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: 320-39183-1
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:
5/16/2018 3:14:28 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: 320-39183-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-39183-1

Receipt
The sample was received on 5/10/2018 3:20 PM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.6° 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 320-223243.

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: 320-39183-1
SDG: 20060.001

Client Sample ID: 176729

Lab Sample ID: 320-39183-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	0.95	J	2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	5.1		2.0	0.87	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)	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: 320-39183-1
SDG: 20060.001

Client Sample ID: 176729
Date Collected: 05/09/18 12:32
Date Received: 05/11/18 15:20

Lab Sample ID: 320-39183-1
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**0.95**	**J**	2.0	0.92	ng/L		05/15/18 09:26	05/15/18 16:30	1
Perfluorohexanesulfonic acid (PFHxS)	**5.1**		2.0	0.87	ng/L		05/15/18 09:26	05/15/18 16:30	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		05/15/18 09:26	05/15/18 16:30	1
Perfluorooctanoic acid (PFOA)	**1.7**	**J**	2.0	0.75	ng/L		05/15/18 09:26	05/15/18 16:30	1
Perfluorooctanesulfonic acid (PFOS)	**2.3**		2.0	1.3	ng/L		05/15/18 09:26	05/15/18 16:30	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		05/15/18 09:26	05/15/18 16:30	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*103*		*25 - 150*	*05/15/18 09:26*	*05/15/18 16:30*	*1*
13C4-PFHpA	*107*		*25 - 150*	*05/15/18 09:26*	*05/15/18 16:30*	*1*
13C4 PFOA	*107*		*25 - 150*	*05/15/18 09:26*	*05/15/18 16:30*	*1*
13C4 PFOS	*102*		*25 - 150*	*05/15/18 09:26*	*05/15/18 16:30*	*1*
13C5 PFNA	*109*		*25 - 150*	*05/15/18 09:26*	*05/15/18 16:30*	*1*

Isotope Dilution Summary

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

TestAmerica Job ID: 320-39183-1
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)
320-39183-1	176729	103	107	107	102	109
LCS 320-223243/2-A	Lab Control Sample	99	101	106	98	104
LCSD 320-223243/3-A	Lab Control Sample Dup	96	105	104	99	99
MB 320-223243/1-A	Method Blank	95	97	101	94	100

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 320-223243/1-A
Matrix: Water
Analysis Batch: 223388

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 223243

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		05/15/18 09:26	05/15/18 10:59	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		05/15/18 09:26	05/15/18 10:59	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		05/15/18 09:26	05/15/18 10:59	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		05/15/18 09:26	05/15/18 10:59	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		05/15/18 09:26	05/15/18 10:59	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		05/15/18 09:26	05/15/18 10:59	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*95*		*25 - 150*	*05/15/18 09:26*	*05/15/18 10:59*	*1*
13C4-PFHpA	*97*		*25 - 150*	*05/15/18 09:26*	*05/15/18 10:59*	*1*
13C4 PFOA	*101*		*25 - 150*	*05/15/18 09:26*	*05/15/18 10:59*	*1*
13C4 PFOS	*94*		*25 - 150*	*05/15/18 09:26*	*05/15/18 10:59*	*1*
13C5 PFNA	*100*		*25 - 150*	*05/15/18 09:26*	*05/15/18 10:59*	*1*

Lab Sample ID: LCS 320-223243/2-A
Matrix: Water
Analysis Batch: 223388

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 223243

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	20.1		ng/L		114	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	19.8		ng/L		109	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	23.1		ng/L		116	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	22.1		ng/L		110	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	21.1		ng/L		114	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	23.1		ng/L		116	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*99*		*25 - 150*
13C4-PFHpA	*101*		*25 - 150*
13C4 PFOA	*106*		*25 - 150*
13C4 PFOS	*98*		*25 - 150*
13C5 PFNA	*104*		*25 - 150*

Lab Sample ID: LCSD 320-223243/3-A
Matrix: Water
Analysis Batch: 223388

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 223243

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	20.5		ng/L		116	72 - 151	2	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	20.6		ng/L		113	73 - 157	4	30
Perfluoroheptanoic acid (PFHpA)			20.0	21.1		ng/L		106	71 - 138	9	30
Perfluorooctanoic acid (PFOA)			20.0	23.1		ng/L		115	70 - 140	4	30
Perfluorooctanesulfonic acid (PFOS)			18.6	19.9		ng/L		107	69 - 144	6	30
Perfluorononanoic acid (PFNA)			20.0	22.8		ng/L		114	73 - 147	2	30

QC Sample Results

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

TestAmerica Job ID: 320-39183-1
SDG: 20060.001

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	96		25 - 150
13C4-PFHpA	105		25 - 150
13C4 PFOA	104		25 - 150
13C4 PFOS	99		25 - 150
13C5 PFNA	99		25 - 150

LCMS

Prep Batch: 223243

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-39183-1	176729	Total/NA	Water	PFAS Prep	
MB 320-223243/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-223243/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-223243/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 223388

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-39183-1	176729	Total/NA	Water	WS-LC-0025 At1	223243
MB 320-223243/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	223243
LCS 320-223243/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	223243
LCSD 320-223243/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	223243

Lab Chronicle

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

TestAmerica Job ID: 320-39183-1
SDG: 20060.001

Client Sample ID: 176729
Date Collected: 05/09/18 12:32
Date Received: 05/11/18 15:20

Lab Sample ID: 320-39183-1
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	223243	05/15/18 09:26	ABH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			223388	05/15/18 16:30	SHK	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: 320-39183-1
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	06-17-19
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	03-17-19
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	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
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
Vermont	State Program	1	VT-4040	04-30-19
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: 320-39183-1
SDG: 20060.001

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC
PFAS Prep	Preparation, Direct Inject PFAS	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: 320-39183-1
SDG: 20060.001

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-39183-1	176729	Water	05/09/18 12:32	05/11/18 15:20

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

CHAIN-OF-CUSTODY RECORD

Laboratory Test America
Attn: D. 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
176729		1232	5/9/18		X	X						2	groundwater

320-39183 Chain of Custody

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:	
Sampler:	AM	(attach shipping bill, if any)	

Instructions	
Requested Turnaround Time:	Rush, 5 day
Special Instructions:	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: 19:20	Signature:	Signature: Time:
Printed Name: A. Masters Date: 5/9/18	Printed Name: Date:	Printed Name: Date:
Company: Shannon+Wilson Inc	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 1520	Signature: Time:	Signature: Time:
Printed Name: David Her Date: 5/10/18	Printed Name: Date:	Printed Name: Date:
Company: ASM	Company:	Company:

F-19-91/UR

5.CC

No. 34947

5/16/2018

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-39183-1
SDG Number: 20060.001

Login Number: 39183
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.	False	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:

May 17, 2018

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

May 16, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-39183-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-39183-1

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:

The sample cooler was recorded at 5.6° C upon receipt at the laboratory.

   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 5.6° C.

The case narrative notes there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) with preparation batch 320-223243.

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.

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: 320-39184-1
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:
5/30/2018 12:54:23 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: 320-39184-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-39184-1

Receipt
The samples were received on 5/10/2018 3:20 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.6º 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 320-225947.

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: 320-39184-1
SDG: 20060.001

Client Sample ID: 569712 — Lab Sample ID: 320-39184-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	50		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	190		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)	9.2		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	6.8		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 151637 — Lab Sample ID: 320-39184-2

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)	2.9		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	0.88	J	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: 176044 — Lab Sample ID: 320-39184-3

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)	32		2.0	0.87	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)	42		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 174271 — Lab Sample ID: 320-39184-4

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)	21		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	4.9		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	7.5		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	52		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 176222 — Lab Sample ID: 320-39184-5

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

This Detection Summary does not include radiochemical test results.

Client Sample ID: 176222 (Continued) — Lab Sample ID: 320-39184-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	10		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.96	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	5.4		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	6.3		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 550124 — Lab Sample ID: 320-39184-6

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)	30		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)	19		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	19		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 550116 — Lab Sample ID: 320-39184-7

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)	41		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.7		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)	12		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 550216 — Lab Sample ID: 320-39184-8

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)	40		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)	5.4		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: 151203 — Lab Sample ID: 320-39184-9

This Detection Summary does not include radiochemical test results.

Client Sample ID: 151203 (Continued) — Lab Sample ID: 320-39184-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	5.2		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)	1.7	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)	36		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 173908 — Lab Sample ID: 320-39184-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	49		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	220		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	18		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)	6.7		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: 320-39184-1
SDG: 20060.001

Client Sample ID: 569712
Date Collected: 05/08/18 10:37
Date Received: 05/10/18 15:20

Lab Sample ID: 320-39184-1
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**50**		2.0	0.92	ng/L		05/29/18 11:04	05/29/18 16:23	1
Perfluorohexanesulfonic acid (PFHxS)	**190**		2.0	0.87	ng/L		05/29/18 11:04	05/29/18 16:23	1
Perfluoroheptanoic acid (PFHpA)	**15**		2.0	0.80	ng/L		05/29/18 11:04	05/29/18 16:23	1
Perfluorooctanoic acid (PFOA)	**9.2**		2.0	0.75	ng/L		05/29/18 11:04	05/29/18 16:23	1
Perfluorooctanesulfonic acid (PFOS)	**6.8**		2.0	1.3	ng/L		05/29/18 11:04	05/29/18 16:23	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		05/29/18 11:04	05/29/18 16:23	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*96*		*25 - 150*	*05/29/18 11:04*	*05/29/18 16:23*	*1*
13C4-PFHpA	*102*		*25 - 150*	*05/29/18 11:04*	*05/29/18 16:23*	*1*
13C4 PFOA	*102*		*25 - 150*	*05/29/18 11:04*	*05/29/18 16:23*	*1*
13C4 PFOS	*91*		*25 - 150*	*05/29/18 11:04*	*05/29/18 16:23*	*1*
13C5 PFNA	*100*		*25 - 150*	*05/29/18 11:04*	*05/29/18 16:23*	*1*

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

TestAmerica Job ID: 320-39184-1
SDG: 20060.001

Client Sample ID: 151637
Date Collected: 05/08/18 09:29
Date Received: 05/10/18 15:20

Lab Sample ID: 320-39184-2
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		05/29/18 11:04	05/29/18 16:42	1
Perfluorohexanesulfonic acid (PFHxS)	**2.9**		2.0	0.87	ng/L		05/29/18 11:04	05/29/18 16:42	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		05/29/18 11:04	05/29/18 16:42	1
Perfluorooctanoic acid (PFOA)	**0.88**	**J**	2.0	0.75	ng/L		05/29/18 11:04	05/29/18 16:42	1
Perfluorooctanesulfonic acid (PFOS)	**6.2**		2.0	1.3	ng/L		05/29/18 11:04	05/29/18 16:42	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		05/29/18 11:04	05/29/18 16:42	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*95*		*25 - 150*	*05/29/18 11:04*	*05/29/18 16:42*	*1*
13C4-PFHpA	*103*		*25 - 150*	*05/29/18 11:04*	*05/29/18 16:42*	*1*
13C4 PFOA	*105*		*25 - 150*	*05/29/18 11:04*	*05/29/18 16:42*	*1*
13C4 PFOS	*94*		*25 - 150*	*05/29/18 11:04*	*05/29/18 16:42*	*1*
13C5 PFNA	*107*		*25 - 150*	*05/29/18 11:04*	*05/29/18 16:42*	*1*

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

TestAmerica Job ID: 320-39184-1
SDG: 20060.001

Client Sample ID: 176044
Date Collected: 05/08/18 12:18
Date Received: 05/10/18 15:20

Lab Sample ID: 320-39184-3
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**4.5**		2.0	0.92	ng/L		05/29/18 11:04	05/29/18 17:00	1
Perfluorohexanesulfonic acid (PFHxS)	**32**		2.0	0.87	ng/L		05/29/18 11:04	05/29/18 17:00	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		05/29/18 11:04	05/29/18 17:00	1
Perfluorooctanoic acid (PFOA)	**15**		2.0	0.75	ng/L		05/29/18 11:04	05/29/18 17:00	1
Perfluorooctanesulfonic acid (PFOS)	**42**		2.0	1.3	ng/L		05/29/18 11:04	05/29/18 17:00	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		05/29/18 11:04	05/29/18 17:00	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*97*		*25 - 150*	*05/29/18 11:04*	*05/29/18 17:00*	*1*
13C4-PFHpA	*101*		*25 - 150*	*05/29/18 11:04*	*05/29/18 17:00*	*1*
13C4 PFOA	*105*		*25 - 150*	*05/29/18 11:04*	*05/29/18 17:00*	*1*
13C4 PFOS	*95*		*25 - 150*	*05/29/18 11:04*	*05/29/18 17:00*	*1*
13C5 PFNA	*109*		*25 - 150*	*05/29/18 11:04*	*05/29/18 17:00*	*1*

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

TestAmerica Job ID: 320-39184-1
SDG: 20060.001

Client Sample ID: 174271
Date Collected: 05/08/18 11:33
Date Received: 05/10/18 15:20

Lab Sample ID: 320-39184-4
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	11		2.0	0.92	ng/L		05/29/18 11:04	05/29/18 17:37	1
Perfluorohexanesulfonic acid (PFHxS)	21		2.0	0.87	ng/L		05/29/18 11:04	05/29/18 17:37	1
Perfluoroheptanoic acid (PFHpA)	4.9		2.0	0.80	ng/L		05/29/18 11:04	05/29/18 17:37	1
Perfluorooctanoic acid (PFOA)	7.5		2.0	0.75	ng/L		05/29/18 11:04	05/29/18 17:37	1
Perfluorooctanesulfonic acid (PFOS)	52		2.0	1.3	ng/L		05/29/18 11:04	05/29/18 17:37	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		05/29/18 11:04	05/29/18 17:37	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*97*		*25 - 150*	*05/29/18 11:04*	*05/29/18 17:37*	*1*
13C4-PFHpA	*104*		*25 - 150*	*05/29/18 11:04*	*05/29/18 17:37*	*1*
13C4 PFOA	*110*		*25 - 150*	*05/29/18 11:04*	*05/29/18 17:37*	*1*
13C4 PFOS	*92*		*25 - 150*	*05/29/18 11:04*	*05/29/18 17:37*	*1*
13C5 PFNA	*97*		*25 - 150*	*05/29/18 11:04*	*05/29/18 17:37*	*1*

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

TestAmerica Job ID: 320-39184-1
SDG: 20060.001

Client Sample ID: 176222
Date Collected: 05/08/18 14:22
Date Received: 05/10/18 15:20

Lab Sample ID: 320-39184-5
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**1.6**	**J**	2.0	0.92	ng/L		05/29/18 11:04	05/29/18 17:55	1
Perfluorohexanesulfonic acid (PFHxS)	**10**		2.0	0.87	ng/L		05/29/18 11:04	05/29/18 17:55	1
Perfluoroheptanoic acid (PFHpA)	**0.96**	**J**	2.0	0.80	ng/L		05/29/18 11:04	05/29/18 17:55	1
Perfluorooctanoic acid (PFOA)	**5.4**		2.0	0.75	ng/L		05/29/18 11:04	05/29/18 17:55	1
Perfluorooctanesulfonic acid (PFOS)	**6.3**		2.0	1.3	ng/L		05/29/18 11:04	05/29/18 17:55	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		05/29/18 11:04	05/29/18 17:55	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*108*		*25 - 150*	*05/29/18 11:04*	*05/29/18 17:55*	*1*
13C4-PFHpA	*115*		*25 - 150*	*05/29/18 11:04*	*05/29/18 17:55*	*1*
13C4 PFOA	*116*		*25 - 150*	*05/29/18 11:04*	*05/29/18 17:55*	*1*
13C4 PFOS	*99*		*25 - 150*	*05/29/18 11:04*	*05/29/18 17:55*	*1*
13C5 PFNA	*114*		*25 - 150*	*05/29/18 11:04*	*05/29/18 17:55*	*1*

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

TestAmerica Job ID: 320-39184-1
SDG: 20060.001

Client Sample ID: 550124
Date Collected: 05/08/18 15:48
Date Received: 05/10/18 15:20

Lab Sample ID: 320-39184-6
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		05/29/18 11:04	05/29/18 18:14	1
Perfluorohexanesulfonic acid (PFHxS)	30		2.0	0.87	ng/L		05/29/18 11:04	05/29/18 18:14	1
Perfluoroheptanoic acid (PFHpA)	11		2.0	0.80	ng/L		05/29/18 11:04	05/29/18 18:14	1
Perfluorooctanoic acid (PFOA)	19		2.0	0.75	ng/L		05/29/18 11:04	05/29/18 18:14	1
Perfluorooctanesulfonic acid (PFOS)	19		2.0	1.3	ng/L		05/29/18 11:04	05/29/18 18:14	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		05/29/18 11:04	05/29/18 18:14	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*99*		*25 - 150*	*05/29/18 11:04*	*05/29/18 18:14*	*1*
13C4-PFHpA	*110*		*25 - 150*	*05/29/18 11:04*	*05/29/18 18:14*	*1*
13C4 PFOA	*110*		*25 - 150*	*05/29/18 11:04*	*05/29/18 18:14*	*1*
13C4 PFOS	*100*		*25 - 150*	*05/29/18 11:04*	*05/29/18 18:14*	*1*
13C5 PFNA	*115*		*25 - 150*	*05/29/18 11:04*	*05/29/18 18:14*	*1*

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

TestAmerica Job ID: 320-39184-1
SDG: 20060.001

Client Sample ID: 550116
Date Collected: 05/09/18 11:18
Date Received: 05/10/18 15:20

Lab Sample ID: 320-39184-7
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**10**		2.0	0.92	ng/L		05/29/18 11:04	05/29/18 18:32	1
Perfluorohexanesulfonic acid (PFHxS)	**41**		2.0	0.87	ng/L		05/29/18 11:04	05/29/18 18:32	1
Perfluoroheptanoic acid (PFHpA)	**2.7**		2.0	0.80	ng/L		05/29/18 11:04	05/29/18 18:32	1
Perfluorooctanoic acid (PFOA)	**5.5**		2.0	0.75	ng/L		05/29/18 11:04	05/29/18 18:32	1
Perfluorooctanesulfonic acid (PFOS)	**12**		2.0	1.3	ng/L		05/29/18 11:04	05/29/18 18:32	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		05/29/18 11:04	05/29/18 18:32	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*97*		*25 - 150*	*05/29/18 11:04*	*05/29/18 18:32*	*1*
13C4-PFHpA	*106*		*25 - 150*	*05/29/18 11:04*	*05/29/18 18:32*	*1*
13C4 PFOA	*109*		*25 - 150*	*05/29/18 11:04*	*05/29/18 18:32*	*1*
13C4 PFOS	*93*		*25 - 150*	*05/29/18 11:04*	*05/29/18 18:32*	*1*
13C5 PFNA	*103*		*25 - 150*	*05/29/18 11:04*	*05/29/18 18:32*	*1*

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

TestAmerica Job ID: 320-39184-1
SDG: 20060.001

Client Sample ID: 550216
Date Collected: 05/09/18 11:08
Date Received: 05/10/18 15:20

Lab Sample ID: 320-39184-8
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**9.5**		2.0	0.92	ng/L		05/29/18 11:04	05/29/18 18:50	1
Perfluorohexanesulfonic acid (PFHxS)	**40**		2.0	0.87	ng/L		05/29/18 11:04	05/29/18 18:50	1
Perfluoroheptanoic acid (PFHpA)	**2.6**		2.0	0.80	ng/L		05/29/18 11:04	05/29/18 18:50	1
Perfluorooctanoic acid (PFOA)	**5.4**		2.0	0.75	ng/L		05/29/18 11:04	05/29/18 18:50	1
Perfluorooctanesulfonic acid (PFOS)	**12**		2.0	1.3	ng/L		05/29/18 11:04	05/29/18 18:50	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		05/29/18 11:04	05/29/18 18:50	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*98*		*25 - 150*	*05/29/18 11:04*	*05/29/18 18:50*	*1*
13C4-PFHpA	*103*		*25 - 150*	*05/29/18 11:04*	*05/29/18 18:50*	*1*
13C4 PFOA	*104*		*25 - 150*	*05/29/18 11:04*	*05/29/18 18:50*	*1*
13C4 PFOS	*93*		*25 - 150*	*05/29/18 11:04*	*05/29/18 18:50*	*1*
13C5 PFNA	*101*		*25 - 150*	*05/29/18 11:04*	*05/29/18 18:50*	*1*

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

TestAmerica Job ID: 320-39184-1
SDG: 20060.001

Client Sample ID: 151203
Date Collected: 05/09/18 13:15
Date Received: 05/10/18 15:20

Lab Sample ID: 320-39184-9
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**5.2**		2.0	0.92	ng/L		05/29/18 11:04	05/29/18 19:09	1
Perfluorohexanesulfonic acid (PFHxS)	**12**		2.0	0.87	ng/L		05/29/18 11:04	05/29/18 19:09	1
Perfluoroheptanoic acid (PFHpA)	**1.7**	**J**	2.0	0.80	ng/L		05/29/18 11:04	05/29/18 19:09	1
Perfluorooctanoic acid (PFOA)	**3.4**		2.0	0.75	ng/L		05/29/18 11:04	05/29/18 19:09	1
Perfluorooctanesulfonic acid (PFOS)	**36**		2.0	1.3	ng/L		05/29/18 11:04	05/29/18 19:09	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		05/29/18 11:04	05/29/18 19:09	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*97*		*25 - 150*	*05/29/18 11:04*	*05/29/18 19:09*	*1*
13C4-PFHpA	*105*		*25 - 150*	*05/29/18 11:04*	*05/29/18 19:09*	*1*
13C4 PFOA	*109*		*25 - 150*	*05/29/18 11:04*	*05/29/18 19:09*	*1*
13C4 PFOS	*97*		*25 - 150*	*05/29/18 11:04*	*05/29/18 19:09*	*1*
13C5 PFNA	*105*		*25 - 150*	*05/29/18 11:04*	*05/29/18 19:09*	*1*

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

TestAmerica Job ID: 320-39184-1
SDG: 20060.001

Client Sample ID: 173908
Date Collected: 05/09/18 14:32
Date Received: 05/10/18 15:20

Lab Sample ID: 320-39184-10
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**49**		2.0	0.92	ng/L		05/29/18 11:04	05/29/18 19:27	1
Perfluorohexanesulfonic acid (PFHxS)	**220**		2.0	0.87	ng/L		05/29/18 11:04	05/29/18 19:27	1
Perfluoroheptanoic acid (PFHpA)	**18**		2.0	0.80	ng/L		05/29/18 11:04	05/29/18 19:27	1
Perfluorooctanoic acid (PFOA)	**9.8**		2.0	0.75	ng/L		05/29/18 11:04	05/29/18 19:27	1
Perfluorooctanesulfonic acid (PFOS)	**6.7**		2.0	1.3	ng/L		05/29/18 11:04	05/29/18 19:27	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		05/29/18 11:04	05/29/18 19:27	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*97*		*25 - 150*	*05/29/18 11:04*	*05/29/18 19:27*	*1*
13C4-PFHpA	*101*		*25 - 150*	*05/29/18 11:04*	*05/29/18 19:27*	*1*
13C4 PFOA	*106*		*25 - 150*	*05/29/18 11:04*	*05/29/18 19:27*	*1*
13C4 PFOS	*96*		*25 - 150*	*05/29/18 11:04*	*05/29/18 19:27*	*1*
13C5 PFNA	*106*		*25 - 150*	*05/29/18 11:04*	*05/29/18 19:27*	*1*

Isotope Dilution Summary

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

TestAmerica Job ID: 320-39184-1
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)
320-39184-1	569712	96	102	102	91	100
320-39184-2	151637	95	103	105	94	107
320-39184-3	176044	97	101	105	95	109
320-39184-4	174271	97	104	110	92	97
320-39184-5	176222	108	115	116	99	114
320-39184-6	550124	99	110	110	100	115
320-39184-7	550116	97	106	109	93	103
320-39184-8	550216	98	103	104	93	101
320-39184-9	151203	97	105	109	97	105
320-39184-10	173908	97	101	106	96	106
LCS 320-225947/2-A	Lab Control Sample	99	98	105	97	97
LCSD 320-225947/3-A	Lab Control Sample Dup	96	102	99	94	103
MB 320-225947/1-A	Method Blank	97	96	99	94	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 320-225947/1-A
Matrix: Water
Analysis Batch: 225992

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 225947

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		05/29/18 11:04	05/29/18 14:15	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		05/29/18 11:04	05/29/18 14:15	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		05/29/18 11:04	05/29/18 14:15	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		05/29/18 11:04	05/29/18 14:15	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		05/29/18 11:04	05/29/18 14:15	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		05/29/18 11:04	05/29/18 14:15	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*97*		*25 - 150*	*05/29/18 11:04*	*05/29/18 14:15*	*1*
13C4-PFHpA	*96*		*25 - 150*	*05/29/18 11:04*	*05/29/18 14:15*	*1*
13C4 PFOA	*99*		*25 - 150*	*05/29/18 11:04*	*05/29/18 14:15*	*1*
13C4 PFOS	*94*		*25 - 150*	*05/29/18 11:04*	*05/29/18 14:15*	*1*
13C5 PFNA	*98*		*25 - 150*	*05/29/18 11:04*	*05/29/18 14:15*	*1*

Lab Sample ID: LCS 320-225947/2-A
Matrix: Water
Analysis Batch: 225992

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 225947

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	19.1		ng/L		108	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	19.0		ng/L		104	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	21.7		ng/L		108	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	19.7		ng/L		98	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	18.8		ng/L		101	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	21.5		ng/L		107	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*99*		*25 - 150*
13C4-PFHpA	*98*		*25 - 150*
13C4 PFOA	*105*		*25 - 150*
13C4 PFOS	*97*		*25 - 150*
13C5 PFNA	*97*		*25 - 150*

Lab Sample ID: LCSD 320-225947/3-A
Matrix: Water
Analysis Batch: 225992

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 225947

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	19.5		ng/L		111	72 - 151	2	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	18.7		ng/L		103	73 - 157	1	30
Perfluoroheptanoic acid (PFHpA)			20.0	21.1		ng/L		105	71 - 138	3	30
Perfluorooctanoic acid (PFOA)			20.0	20.6		ng/L		103	70 - 140	5	30
Perfluorooctanesulfonic acid (PFOS)			18.6	19.0		ng/L		102	69 - 144	1	30
Perfluorononanoic acid (PFNA)			20.0	20.9		ng/L		104	73 - 147	3	30

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	96		25 - 150
13C4-PFHpA	102		25 - 150
13C4 PFOA	99		25 - 150
13C4 PFOS	94		25 - 150
13C5 PFNA	103		25 - 150

LCMS

Prep Batch: 225947

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-39184-1	569712	Total/NA	Water	PFAS Prep	
320-39184-2	151637	Total/NA	Water	PFAS Prep	
320-39184-3	176044	Total/NA	Water	PFAS Prep	
320-39184-4	174271	Total/NA	Water	PFAS Prep	
320-39184-5	176222	Total/NA	Water	PFAS Prep	
320-39184-6	550124	Total/NA	Water	PFAS Prep	
320-39184-7	550116	Total/NA	Water	PFAS Prep	
320-39184-8	550216	Total/NA	Water	PFAS Prep	
320-39184-9	151203	Total/NA	Water	PFAS Prep	
320-39184-10	173908	Total/NA	Water	PFAS Prep	
MB 320-225947/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-225947/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-225947/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 225992

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-39184-1	569712	Total/NA	Water	WS-LC-0025 At1	225947
320-39184-2	151637	Total/NA	Water	WS-LC-0025 At1	225947
320-39184-3	176044	Total/NA	Water	WS-LC-0025 At1	225947
320-39184-4	174271	Total/NA	Water	WS-LC-0025 At1	225947
320-39184-5	176222	Total/NA	Water	WS-LC-0025 At1	225947
320-39184-6	550124	Total/NA	Water	WS-LC-0025 At1	225947
320-39184-7	550116	Total/NA	Water	WS-LC-0025 At1	225947
320-39184-8	550216	Total/NA	Water	WS-LC-0025 At1	225947
320-39184-9	151203	Total/NA	Water	WS-LC-0025 At1	225947
320-39184-10	173908	Total/NA	Water	WS-LC-0025 At1	225947
MB 320-225947/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	225947
LCS 320-225947/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	225947
LCSD 320-225947/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	225947

Lab Chronicle

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

TestAmerica Job ID: 320-39184-1
SDG: 20060.001

Client Sample ID: 569712
Date Collected: 05/08/18 10:37
Date Received: 05/10/18 15:20

Lab Sample ID: 320-39184-1
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	225947	05/29/18 11:04	AAR	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			225992	05/29/18 16:23	SHK	TAL SAC

Client Sample ID: 151637
Date Collected: 05/08/18 09:29
Date Received: 05/10/18 15:20

Lab Sample ID: 320-39184-2
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	225947	05/29/18 11:04	AAR	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			225992	05/29/18 16:42	SHK	TAL SAC

Client Sample ID: 176044
Date Collected: 05/08/18 12:18
Date Received: 05/10/18 15:20

Lab Sample ID: 320-39184-3
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	225947	05/29/18 11:04	AAR	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			225992	05/29/18 17:00	SHK	TAL SAC

Client Sample ID: 174271
Date Collected: 05/08/18 11:33
Date Received: 05/10/18 15:20

Lab Sample ID: 320-39184-4
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	225947	05/29/18 11:04	AAR	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			225992	05/29/18 17:37	SHK	TAL SAC

Client Sample ID: 176222
Date Collected: 05/08/18 14:22
Date Received: 05/10/18 15:20

Lab Sample ID: 320-39184-5
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	225947	05/29/18 11:04	AAR	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			225992	05/29/18 17:55	SHK	TAL SAC

Client Sample ID: 550124
Date Collected: 05/08/18 15:48
Date Received: 05/10/18 15:20

Lab Sample ID: 320-39184-6
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	225947	05/29/18 11:04	AAR	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			225992	05/29/18 18:14	SHK	TAL SAC

Lab Chronicle

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

TestAmerica Job ID: 320-39184-1
SDG: 20060.001

Client Sample ID: 550116
Date Collected: 05/09/18 11:18
Date Received: 05/10/18 15:20

Lab Sample ID: 320-39184-7
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	225947	05/29/18 11:04	AAR	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			225992	05/29/18 18:32	SHK	TAL SAC

Client Sample ID: 550216
Date Collected: 05/09/18 11:08
Date Received: 05/10/18 15:20

Lab Sample ID: 320-39184-8
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	225947	05/29/18 11:04	AAR	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			225992	05/29/18 18:50	SHK	TAL SAC

Client Sample ID: 151203
Date Collected: 05/09/18 13:15
Date Received: 05/10/18 15:20

Lab Sample ID: 320-39184-9
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	225947	05/29/18 11:04	AAR	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			225992	05/29/18 19:09	SHK	TAL SAC

Client Sample ID: 173908
Date Collected: 05/09/18 14:32
Date Received: 05/10/18 15:20

Lab Sample ID: 320-39184-10
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	225947	05/29/18 11:04	AAR	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			225992	05/29/18 19:27	SHK	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: 320-39184-1
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	06-17-19
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	03-17-19
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	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
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
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

Method Summary

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

TestAmerica Job ID: 320-39184-1
SDG: 20060.001

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC
PFAS Prep	Preparation, Direct Inject PFAS	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: 320-39184-1
SDG: 20060.001

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-39184-1	569712	Water	05/08/18 10:37	05/10/18 15:20
320-39184-2	151637	Water	05/08/18 09:29	05/10/18 15:20
320-39184-3	176044	Water	05/08/18 12:18	05/10/18 15:20
320-39184-4	174271	Water	05/08/18 11:33	05/10/18 15:20
320-39184-5	176222	Water	05/08/18 14:22	05/10/18 15:20
320-39184-6	550124	Water	05/08/18 15:48	05/10/18 15:20
320-39184-7	550116	Water	05/09/18 11:18	05/10/18 15:20
320-39184-8	550216	Water	05/09/18 11:08	05/10/18 15:20
320-39184-9	151203	Water	05/09/18 13:15	05/10/18 15:20
320-39184-10	173908	Water	05/09/18 14:32	05/10/18 15:20


320-39184 Chain of Custody

CHAIN-OF-CUSTODY

Attn: Test America D. Alltucker

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

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
569712		1037	5/8/18		X	X						2	groundwater
151637		0929	5/8/18		X	X						2	
176044		1218	5/8/18		X	X						2	
174271		1133	5/8/18		X	X						2	
176222		1422	5/8/18		X	X						2	
550124		1548	5/8/18		X	X						2	
~~176729~~		~~1232~~	~~5/9/18~~		~~X~~	~~X~~						~~2~~	AM
550116		1118	5/9/18		X	X						2	
550216		1108	5/9/18		X	X						2	
151203		1315	5/9/18		X	X						2	

Project Information		Sample Receipt	
Project Number:	20060-001	Total Number of Containers	
Project Name:	FAI	COC Seals/Intact? Y/N/NA	
Contact:	MDW	Received Good Cond./Cold	
Ongoing Project?	Yes ☒ No ☐	Delivery Method:	gold streak
Sampler:	ARM, CAB	(attach shipping bill, if any)	

Instructions

Requested Turnaround Time: Standard

Special Instructions: 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: 1515	Time: 1520	Time:
Printed Name: A. Masters	Printed Name: D. Hu	Printed Name:
Date: 5/9/18	Date: 5/10/16	Date:
Company: Shannon+Wilson, Inc	Company: TA Sac	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature:	Signature:	Signature:
Time: 1520	Time:	Time:
Printed Name: David Hu	Printed Name:	Printed Name:
Date: 5/10/16	Date:	Date:
Company: TA Sac	Company:	Company:

F-19-91/UR

5.6c

No. 34945

5/30/2018

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

CHAIN-OF-CUSTODY RECORD

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

2355 Hill Road
Fairbanks, AK 99709
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2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

2043 Westport Center Drive
St. Louis, MO 63146-3564
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5430 Fairbanks Street, Suite 3
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Denver, CO 80204
(303) 825-3800

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

Page 2 of 2

Laboratory Test America
Attn: D. Allwine

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
173908	1	1432	5/9/18		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: Standard

Special Instructions: 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: DH	Signature:
Time: 1515	Time: 1520	Time:
Printed Name: Amber Masters	Printed Name: DH	Printed Name:
Date: 5/11/18	Date: 5/11/18	Date:
Company: Shannon + Wilson Inc.	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature:	Signature:	Signature:
Time: 1520	Time:	Time:
Printed Name: David Hu	Printed Name:	Printed Name:
Date: 5/11/18	Date:	Date:
Company: TA Sac	Company:	Company:

F-19-91/UR

5.bc

No. 34946

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-39184-1
SDG Number: 20060.001

Login Number: 39184
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.	False	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:

Adam Wyborny

Title:

Environmental Engineering Staff

Date:

May 30, 2018

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

May 30, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-39184-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-39184-1

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 5.6º C.

The case narrative notes there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) with preparation batch 320-225947.

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:

ii. Submitted blind to lab?

◉ Yes ○ No Comments:

The field-duplicate samples *550116* and *550216* 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:

Analytical precision between the field-duplicate samples *550116* and *550216* was found to be within the recommended DQO of 30%.

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: 320-39463-1
Client Project/Site: FIA

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

Attn: Marcy Nadel

Authorized for release by:
5/22/2018 1:48:04 PM

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

Table of Contents

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

TestAmerica Job ID: 320-39463-1

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)

Job ID: 320-39463-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-39463-1

Receipt
The sample was received on 5/17/2018 11:35 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.1° 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 320-224565.

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: 320-39463-1

Client Sample ID: 521809

Lab Sample ID: 320-39463-1

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)	20		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	7.4		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)	19		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: 320-39463-1

Client Sample ID: 521809
Date Collected: 05/15/18 11:12
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39463-1
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		05/21/18 14:13	05/22/18 03:43	1
Perfluorohexanesulfonic acid (PFHxS)	**20**		2.0	0.87	ng/L		05/21/18 14:13	05/22/18 03:43	1
Perfluoroheptanoic acid (PFHpA)	**7.4**		2.0	0.80	ng/L		05/21/18 14:13	05/22/18 03:43	1
Perfluorooctanoic acid (PFOA)	**13**		2.0	0.75	ng/L		05/21/18 14:13	05/22/18 03:43	1
Perfluorooctanesulfonic acid (PFOS)	**19**		2.0	1.3	ng/L		05/21/18 14:13	05/22/18 03:43	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		05/21/18 14:13	05/22/18 03:43	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*106*		*25 - 150*	*05/21/18 14:13*	*05/22/18 03:43*	*1*
13C4-PFHpA	*111*		*25 - 150*	*05/21/18 14:13*	*05/22/18 03:43*	*1*
13C4 PFOA	*114*		*25 - 150*	*05/21/18 14:13*	*05/22/18 03:43*	*1*
13C4 PFOS	*105*		*25 - 150*	*05/21/18 14:13*	*05/22/18 03:43*	*1*
13C5 PFNA	*115*		*25 - 150*	*05/21/18 14:13*	*05/22/18 03:43*	*1*

Isotope Dilution Summary

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

TestAmerica Job ID: 320-39463-1

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)
320-39463-1	521809	106	111	114	105	115
LCS 320-224565/2-A	Lab Control Sample	101	103	111	98	105
LCSD 320-224565/3-A	Lab Control Sample Dup	94	98	101	98	99
MB 320-224565/1-A	Method Blank	91	95	98	92	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 320-224565/1-A
Matrix: Water
Analysis Batch: 224677

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 224565

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		05/21/18 14:13	05/21/18 21:53	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		05/21/18 14:13	05/21/18 21:53	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		05/21/18 14:13	05/21/18 21:53	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		05/21/18 14:13	05/21/18 21:53	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		05/21/18 14:13	05/21/18 21:53	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		05/21/18 14:13	05/21/18 21:53	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*91*		*25 - 150*	*05/21/18 14:13*	*05/21/18 21:53*	*1*
13C4-PFHpA	*95*		*25 - 150*	*05/21/18 14:13*	*05/21/18 21:53*	*1*
13C4 PFOA	*98*		*25 - 150*	*05/21/18 14:13*	*05/21/18 21:53*	*1*
13C4 PFOS	*92*		*25 - 150*	*05/21/18 14:13*	*05/21/18 21:53*	*1*
13C5 PFNA	*96*		*25 - 150*	*05/21/18 14:13*	*05/21/18 21:53*	*1*

Lab Sample ID: LCS 320-224565/2-A
Matrix: Water
Analysis Batch: 224677

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 224565

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	18.3		ng/L		103	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	17.6		ng/L		96	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	20.0		ng/L		100	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	18.4		ng/L		92	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	19.3		ng/L		104	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	20.3		ng/L		102	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*101*		*25 - 150*
13C4-PFHpA	*103*		*25 - 150*
13C4 PFOA	*111*		*25 - 150*
13C4 PFOS	*98*		*25 - 150*
13C5 PFNA	*105*		*25 - 150*

Lab Sample ID: LCSD 320-224565/3-A
Matrix: Water
Analysis Batch: 224677

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 224565

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	17.7		ng/L		100	72 - 151	3	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	18.0		ng/L		99	73 - 157	3	30
Perfluoroheptanoic acid (PFHpA)			20.0	20.1		ng/L		100	71 - 138	1	30
Perfluorooctanoic acid (PFOA)			20.0	19.3		ng/L		96	70 - 140	4	30
Perfluorooctanesulfonic acid (PFOS)			18.6	18.0		ng/L		97	69 - 144	7	30
Perfluorononanoic acid (PFNA)			20.0	21.0		ng/L		105	73 - 147	3	30

QC Sample Results

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

TestAmerica Job ID: 320-39463-1

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	94		25 - 150
13C4-PFHpA	98		25 - 150
13C4 PFOA	101		25 - 150
13C4 PFOS	98		25 - 150
13C5 PFNA	99		25 - 150

QC Association Summary

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

TestAmerica Job ID: 320-39463-1

LCMS

Prep Batch: 224565

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-39463-1	521809	Total/NA	Water	PFAS Prep	
MB 320-224565/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-224565/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-224565/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 224677

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-39463-1	521809	Total/NA	Water	WS-LC-0025 At1	224565
MB 320-224565/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	224565
LCS 320-224565/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	224565
LCSD 320-224565/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	224565

Lab Chronicle

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

TestAmerica Job ID: 320-39463-1

Client Sample ID: 521809
Date Collected: 05/15/18 11:12
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39463-1
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	224565	05/21/18 14:13	ABH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			224677	05/22/18 03:43	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: FIA

TestAmerica Job ID: 320-39463-1

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	06-17-19
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	03-17-19
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	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
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
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

Method Summary

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

TestAmerica Job ID: 320-39463-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC
PFAS Prep	Preparation, Direct Inject PFAS	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: 320-39463-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-39463-1	521809	Water	05/15/18 11:12	05/17/18 11:35

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

400 N. 34th Street, Suite 100
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(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 Althucker

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
521809		11:12	5/15/18		X	X						2	Groundwater

320-39463 Chain of Custody

Project Information		Sample Receipt	
Project Number: 31-1-20060		Total Number of Containers	
Project Name: FIA		COC Seals/Intact? Y/N/NA	(N)
Contact: MDN		Received Good Cond./Cold	5.1°c
Ongoing Project? Yes ☑ No ☐		Delivery Method: Goldstreak (attach shipping bill, if any)	
Sampler: ARM			

Instructions

Requested Turnaround Time: 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 Time: 16:50	Signature: Time:	Signature: Time:
Printed Name: Craig Beebe Date: 5/16/18	Printed Name: Date:	Printed Name: Date:
Company: Shannon Wilson, Inc	Company:	Company:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: Time: 1155	Signature: Time:	Signature: Time:
Printed Name: David Ther Date: 5/17/18	Printed Name: Date:	Printed Name: Date:
Company: TASat	Company:	Company:

F-19-91/UR

No. 34865

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-39463-1

Login Number: 39463
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.	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?	False	
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:

May 23, 2018

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

May 22, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-39463-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-39463-1

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 5.1º C.

The case narrative notes there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) with preparation batch 320-224565.

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.

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: 320-39517-1
Client Project/Site: FAI

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

Attn: Marcy Nadel

Authorized for release by:
6/6/2018 2:21:47 PM
Jill Kellmann, Manager of Project Management
(916)374-4402
jill.kellmann@testamericainc.com

Designee for

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: 320-39517-1

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: 320-39517-1

Job ID: 320-39517-1

Laboratory: TestAmerica Sacramento

Narrative

Receipt
The samples were received on 5/17/2018 11:35 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.1° 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 320-226898.

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: 320-39517-1

Client Sample ID: 176095 — Lab Sample ID: 320-39517-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	0.96	J	2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	5.1		2.0	0.87	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
Perfluorooctanesulfonic acid (PFOS)	3.8		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 176397 — Lab Sample ID: 320-39517-2

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)	78		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	74		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	40		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	24		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 173916 — Lab Sample ID: 320-39517-3

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
Perfluorooctanoic acid (PFOA)	0.87	J	2.0	0.75	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: 173860 — Lab Sample ID: 320-39517-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	50		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	40		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	5.8		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)	6.7		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 407364 — Lab Sample ID: 320-39517-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	2.1		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.80	J	2.0	0.80	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: 320-39517-1

Client Sample ID: 407364 (Continued) — Lab Sample ID: 320-39517-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	2.1		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.9	J	2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 407372 — Lab Sample ID: 320-39517-6

No Detections.

Client Sample ID: 542512 — Lab Sample ID: 320-39517-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	83		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	250		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	21		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
Perfluorooctanesulfonic acid (PFOS)	6.3		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 550132 — Lab Sample ID: 320-39517-8

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)	13		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)	10		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 153915 — Lab Sample ID: 320-39517-9

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)	71		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)	7.6		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	93		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: 153907 — Lab Sample ID: 320-39517-10

This Detection Summary does not include radiochemical test results.

Client Sample ID: 153907 (Continued) — Lab Sample ID: 320-39517-10

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)	60		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	7.0		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
Perfluorooctanesulfonic acid (PFOS)	100		2.0	1.3	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

Client Sample ID: 153699 — Lab Sample ID: 320-39517-11

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)	38		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	5.1		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	2.3		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	4.9		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 510220.1 — Lab Sample ID: 320-39517-12

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	43		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)	21		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	63		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: 510320.1 — Lab Sample ID: 320-39517-13

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	44		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)	7.5		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	62		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

This Detection Summary does not include radiochemical test results.

