and were filtered prior to analysis.

c. Were all corrective actions documented?

☒ Yes ☐ No Comments:

A laboratory control sample (LCS) and a LCS duplicate (LCSD) were extracted and analyzed to demonstrate analytical method accuracy and precision.

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

Comments:

The case narrative does not specify an effect on data quality or usability, please see the following sections for our assessment.

5. Samples Results

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

☒ Yes ☐ No Comments:

b. All applicable holding times met?

☑ Yes ☐ No Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

☐ Yes ☑ No Comments:

N/A; 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 Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

☐ Yes ☑ No Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

☑ Yes ☐ No Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

☑ Yes ☐ No Comments:

iii. If above LOQ, what samples are affected?

Comments:

None; PFAS compounds were not detected in method blank samples.

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

☐ Yes ☑ No Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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 Comments:

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

☐ Yes ☑ No 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

☑ Yes ☐ No Comments:

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

☑ Yes ☐ No Comments:

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

Comments:

N/A; 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 Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

☑ Yes ☐ No Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a 13C-isotope of each target analyte and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

☑ Yes ☐ No Comments:

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

☐ Yes ☑ No Comments:

Qualification of the results was not required; IDA recoveries were within acceptance criteria.

iv. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

☐ Yes ☑ No Comments:

PFASs are not volatile compounds; 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 Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not submitted with this work order.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

☒ Yes ☐ No Comments:

Two field-duplicate pairs were submitted with the analytical samples included in this work order.

ii. Submitted blind to lab?

☒ Yes ☐ No Comments:

Field-duplicate pairs 119946 / 120046 and 669097 / 669197 were submitted with this work order.

iii. Precision – All relative percent differences (RPD) less than specified DQOs? (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 Comments:

Yes, the field-duplicate RPDs are within the DQOs, where calculable for detected analytes.

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

Comments:

The data quality and usability were not affected.

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

☐ Yes ☐ No ☒ Not Applicable

Samples for this project are not collected with reusable equipment, therefore a practical potential for equipment based cross-contamination does not exist.

i. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; an equipment blank was not submitted.

ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

a. Defined and appropriate?

☐ Yes ☒ No Comments:

No other data flags and/or qualifiers were required.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 320-33898-1
Client Project/Site: FIA

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

Attn: Marcy Nadel

Authorized for release by:
12/11/2017 12:33:11 PM

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

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
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Job ID: 320-33898-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-33898-1

Receipt
The samples were received on 12/5/2017 3:15 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.8º C.

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

Organic Prep
Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-198777, method code PFAS_DI_Prep.

Method(s) PFAS Prep: The following samples: 509451 (320-33898-1), 152773 (320-33898-2), 466808 (320-33898-3), 176176 (320-33898-4), 482919 (320-33898-5), 174556 (320-33898-6), 465356 (320-33898-7), 174467 (320-33898-8), 174567 (320-33898-9), 174971 (320-33898-10) and 174297 (320-33898-11) contain sediment.

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: FIA

TestAmerica Job ID: 320-33898-1

Client Sample ID: 509451 — Lab Sample ID: 320-33898-1

No Detections.

Client Sample ID: 152773 — Lab Sample ID: 320-33898-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	19		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	41		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	6.7		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	7.8		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	100		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	0.92	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 466808 — Lab Sample ID: 320-33898-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.6	J	2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	1.9	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.93	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	1.4	J	2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	7.5		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 176176 — Lab Sample ID: 320-33898-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanesulfonic acid (PFOS)	2.3		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 482919 — Lab Sample ID: 320-33898-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	1.2	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	2.1		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 174556 — Lab Sample ID: 320-33898-6

No Detections.

Client Sample ID: 465356 — Lab Sample ID: 320-33898-7

No Detections.

Client Sample ID: 174467 — Lab Sample ID: 320-33898-8

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33898-1

Client Sample ID: 174467 (Continued) — Lab Sample ID: 320-33898-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	7.8		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	20		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	3.7		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	6.7		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	95		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	0.73	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 174567 — Lab Sample ID: 320-33898-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	7.4		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	19		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	3.9		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	6.3		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	92		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	0.78	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 174971 — Lab Sample ID: 320-33898-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	22		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	98		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	11		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	16		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	370		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: 174297 — Lab Sample ID: 320-33898-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	12		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	27		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	5.6		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	9.0		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	89		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: 174297 (Continued) — Lab Sample ID: 320-33898-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorononanoic acid (PFNA)	0.70	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 573752 — Lab Sample ID: 320-33898-12

No Detections.

Client Sample ID: 524051 — Lab Sample ID: 320-33898-13

No Detections.

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33898-1

Client Sample ID: 509451
Date Collected: 11/30/17 10:52
Date Received: 12/05/17 15:15

Lab Sample ID: 320-33898-1
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/07/17 10:50	12/07/17 21:12	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		12/07/17 10:50	12/07/17 21:12	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/07/17 10:50	12/07/17 21:12	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/07/17 10:50	12/07/17 21:12	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		12/07/17 10:50	12/07/17 21:12	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/07/17 10:50	12/07/17 21:12	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*101*		*25 - 150*	*12/07/17 10:50*	*12/07/17 21:12*	*1*
13C4-PFHpA	*100*		*25 - 150*	*12/07/17 10:50*	*12/07/17 21:12*	*1*
13C4 PFOA	*98*		*25 - 150*	*12/07/17 10:50*	*12/07/17 21:12*	*1*
13C4 PFOS	*92*		*25 - 150*	*12/07/17 10:50*	*12/07/17 21:12*	*1*
13C5 PFNA	*92*		*25 - 150*	*12/07/17 10:50*	*12/07/17 21:12*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33898-1

Client Sample ID: 152773
Date Collected: 11/30/17 11:39
Date Received: 12/05/17 15:15

Lab Sample ID: 320-33898-2
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	19		2.0	0.92	ng/L		12/07/17 10:50	12/07/17 21:31	1
Perfluorohexanesulfonic acid (PFHxS)	41		2.0	0.87	ng/L		12/07/17 10:50	12/07/17 21:31	1
Perfluoroheptanoic acid (PFHpA)	6.7		2.0	0.80	ng/L		12/07/17 10:50	12/07/17 21:31	1
Perfluorooctanoic acid (PFOA)	7.8		2.0	0.75	ng/L		12/07/17 10:50	12/07/17 21:31	1
Perfluorooctanesulfonic acid (PFOS)	100		2.0	1.3	ng/L		12/07/17 10:50	12/07/17 21:31	1
Perfluorononanoic acid (PFNA)	0.92	J	2.0	0.65	ng/L		12/07/17 10:50	12/07/17 21:31	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*105*		*25 - 150*	*12/07/17 10:50*	*12/07/17 21:31*	*1*
13C4-PFHpA	*106*		*25 - 150*	*12/07/17 10:50*	*12/07/17 21:31*	*1*
13C4 PFOA	*102*		*25 - 150*	*12/07/17 10:50*	*12/07/17 21:31*	*1*
13C4 PFOS	*97*		*25 - 150*	*12/07/17 10:50*	*12/07/17 21:31*	*1*
13C5 PFNA	*98*		*25 - 150*	*12/07/17 10:50*	*12/07/17 21:31*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33898-1

Client Sample ID: 466808
Date Collected: 11/30/17 13:33
Date Received: 12/05/17 15:15

Lab Sample ID: 320-33898-3
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	1.6	J	2.0	0.92	ng/L		12/07/17 10:50	12/07/17 21:49	1
Perfluorohexanesulfonic acid (PFHxS)	1.9	J	2.0	0.87	ng/L		12/07/17 10:50	12/07/17 21:49	1
Perfluoroheptanoic acid (PFHpA)	0.93	J	2.0	0.80	ng/L		12/07/17 10:50	12/07/17 21:49	1
Perfluorooctanoic acid (PFOA)	1.4	J	2.0	0.75	ng/L		12/07/17 10:50	12/07/17 21:49	1
Perfluorooctanesulfonic acid (PFOS)	7.5		2.0	1.3	ng/L		12/07/17 10:50	12/07/17 21:49	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/07/17 10:50	12/07/17 21:49	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*108*		*25 - 150*	*12/07/17 10:50*	*12/07/17 21:49*	*1*
13C4-PFHpA	*104*		*25 - 150*	*12/07/17 10:50*	*12/07/17 21:49*	*1*
13C4 PFOA	*102*		*25 - 150*	*12/07/17 10:50*	*12/07/17 21:49*	*1*
13C4 PFOS	*98*		*25 - 150*	*12/07/17 10:50*	*12/07/17 21:49*	*1*
13C5 PFNA	*95*		*25 - 150*	*12/07/17 10:50*	*12/07/17 21:49*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33898-1

Client Sample ID: 176176
Date Collected: 11/30/17 15:04
Date Received: 12/05/17 15:15

Lab Sample ID: 320-33898-4
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/07/17 10:50	12/07/17 22:07	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		12/07/17 10:50	12/07/17 22:07	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/07/17 10:50	12/07/17 22:07	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/07/17 10:50	12/07/17 22:07	1
Perfluorooctanesulfonic acid (PFOS)	**2.3**		2.0	1.3	ng/L		12/07/17 10:50	12/07/17 22:07	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/07/17 10:50	12/07/17 22:07	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*108*		*25 - 150*	*12/07/17 10:50*	*12/07/17 22:07*	*1*
13C4-PFHpA	*106*		*25 - 150*	*12/07/17 10:50*	*12/07/17 22:07*	*1*
13C4 PFOA	*107*		*25 - 150*	*12/07/17 10:50*	*12/07/17 22:07*	*1*
13C4 PFOS	*99*		*25 - 150*	*12/07/17 10:50*	*12/07/17 22:07*	*1*
13C5 PFNA	*97*		*25 - 150*	*12/07/17 10:50*	*12/07/17 22:07*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33898-1

Client Sample ID: 482919
Date Collected: 11/30/17 15:49
Date Received: 12/05/17 15:15

Lab Sample ID: 320-33898-5
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/07/17 10:50	12/07/17 22:26	1
Perfluorohexanesulfonic acid (PFHxS)	**1.2**	**J**	2.0	0.87	ng/L		12/07/17 10:50	12/07/17 22:26	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/07/17 10:50	12/07/17 22:26	1
Perfluorooctanoic acid (PFOA)	**2.1**		2.0	0.75	ng/L		12/07/17 10:50	12/07/17 22:26	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		12/07/17 10:50	12/07/17 22:26	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/07/17 10:50	12/07/17 22:26	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*99*		*25 - 150*	*12/07/17 10:50*	*12/07/17 22:26*	*1*
13C4-PFHpA	*97*		*25 - 150*	*12/07/17 10:50*	*12/07/17 22:26*	*1*
13C4 PFOA	*98*		*25 - 150*	*12/07/17 10:50*	*12/07/17 22:26*	*1*
13C4 PFOS	*91*		*25 - 150*	*12/07/17 10:50*	*12/07/17 22:26*	*1*
13C5 PFNA	*89*		*25 - 150*	*12/07/17 10:50*	*12/07/17 22:26*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33898-1

Client Sample ID: 174556
Date Collected: 12/01/17 11:12
Date Received: 12/05/17 15:15

Lab Sample ID: 320-33898-6
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/07/17 10:50	12/07/17 22:44	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		12/07/17 10:50	12/07/17 22:44	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/07/17 10:50	12/07/17 22:44	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/07/17 10:50	12/07/17 22:44	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		12/07/17 10:50	12/07/17 22:44	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/07/17 10:50	12/07/17 22:44	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*104*		*25 - 150*	*12/07/17 10:50*	*12/07/17 22:44*	*1*
13C4-PFHpA	*99*		*25 - 150*	*12/07/17 10:50*	*12/07/17 22:44*	*1*
13C4 PFOA	*97*		*25 - 150*	*12/07/17 10:50*	*12/07/17 22:44*	*1*
13C4 PFOS	*94*		*25 - 150*	*12/07/17 10:50*	*12/07/17 22:44*	*1*
13C5 PFNA	*93*		*25 - 150*	*12/07/17 10:50*	*12/07/17 22:44*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33898-1

Client Sample ID: 465356
Date Collected: 12/01/17 11:54
Date Received: 12/05/17 15:15

Lab Sample ID: 320-33898-7
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/07/17 10:50	12/07/17 23:02	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		12/07/17 10:50	12/07/17 23:02	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/07/17 10:50	12/07/17 23:02	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/07/17 10:50	12/07/17 23:02	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		12/07/17 10:50	12/07/17 23:02	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/07/17 10:50	12/07/17 23:02	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*102*		*25 - 150*	*12/07/17 10:50*	*12/07/17 23:02*	*1*
13C4-PFHpA	*99*		*25 - 150*	*12/07/17 10:50*	*12/07/17 23:02*	*1*
13C4 PFOA	*94*		*25 - 150*	*12/07/17 10:50*	*12/07/17 23:02*	*1*
13C4 PFOS	*92*		*25 - 150*	*12/07/17 10:50*	*12/07/17 23:02*	*1*
13C5 PFNA	*86*		*25 - 150*	*12/07/17 10:50*	*12/07/17 23:02*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33898-1

Client Sample ID: 174467
Date Collected: 12/01/17 13:15
Date Received: 12/05/17 15:15

Lab Sample ID: 320-33898-8
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	7.8		2.0	0.92	ng/L		12/07/17 10:50	12/07/17 23:39	1
Perfluorohexanesulfonic acid (PFHxS)	20		2.0	0.87	ng/L		12/07/17 10:50	12/07/17 23:39	1
Perfluoroheptanoic acid (PFHpA)	3.7		2.0	0.80	ng/L		12/07/17 10:50	12/07/17 23:39	1
Perfluorooctanoic acid (PFOA)	6.7		2.0	0.75	ng/L		12/07/17 10:50	12/07/17 23:39	1
Perfluorooctanesulfonic acid (PFOS)	95		2.0	1.3	ng/L		12/07/17 10:50	12/07/17 23:39	1
Perfluorononanoic acid (PFNA)	0.73	J	2.0	0.65	ng/L		12/07/17 10:50	12/07/17 23:39	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*98*		*25 - 150*	*12/07/17 10:50*	*12/07/17 23:39*	*1*
13C4-PFHpA	*98*		*25 - 150*	*12/07/17 10:50*	*12/07/17 23:39*	*1*
13C4 PFOA	*95*		*25 - 150*	*12/07/17 10:50*	*12/07/17 23:39*	*1*
13C4 PFOS	*90*		*25 - 150*	*12/07/17 10:50*	*12/07/17 23:39*	*1*
13C5 PFNA	*88*		*25 - 150*	*12/07/17 10:50*	*12/07/17 23:39*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33898-1

Client Sample ID: 174567
Date Collected: 12/01/17 13:25
Date Received: 12/05/17 15:15

Lab Sample ID: 320-33898-9
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	7.4		2.0	0.92	ng/L		12/07/17 10:50	12/07/17 23:57	1
Perfluorohexanesulfonic acid (PFHxS)	19		2.0	0.87	ng/L		12/07/17 10:50	12/07/17 23:57	1
Perfluoroheptanoic acid (PFHpA)	3.9		2.0	0.80	ng/L		12/07/17 10:50	12/07/17 23:57	1
Perfluorooctanoic acid (PFOA)	6.3		2.0	0.75	ng/L		12/07/17 10:50	12/07/17 23:57	1
Perfluorooctanesulfonic acid (PFOS)	92		2.0	1.3	ng/L		12/07/17 10:50	12/07/17 23:57	1
Perfluorononanoic acid (PFNA)	0.78	J	2.0	0.65	ng/L		12/07/17 10:50	12/07/17 23:57	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*97*		*25 - 150*	*12/07/17 10:50*	*12/07/17 23:57*	*1*
13C4-PFHpA	*95*		*25 - 150*	*12/07/17 10:50*	*12/07/17 23:57*	*1*
13C4 PFOA	*91*		*25 - 150*	*12/07/17 10:50*	*12/07/17 23:57*	*1*
13C4 PFOS	*87*		*25 - 150*	*12/07/17 10:50*	*12/07/17 23:57*	*1*
13C5 PFNA	*85*		*25 - 150*	*12/07/17 10:50*	*12/07/17 23:57*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33898-1

Client Sample ID: 174971
Date Collected: 12/01/17 14:24
Date Received: 12/05/17 15:15

Lab Sample ID: 320-33898-10
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	22		2.0	0.92	ng/L		12/07/17 10:50	12/08/17 00:16	1
Perfluorohexanesulfonic acid (PFHxS)	98		2.0	0.87	ng/L		12/07/17 10:50	12/08/17 00:16	1
Perfluoroheptanoic acid (PFHpA)	11		2.0	0.80	ng/L		12/07/17 10:50	12/08/17 00:16	1
Perfluorooctanoic acid (PFOA)	16		2.0	0.75	ng/L		12/07/17 10:50	12/08/17 00:16	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/07/17 10:50	12/08/17 00:16	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*99*		*25 - 150*	*12/07/17 10:50*	*12/08/17 00:16*	*1*
13C4-PFHpA	*95*		*25 - 150*	*12/07/17 10:50*	*12/08/17 00:16*	*1*
13C4 PFOA	*93*		*25 - 150*	*12/07/17 10:50*	*12/08/17 00:16*	*1*
13C4 PFOS	*88*		*25 - 150*	*12/07/17 10:50*	*12/08/17 00:16*	*1*
13C5 PFNA	*86*		*25 - 150*	*12/07/17 10:50*	*12/08/17 00:16*	*1*

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	370		20	13	ng/L		12/07/17 10:50	12/08/17 10:54	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*104*		*25 - 150*	*12/07/17 10:50*	*12/08/17 10:54*	*10*
13C4-PFHpA	*99*		*25 - 150*	*12/07/17 10:50*	*12/08/17 10:54*	*10*
13C4 PFOA	*93*		*25 - 150*	*12/07/17 10:50*	*12/08/17 10:54*	*10*
13C4 PFOS	*95*		*25 - 150*	*12/07/17 10:50*	*12/08/17 10:54*	*10*
13C5 PFNA	*85*		*25 - 150*	*12/07/17 10:50*	*12/08/17 10:54*	*10*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33898-1

Client Sample ID: 174297
Date Collected: 12/01/17 14:59
Date Received: 12/05/17 15:15

Lab Sample ID: 320-33898-11
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	12		2.0	0.92	ng/L		12/07/17 10:50	12/08/17 00:34	1
Perfluorohexanesulfonic acid (PFHxS)	27		2.0	0.87	ng/L		12/07/17 10:50	12/08/17 00:34	1
Perfluoroheptanoic acid (PFHpA)	5.6		2.0	0.80	ng/L		12/07/17 10:50	12/08/17 00:34	1
Perfluorooctanoic acid (PFOA)	9.0		2.0	0.75	ng/L		12/07/17 10:50	12/08/17 00:34	1
Perfluorooctanesulfonic acid (PFOS)	89		2.0	1.3	ng/L		12/07/17 10:50	12/08/17 00:34	1
Perfluorononanoic acid (PFNA)	0.70	J	2.0	0.65	ng/L		12/07/17 10:50	12/08/17 00:34	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*100*		*25 - 150*	*12/07/17 10:50*	*12/08/17 00:34*	*1*
13C4-PFHpA	*97*		*25 - 150*	*12/07/17 10:50*	*12/08/17 00:34*	*1*
13C4 PFOA	*95*		*25 - 150*	*12/07/17 10:50*	*12/08/17 00:34*	*1*
13C4 PFOS	*92*		*25 - 150*	*12/07/17 10:50*	*12/08/17 00:34*	*1*
13C5 PFNA	*88*		*25 - 150*	*12/07/17 10:50*	*12/08/17 00:34*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33898-1

Client Sample ID: 573752
Date Collected: 12/01/17 16:48
Date Received: 12/05/17 15:15

Lab Sample ID: 320-33898-12
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/07/17 10:50	12/08/17 00:53	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		12/07/17 10:50	12/08/17 00:53	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/07/17 10:50	12/08/17 00:53	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/07/17 10:50	12/08/17 00:53	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		12/07/17 10:50	12/08/17 00:53	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/07/17 10:50	12/08/17 00:53	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*101*		*25 - 150*	*12/07/17 10:50*	*12/08/17 00:53*	*1*
13C4-PFHpA	*98*		*25 - 150*	*12/07/17 10:50*	*12/08/17 00:53*	*1*
13C4 PFOA	*95*		*25 - 150*	*12/07/17 10:50*	*12/08/17 00:53*	*1*
13C4 PFOS	*94*		*25 - 150*	*12/07/17 10:50*	*12/08/17 00:53*	*1*
13C5 PFNA	*90*		*25 - 150*	*12/07/17 10:50*	*12/08/17 00:53*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33898-1

Client Sample ID: 524051
Date Collected: 12/03/17 17:00
Date Received: 12/05/17 15:15

Lab Sample ID: 320-33898-13
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/07/17 10:50	12/08/17 01:11	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		12/07/17 10:50	12/08/17 01:11	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/07/17 10:50	12/08/17 01:11	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/07/17 10:50	12/08/17 01:11	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		12/07/17 10:50	12/08/17 01:11	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/07/17 10:50	12/08/17 01:11	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*105*		*25 - 150*	*12/07/17 10:50*	*12/08/17 01:11*	*1*
13C4-PFHpA	*101*		*25 - 150*	*12/07/17 10:50*	*12/08/17 01:11*	*1*
13C4 PFOA	*96*		*25 - 150*	*12/07/17 10:50*	*12/08/17 01:11*	*1*
13C4 PFOS	*95*		*25 - 150*	*12/07/17 10:50*	*12/08/17 01:11*	*1*
13C5 PFNA	*91*		*25 - 150*	*12/07/17 10:50*	*12/08/17 01:11*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33898-1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	3O2 PFHx (25-150)	3C4-PFHp (25-150)	3C4 PFO/ (25-150)	3C4 PFO$ (25-150)	3C5 PFN/ (25-150)			
320-33898-1	509451	101	100	98	92	92			
320-33898-2	152773	105	106	102	97	98			
320-33898-3	466808	108	104	102	98	95			
320-33898-4	176176	108	106	107	99	97			
320-33898-5	482919	99	97	98	91	89			
320-33898-6	174556	104	99	97	94	93			
320-33898-7	465356	102	99	94	92	86			
320-33898-8	174467	98	98	95	90	88			
320-33898-9	174567	97	95	91	87	85			
320-33898-10	174971	99	95	93	88	86			
320-33898-10 - DL	174971	104	99	93	95	85			
320-33898-11	174297	100	97	95	92	88			
320-33898-12	573752	101	98	95	94	90			
320-33898-13	524051	105	101	96	95	91			
LCS 320-198777/2-A	Lab Control Sample	100	97	93	91	87			
LCSD 320-198777/3-A	Lab Control Sample Dup	92	89	86	83	82			
MB 320-198777/1-A	Method Blank	96	95	90	89	86			

Surrogate Legend

18O2 PFHxS = 18O2 PFHxS
13C4-PFHpA = 13C4-PFHpA
13C4 PFOA = 13C4 PFOA
13C4 PFOS = 13C4 PFOS
13C5 PFNA = 13C5 PFNA

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-198777/1-A
Matrix: Water
Analysis Batch: 198929

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 198777

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/07/17 10:50	12/07/17 20:17	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		12/07/17 10:50	12/07/17 20:17	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/07/17 10:50	12/07/17 20:17	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/07/17 10:50	12/07/17 20:17	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		12/07/17 10:50	12/07/17 20:17	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/07/17 10:50	12/07/17 20:17	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*96*		*25 - 150*	*12/07/17 10:50*	*12/07/17 20:17*	*1*
13C4-PFHpA	*95*		*25 - 150*	*12/07/17 10:50*	*12/07/17 20:17*	*1*
13C4 PFOA	*90*		*25 - 150*	*12/07/17 10:50*	*12/07/17 20:17*	*1*
13C4 PFOS	*89*		*25 - 150*	*12/07/17 10:50*	*12/07/17 20:17*	*1*
13C5 PFNA	*86*		*25 - 150*	*12/07/17 10:50*	*12/07/17 20:17*	*1*

Lab Sample ID: LCS 320-198777/2-A
Matrix: Water
Analysis Batch: 198929

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 198777

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	18.2		ng/L		103	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	17.5		ng/L		96	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	20.3		ng/L		101	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	20.2		ng/L		101	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	18.3		ng/L		99	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	21.7		ng/L		108	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*100*		*25 - 150*
13C4-PFHpA	*97*		*25 - 150*
13C4 PFOA	*93*		*25 - 150*
13C4 PFOS	*91*		*25 - 150*
13C5 PFNA	*87*		*25 - 150*

Lab Sample ID: LCSD 320-198777/3-A
Matrix: Water
Analysis Batch: 198929

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 198777

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	18.4		ng/L		104	72 - 151	1	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	17.9		ng/L		98	73 - 157	2	30
Perfluoroheptanoic acid (PFHpA)			20.0	21.4		ng/L		107	71 - 138	5	30
Perfluorooctanoic acid (PFOA)			20.0	20.9		ng/L		104	70 - 140	4	30
Perfluorooctanesulfonic acid (PFOS)			18.6	19.2		ng/L		103	69 - 144	5	30
Perfluorononanoic acid (PFNA)			20.0	21.9		ng/L		110	73 - 147	1	30

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33898-1

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	92		25 - 150
13C4-PFHpA	89		25 - 150
13C4 PFOA	86		25 - 150
13C4 PFOS	83		25 - 150
13C5 PFNA	82		25 - 150

LCMS

Prep Batch: 198777

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33898-1	509451	Total/NA	Water	PFAS Prep	
320-33898-2	152773	Total/NA	Water	PFAS Prep	
320-33898-3	466808	Total/NA	Water	PFAS Prep	
320-33898-4	176176	Total/NA	Water	PFAS Prep	
320-33898-5	482919	Total/NA	Water	PFAS Prep	
320-33898-6	174556	Total/NA	Water	PFAS Prep	
320-33898-7	465356	Total/NA	Water	PFAS Prep	
320-33898-8	174467	Total/NA	Water	PFAS Prep	
320-33898-9	174567	Total/NA	Water	PFAS Prep	
320-33898-10	174971	Total/NA	Water	PFAS Prep	
320-33898-10 - DL	174971	Total/NA	Water	PFAS Prep	
320-33898-11	174297	Total/NA	Water	PFAS Prep	
320-33898-12	573752	Total/NA	Water	PFAS Prep	
320-33898-13	524051	Total/NA	Water	PFAS Prep	
MB 320-198777/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-198777/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-198777/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 198929

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33898-1	509451	Total/NA	Water	WS-LC-0025 At1	198777
320-33898-2	152773	Total/NA	Water	WS-LC-0025 At1	198777
320-33898-3	466808	Total/NA	Water	WS-LC-0025 At1	198777
320-33898-4	176176	Total/NA	Water	WS-LC-0025 At1	198777
320-33898-5	482919	Total/NA	Water	WS-LC-0025 At1	198777
320-33898-6	174556	Total/NA	Water	WS-LC-0025 At1	198777
320-33898-7	465356	Total/NA	Water	WS-LC-0025 At1	198777
320-33898-8	174467	Total/NA	Water	WS-LC-0025 At1	198777
320-33898-9	174567	Total/NA	Water	WS-LC-0025 At1	198777
320-33898-10	174971	Total/NA	Water	WS-LC-0025 At1	198777
320-33898-11	174297	Total/NA	Water	WS-LC-0025 At1	198777
320-33898-12	573752	Total/NA	Water	WS-LC-0025 At1	198777
320-33898-13	524051	Total/NA	Water	WS-LC-0025 At1	198777
MB 320-198777/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	198777
LCS 320-198777/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	198777
LCSD 320-198777/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	198777

LCMS (Continued)

Analysis Batch: 198967

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33898-10 - DL	174971	Total/NA	Water	WS-LC-0025 At1	198777

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33898-1

Client Sample ID: 509451
Date Collected: 11/30/17 10:52
Date Received: 12/05/17 15:15

Lab Sample ID: 320-33898-1
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	PFAS Prep			1.00 mL	1.66 mL	198777	12/07/17 10:50	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			198929	12/07/17 21:12	AAR	TAL SAC

Client Sample ID: 152773
Date Collected: 11/30/17 11:39
Date Received: 12/05/17 15:15

Lab Sample ID: 320-33898-2
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	PFAS Prep			1.00 mL	1.66 mL	198777	12/07/17 10:50	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			198929	12/07/17 21:31	AAR	TAL SAC

Client Sample ID: 466808
Date Collected: 11/30/17 13:33
Date Received: 12/05/17 15:15

Lab Sample ID: 320-33898-3
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	PFAS Prep			1.00 mL	1.66 mL	198777	12/07/17 10:50	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			198929	12/07/17 21:49	AAR	TAL SAC

Client Sample ID: 176176
Date Collected: 11/30/17 15:04
Date Received: 12/05/17 15:15

Lab Sample ID: 320-33898-4
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	PFAS Prep			1.00 mL	1.66 mL	198777	12/07/17 10:50	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			198929	12/07/17 22:07	AAR	TAL SAC

Client Sample ID: 482919
Date Collected: 11/30/17 15:49
Date Received: 12/05/17 15:15

Lab Sample ID: 320-33898-5
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	PFAS Prep			1.00 mL	1.66 mL	198777	12/07/17 10:50	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			198929	12/07/17 22:26	AAR	TAL SAC

Client Sample ID: 174556
Date Collected: 12/01/17 11:12
Date Received: 12/05/17 15:15

Lab Sample ID: 320-33898-6
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	PFAS Prep			1.00 mL	1.66 mL	198777	12/07/17 10:50	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			198929	12/07/17 22:44	AAR	TAL SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33898-1

Client Sample ID: 465356
Date Collected: 12/01/17 11:54
Date Received: 12/05/17 15:15

Lab Sample ID: 320-33898-7
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	PFAS Prep			1.00 mL	1.66 mL	198777	12/07/17 10:50	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			198929	12/07/17 23:02	AAR	TAL SAC

Client Sample ID: 174467
Date Collected: 12/01/17 13:15
Date Received: 12/05/17 15:15

Lab Sample ID: 320-33898-8
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	198777	12/07/17 10:50	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			198929	12/07/17 23:39	AAR	TAL SAC

Client Sample ID: 174567
Date Collected: 12/01/17 13:25
Date Received: 12/05/17 15:15

Lab Sample ID: 320-33898-9
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	PFAS Prep			1.00 mL	1.66 mL	198777	12/07/17 10:50	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			198929	12/07/17 23:57	AAR	TAL SAC

Client Sample ID: 174971
Date Collected: 12/01/17 14:24
Date Received: 12/05/17 15:15

Lab Sample ID: 320-33898-10
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	PFAS Prep			1.00 mL	1.66 mL	198777	12/07/17 10:50	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			198929	12/08/17 00:16	AAR	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	198777	12/07/17 10:50	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			198967	12/08/17 10:54	AAR	TAL SAC

Client Sample ID: 174297
Date Collected: 12/01/17 14:59
Date Received: 12/05/17 15:15

Lab Sample ID: 320-33898-11
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	PFAS Prep			1.00 mL	1.66 mL	198777	12/07/17 10:50	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			198929	12/08/17 00:34	AAR	TAL SAC

Client Sample ID: 573752
Date Collected: 12/01/17 16:48
Date Received: 12/05/17 15:15

Lab Sample ID: 320-33898-12
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	PFAS Prep			1.00 mL	1.66 mL	198777	12/07/17 10:50	TON	TAL SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33898-1

Client Sample ID: 573752
Date Collected: 12/01/17 16:48
Date Received: 12/05/17 15:15

Lab Sample ID: 320-33898-12
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	WS-LC-0025 At1		1			198929	12/08/17 00:53	AAR	TAL SAC

Client Sample ID: 524051
Date Collected: 12/03/17 17:00
Date Received: 12/05/17 15:15

Lab Sample ID: 320-33898-13
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	PFAS Prep			1.00 mL	1.66 mL	198777	12/07/17 10:50	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			198929	12/08/17 01:11	AAR	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33898-1

Laboratory: TestAmerica Sacramento

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

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-055	12-18-17
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-18
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-18
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	12-31-17
L-A-B	DoD ELAP		L2468	01-20-18
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-18-18
Michigan	State Program	5	9947	01-31-18
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-28-18
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	12-30-17
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
West Virginia (DW)	State Program	3	9930C	12-31-17
Wyoming	State Program	8	8TMS-L	01-28-19

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33898-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-33898-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-33898-1	509451	Water	11/30/17 10:52	12/05/17 15:15
320-33898-2	152773	Water	11/30/17 11:39	12/05/17 15:15
320-33898-3	466808	Water	11/30/17 13:33	12/05/17 15:15
320-33898-4	176176	Water	11/30/17 15:04	12/05/17 15:15
320-33898-5	482919	Water	11/30/17 15:49	12/05/17 15:15
320-33898-6	174556	Water	12/01/17 11:12	12/05/17 15:15
320-33898-7	465356	Water	12/01/17 11:54	12/05/17 15:15
320-33898-8	174467	Water	12/01/17 13:15	12/05/17 15:15
320-33898-9	174567	Water	12/01/17 13:25	12/05/17 15:15
320-33898-10	174971	Water	12/01/17 14:24	12/05/17 15:15
320-33898-11	174297	Water	12/01/17 14:59	12/05/17 15:15
320-33898-12	573752	Water	12/01/17 16:48	12/05/17 15:15
320-33898-13	524051	Water	12/03/17 17:00	12/05/17 15:15

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

CHAIN-OF-CUSTODY RECORD

Laboratory Test America
Attn: David Alltucker

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFAS x6						Total Number of Containers	Remarks/Matrix
509451		1052	11/30/17		X	X						2	Groundwater
152773		1139			X	X						2	
466808		1333			X	X						1	
176176		1504			X	X							
482019		1549			X	X						2	
174556		1112	12/1/17		X	X						2	
465356		1154			X	X						2	
174467		1315			X	X						2	
~~1754~~ 174567		1325			X	X						2	
174971		1424			X	X						2	

320-33898 Chain of Custody

Project Information		Sample Receipt	
Project Number: 31-1-20060-001		Total Number of Containers	26
Project Name: FIA		COC Seals/Intact? Y/N/NA	—
Contact: MDN		Received Good Cond./Cold	—
Ongoing Project? Yes ☑ No ☐		Delivery Method: Goldstreak	
Sampler: CAB/MDN		(attach shipping bill, if any)	

Instructions	
Requested Turnaround Time:	5-day rush
Special Instructions:	Please bill to: 31-1-20060-001

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Craig Beebe Time: 11:30	Signature: Time:	Signature: Time:
Printed Name: Craig Beebe Date: 12/4/17	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 1515	Signature: Time:	Signature: Time:
Printed Name: Alonso Aguado Date: 12/05/17	Printed Name: Date:	Printed Name: Date:
Company: TAMS	Company:	Company:

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

F-19-91/UR

No. 34416

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

CHAIN-OF-CUSTODY RECORD

Laboratory Test America
Attn: David Alltucker

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
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2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFAS x 6						Total Number of Containers	Remarks/Matrix
174297		1459	12/1/17		X	X						2	Groundwater
573752		1648	↓		X	X						2	↓
524051		1700	12/3/17		X	X						2	↓

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

Instructions

Requested Turnaround Time:

Special Instructions:

Please SEE PAGE 1

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

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 11:30	Signature: Time:	Signature: Time:
Printed Name: Craig Beebe Date: 12/4/17	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 15:15	Signature: Time:	Signature: Time:
Printed Name: Alonso Aguayo Date: 12/5/17	Printed Name: Date:	Printed Name: Date:
Company: TAS	Company:	Company:

F-19-91/UR

No. 34725

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-33898-1

Login Number: 33898
List Number: 1
Creator: Aguayo, Alonso

List Source: 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	
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:

Adam Wyborny

Title:

Environmental Engineering Staff

Date:

December 13, 2017

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

December 11, 2017

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-33898-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-33898-1

1. Laboratory

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

   ○ Yes ◉ No Comments:

ADEC has not approved an analytical laboratory for analysis of PFASs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

   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 Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

   ◉ Yes ○ No Comments:

   b. Correct Analyses requested?

   ◉ Yes ○ No Comments:

3. Laboratory Sample Receipt Documentation

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

   ◉ Yes ○ No Comments:

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

   ◉ Yes ○ No Comments:

Analysis of PFASs does not require a preservative other than temperature control.

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

   ◉ Yes ○ No 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 Comments:

There were no discrepancies identified in the sample receipt documentation.

e. Data quality or usability affected?

Comments:

The data quality and usability were unaffected; see above.

4. Case Narrative

a. Present and understandable?

◉ Yes ○ No Comments:

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

◉ Yes ○ No Comments:

The case narrative notes the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 3.8º C.

The case narrative notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD).

The case narrative notes many of the project samples included in this work order contained sediment and were filtered prior to analysis.

c. Were all corrective actions documented?

◉ Yes ○ No Comments:

A laboratory control sample (LCS) and a LCS duplicate (LCSD) were extracted and analyzed to demonstrate analytical method accuracy and precision.

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

Comments:

The case narrative does not specify an effect on data quality or usability, please see the following sections for our assessment.

5. Samples Results

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

◉ Yes ○ No Comments:

b. All applicable holding times met?

(•) Yes ( ) No Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

( ) Yes (•) No Comments:

N/A; 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 Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

( ) Yes (•) No Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

(•) Yes ( ) No Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

(•) Yes ( ) No Comments:

iii. If above LOQ, what samples are affected?

Comments:

None; PFAS compounds were not detected in method blank samples.

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

( ) Yes (•) No Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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 Comments:

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

( ) Yes (●) No 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

(●) Yes ( ) No Comments:

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

(●) Yes ( ) No Comments:

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

Comments:

N/A; 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 Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

(•) Yes ( ) No Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a 13C-isotope of each target analyte and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

(•) Yes ( ) No Comments:

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

( ) Yes (•) No Comments:

Qualification of the results was not required; IDA recoveries were within acceptance criteria.

iv. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

( ) Yes (•) No Comments:

PFASs are not volatile compounds; 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 Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

○ Yes ◉ No Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not submitted with this work order.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

◉ Yes ○ No Comments:

ii. Submitted blind to lab?

◉ Yes ○ No Comments:

The field-duplicate pair 174467 / 174567 was submitted with this work order.

iii. Precision – All relative percent differences (RPD) less than specified DQOs?
(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 Comments:

The analytical precision demonstrated between the field-duplicate samples was within the project specific DQOs (30% for water samples) for all analytes.

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

Comments:

The data quality and usability were not affected.

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

○ Yes ○ No ◉ Not Applicable

Samples for this project are not collected with reusable equipment, therefore a practical potential for equipment based cross-contamination does not exist.

i. All results less than LOQ?

○ Yes ◉ No Comments:

N/A; an equipment blank was not submitted.

ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

a. Defined and appropriate?

○ Yes ◉ No Comments:

No other data flags and/or qualifiers were required.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 320-34001-1
Client Project/Site: FAI

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

Attn: Marcy Nadel

Authorized for release by:
12/18/2017 11:21:10 AM

David Alltucker, Project Manager I
(916)374-4383
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Table of Contents

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34001-1

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.
CI	The peak identified by the data system exhibited chromatographic interference that could not be resolved. There is reason to suspect there may be a high bias.

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
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Job ID: 320-34001-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-34001-1

Receipt
The samples were received on 12/7/2017 12:35 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.8º C.

LCMS
Method(s) WS-LC-0025 At1: The peak identified by the data system exhibited chromatographic interference for Perfluorononanoic acid (PFNA) that could not be resolved. There is reason to suspect there may be a high bias in the following sample: 407364 (320-34001-7).

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

Organic Prep
Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-198970, method code PFAS_DI_Prep.

Method(s) PFAS Prep: The following samples: 174696 (320-34001-1), 120219 (320-34001-2), 120319 (320-34001-3), 121410 (320-34001-4), 119997 (320-34001-5), 573868 (320-34001-6), 407364 (320-34001-7) and 174840 (320-34001-8) contain sediment.

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: FAI

TestAmerica Job ID: 320-34001-1

Client Sample ID: 174696 — Lab Sample ID: 320-34001-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	21		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	80		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	9.9		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	13		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	1.1	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	370		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: 120219 — Lab Sample ID: 320-34001-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	28		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	120		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	14		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	19		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	1.1	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	580		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: 120319 — Lab Sample ID: 320-34001-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	27		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	120		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	15		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	19		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	1.3	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	650		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: 121410 — Lab Sample ID: 320-34001-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanesulfonic acid (PFOS)	1.7	J	2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 119997 — Lab Sample ID: 320-34001-5

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample ID: 119997 (Continued) — Lab Sample ID: 320-34001-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	10		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	51		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	7.9		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	8.9		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	1.1	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	340		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: 573868 — Lab Sample ID: 320-34001-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	0.89	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	4.5		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 407364 — Lab Sample ID: 320-34001-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.8	J	2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	13		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	3.9		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	9.8		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	5.0		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	5.8	CI	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 174840 — Lab Sample ID: 320-34001-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	6.3		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	8.3		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.3	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	2.7		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: 174696
Date Collected: 12/05/17 15:22
Date Received: 12/07/17 12:35

Lab Sample ID: 320-34001-1
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	21		2.0	0.92	ng/L		12/08/17 10:16	12/08/17 18:15	1
Perfluorohexanesulfonic acid (PFHxS)	80		2.0	0.87	ng/L		12/08/17 10:16	12/08/17 18:15	1
Perfluoroheptanoic acid (PFHpA)	9.9		2.0	0.80	ng/L		12/08/17 10:16	12/08/17 18:15	1
Perfluorooctanoic acid (PFOA)	13		2.0	0.75	ng/L		12/08/17 10:16	12/08/17 18:15	1
Perfluorononanoic acid (PFNA)	1.1	J	2.0	0.65	ng/L		12/08/17 10:16	12/08/17 18:15	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*96*		*25 - 150*	*12/08/17 10:16*	*12/08/17 18:15*	*1*
13C4-PFHpA	*94*		*25 - 150*	*12/08/17 10:16*	*12/08/17 18:15*	*1*
13C4 PFOA	*90*		*25 - 150*	*12/08/17 10:16*	*12/08/17 18:15*	*1*
13C4 PFOS	*84*		*25 - 150*	*12/08/17 10:16*	*12/08/17 18:15*	*1*
13C5 PFNA	*80*		*25 - 150*	*12/08/17 10:16*	*12/08/17 18:15*	*1*

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	370		20	13	ng/L		12/08/17 10:16	12/11/17 16:19	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*91*		*25 - 150*	*12/08/17 10:16*	*12/11/17 16:19*	*10*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34001-1

Client Sample ID: 120219
Date Collected: 12/05/17 16:20
Date Received: 12/07/17 12:35

Lab Sample ID: 320-34001-2
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	28		2.0	0.92	ng/L		12/08/17 10:16	12/08/17 18:33	1
Perfluorohexanesulfonic acid (PFHxS)	120		2.0	0.87	ng/L		12/08/17 10:16	12/08/17 18:33	1
Perfluoroheptanoic acid (PFHpA)	14		2.0	0.80	ng/L		12/08/17 10:16	12/08/17 18:33	1
Perfluorooctanoic acid (PFOA)	19		2.0	0.75	ng/L		12/08/17 10:16	12/08/17 18:33	1
Perfluorononanoic acid (PFNA)	1.1	J	2.0	0.65	ng/L		12/08/17 10:16	12/08/17 18:33	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*97*		*25 - 150*	*12/08/17 10:16*	*12/08/17 18:33*	*1*
13C4-PFHpA	*98*		*25 - 150*	*12/08/17 10:16*	*12/08/17 18:33*	*1*
13C4 PFOA	*92*		*25 - 150*	*12/08/17 10:16*	*12/08/17 18:33*	*1*
13C4 PFOS	*86*		*25 - 150*	*12/08/17 10:16*	*12/08/17 18:33*	*1*
13C5 PFNA	*83*		*25 - 150*	*12/08/17 10:16*	*12/08/17 18:33*	*1*

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	580		20	13	ng/L		12/08/17 10:16	12/11/17 16:37	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*93*		*25 - 150*	*12/08/17 10:16*	*12/11/17 16:37*	*10*

Client Sample ID: 120319
Date Collected: 12/05/17 16:25
Date Received: 12/07/17 12:35

Lab Sample ID: 320-34001-3
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	27		2.0	0.92	ng/L		12/08/17 10:16	12/08/17 18:52	1
Perfluorohexanesulfonic acid (PFHxS)	120		2.0	0.87	ng/L		12/08/17 10:16	12/08/17 18:52	1
Perfluoroheptanoic acid (PFHpA)	15		2.0	0.80	ng/L		12/08/17 10:16	12/08/17 18:52	1
Perfluorooctanoic acid (PFOA)	19		2.0	0.75	ng/L		12/08/17 10:16	12/08/17 18:52	1
Perfluorononanoic acid (PFNA)	1.3	J	2.0	0.65	ng/L		12/08/17 10:16	12/08/17 18:52	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*102*		*25 - 150*	*12/08/17 10:16*	*12/08/17 18:52*	*1*
13C4-PFHpA	*98*		*25 - 150*	*12/08/17 10:16*	*12/08/17 18:52*	*1*
13C4 PFOA	*95*		*25 - 150*	*12/08/17 10:16*	*12/08/17 18:52*	*1*
13C4 PFOS	*88*		*25 - 150*	*12/08/17 10:16*	*12/08/17 18:52*	*1*
13C5 PFNA	*81*		*25 - 150*	*12/08/17 10:16*	*12/08/17 18:52*	*1*

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	650		20	13	ng/L		12/08/17 10:16	12/11/17 16:55	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*87*		*25 - 150*	*12/08/17 10:16*	*12/11/17 16:55*	*10*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34001-1

Client Sample ID: 121410
Date Collected: 12/06/17 11:20
Date Received: 12/07/17 12:35

Lab Sample ID: 320-34001-4
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/08/17 10:16	12/08/17 19:10	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		12/08/17 10:16	12/08/17 19:10	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/08/17 10:16	12/08/17 19:10	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/08/17 10:16	12/08/17 19:10	1
Perfluorooctanesulfonic acid (PFOS)	**1.7**	**J**	2.0	1.3	ng/L		12/08/17 10:16	12/08/17 19:10	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/08/17 10:16	12/08/17 19:10	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*99*		*25 - 150*	*12/08/17 10:16*	*12/08/17 19:10*	*1*
13C4-PFHpA	*98*		*25 - 150*	*12/08/17 10:16*	*12/08/17 19:10*	*1*
13C4 PFOA	*94*		*25 - 150*	*12/08/17 10:16*	*12/08/17 19:10*	*1*
13C4 PFOS	*87*		*25 - 150*	*12/08/17 10:16*	*12/08/17 19:10*	*1*
13C5 PFNA	*87*		*25 - 150*	*12/08/17 10:16*	*12/08/17 19:10*	*1*

Client Sample ID: 119997
Date Collected: 12/06/17 12:00
Date Received: 12/07/17 12:35

Lab Sample ID: 320-34001-5
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	10		2.0	0.92	ng/L		12/08/17 10:16	12/08/17 19:28	1
Perfluorohexanesulfonic acid (PFHxS)	51		2.0	0.87	ng/L		12/08/17 10:16	12/08/17 19:28	1
Perfluoroheptanoic acid (PFHpA)	7.9		2.0	0.80	ng/L		12/08/17 10:16	12/08/17 19:28	1
Perfluorooctanoic acid (PFOA)	8.9		2.0	0.75	ng/L		12/08/17 10:16	12/08/17 19:28	1
Perfluorononanoic acid (PFNA)	1.1	J	2.0	0.65	ng/L		12/08/17 10:16	12/08/17 19:28	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*97*		*25 - 150*	*12/08/17 10:16*	*12/08/17 19:28*	*1*
13C4-PFHpA	*100*		*25 - 150*	*12/08/17 10:16*	*12/08/17 19:28*	*1*
13C4 PFOA	*95*		*25 - 150*	*12/08/17 10:16*	*12/08/17 19:28*	*1*
13C4 PFOS	*85*		*25 - 150*	*12/08/17 10:16*	*12/08/17 19:28*	*1*
13C5 PFNA	*84*		*25 - 150*	*12/08/17 10:16*	*12/08/17 19:28*	*1*

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	340		20	13	ng/L		12/08/17 10:16	12/11/17 17:14	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*95*		*25 - 150*	*12/08/17 10:16*	*12/11/17 17:14*	*10*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34001-1

