



# FLEIS & VANDENBRINK

DESIGN. BUILD. OPERATE.

January 12, 2018

Village of Sparta  
C/O Randy Carter  
156 E. Division  
[r.carter@spartami.org](mailto:r.carter@spartami.org)

**RE: Residential Well Water Sampling Results  
Sampling Date December 28, 2018**

Dear Randy:

Attached is the laboratory report from samples we collected on December 28, 2018 from your potable wells #2, #3 and #5. The samples were analyzed by Pace in Minneapolis, Minnesota for a limited number of perflourinated compounds including perflourinated Perfluorooctane sulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA).

The samples were un-treated groundwater collected from aerator-free copper ports in the corresponding well houses. The laboratory report is summarized below. For reference, the table includes the MDEQ PFOS/PFOA Part 201 Generic Residential and Non-Residential Cleanup Criteria for drinking water of 70 parts per trillion (ppt). Other PFAS substances do not currently have MDEQ Criteria.

Summary of Laboratory Results				
Sample	PFOS/PFOA Detected	Total PFOS/PFOA Detected (ppt)	Total PFOS/PFOA Detected Above or Below MDEQ Criteria (70 ppt, or ng/l)	Non-PFOS/PFOA detected
PW-2 & PW-5 Treated	No	None	Below	2.0
PW-2 Raw	No	None	Below	3.3
PW-3 Raw	No	None	Below	None
Field Blank 11:32	No	None	Below	None
Field Blank 11:48	No	None	Below	None

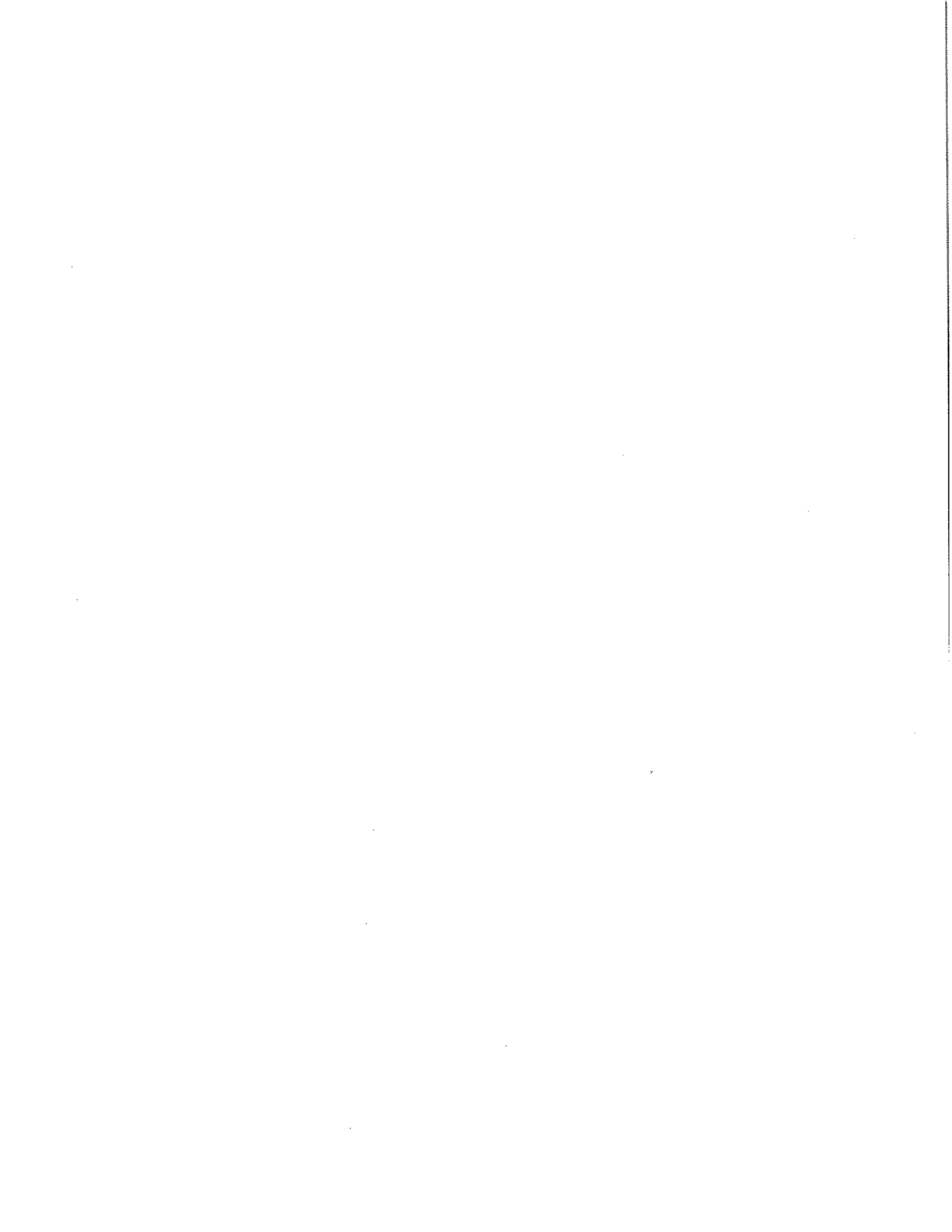
Thank you for using the services of F&V. If you need additional information, please contact me.