Detection Summary

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

TestAmerica Job ID: 320-39517-1

Client Sample ID: 510220.2 — Lab Sample ID: 320-39517-14

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	55		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)	11		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	83		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: 526932 — Lab Sample ID: 320-39517-15

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 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	27		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)	6.6		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	60		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: 120513 — Lab Sample ID: 320-39517-16

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)	6.6		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) - DL	450		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: 120413 — Lab Sample ID: 320-39517-17

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)	6.8		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	470		20	13	ng/L	10		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: 320-39517-1

Client Sample ID: 174254 — Lab Sample ID: 320-39517-18

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)	25		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)	10		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	71		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

Client Sample ID: 542547 — Lab Sample ID: 320-39517-19

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	100		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)	34		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	31		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.9	J	2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 152617 — Lab Sample ID: 320-39517-20

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	94		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)	6.1		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)	21		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: 320-39517-1

Client Sample ID: 176095
Date Collected: 05/09/18 15:35
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-1
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**0.96**	**J**	2.0	0.92	ng/L		06/04/18 06:59	06/05/18 09:53	1
Perfluorohexanesulfonic acid (PFHxS)	**5.1**		2.0	0.87	ng/L		06/04/18 06:59	06/05/18 09:53	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		06/04/18 06:59	06/05/18 09:53	1
Perfluorooctanoic acid (PFOA)	**3.2**		2.0	0.75	ng/L		06/04/18 06:59	06/05/18 09:53	1
Perfluorooctanesulfonic acid (PFOS)	**3.8**		2.0	1.3	ng/L		06/04/18 06:59	06/05/18 09:53	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		06/04/18 06:59	06/05/18 09:53	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*99*		*25 - 150*	*06/04/18 06:59*	*06/05/18 09:53*	*1*
13C4-PFHpA	*99*		*25 - 150*	*06/04/18 06:59*	*06/05/18 09:53*	*1*
13C4 PFOA	*103*		*25 - 150*	*06/04/18 06:59*	*06/05/18 09:53*	*1*
13C4 PFOS	*98*		*25 - 150*	*06/04/18 06:59*	*06/05/18 09:53*	*1*
13C5 PFNA	*104*		*25 - 150*	*06/04/18 06:59*	*06/05/18 09:53*	*1*

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

TestAmerica Job ID: 320-39517-1

Client Sample ID: 176397
Date Collected: 05/09/18 16:47
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-2
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	10		2.0	0.92	ng/L		06/04/18 06:59	06/05/18 10:11	1
Perfluorohexanesulfonic acid (PFHxS)	78		2.0	0.87	ng/L		06/04/18 06:59	06/05/18 10:11	1
Perfluoroheptanoic acid (PFHpA)	74		2.0	0.80	ng/L		06/04/18 06:59	06/05/18 10:11	1
Perfluorooctanoic acid (PFOA)	40		2.0	0.75	ng/L		06/04/18 06:59	06/05/18 10:11	1
Perfluorooctanesulfonic acid (PFOS)	24		2.0	1.3	ng/L		06/04/18 06:59	06/05/18 10:11	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		06/04/18 06:59	06/05/18 10:11	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*97*		*25 - 150*	*06/04/18 06:59*	*06/05/18 10:11*	*1*
13C4-PFHpA	*97*		*25 - 150*	*06/04/18 06:59*	*06/05/18 10:11*	*1*
13C4 PFOA	*109*		*25 - 150*	*06/04/18 06:59*	*06/05/18 10:11*	*1*
13C4 PFOS	*99*		*25 - 150*	*06/04/18 06:59*	*06/05/18 10:11*	*1*
13C5 PFNA	*107*		*25 - 150*	*06/04/18 06:59*	*06/05/18 10:11*	*1*

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

TestAmerica Job ID: 320-39517-1

Client Sample ID: 173916
Date Collected: 05/09/18 17:22
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-3
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		06/04/18 06:59	06/05/18 10:29	1
Perfluorohexanesulfonic acid (PFHxS)	**2.0**		2.0	0.87	ng/L		06/04/18 06:59	06/05/18 10:29	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		06/04/18 06:59	06/05/18 10:29	1
Perfluorooctanoic acid (PFOA)	**0.87**	**J**	2.0	0.75	ng/L		06/04/18 06:59	06/05/18 10:29	1
Perfluorooctanesulfonic acid (PFOS)	**1.7**	**J**	2.0	1.3	ng/L		06/04/18 06:59	06/05/18 10:29	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		06/04/18 06:59	06/05/18 10:29	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*104*		*25 - 150*	*06/04/18 06:59*	*06/05/18 10:29*	*1*
13C4-PFHpA	*102*		*25 - 150*	*06/04/18 06:59*	*06/05/18 10:29*	*1*
13C4 PFOA	*107*		*25 - 150*	*06/04/18 06:59*	*06/05/18 10:29*	*1*
13C4 PFOS	*100*		*25 - 150*	*06/04/18 06:59*	*06/05/18 10:29*	*1*
13C5 PFNA	*104*		*25 - 150*	*06/04/18 06:59*	*06/05/18 10:29*	*1*

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

TestAmerica Job ID: 320-39517-1

Client Sample ID: 173860
Date Collected: 05/09/18 18:28
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-4
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**50**		2.0	0.92	ng/L		06/04/18 06:59	06/05/18 10:48	1
Perfluorohexanesulfonic acid (PFHxS)	**40**		2.0	0.87	ng/L		06/04/18 06:59	06/05/18 10:48	1
Perfluoroheptanoic acid (PFHpA)	**5.8**		2.0	0.80	ng/L		06/04/18 06:59	06/05/18 10:48	1
Perfluorooctanoic acid (PFOA)	**3.4**		2.0	0.75	ng/L		06/04/18 06:59	06/05/18 10:48	1
Perfluorooctanesulfonic acid (PFOS)	**6.7**		2.0	1.3	ng/L		06/04/18 06:59	06/05/18 10:48	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		06/04/18 06:59	06/05/18 10:48	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*104*		*25 - 150*	*06/04/18 06:59*	*06/05/18 10:48*	*1*
13C4-PFHpA	*104*		*25 - 150*	*06/04/18 06:59*	*06/05/18 10:48*	*1*
13C4 PFOA	*110*		*25 - 150*	*06/04/18 06:59*	*06/05/18 10:48*	*1*
13C4 PFOS	*103*		*25 - 150*	*06/04/18 06:59*	*06/05/18 10:48*	*1*
13C5 PFNA	*114*		*25 - 150*	*06/04/18 06:59*	*06/05/18 10:48*	*1*

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

TestAmerica Job ID: 320-39517-1

Client Sample ID: 407364
Date Collected: 05/10/18 10:38
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-5
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		06/04/18 06:59	06/05/18 11:06	1
Perfluorohexanesulfonic acid (PFHxS)	**2.1**		2.0	0.87	ng/L		06/04/18 06:59	06/05/18 11:06	1
Perfluoroheptanoic acid (PFHpA)	**0.80**	**J**	2.0	0.80	ng/L		06/04/18 06:59	06/05/18 11:06	1
Perfluorooctanoic acid (PFOA)	**2.1**		2.0	0.75	ng/L		06/04/18 06:59	06/05/18 11:06	1
Perfluorooctanesulfonic acid (PFOS)	**1.9**	**J**	2.0	1.3	ng/L		06/04/18 06:59	06/05/18 11:06	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		06/04/18 06:59	06/05/18 11:06	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*102*		*25 - 150*	*06/04/18 06:59*	*06/05/18 11:06*	*1*
13C4-PFHpA	*102*		*25 - 150*	*06/04/18 06:59*	*06/05/18 11:06*	*1*
13C4 PFOA	*109*		*25 - 150*	*06/04/18 06:59*	*06/05/18 11:06*	*1*
13C4 PFOS	*100*		*25 - 150*	*06/04/18 06:59*	*06/05/18 11:06*	*1*
13C5 PFNA	*108*		*25 - 150*	*06/04/18 06:59*	*06/05/18 11:06*	*1*

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

TestAmerica Job ID: 320-39517-1

Client Sample ID: 407372
Date Collected: 05/10/18 11:39
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-6
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		06/04/18 06:59	06/05/18 14:47	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		06/04/18 06:59	06/05/18 14:47	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		06/04/18 06:59	06/05/18 14:47	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		06/04/18 06:59	06/05/18 14:47	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		06/04/18 06:59	06/05/18 14:47	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		06/04/18 06:59	06/05/18 14:47	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*100*		*25 - 150*	*06/04/18 06:59*	*06/05/18 14:47*	*1*
13C4-PFHpA	*102*		*25 - 150*	*06/04/18 06:59*	*06/05/18 14:47*	*1*
13C4 PFOA	*105*		*25 - 150*	*06/04/18 06:59*	*06/05/18 14:47*	*1*
13C4 PFOS	*99*		*25 - 150*	*06/04/18 06:59*	*06/05/18 14:47*	*1*
13C5 PFNA	*105*		*25 - 150*	*06/04/18 06:59*	*06/05/18 14:47*	*1*

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

TestAmerica Job ID: 320-39517-1

Client Sample ID: 542512
Date Collected: 05/10/18 13:38
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-7
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	83		2.0	0.92	ng/L		06/04/18 06:59	06/05/18 15:05	1
Perfluorohexanesulfonic acid (PFHxS)	250		2.0	0.87	ng/L		06/04/18 06:59	06/05/18 15:05	1
Perfluoroheptanoic acid (PFHpA)	21		2.0	0.80	ng/L		06/04/18 06:59	06/05/18 15:05	1
Perfluorooctanoic acid (PFOA)	11		2.0	0.75	ng/L		06/04/18 06:59	06/05/18 15:05	1
Perfluorooctanesulfonic acid (PFOS)	6.3		2.0	1.3	ng/L		06/04/18 06:59	06/05/18 15:05	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		06/04/18 06:59	06/05/18 15:05	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*97*		*25 - 150*	*06/04/18 06:59*	*06/05/18 15:05*	*1*
13C4-PFHpA	*98*		*25 - 150*	*06/04/18 06:59*	*06/05/18 15:05*	*1*
13C4 PFOA	*105*		*25 - 150*	*06/04/18 06:59*	*06/05/18 15:05*	*1*
13C4 PFOS	*97*		*25 - 150*	*06/04/18 06:59*	*06/05/18 15:05*	*1*
13C5 PFNA	*104*		*25 - 150*	*06/04/18 06:59*	*06/05/18 15:05*	*1*

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

TestAmerica Job ID: 320-39517-1

Client Sample ID: 550132
Date Collected: 05/11/18 11:31
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-8
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**2.9**		2.0	0.92	ng/L		06/04/18 06:59	06/05/18 15:42	1
Perfluorohexanesulfonic acid (PFHxS)	**13**		2.0	0.87	ng/L		06/04/18 06:59	06/05/18 15:42	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		06/04/18 06:59	06/05/18 15:42	1
Perfluorooctanoic acid (PFOA)	**3.1**		2.0	0.75	ng/L		06/04/18 06:59	06/05/18 15:42	1
Perfluorooctanesulfonic acid (PFOS)	**10**		2.0	1.3	ng/L		06/04/18 06:59	06/05/18 15:42	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		06/04/18 06:59	06/05/18 15:42	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*95*		*25 - 150*	*06/04/18 06:59*	*06/05/18 15:42*	*1*
13C4-PFHpA	*96*		*25 - 150*	*06/04/18 06:59*	*06/05/18 15:42*	*1*
13C4 PFOA	*101*		*25 - 150*	*06/04/18 06:59*	*06/05/18 15:42*	*1*
13C4 PFOS	*96*		*25 - 150*	*06/04/18 06:59*	*06/05/18 15:42*	*1*
13C5 PFNA	*102*		*25 - 150*	*06/04/18 06:59*	*06/05/18 15:42*	*1*

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

TestAmerica Job ID: 320-39517-1

Client Sample ID: 153915
Date Collected: 05/11/18 12:26
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-9
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	18		2.0	0.92	ng/L		06/04/18 06:59	06/05/18 16:00	1
Perfluorohexanesulfonic acid (PFHxS)	71		2.0	0.87	ng/L		06/04/18 06:59	06/05/18 16:00	1
Perfluoroheptanoic acid (PFHpA)	7.5		2.0	0.80	ng/L		06/04/18 06:59	06/05/18 16:00	1
Perfluorooctanoic acid (PFOA)	7.6		2.0	0.75	ng/L		06/04/18 06:59	06/05/18 16:00	1
Perfluorooctanesulfonic acid (PFOS)	93		2.0	1.3	ng/L		06/04/18 06:59	06/05/18 16:00	1
Perfluorononanoic acid (PFNA)	1.1	J	2.0	0.65	ng/L		06/04/18 06:59	06/05/18 16:00	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*94*		*25 - 150*	*06/04/18 06:59*	*06/05/18 16:00*	*1*
13C4-PFHpA	*101*		*25 - 150*	*06/04/18 06:59*	*06/05/18 16:00*	*1*
13C4 PFOA	*106*		*25 - 150*	*06/04/18 06:59*	*06/05/18 16:00*	*1*
13C4 PFOS	*93*		*25 - 150*	*06/04/18 06:59*	*06/05/18 16:00*	*1*
13C5 PFNA	*108*		*25 - 150*	*06/04/18 06:59*	*06/05/18 16:00*	*1*

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

TestAmerica Job ID: 320-39517-1

Client Sample ID: 153907
Date Collected: 05/11/18 12:47
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-10
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	21		2.0	0.92	ng/L		06/04/18 06:59	06/05/18 16:19	1
Perfluorohexanesulfonic acid (PFHxS)	60		2.0	0.87	ng/L		06/04/18 06:59	06/05/18 16:19	1
Perfluoroheptanoic acid (PFHpA)	7.0		2.0	0.80	ng/L		06/04/18 06:59	06/05/18 16:19	1
Perfluorooctanoic acid (PFOA)	11		2.0	0.75	ng/L		06/04/18 06:59	06/05/18 16:19	1
Perfluorooctanesulfonic acid (PFOS)	100		2.0	1.3	ng/L		06/04/18 06:59	06/05/18 16:19	1
Perfluorononanoic acid (PFNA)	1.4	J	2.0	0.65	ng/L		06/04/18 06:59	06/05/18 16:19	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*102*		*25 - 150*	*06/04/18 06:59*	*06/05/18 16:19*	*1*
13C4-PFHpA	*100*		*25 - 150*	*06/04/18 06:59*	*06/05/18 16:19*	*1*
13C4 PFOA	*112*		*25 - 150*	*06/04/18 06:59*	*06/05/18 16:19*	*1*
13C4 PFOS	*101*		*25 - 150*	*06/04/18 06:59*	*06/05/18 16:19*	*1*
13C5 PFNA	*101*		*25 - 150*	*06/04/18 06:59*	*06/05/18 16:19*	*1*

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

TestAmerica Job ID: 320-39517-1

Client Sample ID: 153699
Date Collected: 05/11/18 13:39
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-11
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**41**		2.0	0.92	ng/L		06/04/18 06:59	06/05/18 16:37	1
Perfluorohexanesulfonic acid (PFHxS)	**38**		2.0	0.87	ng/L		06/04/18 06:59	06/05/18 16:37	1
Perfluoroheptanoic acid (PFHpA)	**5.1**		2.0	0.80	ng/L		06/04/18 06:59	06/05/18 16:37	1
Perfluorooctanoic acid (PFOA)	**2.3**		2.0	0.75	ng/L		06/04/18 06:59	06/05/18 16:37	1
Perfluorooctanesulfonic acid (PFOS)	**4.9**		2.0	1.3	ng/L		06/04/18 06:59	06/05/18 16:37	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		06/04/18 06:59	06/05/18 16:37	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*105*		*25 - 150*	*06/04/18 06:59*	*06/05/18 16:37*	*1*
13C4-PFHpA	*103*		*25 - 150*	*06/04/18 06:59*	*06/05/18 16:37*	*1*
13C4 PFOA	*111*		*25 - 150*	*06/04/18 06:59*	*06/05/18 16:37*	*1*
13C4 PFOS	*98*		*25 - 150*	*06/04/18 06:59*	*06/05/18 16:37*	*1*
13C5 PFNA	*105*		*25 - 150*	*06/04/18 06:59*	*06/05/18 16:37*	*1*

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

TestAmerica Job ID: 320-39517-1

Client Sample ID: 510220.1
Date Collected: 05/11/18 14:40
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-12
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**43**		2.0	0.92	ng/L		06/04/18 06:59	06/05/18 16:55	1
Perfluorohexanesulfonic acid (PFHxS)	**170**		2.0	0.87	ng/L		06/04/18 06:59	06/05/18 16:55	1
Perfluoroheptanoic acid (PFHpA)	**21**		2.0	0.80	ng/L		06/04/18 06:59	06/05/18 16:55	1
Perfluorooctanoic acid (PFOA)	**63**		2.0	0.75	ng/L		06/04/18 06:59	06/05/18 16:55	1
Perfluorooctanesulfonic acid (PFOS)	**140**		2.0	1.3	ng/L		06/04/18 06:59	06/05/18 16:55	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		06/04/18 06:59	06/05/18 16:55	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*99*		*25 - 150*	*06/04/18 06:59*	*06/05/18 16:55*	*1*
13C4-PFHpA	*98*		*25 - 150*	*06/04/18 06:59*	*06/05/18 16:55*	*1*
13C4 PFOA	*106*		*25 - 150*	*06/04/18 06:59*	*06/05/18 16:55*	*1*
13C4 PFOS	*97*		*25 - 150*	*06/04/18 06:59*	*06/05/18 16:55*	*1*
13C5 PFNA	*103*		*25 - 150*	*06/04/18 06:59*	*06/05/18 16:55*	*1*

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

TestAmerica Job ID: 320-39517-1

Client Sample ID: 510320.1
Date Collected: 05/11/18 14:50
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-13
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**44**		2.0	0.92	ng/L		06/04/18 06:59	06/05/18 17:14	1
Perfluorohexanesulfonic acid (PFHxS)	**170**		2.0	0.87	ng/L		06/04/18 06:59	06/05/18 17:14	1
Perfluoroheptanoic acid (PFHpA)	**7.5**		2.0	0.80	ng/L		06/04/18 06:59	06/05/18 17:14	1
Perfluorooctanoic acid (PFOA)	**62**		2.0	0.75	ng/L		06/04/18 06:59	06/05/18 17:14	1
Perfluorooctanesulfonic acid (PFOS)	**140**		2.0	1.3	ng/L		06/04/18 06:59	06/05/18 17:14	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		06/04/18 06:59	06/05/18 17:14	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*109*		*25 - 150*	*06/04/18 06:59*	*06/05/18 17:14*	*1*
13C4-PFHpA	*111*		*25 - 150*	*06/04/18 06:59*	*06/05/18 17:14*	*1*
13C4 PFOA	*117*		*25 - 150*	*06/04/18 06:59*	*06/05/18 17:14*	*1*
13C4 PFOS	*100*		*25 - 150*	*06/04/18 06:59*	*06/05/18 17:14*	*1*
13C5 PFNA	*121*		*25 - 150*	*06/04/18 06:59*	*06/05/18 17:14*	*1*

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

TestAmerica Job ID: 320-39517-1

Client Sample ID: 510220.2
Date Collected: 05/11/18 15:13
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-14
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**55**		2.0	0.92	ng/L		06/04/18 06:59	06/05/18 17:32	1
Perfluorohexanesulfonic acid (PFHxS)	**210**		2.0	0.87	ng/L		06/04/18 06:59	06/05/18 17:32	1
Perfluoroheptanoic acid (PFHpA)	**11**		2.0	0.80	ng/L		06/04/18 06:59	06/05/18 17:32	1
Perfluorooctanoic acid (PFOA)	**83**		2.0	0.75	ng/L		06/04/18 06:59	06/05/18 17:32	1
Perfluorooctanesulfonic acid (PFOS)	**160**		2.0	1.3	ng/L		06/04/18 06:59	06/05/18 17:32	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		06/04/18 06:59	06/05/18 17:32	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*106*		*25 - 150*	*06/04/18 06:59*	*06/05/18 17:32*	*1*
13C4-PFHpA	*107*		*25 - 150*	*06/04/18 06:59*	*06/05/18 17:32*	*1*
13C4 PFOA	*109*		*25 - 150*	*06/04/18 06:59*	*06/05/18 17:32*	*1*
13C4 PFOS	*100*		*25 - 150*	*06/04/18 06:59*	*06/05/18 17:32*	*1*
13C5 PFNA	*110*		*25 - 150*	*06/04/18 06:59*	*06/05/18 17:32*	*1*

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

TestAmerica Job ID: 320-39517-1

Client Sample ID: 526932
Date Collected: 05/15/18 10:12
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-15
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	17		2.0	0.92	ng/L		06/04/18 06:59	06/05/18 17:50	1
Perfluorohexanesulfonic acid (PFHxS)	27		2.0	0.87	ng/L		06/04/18 06:59	06/05/18 17:50	1
Perfluoroheptanoic acid (PFHpA)	4.6		2.0	0.80	ng/L		06/04/18 06:59	06/05/18 17:50	1
Perfluorooctanoic acid (PFOA)	6.6		2.0	0.75	ng/L		06/04/18 06:59	06/05/18 17:50	1
Perfluorooctanesulfonic acid (PFOS)	60		2.0	1.3	ng/L		06/04/18 06:59	06/05/18 17:50	1
Perfluorononanoic acid (PFNA)	0.76	J	2.0	0.65	ng/L		06/04/18 06:59	06/05/18 17:50	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*102*		*25 - 150*	*06/04/18 06:59*	*06/05/18 17:50*	*1*
13C4-PFHpA	*103*		*25 - 150*	*06/04/18 06:59*	*06/05/18 17:50*	*1*
13C4 PFOA	*111*		*25 - 150*	*06/04/18 06:59*	*06/05/18 17:50*	*1*
13C4 PFOS	*102*		*25 - 150*	*06/04/18 06:59*	*06/05/18 17:50*	*1*
13C5 PFNA	*116*		*25 - 150*	*06/04/18 06:59*	*06/05/18 17:50*	*1*

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

TestAmerica Job ID: 320-39517-1

Client Sample ID: 120513
Date Collected: 05/15/18 12:04
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-16
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	23		2.0	0.92	ng/L		06/04/18 06:59	06/05/18 18:09	1
Perfluorohexanesulfonic acid (PFHxS)	110		2.0	0.87	ng/L		06/04/18 06:59	06/05/18 18:09	1
Perfluoroheptanoic acid (PFHpA)	6.6		2.0	0.80	ng/L		06/04/18 06:59	06/05/18 18:09	1
Perfluorooctanoic acid (PFOA)	17		2.0	0.75	ng/L		06/04/18 06:59	06/05/18 18:09	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		06/04/18 06:59	06/05/18 18:09	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*106*		*25 - 150*	*06/04/18 06:59*	*06/05/18 18:09*	*1*
13C4-PFHpA	*109*		*25 - 150*	*06/04/18 06:59*	*06/05/18 18:09*	*1*
13C4 PFOA	*117*		*25 - 150*	*06/04/18 06:59*	*06/05/18 18:09*	*1*
13C5 PFNA	*114*		*25 - 150*	*06/04/18 06:59*	*06/05/18 18:09*	*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		06/04/18 06:59	06/06/18 09:09	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*95*		*25 - 150*	*06/04/18 06:59*	*06/06/18 09:09*	*10*

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

TestAmerica Job ID: 320-39517-1

Client Sample ID: 120413
Date Collected: 05/15/18 12:14
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-17
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	23		2.0	0.92	ng/L		06/04/18 06:59	06/05/18 18:27	1
Perfluorohexanesulfonic acid (PFHxS)	110		2.0	0.87	ng/L		06/04/18 06:59	06/05/18 18:27	1
Perfluoroheptanoic acid (PFHpA)	6.8		2.0	0.80	ng/L		06/04/18 06:59	06/05/18 18:27	1
Perfluorooctanoic acid (PFOA)	16		2.0	0.75	ng/L		06/04/18 06:59	06/05/18 18:27	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		06/04/18 06:59	06/05/18 18:27	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*98*		*25 - 150*	*06/04/18 06:59*	*06/05/18 18:27*	*1*
13C4-PFHpA	*101*		*25 - 150*	*06/04/18 06:59*	*06/05/18 18:27*	*1*
13C4 PFOA	*109*		*25 - 150*	*06/04/18 06:59*	*06/05/18 18:27*	*1*
13C5 PFNA	*97*		*25 - 150*	*06/04/18 06:59*	*06/05/18 18:27*	*1*

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	470		20	13	ng/L		06/04/18 06:59	06/06/18 09:27	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*95*		*25 - 150*	*06/04/18 06:59*	*06/06/18 09:27*	*10*

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

TestAmerica Job ID: 320-39517-1

Client Sample ID: 174254
Date Collected: 05/16/18 09:45
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-18
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	9.1		2.0	0.92	ng/L		06/04/18 06:59	06/05/18 19:04	1
Perfluorohexanesulfonic acid (PFHxS)	25		2.0	0.87	ng/L		06/04/18 06:59	06/05/18 19:04	1
Perfluoroheptanoic acid (PFHpA)	5.4		2.0	0.80	ng/L		06/04/18 06:59	06/05/18 19:04	1
Perfluorooctanoic acid (PFOA)	10		2.0	0.75	ng/L		06/04/18 06:59	06/05/18 19:04	1
Perfluorooctanesulfonic acid (PFOS)	71		2.0	1.3	ng/L		06/04/18 06:59	06/05/18 19:04	1
Perfluorononanoic acid (PFNA)	1.3	J	2.0	0.65	ng/L		06/04/18 06:59	06/05/18 19:04	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*100*		*25 - 150*	*06/04/18 06:59*	*06/05/18 19:04*	*1*
13C4-PFHpA	*101*		*25 - 150*	*06/04/18 06:59*	*06/05/18 19:04*	*1*
13C4 PFOA	*112*		*25 - 150*	*06/04/18 06:59*	*06/05/18 19:04*	*1*
13C4 PFOS	*98*		*25 - 150*	*06/04/18 06:59*	*06/05/18 19:04*	*1*
13C5 PFNA	*105*		*25 - 150*	*06/04/18 06:59*	*06/05/18 19:04*	*1*

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

TestAmerica Job ID: 320-39517-1

Client Sample ID: 542547
Date Collected: 05/16/18 10:29
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-19
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	100		2.0	0.92	ng/L		06/04/18 06:59	06/05/18 19:22	1
Perfluorohexanesulfonic acid (PFHxS)	130		2.0	0.87	ng/L		06/04/18 06:59	06/05/18 19:22	1
Perfluoroheptanoic acid (PFHpA)	34		2.0	0.80	ng/L		06/04/18 06:59	06/05/18 19:22	1
Perfluorooctanoic acid (PFOA)	31		2.0	0.75	ng/L		06/04/18 06:59	06/05/18 19:22	1
Perfluorooctanesulfonic acid (PFOS)	1.9	J	2.0	1.3	ng/L		06/04/18 06:59	06/05/18 19:22	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		06/04/18 06:59	06/05/18 19:22	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*93*		*25 - 150*	*06/04/18 06:59*	*06/05/18 19:22*	*1*
13C4-PFHpA	*94*		*25 - 150*	*06/04/18 06:59*	*06/05/18 19:22*	*1*
13C4 PFOA	*103*		*25 - 150*	*06/04/18 06:59*	*06/05/18 19:22*	*1*
13C4 PFOS	*93*		*25 - 150*	*06/04/18 06:59*	*06/05/18 19:22*	*1*
13C5 PFNA	*103*		*25 - 150*	*06/04/18 06:59*	*06/05/18 19:22*	*1*

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

TestAmerica Job ID: 320-39517-1

Client Sample ID: 152617
Date Collected: 05/16/18 11:12
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-20
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**94**		2.0	0.92	ng/L		06/04/18 06:59	06/05/18 19:41	1
Perfluorohexanesulfonic acid (PFHxS)	**20**		2.0	0.87	ng/L		06/04/18 06:59	06/05/18 19:41	1
Perfluoroheptanoic acid (PFHpA)	**6.1**		2.0	0.80	ng/L		06/04/18 06:59	06/05/18 19:41	1
Perfluorooctanoic acid (PFOA)	**6.8**		2.0	0.75	ng/L		06/04/18 06:59	06/05/18 19:41	1
Perfluorooctanesulfonic acid (PFOS)	**21**		2.0	1.3	ng/L		06/04/18 06:59	06/05/18 19:41	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		06/04/18 06:59	06/05/18 19:41	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*98*		*25 - 150*	*06/04/18 06:59*	*06/05/18 19:41*	*1*
13C4-PFHpA	*104*		*25 - 150*	*06/04/18 06:59*	*06/05/18 19:41*	*1*
13C4 PFOA	*109*		*25 - 150*	*06/04/18 06:59*	*06/05/18 19:41*	*1*
13C4 PFOS	*99*		*25 - 150*	*06/04/18 06:59*	*06/05/18 19:41*	*1*
13C5 PFNA	*106*		*25 - 150*	*06/04/18 06:59*	*06/05/18 19:41*	*1*

Isotope Dilution Summary

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

TestAmerica Job ID: 320-39517-1

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)
320-39517-1	176095	99	99	103	98	104
320-39517-2	176397	97	97	109	99	107
320-39517-3	173916	104	102	107	100	104
320-39517-4	173860	104	104	110	103	114
320-39517-5	407364	102	102	109	100	108
320-39517-6	407372	100	102	105	99	105
320-39517-7	542512	97	98	105	97	104
320-39517-8	550132	95	96	101	96	102
320-39517-9	153915	94	101	106	93	108
320-39517-10	153907	102	100	112	101	101
320-39517-11	153699	105	103	111	98	105
320-39517-12	510220.1	99	98	106	97	103
320-39517-13	510320.1	109	111	117	100	121
320-39517-14	510220.2	106	107	109	100	110
320-39517-15	526932	102	103	111	102	116
320-39517-16	120513	106	109	117		114
320-39517-16 - DL	120513				95	
320-39517-17	120413	98	101	109		97
320-39517-17 - DL	120413				95	
320-39517-18	174254	100	101	112	98	105
320-39517-19	542547	93	94	103	93	103
320-39517-20	152617	98	104	109	99	106
LCS 320-226898/2-A	Lab Control Sample	101	97	105	101	108
LCSD 320-226898/3-A	Lab Control Sample Dup	93	90	97	92	94
MB 320-226898/1-A	Method Blank	99	96	104	98	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 320-226898/1-A
Matrix: Water
Analysis Batch: 227071

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 226898

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		06/04/18 06:59	06/05/18 08:58	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		06/04/18 06:59	06/05/18 08:58	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		06/04/18 06:59	06/05/18 08:58	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		06/04/18 06:59	06/05/18 08:58	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		06/04/18 06:59	06/05/18 08:58	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		06/04/18 06:59	06/05/18 08:58	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*99*		*25 - 150*	*06/04/18 06:59*	*06/05/18 08:58*	*1*
13C4-PFHpA	*96*		*25 - 150*	*06/04/18 06:59*	*06/05/18 08:58*	*1*
13C4 PFOA	*104*		*25 - 150*	*06/04/18 06:59*	*06/05/18 08:58*	*1*
13C4 PFOS	*98*		*25 - 150*	*06/04/18 06:59*	*06/05/18 08:58*	*1*
13C5 PFNA	*104*		*25 - 150*	*06/04/18 06:59*	*06/05/18 08:58*	*1*

Lab Sample ID: LCS 320-226898/2-A
Matrix: Water
Analysis Batch: 227071

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 226898

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	19.6		ng/L		111	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	19.1		ng/L		105	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	21.9		ng/L		109	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	20.9		ng/L		105	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	18.7		ng/L		101	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	20.6		ng/L		103	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*101*		*25 - 150*
13C4-PFHpA	*97*		*25 - 150*
13C4 PFOA	*105*		*25 - 150*
13C4 PFOS	*101*		*25 - 150*
13C5 PFNA	*108*		*25 - 150*

Lab Sample ID: LCSD 320-226898/3-A
Matrix: Water
Analysis Batch: 227071

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 226898

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	19.4		ng/L		110	72 - 151	1	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	18.8		ng/L		103	73 - 157	1	30
Perfluoroheptanoic acid (PFHpA)			20.0	21.9		ng/L		109	71 - 138	0	30
Perfluorooctanoic acid (PFOA)			20.0	21.4		ng/L		107	70 - 140	2	30
Perfluorooctanesulfonic acid (PFOS)			18.6	18.3		ng/L		99	69 - 144	2	30
Perfluorononanoic acid (PFNA)			20.0	21.3		ng/L		106	73 - 147	3	30

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	93		25 - 150
13C4-PFHpA	90		25 - 150
13C4 PFOA	97		25 - 150
13C4 PFOS	92		25 - 150
13C5 PFNA	94		25 - 150

LCMS

Prep Batch: 226898

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-39517-1	176095	Total/NA	Water	PFAS Prep	
320-39517-2	176397	Total/NA	Water	PFAS Prep	
320-39517-3	173916	Total/NA	Water	PFAS Prep	
320-39517-4	173860	Total/NA	Water	PFAS Prep	
320-39517-5	407364	Total/NA	Water	PFAS Prep	
320-39517-6	407372	Total/NA	Water	PFAS Prep	
320-39517-7	542512	Total/NA	Water	PFAS Prep	
320-39517-8	550132	Total/NA	Water	PFAS Prep	
320-39517-9	153915	Total/NA	Water	PFAS Prep	
320-39517-10	153907	Total/NA	Water	PFAS Prep	
320-39517-11	153699	Total/NA	Water	PFAS Prep	
320-39517-12	510220.1	Total/NA	Water	PFAS Prep	
320-39517-13	510320.1	Total/NA	Water	PFAS Prep	
320-39517-14	510220.2	Total/NA	Water	PFAS Prep	
320-39517-15	526932	Total/NA	Water	PFAS Prep	
320-39517-16	120513	Total/NA	Water	PFAS Prep	
320-39517-16 - DL	120513	Total/NA	Water	PFAS Prep	
320-39517-17	120413	Total/NA	Water	PFAS Prep	
320-39517-17 - DL	120413	Total/NA	Water	PFAS Prep	
320-39517-18	174254	Total/NA	Water	PFAS Prep	
320-39517-19	542547	Total/NA	Water	PFAS Prep	
320-39517-20	152617	Total/NA	Water	PFAS Prep	
MB 320-226898/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-226898/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-226898/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 227071

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-39517-1	176095	Total/NA	Water	WS-LC-0025 At1	226898
320-39517-2	176397	Total/NA	Water	WS-LC-0025 At1	226898
320-39517-3	173916	Total/NA	Water	WS-LC-0025 At1	226898
320-39517-4	173860	Total/NA	Water	WS-LC-0025 At1	226898
320-39517-5	407364	Total/NA	Water	WS-LC-0025 At1	226898
320-39517-6	407372	Total/NA	Water	WS-LC-0025 At1	226898
320-39517-7	542512	Total/NA	Water	WS-LC-0025 At1	226898
320-39517-8	550132	Total/NA	Water	WS-LC-0025 At1	226898
320-39517-9	153915	Total/NA	Water	WS-LC-0025 At1	226898
320-39517-10	153907	Total/NA	Water	WS-LC-0025 At1	226898
320-39517-11	153699	Total/NA	Water	WS-LC-0025 At1	226898
320-39517-12	510220.1	Total/NA	Water	WS-LC-0025 At1	226898
320-39517-13	510320.1	Total/NA	Water	WS-LC-0025 At1	226898

LCMS (Continued)

Analysis Batch: 227071 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-39517-14	510220.2	Total/NA	Water	WS-LC-0025 At1	226898
320-39517-15	526932	Total/NA	Water	WS-LC-0025 At1	226898
320-39517-16	120513	Total/NA	Water	WS-LC-0025 At1	226898
320-39517-17	120413	Total/NA	Water	WS-LC-0025 At1	226898
320-39517-18	174254	Total/NA	Water	WS-LC-0025 At1	226898
320-39517-19	542547	Total/NA	Water	WS-LC-0025 At1	226898
320-39517-20	152617	Total/NA	Water	WS-LC-0025 At1	226898
MB 320-226898/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	226898
LCS 320-226898/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	226898
LCSD 320-226898/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	226898

Analysis Batch: 227416

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-39517-16 - DL	120513	Total/NA	Water	WS-LC-0025 At1	226898
320-39517-17 - DL	120413	Total/NA	Water	WS-LC-0025 At1	226898

Lab Chronicle

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

TestAmerica Job ID: 320-39517-1

Client Sample ID: 176095
Date Collected: 05/09/18 15:35
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-1
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	226898	06/04/18 06:59	TWL	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			227071	06/05/18 09:53	SHK	TAL SAC

Client Sample ID: 176397
Date Collected: 05/09/18 16:47
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-2
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	226898	06/04/18 06:59	TWL	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			227071	06/05/18 10:11	SHK	TAL SAC

Client Sample ID: 173916
Date Collected: 05/09/18 17:22
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-3
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	226898	06/04/18 06:59	TWL	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			227071	06/05/18 10:29	SHK	TAL SAC

Client Sample ID: 173860
Date Collected: 05/09/18 18:28
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-4
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	226898	06/04/18 06:59	TWL	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			227071	06/05/18 10:48	SHK	TAL SAC

Client Sample ID: 407364
Date Collected: 05/10/18 10:38
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-5
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	226898	06/04/18 06:59	TWL	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			227071	06/05/18 11:06	SHK	TAL SAC

Client Sample ID: 407372
Date Collected: 05/10/18 11:39
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-6
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	226898	06/04/18 06:59	TWL	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			227071	06/05/18 14:47	SHK	TAL SAC

Lab Chronicle

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

TestAmerica Job ID: 320-39517-1

Client Sample ID: 542512
Date Collected: 05/10/18 13:38
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-7
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	226898	06/04/18 06:59	TWL	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			227071	06/05/18 15:05	SHK	TAL SAC

Client Sample ID: 550132
Date Collected: 05/11/18 11:31
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-8
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	226898	06/04/18 06:59	TWL	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			227071	06/05/18 15:42	SHK	TAL SAC

Client Sample ID: 153915
Date Collected: 05/11/18 12:26
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-9
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	226898	06/04/18 06:59	TWL	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			227071	06/05/18 16:00	SHK	TAL SAC

Client Sample ID: 153907
Date Collected: 05/11/18 12:47
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-10
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	226898	06/04/18 06:59	TWL	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			227071	06/05/18 16:19	SHK	TAL SAC

Client Sample ID: 153699
Date Collected: 05/11/18 13:39
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-11
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	226898	06/04/18 06:59	TWL	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			227071	06/05/18 16:37	SHK	TAL SAC

Client Sample ID: 510220.1
Date Collected: 05/11/18 14:40
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-12
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	226898	06/04/18 06:59	TWL	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			227071	06/05/18 16:55	SHK	TAL SAC

Lab Chronicle

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

TestAmerica Job ID: 320-39517-1

Client Sample ID: 510320.1

Lab Sample ID: 320-39517-13

Date Collected: 05/11/18 14:50

Matrix: Water

Date Received: 05/17/18 11:35

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	226898	06/04/18 06:59	TWL	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			227071	06/05/18 17:14	SHK	TAL SAC

Client Sample ID: 510220.2

Lab Sample ID: 320-39517-14

Date Collected: 05/11/18 15:13

Matrix: Water

Date Received: 05/17/18 11:35

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	226898	06/04/18 06:59	TWL	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			227071	06/05/18 17:32	SHK	TAL SAC

Client Sample ID: 526932

Lab Sample ID: 320-39517-15

Date Collected: 05/15/18 10:12

Matrix: Water

Date Received: 05/17/18 11:35

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	226898	06/04/18 06:59	TWL	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			227071	06/05/18 17:50	SHK	TAL SAC

Client Sample ID: 120513

Lab Sample ID: 320-39517-16

Date Collected: 05/15/18 12:04

Matrix: Water

Date Received: 05/17/18 11:35

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	226898	06/04/18 06:59	TWL	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			227071	06/05/18 18:09	SHK	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	226898	06/04/18 06:59	TWL	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			227416	06/06/18 09:09	SHK	TAL SAC

Client Sample ID: 120413

Lab Sample ID: 320-39517-17

Date Collected: 05/15/18 12:14

Matrix: Water

Date Received: 05/17/18 11:35

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	226898	06/04/18 06:59	TWL	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			227071	06/05/18 18:27	SHK	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	226898	06/04/18 06:59	TWL	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			227416	06/06/18 09:27	SHK	TAL SAC

Lab Chronicle

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

TestAmerica Job ID: 320-39517-1

Client Sample ID: 174254

Date Collected: 05/16/18 09:45
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-18

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	226898	06/04/18 06:59	TWL	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			227071	06/05/18 19:04	SHK	TAL SAC

Client Sample ID: 542547

Date Collected: 05/16/18 10:29
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-19

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	226898	06/04/18 06:59	TWL	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			227071	06/05/18 19:22	SHK	TAL SAC

Client Sample ID: 152617

Date Collected: 05/16/18 11:12
Date Received: 05/17/18 11:35

Lab Sample ID: 320-39517-20

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	226898	06/04/18 06:59	TWL	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			227071	06/05/18 19:41	SHK	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: 320-39517-1

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	06-17-19
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	03-17-19
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	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
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
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

Method Summary

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

TestAmerica Job ID: 320-39517-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC
PFAS Prep	Preparation, Direct Inject PFAS	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: 320-39517-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-39517-1	176095	Water	05/09/18 15:35	05/17/18 11:35
320-39517-2	176397	Water	05/09/18 16:47	05/17/18 11:35
320-39517-3	173916	Water	05/09/18 17:22	05/17/18 11:35
320-39517-4	173860	Water	05/09/18 18:28	05/17/18 11:35
320-39517-5	407364	Water	05/10/18 10:38	05/17/18 11:35
320-39517-6	407372	Water	05/10/18 11:39	05/17/18 11:35
320-39517-7	542512	Water	05/10/18 13:38	05/17/18 11:35
320-39517-8	550132	Water	05/11/18 11:31	05/17/18 11:35
320-39517-9	153915	Water	05/11/18 12:26	05/17/18 11:35
320-39517-10	153907	Water	05/11/18 12:47	05/17/18 11:35
320-39517-11	153699	Water	05/11/18 13:39	05/17/18 11:35
320-39517-12	510220.1	Water	05/11/18 14:40	05/17/18 11:35
320-39517-13	510320.1	Water	05/11/18 14:50	05/17/18 11:35
320-39517-14	510220.2	Water	05/11/18 15:13	05/17/18 11:35
320-39517-15	526932	Water	05/15/18 10:12	05/17/18 11:35
320-39517-16	120513	Water	05/15/18 12:04	05/17/18 11:35
320-39517-17	120413	Water	05/15/18 12:14	05/17/18 11:35
320-39517-18	174254	Water	05/16/18 09:45	05/17/18 11:35
320-39517-19	542547	Water	05/16/18 10:29	05/17/18 11:35
320-39517-20	152617	Water	05/16/18 11:12	05/17/18 11:35

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

CHAIN-OF-CUSTODY RECORD

Laboratory Test America
Attn: David Allfuckker

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
176095		1535	5/9/18		X	X					2	Groundwater
176397		1647	5/9/18		X	X					2	
173916		1722	5/9/18		X	X					2	
173860		1828	5/9/18		X	X					2	
407364		1038	5/10/18		X	X					2	
407372		1139	5/10/18		X	X					2	
542512		1338	5/10/18		X	X					2	
550132		11:31	5/11/18		X	X					2	
153915		12:26	5/11/18		X	X					2	
153907		12:47	5/11/18		X	X					2	

Project Information		Sample Receipt	
Project Number:	31-1-20060	Total Number of Containers	
Project Name:	FTA	COC Seals/Intact? Y/N/NA	(NA)
Contact:	MDN	Received Good Cond./Cold	5.1°C
Ongoing Project?	Yes ☑ No ☐	Delivery Method:	goldstreak
Sampler:	CAB, 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: 16:30	Signature:	Time:	Signature:	Time:
Printed Name: Craig Beebe	Date: 5/16/18	Printed Name:	Date:	Printed Name:	Date:
Company: Shannon & Wilson Inc		Company:		Company:	

Received By: 1.		Received By: 2.		Received By: 3.	
Signature:	Time: 1135	Signature:			Time:
Printed Name: Dan Colter	Date: 5/17/18	Printed			Date:
Company: TH Sac		Compa			

320-39517 Chain of Custody

F-19-91/UR

No. 34949

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
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(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 Althaker

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
153699		1339	5/11/18		X	X						2	Groundwater
510220.1		1440	5/11/18		X	X						2	
510320.1		1450	5/11/18		X	X						2	
510220.2		1513	5/11/18		X	X						2	
526932		1012	5/15/18		X	X						2	
120513		1204	5/15/18		X	X						2	
120X413		1214	5/15/18		X	X						2	
~~529809~~		~~1112~~	~~5/15/18~~		X	X						2	(CAB)
174254		0945	5/16/18		X	X						2	
542547		10:29	5/16/18		X	X						2	

Project Information		Sample Receipt	
Project Number:	31-1-20060	Total Number of Containers	
Project Name:	FIA	COC Seals/Intact? Y/N/NA	(N)
Contact:	MDN	Received Good Cond./Cold	5.1 °C
Ongoing Project?	Yes ☑ No ☐	Delivery Method:	Goldstreak
Sampler:	CAB, 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: Craig Beebe Time: 16:50	Signature: Time:	Signature: Time:
Printed Name: Craig Beebe Date: 5/16/18	Printed Name: Date:	Printed Name: Date:
Company: Shannon + Wilson, Inc	Company:	Company:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: Time: 1135	Signature: Time:	Signature: Time:
Printed Name: David Althaker Date: 5/16/18	Printed Name: Date:	Printed Name: Date:
Company: TA Sac	Company:	Company:

F-19-91/UR

No. 34959

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

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

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

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(509) 946-6309

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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
152617		11:12	5/16/18		X	X						2	Groundwater

Project Information		Sample Receipt	
Project Number:	31-1-20060	Total Number of Containers	
Project Name:	FIA	COC Seals/Intact? Y/N/(NA)	
Contact:	MDN	Received Good Cond./Cold	5.1°C
Ongoing Project?	Yes ☑ No ☐	Delivery Method:	Goldstreak
Sampler:	CAB, 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: Craig Beebe	Signature:	Signature:
Time: 16:50	Time:	Time:
Printed Name: Craig Beebe	Printed Name:	Printed Name:
Date: 5/16/18	Date:	Date:
Company: Shannon & Wilson, Inc	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature:	Signature:	Signature:
Time: 1135	Time:	Time:
Printed Name:	Printed Name:	Printed Name:
Date: 5/17/18	Date:	Date:
Company: TAS	Company:	Company:

F-19-91/UR

No. 34864

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-39517-1

Login Number: 39517
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.	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?	False	
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:

Amber Masters

Title:

Environmental Scientist

Date:

January 30, 2019

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

June 6, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-39517-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-39517-1

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:

N/A; all 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:

The sample receipt form lists custody seals as "N/A" and notes that the field samplers' names were not present on COC. The latter comment appears to be in error as the field sampler initials are present on COC.

e. Data quality or usability affected?

Comments:

The data quality and/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 5.1° C.

The case narrative notes there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) associated with preparation batch 320-226898.

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:

N/A; the samples were not affected by laboratory or method contamination.

v. Data quality or usability affected?

Comments:

The data quality and/or usability are 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:

None; 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/or usability are 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/or 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 pairs *510220.1* / *510320.1* and *120413* / *120513* 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 relative precision demonstrated between the PFHpA results of the field duplicate samples *510220.1* and *510320.1* did not meet the recommended DQO of 30%.

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

Comments:

The PFHpA results of the field duplicate samples *510220.1* and *510320.1* are considered estimated and flagged 'J' to identify the imprecision.

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: 320-39845-1
TestAmerica Sample Delivery Group: 20060-001
Client Project/Site: FAI
Revision: 1

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

Attn: Marcy Nadel

Authorized for release by:
6/15/2018 10:31:40 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: 320-39845-1
SDG: 20060-001

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: 320-39845-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-39845-1

Receipt
The samples were received on 5/30/2018 9:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.1º 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 320-228082.

Method(s) PFAS Prep: Samples 153982 (320-39845-2), 120227 (320-39845-3), 375896 (320-39845-4), 152471 (320-39845-5) and 120782 (320-39845-6) in preparation batch 320-228082 were observed to be a light orange color.

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: 320-39845-1
SDG: 20060-001

Client Sample ID: 153419 — Lab Sample ID: 320-39845-1

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)	41		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	9.0		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
Perfluorooctanesulfonic acid (PFOS)	30		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	0.66	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 153982 — Lab Sample ID: 320-39845-2

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)	51		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	6.8		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	6.6		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	81		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	0.99	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 120227 — Lab Sample ID: 320-39845-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	6.1		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	30		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)	6.0		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

Client Sample ID: 375896 — Lab Sample ID: 320-39845-4

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)	46		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	6.3		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)	91		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: 320-39845-1
SDG: 20060-001

Client Sample ID: 375896 (Continued) — Lab Sample ID: 320-39845-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorononanoic acid (PFNA)	1.2	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 152471 — Lab Sample ID: 320-39845-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	7.2		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	22		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)	5.3		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	74		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	0.95	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 120782 — Lab Sample ID: 320-39845-6

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)	6.9		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	2.2		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	4.8		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 120782-EB — Lab Sample ID: 320-39845-7

No Detections.