Client Sample ID: 573868
Date Collected: 12/06/17 13:35
Date Received: 12/07/17 12:35

Lab Sample ID: 320-34001-6
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/08/17 10:16	12/08/17 19:47	1
Perfluorohexanesulfonic acid (PFHxS)	**0.89**	**J**	2.0	0.87	ng/L		12/08/17 10:16	12/08/17 19:47	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/08/17 10:16	12/08/17 19:47	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/08/17 10:16	12/08/17 19:47	1
Perfluorooctanesulfonic acid (PFOS)	**4.5**		2.0	1.3	ng/L		12/08/17 10:16	12/08/17 19:47	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/08/17 10:16	12/08/17 19:47	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*103*		*25 - 150*	*12/08/17 10:16*	*12/08/17 19:47*	*1*
13C4-PFHpA	*101*		*25 - 150*	*12/08/17 10:16*	*12/08/17 19:47*	*1*
13C4 PFOA	*95*		*25 - 150*	*12/08/17 10:16*	*12/08/17 19:47*	*1*
13C4 PFOS	*91*		*25 - 150*	*12/08/17 10:16*	*12/08/17 19:47*	*1*
13C5 PFNA	*86*		*25 - 150*	*12/08/17 10:16*	*12/08/17 19:47*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34001-1

Client Sample ID: 407364
Date Collected: 12/06/17 14:55
Date Received: 12/07/17 12:35

Lab Sample ID: 320-34001-7
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	1.8	J	2.0	0.92	ng/L		12/08/17 10:16	12/08/17 20:05	1
Perfluorohexanesulfonic acid (PFHxS)	13		2.0	0.87	ng/L		12/08/17 10:16	12/08/17 20:05	1
Perfluoroheptanoic acid (PFHpA)	3.9		2.0	0.80	ng/L		12/08/17 10:16	12/08/17 20:05	1
Perfluorooctanoic acid (PFOA)	9.8		2.0	0.75	ng/L		12/08/17 10:16	12/08/17 20:05	1
Perfluorooctanesulfonic acid (PFOS)	5.0		2.0	1.3	ng/L		12/08/17 10:16	12/08/17 20:05	1
Perfluorononanoic acid (PFNA)	5.8	CI	2.0	0.65	ng/L		12/08/17 10:16	12/08/17 20:05	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*103*		*25 - 150*	*12/08/17 10:16*	*12/08/17 20:05*	*1*
13C4-PFHpA	*102*		*25 - 150*	*12/08/17 10:16*	*12/08/17 20:05*	*1*
13C4 PFOA	*98*		*25 - 150*	*12/08/17 10:16*	*12/08/17 20:05*	*1*
13C4 PFOS	*91*		*25 - 150*	*12/08/17 10:16*	*12/08/17 20:05*	*1*
13C5 PFNA	*91*		*25 - 150*	*12/08/17 10:16*	*12/08/17 20:05*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34001-1

Client Sample ID: 174840
Date Collected: 12/05/17 12:42
Date Received: 12/07/17 12:35

Lab Sample ID: 320-34001-8
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**6.3**		2.0	0.92	ng/L		12/08/17 10:16	12/08/17 20:42	1
Perfluorohexanesulfonic acid (PFHxS)	**8.3**		2.0	0.87	ng/L		12/08/17 10:16	12/08/17 20:42	1
Perfluoroheptanoic acid (PFHpA)	**1.3**	**J**	2.0	0.80	ng/L		12/08/17 10:16	12/08/17 20:42	1
Perfluorooctanoic acid (PFOA)	**2.7**		2.0	0.75	ng/L		12/08/17 10:16	12/08/17 20:42	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		12/08/17 10:16	12/08/17 20:42	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/08/17 10:16	12/08/17 20:42	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*97*		*25 - 150*	*12/08/17 10:16*	*12/08/17 20:42*	*1*
13C4-PFHpA	*94*		*25 - 150*	*12/08/17 10:16*	*12/08/17 20:42*	*1*
13C4 PFOA	*93*		*25 - 150*	*12/08/17 10:16*	*12/08/17 20:42*	*1*
13C4 PFOS	*88*		*25 - 150*	*12/08/17 10:16*	*12/08/17 20:42*	*1*
13C5 PFNA	*84*		*25 - 150*	*12/08/17 10:16*	*12/08/17 20:42*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34001-1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)				
Lab Sample ID	Client Sample ID	PFHxS (25-150)	PFHpA (25-150)	PFOA (25-150)	PFOS (25-150)	PFNA (25-150)
320-34001-1	174696	96	94	90	84	80
320-34001-1 - DL	174696				91	
320-34001-2	120219	97	98	92	86	83
320-34001-2 - DL	120219				93	
320-34001-3	120319	102	98	95	88	81
320-34001-3 - DL	120319				87	
320-34001-4	121410	99	98	94	87	87
320-34001-5	119997	97	100	95	85	84
320-34001-5 - DL	119997				95	
320-34001-6	573868	103	101	95	91	86
320-34001-7	407364	103	102	98	91	91
320-34001-8	174840	97	94	93	88	84
LCS 320-198970/2-A	Lab Control Sample	87	89	81	78	76
LCSD 320-198970/3-A	Lab Control Sample Dup	89	88	81	80	75
MB 320-198970/1-A	Method Blank	104	103	95	91	87

Surrogate Legend

PFHxS = 18O2 PFHxS
PFHpA = 13C4-PFHpA
PFOA = 13C4 PFOA
PFOS = 13C4 PFOS
PFNA = 13C5 PFNA

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-198970/1-A
Matrix: Water
Analysis Batch: 199222

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 198970

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/08/17 10:16	12/08/17 17:20	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		12/08/17 10:16	12/08/17 17:20	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/08/17 10:16	12/08/17 17:20	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/08/17 10:16	12/08/17 17:20	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		12/08/17 10:16	12/08/17 17:20	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/08/17 10:16	12/08/17 17:20	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*104*		*25 - 150*	*12/08/17 10:16*	*12/08/17 17:20*	*1*
13C4-PFHpA	*103*		*25 - 150*	*12/08/17 10:16*	*12/08/17 17:20*	*1*
13C4 PFOA	*95*		*25 - 150*	*12/08/17 10:16*	*12/08/17 17:20*	*1*
13C4 PFOS	*91*		*25 - 150*	*12/08/17 10:16*	*12/08/17 17:20*	*1*
13C5 PFNA	*87*		*25 - 150*	*12/08/17 10:16*	*12/08/17 17:20*	*1*

Lab Sample ID: LCS 320-198970/2-A
Matrix: Water
Analysis Batch: 199222

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 198970

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	19.9		ng/L		113	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	19.4		ng/L		106	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	22.4		ng/L		112	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	21.8		ng/L		109	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	20.7		ng/L		111	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	23.2		ng/L		116	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*87*		*25 - 150*
13C4-PFHpA	*89*		*25 - 150*
13C4 PFOA	*81*		*25 - 150*
13C4 PFOS	*78*		*25 - 150*
13C5 PFNA	*76*		*25 - 150*

Lab Sample ID: LCSD 320-198970/3-A
Matrix: Water
Analysis Batch: 199222

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 198970

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	20.2		ng/L		114	72 - 151	1	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	19.9		ng/L		109	73 - 157	3	30
Perfluoroheptanoic acid (PFHpA)			20.0	22.2		ng/L		111	71 - 138	1	30
Perfluorooctanoic acid (PFOA)			20.0	21.8		ng/L		109	70 - 140	0	30
Perfluorooctanesulfonic acid (PFOS)			18.6	20.1		ng/L		108	69 - 144	3	30
Perfluorononanoic acid (PFNA)			20.0	23.8		ng/L		119	73 - 147	3	30

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34001-1

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	89		25 - 150
13C4-PFHpA	88		25 - 150
13C4 PFOA	81		25 - 150
13C4 PFOS	80		25 - 150
13C5 PFNA	75		25 - 150

LCMS

Prep Batch: 198970

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-34001-1 - DL	174696	Total/NA	Water	PFAS Prep	
320-34001-1	174696	Total/NA	Water	PFAS Prep	
320-34001-2	120219	Total/NA	Water	PFAS Prep	
320-34001-2 - DL	120219	Total/NA	Water	PFAS Prep	
320-34001-3 - DL	120319	Total/NA	Water	PFAS Prep	
320-34001-3	120319	Total/NA	Water	PFAS Prep	
320-34001-4	121410	Total/NA	Water	PFAS Prep	
320-34001-5 - DL	119997	Total/NA	Water	PFAS Prep	
320-34001-5	119997	Total/NA	Water	PFAS Prep	
320-34001-6	573868	Total/NA	Water	PFAS Prep	
320-34001-7	407364	Total/NA	Water	PFAS Prep	
320-34001-8	174840	Total/NA	Water	PFAS Prep	
MB 320-198970/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-198970/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-198970/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 199222

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-34001-1	174696	Total/NA	Water	WS-LC-0025 At1	198970
320-34001-2	120219	Total/NA	Water	WS-LC-0025 At1	198970
320-34001-3	120319	Total/NA	Water	WS-LC-0025 At1	198970
320-34001-4	121410	Total/NA	Water	WS-LC-0025 At1	198970
320-34001-5	119997	Total/NA	Water	WS-LC-0025 At1	198970
320-34001-6	573868	Total/NA	Water	WS-LC-0025 At1	198970
320-34001-7	407364	Total/NA	Water	WS-LC-0025 At1	198970
320-34001-8	174840	Total/NA	Water	WS-LC-0025 At1	198970
MB 320-198970/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	198970
LCS 320-198970/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	198970
LCSD 320-198970/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	198970

Analysis Batch: 199392

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-34001-1 - DL	174696	Total/NA	Water	WS-LC-0025 At1	198970
320-34001-2 - DL	120219	Total/NA	Water	WS-LC-0025 At1	198970
320-34001-3 - DL	120319	Total/NA	Water	WS-LC-0025 At1	198970
320-34001-5 - DL	119997	Total/NA	Water	WS-LC-0025 At1	198970

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34001-1

Client Sample ID: 174696
Date Collected: 12/05/17 15:22
Date Received: 12/07/17 12:35

Lab Sample ID: 320-34001-1
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	PFAS Prep			1.00 mL	1.66 mL	198970	12/08/17 10:16	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			199222	12/08/17 18:15	ABH	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	198970	12/08/17 10:16	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			199392	12/11/17 16:19	ABH	TAL SAC

Client Sample ID: 120219
Date Collected: 12/05/17 16:20
Date Received: 12/07/17 12:35

Lab Sample ID: 320-34001-2
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	PFAS Prep			1.00 mL	1.66 mL	198970	12/08/17 10:16	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			199222	12/08/17 18:33	ABH	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	198970	12/08/17 10:16	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			199392	12/11/17 16:37	ABH	TAL SAC

Client Sample ID: 120319
Date Collected: 12/05/17 16:25
Date Received: 12/07/17 12:35

Lab Sample ID: 320-34001-3
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	PFAS Prep			1.00 mL	1.66 mL	198970	12/08/17 10:16	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			199222	12/08/17 18:52	ABH	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	198970	12/08/17 10:16	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			199392	12/11/17 16:55	ABH	TAL SAC

Client Sample ID: 121410
Date Collected: 12/06/17 11:20
Date Received: 12/07/17 12:35

Lab Sample ID: 320-34001-4
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	PFAS Prep			1.00 mL	1.66 mL	198970	12/08/17 10:16	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			199222	12/08/17 19:10	ABH	TAL SAC

Client Sample ID: 119997
Date Collected: 12/06/17 12:00
Date Received: 12/07/17 12:35

Lab Sample ID: 320-34001-5
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	PFAS Prep			1.00 mL	1.66 mL	198970	12/08/17 10:16	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			199222	12/08/17 19:28	ABH	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	198970	12/08/17 10:16	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			199392	12/11/17 17:14	ABH	TAL SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34001-1

Client Sample ID: 573868

Date Collected: 12/06/17 13:35
Date Received: 12/07/17 12:35

Lab Sample ID: 320-34001-6

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	PFAS Prep			1.00 mL	1.66 mL	198970	12/08/17 10:16	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			199222	12/08/17 19:47	ABH	TAL SAC

Client Sample ID: 407364

Date Collected: 12/06/17 14:55
Date Received: 12/07/17 12:35

Lab Sample ID: 320-34001-7

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	PFAS Prep			1.00 mL	1.66 mL	198970	12/08/17 10:16	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			199222	12/08/17 20:05	ABH	TAL SAC

Client Sample ID: 174840

Date Collected: 12/05/17 12:42
Date Received: 12/07/17 12:35

Lab Sample ID: 320-34001-8

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	198970	12/08/17 10:16	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			199222	12/08/17 20:42	ABH	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34001-1

Laboratory: TestAmerica Sacramento

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

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-055	12-18-17 *
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-18
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-18
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	12-31-17
L-A-B	DoD ELAP		L2468	01-20-18
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-18-18
Michigan	State Program	5	9947	01-31-18
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-28-18
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	12-30-17
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
West Virginia (DW)	State Program	3	9930C	12-31-17
Wyoming	State Program	8	8TMS-L	01-28-19

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

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34001-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34001-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-34001-1	174696	Water	12/05/17 15:22	12/07/17 12:35
320-34001-2	120219	Water	12/05/17 16:20	12/07/17 12:35
320-34001-3	120319	Water	12/05/17 16:25	12/07/17 12:35
320-34001-4	121410	Water	12/06/17 11:20	12/07/17 12:35
320-34001-5	119997	Water	12/06/17 12:00	12/07/17 12:35
320-34001-6	573868	Water	12/06/17 13:35	12/07/17 12:35
320-34001-7	407364	Water	12/06/17 14:55	12/07/17 12:35
320-34001-8	174840	Water	12/05/17 12:42	12/07/17 12:35

320-34001 Chain of Custody

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Laboratory Test America
Attn: David Alltucker

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFAS x6 (WS-LC-0025)						Total Number of Containers	Remarks/Matrix
174696		1522	12/5/17		X	X						2	groundwater
120219		1620	↓		X	X						2	↓
120319		1625	↓		X	X						2	↓
121410		1120	12/6/17		X	X						2	↓
119997		1200	↓		X	X						2	↓
573868		1335	↓		X	X						2	↓
407364		1455	↓		X	X						2	↓
174840		1242	12/5/17		X	X						2	↓

Project Information	
Project Number: 31-1-20060	
Project Name: FAI	
Contact: MDN	
Ongoing Project? Yes ☑ No ☐	
Sampler: CTC/MDN/MLR	

Sample Receipt	
Total Number of Containers	
COC Seals/Intact? Y/N/NA	—
Received Good Cond./Cold	—
Delivery Method:	Goldstreak
(attach shipping bill, if any)	

Instructions

Requested Turnaround Time: 5-day rush

Special Instructions:

Please bill to 31-1-20060-001

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: [signature] Time: 1630	Signature: Time:	Signature: Time:
Printed Name: Christian Canfield Date: 12/6	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson Inc.	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: [signature] Time: 1235	Signature: Time:	Signature: Time:
Printed Name: Alonso Arroyo Date: 12/07/17 5.8°C	Printed Name: Date:	Printed Name: Date:
Company: TAWS	Company:	Company:

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

F-19-91/UR

No. 34806

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-34001-1

Login Number: 34001
List Number: 1
Creator: Aguayo, Alonso

List Source: 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	
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:

Michael Jaramillo

Title:

Environmental Chemist

Date:

December 19, 2017

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

December 18, 2017

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-24001-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-24001-1

1. Laboratory

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

   ○ Yes ◉ No Comments:

ADEC has not approved an analytical laboratory for analysis of PFASs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

   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 Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

   ◉ Yes ○ No Comments:

   b. Correct Analyses requested?

   ◉ Yes ○ No Comments:

3. Laboratory Sample Receipt Documentation

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

   ◉ Yes ○ No Comments:

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

   ◉ Yes ○ No Comments:

Analysis of PFASs does not require a preservative other than temperature control.

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

   ◉ Yes ○ No 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 Comments:

There were no discrepancies identified in the sample receipt documentation.

e. Data quality or usability affected?

Comments:

The data quality and usability were unaffected; see above.

4. Case Narrative

a. Present and understandable?

◉ Yes ○ No Comments:

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

◉ Yes ○ No Comments:

The case narrative notes the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 5.8º C.

The case narrative notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD).

The sample 407364 result for Perfluoronanonic acid (PFNA) may be biased high due to matrix interference.

The case narrative notes many of the project samples included in this work order contained sediment.

c. Were all corrective actions documented?

◉ Yes ○ No Comments:

A laboratory control sample (LCS) and a LCS duplicate (LCSD) were extracted and analyzed to demonstrate analytical method accuracy and precision.

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

Comments:

The PFNA result for sample 407364 is considered estimated, biased high, and is flagged 'JH' in the analytical database and reporting tables.

5. Samples Results

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

(•) Yes ( ) No Comments:

b. All applicable holding times met?

(•) Yes ( ) No Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

( ) Yes (•) No Comments:

N/A; 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 Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

( ) Yes (•) No Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

(•) Yes ( ) No Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

(•) Yes ( ) No Comments:

iii. If above LOQ, what samples are affected?

Comments:

None; PFAS compounds were not detected in method blank samples.

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

○ Yes ◉ No Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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 Comments:

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

○ Yes ◉ No 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

◉ Yes ○ No Comments:

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

◉ Yes ○ No Comments:

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

Comments:

N/A; 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 Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

◉ Yes ○ No Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a 13C-isotope of each target analyte, and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

◉ Yes ○ No Comments:

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

○ Yes ◉ No Comments:

Qualification of the results was not required; IDA recoveries were within acceptance criteria.

iv. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

○ Yes ◉ No Comments:

PFASs are not volatile compounds; 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 Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

○ Yes ◉ No Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not submitted with this work order.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

◉ Yes ○ No Comments:

ii. Submitted blind to lab?

◉ Yes ○ No Comments:

Field-duplicate pair 120219 / 120319 was submitted with this work order.

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

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

Where R_1 = Sample Concentration
R_2 = Field Duplicate Concentration

◉ Yes ○ No Comments:

The field-duplicate RPDs are within the DQOs, where calculable for detected analytes.

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

Comments:

The data quality and usability were not affected.

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

○ Yes ○ No ◉ Not Applicable

Samples for this project are not collected with reusable equipment, therefore a practical potential for equipment based cross-contamination does not exist.

i. All results less than LOQ?

○ Yes ◉ No Comments:

N/A; an equipment blank was not submitted.

ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

a. Defined and appropriate?

○ Yes ◉ No Comments:

No other data flags and/or qualifiers were required.

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ANALYTICAL REPORT

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

TestAmerica Job ID: 320-34174-1
Client Project/Site: FAI

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

Attn: Marcy Nadel

Authorized for release by:
12/20/2017 12:01:52 PM

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Table of Contents

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34174-1

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
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Job ID: 320-34174-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-34174-1

Receipt
The samples were received on 12/12/2017 12:21 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.4º C.

LCMS
Method(s) WS-LC-0025 At1: The following samples were diluted to bring the concentration of Perfluorooctanesulfonic acid (PFOS) within the calibration range: 119989 (320-34174-1), 120089 (320-34174-2), 174751 (320-34174-8) and 174777 (320-34174-9). Elevated reporting limits (RLs) are provided.

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

Organic Prep
Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-199666.

Method(s) PFAS Prep: The following samples: 119989 (320-34174-1), 120089 (320-34174-2), 462641 (320-34174-3), 569721 (320-34174-4), 542512 (320-34174-5), 573841 (320-34174-6), 174718 (320-34174-7), 174751 (320-34174-8) and 174777 (320-34174-9) have sediment.

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: FAI

TestAmerica Job ID: 320-34174-1

Client Sample ID: 119989 — Lab Sample ID: 320-34174-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	12		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	56		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	9.1		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	9.4		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	1.4	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	350		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: 120089 — Lab Sample ID: 320-34174-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	12		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	56		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	9.1		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	9.3		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	370		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: 462641 — Lab Sample ID: 320-34174-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	2.8		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	1.9	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 569721 — Lab Sample ID: 320-34174-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	110		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	300		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	26		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	12		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	7.5		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 542512 — Lab Sample ID: 320-34174-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	89		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: 542512 (Continued) — Lab Sample ID: 320-34174-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	240		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	22		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	9.8		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	6.0		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 573841 — Lab Sample ID: 320-34174-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	0.94	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	6.6		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 174718 — Lab Sample ID: 320-34174-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	16		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	46		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	7.1		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	9.8		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	240		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 174751 — Lab Sample ID: 320-34174-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	18		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	76		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	9.8		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	13		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	6.9		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	390		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: 174777 — Lab Sample ID: 320-34174-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	21		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	93		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34174-1

Client Sample ID: 174777 (Continued)

Lab Sample ID: 320-34174-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluoroheptanoic acid (PFHpA)	10		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	14		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	7.9		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	270		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: 119989
Date Collected: 12/07/17 13:35
Date Received: 12/12/17 12:21

Lab Sample ID: 320-34174-1
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	12		2.0	0.92	ng/L		12/13/17 10:28	12/13/17 20:35	1
Perfluorohexanesulfonic acid (PFHxS)	56		2.0	0.87	ng/L		12/13/17 10:28	12/13/17 20:35	1
Perfluoroheptanoic acid (PFHpA)	9.1		2.0	0.80	ng/L		12/13/17 10:28	12/13/17 20:35	1
Perfluorooctanoic acid (PFOA)	9.4		2.0	0.75	ng/L		12/13/17 10:28	12/13/17 20:35	1
Perfluorononanoic acid (PFNA)	1.4	J	2.0	0.65	ng/L		12/13/17 10:28	12/13/17 20:35	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*91*		*25 - 150*	*12/13/17 10:28*	*12/13/17 20:35*	*1*
13C4-PFHpA	*97*		*25 - 150*	*12/13/17 10:28*	*12/13/17 20:35*	*1*
13C4 PFOA	*93*		*25 - 150*	*12/13/17 10:28*	*12/13/17 20:35*	*1*
13C5 PFNA	*86*		*25 - 150*	*12/13/17 10:28*	*12/13/17 20:35*	*1*

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	350		20	13	ng/L		12/13/17 10:28	12/18/17 19:21	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*104*		*25 - 150*	*12/13/17 10:28*	*12/18/17 19:21*	*10*

Client Sample ID: 120089
Date Collected: 12/07/17 14:00
Date Received: 12/12/17 12:21

Lab Sample ID: 320-34174-2
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	12		2.0	0.92	ng/L		12/13/17 10:28	12/13/17 20:53	1
Perfluorohexanesulfonic acid (PFHxS)	56		2.0	0.87	ng/L		12/13/17 10:28	12/13/17 20:53	1
Perfluoroheptanoic acid (PFHpA)	9.1		2.0	0.80	ng/L		12/13/17 10:28	12/13/17 20:53	1
Perfluorooctanoic acid (PFOA)	9.3		2.0	0.75	ng/L		12/13/17 10:28	12/13/17 20:53	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/13/17 10:28	12/13/17 20:53	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*92*		*25 - 150*	*12/13/17 10:28*	*12/13/17 20:53*	*1*
13C4-PFHpA	*98*		*25 - 150*	*12/13/17 10:28*	*12/13/17 20:53*	*1*
13C4 PFOA	*98*		*25 - 150*	*12/13/17 10:28*	*12/13/17 20:53*	*1*
13C5 PFNA	*90*		*25 - 150*	*12/13/17 10:28*	*12/13/17 20:53*	*1*

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	370		20	13	ng/L		12/13/17 10:28	12/18/17 19:39	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*110*		*25 - 150*	*12/13/17 10:28*	*12/18/17 19:39*	*10*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34174-1

Client Sample ID: 462641
Date Collected: 12/07/17 15:15
Date Received: 12/12/17 12:21

Lab Sample ID: 320-34174-3
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**2.8**		2.0	0.92	ng/L		12/13/17 10:28	12/13/17 21:11	1
Perfluorohexanesulfonic acid (PFHxS)	**1.9**	**J**	2.0	0.87	ng/L		12/13/17 10:28	12/13/17 21:11	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/13/17 10:28	12/13/17 21:11	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/13/17 10:28	12/13/17 21:11	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		12/13/17 10:28	12/13/17 21:11	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/13/17 10:28	12/13/17 21:11	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*100*		*25 - 150*	*12/13/17 10:28*	*12/13/17 21:11*	*1*
13C4-PFHpA	*106*		*25 - 150*	*12/13/17 10:28*	*12/13/17 21:11*	*1*
13C4 PFOA	*105*		*25 - 150*	*12/13/17 10:28*	*12/13/17 21:11*	*1*
13C4 PFOS	*90*		*25 - 150*	*12/13/17 10:28*	*12/13/17 21:11*	*1*
13C5 PFNA	*99*		*25 - 150*	*12/13/17 10:28*	*12/13/17 21:11*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34174-1

Client Sample ID: 569721
Date Collected: 12/07/17 11:10
Date Received: 12/12/17 12:21

Lab Sample ID: 320-34174-4
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**110**		2.0	0.92	ng/L		12/13/17 10:28	12/13/17 21:30	1
Perfluorohexanesulfonic acid (PFHxS)	**300**		2.0	0.87	ng/L		12/13/17 10:28	12/13/17 21:30	1
Perfluoroheptanoic acid (PFHpA)	**26**		2.0	0.80	ng/L		12/13/17 10:28	12/13/17 21:30	1
Perfluorooctanoic acid (PFOA)	**12**		2.0	0.75	ng/L		12/13/17 10:28	12/13/17 21:30	1
Perfluorooctanesulfonic acid (PFOS)	**7.5**		2.0	1.3	ng/L		12/13/17 10:28	12/13/17 21:30	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/13/17 10:28	12/13/17 21:30	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*93*		*25 - 150*	*12/13/17 10:28*	*12/13/17 21:30*	*1*
13C4-PFHpA	*95*		*25 - 150*	*12/13/17 10:28*	*12/13/17 21:30*	*1*
13C4 PFOA	*96*		*25 - 150*	*12/13/17 10:28*	*12/13/17 21:30*	*1*
13C4 PFOS	*84*		*25 - 150*	*12/13/17 10:28*	*12/13/17 21:30*	*1*
13C5 PFNA	*92*		*25 - 150*	*12/13/17 10:28*	*12/13/17 21:30*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34174-1

Client Sample ID: 542512
Date Collected: 12/07/17 14:35
Date Received: 12/12/17 12:21

Lab Sample ID: 320-34174-5
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**89**		2.0	0.92	ng/L		12/13/17 10:28	12/13/17 21:48	1
Perfluorohexanesulfonic acid (PFHxS)	**240**		2.0	0.87	ng/L		12/13/17 10:28	12/13/17 21:48	1
Perfluoroheptanoic acid (PFHpA)	**22**		2.0	0.80	ng/L		12/13/17 10:28	12/13/17 21:48	1
Perfluorooctanoic acid (PFOA)	**9.8**		2.0	0.75	ng/L		12/13/17 10:28	12/13/17 21:48	1
Perfluorooctanesulfonic acid (PFOS)	**6.0**		2.0	1.3	ng/L		12/13/17 10:28	12/13/17 21:48	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/13/17 10:28	12/13/17 21:48	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*101*		*25 - 150*	*12/13/17 10:28*	*12/13/17 21:48*	*1*
13C4-PFHpA	*103*		*25 - 150*	*12/13/17 10:28*	*12/13/17 21:48*	*1*
13C4 PFOA	*103*		*25 - 150*	*12/13/17 10:28*	*12/13/17 21:48*	*1*
13C4 PFOS	*94*		*25 - 150*	*12/13/17 10:28*	*12/13/17 21:48*	*1*
13C5 PFNA	*102*		*25 - 150*	*12/13/17 10:28*	*12/13/17 21:48*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34174-1

Client Sample ID: 573841
Date Collected: 12/08/17 11:50
Date Received: 12/12/17 12:21

Lab Sample ID: 320-34174-6
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/13/17 10:28	12/13/17 22:06	1
Perfluorohexanesulfonic acid (PFHxS)	**0.94**	**J**	2.0	0.87	ng/L		12/13/17 10:28	12/13/17 22:06	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/13/17 10:28	12/13/17 22:06	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/13/17 10:28	12/13/17 22:06	1
Perfluorooctanesulfonic acid (PFOS)	**6.6**		2.0	1.3	ng/L		12/13/17 10:28	12/13/17 22:06	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/13/17 10:28	12/13/17 22:06	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*103*		*25 - 150*	*12/13/17 10:28*	*12/13/17 22:06*	*1*
13C4-PFHpA	*109*		*25 - 150*	*12/13/17 10:28*	*12/13/17 22:06*	*1*
13C4 PFOA	*108*		*25 - 150*	*12/13/17 10:28*	*12/13/17 22:06*	*1*
13C4 PFOS	*95*		*25 - 150*	*12/13/17 10:28*	*12/13/17 22:06*	*1*
13C5 PFNA	*103*		*25 - 150*	*12/13/17 10:28*	*12/13/17 22:06*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34174-1

Client Sample ID: 174718
Date Collected: 12/08/17 15:10
Date Received: 12/12/17 12:21

Lab Sample ID: 320-34174-7
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**16**		2.0	0.92	ng/L		12/13/17 10:28	12/13/17 22:25	1
Perfluorohexanesulfonic acid (PFHxS)	**46**		2.0	0.87	ng/L		12/13/17 10:28	12/13/17 22:25	1
Perfluoroheptanoic acid (PFHpA)	**7.1**		2.0	0.80	ng/L		12/13/17 10:28	12/13/17 22:25	1
Perfluorooctanoic acid (PFOA)	**9.8**		2.0	0.75	ng/L		12/13/17 10:28	12/13/17 22:25	1
Perfluorooctanesulfonic acid (PFOS)	**240**		2.0	1.3	ng/L		12/13/17 10:28	12/13/17 22:25	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/13/17 10:28	12/13/17 22:25	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*94*		*25 - 150*	*12/13/17 10:28*	*12/13/17 22:25*	*1*
13C4-PFHpA	*98*		*25 - 150*	*12/13/17 10:28*	*12/13/17 22:25*	*1*
13C4 PFOA	*98*		*25 - 150*	*12/13/17 10:28*	*12/13/17 22:25*	*1*
13C4 PFOS	*85*		*25 - 150*	*12/13/17 10:28*	*12/13/17 22:25*	*1*
13C5 PFNA	*90*		*25 - 150*	*12/13/17 10:28*	*12/13/17 22:25*	*1*

Client Sample ID: 174751
Date Collected: 12/11/17 11:25
Date Received: 12/12/17 12:21

Lab Sample ID: 320-34174-8
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	18		2.0	0.92	ng/L		12/13/17 10:28	12/13/17 23:01	1
Perfluorohexanesulfonic acid (PFHxS)	76		2.0	0.87	ng/L		12/13/17 10:28	12/13/17 23:01	1
Perfluoroheptanoic acid (PFHpA)	9.8		2.0	0.80	ng/L		12/13/17 10:28	12/13/17 23:01	1
Perfluorooctanoic acid (PFOA)	13		2.0	0.75	ng/L		12/13/17 10:28	12/13/17 23:01	1
Perfluorononanoic acid (PFNA)	6.9		2.0	0.65	ng/L		12/13/17 10:28	12/13/17 23:01	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*97*		*25 - 150*	*12/13/17 10:28*	*12/13/17 23:01*	*1*
13C4-PFHpA	*99*		*25 - 150*	*12/13/17 10:28*	*12/13/17 23:01*	*1*
13C4 PFOA	*96*		*25 - 150*	*12/13/17 10:28*	*12/13/17 23:01*	*1*
13C5 PFNA	*89*		*25 - 150*	*12/13/17 10:28*	*12/13/17 23:01*	*1*

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	390		20	13	ng/L		12/13/17 10:28	12/18/17 19:58	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*109*		*25 - 150*	*12/13/17 10:28*	*12/18/17 19:58*	*10*

Client Sample ID: 174777
Date Collected: 12/11/17 10:30
Date Received: 12/12/17 12:21

Lab Sample ID: 320-34174-9
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	21		2.0	0.92	ng/L		12/13/17 10:28	12/13/17 23:20	1
Perfluorohexanesulfonic acid (PFHxS)	93		2.0	0.87	ng/L		12/13/17 10:28	12/13/17 23:20	1
Perfluoroheptanoic acid (PFHpA)	10		2.0	0.80	ng/L		12/13/17 10:28	12/13/17 23:20	1
Perfluorooctanoic acid (PFOA)	14		2.0	0.75	ng/L		12/13/17 10:28	12/13/17 23:20	1
Perfluorononanoic acid (PFNA)	7.9		2.0	0.65	ng/L		12/13/17 10:28	12/13/17 23:20	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*89*		*25 - 150*	*12/13/17 10:28*	*12/13/17 23:20*	*1*
13C4-PFHpA	*96*		*25 - 150*	*12/13/17 10:28*	*12/13/17 23:20*	*1*
13C4 PFOA	*94*		*25 - 150*	*12/13/17 10:28*	*12/13/17 23:20*	*1*
13C5 PFNA	*86*		*25 - 150*	*12/13/17 10:28*	*12/13/17 23:20*	*1*

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	270		20	13	ng/L		12/13/17 10:28	12/18/17 20:16	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*122*		*25 - 150*	*12/13/17 10:28*	*12/18/17 20:16*	*10*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34174-1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFHxS (25-150)	PFHpA (25-150)	PFOA (25-150)	PFOS (25-150)	PFNA (25-150)			
320-34174-1	119989	91	97	93		86			
320-34174-1 - DL	119989				104				
320-34174-2	120089	92	98	98		90			
320-34174-2 - DL	120089				110				
320-34174-3	462641	100	106	105	90	99			
320-34174-4	569721	93	95	96	84	92			
320-34174-5	542512	101	103	103	94	102			
320-34174-6	573841	103	109	108	95	103			
320-34174-7	174718	94	98	98	85	90			
320-34174-8	174751	97	99	96		89			
320-34174-8 - DL	174751				109				
320-34174-9	174777	89	96	94		86			
320-34174-9 - DL	174777				122				
LCS 320-199666/2-A	Lab Control Sample	90	92	89	81	85			
LCSD 320-199666/3-A	Lab Control Sample Dup	88	89	85	81	82			
MB 320-199666/1-A	Method Blank	90	94	91	83	87			

Surrogate Legend

PFHxS = 18O2 PFHxS
PFHpA = 13C4-PFHpA
PFOA = 13C4 PFOA
PFOS = 13C4 PFOS
PFNA = 13C5 PFNA

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-199666/1-A
Matrix: Water
Analysis Batch: 199866

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 199666

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/13/17 10:28	12/13/17 19:40	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		12/13/17 10:28	12/13/17 19:40	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/13/17 10:28	12/13/17 19:40	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/13/17 10:28	12/13/17 19:40	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		12/13/17 10:28	12/13/17 19:40	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/13/17 10:28	12/13/17 19:40	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*90*		*25 - 150*	*12/13/17 10:28*	*12/13/17 19:40*	*1*
13C4-PFHpA	*94*		*25 - 150*	*12/13/17 10:28*	*12/13/17 19:40*	*1*
13C4 PFOA	*91*		*25 - 150*	*12/13/17 10:28*	*12/13/17 19:40*	*1*
13C4 PFOS	*83*		*25 - 150*	*12/13/17 10:28*	*12/13/17 19:40*	*1*
13C5 PFNA	*87*		*25 - 150*	*12/13/17 10:28*	*12/13/17 19:40*	*1*

Lab Sample ID: LCS 320-199666/2-A
Matrix: Water
Analysis Batch: 199866

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 199666

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	21.2		ng/L		120	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	20.5		ng/L		113	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	23.5		ng/L		117	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	22.9		ng/L		115	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	22.2		ng/L		119	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	25.1		ng/L		125	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*90*		*25 - 150*
13C4-PFHpA	*92*		*25 - 150*
13C4 PFOA	*89*		*25 - 150*
13C4 PFOS	*81*		*25 - 150*
13C5 PFNA	*85*		*25 - 150*

Lab Sample ID: LCSD 320-199666/3-A
Matrix: Water
Analysis Batch: 199866

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 199666

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	22.4		ng/L		127	72 - 151	5	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	21.4		ng/L		118	73 - 157	4	30
Perfluoroheptanoic acid (PFHpA)			20.0	24.7		ng/L		123	71 - 138	5	30
Perfluorooctanoic acid (PFOA)			20.0	23.6		ng/L		118	70 - 140	3	30
Perfluorooctanesulfonic acid (PFOS)			18.6	22.5		ng/L		121	69 - 144	2	30
Perfluorononanoic acid (PFNA)			20.0	26.3		ng/L		132	73 - 147	5	30

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34174-1

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	88		25 - 150
13C4-PFHpA	89		25 - 150
13C4 PFOA	85		25 - 150
13C4 PFOS	81		25 - 150
13C5 PFNA	82		25 - 150

LCMS

Prep Batch: 199666

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-34174-1	119989	Total/NA	Water	PFAS Prep	
320-34174-1 - DL	119989	Total/NA	Water	PFAS Prep	
320-34174-2	120089	Total/NA	Water	PFAS Prep	
320-34174-2 - DL	120089	Total/NA	Water	PFAS Prep	
320-34174-3	462641	Total/NA	Water	PFAS Prep	
320-34174-4	569721	Total/NA	Water	PFAS Prep	
320-34174-5	542512	Total/NA	Water	PFAS Prep	
320-34174-6	573841	Total/NA	Water	PFAS Prep	
320-34174-7	174718	Total/NA	Water	PFAS Prep	
320-34174-8 - DL	174751	Total/NA	Water	PFAS Prep	
320-34174-8	174751	Total/NA	Water	PFAS Prep	
320-34174-9 - DL	174777	Total/NA	Water	PFAS Prep	
320-34174-9	174777	Total/NA	Water	PFAS Prep	
MB 320-199666/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-199666/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-199666/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 199866

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-34174-1	119989	Total/NA	Water	WS-LC-0025 At1	199666
320-34174-2	120089	Total/NA	Water	WS-LC-0025 At1	199666
320-34174-3	462641	Total/NA	Water	WS-LC-0025 At1	199666
320-34174-4	569721	Total/NA	Water	WS-LC-0025 At1	199666
320-34174-5	542512	Total/NA	Water	WS-LC-0025 At1	199666
320-34174-6	573841	Total/NA	Water	WS-LC-0025 At1	199666
320-34174-7	174718	Total/NA	Water	WS-LC-0025 At1	199666
320-34174-8	174751	Total/NA	Water	WS-LC-0025 At1	199666
320-34174-9	174777	Total/NA	Water	WS-LC-0025 At1	199666
MB 320-199666/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	199666
LCS 320-199666/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	199666
LCSD 320-199666/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	199666

Analysis Batch: 200405

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-34174-1 - DL	119989	Total/NA	Water	WS-LC-0025 At1	199666
320-34174-2 - DL	120089	Total/NA	Water	WS-LC-0025 At1	199666
320-34174-8 - DL	174751	Total/NA	Water	WS-LC-0025 At1	199666
320-34174-9 - DL	174777	Total/NA	Water	WS-LC-0025 At1	199666

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34174-1

Client Sample ID: 119989
Date Collected: 12/07/17 13:35
Date Received: 12/12/17 12:21

Lab Sample ID: 320-34174-1
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	PFAS Prep			1.00 mL	1.66 mL	199666	12/13/17 10:28	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			199866	12/13/17 20:35	ABH	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	199666	12/13/17 10:28	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			200405	12/18/17 19:21	AAR	TAL SAC

Client Sample ID: 120089
Date Collected: 12/07/17 14:00
Date Received: 12/12/17 12:21

Lab Sample ID: 320-34174-2
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	PFAS Prep			1.00 mL	1.66 mL	199666	12/13/17 10:28	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			199866	12/13/17 20:53	ABH	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	199666	12/13/17 10:28	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			200405	12/18/17 19:39	AAR	TAL SAC

Client Sample ID: 462641
Date Collected: 12/07/17 15:15
Date Received: 12/12/17 12:21

Lab Sample ID: 320-34174-3
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	PFAS Prep			1.00 mL	1.66 mL	199666	12/13/17 10:28	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			199866	12/13/17 21:11	ABH	TAL SAC

Client Sample ID: 569721
Date Collected: 12/07/17 11:10
Date Received: 12/12/17 12:21

Lab Sample ID: 320-34174-4
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	PFAS Prep			1.00 mL	1.66 mL	199666	12/13/17 10:28	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			199866	12/13/17 21:30	ABH	TAL SAC

Client Sample ID: 542512
Date Collected: 12/07/17 14:35
Date Received: 12/12/17 12:21

Lab Sample ID: 320-34174-5
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	PFAS Prep			1.00 mL	1.66 mL	199666	12/13/17 10:28	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			199866	12/13/17 21:48	ABH	TAL SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34174-1

Client Sample ID: 573841
Date Collected: 12/08/17 11:50
Date Received: 12/12/17 12:21

Lab Sample ID: 320-34174-6
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	PFAS Prep			1.00 mL	1.66 mL	199666	12/13/17 10:28	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			199866	12/13/17 22:06	ABH	TAL SAC

Client Sample ID: 174718
Date Collected: 12/08/17 15:10
Date Received: 12/12/17 12:21

Lab Sample ID: 320-34174-7
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	PFAS Prep			1.00 mL	1.66 mL	199666	12/13/17 10:28	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			199866	12/13/17 22:25	ABH	TAL SAC

Client Sample ID: 174751
Date Collected: 12/11/17 11:25
Date Received: 12/12/17 12:21

Lab Sample ID: 320-34174-8
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	199666	12/13/17 10:28	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			199866	12/13/17 23:01	ABH	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	199666	12/13/17 10:28	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			200405	12/18/17 19:58	AAR	TAL SAC

Client Sample ID: 174777
Date Collected: 12/11/17 10:30
Date Received: 12/12/17 12:21

Lab Sample ID: 320-34174-9
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	PFAS Prep			1.00 mL	1.66 mL	199666	12/13/17 10:28	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			199866	12/13/17 23:20	ABH	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	199666	12/13/17 10:28	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			200405	12/18/17 20:16	AAR	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34174-1

Laboratory: TestAmerica Sacramento

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

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-055	12-18-17 *
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-18
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-18
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	12-31-17
L-A-B	DoD ELAP		L2468	01-20-18
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-18-18
Michigan	State Program	5	9947	01-31-18
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-28-18
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	12-30-17 *
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
West Virginia (DW)	State Program	3	9930C	12-31-17
Wyoming	State Program	8	8TMS-L	01-28-19

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

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34174-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34174-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-34174-1	119989	Water	12/07/17 13:35	12/12/17 12:21
320-34174-2	120089	Water	12/07/17 14:00	12/12/17 12:21
320-34174-3	462641	Water	12/07/17 15:15	12/12/17 12:21
320-34174-4	569721	Water	12/07/17 11:10	12/12/17 12:21
320-34174-5	542512	Water	12/07/17 14:35	12/12/17 12:21
320-34174-6	573841	Water	12/08/17 11:50	12/12/17 12:21
320-34174-7	174718	Water	12/08/17 15:10	12/12/17 12:21
320-34174-8	174751	Water	12/11/17 11:25	12/12/17 12:21
320-34174-9	174777	Water	12/11/17 10:30	12/12/17 12:21

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

CHAIN-OF-CUSTODY RECORD

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

Laboratory: Test America
Attn: David Alltucker

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFAS x6 (WS-LC-0025)	Total Number of Containers	Remarks/Matrix
119989		1335	12/7		X	X	2	Groundwater
120089		1400	12/7		X	X	2	
462641		1515	12/7		X	X	2	
569721		1110	12/7		X	X	2	
542512		1435	12/7		X	X	2	
573841		1150	12/8		X	X	2	
174718		1510	12/8		X	X	2	
174751		1125	12/11		X	X	2	
174777		1030	12/11		X	X	2	

320-34174 Chain of Custody

Project Information		Sample Receipt	
Project Number:	31-1-20060	Total Number of Containers	
Project Name:	FAI	COC Seals/Intact? Y/N/NA	—
Contact:	MDN	Received Good Cond./Cold	—
Ongoing Project?	Yes ☑ No ☐	Delivery Method:	Gold Streak
Sampler:	CTC	(attach shipping bill, if any)	

Instructions

Requested Turnaround Time: 5-Day Rush

Special Instructions:

Please Bill to 31-1-20060-001

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

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 1300	Signature: Time:	Signature: Time:
Printed Name: Christian Canfield Date: 12/11	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson Inc.	Company:	Company:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: Time: 12:21	Signature: Time:	Signature: Time:
Printed Name: Alonso Aguilo Date: 12/12/17	Printed Name: Date:	Printed Name: Date:
Company: TAls 5.4°C	Company:	Company:

F-19-91/UR

No. 34794

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-34174-1

Login Number: 34174
List Number: 1
Creator: Aguayo, Alonso

List Source: 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	
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:

Adam Wyborny

Title:

Environmental Engineering Staff

Date:

December 21, 2017

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

December 20, 2017

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-34174-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-34174-1

1. Laboratory

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

   ○ Yes ◉ No Comments:

ADEC has not approved an analytical laboratory for analysis of PFASs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

   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 Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

   ◉ Yes ○ No Comments:

   b. Correct Analyses requested?

   ◉ Yes ○ No Comments:

3. Laboratory Sample Receipt Documentation

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

   ◉ Yes ○ No Comments:

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

   ◉ Yes ○ No Comments:

Analysis of PFASs does not require a preservative other than temperature control.

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

   ◉ Yes ○ No 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 Comments:

There were no discrepancies identified in the sample receipt documentation.

e. Data quality or usability affected?

Comments:

The data quality and usability were unaffected; see above.

4. Case Narrative

a. Present and understandable?

◉ Yes ○ No Comments:

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

◉ Yes ○ No Comments:

The case narrative notes the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 5.4º C.

The case narrative notes that the samples *119989*, *120089*, *174751*, and *174777* were diluted to bring the PFOS concentrations within calibration range. Because of the dilution the reporting limits are elevated for these samples.

The case narrative notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD).

The case narrative notes many of the project samples included in this work order contained sediment.

c. Were all corrective actions documented?

◉ Yes ○ No Comments:

A laboratory control sample (LCS) and a LCS duplicate (LCSD) were extracted and analyzed to demonstrate analytical method accuracy and precision.

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

Comments:

The case narrative does not specify an effect on data quality or usability.

5. Samples Results

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

(•) Yes ( ) No Comments:

b. All applicable holding times met?

(•) Yes ( ) No Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

( ) Yes (•) No Comments:

N/A; 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 Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

( ) Yes (•) No Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

(•) Yes ( ) No Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

(•) Yes ( ) No Comments:

iii. If above LOQ, what samples are affected?

Comments:

None; PFAS compounds were not detected in method blank samples.

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

○ Yes ◉ No Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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 Comments:

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

○ Yes ◉ No 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

◉ Yes ○ No Comments:

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

◉ Yes ○ No Comments:

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

Comments:

N/A; 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 Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

◉ Yes ○ No Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a 13C-isotope of each target analyte, and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

◉ Yes ○ No Comments:

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

○ Yes ◉ No Comments:

Qualification of the results was not required; IDA recoveries were within acceptance criteria.

iv. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

○ Yes ◉ No Comments:

PFASs are not volatile compounds; 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 Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

○ Yes ◉ No Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not submitted with this work order.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

◉ Yes ○ No Comments:

ii. Submitted blind to lab?

◉ Yes ○ No Comments:

Field-duplicate pair *119989* / *120089* was submitted with this work order.

iii. Precision – All relative percent differences (RPD) less than specified DQOs? (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 Comments:

The field-duplicate RPDs are within the project specific DQO (30% for water samples), where calculable for detected analytes.

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

Comments:

The data quality and usability were not affected.

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

○ Yes ○ No ◉ Not Applicable

Samples for this project are not collected with reusable equipment, therefore a practical potential for equipment based cross-contamination does not exist.

i. All results less than LOQ?

○ Yes ◉ No Comments:

N/A; an equipment blank was not submitted.

ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

a. Defined and appropriate?

○ Yes ◉ No Comments:

No other data flags and/or qualifiers were required.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 320-34285-1
Client Project/Site: City of Fairbanks Fire Training Area

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

Attn: Marcy Nadel

Authorized for release by:
12/20/2017 12:55:47 PM

David Alltucker, Project Manager I
(916)374-4383
david.alltucker@testamericainc.com

Table of Contents

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-34285-1

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
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Case Narrative

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-34285-1

Job ID: 320-34285-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-34285-1

Receipt
The samples were received on 12/14/2017 12:29 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 6.0º C.