Sincerely,  
FLEIS & VANDENBRINK

Brian L. Rice, P.E.  
Manager, Environmental Services Group

att: Laboratory Report and Chain of Custody  
cc: Mark Worrall, MDEQ  
Karen Vorce, MDEQ

2960 Lucerne Drive SE, Suite 100  
Grand Rapids, MI 49546  
P: 616.977.1000  
F: 616.977.1005  
[www.fveng.com](http://www.fveng.com)





Pace Analytical Services, Inc.  
1700 Elm Street  
Minneapolis, MN 55414  
Phone: 612.607.1700  
Fax: 612.607.6444

**Report Prepared for:**

Will Cole  
Pace Analytical Grand Rapids  
5560 Corporate Exchange Court  
Grand Rapids MI 49512

**REPORT OF  
LABORATORY  
ANALYSIS  
FOR PFAAs**

**Report Information:**

Pace Project #: 10415869  
Sample Receipt Date: 12/29/2017  
Client Project #: 466574  
Client Sub PO #: N/A  
State Cert #: 9909

**Invoicing & Reporting Options:**

The report provided has been invoiced as a Level 2 PFAA Report. If an upgrade of this report package is requested, an additional charge may be applied.

Please review the attached invoice for accuracy and forward any questions to Megan McCabe, your Pace Project Manager.

**This report has been reviewed by:**

January 10, 2018

Megan McCabe, Project Manager  
612-607-6429  
(612) 607-6444 (fax)  
megan.mccabe@pacelabs.com

**Report Prepared Date:**

January 10, 2018



**Report of Laboratory Analysis**

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The results relate only to the samples included in this report.

## **DISCUSSION**

This report presents the results from the analyses performed on five of six samples submitted by a representative of Pace Analytical-Grand Rapids. The samples were analyzed for the presence or absence of twenty-one perfluorinated compounds using a modified version of USEPA Method 537. Reporting limits were set to the quantitation limits. Results for one field blank were not reported since the analytes were not detected in the associated sample material.

The recoveries of the isotopically-labeled surrogate standards in the sample extracts ranged from 84-121%. All of the labeled standard recoveries obtained for this project were within the target ranges specified in the method.

A laboratory method blank was prepared and analyzed with the sample batch as part of our routine quality control procedures. The results show the blank to be free of the target perfluorinated compounds at the reporting limits. This indicates that the sample processing procedures did not significantly contribute to the analyte content determined for the sample material.

Laboratory spike samples were also prepared with the sample batch using clean reference matrix that had been fortified with native standards. The results show that the spiked native compounds in the laboratory spikes were recovered at 66-115%, with relative percent differences of 0-12%. These results were within the method limits.

It should be noted that Pace Analytical has not yet completed the certification process for this method.