This Detection Summary does not include radiochemical test results.

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

TestAmerica Job ID: 320-39845-1
SDG: 20060-001

Client Sample ID: 153419
Date Collected: 05/24/18 12:05
Date Received: 05/30/18 09:30

Lab Sample ID: 320-39845-1
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	23		2.0	0.92	ng/L		06/08/18 12:05	06/11/18 19:42	1
Perfluorohexanesulfonic acid (PFHxS)	41		2.0	0.87	ng/L		06/08/18 12:05	06/11/18 19:42	1
Perfluoroheptanoic acid (PFHpA)	9.0		2.0	0.80	ng/L		06/08/18 12:05	06/11/18 19:42	1
Perfluorooctanoic acid (PFOA)	11		2.0	0.75	ng/L		06/08/18 12:05	06/11/18 19:42	1
Perfluorooctanesulfonic acid (PFOS)	30		2.0	1.3	ng/L		06/08/18 12:05	06/11/18 19:42	1
Perfluorononanoic acid (PFNA)	0.66	J	2.0	0.65	ng/L		06/08/18 12:05	06/11/18 19:42	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*102*		*25 - 150*	*06/08/18 12:05*	*06/11/18 19:42*	*1*
13C4-PFHpA	*108*		*25 - 150*	*06/08/18 12:05*	*06/11/18 19:42*	*1*
13C4 PFOA	*111*		*25 - 150*	*06/08/18 12:05*	*06/11/18 19:42*	*1*
13C4 PFOS	*97*		*25 - 150*	*06/08/18 12:05*	*06/11/18 19:42*	*1*
13C5 PFNA	*105*		*25 - 150*	*06/08/18 12:05*	*06/11/18 19:42*	*1*

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

TestAmerica Job ID: 320-39845-1
SDG: 20060-001

Client Sample ID: 153982
Date Collected: 05/24/18 11:40
Date Received: 05/30/18 09:30

Lab Sample ID: 320-39845-2
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	16		2.0	0.92	ng/L		06/08/18 12:05	06/11/18 20:00	1
Perfluorohexanesulfonic acid (PFHxS)	51		2.0	0.87	ng/L		06/08/18 12:05	06/11/18 20:00	1
Perfluoroheptanoic acid (PFHpA)	6.8		2.0	0.80	ng/L		06/08/18 12:05	06/11/18 20:00	1
Perfluorooctanoic acid (PFOA)	6.6		2.0	0.75	ng/L		06/08/18 12:05	06/11/18 20:00	1
Perfluorooctanesulfonic acid (PFOS)	81		2.0	1.3	ng/L		06/08/18 12:05	06/11/18 20:00	1
Perfluorononanoic acid (PFNA)	0.99	J	2.0	0.65	ng/L		06/08/18 12:05	06/11/18 20:00	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*109*		*25 - 150*	*06/08/18 12:05*	*06/11/18 20:00*	*1*
13C4-PFHpA	*107*		*25 - 150*	*06/08/18 12:05*	*06/11/18 20:00*	*1*
13C4 PFOA	*116*		*25 - 150*	*06/08/18 12:05*	*06/11/18 20:00*	*1*
13C4 PFOS	*102*		*25 - 150*	*06/08/18 12:05*	*06/11/18 20:00*	*1*
13C5 PFNA	*108*		*25 - 150*	*06/08/18 12:05*	*06/11/18 20:00*	*1*

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

TestAmerica Job ID: 320-39845-1
SDG: 20060-001

Client Sample ID: 120227
Date Collected: 05/24/18 10:29
Date Received: 05/30/18 09:30

Lab Sample ID: 320-39845-3
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**6.1**		2.0	0.92	ng/L		06/08/18 12:05	06/11/18 20:18	1
Perfluorohexanesulfonic acid (PFHxS)	**30**		2.0	0.87	ng/L		06/08/18 12:05	06/11/18 20:18	1
Perfluoroheptanoic acid (PFHpA)	**4.7**		2.0	0.80	ng/L		06/08/18 12:05	06/11/18 20:18	1
Perfluorooctanoic acid (PFOA)	**6.0**		2.0	0.75	ng/L		06/08/18 12:05	06/11/18 20:18	1
Perfluorooctanesulfonic acid (PFOS)	**250**		2.0	1.3	ng/L		06/08/18 12:05	06/11/18 20:18	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		06/08/18 12:05	06/11/18 20:18	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*107*		*25 - 150*	*06/08/18 12:05*	*06/11/18 20:18*	*1*
13C4-PFHpA	*108*		*25 - 150*	*06/08/18 12:05*	*06/11/18 20:18*	*1*
13C4 PFOA	*112*		*25 - 150*	*06/08/18 12:05*	*06/11/18 20:18*	*1*
13C4 PFOS	*97*		*25 - 150*	*06/08/18 12:05*	*06/11/18 20:18*	*1*
13C5 PFNA	*104*		*25 - 150*	*06/08/18 12:05*	*06/11/18 20:18*	*1*

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

TestAmerica Job ID: 320-39845-1
SDG: 20060-001

Client Sample ID: 375896
Date Collected: 05/24/18 11:16
Date Received: 05/30/18 09:30

Lab Sample ID: 320-39845-4
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	11		2.0	0.92	ng/L		06/08/18 12:05	06/11/18 20:37	1
Perfluorohexanesulfonic acid (PFHxS)	46		2.0	0.87	ng/L		06/08/18 12:05	06/11/18 20:37	1
Perfluoroheptanoic acid (PFHpA)	6.3		2.0	0.80	ng/L		06/08/18 12:05	06/11/18 20:37	1
Perfluorooctanoic acid (PFOA)	8.6		2.0	0.75	ng/L		06/08/18 12:05	06/11/18 20:37	1
Perfluorooctanesulfonic acid (PFOS)	91		2.0	1.3	ng/L		06/08/18 12:05	06/11/18 20:37	1
Perfluorononanoic acid (PFNA)	1.2	J	2.0	0.65	ng/L		06/08/18 12:05	06/11/18 20:37	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*103*		*25 - 150*	*06/08/18 12:05*	*06/11/18 20:37*	*1*
13C4-PFHpA	*104*		*25 - 150*	*06/08/18 12:05*	*06/11/18 20:37*	*1*
13C4 PFOA	*107*		*25 - 150*	*06/08/18 12:05*	*06/11/18 20:37*	*1*
13C4 PFOS	*96*		*25 - 150*	*06/08/18 12:05*	*06/11/18 20:37*	*1*
13C5 PFNA	*102*		*25 - 150*	*06/08/18 12:05*	*06/11/18 20:37*	*1*

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

TestAmerica Job ID: 320-39845-1
SDG: 20060-001

Client Sample ID: 152471
Date Collected: 05/24/18 09:16
Date Received: 05/30/18 09:30

Lab Sample ID: 320-39845-5
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	7.2		2.0	0.92	ng/L		06/08/18 12:05	06/11/18 20:55	1
Perfluorohexanesulfonic acid (PFHxS)	22		2.0	0.87	ng/L		06/08/18 12:05	06/11/18 20:55	1
Perfluoroheptanoic acid (PFHpA)	3.7		2.0	0.80	ng/L		06/08/18 12:05	06/11/18 20:55	1
Perfluorooctanoic acid (PFOA)	5.3		2.0	0.75	ng/L		06/08/18 12:05	06/11/18 20:55	1
Perfluorooctanesulfonic acid (PFOS)	74		2.0	1.3	ng/L		06/08/18 12:05	06/11/18 20:55	1
Perfluorononanoic acid (PFNA)	0.95	J	2.0	0.65	ng/L		06/08/18 12:05	06/11/18 20:55	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*104*		*25 - 150*	*06/08/18 12:05*	*06/11/18 20:55*	*1*
13C4-PFHpA	*110*		*25 - 150*	*06/08/18 12:05*	*06/11/18 20:55*	*1*
13C4 PFOA	*108*		*25 - 150*	*06/08/18 12:05*	*06/11/18 20:55*	*1*
13C4 PFOS	*102*		*25 - 150*	*06/08/18 12:05*	*06/11/18 20:55*	*1*
13C5 PFNA	*105*		*25 - 150*	*06/08/18 12:05*	*06/11/18 20:55*	*1*

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

TestAmerica Job ID: 320-39845-1
SDG: 20060-001

Client Sample ID: 120782
Date Collected: 05/29/18 16:49
Date Received: 05/30/18 09:30

Lab Sample ID: 320-39845-6
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**1.8**	**J**	2.0	0.92	ng/L		06/08/18 12:05	06/11/18 21:13	1
Perfluorohexanesulfonic acid (PFHxS)	**6.9**		2.0	0.87	ng/L		06/08/18 12:05	06/11/18 21:13	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		06/08/18 12:05	06/11/18 21:13	1
Perfluorooctanoic acid (PFOA)	**2.2**		2.0	0.75	ng/L		06/08/18 12:05	06/11/18 21:13	1
Perfluorooctanesulfonic acid (PFOS)	**4.8**		2.0	1.3	ng/L		06/08/18 12:05	06/11/18 21:13	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		06/08/18 12:05	06/11/18 21:13	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*105*		*25 - 150*	*06/08/18 12:05*	*06/11/18 21:13*	*1*
13C4-PFHpA	*105*		*25 - 150*	*06/08/18 12:05*	*06/11/18 21:13*	*1*
13C4 PFOA	*114*		*25 - 150*	*06/08/18 12:05*	*06/11/18 21:13*	*1*
13C4 PFOS	*104*		*25 - 150*	*06/08/18 12:05*	*06/11/18 21:13*	*1*
13C5 PFNA	*112*		*25 - 150*	*06/08/18 12:05*	*06/11/18 21:13*	*1*

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

TestAmerica Job ID: 320-39845-1
SDG: 20060-001

Client Sample ID: 120782-EB
Date Collected: 05/29/18 17:00
Date Received: 05/30/18 09:30

Lab Sample ID: 320-39845-7
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		06/08/18 12:05	06/11/18 21:32	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		06/08/18 12:05	06/11/18 21:32	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		06/08/18 12:05	06/11/18 21:32	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		06/08/18 12:05	06/11/18 21:32	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		06/08/18 12:05	06/11/18 21:32	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		06/08/18 12:05	06/11/18 21:32	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*102*		*25 - 150*	*06/08/18 12:05*	*06/11/18 21:32*	*1*
13C4-PFHpA	*101*		*25 - 150*	*06/08/18 12:05*	*06/11/18 21:32*	*1*
13C4 PFOA	*110*		*25 - 150*	*06/08/18 12:05*	*06/11/18 21:32*	*1*
13C4 PFOS	*100*		*25 - 150*	*06/08/18 12:05*	*06/11/18 21:32*	*1*
13C5 PFNA	*98*		*25 - 150*	*06/08/18 12:05*	*06/11/18 21:32*	*1*

Isotope Dilution Summary

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

TestAmerica Job ID: 320-39845-1
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)
320-39845-1	153419	102	108	111	97	105
320-39845-2	153982	109	107	116	102	108
320-39845-3	120227	107	108	112	97	104
320-39845-4	375896	103	104	107	96	102
320-39845-5	152471	104	110	108	102	105
320-39845-6	120782	105	105	114	104	112
320-39845-7	120782-EB	102	101	110	100	98
LCS 320-228082/2-A	Lab Control Sample	98	98	108	99	101
LCSD 320-228082/3-A	Lab Control Sample Dup	101	105	102	98	102
MB 320-228082/1-A	Method Blank	98	100	102	94	101

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 320-228082/1-A
Matrix: Water
Analysis Batch: 228511

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 228082

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		06/08/18 12:05	06/11/18 18:46	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		06/08/18 12:05	06/11/18 18:46	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		06/08/18 12:05	06/11/18 18:46	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		06/08/18 12:05	06/11/18 18:46	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		06/08/18 12:05	06/11/18 18:46	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		06/08/18 12:05	06/11/18 18:46	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*98*		*25 - 150*	*06/08/18 12:05*	*06/11/18 18:46*	*1*
13C4-PFHpA	*100*		*25 - 150*	*06/08/18 12:05*	*06/11/18 18:46*	*1*
13C4 PFOA	*102*		*25 - 150*	*06/08/18 12:05*	*06/11/18 18:46*	*1*
13C4 PFOS	*94*		*25 - 150*	*06/08/18 12:05*	*06/11/18 18:46*	*1*
13C5 PFNA	*101*		*25 - 150*	*06/08/18 12:05*	*06/11/18 18:46*	*1*

Lab Sample ID: LCS 320-228082/2-A
Matrix: Water
Analysis Batch: 228511

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 228082

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	20.1		ng/L		114	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	19.5		ng/L		107	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	21.8		ng/L		109	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	20.8		ng/L		104	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	19.7		ng/L		106	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	21.7		ng/L		109	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*98*		*25 - 150*
13C4-PFHpA	*98*		*25 - 150*
13C4 PFOA	*108*		*25 - 150*
13C4 PFOS	*99*		*25 - 150*
13C5 PFNA	*101*		*25 - 150*

Lab Sample ID: LCSD 320-228082/3-A
Matrix: Water
Analysis Batch: 228511

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 228082

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	19.0		ng/L		107	72 - 151	6	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	18.1		ng/L		99	73 - 157	8	30
Perfluoroheptanoic acid (PFHpA)			20.0	20.3		ng/L		102	71 - 138	7	30
Perfluorooctanoic acid (PFOA)			20.0	20.9		ng/L		105	70 - 140	0	30
Perfluorooctanesulfonic acid (PFOS)			18.6	18.5		ng/L		99	69 - 144	7	30
Perfluorononanoic acid (PFNA)			20.0	21.5		ng/L		108	73 - 147	1	30

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	101		25 - 150
13C4-PFHpA	105		25 - 150
13C4 PFOA	102		25 - 150
13C4 PFOS	98		25 - 150
13C5 PFNA	102		25 - 150

QC Association Summary

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

TestAmerica Job ID: 320-39845-1
SDG: 20060-001

LCMS

Prep Batch: 228082

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-39845-1	153419	Total/NA	Water	PFAS Prep	
320-39845-2	153982	Total/NA	Water	PFAS Prep	
320-39845-3	120227	Total/NA	Water	PFAS Prep	
320-39845-4	375896	Total/NA	Water	PFAS Prep	
320-39845-5	152471	Total/NA	Water	PFAS Prep	
320-39845-6	120782	Total/NA	Water	PFAS Prep	
320-39845-7	120782-EB	Total/NA	Water	PFAS Prep	
MB 320-228082/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-228082/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-228082/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 228511

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-39845-1	153419	Total/NA	Water	WS-LC-0025 At1	228082
320-39845-2	153982	Total/NA	Water	WS-LC-0025 At1	228082
320-39845-3	120227	Total/NA	Water	WS-LC-0025 At1	228082
320-39845-4	375896	Total/NA	Water	WS-LC-0025 At1	228082
320-39845-5	152471	Total/NA	Water	WS-LC-0025 At1	228082
320-39845-6	120782	Total/NA	Water	WS-LC-0025 At1	228082
320-39845-7	120782-EB	Total/NA	Water	WS-LC-0025 At1	228082
MB 320-228082/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	228082
LCS 320-228082/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	228082
LCSD 320-228082/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	228082

Lab Chronicle

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

TestAmerica Job ID: 320-39845-1
SDG: 20060-001

Client Sample ID: 153419
Date Collected: 05/24/18 12:05
Date Received: 05/30/18 09:30

Lab Sample ID: 320-39845-1
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	228082	06/08/18 12:05	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			228511	06/11/18 19:42	SHK	TAL SAC

Client Sample ID: 153982
Date Collected: 05/24/18 11:40
Date Received: 05/30/18 09:30

Lab Sample ID: 320-39845-2
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	228082	06/08/18 12:05	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			228511	06/11/18 20:00	SHK	TAL SAC

Client Sample ID: 120227
Date Collected: 05/24/18 10:29
Date Received: 05/30/18 09:30

Lab Sample ID: 320-39845-3
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	228082	06/08/18 12:05	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			228511	06/11/18 20:18	SHK	TAL SAC

Client Sample ID: 375896
Date Collected: 05/24/18 11:16
Date Received: 05/30/18 09:30

Lab Sample ID: 320-39845-4
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	228082	06/08/18 12:05	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			228511	06/11/18 20:37	SHK	TAL SAC

Client Sample ID: 152471
Date Collected: 05/24/18 09:16
Date Received: 05/30/18 09:30

Lab Sample ID: 320-39845-5
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	228082	06/08/18 12:05	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			228511	06/11/18 20:55	SHK	TAL SAC

Client Sample ID: 120782
Date Collected: 05/29/18 16:49
Date Received: 05/30/18 09:30

Lab Sample ID: 320-39845-6
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	228082	06/08/18 12:05	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			228511	06/11/18 21:13	SHK	TAL SAC

Lab Chronicle

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

TestAmerica Job ID: 320-39845-1
SDG: 20060-001

Client Sample ID: 120782-EB
Date Collected: 05/29/18 17:00
Date Received: 05/30/18 09:30

Lab Sample ID: 320-39845-7
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	228082	06/08/18 12:05	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			228511	06/11/18 21:32	SHK	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: 320-39845-1
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	06-17-19
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	03-17-19
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	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
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
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

Method Summary

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

TestAmerica Job ID: 320-39845-1
SDG: 20060-001

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC
PFAS Prep	Preparation, Direct Inject PFAS	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: 320-39845-1
SDG: 20060-001

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-39845-1	153419	Water	05/24/18 12:05	05/30/18 09:30
320-39845-2	153982	Water	05/24/18 11:40	05/30/18 09:30
320-39845-3	120227	Water	05/24/18 10:29	05/30/18 09:30
320-39845-4	375896	Water	05/24/18 11:16	05/30/18 09:30
320-39845-5	152471	Water	05/24/18 09:16	05/30/18 09:30
320-39845-6	120782	Water	05/29/18 16:49	05/30/18 09:30
320-39845-7	120782-EB	Water	05/29/18 17:00	05/30/18 09:30

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

CHAIN-OF-CUSTODY RECORD

Laboratory Test America
Attn: D. Althuckes

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 (x60)						Total Number of Containers	Remarks/Matrix
151688		1205	5/24/18		X	X						2	groundwater
153982		1140	5/24/18		X	X						2	
120227		1029	5/24/18		X	X						2	
375896		1116	5/24/18		X	X						2	
152471		0916	5/24/18		X	X						2	
120782		1649	5/29/18		X	X						2	
120782-EB		1700	5/29/18		X	X						2	

Project Information		Sample Receipt	
Project Number:	20060-001	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:	Goldstreak
Sampler:	ARM	(attach shipping bill, if any)	

Instructions

Requested Turnaround Time: Standard

Special Instructions:

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 1800	Signature: Time:	Signature: Time:
Printed Name: Amber Masters Date: 5/29/18	Printed Name: Date:	Printed Name: Date:
Company: Shannon + Wilson, Inc.	Company:	Company:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: Time: 930	Signature: Time:	Signature: Time:
Printed Name: David Hu Date: 5/30/18	Printed Name: Date:	Printed Name: Date:
Company: TA Sea	Company:	Company:

Distribution: W
Ye
Pi
oratory report

320-39845 Chain of Custody

F-19-91/UR

No. 34882

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-39845-1
SDG Number: 20060-001

Login Number: 39845
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.	False	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:

June 19, 2018

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

June 15, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-39845-1 REV1

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:

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:

The laboratory report was revised to correct a sample naming error. The COC lists sample 153419 as 151688.

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 3.1° C.

The case narrative notes there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) with preparation batch 320-228082.

The case narrative also notes several samples arrived with an orange color.

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/or 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

Equipment blank 120782-EB was submitted to the laboratory for analysis of PFAS.

i. All results less than LOQ?

(•) Yes ( ) No Comments:

PFAS reported for this project were not detected in the EB sample.

ii. If above LOQ, what samples are affected?

Comments:

None; see above.

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: 320-40406-1
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:
7/3/2018 3:32:32 PM

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: 320-40406-1
SDG: 20060-001

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: 320-40406-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-40406-1

Receipt
The samples were received on 6/19/2018 10:05 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 4.2º C.

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

Organic Prep
Method(s) PFAS Prep: Samples 174947 (320-40406-1) and 152315 (320-40406-5) in preparation batch 320-231086 were observed to be a yellow color.

Method(s) PFAS Prep: Samples 120081 (320-40406-3), 120181 (320-40406-4) and 173924 (320-40406-8) in preparation batch 320-231086 are observed to be a light yellow color.

Method(s) PFAS Prep: Samples 153826 (320-40406-2), 153354 (320-40406-6) and 120006 (320-40406-7) in preparation batch 320-231086 were observed to be a light brown color.

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-231086.

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: 320-40406-1
SDG: 20060-001

Client Sample ID: 174947 — Lab Sample ID: 320-40406-1

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)	58		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	7.2		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) - DL	340		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: 153826 — Lab Sample ID: 320-40406-2

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)	80		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)	43		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	90		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

Client Sample ID: 120081 — Lab Sample ID: 320-40406-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	32		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)	21		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	27		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	3.3		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	940		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: 120181 — Lab Sample ID: 320-40406-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	33		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)	21		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	29		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	4.4		2.0	0.65	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: 320-40406-1
SDG: 20060-001

Client Sample ID: 120181 (Continued) — Lab Sample ID: 320-40406-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanesulfonic acid (PFOS) - DL	1300		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: 152315 — Lab Sample ID: 320-40406-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	9.3		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)	4.6		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)	120		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: 153354 — Lab Sample ID: 320-40406-6

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)	55		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	9.0		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
Perfluorooctanesulfonic acid (PFOS)	76		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	1.7	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 120006 — Lab Sample ID: 320-40406-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	33		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)	16		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
Perfluorooctanesulfonic acid (PFOS) - DL	590		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: 173924 — Lab Sample ID: 320-40406-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	3.5		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: 173924 (Continued)

Lab Sample ID: 320-40406-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	3.7		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: 174947
Date Collected: 06/11/18 10:20
Date Received: 06/19/18 10:05

Lab Sample ID: 320-40406-1
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		06/26/18 14:22	06/30/18 06:40	1
Perfluorohexanesulfonic acid (PFHxS)	**58**		2.0	0.87	ng/L		06/26/18 14:22	06/30/18 06:40	1
Perfluoroheptanoic acid (PFHpA)	**7.2**		2.0	0.80	ng/L		06/26/18 14:22	06/30/18 06:40	1
Perfluorooctanoic acid (PFOA)	**10**		2.0	0.75	ng/L		06/26/18 14:22	06/30/18 06:40	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		06/26/18 14:22	06/30/18 06:40	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*92*		*25 - 150*	*06/26/18 14:22*	*06/30/18 06:40*	*1*
13C4-PFHpA	*82*		*25 - 150*	*06/26/18 14:22*	*06/30/18 06:40*	*1*
13C4 PFOA	*81*		*25 - 150*	*06/26/18 14:22*	*06/30/18 06:40*	*1*
13C5 PFNA	*67*		*25 - 150*	*06/26/18 14:22*	*06/30/18 06:40*	*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		06/26/18 14:22	07/03/18 07:14	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*98*		*25 - 150*	*06/26/18 14:22*	*07/03/18 07:14*	*10*

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

TestAmerica Job ID: 320-40406-1
SDG: 20060-001

Client Sample ID: 153826
Date Collected: 06/11/18 11:20
Date Received: 06/19/18 10:05

Lab Sample ID: 320-40406-2
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	31		2.0	0.92	ng/L		06/26/18 14:22	06/30/18 06:59	1
Perfluorohexanesulfonic acid (PFHxS)	80		2.0	0.87	ng/L		06/26/18 14:22	06/30/18 06:59	1
Perfluoroheptanoic acid (PFHpA)	10		2.0	0.80	ng/L		06/26/18 14:22	06/30/18 06:59	1
Perfluorooctanoic acid (PFOA)	43		2.0	0.75	ng/L		06/26/18 14:22	06/30/18 06:59	1
Perfluorooctanesulfonic acid (PFOS)	90		2.0	1.3	ng/L		06/26/18 14:22	06/30/18 06:59	1
Perfluorononanoic acid (PFNA)	1.3	J	2.0	0.65	ng/L		06/26/18 14:22	06/30/18 06:59	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*97*		*25 - 150*	*06/26/18 14:22*	*06/30/18 06:59*	*1*
13C4-PFHpA	*83*		*25 - 150*	*06/26/18 14:22*	*06/30/18 06:59*	*1*
13C4 PFOA	*77*		*25 - 150*	*06/26/18 14:22*	*06/30/18 06:59*	*1*
13C4 PFOS	*89*		*25 - 150*	*06/26/18 14:22*	*06/30/18 06:59*	*1*
13C5 PFNA	*70*		*25 - 150*	*06/26/18 14:22*	*06/30/18 06:59*	*1*

Client Sample ID: 120081

Date Collected: 06/15/18 11:28
Date Received: 06/19/18 10:05

Lab Sample ID: 320-40406-3

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	32		2.0	0.92	ng/L		06/26/18 14:22	06/30/18 07:17	1
Perfluorohexanesulfonic acid (PFHxS)	150		2.0	0.87	ng/L		06/26/18 14:22	06/30/18 07:17	1
Perfluoroheptanoic acid (PFHpA)	21		2.0	0.80	ng/L		06/26/18 14:22	06/30/18 07:17	1
Perfluorooctanoic acid (PFOA)	27		2.0	0.75	ng/L		06/26/18 14:22	06/30/18 07:17	1
Perfluorononanoic acid (PFNA)	3.3		2.0	0.65	ng/L		06/26/18 14:22	06/30/18 07:17	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*97*		*25 - 150*	*06/26/18 14:22*	*06/30/18 07:17*	*1*
13C4-PFHpA	*82*		*25 - 150*	*06/26/18 14:22*	*06/30/18 07:17*	*1*
13C4 PFOA	*83*		*25 - 150*	*06/26/18 14:22*	*06/30/18 07:17*	*1*
13C5 PFNA	*63*		*25 - 150*	*06/26/18 14:22*	*06/30/18 07:17*	*1*

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	940		20	13	ng/L		06/26/18 14:22	07/03/18 07:32	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*103*		*25 - 150*	*06/26/18 14:22*	*07/03/18 07:32*	*10*

Client Sample ID: 120181
Date Collected: 06/15/18 11:18
Date Received: 06/19/18 10:05

Lab Sample ID: 320-40406-4
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	33		2.0	0.92	ng/L		06/26/18 14:22	06/30/18 07:35	1
Perfluorohexanesulfonic acid (PFHxS)	150		2.0	0.87	ng/L		06/26/18 14:22	06/30/18 07:35	1
Perfluoroheptanoic acid (PFHpA)	21		2.0	0.80	ng/L		06/26/18 14:22	06/30/18 07:35	1
Perfluorooctanoic acid (PFOA)	29		2.0	0.75	ng/L		06/26/18 14:22	06/30/18 07:35	1
Perfluorononanoic acid (PFNA)	4.4		2.0	0.65	ng/L		06/26/18 14:22	06/30/18 07:35	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*86*		*25 - 150*	*06/26/18 14:22*	*06/30/18 07:35*	*1*
13C4-PFHpA	*72*		*25 - 150*	*06/26/18 14:22*	*06/30/18 07:35*	*1*
13C4 PFOA	*76*		*25 - 150*	*06/26/18 14:22*	*06/30/18 07:35*	*1*
13C5 PFNA	*56*		*25 - 150*	*06/26/18 14:22*	*06/30/18 07:35*	*1*

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	1300		20	13	ng/L		06/26/18 14:22	07/03/18 07:51	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*97*		*25 - 150*	*06/26/18 14:22*	*07/03/18 07:51*	*10*

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

TestAmerica Job ID: 320-40406-1
SDG: 20060-001

Client Sample ID: 152315
Date Collected: 06/13/18 15:09
Date Received: 06/19/18 10:05

Lab Sample ID: 320-40406-5
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	9.3		2.0	0.92	ng/L		06/26/18 14:22	06/30/18 07:54	1
Perfluorohexanesulfonic acid (PFHxS)	25		2.0	0.87	ng/L		06/26/18 14:22	06/30/18 07:54	1
Perfluoroheptanoic acid (PFHpA)	4.6		2.0	0.80	ng/L		06/26/18 14:22	06/30/18 07:54	1
Perfluorooctanoic acid (PFOA)	7.3		2.0	0.75	ng/L		06/26/18 14:22	06/30/18 07:54	1
Perfluorooctanesulfonic acid (PFOS)	120		2.0	1.3	ng/L		06/26/18 14:22	06/30/18 07:54	1
Perfluorononanoic acid (PFNA)	1.6	J	2.0	0.65	ng/L		06/26/18 14:22	06/30/18 07:54	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*99*		*25 - 150*	*06/26/18 14:22*	*06/30/18 07:54*	*1*
13C4-PFHpA	*85*		*25 - 150*	*06/26/18 14:22*	*06/30/18 07:54*	*1*
13C4 PFOA	*87*		*25 - 150*	*06/26/18 14:22*	*06/30/18 07:54*	*1*
13C4 PFOS	*92*		*25 - 150*	*06/26/18 14:22*	*06/30/18 07:54*	*1*
13C5 PFNA	*72*		*25 - 150*	*06/26/18 14:22*	*06/30/18 07:54*	*1*

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

TestAmerica Job ID: 320-40406-1
SDG: 20060-001

Client Sample ID: 153354
Date Collected: 06/18/18 13:28
Date Received: 06/19/18 10:05

Lab Sample ID: 320-40406-6
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	34		2.0	0.92	ng/L		06/26/18 14:22	06/30/18 08:30	1
Perfluorohexanesulfonic acid (PFHxS)	55		2.0	0.87	ng/L		06/26/18 14:22	06/30/18 08:30	1
Perfluoroheptanoic acid (PFHpA)	9.0		2.0	0.80	ng/L		06/26/18 14:22	06/30/18 08:30	1
Perfluorooctanoic acid (PFOA)	11		2.0	0.75	ng/L		06/26/18 14:22	06/30/18 08:30	1
Perfluorooctanesulfonic acid (PFOS)	76		2.0	1.3	ng/L		06/26/18 14:22	06/30/18 08:30	1
Perfluorononanoic acid (PFNA)	1.7	J	2.0	0.65	ng/L		06/26/18 14:22	06/30/18 08:30	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*97*		*25 - 150*	*06/26/18 14:22*	*06/30/18 08:30*	*1*
13C4-PFHpA	*86*		*25 - 150*	*06/26/18 14:22*	*06/30/18 08:30*	*1*
13C4 PFOA	*90*		*25 - 150*	*06/26/18 14:22*	*06/30/18 08:30*	*1*
13C4 PFOS	*93*		*25 - 150*	*06/26/18 14:22*	*06/30/18 08:30*	*1*
13C5 PFNA	*76*		*25 - 150*	*06/26/18 14:22*	*06/30/18 08:30*	*1*

Client Sample ID: 120006
Date Collected: 06/18/18 11:55
Date Received: 06/19/18 10:05

Lab Sample ID: 320-40406-7
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	33		2.0	0.92	ng/L		06/26/18 14:22	06/30/18 08:49	1
Perfluorohexanesulfonic acid (PFHxS)	130		2.0	0.87	ng/L		06/26/18 14:22	06/30/18 08:49	1
Perfluoroheptanoic acid (PFHpA)	16		2.0	0.80	ng/L		06/26/18 14:22	06/30/18 08:49	1
Perfluorooctanoic acid (PFOA)	22		2.0	0.75	ng/L		06/26/18 14:22	06/30/18 08:49	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		06/26/18 14:22	06/30/18 08:49	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*101*		*25 - 150*	*06/26/18 14:22*	*06/30/18 08:49*	*1*
13C4-PFHpA	*85*		*25 - 150*	*06/26/18 14:22*	*06/30/18 08:49*	*1*
13C4 PFOA	*89*		*25 - 150*	*06/26/18 14:22*	*06/30/18 08:49*	*1*
13C5 PFNA	*73*		*25 - 150*	*06/26/18 14:22*	*06/30/18 08:49*	*1*

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	590		20	13	ng/L		06/26/18 14:22	07/03/18 08:09	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*95*		*25 - 150*	*06/26/18 14:22*	*07/03/18 08:09*	*10*

Client Sample ID: 173924
Date Collected: 06/18/18 14:00
Date Received: 06/19/18 10:05

Lab Sample ID: 320-40406-8
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**3.5**		2.0	0.92	ng/L		06/26/18 14:22	06/30/18 09:07	1
Perfluorohexanesulfonic acid (PFHxS)	**3.7**		2.0	0.87	ng/L		06/26/18 14:22	06/30/18 09:07	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		06/26/18 14:22	06/30/18 09:07	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		06/26/18 14:22	06/30/18 09:07	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		06/26/18 14:22	06/30/18 09:07	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		06/26/18 14:22	06/30/18 09:07	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*103*		*25 - 150*	*06/26/18 14:22*	*06/30/18 09:07*	*1*
13C4-PFHpA	*88*		*25 - 150*	*06/26/18 14:22*	*06/30/18 09:07*	*1*
13C4 PFOA	*91*		*25 - 150*	*06/26/18 14:22*	*06/30/18 09:07*	*1*
13C4 PFOS	*92*		*25 - 150*	*06/26/18 14:22*	*06/30/18 09:07*	*1*
13C5 PFNA	*77*		*25 - 150*	*06/26/18 14:22*	*06/30/18 09:07*	*1*

Isotope Dilution Summary

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

TestAmerica Job ID: 320-40406-1
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)
320-40406-1	174947	92	82	81		67
320-40406-1 - DL	174947				98	
320-40406-2	153826	97	83	77	89	70
320-40406-3	120081	97	82	83		63
320-40406-3 - DL	120081				103	
320-40406-4	120181	86	72	76		56
320-40406-4 - DL	120181				97	
320-40406-5	152315	99	85	87	92	72
320-40406-6	153354	97	86	90	93	76
320-40406-7	120006	101	85	89		73
320-40406-7 - DL	120006				95	
320-40406-8	173924	103	88	91	92	77
LCS 320-231086/2-A	Lab Control Sample	93	81	87	88	70
LCSD 320-231086/3-A	Lab Control Sample Dup	98	84	87	90	68
MB 320-231086/1-A	Method Blank	94	79	84	90	68

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 320-231086/1-A
Matrix: Water
Analysis Batch: 231792

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 231086

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		06/26/18 14:22	06/30/18 01:46	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		06/26/18 14:22	06/30/18 01:46	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		06/26/18 14:22	06/30/18 01:46	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		06/26/18 14:22	06/30/18 01:46	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		06/26/18 14:22	06/30/18 01:46	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		06/26/18 14:22	06/30/18 01:46	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*94*		*25 - 150*	*06/26/18 14:22*	*06/30/18 01:46*	*1*
13C4-PFHpA	*79*		*25 - 150*	*06/26/18 14:22*	*06/30/18 01:46*	*1*
13C4 PFOA	*84*		*25 - 150*	*06/26/18 14:22*	*06/30/18 01:46*	*1*
13C4 PFOS	*90*		*25 - 150*	*06/26/18 14:22*	*06/30/18 01:46*	*1*
13C5 PFNA	*68*		*25 - 150*	*06/26/18 14:22*	*06/30/18 01:46*	*1*

Lab Sample ID: LCS 320-231086/2-A
Matrix: Water
Analysis Batch: 231792

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 231086

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	20.3		ng/L		115	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	18.4		ng/L		101	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	20.7		ng/L		103	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	19.0		ng/L		95	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	18.3		ng/L		98	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	19.9		ng/L		99	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*93*		*25 - 150*
13C4-PFHpA	*81*		*25 - 150*
13C4 PFOA	*87*		*25 - 150*
13C4 PFOS	*88*		*25 - 150*
13C5 PFNA	*70*		*25 - 150*

Lab Sample ID: LCSD 320-231086/3-A
Matrix: Water
Analysis Batch: 231792

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 231086

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	18.6		ng/L		105	72 - 151	9	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	17.7		ng/L		97	73 - 157	4	30
Perfluoroheptanoic acid (PFHpA)			20.0	19.8		ng/L		99	71 - 138	4	30
Perfluorooctanoic acid (PFOA)			20.0	20.3		ng/L		101	70 - 140	7	30
Perfluorooctanesulfonic acid (PFOS)			18.6	17.4		ng/L		94	69 - 144	5	30
Perfluorononanoic acid (PFNA)			20.0	20.0		ng/L		100	73 - 147	1	30

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	98		25 - 150
13C4-PFHpA	84		25 - 150
13C4 PFOA	87		25 - 150
13C4 PFOS	90		25 - 150
13C5 PFNA	68		25 - 150

LCMS

Prep Batch: 231086

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-40406-1 - DL	174947	Total/NA	Water	PFAS Prep	
320-40406-1	174947	Total/NA	Water	PFAS Prep	
320-40406-2	153826	Total/NA	Water	PFAS Prep	
320-40406-3	120081	Total/NA	Water	PFAS Prep	
320-40406-3 - DL	120081	Total/NA	Water	PFAS Prep	
320-40406-4 - DL	120181	Total/NA	Water	PFAS Prep	
320-40406-4	120181	Total/NA	Water	PFAS Prep	
320-40406-5	152315	Total/NA	Water	PFAS Prep	
320-40406-6	153354	Total/NA	Water	PFAS Prep	
320-40406-7	120006	Total/NA	Water	PFAS Prep	
320-40406-7 - DL	120006	Total/NA	Water	PFAS Prep	
320-40406-8	173924	Total/NA	Water	PFAS Prep	
MB 320-231086/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-231086/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-231086/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 231792

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-40406-1	174947	Total/NA	Water	WS-LC-0025 At1	231086
320-40406-2	153826	Total/NA	Water	WS-LC-0025 At1	231086
320-40406-3	120081	Total/NA	Water	WS-LC-0025 At1	231086
320-40406-4	120181	Total/NA	Water	WS-LC-0025 At1	231086
320-40406-5	152315	Total/NA	Water	WS-LC-0025 At1	231086
320-40406-6	153354	Total/NA	Water	WS-LC-0025 At1	231086
320-40406-7	120006	Total/NA	Water	WS-LC-0025 At1	231086
320-40406-8	173924	Total/NA	Water	WS-LC-0025 At1	231086
MB 320-231086/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	231086
LCS 320-231086/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	231086
LCSD 320-231086/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	231086

Analysis Batch: 231911

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-40406-1 - DL	174947	Total/NA	Water	WS-LC-0025 At1	231086
320-40406-3 - DL	120081	Total/NA	Water	WS-LC-0025 At1	231086
320-40406-4 - DL	120181	Total/NA	Water	WS-LC-0025 At1	231086
320-40406-7 - DL	120006	Total/NA	Water	WS-LC-0025 At1	231086

Lab Chronicle

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

TestAmerica Job ID: 320-40406-1
SDG: 20060-001

Client Sample ID: 174947
Date Collected: 06/11/18 10:20
Date Received: 06/19/18 10:05

Lab Sample ID: 320-40406-1
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	231086	06/26/18 14:22	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			231792	06/30/18 06:40	S1M	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	231086	06/26/18 14:22	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			231911	07/03/18 07:14	AAR	TAL SAC

Client Sample ID: 153826
Date Collected: 06/11/18 11:20
Date Received: 06/19/18 10:05

Lab Sample ID: 320-40406-2
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	231086	06/26/18 14:22	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			231792	06/30/18 06:59	S1M	TAL SAC

Client Sample ID: 120081
Date Collected: 06/15/18 11:28
Date Received: 06/19/18 10:05

Lab Sample ID: 320-40406-3
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	231086	06/26/18 14:22	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			231792	06/30/18 07:17	S1M	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	231086	06/26/18 14:22	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			231911	07/03/18 07:32	AAR	TAL SAC

Client Sample ID: 120181
Date Collected: 06/15/18 11:18
Date Received: 06/19/18 10:05

Lab Sample ID: 320-40406-4
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	231086	06/26/18 14:22	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			231792	06/30/18 07:35	S1M	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	231086	06/26/18 14:22	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			231911	07/03/18 07:51	AAR	TAL SAC

Client Sample ID: 152315
Date Collected: 06/13/18 15:09
Date Received: 06/19/18 10:05

Lab Sample ID: 320-40406-5
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	231086	06/26/18 14:22	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			231792	06/30/18 07:54	S1M	TAL SAC

Lab Chronicle

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

TestAmerica Job ID: 320-40406-1
SDG: 20060-001

Client Sample ID: 153354
Date Collected: 06/18/18 13:28
Date Received: 06/19/18 10:05

Lab Sample ID: 320-40406-6
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	231086	06/26/18 14:22	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			231792	06/30/18 08:30	S1M	TAL SAC

Client Sample ID: 120006
Date Collected: 06/18/18 11:55
Date Received: 06/19/18 10:05

Lab Sample ID: 320-40406-7
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	231086	06/26/18 14:22	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			231792	06/30/18 08:49	S1M	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	231086	06/26/18 14:22	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			231911	07/03/18 08:09	AAR	TAL SAC

Client Sample ID: 173924
Date Collected: 06/18/18 14:00
Date Received: 06/19/18 10:05

Lab Sample ID: 320-40406-8
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	231086	06/26/18 14:22	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			231792	06/30/18 09:07	S1M	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: 320-40406-1
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
ANAB	DoD ELAP		L2468	01-20-21
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-19
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	06-30-19
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-19
Kansas	NELAP	7	E-10375	10-31-18
Louisiana	NELAP	6	30612	06-30-19
Maine	State Program	1	CA0004	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-19
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
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
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

Method Summary

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

TestAmerica Job ID: 320-40406-1
SDG: 20060-001

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC
PFAS Prep	Preparation, Direct Inject PFAS	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: 320-40406-1
SDG: 20060-001

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-40406-1	174947	Water	06/11/18 10:20	06/19/18 10:05
320-40406-2	153826	Water	06/11/18 11:20	06/19/18 10:05
320-40406-3	120081	Water	06/15/18 11:28	06/19/18 10:05
320-40406-4	120181	Water	06/15/18 11:18	06/19/18 10:05
320-40406-5	152315	Water	06/13/18 15:09	06/19/18 10:05
320-40406-6	153354	Water	06/18/18 13:28	06/19/18 10:05
320-40406-7	120006	Water	06/18/18 11:55	06/19/18 10:05
320-40406-8	173924	Water	06/18/18 14:00	06/19/18 10:05

320-40406 Chain of Custody

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

CHAIN-OF-CUSTODY RECORD

Laboratory Test America
Attn: D Alfuckey

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
~~X~~ 174947		1020	6/11/18		X	X						2	GW
153826		1120	6/11/18		X	X						2	
120081		1128	6/15/18		X	X						2	
120181		1118	6/15/18		X	X						2	
152315		1509	6/13/18		X	X						2	
153354		1328	6/18/18		X	X						2	
120006		1155	6/18/18		X	X						2	
173924		1400	6/18/18		X	X						2	

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:	
Sampler:	ARM	(attach shipping bill, if any)	GoldStreak

Instructions

Requested Turnaround Time:

Special Instructions: Bill to:
31-1-20060-002

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: 1640	Signature: Time:	Signature: Time:
Printed Name: A. Masters Date: 6/18/18	Printed Name: Date:	Printed Name: Date:
Company: Shannon + Wilson, Inc	Company:	Company:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: Time: 1005	Signature: Time:	Signature: Time:
Printed Name: David Huer Date: 6/19/18	Printed Name: Date:	Printed Name: Date:
Company: TA - Sun 4.2c	Company:	Company:

F-19-91/UR

No. 34932

7/3/2018

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-40406-1
SDG Number: 20060-001

Login Number: 40406
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").	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:

Adam Wyborny

Title:

Environmental Engineering Staff

Date:

July 5, 2018

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

July 3, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-40406-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-40406-1

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 4.2º C.

The case narrative notes there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) with preparation batch 320-231086.

The case narrative also notes several samples arrived with a yellowish color.

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/or 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:

ii. Submitted blind to lab?

◉ Yes ○ No Comments:

The field duplicate samples *120081* and *120181* 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 relative precision between the detected analyte concentrations for samples *120081* and *120181* were within the project-specific DQO of 30% for all analytes except PFOS.

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

Comments:

The PFOS results of the samples *120081* and *120181* are considered estimated due to the field duplicate precision failure. These results are flagged 'J*' for reporting purposes.

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

○ Yes ○ No ◉ Not Applicable

Due to accessibility issues, sample *153354* was collected using the property owner's rubber hose. The other samples submitted with this work order were not collected with reusable equipment. With the exception of sample *153354*, an equipment blank was not required.

i. All results less than LOQ?

◉ Yes ○ No Comments:

N/A; an equipment blank was not submitted with this work order.

ii. If above LOQ, what samples are affected?

Comments:

None; see above.

iii. Data quality or usability affected?

Comments:

The PFAS results for sample *153354* are considered estimated and flagged 'J*' for reporting purposes.

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: 320-40844-1
TestAmerica Sample Delivery Group: 20060-002
Client Project/Site: FAI

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

Attn: Marcy Nadel

Authorized for release by:
7/17/2018 1:15:54 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: 320-40844-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-40844-1

Receipt
The samples were received on 7/3/2018 9:35 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.5º C.

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

Organic Prep
Method(s) PFAS Prep: Sample 174751 (320-40844-1) is a yellowish orange color.

Method(s) PFAS Prep: Sample 443239 (320-40844-2) is a slightly gray color.

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-232738.