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

Organic Prep
Method(s) PFAS Prep: Sediment was present in the following samples: 506770 (320-34285-1), 121401 (320-34285-2), 117021 (320-34285-3), 119881 (320-34285-4) and 117161 (320-34285-5).

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-200103.

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: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-34285-1

Client Sample ID: 506770 — Lab Sample ID: 320-34285-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	1.7	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	9.2		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 121401 — Lab Sample ID: 320-34285-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	3.5		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	0.81	J	2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	25		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 117021 — Lab Sample ID: 320-34285-3

No Detections.

Client Sample ID: 119881 — Lab Sample ID: 320-34285-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	4.5		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	24		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	4.0		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	5.2		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	160		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	0.73	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 117161 — Lab Sample ID: 320-34285-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	2.5		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.2	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	5.8		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-34285-1

Client Sample ID: 506770
Date Collected: 12/13/17 14:30
Date Received: 12/14/17 12:29

Lab Sample ID: 320-34285-1
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/15/17 13:32	12/15/17 20:21	1
Perfluorohexanesulfonic acid (PFHxS)	**1.7**	**J**	2.0	0.87	ng/L		12/15/17 13:32	12/15/17 20:21	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/15/17 13:32	12/15/17 20:21	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/15/17 13:32	12/15/17 20:21	1
Perfluorooctanesulfonic acid (PFOS)	**9.2**		2.0	1.3	ng/L		12/15/17 13:32	12/15/17 20:21	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/15/17 13:32	12/15/17 20:21	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*109*		*25 - 150*	*12/15/17 13:32*	*12/15/17 20:21*	*1*
13C4-PFHpA	*116*		*25 - 150*	*12/15/17 13:32*	*12/15/17 20:21*	*1*
13C4 PFOA	*115*		*25 - 150*	*12/15/17 13:32*	*12/15/17 20:21*	*1*
13C4 PFOS	*106*		*25 - 150*	*12/15/17 13:32*	*12/15/17 20:21*	*1*
13C5 PFNA	*114*		*25 - 150*	*12/15/17 13:32*	*12/15/17 20:21*	*1*

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-34285-1

Client Sample ID: 121401
Date Collected: 12/13/17 15:40
Date Received: 12/14/17 12:29

Lab Sample ID: 320-34285-2
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/15/17 13:32	12/15/17 20:39	1
Perfluorohexanesulfonic acid (PFHxS)	**3.5**		2.0	0.87	ng/L		12/15/17 13:32	12/15/17 20:39	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/15/17 13:32	12/15/17 20:39	1
Perfluorooctanoic acid (PFOA)	**0.81**	**J**	2.0	0.75	ng/L		12/15/17 13:32	12/15/17 20:39	1
Perfluorooctanesulfonic acid (PFOS)	**25**		2.0	1.3	ng/L		12/15/17 13:32	12/15/17 20:39	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/15/17 13:32	12/15/17 20:39	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*113*		*25 - 150*	*12/15/17 13:32*	*12/15/17 20:39*	*1*
13C4-PFHpA	*121*		*25 - 150*	*12/15/17 13:32*	*12/15/17 20:39*	*1*
13C4 PFOA	*125*		*25 - 150*	*12/15/17 13:32*	*12/15/17 20:39*	*1*
13C4 PFOS	*107*		*25 - 150*	*12/15/17 13:32*	*12/15/17 20:39*	*1*
13C5 PFNA	*119*		*25 - 150*	*12/15/17 13:32*	*12/15/17 20:39*	*1*

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-34285-1

Client Sample ID: 117021
Date Collected: 12/12/17 16:30
Date Received: 12/14/17 12:29

Lab Sample ID: 320-34285-3
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/15/17 13:32	12/15/17 20:58	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		12/15/17 13:32	12/15/17 20:58	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/15/17 13:32	12/15/17 20:58	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/15/17 13:32	12/15/17 20:58	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		12/15/17 13:32	12/15/17 20:58	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/15/17 13:32	12/15/17 20:58	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*109*		*25 - 150*	*12/15/17 13:32*	*12/15/17 20:58*	*1*
13C4-PFHpA	*116*		*25 - 150*	*12/15/17 13:32*	*12/15/17 20:58*	*1*
13C4 PFOA	*118*		*25 - 150*	*12/15/17 13:32*	*12/15/17 20:58*	*1*
13C4 PFOS	*103*		*25 - 150*	*12/15/17 13:32*	*12/15/17 20:58*	*1*
13C5 PFNA	*113*		*25 - 150*	*12/15/17 13:32*	*12/15/17 20:58*	*1*

Client Sample ID: 119881
Date Collected: 12/12/17 14:10
Date Received: 12/14/17 12:29

Lab Sample ID: 320-34285-4
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	4.5		2.0	0.92	ng/L		12/15/17 13:32	12/15/17 21:34	1
Perfluorohexanesulfonic acid (PFHxS)	24		2.0	0.87	ng/L		12/15/17 13:32	12/15/17 21:34	1
Perfluoroheptanoic acid (PFHpA)	4.0		2.0	0.80	ng/L		12/15/17 13:32	12/15/17 21:34	1
Perfluorooctanoic acid (PFOA)	5.2		2.0	0.75	ng/L		12/15/17 13:32	12/15/17 21:34	1
Perfluorooctanesulfonic acid (PFOS)	160		2.0	1.3	ng/L		12/15/17 13:32	12/15/17 21:34	1
Perfluorononanoic acid (PFNA)	0.73	J	2.0	0.65	ng/L		12/15/17 13:32	12/15/17 21:34	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*109*		*25 - 150*	*12/15/17 13:32*	*12/15/17 21:34*	*1*
13C4-PFHpA	*116*		*25 - 150*	*12/15/17 13:32*	*12/15/17 21:34*	*1*
13C4 PFOA	*120*		*25 - 150*	*12/15/17 13:32*	*12/15/17 21:34*	*1*
13C4 PFOS	*106*		*25 - 150*	*12/15/17 13:32*	*12/15/17 21:34*	*1*
13C5 PFNA	*119*		*25 - 150*	*12/15/17 13:32*	*12/15/17 21:34*	*1*

Client Sample ID: 117161
Date Collected: 12/11/17 17:00
Date Received: 12/14/17 12:29

Lab Sample ID: 320-34285-5
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/15/17 13:32	12/15/17 21:53	1
Perfluorohexanesulfonic acid (PFHxS)	**2.5**		2.0	0.87	ng/L		12/15/17 13:32	12/15/17 21:53	1
Perfluoroheptanoic acid (PFHpA)	**1.2**	**J**	2.0	0.80	ng/L		12/15/17 13:32	12/15/17 21:53	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/15/17 13:32	12/15/17 21:53	1
Perfluorooctanesulfonic acid (PFOS)	**5.8**		2.0	1.3	ng/L		12/15/17 13:32	12/15/17 21:53	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/15/17 13:32	12/15/17 21:53	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*114*		*25 - 150*	*12/15/17 13:32*	*12/15/17 21:53*	*1*
13C4-PFHpA	*125*		*25 - 150*	*12/15/17 13:32*	*12/15/17 21:53*	*1*
13C4 PFOA	*124*		*25 - 150*	*12/15/17 13:32*	*12/15/17 21:53*	*1*
13C4 PFOS	*108*		*25 - 150*	*12/15/17 13:32*	*12/15/17 21:53*	*1*
13C5 PFNA	*117*		*25 - 150*	*12/15/17 13:32*	*12/15/17 21:53*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-34285-1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)				
Lab Sample ID	Client Sample ID	PFHxS (25-150)	PFHpA (25-150)	PFOA (25-150)	PFOS (25-150)	PFNA (25-150)
320-34285-1	506770	109	116	115	106	114
320-34285-2	121401	113	121	125	107	119
320-34285-3	117021	109	116	118	103	113
320-34285-4	119881	109	116	120	106	119
320-34285-5	117161	114	125	124	108	117
LCS 320-200103/2-A	Lab Control Sample	112	120	121	111	114
LCSD 320-200103/3-A	Lab Control Sample Dup	106	112	111	103	107
MB 320-200103/1-A	Method Blank	106	112	112	105	106

Surrogate Legend

PFHxS = 18O2 PFHxS
PFHpA = 13C4-PFHpA
PFOA = 13C4 PFOA
PFOS = 13C4 PFOS
PFNA = 13C5 PFNA

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-200103/1-A
Matrix: Water
Analysis Batch: 200267

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 200103

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/15/17 13:32	12/15/17 19:26	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		12/15/17 13:32	12/15/17 19:26	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/15/17 13:32	12/15/17 19:26	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/15/17 13:32	12/15/17 19:26	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		12/15/17 13:32	12/15/17 19:26	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/15/17 13:32	12/15/17 19:26	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*106*		*25 - 150*	*12/15/17 13:32*	*12/15/17 19:26*	*1*
13C4-PFHpA	*112*		*25 - 150*	*12/15/17 13:32*	*12/15/17 19:26*	*1*
13C4 PFOA	*112*		*25 - 150*	*12/15/17 13:32*	*12/15/17 19:26*	*1*
13C4 PFOS	*105*		*25 - 150*	*12/15/17 13:32*	*12/15/17 19:26*	*1*
13C5 PFNA	*106*		*25 - 150*	*12/15/17 13:32*	*12/15/17 19:26*	*1*

Lab Sample ID: LCS 320-200103/2-A
Matrix: Water
Analysis Batch: 200267

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 200103

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	20.2		ng/L		114	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	19.9		ng/L		109	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	22.2		ng/L		111	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	21.5		ng/L		107	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	19.8		ng/L		107	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	23.2		ng/L		116	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*112*		*25 - 150*
13C4-PFHpA	*120*		*25 - 150*
13C4 PFOA	*121*		*25 - 150*
13C4 PFOS	*111*		*25 - 150*
13C5 PFNA	*114*		*25 - 150*

Lab Sample ID: LCSD 320-200103/3-A
Matrix: Water
Analysis Batch: 200267

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 200103

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	21.8		ng/L		123	72 - 151	8	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	21.5		ng/L		118	73 - 157	7	30
Perfluoroheptanoic acid (PFHpA)			20.0	24.1		ng/L		120	71 - 138	8	30
Perfluorooctanoic acid (PFOA)			20.0	23.8		ng/L		119	70 - 140	10	30
Perfluorooctanesulfonic acid (PFOS)			18.6	20.0		ng/L		108	69 - 144	1	30
Perfluorononanoic acid (PFNA)			20.0	24.2		ng/L		121	73 - 147	4	30

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-34285-1

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	106		25 - 150
13C4-PFHpA	112		25 - 150
13C4 PFOA	111		25 - 150
13C4 PFOS	103		25 - 150
13C5 PFNA	107		25 - 150

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-34285-1

LCMS

Prep Batch: 200103

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-34285-1	506770	Total/NA	Water	PFAS Prep	
320-34285-2	121401	Total/NA	Water	PFAS Prep	
320-34285-3	117021	Total/NA	Water	PFAS Prep	
320-34285-4	119881	Total/NA	Water	PFAS Prep	
320-34285-5	117161	Total/NA	Water	PFAS Prep	
MB 320-200103/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-200103/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-200103/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 200267

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-34285-1	506770	Total/NA	Water	WS-LC-0025 At1	200103
320-34285-2	121401	Total/NA	Water	WS-LC-0025 At1	200103
320-34285-3	117021	Total/NA	Water	WS-LC-0025 At1	200103
320-34285-4	119881	Total/NA	Water	WS-LC-0025 At1	200103
320-34285-5	117161	Total/NA	Water	WS-LC-0025 At1	200103
MB 320-200103/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	200103
LCS 320-200103/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	200103
LCSD 320-200103/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	200103

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-34285-1

Client Sample ID: 506770
Date Collected: 12/13/17 14:30
Date Received: 12/14/17 12:29

Lab Sample ID: 320-34285-1
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	PFAS Prep			1.00 mL	1.66 mL	200103	12/15/17 13:32	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			200267	12/15/17 20:21	AAR	TAL SAC

Client Sample ID: 121401
Date Collected: 12/13/17 15:40
Date Received: 12/14/17 12:29

Lab Sample ID: 320-34285-2
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	PFAS Prep			1.00 mL	1.66 mL	200103	12/15/17 13:32	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			200267	12/15/17 20:39	AAR	TAL SAC

Client Sample ID: 117021
Date Collected: 12/12/17 16:30
Date Received: 12/14/17 12:29

Lab Sample ID: 320-34285-3
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	PFAS Prep			1.00 mL	1.66 mL	200103	12/15/17 13:32	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			200267	12/15/17 20:58	AAR	TAL SAC

Client Sample ID: 119881
Date Collected: 12/12/17 14:10
Date Received: 12/14/17 12:29

Lab Sample ID: 320-34285-4
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	PFAS Prep			1.00 mL	1.66 mL	200103	12/15/17 13:32	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			200267	12/15/17 21:34	AAR	TAL SAC

Client Sample ID: 117161
Date Collected: 12/11/17 17:00
Date Received: 12/14/17 12:29

Lab Sample ID: 320-34285-5
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	PFAS Prep			1.00 mL	1.66 mL	200103	12/15/17 13:32	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			200267	12/15/17 21:53	AAR	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-34285-1

Laboratory: TestAmerica Sacramento

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

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-055	12-18-17 *
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-18
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-18
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	12-31-17
L-A-B	DoD ELAP		L2468	01-20-18
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-18-18
Michigan	State Program	5	9947	01-31-18
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-28-18
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	12-30-17 *
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
West Virginia (DW)	State Program	3	9930C	12-31-17
Wyoming	State Program	8	8TMS-L	01-28-19

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

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-34285-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-34285-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-34285-1	506770	Water	12/13/17 14:30	12/14/17 12:29
320-34285-2	121401	Water	12/13/17 15:40	12/14/17 12:29
320-34285-3	117021	Water	12/12/17 16:30	12/14/17 12:29
320-34285-4	119881	Water	12/12/17 14:10	12/14/17 12:29
320-34285-5	117161	Water	12/11/17 17:00	12/14/17 12:29

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

CHAIN-OF-CUSTODY RECORD

Laboratory Test America
Attn: David Alltucker

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFAS x 6 (WS-LC-0025)	Total Number of Containers	Remarks/Matrix
506770		1430	12/13		X	X		Groundwater
121401		1540	12/13		X	X		
117021		1630	12/12		X	X		
119881		1410	12/12		X	X		
117161		1700	12/11		X	X		

320-34285 Chain of Custody

Project Information		Sample Receipt	
Project Number:	31-1-20060	Total Number of Containers	
Project Name:	FAI	COC Seals/Intact? Y/N/NA	
Contact:	MDN	Received Good Cond./Cold	
Ongoing Project?	Yes ☑ No ☐	Delivery Method:	
Sampler:	CTC	(attach shipping bill, if any)	

Instructions

Requested Turnaround Time: 5-Day Rush

Special Instructions:
Please Bill to 31-1-20060-601

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

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 1615	Signature: Time:	Signature: Time:
Printed Name: Christian Canfield Date: 12/13/17	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson, Inc.	Company:	Company:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: Time: 12:27	Signature: Time:	Signature: Time:
Printed Name: Alonso Aguayo Date: 12/14/17	Printed Name: Date:	Printed Name: Date:
Company: Tacoma 6.0°C	Company:	Company:

F-19-91/UR

No. 34795

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-34285-1

Login Number: 34285
List Number: 1
Creator: Aguayo, Alonso

List Source: 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	
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:

Adam Wyborny

Title:

Environmental Engineering Staff

Date:

December 21, 2017

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

December 20, 2017

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-34285-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-34285-1

1. Laboratory

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

   ○ Yes ◉ No Comments:

ADEC has not approved an analytical laboratory for analysis of PFASs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

   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 Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

   ◉ Yes ○ No Comments:

   b. Correct Analyses requested?

   ◉ Yes ○ No Comments:

3. Laboratory Sample Receipt Documentation

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

   ◉ Yes ○ No Comments:

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

   ◉ Yes ○ No Comments:

Analysis of PFASs does not require a preservative other than temperature control.

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

   ◉ Yes ○ No 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 Comments:

There were no discrepancies identified in the sample receipt documentation.

e. Data quality or usability affected?

Comments:

The data quality and usability were unaffected; see above.

4. Case Narrative

a. Present and understandable?

◉ Yes ○ No Comments:

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

◉ Yes ○ No Comments:

The case narrative notes the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 6.0º C.

The case narrative notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD).

The case narrative notes many of the project samples included in this work order contained sediment.

c. Were all corrective actions documented?

◉ Yes ○ No Comments:

A laboratory control sample (LCS) and a LCS duplicate (LCSD) were extracted and analyzed to demonstrate analytical method accuracy and precision.

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

Comments:

The case narrative does not specify an effect on data quality or usability.

5. Samples Results

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

◉ Yes ○ No Comments:

b. All applicable holding times met?

(•) Yes ( ) No Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

( ) Yes (•) No Comments:

N/A; 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 Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

( ) Yes (•) No Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

(•) Yes ( ) No Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

(•) Yes ( ) No Comments:

iii. If above LOQ, what samples are affected?

Comments:

None; PFAS compounds were not detected in method blank samples.

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

( ) Yes (•) No Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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 Comments:

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

( ) Yes (•) No 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

(•) Yes ( ) No Comments:

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

(•) Yes ( ) No Comments:

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

Comments:

N/A; 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 Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

(•) Yes ( ) No Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a 13C-isotope of each target analyte, and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

(•) Yes ( ) No Comments:

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

( ) Yes (•) No Comments:

Qualification of the results was not required; IDA recoveries were within acceptance criteria.

iv. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

( ) Yes (•) No Comments:

PFASs are not volatile compounds; 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 Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

○ Yes ◉ No Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not submitted with this work order.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

◉ Yes ○ No Comments:

ii. Submitted blind to lab?

○ Yes ◉ No Comments:

A field-duplicate pair was not submitted with this work order. However, field-duplicate samples are submitted with the appropriate frequency for the overall project.

iii. Precision – All relative percent differences (RPD) less than specified DQOs?
(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 Comments:

N/A; field-duplicate samples were not submitted with this work order.

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

Comments:

The data quality and usability were not affected.

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

○ Yes ○ No ◉ Not Applicable

Samples for this project are not collected with reusable equipment, therefore a practical potential for equipment based cross-contamination does not exist.

i. All results less than LOQ?

○ Yes ◉ No Comments:

N/A; an equipment blank was not submitted.

ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

a. Defined and appropriate?

○ Yes ◉ No Comments:

No other data flags and/or qualifiers were required.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 320-34503-1
Client Project/Site: FAI

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

Attn: Marcy Nadel

Authorized for release by:
12/26/2017 2:44:02 PM

David Alltucker, Project Manager I
(916)374-4383
david.alltucker@testamericainc.com

Table of Contents

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34503-1

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
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Job ID: 320-34503-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-34503-1

Receipt
The samples were received on 12/20/2017 10:05 AM; the samples arrived in good condition, properly preserved and, where required, 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(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-201194 and method code PFAS_DI_Prep.

Method(s) PFAS Prep: The following samples: 176010 (320-34503-1), 174939 (320-34503-2), 174815 (320-34503-3), 117196 (320-34503-4) and 120235 (320-34503-5) contain orange colored sediment on the bottom of the container.

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: FAI

TestAmerica Job ID: 320-34503-1

Client Sample ID: 176010 — Lab Sample ID: 320-34503-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	2.3		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	7.9		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 174939 — Lab Sample ID: 320-34503-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.1	J	2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	2.3		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.1	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	1.8	J	2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	6.0		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 174815 — Lab Sample ID: 320-34503-3

No Detections.

Client Sample ID: 117196 — Lab Sample ID: 320-34503-4

No Detections.

Client Sample ID: 120235 — Lab Sample ID: 320-34503-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	4.1		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	21		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	3.5		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	4.5		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	170		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34503-1

Client Sample ID: 176010
Date Collected: 12/14/17 10:50
Date Received: 12/20/17 10:05

Lab Sample ID: 320-34503-1
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/22/17 17:00	12/26/17 11:45	1
Perfluorohexanesulfonic acid (PFHxS)	**2.3**		2.0	0.87	ng/L		12/22/17 17:00	12/26/17 11:45	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/22/17 17:00	12/26/17 11:45	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/22/17 17:00	12/26/17 11:45	1
Perfluorooctanesulfonic acid (PFOS)	**7.9**		2.0	1.3	ng/L		12/22/17 17:00	12/26/17 11:45	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/22/17 17:00	12/26/17 11:45	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*118*		*25 - 150*	*12/22/17 17:00*	*12/26/17 11:45*	*1*
13C4-PFHpA	*120*		*25 - 150*	*12/22/17 17:00*	*12/26/17 11:45*	*1*
13C4 PFOA	*120*		*25 - 150*	*12/22/17 17:00*	*12/26/17 11:45*	*1*
13C4 PFOS	*106*		*25 - 150*	*12/22/17 17:00*	*12/26/17 11:45*	*1*
13C5 PFNA	*115*		*25 - 150*	*12/22/17 17:00*	*12/26/17 11:45*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34503-1

Client Sample ID: 174939
Date Collected: 12/14/17 14:40
Date Received: 12/20/17 10:05

Lab Sample ID: 320-34503-2
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**1.1**	**J**	2.0	0.92	ng/L		12/22/17 17:00	12/26/17 12:03	1
Perfluorohexanesulfonic acid (PFHxS)	**2.3**		2.0	0.87	ng/L		12/22/17 17:00	12/26/17 12:03	1
Perfluoroheptanoic acid (PFHpA)	**1.1**	**J**	2.0	0.80	ng/L		12/22/17 17:00	12/26/17 12:03	1
Perfluorooctanoic acid (PFOA)	**1.8**	**J**	2.0	0.75	ng/L		12/22/17 17:00	12/26/17 12:03	1
Perfluorooctanesulfonic acid (PFOS)	**6.0**		2.0	1.3	ng/L		12/22/17 17:00	12/26/17 12:03	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/22/17 17:00	12/26/17 12:03	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*113*		*25 - 150*	*12/22/17 17:00*	*12/26/17 12:03*	*1*
13C4-PFHpA	*120*		*25 - 150*	*12/22/17 17:00*	*12/26/17 12:03*	*1*
13C4 PFOA	*120*		*25 - 150*	*12/22/17 17:00*	*12/26/17 12:03*	*1*
13C4 PFOS	*105*		*25 - 150*	*12/22/17 17:00*	*12/26/17 12:03*	*1*
13C5 PFNA	*113*		*25 - 150*	*12/22/17 17:00*	*12/26/17 12:03*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34503-1

Client Sample ID: 174815
Date Collected: 12/14/17 15:30
Date Received: 12/20/17 10:05

Lab Sample ID: 320-34503-3
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/22/17 17:00	12/26/17 12:22	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		12/22/17 17:00	12/26/17 12:22	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/22/17 17:00	12/26/17 12:22	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/22/17 17:00	12/26/17 12:22	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		12/22/17 17:00	12/26/17 12:22	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/22/17 17:00	12/26/17 12:22	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*116*		*25 - 150*	*12/22/17 17:00*	*12/26/17 12:22*	*1*
13C4-PFHpA	*122*		*25 - 150*	*12/22/17 17:00*	*12/26/17 12:22*	*1*
13C4 PFOA	*125*		*25 - 150*	*12/22/17 17:00*	*12/26/17 12:22*	*1*
13C4 PFOS	*108*		*25 - 150*	*12/22/17 17:00*	*12/26/17 12:22*	*1*
13C5 PFNA	*114*		*25 - 150*	*12/22/17 17:00*	*12/26/17 12:22*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34503-1

Client Sample ID: 117196
Date Collected: 12/15/17 12:40
Date Received: 12/20/17 10:05

Lab Sample ID: 320-34503-4
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/22/17 17:00	12/26/17 12:40	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		12/22/17 17:00	12/26/17 12:40	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/22/17 17:00	12/26/17 12:40	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/22/17 17:00	12/26/17 12:40	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		12/22/17 17:00	12/26/17 12:40	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/22/17 17:00	12/26/17 12:40	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*116*		*25 - 150*	*12/22/17 17:00*	*12/26/17 12:40*	*1*
13C4-PFHpA	*122*		*25 - 150*	*12/22/17 17:00*	*12/26/17 12:40*	*1*
13C4 PFOA	*125*		*25 - 150*	*12/22/17 17:00*	*12/26/17 12:40*	*1*
13C4 PFOS	*107*		*25 - 150*	*12/22/17 17:00*	*12/26/17 12:40*	*1*
13C5 PFNA	*119*		*25 - 150*	*12/22/17 17:00*	*12/26/17 12:40*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34503-1

Client Sample ID: 120235
Date Collected: 12/15/17 10:20
Date Received: 12/20/17 10:05

Lab Sample ID: 320-34503-5
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**4.1**		2.0	0.92	ng/L		12/22/17 17:00	12/26/17 12:59	1
Perfluorohexanesulfonic acid (PFHxS)	**21**		2.0	0.87	ng/L		12/22/17 17:00	12/26/17 12:59	1
Perfluoroheptanoic acid (PFHpA)	**3.5**		2.0	0.80	ng/L		12/22/17 17:00	12/26/17 12:59	1
Perfluorooctanoic acid (PFOA)	**4.5**		2.0	0.75	ng/L		12/22/17 17:00	12/26/17 12:59	1
Perfluorooctanesulfonic acid (PFOS)	**170**		2.0	1.3	ng/L		12/22/17 17:00	12/26/17 12:59	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/22/17 17:00	12/26/17 12:59	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*113*		*25 - 150*	*12/22/17 17:00*	*12/26/17 12:59*	*1*
13C4-PFHpA	*120*		*25 - 150*	*12/22/17 17:00*	*12/26/17 12:59*	*1*
13C4 PFOA	*117*		*25 - 150*	*12/22/17 17:00*	*12/26/17 12:59*	*1*
13C4 PFOS	*103*		*25 - 150*	*12/22/17 17:00*	*12/26/17 12:59*	*1*
13C5 PFNA	*114*		*25 - 150*	*12/22/17 17:00*	*12/26/17 12:59*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34503-1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)				
Lab Sample ID	Client Sample ID	PFHxS (25-150)	PFHpA (25-150)	PFOA (25-150)	PFOS (25-150)	PFNA (25-150)
320-34503-1	176010	118	120	120	106	115
320-34503-2	174939	113	120	120	105	113
320-34503-3	174815	116	122	125	108	114
320-34503-4	117196	116	122	125	107	119
320-34503-5	120235	113	120	117	103	114
LCS 320-201194/2-A	Lab Control Sample	109	112	108	103	104
LCSD 320-201194/3-A	Lab Control Sample Dup	111	113	107	102	102
MB 320-201194/1-A	Method Blank	113	112	109	105	105

Surrogate Legend

PFHxS = 18O2 PFHxS
PFHpA = 13C4-PFHpA
PFOA = 13C4 PFOA
PFOS = 13C4 PFOS
PFNA = 13C5 PFNA

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-201194/1-A
Matrix: Water
Analysis Batch: 201293

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 201194

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/22/17 17:00	12/26/17 10:50	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		12/22/17 17:00	12/26/17 10:50	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/22/17 17:00	12/26/17 10:50	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/22/17 17:00	12/26/17 10:50	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		12/22/17 17:00	12/26/17 10:50	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/22/17 17:00	12/26/17 10:50	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*113*		*25 - 150*	*12/22/17 17:00*	*12/26/17 10:50*	*1*
13C4-PFHpA	*112*		*25 - 150*	*12/22/17 17:00*	*12/26/17 10:50*	*1*
13C4 PFOA	*109*		*25 - 150*	*12/22/17 17:00*	*12/26/17 10:50*	*1*
13C4 PFOS	*105*		*25 - 150*	*12/22/17 17:00*	*12/26/17 10:50*	*1*
13C5 PFNA	*105*		*25 - 150*	*12/22/17 17:00*	*12/26/17 10:50*	*1*

Lab Sample ID: LCS 320-201194/2-A
Matrix: Water
Analysis Batch: 201293

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 201194

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	20.9		ng/L		118	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	20.9		ng/L		115	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	23.8		ng/L		119	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	23.3		ng/L		116	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	21.2		ng/L		114	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	23.8		ng/L		119	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*109*		*25 - 150*
13C4-PFHpA	*112*		*25 - 150*
13C4 PFOA	*108*		*25 - 150*
13C4 PFOS	*103*		*25 - 150*
13C5 PFNA	*104*		*25 - 150*

Lab Sample ID: LCSD 320-201194/3-A
Matrix: Water
Analysis Batch: 201293

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 201194

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	21.5		ng/L		121	72 - 151	3	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	21.4		ng/L		118	73 - 157	2	30
Perfluoroheptanoic acid (PFHpA)			20.0	24.0		ng/L		120	71 - 138	1	30
Perfluorooctanoic acid (PFOA)			20.0	24.3		ng/L		122	70 - 140	5	30
Perfluorooctanesulfonic acid (PFOS)			18.6	21.0		ng/L		113	69 - 144	1	30
Perfluorononanoic acid (PFNA)			20.0	25.1		ng/L		126	73 - 147	5	30

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34503-1

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	111		25 - 150
13C4-PFHpA	113		25 - 150
13C4 PFOA	107		25 - 150
13C4 PFOS	102		25 - 150
13C5 PFNA	102		25 - 150

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34503-1

LCMS

Prep Batch: 201194

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-34503-1	176010	Total/NA	Water	PFAS Prep	
320-34503-2	174939	Total/NA	Water	PFAS Prep	
320-34503-3	174815	Total/NA	Water	PFAS Prep	
320-34503-4	117196	Total/NA	Water	PFAS Prep	
320-34503-5	120235	Total/NA	Water	PFAS Prep	
MB 320-201194/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-201194/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-201194/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 201293

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-34503-1	176010	Total/NA	Water	WS-LC-0025 At1	201194
320-34503-2	174939	Total/NA	Water	WS-LC-0025 At1	201194
320-34503-3	174815	Total/NA	Water	WS-LC-0025 At1	201194
320-34503-4	117196	Total/NA	Water	WS-LC-0025 At1	201194
320-34503-5	120235	Total/NA	Water	WS-LC-0025 At1	201194
MB 320-201194/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	201194
LCS 320-201194/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	201194
LCSD 320-201194/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	201194

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34503-1

Client Sample ID: 176010
Date Collected: 12/14/17 10:50
Date Received: 12/20/17 10:05

Lab Sample ID: 320-34503-1
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	PFAS Prep			1.00 mL	1.66 mL	201194	12/22/17 17:00	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			201293	12/26/17 11:45	AAR	TAL SAC

Client Sample ID: 174939
Date Collected: 12/14/17 14:40
Date Received: 12/20/17 10:05

Lab Sample ID: 320-34503-2
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	PFAS Prep			1.00 mL	1.66 mL	201194	12/22/17 17:00	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			201293	12/26/17 12:03	AAR	TAL SAC

Client Sample ID: 174815
Date Collected: 12/14/17 15:30
Date Received: 12/20/17 10:05

Lab Sample ID: 320-34503-3
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	PFAS Prep			1.00 mL	1.66 mL	201194	12/22/17 17:00	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			201293	12/26/17 12:22	AAR	TAL SAC

Client Sample ID: 117196
Date Collected: 12/15/17 12:40
Date Received: 12/20/17 10:05

Lab Sample ID: 320-34503-4
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	PFAS Prep			1.00 mL	1.66 mL	201194	12/22/17 17:00	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			201293	12/26/17 12:40	AAR	TAL SAC

Client Sample ID: 120235
Date Collected: 12/15/17 10:20
Date Received: 12/20/17 10:05

Lab Sample ID: 320-34503-5
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	PFAS Prep			1.00 mL	1.66 mL	201194	12/22/17 17:00	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			201293	12/26/17 12:59	AAR	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34503-1

Laboratory: TestAmerica Sacramento

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

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-055	12-18-17 *
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-18
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-18
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	12-31-17
L-A-B	DoD ELAP		L2468	01-20-18
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-18-18
Michigan	State Program	5	9947	01-31-18
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-28-18
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	12-30-17 *
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
West Virginia (DW)	State Program	3	9930C	12-31-17
Wyoming	State Program	8	8TMS-L	01-28-19

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

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34503-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34503-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-34503-1	176010	Water	12/14/17 10:50	12/20/17 10:05
320-34503-2	174939	Water	12/14/17 14:40	12/20/17 10:05
320-34503-3	174815	Water	12/14/17 15:30	12/20/17 10:05
320-34503-4	117196	Water	12/15/17 12:40	12/20/17 10:05
320-34503-5	120235	Water	12/15/17 10:20	12/20/17 10:05

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

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(206) 632-8020

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(907) 479-0600

2255 S.W. Canyon Road
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(503) 223-6147

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St. Louis, MO 63146-3564
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5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

CHAIN-OF-CUSTODY RECORD

Laboratory TEST AMERICA
Attn: David Alltucker

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFAS +6 (WS-LC-0015)	Total Number of Containers	Remarks/Matrix
176010		1050	12/14	X	X	X	2	GROUNDWATER
174939		1440	12/14	X	X	X	2	
174815		1530	12/14	X	X	X	2	
117196		1240	12/15	X	X	X	2	
120235		1020	12/15	X	X	X	2	

320-34503 Chain of Custody

Project Information		Sample Receipt	
Project Number:	31-1-20060	Total Number of Containers	10
Project Name:	FAI	COC Seals/Intact? Y/N/NA	—
Contact:	MDN	Received Good Cond./Cold	—
Ongoing Project?	Yes ☑ No ☐	Delivery Method:	Goldstreak
Sampler:	CTC	(attach shipping bill, if any)	

Instructions

Requested Turnaround Time: 5-Day Rush

Special Instructions:
Please Bill to 31-1-20060-001

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

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature:	Signature:	Signature:
Time: 1400	Time:	Time:
Printed Name: Christian Canfield	Printed Name:	Printed Name:
Date: 12/15/17	Date:	Date:
Company: Shannon & Wilson, Inc	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature:	Signature:	Signature:
Time: 10:05	Time:	Time:
Printed Name: Alonso Aguayo	Printed Name:	Printed Name:
Date: 12/20/17	Date:	Date:
Company: TAws 2.5	Company:	Company:

F-19-91/UR

No. 34796

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-34503-1

Login Number: 34503
List Number: 1
Creator: Aguayo, Alonso

List Source: 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	
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:

Adam Wyborny

Title:

Environmental Engineering Staff

Date:

December 27, 2017

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

December 26, 2017

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-34503-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-34503-1

1. Laboratory

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

   ○ Yes ◉ No Comments:

ADEC has not approved an analytical laboratory for analysis of PFASs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

   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 Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

   ◉ Yes ○ No Comments:

   b. Correct Analyses requested?

   ◉ Yes ○ No Comments:

3. Laboratory Sample Receipt Documentation

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

   ◉ Yes ○ No Comments:

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

   ◉ Yes ○ No Comments:

Analysis of PFASs does not require a preservative other than temperature control.

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

   ◉ Yes ○ No 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 Comments:

There were no discrepancies identified in the sample receipt documentation.

e. Data quality or usability affected?

Comments:

The data quality and usability were unaffected; see above.

4. Case Narrative

a. Present and understandable?

◉ Yes ○ No Comments:

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

◉ Yes ○ No Comments:

The case narrative notes the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 2.8º C.

The case narrative notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD).

The case narrative notes many of the project samples included in this work order contained sediment.

c. Were all corrective actions documented?

◉ Yes ○ No Comments:

A laboratory control sample (LCS) and a LCS duplicate (LCSD) were extracted and analyzed to demonstrate analytical method accuracy and precision.

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

Comments:

The case narrative does not specify an effect on data quality or usability.

5. Samples Results

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

◉ Yes ○ No Comments:

b. All applicable holding times met?

◉ Yes ○ No Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

○ Yes ◉ No Comments:

N/A; 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 Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

○ Yes ◉ No Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

◉ Yes ○ No Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

◉ Yes ○ No Comments:

iii. If above LOQ, what samples are affected?

Comments:

None; PFAS compounds were not detected in method blank samples.

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

○ Yes ◉ No Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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 Comments:

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

( ) Yes (●) No 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

(●) Yes ( ) No Comments:

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

(●) Yes ( ) No Comments:

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

Comments:

N/A; 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 Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

(•) Yes ( ) No Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a 13C-isotope of each target analyte, and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

(•) Yes ( ) No Comments:

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

( ) Yes (•) No Comments:

Qualification of the results was not required; IDA recoveries were within acceptance criteria.

iv. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

( ) Yes (•) No Comments:

PFASs are not volatile compounds; 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 Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

○ Yes ◉ No Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not submitted with this work order.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

◉ Yes ○ No Comments:

ii. Submitted blind to lab?

○ Yes ◉ No Comments:

A field-duplicate pair was not submitted with this work order. However, field-duplicate samples are submitted with the appropriate frequency for the overall project.

iii. Precision – All relative percent differences (RPD) less than specified DQOs?
(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 Comments:

N/A; field-duplicate samples were not submitted with this work order.

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

Comments:

The data quality and usability were not affected.

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

○ Yes ○ No ◉ Not Applicable

Samples for this project are not collected with reusable equipment, therefore a practical potential for equipment based cross-contamination does not exist.

i. All results less than LOQ?

○ Yes ◉ No Comments:

N/A; an equipment blank was not submitted.

ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

a. Defined and appropriate?

○ Yes ◉ No Comments:

No other data flags and/or qualifiers were required.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 320-34744-1
Client Project/Site: FIA

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

Attn: Marcy Nadel

Authorized for release by:
1/5/2018 3:25:34 PM

David Alltucker, Project Manager I
(916)374-4383
david.alltucker@testamericainc.com

Table of Contents

Qualifiers

LCMS

Qualifier	Qualifier Description
CI	The peak identified by the data system exhibited chromatographic interference that could not be resolved. There is reason to suspect there may be a high bias.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
*	Isotope Dilution analyte is outside acceptance limits.

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
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Job ID: 320-34744-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-34744-1

Receipt
The samples were received on 12/28/2017 10:50 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.5º C.

LCMS
Method(s) WS-LC-0025 At1: Several Isotope Dilution Analyte (IDA) recoveries are above the method recommended limit for the following sample: 120341 (320-34744-6). Quantitation by isotope dilution generally precludes any adverse effect on data quality due to elevated IDA recoveries.

Method(s) WS-LC-0025 At1: The following samples has chromatographic interferences that could adversely impact the identification and quantitation of Perfluorononanoic acid (PFNA): 120201 (320-34744-3) and 120197 (320-34744-4) These interferences may cause a false positive result.

Method(s) WS-LC-0025 At1: The following samples were diluted to bring the concentration of Perfluorooctanesulfonic acid (PFOS) within the calibration range: 120201 (320-34744-3) and 120197 (320-34744-4). Elevated reporting limits (RLs) are provided.

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

Organic Prep
Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-202004 and analytical method PFAS_DI_Prep.

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: FIA

TestAmerica Job ID: 320-34744-1

Client Sample ID: 117102 — Lab Sample ID: 320-34744-1

No Detections.

Client Sample ID: 121673 — Lab Sample ID: 320-34744-2

No Detections.

Client Sample ID: 120201 — Lab Sample ID: 320-34744-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	23		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	110		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	12		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	19		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	1.5	J CI	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	630		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: 120197 — Lab Sample ID: 320-34744-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	29		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	120		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	15		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	23		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	1.2	J CI	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	500		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: 153699 — Lab Sample ID: 320-34744-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	34		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	32		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	4.4		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	2.5		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	5.1		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 120341 — Lab Sample ID: 320-34744-6

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample ID: 120341 (Continued) — Lab Sample ID: 320-34744-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.9	J	2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	9.5		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.2	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	2.1		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	59		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 120441 — Lab Sample ID: 320-34744-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	2.5		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	12		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.6	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	2.4		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	76		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 407348 — Lab Sample ID: 320-34744-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	5.9		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	45		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	12		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	37		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	9.6		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-34744-1

Client Sample ID: 117102
Date Collected: 12/19/17 17:37
Date Received: 12/28/17 10:50

Lab Sample ID: 320-34744-1
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/29/17 18:12	01/02/18 14:29	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		12/29/17 18:12	01/02/18 14:29	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/29/17 18:12	01/02/18 14:29	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/29/17 18:12	01/02/18 14:29	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		12/29/17 18:12	01/02/18 14:29	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/29/17 18:12	01/02/18 14:29	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*120*		*25 - 150*	*12/29/17 18:12*	*01/02/18 14:29*	*1*
13C4-PFHpA	*122*		*25 - 150*	*12/29/17 18:12*	*01/02/18 14:29*	*1*
13C4 PFOA	*114*		*25 - 150*	*12/29/17 18:12*	*01/02/18 14:29*	*1*
13C4 PFOS	*116*		*25 - 150*	*12/29/17 18:12*	*01/02/18 14:29*	*1*
13C5 PFNA	*122*		*25 - 150*	*12/29/17 18:12*	*01/02/18 14:29*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-34744-1

Client Sample ID: 121673
Date Collected: 12/20/17 15:37
Date Received: 12/28/17 10:50

Lab Sample ID: 320-34744-2
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/29/17 18:12	01/02/18 14:48	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		12/29/17 18:12	01/02/18 14:48	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/29/17 18:12	01/02/18 14:48	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/29/17 18:12	01/02/18 14:48	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		12/29/17 18:12	01/02/18 14:48	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/29/17 18:12	01/02/18 14:48	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*119*		*25 - 150*	*12/29/17 18:12*	*01/02/18 14:48*	*1*
13C4-PFHpA	*122*		*25 - 150*	*12/29/17 18:12*	*01/02/18 14:48*	*1*
13C4 PFOA	*115*		*25 - 150*	*12/29/17 18:12*	*01/02/18 14:48*	*1*
13C4 PFOS	*115*		*25 - 150*	*12/29/17 18:12*	*01/02/18 14:48*	*1*
13C5 PFNA	*121*		*25 - 150*	*12/29/17 18:12*	*01/02/18 14:48*	*1*

Client Sample ID: 120201
Date Collected: 12/21/17 16:34
Date Received: 12/28/17 10:50

Lab Sample ID: 320-34744-3
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	23		2.0	0.92	ng/L		12/29/17 18:12	01/02/18 15:06	1
Perfluorohexanesulfonic acid (PFHxS)	110		2.0	0.87	ng/L		12/29/17 18:12	01/02/18 15:06	1
Perfluoroheptanoic acid (PFHpA)	12		2.0	0.80	ng/L		12/29/17 18:12	01/02/18 15:06	1
Perfluorooctanoic acid (PFOA)	19		2.0	0.75	ng/L		12/29/17 18:12	01/02/18 15:06	1
Perfluorononanoic acid (PFNA)	1.5	J CI	2.0	0.65	ng/L		12/29/17 18:12	01/02/18 15:06	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*116*		*25 - 150*	*12/29/17 18:12*	*01/02/18 15:06*	*1*
13C4-PFHpA	*120*		*25 - 150*	*12/29/17 18:12*	*01/02/18 15:06*	*1*
13C4 PFOA	*110*		*25 - 150*	*12/29/17 18:12*	*01/02/18 15:06*	*1*
13C5 PFNA	*111*		*25 - 150*	*12/29/17 18:12*	*01/02/18 15:06*	*1*

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	630		20	13	ng/L		12/29/17 18:12	01/04/18 14:11	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*110*		*25 - 150*	*12/29/17 18:12*	*01/04/18 14:11*	*10*

Client Sample ID: 120197
Date Collected: 12/21/17 17:08
Date Received: 12/28/17 10:50

Lab Sample ID: 320-34744-4
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	29		2.0	0.92	ng/L		12/29/17 18:12	01/02/18 15:24	1
Perfluorohexanesulfonic acid (PFHxS)	120		2.0	0.87	ng/L		12/29/17 18:12	01/02/18 15:24	1
Perfluoroheptanoic acid (PFHpA)	15		2.0	0.80	ng/L		12/29/17 18:12	01/02/18 15:24	1
Perfluorooctanoic acid (PFOA)	23		2.0	0.75	ng/L		12/29/17 18:12	01/02/18 15:24	1
Perfluorononanoic acid (PFNA)	1.2	J CI	2.0	0.65	ng/L		12/29/17 18:12	01/02/18 15:24	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*121*		*25 - 150*	*12/29/17 18:12*	*01/02/18 15:24*	*1*
13C4-PFHpA	*121*		*25 - 150*	*12/29/17 18:12*	*01/02/18 15:24*	*1*
13C4 PFOA	*111*		*25 - 150*	*12/29/17 18:12*	*01/02/18 15:24*	*1*
13C5 PFNA	*115*		*25 - 150*	*12/29/17 18:12*	*01/02/18 15:24*	*1*

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	500		20	13	ng/L		12/29/17 18:12	01/04/18 14:30	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*109*		*25 - 150*	*12/29/17 18:12*	*01/04/18 14:30*	*10*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-34744-1

Client Sample ID: 153699
Date Collected: 12/22/17 12:53
Date Received: 12/28/17 10:50

Lab Sample ID: 320-34744-5
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**34**		2.0	0.92	ng/L		12/29/17 18:12	01/02/18 15:43	1
Perfluorohexanesulfonic acid (PFHxS)	**32**		2.0	0.87	ng/L		12/29/17 18:12	01/02/18 15:43	1
Perfluoroheptanoic acid (PFHpA)	**4.4**		2.0	0.80	ng/L		12/29/17 18:12	01/02/18 15:43	1
Perfluorooctanoic acid (PFOA)	**2.5**		2.0	0.75	ng/L		12/29/17 18:12	01/02/18 15:43	1
Perfluorooctanesulfonic acid (PFOS)	**5.1**		2.0	1.3	ng/L		12/29/17 18:12	01/02/18 15:43	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/29/17 18:12	01/02/18 15:43	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*134*		*25 - 150*	*12/29/17 18:12*	*01/02/18 15:43*	*1*
13C4-PFHpA	*138*		*25 - 150*	*12/29/17 18:12*	*01/02/18 15:43*	*1*
13C4 PFOA	*127*		*25 - 150*	*12/29/17 18:12*	*01/02/18 15:43*	*1*
13C4 PFOS	*125*		*25 - 150*	*12/29/17 18:12*	*01/02/18 15:43*	*1*
13C5 PFNA	*132*		*25 - 150*	*12/29/17 18:12*	*01/02/18 15:43*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-34744-1

Client Sample ID: 120341
Date Collected: 12/22/17 13:31
Date Received: 12/28/17 10:50

Lab Sample ID: 320-34744-6
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**1.9**	**J**	2.0	0.92	ng/L		12/29/17 18:12	01/02/18 16:01	1
Perfluorohexanesulfonic acid (PFHxS)	**9.5**		2.0	0.87	ng/L		12/29/17 18:12	01/02/18 16:01	1
Perfluoroheptanoic acid (PFHpA)	**1.2**	**J**	2.0	0.80	ng/L		12/29/17 18:12	01/02/18 16:01	1
Perfluorooctanoic acid (PFOA)	**2.1**		2.0	0.75	ng/L		12/29/17 18:12	01/02/18 16:01	1
Perfluorooctanesulfonic acid (PFOS)	**59**		2.0	1.3	ng/L		12/29/17 18:12	01/02/18 16:01	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/29/17 18:12	01/02/18 16:01	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*157*	*	*25 - 150*	*12/29/17 18:12*	*01/02/18 16:01*	*1*
13C4-PFHpA	*159*	*	*25 - 150*	*12/29/17 18:12*	*01/02/18 16:01*	*1*
13C4 PFOA	*147*		*25 - 150*	*12/29/17 18:12*	*01/02/18 16:01*	*1*
13C4 PFOS	*145*		*25 - 150*	*12/29/17 18:12*	*01/02/18 16:01*	*1*
13C5 PFNA	*154*	*	*25 - 150*	*12/29/17 18:12*	*01/02/18 16:01*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-34744-1

Client Sample ID: 120441
Date Collected: 12/22/17 03:14
Date Received: 12/28/17 10:50