## Minnesota Laboratory Certifications

Authority	Certificate #	Authority	Certificate #
A2LA	2926.01	Mississippi	MN00064
Alabama	40770	Montana	CERT0092
Alaska	MN00064	Nebraska	NE-OS-18-06
Alaska	UST-078	Nevada	MN00064
Arizona	AZ0014	New Jersey (NE	MN002
Arkansas	88-0680	New York (NEL	11647
CNMI Saipan	MP0003	New hampshire	2081
California	MN00064	North Carolina	27700
Colorado	MN00064	North Carolina	530
Connecticut	PH-0256	North Dakota	R-036
EPA Region 8	8TMS-L	Ohio	41244
Florida (NELAP	E87605	Ohio VAP	CL101
Georgia (EDP)	959	Oklahoma	9507
Guam EPA	959	Oregon (ELAP)	MN200001
Hawaii	MN00064	Oregon (OREL	MN300001
Idaho	MN00064	Pennsylvania	68-00563
Illinois	200011	Puerto Rico	MN00064
Indiana	C-MN-01	South Carolina	74003001
Iowa	368	Tennessee	TN02818
Kansas	E-10167	Texas	T104704192
Kentucky	90062	Utah (NELAP)	MN00064
Louisiana	03086	Virginia	460163
Louisiana	MN00064	Washington	C486
Maine	MN00064	West Virginia #	9952C
Maryland	322	West Virginia D	382
Michigan	9909	Wisconsin	999407970
Minnesota	027-053-137	Wyoming	8TMS-L

## REPORT OF LABORATORY ANALYSIS

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Report No.....10413201

# Appendix A

## Sample Management

10415869

Chain of Custody



Workorder: 466574 Workorder Name: FV Sparta PWs

Owner Received Date: 12/28/2017 Results Requested By: 1/10/2018

Will Cole  
Pace Analytical Services  
5560 Corporate Exchange Ct SE  
Grand Rapids, MI 49512  
USA  
Phone (616)975-4500

Pace Analytical Minnesota  
1700 Elm Street  
Suite 200  
Minneapolis, MN 55414  
Phone (612)607-1700

Report to: SUBCONTACT			RESULTS ANALYSIS					
Item	Sample ID	Sample Use	Collection Date/Time	Bottle ID	Matrix	Other	PFAs/PFCs by 537	LAB USE ONLY
1	PW-2 & PW-5 Treated	PS	12/28/2017 11:30	466574001	Water	1	X	001
2	FB-11-32	PS	12/28/2017 11:32	466574002	Water	1	X	002
3	PW-2 Raw	PS	12/28/2017 11:45	466574003	Water	1	X	003
4	FB-11-46	PS	12/28/2017 11:48	466574004	Water	1	X	004
5	PW-3 Raw	PS	12/28/2017 12:05	466574005	Water	1	X	005
6	FB-12-10	PS	12/28/2017 12:10	466574006	Water	1	X	006

Transfers	Released By	Date/Time	Received By	Date/Time
1	<i>[Signature]</i>	12-28-17 17:00	<i>[Signature]</i>	12/29/17
2				
3				


Cooler Temperature on Receipt	3 °C	Custody Seal	Y or N	Received on Ice	Y or N	Samples Intact	Y or N
			(N)			(Y)	(N)

\*\*\*In order to maintain client confidentiality, location/name of the sampling site, sampler's name and signature may not be provided on this COC document. This chain of custody is considered complete as is since this information is available in the owner laboratory.

**Sample Condition Upon Receipt**

Client Name: Pace Analytical Services Project #: \_\_\_\_\_

**WO# : 10415869**



10415869

Courier:  FedEx  UPS  USPS  Client  
 Commercial  Pace  Speedee  Other: \_\_\_\_\_  
 Tracking Number: 4175 9743 2444

Custody Seal on Cooler/Box Present?  Yes  No      Seals Intact?  Yes  No      Optional: Proj. Due Date: \_\_\_\_\_ Proj. Name: \_\_\_\_\_

Packing Material:  Bubble Wrap  Bubble Bags  None  Other: \_\_\_\_\_      Temp Blank?  Yes  No

Thermometer Used:  151401163  G87A9155100842      Type of Ice:  Wet  Blue  None  Dry  Melted

Cooler Temp Read (°C): 0.6 Cooler Temp Corrected (°C): 0.3      Biological Tissue Frozen?  Yes  No  N/A  
 Temp should be above freezing to 6°C      Correction Factor: -0.3      Date and Initials of Person Examining Contents: 12/29/17

USDA Regulated Soil (  N/A, water sample)  
 Did samples originate in a quarantine zone within the United States: AL, AR, CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX or VA (check maps)?  Yes  No  
 Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)?  Yes  No  
 If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.