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: 320-40844-1
SDG: 20060-002

Client Sample ID: 174751 — Lab Sample ID: 320-40844-1

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)	68		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)	13		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	360		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: 443239 — Lab Sample ID: 320-40844-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	5.8		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	5.9		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: 174751
Date Collected: 06/19/18 13:20
Date Received: 07/03/18 09:35

Lab Sample ID: 320-40844-1
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	18		2.0	0.92	ng/L		07/06/18 13:03	07/08/18 00:56	1
Perfluorohexanesulfonic acid (PFHxS)	68		2.0	0.87	ng/L		07/06/18 13:03	07/08/18 00:56	1
Perfluoroheptanoic acid (PFHpA)	8.5		2.0	0.80	ng/L		07/06/18 13:03	07/08/18 00:56	1
Perfluorooctanoic acid (PFOA)	13		2.0	0.75	ng/L		07/06/18 13:03	07/08/18 00:56	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		07/06/18 13:03	07/08/18 00:56	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*106*		*25 - 150*	*07/06/18 13:03*	*07/08/18 00:56*	*1*
13C4-PFHpA	*107*		*25 - 150*	*07/06/18 13:03*	*07/08/18 00:56*	*1*
13C4 PFOA	*104*		*25 - 150*	*07/06/18 13:03*	*07/08/18 00:56*	*1*
13C5 PFNA	*95*		*25 - 150*	*07/06/18 13:03*	*07/08/18 00:56*	*1*

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	360		20	13	ng/L		07/06/18 13:03	07/16/18 15:29	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*97*		*25 - 150*	*07/06/18 13:03*	*07/16/18 15:29*	*10*

Client Sample Results

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

TestAmerica Job ID: 320-40844-1
SDG: 20060-002

Client Sample ID: 443239
Date Collected: 06/21/18 13:27
Date Received: 07/03/18 09:35

Lab Sample ID: 320-40844-2
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		07/06/18 13:03	07/08/18 01:14	1
Perfluorohexanesulfonic acid (PFHxS)	**5.8**		2.0	0.87	ng/L		07/06/18 13:03	07/08/18 01:14	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		07/06/18 13:03	07/08/18 01:14	1
Perfluorooctanoic acid (PFOA)	**5.9**		2.0	0.75	ng/L		07/06/18 13:03	07/08/18 01:14	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		07/06/18 13:03	07/08/18 01:14	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		07/06/18 13:03	07/08/18 01:14	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*107*		*25 - 150*	*07/06/18 13:03*	*07/08/18 01:14*	*1*
13C4-PFHpA	*107*		*25 - 150*	*07/06/18 13:03*	*07/08/18 01:14*	*1*
13C4 PFOA	*108*		*25 - 150*	*07/06/18 13:03*	*07/08/18 01:14*	*1*
13C4 PFOS	*98*		*25 - 150*	*07/06/18 13:03*	*07/08/18 01:14*	*1*
13C5 PFNA	*98*		*25 - 150*	*07/06/18 13:03*	*07/08/18 01:14*	*1*

Isotope Dilution Summary

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

TestAmerica Job ID: 320-40844-1
SDG: 20060-002

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)			
320-40844-1	174751	106	107	104		95			
320-40844-1 - DL	174751				97				
320-40844-2	443239	107	107	108	98	98			
LCS 320-233065/2-A	Lab Control Sample	103	106	101	98	96			
LCSD 320-233065/3-A	Lab Control Sample Dup	100	98	103	93	96			
MB 320-233065/1-A	Method Blank	102	103	101	94	92			

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 320-233065/1-A
Matrix: Water
Analysis Batch: 233092

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 233065

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		07/06/18 13:03	07/08/18 00:01	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		07/06/18 13:03	07/08/18 00:01	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		07/06/18 13:03	07/08/18 00:01	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		07/06/18 13:03	07/08/18 00:01	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		07/06/18 13:03	07/08/18 00:01	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		07/06/18 13:03	07/08/18 00:01	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*102*		*25 - 150*	*07/06/18 13:03*	*07/08/18 00:01*	*1*
13C4-PFHpA	*103*		*25 - 150*	*07/06/18 13:03*	*07/08/18 00:01*	*1*
13C4 PFOA	*101*		*25 - 150*	*07/06/18 13:03*	*07/08/18 00:01*	*1*
13C4 PFOS	*94*		*25 - 150*	*07/06/18 13:03*	*07/08/18 00:01*	*1*
13C5 PFNA	*92*		*25 - 150*	*07/06/18 13:03*	*07/08/18 00:01*	*1*

Lab Sample ID: LCS 320-233065/2-A
Matrix: Water
Analysis Batch: 233092

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 233065

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	18.1		ng/L		103	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	19.5		ng/L		98	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	16.8		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	*103*		*25 - 150*
13C4-PFHpA	*106*		*25 - 150*
13C4 PFOA	*101*		*25 - 150*
13C4 PFOS	*98*		*25 - 150*
13C5 PFNA	*96*		*25 - 150*

Lab Sample ID: LCSD 320-233065/3-A
Matrix: Water
Analysis Batch: 233092

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 233065

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	19.5		ng/L		110	72 - 151	7	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	17.9		ng/L		99	73 - 157	4	30
Perfluoroheptanoic acid (PFHpA)			20.0	21.3		ng/L		106	71 - 138	9	30
Perfluorooctanoic acid (PFOA)			20.0	20.0		ng/L		100	70 - 140	2	30
Perfluorooctanesulfonic acid (PFOS)			18.6	18.6		ng/L		100	69 - 144	10	30
Perfluorononanoic acid (PFNA)			20.0	21.0		ng/L		105	73 - 147	8	30

QC Sample Results

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

TestAmerica Job ID: 320-40844-1
SDG: 20060-002

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	100		25 - 150
13C4-PFHpA	98		25 - 150
13C4 PFOA	103		25 - 150
13C4 PFOS	93		25 - 150
13C5 PFNA	96		25 - 150

QC Association Summary

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

TestAmerica Job ID: 320-40844-1
SDG: 20060-002

LCMS

Prep Batch: 233065

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-40844-1 - DL	174751	Total/NA	Water	PFAS Prep	
320-40844-1	174751	Total/NA	Water	PFAS Prep	
320-40844-2	443239	Total/NA	Water	PFAS Prep	
MB 320-233065/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-233065/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-233065/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 233092

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-40844-1	174751	Total/NA	Water	WS-LC-0025 At1	233065
320-40844-2	443239	Total/NA	Water	WS-LC-0025 At1	233065
MB 320-233065/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	233065
LCS 320-233065/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	233065
LCSD 320-233065/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	233065

Analysis Batch: 234208

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-40844-1 - DL	174751	Total/NA	Water	WS-LC-0025 At1	233065

Lab Chronicle

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

TestAmerica Job ID: 320-40844-1
SDG: 20060-002

Client Sample ID: 174751

Date Collected: 06/19/18 13:20
Date Received: 07/03/18 09:35

Lab Sample ID: 320-40844-1

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	233065	07/06/18 13:03	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			233092	07/08/18 00:56	D1R	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	233065	07/06/18 13:03	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			234208	07/16/18 15:29	D1R	TAL SAC

Client Sample ID: 443239

Date Collected: 06/21/18 13:27
Date Received: 07/03/18 09:35

Lab Sample ID: 320-40844-2

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	233065	07/06/18 13:03	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			233092	07/08/18 01:14	D1R	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: 320-40844-1
SDG: 20060-002

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
ANAB	DoD ELAP		L2468	01-20-21
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-19
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-19
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-19
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-19
Kansas	NELAP	7	E-10375	10-31-18
Louisiana	NELAP	6	30612	06-30-19
Maine	State Program	1	CA0004	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-18 *
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-19
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
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
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
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: 320-40844-1
SDG: 20060-002

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC
PFAS Prep	Preparation, Direct Inject PFAS	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: 320-40844-1
SDG: 20060-002

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-40844-1	174751	Water	06/19/18 13:20	07/03/18 09:35
320-40844-2	443239	Water	06/21/18 13:27	07/03/18 09:35

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Laboratory Test America
Attn: D. 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

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

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

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
174751		1320	6/19/18		X	X						2	Groundwater
443239		1327	6/21/18		X	X						2	1

Project Information		Sample Receipt	
Project Number:	200[illegible]-002	Total Number of Containers	
Project Name:	FAI	COC Seals/Intact? Y/N/NA	Y
Contact:	MDN	Received Good Cond./Cold	2.5°C
Ongoing Project?	Yes ☒ No ☐	Delivery Method: (attach shipping bill, if any)	Alc-3 Selpak Goldstreak
Sampler:	AAM		

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 1623	Signature: Time:	Signature: Time:
Printed Name: A. Masters Date: 7/2/18	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson, Inc.	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 0935	Signature:	
Printed Name: Troy G. Turpen Date: 7/3/18	Printed Name:	
Company: TA - SAC	Company:	

320-40844 Chain of Custody

Instructions

Requested Turnaround Time: Std

Special Instructions:

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

2.5°C

No. 30635

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-40844-1
SDG Number: 20060-002

Login Number: 40844
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:

July 20, 2018

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

July 17, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-40844-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-40844-1

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 2.5º C.

The case narrative notes there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) with preparation batch 320-232738.

The case narrative also notes a sample arrived with a yellowish color and another with a slightly gray color.

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/or 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:

Field duplicates were not submitted with this work order, but 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; 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 with this work order.

ii. If above LOQ, what samples are affected?

Comments:

None; see above.

iii. Data quality or usability affected?

Comments:

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

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: 320-41182-1
TestAmerica Sample Delivery Group: 20060-002
Client Project/Site: FAI

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

Attn: Marcy Nadel

Authorized for release by:
7/25/2018 12:45:50 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

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: 320-41182-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-41182-1

Receipt
The sample was received on 7/17/2018 9:35 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 4.4º 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 320-234966.

Method(s) PFAS Prep: The sample was observed to be a light brown color: 152889 (320-41182-1)

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: 320-41182-1
SDG: 20060-002

Client Sample ID: 152889

Lab Sample ID: 320-41182-1

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)	41		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	7.0		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)	88		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	0.84	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: 320-41182-1
SDG: 20060-002

Client Sample ID: 152889
Date Collected: 07/03/18 14:03
Date Received: 07/17/18 09:35

Lab Sample ID: 320-41182-1
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	20		2.0	0.92	ng/L		07/19/18 15:21	07/23/18 00:39	1
Perfluorohexanesulfonic acid (PFHxS)	41		2.0	0.87	ng/L		07/19/18 15:21	07/23/18 00:39	1
Perfluoroheptanoic acid (PFHpA)	7.0		2.0	0.80	ng/L		07/19/18 15:21	07/23/18 00:39	1
Perfluorooctanoic acid (PFOA)	8.1		2.0	0.75	ng/L		07/19/18 15:21	07/23/18 00:39	1
Perfluorooctanesulfonic acid (PFOS)	88		2.0	1.3	ng/L		07/19/18 15:21	07/23/18 00:39	1
Perfluorononanoic acid (PFNA)	0.84	J	2.0	0.65	ng/L		07/19/18 15:21	07/23/18 00:39	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*91*		*25 - 150*	*07/19/18 15:21*	*07/23/18 00:39*	*1*
13C4-PFHpA	*79*		*25 - 150*	*07/19/18 15:21*	*07/23/18 00:39*	*1*
13C4 PFOA	*83*		*25 - 150*	*07/19/18 15:21*	*07/23/18 00:39*	*1*
13C4 PFOS	*86*		*25 - 150*	*07/19/18 15:21*	*07/23/18 00:39*	*1*
13C5 PFNA	*74*		*25 - 150*	*07/19/18 15:21*	*07/23/18 00:39*	*1*

Isotope Dilution Summary

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

TestAmerica Job ID: 320-41182-1
SDG: 20060-002

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)
320-41182-1	152889	91	79	83	86	74
LCS 320-234966/2-A	Lab Control Sample	94	84	77	86	66
LCSD 320-234966/3-A	Lab Control Sample Dup	97	84	82	89	67
MB 320-234966/1-A	Method Blank	93	86	81	87	67

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 320-234966/1-A
Matrix: Water
Analysis Batch: 235463

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 234966

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		07/19/18 15:20	07/22/18 18:51	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		07/19/18 15:20	07/22/18 18:51	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		07/19/18 15:20	07/22/18 18:51	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		07/19/18 15:20	07/22/18 18:51	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		07/19/18 15:20	07/22/18 18:51	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		07/19/18 15:20	07/22/18 18:51	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*93*		*25 - 150*	*07/19/18 15:20*	*07/22/18 18:51*	*1*
13C4-PFHpA	*86*		*25 - 150*	*07/19/18 15:20*	*07/22/18 18:51*	*1*
13C4 PFOA	*81*		*25 - 150*	*07/19/18 15:20*	*07/22/18 18:51*	*1*
13C4 PFOS	*87*		*25 - 150*	*07/19/18 15:20*	*07/22/18 18:51*	*1*
13C5 PFNA	*67*		*25 - 150*	*07/19/18 15:20*	*07/22/18 18:51*	*1*

Lab Sample ID: LCS 320-234966/2-A
Matrix: Water
Analysis Batch: 235463

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 234966

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	17.6		ng/L		97	73 - 157
Perfluoroheptanoic acid (PFHpA)	20.0	21.4		ng/L		107	71 - 138
Perfluorooctanoic acid (PFOA)	20.0	20.7		ng/L		104	70 - 140
Perfluorooctanesulfonic acid (PFOS)	18.6	18.3		ng/L		99	69 - 144
Perfluorononanoic acid (PFNA)	20.0	21.4		ng/L		107	73 - 147

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*94*		*25 - 150*
13C4-PFHpA	*84*		*25 - 150*
13C4 PFOA	*77*		*25 - 150*
13C4 PFOS	*86*		*25 - 150*
13C5 PFNA	*66*		*25 - 150*

Lab Sample ID: LCSD 320-234966/3-A
Matrix: Water
Analysis Batch: 235463

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 234966

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)	17.7	18.3		ng/L		104	72 - 151	2	30
Perfluorohexanesulfonic acid (PFHxS)	18.2	18.0		ng/L		99	73 - 157	2	30
Perfluoroheptanoic acid (PFHpA)	20.0	20.8		ng/L		104	71 - 138	3	30
Perfluorooctanoic acid (PFOA)	20.0	20.4		ng/L		102	70 - 140	2	30
Perfluorooctanesulfonic acid (PFOS)	18.6	17.9		ng/L		97	69 - 144	2	30
Perfluorononanoic acid (PFNA)	20.0	20.7		ng/L		104	73 - 147	3	30

QC Sample Results

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

TestAmerica Job ID: 320-41182-1
SDG: 20060-002

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	97		25 - 150
13C4-PFHpA	84		25 - 150
13C4 PFOA	82		25 - 150
13C4 PFOS	89		25 - 150
13C5 PFNA	67		25 - 150

LCMS

Prep Batch: 234966

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-41182-1	152889	Total/NA	Water	PFAS Prep	
MB 320-234966/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-234966/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-234966/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 235463

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-41182-1	152889	Total/NA	Water	WS-LC-0025 At1	234966
MB 320-234966/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	234966
LCS 320-234966/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	234966
LCSD 320-234966/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	234966

Lab Chronicle

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

TestAmerica Job ID: 320-41182-1
SDG: 20060-002

Client Sample ID: 152889
Date Collected: 07/03/18 14:03
Date Received: 07/17/18 09:35

Lab Sample ID: 320-41182-1
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	234966	07/19/18 15:21	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			235463	07/23/18 00:39	D1R	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: 320-41182-1
SDG: 20060-002

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
ANAB	DoD ELAP		L2468	01-20-21
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-19
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-19
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-19
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-19
Kansas	NELAP	7	E-10375	10-31-18
Louisiana	NELAP	6	30612	06-30-19
Maine	State Program	1	CA0004	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-18 *
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-19
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
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
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
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: 320-41182-1
SDG: 20060-002

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC
PFAS Prep	Preparation, Direct Inject PFAS	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: 320-41182-1
SDG: 20060-002

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-41182-1	152889	Water	07/03/18 14:03	07/17/18 09:35

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

CHAIN-OF-CUSTODY RECORD

Page 1 of

Laboratory Test America
Attn: D. Alfuckes

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

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

303 Wellsian Way
Richland, WA 99352
(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

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

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

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFAS +6						Total Number of Containers	Remarks/Matrix
152889		1403	7/3/18		X	X						2	Groundwater

Project Information		Sample Receipt	
Project Number:	20060-002	Total Number of Containers	
Project Name:	FA1	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: Standard

Special Instructions:

Distribution: Wh
Yel
Pink

ratory report

320-41182 Chain of Custody

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 1600	Signature: Time:	Signature: Time:
Printed Name: A Masters Date: 7/16/18	Printed Name: Date:	Printed Name: Date:
Company: Shannon+Wilson, Inc.	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 7/17/18 935	Signature: Time:	Signature: Time:
Printed Name: David Ter Date: 7/17/18	Printed Name: Date:	Printed Name: Date:
Company: TA-Sea	Company:	Company:

F-19-91/UR

No. 30604

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-41182-1
SDG Number: 20060-002

Login Number: 41182
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:

August 8, 2018

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

July 25, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-41182-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-41182-1

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:

The sample cooler was recorded at 4.4° C upon receipt at the laboratory.

   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 are 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 4.4° C.

The case narrative notes there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) with preparation batch 320-234966. It also notes the sample *152889* was observed to be a light brown color.

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.

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: 320-41852-1
TestAmerica Sample Delivery Group: 20060-002
Client Project/Site: FAI

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

Attn: Marcy Nadel

Authorized for release by:
8/14/2018 6:50:38 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

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: 320-41852-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-41852-1

Receipt
The samples were received on 8/7/2018 10:10 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.6º 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 320-239052.

Method(s) PFAS Prep: The following samples: 462659 (320-41852-1) and 569712 (320-41852-2) are a yellow color.

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: 320-41852-1
SDG: 20060-002

Client Sample ID: 462659 — Lab Sample ID: 320-41852-1

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

Client Sample ID: 569712 — Lab Sample ID: 320-41852-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	53		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	240		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)	11		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	7.2		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	1.8	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 Results

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

TestAmerica Job ID: 320-41852-1
SDG: 20060-002

Client Sample ID: 462659
Date Collected: 08/02/18 09:59
Date Received: 08/07/18 10:10

Lab Sample ID: 320-41852-1
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		08/09/18 14:06	08/09/18 20:01	1
Perfluorohexanesulfonic acid (PFHxS)	**1.4**	**J**	2.0	0.87	ng/L		08/09/18 14:06	08/09/18 20:01	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		08/09/18 14:06	08/09/18 20:01	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		08/09/18 14:06	08/09/18 20:01	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		08/09/18 14:06	08/09/18 20:01	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		08/09/18 14:06	08/09/18 20:01	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*110*		*25 - 150*	*08/09/18 14:06*	*08/09/18 20:01*	*1*
13C4-PFHpA	*116*		*25 - 150*	*08/09/18 14:06*	*08/09/18 20:01*	*1*
13C4 PFOA	*117*		*25 - 150*	*08/09/18 14:06*	*08/09/18 20:01*	*1*
13C4 PFOS	*104*		*25 - 150*	*08/09/18 14:06*	*08/09/18 20:01*	*1*
13C5 PFNA	*112*		*25 - 150*	*08/09/18 14:06*	*08/09/18 20:01*	*1*

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

TestAmerica Job ID: 320-41852-1
SDG: 20060-002

Client Sample ID: 569712
Date Collected: 08/03/18 14:38
Date Received: 08/07/18 10:10

Lab Sample ID: 320-41852-2
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	53		2.0	0.92	ng/L		08/09/18 14:06	08/09/18 20:19	1
Perfluorohexanesulfonic acid (PFHxS)	240		2.0	0.87	ng/L		08/09/18 14:06	08/09/18 20:19	1
Perfluoroheptanoic acid (PFHpA)	17		2.0	0.80	ng/L		08/09/18 14:06	08/09/18 20:19	1
Perfluorooctanoic acid (PFOA)	11		2.0	0.75	ng/L		08/09/18 14:06	08/09/18 20:19	1
Perfluorooctanesulfonic acid (PFOS)	7.2		2.0	1.3	ng/L		08/09/18 14:06	08/09/18 20:19	1
Perfluorononanoic acid (PFNA)	1.8	J	2.0	0.65	ng/L		08/09/18 14:06	08/09/18 20:19	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*93*		*25 - 150*	*08/09/18 14:06*	*08/09/18 20:19*	*1*
13C4-PFHpA	*103*		*25 - 150*	*08/09/18 14:06*	*08/09/18 20:19*	*1*
13C4 PFOA	*112*		*25 - 150*	*08/09/18 14:06*	*08/09/18 20:19*	*1*
13C4 PFOS	*100*		*25 - 150*	*08/09/18 14:06*	*08/09/18 20:19*	*1*
13C5 PFNA	*109*		*25 - 150*	*08/09/18 14:06*	*08/09/18 20:19*	*1*

Isotope Dilution Summary

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

TestAmerica Job ID: 320-41852-1
SDG: 20060-002

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)
320-41852-1	462659	110	116	117	104	112
320-41852-2	569712	93	103	112	100	109
LCS 320-239052/2-A	Lab Control Sample	105	111	106	101	104
LCSD 320-239052/3-A	Lab Control Sample Dup	103	108	106	103	101
MB 320-239052/1-A	Method Blank	106	108	105	96	100

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 320-239052/1-A
Matrix: Water
Analysis Batch: 239127

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 239052

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		08/09/18 14:05	08/09/18 17:34	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		08/09/18 14:05	08/09/18 17:34	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		08/09/18 14:05	08/09/18 17:34	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		08/09/18 14:05	08/09/18 17:34	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		08/09/18 14:05	08/09/18 17:34	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		08/09/18 14:05	08/09/18 17:34	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*106*		*25 - 150*	*08/09/18 14:05*	*08/09/18 17:34*	*1*
13C4-PFHpA	*108*		*25 - 150*	*08/09/18 14:05*	*08/09/18 17:34*	*1*
13C4 PFOA	*105*		*25 - 150*	*08/09/18 14:05*	*08/09/18 17:34*	*1*
13C4 PFOS	*96*		*25 - 150*	*08/09/18 14:05*	*08/09/18 17:34*	*1*
13C5 PFNA	*100*		*25 - 150*	*08/09/18 14:05*	*08/09/18 17:34*	*1*

Lab Sample ID: LCS 320-239052/2-A
Matrix: Water
Analysis Batch: 239127

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 239052

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	20.0		ng/L		113	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	20.1		ng/L		110	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	22.7		ng/L		113	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	23.6		ng/L		118	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	21.6		ng/L		116	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	22.6		ng/L		113	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*105*		*25 - 150*
13C4-PFHpA	*111*		*25 - 150*
13C4 PFOA	*106*		*25 - 150*
13C4 PFOS	*101*		*25 - 150*
13C5 PFNA	*104*		*25 - 150*

Lab Sample ID: LCSD 320-239052/3-A
Matrix: Water
Analysis Batch: 239127

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 239052

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	19.2		ng/L		109	72 - 151	4	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	18.7		ng/L		103	73 - 157	7	30
Perfluoroheptanoic acid (PFHpA)			20.0	21.7		ng/L		108	71 - 138	4	30
Perfluorooctanoic acid (PFOA)			20.0	23.4		ng/L		117	70 - 140	1	30
Perfluorooctanesulfonic acid (PFOS)			18.6	19.7		ng/L		106	69 - 144	9	30
Perfluorononanoic acid (PFNA)			20.0	22.5		ng/L		113	73 - 147	0	30

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	103		25 - 150
13C4-PFHpA	108		25 - 150
13C4 PFOA	106		25 - 150
13C4 PFOS	103		25 - 150
13C5 PFNA	101		25 - 150

QC Association Summary

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

TestAmerica Job ID: 320-41852-1
SDG: 20060-002

LCMS

Prep Batch: 239052

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-41852-1	462659	Total/NA	Water	PFAS Prep	
320-41852-2	569712	Total/NA	Water	PFAS Prep	
MB 320-239052/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-239052/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-239052/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 239127

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-41852-1	462659	Total/NA	Water	WS-LC-0025 At1	239052
320-41852-2	569712	Total/NA	Water	WS-LC-0025 At1	239052
MB 320-239052/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	239052
LCS 320-239052/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	239052
LCSD 320-239052/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	239052

Lab Chronicle

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

TestAmerica Job ID: 320-41852-1
SDG: 20060-002

Client Sample ID: 462659

Date Collected: 08/02/18 09:59
Date Received: 08/07/18 10:10

Lab Sample ID: 320-41852-1
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	239052	08/09/18 14:06	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			239127	08/09/18 20:01	S1M	TAL SAC

Client Sample ID: 569712

Date Collected: 08/03/18 14:38
Date Received: 08/07/18 10:10

Lab Sample ID: 320-41852-2
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	239052	08/09/18 14:06	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			239127	08/09/18 20:19	S1M	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: 320-41852-1
SDG: 20060-002

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
ANAB	DoD ELAP		L2468	01-20-21
Arizona	State Program	9	AZ0708	08-11-19
Arkansas DEQ	State Program	6	88-0691	06-17-19
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-19
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-19
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-19
Kansas	NELAP	7	E-10375	10-31-18
Louisiana	NELAP	6	30612	06-30-19
Maine	State Program	1	CA0004	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-19
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-19
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
US Fish & Wildlife	Federal		LE148388-0	07-31-19
USDA	Federal		P330-18-00239	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-19
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

Method Summary

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

TestAmerica Job ID: 320-41852-1
SDG: 20060-002

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC
PFAS Prep	Preparation, Direct Inject PFAS	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: 320-41852-1
SDG: 20060-002

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-41852-1	462659	Water	08/02/18 09:59	08/07/18 10:10
320-41852-2	569712	Water	08/03/18 14:38	08/07/18 10:10

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

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Laboratory Test America
Attn: D. Altwater

Analytical Methods (include preservative if used)

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

Sample Identity	Lab No.	Time	Date Sampled	RTAS x6	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
462659		0959	8/2/18	X	2	Groundwaters
569712		1438	8/3/18	X	2	GW

Project Information		Sample Receipt	
Number:	20060-002	Total No. of Containers:	
Name:	FAI	COC Seals/Intact? Y/N/NA	Y
Contact:	MDN	Received Good Cond./Cold	
Ongoing Project?	Yes [X] No [ ]	Temp:	3.6 C
Sampler:	ARM	Delivery Method:	goldstreak

Reliquished By: 1.	Reliquished By: 2.	Reliquished By: 3.
Signature: Time: 1606	Signature: Time: 4:10	Signature: Time:
Printed Name: A Masters Date: 8/6/18	Printed Name: Amanda Smith Date: 8/6/18	Printed Name: Date:
Company: Shannon + Wilson Inc.	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time:	Signature: Time: 435 1010	Signature: Time:
Printed Name: Date:	Printed Name: Edric Chang Date: 8/7/18	Printed Name: Date:
Company:	Company: TA-SHL	Company:

320-41852 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

No. 35586

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-41852-1
SDG Number: 20060-002

Login Number: 41852
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").	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:

Adam Wyborny

Title:

Environmental Engineering Staff

Date:

August 27, 2018

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

August 14, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-41852-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-41852-1

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:

The sample cooler was recorded at 3.6° C upon receipt at the laboratory.

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

   ◉ Yes ○ No Comments:

Analysis of PFAS compounds 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 are 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 3.6° C.

The case narrative notes there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) with preparation batch 320-239052. It also notes the samples were observed to have a yellowish color.

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/or 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:

PFAS compounds are not volatile; 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.

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: 320-42091-1
Client Project/Site: FAI

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

Attn: Marcy Nadel

Authorized for release by:
8/20/2018 2:33:39 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: 320-42091-1

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: 320-42091-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-42091-1

Receipt
The samples were received on 8/14/2018 1:15 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 4.7° C.

Receipt Exceptions

One of two poly bottles were received without a label. The sample was in the same bag a pair with the one that had the label. 176095 (320-42091-1)

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 320-240272.

Method(s) PFAS Prep: The samples have a slight brown color with brown sediment at the bottom: 550132 (320-42091-2), 151203 (320-42091-5), 542512 (320-42091-6), 176222 (320-42091-7), 407464 (320-42091-8), 407364 (320-42091-9) and 407313 (320-42091-10)

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: 320-42091-1

Client Sample ID: 176095 — Lab Sample ID: 320-42091-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	4.9		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)	2.9		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	3.4		2.0	1.3	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

Client Sample ID: 550132 — Lab Sample ID: 320-42091-2

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
Perfluoroheptanoic acid (PFHpA)	1.8	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
Perfluorooctanesulfonic acid (PFOS)	10		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	7.0		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 550124 — Lab Sample ID: 320-42091-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	5.0		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)	12		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)	17		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	46		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 176397 — Lab Sample ID: 320-42091-4

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)	65		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	60		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	53		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

This Detection Summary does not include radiochemical test results.

Detection Summary

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

TestAmerica Job ID: 320-42091-1

Client Sample ID: 176397 (Continued) — Lab Sample ID: 320-42091-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorononanoic acid (PFNA)	54		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 151203 — Lab Sample ID: 320-42091-5

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)	12		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.9	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)	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

Client Sample ID: 542512 — Lab Sample ID: 320-42091-6

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 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	240		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)	11		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)	1.8	J	2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 176222 — Lab Sample ID: 320-42091-7

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)	8.2		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.2		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)	5.3		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	9.3		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 407464 — Lab Sample ID: 320-42091-8

This Detection Summary does not include radiochemical test results.

Client Sample ID: 407464 (Continued) — Lab Sample ID: 320-42091-8

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)	23		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	6.8		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)	4.5		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	10		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 407364 — Lab Sample ID: 320-42091-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	3.2		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)	7.2		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)	4.7		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	11		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 407313 — Lab Sample ID: 320-42091-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	0.92	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: 320-42091-1

Client Sample ID: 176095
Date Collected: 08/07/18 13:36
Date Received: 08/14/18 13:15

Lab Sample ID: 320-42091-1
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		08/16/18 10:31	08/18/18 00:01	1
Perfluorohexanesulfonic acid (PFHxS)	**4.9**		2.0	0.87	ng/L		08/16/18 10:31	08/18/18 00:01	1
Perfluoroheptanoic acid (PFHpA)	**1.4**	**J**	2.0	0.80	ng/L		08/16/18 10:31	08/18/18 00:01	1
Perfluorooctanoic acid (PFOA)	**2.9**		2.0	0.75	ng/L		08/16/18 10:31	08/18/18 00:01	1
Perfluorooctanesulfonic acid (PFOS)	**3.4**		2.0	1.3	ng/L		08/16/18 10:31	08/18/18 00:01	1
Perfluorononanoic acid (PFNA)	**6.9**		2.0	0.65	ng/L		08/16/18 10:31	08/18/18 00:01	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*110*		*25 - 150*	*08/16/18 10:31*	*08/18/18 00:01*	*1*
13C4-PFHpA	*119*		*25 - 150*	*08/16/18 10:31*	*08/18/18 00:01*	*1*
13C4 PFOA	*121*		*25 - 150*	*08/16/18 10:31*	*08/18/18 00:01*	*1*
13C4 PFOS	*106*		*25 - 150*	*08/16/18 10:31*	*08/18/18 00:01*	*1*
13C5 PFNA	*117*		*25 - 150*	*08/16/18 10:31*	*08/18/18 00:01*	*1*

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

TestAmerica Job ID: 320-42091-1

Client Sample ID: 550132
Date Collected: 08/08/18 09:21
Date Received: 08/14/18 13:15

Lab Sample ID: 320-42091-2
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		08/16/18 10:31	08/18/18 00:19	1
Perfluorohexanesulfonic acid (PFHxS)	12		2.0	0.87	ng/L		08/16/18 10:31	08/18/18 00:19	1
Perfluoroheptanoic acid (PFHpA)	1.8	J	2.0	0.80	ng/L		08/16/18 10:31	08/18/18 00:19	1
Perfluorooctanoic acid (PFOA)	3.2		2.0	0.75	ng/L		08/16/18 10:31	08/18/18 00:19	1
Perfluorooctanesulfonic acid (PFOS)	10		2.0	1.3	ng/L		08/16/18 10:31	08/18/18 00:19	1
Perfluorononanoic acid (PFNA)	7.0		2.0	0.65	ng/L		08/16/18 10:31	08/18/18 00:19	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*102*		*25 - 150*	*08/16/18 10:31*	*08/18/18 00:19*	*1*
13C4-PFHpA	*110*		*25 - 150*	*08/16/18 10:31*	*08/18/18 00:19*	*1*
13C4 PFOA	*112*		*25 - 150*	*08/16/18 10:31*	*08/18/18 00:19*	*1*
13C4 PFOS	*98*		*25 - 150*	*08/16/18 10:31*	*08/18/18 00:19*	*1*
13C5 PFNA	*111*		*25 - 150*	*08/16/18 10:31*	*08/18/18 00:19*	*1*

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

TestAmerica Job ID: 320-42091-1

Client Sample ID: 550124
Date Collected: 08/08/18 10:42
Date Received: 08/14/18 13:15

Lab Sample ID: 320-42091-3
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	5.0		2.0	0.92	ng/L		08/16/18 10:31	08/18/18 00:38	1
Perfluorohexanesulfonic acid (PFHxS)	26		2.0	0.87	ng/L		08/16/18 10:31	08/18/18 00:38	1
Perfluoroheptanoic acid (PFHpA)	12		2.0	0.80	ng/L		08/16/18 10:31	08/18/18 00:38	1
Perfluorooctanoic acid (PFOA)	16		2.0	0.75	ng/L		08/16/18 10:31	08/18/18 00:38	1
Perfluorooctanesulfonic acid (PFOS)	17		2.0	1.3	ng/L		08/16/18 10:31	08/18/18 00:38	1
Perfluorononanoic acid (PFNA)	46		2.0	0.65	ng/L		08/16/18 10:31	08/18/18 00:38	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*108*		*25 - 150*	*08/16/18 10:31*	*08/18/18 00:38*	*1*
13C4-PFHpA	*117*		*25 - 150*	*08/16/18 10:31*	*08/18/18 00:38*	*1*
13C4 PFOA	*120*		*25 - 150*	*08/16/18 10:31*	*08/18/18 00:38*	*1*
13C4 PFOS	*107*		*25 - 150*	*08/16/18 10:31*	*08/18/18 00:38*	*1*
13C5 PFNA	*118*		*25 - 150*	*08/16/18 10:31*	*08/18/18 00:38*	*1*

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

TestAmerica Job ID: 320-42091-1

Client Sample ID: 176397
Date Collected: 08/08/18 11:35
Date Received: 08/14/18 13:15

Lab Sample ID: 320-42091-4
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	7.7		2.0	0.92	ng/L		08/16/18 10:31	08/18/18 00:56	1
Perfluorohexanesulfonic acid (PFHxS)	65		2.0	0.87	ng/L		08/16/18 10:31	08/18/18 00:56	1
Perfluoroheptanoic acid (PFHpA)	60		2.0	0.80	ng/L		08/16/18 10:31	08/18/18 00:56	1
Perfluorooctanoic acid (PFOA)	53		2.0	0.75	ng/L		08/16/18 10:31	08/18/18 00:56	1
Perfluorooctanesulfonic acid (PFOS)	23		2.0	1.3	ng/L		08/16/18 10:31	08/18/18 00:56	1
Perfluorononanoic acid (PFNA)	54		2.0	0.65	ng/L		08/16/18 10:31	08/18/18 00:56	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*105*		*25 - 150*	*08/16/18 10:31*	*08/18/18 00:56*	*1*
13C4-PFHpA	*111*		*25 - 150*	*08/16/18 10:31*	*08/18/18 00:56*	*1*
13C4 PFOA	*112*		*25 - 150*	*08/16/18 10:31*	*08/18/18 00:56*	*1*
13C4 PFOS	*104*		*25 - 150*	*08/16/18 10:31*	*08/18/18 00:56*	*1*
13C5 PFNA	*111*		*25 - 150*	*08/16/18 10:31*	*08/18/18 00:56*	*1*

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

TestAmerica Job ID: 320-42091-1

Client Sample ID: 151203
Date Collected: 08/08/18 13:22
Date Received: 08/14/18 13:15

Lab Sample ID: 320-42091-5
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	4.5		2.0	0.92	ng/L		08/16/18 10:31	08/18/18 01:15	1
Perfluorohexanesulfonic acid (PFHxS)	12		2.0	0.87	ng/L		08/16/18 10:31	08/18/18 01:15	1
Perfluoroheptanoic acid (PFHpA)	1.9	J	2.0	0.80	ng/L		08/16/18 10:31	08/18/18 01:15	1
Perfluorooctanoic acid (PFOA)	3.4		2.0	0.75	ng/L		08/16/18 10:31	08/18/18 01:15	1
Perfluorooctanesulfonic acid (PFOS)	40		2.0	1.3	ng/L		08/16/18 10:31	08/18/18 01:15	1
Perfluorononanoic acid (PFNA)	1.6	J	2.0	0.65	ng/L		08/16/18 10:31	08/18/18 01:15	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*102*		*25 - 150*	*08/16/18 10:31*	*08/18/18 01:15*	*1*
13C4-PFHpA	*110*		*25 - 150*	*08/16/18 10:31*	*08/18/18 01:15*	*1*
13C4 PFOA	*114*		*25 - 150*	*08/16/18 10:31*	*08/18/18 01:15*	*1*
13C4 PFOS	*97*		*25 - 150*	*08/16/18 10:31*	*08/18/18 01:15*	*1*
13C5 PFNA	*111*		*25 - 150*	*08/16/18 10:31*	*08/18/18 01:15*	*1*

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

TestAmerica Job ID: 320-42091-1

Client Sample ID: 542512
Date Collected: 08/10/18 11:07
Date Received: 08/14/18 13:15

Lab Sample ID: 320-42091-6
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	69		2.0	0.92	ng/L		08/16/18 10:31	08/18/18 01:51	1
Perfluorohexanesulfonic acid (PFHxS)	240		2.0	0.87	ng/L		08/16/18 10:31	08/18/18 01:51	1
Perfluoroheptanoic acid (PFHpA)	19		2.0	0.80	ng/L		08/16/18 10:31	08/18/18 01:51	1
Perfluorooctanoic acid (PFOA)	11		2.0	0.75	ng/L		08/16/18 10:31	08/18/18 01:51	1
Perfluorooctanesulfonic acid (PFOS)	6.0		2.0	1.3	ng/L		08/16/18 10:31	08/18/18 01:51	1
Perfluorononanoic acid (PFNA)	1.8	J	2.0	0.65	ng/L		08/16/18 10:31	08/18/18 01:51	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*101*		*25 - 150*	*08/16/18 10:31*	*08/18/18 01:51*	*1*
13C4-PFHpA	*110*		*25 - 150*	*08/16/18 10:31*	*08/18/18 01:51*	*1*
13C4 PFOA	*114*		*25 - 150*	*08/16/18 10:31*	*08/18/18 01:51*	*1*
13C4 PFOS	*105*		*25 - 150*	*08/16/18 10:31*	*08/18/18 01:51*	*1*
13C5 PFNA	*115*		*25 - 150*	*08/16/18 10:31*	*08/18/18 01:51*	*1*

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

TestAmerica Job ID: 320-42091-1

Client Sample ID: 176222
Date Collected: 08/10/18 10:12
Date Received: 08/14/18 13:15

Lab Sample ID: 320-42091-7
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	1.3	J	2.0	0.92	ng/L		08/16/18 10:31	08/18/18 02:10	1
Perfluorohexanesulfonic acid (PFHxS)	8.2		2.0	0.87	ng/L		08/16/18 10:31	08/18/18 02:10	1
Perfluoroheptanoic acid (PFHpA)	2.2		2.0	0.80	ng/L		08/16/18 10:31	08/18/18 02:10	1
Perfluorooctanoic acid (PFOA)	4.7		2.0	0.75	ng/L		08/16/18 10:31	08/18/18 02:10	1
Perfluorooctanesulfonic acid (PFOS)	5.3		2.0	1.3	ng/L		08/16/18 10:31	08/18/18 02:10	1
Perfluorononanoic acid (PFNA)	9.3		2.0	0.65	ng/L		08/16/18 10:31	08/18/18 02:10	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*104*		*25 - 150*	*08/16/18 10:31*	*08/18/18 02:10*	*1*
13C4-PFHpA	*111*		*25 - 150*	*08/16/18 10:31*	*08/18/18 02:10*	*1*
13C4 PFOA	*111*		*25 - 150*	*08/16/18 10:31*	*08/18/18 02:10*	*1*
13C4 PFOS	*104*		*25 - 150*	*08/16/18 10:31*	*08/18/18 02:10*	*1*
13C5 PFNA	*113*		*25 - 150*	*08/16/18 10:31*	*08/18/18 02:10*	*1*

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

TestAmerica Job ID: 320-42091-1

Client Sample ID: 407464
Date Collected: 08/10/18 14:12
Date Received: 08/14/18 13:15

Lab Sample ID: 320-42091-8
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	3.3		2.0	0.92	ng/L		08/16/18 10:31	08/18/18 02:28	1
Perfluorohexanesulfonic acid (PFHxS)	23		2.0	0.87	ng/L		08/16/18 10:31	08/18/18 02:28	1
Perfluoroheptanoic acid (PFHpA)	6.8		2.0	0.80	ng/L		08/16/18 10:31	08/18/18 02:28	1
Perfluorooctanoic acid (PFOA)	17		2.0	0.75	ng/L		08/16/18 10:31	08/18/18 02:28	1
Perfluorooctanesulfonic acid (PFOS)	4.5		2.0	1.3	ng/L		08/16/18 10:31	08/18/18 02:28	1
Perfluorononanoic acid (PFNA)	10		2.0	0.65	ng/L		08/16/18 10:31	08/18/18 02:28	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*107*		*25 - 150*	*08/16/18 10:31*	*08/18/18 02:28*	*1*
13C4-PFHpA	*112*		*25 - 150*	*08/16/18 10:31*	*08/18/18 02:28*	*1*
13C4 PFOA	*119*		*25 - 150*	*08/16/18 10:31*	*08/18/18 02:28*	*1*
13C4 PFOS	*104*		*25 - 150*	*08/16/18 10:31*	*08/18/18 02:28*	*1*
13C5 PFNA	*110*		*25 - 150*	*08/16/18 10:31*	*08/18/18 02:28*	*1*

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

TestAmerica Job ID: 320-42091-1

Client Sample ID: 407364
Date Collected: 08/10/18 14:22
Date Received: 08/14/18 13:15

Lab Sample ID: 320-42091-9
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	3.2		2.0	0.92	ng/L		08/16/18 10:31	08/18/18 02:46	1
Perfluorohexanesulfonic acid (PFHxS)	23		2.0	0.87	ng/L		08/16/18 10:31	08/18/18 02:46	1
Perfluoroheptanoic acid (PFHpA)	7.2		2.0	0.80	ng/L		08/16/18 10:31	08/18/18 02:46	1
Perfluorooctanoic acid (PFOA)	17		2.0	0.75	ng/L		08/16/18 10:31	08/18/18 02:46	1
Perfluorooctanesulfonic acid (PFOS)	4.7		2.0	1.3	ng/L		08/16/18 10:31	08/18/18 02:46	1
Perfluorononanoic acid (PFNA)	11		2.0	0.65	ng/L		08/16/18 10:31	08/18/18 02:46	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*108*		*25 - 150*	*08/16/18 10:31*	*08/18/18 02:46*	*1*
13C4-PFHpA	*114*		*25 - 150*	*08/16/18 10:31*	*08/18/18 02:46*	*1*
13C4 PFOA	*118*		*25 - 150*	*08/16/18 10:31*	*08/18/18 02:46*	*1*
13C4 PFOS	*107*		*25 - 150*	*08/16/18 10:31*	*08/18/18 02:46*	*1*
13C5 PFNA	*111*		*25 - 150*	*08/16/18 10:31*	*08/18/18 02:46*	*1*

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

TestAmerica Job ID: 320-42091-1

Client Sample ID: 407313
Date Collected: 08/10/18 13:42
Date Received: 08/14/18 13:15

Lab Sample ID: 320-42091-10
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		08/16/18 10:31	08/18/18 03:05	1
Perfluorohexanesulfonic acid (PFHxS)	**0.92**	**J**	2.0	0.87	ng/L		08/16/18 10:31	08/18/18 03:05	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		08/16/18 10:31	08/18/18 03:05	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		08/16/18 10:31	08/18/18 03:05	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		08/16/18 10:31	08/18/18 03:05	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		08/16/18 10:31	08/18/18 03:05	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*107*		*25 - 150*	*08/16/18 10:31*	*08/18/18 03:05*	*1*
13C4-PFHpA	*115*		*25 - 150*	*08/16/18 10:31*	*08/18/18 03:05*	*1*
13C4 PFOA	*118*		*25 - 150*	*08/16/18 10:31*	*08/18/18 03:05*	*1*
13C4 PFOS	*103*		*25 - 150*	*08/16/18 10:31*	*08/18/18 03:05*	*1*
13C5 PFNA	*115*		*25 - 150*	*08/16/18 10:31*	*08/18/18 03:05*	*1*

Isotope Dilution Summary

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

TestAmerica Job ID: 320-42091-1

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)
320-42091-1	176095	110	119	121	106	117
320-42091-2	550132	102	110	112	98	111
320-42091-3	550124	108	117	120	107	118
320-42091-4	176397	105	111	112	104	111
320-42091-5	151203	102	110	114	97	111
320-42091-6	542512	101	110	114	105	115
320-42091-7	176222	104	111	111	104	113
320-42091-8	407464	107	112	119	104	110
320-42091-9	407364	108	114	118	107	111
320-42091-10	407313	107	115	118	103	115
LCS 320-240272/2-A	Lab Control Sample	96	102	106	96	98
LCSD 320-240272/3-A	Lab Control Sample Dup	99	102	109	99	99
MB 320-240272/1-A	Method Blank	102	105	112	100	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 320-240272/1-A
Matrix: Water
Analysis Batch: 240433

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 240272

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		08/16/18 10:31	08/17/18 22:29	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		08/16/18 10:31	08/17/18 22:29	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		08/16/18 10:31	08/17/18 22:29	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		08/16/18 10:31	08/17/18 22:29	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		08/16/18 10:31	08/17/18 22:29	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		08/16/18 10:31	08/17/18 22:29	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*102*		*25 - 150*	*08/16/18 10:31*	*08/17/18 22:29*	*1*
13C4-PFHpA	*105*		*25 - 150*	*08/16/18 10:31*	*08/17/18 22:29*	*1*
13C4 PFOA	*112*		*25 - 150*	*08/16/18 10:31*	*08/17/18 22:29*	*1*
13C4 PFOS	*100*		*25 - 150*	*08/16/18 10:31*	*08/17/18 22:29*	*1*
13C5 PFNA	*104*		*25 - 150*	*08/16/18 10:31*	*08/17/18 22:29*	*1*

Lab Sample ID: LCS 320-240272/2-A
Matrix: Water
Analysis Batch: 240433

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 240272

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	20.4		ng/L		115	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	20.1		ng/L		110	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	23.3		ng/L		116	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	22.8		ng/L		114	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	20.0		ng/L		108	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	22.4		ng/L		112	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*96*		*25 - 150*
13C4-PFHpA	*102*		*25 - 150*
13C4 PFOA	*106*		*25 - 150*
13C4 PFOS	*96*		*25 - 150*
13C5 PFNA	*98*		*25 - 150*

Lab Sample ID: LCSD 320-240272/3-A
Matrix: Water
Analysis Batch: 240433

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 240272

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	19.4		ng/L		109	72 - 151	5	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	19.3		ng/L		106	73 - 157	4	30
Perfluoroheptanoic acid (PFHpA)			20.0	22.0		ng/L		110	71 - 138	5	30
Perfluorooctanoic acid (PFOA)			20.0	21.8		ng/L		109	70 - 140	5	30
Perfluorooctanesulfonic acid (PFOS)			18.6	19.9		ng/L		107	69 - 144	1	30
Perfluorononanoic acid (PFNA)			20.0	23.4		ng/L		117	73 - 147	5	30

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

TestAmerica Job ID: 320-42091-1

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	99		25 - 150
13C4-PFHpA	102		25 - 150
13C4 PFOA	109		25 - 150
13C4 PFOS	99		25 - 150
13C5 PFNA	99		25 - 150