Lab Sample ID: 320-34744-7
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**2.5**		2.0	0.92	ng/L		12/29/17 18:12	01/02/18 16:19	1
Perfluorohexanesulfonic acid (PFHxS)	**12**		2.0	0.87	ng/L		12/29/17 18:12	01/02/18 16:19	1
Perfluoroheptanoic acid (PFHpA)	**1.6**	**J**	2.0	0.80	ng/L		12/29/17 18:12	01/02/18 16:19	1
Perfluorooctanoic acid (PFOA)	**2.4**		2.0	0.75	ng/L		12/29/17 18:12	01/02/18 16:19	1
Perfluorooctanesulfonic acid (PFOS)	**76**		2.0	1.3	ng/L		12/29/17 18:12	01/02/18 16:19	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/29/17 18:12	01/02/18 16:19	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*122*		*25 - 150*	*12/29/17 18:12*	*01/02/18 16:19*	*1*
13C4-PFHpA	*124*		*25 - 150*	*12/29/17 18:12*	*01/02/18 16:19*	*1*
13C4 PFOA	*117*		*25 - 150*	*12/29/17 18:12*	*01/02/18 16:19*	*1*
13C4 PFOS	*113*		*25 - 150*	*12/29/17 18:12*	*01/02/18 16:19*	*1*
13C5 PFNA	*122*		*25 - 150*	*12/29/17 18:12*	*01/02/18 16:19*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-34744-1

Client Sample ID: 407348
Date Collected: 12/22/17 16:22
Date Received: 12/28/17 10:50

Lab Sample ID: 320-34744-8
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**5.9**		2.0	0.92	ng/L		12/29/17 18:12	01/02/18 16:56	1
Perfluorohexanesulfonic acid (PFHxS)	**45**		2.0	0.87	ng/L		12/29/17 18:12	01/02/18 16:56	1
Perfluoroheptanoic acid (PFHpA)	**12**		2.0	0.80	ng/L		12/29/17 18:12	01/02/18 16:56	1
Perfluorooctanoic acid (PFOA)	**37**		2.0	0.75	ng/L		12/29/17 18:12	01/02/18 16:56	1
Perfluorooctanesulfonic acid (PFOS)	**9.6**		2.0	1.3	ng/L		12/29/17 18:12	01/02/18 16:56	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/29/17 18:12	01/02/18 16:56	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*137*		*25 - 150*	*12/29/17 18:12*	*01/02/18 16:56*	*1*
13C4-PFHpA	*142*		*25 - 150*	*12/29/17 18:12*	*01/02/18 16:56*	*1*
13C4 PFOA	*134*		*25 - 150*	*12/29/17 18:12*	*01/02/18 16:56*	*1*
13C4 PFOS	*129*		*25 - 150*	*12/29/17 18:12*	*01/02/18 16:56*	*1*
13C5 PFNA	*139*		*25 - 150*	*12/29/17 18:12*	*01/02/18 16:56*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-34744-1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)				
Lab Sample ID	Client Sample ID	PFHxS (25-150)	PFHpA (25-150)	PFOA (25-150)	PFOS (25-150)	PFNA (25-150)
320-34744-1	117102	120	122	114	116	122
320-34744-2	121673	119	122	115	115	121
320-34744-3	120201	116	120	110		111
320-34744-3 - DL	120201				110	
320-34744-4	120197	121	121	111		115
320-34744-4 - DL	120197				109	
320-34744-5	153699	134	138	127	125	132
320-34744-6	120341	157 *	159 *	147	145	154 *
320-34744-7	120441	122	124	117	113	122
320-34744-8	407348	137	142	134	129	139
LCS 320-202004/2-A	Lab Control Sample	118	119	109	113	117
LCSD 320-202004/3-A	Lab Control Sample Dup	115	117	107	112	114
MB 320-202004/1-A	Method Blank	107	108	101	103	104

Surrogate Legend

PFHxS = 18O2 PFHxS
PFHpA = 13C4-PFHpA
PFOA = 13C4 PFOA
PFOS = 13C4 PFOS
PFNA = 13C5 PFNA

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-202004/1-A
Matrix: Water
Analysis Batch: 202286

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 202004

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/29/17 18:12	01/02/18 13:34	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		12/29/17 18:12	01/02/18 13:34	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/29/17 18:12	01/02/18 13:34	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/29/17 18:12	01/02/18 13:34	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		12/29/17 18:12	01/02/18 13:34	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/29/17 18:12	01/02/18 13:34	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*107*		*25 - 150*	*12/29/17 18:12*	*01/02/18 13:34*	*1*
13C4-PFHpA	*108*		*25 - 150*	*12/29/17 18:12*	*01/02/18 13:34*	*1*
13C4 PFOA	*101*		*25 - 150*	*12/29/17 18:12*	*01/02/18 13:34*	*1*
13C4 PFOS	*103*		*25 - 150*	*12/29/17 18:12*	*01/02/18 13:34*	*1*
13C5 PFNA	*104*		*25 - 150*	*12/29/17 18:12*	*01/02/18 13:34*	*1*

Lab Sample ID: LCS 320-202004/2-A
Matrix: Water
Analysis Batch: 202286

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 202004

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorobutanesulfonic acid (PFBS)	17.7	16.2		ng/L		92	72 - 151
Perfluorohexanesulfonic acid (PFHxS)	18.2	17.0		ng/L		94	73 - 157
Perfluoroheptanoic acid (PFHpA)	20.0	19.7		ng/L		98	71 - 138
Perfluorooctanoic acid (PFOA)	20.0	20.4		ng/L		102	70 - 140
Perfluorooctanesulfonic acid (PFOS)	18.6	17.8		ng/L		96	69 - 144
Perfluorononanoic acid (PFNA)	20.0	19.2		ng/L		96	73 - 147

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*118*		*25 - 150*
13C4-PFHpA	*119*		*25 - 150*
13C4 PFOA	*109*		*25 - 150*
13C4 PFOS	*113*		*25 - 150*
13C5 PFNA	*117*		*25 - 150*

Lab Sample ID: LCSD 320-202004/3-A
Matrix: Water
Analysis Batch: 202286

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 202004

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)	17.7	16.4		ng/L		93	72 - 151	1	30
Perfluorohexanesulfonic acid (PFHxS)	18.2	16.8		ng/L		92	73 - 157	1	30
Perfluoroheptanoic acid (PFHpA)	20.0	19.1		ng/L		95	71 - 138	3	30
Perfluorooctanoic acid (PFOA)	20.0	20.7		ng/L		104	70 - 140	1	30
Perfluorooctanesulfonic acid (PFOS)	18.6	17.2		ng/L		93	69 - 144	4	30
Perfluorononanoic acid (PFNA)	20.0	18.9		ng/L		95	73 - 147	2	30

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-34744-1

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	115		25 - 150
13C4-PFHpA	117		25 - 150
13C4 PFOA	107		25 - 150
13C4 PFOS	112		25 - 150
13C5 PFNA	114		25 - 150

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-34744-1

LCMS

Prep Batch: 202004

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-34744-1	117102	Total/NA	Water	PFAS Prep	
320-34744-2	121673	Total/NA	Water	PFAS Prep	
320-34744-3	120201	Total/NA	Water	PFAS Prep	
320-34744-3 - DL	120201	Total/NA	Water	PFAS Prep	
320-34744-4	120197	Total/NA	Water	PFAS Prep	
320-34744-4 - DL	120197	Total/NA	Water	PFAS Prep	
320-34744-5	153699	Total/NA	Water	PFAS Prep	
320-34744-6	120341	Total/NA	Water	PFAS Prep	
320-34744-7	120441	Total/NA	Water	PFAS Prep	
320-34744-8	407348	Total/NA	Water	PFAS Prep	
MB 320-202004/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-202004/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-202004/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 202286

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-34744-1	117102	Total/NA	Water	WS-LC-0025 At1	202004
320-34744-2	121673	Total/NA	Water	WS-LC-0025 At1	202004
320-34744-3	120201	Total/NA	Water	WS-LC-0025 At1	202004
320-34744-4	120197	Total/NA	Water	WS-LC-0025 At1	202004
320-34744-5	153699	Total/NA	Water	WS-LC-0025 At1	202004
320-34744-6	120341	Total/NA	Water	WS-LC-0025 At1	202004
320-34744-7	120441	Total/NA	Water	WS-LC-0025 At1	202004
320-34744-8	407348	Total/NA	Water	WS-LC-0025 At1	202004
MB 320-202004/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	202004
LCS 320-202004/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	202004
LCSD 320-202004/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	202004

Analysis Batch: 202556

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-34744-3 - DL	120201	Total/NA	Water	WS-LC-0025 At1	202004
320-34744-4 - DL	120197	Total/NA	Water	WS-LC-0025 At1	202004

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-34744-1

Client Sample ID: 117102
Date Collected: 12/19/17 17:37
Date Received: 12/28/17 10:50

Lab Sample ID: 320-34744-1
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	PFAS Prep			1.00 mL	1.66 mL	202004	12/29/17 18:12	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			202286	01/02/18 14:29	AAR	TAL SAC

Client Sample ID: 121673
Date Collected: 12/20/17 15:37
Date Received: 12/28/17 10:50

Lab Sample ID: 320-34744-2
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	PFAS Prep			1.00 mL	1.66 mL	202004	12/29/17 18:12	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			202286	01/02/18 14:48	AAR	TAL SAC

Client Sample ID: 120201
Date Collected: 12/21/17 16:34
Date Received: 12/28/17 10:50

Lab Sample ID: 320-34744-3
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	PFAS Prep			1.00 mL	1.66 mL	202004	12/29/17 18:12	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			202286	01/02/18 15:06	AAR	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	202004	12/29/17 18:12	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			202556	01/04/18 14:11	AAR	TAL SAC

Client Sample ID: 120197
Date Collected: 12/21/17 17:08
Date Received: 12/28/17 10:50

Lab Sample ID: 320-34744-4
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	PFAS Prep			1.00 mL	1.66 mL	202004	12/29/17 18:12	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			202286	01/02/18 15:24	AAR	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	202004	12/29/17 18:12	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			202556	01/04/18 14:30	AAR	TAL SAC

Client Sample ID: 153699
Date Collected: 12/22/17 12:53
Date Received: 12/28/17 10:50

Lab Sample ID: 320-34744-5
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	PFAS Prep			1.00 mL	1.66 mL	202004	12/29/17 18:12	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			202286	01/02/18 15:43	AAR	TAL SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-34744-1

Client Sample ID: 120341
Date Collected: 12/22/17 13:31
Date Received: 12/28/17 10:50

Lab Sample ID: 320-34744-6
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	PFAS Prep			1.00 mL	1.66 mL	202004	12/29/17 18:12	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			202286	01/02/18 16:01	AAR	TAL SAC

Client Sample ID: 120441
Date Collected: 12/22/17 03:14
Date Received: 12/28/17 10:50

Lab Sample ID: 320-34744-7
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	PFAS Prep			1.00 mL	1.66 mL	202004	12/29/17 18:12	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			202286	01/02/18 16:19	AAR	TAL SAC

Client Sample ID: 407348
Date Collected: 12/22/17 16:22
Date Received: 12/28/17 10:50

Lab Sample ID: 320-34744-8
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	202004	12/29/17 18:12	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			202286	01/02/18 16:56	AAR	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-34744-1

Laboratory: TestAmerica Sacramento

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

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-055	01-31-18
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-18
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-18
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	12-31-17 *
L-A-B	DoD ELAP		L2468	01-20-18
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-18-18
Michigan	State Program	5	9947	01-31-18
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-28-18
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	12-30-17 *
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
Wyoming	State Program	8	8TMS-L	01-28-19

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

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-34744-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: FIA

TestAmerica Job ID: 320-34744-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-34744-1	117102	Water	12/19/17 17:37	12/28/17 10:50
320-34744-2	121673	Water	12/20/17 15:37	12/28/17 10:50
320-34744-3	120201	Water	12/21/17 16:34	12/28/17 10:50
320-34744-4	120197	Water	12/21/17 17:08	12/28/17 10:50
320-34744-5	153699	Water	12/22/17 12:53	12/28/17 10:50
320-34744-6	120341	Water	12/22/17 13:31	12/28/17 10:50
320-34744-7	120441	Water	12/22/17 03:14	12/28/17 10:50
320-34744-8	407348	Water	12/22/17 16:22	12/28/17 10:50

320-34744 Chain of Custody

CHAIN-OF-CUSTODY RECORD

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

Laboratory Test America
Attn: David Alltucker

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFAS x6						Total Number of Containers	Remarks/Matrix
117102		17:37	12/19/17		X	X						2	Groundwater
121673		15:37	12/20/17		X	X						2	
120201		1634	12/21/17		X	X						2	
120197		1708	12/21/17		X	X						2	
153699		1253	12/22/17		X	X						2	
120341		1331	↓		X	X						2	
120441		1341			X	X						2	
407348		1622			X	X						2	

Project Information		Sample Receipt	
Project Number:	31-1-20060-001	Total Number of Containers	16
Project Name:	FIA	COC Seals/Intact? Y/N/NA	—
Contact:	MDN	Received Good Cond./Cold	—
Ongoing Project?	Yes ☒ No ☐	Delivery Method:	Goldstreak
Sampler:	CAB, MDN	(attach shipping bill, if any)	

Instructions

Requested Turnaround Time: 5-day rush please

Special Instructions: Please bill to:
31-1-20060-001

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 1700	Signature: Time:	Signature: Time:
Printed Name: Marcy Nadel Date: 12/27/17	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 10:50 12/28/17	Signature: Time:	Signature: Time:
Printed Name: Mayce Gooch Date:	Printed Name: Date:	Printed Name: Date:
Company: TA-W.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

F-19-91/UR

1.5

No. 34807

1/5/2018

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-34744-1

Login Number: 34744
List Number: 1
Creator: Her, David A

List Source: 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	
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 PACK
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:

Adam Wyborny

Title:

Environmental Engineering Staff

Date:

January 8, 2017

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

January 5, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-34744-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-34744-1

1. Laboratory

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

   ○ Yes ◉ No Comments:

ADEC has not approved an analytical laboratory for analysis of PFASs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

   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 Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

   ◉ Yes ○ No Comments:

   b. Correct Analyses requested?

   ◉ Yes ○ No Comments:

3. Laboratory Sample Receipt Documentation

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

   ◉ Yes ○ No Comments:

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

   ◉ Yes ○ No Comments:

Analysis of PFASs does not require a preservative other than temperature control.

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

   ◉ Yes ○ No 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 Comments:

There were no discrepancies identified in the sample receipt documentation.

e. Data quality or usability affected?

Comments:

The data quality and usability were unaffected; see above.

4. Case Narrative

a. Present and understandable?

◉ Yes ○ No Comments:

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

◉ Yes ○ No Comments:

The case narrative notes the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 1.5º C.

The recoveries of several isotope dilution analytes (IDAs) were above the recommended limits in the sample *120341*.

The samples *120201* and *120197* experienced chromatographic interferences that could adversely impact the identification and quantitation of perfluorononanoic acid (PFNA).

The samples *120201* and *120197* were diluted to bring the concentrations of perfluorooctanesulfonic acid (PFOS) within the instrument's calibration range. The reporting limits (RLs) are elevated as a result of the dilution.

The case narrative notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD).

c. Were all corrective actions documented?

◉ Yes ○ No Comments:

A laboratory control sample (LCS) and a LCS duplicate (LCSD) were extracted and analyzed to demonstrate analytical method accuracy and precision.

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

Comments:

The case narrative notes that quantitation by isotope dilution generally generally precludes any adverse effect on data quality due to elevated IDA recoveries.

The case narrative notes that the PFNA results of the samples *120201* and *120197* may have a high analytical bias or a false positive result.

5. Samples Results

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

(•) Yes ( ) No Comments:

b. All applicable holding times met?

(•) Yes ( ) No Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

( ) Yes (•) No Comments:

N/A; 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 Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

( ) Yes (•) No Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

(•) Yes ( ) No Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

(•) Yes ( ) No Comments:

iii. If above LOQ, what samples are affected?

Comments:

None; PFAS compounds were not detected in method blank samples.

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

( ) Yes (•) No Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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 Comments:

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

( ) Yes (•) No 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

(•) Yes ( ) No Comments:

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

(•) Yes ( ) No Comments:

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

Comments:

N/A; 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 Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

(•) Yes ( ) No Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a 13C-isotope of each target analyte, and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

( ) Yes (•) No Comments:

The IDAs 18O2 PFHxS, 13C4-PFHpA, and 13C5 PFNA were recovered above the recommended limits in the sample *120341*.

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

(•) Yes ( ) No Comments:

The perfluorobutanesulfonic acid (PFBS), perfluorohexanesulfonic acid (PFHxS), perfluoroheptanoic acid (PFHpA) and perfluorononanoic acid (PFNA) results of the sample *120341* are considered estimated and are flagged 'J' in the reporting tables.

iv. Data quality or usability affected?

Comments:

The data quality and usability are affected; see above.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

○ Yes ◉ No Comments:

PFASs are not volatile compounds; 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 Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

○ Yes ◉ No Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not submitted with this work order.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

◉ Yes ○ No Comments:

ii. Submitted blind to lab?

◉ Yes ○ No Comments:

The field-duplicate samples *120341* and *120441* were submitted with this work order.

iii. Precision – All relative percent differences (RPD) less than specified DQOs? (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 Comments:

The analytical precision demonstrated by the field-duplicate sample RPDs was within the project specific DQO of 30% for all detected analytes.

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

Comments:

The data quality and usability were not affected.

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

( ) Yes ( ) No (•) Not Applicable

Samples for this project are not collected with reusable equipment, therefore a practical potential for equipment based cross-contamination does not exist.

i. All results less than LOQ?

( ) Yes (•) No Comments:

N/A; an equipment blank was not submitted.

ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

a. Defined and appropriate?

(•) Yes ( ) No Comments:

The PFNA results of the samples *120201* and *120197* may have been affected by a chromatographic interference and may exhibit a high analytical bias. These results are flagged 'JH' in the reporting tables.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 320-34935-1
Client Project/Site: FAI

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

Attn: Marcy Nadel

Authorized for release by:
1/16/2018 2:01:21 PM

David Alltucker, Project Manager I
(916)374-4383
david.alltucker@testamericainc.com

Table of Contents

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34935-1

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
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Case Narrative

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34935-1

Job ID: 320-34935-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-34935-1

Receipt
The samples were received on 1/9/2018 2:45 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.7º C.

Receipt Exceptions
The container label for the following sample did not match the information listed on the Chain-of-Custody (COC): 174150 (320-34935-9). The container labels lists 174150, while the COC lists 174151. Client was informed and instructed the lab to log in based on the sapmle label.

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

Organic Prep
Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-203401.

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: FAI

TestAmerica Job ID: 320-34935-1

Client Sample ID: 121657 — Lab Sample ID: 320-34935-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	4.8		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	1.9	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.1	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	2.5		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 121592 — Lab Sample ID: 320-34935-2

No Detections.

Client Sample ID: 173762 — Lab Sample ID: 320-34935-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	0.94	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 136891 — Lab Sample ID: 320-34935-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	20		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	51		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	4.0		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	2.7		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	7.0		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 172880 — Lab Sample ID: 320-34935-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	2.3		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	3.4		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 473499 — Lab Sample ID: 320-34935-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	0.88	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 473481 — Lab Sample ID: 320-34935-7

No Detections.

Client Sample ID: 174050 — Lab Sample ID: 320-34935-8

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample ID: 174050 (Continued) — Lab Sample ID: 320-34935-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.7	J	2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	15		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.95	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	1.7	J	2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	5.3		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 174150 — Lab Sample ID: 320-34935-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.7	J	2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	16		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.98	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	1.8	J	2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	5.6		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 172812 — Lab Sample ID: 320-34935-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	2.5		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	5.5		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.7	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	2.4		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	2.3		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34935-1

Client Sample ID: 121657
Date Collected: 12/28/17 11:42
Date Received: 01/09/18 14:45

Lab Sample ID: 320-34935-1
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**4.8**		2.0	0.92	ng/L		01/10/18 14:04	01/10/18 21:55	1
Perfluorohexanesulfonic acid (PFHxS)	**1.9**	**J**	2.0	0.87	ng/L		01/10/18 14:04	01/10/18 21:55	1
Perfluoroheptanoic acid (PFHpA)	**1.1**	**J**	2.0	0.80	ng/L		01/10/18 14:04	01/10/18 21:55	1
Perfluorooctanoic acid (PFOA)	**2.5**		2.0	0.75	ng/L		01/10/18 14:04	01/10/18 21:55	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		01/10/18 14:04	01/10/18 21:55	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		01/10/18 14:04	01/10/18 21:55	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*129*		*25 - 150*	*01/10/18 14:04*	*01/10/18 21:55*	*1*
13C4-PFHpA	*137*		*25 - 150*	*01/10/18 14:04*	*01/10/18 21:55*	*1*
13C4 PFOA	*126*		*25 - 150*	*01/10/18 14:04*	*01/10/18 21:55*	*1*
13C4 PFOS	*123*		*25 - 150*	*01/10/18 14:04*	*01/10/18 21:55*	*1*
13C5 PFNA	*134*		*25 - 150*	*01/10/18 14:04*	*01/10/18 21:55*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34935-1

Client Sample ID: 121592
Date Collected: 01/02/18 13:59
Date Received: 01/09/18 14:45

Lab Sample ID: 320-34935-2
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		01/10/18 14:04	01/10/18 22:14	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		01/10/18 14:04	01/10/18 22:14	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		01/10/18 14:04	01/10/18 22:14	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		01/10/18 14:04	01/10/18 22:14	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		01/10/18 14:04	01/10/18 22:14	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		01/10/18 14:04	01/10/18 22:14	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*133*		*25 - 150*	*01/10/18 14:04*	*01/10/18 22:14*	*1*
13C4-PFHpA	*140*		*25 - 150*	*01/10/18 14:04*	*01/10/18 22:14*	*1*
13C4 PFOA	*131*		*25 - 150*	*01/10/18 14:04*	*01/10/18 22:14*	*1*
13C4 PFOS	*125*		*25 - 150*	*01/10/18 14:04*	*01/10/18 22:14*	*1*
13C5 PFNA	*139*		*25 - 150*	*01/10/18 14:04*	*01/10/18 22:14*	*1*

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34935-1

Client Sample ID: 173762
Date Collected: 01/02/18 14:57
Date Received: 01/09/18 14:45

Lab Sample ID: 320-34935-3
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		01/10/18 14:04	01/10/18 22:32	1
Perfluorohexanesulfonic acid (PFHxS)	**0.94**	**J**	2.0	0.87	ng/L		01/10/18 14:04	01/10/18 22:32	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		01/10/18 14:04	01/10/18 22:32	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		01/10/18 14:04	01/10/18 22:32	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		01/10/18 14:04	01/10/18 22:32	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		01/10/18 14:04	01/10/18 22:32	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*128*		*25 - 150*	*01/10/18 14:04*	*01/10/18 22:32*	*1*
13C4-PFHpA	*139*		*25 - 150*	*01/10/18 14:04*	*01/10/18 22:32*	*1*
13C4 PFOA	*131*		*25 - 150*	*01/10/18 14:04*	*01/10/18 22:32*	*1*
13C4 PFOS	*120*		*25 - 150*	*01/10/18 14:04*	*01/10/18 22:32*	*1*
13C5 PFNA	*134*		*25 - 150*	*01/10/18 14:04*	*01/10/18 22:32*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34935-1

Client Sample ID: 136891
Date Collected: 01/02/18 16:07
Date Received: 01/09/18 14:45

Lab Sample ID: 320-34935-4
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**20**		2.0	0.92	ng/L		01/10/18 14:04	01/10/18 22:51	1
Perfluorohexanesulfonic acid (PFHxS)	**51**		2.0	0.87	ng/L		01/10/18 14:04	01/10/18 22:51	1
Perfluoroheptanoic acid (PFHpA)	**4.0**		2.0	0.80	ng/L		01/10/18 14:04	01/10/18 22:51	1
Perfluorooctanoic acid (PFOA)	**2.7**		2.0	0.75	ng/L		01/10/18 14:04	01/10/18 22:51	1
Perfluorooctanesulfonic acid (PFOS)	**7.0**		2.0	1.3	ng/L		01/10/18 14:04	01/10/18 22:51	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		01/10/18 14:04	01/10/18 22:51	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*126*		*25 - 150*	*01/10/18 14:04*	*01/10/18 22:51*	*1*
13C4-PFHpA	*137*		*25 - 150*	*01/10/18 14:04*	*01/10/18 22:51*	*1*
13C4 PFOA	*130*		*25 - 150*	*01/10/18 14:04*	*01/10/18 22:51*	*1*
13C4 PFOS	*118*		*25 - 150*	*01/10/18 14:04*	*01/10/18 22:51*	*1*
13C5 PFNA	*137*		*25 - 150*	*01/10/18 14:04*	*01/10/18 22:51*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34935-1

Client Sample ID: 172880
Date Collected: 01/03/18 13:32
Date Received: 01/09/18 14:45

Lab Sample ID: 320-34935-5
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**2.3**		2.0	0.92	ng/L		01/10/18 14:04	01/10/18 23:09	1
Perfluorohexanesulfonic acid (PFHxS)	**3.4**		2.0	0.87	ng/L		01/10/18 14:04	01/10/18 23:09	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		01/10/18 14:04	01/10/18 23:09	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		01/10/18 14:04	01/10/18 23:09	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		01/10/18 14:04	01/10/18 23:09	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		01/10/18 14:04	01/10/18 23:09	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*124*		*25 - 150*	*01/10/18 14:04*	*01/10/18 23:09*	*1*
13C4-PFHpA	*133*		*25 - 150*	*01/10/18 14:04*	*01/10/18 23:09*	*1*
13C4 PFOA	*124*		*25 - 150*	*01/10/18 14:04*	*01/10/18 23:09*	*1*
13C4 PFOS	*117*		*25 - 150*	*01/10/18 14:04*	*01/10/18 23:09*	*1*
13C5 PFNA	*132*		*25 - 150*	*01/10/18 14:04*	*01/10/18 23:09*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34935-1

Client Sample ID: 473499
Date Collected: 01/03/18 14:22
Date Received: 01/09/18 14:45

Lab Sample ID: 320-34935-6
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		01/10/18 14:04	01/10/18 23:27	1
Perfluorohexanesulfonic acid (PFHxS)	**0.88**	**J**	2.0	0.87	ng/L		01/10/18 14:04	01/10/18 23:27	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		01/10/18 14:04	01/10/18 23:27	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		01/10/18 14:04	01/10/18 23:27	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		01/10/18 14:04	01/10/18 23:27	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		01/10/18 14:04	01/10/18 23:27	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*126*		*25 - 150*	*01/10/18 14:04*	*01/10/18 23:27*	*1*
13C4-PFHpA	*139*		*25 - 150*	*01/10/18 14:04*	*01/10/18 23:27*	*1*
13C4 PFOA	*127*		*25 - 150*	*01/10/18 14:04*	*01/10/18 23:27*	*1*
13C4 PFOS	*116*		*25 - 150*	*01/10/18 14:04*	*01/10/18 23:27*	*1*
13C5 PFNA	*136*		*25 - 150*	*01/10/18 14:04*	*01/10/18 23:27*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34935-1

Client Sample ID: 473481
Date Collected: 01/04/18 11:27
Date Received: 01/09/18 14:45

Lab Sample ID: 320-34935-7
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		01/10/18 14:04	01/10/18 23:46	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		01/10/18 14:04	01/10/18 23:46	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		01/10/18 14:04	01/10/18 23:46	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		01/10/18 14:04	01/10/18 23:46	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		01/10/18 14:04	01/10/18 23:46	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		01/10/18 14:04	01/10/18 23:46	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*121*		*25 - 150*	*01/10/18 14:04*	*01/10/18 23:46*	*1*
13C4-PFHpA	*133*		*25 - 150*	*01/10/18 14:04*	*01/10/18 23:46*	*1*
13C4 PFOA	*126*		*25 - 150*	*01/10/18 14:04*	*01/10/18 23:46*	*1*
13C4 PFOS	*115*		*25 - 150*	*01/10/18 14:04*	*01/10/18 23:46*	*1*
13C5 PFNA	*135*		*25 - 150*	*01/10/18 14:04*	*01/10/18 23:46*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34935-1

Client Sample ID: 174050
Date Collected: 01/04/18 14:29
Date Received: 01/09/18 14:45

Lab Sample ID: 320-34935-8
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**1.7**	**J**	2.0	0.92	ng/L		01/10/18 14:04	01/11/18 00:22	1
Perfluorohexanesulfonic acid (PFHxS)	**15**		2.0	0.87	ng/L		01/10/18 14:04	01/11/18 00:22	1
Perfluoroheptanoic acid (PFHpA)	**0.95**	**J**	2.0	0.80	ng/L		01/10/18 14:04	01/11/18 00:22	1
Perfluorooctanoic acid (PFOA)	**1.7**	**J**	2.0	0.75	ng/L		01/10/18 14:04	01/11/18 00:22	1
Perfluorooctanesulfonic acid (PFOS)	**5.3**		2.0	1.3	ng/L		01/10/18 14:04	01/11/18 00:22	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		01/10/18 14:04	01/11/18 00:22	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*126*		*25 - 150*	*01/10/18 14:04*	*01/11/18 00:22*	*1*
13C4-PFHpA	*130*		*25 - 150*	*01/10/18 14:04*	*01/11/18 00:22*	*1*
13C4 PFOA	*128*		*25 - 150*	*01/10/18 14:04*	*01/11/18 00:22*	*1*
13C4 PFOS	*124*		*25 - 150*	*01/10/18 14:04*	*01/11/18 00:22*	*1*
13C5 PFNA	*140*		*25 - 150*	*01/10/18 14:04*	*01/11/18 00:22*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34935-1

Client Sample ID: 174150
Date Collected: 01/04/18 14:19
Date Received: 01/09/18 14:45

Lab Sample ID: 320-34935-9
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**1.7**	**J**	2.0	0.92	ng/L		01/10/18 14:04	01/11/18 00:41	1
Perfluorohexanesulfonic acid (PFHxS)	**16**		2.0	0.87	ng/L		01/10/18 14:04	01/11/18 00:41	1
Perfluoroheptanoic acid (PFHpA)	**0.98**	**J**	2.0	0.80	ng/L		01/10/18 14:04	01/11/18 00:41	1
Perfluorooctanoic acid (PFOA)	**1.8**	**J**	2.0	0.75	ng/L		01/10/18 14:04	01/11/18 00:41	1
Perfluorooctanesulfonic acid (PFOS)	**5.6**		2.0	1.3	ng/L		01/10/18 14:04	01/11/18 00:41	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		01/10/18 14:04	01/11/18 00:41	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*121*		*25 - 150*	*01/10/18 14:04*	*01/11/18 00:41*	*1*
13C4-PFHpA	*126*		*25 - 150*	*01/10/18 14:04*	*01/11/18 00:41*	*1*
13C4 PFOA	*120*		*25 - 150*	*01/10/18 14:04*	*01/11/18 00:41*	*1*
13C4 PFOS	*116*		*25 - 150*	*01/10/18 14:04*	*01/11/18 00:41*	*1*
13C5 PFNA	*126*		*25 - 150*	*01/10/18 14:04*	*01/11/18 00:41*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34935-1

Client Sample ID: 172812
Date Collected: 01/04/18 16:35
Date Received: 01/09/18 14:45

Lab Sample ID: 320-34935-10
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**2.5**		2.0	0.92	ng/L		01/10/18 14:04	01/11/18 00:59	1
Perfluorohexanesulfonic acid (PFHxS)	**5.5**		2.0	0.87	ng/L		01/10/18 14:04	01/11/18 00:59	1
Perfluoroheptanoic acid (PFHpA)	**1.7**	**J**	2.0	0.80	ng/L		01/10/18 14:04	01/11/18 00:59	1
Perfluorooctanoic acid (PFOA)	**2.4**		2.0	0.75	ng/L		01/10/18 14:04	01/11/18 00:59	1
Perfluorooctanesulfonic acid (PFOS)	**2.3**		2.0	1.3	ng/L		01/10/18 14:04	01/11/18 00:59	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		01/10/18 14:04	01/11/18 00:59	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*128*		*25 - 150*	*01/10/18 14:04*	*01/11/18 00:59*	*1*
13C4-PFHpA	*135*		*25 - 150*	*01/10/18 14:04*	*01/11/18 00:59*	*1*
13C4 PFOA	*126*		*25 - 150*	*01/10/18 14:04*	*01/11/18 00:59*	*1*
13C4 PFOS	*119*		*25 - 150*	*01/10/18 14:04*	*01/11/18 00:59*	*1*
13C5 PFNA	*130*		*25 - 150*	*01/10/18 14:04*	*01/11/18 00:59*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34935-1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)				
Lab Sample ID	Client Sample ID	PFHxS (25-150)	PFHpA (25-150)	PFOA (25-150)	PFOS (25-150)	PFNA (25-150)
320-34935-1	121657	129	137	126	123	134
320-34935-2	121592	133	140	131	125	139
320-34935-3	173762	128	139	131	120	134
320-34935-4	136891	126	137	130	118	137
320-34935-5	172880	124	133	124	117	132
320-34935-6	473499	126	139	127	116	136
320-34935-7	473481	121	133	126	115	135
320-34935-8	174050	126	130	128	124	140
320-34935-9	174150	121	126	120	116	126
320-34935-10	172812	128	135	126	119	130
LCS 320-203401/2-A	Lab Control Sample	127	133	123	121	131
LCSD 320-203401/3-A	Lab Control Sample Dup	128	135	125	125	137
MB 320-203401/1-A	Method Blank	126	134	122	123	134

Surrogate Legend

PFHxS = 18O2 PFHxS
PFHpA = 13C4-PFHpA
PFOA = 13C4 PFOA
PFOS = 13C4 PFOS
PFNA = 13C5 PFNA

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-203401/1-A
Matrix: Water
Analysis Batch: 203480

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 203401

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		01/10/18 14:04	01/10/18 21:00	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		01/10/18 14:04	01/10/18 21:00	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		01/10/18 14:04	01/10/18 21:00	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		01/10/18 14:04	01/10/18 21:00	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		01/10/18 14:04	01/10/18 21:00	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		01/10/18 14:04	01/10/18 21:00	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*126*		*25 - 150*	*01/10/18 14:04*	*01/10/18 21:00*	*1*
13C4-PFHpA	*134*		*25 - 150*	*01/10/18 14:04*	*01/10/18 21:00*	*1*
13C4 PFOA	*122*		*25 - 150*	*01/10/18 14:04*	*01/10/18 21:00*	*1*
13C4 PFOS	*123*		*25 - 150*	*01/10/18 14:04*	*01/10/18 21:00*	*1*
13C5 PFNA	*134*		*25 - 150*	*01/10/18 14:04*	*01/10/18 21:00*	*1*

Lab Sample ID: LCS 320-203401/2-A
Matrix: Water
Analysis Batch: 203480

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 203401

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	17.8		ng/L		100	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	17.6		ng/L		97	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	20.2		ng/L		101	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	21.2		ng/L		106	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	17.9		ng/L		96	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	19.7		ng/L		99	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*127*		*25 - 150*
13C4-PFHpA	*133*		*25 - 150*
13C4 PFOA	*123*		*25 - 150*
13C4 PFOS	*121*		*25 - 150*
13C5 PFNA	*131*		*25 - 150*

Lab Sample ID: LCSD 320-203401/3-A
Matrix: Water
Analysis Batch: 203480

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 203401

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	18.4		ng/L		104	72 - 151	4	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	17.8		ng/L		98	73 - 157	1	30
Perfluoroheptanoic acid (PFHpA)			20.0	20.7		ng/L		104	71 - 138	3	30
Perfluorooctanoic acid (PFOA)			20.0	21.5		ng/L		108	70 - 140	1	30
Perfluorooctanesulfonic acid (PFOS)			18.6	18.1		ng/L		98	69 - 144	1	30
Perfluorononanoic acid (PFNA)			20.0	19.8		ng/L		99	73 - 147	1	30

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34935-1

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	128		25 - 150
13C4-PFHpA	135		25 - 150
13C4 PFOA	125		25 - 150
13C4 PFOS	125		25 - 150
13C5 PFNA	137		25 - 150

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34935-1

LCMS

Prep Batch: 203401

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-34935-1	121657	Total/NA	Water	PFAS Prep	
320-34935-2	121592	Total/NA	Water	PFAS Prep	
320-34935-3	173762	Total/NA	Water	PFAS Prep	
320-34935-4	136891	Total/NA	Water	PFAS Prep	
320-34935-5	172880	Total/NA	Water	PFAS Prep	
320-34935-6	473499	Total/NA	Water	PFAS Prep	
320-34935-7	473481	Total/NA	Water	PFAS Prep	
320-34935-8	174050	Total/NA	Water	PFAS Prep	
320-34935-9	174150	Total/NA	Water	PFAS Prep	
320-34935-10	172812	Total/NA	Water	PFAS Prep	
MB 320-203401/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-203401/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-203401/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 203480

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-34935-1	121657	Total/NA	Water	WS-LC-0025 At1	203401
320-34935-2	121592	Total/NA	Water	WS-LC-0025 At1	203401
320-34935-3	173762	Total/NA	Water	WS-LC-0025 At1	203401
320-34935-4	136891	Total/NA	Water	WS-LC-0025 At1	203401
320-34935-5	172880	Total/NA	Water	WS-LC-0025 At1	203401
320-34935-6	473499	Total/NA	Water	WS-LC-0025 At1	203401
320-34935-7	473481	Total/NA	Water	WS-LC-0025 At1	203401
320-34935-8	174050	Total/NA	Water	WS-LC-0025 At1	203401
320-34935-9	174150	Total/NA	Water	WS-LC-0025 At1	203401
320-34935-10	172812	Total/NA	Water	WS-LC-0025 At1	203401
MB 320-203401/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	203401
LCS 320-203401/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	203401
LCSD 320-203401/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	203401

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34935-1

Client Sample ID: 121657
Date Collected: 12/28/17 11:42
Date Received: 01/09/18 14:45

Lab Sample ID: 320-34935-1
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	PFAS Prep			1.00 mL	1.66 mL	203401	01/10/18 14:04	TWL	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			203480	01/10/18 21:55	AAR	TAL SAC

Client Sample ID: 121592
Date Collected: 01/02/18 13:59
Date Received: 01/09/18 14:45

Lab Sample ID: 320-34935-2
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	PFAS Prep			1.00 mL	1.66 mL	203401	01/10/18 14:04	TWL	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			203480	01/10/18 22:14	AAR	TAL SAC

Client Sample ID: 173762
Date Collected: 01/02/18 14:57
Date Received: 01/09/18 14:45

Lab Sample ID: 320-34935-3
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	PFAS Prep			1.00 mL	1.66 mL	203401	01/10/18 14:04	TWL	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			203480	01/10/18 22:32	AAR	TAL SAC

Client Sample ID: 136891
Date Collected: 01/02/18 16:07
Date Received: 01/09/18 14:45

Lab Sample ID: 320-34935-4
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	PFAS Prep			1.00 mL	1.66 mL	203401	01/10/18 14:04	TWL	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			203480	01/10/18 22:51	AAR	TAL SAC

Client Sample ID: 172880
Date Collected: 01/03/18 13:32
Date Received: 01/09/18 14:45

Lab Sample ID: 320-34935-5
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	PFAS Prep			1.00 mL	1.66 mL	203401	01/10/18 14:04	TWL	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			203480	01/10/18 23:09	AAR	TAL SAC

Client Sample ID: 473499
Date Collected: 01/03/18 14:22
Date Received: 01/09/18 14:45

Lab Sample ID: 320-34935-6
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	PFAS Prep			1.00 mL	1.66 mL	203401	01/10/18 14:04	TWL	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			203480	01/10/18 23:27	AAR	TAL SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34935-1

Client Sample ID: 473481
Date Collected: 01/04/18 11:27
Date Received: 01/09/18 14:45

Lab Sample ID: 320-34935-7
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	PFAS Prep			1.00 mL	1.66 mL	203401	01/10/18 14:04	TWL	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			203480	01/10/18 23:46	AAR	TAL SAC

Client Sample ID: 174050
Date Collected: 01/04/18 14:29
Date Received: 01/09/18 14:45

Lab Sample ID: 320-34935-8
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	203401	01/10/18 14:04	TWL	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			203480	01/11/18 00:22	AAR	TAL SAC

Client Sample ID: 174150
Date Collected: 01/04/18 14:19
Date Received: 01/09/18 14:45

Lab Sample ID: 320-34935-9
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	PFAS Prep			1.00 mL	1.66 mL	203401	01/10/18 14:04	TWL	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			203480	01/11/18 00:41	AAR	TAL SAC

Client Sample ID: 172812
Date Collected: 01/04/18 16:35
Date Received: 01/09/18 14:45

Lab Sample ID: 320-34935-10
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	PFAS Prep			1.00 mL	1.66 mL	203401	01/10/18 14:04	TWL	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			203480	01/11/18 00:59	AAR	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34935-1

Laboratory: TestAmerica Sacramento

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

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-055	01-31-18
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-18
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-18
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	12-31-17 *
L-A-B	DoD ELAP		L2468	01-20-18
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-18-18
Michigan	State Program	5	9947	01-31-18
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-29-20
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	12-30-17 *
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
Wyoming	State Program	8	8TMS-L	01-28-19

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

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34935-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-34935-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-34935-1	121657	Water	12/28/17 11:42	01/09/18 14:45
320-34935-2	121592	Water	01/02/18 13:59	01/09/18 14:45
320-34935-3	173762	Water	01/02/18 14:57	01/09/18 14:45
320-34935-4	136891	Water	01/02/18 16:07	01/09/18 14:45
320-34935-5	172880	Water	01/03/18 13:32	01/09/18 14:45
320-34935-6	473499	Water	01/03/18 14:22	01/09/18 14:45
320-34935-7	473481	Water	01/04/18 11:27	01/09/18 14:45
320-34935-8	174050	Water	01/04/18 14:29	01/09/18 14:45
320-34935-9	174150	Water	01/04/18 14:19	01/09/18 14:45
320-34935-10	172812	Water	01/04/18 16:35	01/09/18 14:45

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Laboratory Test America
Attn: David Alltucker

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFAS x 6						Total Number of Containers	Remarks/Matrix
121657		1142	12/28/17		X	X							Groundwater
121592		1359	1/2/18		X	X							
173762		1457	1/2/18		X	X							
136891		1607	1/2/18		X	X							
172880		1332	1/3/18		X	X							
473499		1422	1/3/18		X	X							
473481		1127	1/4/18		X	X							
174050		1429	1/4/18		X	X							
*174151		1419	1/4/18		X	X							
172812		1635	1/4/18		X	X							

Project Information		Sample Receipt	
Project Number:	31-1-20060-001	Total Number of Containers	
Project Name:	FAI	COC Seals/Intact? Y/N/NA	
Contact:	MDN	Received Good Cond./Cold	
Ongoing Project?	Yes ☑ No ☐	Delivery Method:	Gold Streak
Sampler	CAB, MDN, DHF, ARM, SMH	(attach shipping bill, if any)	

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Craig Beebe	Signature:	Signature:
Time: 16:25	Time:	Time:
Printed Name: Craig Beebe	Printed Name:	Printed Name:
Date: 1/8/2018	Date:	Date:
Company: Shannon & Wilson, Inc	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature:	Signature:	Time:
Time: 1445	Printed Name	Date:
Printed Name: David Alltucker	Company:	
Date: 1/9/18		
Company: TA-Sac		

320-34935 Chain of Custody

Instructions

Requested Turnaround Time: 5 day rush please

Special Instructions: Please bill to:
31-1-20060-001

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

F-19-91/UR

* labeled 174150 AA 01/09/18

1.7

No. 34450

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-34935-1

Login Number: 34935
List Number: 1
Creator: Turpen, Troy

List Source: 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	
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 Pack
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.	False	IDs on containers do not match the COC. Logged in per COC.
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:

Adam Wyborny

Title:

Environmental Engineering Staff

Date:

January 17, 2017

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

January 16, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-34935-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-34935-1

1. Laboratory

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

   ○ Yes ◉ No Comments:

ADEC has not approved an analytical laboratory for analysis of PFASs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

   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 Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

   ◉ Yes ○ No Comments:

   b. Correct Analyses requested?

   ◉ Yes ○ No Comments:

3. Laboratory Sample Receipt Documentation

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

   ◉ Yes ○ No Comments:

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

   ◉ Yes ○ No Comments:

Analysis of PFASs does not require a preservative other than temperature control.

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

   ◉ Yes ○ No 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 Comments:

The laboratory noted that the sample IDs on the containers did not match those on the COC. The samples were initially logged in and per the COC.

e. Data quality or usability affected?

Comments:

One sample had a minor discrepancy between the label and the COC. The laboratory contacted Shannon & Wilson and the issue was resolved. The sample was logged in and analyzed normally. The data quality and usability were not affected.

4. Case Narrative

a. Present and understandable?

(•) Yes ( ) No Comments:

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

(•) Yes ( ) No Comments:

The case narrative notes the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 1.7º C.

There was a discrepancy between the sample label and COC entry for one sample. The sample container was labeled *174150* while the COC listed *174151*. The laboratory contacted Shannon & Wilson who confirmed that the sample label was accurate.

The case narrative notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD).

c. Were all corrective actions documented?

(•) Yes ( ) No Comments:

A laboratory control sample (LCS) and a LCS duplicate (LCSD) were extracted and analyzed to demonstrate analytical method accuracy and precision.

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

Comments:

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

5. Samples Results

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

(•) Yes ( ) No Comments:

b. All applicable holding times met?

(•) Yes ( ) No Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

( ) Yes (•) No Comments:

N/A; 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 Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

( ) Yes (•) No Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

(•) Yes ( ) No Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

(•) Yes ( ) No Comments:

iii. If above LOQ, what samples are affected?

Comments:

None; PFAS compounds were not detected in method blank samples.

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

○ Yes ◉ No Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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 Comments:

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

○ Yes ◉ No 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

◉ Yes ○ No Comments:

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

◉ Yes ○ No Comments:

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

Comments:

N/A; 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 Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

◉ Yes ○ No Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a 13C-isotope of each target analyte, and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

◉ Yes ○ No Comments:

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

○ Yes ◉ No Comments:

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

iv. Data quality or usability affected?

Comments:

The data quality and usability are not affected; see above.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

○ Yes ◉ No Comments:

PFASs are not volatile compounds; 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 Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

○ Yes ◉ No Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not submitted with this work order.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

◉ Yes ○ No Comments:

ii. Submitted blind to lab?

◉ Yes ○ No Comments:

The field-duplicate samples *174050* and *174150* were submitted with this work order.

iii. Precision – All relative percent differences (RPD) less than specified DQOs? (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 Comments:

The analytical precision demonstrated by the field-duplicate sample RPDs was within the project specific DQO of 30% for all detected analytes.

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

Comments:

The data quality and usability were not affected.

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

○ Yes ○ No ◉ Not Applicable

Samples for this project are not collected with reusable equipment, therefore a practical potential for equipment based cross-contamination does not exist.

i. All results less than LOQ?

○ Yes ◉ No Comments:

N/A; an equipment blank was not submitted.

ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

a. Defined and appropriate?

○ Yes ◉ No Comments:

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

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 320-35084-1
Client Project/Site: FAI

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

Attn: Marcy Nadel

Authorized for release by:
1/19/2018 10:09:42 AM

David Alltucker, Project Manager I
(916)374-4383
david.alltucker@testamericainc.com

Table of Contents

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35084-1

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
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Job ID: 320-35084-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-35084-1

Receipt
The samples were received on 1/16/2018 9:40 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.9º C.

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

Organic Prep
Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-204269.

Method(s) PFAS Prep: Sediment was present in the following samples: 120774 (320-35084-1), 120874 (320-35084-2), 174670 (320-35084-3), 121614 (320-35084-4), 121622 (320-35084-5) and 121665 (320-35084-6). The samples are associated with prep batch 320-204269 and prep method PFAS_DI_Prep.

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: FAI

TestAmerica Job ID: 320-35084-1

Client Sample ID: 120774 — Lab Sample ID: 320-35084-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.2	J	2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	5.4		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	2.1		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	2.7		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 120874 — Lab Sample ID: 320-35084-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.2	J	2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	5.4		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	2.0		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	2.8		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 174670 — Lab Sample ID: 320-35084-3

No Detections.

Client Sample ID: 121614 — Lab Sample ID: 320-35084-4

No Detections.