		COMMENTS:
Chain of Custody Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	1.
Chain of Custody Filled Out?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	2.
Chain of Custody Relinquished?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	3.
Sampler Name and/or Signature on COC?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	4.
Samples Arrived within Hold Time?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	5.
Short Hold Time Analysis (<72 hr)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	6.
Rush Turn Around Time Requested?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	7.
Sufficient Volume?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	8.
Correct Containers Used?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	9.
-Pace Containers Used?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Containers intact?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	10.
Filtered Volume Received for Dissolved Tests?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	11. Note if sediment is visible in the dissolved container
Sample Labels Match COC?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	12.
-Includes Date/Time/ID/Analysis Matrix: <u>WT</u>		
All containers needing acid/base preservation have been checked?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	13. <input type="checkbox"/> HNO <sub>3</sub> <input type="checkbox"/> H <sub>2</sub> SO <sub>4</sub> <input type="checkbox"/> NaOH Positive for Res. Chlorine? Y N
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO <sub>3</sub> , H <sub>2</sub> SO <sub>4</sub> <2pH, NaOH >9 Sulfide, NaOH >12 Cyanide) Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxin.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Sample # Initial when completed: _____ Lot # of added preservative: _____
Headspace in VOA Vials (>6mm)?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	14.
Trip Blank Present?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	15.
Trip Blank Custody Seals Present?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Pace Trip Blank Lot # (if purchased):		

**CLIENT NOTIFICATION/RESOLUTION**

Field Data Required?  Yes  No

Person Contacted: \_\_\_\_\_ Date/Time: \_\_\_\_\_  
 Comments/Resolution: \_\_\_\_\_

Project Manager Review: Megan McCalve Date: 12/29/17

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers).



# SAMPLE RECEIVING / LOG-IN CHECKLIST

**Pace Analytical**

Client: <b>POB</b>	Work Order #: <b>41010574</b>
Receipt Record Page/Line #: <b>12-21 / 12-22</b>	Project Chemist: _____ Sample #s: _____

Recorded by (initials/date): <b>TS 12/28/17</b>	<input checked="" type="checkbox"/> Cooler <input type="checkbox"/> Box <input type="checkbox"/> Other	Qty Received: <b>2</b>	<input checked="" type="checkbox"/> IR Gun (#202) Thermometer Used: <input type="checkbox"/> Digital Thermometer (#54) <input type="checkbox"/> See Additional Cooler Information Form <input type="checkbox"/> Other (# _____)
---	--	------------------------	---

Cooler #	Time	Cooler #	Time	Cooler #	Time	Cooler #	Time
<b>Shy Blue</b>	<b>1612</b>	<b>Red</b>	<b>1615</b>				
Custody Seals: <input checked="" type="checkbox"/> None <input type="checkbox"/> Present / Intact <input type="checkbox"/> Present / Not Intact		Custody Seals: <input checked="" type="checkbox"/> None <input type="checkbox"/> Present / Intact <input type="checkbox"/> Present / Not Intact		Custody Seals: <input type="checkbox"/> None <input type="checkbox"/> Present / Intact <input type="checkbox"/> Present / Not Intact		Custody Seals: <input type="checkbox"/> None <input type="checkbox"/> Present / Intact <input type="checkbox"/> Present / Not Intact	
Coolant Type: <input checked="" type="checkbox"/> Loose Ice <input type="checkbox"/> Bagged Ice <input type="checkbox"/> Blue Ice <input type="checkbox"/> None		Coolant Type: <input checked="" type="checkbox"/> Loose Ice <input type="checkbox"/> Bagged Ice <input type="checkbox"/> Blue Ice <input type="checkbox"/> None		Coolant Type: <input type="checkbox"/> Loose Ice <input type="checkbox"/> Bagged Ice <input type="checkbox"/> Blue Ice <input type="checkbox"/> None		Coolant Type: <input type="checkbox"/> Loose Ice <input type="checkbox"/> Bagged Ice <input type="checkbox"/> Blue Ice <input type="checkbox"/> None	
Coolant Location: <input checked="" type="checkbox"/> Dispersed / Top / Middle / Bottom		Coolant Location: <input checked="" type="checkbox"/> Dispersed / Top / Middle / Bottom		Coolant Location: <input type="checkbox"/> Dispersed / Top / Middle / Bottom		Coolant Location: <input type="checkbox"/> Dispersed / Top / Middle / Bottom	
Temp Blank Present: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Temp Blank Present: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Temp Blank Present: <input type="checkbox"/> Yes <input type="checkbox"/> No		Temp Blank Present: <input type="checkbox"/> Yes <input type="checkbox"/> No	
If Present, Temperature Blank Location is:		If Present, Temperature Blank Location is:		If Present, Temperature Blank Location is:		If Present, Temperature Blank Location is:	
<input type="checkbox"/> Representative <input type="checkbox"/> Not Representative		<input type="checkbox"/> Representative <input type="checkbox"/> Not Representative		<input type="checkbox"/> Representative <input type="checkbox"/> Not Representative		<input type="checkbox"/> Representative <input type="checkbox"/> Not Representative	
Observed °C	Correction Factor °C	Actual °C	Observed °C	Correction Factor °C	Actual °C	Observed °C	Correction Factor °C
Temp Blank:			Temp Blank:			Temp Blank:	
Sample 1: 1.8		1.8	Sample 1: 1.8		1.8	Sample 1:	
Sample 2: 1.0		1.0	Sample 2: 1.8		1.8	Sample 2:	
Sample 3: 1.8		1.8	Sample 3: 1.9		1.9	Sample 3:	
3 Sample Average °C: <b>1.3</b>			3 Sample Average °C: <b>1.7</b>			3 Sample Average °C: _____	
<input type="checkbox"/> Cooler ID on COC?		<input type="checkbox"/> Cooler ID on COC?		<input type="checkbox"/> Cooler ID on COC?		<input type="checkbox"/> Cooler ID on COC?	
<input type="checkbox"/> VOC Trip Blank received?		<input type="checkbox"/> VOC Trip Blank received?		<input type="checkbox"/> VOC Trip Blank received?		<input type="checkbox"/> VOC Trip Blank received?	