LCMS

Prep Batch: 240272

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42091-1	176095	Total/NA	Water	PFAS Prep	
320-42091-2	550132	Total/NA	Water	PFAS Prep	
320-42091-3	550124	Total/NA	Water	PFAS Prep	
320-42091-4	176397	Total/NA	Water	PFAS Prep	
320-42091-5	151203	Total/NA	Water	PFAS Prep	
320-42091-6	542512	Total/NA	Water	PFAS Prep	
320-42091-7	176222	Total/NA	Water	PFAS Prep	
320-42091-8	407464	Total/NA	Water	PFAS Prep	
320-42091-9	407364	Total/NA	Water	PFAS Prep	
320-42091-10	407313	Total/NA	Water	PFAS Prep	
MB 320-240272/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-240272/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-240272/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 240433

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42091-1	176095	Total/NA	Water	WS-LC-0025 At1	240272
320-42091-2	550132	Total/NA	Water	WS-LC-0025 At1	240272
320-42091-3	550124	Total/NA	Water	WS-LC-0025 At1	240272
320-42091-4	176397	Total/NA	Water	WS-LC-0025 At1	240272
320-42091-5	151203	Total/NA	Water	WS-LC-0025 At1	240272
320-42091-6	542512	Total/NA	Water	WS-LC-0025 At1	240272
320-42091-7	176222	Total/NA	Water	WS-LC-0025 At1	240272
320-42091-8	407464	Total/NA	Water	WS-LC-0025 At1	240272
320-42091-9	407364	Total/NA	Water	WS-LC-0025 At1	240272
320-42091-10	407313	Total/NA	Water	WS-LC-0025 At1	240272
MB 320-240272/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	240272
LCS 320-240272/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	240272
LCSD 320-240272/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	240272

Lab Chronicle

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

TestAmerica Job ID: 320-42091-1

Client Sample ID: 176095
Date Collected: 08/07/18 13:36
Date Received: 08/14/18 13:15

Lab Sample ID: 320-42091-1
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	240272	08/16/18 10:31	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			240433	08/18/18 00:01	S1M	TAL SAC

Client Sample ID: 550132
Date Collected: 08/08/18 09:21
Date Received: 08/14/18 13:15

Lab Sample ID: 320-42091-2
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	240272	08/16/18 10:31	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			240433	08/18/18 00:19	S1M	TAL SAC

Client Sample ID: 550124
Date Collected: 08/08/18 10:42
Date Received: 08/14/18 13:15

Lab Sample ID: 320-42091-3
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	240272	08/16/18 10:31	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			240433	08/18/18 00:38	S1M	TAL SAC

Client Sample ID: 176397
Date Collected: 08/08/18 11:35
Date Received: 08/14/18 13:15

Lab Sample ID: 320-42091-4
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	240272	08/16/18 10:31	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			240433	08/18/18 00:56	S1M	TAL SAC

Client Sample ID: 151203
Date Collected: 08/08/18 13:22
Date Received: 08/14/18 13:15

Lab Sample ID: 320-42091-5
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	240272	08/16/18 10:31	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			240433	08/18/18 01:15	S1M	TAL SAC

Client Sample ID: 542512
Date Collected: 08/10/18 11:07
Date Received: 08/14/18 13:15

Lab Sample ID: 320-42091-6
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	240272	08/16/18 10:31	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			240433	08/18/18 01:51	S1M	TAL SAC

Lab Chronicle

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

TestAmerica Job ID: 320-42091-1

Client Sample ID: 176222
Date Collected: 08/10/18 10:12
Date Received: 08/14/18 13:15

Lab Sample ID: 320-42091-7
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	240272	08/16/18 10:31	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			240433	08/18/18 02:10	S1M	TAL SAC

Client Sample ID: 407464
Date Collected: 08/10/18 14:12
Date Received: 08/14/18 13:15

Lab Sample ID: 320-42091-8
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	240272	08/16/18 10:31	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			240433	08/18/18 02:28	S1M	TAL SAC

Client Sample ID: 407364
Date Collected: 08/10/18 14:22
Date Received: 08/14/18 13:15

Lab Sample ID: 320-42091-9
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	240272	08/16/18 10:31	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			240433	08/18/18 02:46	S1M	TAL SAC

Client Sample ID: 407313
Date Collected: 08/10/18 13:42
Date Received: 08/14/18 13:15

Lab Sample ID: 320-42091-10
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	240272	08/16/18 10:31	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			240433	08/18/18 03:05	S1M	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: 320-42091-1

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
ANAB	DoD ELAP		L2468	01-20-21
Arizona	State Program	9	AZ0708	08-11-19
Arkansas DEQ	State Program	6	88-0691	06-17-19
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-19
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-19
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-19
Kansas	NELAP	7	E-10375	10-31-18
Louisiana	NELAP	6	30612	06-30-19
Maine	State Program	1	CA0004	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-19
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-19
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
US Fish & Wildlife	Federal		LE148388-0	07-31-19
USDA	Federal		P330-18-00239	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-19
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

Method Summary

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

TestAmerica Job ID: 320-42091-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC
PFAS Prep	Preparation, Direct Inject PFAS	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: 320-42091-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-42091-1	176095	Water	08/07/18 13:36	08/14/18 13:15
320-42091-2	550132	Water	08/08/18 09:21	08/14/18 13:15
320-42091-3	550124	Water	08/08/18 10:42	08/14/18 13:15
320-42091-4	176397	Water	08/08/18 11:35	08/14/18 13:15
320-42091-5	151203	Water	08/08/18 13:22	08/14/18 13:15
320-42091-6	542512	Water	08/10/18 11:07	08/14/18 13:15
320-42091-7	176222	Water	08/10/18 10:12	08/14/18 13:15
320-42091-8	407464	Water	08/10/18 14:12	08/14/18 13:15
320-42091-9	407364	Water	08/10/18 14:22	08/14/18 13:15
320-42091-10	407313	Water	08/10/18 13:42	08/14/18 13:15

CHAIN-OF-CUSTODY RECORD

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

Laboratory Test America
Attn: D. Alltucker

Analytical Methods (include preservative if used)

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

320-42091 Chain of Custody

Sample Identity	Lab No.	Time	Date Sampled	RTAs x6	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
176095		1336	8/7/18	X	2	GW
550132		0921	8/8/18	X	2	
550124		1042	8/8/18	X	2	
176397		1135	8/8/18	X	2	
151203		1322	8/8/18	X	2	
542512		1107	8/10/18	X	2	
176222		1012	8/10/18	X	2	
407464		1412	8/10/18	X	2	
407364		1422	8/10/18	X	2	
407313		1342	8/10/18	X	2	

Project Information	Sample Receipt
Number: 20074-002	Total No. of Containers:
Name: FA1	COC Seals/Intact? Y/N/NA
Contact: MDN	Received Good Cond./Cold
Ongoing Project? Yes☒ No☐	Temp:
Sampler: AEM	Delivery Method: goldstreak

Notes:

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 4:30	Signature: Time:	Signature: Time:
Printed Name: Amanda Smith Date: 8/13/18	Printed Name: Date:	Printed Name: Date:
Company: Shannon+Wilson, Inc.	Company:	Company:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: Time: 1315	Signature: Time:	Signature: Time:
Printed Name: Edric Chang Date: 8/14/18	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

(1) Sample received with no label. 8/14/18

No. 35584

(1) Page 27 of 28

8/20/2018

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-42091-1

Login Number: 42091
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	#1-1 of 2 poly bottle were received without a label
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:

Adam Wyborny

Title:

Environmental Engineering Staff

Date:

August 27, 2018

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

August 20, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-42091-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-42091-1

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:

The sample cooler was recorded at 4.7° C upon receipt at the laboratory.

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

   ◉ Yes ○ No Comments:

Analysis of PFAS compounds 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 checklist notes that one sample container was received without a label.

e. Data quality or usability affected?

Comments:

Data quality or usability are not affected. The container lacking a label was one of two containers associated with sample 176095. The second container was labeled, and the pair was contained in the same bag. For this reason, the identity of the sample container was unambiguous.

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 4.7° C.

The case narrative notes that one of two containers for the sample 176095 was received without a label.

The case narrative notes there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) with preparation batch 320-240272. It also notes that several samples contained sediment and were observed to have a slight brown color.

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/or 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:

PFAS compounds are not volatile; 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 407364 and 407464 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:

The analytical precision between the PFAS results of the field duplicate samples was within the project specific DQO of 30% 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:

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: 320-42344-1
Client Project/Site: FAI

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

Attn: Marcy Nadel

Authorized for release by:
9/6/2018 1:32:13 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

Definitions/Glossary

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

TestAmerica Job ID: 320-42344-1

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: 320-42344-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-42344-1

Receipt
The samples were received on 8/21/2018 10:10 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.6º 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 320-241948.

Method(s) PFAS Prep: The samples are brown in color and have brown sediment at the bottom of the container: 176044.4 (320-42344-2), 176044.5 (320-42344-3), 176435 (320-42344-4), 579645 (320-42344-5), 120332 (320-42344-6), 173908 (320-42344-10), 120472 (320-42344-11) and 521809 (320-42344-12).

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: 320-42344-1

Client Sample ID: 173916 — Lab Sample ID: 320-42344-1

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)	0.77	J	2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.6	J	2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 176044.4 — Lab Sample ID: 320-42344-2

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)	87		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	86		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS) - DL	310		20	8.7	ng/L	10		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: 176044.5 — Lab Sample ID: 320-42344-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	68		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	170		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS) - DL	470		20	8.7	ng/L	10		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	1000		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: 176435 — Lab Sample ID: 320-42344-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	9.4		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)	3.9		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: 579645 — Lab Sample ID: 320-42344-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	5.5		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	59		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: 579645 (Continued) — Lab Sample ID: 320-42344-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
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)	4.5		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 120332 — Lab Sample ID: 320-42344-6

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)	78		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)	15		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	470		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: 483541 — Lab Sample ID: 320-42344-7

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)	71		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)	3.8		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	3.6		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 173002 — Lab Sample ID: 320-42344-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	5.1		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	29		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.4		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)	4.7		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 391247 — Lab Sample ID: 320-42344-9

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

This Detection Summary does not include radiochemical test results.

Client Sample ID: 391247 (Continued) — Lab Sample ID: 320-42344-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	31		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)	2.7		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	4.1		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 173908 — Lab Sample ID: 320-42344-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	42		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	180		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)	8.4		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: 120472 — Lab Sample ID: 320-42344-11

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)	97		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)	16		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	530		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: 521809 — Lab Sample ID: 320-42344-12

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
Perfluorohexanesulfonic acid (PFHxS)	23		2.0	0.87	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)	20		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: 320-42344-1

Client Sample ID: 173916
Date Collected: 08/15/18 11:22
Date Received: 08/21/18 10:10

Lab Sample ID: 320-42344-1
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		08/24/18 15:15	08/26/18 15:54	1
Perfluorohexanesulfonic acid (PFHxS)	**1.8**	**J**	2.0	0.87	ng/L		08/24/18 15:15	08/26/18 15:54	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		08/24/18 15:15	08/26/18 15:54	1
Perfluorooctanoic acid (PFOA)	**0.77**	**J**	2.0	0.75	ng/L		08/24/18 15:15	08/26/18 15:54	1
Perfluorooctanesulfonic acid (PFOS)	**1.6**	**J**	2.0	1.3	ng/L		08/24/18 15:15	08/26/18 15:54	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		08/24/18 15:15	08/26/18 15:54	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*106*		*25 - 150*	*08/24/18 15:15*	*08/26/18 15:54*	*1*
13C4-PFHpA	*107*		*25 - 150*	*08/24/18 15:15*	*08/26/18 15:54*	*1*
13C4 PFOA	*111*		*25 - 150*	*08/24/18 15:15*	*08/26/18 15:54*	*1*
13C4 PFOS	*106*		*25 - 150*	*08/24/18 15:15*	*08/26/18 15:54*	*1*
13C5 PFNA	*109*		*25 - 150*	*08/24/18 15:15*	*08/26/18 15:54*	*1*

Client Sample Results

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

TestAmerica Job ID: 320-42344-1

Client Sample ID: 176044.4

Date Collected: 08/15/18 12:41
Date Received: 08/21/18 10:10

Lab Sample ID: 320-42344-2

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**45**		2.0	0.92	ng/L		08/24/18 15:15	08/26/18 16:12	1
Perfluoroheptanoic acid (PFHpA)	**87**		2.0	0.80	ng/L		08/24/18 15:15	08/26/18 16:12	1
Perfluorooctanoic acid (PFOA)	**86**		2.0	0.75	ng/L		08/24/18 15:15	08/26/18 16:12	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		08/24/18 15:15	08/26/18 16:12	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*101*		*25 - 150*	*08/24/18 15:15*	*08/26/18 16:12*	*1*
13C4-PFHpA	*100*		*25 - 150*	*08/24/18 15:15*	*08/26/18 16:12*	*1*
13C4 PFOA	*108*		*25 - 150*	*08/24/18 15:15*	*08/26/18 16:12*	*1*
13C5 PFNA	*103*		*25 - 150*	*08/24/18 15:15*	*08/26/18 16:12*	*1*

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanesulfonic acid (PFHxS)	**310**		20	8.7	ng/L		08/24/18 15:15	08/28/18 15:32	10
Perfluorooctanesulfonic acid (PFOS)	**450**		20	13	ng/L		08/24/18 15:15	08/28/18 15:32	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*114*		*25 - 150*	*08/24/18 15:15*	*08/28/18 15:32*	*10*
13C4 PFOS	*107*		*25 - 150*	*08/24/18 15:15*	*08/28/18 15:32*	*10*

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

TestAmerica Job ID: 320-42344-1

Client Sample ID: 176044.5
Date Collected: 08/15/18 13:04
Date Received: 08/21/18 10:10

Lab Sample ID: 320-42344-3
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**68**		2.0	0.92	ng/L		08/24/18 15:15	08/26/18 16:31	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		08/24/18 15:15	08/26/18 16:31	1
Perfluorooctanoic acid (PFOA)	**170**		2.0	0.75	ng/L		08/24/18 15:15	08/26/18 16:31	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		08/24/18 15:15	08/26/18 16:31	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*100*		*25 - 150*	*08/24/18 15:15*	*08/26/18 16:31*	*1*
13C4-PFHpA	*99*		*25 - 150*	*08/24/18 15:15*	*08/26/18 16:31*	*1*
13C4 PFOA	*111*		*25 - 150*	*08/24/18 15:15*	*08/26/18 16:31*	*1*
13C5 PFNA	*99*		*25 - 150*	*08/24/18 15:15*	*08/26/18 16:31*	*1*

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanesulfonic acid (PFHxS)	**470**		20	8.7	ng/L		08/24/18 15:15	08/28/18 15:50	10
Perfluorooctanesulfonic acid (PFOS)	**1000**		20	13	ng/L		08/24/18 15:15	08/28/18 15:50	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*116*		*25 - 150*	*08/24/18 15:15*	*08/28/18 15:50*	*10*
13C4 PFOS	*114*		*25 - 150*	*08/24/18 15:15*	*08/28/18 15:50*	*10*

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

TestAmerica Job ID: 320-42344-1

Client Sample ID: 176435
Date Collected: 08/15/18 14:38
Date Received: 08/21/18 10:10

Lab Sample ID: 320-42344-4
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	9.4		2.0	0.92	ng/L		08/24/18 15:15	08/26/18 16:49	1
Perfluorohexanesulfonic acid (PFHxS)	41		2.0	0.87	ng/L		08/24/18 15:15	08/26/18 16:49	1
Perfluoroheptanoic acid (PFHpA)	2.6		2.0	0.80	ng/L		08/24/18 15:15	08/26/18 16:49	1
Perfluorooctanoic acid (PFOA)	3.9		2.0	0.75	ng/L		08/24/18 15:15	08/26/18 16:49	1
Perfluorooctanesulfonic acid (PFOS)	7.5		2.0	1.3	ng/L		08/24/18 15:15	08/26/18 16:49	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		08/24/18 15:15	08/26/18 16:49	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*109*		*25 - 150*	*08/24/18 15:15*	*08/26/18 16:49*	*1*
13C4-PFHpA	*108*		*25 - 150*	*08/24/18 15:15*	*08/26/18 16:49*	*1*
13C4 PFOA	*116*		*25 - 150*	*08/24/18 15:15*	*08/26/18 16:49*	*1*
13C4 PFOS	*107*		*25 - 150*	*08/24/18 15:15*	*08/26/18 16:49*	*1*
13C5 PFNA	*109*		*25 - 150*	*08/24/18 15:15*	*08/26/18 16:49*	*1*

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

TestAmerica Job ID: 320-42344-1

Client Sample ID: 579645
Date Collected: 08/14/18 13:30
Date Received: 08/21/18 10:10

Lab Sample ID: 320-42344-5
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**5.5**		2.0	0.92	ng/L		08/24/18 15:15	08/26/18 17:07	1
Perfluorohexanesulfonic acid (PFHxS)	**59**		2.0	0.87	ng/L		08/24/18 15:15	08/26/18 17:07	1
Perfluoroheptanoic acid (PFHpA)	**3.5**		2.0	0.80	ng/L		08/24/18 15:15	08/26/18 17:07	1
Perfluorooctanoic acid (PFOA)	**3.5**		2.0	0.75	ng/L		08/24/18 15:15	08/26/18 17:07	1
Perfluorooctanesulfonic acid (PFOS)	**4.5**		2.0	1.3	ng/L		08/24/18 15:15	08/26/18 17:07	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		08/24/18 15:15	08/26/18 17:07	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*107*		*25 - 150*	*08/24/18 15:15*	*08/26/18 17:07*	*1*
13C4-PFHpA	*107*		*25 - 150*	*08/24/18 15:15*	*08/26/18 17:07*	*1*
13C4 PFOA	*111*		*25 - 150*	*08/24/18 15:15*	*08/26/18 17:07*	*1*
13C4 PFOS	*100*		*25 - 150*	*08/24/18 15:15*	*08/26/18 17:07*	*1*
13C5 PFNA	*111*		*25 - 150*	*08/24/18 15:15*	*08/26/18 17:07*	*1*

Client Sample ID: 120332
Date Collected: 08/17/18 11:25
Date Received: 08/21/18 10:10

Lab Sample ID: 320-42344-6
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	15		2.0	0.92	ng/L		08/24/18 15:15	08/26/18 17:26	1
Perfluorohexanesulfonic acid (PFHxS)	78		2.0	0.87	ng/L		08/24/18 15:15	08/26/18 17:26	1
Perfluoroheptanoic acid (PFHpA)	7.1		2.0	0.80	ng/L		08/24/18 15:15	08/26/18 17:26	1
Perfluorooctanoic acid (PFOA)	15		2.0	0.75	ng/L		08/24/18 15:15	08/26/18 17:26	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		08/24/18 15:15	08/26/18 17:26	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*108*		*25 - 150*	*08/24/18 15:15*	*08/26/18 17:26*	*1*
13C4-PFHpA	*102*		*25 - 150*	*08/24/18 15:15*	*08/26/18 17:26*	*1*
13C4 PFOA	*106*		*25 - 150*	*08/24/18 15:15*	*08/26/18 17:26*	*1*
13C5 PFNA	*100*		*25 - 150*	*08/24/18 15:15*	*08/26/18 17:26*	*1*

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	470		20	13	ng/L		08/24/18 15:15	08/28/18 16:09	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*108*		*25 - 150*	*08/24/18 15:15*	*08/28/18 16:09*	*10*

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

TestAmerica Job ID: 320-42344-1

Client Sample ID: 483541
Date Collected: 08/16/18 14:20
Date Received: 08/21/18 10:10

Lab Sample ID: 320-42344-7
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**18**		2.0	0.92	ng/L		08/24/18 15:15	08/26/18 17:44	1
Perfluorohexanesulfonic acid (PFHxS)	**71**		2.0	0.87	ng/L		08/24/18 15:15	08/26/18 17:44	1
Perfluoroheptanoic acid (PFHpA)	**5.5**		2.0	0.80	ng/L		08/24/18 15:15	08/26/18 17:44	1
Perfluorooctanoic acid (PFOA)	**3.8**		2.0	0.75	ng/L		08/24/18 15:15	08/26/18 17:44	1
Perfluorooctanesulfonic acid (PFOS)	**3.6**		2.0	1.3	ng/L		08/24/18 15:15	08/26/18 17:44	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		08/24/18 15:15	08/26/18 17:44	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*111*		*25 - 150*	*08/24/18 15:15*	*08/26/18 17:44*	*1*
13C4-PFHpA	*112*		*25 - 150*	*08/24/18 15:15*	*08/26/18 17:44*	*1*
13C4 PFOA	*121*		*25 - 150*	*08/24/18 15:15*	*08/26/18 17:44*	*1*
13C4 PFOS	*107*		*25 - 150*	*08/24/18 15:15*	*08/26/18 17:44*	*1*
13C5 PFNA	*119*		*25 - 150*	*08/24/18 15:15*	*08/26/18 17:44*	*1*

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

TestAmerica Job ID: 320-42344-1

Client Sample ID: 173002
Date Collected: 08/16/18 10:34
Date Received: 08/21/18 10:10

Lab Sample ID: 320-42344-8
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**5.1**		2.0	0.92	ng/L		08/24/18 15:15	08/26/18 18:21	1
Perfluorohexanesulfonic acid (PFHxS)	**29**		2.0	0.87	ng/L		08/24/18 15:15	08/26/18 18:21	1
Perfluoroheptanoic acid (PFHpA)	**2.4**		2.0	0.80	ng/L		08/24/18 15:15	08/26/18 18:21	1
Perfluorooctanoic acid (PFOA)	**2.9**		2.0	0.75	ng/L		08/24/18 15:15	08/26/18 18:21	1
Perfluorooctanesulfonic acid (PFOS)	**4.7**		2.0	1.3	ng/L		08/24/18 15:15	08/26/18 18:21	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		08/24/18 15:15	08/26/18 18:21	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*105*		*25 - 150*	*08/24/18 15:15*	*08/26/18 18:21*	*1*
13C4-PFHpA	*107*		*25 - 150*	*08/24/18 15:15*	*08/26/18 18:21*	*1*
13C4 PFOA	*112*		*25 - 150*	*08/24/18 15:15*	*08/26/18 18:21*	*1*
13C4 PFOS	*100*		*25 - 150*	*08/24/18 15:15*	*08/26/18 18:21*	*1*
13C5 PFNA	*108*		*25 - 150*	*08/24/18 15:15*	*08/26/18 18:21*	*1*

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

TestAmerica Job ID: 320-42344-1

Client Sample ID: 391247
Date Collected: 08/16/18 10:14
Date Received: 08/21/18 10:10

Lab Sample ID: 320-42344-9
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	4.7		2.0	0.92	ng/L		08/24/18 15:15	08/26/18 18:39	1
Perfluorohexanesulfonic acid (PFHxS)	31		2.0	0.87	ng/L		08/24/18 15:15	08/26/18 18:39	1
Perfluoroheptanoic acid (PFHpA)	2.3		2.0	0.80	ng/L		08/24/18 15:15	08/26/18 18:39	1
Perfluorooctanoic acid (PFOA)	2.7		2.0	0.75	ng/L		08/24/18 15:15	08/26/18 18:39	1
Perfluorooctanesulfonic acid (PFOS)	4.1		2.0	1.3	ng/L		08/24/18 15:15	08/26/18 18:39	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		08/24/18 15:15	08/26/18 18:39	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*104*		*25 - 150*	*08/24/18 15:15*	*08/26/18 18:39*	*1*
13C4-PFHpA	*103*		*25 - 150*	*08/24/18 15:15*	*08/26/18 18:39*	*1*
13C4 PFOA	*111*		*25 - 150*	*08/24/18 15:15*	*08/26/18 18:39*	*1*
13C4 PFOS	*103*		*25 - 150*	*08/24/18 15:15*	*08/26/18 18:39*	*1*
13C5 PFNA	*108*		*25 - 150*	*08/24/18 15:15*	*08/26/18 18:39*	*1*

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

TestAmerica Job ID: 320-42344-1

Client Sample ID: 173908
Date Collected: 08/16/18 14:53
Date Received: 08/21/18 10:10

Lab Sample ID: 320-42344-10
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	42		2.0	0.92	ng/L		08/24/18 15:15	08/26/18 18:58	1
Perfluorohexanesulfonic acid (PFHxS)	180		2.0	0.87	ng/L		08/24/18 15:15	08/26/18 18:58	1
Perfluoroheptanoic acid (PFHpA)	13		2.0	0.80	ng/L		08/24/18 15:15	08/26/18 18:58	1
Perfluorooctanoic acid (PFOA)	8.4		2.0	0.75	ng/L		08/24/18 15:15	08/26/18 18:58	1
Perfluorooctanesulfonic acid (PFOS)	6.2		2.0	1.3	ng/L		08/24/18 15:15	08/26/18 18:58	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		08/24/18 15:15	08/26/18 18:58	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*102*		*25 - 150*	*08/24/18 15:15*	*08/26/18 18:58*	*1*
13C4-PFHpA	*105*		*25 - 150*	*08/24/18 15:15*	*08/26/18 18:58*	*1*
13C4 PFOA	*115*		*25 - 150*	*08/24/18 15:15*	*08/26/18 18:58*	*1*
13C4 PFOS	*104*		*25 - 150*	*08/24/18 15:15*	*08/26/18 18:58*	*1*
13C5 PFNA	*108*		*25 - 150*	*08/24/18 15:15*	*08/26/18 18:58*	*1*

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

TestAmerica Job ID: 320-42344-1

Client Sample ID: 120472
Date Collected: 08/16/18 12:13
Date Received: 08/21/18 10:10

Lab Sample ID: 320-42344-11
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	20		2.0	0.92	ng/L		08/24/18 15:15	08/26/18 19:16	1
Perfluorohexanesulfonic acid (PFHxS)	97		2.0	0.87	ng/L		08/24/18 15:15	08/26/18 19:16	1
Perfluoroheptanoic acid (PFHpA)	12		2.0	0.80	ng/L		08/24/18 15:15	08/26/18 19:16	1
Perfluorooctanoic acid (PFOA)	16		2.0	0.75	ng/L		08/24/18 15:15	08/26/18 19:16	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		08/24/18 15:15	08/26/18 19:16	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*112*		*25 - 150*	*08/24/18 15:15*	*08/26/18 19:16*	*1*
13C4-PFHpA	*109*		*25 - 150*	*08/24/18 15:15*	*08/26/18 19:16*	*1*
13C4 PFOA	*124*		*25 - 150*	*08/24/18 15:15*	*08/26/18 19:16*	*1*
13C5 PFNA	*109*		*25 - 150*	*08/24/18 15:15*	*08/26/18 19:16*	*1*

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	530		20	13	ng/L		08/24/18 15:15	08/31/18 00:08	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*101*		*25 - 150*	*08/24/18 15:15*	*08/31/18 00:08*	*10*

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

TestAmerica Job ID: 320-42344-1

Client Sample ID: 521809
Date Collected: 08/16/18 13:30
Date Received: 08/21/18 10:10

Lab Sample ID: 320-42344-12
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**4.2**		2.0	0.92	ng/L		08/24/18 15:15	08/26/18 19:34	1
Perfluorohexanesulfonic acid (PFHxS)	**23**		2.0	0.87	ng/L		08/24/18 15:15	08/26/18 19:34	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		08/24/18 15:15	08/26/18 19:34	1
Perfluorooctanoic acid (PFOA)	**15**		2.0	0.75	ng/L		08/24/18 15:15	08/26/18 19:34	1
Perfluorooctanesulfonic acid (PFOS)	**20**		2.0	1.3	ng/L		08/24/18 15:15	08/26/18 19:34	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		08/24/18 15:15	08/26/18 19:34	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*104*		*25 - 150*	*08/24/18 15:15*	*08/26/18 19:34*	*1*
13C4-PFHpA	*108*		*25 - 150*	*08/24/18 15:15*	*08/26/18 19:34*	*1*
13C4 PFOA	*112*		*25 - 150*	*08/24/18 15:15*	*08/26/18 19:34*	*1*
13C4 PFOS	*102*		*25 - 150*	*08/24/18 15:15*	*08/26/18 19:34*	*1*
13C5 PFNA	*108*		*25 - 150*	*08/24/18 15:15*	*08/26/18 19:34*	*1*

Isotope Dilution Summary

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

TestAmerica Job ID: 320-42344-1

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)
320-42344-1	173916	106	107	111	106	109
320-42344-2	176044.4	101	100	108		103
320-42344-2 - DL	176044.4	114			107	
320-42344-3	176044.5	100	99	111		99
320-42344-3 - DL	176044.5	116			114	
320-42344-4	176435	109	108	116	107	109
320-42344-5	579645	107	107	111	100	111
320-42344-6	120332	108	102	106		100
320-42344-6 - DL	120332				108	
320-42344-7	483541	111	112	121	107	119
320-42344-8	173002	105	107	112	100	108
320-42344-9	391247	104	103	111	103	108
320-42344-10	173908	102	105	115	104	108
320-42344-11	120472	112	109	124		109
320-42344-11 - DL	120472				101	
320-42344-12	521809	104	108	112	102	108
LCS 320-241948/2-A	Lab Control Sample	114	113	117	109	106
LCSD 320-241948/3-A	Lab Control Sample Dup	109	111	109	105	109
MB 320-241948/1-A	Method Blank	107	109	110	106	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 320-241948/1-A
Matrix: Water
Analysis Batch: 242058

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 241948

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		08/24/18 15:15	08/26/18 14:59	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		08/24/18 15:15	08/26/18 14:59	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		08/24/18 15:15	08/26/18 14:59	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		08/24/18 15:15	08/26/18 14:59	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		08/24/18 15:15	08/26/18 14:59	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		08/24/18 15:15	08/26/18 14:59	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*107*		*25 - 150*	*08/24/18 15:15*	*08/26/18 14:59*	*1*
13C4-PFHpA	*109*		*25 - 150*	*08/24/18 15:15*	*08/26/18 14:59*	*1*
13C4 PFOA	*110*		*25 - 150*	*08/24/18 15:15*	*08/26/18 14:59*	*1*
13C4 PFOS	*106*		*25 - 150*	*08/24/18 15:15*	*08/26/18 14:59*	*1*
13C5 PFNA	*106*		*25 - 150*	*08/24/18 15:15*	*08/26/18 14:59*	*1*

Lab Sample ID: LCS 320-241948/2-A
Matrix: Water
Analysis Batch: 242058

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 241948

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	17.0		ng/L		96	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	16.5		ng/L		91	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	19.0		ng/L		95	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	19.2		ng/L		96	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	16.5		ng/L		89	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	19.5		ng/L		98	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*114*		*25 - 150*
13C4-PFHpA	*113*		*25 - 150*
13C4 PFOA	*117*		*25 - 150*
13C4 PFOS	*109*		*25 - 150*
13C5 PFNA	*106*		*25 - 150*

Lab Sample ID: LCSD 320-241948/3-A
Matrix: Water
Analysis Batch: 242058

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 241948

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	0	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	17.1		ng/L		94	73 - 157	3	30
Perfluoroheptanoic acid (PFHpA)			20.0	19.5		ng/L		97	71 - 138	3	30
Perfluorooctanoic acid (PFOA)			20.0	19.9		ng/L		100	70 - 140	4	30
Perfluorooctanesulfonic acid (PFOS)			18.6	17.1		ng/L		92	69 - 144	4	30
Perfluorononanoic acid (PFNA)			20.0	18.6		ng/L		93	73 - 147	5	30

QC Sample Results

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

TestAmerica Job ID: 320-42344-1

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	109		25 - 150
13C4-PFHpA	111		25 - 150
13C4 PFOA	109		25 - 150
13C4 PFOS	105		25 - 150
13C5 PFNA	109		25 - 150

LCMS

Prep Batch: 241948

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42344-1	173916	Total/NA	Water	PFAS Prep	
320-42344-2	176044.4	Total/NA	Water	PFAS Prep	
320-42344-2 - DL	176044.4	Total/NA	Water	PFAS Prep	
320-42344-3 - DL	176044.5	Total/NA	Water	PFAS Prep	
320-42344-3	176044.5	Total/NA	Water	PFAS Prep	
320-42344-4	176435	Total/NA	Water	PFAS Prep	
320-42344-5	579645	Total/NA	Water	PFAS Prep	
320-42344-6	120332	Total/NA	Water	PFAS Prep	
320-42344-6 - DL	120332	Total/NA	Water	PFAS Prep	
320-42344-7	483541	Total/NA	Water	PFAS Prep	
320-42344-8	173002	Total/NA	Water	PFAS Prep	
320-42344-9	391247	Total/NA	Water	PFAS Prep	
320-42344-10	173908	Total/NA	Water	PFAS Prep	
320-42344-11	120472	Total/NA	Water	PFAS Prep	
320-42344-11 - DL	120472	Total/NA	Water	PFAS Prep	
320-42344-12	521809	Total/NA	Water	PFAS Prep	
MB 320-241948/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-241948/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-241948/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 242058

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42344-1	173916	Total/NA	Water	WS-LC-0025 At1	241948
320-42344-2	176044.4	Total/NA	Water	WS-LC-0025 At1	241948
320-42344-3	176044.5	Total/NA	Water	WS-LC-0025 At1	241948
320-42344-4	176435	Total/NA	Water	WS-LC-0025 At1	241948
320-42344-5	579645	Total/NA	Water	WS-LC-0025 At1	241948
320-42344-6	120332	Total/NA	Water	WS-LC-0025 At1	241948
320-42344-7	483541	Total/NA	Water	WS-LC-0025 At1	241948
320-42344-8	173002	Total/NA	Water	WS-LC-0025 At1	241948
320-42344-9	391247	Total/NA	Water	WS-LC-0025 At1	241948
320-42344-10	173908	Total/NA	Water	WS-LC-0025 At1	241948
320-42344-11	120472	Total/NA	Water	WS-LC-0025 At1	241948
320-42344-12	521809	Total/NA	Water	WS-LC-0025 At1	241948
MB 320-241948/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	241948
LCS 320-241948/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	241948
LCSD 320-241948/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	241948

LCMS (Continued)

Analysis Batch: 242603

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42344-2 - DL	176044.4	Total/NA	Water	WS-LC-0025 At1	241948
320-42344-3 - DL	176044.5	Total/NA	Water	WS-LC-0025 At1	241948
320-42344-6 - DL	120332	Total/NA	Water	WS-LC-0025 At1	241948

Analysis Batch: 243099

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42344-11 - DL	120472	Total/NA	Water	WS-LC-0025 At1	241948

Lab Chronicle

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

TestAmerica Job ID: 320-42344-1

Client Sample ID: 173916
Date Collected: 08/15/18 11:22
Date Received: 08/21/18 10:10

Lab Sample ID: 320-42344-1
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	241948	08/24/18 15:15	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			242058	08/26/18 15:54	D1R	TAL SAC

Client Sample ID: 176044.4
Date Collected: 08/15/18 12:41
Date Received: 08/21/18 10:10

Lab Sample ID: 320-42344-2
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	241948	08/24/18 15:15	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			242058	08/26/18 16:12	D1R	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	241948	08/24/18 15:15	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			242603	08/28/18 15:32	D1R	TAL SAC

Client Sample ID: 176044.5
Date Collected: 08/15/18 13:04
Date Received: 08/21/18 10:10

Lab Sample ID: 320-42344-3
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	241948	08/24/18 15:15	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			242058	08/26/18 16:31	D1R	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	241948	08/24/18 15:15	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			242603	08/28/18 15:50	D1R	TAL SAC

Client Sample ID: 176435
Date Collected: 08/15/18 14:38
Date Received: 08/21/18 10:10

Lab Sample ID: 320-42344-4
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	241948	08/24/18 15:15	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			242058	08/26/18 16:49	D1R	TAL SAC

Client Sample ID: 579645
Date Collected: 08/14/18 13:30
Date Received: 08/21/18 10:10

Lab Sample ID: 320-42344-5
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	241948	08/24/18 15:15	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			242058	08/26/18 17:07	D1R	TAL SAC

Lab Chronicle

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

TestAmerica Job ID: 320-42344-1

Client Sample ID: 120332
Date Collected: 08/17/18 11:25
Date Received: 08/21/18 10:10

Lab Sample ID: 320-42344-6
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	241948	08/24/18 15:15	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			242058	08/26/18 17:26	D1R	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	241948	08/24/18 15:15	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			242603	08/28/18 16:09	D1R	TAL SAC

Client Sample ID: 483541
Date Collected: 08/16/18 14:20
Date Received: 08/21/18 10:10

Lab Sample ID: 320-42344-7
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	241948	08/24/18 15:15	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			242058	08/26/18 17:44	D1R	TAL SAC

Client Sample ID: 173002
Date Collected: 08/16/18 10:34
Date Received: 08/21/18 10:10

Lab Sample ID: 320-42344-8
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	241948	08/24/18 15:15	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			242058	08/26/18 18:21	D1R	TAL SAC

Client Sample ID: 391247
Date Collected: 08/16/18 10:14
Date Received: 08/21/18 10:10

Lab Sample ID: 320-42344-9
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	241948	08/24/18 15:15	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			242058	08/26/18 18:39	D1R	TAL SAC

Client Sample ID: 173908
Date Collected: 08/16/18 14:53
Date Received: 08/21/18 10:10

Lab Sample ID: 320-42344-10
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	241948	08/24/18 15:15	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			242058	08/26/18 18:58	D1R	TAL SAC

Client Sample ID: 120472
Date Collected: 08/16/18 12:13
Date Received: 08/21/18 10:10

Lab Sample ID: 320-42344-11
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	241948	08/24/18 15:15	QCP	TAL SAC

Lab Chronicle

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

TestAmerica Job ID: 320-42344-1

Client Sample ID: 120472

Date Collected: 08/16/18 12:13
Date Received: 08/21/18 10:10

Lab Sample ID: 320-42344-11

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			242058	08/26/18 19:16	D1R	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	241948	08/24/18 15:15	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			243099	08/31/18 00:08	D1R	TAL SAC

Client Sample ID: 521809

Date Collected: 08/16/18 13:30
Date Received: 08/21/18 10:10

Lab Sample ID: 320-42344-12

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	241948	08/24/18 15:15	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			242058	08/26/18 19:34	D1R	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: 320-42344-1

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
ANAB	DoD ELAP		L2468	01-20-21
Arizona	State Program	9	AZ0708	08-11-19
Arkansas DEQ	State Program	6	88-0691	06-17-19
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-19
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-19
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-19
Kansas	NELAP	7	E-10375	10-31-18
Louisiana	NELAP	6	30612	06-30-19
Maine	State Program	1	CA0004	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-19
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-19
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
US Fish & Wildlife	Federal		LE148388-0	07-31-19
USDA	Federal		P330-18-00239	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-19
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

Method Summary

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

TestAmerica Job ID: 320-42344-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC
PFAS Prep	Preparation, Direct Inject PFAS	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: 320-42344-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-42344-1	173916	Water	08/15/18 11:22	08/21/18 10:10
320-42344-2	176044.4	Water	08/15/18 12:41	08/21/18 10:10
320-42344-3	176044.5	Water	08/15/18 13:04	08/21/18 10:10
320-42344-4	176435	Water	08/15/18 14:38	08/21/18 10:10
320-42344-5	579645	Water	08/14/18 13:30	08/21/18 10:10
320-42344-6	120332	Water	08/17/18 11:25	08/21/18 10:10
320-42344-7	483541	Water	08/16/18 14:20	08/21/18 10:10
320-42344-8	173002	Water	08/16/18 10:34	08/21/18 10:10
320-42344-9	391247	Water	08/16/18 10:14	08/21/18 10:10
320-42344-10	173908	Water	08/16/18 14:53	08/21/18 10:10
320-42344-11	120472	Water	08/16/18 12:13	08/21/18 10:10
320-42344-12	521809	Water	08/16/18 13:30	08/21/18 10:10

CHAIN-OF-CUSTODY RECORD

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

Laboratory Test America
Attn: D. Alltuck

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

Quote No:

J-Flags: [X] Yes [ ] No

Analytical Methods (include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	PFAS x6	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
173916		1122	8/15/18	X	2	Groundwaters
~~176044~~		~~1222~~	~~8/15/18~~	~~X~~	~~2~~	
176044.4		1241	8/15/18	X	2	
176044.5		1304	8/15/18	X	2	
176435		1438	8/15/18	X	2	
579645		1330	8/14/18	X	2	
120332		1125	8/17/18	X	2	
483541		1420	8/16/18	X	2	
173002		1034	8/16/18	X	2	
391247		1014	8/16/18	X	2	

320-42344 Chain of Custody

Project Information	
Number:	20060-002
Name:	FAI
Contact:	MDN
Ongoing Project?	Yes [X] No [ ]
Sampler:	ARm

Sample Receipt	
Total No. of Containers:	1
COC Seals/Intact?	Y/N/NA
Received:	Good Cond./Cold
Temp:	5.6°C
Delivery Method:	Gold Streak

Reliquished By: 1.	Reliquished By: 2.	Reliquished By: 3.
Signature: Time: 1715	Signature: Time:	Signature: Time:
Printed Name: Amanda Smith Date: 8/17/18	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 1010	Signature: Time:	Signature: Time:
Printed Name: C. Alltuck Date: 8/21/18	Printed Name: Date:	Printed Name: Date:
Company: TA Spokane	Company:	Company:

Notes:

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

5.6°C

No. 35600

9/6/2018

CHAIN-OF-CUSTODY RECORD

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

Laboratory Test America
Attn: D. Altweger

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

Analytical Methods (include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	PFAS x6	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
173908		1453	8/16/18	X	2	GW
120472		1213	8/16/18	X	2	1
521809		1330	8/16/18	X	2	1

Project Information		Sample Receipt	
Number:		Total No. of Containers:	
Name:		COC Seals/Intact? Y/N/NA	
Contact:	See Page 1	Received Good Cond./Cold	
Ongoing Project?	Yes [ ] No [ ]	Temp:	
Sampler:		Delivery Method:	

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 4:15	Signature: Time:	Signature: Time:
Printed Name: Amanda Smith Date: 8/20/18	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson	Company:	Company:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: Time: 10:10	Signature: Time:	Signature: Time:
Printed Name: C. Hytrek Date: 8-21-18	Printed Name: Date:	Printed Name: Date:
Company: Alaska	Company:	Company:

Notes:

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

5.6°C

No. 35601

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-42344-1

Login Number: 42344
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
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.	False	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:

September 8, 2018

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

September 6, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-42344-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-42344-1

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:

The sample cooler was recorded at 5.6° C upon receipt at the laboratory.

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

   ☒ Yes ☐ No Comments:

Analysis of PFAS compounds 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 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 are 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 5.6° C.

The case narrative notes there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) with preparation batch 320-241948. It also notes several samples were observed to have a brown color and sediment in the bottom.

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/or 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:

PFAS compounds are not volatile; 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:

Due to pump failures and sampling technique needed for sample *120332* we consider the results estimated, flagged with a "J" in the analytical table.

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: 320-42568-1
Client Project/Site: FAI
Revision: 1

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

Attn: Marcy Nadel

Authorized for release by:
9/10/2018 3:43:11 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: 320-42568-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-42568-1

Receipt
The samples were received on 8/28/2018 1:09 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.7º 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 were observed to be a light orange color, with some dark orange residue on the bottom of the sample containers:120774 (320-42568-1), 120874 (320-42568-2), 153699 (320-42568-3), 173860 (320-42568-5), 151637 (320-42568-6) and 136891 (320-42568-7).

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-243729.

Method(s) PFAS Prep: The samples are brown in color and have brown sediment at the bottom of the containers: 151637 (320-42568-6) and 136891 (320-42568-7).

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-243730.

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-243916.