Client Sample ID: 121622 — Lab Sample ID: 320-35084-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanesulfonic acid (PFOS)	1.3	J	2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 121665 — Lab Sample ID: 320-35084-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	1.7	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35084-1

Client Sample ID: 120774
Date Collected: 01/10/18 12:28
Date Received: 01/16/18 09:40

Lab Sample ID: 320-35084-1
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**1.2**	**J**	2.0	0.92	ng/L		01/17/18 08:34	01/17/18 14:05	1
Perfluorohexanesulfonic acid (PFHxS)	**5.4**		2.0	0.87	ng/L		01/17/18 08:34	01/17/18 14:05	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		01/17/18 08:34	01/17/18 14:05	1
Perfluorooctanoic acid (PFOA)	**2.1**		2.0	0.75	ng/L		01/17/18 08:34	01/17/18 14:05	1
Perfluorooctanesulfonic acid (PFOS)	**2.7**		2.0	1.3	ng/L		01/17/18 08:34	01/17/18 14:05	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		01/17/18 08:34	01/17/18 14:05	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*105*		*25 - 150*	*01/17/18 08:34*	*01/17/18 14:05*	*1*
13C4-PFHpA	*114*		*25 - 150*	*01/17/18 08:34*	*01/17/18 14:05*	*1*
13C4 PFOA	*104*		*25 - 150*	*01/17/18 08:34*	*01/17/18 14:05*	*1*
13C4 PFOS	*105*		*25 - 150*	*01/17/18 08:34*	*01/17/18 14:05*	*1*
13C5 PFNA	*111*		*25 - 150*	*01/17/18 08:34*	*01/17/18 14:05*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35084-1

Client Sample ID: 120874
Date Collected: 01/10/18 12:38
Date Received: 01/16/18 09:40

Lab Sample ID: 320-35084-2
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**1.2**	**J**	2.0	0.92	ng/L		01/17/18 08:34	01/17/18 14:24	1
Perfluorohexanesulfonic acid (PFHxS)	**5.4**		2.0	0.87	ng/L		01/17/18 08:34	01/17/18 14:24	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		01/17/18 08:34	01/17/18 14:24	1
Perfluorooctanoic acid (PFOA)	**2.0**		2.0	0.75	ng/L		01/17/18 08:34	01/17/18 14:24	1
Perfluorooctanesulfonic acid (PFOS)	**2.8**		2.0	1.3	ng/L		01/17/18 08:34	01/17/18 14:24	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		01/17/18 08:34	01/17/18 14:24	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*105*		*25 - 150*	*01/17/18 08:34*	*01/17/18 14:24*	*1*
13C4-PFHpA	*114*		*25 - 150*	*01/17/18 08:34*	*01/17/18 14:24*	*1*
13C4 PFOA	*103*		*25 - 150*	*01/17/18 08:34*	*01/17/18 14:24*	*1*
13C4 PFOS	*103*		*25 - 150*	*01/17/18 08:34*	*01/17/18 14:24*	*1*
13C5 PFNA	*113*		*25 - 150*	*01/17/18 08:34*	*01/17/18 14:24*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35084-1

Client Sample ID: 174670
Date Collected: 01/11/18 14:36
Date Received: 01/16/18 09:40

Lab Sample ID: 320-35084-3
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		01/17/18 08:34	01/17/18 14:42	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		01/17/18 08:34	01/17/18 14:42	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		01/17/18 08:34	01/17/18 14:42	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		01/17/18 08:34	01/17/18 14:42	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		01/17/18 08:34	01/17/18 14:42	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		01/17/18 08:34	01/17/18 14:42	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*115*		*25 - 150*	*01/17/18 08:34*	*01/17/18 14:42*	*1*
13C4-PFHpA	*119*		*25 - 150*	*01/17/18 08:34*	*01/17/18 14:42*	*1*
13C4 PFOA	*110*		*25 - 150*	*01/17/18 08:34*	*01/17/18 14:42*	*1*
13C4 PFOS	*113*		*25 - 150*	*01/17/18 08:34*	*01/17/18 14:42*	*1*
13C5 PFNA	*119*		*25 - 150*	*01/17/18 08:34*	*01/17/18 14:42*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35084-1

Client Sample ID: 121614
Date Collected: 01/15/18 11:50
Date Received: 01/16/18 09:40

Lab Sample ID: 320-35084-4
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		01/17/18 08:34	01/17/18 15:00	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		01/17/18 08:34	01/17/18 15:00	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		01/17/18 08:34	01/17/18 15:00	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		01/17/18 08:34	01/17/18 15:00	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		01/17/18 08:34	01/17/18 15:00	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		01/17/18 08:34	01/17/18 15:00	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*111*		*25 - 150*	*01/17/18 08:34*	*01/17/18 15:00*	*1*
13C4-PFHpA	*116*		*25 - 150*	*01/17/18 08:34*	*01/17/18 15:00*	*1*
13C4 PFOA	*109*		*25 - 150*	*01/17/18 08:34*	*01/17/18 15:00*	*1*
13C4 PFOS	*112*		*25 - 150*	*01/17/18 08:34*	*01/17/18 15:00*	*1*
13C5 PFNA	*121*		*25 - 150*	*01/17/18 08:34*	*01/17/18 15:00*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35084-1

Client Sample ID: 121622
Date Collected: 01/15/18 12:34
Date Received: 01/16/18 09:40

Lab Sample ID: 320-35084-5
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		01/17/18 08:34	01/17/18 15:19	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		01/17/18 08:34	01/17/18 15:19	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		01/17/18 08:34	01/17/18 15:19	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		01/17/18 08:34	01/17/18 15:19	1
Perfluorooctanesulfonic acid (PFOS)	**1.3**	**J**	2.0	1.3	ng/L		01/17/18 08:34	01/17/18 15:19	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		01/17/18 08:34	01/17/18 15:19	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*104*		*25 - 150*	*01/17/18 08:34*	*01/17/18 15:19*	*1*
13C4-PFHpA	*112*		*25 - 150*	*01/17/18 08:34*	*01/17/18 15:19*	*1*
13C4 PFOA	*103*		*25 - 150*	*01/17/18 08:34*	*01/17/18 15:19*	*1*
13C4 PFOS	*104*		*25 - 150*	*01/17/18 08:34*	*01/17/18 15:19*	*1*
13C5 PFNA	*111*		*25 - 150*	*01/17/18 08:34*	*01/17/18 15:19*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35084-1

Client Sample ID: 121665
Date Collected: 01/15/18 13:41
Date Received: 01/16/18 09:40

Lab Sample ID: 320-35084-6
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		01/17/18 08:34	01/17/18 15:37	1
Perfluorohexanesulfonic acid (PFHxS)	**1.7**	**J**	2.0	0.87	ng/L		01/17/18 08:34	01/17/18 15:37	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		01/17/18 08:34	01/17/18 15:37	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		01/17/18 08:34	01/17/18 15:37	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		01/17/18 08:34	01/17/18 15:37	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		01/17/18 08:34	01/17/18 15:37	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*100*		*25 - 150*	*01/17/18 08:34*	*01/17/18 15:37*	*1*
13C4-PFHpA	*102*		*25 - 150*	*01/17/18 08:34*	*01/17/18 15:37*	*1*
13C4 PFOA	*95*		*25 - 150*	*01/17/18 08:34*	*01/17/18 15:37*	*1*
13C4 PFOS	*103*		*25 - 150*	*01/17/18 08:34*	*01/17/18 15:37*	*1*
13C5 PFNA	*105*		*25 - 150*	*01/17/18 08:34*	*01/17/18 15:37*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35084-1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)				
Lab Sample ID	Client Sample ID	PFHxS (25-150)	PFHpA (25-150)	PFOA (25-150)	PFOS (25-150)	PFNA (25-150)
320-35084-1	120774	105	114	104	105	111
320-35084-2	120874	105	114	103	103	113
320-35084-3	174670	115	119	110	113	119
320-35084-4	121614	111	116	109	112	121
320-35084-5	121622	104	112	103	104	111
320-35084-6	121665	100	102	95	103	105
LCS 320-204269/2-A	Lab Control Sample	102	104	92	101	104
LCSD 320-204269/3-A	Lab Control Sample Dup	96	101	90	94	101
MB 320-204269/1-A	Method Blank	105	108	97	104	109

Surrogate Legend

PFHxS = 18O2 PFHxS
PFHpA = 13C4-PFHpA
PFOA = 13C4 PFOA
PFOS = 13C4 PFOS
PFNA = 13C5 PFNA

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-204269/1-A
Matrix: Water
Analysis Batch: 204417

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 204269

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		01/17/18 08:34	01/17/18 13:10	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		01/17/18 08:34	01/17/18 13:10	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		01/17/18 08:34	01/17/18 13:10	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		01/17/18 08:34	01/17/18 13:10	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		01/17/18 08:34	01/17/18 13:10	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		01/17/18 08:34	01/17/18 13:10	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*105*		*25 - 150*	*01/17/18 08:34*	*01/17/18 13:10*	*1*
13C4-PFHpA	*108*		*25 - 150*	*01/17/18 08:34*	*01/17/18 13:10*	*1*
13C4 PFOA	*97*		*25 - 150*	*01/17/18 08:34*	*01/17/18 13:10*	*1*
13C4 PFOS	*104*		*25 - 150*	*01/17/18 08:34*	*01/17/18 13:10*	*1*
13C5 PFNA	*109*		*25 - 150*	*01/17/18 08:34*	*01/17/18 13:10*	*1*

Lab Sample ID: LCS 320-204269/2-A
Matrix: Water
Analysis Batch: 204417

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 204269

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	15.9		ng/L		90	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	16.5		ng/L		91	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	18.3		ng/L		91	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	20.4		ng/L		102	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	16.6		ng/L		90	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	18.6		ng/L		93	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*102*		*25 - 150*
13C4-PFHpA	*104*		*25 - 150*
13C4 PFOA	*92*		*25 - 150*
13C4 PFOS	*101*		*25 - 150*
13C5 PFNA	*104*		*25 - 150*

Lab Sample ID: LCSD 320-204269/3-A
Matrix: Water
Analysis Batch: 204417

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 204269

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	19.1		ng/L		108	72 - 151	19	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	19.8		ng/L		109	73 - 157	18	30
Perfluoroheptanoic acid (PFHpA)			20.0	22.5		ng/L		112	71 - 138	21	30
Perfluorooctanoic acid (PFOA)			20.0	24.3		ng/L		121	70 - 140	17	30
Perfluorooctanesulfonic acid (PFOS)			18.6	19.8		ng/L		107	69 - 144	17	30
Perfluorononanoic acid (PFNA)			20.0	21.9		ng/L		110	73 - 147	17	30

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35084-1

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	96		25 - 150
13C4-PFHpA	101		25 - 150
13C4 PFOA	90		25 - 150
13C4 PFOS	94		25 - 150
13C5 PFNA	101		25 - 150

LCMS

Prep Batch: 204269

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35084-1	120774	Total/NA	Water	PFAS Prep	
320-35084-2	120874	Total/NA	Water	PFAS Prep	
320-35084-3	174670	Total/NA	Water	PFAS Prep	
320-35084-4	121614	Total/NA	Water	PFAS Prep	
320-35084-5	121622	Total/NA	Water	PFAS Prep	
320-35084-6	121665	Total/NA	Water	PFAS Prep	
MB 320-204269/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-204269/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-204269/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 204417

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35084-1	120774	Total/NA	Water	WS-LC-0025 At1	204269
320-35084-2	120874	Total/NA	Water	WS-LC-0025 At1	204269
320-35084-3	174670	Total/NA	Water	WS-LC-0025 At1	204269
320-35084-4	121614	Total/NA	Water	WS-LC-0025 At1	204269
320-35084-5	121622	Total/NA	Water	WS-LC-0025 At1	204269
320-35084-6	121665	Total/NA	Water	WS-LC-0025 At1	204269
MB 320-204269/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	204269
LCS 320-204269/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	204269
LCSD 320-204269/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	204269

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35084-1

Client Sample ID: 120774
Date Collected: 01/10/18 12:28
Date Received: 01/16/18 09:40

Lab Sample ID: 320-35084-1
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	PFAS Prep			1.00 mL	1.66 mL	204269	01/17/18 08:34	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			204417	01/17/18 14:05	AAR	TAL SAC

Client Sample ID: 120874
Date Collected: 01/10/18 12:38
Date Received: 01/16/18 09:40

Lab Sample ID: 320-35084-2
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	PFAS Prep			1.00 mL	1.66 mL	204269	01/17/18 08:34	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			204417	01/17/18 14:24	AAR	TAL SAC

Client Sample ID: 174670
Date Collected: 01/11/18 14:36
Date Received: 01/16/18 09:40

Lab Sample ID: 320-35084-3
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	PFAS Prep			1.00 mL	1.66 mL	204269	01/17/18 08:34	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			204417	01/17/18 14:42	AAR	TAL SAC

Client Sample ID: 121614
Date Collected: 01/15/18 11:50
Date Received: 01/16/18 09:40

Lab Sample ID: 320-35084-4
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	PFAS Prep			1.00 mL	1.66 mL	204269	01/17/18 08:34	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			204417	01/17/18 15:00	AAR	TAL SAC

Client Sample ID: 121622
Date Collected: 01/15/18 12:34
Date Received: 01/16/18 09:40

Lab Sample ID: 320-35084-5
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	PFAS Prep			1.00 mL	1.66 mL	204269	01/17/18 08:34	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			204417	01/17/18 15:19	AAR	TAL SAC

Client Sample ID: 121665
Date Collected: 01/15/18 13:41
Date Received: 01/16/18 09:40

Lab Sample ID: 320-35084-6
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	PFAS Prep			1.00 mL	1.66 mL	204269	01/17/18 08:34	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			204417	01/17/18 15:37	AAR	TAL SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35084-1

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35084-1

Laboratory: TestAmerica Sacramento

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

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-055	01-31-18
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-18
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	10-31-18
L-A-B	DoD ELAP		L2468	01-20-21
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-18-18
Michigan	State Program	5	9947	01-31-18
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-29-20
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
Wyoming	State Program	8	8TMS-L	01-28-19

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35084-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35084-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-35084-1	120774	Water	01/10/18 12:28	01/16/18 09:40
320-35084-2	120874	Water	01/10/18 12:38	01/16/18 09:40
320-35084-3	174670	Water	01/11/18 14:36	01/16/18 09:40
320-35084-4	121614	Water	01/15/18 11:50	01/16/18 09:40
320-35084-5	121622	Water	01/15/18 12:34	01/16/18 09:40
320-35084-6	121665	Water	01/15/18 13:41	01/16/18 09:40

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

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5430 Fairbanks Street, Suite 3
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(907) 561-2120

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Denver, CO 80204
(303) 825-3800

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(509) 946-6309

CHAIN-OF-CUSTODY RECORD

Laboratory Test America
Attn: David Alltucker

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFAS +b						Total Number of Containers	Remarks/Matrix
120774		12:28	1/10/18		X	X						2	groundwater
120874		12:38	1/10/18		X	X						2	
174670		14:36	1/11/18		X	X						2	
121614		1150	1/15/18		X	X						2	
121622		1234	1/15/18		X	X						2	
121665		1341	1/15/18		X	X						2	

Project Information		Sample Receipt	
Project Number:	20060	Total Number of Containers	12
Project Name:	FAI	COC Seals/Intact? Y/N/NA	
Contact:	MDN	Received Good Cond./Cold	
Ongoing Project?	Yes ☒ No ☐	Delivery Method:	gold streak
Sampler:	ARM, CAB	(attach shipping bill, if any)	

Instructions

Requested Turnaround Time: 5 day rush

Special Instructions: please bill to
31-1-20060-001

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 1500	Signature: Time:	Signature: Time:
Printed Name: Sheila Hinckley Date: 1/15/18	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson, Inc	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 0940	Signature:	
Printed Name: Troy A. Turpen Date: 1/16-18	Printed Name:	
Company: TA-SPK 3.9°C IR gel pack	Company:	

320-35084 Chain of Custody

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

F-19-91/UR

No. 34451

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-35084-1

Login Number: 35084
List Number: 1
Creator: Turpen, Troy

List Source: 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	
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:

Kristen Freiburger

Title:

Senior Chemist

Date:

January 19, 2018

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

January 19, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-35084-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-35084-1

1. Laboratory

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

   ☐ Yes ☒ No Comments:

ADEC has not approved an analytical laboratory for analysis of PFASs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

   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 Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

   ☒ Yes ☐ No Comments:

   b. Correct Analyses requested?

   ☒ Yes ☐ No Comments:

3. Laboratory Sample Receipt Documentation

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

   ☒ Yes ☐ No Comments:

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

   ☒ Yes ☐ No Comments:

Analysis of PFASs does not require a preservative other than temperature control.

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

   ☒ Yes ☐ No 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 Comments:

The samples were received in good condition.

e. Data quality or usability affected?

Comments:

Data quality or usability is not affected; see above.

4. Case Narrative

a. Present and understandable?

☒ Yes ☐ No Comments:

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

☒ Yes ☐ No Comments:

The case narrative notes the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 3.9º C.

The case narrative notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD).

c. Were all corrective actions documented?

☒ Yes ☐ No Comments:

A laboratory control sample (LCS) and a LCS duplicate (LCSD) were extracted and analyzed to demonstrate analytical method accuracy and precision.

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

Comments:

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

5. Samples Results

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

☒ Yes ☐ No Comments:

b. All applicable holding times met?

☑ Yes ☐ No Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

☐ Yes ☑ No Comments:

N/A; 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 Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

☐ Yes ☑ No Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

☑ Yes ☐ No Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

☑ Yes ☐ No Comments:

iii. If above LOQ, what samples are affected?

Comments:

None; PFAS compounds were not detected in method blank samples.

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

☐ Yes ☑ No Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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 Comments:

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

☐ Yes ☑ No 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

☑ Yes ☐ No Comments:

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

☑ Yes ☐ No Comments:

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

Comments:

N/A; 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 Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

☑ Yes ☐ No Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a 13C-isotope of each target analyte, and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

☑ Yes ☐ No Comments:

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

☐ Yes ☑ No Comments:

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

iv. Data quality or usability affected?

Comments:

The data quality and usability are not affected; see above.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

☐ Yes ☑ No Comments:

PFASs are not volatile compounds; 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 Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not submitted with this work order.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

☒ Yes ☐ No Comments:

ii. Submitted blind to lab?

☒ Yes ☐ No Comments:

The field-duplicate samples *120774* and *120874* were submitted with this work order.

iii. Precision – All relative percent differences (RPD) less than specified DQOs? (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 Comments:

The analytical precision demonstrated by the field-duplicate sample RPDs was within the project specific DQO of 30% for all detected analytes.

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

Comments:

The data quality and usability were not affected.

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

☐ Yes ☐ No ☒ Not Applicable

Samples for this project are not collected with reusable equipment, therefore a practical potential for equipment based cross-contamination does not exist.

i. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; an equipment blank was not submitted.

ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

a. Defined and appropriate?

☐ Yes ☒ No Comments:

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

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 320-35281-1
Client Project/Site: FAI
Revision: 1

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

Attn: Marcy Nadel

Authorized for release by:
2/2/2018 9:11:17 AM

David Alltucker, Project Manager I
(916)374-4383
david.alltucker@testamericainc.com

Table of Contents

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35281-1

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.
*	Isotope Dilution analyte is outside acceptance limits.

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
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Job ID: 320-35281-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-35281-1

Revision:
Method(s) WS-LC-0025 At1: The following samples 172863 (320-35281-1) and 172847 (320-35281-6) were originally reported as Non-Detect (ND) for Perfluorooctanesulfonic acid (PFOS). Upon further review of the data the data have been corrected to report PFOS with a positive result. 172863 (320-35281-1) and 172847 (320-35281-6)

Receipt
The samples were received on 1/23/2018 9:25 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.2º C.

LCMS
Method(s) WS-LC-0025 At1: Isotope Dilution Analyte (IDA) recovery is above the method recommended limit for 13C4-PFHpA and 13C5 PFNA in the following samples: 121631 (320-35281-3), 121649 (320-35281-4) and 172847 (320-35281-6). Quantitation by isotope dilution generally precludes any adverse effect on data quality due to elevated IDA recoveries.

Method(s) WS-LC-0025 At1: Isotope Dilution Analyte (IDA) recovery is above the method recommended limit for several analytes in the following samples: 172952 (320-35281-2), 172871 (320-35281-5), 172821 (320-35281-7) and 172901 (320-35281-8). Quantitation by isotope dilution generally precludes any adverse effect on data quality due to elevated IDA recoveries.

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

Organic Prep
Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-205573.

Method(s) PFAS Prep: There is sediment present in the following samples: 172863 (320-35281-1), 172952 (320-35281-2), 121631 (320-35281-3), 121649 (320-35281-4), 172871 (320-35281-5), 172847 (320-35281-6), 172821 (320-35281-7), 172901 (320-35281-8), 365670 (320-35281-9), 116947 (320-35281-10) and 123226 (320-35281-11). Associated with prep batch 320-205573 and method code PFAS_DI_Prep, waters.

Method(s) PFAS Prep: The following samples: 172863 (320-35281-1), 172952 (320-35281-2), 121631 (320-35281-3), 121649 (320-35281-4), 172871 (320-35281-5), 172847 (320-35281-6), 172821 (320-35281-7), 365670 (320-35281-9), 116947 (320-35281-10) and 123226 (320-35281-11) were observed to be orange color. Associated with prep batch 320-205573 and method code PFAS_DI_Prep, waters.

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: FAI

TestAmerica Job ID: 320-35281-1

Client Sample ID: 172863 — Lab Sample ID: 320-35281-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	6.9		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	11		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.7	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	3.4		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	2.5		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 172952 — Lab Sample ID: 320-35281-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.2	J	2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	2.5		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 121631 — Lab Sample ID: 320-35281-3

No Detections.

Client Sample ID: 121649 — Lab Sample ID: 320-35281-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	3.3		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	3.0		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.3		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	2.9		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 172871 — Lab Sample ID: 320-35281-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.1	J	2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	2.4		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 172847 — Lab Sample ID: 320-35281-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	5.3		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	4.0		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.6	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	3.2		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: 172847 (Continued) — Lab Sample ID: 320-35281-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanesulfonic acid (PFOS)	1.3	J	2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 172821 — Lab Sample ID: 320-35281-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	2.2		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	3.9		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.91	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	0.94	J	2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 172901 — Lab Sample ID: 320-35281-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	2.4		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	4.1		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.93	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	1.7	J	2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 365670 — Lab Sample ID: 320-35281-9

No Detections.

Client Sample ID: 116947 — Lab Sample ID: 320-35281-10

No Detections.

Client Sample ID: 123226 — Lab Sample ID: 320-35281-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	2.3		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35281-1

Client Sample ID: 172863
Date Collected: 01/16/18 14:24
Date Received: 01/23/18 09:25

Lab Sample ID: 320-35281-1
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	6.9		2.0	0.92	ng/L		01/25/18 12:10	01/26/18 00:54	1
Perfluorohexanesulfonic acid (PFHxS)	11		2.0	0.87	ng/L		01/25/18 12:10	01/26/18 00:54	1
Perfluoroheptanoic acid (PFHpA)	1.7	J	2.0	0.80	ng/L		01/25/18 12:10	01/26/18 00:54	1
Perfluorooctanoic acid (PFOA)	3.4		2.0	0.75	ng/L		01/25/18 12:10	01/26/18 00:54	1
Perfluorooctanesulfonic acid (PFOS)	2.5		2.0	1.3	ng/L		01/25/18 12:10	01/26/18 00:54	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		01/25/18 12:10	01/26/18 00:54	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*137*		*25 - 150*	*01/25/18 12:10*	*01/26/18 00:54*	*1*
13C4-PFHpA	*145*		*25 - 150*	*01/25/18 12:10*	*01/26/18 00:54*	*1*
13C4 PFOA	*132*		*25 - 150*	*01/25/18 12:10*	*01/26/18 00:54*	*1*
13C4 PFOS	*128*		*25 - 150*	*01/25/18 12:10*	*01/26/18 00:54*	*1*
13C5 PFNA	*146*		*25 - 150*	*01/25/18 12:10*	*01/26/18 00:54*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35281-1

Client Sample ID: 172952
Date Collected: 01/16/18 12:53
Date Received: 01/23/18 09:25

Lab Sample ID: 320-35281-2
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**1.2**	**J**	2.0	0.92	ng/L		01/25/18 12:10	01/26/18 01:13	1
Perfluorohexanesulfonic acid (PFHxS)	**2.5**		2.0	0.87	ng/L		01/25/18 12:10	01/26/18 01:13	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		01/25/18 12:10	01/26/18 01:13	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		01/25/18 12:10	01/26/18 01:13	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		01/25/18 12:10	01/26/18 01:13	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		01/25/18 12:10	01/26/18 01:13	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*152*	*	*25 - 150*	*01/25/18 12:10*	*01/26/18 01:13*	*1*
13C4-PFHpA	*158*	*	*25 - 150*	*01/25/18 12:10*	*01/26/18 01:13*	*1*
13C4 PFOA	*149*		*25 - 150*	*01/25/18 12:10*	*01/26/18 01:13*	*1*
13C4 PFOS	*143*		*25 - 150*	*01/25/18 12:10*	*01/26/18 01:13*	*1*
13C5 PFNA	*160*	*	*25 - 150*	*01/25/18 12:10*	*01/26/18 01:13*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35281-1

Client Sample ID: 121631
Date Collected: 01/16/18 15:36
Date Received: 01/23/18 09:25

Lab Sample ID: 320-35281-3
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		01/25/18 12:10	01/26/18 01:31	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		01/25/18 12:10	01/26/18 01:31	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		01/25/18 12:10	01/26/18 01:31	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		01/25/18 12:10	01/26/18 01:31	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		01/25/18 12:10	01/26/18 01:31	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		01/25/18 12:10	01/26/18 01:31	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*148*		*25 - 150*	*01/25/18 12:10*	*01/26/18 01:31*	*1*
13C4-PFHpA	*158*	*	*25 - 150*	*01/25/18 12:10*	*01/26/18 01:31*	*1*
13C4 PFOA	*147*		*25 - 150*	*01/25/18 12:10*	*01/26/18 01:31*	*1*
13C4 PFOS	*139*		*25 - 150*	*01/25/18 12:10*	*01/26/18 01:31*	*1*
13C5 PFNA	*161*	*	*25 - 150*	*01/25/18 12:10*	*01/26/18 01:31*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35281-1

Client Sample ID: 121649
Date Collected: 01/17/18 10:53
Date Received: 01/23/18 09:25

Lab Sample ID: 320-35281-4
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**3.3**		2.0	0.92	ng/L		01/25/18 12:10	01/26/18 01:49	1
Perfluorohexanesulfonic acid (PFHxS)	**3.0**		2.0	0.87	ng/L		01/25/18 12:10	01/26/18 01:49	1
Perfluoroheptanoic acid (PFHpA)	**2.3**		2.0	0.80	ng/L		01/25/18 12:10	01/26/18 01:49	1
Perfluorooctanoic acid (PFOA)	**2.9**		2.0	0.75	ng/L		01/25/18 12:10	01/26/18 01:49	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		01/25/18 12:10	01/26/18 01:49	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		01/25/18 12:10	01/26/18 01:49	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*145*		*25 - 150*	*01/25/18 12:10*	*01/26/18 01:49*	*1*
13C4-PFHpA	*151*	*	*25 - 150*	*01/25/18 12:10*	*01/26/18 01:49*	*1*
13C4 PFOA	*141*		*25 - 150*	*01/25/18 12:10*	*01/26/18 01:49*	*1*
13C4 PFOS	*138*		*25 - 150*	*01/25/18 12:10*	*01/26/18 01:49*	*1*
13C5 PFNA	*155*	*	*25 - 150*	*01/25/18 12:10*	*01/26/18 01:49*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35281-1

Client Sample ID: 172871
Date Collected: 01/17/18 12:13
Date Received: 01/23/18 09:25

Lab Sample ID: 320-35281-5
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**1.1**	**J**	2.0	0.92	ng/L		01/25/18 12:10	01/26/18 02:08	1
Perfluorohexanesulfonic acid (PFHxS)	**2.4**		2.0	0.87	ng/L		01/25/18 12:10	01/26/18 02:08	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		01/25/18 12:10	01/26/18 02:08	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		01/25/18 12:10	01/26/18 02:08	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		01/25/18 12:10	01/26/18 02:08	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		01/25/18 12:10	01/26/18 02:08	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*148*		*25 - 150*	*01/25/18 12:10*	*01/26/18 02:08*	*1*
13C4-PFHpA	*159*	*	*25 - 150*	*01/25/18 12:10*	*01/26/18 02:08*	*1*
13C4 PFOA	*151*	*	*25 - 150*	*01/25/18 12:10*	*01/26/18 02:08*	*1*
13C4 PFOS	*137*		*25 - 150*	*01/25/18 12:10*	*01/26/18 02:08*	*1*
13C5 PFNA	*164*	*	*25 - 150*	*01/25/18 12:10*	*01/26/18 02:08*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35281-1

Client Sample ID: 172847
Date Collected: 01/19/18 09:17
Date Received: 01/23/18 09:25

Lab Sample ID: 320-35281-6
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	5.3		2.0	0.92	ng/L		01/25/18 12:10	01/26/18 02:26	1
Perfluorohexanesulfonic acid (PFHxS)	4.0		2.0	0.87	ng/L		01/25/18 12:10	01/26/18 02:26	1
Perfluoroheptanoic acid (PFHpA)	1.6	J	2.0	0.80	ng/L		01/25/18 12:10	01/26/18 02:26	1
Perfluorooctanoic acid (PFOA)	3.2		2.0	0.75	ng/L		01/25/18 12:10	01/26/18 02:26	1
Perfluorooctanesulfonic acid (PFOS)	1.3	J	2.0	1.3	ng/L		01/25/18 12:10	01/26/18 02:26	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		01/25/18 12:10	01/26/18 02:26	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*150*		*25 - 150*	*01/25/18 12:10*	*01/26/18 02:26*	*1*
13C4-PFHpA	*159*	*	*25 - 150*	*01/25/18 12:10*	*01/26/18 02:26*	*1*
13C4 PFOA	*146*		*25 - 150*	*01/25/18 12:10*	*01/26/18 02:26*	*1*
13C4 PFOS	*143*		*25 - 150*	*01/25/18 12:10*	*01/26/18 02:26*	*1*
13C5 PFNA	*160*	*	*25 - 150*	*01/25/18 12:10*	*01/26/18 02:26*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35281-1

Client Sample ID: 172821
Date Collected: 01/19/18 09:56
Date Received: 01/23/18 09:25

Lab Sample ID: 320-35281-7
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**2.2**		2.0	0.92	ng/L		01/25/18 12:10	01/26/18 02:44	1
Perfluorohexanesulfonic acid (PFHxS)	**3.9**		2.0	0.87	ng/L		01/25/18 12:10	01/26/18 02:44	1
Perfluoroheptanoic acid (PFHpA)	**0.91**	**J**	2.0	0.80	ng/L		01/25/18 12:10	01/26/18 02:44	1
Perfluorooctanoic acid (PFOA)	**0.94**	**J**	2.0	0.75	ng/L		01/25/18 12:10	01/26/18 02:44	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		01/25/18 12:10	01/26/18 02:44	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		01/25/18 12:10	01/26/18 02:44	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*155*	*	*25 - 150*	*01/25/18 12:10*	*01/26/18 02:44*	*1*
13C4-PFHpA	*164*	*	*25 - 150*	*01/25/18 12:10*	*01/26/18 02:44*	*1*
13C4 PFOA	*154*	*	*25 - 150*	*01/25/18 12:10*	*01/26/18 02:44*	*1*
13C4 PFOS	*147*		*25 - 150*	*01/25/18 12:10*	*01/26/18 02:44*	*1*
13C5 PFNA	*167*	*	*25 - 150*	*01/25/18 12:10*	*01/26/18 02:44*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35281-1

Client Sample ID: 172901
Date Collected: 01/19/18 11:32
Date Received: 01/23/18 09:25

Lab Sample ID: 320-35281-8
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**2.4**		2.0	0.92	ng/L		01/25/18 12:10	01/26/18 03:21	1
Perfluorohexanesulfonic acid (PFHxS)	**4.1**		2.0	0.87	ng/L		01/25/18 12:10	01/26/18 03:21	1
Perfluoroheptanoic acid (PFHpA)	**0.93**	**J**	2.0	0.80	ng/L		01/25/18 12:10	01/26/18 03:21	1
Perfluorooctanoic acid (PFOA)	**1.7**	**J**	2.0	0.75	ng/L		01/25/18 12:10	01/26/18 03:21	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		01/25/18 12:10	01/26/18 03:21	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		01/25/18 12:10	01/26/18 03:21	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*155*	*	*25 - 150*	*01/25/18 12:10*	*01/26/18 03:21*	*1*
13C4-PFHpA	*157*	*	*25 - 150*	*01/25/18 12:10*	*01/26/18 03:21*	*1*
13C4 PFOA	*150*		*25 - 150*	*01/25/18 12:10*	*01/26/18 03:21*	*1*
13C4 PFOS	*147*		*25 - 150*	*01/25/18 12:10*	*01/26/18 03:21*	*1*
13C5 PFNA	*178*	*	*25 - 150*	*01/25/18 12:10*	*01/26/18 03:21*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35281-1

Client Sample ID: 365670
Date Collected: 01/19/18 15:46
Date Received: 01/23/18 09:25

Lab Sample ID: 320-35281-9
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		01/25/18 12:10	01/26/18 03:39	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		01/25/18 12:10	01/26/18 03:39	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		01/25/18 12:10	01/26/18 03:39	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		01/25/18 12:10	01/26/18 03:39	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		01/25/18 12:10	01/26/18 03:39	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		01/25/18 12:10	01/26/18 03:39	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*120*		*25 - 150*	*01/25/18 12:10*	*01/26/18 03:39*	*1*
13C4-PFHpA	*109*		*25 - 150*	*01/25/18 12:10*	*01/26/18 03:39*	*1*
13C4 PFOA	*105*		*25 - 150*	*01/25/18 12:10*	*01/26/18 03:39*	*1*
13C4 PFOS	*114*		*25 - 150*	*01/25/18 12:10*	*01/26/18 03:39*	*1*
13C5 PFNA	*116*		*25 - 150*	*01/25/18 12:10*	*01/26/18 03:39*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35281-1

Client Sample ID: 116947
Date Collected: 01/19/18 12:58
Date Received: 01/23/18 09:25

Lab Sample ID: 320-35281-10
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		01/25/18 12:10	01/26/18 03:58	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		01/25/18 12:10	01/26/18 03:58	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		01/25/18 12:10	01/26/18 03:58	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		01/25/18 12:10	01/26/18 03:58	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		01/25/18 12:10	01/26/18 03:58	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		01/25/18 12:10	01/26/18 03:58	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*127*		*25 - 150*	*01/25/18 12:10*	*01/26/18 03:58*	*1*
13C4-PFHpA	*137*		*25 - 150*	*01/25/18 12:10*	*01/26/18 03:58*	*1*
13C4 PFOA	*129*		*25 - 150*	*01/25/18 12:10*	*01/26/18 03:58*	*1*
13C4 PFOS	*120*		*25 - 150*	*01/25/18 12:10*	*01/26/18 03:58*	*1*
13C5 PFNA	*141*		*25 - 150*	*01/25/18 12:10*	*01/26/18 03:58*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35281-1

Client Sample ID: 123226
Date Collected: 01/19/18 14:06
Date Received: 01/23/18 09:25

Lab Sample ID: 320-35281-11
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**2.3**		2.0	0.92	ng/L		01/25/18 12:10	01/26/18 04:16	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		01/25/18 12:10	01/26/18 04:16	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		01/25/18 12:10	01/26/18 04:16	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		01/25/18 12:10	01/26/18 04:16	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		01/25/18 12:10	01/26/18 04:16	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		01/25/18 12:10	01/26/18 04:16	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*131*		*25 - 150*	*01/25/18 12:10*	*01/26/18 04:16*	*1*
13C4-PFHpA	*138*		*25 - 150*	*01/25/18 12:10*	*01/26/18 04:16*	*1*
13C4 PFOA	*130*		*25 - 150*	*01/25/18 12:10*	*01/26/18 04:16*	*1*
13C4 PFOS	*123*		*25 - 150*	*01/25/18 12:10*	*01/26/18 04:16*	*1*
13C5 PFNA	*142*		*25 - 150*	*01/25/18 12:10*	*01/26/18 04:16*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35281-1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)				
Lab Sample ID	Client Sample ID	PFHxS (25-150)	PFHpA (25-150)	PFOA (25-150)	PFOS (25-150)	PFNA (25-150)
320-35281-1	172863	137	145	132	128	146
320-35281-2	172952	152 *	158 *	149	143	160 *
320-35281-3	121631	148	158 *	147	139	161 *
320-35281-4	121649	145	151 *	141	138	155 *
320-35281-5	172871	148	159 *	151 *	137	164 *
320-35281-6	172847	150	159 *	146	143	160 *
320-35281-7	172821	155 *	164 *	154 *	147	167 *
320-35281-8	172901	155 *	157 *	150	147	178 *
320-35281-9	365670	120	109	105	114	116
320-35281-10	116947	127	137	129	120	141
320-35281-11	123226	131	138	130	123	142
LCS 320-205573/2-A	Lab Control Sample	133	136	127	127	139
LCSD 320-205573/3-A	Lab Control Sample Dup	135	139	128	129	142
MB 320-205573/1-A	Method Blank	125	125	119	118	132

Surrogate Legend

PFHxS = 18O2 PFHxS
PFHpA = 13C4-PFHpA
PFOA = 13C4 PFOA
PFOS = 13C4 PFOS
PFNA = 13C5 PFNA

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-205573/1-A
Matrix: Water
Analysis Batch: 205699

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 205573

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		01/25/18 12:10	01/25/18 23:59	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		01/25/18 12:10	01/25/18 23:59	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		01/25/18 12:10	01/25/18 23:59	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		01/25/18 12:10	01/25/18 23:59	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		01/25/18 12:10	01/25/18 23:59	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		01/25/18 12:10	01/25/18 23:59	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*125*		*25 - 150*	*01/25/18 12:10*	*01/25/18 23:59*	*1*
13C4-PFHpA	*125*		*25 - 150*	*01/25/18 12:10*	*01/25/18 23:59*	*1*
13C4 PFOA	*119*		*25 - 150*	*01/25/18 12:10*	*01/25/18 23:59*	*1*
13C4 PFOS	*118*		*25 - 150*	*01/25/18 12:10*	*01/25/18 23:59*	*1*
13C5 PFNA	*132*		*25 - 150*	*01/25/18 12:10*	*01/25/18 23:59*	*1*

Lab Sample ID: LCS 320-205573/2-A
Matrix: Water
Analysis Batch: 205699

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 205573

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	16.4		ng/L		93	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	17.2		ng/L		95	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	19.1		ng/L		96	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	20.6		ng/L		103	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	17.4		ng/L		94	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	19.5		ng/L		98	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*133*		*25 - 150*
13C4-PFHpA	*136*		*25 - 150*
13C4 PFOA	*127*		*25 - 150*
13C4 PFOS	*127*		*25 - 150*
13C5 PFNA	*139*		*25 - 150*

Lab Sample ID: LCSD 320-205573/3-A
Matrix: Water
Analysis Batch: 205699

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 205573

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	16.7		ng/L		94	72 - 151	2	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	17.4		ng/L		96	73 - 157	1	30
Perfluoroheptanoic acid (PFHpA)			20.0	19.2		ng/L		96	71 - 138	0	30
Perfluorooctanoic acid (PFOA)			20.0	21.4		ng/L		107	70 - 140	4	30
Perfluorooctanesulfonic acid (PFOS)			18.6	17.0		ng/L		92	69 - 144	2	30
Perfluorononanoic acid (PFNA)			20.0	19.5		ng/L		98	73 - 147	0	30

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35281-1

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	135		25 - 150
13C4-PFHpA	139		25 - 150
13C4 PFOA	128		25 - 150
13C4 PFOS	129		25 - 150
13C5 PFNA	142		25 - 150

LCMS

Prep Batch: 205573

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35281-1	172863	Total/NA	Water	PFAS Prep	
320-35281-2	172952	Total/NA	Water	PFAS Prep	
320-35281-3	121631	Total/NA	Water	PFAS Prep	
320-35281-4	121649	Total/NA	Water	PFAS Prep	
320-35281-5	172871	Total/NA	Water	PFAS Prep	
320-35281-6	172847	Total/NA	Water	PFAS Prep	
320-35281-7	172821	Total/NA	Water	PFAS Prep	
320-35281-8	172901	Total/NA	Water	PFAS Prep	
320-35281-9	365670	Total/NA	Water	PFAS Prep	
320-35281-10	116947	Total/NA	Water	PFAS Prep	
320-35281-11	123226	Total/NA	Water	PFAS Prep	
MB 320-205573/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-205573/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-205573/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 205699

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35281-1	172863	Total/NA	Water	WS-LC-0025 At1	205573
320-35281-2	172952	Total/NA	Water	WS-LC-0025 At1	205573
320-35281-3	121631	Total/NA	Water	WS-LC-0025 At1	205573
320-35281-4	121649	Total/NA	Water	WS-LC-0025 At1	205573
320-35281-5	172871	Total/NA	Water	WS-LC-0025 At1	205573
320-35281-6	172847	Total/NA	Water	WS-LC-0025 At1	205573
320-35281-7	172821	Total/NA	Water	WS-LC-0025 At1	205573
320-35281-8	172901	Total/NA	Water	WS-LC-0025 At1	205573
320-35281-9	365670	Total/NA	Water	WS-LC-0025 At1	205573
320-35281-10	116947	Total/NA	Water	WS-LC-0025 At1	205573
320-35281-11	123226	Total/NA	Water	WS-LC-0025 At1	205573
MB 320-205573/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	205573
LCS 320-205573/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	205573
LCSD 320-205573/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	205573

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35281-1

Client Sample ID: 172863
Date Collected: 01/16/18 14:24
Date Received: 01/23/18 09:25

Lab Sample ID: 320-35281-1
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	PFAS Prep			1.00 mL	1.66 mL	205573	01/25/18 12:10	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			205699	01/26/18 00:54	ABH	TAL SAC

Client Sample ID: 172952
Date Collected: 01/16/18 12:53
Date Received: 01/23/18 09:25

Lab Sample ID: 320-35281-2
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	PFAS Prep			1.00 mL	1.66 mL	205573	01/25/18 12:10	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			205699	01/26/18 01:13	ABH	TAL SAC

Client Sample ID: 121631
Date Collected: 01/16/18 15:36
Date Received: 01/23/18 09:25

Lab Sample ID: 320-35281-3
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	PFAS Prep			1.00 mL	1.66 mL	205573	01/25/18 12:10	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			205699	01/26/18 01:31	ABH	TAL SAC

Client Sample ID: 121649
Date Collected: 01/17/18 10:53
Date Received: 01/23/18 09:25

Lab Sample ID: 320-35281-4
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	PFAS Prep			1.00 mL	1.66 mL	205573	01/25/18 12:10	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			205699	01/26/18 01:49	ABH	TAL SAC

Client Sample ID: 172871
Date Collected: 01/17/18 12:13
Date Received: 01/23/18 09:25

Lab Sample ID: 320-35281-5
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	PFAS Prep			1.00 mL	1.66 mL	205573	01/25/18 12:10	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			205699	01/26/18 02:08	ABH	TAL SAC

Client Sample ID: 172847
Date Collected: 01/19/18 09:17
Date Received: 01/23/18 09:25

Lab Sample ID: 320-35281-6
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	PFAS Prep			1.00 mL	1.66 mL	205573	01/25/18 12:10	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			205699	01/26/18 02:26	ABH	TAL SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35281-1

Client Sample ID: 172821
Date Collected: 01/19/18 09:56
Date Received: 01/23/18 09:25

Lab Sample ID: 320-35281-7
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	PFAS Prep			1.00 mL	1.66 mL	205573	01/25/18 12:10	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			205699	01/26/18 02:44	ABH	TAL SAC

Client Sample ID: 172901
Date Collected: 01/19/18 11:32
Date Received: 01/23/18 09:25

Lab Sample ID: 320-35281-8
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	205573	01/25/18 12:10	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			205699	01/26/18 03:21	ABH	TAL SAC

Client Sample ID: 365670
Date Collected: 01/19/18 15:46
Date Received: 01/23/18 09:25

Lab Sample ID: 320-35281-9
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	PFAS Prep			1.00 mL	1.66 mL	205573	01/25/18 12:10	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			205699	01/26/18 03:39	ABH	TAL SAC

Client Sample ID: 116947
Date Collected: 01/19/18 12:58
Date Received: 01/23/18 09:25

Lab Sample ID: 320-35281-10
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	PFAS Prep			1.00 mL	1.66 mL	205573	01/25/18 12:10	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			205699	01/26/18 03:58	ABH	TAL SAC

Client Sample ID: 123226
Date Collected: 01/19/18 14:06
Date Received: 01/23/18 09:25

Lab Sample ID: 320-35281-11
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	PFAS Prep			1.00 mL	1.66 mL	205573	01/25/18 12:10	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			205699	01/26/18 04:16	ABH	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35281-1

Laboratory: TestAmerica Sacramento

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

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-055	01-31-18 *
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	10-31-18
L-A-B	DoD ELAP		L2468	01-20-21
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-14-18
Michigan	State Program	5	9947	01-31-18 *
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-29-20
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

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

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35281-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35281-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-35281-1	172863	Water	01/16/18 14:24	01/23/18 09:25
320-35281-2	172952	Water	01/16/18 12:53	01/23/18 09:25
320-35281-3	121631	Water	01/16/18 15:36	01/23/18 09:25
320-35281-4	121649	Water	01/17/18 10:53	01/23/18 09:25
320-35281-5	172871	Water	01/17/18 12:13	01/23/18 09:25
320-35281-6	172847	Water	01/19/18 09:17	01/23/18 09:25
320-35281-7	172821	Water	01/19/18 09:56	01/23/18 09:25
320-35281-8	172901	Water	01/19/18 11:32	01/23/18 09:25
320-35281-9	365670	Water	01/19/18 15:46	01/23/18 09:25
320-35281-10	116947	Water	01/19/18 12:58	01/23/18 09:25
320-35281-11	123226	Water	01/19/18 14:06	01/23/18 09:25

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CHAIN-OF-CUSTODY RECORD

Laboratory Test America
Attn: David Althacker

320-35281 Chain of Custody

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFAS x6 (537-LL-0035)	Analysis Parameters/Sample Container Description (include preservative)						
172863		1424	1/16/18		X	X						2	groundwater
172952		1253	1/16/18		X	X						2	
121631		1536	1/16/18		X	X						2	
121649		1053	1/17/18		X	X						2	
172871		1213	1/17/18		X	X						2	
172847		917	1/19/18		X	X						2	
172821		956	1/19/18		X	X						2	
172901		1132	1/19/18		X	X						2	
365670		1546	1/19/18		X	X						2	
116947		1258	1/19/18		X	X						2	

Project Information		Sample Receipt	
Project Number:	20060-01	Total Number of Containers	
Project Name:	FAI	COC Seals/Intact? Y/N/NA	
Contact:	MDN@shanwil.com	Received Good Cond./Cold	
Ongoing Project?	Yes ☒ No ☐	Delivery Method:	Goldstreak
Sampler:	ARM	(attach shipping bill, if any)	

Instructions	
Requested Turnaround Time:	5 day Rush
Special Instructions:	Please bill to: 31-1-20060-001

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: [signature] Time: 16:00	Signature: Time:	Signature: Time:
Printed Name: Craig Beebe Date: 1/22/18	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson, Inc	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: [signature] Time: 925	Signature: Time:	Signature: Time:
Printed Name: David Her Date: 1/23/18	Printed Name: Date:	Printed Name: Date:
Company: TA - 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

F-19-91/UR

3.2 C

No. 34453

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

CHAIN-OF-CUSTODY RECORD

Laboratory Test America
Attn: David Althacker

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFAS x6 (WS-LC-0025)						Total Number of Containers	Remarks/Matrix
123226		1406	1/19/18		X	x						2	Groundwater

Project Information		Sample Receipt	
Project Number:	20060-001	Total Number of Containers	
Project Name:	FAI	COC Seals/Intact? Y/N/NA	
Contact:	MDN	Received Good Cond./Cold	
Ongoing Project?	Yes ☒ No ☐	Delivery Method:	goldstreak
Sampler:	ARM	(attach shipping bill, if any)	

Instructions

Requested Turnaround Time: Please See Page one

Special Instructions:

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 16:00	Signature: Time:	Signature: Time:
Printed Name: Craig Beebe Date: 1/22/18	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson, Inc	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 925	Signature: Time:	Signature: Time:
Printed Name: David Her Date: 1/23/18	Printed Name: Date:	Printed Name: Date:
Company: TA- 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

F-19-91/UR

3.2C

No. 34810

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-35281-1

Login Number: 35281
List Number: 1
Creator: Hytrek, Cheryl

List Source: 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	
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:

Kristen Freiburger

Title:

Senior Chemist

Date:

February 2, 2018

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

February 6, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-35281-1_Revision 1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

1. Laboratory

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

   ○ Yes ◉ No Comments:

ADEC has not approved an analytical laboratory for analysis of PFASs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

   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 Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

   ◉ Yes ○ No Comments:

   b. Correct Analyses requested?