**If any shaded areas checked, complete Sample Receiving Non-Conformance and/or Inventory Form**

**Paperwork Received**

Yes  No  Chain of Custody record(s)? If No, Initiated By \_\_\_\_\_  
 Received for Lab Signed/Date/Time? \_\_\_\_\_  
 Shipping document?  
 Other \_\_\_\_\_

**Check Sample Preservation**

N/A  Yes  No

Temperature Blank OR average sample temperature, ≥6° C?  
 If either is ≥6° C, was thermal preservation required?  
 If "Yes", Project Chemist Approval Initials: \_\_\_\_\_  
 If "Yes" Completed Non Con Cooler - Cont Inventory Form?  
 Completed Sample Preservation Verification Form?  
 Samples chemically preserved correctly?  
 If "No", added orange tag?  
 Received pre-preserved VOC soils?  
 MeOH  Na<sub>2</sub>SO<sub>4</sub>

**COC Information**

Pace COC  Other \_\_\_\_\_

COC ID Numbers:  
**2183833 / 2178688**

**Check COC for Accuracy**

Yes  No  Analysis Requested?  
 Sample ID matches COC?  
 Sample Date and Time matches COC?  
 Container type completed on COC?  
 All container types indicated are received?

**Check for Short Hold-Time Prep/Analyses**

Bacteriological  
 Air Bags  
 EnCores / Methanol Pre-Preserved  
 Formaldehyde/Aldehyde  
 Green-tagged containers  
 Yellow/White-tagged 1 L. ambers (SV Prep-Lab)

**AFTER HOURS ONLY:**  
COPIES OF COC TO LAB AREA(S)

NONE RECEIVED  
 RECEIVED, COCs TO LAB(S)

**Sample Condition Summary**

N/A  Yes  No

Broken containers/lds?  
 Missing or Incomplete labels?  
 Illegible information on labels?  
 Low volume received?  
 Inappropriate or non-Pace containers received?  
 VOC vials / TOX containers have headspace?  
 Extra sample locations / containers not listed on COC?