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: 320-42568-1

Client Sample ID: 120774 — Lab Sample ID: 320-42568-1

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)	6.0		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)	3.1		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 120874 — Lab Sample ID: 320-42568-2

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)	6.1		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)	3.0		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 153699 — Lab Sample ID: 320-42568-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	42		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	43		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)	2.7		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: 152617 — Lab Sample ID: 320-42568-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	73		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)	5.8		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	7.4		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	24		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 173860 — Lab Sample ID: 320-42568-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	53		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: 173860 (Continued) — Lab Sample ID: 320-42568-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	43		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	6.0		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)	6.7		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 151637 — Lab Sample ID: 320-42568-6

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)	3.9		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
Perfluorooctanesulfonic acid (PFOS)	6.6		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 136891 — Lab Sample ID: 320-42568-7

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)	44		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)	3.0		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	8.0		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: 320-42568-1

Client Sample ID: 120774
Date Collected: 08/21/18 10:09
Date Received: 08/28/18 13:09

Lab Sample ID: 320-42568-1
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**1.4**	**J**	2.0	0.92	ng/L		09/04/18 13:13	09/06/18 12:48	1
Perfluorohexanesulfonic acid (PFHxS)	**6.0**		2.0	0.87	ng/L		09/04/18 13:13	09/06/18 12:48	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/04/18 13:13	09/06/18 12:48	1
Perfluorooctanoic acid (PFOA)	**2.1**		2.0	0.75	ng/L		09/04/18 13:13	09/06/18 12:48	1
Perfluorooctanesulfonic acid (PFOS)	**3.1**		2.0	1.3	ng/L		09/04/18 13:13	09/06/18 12:48	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/04/18 13:13	09/06/18 12:48	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*105*		*25 - 150*	*09/04/18 13:13*	*09/06/18 12:48*	*1*
13C4-PFHpA	*107*		*25 - 150*	*09/04/18 13:13*	*09/06/18 12:48*	*1*
13C4 PFOA	*121*		*25 - 150*	*09/04/18 13:13*	*09/06/18 12:48*	*1*
13C4 PFOS	*110*		*25 - 150*	*09/04/18 13:13*	*09/06/18 12:48*	*1*
13C5 PFNA	*118*		*25 - 150*	*09/04/18 13:13*	*09/06/18 12:48*	*1*

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

TestAmerica Job ID: 320-42568-1

Client Sample ID: 120874
Date Collected: 08/21/18 09:59
Date Received: 08/28/18 13:09

Lab Sample ID: 320-42568-2
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**1.4**	**J**	2.0	0.92	ng/L		09/04/18 13:13	09/06/18 12:30	1
Perfluorohexanesulfonic acid (PFHxS)	**6.1**		2.0	0.87	ng/L		09/04/18 13:13	09/06/18 12:30	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/04/18 13:13	09/06/18 12:30	1
Perfluorooctanoic acid (PFOA)	**2.0**		2.0	0.75	ng/L		09/04/18 13:13	09/06/18 12:30	1
Perfluorooctanesulfonic acid (PFOS)	**3.0**		2.0	1.3	ng/L		09/04/18 13:13	09/06/18 12:30	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/04/18 13:13	09/06/18 12:30	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*104*		*25 - 150*	*09/04/18 13:13*	*09/06/18 12:30*	*1*
13C4-PFHpA	*106*		*25 - 150*	*09/04/18 13:13*	*09/06/18 12:30*	*1*
13C4 PFOA	*115*		*25 - 150*	*09/04/18 13:13*	*09/06/18 12:30*	*1*
13C4 PFOS	*108*		*25 - 150*	*09/04/18 13:13*	*09/06/18 12:30*	*1*
13C5 PFNA	*110*		*25 - 150*	*09/04/18 13:13*	*09/06/18 12:30*	*1*

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

TestAmerica Job ID: 320-42568-1

Client Sample ID: 153699
Date Collected: 08/21/18 11:47
Date Received: 08/28/18 13:09

Lab Sample ID: 320-42568-3
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**42**		2.0	0.92	ng/L		09/05/18 12:29	09/07/18 01:02	1
Perfluorohexanesulfonic acid (PFHxS)	**43**		2.0	0.87	ng/L		09/05/18 12:29	09/07/18 01:02	1
Perfluoroheptanoic acid (PFHpA)	**5.4**		2.0	0.80	ng/L		09/05/18 12:29	09/07/18 01:02	1
Perfluorooctanoic acid (PFOA)	**2.7**		2.0	0.75	ng/L		09/05/18 12:29	09/07/18 01:02	1
Perfluorooctanesulfonic acid (PFOS)	**5.4**		2.0	1.3	ng/L		09/05/18 12:29	09/07/18 01:02	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/05/18 12:29	09/07/18 01:02	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*114*		*25 - 150*	*09/05/18 12:29*	*09/07/18 01:02*	*1*
13C4-PFHpA	*116*		*25 - 150*	*09/05/18 12:29*	*09/07/18 01:02*	*1*
13C4 PFOA	*138*		*25 - 150*	*09/05/18 12:29*	*09/07/18 01:02*	*1*
13C4 PFOS	*121*		*25 - 150*	*09/05/18 12:29*	*09/07/18 01:02*	*1*
13C5 PFNA	*127*		*25 - 150*	*09/05/18 12:29*	*09/07/18 01:02*	*1*

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

TestAmerica Job ID: 320-42568-1

Client Sample ID: 152617
Date Collected: 08/21/18 12:23
Date Received: 08/28/18 13:09

Lab Sample ID: 320-42568-4
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**73**		2.0	0.92	ng/L		09/04/18 13:07	09/05/18 21:12	1
Perfluorohexanesulfonic acid (PFHxS)	**21**		2.0	0.87	ng/L		09/04/18 13:07	09/05/18 21:12	1
Perfluoroheptanoic acid (PFHpA)	**5.8**		2.0	0.80	ng/L		09/04/18 13:07	09/05/18 21:12	1
Perfluorooctanoic acid (PFOA)	**7.4**		2.0	0.75	ng/L		09/04/18 13:07	09/05/18 21:12	1
Perfluorooctanesulfonic acid (PFOS)	**24**		2.0	1.3	ng/L		09/04/18 13:07	09/05/18 21:12	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/04/18 13:07	09/05/18 21:12	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*102*		*25 - 150*	*09/04/18 13:07*	*09/05/18 21:12*	*1*
13C4-PFHpA	*111*		*25 - 150*	*09/04/18 13:07*	*09/05/18 21:12*	*1*
13C4 PFOA	*119*		*25 - 150*	*09/04/18 13:07*	*09/05/18 21:12*	*1*
13C4 PFOS	*108*		*25 - 150*	*09/04/18 13:07*	*09/05/18 21:12*	*1*
13C5 PFNA	*118*		*25 - 150*	*09/04/18 13:07*	*09/05/18 21:12*	*1*

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

TestAmerica Job ID: 320-42568-1

Client Sample ID: 173860
Date Collected: 08/23/18 17:56
Date Received: 08/28/18 13:09

Lab Sample ID: 320-42568-5
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	53		2.0	0.92	ng/L		09/04/18 13:13	09/06/18 12:11	1
Perfluorohexanesulfonic acid (PFHxS)	43		2.0	0.87	ng/L		09/04/18 13:13	09/06/18 12:11	1
Perfluoroheptanoic acid (PFHpA)	6.0		2.0	0.80	ng/L		09/04/18 13:13	09/06/18 12:11	1
Perfluorooctanoic acid (PFOA)	3.4		2.0	0.75	ng/L		09/04/18 13:13	09/06/18 12:11	1
Perfluorooctanesulfonic acid (PFOS)	6.7		2.0	1.3	ng/L		09/04/18 13:13	09/06/18 12:11	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/04/18 13:13	09/06/18 12:11	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*103*		*25 - 150*	*09/04/18 13:13*	*09/06/18 12:11*	*1*
13C4-PFHpA	*101*		*25 - 150*	*09/04/18 13:13*	*09/06/18 12:11*	*1*
13C4 PFOA	*119*		*25 - 150*	*09/04/18 13:13*	*09/06/18 12:11*	*1*
13C4 PFOS	*112*		*25 - 150*	*09/04/18 13:13*	*09/06/18 12:11*	*1*
13C5 PFNA	*115*		*25 - 150*	*09/04/18 13:13*	*09/06/18 12:11*	*1*

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

TestAmerica Job ID: 320-42568-1

Client Sample ID: 151637
Date Collected: 08/27/18 14:57
Date Received: 08/28/18 13:09

Lab Sample ID: 320-42568-6
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**1.8**	**J**	2.0	0.92	ng/L		09/04/18 13:07	09/05/18 21:31	1
Perfluorohexanesulfonic acid (PFHxS)	**3.9**		2.0	0.87	ng/L		09/04/18 13:07	09/05/18 21:31	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/04/18 13:07	09/05/18 21:31	1
Perfluorooctanoic acid (PFOA)	**1.0**	**J**	2.0	0.75	ng/L		09/04/18 13:07	09/05/18 21:31	1
Perfluorooctanesulfonic acid (PFOS)	**6.6**		2.0	1.3	ng/L		09/04/18 13:07	09/05/18 21:31	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/04/18 13:07	09/05/18 21:31	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*106*		*25 - 150*	*09/04/18 13:07*	*09/05/18 21:31*	*1*
13C4-PFHpA	*114*		*25 - 150*	*09/04/18 13:07*	*09/05/18 21:31*	*1*
13C4 PFOA	*131*		*25 - 150*	*09/04/18 13:07*	*09/05/18 21:31*	*1*
13C4 PFOS	*106*		*25 - 150*	*09/04/18 13:07*	*09/05/18 21:31*	*1*
13C5 PFNA	*127*		*25 - 150*	*09/04/18 13:07*	*09/05/18 21:31*	*1*

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

TestAmerica Job ID: 320-42568-1

Client Sample ID: 136891
Date Collected: 08/27/18 13:57
Date Received: 08/28/18 13:09

Lab Sample ID: 320-42568-7
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**15**		2.0	0.92	ng/L		09/04/18 13:07	09/05/18 21:49	1
Perfluorohexanesulfonic acid (PFHxS)	**44**		2.0	0.87	ng/L		09/04/18 13:07	09/05/18 21:49	1
Perfluoroheptanoic acid (PFHpA)	**3.7**		2.0	0.80	ng/L		09/04/18 13:07	09/05/18 21:49	1
Perfluorooctanoic acid (PFOA)	**3.0**		2.0	0.75	ng/L		09/04/18 13:07	09/05/18 21:49	1
Perfluorooctanesulfonic acid (PFOS)	**8.0**		2.0	1.3	ng/L		09/04/18 13:07	09/05/18 21:49	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/04/18 13:07	09/05/18 21:49	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*102*		*25 - 150*	*09/04/18 13:07*	*09/05/18 21:49*	*1*
13C4-PFHpA	*111*		*25 - 150*	*09/04/18 13:07*	*09/05/18 21:49*	*1*
13C4 PFOA	*123*		*25 - 150*	*09/04/18 13:07*	*09/05/18 21:49*	*1*
13C4 PFOS	*107*		*25 - 150*	*09/04/18 13:07*	*09/05/18 21:49*	*1*
13C5 PFNA	*122*		*25 - 150*	*09/04/18 13:07*	*09/05/18 21:49*	*1*

Isotope Dilution Summary

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

TestAmerica Job ID: 320-42568-1

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)
320-42568-1	120774	105	107	121	110	118
320-42568-2	120874	104	106	115	108	110
320-42568-3	153699	114	116	138	121	127
320-42568-4	152617	102	111	119	108	118
320-42568-5	173860	103	101	119	112	115
320-42568-6	151637	106	114	131	106	127
320-42568-7	136891	102	111	123	107	122
LCS 320-243729/2-A	Lab Control Sample	98	117	118	104	121
LCS 320-243730/2-A	Lab Control Sample	105	105	118	113	128
LCS 320-243916/2-A	Lab Control Sample	121	120	125	124	126
LCSD 320-243729/3-A	Lab Control Sample Dup	100	114	119	108	117
LCSD 320-243730/3-A	Lab Control Sample Dup	107	110	121	114	123
LCSD 320-243916/3-A	Lab Control Sample Dup	109	115	129	118	120
MB 320-243729/1-A	Method Blank	101	115	114	106	118
MB 320-243730/1-A	Method Blank	101	98	117	112	116
MB 320-243916/1-A	Method Blank	122	124	128	122	126

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 320-243729/1-A
Matrix: Water
Analysis Batch: 243992

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 243729

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/04/18 13:05	09/05/18 17:14	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/04/18 13:05	09/05/18 17:14	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/04/18 13:05	09/05/18 17:14	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/04/18 13:05	09/05/18 17:14	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/04/18 13:05	09/05/18 17:14	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/04/18 13:05	09/05/18 17:14	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*101*		*25 - 150*	*09/04/18 13:05*	*09/05/18 17:14*	*1*
13C4-PFHpA	*115*		*25 - 150*	*09/04/18 13:05*	*09/05/18 17:14*	*1*
13C4 PFOA	*114*		*25 - 150*	*09/04/18 13:05*	*09/05/18 17:14*	*1*
13C4 PFOS	*106*		*25 - 150*	*09/04/18 13:05*	*09/05/18 17:14*	*1*
13C5 PFNA	*118*		*25 - 150*	*09/04/18 13:05*	*09/05/18 17:14*	*1*

Lab Sample ID: LCS 320-243729/2-A
Matrix: Water
Analysis Batch: 243992

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 243729

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	22.4		ng/L		126	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	22.6		ng/L		124	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	23.1		ng/L		115	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	23.4		ng/L		117	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	20.9		ng/L		112	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	23.3		ng/L		116	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*98*		*25 - 150*
13C4-PFHpA	*117*		*25 - 150*
13C4 PFOA	*118*		*25 - 150*
13C4 PFOS	*104*		*25 - 150*
13C5 PFNA	*121*		*25 - 150*

Lab Sample ID: LCSD 320-243729/3-A
Matrix: Water
Analysis Batch: 243992

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 243729

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	21.3		ng/L		120	72 - 151	5	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	21.9		ng/L		120	73 - 157	3	30
Perfluoroheptanoic acid (PFHpA)			20.0	23.3		ng/L		116	71 - 138	1	30
Perfluorooctanoic acid (PFOA)			20.0	23.7		ng/L		118	70 - 140	1	30
Perfluorooctanesulfonic acid (PFOS)			18.6	20.1		ng/L		108	69 - 144	4	30
Perfluorononanoic acid (PFNA)			20.0	24.7		ng/L		124	73 - 147	6	30

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	100		25 - 150
13C4-PFHpA	114		25 - 150
13C4 PFOA	119		25 - 150
13C4 PFOS	108		25 - 150
13C5 PFNA	117		25 - 150

Lab Sample ID: MB 320-243730/1-A
Matrix: Water
Analysis Batch: 244213

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 243730

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/04/18 13:13	09/06/18 07:36	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/04/18 13:13	09/06/18 07:36	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/04/18 13:13	09/06/18 07:36	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/04/18 13:13	09/06/18 07:36	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/04/18 13:13	09/06/18 07:36	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/04/18 13:13	09/06/18 07:36	1

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	101		25 - 150	09/04/18 13:13	09/06/18 07:36	1
13C4-PFHpA	98		25 - 150	09/04/18 13:13	09/06/18 07:36	1
13C4 PFOA	117		25 - 150	09/04/18 13:13	09/06/18 07:36	1
13C4 PFOS	112		25 - 150	09/04/18 13:13	09/06/18 07:36	1
13C5 PFNA	116		25 - 150	09/04/18 13:13	09/06/18 07:36	1

Lab Sample ID: LCS 320-243730/2-A
Matrix: Water
Analysis Batch: 244213

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 243730

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	21.4		ng/L		118	73 - 157
Perfluoroheptanoic acid (PFHpA)	20.0	23.4		ng/L		117	71 - 138
Perfluorooctanoic acid (PFOA)	20.0	24.7		ng/L		123	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	105		25 - 150
13C4-PFHpA	105		25 - 150
13C4 PFOA	118		25 - 150
13C4 PFOS	113		25 - 150
13C5 PFNA	128		25 - 150

Lab Sample ID: LCSD 320-243730/3-A
Matrix: Water
Analysis Batch: 244213

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 243730

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)	17.7	21.0		ng/L		119	72 - 151	4	30
Perfluorohexanesulfonic acid (PFHxS)	18.2	22.1		ng/L		121	73 - 157	3	30

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

Lab Sample ID: LCSD 320-243730/3-A
Matrix: Water
Analysis Batch: 244213

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 243730

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluoroheptanoic acid (PFHpA)			20.0	22.5		ng/L		113	71 - 138	4	30
Perfluorooctanoic acid (PFOA)			20.0	24.4		ng/L		122	70 - 140	1	30
Perfluorooctanesulfonic acid (PFOS)			18.6	20.7		ng/L		111	69 - 144	1	30
Perfluorononanoic acid (PFNA)			20.0	23.3		ng/L		117	73 - 147	1	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
18O2 PFHxS	*107*		*25 - 150*
13C4-PFHpA	*110*		*25 - 150*
13C4 PFOA	*121*		*25 - 150*
13C4 PFOS	*114*		*25 - 150*
13C5 PFNA	*123*		*25 - 150*

Lab Sample ID: MB 320-243916/1-A
Matrix: Water
Analysis Batch: 244261

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 243916

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/05/18 12:28	09/07/18 00:07	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/05/18 12:28	09/07/18 00:07	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/05/18 12:28	09/07/18 00:07	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/05/18 12:28	09/07/18 00:07	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/05/18 12:28	09/07/18 00:07	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/05/18 12:28	09/07/18 00:07	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*122*		*25 - 150*	*09/05/18 12:28*	*09/07/18 00:07*	*1*
13C4-PFHpA	*124*		*25 - 150*	*09/05/18 12:28*	*09/07/18 00:07*	*1*
13C4 PFOA	*128*		*25 - 150*	*09/05/18 12:28*	*09/07/18 00:07*	*1*
13C4 PFOS	*122*		*25 - 150*	*09/05/18 12:28*	*09/07/18 00:07*	*1*
13C5 PFNA	*126*		*25 - 150*	*09/05/18 12:28*	*09/07/18 00:07*	*1*

Lab Sample ID: LCS 320-243916/2-A
Matrix: Water
Analysis Batch: 244261

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 243916

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorobutanesulfonic acid (PFBS)			17.7	17.5		ng/L		99	72 - 151
Perfluorohexanesulfonic acid (PFHxS)			18.2	18.2		ng/L		100	73 - 157
Perfluoroheptanoic acid (PFHpA)			20.0	21.0		ng/L		105	71 - 138
Perfluorooctanoic acid (PFOA)			20.0	21.4		ng/L		107	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	*121*		*25 - 150*
13C4-PFHpA	*120*		*25 - 150*

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

Lab Sample ID: LCS 320-243916/2-A
Matrix: Water
Analysis Batch: 244261

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 243916

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
13C4 PFOA	125		25 - 150
13C4 PFOS	124		25 - 150
13C5 PFNA	126		25 - 150

Lab Sample ID: LCSD 320-243916/3-A
Matrix: Water
Analysis Batch: 244261

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 243916

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	18.6		ng/L		105	72 - 151	6	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	19.1		ng/L		105	73 - 157	5	30
Perfluoroheptanoic acid (PFHpA)			20.0	20.0		ng/L		100	71 - 138	5	30
Perfluorooctanoic acid (PFOA)			20.0	20.3		ng/L		102	70 - 140	5	30
Perfluorooctanesulfonic acid (PFOS)			18.6	17.7		ng/L		95	69 - 144	3	30
Perfluorononanoic acid (PFNA)			20.0	20.6		ng/L		103	73 - 147	4	30

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	109		25 - 150
13C4-PFHpA	115		25 - 150
13C4 PFOA	129		25 - 150
13C4 PFOS	118		25 - 150
13C5 PFNA	120		25 - 150

LCMS

Prep Batch: 243729

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42568-4	152617	Total/NA	Water	PFAS Prep	
320-42568-6	151637	Total/NA	Water	PFAS Prep	
320-42568-7	136891	Total/NA	Water	PFAS Prep	
MB 320-243729/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-243729/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-243729/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Prep Batch: 243730

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42568-1	120774	Total/NA	Water	PFAS Prep	
320-42568-2	120874	Total/NA	Water	PFAS Prep	
320-42568-5	173860	Total/NA	Water	PFAS Prep	
MB 320-243730/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-243730/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-243730/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Prep Batch: 243916

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42568-3	153699	Total/NA	Water	PFAS Prep	
MB 320-243916/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-243916/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-243916/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 243992

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42568-4	152617	Total/NA	Water	WS-LC-0025 At1	243729
320-42568-6	151637	Total/NA	Water	WS-LC-0025 At1	243729
320-42568-7	136891	Total/NA	Water	WS-LC-0025 At1	243729
MB 320-243729/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	243729
LCS 320-243729/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	243729
LCSD 320-243729/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	243729

Analysis Batch: 244213

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42568-1	120774	Total/NA	Water	WS-LC-0025 At1	243730
320-42568-2	120874	Total/NA	Water	WS-LC-0025 At1	243730
320-42568-5	173860	Total/NA	Water	WS-LC-0025 At1	243730
MB 320-243730/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	243730
LCS 320-243730/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	243730
LCSD 320-243730/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	243730

LCMS (Continued)

Analysis Batch: 244261

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42568-3	153699	Total/NA	Water	WS-LC-0025 At1	243916
MB 320-243916/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	243916
LCS 320-243916/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	243916
LCSD 320-243916/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	243916

Lab Chronicle

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

TestAmerica Job ID: 320-42568-1

Client Sample ID: 120774
Date Collected: 08/21/18 10:09
Date Received: 08/28/18 13:09

Lab Sample ID: 320-42568-1
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	243730	09/04/18 13:13	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			244213	09/06/18 12:48	D1R	TAL SAC

Client Sample ID: 120874
Date Collected: 08/21/18 09:59
Date Received: 08/28/18 13:09

Lab Sample ID: 320-42568-2
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	243730	09/04/18 13:13	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			244213	09/06/18 12:30	D1R	TAL SAC

Client Sample ID: 153699
Date Collected: 08/21/18 11:47
Date Received: 08/28/18 13:09

Lab Sample ID: 320-42568-3
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	243916	09/05/18 12:29	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			244261	09/07/18 01:02	S1M	TAL SAC

Client Sample ID: 152617
Date Collected: 08/21/18 12:23
Date Received: 08/28/18 13:09

Lab Sample ID: 320-42568-4
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	243729	09/04/18 13:07	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			243992	09/05/18 21:12	S1M	TAL SAC

Client Sample ID: 173860
Date Collected: 08/23/18 17:56
Date Received: 08/28/18 13:09

Lab Sample ID: 320-42568-5
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	243730	09/04/18 13:13	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			244213	09/06/18 12:11	D1R	TAL SAC

Client Sample ID: 151637
Date Collected: 08/27/18 14:57
Date Received: 08/28/18 13:09

Lab Sample ID: 320-42568-6
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	243729	09/04/18 13:07	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			243992	09/05/18 21:31	S1M	TAL SAC

Lab Chronicle

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

TestAmerica Job ID: 320-42568-1

Client Sample ID: 136891
Date Collected: 08/27/18 13:57
Date Received: 08/28/18 13:09

Lab Sample ID: 320-42568-7
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	243729	09/04/18 13:07	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			243992	09/05/18 21:49	S1M	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: 320-42568-1

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
ANAB	DoD ELAP		L2468	01-20-21
Arizona	State Program	9	AZ0708	08-11-19
Arkansas DEQ	State Program	6	88-0691	06-17-19
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-19
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-19
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-19
Kansas	NELAP	7	E-10375	10-31-18
Louisiana	NELAP	6	30612	06-30-19
Maine	State Program	1	CA0004	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-19
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-19
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
US Fish & Wildlife	Federal		LE148388-0	07-31-19
USDA	Federal		P330-18-00239	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-19
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

Method Summary

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

TestAmerica Job ID: 320-42568-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC
PFAS Prep	Preparation, Direct Inject PFAS	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: 320-42568-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-42568-1	120774	Water	08/21/18 10:09	08/28/18 13:09
320-42568-2	120874	Water	08/21/18 09:59	08/28/18 13:09
320-42568-3	153699	Water	08/21/18 11:47	08/28/18 13:09
320-42568-4	152617	Water	08/21/18 12:23	08/28/18 13:09
320-42568-5	173860	Water	08/23/18 17:56	08/28/18 13:09
320-42568-6	151637	Water	08/27/18 14:57	08/28/18 13:09
320-42568-7	136891	Water	08/27/18 13:57	08/28/18 13:09

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

CHAIN-OF-CUSTODY RECORD

Laboratory Test America
Attn: D. Allucker

Analytical Methods (include preservative if used)

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

Sample Identity	Lab No.	Time	Date Sampled	PFAS x6	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
120774		1009	8/21/18	X	2	Ground water
120874		0959	8/21/18	X	2	
153699		1147	8/21/18	X	2	
152617		1223	8/21/18	X	2	
173860		1756	8/23/18	X	2	
151673		1457	8/27/18	X	2	
136891		1357	8/27/18	X	2	

320-42568 Chain of Custody

Project Information	Sample Receipt
Number: 20060-002	Total No. of Containers:
Name: FAI	COC Seals/Intact? Y/N/NA
Contact: MDN	Received Good Cond./Cold
Ongoing Project? Yes [X] No [ ]	Temp:
Sampler: ADM, CAB	Delivery Method: Quickstrike

Notes:

Reliquished By: 1.	Reliquished By: 2.	Reliquished By: 3.
Signature: Craig Beebe Time: 1600	Signature: Time:	Signature: Time:
Printed Name: Craig Beebe Date: 8/27/18	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson, Inc.	Company:	Company:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: Time: 1309	Signature: Time:	Signature: Time:
Printed Name: Edric Chung Date: 8/28/18	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

5.7C

No. 35604

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-42568-1

Login Number: 42568
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.	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:

Marcy Nadel

Title:

Geologist

Date:

September 14, 2018

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

September 10, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-42568-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-42568-1

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 PFAS. 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:

Sample 151637 is listed on the COC incorrectly as sample 151673.

   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 PFAS 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:

Sample 151637 is listed on the COC incorrectly. The laboratory revised the sample name upon request.

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 5.7º C. It also notes some samples contained sediment, orange residue, or were a light orange color.

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

c. Were all corrective actions documented?

○ Yes ◉ No Comments:

N/A; 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 ADEC action level for drinking water 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:

PFAS 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:

Yes, a field duplicate was submitted with this work order.

ii. Submitted blind to lab?

◉ Yes ○ No Comments:

Field duplicate pair 120774 / 120874 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 RPD, where calculable for detected values, was less than 30% for each analyte. The RPDs were each less than 5%.

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; 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 with this work order.

ii. If above LOQ, what samples are affected?

Comments:

None; see above.

iii. Data quality or usability affected?

Comments:

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

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: 320-43141-1
Client Project/Site: FAI

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

Attn: Marcy Nadel

Authorized for release by:
9/24/2018 10:41:27 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: 320-43141-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-43141-1

Receipt
The samples were received on 9/13/2018 3:30 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 7.1° 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 320-246215.

Method(s) PFAS Prep: The samples have brown sediment at the bottom of the containers and are a slight brown color: 407372 (320-43141-1) and 550116 (320-43141-2).

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: 320-43141-1

Client Sample ID: 407372 — Lab Sample ID: 320-43141-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	1.0	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	0.85	J	2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 550116 — Lab Sample ID: 320-43141-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	7.9		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	36		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)	5.1		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	13		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	8.4		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample Results

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

TestAmerica Job ID: 320-43141-1

Client Sample ID: 407372
Date Collected: 09/07/18 11:12
Date Received: 09/13/18 15:30

Lab Sample ID: 320-43141-1
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		09/18/18 11:20	09/20/18 01:31	1
Perfluorohexanesulfonic acid (PFHxS)	**1.0**	**J**	2.0	0.87	ng/L		09/18/18 11:20	09/20/18 01:31	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/18/18 11:20	09/20/18 01:31	1
Perfluorooctanoic acid (PFOA)	**0.85**	**J**	2.0	0.75	ng/L		09/18/18 11:20	09/20/18 01:31	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/18/18 11:20	09/20/18 01:31	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/18/18 11:20	09/20/18 01:31	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*98*		*25 - 150*	*09/18/18 11:20*	*09/20/18 01:31*	*1*
13C4-PFHpA	*97*		*25 - 150*	*09/18/18 11:20*	*09/20/18 01:31*	*1*
13C4 PFOA	*92*		*25 - 150*	*09/18/18 11:20*	*09/20/18 01:31*	*1*
13C4 PFOS	*92*		*25 - 150*	*09/18/18 11:20*	*09/20/18 01:31*	*1*
13C5 PFNA	*83*		*25 - 150*	*09/18/18 11:20*	*09/20/18 01:31*	*1*

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

TestAmerica Job ID: 320-43141-1

Client Sample ID: 550116
Date Collected: 08/29/18 12:28
Date Received: 09/13/18 15:30

Lab Sample ID: 320-43141-2
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	7.9		2.0	0.92	ng/L		09/18/18 11:20	09/20/18 01:50	1
Perfluorohexanesulfonic acid (PFHxS)	36		2.0	0.87	ng/L		09/18/18 11:20	09/20/18 01:50	1
Perfluoroheptanoic acid (PFHpA)	4.5		2.0	0.80	ng/L		09/18/18 11:20	09/20/18 01:50	1
Perfluorooctanoic acid (PFOA)	5.1		2.0	0.75	ng/L		09/18/18 11:20	09/20/18 01:50	1
Perfluorooctanesulfonic acid (PFOS)	13		2.0	1.3	ng/L		09/18/18 11:20	09/20/18 01:50	1
Perfluorononanoic acid (PFNA)	8.4		2.0	0.65	ng/L		09/18/18 11:20	09/20/18 01:50	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*100*		*25 - 150*	*09/18/18 11:20*	*09/20/18 01:50*	*1*
13C4-PFHpA	*92*		*25 - 150*	*09/18/18 11:20*	*09/20/18 01:50*	*1*
13C4 PFOA	*91*		*25 - 150*	*09/18/18 11:20*	*09/20/18 01:50*	*1*
13C4 PFOS	*93*		*25 - 150*	*09/18/18 11:20*	*09/20/18 01:50*	*1*
13C5 PFNA	*81*		*25 - 150*	*09/18/18 11:20*	*09/20/18 01:50*	*1*

Isotope Dilution Summary

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

TestAmerica Job ID: 320-43141-1

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)
320-43141-1	407372	98	97	92	92	83
320-43141-2	550116	100	92	91	93	81
LCS 320-246215/2-A	Lab Control Sample	95	89	85	92	77
LCSD 320-246215/3-A	Lab Control Sample Dup	100	96	88	100	82
MB 320-246215/1-A	Method Blank	103	95	94	100	85

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 320-246215/1-A
Matrix: Water
Analysis Batch: 246727

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 246215

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/18/18 11:20	09/20/18 00:18	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/18/18 11:20	09/20/18 00:18	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/18/18 11:20	09/20/18 00:18	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/18/18 11:20	09/20/18 00:18	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/18/18 11:20	09/20/18 00:18	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/18/18 11:20	09/20/18 00:18	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*103*		*25 - 150*	*09/18/18 11:20*	*09/20/18 00:18*	*1*
13C4-PFHpA	*95*		*25 - 150*	*09/18/18 11:20*	*09/20/18 00:18*	*1*
13C4 PFOA	*94*		*25 - 150*	*09/18/18 11:20*	*09/20/18 00:18*	*1*
13C4 PFOS	*100*		*25 - 150*	*09/18/18 11:20*	*09/20/18 00:18*	*1*
13C5 PFNA	*85*		*25 - 150*	*09/18/18 11:20*	*09/20/18 00:18*	*1*

Lab Sample ID: LCS 320-246215/2-A
Matrix: Water
Analysis Batch: 246727

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 246215

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	19.3		ng/L		109	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	19.6		ng/L		108	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	20.9		ng/L		105	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	20.0		ng/L		100	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	18.5		ng/L		99	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	21.6		ng/L		108	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*95*		*25 - 150*
13C4-PFHpA	*89*		*25 - 150*
13C4 PFOA	*85*		*25 - 150*
13C4 PFOS	*92*		*25 - 150*
13C5 PFNA	*77*		*25 - 150*

Lab Sample ID: LCSD 320-246215/3-A
Matrix: Water
Analysis Batch: 246727

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 246215

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	19.5		ng/L		111	72 - 151	1	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	19.3		ng/L		106	73 - 157	2	30
Perfluoroheptanoic acid (PFHpA)			20.0	20.9		ng/L		104	71 - 138	0	30
Perfluorooctanoic acid (PFOA)			20.0	21.5		ng/L		107	70 - 140	7	30
Perfluorooctanesulfonic acid (PFOS)			18.6	18.2		ng/L		98	69 - 144	1	30
Perfluorononanoic acid (PFNA)			20.0	20.9		ng/L		104	73 - 147	3	30

QC Sample Results

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

TestAmerica Job ID: 320-43141-1

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	100		25 - 150
13C4-PFHpA	96		25 - 150
13C4 PFOA	88		25 - 150
13C4 PFOS	100		25 - 150
13C5 PFNA	82		25 - 150

QC Association Summary

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

TestAmerica Job ID: 320-43141-1

LCMS

Prep Batch: 246215

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-43141-1	407372	Total/NA	Water	PFAS Prep	
320-43141-2	550116	Total/NA	Water	PFAS Prep	
MB 320-246215/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-246215/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-246215/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 246727

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-43141-1	407372	Total/NA	Water	WS-LC-0025 At1	246215
320-43141-2	550116	Total/NA	Water	WS-LC-0025 At1	246215
MB 320-246215/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	246215
LCS 320-246215/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	246215
LCSD 320-246215/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	246215

Lab Chronicle

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

TestAmerica Job ID: 320-43141-1

Client Sample ID: 407372

Date Collected: 09/07/18 11:12
Date Received: 09/13/18 15:30

Lab Sample ID: 320-43141-1

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	246215	09/18/18 11:20	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			246727	09/20/18 01:31	S1M	TAL SAC

Client Sample ID: 550116

Date Collected: 08/29/18 12:28
Date Received: 09/13/18 15:30

Lab Sample ID: 320-43141-2

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	246215	09/18/18 11:20	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			246727	09/20/18 01:50	S1M	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: 320-43141-1

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
ANAB	DoD ELAP		L2468	01-20-21
Arizona	State Program	9	AZ0708	08-11-19
Arkansas DEQ	State Program	6	88-0691	06-17-19
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-19
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-19
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-19
Kansas	NELAP	7	E-10375	10-31-18
Louisiana	NELAP	6	30612	06-30-19
Maine	State Program	1	CA0004	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-19
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-19
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
US Fish & Wildlife	Federal		LE148388-0	07-31-19
USDA	Federal		P330-18-00239	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-19
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

Method Summary

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

TestAmerica Job ID: 320-43141-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC
PFAS Prep	Preparation, Direct Inject PFAS	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: 320-43141-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-43141-1	407372	Water	09/07/18 11:12	09/13/18 15:30
320-43141-2	550116	Water	08/29/18 12:28	09/13/18 15:30

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

3355 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	UCMR PFAS x6						Total Number of Containers	Remarks/Matrix
407372		1112	9/7/18		✓	✓						2	Groundwater
550116		1228	8/29/18		✓	✓						2	"

320-43141 Chain of Custody

Project Information	Sample Receipt
Project Number: 31-1-20060-007	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: CTC/CAB	(attach shipping bill, if any)

Instructions
Requested Turnaround Time: Standard
Special Instructions:

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 4:30	Signature: Time:	Signature: Time:
Printed Name: Amanda Smith Date: 9/12/18	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 1530	Signature: Time:	Signature: Time:
Printed Name: Eric Chung Date: 9/13/18	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

T, I, C

No. 34798

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-43141-1

Login Number: 43141
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.	False	Refer to Job Narrative for details.
Cooler Temperature is recorded.	True	7.1
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").	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:

Marcy Nadel

Title:

Geologist

Date:

September 26, 2018

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

September 24, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-43141-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-43141-1

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 PFAS. 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:

The temperature blank was measured outside the acceptable temperature range of 0 °C to 6 °C upon receipt at the laboratory (7.1 °C).

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

   ◉ Yes ○ No Comments:

Due to the high chemical and biological stability of PFAS, it is unlikely the integrity of the project samples was adversely affected by the high cooler temperature. Analysis of PFAS does not require a preservative. In an e-mail dated August 3, 2015, the ADEC project manager noted that he had spoken with their chemist, who "agrees the high temperature probably would not affect the PFC results." PFAS are also know as PFCs.

   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 documentation notes the cooler temperature was outside the accepted range.

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 7.1º C.

The case narrative notes there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) with preparation batch 320-246215. It further notes the two samples contained sediment and were a slight brown color.

c. Were all corrective actions documented?

( ) Yes (•) No Comments:

N/A; 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 ADEC action level for drinking water 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:

PFAS 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 was not included in this work order. However, field duplicate samples are submitted at the appropriate frequency for the overall project.

ii. Submitted blind to lab?

○ Yes ◉ No Comments:

N/A; a field duplicate was not included.

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 included.

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; 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 with this work order.

ii. If above LOQ, what samples are affected?

Comments:

None; see above.

iii. Data quality or usability affected?

Comments:

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

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: 320-43820-1
Client Project/Site: FAI

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

Attn: Marcy Nadel

Authorized for release by:
10/15/2018 4:06:01 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.
E	Result exceeded calibration range.
H	Sample was prepped or analyzed beyond the specified holding time

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: 320-43820-1

Job ID: 320-43820-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-43820-1

Receipt
The samples were received on 10/3/2018 10:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.0º C.

LCMS
Method(s) WS-LC-0025 At1: Reanalysis of a dilution of the following sample was performed outside of the analytical holding time due to analyst error : 152251 (320-43820-1).

Method(s) WS-LC-0025 At1: The concentration of Perfluorooctanesulfonic acid (PFOS) associated with the following sample exceeded the instrument calibration range: 152251 (320-43820-1). The analyte has been qualified; however, the peak did not saturate the instrument detector. Historical data indicate that for the isotope dilution method, dilution and re-analysis will not produce significantly different results from those reported above the calibration range. The sample was analyzed at a dilution although outside the analytical holding time. Both sets of data are reported.

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 320-250333.

Method(s) PFAS Prep: The following samples are a yellow color prior to extraction: 152251 (320-43820-1) and 152480 (320-43820-2) .

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: 320-43820-1

Client Sample ID: 152251 — Lab Sample ID: 320-43820-1

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)	71		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)	13		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	390	E	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
Perfluorooctanesulfonic acid (PFOS) - DL	400	H	20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: 152480 — Lab Sample ID: 320-43820-2

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)	39		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)	4.5		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)	0.65	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: 320-43820-1

Client Sample ID: 152251
Date Collected: 09/14/18 14:05
Date Received: 10/03/18 10:00

Lab Sample ID: 320-43820-1
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		10/08/18 04:26	10/11/18 23:31	1
Perfluorohexanesulfonic acid (PFHxS)	71		2.0	0.87	ng/L		10/08/18 04:26	10/11/18 23:31	1
Perfluoroheptanoic acid (PFHpA)	13		2.0	0.80	ng/L		10/08/18 04:26	10/11/18 23:31	1
Perfluorooctanoic acid (PFOA)	13		2.0	0.75	ng/L		10/08/18 04:26	10/11/18 23:31	1
Perfluorooctanesulfonic acid (PFOS)	390	E	2.0	1.3	ng/L		10/08/18 04:26	10/11/18 23:31	1
Perfluorononanoic acid (PFNA)	1.9	J	2.0	0.65	ng/L		10/08/18 04:26	10/11/18 23:31	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*110*		*25 - 150*	*10/08/18 04:26*	*10/11/18 23:31*	*1*
13C4 PFHpA	*110*		*25 - 150*	*10/08/18 04:26*	*10/11/18 23:31*	*1*
13C4 PFOA	*123*		*25 - 150*	*10/08/18 04:26*	*10/11/18 23:31*	*1*
13C4 PFOS	*109*		*25 - 150*	*10/08/18 04:26*	*10/11/18 23:31*	*1*
13C5 PFNA	*120*		*25 - 150*	*10/08/18 04:26*	*10/11/18 23:31*	*1*

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	400	H	20	13	ng/L		10/08/18 04:26	10/14/18 14:54	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*107*		*25 - 150*	*10/08/18 04:26*	*10/14/18 14:54*	*10*

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

TestAmerica Job ID: 320-43820-1

Client Sample ID: 152480
Date Collected: 09/26/18 09:53
Date Received: 10/03/18 10:00

Lab Sample ID: 320-43820-2
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	15		2.0	0.92	ng/L		10/08/18 04:26	10/12/18 00:08	1
Perfluorohexanesulfonic acid (PFHxS)	39		2.0	0.87	ng/L		10/08/18 04:26	10/12/18 00:08	1
Perfluoroheptanoic acid (PFHpA)	4.7		2.0	0.80	ng/L		10/08/18 04:26	10/12/18 00:08	1
Perfluorooctanoic acid (PFOA)	4.5		2.0	0.75	ng/L		10/08/18 04:26	10/12/18 00:08	1
Perfluorooctanesulfonic acid (PFOS)	55		2.0	1.3	ng/L		10/08/18 04:26	10/12/18 00:08	1
Perfluorononanoic acid (PFNA)	0.65	J	2.0	0.65	ng/L		10/08/18 04:26	10/12/18 00:08	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*110*		*25 - 150*	*10/08/18 04:26*	*10/12/18 00:08*	*1*
13C4 PFHpA	*114*		*25 - 150*	*10/08/18 04:26*	*10/12/18 00:08*	*1*
13C4 PFOA	*127*		*25 - 150*	*10/08/18 04:26*	*10/12/18 00:08*	*1*
13C4 PFOS	*106*		*25 - 150*	*10/08/18 04:26*	*10/12/18 00:08*	*1*
13C5 PFNA	*121*		*25 - 150*	*10/08/18 04:26*	*10/12/18 00:08*	*1*

Isotope Dilution Summary

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

TestAmerica Job ID: 320-43820-1

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)
320-43820-1	152251	110	110	123	109	120
320-43820-1 - DL	152251				107	
320-43820-2	152480	110	114	127	106	121
LCS 320-250333/2-A	Lab Control Sample	108	117	117	105	110
LCSD 320-250333/3-A	Lab Control Sample Dup	111	115	123	108	121
MB 320-250333/1-A	Method Blank	111	119	120	109	119

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 320-250333/1-A
Matrix: Water
Analysis Batch: 251333

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 250333

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		10/05/18 11:54	10/11/18 17:25	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		10/05/18 11:54	10/11/18 17:25	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		10/05/18 11:54	10/11/18 17:25	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		10/05/18 11:54	10/11/18 17:25	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		10/05/18 11:54	10/11/18 17:25	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/05/18 11:54	10/11/18 17:25	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*111*		*25 - 150*	*10/05/18 11:54*	*10/11/18 17:25*	*1*
13C4 PFHpA	*119*		*25 - 150*	*10/05/18 11:54*	*10/11/18 17:25*	*1*
13C4 PFOA	*120*		*25 - 150*	*10/05/18 11:54*	*10/11/18 17:25*	*1*
13C4 PFOS	*109*		*25 - 150*	*10/05/18 11:54*	*10/11/18 17:25*	*1*
13C5 PFNA	*119*		*25 - 150*	*10/05/18 11:54*	*10/11/18 17:25*	*1*

Lab Sample ID: LCS 320-250333/2-A
Matrix: Water
Analysis Batch: 251333

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 250333

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	17.5		ng/L		99	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	17.1		ng/L		94	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	19.6		ng/L		98	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	19.2		ng/L		96	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	16.9		ng/L		91	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	17.9		ng/L		89	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*108*		*25 - 150*
13C4 PFHpA	*117*		*25 - 150*
13C4 PFOA	*117*		*25 - 150*
13C4 PFOS	*105*		*25 - 150*
13C5 PFNA	*110*		*25 - 150*

Lab Sample ID: LCSD 320-250333/3-A
Matrix: Water
Analysis Batch: 251333

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 250333

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	1	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	17.7		ng/L		97	73 - 157	4	30
Perfluoroheptanoic acid (PFHpA)			20.0	21.6		ng/L		108	71 - 138	10	30
Perfluorooctanoic acid (PFOA)			20.0	19.1		ng/L		95	70 - 140	0	30
Perfluorooctanesulfonic acid (PFOS)			18.6	17.7		ng/L		95	69 - 144	5	30
Perfluorononanoic acid (PFNA)			20.0	19.0		ng/L		95	73 - 147	6	30

QC Sample Results

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

TestAmerica Job ID: 320-43820-1

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	111		25 - 150
13C4 PFHpA	115		25 - 150
13C4 PFOA	123		25 - 150
13C4 PFOS	108		25 - 150
13C5 PFNA	121		25 - 150

QC Association Summary

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

TestAmerica Job ID: 320-43820-1

LCMS

Prep Batch: 250333

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-43820-1 - DL	152251	Total/NA	Water	PFAS Prep	
320-43820-1	152251	Total/NA	Water	PFAS Prep	
320-43820-2	152480	Total/NA	Water	PFAS Prep	
MB 320-250333/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-250333/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-250333/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 251333

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-43820-1	152251	Total/NA	Water	WS-LC-0025 At1	250333
320-43820-2	152480	Total/NA	Water	WS-LC-0025 At1	250333
MB 320-250333/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	250333
LCS 320-250333/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	250333
LCSD 320-250333/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	250333

Analysis Batch: 251696

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-43820-1 - DL	152251	Total/NA	Water	WS-LC-0025 At1	250333

Lab Chronicle

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

TestAmerica Job ID: 320-43820-1

Client Sample ID: 152251

Date Collected: 09/14/18 14:05
Date Received: 10/03/18 10:00

Lab Sample ID: 320-43820-1
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	250333	10/08/18 04:26	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			251333	10/11/18 23:31	ABH	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	250333	10/08/18 04:26	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			251696	10/14/18 14:54	S1M	TAL SAC

Client Sample ID: 152480

Date Collected: 09/26/18 09:53
Date Received: 10/03/18 10:00

Lab Sample ID: 320-43820-2
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	250333	10/08/18 04:26	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			251333	10/12/18 00:08	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: 320-43820-1

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
ANAB	DoD ELAP		L2468	01-20-21
Arizona	State Program	9	AZ0708	08-11-19
Arkansas DEQ	State Program	6	88-0691	06-17-19
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-19
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-19
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-19
Kansas	NELAP	7	E-10375	10-31-18 *
Louisiana	NELAP	6	30612	06-30-19
Maine	State Program	1	CA0004	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-19
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-19
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
US Fish & Wildlife	Federal		LE148388-0	07-31-19
USDA	Federal		P330-18-00239	01-17-21
USEPA UCMR	Federal	1	CA00044	12-31-20
Utah	NELAP	8	CA00044	02-28-19
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
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: 320-43820-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC
PFAS Prep	Preparation, Direct Inject PFAS	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: 320-43820-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-43820-1	152251	Water	09/14/18 14:05	10/03/18 10:00
320-43820-2	152480	Water	09/26/18 09:53	10/03/18 10:00

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	VOMF PFAS x6						Total Number of Containers	Remarks/Matrix
152251		1405	9/14/18		✓	✓						2	Groundwater
152480		0953	9/26/18		✓	✓						2	"

320-43820 Chain of Custody

Project Information		Sample Receipt	
Project Number:	31-1-20060-002	Total Number of Containers	4
Project Name:	FAI	COC Seals/Intact? Y/N/NA	—
Contact:	MDN	Received Good Cond./Cold	—
Ongoing Project?	Yes ☒ No ☐	Delivery Method:	Goldstreak
Sampler:	CTC/MDN	(attach shipping bill, if any)	

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: MM-Nadell Time: 1530	Signature: Time:	Signature: Time:
Printed Name: Marcy Nadell Date: 10/2/18	Printed Name: Date:	Printed Name: Date:
Company: Shannon&Wilson	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 1005	Signature: Time:	Signature: Time:
Printed Name: Date: 10/3/18	Printed Name: Date:	Printed Name: Date:
Company: TA Sa	Company:	Company:

F-19-91/UR

5,0c

No. 34799

10/15/2018

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-43820-1

Login Number: 43820
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:

October 16, 2018

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

October 15, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-43820-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-43820-1

1. Laboratory

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

   ☐ ☒

   ADEC has not approved an analytical laboratory for analysis of PFAS. 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?

   ☐ ☒

   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)?

   ☒ ☐

   b. Correct Analyses requested?

   ☒ ☐

3. Laboratory Sample Receipt Documentation

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

   ☒ ☐

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

   ☒ ☐

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

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

   ☒ ☐

   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.?

☐ ☒

e. Data quality or usability affected?

Comments:

Data quality or usability is not affected; see above.

4. Case Narrative

a. Present and understandable?

☒ ☐

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

☒ ☐

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 5.0º C.

The PFOS result for sample 152251 exceeded the instrument calibration range; analyte has been qualified.

The case narrative notes there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) with preparation batch 320-250333. It further notes the two samples were yellow in color.

c. Were all corrective actions documented?

☒ ☐

Yes, the PFOS result for sample 152251 was re-analyzed outside of hold time, at a dilution, confirming the original result. Both sets of data are reported.

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

Comments:

The case narrative notes the original PFOS result for sample 152251 is qualified. The result is considered estimated, flagged with a “J” in the analytical tables and database.

5. Samples Results

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

☒ ☐

b. All applicable holding times met?

☐ ☒

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 the original analyses. However, the PFOS result for sample 152251 was re-analyzed outside of hold time.

c. All soils reported on a dry weight basis?

☐ ☒

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?

☒ ☐

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

e. Data quality or usability affected?

☐ ☒

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?

☒ ☐

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

☒ ☐

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?

☐ ☒

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)

☒ ☐

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

☐ ☒

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)

☒ ☐

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)

☒ ☐

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?

☐ ☉

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?

☉ ☐

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)

☉ ☐

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

☐ ☉

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.): <u>Water and Soil</u>

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

☐ ☉

PFAS 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)

☐ ☉

N/A; a trip blank is not required.

iii. All results less than LOQ?

☐ ☉

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?

☐ ☉

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

ii. Submitted blind to lab?