   ◉ Yes ○ No Comments:

3. Laboratory Sample Receipt Documentation

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

   ◉ Yes ○ No Comments:

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

   ◉ Yes ○ No Comments:

Analysis of PFASs does not require a preservative other than temperature control.

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

   ◉ Yes ○ No 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 Comments:

The samples were received in good condition.

e. Data quality or usability affected?

Comments:

Data quality or usability is not affected; see above.

4. Case Narrative

a. Present and understandable?

(•) Yes ( ) No Comments:

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

(•) Yes ( ) No Comments:

The case narrative notes that the samples 172863 and 172847 were originally reported as ND for PFOS. A routine laboratory QA review indicated that the PFOS results for these samples required correction. The PFOS results were corrected for these samples with positive PFOS results. The results were corrected and the laboratory has implemented corrective actions to address this issue.

The case narrative notes the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 3.2º C.

The case narrative notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD).

The case narrative notes there is sediment present in most of the project samples.

The case narrative notes there were several isotope dilution analyte (IDA) recoveries that were outside the method recommended limit.

c. Were all corrective actions documented?

(•) Yes ( ) No Comments:

A laboratory control sample (LCS) and a LCS duplicate (LCSD) were extracted and analyzed to demonstrate analytical method accuracy and precision.

Please see section 6 below for assessment of IDA recoveries.

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

Comments:

The case narrative does not note an affect on the data quality or usability. The laboratory notes the quantitation by isotope dilution generally precludes any adverse effect on data quality due to elevated IDA recoveries.

5. Samples Results

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

(•) Yes ( ) No Comments:

b. All applicable holding times met?

(•) Yes ( ) No Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

( ) Yes (•) No Comments:

N/A; 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 Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

( ) Yes (•) No Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

(•) Yes ( ) No Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

(•) Yes ( ) No Comments:

iii. If above LOQ, what samples are affected?

Comments:

None; PFAS compounds were not detected in method blank samples.

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

( ) Yes (•) No Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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 Comments:

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

( ) Yes (•) No 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

(•) Yes ( ) No Comments:

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

◉ Yes ○ No Comments:

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

Comments:

N/A; 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 Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

◉ Yes ○ No Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a 13C-isotope of target analytes, and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

○ Yes ◉ No Comments:

IDA recoveries of 18O2 PFHxS, 13C4-PFHpA, and 13C5-PFNA were outside the recommended limits for samples *172952* and *172901*. IDA recoveries of 13C4-PFHpA and 13C5 PFNA were outside the recommended limits for samples *121631, 121649,* and *172847*. IDA recoveries of 13C4-PFHpA, 13C4 PFOA, and 13C5 PFNA were outside recommended limits for sample *172871*. IDA recoveries of 18O2 PFHxS, 13C4-PFHpA, 13C4-PFOA, and 13C5 PFNA were outside recommended limits for sample *172821*.

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

(•) Yes ( ) No Comments:

Each analyte associated with the IDA recovery failures are affected. Detected results are flagged 'J' and non-detect results are flagged with a 'UJ' in the table and associated analytical database. The analyte PFBS is associated with the IDA 18O2 PFHxS.

iv. Data quality or usability affected?

Comments:

Analytes associated with the IDA recoveries are considered estimated, with no direction of bias.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

( ) Yes (•) No Comments:

PFASs are not volatile compounds; 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 Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

( ) Yes (•) No Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not submitted with this work order.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

◉ Yes ○ No Comments:

A field-duplicate sample was not submitted with this work order; however, they are submitted at the proper frequency for the overall project.

ii. Submitted blind to lab?

◉ Yes ○ No Comments:

N/A; see above.

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

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

Where R_1 = Sample Concentration
R_2 = Field Duplicate Concentration

◉ Yes ○ No Comments:

N/A; see above.

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

Comments:

N/A; see above.

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

○ Yes ○ No ◉ Not Applicable

Samples for this project are not collected with reusable equipment, therefore a practical potential for equipment based cross-contamination does not exist.

i. All results less than LOQ?

○ Yes ◉ No Comments:

N/A; an equipment blank was not submitted.

ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

a. Defined and appropriate?

○ Yes ◉ No Comments:

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

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 320-35502-1
Client Project/Site: FAI

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

Attn: Marcy Nadel

Authorized for release by:
2/6/2018 7:53:23 AM

David Alltucker, Project Manager I
(916)374-4383
david.alltucker@testamericainc.com

Table of Contents

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35502-1

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
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Job ID: 320-35502-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-35502-1

Receipt
The samples were received on 1/30/2018 8:57 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.4° C.

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

Organic Prep
Method(s) PFAS Prep: In the following sample(s): 557676 (320-35502-1), 121681 (320-35502-2), 123234 (320-35502-3), 117153 (320-35502-4), 151303 (320-35502-5) and 151203 (320-35502-6) in preparation batch 320-206551 sediment was present.

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-206551.

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: FAI

TestAmerica Job ID: 320-35502-1

Client Sample ID: 557676 — Lab Sample ID: 320-35502-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	3.1		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	4.8		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.1	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 121681 — Lab Sample ID: 320-35502-2

No Detections.

Client Sample ID: 123234 — Lab Sample ID: 320-35502-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.3	J	2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 117153 — Lab Sample ID: 320-35502-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	1.7	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	3.1		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	3.1		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	2.0		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 151303 — Lab Sample ID: 320-35502-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	4.8		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	12		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.1		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	3.6		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	41		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	1.6	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 151203 — Lab Sample ID: 320-35502-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	4.8		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	12		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.0		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35502-1

Client Sample ID: 151203 (Continued)

Lab Sample ID: 320-35502-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	3.8		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	40		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	1.6	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35502-1

Client Sample ID: 557676
Date Collected: 01/22/18 16:40
Date Received: 01/30/18 08:57

Lab Sample ID: 320-35502-1
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**3.1**		2.0	0.92	ng/L		02/01/18 12:47	02/02/18 15:01	1
Perfluorohexanesulfonic acid (PFHxS)	**4.8**		2.0	0.87	ng/L		02/01/18 12:47	02/02/18 15:01	1
Perfluoroheptanoic acid (PFHpA)	**1.1**	**J**	2.0	0.80	ng/L		02/01/18 12:47	02/02/18 15:01	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		02/01/18 12:47	02/02/18 15:01	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		02/01/18 12:47	02/02/18 15:01	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		02/01/18 12:47	02/02/18 15:01	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*81*		*25 - 150*	*02/01/18 12:47*	*02/02/18 15:01*	*1*
13C4-PFHpA	*90*		*25 - 150*	*02/01/18 12:47*	*02/02/18 15:01*	*1*
13C4 PFOA	*75*		*25 - 150*	*02/01/18 12:47*	*02/02/18 15:01*	*1*
13C4 PFOS	*75*		*25 - 150*	*02/01/18 12:47*	*02/02/18 15:01*	*1*
13C5 PFNA	*81*		*25 - 150*	*02/01/18 12:47*	*02/02/18 15:01*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35502-1

Client Sample ID: 121681
Date Collected: 01/22/18 14:04
Date Received: 01/30/18 08:57

Lab Sample ID: 320-35502-2
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		02/01/18 12:47	02/02/18 15:19	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		02/01/18 12:47	02/02/18 15:19	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		02/01/18 12:47	02/02/18 15:19	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		02/01/18 12:47	02/02/18 15:19	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		02/01/18 12:47	02/02/18 15:19	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		02/01/18 12:47	02/02/18 15:19	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*83*		*25 - 150*	*02/01/18 12:47*	*02/02/18 15:19*	*1*
13C4-PFHpA	*94*		*25 - 150*	*02/01/18 12:47*	*02/02/18 15:19*	*1*
13C4 PFOA	*78*		*25 - 150*	*02/01/18 12:47*	*02/02/18 15:19*	*1*
13C4 PFOS	*72*		*25 - 150*	*02/01/18 12:47*	*02/02/18 15:19*	*1*
13C5 PFNA	*75*		*25 - 150*	*02/01/18 12:47*	*02/02/18 15:19*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35502-1

Client Sample ID: 123234
Date Collected: 01/23/18 17:21
Date Received: 01/30/18 08:57

Lab Sample ID: 320-35502-3
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**1.3**	**J**	2.0	0.92	ng/L		02/01/18 12:47	02/02/18 15:37	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		02/01/18 12:47	02/02/18 15:37	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		02/01/18 12:47	02/02/18 15:37	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		02/01/18 12:47	02/02/18 15:37	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		02/01/18 12:47	02/02/18 15:37	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		02/01/18 12:47	02/02/18 15:37	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*80*		*25 - 150*	*02/01/18 12:47*	*02/02/18 15:37*	*1*
13C4-PFHpA	*91*		*25 - 150*	*02/01/18 12:47*	*02/02/18 15:37*	*1*
13C4 PFOA	*75*		*25 - 150*	*02/01/18 12:47*	*02/02/18 15:37*	*1*
13C4 PFOS	*76*		*25 - 150*	*02/01/18 12:47*	*02/02/18 15:37*	*1*
13C5 PFNA	*81*		*25 - 150*	*02/01/18 12:47*	*02/02/18 15:37*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35502-1

Client Sample ID: 117153
Date Collected: 01/23/18 16:31
Date Received: 01/30/18 08:57

Lab Sample ID: 320-35502-4
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		02/01/18 12:47	02/02/18 15:56	1
Perfluorohexanesulfonic acid (PFHxS)	**1.7**	**J**	2.0	0.87	ng/L		02/01/18 12:47	02/02/18 15:56	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		02/01/18 12:47	02/02/18 15:56	1
Perfluorooctanoic acid (PFOA)	**3.1**		2.0	0.75	ng/L		02/01/18 12:47	02/02/18 15:56	1
Perfluorooctanesulfonic acid (PFOS)	**3.1**		2.0	1.3	ng/L		02/01/18 12:47	02/02/18 15:56	1
Perfluorononanoic acid (PFNA)	**2.0**		2.0	0.65	ng/L		02/01/18 12:47	02/02/18 15:56	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*93*		*25 - 150*	*02/01/18 12:47*	*02/02/18 15:56*	*1*
13C4-PFHpA	*102*		*25 - 150*	*02/01/18 12:47*	*02/02/18 15:56*	*1*
13C4 PFOA	*88*		*25 - 150*	*02/01/18 12:47*	*02/02/18 15:56*	*1*
13C4 PFOS	*88*		*25 - 150*	*02/01/18 12:47*	*02/02/18 15:56*	*1*
13C5 PFNA	*92*		*25 - 150*	*02/01/18 12:47*	*02/02/18 15:56*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35502-1

Client Sample ID: 151303
Date Collected: 01/24/18 13:17
Date Received: 01/30/18 08:57

Lab Sample ID: 320-35502-5
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	4.8		2.0	0.92	ng/L		02/01/18 12:47	02/02/18 16:14	1
Perfluorohexanesulfonic acid (PFHxS)	12		2.0	0.87	ng/L		02/01/18 12:47	02/02/18 16:14	1
Perfluoroheptanoic acid (PFHpA)	2.1		2.0	0.80	ng/L		02/01/18 12:47	02/02/18 16:14	1
Perfluorooctanoic acid (PFOA)	3.6		2.0	0.75	ng/L		02/01/18 12:47	02/02/18 16:14	1
Perfluorooctanesulfonic acid (PFOS)	41		2.0	1.3	ng/L		02/01/18 12:47	02/02/18 16:14	1
Perfluorononanoic acid (PFNA)	1.6	J	2.0	0.65	ng/L		02/01/18 12:47	02/02/18 16:14	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*89*		*25 - 150*	*02/01/18 12:47*	*02/02/18 16:14*	*1*
13C4-PFHpA	*99*		*25 - 150*	*02/01/18 12:47*	*02/02/18 16:14*	*1*
13C4 PFOA	*87*		*25 - 150*	*02/01/18 12:47*	*02/02/18 16:14*	*1*
13C4 PFOS	*87*		*25 - 150*	*02/01/18 12:47*	*02/02/18 16:14*	*1*
13C5 PFNA	*94*		*25 - 150*	*02/01/18 12:47*	*02/02/18 16:14*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35502-1

Client Sample ID: 151203
Date Collected: 01/24/18 13:27
Date Received: 01/30/18 08:57

Lab Sample ID: 320-35502-6
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	4.8		2.0	0.92	ng/L		02/01/18 12:47	02/02/18 16:32	1
Perfluorohexanesulfonic acid (PFHxS)	12		2.0	0.87	ng/L		02/01/18 12:47	02/02/18 16:32	1
Perfluoroheptanoic acid (PFHpA)	2.0		2.0	0.80	ng/L		02/01/18 12:47	02/02/18 16:32	1
Perfluorooctanoic acid (PFOA)	3.8		2.0	0.75	ng/L		02/01/18 12:47	02/02/18 16:32	1
Perfluorooctanesulfonic acid (PFOS)	40		2.0	1.3	ng/L		02/01/18 12:47	02/02/18 16:32	1
Perfluorononanoic acid (PFNA)	1.6	J	2.0	0.65	ng/L		02/01/18 12:47	02/02/18 16:32	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*91*		*25 - 150*	*02/01/18 12:47*	*02/02/18 16:32*	*1*
13C4-PFHpA	*100*		*25 - 150*	*02/01/18 12:47*	*02/02/18 16:32*	*1*
13C4 PFOA	*87*		*25 - 150*	*02/01/18 12:47*	*02/02/18 16:32*	*1*
13C4 PFOS	*89*		*25 - 150*	*02/01/18 12:47*	*02/02/18 16:32*	*1*
13C5 PFNA	*94*		*25 - 150*	*02/01/18 12:47*	*02/02/18 16:32*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35502-1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)				
Lab Sample ID	Client Sample ID	PFHxS (25-150)	PFHpA (25-150)	PFOA (25-150)	PFOS (25-150)	PFNA (25-150)
320-35502-1	557676	81	90	75	75	81
320-35502-2	121681	83	94	78	72	75
320-35502-3	123234	80	91	75	76	81
320-35502-4	117153	93	102	88	88	92
320-35502-5	151303	89	99	87	87	94
320-35502-6	151203	91	100	87	89	94
LCS 320-206551/2-A	Lab Control Sample	87	92	77	84	85
LCSD 320-206551/3-A	Lab Control Sample Dup	93	97	81	86	86
MB 320-206551/1-A	Method Blank	98	103	88	95	96

Surrogate Legend

PFHxS = 18O2 PFHxS
PFHpA = 13C4-PFHpA
PFOA = 13C4 PFOA
PFOS = 13C4 PFOS
PFNA = 13C5 PFNA

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-206551/1-A
Matrix: Water
Analysis Batch: 206846

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 206551

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		02/01/18 12:47	02/02/18 13:29	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		02/01/18 12:47	02/02/18 13:29	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		02/01/18 12:47	02/02/18 13:29	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		02/01/18 12:47	02/02/18 13:29	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		02/01/18 12:47	02/02/18 13:29	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		02/01/18 12:47	02/02/18 13:29	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*98*		*25 - 150*	*02/01/18 12:47*	*02/02/18 13:29*	*1*
13C4-PFHpA	*103*		*25 - 150*	*02/01/18 12:47*	*02/02/18 13:29*	*1*
13C4 PFOA	*88*		*25 - 150*	*02/01/18 12:47*	*02/02/18 13:29*	*1*
13C4 PFOS	*95*		*25 - 150*	*02/01/18 12:47*	*02/02/18 13:29*	*1*
13C5 PFNA	*96*		*25 - 150*	*02/01/18 12:47*	*02/02/18 13:29*	*1*

Lab Sample ID: LCS 320-206551/2-A
Matrix: Water
Analysis Batch: 206846

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 206551

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	21.3		ng/L		121	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	20.8		ng/L		115	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	23.5		ng/L		118	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	25.1		ng/L		126	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	20.8		ng/L		112	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	21.7		ng/L		109	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*87*		*25 - 150*
13C4-PFHpA	*92*		*25 - 150*
13C4 PFOA	*77*		*25 - 150*
13C4 PFOS	*84*		*25 - 150*
13C5 PFNA	*85*		*25 - 150*

Lab Sample ID: LCSD 320-206551/3-A
Matrix: Water
Analysis Batch: 206846

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 206551

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	19.3		ng/L		109	72 - 151	10	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	19.3		ng/L		106	73 - 157	8	30
Perfluoroheptanoic acid (PFHpA)			20.0	21.8		ng/L		109	71 - 138	8	30
Perfluorooctanoic acid (PFOA)			20.0	23.8		ng/L		119	70 - 140	5	30
Perfluorooctanesulfonic acid (PFOS)			18.6	19.8		ng/L		106	69 - 144	5	30
Perfluorononanoic acid (PFNA)			20.0	21.7		ng/L		108	73 - 147	0	30

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35502-1

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	93		25 - 150
13C4-PFHpA	97		25 - 150
13C4 PFOA	81		25 - 150
13C4 PFOS	86		25 - 150
13C5 PFNA	86		25 - 150

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35502-1

LCMS

Prep Batch: 206551

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35502-1	557676	Total/NA	Water	PFAS Prep	
320-35502-2	121681	Total/NA	Water	PFAS Prep	
320-35502-3	123234	Total/NA	Water	PFAS Prep	
320-35502-4	117153	Total/NA	Water	PFAS Prep	
320-35502-5	151303	Total/NA	Water	PFAS Prep	
320-35502-6	151203	Total/NA	Water	PFAS Prep	
MB 320-206551/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-206551/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-206551/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 206846

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35502-1	557676	Total/NA	Water	WS-LC-0025 At1	206551
320-35502-2	121681	Total/NA	Water	WS-LC-0025 At1	206551
320-35502-3	123234	Total/NA	Water	WS-LC-0025 At1	206551
320-35502-4	117153	Total/NA	Water	WS-LC-0025 At1	206551
320-35502-5	151303	Total/NA	Water	WS-LC-0025 At1	206551
320-35502-6	151203	Total/NA	Water	WS-LC-0025 At1	206551
MB 320-206551/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	206551
LCS 320-206551/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	206551
LCSD 320-206551/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	206551

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35502-1

Client Sample ID: 557676
Date Collected: 01/22/18 16:40
Date Received: 01/30/18 08:57

Lab Sample ID: 320-35502-1
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	PFAS Prep			1.00 mL	1.66 mL	206551	02/01/18 12:47	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			206846	02/02/18 15:01	CBW	TAL SAC

Client Sample ID: 121681
Date Collected: 01/22/18 14:04
Date Received: 01/30/18 08:57

Lab Sample ID: 320-35502-2
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	PFAS Prep			1.00 mL	1.66 mL	206551	02/01/18 12:47	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			206846	02/02/18 15:19	CBW	TAL SAC

Client Sample ID: 123234
Date Collected: 01/23/18 17:21
Date Received: 01/30/18 08:57

Lab Sample ID: 320-35502-3
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	PFAS Prep			1.00 mL	1.66 mL	206551	02/01/18 12:47	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			206846	02/02/18 15:37	CBW	TAL SAC

Client Sample ID: 117153
Date Collected: 01/23/18 16:31
Date Received: 01/30/18 08:57

Lab Sample ID: 320-35502-4
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	PFAS Prep			1.00 mL	1.66 mL	206551	02/01/18 12:47	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			206846	02/02/18 15:56	CBW	TAL SAC

Client Sample ID: 151303
Date Collected: 01/24/18 13:17
Date Received: 01/30/18 08:57

Lab Sample ID: 320-35502-5
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	PFAS Prep			1.00 mL	1.66 mL	206551	02/01/18 12:47	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			206846	02/02/18 16:14	CBW	TAL SAC

Client Sample ID: 151203
Date Collected: 01/24/18 13:27
Date Received: 01/30/18 08:57

Lab Sample ID: 320-35502-6
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	PFAS Prep			1.00 mL	1.66 mL	206551	02/01/18 12:47	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			206846	02/02/18 16:32	CBW	TAL SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35502-1

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35502-1

Laboratory: TestAmerica Sacramento

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

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-055	01-31-18 *
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	10-31-18
L-A-B	DoD ELAP		L2468	01-20-21
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-14-18
Michigan	State Program	5	9947	01-31-18 *
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-29-20
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

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

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35502-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-35502-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-35502-1	557676	Water	01/22/18 16:40	01/30/18 08:57
320-35502-2	121681	Water	01/22/18 14:04	01/30/18 08:57
320-35502-3	123234	Water	01/23/18 17:21	01/30/18 08:57
320-35502-4	117153	Water	01/23/18 16:31	01/30/18 08:57
320-35502-5	151303	Water	01/24/18 13:17	01/30/18 08:57
320-35502-6	151203	Water	01/24/18 13:27	01/30/18 08:57

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

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Page 1 of 1

Laboratory Test America
Attn: David Alltucker

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	DRO x 6 (WS-LC-0025)	Total Number of Containers	Remarks/Matrix
557676		1640	1/22/18		X		2	groundwater
121681		1404	1/22/18		X		2	
123234		1721	1/23/18		X		2	
117153		1631	1/23/18		X		2	
151303		1317	1/24/18		X		2	
151203		1327	1/24/18		X		2	

Project Information		Sample Receipt	
Project Number:	20060-100	Total Number of Containers	
Project Name:	FAI	COC Seals/Intact? Y/N/NA	
Contact:	MDN	Received Good Cond./Cold	
Ongoing Project?	Yes ☑ No ☐	Delivery Method:	Goldstreak
Sampler:	ARM	(attach shipping bill, if any)	

Instructions	
Requested Turnaround Time:	5 day rush
Special Instructions:	Please bill to: 31-1-20060-001

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

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Craig Beebe	Signature:	Signature:
Time: 16:15	Time:	Time:
Printed Name: Craig Beebe	Printed Name:	Printed Name:
Date: 1/29/18	Date:	Date:
Company: Shannon & Wilson, Inc	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature:	Signature:	Signature:
Time: 0857	Time:	Time:
Printed Name: David Her	Printed Name:	Printed Name:
Date: 1/30/18	Date:	Date:
Company: TA-Sac	Company:	Company:

320-35502 Chain of Custody

F-19-91/UR

5.4

No. 34823

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-35502-1

Login Number: 35502
List Number: 1
Creator: Turpen, Troy

List Source: 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	
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 Pack
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:

Kristen Freiburger

Title:

Senior Chemist

Date:

February 7, 2018

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

February 6, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-35502-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-35502-1

1. Laboratory

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

   ☐ Yes ☒ No Comments:

ADEC has not approved an analytical laboratory for analysis of PFASs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

   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 Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

   ☒ Yes ☐ No Comments:

   b. Correct Analyses requested?

   ☒ Yes ☐ No Comments:

3. Laboratory Sample Receipt Documentation

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

   ☒ Yes ☐ No Comments:

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

   ☒ Yes ☐ No Comments:

Analysis of PFASs does not require a preservative other than temperature control.

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

   ☒ Yes ☐ No 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 Comments:

The samples were received in good condition.

e. Data quality or usability affected?

Comments:

Data quality or usability is not affected; see above.

4. Case Narrative

a. Present and understandable?

☑ Yes ☐ No Comments:

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

☑ Yes ☐ No Comments:

The case narrative notes the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 5.4º C.

The case narrative notes some of the samples contain sediment.

The case narrative notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD).

c. Were all corrective actions documented?

☑ Yes ☐ No Comments:

A laboratory control sample (LCS) and a LCS duplicate (LCSD) were extracted and analyzed to demonstrate analytical method accuracy and precision.

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

Comments:

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

5. Samples Results

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

☑ Yes ☐ No Comments:

b. All applicable holding times met?

☑ Yes ☐ No Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

☐ Yes ☑ No Comments:

N/A; 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 Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

☐ Yes ☑ No Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

☑ Yes ☐ No Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

☑ Yes ☐ No Comments:

iii. If above LOQ, what samples are affected?

Comments:

None; PFAS compounds were not detected in method blank samples.

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

☐ Yes ☑ No Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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 Comments:

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

☐ Yes ☑ No 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

☑ Yes ☐ No Comments:

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

☑ Yes ☐ No Comments:

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

Comments:

N/A; 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 Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

☒ Yes ☐ No Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a 13C-isotope of each target analyte, and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

☒ Yes ☐ No Comments:

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

☐ Yes ☒ No Comments:

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

iv. Data quality or usability affected?

Comments:

The data quality and usability are not affected; see above.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

☐ Yes ☒ No Comments:

PFASs are not volatile compounds; 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 Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not submitted with this work order.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

☒ Yes ☐ No Comments:

ii. Submitted blind to lab?

☒ Yes ☐ No Comments:

The field-duplicate samples *151203* and *151303* were submitted with this work order.

iii. Precision – All relative percent differences (RPD) less than specified DQOs? (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 Comments:

The analytical precision demonstrated by the field-duplicate sample RPDs was within the project specific DQO of 30% for all detected analytes.

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

Comments:

The data quality and usability were not affected.

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

☐ Yes ☐ No ☒ Not Applicable

Samples for this project are not collected with reusable equipment, therefore a practical potential for equipment based cross-contamination does not exist.

i. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; an equipment blank was not submitted.

ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

a. Defined and appropriate?

☐ Yes ☒ No Comments:

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

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 320-35778-1
Client Project/Site: Fairbanks International Airport

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

Attn: Marcy Nadel

Authorized for release by:
2/13/2018 1:51:20 PM

David Alltucker, Project Manager I
(916)374-4383
david.alltucker@testamericainc.com

Table of Contents

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
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Case Narrative

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks International Airport

TestAmerica Job ID: 320-35778-1

Job ID: 320-35778-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-35778-1

Receipt
The samples were received on 2/6/2018 11:40 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.5º C.

Receipt Exceptions
The container label for the following sample did not match the information listed on the Chain-of-Custody (COC): 561711 (320-35778-3). 2 of 2 Container had no sample ID, while the COC lists 561711. Identify by time on container and cross elemination. Labeled according to COC.

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

Organic Prep
Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-207944.

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: Fairbanks International Airport

TestAmerica Job ID: 320-35778-1

Client Sample ID: 176061 — Lab Sample ID: 320-35778-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	30		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	210		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	81		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	75		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	190		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	480		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: 407372 — Lab Sample ID: 320-35778-2

No Detections.

Client Sample ID: 561711 — Lab Sample ID: 320-35778-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	0.90	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	1.0	J	2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: 176061
Date Collected: 01/30/18 15:54
Date Received: 02/06/18 11:40

Lab Sample ID: 320-35778-1
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	30		2.0	0.92	ng/L		02/12/18 10:21	02/13/18 04:29	1
Perfluorohexanesulfonic acid (PFHxS)	210		2.0	0.87	ng/L		02/12/18 10:21	02/13/18 04:29	1
Perfluoroheptanoic acid (PFHpA)	81		2.0	0.80	ng/L		02/12/18 10:21	02/13/18 04:29	1
Perfluorooctanoic acid (PFOA)	75		2.0	0.75	ng/L		02/12/18 10:21	02/13/18 04:29	1
Perfluorononanoic acid (PFNA)	190		2.0	0.65	ng/L		02/12/18 10:21	02/13/18 04:29	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*98*		*25 - 150*	*02/12/18 10:21*	*02/13/18 04:29*	*1*
13C4-PFHpA	*94*		*25 - 150*	*02/12/18 10:21*	*02/13/18 04:29*	*1*
13C4 PFOA	*86*		*25 - 150*	*02/12/18 10:21*	*02/13/18 04:29*	*1*
13C5 PFNA	*92*		*25 - 150*	*02/12/18 10:21*	*02/13/18 04:29*	*1*

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	480		20	13	ng/L		02/12/18 10:21	02/13/18 08:46	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*98*		*25 - 150*	*02/12/18 10:21*	*02/13/18 08:46*	*10*

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks International Airport

TestAmerica Job ID: 320-35778-1

Client Sample ID: 407372
Date Collected: 01/30/18 18:10
Date Received: 02/06/18 11:40

Lab Sample ID: 320-35778-2
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		02/12/18 10:21	02/13/18 05:06	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		02/12/18 10:21	02/13/18 05:06	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		02/12/18 10:21	02/13/18 05:06	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		02/12/18 10:21	02/13/18 05:06	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		02/12/18 10:21	02/13/18 05:06	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		02/12/18 10:21	02/13/18 05:06	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*103*		*25 - 150*	*02/12/18 10:21*	*02/13/18 05:06*	*1*
13C4-PFHpA	*101*		*25 - 150*	*02/12/18 10:21*	*02/13/18 05:06*	*1*
13C4 PFOA	*90*		*25 - 150*	*02/12/18 10:21*	*02/13/18 05:06*	*1*
13C4 PFOS	*101*		*25 - 150*	*02/12/18 10:21*	*02/13/18 05:06*	*1*
13C5 PFNA	*98*		*25 - 150*	*02/12/18 10:21*	*02/13/18 05:06*	*1*

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks International Airport

TestAmerica Job ID: 320-35778-1

Client Sample ID: 561711
Date Collected: 01/30/18 18:54
Date Received: 02/06/18 11:40

Lab Sample ID: 320-35778-3
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		02/12/18 10:21	02/13/18 05:24	1
Perfluorohexanesulfonic acid (PFHxS)	**0.90**	**J**	2.0	0.87	ng/L		02/12/18 10:21	02/13/18 05:24	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		02/12/18 10:21	02/13/18 05:24	1
Perfluorooctanoic acid (PFOA)	**1.0**	**J**	2.0	0.75	ng/L		02/12/18 10:21	02/13/18 05:24	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		02/12/18 10:21	02/13/18 05:24	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		02/12/18 10:21	02/13/18 05:24	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*99*		*25 - 150*	*02/12/18 10:21*	*02/13/18 05:24*	*1*
13C4-PFHpA	*94*		*25 - 150*	*02/12/18 10:21*	*02/13/18 05:24*	*1*
13C4 PFOA	*87*		*25 - 150*	*02/12/18 10:21*	*02/13/18 05:24*	*1*
13C4 PFOS	*101*		*25 - 150*	*02/12/18 10:21*	*02/13/18 05:24*	*1*
13C5 PFNA	*92*		*25 - 150*	*02/12/18 10:21*	*02/13/18 05:24*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks International Airport

TestAmerica Job ID: 320-35778-1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)				
Lab Sample ID	Client Sample ID	PFHxS (25-150)	PFHpA (25-150)	PFOA (25-150)	PFOS (25-150)	PFNA (25-150)
320-35778-1	176061	98	94	86		92
320-35778-1 - DL	176061				98	
320-35778-2	407372	103	101	90	101	98
320-35778-3	561711	99	94	87	101	92
LCS 320-207944/2-A	Lab Control Sample	96	86	80	95	85
LCSD 320-207944/3-A	Lab Control Sample Dup	100	90	82	102	87
MB 320-207944/1-A	Method Blank	97	89	79	96	88

Surrogate Legend

PFHxS = 18O2 PFHxS
PFHpA = 13C4-PFHpA
PFOA = 13C4 PFOA
PFOS = 13C4 PFOS
PFNA = 13C5 PFNA

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-207944/1-A
Matrix: Water
Analysis Batch: 208069

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 207944

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		02/12/18 10:21	02/12/18 22:22	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		02/12/18 10:21	02/12/18 22:22	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		02/12/18 10:21	02/12/18 22:22	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		02/12/18 10:21	02/12/18 22:22	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		02/12/18 10:21	02/12/18 22:22	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		02/12/18 10:21	02/12/18 22:22	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*97*		*25 - 150*	*02/12/18 10:21*	*02/12/18 22:22*	*1*
13C4-PFHpA	*89*		*25 - 150*	*02/12/18 10:21*	*02/12/18 22:22*	*1*
13C4 PFOA	*79*		*25 - 150*	*02/12/18 10:21*	*02/12/18 22:22*	*1*
13C4 PFOS	*96*		*25 - 150*	*02/12/18 10:21*	*02/12/18 22:22*	*1*
13C5 PFNA	*88*		*25 - 150*	*02/12/18 10:21*	*02/12/18 22:22*	*1*

Lab Sample ID: LCS 320-207944/2-A
Matrix: Water
Analysis Batch: 208069

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 207944

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	16.3		ng/L		92	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	16.9		ng/L		93	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	19.0		ng/L		95	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	20.4		ng/L		102	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	17.5		ng/L		94	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	19.1		ng/L		95	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*96*		*25 - 150*
13C4-PFHpA	*86*		*25 - 150*
13C4 PFOA	*80*		*25 - 150*
13C4 PFOS	*95*		*25 - 150*
13C5 PFNA	*85*		*25 - 150*

Lab Sample ID: LCSD 320-207944/3-A
Matrix: Water
Analysis Batch: 208069

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 207944

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	16.3		ng/L		92	72 - 151	0	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	16.6		ng/L		91	73 - 157	1	30
Perfluoroheptanoic acid (PFHpA)			20.0	19.5		ng/L		97	71 - 138	2	30
Perfluorooctanoic acid (PFOA)			20.0	20.7		ng/L		103	70 - 140	1	30
Perfluorooctanesulfonic acid (PFOS)			18.6	17.3		ng/L		93	69 - 144	1	30
Perfluorononanoic acid (PFNA)			20.0	19.5		ng/L		98	73 - 147	2	30

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks International Airport

TestAmerica Job ID: 320-35778-1

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	100		25 - 150
13C4-PFHpA	90		25 - 150
13C4 PFOA	82		25 - 150
13C4 PFOS	102		25 - 150
13C5 PFNA	87		25 - 150

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks International Airport

TestAmerica Job ID: 320-35778-1

LCMS

Prep Batch: 207944

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35778-1	176061	Total/NA	Water	PFAS Prep	
320-35778-1 - DL	176061	Total/NA	Water	PFAS Prep	
320-35778-2	407372	Total/NA	Water	PFAS Prep	
320-35778-3	561711	Total/NA	Water	PFAS Prep	
MB 320-207944/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-207944/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-207944/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 208069

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35778-1	176061	Total/NA	Water	WS-LC-0025 At1	207944
320-35778-2	407372	Total/NA	Water	WS-LC-0025 At1	207944
320-35778-3	561711	Total/NA	Water	WS-LC-0025 At1	207944
MB 320-207944/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	207944
LCS 320-207944/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	207944
LCSD 320-207944/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	207944

Analysis Batch: 208147

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35778-1 - DL	176061	Total/NA	Water	WS-LC-0025 At1	207944

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks International Airport

TestAmerica Job ID: 320-35778-1

Client Sample ID: 176061
Date Collected: 01/30/18 15:54
Date Received: 02/06/18 11:40

Lab Sample ID: 320-35778-1
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	PFAS Prep			1.00 mL	1.66 mL	207944	02/12/18 10:21	CBW	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			208069	02/13/18 04:29	CBW	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	207944	02/12/18 10:21	CBW	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			208147	02/13/18 08:46	CBW	TAL SAC

Client Sample ID: 407372
Date Collected: 01/30/18 18:10
Date Received: 02/06/18 11:40

Lab Sample ID: 320-35778-2
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	PFAS Prep			1.00 mL	1.66 mL	207944	02/12/18 10:21	CBW	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			208069	02/13/18 05:06	CBW	TAL SAC

Client Sample ID: 561711
Date Collected: 01/30/18 18:54
Date Received: 02/06/18 11:40

Lab Sample ID: 320-35778-3
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	PFAS Prep			1.00 mL	1.66 mL	207944	02/12/18 10:21	CBW	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			208069	02/13/18 05:24	CBW	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks International Airport

TestAmerica Job ID: 320-35778-1

Laboratory: TestAmerica Sacramento

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

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-020	01-20-21
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	10-31-18
L-A-B	DoD ELAP		L2468	01-20-21
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-14-18
Michigan	State Program	5	9947	01-31-18 *
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

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

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks International Airport

TestAmerica Job ID: 320-35778-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: Fairbanks International Airport

TestAmerica Job ID: 320-35778-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-35778-1	176061	Water	01/30/18 15:54	02/06/18 11:40
320-35778-2	407372	Water	01/30/18 18:10	02/06/18 11:40
320-35778-3	561711	Water	01/30/18 18:54	02/06/18 11:40

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

CHAIN-OF-CUSTODY RECORD

Laboratory: ~~SGS~~ smH Test America Page 1 of 1
Attn: David Aittucker

400 N. 34th Street, Suite 100, Seattle, WA 98103, (206) 632-8020
2355 Hill Road, Fairbanks, AK 99709, (907) 479-0600
2255 S.W. Canyon Road, Portland, OR 97201-2498, (503) 223-6147
2043 Westport Center Drive, St. Louis, MO 63146-3564, (314) 699-9660
5430 Fairbanks Street, Suite 3, Anchorage, AK 99518, (907) 561-2120
1321 Bannock Street, Suite 200, Denver, CO 80204, (303) 825-3800
2705 Saint Andrews Loop, Suite A, Pasco, WA 99301-3378, (509) 946-6309

Analysis Parameters/Sample Container Description (include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFAS x 6						Total Number of Containers	Remarks/Matrix
176061		1554	1/30/18		X	2						2	Groundwater
407372		1810	1/30/18		X	2						2	↓
561711 *		1854	1/30/18		X	2						2	↓

320-35778 Chain of Custody

Project Information	Sample Receipt	
Project Number: 20060-001	Total Number of Containers	6
Project Name: Fairbanks International Airport	COC Seals/Intact? Y/N/NA	
Contact: MDN	Received Good Cond./Cold	
Ongoing Project? Yes ☒ No ☐	Delivery Method: goldstreak (attach shipping bill, if any)	
Sampler: SMH		

Instructions
Requested Turnaround Time: 5-day rush
Special Instructions: Bill to SWI 31-1-20060-001

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: [signature] Time: 1645	Signature: Time:	Signature: Time:
Printed Name: Sheila Hinckley Date: 2/5/18	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson, Inc	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: [signature] Time: 1145	Signature: Time:	Signature: Time:
Printed Name: C Hafner Date: 2-6-18	Printed Name: Date:	Printed Name: Date:
Company: TASAC	Company:	Company:

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

F-19-91/UR

No. 34308

* Label has no Sample ID. Identify base on time & cross elevation 5.5 - DH 2/6/18

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-35778-1

Login Number: 35778
List Number: 1
Creator: Her, David A

List Source: 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	
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.	False	IDs on containers do not match the COC. Logged in per COC.
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:

Kristen Freiburger

Title:

Senior Chemist

Date:

February 13, 2018

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

February 13, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-35778-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-35778-1

1. Laboratory

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

   ☐ Yes ☒ No Comments:

ADEC has not approved an analytical laboratory for analysis of PFASs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

   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 Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

   ☒ Yes ☐ No Comments:

   b. Correct Analyses requested?

   ☒ Yes ☐ No Comments:

3. Laboratory Sample Receipt Documentation

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

   ☒ Yes ☐ No Comments:

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

   ☒ Yes ☐ No Comments:

Analysis of PFASs does not require a preservative other than temperature control.

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

   ☒ Yes ☐ No 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 Comments:

The samples receipt form notes the sample jars for sample 561711 had no sample ID on the labels. The samples were identified by the time on the container and cross elimination. We do not consider the results affected by this discrepancy.

e. Data quality or usability affected?

Comments:

Data quality or usability is not affected; see above.

4. Case Narrative

a. Present and understandable?

☒ Yes ☐ No Comments:

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

☒ Yes ☐ No Comments:

The case narrative notes the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 5.5º C.

The case narrative notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD).

c. Were all corrective actions documented?

☒ Yes ☐ No Comments:

A laboratory control sample (LCS) and a LCS duplicate (LCSD) were extracted and analyzed to demonstrate analytical method accuracy and precision.

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

Comments:

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

5. Samples Results

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

☒ Yes ☐ No Comments:

b. All applicable holding times met?

☑ Yes ☐ No Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

☐ Yes ☑ No Comments:

N/A; 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 Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

☐ Yes ☑ No Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

☑ Yes ☐ No Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

☑ Yes ☐ No Comments:

iii. If above LOQ, what samples are affected?

Comments:

None; PFAS compounds were not detected in method blank samples.

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

☐ Yes ☑ No Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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 Comments:

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

☐ Yes ☑ No 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

☑ Yes ☐ No Comments:

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

☑ Yes ☐ No Comments:

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

Comments:

N/A; 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 Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

☒ Yes ☐ No Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a 13C-isotope of each target analyte, and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

☒ Yes ☐ No Comments:

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

☐ Yes ☒ No Comments:

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

iv. Data quality or usability affected?

Comments:

The data quality and usability are not affected; see above.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

☐ Yes ☒ No Comments:

PFASs are not volatile compounds; 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 Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not submitted with this work order.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

☒ Yes ☐ No Comments:

Field-duplicate samples were not submitted with this work order; however, they have been submitted at the proper frequency for the overall project.

ii. Submitted blind to lab?

☒ Yes ☐ No Comments:

N/A; see above.

iii. Precision – All relative percent differences (RPD) less than specified DQOs? (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 Comments:

N/A; see above.

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

Comments:

The data quality and usability were not affected.

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

☐ Yes ☐ No ☒ Not Applicable

Samples for this project are not collected with reusable equipment, therefore a practical potential for equipment based cross-contamination does not exist.

i. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; an equipment blank was not submitted.

ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

a. Defined and appropriate?

☐ Yes ☒ No Comments:

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

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 320-36087-1
TestAmerica Sample Delivery Group: 20060
Client Project/Site: FAI

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

Attn: Marcy Nadel

Authorized for release by:
2/20/2018 2:54:25 PM

David Alltucker, Project Manager I
(916)374-4383
david.alltucker@testamericainc.com

Table of Contents

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
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Job ID: 320-36087-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-36087-1

Receipt
The samples were received on 2/15/2018 10:43 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.2º C.

LCMS
Method(s) WS-LC-0025 At1: The Isotope Dilution Analyte (IDA) recovery for 13C5 PFNA associated with the following CCVL is below the method recommended limit: (CCVL 320-208790/4). The native Perfluorononanoic acid (PFNA) recovery is in control. The IDA recovery in the Laboratory Control Sample (LCS)/Laboratory Control Sample Duplicate (LCSD) and all samples associated with this CCV are in control; demonstrating no impact to quantitation of either the IDA or the target analyte. The low IDA in the CCVL has no adverse impact on data quality.

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

Organic Prep
Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-208808.