**Notes**

**PFA's**

Trip Blank received  Trip Blank not listed on COC

Cooler Received (Date/Time)	Paperwork Delivered (Date/Time)	≤1 Hour Goal Met?
<b>TS 12/28/17</b>	<b>TS 12/28/17</b>	Yes / No

## Reporting Flags

- A = Reporting Limit based on signal to noise
- B = Less than 10x higher than method blank level
- C = Result obtained from confirmation analysis
- D = Result obtained from analysis of diluted sample
- E = Exceeds calibration range
- I = Interference present
- J = Estimated value
- Nn = Value obtained from additional analysis
- P = PCDE Interference
- R = Recovery outside target range
- S = Peak saturated
- U = Analyte not detected
- V = Result verified by confirmation analysis
- X = %D Exceeds limits
- Y = Calculated using average of daily RFs
- \* = See Discussion

### REPORT OF LABORATORY ANALYSIS

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## Appendix B

### Sample Analysis Summary



### PFAA Sample Analysis Summary

Client's Sample ID	PW-2 & PW-5 Treated	Date Extracted	01/02/2017
Lab Sample ID	466574001	Total Amount Extracted	237 mL
Filename	10LCMS01_180105A_022	ICAL ID	171228B01
Matrix	Water	Starting CCal	10LCMS01_180105A_014
Collected	12/28/2017	Ending CCal	10LCMS01_180105A_025
Received	12/29/2017	Method Blank Filename	10LCMS01_180105A_007

Compound	Concentration (ng/L)	PQL (ng/L)	MDL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
PFBS	2.0	2	0.34	1	01/05/2018 14:21	375-73-5	
PFHxA	ND	2	0.41	1	01/05/2018 14:21	307-24-4	
PFHpA	ND	2	0.68	1	01/05/2018 14:21	375-85-9	
PFHxS	ND	2	0.66	1	01/05/2018 14:21	355-46-4	
PFOA	ND	2	0.45	1	01/05/2018 14:21	335-67-1	
PFNA	ND	2	0.72	1	01/05/2018 14:21	375-95-1	
PFOS	ND	2	0.48	1	01/05/2018 14:21	1763-23-1	
PFDA	ND	2	0.41	1	01/05/2018 14:21	335-76-2	
PFUdA	ND	2	0.58	1	01/05/2018 14:21	2058-94-8	
N-MeFOSAA	ND	4	1.0	1	01/05/2018 14:21	2355-31-9	
N-EtFOSAA	ND	4	1.4	1	01/05/2018 14:21	2991-50-6	
PFDoA	ND	2	0.50	1	01/05/2018 14:21	307-55-1	
PFTTrDA	ND	2	0.48	1	01/05/2018 14:21	72629-94-8	
PFTeDA	ND	2	0.39	1	01/05/2018 14:21	376-06-7	
PFBA	ND	2	0.65	1	01/05/2018 14:21	375-22-4	
PFPeA	ND	2	0.39	1	01/05/2018 14:21	2706-90-3	
PFDS	ND	2	0.49	1	01/05/2018 14:21	335-77-3	

#### Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	2.2	110	70 - 130	Pass
13C2_PFDA	2.0	1.9	95	70 - 130	Pass
d5-EtFOSAA	8.0	7.9	99	70 - 130	Pass

#### Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPrPrA	35453	21472 - 64417	25200 - 50401	Pass
13C2_PFOA	121806	73967 - 221901	81128 - 162256	Pass
13C4_PFOS	149469	91197 - 273592	110369 - 220739	Pass
d3-MeFOSAA	110228	63192 - 189576	70858 - 141716	Pass

50-150% of Ical area

70-140% of the preceding CCV area



### PFAA Sample Analysis Summary

Client's Sample ID	FB-11:32	Date Extracted	01/02/2017
Lab Sample ID	466574002	Total Amount Extracted	251 mL
Filename	10LCMS01_180105A_017	ICAL ID	171228B01
Matrix	Water	Starting CCal	10LCMS01_180105A_014
Collected	12/28/2017	Ending CCal	10LCMS01_180105A_025
Received	12/29/2017	Method Blank Filename	10LCMS01_180105A_007