☐ ☉

N/A; a field duplicate was not included.

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

☐ ☉

N/A; a field duplicate was not included.

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; see above.

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

☐ ☐ ☒

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?

☐ ☒

N/A; an equipment blank was not submitted with this work order.

ii. If above LOQ, what samples are affected?

Comments:

None; see above.

iii. Data quality or usability affected?

Comments:

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

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

a. Defined and appropriate?

☐ ☒

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: 320-43916-1
Client Project/Site: FAI

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

Attn: Marcy Nadel

Karen Dahl

Authorized for release by:
10/11/2018 1:39:47 PM
Karen Dahl, Senior Project Manager
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Designee for

David Alltucker, Project Manager I
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Table of Contents

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

TestAmerica Job ID: 320-43916-1

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)

Job ID: 320-43916-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-43916-1

Comments
No additional comments.

Receipt
The samples were received on 10/5/2018 1:40 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 7.9º C.

Receipt Exceptions
The following samples were received at the laboratory outside the required temperature criteria: 510238.1 (320-43916-1), 510238.2 (320-43916-2) and 510238.2-EB (320-43916-3).

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 sample is brown in color: 510238.1 (320-43916-1).

Method(s) PFAS Prep: The following sample is light brown in color: 510238.2 (320-43916-2).

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-250420.

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: 320-43916-1

Client Sample ID: 510238.1 — Lab Sample ID: 320-43916-1

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)	190		2.0	0.87	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
Perfluorooctanesulfonic acid (PFOS)	76		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 510238.2 — Lab Sample ID: 320-43916-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	51		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	240		2.0	0.87	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
Perfluorooctanesulfonic acid (PFOS)	70		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 510238.2-EB — Lab Sample ID: 320-43916-3

No Detections.

This Detection Summary does not include radiochemical test results.

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

TestAmerica Job ID: 320-43916-1

Client Sample ID: 510238.1
Date Collected: 10/03/18 16:26
Date Received: 10/05/18 13:40

Lab Sample ID: 320-43916-1
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**38**		2.0	0.92	ng/L		10/08/18 11:28	10/10/18 02:55	1
Perfluorohexanesulfonic acid (PFHxS)	**190**		2.0	0.87	ng/L		10/08/18 11:28	10/10/18 02:55	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		10/08/18 11:28	10/10/18 02:55	1
Perfluorooctanoic acid (PFOA)	**100**		2.0	0.75	ng/L		10/08/18 11:28	10/10/18 02:55	1
Perfluorooctanesulfonic acid (PFOS)	**76**		2.0	1.3	ng/L		10/08/18 11:28	10/10/18 02:55	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/08/18 11:28	10/10/18 02:55	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*123*		*25 - 150*	*10/08/18 11:28*	*10/10/18 02:55*	*1*
13C4 PFHpA	*122*		*25 - 150*	*10/08/18 11:28*	*10/10/18 02:55*	*1*
13C4 PFOA	*133*		*25 - 150*	*10/08/18 11:28*	*10/10/18 02:55*	*1*
13C4 PFOS	*120*		*25 - 150*	*10/08/18 11:28*	*10/10/18 02:55*	*1*
13C5 PFNA	*137*		*25 - 150*	*10/08/18 11:28*	*10/10/18 02:55*	*1*

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

TestAmerica Job ID: 320-43916-1

Client Sample ID: 510238.2
Date Collected: 10/04/18 13:35
Date Received: 10/05/18 13:40

Lab Sample ID: 320-43916-2
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**51**		2.0	0.92	ng/L		10/08/18 11:28	10/10/18 03:13	1
Perfluorohexanesulfonic acid (PFHxS)	**240**		2.0	0.87	ng/L		10/08/18 11:28	10/10/18 03:13	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		10/08/18 11:28	10/10/18 03:13	1
Perfluorooctanoic acid (PFOA)	**100**		2.0	0.75	ng/L		10/08/18 11:28	10/10/18 03:13	1
Perfluorooctanesulfonic acid (PFOS)	**70**		2.0	1.3	ng/L		10/08/18 11:28	10/10/18 03:13	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/08/18 11:28	10/10/18 03:13	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*116*		*25 - 150*	*10/08/18 11:28*	*10/10/18 03:13*	*1*
13C4 PFHpA	*118*		*25 - 150*	*10/08/18 11:28*	*10/10/18 03:13*	*1*
13C4 PFOA	*123*		*25 - 150*	*10/08/18 11:28*	*10/10/18 03:13*	*1*
13C4 PFOS	*116*		*25 - 150*	*10/08/18 11:28*	*10/10/18 03:13*	*1*
13C5 PFNA	*133*		*25 - 150*	*10/08/18 11:28*	*10/10/18 03:13*	*1*

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

TestAmerica Job ID: 320-43916-1

Client Sample ID: 510238.2-EB
Date Collected: 10/04/18 13:45
Date Received: 10/05/18 13:40

Lab Sample ID: 320-43916-3
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		10/08/18 11:28	10/10/18 03:31	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		10/08/18 11:28	10/10/18 03:31	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		10/08/18 11:28	10/10/18 03:31	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		10/08/18 11:28	10/10/18 03:31	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		10/08/18 11:28	10/10/18 03:31	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/08/18 11:28	10/10/18 03:31	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*115*		*25 - 150*	*10/08/18 11:28*	*10/10/18 03:31*	*1*
13C4 PFHpA	*119*		*25 - 150*	*10/08/18 11:28*	*10/10/18 03:31*	*1*
13C4 PFOA	*136*		*25 - 150*	*10/08/18 11:28*	*10/10/18 03:31*	*1*
13C4 PFOS	*112*		*25 - 150*	*10/08/18 11:28*	*10/10/18 03:31*	*1*
13C5 PFNA	*134*		*25 - 150*	*10/08/18 11:28*	*10/10/18 03:31*	*1*

Isotope Dilution Summary

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

TestAmerica Job ID: 320-43916-1

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)
320-43916-1	510238.1	123	122	133	120	137
320-43916-2	510238.2	116	118	123	116	133
320-43916-3	510238.2-EB	115	119	136	112	134
LCS 320-250420/2-A	Lab Control Sample	116	124	126	116	131
LCSD 320-250420/3-A	Lab Control Sample Dup	114	123	135	111	124
MB 320-250420/1-A	Method Blank	113	114	126	107	114

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 320-250420/1-A
Matrix: Water
Analysis Batch: 250736

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 250420

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		10/08/18 11:28	10/10/18 02:00	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		10/08/18 11:28	10/10/18 02:00	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		10/08/18 11:28	10/10/18 02:00	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		10/08/18 11:28	10/10/18 02:00	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		10/08/18 11:28	10/10/18 02:00	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/08/18 11:28	10/10/18 02:00	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*113*		*25 - 150*	*10/08/18 11:28*	*10/10/18 02:00*	*1*
13C4 PFHpA	*114*		*25 - 150*	*10/08/18 11:28*	*10/10/18 02:00*	*1*
13C4 PFOA	*126*		*25 - 150*	*10/08/18 11:28*	*10/10/18 02:00*	*1*
13C4 PFOS	*107*		*25 - 150*	*10/08/18 11:28*	*10/10/18 02:00*	*1*
13C5 PFNA	*114*		*25 - 150*	*10/08/18 11:28*	*10/10/18 02:00*	*1*

Lab Sample ID: LCS 320-250420/2-A
Matrix: Water
Analysis Batch: 250736

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 250420

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	17.5		ng/L		99	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	16.9		ng/L		93	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	18.5		ng/L		93	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	19.4		ng/L		97	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	16.9		ng/L		91	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	18.2		ng/L		91	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*116*		*25 - 150*
13C4 PFHpA	*124*		*25 - 150*
13C4 PFOA	*126*		*25 - 150*
13C4 PFOS	*116*		*25 - 150*
13C5 PFNA	*131*		*25 - 150*

Lab Sample ID: LCSD 320-250420/3-A
Matrix: Water
Analysis Batch: 250736

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 250420

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	4	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	17.2		ng/L		94	73 - 157	1	30
Perfluoroheptanoic acid (PFHpA)			20.0	18.4		ng/L		92	71 - 138	1	30
Perfluorooctanoic acid (PFOA)			20.0	18.3		ng/L		91	70 - 140	6	30
Perfluorooctanesulfonic acid (PFOS)			18.6	17.8		ng/L		96	69 - 144	5	30
Perfluorononanoic acid (PFNA)			20.0	18.3		ng/L		91	73 - 147	1	30

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

TestAmerica Job ID: 320-43916-1

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	114		25 - 150
13C4 PFHpA	123		25 - 150
13C4 PFOA	135		25 - 150
13C4 PFOS	111		25 - 150
13C5 PFNA	124		25 - 150

QC Association Summary

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

TestAmerica Job ID: 320-43916-1

LCMS

Prep Batch: 250420

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-43916-1	510238.1	Total/NA	Water	PFAS Prep	
320-43916-2	510238.2	Total/NA	Water	PFAS Prep	
320-43916-3	510238.2-EB	Total/NA	Water	PFAS Prep	
MB 320-250420/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-250420/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-250420/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 250736

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-43916-1	510238.1	Total/NA	Water	WS-LC-0025 At1	250420
320-43916-2	510238.2	Total/NA	Water	WS-LC-0025 At1	250420
320-43916-3	510238.2-EB	Total/NA	Water	WS-LC-0025 At1	250420
MB 320-250420/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	250420
LCS 320-250420/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	250420
LCSD 320-250420/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	250420

Lab Chronicle

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

TestAmerica Job ID: 320-43916-1

Client Sample ID: 510238.1

Date Collected: 10/03/18 16:26
Date Received: 10/05/18 13:40

Lab Sample ID: 320-43916-1

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	250420	10/08/18 11:28	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			250736	10/10/18 02:55	D1R	TAL SAC

Client Sample ID: 510238.2

Date Collected: 10/04/18 13:35
Date Received: 10/05/18 13:40

Lab Sample ID: 320-43916-2

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	250420	10/08/18 11:28	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			250736	10/10/18 03:13	D1R	TAL SAC

Client Sample ID: 510238.2-EB

Date Collected: 10/04/18 13:45
Date Received: 10/05/18 13:40

Lab Sample ID: 320-43916-3

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	250420	10/08/18 11:28	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			250736	10/10/18 03:31	D1R	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: 320-43916-1

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
ANAB	DoD ELAP		L2468	01-20-21
Arizona	State Program	9	AZ0708	08-11-19
Arkansas DEQ	State Program	6	88-0691	06-17-19
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-19
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-19
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-19
Kansas	NELAP	7	E-10375	10-31-18 *
Louisiana	NELAP	6	30612	06-30-19
Maine	State Program	1	CA0004	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-19
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-19
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
US Fish & Wildlife	Federal		LE148388-0	07-31-19
USDA	Federal		P330-18-00239	01-17-21
USEPA UCMR	Federal	1	CA00044	12-31-20
Utah	NELAP	8	CA00044	02-28-19
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
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: 320-43916-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC
PFAS Prep	Preparation, Direct Inject PFAS	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: 320-43916-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-43916-1	510238.1	Water	10/03/18 16:26	10/05/18 13:40
320-43916-2	510238.2	Water	10/04/18 13:35	10/05/18 13:40
320-43916-3	510238.2-EB	Water	10/04/18 13:45	10/05/18 13:40

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

Page 1 of 1

Laboratory Test America
Attn: D. Altucker

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

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	UCMR PFAS x6						Total Number of Containers	Remarks/Matrix
510238.1		1626	10/3/18		X	X						2	groundwater
510238.2		1335	10/4/18		X	X						2	
510238.2-EB		1345	10/4/18		X	X						2	

320-43916 Chain of Custody

Project Information	Sample Receipt
Project Number: 20960-001	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: MDN, AEM	(attach shipping bill, if any)

Instructions

Requested Turnaround Time: Rush - 5 day

Special Instructions:

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 1420	Signature: Time:	Signature: Time:
Printed Name: A. Masters Date: 10/4/18	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson, Inc.	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 1340	Signature: Time:	Signature: Time:
Printed Name: I. Darlington Date: 5 Oct 18	Printed Name: Date:	Printed Name: Date:
Company: TAW 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

7.9°C

No. 34801

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-43916-1

Login Number: 43916
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.	False	Cooler temperature outside required temperature criteria.
Cooler Temperature is recorded.	True	7.9c
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").	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:

Marcy Nadel

Title:

Geologist

Date:

October 16, 2018

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

October 11, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-43916-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-43916-1

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 PFAS. 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:

The temperature blank was measured outside the acceptable temperature range of 0 °C to 6 °C upon receipt at the laboratory (7.9 °C).

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

   ◉ Yes ○ No Comments:

Due to the high chemical and biological stability of PFAS, it is unlikely the integrity of the project samples was adversely affected by the high cooler temperature. Analysis of PFAS does not require a preservative. In an e-mail dated August 3, 2015, the ADEC project manager noted that he had spoken with their chemist, who "agrees the high temperature probably would not affect the PFC results." PFAS are also know as PFCs.

   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 documentation notes the cooler temperature was outside the accepted range.

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 7.9º C.

The case narrative notes there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) with preparation batch 320-250420. It further notes that two of the three samples were brown or light brown in color.

c. Were all corrective actions documented?

( ) Yes (•) No Comments:

N/A; 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 the applicable ADEC action level for drinking water 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:

PFAS 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:

Sample *510238.1* is associated with field duplicate sample *510338.1* in work order 320-43917.

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:

Field duplicate RPDs are within the recommended range for PFBS, PFOA, PFHxS, and PFOS. PFHpA and PFNA are not detected in sample *510238.1*; however, they are detected above the reporting range in sample *510338.1*. The results for PFHpA and PFNA are considered estimated, flagged "J" for both project samples.

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

Comments:

Yes, the PFHpA and PFNA results are considered estimated and flagged 'J' in the field-duplicate pair.

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

(•) Yes ( ) No ( ) Not Applicable

Equipment blank sample *510238.2-EB* was submitted for determination of PFAS. Samples *510238.2* and *510238.2-EB* were collected using a rented submersible Mega-Monsoon pump. Sample *510238.1* was not collected using reusable equipment.

i. All results less than LOQ?

(•) Yes ( ) No Comments:

PFAS reported for this project were not detected in the equipment blank sample.

ii. If above LOQ, what samples are affected?

Comments:

None; see above.

iii. Data quality or usability affected?

Comments:

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

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: 320-43917-1
Client Project/Site: FAI

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

Attn: Marcy Nadel

Authorized for release by:
10/15/2018 4:19:47 PM

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: 320-43917-1

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: 320-43917-1

Job ID: 320-43917-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-43917-1

Receipt
The sample was received on 10/5/2018 1:40 PM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 7.9º C.

Receipt Exceptions
The following sample was received at the laboratory outside the required temperature criteria of 0-6º C.: 510338.1 (320-43917-1).

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 320-250808.

Method(s) PFAS Prep: The following sample is brown in color: 510338.1 (320-43917-1).

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: 320-43917-1

Client Sample ID: 510338.1 — Lab Sample ID: 320-43917-1

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)	200		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	29		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
Perfluorooctanesulfonic acid (PFOS)	77		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	12		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: 320-43917-1

Client Sample ID: 510338.1
Date Collected: 10/03/18 16:30
Date Received: 10/05/18 13:40

Lab Sample ID: 320-43917-1
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	38		2.0	0.92	ng/L		10/09/18 13:35	10/14/18 14:17	1
Perfluorohexanesulfonic acid (PFHxS)	200		2.0	0.87	ng/L		10/09/18 13:35	10/14/18 14:17	1
Perfluoroheptanoic acid (PFHpA)	29		2.0	0.80	ng/L		10/09/18 13:35	10/14/18 14:17	1
Perfluorooctanoic acid (PFOA)	100		2.0	0.75	ng/L		10/09/18 13:35	10/14/18 14:17	1
Perfluorooctanesulfonic acid (PFOS)	77		2.0	1.3	ng/L		10/09/18 13:35	10/14/18 14:17	1
Perfluorononanoic acid (PFNA)	12		2.0	0.65	ng/L		10/09/18 13:35	10/14/18 14:17	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*121*		*25 - 150*	*10/09/18 13:35*	*10/14/18 14:17*	*1*
13C4 PFHpA	*117*		*25 - 150*	*10/09/18 13:35*	*10/14/18 14:17*	*1*
13C4 PFOA	*131*		*25 - 150*	*10/09/18 13:35*	*10/14/18 14:17*	*1*
13C4 PFOS	*116*		*25 - 150*	*10/09/18 13:35*	*10/14/18 14:17*	*1*
13C5 PFNA	*126*		*25 - 150*	*10/09/18 13:35*	*10/14/18 14:17*	*1*

Isotope Dilution Summary

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

TestAmerica Job ID: 320-43917-1

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)
320-43917-1	510338.1	121	117	131	116	126
LCS 320-250808/2-A	Lab Control Sample	112	124	133	115	126
LCSD 320-250808/3-A	Lab Control Sample Dup	120	130	142	119	127
MB 320-250808/1-A	Method Blank	115	120	123	117	121

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 320-250808/1-A
Matrix: Water
Analysis Batch: 251696

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 250808

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		10/09/18 13:35	10/14/18 00:32	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		10/09/18 13:35	10/14/18 00:32	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		10/09/18 13:35	10/14/18 00:32	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		10/09/18 13:35	10/14/18 00:32	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		10/09/18 13:35	10/14/18 00:32	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/09/18 13:35	10/14/18 00:32	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*115*		*25 - 150*	*10/09/18 13:35*	*10/14/18 00:32*	*1*
13C4 PFHpA	*120*		*25 - 150*	*10/09/18 13:35*	*10/14/18 00:32*	*1*
13C4 PFOA	*123*		*25 - 150*	*10/09/18 13:35*	*10/14/18 00:32*	*1*
13C4 PFOS	*117*		*25 - 150*	*10/09/18 13:35*	*10/14/18 00:32*	*1*
13C5 PFNA	*121*		*25 - 150*	*10/09/18 13:35*	*10/14/18 00:32*	*1*

Lab Sample ID: LCS 320-250808/2-A
Matrix: Water
Analysis Batch: 251696

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 250808

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	16.8		ng/L		95	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	17.7		ng/L		97	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	19.0		ng/L		95	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	17.4		ng/L		87	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	16.1		ng/L		87	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	17.6		ng/L		88	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*112*		*25 - 150*
13C4 PFHpA	*124*		*25 - 150*
13C4 PFOA	*133*		*25 - 150*
13C4 PFOS	*115*		*25 - 150*
13C5 PFNA	*126*		*25 - 150*

Lab Sample ID: LCSD 320-250808/3-A
Matrix: Water
Analysis Batch: 251696

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 250808

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	15.8		ng/L		89	72 - 151	6	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	16.1		ng/L		88	73 - 157	9	30
Perfluoroheptanoic acid (PFHpA)			20.0	17.0		ng/L		85	71 - 138	11	30
Perfluorooctanoic acid (PFOA)			20.0	16.4		ng/L		82	70 - 140	6	30
Perfluorooctanesulfonic acid (PFOS)			18.6	15.1		ng/L		81	69 - 144	7	30
Perfluorononanoic acid (PFNA)			20.0	16.8		ng/L		84	73 - 147	5	30

QC Sample Results

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

TestAmerica Job ID: 320-43917-1

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	120		25 - 150
13C4 PFHpA	130		25 - 150
13C4 PFOA	142		25 - 150
13C4 PFOS	119		25 - 150
13C5 PFNA	127		25 - 150

QC Association Summary

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

TestAmerica Job ID: 320-43917-1

LCMS

Prep Batch: 250808

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-43917-1	510338.1	Total/NA	Water	PFAS Prep	
MB 320-250808/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-250808/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-250808/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 251696

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-43917-1	510338.1	Total/NA	Water	WS-LC-0025 At1	250808
MB 320-250808/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	250808
LCS 320-250808/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	250808
LCSD 320-250808/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	250808

Lab Chronicle

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

TestAmerica Job ID: 320-43917-1

Client Sample ID: 510338.1
Date Collected: 10/03/18 16:30
Date Received: 10/05/18 13:40

Lab Sample ID: 320-43917-1
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	250808	10/09/18 13:35	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			251696	10/14/18 14:17	S1M	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: 320-43917-1

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
ANAB	DoD ELAP		L2468	01-20-21
Arizona	State Program	9	AZ0708	08-11-19
Arkansas DEQ	State Program	6	88-0691	06-17-19
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-19
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-19
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-19
Kansas	NELAP	7	E-10375	10-31-18 *
Louisiana	NELAP	6	30612	06-30-19
Maine	State Program	1	CA0004	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-19
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-19
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
US Fish & Wildlife	Federal		LE148388-0	07-31-19
USDA	Federal		P330-18-00239	01-17-21
USEPA UCMR	Federal	1	CA00044	12-31-20
Utah	NELAP	8	CA00044	02-28-19
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
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: 320-43917-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC
PFAS Prep	Preparation, Direct Inject PFAS	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: 320-43917-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-43917-1	510338.1	Water	10/03/18 16:30	10/05/18 13:40

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

CHAIN-OF-CUSTODY RECORD

Laboratory Test America
Attn: D 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	~~VOC~~ RSKs+6						Total Number of Containers	Remarks/Matrix
510338.1		1630	10/3/2018		X	~~X~~						2	groundwater

320-43917 Chain of Custody

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:	
Sampler:	MDN	(attach shipping bill, if any)	

Instructions

Requested Turnaround Time: Standard

Special Instructions:

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 1419	Signature: Time:	Signature: Time:
Printed Name: A. Masters Date: 10/4/18	Printed Name: Date:	Printed Name: Date:
Company: Shannon + Wilson, Inc.	Company:	Company:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: Time: 1340	Signature: Time:	Signature: Time:
Printed Name: J. Darlington Date: 5 Oct 18	Printed Name: Date:	Printed Name: Date:
Company: TAW 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

7.9 °C

No. 34802

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-43917-1

Login Number: 43917
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 packs
Cooler Temperature is acceptable.	False	Cooler temperature outside required temperature criteria.
Cooler Temperature is recorded.	True	7.9c
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").	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:

Marcy Nadel

Title:

Geologist

Date:

October 16, 2018

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

October 15, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-43917-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-43917-1

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 PFAS. 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:

The temperature blank was measured outside the acceptable temperature range of 0 °C to 6 °C upon receipt at the laboratory (7.9 °C). Work order 320-43917 was submitted in the same cooler as the samples included in work order 320-43916.

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

   ◉ Yes ○ No Comments:

Due to the high chemical and biological stability of PFAS, it is unlikely the integrity of the project samples was adversely affected by the high cooler temperature. Analysis of PFAS does not require a preservative. In an e-mail dated August 3, 2015, the ADEC project manager noted that he had spoken with their chemist, who "agrees the high temperature probably would not affect the PFC results." PFAS are also known as PFCs.

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 documentation notes the cooler temperature was outside the accepted range.

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 7.9º C.

The case narrative notes there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) with preparation batch 320-250808. It further notes the sample was brown in color.

c. Were all corrective actions documented?

( ) Yes (•) No Comments:

N/A; 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 the applicable ADEC action level for drinking water 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:

PFAS 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 sample *510338.1* is associated with sample *510238.1* in work order 320-43916.

ii. Submitted blind to lab?

◉ Yes ○ No Comments:

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:

Field duplicate RPDs are within the recommended range for PFBS, PFOA, PFHxS, and PFOS. PFHpA and PFNA are not detected in sample *510238.1*; however, they are detected above the reporting range in sample *510338.1*. The results for PFHpA and PFNA are considered estimated, flagged "J" for both project samples.

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

Comments:

Yes, the PFHpA and PFNA results are considered estimated and flagged 'J' in the field-duplicate pair.

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

○ Yes ○ No ◉ Not Applicable

Sample *510338.1* was not collected using 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 with this work order.

ii. If above LOQ, what samples are affected?

Comments:

None; see above.

iii. Data quality or usability affected?

Comments:

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

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: 320-45444-3
Client Project/Site: FAI
Revision: 1

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

Attn: Marcy Nadel

Authorized for release by:
12/5/2018 3:01:09 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: 320-45444-3

Qualifiers

LCMS

Qualifier	Qualifier Description
*	Isotope Dilution analyte is outside acceptance limits.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
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: 320-45444-3

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-45444-3

Receipt
The samples were received on 11/20/2018 11:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 3.1º C and 4.7º C.

LCMS
Method(s) WS-LC-0025 At1: Isotope Dilution Analyte (IDA) recovery is above the method recommended limit for 13C5 PFNA for the following samples: 1736363 (320-45444-11). 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 320-262055.

Method(s) PFAS Prep: The following samples were orange in color. 151637 (320-45444-5), 407313 (320-45444-6), 407364 (320-45444-7), 153699 (320-45444-8), 120804 (320-45444-10), 1736363 (320-45444-11), 173463 (320-45444-12), 483532 (320-45444-13), 173916 (320-45444-14), 407372 (320-45444-15), 174016 (320-45444-16), 176435 (320-45444-17), 550132 (320-45444-18), 173002 (320-45444-19), 561711 (320-45444-20), 136891 (320-45444-21) and 173860 (320-45444-22)

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: 320-45444-3

Client Sample ID: 151637 — Lab Sample ID: 320-45444-5

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)	4.0		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	0.79	J	2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	6.4		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 407313 — Lab Sample ID: 320-45444-6

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)	1.3	J	2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 407364 — Lab Sample ID: 320-45444-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	2.1		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)	4.2		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
Perfluorooctanesulfonic acid (PFOS)	5.2		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 153699 — Lab Sample ID: 320-45444-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	43		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)	5.2		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	2.2		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	4.9		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 151203 — Lab Sample ID: 320-45444-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	4.4		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
Perfluoroheptanoic acid (PFHpA)	1.8	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: 151203 (Continued) — Lab Sample ID: 320-45444-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	2.7		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	36		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 120804 — Lab Sample ID: 320-45444-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	49		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	180		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	59		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	49		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	110		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 173363 — Lab Sample ID: 320-45444-11

No Detections.

Client Sample ID: 173463 — Lab Sample ID: 320-45444-12

No Detections.

Client Sample ID: 483532 — Lab Sample ID: 320-45444-13

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)	9.3		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.0	J	2.0	0.80	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
Perfluorooctanesulfonic acid (PFOS)	1.5	J	2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 173916 — Lab Sample ID: 320-45444-14

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	2.2		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	0.78	J	2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.6	J	2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 407372 — Lab Sample ID: 320-45444-15

No Detections.

This Detection Summary does not include radiochemical test results.

Detection Summary

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

TestAmerica Job ID: 320-45444-3

Client Sample ID: 174016 — Lab Sample ID: 320-45444-16

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)	1.6	J	2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 176435 — Lab Sample ID: 320-45444-17

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)	47		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	3.0		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	3.8		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	7.7		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 550132 — Lab Sample ID: 320-45444-18

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
Perfluoroheptanoic acid (PFHpA)	1.8	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	2.8		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	10		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 173002 — Lab Sample ID: 320-45444-19

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)	18		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.5	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)	3.8		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 561711 — Lab Sample ID: 320-45444-20

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	0.97	J	2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 136891 — Lab Sample ID: 320-45444-21

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample ID: 136891 (Continued)

Lab Sample ID: 320-45444-21

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)	52		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)	2.5		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	7.1		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 173860

Lab Sample ID: 320-45444-22

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	50		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)	5.7		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	2.8		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

This Detection Summary does not include radiochemical test results.

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

TestAmerica Job ID: 320-45444-3

Client Sample ID: 151637
Date Collected: 11/15/18 10:23
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-5
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**1.9**	**J**	2.0	0.92	ng/L		11/29/18 17:03	12/01/18 15:39	1
Perfluorohexanesulfonic acid (PFHxS)	**4.0**		2.0	0.87	ng/L		11/29/18 17:03	12/01/18 15:39	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/29/18 17:03	12/01/18 15:39	1
Perfluorooctanoic acid (PFOA)	**0.79**	**J**	2.0	0.75	ng/L		11/29/18 17:03	12/01/18 15:39	1
Perfluorooctanesulfonic acid (PFOS)	**6.4**		2.0	1.3	ng/L		11/29/18 17:03	12/01/18 15:39	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/29/18 17:03	12/01/18 15:39	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*81*		*25 - 150*	*11/29/18 17:03*	*12/01/18 15:39*	*1*
13C4 PFHpA	*99*		*25 - 150*	*11/29/18 17:03*	*12/01/18 15:39*	*1*
13C4 PFOA	*112*		*25 - 150*	*11/29/18 17:03*	*12/01/18 15:39*	*1*
13C4 PFOS	*85*		*25 - 150*	*11/29/18 17:03*	*12/01/18 15:39*	*1*
13C5 PFNA	*111*		*25 - 150*	*11/29/18 17:03*	*12/01/18 15:39*	*1*

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

TestAmerica Job ID: 320-45444-3

Client Sample ID: 407313
Date Collected: 11/15/18 12:25
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-6
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		11/29/18 17:03	12/01/18 15:58	1
Perfluorohexanesulfonic acid (PFHxS)	**1.2**	**J**	2.0	0.87	ng/L		11/29/18 17:03	12/01/18 15:58	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/29/18 17:03	12/01/18 15:58	1
Perfluorooctanoic acid (PFOA)	**1.3**	**J**	2.0	0.75	ng/L		11/29/18 17:03	12/01/18 15:58	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/29/18 17:03	12/01/18 15:58	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/29/18 17:03	12/01/18 15:58	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*100*		*25 - 150*	*11/29/18 17:03*	*12/01/18 15:58*	*1*
13C4 PFHpA	*132*		*25 - 150*	*11/29/18 17:03*	*12/01/18 15:58*	*1*
13C4 PFOA	*140*		*25 - 150*	*11/29/18 17:03*	*12/01/18 15:58*	*1*
13C4 PFOS	*106*		*25 - 150*	*11/29/18 17:03*	*12/01/18 15:58*	*1*
13C5 PFNA	*146*		*25 - 150*	*11/29/18 17:03*	*12/01/18 15:58*	*1*

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

TestAmerica Job ID: 320-45444-3

Client Sample ID: 407364
Date Collected: 11/15/18 11:32
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-7
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	2.1		2.0	0.92	ng/L		11/29/18 17:03	12/01/18 16:16	1
Perfluorohexanesulfonic acid (PFHxS)	15		2.0	0.87	ng/L		11/29/18 17:03	12/01/18 16:16	1
Perfluoroheptanoic acid (PFHpA)	4.2		2.0	0.80	ng/L		11/29/18 17:03	12/01/18 16:16	1
Perfluorooctanoic acid (PFOA)	11		2.0	0.75	ng/L		11/29/18 17:03	12/01/18 16:16	1
Perfluorooctanesulfonic acid (PFOS)	5.2		2.0	1.3	ng/L		11/29/18 17:03	12/01/18 16:16	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/29/18 17:03	12/01/18 16:16	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*102*		*25 - 150*	*11/29/18 17:03*	*12/01/18 16:16*	*1*
13C4 PFHpA	*126*		*25 - 150*	*11/29/18 17:03*	*12/01/18 16:16*	*1*
13C4 PFOA	*134*		*25 - 150*	*11/29/18 17:03*	*12/01/18 16:16*	*1*
13C4 PFOS	*109*		*25 - 150*	*11/29/18 17:03*	*12/01/18 16:16*	*1*
13C5 PFNA	*145*		*25 - 150*	*11/29/18 17:03*	*12/01/18 16:16*	*1*

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

TestAmerica Job ID: 320-45444-3

Client Sample ID: 153699
Date Collected: 11/15/18 13:28
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-8
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**43**		2.0	0.92	ng/L		11/29/18 17:03	12/01/18 16:35	1
Perfluorohexanesulfonic acid (PFHxS)	**42**		2.0	0.87	ng/L		11/29/18 17:03	12/01/18 16:35	1
Perfluoroheptanoic acid (PFHpA)	**5.2**		2.0	0.80	ng/L		11/29/18 17:03	12/01/18 16:35	1
Perfluorooctanoic acid (PFOA)	**2.2**		2.0	0.75	ng/L		11/29/18 17:03	12/01/18 16:35	1
Perfluorooctanesulfonic acid (PFOS)	**4.9**		2.0	1.3	ng/L		11/29/18 17:03	12/01/18 16:35	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/29/18 17:03	12/01/18 16:35	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*105*		*25 - 150*	*11/29/18 17:03*	*12/01/18 16:35*	*1*
13C4 PFHpA	*128*		*25 - 150*	*11/29/18 17:03*	*12/01/18 16:35*	*1*
13C4 PFOA	*139*		*25 - 150*	*11/29/18 17:03*	*12/01/18 16:35*	*1*
13C4 PFOS	*109*		*25 - 150*	*11/29/18 17:03*	*12/01/18 16:35*	*1*
13C5 PFNA	*149*		*25 - 150*	*11/29/18 17:03*	*12/01/18 16:35*	*1*

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

TestAmerica Job ID: 320-45444-3

Client Sample ID: 151203
Date Collected: 11/15/18 14:29
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-9
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**4.4**		2.0	0.92	ng/L		11/29/18 17:03	12/01/18 16:53	1
Perfluorohexanesulfonic acid (PFHxS)	**11**		2.0	0.87	ng/L		11/29/18 17:03	12/01/18 16:53	1
Perfluoroheptanoic acid (PFHpA)	**1.8**	**J**	2.0	0.80	ng/L		11/29/18 17:03	12/01/18 16:53	1
Perfluorooctanoic acid (PFOA)	**2.7**		2.0	0.75	ng/L		11/29/18 17:03	12/01/18 16:53	1
Perfluorooctanesulfonic acid (PFOS)	**36**		2.0	1.3	ng/L		11/29/18 17:03	12/01/18 16:53	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/29/18 17:03	12/01/18 16:53	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*104*		*25 - 150*	*11/29/18 17:03*	*12/01/18 16:53*	*1*
13C4 PFHpA	*129*		*25 - 150*	*11/29/18 17:03*	*12/01/18 16:53*	*1*
13C4 PFOA	*144*		*25 - 150*	*11/29/18 17:03*	*12/01/18 16:53*	*1*
13C4 PFOS	*109*		*25 - 150*	*11/29/18 17:03*	*12/01/18 16:53*	*1*
13C5 PFNA	*150*		*25 - 150*	*11/29/18 17:03*	*12/01/18 16:53*	*1*

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

TestAmerica Job ID: 320-45444-3

Client Sample ID: 120804
Date Collected: 11/15/18 13:24
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-10
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	49		2.0	0.92	ng/L		11/29/18 17:03	12/01/18 17:11	1
Perfluorohexanesulfonic acid (PFHxS)	180		2.0	0.87	ng/L		11/29/18 17:03	12/01/18 17:11	1
Perfluoroheptanoic acid (PFHpA)	59		2.0	0.80	ng/L		11/29/18 17:03	12/01/18 17:11	1
Perfluorooctanoic acid (PFOA)	49		2.0	0.75	ng/L		11/29/18 17:03	12/01/18 17:11	1
Perfluorooctanesulfonic acid (PFOS)	110		2.0	1.3	ng/L		11/29/18 17:03	12/01/18 17:11	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/29/18 17:03	12/01/18 17:11	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*100*		*25 - 150*	*11/29/18 17:03*	*12/01/18 17:11*	*1*
13C4 PFHpA	*122*		*25 - 150*	*11/29/18 17:03*	*12/01/18 17:11*	*1*
13C4 PFOA	*134*		*25 - 150*	*11/29/18 17:03*	*12/01/18 17:11*	*1*
13C4 PFOS	*108*		*25 - 150*	*11/29/18 17:03*	*12/01/18 17:11*	*1*
13C5 PFNA	*140*		*25 - 150*	*11/29/18 17:03*	*12/01/18 17:11*	*1*

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

TestAmerica Job ID: 320-45444-3

Client Sample ID: 173363
Date Collected: 11/15/18 12:36
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-11
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/29/18 17:03	12/01/18 17:30	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/29/18 17:03	12/01/18 17:30	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/29/18 17:03	12/01/18 17:30	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/29/18 17:03	12/01/18 17:30	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/29/18 17:03	12/01/18 17:30	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/29/18 17:03	12/01/18 17:30	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*104*		*25 - 150*	*11/29/18 17:03*	*12/01/18 17:30*	*1*
13C4 PFHpA	*129*		*25 - 150*	*11/29/18 17:03*	*12/01/18 17:30*	*1*
13C4 PFOA	*138*		*25 - 150*	*11/29/18 17:03*	*12/01/18 17:30*	*1*
13C4 PFOS	*109*		*25 - 150*	*11/29/18 17:03*	*12/01/18 17:30*	*1*
13C5 PFNA	*151*	*	*25 - 150*	*11/29/18 17:03*	*12/01/18 17:30*	*1*

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

TestAmerica Job ID: 320-45444-3

Client Sample ID: 173463
Date Collected: 11/15/18 12:33
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-12
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		11/29/18 17:03	12/01/18 18:06	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/29/18 17:03	12/01/18 18:06	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/29/18 17:03	12/01/18 18:06	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/29/18 17:03	12/01/18 18:06	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/29/18 17:03	12/01/18 18:06	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/29/18 17:03	12/01/18 18:06	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*103*		*25 - 150*	*11/29/18 17:03*	*12/01/18 18:06*	*1*
13C4 PFHpA	*129*		*25 - 150*	*11/29/18 17:03*	*12/01/18 18:06*	*1*
13C4 PFOA	*134*		*25 - 150*	*11/29/18 17:03*	*12/01/18 18:06*	*1*
13C4 PFOS	*104*		*25 - 150*	*11/29/18 17:03*	*12/01/18 18:06*	*1*
13C5 PFNA	*148*		*25 - 150*	*11/29/18 17:03*	*12/01/18 18:06*	*1*

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

TestAmerica Job ID: 320-45444-3

Client Sample ID: 483532
Date Collected: 11/14/18 11:56
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-13
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	2.8		2.0	0.92	ng/L		11/29/18 17:03	12/01/18 18:25	1
Perfluorohexanesulfonic acid (PFHxS)	9.3		2.0	0.87	ng/L		11/29/18 17:03	12/01/18 18:25	1
Perfluoroheptanoic acid (PFHpA)	1.0	J	2.0	0.80	ng/L		11/29/18 17:03	12/01/18 18:25	1
Perfluorooctanoic acid (PFOA)	1.2	J	2.0	0.75	ng/L		11/29/18 17:03	12/01/18 18:25	1
Perfluorooctanesulfonic acid (PFOS)	1.5	J	2.0	1.3	ng/L		11/29/18 17:03	12/01/18 18:25	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/29/18 17:03	12/01/18 18:25	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*101*		*25 - 150*	*11/29/18 17:03*	*12/01/18 18:25*	*1*
13C4 PFHpA	*131*		*25 - 150*	*11/29/18 17:03*	*12/01/18 18:25*	*1*
13C4 PFOA	*143*		*25 - 150*	*11/29/18 17:03*	*12/01/18 18:25*	*1*
13C4 PFOS	*112*		*25 - 150*	*11/29/18 17:03*	*12/01/18 18:25*	*1*
13C5 PFNA	*148*		*25 - 150*	*11/29/18 17:03*	*12/01/18 18:25*	*1*

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

TestAmerica Job ID: 320-45444-3

Client Sample ID: 173916
Date Collected: 11/14/18 10:35
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-14
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/29/18 17:03	12/01/18 18:43	1
Perfluorohexanesulfonic acid (PFHxS)	**2.2**		2.0	0.87	ng/L		11/29/18 17:03	12/01/18 18:43	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/29/18 17:03	12/01/18 18:43	1
Perfluorooctanoic acid (PFOA)	**0.78**	**J**	2.0	0.75	ng/L		11/29/18 17:03	12/01/18 18:43	1
Perfluorooctanesulfonic acid (PFOS)	**1.6**	**J**	2.0	1.3	ng/L		11/29/18 17:03	12/01/18 18:43	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/29/18 17:03	12/01/18 18:43	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*99*		*25 - 150*	*11/29/18 17:03*	*12/01/18 18:43*	*1*
13C4 PFHpA	*124*		*25 - 150*	*11/29/18 17:03*	*12/01/18 18:43*	*1*
13C4 PFOA	*133*		*25 - 150*	*11/29/18 17:03*	*12/01/18 18:43*	*1*
13C4 PFOS	*102*		*25 - 150*	*11/29/18 17:03*	*12/01/18 18:43*	*1*
13C5 PFNA	*140*		*25 - 150*	*11/29/18 17:03*	*12/01/18 18:43*	*1*

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

TestAmerica Job ID: 320-45444-3

Client Sample ID: 407372
Date Collected: 11/12/18 14:57
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-15
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/29/18 17:03	12/01/18 19:01	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/29/18 17:03	12/01/18 19:01	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/29/18 17:03	12/01/18 19:01	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/29/18 17:03	12/01/18 19:01	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/29/18 17:03	12/01/18 19:01	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/29/18 17:03	12/01/18 19:01	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*102*		*25 - 150*	*11/29/18 17:03*	*12/01/18 19:01*	*1*
13C4 PFHpA	*124*		*25 - 150*	*11/29/18 17:03*	*12/01/18 19:01*	*1*
13C4 PFOA	*131*		*25 - 150*	*11/29/18 17:03*	*12/01/18 19:01*	*1*
13C4 PFOS	*102*		*25 - 150*	*11/29/18 17:03*	*12/01/18 19:01*	*1*
13C5 PFNA	*139*		*25 - 150*	*11/29/18 17:03*	*12/01/18 19:01*	*1*

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

TestAmerica Job ID: 320-45444-3

Client Sample ID: 174016
Date Collected: 11/14/18 10:32
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-16
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/29/18 17:03	12/01/18 19:20	1
Perfluorohexanesulfonic acid (PFHxS)	**2.3**		2.0	0.87	ng/L		11/29/18 17:03	12/01/18 19:20	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/29/18 17:03	12/01/18 19:20	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/29/18 17:03	12/01/18 19:20	1
Perfluorooctanesulfonic acid (PFOS)	**1.6**	**J**	2.0	1.3	ng/L		11/29/18 17:03	12/01/18 19:20	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/29/18 17:03	12/01/18 19:20	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*98*		*25 - 150*	*11/29/18 17:03*	*12/01/18 19:20*	*1*
13C4 PFHpA	*125*		*25 - 150*	*11/29/18 17:03*	*12/01/18 19:20*	*1*
13C4 PFOA	*132*		*25 - 150*	*11/29/18 17:03*	*12/01/18 19:20*	*1*
13C4 PFOS	*104*		*25 - 150*	*11/29/18 17:03*	*12/01/18 19:20*	*1*
13C5 PFNA	*146*		*25 - 150*	*11/29/18 17:03*	*12/01/18 19:20*	*1*

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

TestAmerica Job ID: 320-45444-3

Client Sample ID: 176435
Date Collected: 11/14/18 14:23
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-17
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	10		2.0	0.92	ng/L		11/29/18 17:03	12/01/18 19:38	1
Perfluorohexanesulfonic acid (PFHxS)	47		2.0	0.87	ng/L		11/29/18 17:03	12/01/18 19:38	1
Perfluoroheptanoic acid (PFHpA)	3.0		2.0	0.80	ng/L		11/29/18 17:03	12/01/18 19:38	1
Perfluorooctanoic acid (PFOA)	3.8		2.0	0.75	ng/L		11/29/18 17:03	12/01/18 19:38	1
Perfluorooctanesulfonic acid (PFOS)	7.7		2.0	1.3	ng/L		11/29/18 17:03	12/01/18 19:38	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/29/18 17:03	12/01/18 19:38	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*105*		*25 - 150*	*11/29/18 17:03*	*12/01/18 19:38*	*1*
13C4 PFHpA	*128*		*25 - 150*	*11/29/18 17:03*	*12/01/18 19:38*	*1*
13C4 PFOA	*136*		*25 - 150*	*11/29/18 17:03*	*12/01/18 19:38*	*1*
13C4 PFOS	*109*		*25 - 150*	*11/29/18 17:03*	*12/01/18 19:38*	*1*
13C5 PFNA	*148*		*25 - 150*	*11/29/18 17:03*	*12/01/18 19:38*	*1*

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

TestAmerica Job ID: 320-45444-3

Client Sample ID: 550132
Date Collected: 11/14/18 13:28
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-18
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**2.4**		2.0	0.92	ng/L		11/29/18 17:03	12/01/18 19:56	1
Perfluorohexanesulfonic acid (PFHxS)	**12**		2.0	0.87	ng/L		11/29/18 17:03	12/01/18 19:56	1
Perfluoroheptanoic acid (PFHpA)	**1.8**	**J**	2.0	0.80	ng/L		11/29/18 17:03	12/01/18 19:56	1
Perfluorooctanoic acid (PFOA)	**2.8**		2.0	0.75	ng/L		11/29/18 17:03	12/01/18 19:56	1
Perfluorooctanesulfonic acid (PFOS)	**10**		2.0	1.3	ng/L		11/29/18 17:03	12/01/18 19:56	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/29/18 17:03	12/01/18 19:56	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*101*		*25 - 150*	*11/29/18 17:03*	*12/01/18 19:56*	*1*
13C4 PFHpA	*133*		*25 - 150*	*11/29/18 17:03*	*12/01/18 19:56*	*1*
13C4 PFOA	*142*		*25 - 150*	*11/29/18 17:03*	*12/01/18 19:56*	*1*
13C4 PFOS	*107*		*25 - 150*	*11/29/18 17:03*	*12/01/18 19:56*	*1*
13C5 PFNA	*147*		*25 - 150*	*11/29/18 17:03*	*12/01/18 19:56*	*1*

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

TestAmerica Job ID: 320-45444-3

Client Sample ID: 173002
Date Collected: 11/12/18 13:42
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-19
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	2.9		2.0	0.92	ng/L		11/29/18 17:03	12/01/18 20:15	1
Perfluorohexanesulfonic acid (PFHxS)	18		2.0	0.87	ng/L		11/29/18 17:03	12/01/18 20:15	1
Perfluoroheptanoic acid (PFHpA)	1.5	J	2.0	0.80	ng/L		11/29/18 17:03	12/01/18 20:15	1
Perfluorooctanoic acid (PFOA)	1.7	J	2.0	0.75	ng/L		11/29/18 17:03	12/01/18 20:15	1
Perfluorooctanesulfonic acid (PFOS)	3.8		2.0	1.3	ng/L		11/29/18 17:03	12/01/18 20:15	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/29/18 17:03	12/01/18 20:15	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*97*		*25 - 150*	*11/29/18 17:03*	*12/01/18 20:15*	*1*
13C4 PFHpA	*123*		*25 - 150*	*11/29/18 17:03*	*12/01/18 20:15*	*1*
13C4 PFOA	*129*		*25 - 150*	*11/29/18 17:03*	*12/01/18 20:15*	*1*
13C4 PFOS	*101*		*25 - 150*	*11/29/18 17:03*	*12/01/18 20:15*	*1*
13C5 PFNA	*143*		*25 - 150*	*11/29/18 17:03*	*12/01/18 20:15*	*1*