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: FAI

TestAmerica Job ID: 320-36087-1
SDG: 20060

Client Sample ID: 174742 — Lab Sample ID: 320-36087-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	14		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	52		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	7.8		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	9.9		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	300		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	4.7		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 174688 — Lab Sample ID: 320-36087-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	8.5		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	33		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	4.7		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	6.8		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	150		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	4.0		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 174788 — Lab Sample ID: 320-36087-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	8.6		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	32		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	4.6		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	7.0		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	150		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	3.5		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 151131 — Lab Sample ID: 320-36087-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	15		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	58		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	10		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	14		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: 151131 (Continued)

Lab Sample ID: 320-36087-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanesulfonic acid (PFOS)	230		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	4.1		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36087-1
SDG: 20060

Client Sample ID: 174742
Date Collected: 02/06/18 13:00
Date Received: 02/15/18 10:43

Lab Sample ID: 320-36087-1
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	14		2.0	0.92	ng/L		02/16/18 13:08	02/17/18 05:49	1
Perfluorohexanesulfonic acid (PFHxS)	52		2.0	0.87	ng/L		02/16/18 13:08	02/17/18 05:49	1
Perfluoroheptanoic acid (PFHpA)	7.8		2.0	0.80	ng/L		02/16/18 13:08	02/17/18 05:49	1
Perfluorooctanoic acid (PFOA)	9.9		2.0	0.75	ng/L		02/16/18 13:08	02/17/18 05:49	1
Perfluorooctanesulfonic acid (PFOS)	300		2.0	1.3	ng/L		02/16/18 13:08	02/17/18 05:49	1
Perfluorononanoic acid (PFNA)	4.7		2.0	0.65	ng/L		02/16/18 13:08	02/17/18 05:49	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*95*		*25 - 150*	*02/16/18 13:08*	*02/17/18 05:49*	*1*
13C4-PFHpA	*78*		*25 - 150*	*02/16/18 13:08*	*02/17/18 05:49*	*1*
13C4 PFOA	*69*		*25 - 150*	*02/16/18 13:08*	*02/17/18 05:49*	*1*
13C4 PFOS	*91*		*25 - 150*	*02/16/18 13:08*	*02/17/18 05:49*	*1*
13C5 PFNA	*66*		*25 - 150*	*02/16/18 13:08*	*02/17/18 05:49*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36087-1
SDG: 20060

Client Sample ID: 174688
Date Collected: 02/07/18 15:41
Date Received: 02/15/18 10:43

Lab Sample ID: 320-36087-2
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	8.5		2.0	0.92	ng/L		02/16/18 13:08	02/17/18 06:07	1
Perfluorohexanesulfonic acid (PFHxS)	33		2.0	0.87	ng/L		02/16/18 13:08	02/17/18 06:07	1
Perfluoroheptanoic acid (PFHpA)	4.7		2.0	0.80	ng/L		02/16/18 13:08	02/17/18 06:07	1
Perfluorooctanoic acid (PFOA)	6.8		2.0	0.75	ng/L		02/16/18 13:08	02/17/18 06:07	1
Perfluorooctanesulfonic acid (PFOS)	150		2.0	1.3	ng/L		02/16/18 13:08	02/17/18 06:07	1
Perfluorononanoic acid (PFNA)	4.0		2.0	0.65	ng/L		02/16/18 13:08	02/17/18 06:07	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*97*		*25 - 150*	*02/16/18 13:08*	*02/17/18 06:07*	*1*
13C4-PFHpA	*82*		*25 - 150*	*02/16/18 13:08*	*02/17/18 06:07*	*1*
13C4 PFOA	*70*		*25 - 150*	*02/16/18 13:08*	*02/17/18 06:07*	*1*
13C4 PFOS	*94*		*25 - 150*	*02/16/18 13:08*	*02/17/18 06:07*	*1*
13C5 PFNA	*69*		*25 - 150*	*02/16/18 13:08*	*02/17/18 06:07*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36087-1
SDG: 20060

Client Sample ID: 174788
Date Collected: 02/07/18 15:31
Date Received: 02/15/18 10:43

Lab Sample ID: 320-36087-3
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	8.6		2.0	0.92	ng/L		02/16/18 13:08	02/17/18 06:26	1
Perfluorohexanesulfonic acid (PFHxS)	32		2.0	0.87	ng/L		02/16/18 13:08	02/17/18 06:26	1
Perfluoroheptanoic acid (PFHpA)	4.6		2.0	0.80	ng/L		02/16/18 13:08	02/17/18 06:26	1
Perfluorooctanoic acid (PFOA)	7.0		2.0	0.75	ng/L		02/16/18 13:08	02/17/18 06:26	1
Perfluorooctanesulfonic acid (PFOS)	150		2.0	1.3	ng/L		02/16/18 13:08	02/17/18 06:26	1
Perfluorononanoic acid (PFNA)	3.5		2.0	0.65	ng/L		02/16/18 13:08	02/17/18 06:26	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*97*		*25 - 150*	*02/16/18 13:08*	*02/17/18 06:26*	*1*
13C4-PFHpA	*82*		*25 - 150*	*02/16/18 13:08*	*02/17/18 06:26*	*1*
13C4 PFOA	*71*		*25 - 150*	*02/16/18 13:08*	*02/17/18 06:26*	*1*
13C4 PFOS	*92*		*25 - 150*	*02/16/18 13:08*	*02/17/18 06:26*	*1*
13C5 PFNA	*70*		*25 - 150*	*02/16/18 13:08*	*02/17/18 06:26*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36087-1
SDG: 20060

Client Sample ID: 151131
Date Collected: 02/13/18 11:40
Date Received: 02/15/18 10:43

Lab Sample ID: 320-36087-4
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	15		2.0	0.92	ng/L		02/16/18 13:08	02/17/18 06:44	1
Perfluorohexanesulfonic acid (PFHxS)	58		2.0	0.87	ng/L		02/16/18 13:08	02/17/18 06:44	1
Perfluoroheptanoic acid (PFHpA)	10		2.0	0.80	ng/L		02/16/18 13:08	02/17/18 06:44	1
Perfluorooctanoic acid (PFOA)	14		2.0	0.75	ng/L		02/16/18 13:08	02/17/18 06:44	1
Perfluorooctanesulfonic acid (PFOS)	230		2.0	1.3	ng/L		02/16/18 13:08	02/17/18 06:44	1
Perfluorononanoic acid (PFNA)	4.1		2.0	0.65	ng/L		02/16/18 13:08	02/17/18 06:44	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*91*		*25 - 150*	*02/16/18 13:08*	*02/17/18 06:44*	*1*
13C4-PFHpA	*74*		*25 - 150*	*02/16/18 13:08*	*02/17/18 06:44*	*1*
13C4 PFOA	*66*		*25 - 150*	*02/16/18 13:08*	*02/17/18 06:44*	*1*
13C4 PFOS	*88*		*25 - 150*	*02/16/18 13:08*	*02/17/18 06:44*	*1*
13C5 PFNA	*65*		*25 - 150*	*02/16/18 13:08*	*02/17/18 06:44*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36087-1
SDG: 20060

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)				
Lab Sample ID	Client Sample ID	PFHxS (25-150)	PFHpA (25-150)	PFOA (25-150)	PFOS (25-150)	PFNA (25-150)
320-36087-1	174742	95	78	69	91	66
320-36087-2	174688	97	82	70	94	69
320-36087-3	174788	97	82	71	92	70
320-36087-4	151131	91	74	66	88	65
LCS 320-208808/2-A	Lab Control Sample	95	75	66	93	63
LCSD 320-208808/3-A	Lab Control Sample Dup	99	77	68	96	65
MB 320-208808/1-A	Method Blank	90	72	61	85	58

Surrogate Legend

PFHxS = 18O2 PFHxS
PFHpA = 13C4-PFHpA
PFOA = 13C4 PFOA
PFOS = 13C4 PFOS
PFNA = 13C5 PFNA

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-208808/1-A
Matrix: Water
Analysis Batch: 208862

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 208808

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		02/16/18 13:08	02/17/18 01:14	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		02/16/18 13:08	02/17/18 01:14	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		02/16/18 13:08	02/17/18 01:14	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		02/16/18 13:08	02/17/18 01:14	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		02/16/18 13:08	02/17/18 01:14	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		02/16/18 13:08	02/17/18 01:14	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*90*		*25 - 150*	*02/16/18 13:08*	*02/17/18 01:14*	*1*
13C4-PFHpA	*72*		*25 - 150*	*02/16/18 13:08*	*02/17/18 01:14*	*1*
13C4 PFOA	*61*		*25 - 150*	*02/16/18 13:08*	*02/17/18 01:14*	*1*
13C4 PFOS	*85*		*25 - 150*	*02/16/18 13:08*	*02/17/18 01:14*	*1*
13C5 PFNA	*58*		*25 - 150*	*02/16/18 13:08*	*02/17/18 01:14*	*1*

Lab Sample ID: LCS 320-208808/2-A
Matrix: Water
Analysis Batch: 208862

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 208808

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	19.4		ng/L		110	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	19.2		ng/L		106	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	21.8		ng/L		109	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	23.1		ng/L		116	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	20.0		ng/L		108	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	22.1		ng/L		111	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*95*		*25 - 150*
13C4-PFHpA	*75*		*25 - 150*
13C4 PFOA	*66*		*25 - 150*
13C4 PFOS	*93*		*25 - 150*
13C5 PFNA	*63*		*25 - 150*

Lab Sample ID: LCSD 320-208808/3-A
Matrix: Water
Analysis Batch: 208862

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 208808

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	19.1		ng/L		108	72 - 151	1	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	18.8		ng/L		103	73 - 157	2	30
Perfluoroheptanoic acid (PFHpA)			20.0	21.8		ng/L		109	71 - 138	0	30
Perfluorooctanoic acid (PFOA)			20.0	23.4		ng/L		117	70 - 140	1	30
Perfluorooctanesulfonic acid (PFOS)			18.6	20.1		ng/L		109	69 - 144	1	30
Perfluorononanoic acid (PFNA)			20.0	21.5		ng/L		108	73 - 147	3	30

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	99		25 - 150
13C4-PFHpA	77		25 - 150
13C4 PFOA	68		25 - 150
13C4 PFOS	96		25 - 150
13C5 PFNA	65		25 - 150

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36087-1
SDG: 20060

LCMS

Prep Batch: 208808

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-36087-1	174742	Total/NA	Water	PFAS Prep	
320-36087-2	174688	Total/NA	Water	PFAS Prep	
320-36087-3	174788	Total/NA	Water	PFAS Prep	
320-36087-4	151131	Total/NA	Water	PFAS Prep	
MB 320-208808/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-208808/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-208808/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 208862

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-36087-1	174742	Total/NA	Water	WS-LC-0025 At1	208808
320-36087-2	174688	Total/NA	Water	WS-LC-0025 At1	208808
320-36087-3	174788	Total/NA	Water	WS-LC-0025 At1	208808
320-36087-4	151131	Total/NA	Water	WS-LC-0025 At1	208808
MB 320-208808/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	208808
LCS 320-208808/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	208808
LCSD 320-208808/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	208808

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36087-1
SDG: 20060

Client Sample ID: 174742
Date Collected: 02/06/18 13:00
Date Received: 02/15/18 10:43

Lab Sample ID: 320-36087-1
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	PFAS Prep			1.00 mL	1.66 mL	208808	02/16/18 13:08	ABH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			208862	02/17/18 05:49	TTP	TAL SAC

Client Sample ID: 174688
Date Collected: 02/07/18 15:41
Date Received: 02/15/18 10:43

Lab Sample ID: 320-36087-2
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	PFAS Prep			1.00 mL	1.66 mL	208808	02/16/18 13:08	ABH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			208862	02/17/18 06:07	TTP	TAL SAC

Client Sample ID: 174788
Date Collected: 02/07/18 15:31
Date Received: 02/15/18 10:43

Lab Sample ID: 320-36087-3
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	PFAS Prep			1.00 mL	1.66 mL	208808	02/16/18 13:08	ABH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			208862	02/17/18 06:26	TTP	TAL SAC

Client Sample ID: 151131
Date Collected: 02/13/18 11:40
Date Received: 02/15/18 10:43

Lab Sample ID: 320-36087-4
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	PFAS Prep			1.00 mL	1.66 mL	208808	02/16/18 13:08	ABH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			208862	02/17/18 06:44	TTP	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36087-1
SDG: 20060

Laboratory: TestAmerica Sacramento

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

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-020	01-20-21
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	10-31-18
L-A-B	DoD ELAP		L2468	01-20-21
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-14-18
Michigan	State Program	5	9947	01-31-18 *
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

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

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36087-1
SDG: 20060

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36087-1
SDG: 20060

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-36087-1	174742	Water	02/06/18 13:00	02/15/18 10:43
320-36087-2	174688	Water	02/07/18 15:41	02/15/18 10:43
320-36087-3	174788	Water	02/07/18 15:31	02/15/18 10:43
320-36087-4	151131	Water	02/13/18 11:40	02/15/18 10:43

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Laboratory: Test America
Attn: David Alltucker

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFAs x6						Total Number of Containers	Remarks/Matrix
174742		1300	2/6/18		X	X						2	Groundwater
174688		1541	2/7/18		X	X						2	
174788		1531	2/7/18		X	X						2	
151131		1140	2/13/18		X	X						2	

320-36087 Chain of Custody

Project Information		Sample Receipt	
Project Number: 20060		Total Number of Containers	8
Project Name: FAI		COC Seals/Intact? Y/N/NA	Y
Contact: MDN		Received Good Cond./Cold	1.2°C
Ongoing Project? Yes ☒ No ☐		Delivery Method: goldstreak (attach shipping bill, if any)	
Sampler: ARM			

Instructions

Requested Turnaround Time: ~~Standar~~ 5 day rush

Special Instructions: Please bill to:

31-1-20060-001

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature:	Signature:	Signature:
Time: 9:20	Time:	Time:
Printed Name: Amber Masters	Printed Name:	Printed Name:
Date: 2/14/18	Date:	Date:
Company: Shannon & Wilson, INC.	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature:	Signature:	Signature:
Time: 1043	Time:	Time:
Printed Name: Troy C. Tarpey	Printed Name:	Printed Name:
Date: 2-15-18	Date:	Date:
Company: TA-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

F-19-91/UR

No. 34830

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-36087-1
SDG Number: 20060

Login Number: 36087
List Number: 1
Creator: Turpen, Troy

List Source: 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	
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:

Kristen Freiburger

Title:

Senior Chemist

Date:

February 21, 2018

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

February 20, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-36087-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-36087-1

1. Laboratory

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

   ☐ Yes ☒ No Comments:

ADEC has not approved an analytical laboratory for analysis of PFASs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

   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 Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

   ☒ Yes ☐ No Comments:

   b. Correct Analyses requested?

   ☒ Yes ☐ No Comments:

3. Laboratory Sample Receipt Documentation

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

   ☒ Yes ☐ No Comments:

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

   ☒ Yes ☐ No Comments:

Analysis of PFASs does not require a preservative other than temperature control.

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

   ☒ Yes ☐ No 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 Comments:

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

e. Data quality or usability affected?

Comments:

Data quality or usability is not affected; see above.

4. Case Narrative

a. Present and understandable?

☒ Yes ☐ No Comments:

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

☒ Yes ☐ No Comments:

The case narrative notes the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 1.2º C.

The case narrative notes "the Isotope Dilution Analyte (IDA) recovery for 13C5 PFNA associated with the following CCVL is below the method recommended limit: (CCVL 320-208790/4). The native Perfluorononanoic acid (PFNA) recovery is in control. The IDA recovery in the Laboratory Control Sample (LCS)/Laboratory Control Sample Duplicate (LCSD) and all samples associated with this CCV are in control; demonstrating no impact to quantitation of either the IDA or the target analyte. The low IDA in the CCVL has no adverse impact on data quality."

The case narrative notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD).

c. Were all corrective actions documented?

☒ Yes ☐ No Comments:

A laboratory control sample (LCS) and a LCS duplicate (LCSD) were extracted and analyzed to demonstrate analytical method accuracy and precision.

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

Comments:

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

5. Samples Results

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

☑ Yes ☐ No Comments:

b. All applicable holding times met?

☑ Yes ☐ No Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

☐ Yes ☑ No Comments:

N/A; 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 Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

☐ Yes ☑ No Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

☑ Yes ☐ No Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

☑ Yes ☐ No Comments:

iii. If above LOQ, what samples are affected?

Comments:

None; PFAS compounds were not detected in method blank samples.

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

☐ Yes ☒ No Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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 Comments:

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

☐ Yes ☒ No 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No Comments:

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

☒ Yes ☐ No Comments:

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

Comments:

N/A; 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 Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

☒ Yes ☐ No Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a 13C-isotope of each target analyte, and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

☒ Yes ☐ No Comments:

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

☐ Yes ☒ No Comments:

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

iv. Data quality or usability affected?

Comments:

The data quality and usability are not affected; see above.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

☐ Yes ☒ No Comments:

PFASs are not volatile compounds; 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 Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not submitted with this work order.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

☒ Yes ☐ No Comments:

Field-duplicate samples 174688/174788 were submitted with this work order.

ii. Submitted blind to lab?

☒ Yes ☐ No Comments:

iii. Precision – All relative percent differences (RPD) less than specified DQOs? (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 Comments:

RPDs are within the DQO of 30% for water samples.

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

Comments:

The data quality and usability were not affected.

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

☐ Yes ☐ No ☒ Not Applicable

Samples for this project are not collected with reusable equipment, therefore a practical potential for equipment based cross-contamination does not exist.

i. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; an equipment blank was not submitted.

ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

a. Defined and appropriate?

☐ Yes ☒ No Comments:

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

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 320-36092-1
TestAmerica Sample Delivery Group: 2006-001
Client Project/Site: FAI

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

Attn: Marcy Nadel

Authorized for release by:
2/26/2018 12:24:06 PM

David Alltucker, Project Manager I
(916)374-4383
david.alltucker@testamericainc.com

Table of Contents

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
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Job ID: 320-36092-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-36092-1

Receipt
The samples were received on 2/15/2018 10:43 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.2º C.

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

Organic Prep
Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-209687.

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: FAI

TestAmerica Job ID: 320-36092-1
SDG: 2006-001

Client Sample ID: 176044 — Lab Sample ID: 320-36092-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	3.4		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	25		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	10		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	13		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	32		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	26		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 521809 — Lab Sample ID: 320-36092-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	4.5		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	28		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	9.8		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	19		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	25		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	35		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36092-1
SDG: 2006-001

Client Sample ID: 176044
Date Collected: 02/13/18 10:54
Date Received: 02/15/18 10:43

Lab Sample ID: 320-36092-1
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	3.4		2.0	0.92	ng/L		02/22/18 14:19	02/23/18 05:11	1
Perfluorohexanesulfonic acid (PFHxS)	25		2.0	0.87	ng/L		02/22/18 14:19	02/23/18 05:11	1
Perfluoroheptanoic acid (PFHpA)	10		2.0	0.80	ng/L		02/22/18 14:19	02/23/18 05:11	1
Perfluorooctanoic acid (PFOA)	13		2.0	0.75	ng/L		02/22/18 14:19	02/23/18 05:11	1
Perfluorooctanesulfonic acid (PFOS)	32		2.0	1.3	ng/L		02/22/18 14:19	02/23/18 05:11	1
Perfluorononanoic acid (PFNA)	26		2.0	0.65	ng/L		02/22/18 14:19	02/23/18 05:11	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*95*		*25 - 150*	*02/22/18 14:19*	*02/23/18 05:11*	*1*
13C4-PFHpA	*99*		*25 - 150*	*02/22/18 14:19*	*02/23/18 05:11*	*1*
13C4 PFOA	*79*		*25 - 150*	*02/22/18 14:19*	*02/23/18 05:11*	*1*
13C4 PFOS	*90*		*25 - 150*	*02/22/18 14:19*	*02/23/18 05:11*	*1*
13C5 PFNA	*86*		*25 - 150*	*02/22/18 14:19*	*02/23/18 05:11*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36092-1
SDG: 2006-001

Client Sample ID: 521809
Date Collected: 02/13/18 09:51
Date Received: 02/15/18 10:43

Lab Sample ID: 320-36092-2
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	4.5		2.0	0.92	ng/L		02/22/18 14:19	02/23/18 05:48	1
Perfluorohexanesulfonic acid (PFHxS)	28		2.0	0.87	ng/L		02/22/18 14:19	02/23/18 05:48	1
Perfluoroheptanoic acid (PFHpA)	9.8		2.0	0.80	ng/L		02/22/18 14:19	02/23/18 05:48	1
Perfluorooctanoic acid (PFOA)	19		2.0	0.75	ng/L		02/22/18 14:19	02/23/18 05:48	1
Perfluorooctanesulfonic acid (PFOS)	25		2.0	1.3	ng/L		02/22/18 14:19	02/23/18 05:48	1
Perfluorononanoic acid (PFNA)	35		2.0	0.65	ng/L		02/22/18 14:19	02/23/18 05:48	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*93*		*25 - 150*	*02/22/18 14:19*	*02/23/18 05:48*	*1*
13C4-PFHpA	*98*		*25 - 150*	*02/22/18 14:19*	*02/23/18 05:48*	*1*
13C4 PFOA	*77*		*25 - 150*	*02/22/18 14:19*	*02/23/18 05:48*	*1*
13C4 PFOS	*89*		*25 - 150*	*02/22/18 14:19*	*02/23/18 05:48*	*1*
13C5 PFNA	*86*		*25 - 150*	*02/22/18 14:19*	*02/23/18 05:48*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36092-1
SDG: 2006-001

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)				
Lab Sample ID	Client Sample ID	PFHxS (25-150)	PFHpA (25-150)	PFOA (25-150)	PFOS (25-150)	PFNA (25-150)
320-36092-1	176044	95	99	79	90	86
320-36092-2	521809	93	98	77	89	86
LCS 320-209687/2-A	Lab Control Sample	97	99	75	93	82
LCSD 320-209687/3-A	Lab Control Sample Dup	95	95	73	89	79
MB 320-209687/1-A	Method Blank	97	101	76	92	83

Surrogate Legend

PFHxS = 18O2 PFHxS
PFHpA = 13C4-PFHpA
PFOA = 13C4 PFOA
PFOS = 13C4 PFOS
PFNA = 13C5 PFNA

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-209687/1-A
Matrix: Water
Analysis Batch: 209761

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 209687

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		02/22/18 14:18	02/22/18 23:03	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		02/22/18 14:18	02/22/18 23:03	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		02/22/18 14:18	02/22/18 23:03	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		02/22/18 14:18	02/22/18 23:03	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		02/22/18 14:18	02/22/18 23:03	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		02/22/18 14:18	02/22/18 23:03	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*97*		*25 - 150*	*02/22/18 14:18*	*02/22/18 23:03*	*1*
13C4-PFHpA	*101*		*25 - 150*	*02/22/18 14:18*	*02/22/18 23:03*	*1*
13C4 PFOA	*76*		*25 - 150*	*02/22/18 14:18*	*02/22/18 23:03*	*1*
13C4 PFOS	*92*		*25 - 150*	*02/22/18 14:18*	*02/22/18 23:03*	*1*
13C5 PFNA	*83*		*25 - 150*	*02/22/18 14:18*	*02/22/18 23:03*	*1*

Lab Sample ID: LCS 320-209687/2-A
Matrix: Water
Analysis Batch: 209761

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 209687

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	22.0		ng/L		124	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	21.9		ng/L		120	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	24.1		ng/L		121	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	26.1		ng/L		131	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	22.2		ng/L		120	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	24.9		ng/L		125	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*97*		*25 - 150*
13C4-PFHpA	*99*		*25 - 150*
13C4 PFOA	*75*		*25 - 150*
13C4 PFOS	*93*		*25 - 150*
13C5 PFNA	*82*		*25 - 150*

Lab Sample ID: LCSD 320-209687/3-A
Matrix: Water
Analysis Batch: 209761

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 209687

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	22.1		ng/L		125	72 - 151	0	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	21.9		ng/L		120	73 - 157	0	30
Perfluoroheptanoic acid (PFHpA)			20.0	24.7		ng/L		123	71 - 138	2	30
Perfluorooctanoic acid (PFOA)			20.0	25.3		ng/L		127	70 - 140	3	30
Perfluorooctanesulfonic acid (PFOS)			18.6	22.7		ng/L		122	69 - 144	2	30
Perfluorononanoic acid (PFNA)			20.0	26.0		ng/L		130	73 - 147	4	30

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	95		25 - 150
13C4-PFHpA	95		25 - 150
13C4 PFOA	73		25 - 150
13C4 PFOS	89		25 - 150
13C5 PFNA	79		25 - 150

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36092-1
SDG: 2006-001

LCMS

Prep Batch: 209687

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-36092-1	176044	Total/NA	Water	PFAS Prep	
320-36092-2	521809	Total/NA	Water	PFAS Prep	
MB 320-209687/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-209687/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-209687/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 209761

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-36092-1	176044	Total/NA	Water	WS-LC-0025 At1	209687
320-36092-2	521809	Total/NA	Water	WS-LC-0025 At1	209687
MB 320-209687/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	209687
LCS 320-209687/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	209687
LCSD 320-209687/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	209687

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36092-1
SDG: 2006-001

Client Sample ID: 176044

Date Collected: 02/13/18 10:54
Date Received: 02/15/18 10:43

Lab Sample ID: 320-36092-1

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	PFAS Prep			1.00 mL	1.66 mL	209687	02/22/18 14:19	ABH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			209761	02/23/18 05:11	CBW	TAL SAC

Client Sample ID: 521809

Date Collected: 02/13/18 09:51
Date Received: 02/15/18 10:43

Lab Sample ID: 320-36092-2

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	PFAS Prep			1.00 mL	1.66 mL	209687	02/22/18 14:19	ABH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			209761	02/23/18 05:48	CBW	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36092-1
SDG: 2006-001

Laboratory: TestAmerica Sacramento

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

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-020	01-20-21
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	10-31-18
L-A-B	DoD ELAP		L2468	01-20-21
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-14-18
Michigan	State Program	5	9947	01-31-18 *
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18 *
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

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

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36092-1
SDG: 2006-001

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36092-1
SDG: 2006-001

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-36092-1	176044	Water	02/13/18 10:54	02/15/18 10:43
320-36092-2	521809	Water	02/13/18 09:51	02/15/18 10:43

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

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Pasco, WA 99301-3378
(509) 946-6309

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Fairbanks, AK 99709
(907) 479-0600

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

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Portland, OR 97201-2498
(503) 223-6147

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Laboratory Test America
Attn: David Althucker

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFAS x 6						Total Number of Containers	Remarks/Matrix
176044		1054	2/13/18		X	X						2	groundwater
521809		0951	2/13/18		X	X						2	groundwater

320-36092 Chain of Custody

Project Information		Sample Receipt	
Project Number: 20060-001		Total Number of Containers	4
Project Name: FAI		COC Seals/Intact? Y/N/NA	Y
Contact: MDN		Received Good Cond./Cold	1.2°C
Ongoing Project? Yes ☒ No ☐		Delivery Method:	goldstreak
Sampler: ARM		(attach shipping bill, if any)	

Instructions

Requested Turnaround Time: Standard

Special Instructions: please bill to:
31-1-20060-001

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

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 930	Signature: Time:	Signature: Time:
Printed Name: Amber Masters Date: 2/14/18	Printed Name: Date:	Printed Name: Date:
Company: Shannon Wilson, INC	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 1043	Signature: Time:	Signature: Time:
Printed Name: Troy G. Tumpen Date: 2-15-18	Printed Name: Date:	Printed Name: Date:
Company: TA-SAC	Company:	Company:

F-19-91/UR

No. 34831

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-36092-1
SDG Number: 2006-001

Login Number: 36092
List Number: 1
Creator: Turpen, Troy

List Source: 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	
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:

Dana Fjare

Title:

Environmental Scientist

Date:

March 7, 2018

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

February 26, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-36092-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-36092-1

1. Laboratory

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

   ☐ Yes ☒ No Comments:

ADEC has not approved an analytical laboratory for analysis of PFASs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

   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 Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

   ☒ Yes ☐ No Comments:

   b. Correct Analyses requested?

   ☒ Yes ☐ No Comments:

3. Laboratory Sample Receipt Documentation

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

   ☒ Yes ☐ No Comments:

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

   ☒ Yes ☐ No Comments:

Analysis of PFASs does not require a preservative other than temperature control.

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

   ☒ Yes ☐ No 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 Comments:

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

e. Data quality or usability affected?

Comments:

Data quality or usability is not affected; see above.

4. Case Narrative

a. Present and understandable?

☒ Yes ☐ No Comments:

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

☒ Yes ☐ No Comments:

The case narrative notes the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 1.2º C.

The case narrative notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD).

c. Were all corrective actions documented?

☒ Yes ☐ No Comments:

The laboratory does not describe corrective actions.

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 Comments:

b. All applicable holding times met?

☑ Yes ☐ No Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

☐ Yes ☑ No Comments:

N/A; 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 Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

☐ Yes ☑ No Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

☑ Yes ☐ No Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

☑ Yes ☐ No Comments:

iii. If above LOQ, what samples are affected?

Comments:

None; PFAS compounds were not detected in method blank samples.

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

☐ Yes ☑ No Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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 Comments:

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

☐ Yes ☑ No 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

☑ Yes ☐ No Comments:

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

☑ Yes ☐ No Comments:

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

Comments:

N/A; 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 Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

☒ Yes ☐ No Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a 13C-isotope of each target analyte, and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

☒ Yes ☐ No Comments:

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

☐ Yes ☒ No Comments:

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

iv. Data quality or usability affected?

Comments:

The data quality and usability are not affected; see above.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

☐ Yes ☒ No Comments:

PFASs are not volatile compounds; 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 Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not submitted with this work order.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

☐ Yes ☒ No Comments:

A field duplicate sample was not submitted with this work order. However, field duplicate samples were collected with the frequency required for the overall project.

ii. Submitted blind to lab?

☐ Yes ☒ No Comments:

N/A; a field duplicate was not submitted with this work order.

iii. Precision – All relative percent differences (RPD) less than specified DQOs? (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 Comments:

N/A; a field duplicate was not submitted with this work order.

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

Comments:

The data quality and usability were not affected.

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

☐ Yes ☐ No ☒ Not Applicable

Samples for this project are not collected with reusable equipment, therefore a practical potential for equipment based cross-contamination does not exist.

i. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; an equipment blank was not submitted.

ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

a. Defined and appropriate?

☐ Yes ☒ No Comments:

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

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 320-36310-1
Client Project/Site: FAI

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

Attn: Marcy Nadel

Authorized for release by:
3/7/2018 9:35:23 AM

David Alltucker, Project Manager I
(916)374-4383
david.alltucker@testamericainc.com

Table of Contents

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36310-1

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
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Case Narrative

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36310-1

Job ID: 320-36310-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-36310-1

Receipt
The samples were received on 2/22/2018 9:40 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.2º C.

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

Organic Prep
Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-210973.

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: FAI

TestAmerica Job ID: 320-36310-1

Client Sample ID: 407348 — Lab Sample ID: 320-36310-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	7.6		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	62		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	16		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	51		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	14		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	29		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 174271 — Lab Sample ID: 320-36310-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	9.1		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	24		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	4.5		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	8.4		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	56		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	3.0		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 153338 — Lab Sample ID: 320-36310-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	31		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	51		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	9.7		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	12		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	55		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	2.9		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36310-1

Client Sample ID: 407348
Date Collected: 02/14/18 16:38
Date Received: 02/22/18 09:40

Lab Sample ID: 320-36310-1
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	7.6		2.0	0.92	ng/L		03/02/18 13:35	03/02/18 21:50	1
Perfluorohexanesulfonic acid (PFHxS)	62		2.0	0.87	ng/L		03/02/18 13:35	03/02/18 21:50	1
Perfluoroheptanoic acid (PFHpA)	16		2.0	0.80	ng/L		03/02/18 13:35	03/02/18 21:50	1
Perfluorooctanoic acid (PFOA)	51		2.0	0.75	ng/L		03/02/18 13:35	03/02/18 21:50	1
Perfluorooctanesulfonic acid (PFOS)	14		2.0	1.3	ng/L		03/02/18 13:35	03/02/18 21:50	1
Perfluorononanoic acid (PFNA)	29		2.0	0.65	ng/L		03/02/18 13:35	03/02/18 21:50	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*96*		*25 - 150*	*03/02/18 13:35*	*03/02/18 21:50*	*1*
13C4-PFHpA	*118*		*25 - 150*	*03/02/18 13:35*	*03/02/18 21:50*	*1*
13C4 PFOA	*92*		*25 - 150*	*03/02/18 13:35*	*03/02/18 21:50*	*1*
13C4 PFOS	*87*		*25 - 150*	*03/02/18 13:35*	*03/02/18 21:50*	*1*
13C5 PFNA	*103*		*25 - 150*	*03/02/18 13:35*	*03/02/18 21:50*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36310-1

Client Sample ID: 174271
Date Collected: 02/20/18 12:00
Date Received: 02/22/18 09:40

Lab Sample ID: 320-36310-2
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	9.1		2.0	0.92	ng/L		03/02/18 13:35	03/02/18 22:08	1
Perfluorohexanesulfonic acid (PFHxS)	24		2.0	0.87	ng/L		03/02/18 13:35	03/02/18 22:08	1
Perfluoroheptanoic acid (PFHpA)	4.5		2.0	0.80	ng/L		03/02/18 13:35	03/02/18 22:08	1
Perfluorooctanoic acid (PFOA)	8.4		2.0	0.75	ng/L		03/02/18 13:35	03/02/18 22:08	1
Perfluorooctanesulfonic acid (PFOS)	56		2.0	1.3	ng/L		03/02/18 13:35	03/02/18 22:08	1
Perfluorononanoic acid (PFNA)	3.0		2.0	0.65	ng/L		03/02/18 13:35	03/02/18 22:08	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*89*		*25 - 150*	*03/02/18 13:35*	*03/02/18 22:08*	*1*
13C4-PFHpA	*108*		*25 - 150*	*03/02/18 13:35*	*03/02/18 22:08*	*1*
13C4 PFOA	*88*		*25 - 150*	*03/02/18 13:35*	*03/02/18 22:08*	*1*
13C4 PFOS	*81*		*25 - 150*	*03/02/18 13:35*	*03/02/18 22:08*	*1*
13C5 PFNA	*93*		*25 - 150*	*03/02/18 13:35*	*03/02/18 22:08*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36310-1

Client Sample ID: 153338
Date Collected: 02/20/18 17:52
Date Received: 02/22/18 09:40

Lab Sample ID: 320-36310-3
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	31		2.0	0.92	ng/L		03/02/18 13:35	03/02/18 22:26	1
Perfluorohexanesulfonic acid (PFHxS)	51		2.0	0.87	ng/L		03/02/18 13:35	03/02/18 22:26	1
Perfluoroheptanoic acid (PFHpA)	9.7		2.0	0.80	ng/L		03/02/18 13:35	03/02/18 22:26	1
Perfluorooctanoic acid (PFOA)	12		2.0	0.75	ng/L		03/02/18 13:35	03/02/18 22:26	1
Perfluorooctanesulfonic acid (PFOS)	55		2.0	1.3	ng/L		03/02/18 13:35	03/02/18 22:26	1
Perfluorononanoic acid (PFNA)	2.9		2.0	0.65	ng/L		03/02/18 13:35	03/02/18 22:26	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*99*		*25 - 150*	*03/02/18 13:35*	*03/02/18 22:26*	*1*
13C4-PFHpA	*115*		*25 - 150*	*03/02/18 13:35*	*03/02/18 22:26*	*1*
13C4 PFOA	*92*		*25 - 150*	*03/02/18 13:35*	*03/02/18 22:26*	*1*
13C4 PFOS	*95*		*25 - 150*	*03/02/18 13:35*	*03/02/18 22:26*	*1*
13C5 PFNA	*104*		*25 - 150*	*03/02/18 13:35*	*03/02/18 22:26*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36310-1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)				
Lab Sample ID	Client Sample ID	PFHxS (25-150)	PFHpA (25-150)	PFOA (25-150)	PFOS (25-150)	PFNA (25-150)
320-36310-1	407348	96	118	92	87	103
320-36310-2	174271	89	108	88	81	93
320-36310-3	153338	99	115	92	95	104
LCS 320-210973/2-A	Lab Control Sample	102	114	92	98	97
LCSD 320-210973/3-A	Lab Control Sample Dup	96	117	88	90	96
MB 320-210973/1-A	Method Blank	96	116	91	92	98

Surrogate Legend

PFHxS = 18O2 PFHxS
PFHpA = 13C4-PFHpA
PFOA = 13C4 PFOA
PFOS = 13C4 PFOS
PFNA = 13C5 PFNA

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-210973/1-A
Matrix: Water
Analysis Batch: 211104

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 210973

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		03/02/18 13:35	03/02/18 20:54	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		03/02/18 13:35	03/02/18 20:54	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		03/02/18 13:35	03/02/18 20:54	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		03/02/18 13:35	03/02/18 20:54	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		03/02/18 13:35	03/02/18 20:54	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		03/02/18 13:35	03/02/18 20:54	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*96*		*25 - 150*	*03/02/18 13:35*	*03/02/18 20:54*	*1*
13C4-PFHpA	*116*		*25 - 150*	*03/02/18 13:35*	*03/02/18 20:54*	*1*
13C4 PFOA	*91*		*25 - 150*	*03/02/18 13:35*	*03/02/18 20:54*	*1*
13C4 PFOS	*92*		*25 - 150*	*03/02/18 13:35*	*03/02/18 20:54*	*1*
13C5 PFNA	*98*		*25 - 150*	*03/02/18 13:35*	*03/02/18 20:54*	*1*

Lab Sample ID: LCS 320-210973/2-A
Matrix: Water
Analysis Batch: 211104

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 210973

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	17.8		ng/L		101	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	18.0		ng/L		99	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	19.9		ng/L		100	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	21.2		ng/L		106	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	18.3		ng/L		98	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	20.9		ng/L		105	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*102*		*25 - 150*
13C4-PFHpA	*114*		*25 - 150*
13C4 PFOA	*92*		*25 - 150*
13C4 PFOS	*98*		*25 - 150*
13C5 PFNA	*97*		*25 - 150*

Lab Sample ID: LCSD 320-210973/3-A
Matrix: Water
Analysis Batch: 211104

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 210973

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	18.5		ng/L		105	72 - 151	4	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	18.6		ng/L		102	73 - 157	3	30
Perfluoroheptanoic acid (PFHpA)			20.0	20.2		ng/L		101	71 - 138	1	30
Perfluorooctanoic acid (PFOA)			20.0	21.8		ng/L		109	70 - 140	3	30
Perfluorooctanesulfonic acid (PFOS)			18.6	19.3		ng/L		104	69 - 144	5	30
Perfluorononanoic acid (PFNA)			20.0	21.4		ng/L		107	73 - 147	2	30

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36310-1

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	96		25 - 150
13C4-PFHpA	117		25 - 150
13C4 PFOA	88		25 - 150
13C4 PFOS	90		25 - 150
13C5 PFNA	96		25 - 150

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36310-1

LCMS

Prep Batch: 210973

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-36310-1	407348	Total/NA	Water	PFAS Prep	
320-36310-2	174271	Total/NA	Water	PFAS Prep	
320-36310-3	153338	Total/NA	Water	PFAS Prep	
MB 320-210973/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-210973/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-210973/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 211104

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-36310-1	407348	Total/NA	Water	WS-LC-0025 At1	210973
320-36310-2	174271	Total/NA	Water	WS-LC-0025 At1	210973
320-36310-3	153338	Total/NA	Water	WS-LC-0025 At1	210973
MB 320-210973/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	210973
LCS 320-210973/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	210973
LCSD 320-210973/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	210973

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36310-1

Client Sample ID: 407348
Date Collected: 02/14/18 16:38
Date Received: 02/22/18 09:40

Lab Sample ID: 320-36310-1
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	PFAS Prep			1.00 mL	1.66 mL	210973	03/02/18 13:35	ABH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			211104	03/02/18 21:50	CBW	TAL SAC

Client Sample ID: 174271
Date Collected: 02/20/18 12:00
Date Received: 02/22/18 09:40

Lab Sample ID: 320-36310-2
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	PFAS Prep			1.00 mL	1.66 mL	210973	03/02/18 13:35	ABH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			211104	03/02/18 22:08	CBW	TAL SAC

Client Sample ID: 153338
Date Collected: 02/20/18 17:52
Date Received: 02/22/18 09:40

Lab Sample ID: 320-36310-3
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	PFAS Prep			1.00 mL	1.66 mL	210973	03/02/18 13:35	ABH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			211104	03/02/18 22:26	CBW	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36310-1

Laboratory: TestAmerica Sacramento

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

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-020	01-20-21
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	10-31-18
L-A-B	DoD ELAP		L2468	01-20-21
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-14-18
Michigan	State Program	5	9947	01-31-18 *
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18 *
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

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

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36310-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36310-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-36310-1	407348	Water	02/14/18 16:38	02/22/18 09:40
320-36310-2	174271	Water	02/20/18 12:00	02/22/18 09:40
320-36310-3	153338	Water	02/20/18 17:52	02/22/18 09:40

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

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Anchorage, AK 99518
(907) 561-2120

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

CHAIN-OF-CUSTODY RECORD

Laboratory Test America
Attn: David Althoff

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	TEXAS 16						Total Number of Containers	Remarks/Matrix
407348		1638	2/14/18		X	X						2	groundwater
174271		1200	2/20/18		X	X						2	
153338		1752	2/20/18		X	X						2	

320-36310 Chain of Custody

Project Information		Sample Receipt	
Project Number:	20060	Total Number of Containers	
Project Name:	FAI	COC Seals/Intact? Y/N/NA	
Contact:	MDN	Received Good Cond./Cold	1.2°C gel ice ML-4
Ongoing Project? Yes ☒ No ☐		Delivery Method: (attach shipping bill, if any)	goldstreak
Sampler:	ARM		

Instructions
Requested Turnaround Time: Standard
Special Instructions: Please Bill to: 31-1-20060-001

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 14:12	Signature: Time:	Signature: Time:
Printed Name: Amber Masters Date: 2/21/18	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson Inc	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 0940	Signature: Time:	Signature: Time:
Printed Name: Troy Gilmpin Date: 2/22/18	Printed Name: Date:	Printed Name: Date:
Company: TA-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

F-19-91/UR

No. 34834

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-36310-1

Login Number: 36310
List Number: 1
Creator: Gooch, Mayce

List Source: 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	
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:

Dana Fjare

Title:

Environmental Scientist

Date:

March 7, 2018

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

March 7, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-36310-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-36310-1

1. Laboratory

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

   ☐ Yes ☒ No Comments:

ADEC has not approved an analytical laboratory for analysis of PFASs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

   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 Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

   ☒ Yes ☐ No Comments:

   b. Correct Analyses requested?

   ☒ Yes ☐ No Comments:

3. Laboratory Sample Receipt Documentation

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

   ☒ Yes ☐ No Comments:

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

   ☒ Yes ☐ No Comments:

Analysis of PFASs does not require a preservative other than temperature control.

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

   ☒ Yes ☐ No 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 Comments:

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

e. Data quality or usability affected?

Comments:

Data quality or usability is not affected; see above.

4. Case Narrative

a. Present and understandable?

☒ Yes ☐ No Comments:

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

☒ Yes ☐ No Comments:

The case narrative notes the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 1.2º C.

The case narrative notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD).

c. Were all corrective actions documented?

☒ Yes ☐ No Comments:

The laboratory does not describe corrective actions.

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 Comments:

b. All applicable holding times met?

☑ Yes ☐ No Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

☐ Yes ☑ No Comments:

N/A; 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 Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

☐ Yes ☑ No Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

☑ Yes ☐ No Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

☑ Yes ☐ No Comments:

iii. If above LOQ, what samples are affected?

Comments:

None; PFAS compounds were not detected in method blank samples.

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

☐ Yes ☑ No Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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 Comments:

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

☐ Yes ☑ No 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

☑ Yes ☐ No Comments:

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

☑ Yes ☐ No Comments:

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

Comments:

N/A; 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 Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

☑ Yes ☐ No Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a 13C-isotope of each target analyte, and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

☑ Yes ☐ No Comments:

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

☐ Yes ☑ No Comments:

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

iv. Data quality or usability affected?

Comments:

The data quality and usability are not affected; see above.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

☐ Yes ☑ No Comments:

PFASs are not volatile compounds; 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 Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not submitted with this work order.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

☐ Yes ☒ No Comments:

A field duplicate sample was not submitted with this work order. However, field duplicate samples were collected with the frequency required for the overall project.

ii. Submitted blind to lab?

☐ Yes ☒ No Comments:

N/A; a field duplicate was not submitted with this work order.

iii. Precision – All relative percent differences (RPD) less than specified DQOs? (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 Comments:

N/A; a field duplicate was not submitted with this work order.

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

Comments:

The data quality and usability were not affected.

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

☐ Yes ☐ No ☒ Not Applicable

Samples for this project are not collected with reusable equipment, therefore a practical potential for equipment based cross-contamination does not exist.

i. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; an equipment blank was not submitted.

ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

a. Defined and appropriate?

☐ Yes ☒ No Comments:

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

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 320-36749-1
TestAmerica Sample Delivery Group: 20060
Client Project/Site: FAI
Revision: 1

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

Attn: Marcy Nadel

Authorized for release by:
3/13/2018 7:34:52 AM

David Alltucker, Project Manager I
(916)374-4383
david.alltucker@testamericainc.com

Table of Contents

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36749-1
SDG: 20060

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
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Case Narrative

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36749-1
SDG: 20060

Job ID: 320-36749-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-36749-1

Receipt
The samples were received on 3/6/2018 9:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.9º C.

Receipt Exceptions
The Chain-of-Custody (COC) was incomplete as received and/or improperly completed. COC was not relinquished.

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

Organic Prep
Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-211657.

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: FAI

TestAmerica Job ID: 320-36749-1
SDG: 20060

Client Sample ID: 120090 — Lab Sample ID: 320-36749-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	19		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	110		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	17		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	18		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	13		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	630		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: 174238 — Lab Sample ID: 320-36749-2

No Detections.

Client Sample ID: 646790 — Lab Sample ID: 320-36749-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.3	J	2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	3.5		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36749-1
SDG: 20060

Client Sample ID: 120090
Date Collected: 02/23/18 10:47
Date Received: 03/06/18 13:08

Lab Sample ID: 320-36749-1
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	19		2.0	0.92	ng/L		03/07/18 10:51	03/07/18 19:14	1
Perfluorohexanesulfonic acid (PFHxS)	110		2.0	0.87	ng/L		03/07/18 10:51	03/07/18 19:14	1
Perfluoroheptanoic acid (PFHpA)	17		2.0	0.80	ng/L		03/07/18 10:51	03/07/18 19:14	1
Perfluorooctanoic acid (PFOA)	18		2.0	0.75	ng/L		03/07/18 10:51	03/07/18 19:14	1
Perfluorononanoic acid (PFNA)	13		2.0	0.65	ng/L		03/07/18 10:51	03/07/18 19:14	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*109*		*25 - 150*	*03/07/18 10:51*	*03/07/18 19:14*	*1*
13C4-PFHpA	*136*		*25 - 150*	*03/07/18 10:51*	*03/07/18 19:14*	*1*
13C4 PFOA	*109*		*25 - 150*	*03/07/18 10:51*	*03/07/18 19:14*	*1*
13C4 PFOS	*105*		*25 - 150*	*03/07/18 10:51*	*03/07/18 19:14*	*1*
13C5 PFNA	*121*		*25 - 150*	*03/07/18 10:51*	*03/07/18 19:14*	*1*

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	630		20	13	ng/L		03/07/18 10:51	03/08/18 13:24	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*105*		*25 - 150*	*03/07/18 10:51*	*03/08/18 13:24*	*10*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36749-1
SDG: 20060

Client Sample ID: 174238
Date Collected: 02/27/18 11:36
Date Received: 03/06/18 13:08

Lab Sample ID: 320-36749-2
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		03/07/18 10:51	03/07/18 19:32	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		03/07/18 10:51	03/07/18 19:32	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		03/07/18 10:51	03/07/18 19:32	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		03/07/18 10:51	03/07/18 19:32	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		03/07/18 10:51	03/07/18 19:32	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		03/07/18 10:51	03/07/18 19:32	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*108*		*25 - 150*	*03/07/18 10:51*	*03/07/18 19:32*	*1*
13C4-PFHpA	*132*		*25 - 150*	*03/07/18 10:51*	*03/07/18 19:32*	*1*
13C4 PFOA	*109*		*25 - 150*	*03/07/18 10:51*	*03/07/18 19:32*	*1*
13C4 PFOS	*106*		*25 - 150*	*03/07/18 10:51*	*03/07/18 19:32*	*1*
13C5 PFNA	*127*		*25 - 150*	*03/07/18 10:51*	*03/07/18 19:32*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36749-1
SDG: 20060

Client Sample ID: 646790
Date Collected: 03/01/18 13:24
Date Received: 03/06/18 13:08

Lab Sample ID: 320-36749-3
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**1.3**	**J**	2.0	0.92	ng/L		03/07/18 10:51	03/07/18 19:50	1
Perfluorohexanesulfonic acid (PFHxS)	**3.5**		2.0	0.87	ng/L		03/07/18 10:51	03/07/18 19:50	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		03/07/18 10:51	03/07/18 19:50	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		03/07/18 10:51	03/07/18 19:50	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		03/07/18 10:51	03/07/18 19:50	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		03/07/18 10:51	03/07/18 19:50	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*99*		*25 - 150*	*03/07/18 10:51*	*03/07/18 19:50*	*1*
13C4-PFHpA	*130*		*25 - 150*	*03/07/18 10:51*	*03/07/18 19:50*	*1*
13C4 PFOA	*106*		*25 - 150*	*03/07/18 10:51*	*03/07/18 19:50*	*1*
13C4 PFOS	*100*		*25 - 150*	*03/07/18 10:51*	*03/07/18 19:50*	*1*
13C5 PFNA	*122*		*25 - 150*	*03/07/18 10:51*	*03/07/18 19:50*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36749-1
SDG: 20060

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFHxS (25-150)	PFHpA (25-150)	PFOA (25-150)	PFOS (25-150)	PFNA (25-150)			
320-36749-1	120090	109	136	109	105	121			
320-36749-1 - DL	120090				105				
320-36749-2	174238	108	132	109	106	127			
320-36749-3	646790	99	130	106	100	122			
LCS 320-211657/2-A	Lab Control Sample	102	126	98	100	109			
LCSD 320-211657/3-A	Lab Control Sample Dup	104	129	100	101	113			
MB 320-211657/1-A	Method Blank	98	123	94	97	106			

Surrogate Legend

PFHxS = 18O2 PFHxS
PFHpA = 13C4-PFHpA
PFOA = 13C4 PFOA
PFOS = 13C4 PFOS
PFNA = 13C5 PFNA

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-211657/1-A
Matrix: Water
Analysis Batch: 211721

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 211657

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		03/07/18 10:50	03/07/18 18:19	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		03/07/18 10:50	03/07/18 18:19	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		03/07/18 10:50	03/07/18 18:19	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		03/07/18 10:50	03/07/18 18:19	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		03/07/18 10:50	03/07/18 18:19	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		03/07/18 10:50	03/07/18 18:19	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*98*		*25 - 150*	*03/07/18 10:50*	*03/07/18 18:19*	*1*
13C4-PFHpA	*123*		*25 - 150*	*03/07/18 10:50*	*03/07/18 18:19*	*1*
13C4 PFOA	*94*		*25 - 150*	*03/07/18 10:50*	*03/07/18 18:19*	*1*
13C4 PFOS	*97*		*25 - 150*	*03/07/18 10:50*	*03/07/18 18:19*	*1*
13C5 PFNA	*106*		*25 - 150*	*03/07/18 10:50*	*03/07/18 18:19*	*1*

Lab Sample ID: LCS 320-211657/2-A
Matrix: Water
Analysis Batch: 211721

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 211657

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	15.1		ng/L		85	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	15.6		ng/L		86	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	17.8		ng/L		89	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	17.8		ng/L		89	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	15.9		ng/L		86	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	18.8		ng/L		94	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*102*		*25 - 150*
13C4-PFHpA	*126*		*25 - 150*
13C4 PFOA	*98*		*25 - 150*
13C4 PFOS	*100*		*25 - 150*
13C5 PFNA	*109*		*25 - 150*

Lab Sample ID: LCSD 320-211657/3-A
Matrix: Water
Analysis Batch: 211721

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 211657

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	15.3		ng/L		87	72 - 151	1	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	15.8		ng/L		87	73 - 157	1	30
Perfluoroheptanoic acid (PFHpA)			20.0	17.7		ng/L		89	71 - 138	0	30
Perfluorooctanoic acid (PFOA)			20.0	18.7		ng/L		93	70 - 140	5	30
Perfluorooctanesulfonic acid (PFOS)			18.6	15.6		ng/L		84	69 - 144	2	30
Perfluorononanoic acid (PFNA)			20.0	17.7		ng/L		89	73 - 147	6	30

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36749-1
SDG: 20060

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	104		25 - 150
13C4-PFHpA	129		25 - 150
13C4 PFOA	100		25 - 150
13C4 PFOS	101		25 - 150
13C5 PFNA	113		25 - 150

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36749-1
SDG: 20060

LCMS

Prep Batch: 211657

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-36749-1	120090	Total/NA	Water	PFAS Prep	
320-36749-1 - DL	120090	Total/NA	Water	PFAS Prep	
320-36749-2	174238	Total/NA	Water	PFAS Prep	
320-36749-3	646790	Total/NA	Water	PFAS Prep	
MB 320-211657/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-211657/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-211657/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 211721

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-36749-1	120090	Total/NA	Water	WS-LC-0025 At1	211657
320-36749-2	174238	Total/NA	Water	WS-LC-0025 At1	211657
320-36749-3	646790	Total/NA	Water	WS-LC-0025 At1	211657
MB 320-211657/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	211657
LCS 320-211657/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	211657
LCSD 320-211657/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	211657

Analysis Batch: 211938

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-36749-1 - DL	120090	Total/NA	Water	WS-LC-0025 At1	211657

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36749-1
SDG: 20060

Client Sample ID: 120090
Date Collected: 02/23/18 10:47
Date Received: 03/06/18 13:08

Lab Sample ID: 320-36749-1
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	PFAS Prep			1.00 mL	1.66 mL	211657	03/07/18 10:51	AAR	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			211721	03/07/18 19:14	ABH	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	211657	03/07/18 10:51	AAR	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			211938	03/08/18 13:24	ABH	TAL SAC

Client Sample ID: 174238
Date Collected: 02/27/18 11:36
Date Received: 03/06/18 13:08

Lab Sample ID: 320-36749-2
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	PFAS Prep			1.00 mL	1.66 mL	211657	03/07/18 10:51	AAR	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			211721	03/07/18 19:32	ABH	TAL SAC

Client Sample ID: 646790
Date Collected: 03/01/18 13:24
Date Received: 03/06/18 13:08

Lab Sample ID: 320-36749-3
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	PFAS Prep			1.00 mL	1.66 mL	211657	03/07/18 10:51	AAR	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			211721	03/07/18 19:50	ABH	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36749-1
SDG: 20060

Laboratory: TestAmerica Sacramento

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

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-020	01-20-21
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	10-31-18
L-A-B	DoD ELAP		L2468	01-20-21
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-14-18
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18 *
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-18
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

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

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36749-1
SDG: 20060

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36749-1
SDG: 20060

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-36749-1	120090	Water	02/23/18 10:47	03/06/18 13:08
320-36749-2	174238	Water	02/27/18 11:36	03/06/18 13:08
320-36749-3	646790	Water	03/01/18 13:24	03/06/18 13:08

SHANNON & WILSON, INC.
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Anchorage, AK 99518
(907) 561-2120

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

CHAIN-OF-CUSTODY RECORD

Laboratory Test America
Attn: David Altucker

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	DRAS x6						Total Number of Containers	Remarks/Matrix
120096		1047	2/23/18		X	X						2	groundwater
174238		1136	2/27/18		X	X						2	"
646790		1324	3/1/18		X	X						2	"

320-36749 Chain of Custody

Project Information	
Project Number: 24060	
Project Name: EAI	
Contact: MDN	
Ongoing Project? Yes ☒ No ☐	
Sampler: CABARM	

Sample Receipt	
Total Number of Containers	
COC Seals/Intact? (Y)N/NA	
Received Good Cond./Cold	2.9°C
Delivery Method: (attach shipping bill, if any)	gel ice AK2

Instructions
Requested Turnaround Time: 5 day rush
Special Instructions: Bill to:

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

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time:	Signature: Time:	Signature: Time:
Printed Name: Date:	Printed Name: Date:	Printed Name: Date:
Company:	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 0930	Signature: Time:	Signature: Time:
Printed Name: Troy G. Turpen Date: 3-6-18	Printed Name: Date:	Printed Name: Date:
Company: TA-SAC	Company:	Company:

F-19-91/UR

No. 34839

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-36749-1
SDG Number: 20060

Login Number: 36749
List Number: 1
Creator: Her, David A

List Source: 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	
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.	False	COC not relinquished
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").	N/A	
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:

Kristen Freiburger

Title:

Senior Chemist

Date:

March 13, 2018

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

March 13, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-36749-1 (Rev 1)

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

1. Laboratory

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

   ☐ Yes ☒ No Comments:

ADEC has not approved an analytical laboratory for analysis of PFASs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

   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 Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

   ☐ Yes ☒ No Comments:

The Login Sample Receipt Checklist notes the COC was not relinquished. However, the samples were received in good condition and we do not consider the results affected by this discrepancy.

   b. Correct Analyses requested?