Compound	Concentration (ng/L)	PQL (ng/L)	MDL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
PFBS	ND	2	0.32	1	01/05/2018 13:20	375-73-5	
PFHxA	ND	2	0.39	1	01/05/2018 13:20	307-24-4	
PFHpA	ND	2	0.64	1	01/05/2018 13:20	375-85-9	
PFHxS	ND	2	0.62	1	01/05/2018 13:20	355-46-4	
PFOA	ND	2	0.43	1	01/05/2018 13:20	335-67-1	
PFNA	ND	2	0.68	1	01/05/2018 13:20	375-95-1	
PFOS	ND	2	0.45	1	01/05/2018 13:20	1763-23-1	
PFDA	ND	2	0.39	1	01/05/2018 13:20	335-76-2	
PFUdA	ND	2	0.55	1	01/05/2018 13:20	2058-94-8	
N-MeFOSAA	ND	4	0.99	1	01/05/2018 13:20	2355-31-9	
N-EtFOSAA	ND	4	1.3	1	01/05/2018 13:20	2991-50-6	
PFDoA	ND	2	0.47	1	01/05/2018 13:20	307-55-1	
PFTrDA	ND	2	0.45	1	01/05/2018 13:20	72629-94-8	
PFTeDA	ND	2	0.37	1	01/05/2018 13:20	376-06-7	
PFBA	ND	2	0.61	1	01/05/2018 13:20	375-22-4	
PFPeA	ND	2	0.37	1	01/05/2018 13:20	2706-90-3	
PFDS	ND	2	0.47	1	01/05/2018 13:20	335-77-3	

#### Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	2.1	105	70 - 130	Pass
13C2_PFDA	2.0	2.1	105	70 - 130	Pass
d5-EtFOSAA	8.0	9.7	121	70 - 130	Pass

#### Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPrA	34386	21472 - 64417	25200 - 50401	Pass
13C2_PFOA	117813	73967 - 221901	81128 - 162256	Pass
13C4_PFOS	151936	91197 - 273592	110369 - 220739	Pass
d3-MeFOSAA	115674	63192 - 189576	70858 - 141716	Pass

50-150% of Ical area

70-140% of the preceding CCV area



### PFAA Sample Analysis Summary

Client's Sample ID	PW-2 Raw	Date Extracted	01/02/2017
Lab Sample ID	466574003	Total Amount Extracted	250 mL
Filename	10LCMS01_180105A_023	ICAL ID	171228B01
Matrix	Water	Starting CCal	10LCMS01_180105A_014
Collected	12/28/2017	Ending CCal	10LCMS01_180105A_025
Received	12/29/2017	Method Blank Filename	10LCMS01_180105A_007

Compound	Concentration (ng/L)	PQL (ng/L)	MDL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
PFBS	3.3	2	0.32	1	01/05/2018 14:33	375-73-5	
PFHxA	ND	2	0.39	1	01/05/2018 14:33	307-24-4	
PFHpA	ND	2	0.65	1	01/05/2018 14:33	375-85-9	
PFHxS	ND	2	0.62	1	01/05/2018 14:33	355-46-4	
PFOA	ND	2	0.43	1	01/05/2018 14:33	335-67-1	
PFNA	ND	2	0.69	1	01/05/2018 14:33	375-95-1	
PFOS	ND	2	0.45	1	01/05/2018 14:33	1763-23-1	
PFDA	ND	2	0.39	1	01/05/2018 14:33	335-76-2	
PFUdA	ND	2	0.55	1	01/05/2018 14:33	2058-94-8	
N-MeFOSAA	ND	4	0.99	1	01/05/2018 14:33	2355-31-9	
N-EtFOSAA	ND	4	1.3	1	01/05/2018 14:33	2991-50-6	
PFDaA	ND	2	0.47	1	01/05/2018 14:33	307-55-1	
PFTrDA	ND	2	0.46	1	01/05/2018 14:33	72629-94-8	
PFTeDA	ND	2	0.37	1	01/05/2018 14:33	376-06-7	
PFBA	ND	2	0.62	1	01/05/2018 14:33	375-22-4	
PFPeA	ND	2	0.37	1	01/05/2018 14:33	2706-90-3	
PFDS	ND	2	0.47	1	01/05/2018 14:33	335-77-3	

#### Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.8	91	70 - 130	Pass
13C2_PFDA	2.0	2.0	99	70 - 130	Pass
d5-EtFOSAA	8.0	9.1	114	70 - 130	Pass

#### Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPrA	31474	21472 - 64417	25200 - 50401	Pass
13C2_PFOA	137820	73967 - 221901	81128 - 162256	Pass
13C4_PFOS	157927	91197 - 273592	110369 - 220739	Pass
d3-MeFOSAA	112281	63192 - 189576	70858 - 141716	Pass