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

TestAmerica Job ID: 320-45444-3

Client Sample ID: 561711
Date Collected: 11/12/18 15:30
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-20
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/29/18 17:03	12/01/18 20:33	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/29/18 17:03	12/01/18 20:33	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/29/18 17:03	12/01/18 20:33	1
Perfluorooctanoic acid (PFOA)	**0.97**	**J**	2.0	0.75	ng/L		11/29/18 17:03	12/01/18 20:33	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/29/18 17:03	12/01/18 20:33	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/29/18 17:03	12/01/18 20:33	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*101*		*25 - 150*	*11/29/18 17:03*	*12/01/18 20:33*	*1*
13C4 PFHpA	*122*		*25 - 150*	*11/29/18 17:03*	*12/01/18 20:33*	*1*
13C4 PFOA	*134*		*25 - 150*	*11/29/18 17:03*	*12/01/18 20:33*	*1*
13C4 PFOS	*101*		*25 - 150*	*11/29/18 17:03*	*12/01/18 20:33*	*1*
13C5 PFNA	*141*		*25 - 150*	*11/29/18 17:03*	*12/01/18 20:33*	*1*

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

TestAmerica Job ID: 320-45444-3

Client Sample ID: 136891
Date Collected: 11/14/18 15:39
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-21
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**20**		2.0	0.92	ng/L		11/29/18 17:03	12/01/18 20:52	1
Perfluorohexanesulfonic acid (PFHxS)	**52**		2.0	0.87	ng/L		11/29/18 17:03	12/01/18 20:52	1
Perfluoroheptanoic acid (PFHpA)	**4.5**		2.0	0.80	ng/L		11/29/18 17:03	12/01/18 20:52	1
Perfluorooctanoic acid (PFOA)	**2.5**		2.0	0.75	ng/L		11/29/18 17:03	12/01/18 20:52	1
Perfluorooctanesulfonic acid (PFOS)	**7.1**		2.0	1.3	ng/L		11/29/18 17:03	12/01/18 20:52	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/29/18 17:03	12/01/18 20:52	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*99*		*25 - 150*	*11/29/18 17:03*	*12/01/18 20:52*	*1*
13C4 PFHpA	*124*		*25 - 150*	*11/29/18 17:03*	*12/01/18 20:52*	*1*
13C4 PFOA	*138*		*25 - 150*	*11/29/18 17:03*	*12/01/18 20:52*	*1*
13C4 PFOS	*100*		*25 - 150*	*11/29/18 17:03*	*12/01/18 20:52*	*1*
13C5 PFNA	*143*		*25 - 150*	*11/29/18 17:03*	*12/01/18 20:52*	*1*

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

TestAmerica Job ID: 320-45444-3

Client Sample ID: 173860
Date Collected: 11/14/18 18:18
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-22
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	50		2.0	0.92	ng/L		11/29/18 17:03	12/01/18 21:28	1
Perfluorohexanesulfonic acid (PFHxS)	41		2.0	0.87	ng/L		11/29/18 17:03	12/01/18 21:28	1
Perfluoroheptanoic acid (PFHpA)	5.7		2.0	0.80	ng/L		11/29/18 17:03	12/01/18 21:28	1
Perfluorooctanoic acid (PFOA)	2.8		2.0	0.75	ng/L		11/29/18 17:03	12/01/18 21:28	1
Perfluorooctanesulfonic acid (PFOS)	6.0		2.0	1.3	ng/L		11/29/18 17:03	12/01/18 21:28	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/29/18 17:03	12/01/18 21:28	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*98*		*25 - 150*	*11/29/18 17:03*	*12/01/18 21:28*	*1*
13C4 PFHpA	*121*		*25 - 150*	*11/29/18 17:03*	*12/01/18 21:28*	*1*
13C4 PFOA	*136*		*25 - 150*	*11/29/18 17:03*	*12/01/18 21:28*	*1*
13C4 PFOS	*102*		*25 - 150*	*11/29/18 17:03*	*12/01/18 21:28*	*1*
13C5 PFNA	*144*		*25 - 150*	*11/29/18 17:03*	*12/01/18 21:28*	*1*

Isotope Dilution Summary

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

TestAmerica Job ID: 320-45444-3

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)
320-45444-5	151637	81	99	112	85	111
320-45444-6	407313	100	132	140	106	146
320-45444-7	407364	102	126	134	109	145
320-45444-8	153699	105	128	139	109	149
320-45444-9	151203	104	129	144	109	150
320-45444-10	120804	100	122	134	108	140
320-45444-11	173363	104	129	138	109	151 *
320-45444-12	173463	103	129	134	104	148
320-45444-13	483532	101	131	143	112	148
320-45444-14	173916	99	124	133	102	140
320-45444-15	407372	102	124	131	102	139
320-45444-16	174016	98	125	132	104	146
320-45444-17	176435	105	128	136	109	148
320-45444-18	550132	101	133	142	107	147
320-45444-19	173002	97	123	129	101	143
320-45444-20	561711	101	122	134	101	141
320-45444-21	136891	99	124	138	100	143
320-45444-22	173860	98	121	136	102	144
LCS 320-262055/2-A	Lab Control Sample	100	119	119	104	126
LCSD 320-262055/3-A	Lab Control Sample Dup	107	130	125	112	129
MB 320-262055/1-A	Method Blank	98	117	125	110	124

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 320-262055/1-A
Matrix: Water
Analysis Batch: 262285

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 262055

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/29/18 17:03	12/01/18 14:44	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/29/18 17:03	12/01/18 14:44	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/29/18 17:03	12/01/18 14:44	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/29/18 17:03	12/01/18 14:44	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/29/18 17:03	12/01/18 14:44	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/29/18 17:03	12/01/18 14:44	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*98*		*25 - 150*	*11/29/18 17:03*	*12/01/18 14:44*	*1*
13C4 PFHpA	*117*		*25 - 150*	*11/29/18 17:03*	*12/01/18 14:44*	*1*
13C4 PFOA	*125*		*25 - 150*	*11/29/18 17:03*	*12/01/18 14:44*	*1*
13C4 PFOS	*110*		*25 - 150*	*11/29/18 17:03*	*12/01/18 14:44*	*1*
13C5 PFNA	*124*		*25 - 150*	*11/29/18 17:03*	*12/01/18 14:44*	*1*

Lab Sample ID: LCS 320-262055/2-A
Matrix: Water
Analysis Batch: 262285

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 262055

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	17.5		ng/L		99	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	18.3		ng/L		100	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	20.1		ng/L		100	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	19.5		ng/L		97	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	17.5		ng/L		94	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	20.3		ng/L		102	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*100*		*25 - 150*
13C4 PFHpA	*119*		*25 - 150*
13C4 PFOA	*119*		*25 - 150*
13C4 PFOS	*104*		*25 - 150*
13C5 PFNA	*126*		*25 - 150*

Lab Sample ID: LCSD 320-262055/3-A
Matrix: Water
Analysis Batch: 262285

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 262055

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	3	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	17.9		ng/L		98	73 - 157	2	30
Perfluoroheptanoic acid (PFHpA)			20.0	19.4		ng/L		97	71 - 138	3	30
Perfluorooctanoic acid (PFOA)			20.0	19.1		ng/L		95	70 - 140	2	30
Perfluorooctanesulfonic acid (PFOS)			18.6	16.8		ng/L		90	69 - 144	4	30
Perfluorononanoic acid (PFNA)			20.0	19.3		ng/L		96	73 - 147	5	30

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	107		25 - 150
13C4 PFHpA	130		25 - 150
13C4 PFOA	125		25 - 150
13C4 PFOS	112		25 - 150
13C5 PFNA	129		25 - 150

LCMS

Prep Batch: 262055

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-45444-5	151637	Total/NA	Water	PFAS Prep	
320-45444-6	407313	Total/NA	Water	PFAS Prep	
320-45444-7	407364	Total/NA	Water	PFAS Prep	
320-45444-8	153699	Total/NA	Water	PFAS Prep	
320-45444-9	151203	Total/NA	Water	PFAS Prep	
320-45444-10	120804	Total/NA	Water	PFAS Prep	
320-45444-11	173363	Total/NA	Water	PFAS Prep	
320-45444-12	173463	Total/NA	Water	PFAS Prep	
320-45444-13	483532	Total/NA	Water	PFAS Prep	
320-45444-14	173916	Total/NA	Water	PFAS Prep	
320-45444-15	407372	Total/NA	Water	PFAS Prep	
320-45444-16	174016	Total/NA	Water	PFAS Prep	
320-45444-17	176435	Total/NA	Water	PFAS Prep	
320-45444-18	550132	Total/NA	Water	PFAS Prep	
320-45444-19	173002	Total/NA	Water	PFAS Prep	
320-45444-20	561711	Total/NA	Water	PFAS Prep	
320-45444-21	136891	Total/NA	Water	PFAS Prep	
320-45444-22	173860	Total/NA	Water	PFAS Prep	
MB 320-262055/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-262055/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-262055/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 262285

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-45444-5	151637	Total/NA	Water	WS-LC-0025 At1	262055
320-45444-6	407313	Total/NA	Water	WS-LC-0025 At1	262055
320-45444-7	407364	Total/NA	Water	WS-LC-0025 At1	262055
320-45444-8	153699	Total/NA	Water	WS-LC-0025 At1	262055
320-45444-9	151203	Total/NA	Water	WS-LC-0025 At1	262055
320-45444-10	120804	Total/NA	Water	WS-LC-0025 At1	262055
320-45444-11	173363	Total/NA	Water	WS-LC-0025 At1	262055
320-45444-12	173463	Total/NA	Water	WS-LC-0025 At1	262055
320-45444-13	483532	Total/NA	Water	WS-LC-0025 At1	262055
320-45444-14	173916	Total/NA	Water	WS-LC-0025 At1	262055
320-45444-15	407372	Total/NA	Water	WS-LC-0025 At1	262055
320-45444-16	174016	Total/NA	Water	WS-LC-0025 At1	262055
320-45444-17	176435	Total/NA	Water	WS-LC-0025 At1	262055
320-45444-18	550132	Total/NA	Water	WS-LC-0025 At1	262055
320-45444-19	173002	Total/NA	Water	WS-LC-0025 At1	262055

LCMS (Continued)

Analysis Batch: 262285 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-45444-20	561711	Total/NA	Water	WS-LC-0025 At1	262055
320-45444-21	136891	Total/NA	Water	WS-LC-0025 At1	262055
320-45444-22	173860	Total/NA	Water	WS-LC-0025 At1	262055
MB 320-262055/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	262055
LCS 320-262055/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	262055
LCSD 320-262055/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	262055

Lab Chronicle

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

TestAmerica Job ID: 320-45444-3

Client Sample ID: 151637
Date Collected: 11/15/18 10:23
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-5
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	262055	11/29/18 17:03	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			262285	12/01/18 15:39	S1M	TAL SAC

Client Sample ID: 407313
Date Collected: 11/15/18 12:25
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-6
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	262055	11/29/18 17:03	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			262285	12/01/18 15:58	S1M	TAL SAC

Client Sample ID: 407364
Date Collected: 11/15/18 11:32
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-7
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	262055	11/29/18 17:03	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			262285	12/01/18 16:16	S1M	TAL SAC

Client Sample ID: 153699
Date Collected: 11/15/18 13:28
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-8
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	262055	11/29/18 17:03	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			262285	12/01/18 16:35	S1M	TAL SAC

Client Sample ID: 151203
Date Collected: 11/15/18 14:29
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-9
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	262055	11/29/18 17:03	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			262285	12/01/18 16:53	S1M	TAL SAC

Client Sample ID: 120804
Date Collected: 11/15/18 13:24
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-10
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	262055	11/29/18 17:03	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			262285	12/01/18 17:11	S1M	TAL SAC

Lab Chronicle

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

TestAmerica Job ID: 320-45444-3

Client Sample ID: 173363
Date Collected: 11/15/18 12:36
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-11
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	262055	11/29/18 17:03	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			262285	12/01/18 17:30	S1M	TAL SAC

Client Sample ID: 173463
Date Collected: 11/15/18 12:33
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-12
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	262055	11/29/18 17:03	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			262285	12/01/18 18:06	S1M	TAL SAC

Client Sample ID: 483532
Date Collected: 11/14/18 11:56
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-13
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	262055	11/29/18 17:03	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			262285	12/01/18 18:25	S1M	TAL SAC

Client Sample ID: 173916
Date Collected: 11/14/18 10:35
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-14
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	262055	11/29/18 17:03	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			262285	12/01/18 18:43	S1M	TAL SAC

Client Sample ID: 407372
Date Collected: 11/12/18 14:57
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-15
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	262055	11/29/18 17:03	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			262285	12/01/18 19:01	S1M	TAL SAC

Client Sample ID: 174016
Date Collected: 11/14/18 10:32
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-16
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	262055	11/29/18 17:03	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			262285	12/01/18 19:20	S1M	TAL SAC

Lab Chronicle

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

TestAmerica Job ID: 320-45444-3

Client Sample ID: 176435
Date Collected: 11/14/18 14:23
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-17
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	262055	11/29/18 17:03	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			262285	12/01/18 19:38	S1M	TAL SAC

Client Sample ID: 550132
Date Collected: 11/14/18 13:28
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-18
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	262055	11/29/18 17:03	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			262285	12/01/18 19:56	S1M	TAL SAC

Client Sample ID: 173002
Date Collected: 11/12/18 13:42
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-19
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	262055	11/29/18 17:03	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			262285	12/01/18 20:15	S1M	TAL SAC

Client Sample ID: 561711
Date Collected: 11/12/18 15:30
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-20
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	262055	11/29/18 17:03	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			262285	12/01/18 20:33	S1M	TAL SAC

Client Sample ID: 136891
Date Collected: 11/14/18 15:39
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-21
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	262055	11/29/18 17:03	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			262285	12/01/18 20:52	S1M	TAL SAC

Client Sample ID: 173860
Date Collected: 11/14/18 18:18
Date Received: 11/20/18 11:00

Lab Sample ID: 320-45444-22
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	262055	11/29/18 17:03	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			262285	12/01/18 21:28	S1M	TAL SAC

Lab Chronicle

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

TestAmerica Job ID: 320-45444-3

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: 320-45444-3

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
ANAB	DoD ELAP		L2468	01-20-21
Arizona	State Program	9	AZ0708	08-11-19
Arkansas DEQ	State Program	6	88-0691	06-17-19
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-19
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-19
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-19
Louisiana	NELAP	6	30612	06-30-19
Maine	State Program	1	CA0004	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-19
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-19
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
US Fish & Wildlife	Federal		LE148388-0	07-31-19
USDA	Federal		P330-18-00239	01-17-21
USEPA UCMR	Federal	1	CA00044	12-31-20
Utah	NELAP	8	CA00044	02-28-19
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

Method Summary

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

TestAmerica Job ID: 320-45444-3

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC
PFAS Prep	Preparation, Direct Inject PFAS	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: 320-45444-3

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-45444-5	151637	Water	11/15/18 10:23	11/20/18 11:00
320-45444-6	407313	Water	11/15/18 12:25	11/20/18 11:00
320-45444-7	407364	Water	11/15/18 11:32	11/20/18 11:00
320-45444-8	153699	Water	11/15/18 13:28	11/20/18 11:00
320-45444-9	151203	Water	11/15/18 14:29	11/20/18 11:00
320-45444-10	120804	Water	11/15/18 13:24	11/20/18 11:00
320-45444-11	173363	Water	11/15/18 12:36	11/20/18 11:00
320-45444-12	173463	Water	11/15/18 12:33	11/20/18 11:00
320-45444-13	483532	Water	11/14/18 11:56	11/20/18 11:00
320-45444-14	173916	Water	11/14/18 10:35	11/20/18 11:00
320-45444-15	407372	Water	11/12/18 14:57	11/20/18 11:00
320-45444-16	174016	Water	11/14/18 10:32	11/20/18 11:00
320-45444-17	176435	Water	11/14/18 14:23	11/20/18 11:00
320-45444-18	550132	Water	11/14/18 13:28	11/20/18 11:00
320-45444-19	173002	Water	11/12/18 13:42	11/20/18 11:00
320-45444-20	561711	Water	11/12/18 15:30	11/20/18 11:00
320-45444-21	136891	Water	11/14/18 15:39	11/20/18 11:00
320-45444-22	173860	Water	11/14/18 18:18	11/20/18 11:00

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

CHAIN-OF-CUSTODY RECORD

Laboratory Test America
Attn: D. 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 UCMR x6						Total Number of Containers	Remarks/Matrix
151637		1023	11/15/18		X	X						2	ground water
407313		1225	11/15/18		X	X						2	
407364		1132	11/15/18		X	X						2	
153699		1328	11/15/18		X	X						2	
151203		1429	11/15/18		X	X						2	
120804		1324	11/16/18		X	X						2	
173363		1236	11/16/18		X	X						2	
173463		1233	11/16/18		X	X						2	

Project Information		Sample Receipt	
Project Number:	20060-002	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:	ARM, GCD, MDN	Goldstreak (attach shipping bill, if any)	

Instructions	
Requested Turnaround Time:	Standard
Special Instructions:	

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 14:45	Signature: Time:	Signature: Time:
Printed Name: G. Cherissa DuKelow Date: 11/19/18	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson, Inc.	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 1100	Signature: Time:	Signature: Time:
Printed Name: Edric Chung Date: 11/20/18	Printed Name: Date:	Printed Name: Date:
Company: TA-SHC	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. 34520

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
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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

Laboratory Test America
Attn: D. Alltucker

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

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	BTAS ICME x6						Total Number of Containers	Remarks/Matrix
483532		1156	11/14/18			X						2	Groundwater
173916		1035	11/14/18			X							
407372		1457	11/12/18			X							
174016		1032	11/14/18			X							
176435		1423	11/14/18			X							
550132		1328	11/14/18			X							
173002		1342	11/12/18			X							
561711		1530	11/12/18			X							
136891		1539	11/14/18			X							
173860		1318	11/14/18			X							

Project Information	Sample Receipt
Project Number: 20060-002	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: ABM, GCD, MDN	(attach shipping bill, if any)

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 14:45	Signature: Time:	Signature: Time:
Printed Name: G. Clerissa Dukelow Date: 11/19/18	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson, Inc	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 1100	Signature: Time:	Signature: Time:
Printed Name: Edric Chung Date: 11/20/18	Printed Name: Date:	Printed Name: Date:
Company: TA-SAC	Company:	Company:

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

F-19-91/UR

No. 34519

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-45444-3

Login Number: 45444
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	SEALS
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
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:

December 6, 2018

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

December 5, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-45444-3 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 PFAS. 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:

The sample coolers were recorded at 3.1° C and 4.7° C upon receipt at the laboratory.

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

   ◉ Yes ○ No Comments:

Analysis of PFAS compounds 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 two coolers upon receipt at the laboratory were 3.1º C and 4.7º C.

IDA recovery is above the method recommended limit for 13C5 PFNA for sample *1736363*. The sample identified by the laboratory was a mistake and should be *173363*.

The case narrative notes there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) with preparation batch 320-262055. It further notes most samples were orange in color.

c. Were all corrective actions documented?

○ Yes ◉ No Comments:

N/A; 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 laboratory notes quantitation by isotope dilution generally precludes any adverse effect on data quality due to elevated IDA recoveries. However, the IDA recovery failure is discussed in section 6c.

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 the applicable ADEC action level for drinking water 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:

The percent recovery for 13C5 PFNA was above laboratory limits for sample *173363*. The other IDA recoveries were within laboratory limits.

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

◉ Yes ○ No Comments:

The PFNA result for sample *173363* is considered estimated, no direction of bias, and is flagged 'UJ.'

iv. Data quality or usability affected?

Comments:

Yes; 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:

PFAS 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 samples were submitted with this work order.

ii. Submitted blind to lab?

◉ Yes ○ No Comments:

Field duplicate sample *173463* is associated with sample *173363*; field duplicate sample *174016* is associated with sample *173916.*

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:

Field duplicate RPDs are within the recommended ranges, 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 in this work order were 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 with this work order.

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: 320-45633-1
Client Project/Site: FAI

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

Attn: Marcy Nadel

Authorized for release by:
12/7/2018 1:16:08 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: 320-45633-1

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: 320-45633-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-45633-1

Receipt
The sample was received on 11/28/2018 1:00 PM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.0º C.

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

Organic Prep
Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-262970.

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: 320-45633-1

Client Sample ID: 176095

Lab Sample ID: 320-45633-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.0	J	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)	3.1		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	3.8		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: FAI

TestAmerica Job ID: 320-45633-1

Client Sample ID: 176095
Date Collected: 11/20/18 15:24
Date Received: 11/28/18 13:00

Lab Sample ID: 320-45633-1
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**1.0**	**J**	2.0	0.92	ng/L		12/04/18 10:44	12/05/18 14:10	1
Perfluorohexanesulfonic acid (PFHxS)	**5.5**		2.0	0.87	ng/L		12/04/18 10:44	12/05/18 14:10	1
Perfluoroheptanoic acid (PFHpA)	**1.7**	**J**	2.0	0.80	ng/L		12/04/18 10:44	12/05/18 14:10	1
Perfluorooctanoic acid (PFOA)	**3.1**		2.0	0.75	ng/L		12/04/18 10:44	12/05/18 14:10	1
Perfluorooctanesulfonic acid (PFOS)	**3.8**		2.0	1.3	ng/L		12/04/18 10:44	12/05/18 14:10	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/04/18 10:44	12/05/18 14:10	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*116*		*25 - 150*	*12/04/18 10:44*	*12/05/18 14:10*	*1*
13C4 PFHpA	*120*		*25 - 150*	*12/04/18 10:44*	*12/05/18 14:10*	*1*
13C4 PFOA	*125*		*25 - 150*	*12/04/18 10:44*	*12/05/18 14:10*	*1*
13C4 PFOS	*115*		*25 - 150*	*12/04/18 10:44*	*12/05/18 14:10*	*1*
13C5 PFNA	*123*		*25 - 150*	*12/04/18 10:44*	*12/05/18 14:10*	*1*

Isotope Dilution Summary

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

TestAmerica Job ID: 320-45633-1

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)
320-45633-1	176095	116	120	125	115	123
LCS 320-262970/2-A	Lab Control Sample	110	108	113	109	115
LCSD 320-262970/3-A	Lab Control Sample Dup	102	103	112	102	110
MB 320-262970/1-A	Method Blank	107	110	116	106	112

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 320-262970/1-A
Matrix: Water
Analysis Batch: 262935

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 262970

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/04/18 10:44	12/05/18 09:53	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		12/04/18 10:44	12/05/18 09:53	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/04/18 10:44	12/05/18 09:53	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/04/18 10:44	12/05/18 09:53	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		12/04/18 10:44	12/05/18 09:53	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/04/18 10:44	12/05/18 09:53	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*107*		*25 - 150*	*12/04/18 10:44*	*12/05/18 09:53*	*1*
13C4 PFHpA	*110*		*25 - 150*	*12/04/18 10:44*	*12/05/18 09:53*	*1*
13C4 PFOA	*116*		*25 - 150*	*12/04/18 10:44*	*12/05/18 09:53*	*1*
13C4 PFOS	*106*		*25 - 150*	*12/04/18 10:44*	*12/05/18 09:53*	*1*
13C5 PFNA	*112*		*25 - 150*	*12/04/18 10:44*	*12/05/18 09:53*	*1*

Lab Sample ID: LCS 320-262970/2-A
Matrix: Water
Analysis Batch: 262935

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 262970

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	17.0		ng/L		96	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	16.9		ng/L		93	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	20.1		ng/L		101	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	19.1		ng/L		95	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	17.1		ng/L		92	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	19.0		ng/L		95	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*110*		*25 - 150*
13C4 PFHpA	*108*		*25 - 150*
13C4 PFOA	*113*		*25 - 150*
13C4 PFOS	*109*		*25 - 150*
13C5 PFNA	*115*		*25 - 150*

Lab Sample ID: LCSD 320-262970/3-A
Matrix: Water
Analysis Batch: 262935

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 262970

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	5	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	18.0		ng/L		99	73 - 157	6	30
Perfluoroheptanoic acid (PFHpA)			20.0	20.6		ng/L		103	71 - 138	2	30
Perfluorooctanoic acid (PFOA)			20.0	18.9		ng/L		94	70 - 140	1	30
Perfluorooctanesulfonic acid (PFOS)			18.6	18.7		ng/L		101	69 - 144	9	30
Perfluorononanoic acid (PFNA)			20.0	18.8		ng/L		94	73 - 147	1	30

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

TestAmerica Job ID: 320-45633-1

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	102		25 - 150
13C4 PFHpA	103		25 - 150
13C4 PFOA	112		25 - 150
13C4 PFOS	102		25 - 150
13C5 PFNA	110		25 - 150

QC Association Summary

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

TestAmerica Job ID: 320-45633-1

LCMS

Analysis Batch: 262935

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-45633-1	176095	Total/NA	Water	WS-LC-0025 At1	262970
MB 320-262970/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	262970
LCS 320-262970/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	262970
LCSD 320-262970/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	262970

Prep Batch: 262970

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-45633-1	176095	Total/NA	Water	PFAS Prep	
MB 320-262970/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-262970/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-262970/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Lab Chronicle

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

TestAmerica Job ID: 320-45633-1

Client Sample ID: 176095
Date Collected: 11/20/18 15:24
Date Received: 11/28/18 13:00

Lab Sample ID: 320-45633-1
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	262970	12/04/18 10:44	JRM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			262935	12/05/18 14:10	D1R	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: 320-45633-1

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
ANAB	DoD ELAP		L2468	01-20-21
Arizona	State Program	9	AZ0708	08-11-19
Arkansas DEQ	State Program	6	88-0691	06-17-19
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-19
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-19
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-19
Louisiana	NELAP	6	30612	06-30-19
Maine	State Program	1	CA0004	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-19
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-19
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
US Fish & Wildlife	Federal		LE148388-0	07-31-19
USDA	Federal		P330-18-00239	01-17-21
USEPA UCMR	Federal	1	CA00044	12-31-20
Utah	NELAP	8	CA00044	02-28-19
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

Method Summary

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

TestAmerica Job ID: 320-45633-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC
PFAS Prep	Preparation, Direct Inject PFAS	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: 320-45633-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-45633-1	176095	Water	11/20/18 15:24	11/28/18 13:00

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

CHAIN-OF-CUSTODY RECORD

Page 1 of ____

Laboratory Test America
Attn: D. Allteker

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 UCMR x6						Total Number of Containers	Remarks/Matrix
176095		1524	11/20/18		X							2	Groundwater

320-45633 Chain of Custody

Project Information	
Project Number:	20060-002
Project Name:	PA1
Contact:	MDN
Ongoing Project? Yes ☒ No ☐	
Sampler:	AFM

Sample Receipt	
Total Number of Containers	2
COC Seals/Intact? Y/N/NA	
Received Good Cond./Cold	
Delivery Method: goldstreak (attach shipping bill, if any)	

Instructions

Requested Turnaround Time: std.

Special Instructions: Bill to SWI

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: 1615	Signature: Time:	Signature: Time:
Printed Name: Sheila Hinckley Date: 11/27/18	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson, Inc.	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: [signature] Time: 1300	Signature: Time:	Signature: Time:
Printed Name: David Ke Date: 11/28/18	Printed Name: Date:	Printed Name: Date:
Company: TA Sac	Company:	Company:

F-19-91/UR

No. 34521

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-45633-1

Login Number: 45633
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	SEAL
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Laboratory Data Review Checklist

Completed By:

Michael Jaramillo

Title:

Chemist

Date:

December 26, 2018

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

December 7, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-45633-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-45633-1

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 PFAS. 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 PFAS 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 to document.

e. Data quality or usability affected?

Comments:

No; 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 samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 5.0º C.

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

c. Were all corrective actions documented?

○ Yes ◉ No Comments:

N/A; 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 ADEC action level for drinking water 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:

LCS/LCSD samples were reported for PFAS analyses.

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:

PFAS 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 was not submitted with this work order. However, field-duplicates were submitted at the required frequency of 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; 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 with this work order.

ii. If above LOQ, what samples are affected?

Comments:

None; see above.

iii. Data quality or usability affected?

Comments:

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

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: 320-45879-1
Client Project/Site: FAI

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

Attn: Marcy Nadel

Authorized for release by:
12/13/2018 3:29:29 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: 320-45879-1

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: 320-45879-1

Job ID: 320-45879-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-45879-1

Receipt
The sample was received on 12/5/2018 11:00 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.6º C.

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

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

Detection Summary

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

TestAmerica Job ID: 320-45879-1

Client Sample ID: 173975

Lab Sample ID: 320-45879-1

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)	1.7	J	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: 320-45879-1

Client Sample ID: 173975
Date Collected: 11/30/18 10:23
Date Received: 12/05/18 11:00

Lab Sample ID: 320-45879-1
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		12/10/18 10:58	12/11/18 06:28	1
Perfluorohexanesulfonic acid (PFHxS)	**1.7**	**J**	2.0	0.87	ng/L		12/10/18 10:58	12/11/18 06:28	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/10/18 10:58	12/11/18 06:28	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/10/18 10:58	12/11/18 06:28	1
Perfluorooctanesulfonic acid (PFOS)	**1.7**	**J**	2.0	1.3	ng/L		12/10/18 10:58	12/11/18 06:28	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/10/18 10:58	12/11/18 06:28	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*114*		*25 - 150*	*12/10/18 10:58*	*12/11/18 06:28*	*1*
13C4 PFHpA	*114*		*25 - 150*	*12/10/18 10:58*	*12/11/18 06:28*	*1*
13C4 PFOA	*122*		*25 - 150*	*12/10/18 10:58*	*12/11/18 06:28*	*1*
13C4 PFOS	*112*		*25 - 150*	*12/10/18 10:58*	*12/11/18 06:28*	*1*
13C5 PFNA	*114*		*25 - 150*	*12/10/18 10:58*	*12/11/18 06:28*	*1*

Isotope Dilution Summary

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

TestAmerica Job ID: 320-45879-1

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)
320-45879-1	173975	114	114	122	112	114
LCS 320-264218/2-A	Lab Control Sample	108	107	106	107	108
LCSD 320-264218/3-B	Lab Control Sample Dup	113	116	112	115	116
MB 320-264218/1-A	Method Blank	108	107	111	110	112

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 320-264218/1-A
Matrix: Water
Analysis Batch: 264296

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 264218

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/10/18 10:58	12/11/18 02:30	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		12/10/18 10:58	12/11/18 02:30	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/10/18 10:58	12/11/18 02:30	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/10/18 10:58	12/11/18 02:30	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		12/10/18 10:58	12/11/18 02:30	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/10/18 10:58	12/11/18 02:30	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*108*		*25 - 150*	*12/10/18 10:58*	*12/11/18 02:30*	*1*
13C4 PFHpA	*107*		*25 - 150*	*12/10/18 10:58*	*12/11/18 02:30*	*1*
13C4 PFOA	*111*		*25 - 150*	*12/10/18 10:58*	*12/11/18 02:30*	*1*
13C4 PFOS	*110*		*25 - 150*	*12/10/18 10:58*	*12/11/18 02:30*	*1*
13C5 PFNA	*112*		*25 - 150*	*12/10/18 10:58*	*12/11/18 02:30*	*1*

Lab Sample ID: LCS 320-264218/2-A
Matrix: Water
Analysis Batch: 264296

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 264218

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	19.3		ng/L		109	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	18.9		ng/L		104	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	21.4		ng/L		107	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	21.7		ng/L		108	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	19.2		ng/L		103	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	21.1		ng/L		105	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*108*		*25 - 150*
13C4 PFHpA	*107*		*25 - 150*
13C4 PFOA	*106*		*25 - 150*
13C4 PFOS	*107*		*25 - 150*
13C5 PFNA	*108*		*25 - 150*

Lab Sample ID: LCSD 320-264218/3-B
Matrix: Water
Analysis Batch: 264296

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 264218

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	19.7		ng/L		112	72 - 151	2	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	20.1		ng/L		110	73 - 157	6	30
Perfluoroheptanoic acid (PFHpA)			20.0	22.4		ng/L		112	71 - 138	5	30
Perfluorooctanoic acid (PFOA)			20.0	21.7		ng/L		108	70 - 140	0	30
Perfluorooctanesulfonic acid (PFOS)			18.6	19.7		ng/L		106	69 - 144	3	30
Perfluorononanoic acid (PFNA)			20.0	22.4		ng/L		112	73 - 147	6	30

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

TestAmerica Job ID: 320-45879-1

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	113		25 - 150
13C4 PFHpA	116		25 - 150
13C4 PFOA	112		25 - 150
13C4 PFOS	115		25 - 150
13C5 PFNA	116		25 - 150

QC Association Summary

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

TestAmerica Job ID: 320-45879-1

LCMS

Prep Batch: 264218

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-45879-1	173975	Total/NA	Water	PFAS Prep	
MB 320-264218/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-264218/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-264218/3-B	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 264296

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-45879-1	173975	Total/NA	Water	WS-LC-0025 At1	264218
MB 320-264218/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	264218
LCS 320-264218/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	264218
LCSD 320-264218/3-B	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	264218

Lab Chronicle

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

TestAmerica Job ID: 320-45879-1

Client Sample ID: 173975
Date Collected: 11/30/18 10:23
Date Received: 12/05/18 11:00

Lab Sample ID: 320-45879-1
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	264218	12/10/18 10:58	JRM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			264296	12/11/18 06:28	D1R	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: 320-45879-1

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
ANAB	DoD ELAP		L2468	01-20-21
Arizona	State Program	9	AZ0708	08-11-19
Arkansas DEQ	State Program	6	88-0691	06-17-19
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-19
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-19
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-19
Louisiana	NELAP	6	30612	06-30-19
Maine	State Program	1	CA0004	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-19
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-19
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
US Fish & Wildlife	Federal		LE148388-0	07-31-19
USDA	Federal		P330-18-00239	01-17-21
USEPA UCMR	Federal	1	CA00044	12-31-20
Utah	NELAP	8	CA00044	02-28-19
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

Method Summary

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

TestAmerica Job ID: 320-45879-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC
PFAS Prep	Preparation, Direct Inject PFAS	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: 320-45879-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-45879-1	173975	Water	11/30/18 10:23	12/05/18 11:00

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: D. Alltucker

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

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PKAS x6						Total Number of Containers	Remarks/Matrix
173975		1023	11/30/2018		X	X						2	Groundwater

320-45879 Chain of Custody

Project Information		Sample Receipt	
Project Number:	20060-002	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:	Standard
Special Instructions:	

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: [signature] Time: 1400	Signature: Time:	Signature: Time:
Printed Name: Sheila Hinckley Date: 12/4/18	Printed Name: Date:	Printed Name: Date:
Company: Shannon + Wilson, Inc.	Company:	Company:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: [signature] Time: 1130	Signature: Time:	Signature: Time:
Printed Name: Dan Alltucker Date: 12/5/18	Printed Name: Date:	Printed Name: Date:
Company: TA Sea	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. 34522

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-45879-1

Login Number: 45879
List Number: 1
Creator: Horner, Nathaniel 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	seals
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
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").	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:

Michael Jaramillo

Title:

Chemist

Date:

December 26, 2018

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

December 13, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-45879-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-45879-1

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 PFAS. 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 PFAS 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 to document.

e. Data quality or usability affected?

Comments:

No; 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 samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 0.6º C.

c. Were all corrective actions documented?

○ Yes ◉ No Comments:

N/A; 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 ADEC action level for drinking water 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:

LCS/LCSD samples were reported for PFAS analyses.

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:

PFAS 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 was not submitted with this work order. However, field-duplicates were submitted at the required frequency of 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)

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

Where R_1 = Sample Concentration
R_2 = Field Duplicate Concentration

○ Yes ◉ No Comments:

N/A; 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; 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 with this work order.

ii. If above LOQ, what samples are affected?

Comments:

None; see above.

iii. Data quality or usability affected?

Comments:

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

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: 320-46123-1
Client Project/Site: FAI

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

Attn: Marcy Nadel

Authorized for release by:
12/19/2018 8:19:42 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: 320-46123-1

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: 320-46123-1

Job ID: 320-46123-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-46123-1

Receipt
The samples were received on 12/13/2018 11:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.2º 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 320-265282.

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: 320-46123-1

Client Sample ID: 176222 — Lab Sample ID: 320-46123-1

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)	11		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.8		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)	6.4		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: 604691 — Lab Sample ID: 320-46123-2

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)	6.1		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
Perfluorooctanoic acid (PFOA)	2.9		2.0	0.75	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: 320-46123-1

Client Sample ID: 176222
Date Collected: 12/05/18 14:45
Date Received: 12/13/18 11:30

Lab Sample ID: 320-46123-1
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**1.7**	**J**	2.0	0.92	ng/L		12/14/18 10:59	12/15/18 04:31	1
Perfluorohexanesulfonic acid (PFHxS)	**11**		2.0	0.87	ng/L		12/14/18 10:59	12/15/18 04:31	1
Perfluoroheptanoic acid (PFHpA)	**2.8**		2.0	0.80	ng/L		12/14/18 10:59	12/15/18 04:31	1
Perfluorooctanoic acid (PFOA)	**5.8**		2.0	0.75	ng/L		12/14/18 10:59	12/15/18 04:31	1
Perfluorooctanesulfonic acid (PFOS)	**6.4**		2.0	1.3	ng/L		12/14/18 10:59	12/15/18 04:31	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/14/18 10:59	12/15/18 04:31	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*119*		*25 - 150*	*12/14/18 10:59*	*12/15/18 04:31*	*1*
13C4 PFHpA	*120*		*25 - 150*	*12/14/18 10:59*	*12/15/18 04:31*	*1*
13C4 PFOA	*117*		*25 - 150*	*12/14/18 10:59*	*12/15/18 04:31*	*1*
13C4 PFOS	*115*		*25 - 150*	*12/14/18 10:59*	*12/15/18 04:31*	*1*
13C5 PFNA	*115*		*25 - 150*	*12/14/18 10:59*	*12/15/18 04:31*	*1*

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

TestAmerica Job ID: 320-46123-1

Client Sample ID: 604691
Date Collected: 12/12/18 14:32
Date Received: 12/13/18 11:30

Lab Sample ID: 320-46123-2
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**4.8**		2.0	0.92	ng/L		12/14/18 10:59	12/15/18 04:49	1
Perfluorohexanesulfonic acid (PFHxS)	**6.1**		2.0	0.87	ng/L		12/14/18 10:59	12/15/18 04:49	1
Perfluoroheptanoic acid (PFHpA)	**2.0**		2.0	0.80	ng/L		12/14/18 10:59	12/15/18 04:49	1
Perfluorooctanoic acid (PFOA)	**2.9**		2.0	0.75	ng/L		12/14/18 10:59	12/15/18 04:49	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		12/14/18 10:59	12/15/18 04:49	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/14/18 10:59	12/15/18 04:49	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*110*		*25 - 150*	*12/14/18 10:59*	*12/15/18 04:49*	*1*
13C4 PFHpA	*109*		*25 - 150*	*12/14/18 10:59*	*12/15/18 04:49*	*1*
13C4 PFOA	*117*		*25 - 150*	*12/14/18 10:59*	*12/15/18 04:49*	*1*
13C4 PFOS	*109*		*25 - 150*	*12/14/18 10:59*	*12/15/18 04:49*	*1*
13C5 PFNA	*119*		*25 - 150*	*12/14/18 10:59*	*12/15/18 04:49*	*1*

Isotope Dilution Summary

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

TestAmerica Job ID: 320-46123-1

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)
320-46123-1	176222	119	120	117	115	115
320-46123-2	604691	110	109	117	109	119
LCS 320-265282/2-A	Lab Control Sample	114	111	110	114	115
LCSD 320-265282/3-A	Lab Control Sample Dup	113	110	106	110	113
MB 320-265282/1-A	Method Blank	114	113	111	111	116

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 320-265282/1-A
Matrix: Water
Analysis Batch: 265413

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 265282

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/14/18 10:59	12/15/18 03:36	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		12/14/18 10:59	12/15/18 03:36	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/14/18 10:59	12/15/18 03:36	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/14/18 10:59	12/15/18 03:36	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		12/14/18 10:59	12/15/18 03:36	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/14/18 10:59	12/15/18 03:36	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*114*		*25 - 150*	*12/14/18 10:59*	*12/15/18 03:36*	*1*
13C4 PFHpA	*113*		*25 - 150*	*12/14/18 10:59*	*12/15/18 03:36*	*1*
13C4 PFOA	*111*		*25 - 150*	*12/14/18 10:59*	*12/15/18 03:36*	*1*
13C4 PFOS	*111*		*25 - 150*	*12/14/18 10:59*	*12/15/18 03:36*	*1*
13C5 PFNA	*116*		*25 - 150*	*12/14/18 10:59*	*12/15/18 03:36*	*1*

Lab Sample ID: LCS 320-265282/2-A
Matrix: Water
Analysis Batch: 265413

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 265282

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanesulfonic acid (PFBS)			17.7	18.7		ng/L		106	72 - 151		
Perfluorohexanesulfonic acid (PFHxS)			18.2	18.8		ng/L		103	73 - 157		
Perfluoroheptanoic acid (PFHpA)			20.0	21.7		ng/L		109	71 - 138		
Perfluorooctanoic acid (PFOA)			20.0	20.0		ng/L		100	70 - 140		
Perfluorooctanesulfonic acid (PFOS)			18.6	18.9		ng/L		102	69 - 144		
Perfluorononanoic acid (PFNA)			20.0	20.7		ng/L		104	73 - 147		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*114*		*25 - 150*
13C4 PFHpA	*111*		*25 - 150*
13C4 PFOA	*110*		*25 - 150*
13C4 PFOS	*114*		*25 - 150*
13C5 PFNA	*115*		*25 - 150*

Lab Sample ID: LCSD 320-265282/3-A
Matrix: Water
Analysis Batch: 265413

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 265282

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)			17.7	19.0		ng/L		107	72 - 151	2	30
Perfluorohexanesulfonic acid (PFHxS)			18.2	19.5		ng/L		107	73 - 157	3	30
Perfluoroheptanoic acid (PFHpA)			20.0	22.8		ng/L		114	71 - 138	5	30
Perfluorooctanoic acid (PFOA)			20.0	22.3		ng/L		111	70 - 140	11	30
Perfluorooctanesulfonic acid (PFOS)			18.6	19.9		ng/L		107	69 - 144	5	30
Perfluorononanoic acid (PFNA)			20.0	22.8		ng/L		114	73 - 147	10	30

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

TestAmerica Job ID: 320-46123-1

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
18O2 PFHxS	113		25 - 150
13C4 PFHpA	110		25 - 150
13C4 PFOA	106		25 - 150
13C4 PFOS	110		25 - 150
13C5 PFNA	113		25 - 150

QC Association Summary

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

TestAmerica Job ID: 320-46123-1

LCMS

Prep Batch: 265282

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-46123-1	176222	Total/NA	Water	PFAS Prep	
320-46123-2	604691	Total/NA	Water	PFAS Prep	
MB 320-265282/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-265282/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-265282/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 265413

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-46123-1	176222	Total/NA	Water	WS-LC-0025 At1	265282
320-46123-2	604691	Total/NA	Water	WS-LC-0025 At1	265282
MB 320-265282/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	265282
LCS 320-265282/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	265282
LCSD 320-265282/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	265282

Lab Chronicle

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

TestAmerica Job ID: 320-46123-1

Client Sample ID: 176222

Lab Sample ID: 320-46123-1

Date Collected: 12/05/18 14:45

Matrix: Water

Date Received: 12/13/18 11:30

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	265282	12/14/18 10:59	JRM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			265413	12/15/18 04:31	D1R	TAL SAC

Client Sample ID: 604691

Lab Sample ID: 320-46123-2

Date Collected: 12/12/18 14:32

Matrix: Water

Date Received: 12/13/18 11:30

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	265282	12/14/18 10:59	JRM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			265413	12/15/18 04:49	D1R	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: 320-46123-1

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
ANAB	DoD ELAP		L2468	01-20-21
Arizona	State Program	9	AZ0708	08-11-19
Arkansas DEQ	State Program	6	88-0691	06-17-19
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-19
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-19
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-19
Louisiana	NELAP	6	30612	06-30-19
Maine	State Program	1	CA0004	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-19
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-19
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
US Fish & Wildlife	Federal		LE148388-0	07-31-19
USDA	Federal		P330-18-00239	01-17-21
USEPA UCMR	Federal	1	CA00044	12-31-20
Utah	NELAP	8	CA00044	02-28-19
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

Method Summary

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

TestAmerica Job ID: 320-46123-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC
PFAS Prep	Preparation, Direct Inject PFAS	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: 320-46123-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-46123-1	176222	Water	12/05/18 14:45	12/13/18 11:30
320-46123-2	604691	Water	12/12/18 14:32	12/13/18 11:30

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

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Laboratory TestAmerica
Attn: D. Alltucker

Analytical Methods (include preservative if used)

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

Sample Identity	Lab No.	Time	Date Sampled	PFAS x6 WS-LC-0025	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
176222		1445	12/5/18	X	2	groundwater
604691		1432	12/12/18	X	2	1

320-46123 Chain of Custody

Project Information		Sample Receipt	
Number:	20060-002	Total No. of Containers:	
Name:	FAI	COC Seals/Intact? Y/N/NA	
Contact:	MDN	Received Good Cond./Cold	
Ongoing Project?	Yes ☒ No ☐	Temp:	
Sampler:	AEM	Delivery Method:	

Notes:

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 1501	Signature: Time: 12-13-18	Signature: Time:
Printed Name: A. Masters Date: 12/12/18	Printed Name: C. Hatrek Date: 1130	Printed Name: Date:
Company: Shannon+Wilson, INC	Company: TAS LAB	Company:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: Time:	Signature: Time:	Signature: Time:
Printed Name: Date:	Printed Name: Date:	Printed Name: Date:
Company:	Company:	Company:

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

5.2°C

No. 35641

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-46123-1

Login Number: 46123
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	188201, 188202
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:

Chemist

Date:

December 26, 2018

CS Report Name:

Fairbanks International Airport (FAI)

Report Date:

December 19, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-46123-1

ADEC File Number:

100.38.277

Hazard Identification Number:

26816

320-46123-1

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 PFAS. 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:

The laboratory signature for receiving the samples was in the incorrect location on the COC. However, the receipt date and time on the COC match the receipt date and time in the case narrative. This discrepancy does not affect the sample results.

   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 PFAS 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 to document.

e. Data quality or usability affected?

Comments:

No; 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 samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 5.2º C.

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

c. Were all corrective actions documented?

○ Yes ◉ No Comments:

N/A; 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 ADEC action level for drinking water 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:

LCS/LCSD samples were reported for PFAS analyses.

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:

PFAS 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 was not submitted with this work order. However, field-duplicates were submitted at the required frequency of 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; 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 with this work order.

ii. If above LOQ, what samples are affected?

Comments:

None; see above.

iii. Data quality or usability affected?

Comments:

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

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.