   ☒ Yes ☐ No Comments:

3. Laboratory Sample Receipt Documentation

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

   ☒ Yes ☐ No Comments:

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

   ☒ Yes ☐ No Comments:

Analysis of PFASs does not require a preservative other than temperature control.

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

   ☒ Yes ☐ No 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 Comments:

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

e. Data quality or usability affected?

Comments:

Data quality or usability is not affected; see above.

4. Case Narrative

a. Present and understandable?

☑ Yes ☐ No Comments:

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

☑ Yes ☐ No Comments:

The case narrative notes the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 2.9º C.

The case narrative notes there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD).

c. Were all corrective actions documented?

☑ Yes ☐ No Comments:

The laboratory does not describe corrective actions.

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 Comments:

b. All applicable holding times met?

☑ Yes ☐ No Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

☐ Yes ☑ No Comments:

N/A; 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 Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

☐ Yes ☑ No Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

☑ Yes ☐ No Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

☑ Yes ☐ No Comments:

iii. If above LOQ, what samples are affected?

Comments:

None; PFAS compounds were not detected in method blank samples.

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

☐ Yes ☑ No Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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 Comments:

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

☐ Yes ☑ No 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

☑ Yes ☐ No Comments:

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

☑ Yes ☐ No Comments:

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

Comments:

N/A; 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 Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

☒ Yes ☐ No Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a 13C-isotope of each target analyte, and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

☒ Yes ☐ No Comments:

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

☐ Yes ☒ No Comments:

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

iv. Data quality or usability affected?

Comments:

The data quality and usability are not affected; see above.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

☐ Yes ☒ No Comments:

PFASs are not volatile compounds; 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 Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not submitted with this work order.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

☐ Yes ☒ No Comments:

A field duplicate sample was not submitted with this work order. However, field duplicate samples were collected with the frequency required for the overall project.

ii. Submitted blind to lab?

☐ Yes ☒ No Comments:

N/A; a field duplicate was not submitted with this work order.

iii. Precision – All relative percent differences (RPD) less than specified DQOs? (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 Comments:

N/A; a field duplicate was not submitted with this work order.

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

Comments:

The data quality and usability were not affected.

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

☐ Yes ☐ No ☒ Not Applicable

Samples for this project are not collected with reusable equipment, therefore a practical potential for equipment based cross-contamination does not exist.

i. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; an equipment blank was not submitted.

ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

a. Defined and appropriate?

☐ Yes ☒ No Comments:

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

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 320-36750-1
TestAmerica Sample Delivery Group: 20060
Client Project/Site: FAI

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

Attn: Marcy Nadel

Authorized for release by:
3/13/2018 1:53:52 PM

David Alltucker, Project Manager I
(916)374-4383
david.alltucker@testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

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
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Job ID: 320-36750-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-36750-1

Receipt
The sample was received on 3/6/2018 9:30 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.9º C.

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

Organic Prep
Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-211657.

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: FAI

TestAmerica Job ID: 320-36750-1
SDG: 20060

Client Sample ID: 174254

Lab Sample ID: 320-36750-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	8.1		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	23		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	4.5		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	8.6		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	46		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	2.1		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36750-1
SDG: 20060

Client Sample ID: 174254
Date Collected: 02/28/18 16:07
Date Received: 03/06/18 09:30

Lab Sample ID: 320-36750-1
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	8.1		2.0	0.92	ng/L		03/07/18 10:51	03/07/18 20:09	1
Perfluorohexanesulfonic acid (PFHxS)	23		2.0	0.87	ng/L		03/07/18 10:51	03/07/18 20:09	1
Perfluoroheptanoic acid (PFHpA)	4.5		2.0	0.80	ng/L		03/07/18 10:51	03/07/18 20:09	1
Perfluorooctanoic acid (PFOA)	8.6		2.0	0.75	ng/L		03/07/18 10:51	03/07/18 20:09	1
Perfluorooctanesulfonic acid (PFOS)	46		2.0	1.3	ng/L		03/07/18 10:51	03/07/18 20:09	1
Perfluorononanoic acid (PFNA)	2.1		2.0	0.65	ng/L		03/07/18 10:51	03/07/18 20:09	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*101*		*25 - 150*	*03/07/18 10:51*	*03/07/18 20:09*	*1*
13C4-PFHpA	*130*		*25 - 150*	*03/07/18 10:51*	*03/07/18 20:09*	*1*
13C4 PFOA	*102*		*25 - 150*	*03/07/18 10:51*	*03/07/18 20:09*	*1*
13C4 PFOS	*99*		*25 - 150*	*03/07/18 10:51*	*03/07/18 20:09*	*1*
13C5 PFNA	*126*		*25 - 150*	*03/07/18 10:51*	*03/07/18 20:09*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36750-1
SDG: 20060

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)				
Lab Sample ID	Client Sample ID	PFHxS (25-150)	PFHpA (25-150)	PFOA (25-150)	PFOS (25-150)	PFNA (25-150)
320-36750-1	174254	101	130	102	99	126
LCS 320-211657/2-A	Lab Control Sample	102	126	98	100	109
LCSD 320-211657/3-A	Lab Control Sample Dup	104	129	100	101	113
MB 320-211657/1-A	Method Blank	98	123	94	97	106

Surrogate Legend

PFHxS = 18O2 PFHxS
PFHpA = 13C4-PFHpA
PFOA = 13C4 PFOA
PFOS = 13C4 PFOS
PFNA = 13C5 PFNA

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-211657/1-A
Matrix: Water
Analysis Batch: 211721

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 211657

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		03/07/18 10:50	03/07/18 18:19	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		03/07/18 10:50	03/07/18 18:19	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		03/07/18 10:50	03/07/18 18:19	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		03/07/18 10:50	03/07/18 18:19	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		03/07/18 10:50	03/07/18 18:19	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		03/07/18 10:50	03/07/18 18:19	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*98*		*25 - 150*	*03/07/18 10:50*	*03/07/18 18:19*	*1*
13C4-PFHpA	*123*		*25 - 150*	*03/07/18 10:50*	*03/07/18 18:19*	*1*
13C4 PFOA	*94*		*25 - 150*	*03/07/18 10:50*	*03/07/18 18:19*	*1*
13C4 PFOS	*97*		*25 - 150*	*03/07/18 10:50*	*03/07/18 18:19*	*1*
13C5 PFNA	*106*		*25 - 150*	*03/07/18 10:50*	*03/07/18 18:19*	*1*

Lab Sample ID: LCS 320-211657/2-A
Matrix: Water
Analysis Batch: 211721

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 211657

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	15.1		ng/L		85	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	15.6		ng/L		86	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	17.8		ng/L		89	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	17.8		ng/L		89	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	15.9		ng/L		86	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	18.8		ng/L		94	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*102*		*25 - 150*
13C4-PFHpA	*126*		*25 - 150*
13C4 PFOA	*98*		*25 - 150*
13C4 PFOS	*100*		*25 - 150*
13C5 PFNA	*109*		*25 - 150*

Lab Sample ID: LCSD 320-211657/3-A
Matrix: Water
Analysis Batch: 211721

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 211657

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	15.3		ng/L		87	72 - 151	1	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	15.8		ng/L		87	73 - 157	1	30
Perfluoroheptanoic acid (PFHpA)			20.0	17.7		ng/L		89	71 - 138	0	30
Perfluorooctanoic acid (PFOA)			20.0	18.7		ng/L		93	70 - 140	5	30
Perfluorooctanesulfonic acid (PFOS)			18.6	15.6		ng/L		84	69 - 144	2	30
Perfluorononanoic acid (PFNA)			20.0	17.7		ng/L		89	73 - 147	6	30

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	104		25 - 150
13C4-PFHpA	129		25 - 150
13C4 PFOA	100		25 - 150
13C4 PFOS	101		25 - 150
13C5 PFNA	113		25 - 150

LCMS

Prep Batch: 211657

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-36750-1	174254	Total/NA	Water	PFAS Prep	
MB 320-211657/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-211657/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-211657/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 211721

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-36750-1	174254	Total/NA	Water	WS-LC-0025 At1	211657
MB 320-211657/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	211657
LCS 320-211657/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	211657
LCSD 320-211657/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	211657

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36750-1
SDG: 20060

Client Sample ID: 174254
Date Collected: 02/28/18 16:07
Date Received: 03/06/18 09:30

Lab Sample ID: 320-36750-1
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	PFAS Prep			1.00 mL	1.66 mL	211657	03/07/18 10:51	AAR	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			211721	03/07/18 20:09	ABH	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36750-1
SDG: 20060

Laboratory: TestAmerica Sacramento

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

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-020	01-20-21
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	10-31-18
L-A-B	DoD ELAP		L2468	01-20-21
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-14-18
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18 *
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-18
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

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

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36750-1
SDG: 20060

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-36750-1
SDG: 20060

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-36750-1	174254	Water	02/28/18 16:07	03/06/18 09:30

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

CHAIN-OF-CUSTODY RECORD

Laboratory: TestAmerica
Attn: D. Althucke

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	RFAS x6						Total Number of Containers	Remarks/Matrix
174254		1607	2/28/18		X							2	Groundwater

320-36750 Chain of Custody

Project Information	
Project Number:	20060
Project Name:	FAI
Contact:	MDN
Ongoing Project? Yes ☒ No ☐	
Sampler:	ARM

Sample Receipt	
Total Number of Containers	
COC Seals/Intact? Y/N/NA	Y
Received Good Cond./Cold	2°C
Delivery Method: (attach shipping bill, if any)	gelree AK-2

Instructions	
Requested Turnaround Time:	Standard
Special Instructions:	

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

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time:	Signature: Time:	Signature: Time:
Printed Name: Date:	Printed Name: Date:	Printed Name: Date:
Company:	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 0930	Signature: Time:	Signature: Time:
Printed Name: Troy L. Turpen Date: 3-6-18	Printed Name: Date:	Printed Name: Date:
Company: DA-SAC	Company:	Company:

F-19-91/UR

No. 34838

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-36750-1
SDG Number: 20060

Login Number: 36750
List Number: 1
Creator: Her, David A

List Source: 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	
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.	False	COC not relinquished.
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").	N/A	
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:

Kristen Freiburger

Title:

Senior Chemist

Date:

March 14, 2018

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

March 13, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-36750-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-36750-1

1. Laboratory

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

   ☐ Yes ☒ No Comments:

ADEC has not approved an analytical laboratory for analysis of PFASs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

   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 Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

   ☐ Yes ☒ No Comments:

The Login Sample Receipt Checklist notes the COC was not relinquished. However, the samples were received in good condition and we do not consider the results affected by this discrepancy.

   b. Correct Analyses requested?

   ☒ Yes ☐ No Comments:

3. Laboratory Sample Receipt Documentation

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

   ☒ Yes ☐ No Comments:

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

   ☒ Yes ☐ No Comments:

Analysis of PFASs does not require a preservative other than temperature control.

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

   ☒ Yes ☐ No 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 Comments:

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

e. Data quality or usability affected?

Comments:

Data quality or usability is not affected; see above.

4. Case Narrative

a. Present and understandable?

☒ Yes ☐ No Comments:

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

☒ Yes ☐ No Comments:

The case narrative notes the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 2.9º C.

The case narrative notes there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD).

c. Were all corrective actions documented?

☒ Yes ☐ No Comments:

The laboratory does not describe corrective actions.

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 Comments:

b. All applicable holding times met?

☑ Yes ☐ No Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

☐ Yes ☑ No Comments:

N/A; 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 Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

☐ Yes ☑ No Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

☑ Yes ☐ No Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

☑ Yes ☐ No Comments:

iii. If above LOQ, what samples are affected?

Comments:

None; PFAS compounds were not detected in method blank samples.

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

☐ Yes ☑ No Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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 Comments:

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

☐ Yes ☑ No 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

☑ Yes ☐ No Comments:

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

☑ Yes ☐ No Comments:

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

Comments:

N/A; 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 Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

☒ Yes ☐ No Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a 13C-isotope of each target analyte, and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

☒ Yes ☐ No Comments:

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

☐ Yes ☒ No Comments:

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

iv. Data quality or usability affected?

Comments:

The data quality and usability are not affected; see above.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

☐ Yes ☒ No Comments:

PFASs are not volatile compounds; 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 Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not submitted with this work order.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

☐ Yes ☒ No Comments:

A field duplicate sample was not submitted with this work order. However, field duplicate samples were collected with the frequency required for the overall project.

ii. Submitted blind to lab?

☐ Yes ☒ No Comments:

N/A; a field duplicate was not submitted with this work order.

iii. Precision – All relative percent differences (RPD) less than specified DQOs? (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 Comments:

N/A; a field duplicate was not submitted with this work order.

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

Comments:

The data quality and usability were not affected.

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

☐ Yes ☐ No ☒ Not Applicable

Samples for this project are not collected with reusable equipment, therefore a practical potential for equipment based cross-contamination does not exist.

i. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; an equipment blank was not submitted.

ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

a. Defined and appropriate?

☐ Yes ☒ No Comments:

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

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 320-37135-1
TestAmerica Sample Delivery Group: 20060-001
Client Project/Site: FAI

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

Attn: Marcy Nadel

Authorized for release by:
3/20/2018 2:31:59 PM

David Alltucker, Project Manager I
(916)374-4383
david.alltucker@testamericainc.com

Table of Contents

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
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Job ID: 320-37135-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-37135-1

Receipt
The samples were received on 3/15/2018 9:23 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.9º C.

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

Organic Prep
Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-213723.

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: FAI

TestAmerica Job ID: 320-37135-1
SDG: 20060-001

Client Sample ID: 407330 — Lab Sample ID: 320-37135-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	4.3		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	34		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	8.0		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	26		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	9.7		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	17		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 407313 — Lab Sample ID: 320-37135-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	1.4	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.4	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	9.8		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	12		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 175013 — Lab Sample ID: 320-37135-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	8.5		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	35		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	5.6		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	6.7		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	210		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	3.7		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-37135-1
SDG: 20060-001

Client Sample ID: 407330
Date Collected: 03/12/18 12:42
Date Received: 03/15/18 09:23

Lab Sample ID: 320-37135-1
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	4.3		2.0	0.92	ng/L		03/19/18 14:14	03/19/18 17:43	1
Perfluorohexanesulfonic acid (PFHxS)	34		2.0	0.87	ng/L		03/19/18 14:14	03/19/18 17:43	1
Perfluoroheptanoic acid (PFHpA)	8.0		2.0	0.80	ng/L		03/19/18 14:14	03/19/18 17:43	1
Perfluorooctanoic acid (PFOA)	26		2.0	0.75	ng/L		03/19/18 14:14	03/19/18 17:43	1
Perfluorooctanesulfonic acid (PFOS)	9.7		2.0	1.3	ng/L		03/19/18 14:14	03/19/18 17:43	1
Perfluorononanoic acid (PFNA)	17		2.0	0.65	ng/L		03/19/18 14:14	03/19/18 17:43	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*63*		*25 - 150*	*03/19/18 14:14*	*03/19/18 17:43*	*1*
13C4-PFHpA	*88*		*25 - 150*	*03/19/18 14:14*	*03/19/18 17:43*	*1*
13C4 PFOA	*70*		*25 - 150*	*03/19/18 14:14*	*03/19/18 17:43*	*1*
13C4 PFOS	*62*		*25 - 150*	*03/19/18 14:14*	*03/19/18 17:43*	*1*
13C5 PFNA	*84*		*25 - 150*	*03/19/18 14:14*	*03/19/18 17:43*	*1*

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-37135-1
SDG: 20060-001

Client Sample ID: 407313
Date Collected: 03/12/18 11:24
Date Received: 03/15/18 09:23

Lab Sample ID: 320-37135-2
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		03/19/18 14:14	03/19/18 18:01	1
Perfluorohexanesulfonic acid (PFHxS)	**1.4**	**J**	2.0	0.87	ng/L		03/19/18 14:14	03/19/18 18:01	1
Perfluoroheptanoic acid (PFHpA)	**1.4**	**J**	2.0	0.80	ng/L		03/19/18 14:14	03/19/18 18:01	1
Perfluorooctanoic acid (PFOA)	**9.8**		2.0	0.75	ng/L		03/19/18 14:14	03/19/18 18:01	1
Perfluorooctanesulfonic acid (PFOS)	**12**		2.0	1.3	ng/L		03/19/18 14:14	03/19/18 18:01	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		03/19/18 14:14	03/19/18 18:01	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*103*		*25 - 150*	*03/19/18 14:14*	*03/19/18 18:01*	*1*
13C4-PFHpA	*144*		*25 - 150*	*03/19/18 14:14*	*03/19/18 18:01*	*1*
13C4 PFOA	*115*		*25 - 150*	*03/19/18 14:14*	*03/19/18 18:01*	*1*
13C4 PFOS	*102*		*25 - 150*	*03/19/18 14:14*	*03/19/18 18:01*	*1*
13C5 PFNA	*137*		*25 - 150*	*03/19/18 14:14*	*03/19/18 18:01*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-37135-1
SDG: 20060-001

Client Sample ID: 175013
Date Collected: 03/14/18 10:42
Date Received: 03/15/18 09:23

Lab Sample ID: 320-37135-3
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	8.5		2.0	0.92	ng/L		03/19/18 14:14	03/19/18 18:19	1
Perfluorohexanesulfonic acid (PFHxS)	35		2.0	0.87	ng/L		03/19/18 14:14	03/19/18 18:19	1
Perfluoroheptanoic acid (PFHpA)	5.6		2.0	0.80	ng/L		03/19/18 14:14	03/19/18 18:19	1
Perfluorooctanoic acid (PFOA)	6.7		2.0	0.75	ng/L		03/19/18 14:14	03/19/18 18:19	1
Perfluorooctanesulfonic acid (PFOS)	210		2.0	1.3	ng/L		03/19/18 14:14	03/19/18 18:19	1
Perfluorononanoic acid (PFNA)	3.7		2.0	0.65	ng/L		03/19/18 14:14	03/19/18 18:19	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*102*		*25 - 150*	*03/19/18 14:14*	*03/19/18 18:19*	*1*
13C4-PFHpA	*143*		*25 - 150*	*03/19/18 14:14*	*03/19/18 18:19*	*1*
13C4 PFOA	*114*		*25 - 150*	*03/19/18 14:14*	*03/19/18 18:19*	*1*
13C4 PFOS	*100*		*25 - 150*	*03/19/18 14:14*	*03/19/18 18:19*	*1*
13C5 PFNA	*138*		*25 - 150*	*03/19/18 14:14*	*03/19/18 18:19*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-37135-1
SDG: 20060-001

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)				
Lab Sample ID	Client Sample ID	PFHxS (25-150)	PFHpA (25-150)	PFOA (25-150)	PFOS (25-150)	PFNA (25-150)
320-37135-1	407330	63	88	70	62	84
320-37135-2	407313	103	144	115	102	137
320-37135-3	175013	102	143	114	100	138
LCS 320-213723/2-A	Lab Control Sample	97	132	106	97	121
LCSD 320-213723/3-A	Lab Control Sample Dup	109	148	116	105	131
MB 320-213723/1-A	Method Blank	102	139	110	102	127

Surrogate Legend

PFHxS = 18O2 PFHxS
PFHpA = 13C4-PFHpA
PFOA = 13C4 PFOA
PFOS = 13C4 PFOS
PFNA = 13C5 PFNA

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-213723/1-A
Matrix: Water
Analysis Batch: 213781

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 213723

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		03/19/18 14:13	03/19/18 16:47	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		03/19/18 14:13	03/19/18 16:47	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		03/19/18 14:13	03/19/18 16:47	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		03/19/18 14:13	03/19/18 16:47	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		03/19/18 14:13	03/19/18 16:47	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		03/19/18 14:13	03/19/18 16:47	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*102*		*25 - 150*	*03/19/18 14:13*	*03/19/18 16:47*	*1*
13C4-PFHpA	*139*		*25 - 150*	*03/19/18 14:13*	*03/19/18 16:47*	*1*
13C4 PFOA	*110*		*25 - 150*	*03/19/18 14:13*	*03/19/18 16:47*	*1*
13C4 PFOS	*102*		*25 - 150*	*03/19/18 14:13*	*03/19/18 16:47*	*1*
13C5 PFNA	*127*		*25 - 150*	*03/19/18 14:13*	*03/19/18 16:47*	*1*

Lab Sample ID: LCS 320-213723/2-A
Matrix: Water
Analysis Batch: 213781

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 213723

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorobutanesulfonic acid (PFBS)	17.7	19.7		ng/L		111	72 - 151
Perfluorohexanesulfonic acid (PFHxS)	18.2	19.7		ng/L		108	73 - 157
Perfluoroheptanoic acid (PFHpA)	20.0	22.2		ng/L		111	71 - 138
Perfluorooctanoic acid (PFOA)	20.0	23.7		ng/L		119	70 - 140
Perfluorooctanesulfonic acid (PFOS)	18.6	20.4		ng/L		110	69 - 144
Perfluorononanoic acid (PFNA)	20.0	23.2		ng/L		116	73 - 147

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*97*		*25 - 150*
13C4-PFHpA	*132*		*25 - 150*
13C4 PFOA	*106*		*25 - 150*
13C4 PFOS	*97*		*25 - 150*
13C5 PFNA	*121*		*25 - 150*

Lab Sample ID: LCSD 320-213723/3-A
Matrix: Water
Analysis Batch: 213781

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 213723

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)	17.7	21.5		ng/L		121	72 - 151	9	30
Perfluorohexanesulfonic acid (PFHxS)	18.2	21.2		ng/L		116	73 - 157	7	30
Perfluoroheptanoic acid (PFHpA)	20.0	23.7		ng/L		118	71 - 138	6	30
Perfluorooctanoic acid (PFOA)	20.0	25.1		ng/L		126	70 - 140	6	30
Perfluorooctanesulfonic acid (PFOS)	18.6	22.0		ng/L		118	69 - 144	8	30
Perfluorononanoic acid (PFNA)	20.0	25.0		ng/L		125	73 - 147	8	30

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	109		25 - 150
13C4-PFHpA	148		25 - 150
13C4 PFOA	116		25 - 150
13C4 PFOS	105		25 - 150
13C5 PFNA	131		25 - 150

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-37135-1
SDG: 20060-001

LCMS

Prep Batch: 213723

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-37135-1	407330	Total/NA	Water	PFAS Prep	
320-37135-2	407313	Total/NA	Water	PFAS Prep	
320-37135-3	175013	Total/NA	Water	PFAS Prep	
MB 320-213723/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-213723/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-213723/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 213781

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-37135-1	407330	Total/NA	Water	WS-LC-0025 At1	213723
320-37135-2	407313	Total/NA	Water	WS-LC-0025 At1	213723
320-37135-3	175013	Total/NA	Water	WS-LC-0025 At1	213723
MB 320-213723/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	213723
LCS 320-213723/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	213723
LCSD 320-213723/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	213723

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-37135-1
SDG: 20060-001

Client Sample ID: 407330
Date Collected: 03/12/18 12:42
Date Received: 03/15/18 09:23

Lab Sample ID: 320-37135-1
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	PFAS Prep			1.00 mL	1.66 mL	213723	03/19/18 14:14	ABH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			213781	03/19/18 17:43	AAR	TAL SAC

Client Sample ID: 407313
Date Collected: 03/12/18 11:24
Date Received: 03/15/18 09:23

Lab Sample ID: 320-37135-2
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	PFAS Prep			1.00 mL	1.66 mL	213723	03/19/18 14:14	ABH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			213781	03/19/18 18:01	AAR	TAL SAC

Client Sample ID: 175013
Date Collected: 03/14/18 10:42
Date Received: 03/15/18 09:23

Lab Sample ID: 320-37135-3
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	PFAS Prep			1.00 mL	1.66 mL	213723	03/19/18 14:14	ABH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			213781	03/19/18 18:19	AAR	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-37135-1
SDG: 20060-001

Laboratory: TestAmerica Sacramento

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

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-020	01-20-21
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-18 *
Kansas	NELAP	7	E-10375	10-31-18
L-A-B	DoD ELAP		L2468	01-20-21
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-14-18
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-18 *
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18 *
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-18
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

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

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-37135-1
SDG: 20060-001

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-37135-1
SDG: 20060-001

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-37135-1	407330	Water	03/12/18 12:42	03/15/18 09:23
320-37135-2	407313	Water	03/12/18 11:24	03/15/18 09:23
320-37135-3	175013	Water	03/14/18 10:42	03/15/18 09:23

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Laboratory Test America
Attn: David Alltucker

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFAS x6					Total Number of Containers	Remarks/Matrix
407330		1242	3/12/18		X	X					2	groundwater
407313		1124	3/12/18		X	X					2	1
175013		1042	3/14/18		X	X					2	

320-37135 Chain of Custody

Project Information		Sample Receipt	
Project Number:	20060-001	Total Number of Containers	6
Project Name:	FAI	COC Seals/Intact? Y/N/NA	—
Contact:	MDN	Received Good Cond./Cold	—
Ongoing Project? Yes☒ No ☐		Delivery Method: goldstreak (attach shipping bill, if any)	
Sampler:	ARM		

Instructions
Requested Turnaround Time: 5 day rush
Special Instructions: Bill to: 31-1-20060-001

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 12:50	Signature: Time:	Signature: Time:
Printed Name: Amber Masters Date: 3/14/18	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson Inc	Company:	Company:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: Kim Nelson Time: 9:23	Signature: Time:	Signature: Time:
Printed Name: Kim Nelson Date: 3/15/18	Printed Name: Date:	Printed Name: Date:
Company:	Company:	Company:

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

F-19-91/UR

5 90c

No. 34817

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-37135-1
SDG Number: 20060-001

Login Number: 37135
List Number: 1
Creator: Nelson, Kym D

List Source: 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:

Adam Wyborny

Title:

Environmental Engineering Staff

Date:

March 22, 2018

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

March 20, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-37135-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-37135-1

1. Laboratory

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

   ○ Yes ◉ No Comments:

ADEC has not approved an analytical laboratory for analysis of PFASs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

   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 Comments:

Analyses were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

   ◉ Yes ○ No Comments:

   b. Correct Analyses requested?

   ◉ Yes ○ No Comments:

3. Laboratory Sample Receipt Documentation

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

   ◉ Yes ○ No Comments:

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

   ◉ Yes ○ No Comments:

Analysis of PFASs does not require a preservative other than temperature control.

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

   ◉ Yes ○ No 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 Comments:

There were no discrepancies noted in the sample receipt documentation.

e. Data quality or usability affected?

Comments:

Data quality or usability is not affected; see above.

4. Case Narrative

a. Present and understandable?

◉ Yes ○ No Comments:

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

◉ Yes ○ No Comments:

The case narrative notes the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 5.9º C.

The case narrative notes there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) with preparation batch 320-213723.

c. Were all corrective actions documented?

○ Yes ◉ No Comments:

There were no corrective actions documented in the case narrative.

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 Comments:

b. All applicable holding times met?

◉ Yes ○ No Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met for all samples.

c. All soils reported on a dry weight basis?

○ Yes ◉ No Comments:

N/A; 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 Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

○ Yes ◉ No Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

◉ Yes ○ No Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

◉ Yes ○ No Comments:

iii. If above LOQ, what samples are affected?

Comments:

None; PFAS compounds were not detected in method blank sample.

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

○ Yes ◉ No Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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 Comments:

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

( ) Yes (●) No 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

(●) Yes ( ) No Comments:

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

(●) Yes ( ) No Comments:

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

Comments:

N/A; 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 Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

(•) Yes ( ) No Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a 13C-isotope of each target analyte, and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

(•) Yes ( ) No Comments:

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

( ) Yes (•) No Comments:

N/A; there were no IDA recovery failures associated with this work order.

iv. Data quality or usability affected?

Comments:

The data quality and usability are not affected; see above.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

( ) Yes (•) No Comments:

PFASs are not volatile compounds; 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 Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

○ Yes ◉ No Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not submitted with this work order.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

○ Yes ◉ No Comments:

A field duplicate sample was not submitted with this work order. However, field duplicate samples were collected with the frequency required for the overall project.

ii. Submitted blind to lab?

○ Yes ◉ No Comments:

N/A; a field duplicate was not submitted with this work order.

iii. Precision – All relative percent differences (RPD) less than specified DQOs? (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 Comments:

N/A; a field duplicate was not submitted with this work order.

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

Comments:

The data quality and usability were not affected.

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

○ Yes ○ No ◉ Not Applicable

Samples for this project are not collected with reusable equipment, therefore a practical potential for equipment based cross-contamination does not exist.

i. All results less than LOQ?

○ Yes ◉ No Comments:

N/A; an equipment blank was not submitted.

ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

a. Defined and appropriate?

○ Yes ◉ No Comments:

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

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 320-37396-1
TestAmerica Sample Delivery Group: 20060
Client Project/Site: FAI

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

Attn: Marcy Nadel

Authorized for release by:
3/28/2018 3:03:39 PM

David Alltucker, Project Manager I
(916)374-4383
david.alltucker@testamericainc.com

Table of Contents

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
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Job ID: 320-37396-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-37396-1

Receipt
The samples were received on 3/22/2018 2:45 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.1° C.

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

Organic Prep
Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-214840.

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: FAI

TestAmerica Job ID: 320-37396-1
SDG: 20060

Client Sample ID: 542547 — Lab Sample ID: 320-37396-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	80		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	97		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	30		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	34		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.8	J	2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	1.9	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 120553 — Lab Sample ID: 320-37396-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	4.7		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	24		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	4.2		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	7.2		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	150		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	9.4		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 121401 — Lab Sample ID: 320-37396-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanesulfonic acid (PFOS)	9.6		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-37396-1
SDG: 20060

Client Sample ID: 542547
Date Collected: 03/19/18 15:30
Date Received: 03/22/18 14:45

Lab Sample ID: 320-37396-1
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	80		2.0	0.92	ng/L		03/26/18 12:40	03/26/18 17:39	1
Perfluorohexanesulfonic acid (PFHxS)	97		2.0	0.87	ng/L		03/26/18 12:40	03/26/18 17:39	1
Perfluoroheptanoic acid (PFHpA)	30		2.0	0.80	ng/L		03/26/18 12:40	03/26/18 17:39	1
Perfluorooctanoic acid (PFOA)	34		2.0	0.75	ng/L		03/26/18 12:40	03/26/18 17:39	1
Perfluorooctanesulfonic acid (PFOS)	1.8	J	2.0	1.3	ng/L		03/26/18 12:40	03/26/18 17:39	1
Perfluorononanoic acid (PFNA)	1.9	J	2.0	0.65	ng/L		03/26/18 12:40	03/26/18 17:39	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*99*		*25 - 150*	*03/26/18 12:40*	*03/26/18 17:39*	*1*
13C4-PFHpA	*92*		*25 - 150*	*03/26/18 12:40*	*03/26/18 17:39*	*1*
13C4 PFOA	*84*		*25 - 150*	*03/26/18 12:40*	*03/26/18 17:39*	*1*
13C4 PFOS	*97*		*25 - 150*	*03/26/18 12:40*	*03/26/18 17:39*	*1*
13C5 PFNA	*94*		*25 - 150*	*03/26/18 12:40*	*03/26/18 17:39*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-37396-1
SDG: 20060

Client Sample ID: 120553
Date Collected: 03/19/18 14:41
Date Received: 03/22/18 14:45

Lab Sample ID: 320-37396-2
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	4.7		2.0	0.92	ng/L		03/26/18 12:40	03/26/18 17:58	1
Perfluorohexanesulfonic acid (PFHxS)	24		2.0	0.87	ng/L		03/26/18 12:40	03/26/18 17:58	1
Perfluoroheptanoic acid (PFHpA)	4.2		2.0	0.80	ng/L		03/26/18 12:40	03/26/18 17:58	1
Perfluorooctanoic acid (PFOA)	7.2		2.0	0.75	ng/L		03/26/18 12:40	03/26/18 17:58	1
Perfluorooctanesulfonic acid (PFOS)	150		2.0	1.3	ng/L		03/26/18 12:40	03/26/18 17:58	1
Perfluorononanoic acid (PFNA)	9.4		2.0	0.65	ng/L		03/26/18 12:40	03/26/18 17:58	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*109*		*25 - 150*	*03/26/18 12:40*	*03/26/18 17:58*	*1*
13C4-PFHpA	*118*		*25 - 150*	*03/26/18 12:40*	*03/26/18 17:58*	*1*
13C4 PFOA	*104*		*25 - 150*	*03/26/18 12:40*	*03/26/18 17:58*	*1*
13C4 PFOS	*106*		*25 - 150*	*03/26/18 12:40*	*03/26/18 17:58*	*1*
13C5 PFNA	*109*		*25 - 150*	*03/26/18 12:40*	*03/26/18 17:58*	*1*

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-37396-1
SDG: 20060

Client Sample ID: 121401
Date Collected: 03/20/18 15:40
Date Received: 03/22/18 14:45

Lab Sample ID: 320-37396-3
Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		03/26/18 12:40	03/26/18 18:16	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		03/26/18 12:40	03/26/18 18:16	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		03/26/18 12:40	03/26/18 18:16	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		03/26/18 12:40	03/26/18 18:16	1
Perfluorooctanesulfonic acid (PFOS)	**9.6**		2.0	1.3	ng/L		03/26/18 12:40	03/26/18 18:16	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		03/26/18 12:40	03/26/18 18:16	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*99*		*25 - 150*	*03/26/18 12:40*	*03/26/18 18:16*	*1*
13C4-PFHpA	*106*		*25 - 150*	*03/26/18 12:40*	*03/26/18 18:16*	*1*
13C4 PFOA	*96*		*25 - 150*	*03/26/18 12:40*	*03/26/18 18:16*	*1*
13C4 PFOS	*98*		*25 - 150*	*03/26/18 12:40*	*03/26/18 18:16*	*1*
13C5 PFNA	*101*		*25 - 150*	*03/26/18 12:40*	*03/26/18 18:16*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-37396-1
SDG: 20060

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)				
Lab Sample ID	Client Sample ID	PFHxS (25-150)	PFHpA (25-150)	PFOA (25-150)	PFOS (25-150)	PFNA (25-150)
320-37396-1	542547	99	92	84	97	94
320-37396-2	120553	109	118	104	106	109
320-37396-3	121401	99	106	96	98	101
LCS 320-214840/2-A	Lab Control Sample	106	109	92	104	103
LCSD 320-214840/3-A	Lab Control Sample Dup	105	107	93	103	104
MB 320-214840/1-A	Method Blank	105	107	92	102	102

Surrogate Legend

PFHxS = 18O2 PFHxS
PFHpA = 13C4-PFHpA
PFOA = 13C4 PFOA
PFOS = 13C4 PFOS
PFNA = 13C5 PFNA

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-214840/1-A
Matrix: Water
Analysis Batch: 214889

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 214840

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		03/26/18 12:40	03/26/18 16:44	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		03/26/18 12:40	03/26/18 16:44	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		03/26/18 12:40	03/26/18 16:44	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		03/26/18 12:40	03/26/18 16:44	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		03/26/18 12:40	03/26/18 16:44	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		03/26/18 12:40	03/26/18 16:44	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*105*		*25 - 150*	*03/26/18 12:40*	*03/26/18 16:44*	*1*
13C4-PFHpA	*107*		*25 - 150*	*03/26/18 12:40*	*03/26/18 16:44*	*1*
13C4 PFOA	*92*		*25 - 150*	*03/26/18 12:40*	*03/26/18 16:44*	*1*
13C4 PFOS	*102*		*25 - 150*	*03/26/18 12:40*	*03/26/18 16:44*	*1*
13C5 PFNA	*102*		*25 - 150*	*03/26/18 12:40*	*03/26/18 16:44*	*1*

Lab Sample ID: LCS 320-214840/2-A
Matrix: Water
Analysis Batch: 214889

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 214840

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorobutanesulfonic acid (PFBS)	17.7	17.2		ng/L		97	72 - 151
Perfluorohexanesulfonic acid (PFHxS)	18.2	17.8		ng/L		98	73 - 157
Perfluoroheptanoic acid (PFHpA)	20.0	18.8		ng/L		94	71 - 138
Perfluorooctanoic acid (PFOA)	20.0	21.0		ng/L		105	70 - 140
Perfluorooctanesulfonic acid (PFOS)	18.6	16.9		ng/L		91	69 - 144
Perfluorononanoic acid (PFNA)	20.0	19.5		ng/L		98	73 - 147

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*106*		*25 - 150*
13C4-PFHpA	*109*		*25 - 150*
13C4 PFOA	*92*		*25 - 150*
13C4 PFOS	*104*		*25 - 150*
13C5 PFNA	*103*		*25 - 150*

Lab Sample ID: LCSD 320-214840/3-A
Matrix: Water
Analysis Batch: 214889

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 214840

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)	17.7	16.8		ng/L		95	72 - 151	2	30
Perfluorohexanesulfonic acid (PFHxS)	18.2	17.8		ng/L		98	73 - 157	0	30
Perfluoroheptanoic acid (PFHpA)	20.0	19.4		ng/L		97	71 - 138	3	30
Perfluorooctanoic acid (PFOA)	20.0	22.4		ng/L		112	70 - 140	6	30
Perfluorooctanesulfonic acid (PFOS)	18.6	16.9		ng/L		91	69 - 144	0	30
Perfluorononanoic acid (PFNA)	20.0	18.9		ng/L		95	73 - 147	3	30

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	105		25 - 150
13C4-PFHpA	107		25 - 150
13C4 PFOA	93		25 - 150
13C4 PFOS	103		25 - 150
13C5 PFNA	104		25 - 150

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-37396-1
SDG: 20060

LCMS

Prep Batch: 214840

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-37396-1	542547	Total/NA	Water	PFAS Prep	
320-37396-2	120553	Total/NA	Water	PFAS Prep	
320-37396-3	121401	Total/NA	Water	PFAS Prep	
MB 320-214840/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-214840/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-214840/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 214889

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-37396-1	542547	Total/NA	Water	WS-LC-0025 At1	214840
320-37396-2	120553	Total/NA	Water	WS-LC-0025 At1	214840
320-37396-3	121401	Total/NA	Water	WS-LC-0025 At1	214840
MB 320-214840/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	214840
LCS 320-214840/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	214840
LCSD 320-214840/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	214840

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-37396-1
SDG: 20060

Client Sample ID: 542547
Date Collected: 03/19/18 15:30
Date Received: 03/22/18 14:45

Lab Sample ID: 320-37396-1
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	PFAS Prep			1.00 mL	1.66 mL	214840	03/26/18 12:40	AAR	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			214889	03/26/18 17:39	AAR	TAL SAC

Client Sample ID: 120553
Date Collected: 03/19/18 14:41
Date Received: 03/22/18 14:45

Lab Sample ID: 320-37396-2
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	PFAS Prep			1.00 mL	1.66 mL	214840	03/26/18 12:40	AAR	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			214889	03/26/18 17:58	AAR	TAL SAC

Client Sample ID: 121401
Date Collected: 03/20/18 15:40
Date Received: 03/22/18 14:45

Lab Sample ID: 320-37396-3
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	PFAS Prep			1.00 mL	1.66 mL	214840	03/26/18 12:40	AAR	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			214889	03/26/18 18:16	AAR	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-37396-1
SDG: 20060

Laboratory: TestAmerica Sacramento

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

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-020	01-20-21
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-18 *
Kansas	NELAP	7	E-10375	10-31-18
L-A-B	DoD ELAP		L2468	01-20-21
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-14-18
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-18 *
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-18
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

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

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-37396-1
SDG: 20060

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: FAI

TestAmerica Job ID: 320-37396-1
SDG: 20060

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-37396-1	542547	Water	03/19/18 15:30	03/22/18 14:45
320-37396-2	120553	Water	03/19/18 14:41	03/22/18 14:45
320-37396-3	121401	Water	03/20/18 15:40	03/22/18 14:45

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

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(907) 479-0600

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Portland, OR 97201-2498
(503) 223-6147

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Anchorage, AK 99518
(907) 561-2120

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

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Pasco, WA 99301-3378
(509) 946-6309

CHAIN-OF-CUSTODY RECORD

Laboratory Test America
Attn: David Althecker

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFAS x6						Total Number of Containers	Remarks/Matrix
542547		1530	3/19/18		X	X						2	groundwater
120 553		1441	3/19/18		X	X						2	
121401		1540	3/20/18		X	X						2	

320-37396 Chain of Custody

Project Information		Sample Receipt	
Project Number:	20060	Total Number of Containers	6
Project Name:	FAI	COC Seals/Intact? Y/N/NA	
Contact:	MDN	Received Good Cond./Cold	
Ongoing Project?	Yes ☒ No ☐	Delivery Method:	goldstreak
Sampler:	ARM	(attach shipping bill, if any)	

Instructions

Requested Turnaround Time: 5day rush

Special Instructions: Bill to: 31-1-20060-001

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 13:20	Signature: Time:	Signature: Time:
Printed Name: Craig Beebe Date: 3/21/2018	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson, Inc	Company:	Company:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: Time: 1445	Signature: Time:	Signature: Time:
Printed Name: David Althecker Date: 3/22/18	Printed Name: Date:	Printed Name: Date:
Company: TA Spokane	Company:	Company:

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

F-19-91/UR

2.1C

No. 34818

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-37396-1
SDG Number: 20060

Login Number: 37396
List Number: 1
Creator: Nelson, Kym D

List Source: 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	
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:

Kristen Freiburger

Title:

Senior Chemist

Date:

March 29, 2018

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

March 28, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-37396-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-37396-1

1. Laboratory

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

   ☐ Yes ☒ No Comments:

ADEC has not approved an analytical laboratory for analysis of PFASs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

   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 Comments:

Analyses were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

   ☒ Yes ☐ No Comments:

   b. Correct Analyses requested?

   ☒ Yes ☐ No Comments:

3. Laboratory Sample Receipt Documentation

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

   ☒ Yes ☐ No Comments:

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

   ☒ Yes ☐ No Comments:

Analysis of PFASs does not require a preservative other than temperature control.

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

   ☒ Yes ☐ No 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 Comments:

There were no discrepancies noted in the sample receipt documentation.

e. Data quality or usability affected?

Comments:

Data quality or usability is not affected; see above.

4. Case Narrative

a. Present and understandable?

☒ Yes ☐ No Comments:

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

☒ Yes ☐ No Comments:

The case narrative notes the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 2.1º C.

The case narrative notes there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) with preparation batch 320-214840.

c. Were all corrective actions documented?

☐ Yes ☒ No Comments:

There were no corrective actions documented in the case narrative.

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 Comments:

b. All applicable holding times met?

☑ Yes ☐ No Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met for all samples.

c. All soils reported on a dry weight basis?

☐ Yes ☑ No Comments:

N/A; 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 Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

☐ Yes ☑ No Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

☑ Yes ☐ No Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

☑ Yes ☐ No Comments:

iii. If above LOQ, what samples are affected?

Comments:

None; PFAS compounds were not detected in method blank sample.

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

☐ Yes ☑ No Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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 Comments:

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

☐ Yes ☑ No 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

☑ Yes ☐ No Comments:

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

☑ Yes ☐ No Comments:

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

Comments:

N/A; 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 Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

☒ Yes ☐ No Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a 13C-isotope of each target analyte, and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

☒ Yes ☐ No Comments:

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

☐ Yes ☒ No Comments:

N/A; there were no IDA recovery failures associated with this work order.

iv. Data quality or usability affected?

Comments:

The data quality and usability are not affected; see above.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

☐ Yes ☒ No Comments:

PFASs are not volatile compounds; 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 Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not submitted with this work order.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

☐ Yes ☒ No Comments:

A field duplicate sample was not submitted with this work order. However, field duplicate samples are collected at the proper frequency for the overall project.

ii. Submitted blind to lab?

☐ Yes ☒ No Comments:

N/A; a field duplicate was not submitted with this work order.

iii. Precision – All relative percent differences (RPD) less than specified DQOs? (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 Comments:

N/A; a field duplicate was not submitted with this work order.

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

Comments:

The data quality and usability were not affected.

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

☐ Yes ☐ No ☒ Not Applicable

Samples for this project are not collected with reusable equipment, therefore a practical potential for equipment based cross-contamination does not exist.

i. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; an equipment blank was not submitted.

ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

a. Defined and appropriate?

☐ Yes ☒ No Comments:

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

MDN