50-150% of Ical area

70-140% of the preceding CCV area



### PFAA Sample Analysis Summary

Client's Sample ID	FB-11:48	Date Extracted	01/02/2017
Lab Sample ID	466574004	Total Amount Extracted	245 mL
Filename	10LCMS01_180105A_018	ICAL ID	171228B01
Matrix	Water	Starting CCal	10LCMS01_180105A_014
Collected	12/28/2017	Ending CCal	10LCMS01_180105A_025
Received	12/29/2017	Method Blank Filename	10LCMS01_180105A_007

Compound	Concentration (ng/L)	PQL (ng/L)	MDL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
PFBS	ND	2	0.33	1	01/05/2018 13:32	375-73-5	
PFHxA	ND	2	0.40	1	01/05/2018 13:32	307-24-4	
PFHpA	ND	2	0.66	1	01/05/2018 13:32	375-85-9	
PFHxS	ND	2	0.63	1	01/05/2018 13:32	355-46-4	
PFOA	ND	2	0.44	1	01/05/2018 13:32	335-67-1	
PFNA	ND	2	0.70	1	01/05/2018 13:32	375-95-1	
PFOS	ND	2	0.46	1	01/05/2018 13:32	1763-23-1	
PFDA	ND	2	0.40	1	01/05/2018 13:32	335-76-2	
PFUdA	ND	2	0.56	1	01/05/2018 13:32	2058-94-8	
N-MeFOSAA	ND	4	1.0	1	01/05/2018 13:32	2355-31-9	
N-EtFOSAA	ND	4	1.4	1	01/05/2018 13:32	2991-50-6	
PFDoA	ND	2	0.48	1	01/05/2018 13:32	307-55-1	
PFTeDA	ND	2	0.46	1	01/05/2018 13:32	72629-94-8	
PFTeDA	ND	2	0.38	1	01/05/2018 13:32	376-06-7	
PFBA	ND	2	0.63	1	01/05/2018 13:32	375-22-4	
PFPeA	ND	2	0.38	1	01/05/2018 13:32	2706-90-3	
PFDS	ND	2	0.48	1	01/05/2018 13:32	335-77-3	

#### Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.7	84	70 - 130	Pass
13C2_PFDA	2.0	1.8	91	70 - 130	Pass
d5-EtFOSAA	8.0	7.7	96	70 - 130	Pass

#### Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPrA	32975	21472 - 64417	25200 - 50401	Pass
13C2_PFOA	133682	73967 - 221901	81128 - 162256	Pass
13C4_PFOS	162453	91197 - 273592	110369 - 220739	Pass
d3-MeFOSAA	108898	63192 - 189576	70858 - 141716	Pass

50-150% of Ical area

70-140% of the preceding CCV area



### PFAA Sample Analysis Summary

Client's Sample ID	PW-3 Raw	Date Extracted	01/02/2017
Lab Sample ID	466574005	Total Amount Extracted	237 mL
Filename	10LCMS01_180105A_024	ICAL ID	171228B01
Matrix	Water	Starting CCal	10LCMS01_180105A_014
Collected	12/28/2017	Ending CCal	10LCMS01_180105A_025
Received	12/29/2017	Method Blank Filename	10LCMS01_180105A_007

Compound	Concentration (ng/L)	PQL (ng/L)	MDL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
PFBS	ND	2	0.34	1	01/05/2018 14:45	375-73-5	
PFHxA	ND	2	0.41	1	01/05/2018 14:45	307-24-4	
PFHpA	ND	2	0.68	1	01/05/2018 14:45	375-85-9	
PFHxS	ND	2	0.66	1	01/05/2018 14:45	355-46-4	
PFOA	ND	2	0.45	1	01/05/2018 14:45	335-67-1	
PFNA	ND	2	0.73	1	01/05/2018 14:45	375-95-1	
PFOS	ND	2	0.48	1	01/05/2018 14:45	1763-23-1	
PFDA	ND	2	0.41	1	01/05/2018 14:45	335-76-2	
PFUdA	ND	2	0.58	1	01/05/2018 14:45	2058-94-8	
N-MeFOSAA	ND	4	1.0	1	01/05/2018 14:45	2355-31-9	
N-EtFOSAA	ND	4	1.4	1	01/05/2018 14:45	2991-50-6	
PFDaA	ND	2	0.50	1	01/05/2018 14:45	307-55-1	
PFTrDA	ND	2	0.48	1	01/05/2018 14:45	72629-94-8	
PFTeDA	ND	2	0.39	1	01/05/2018 14:45	376-06-7	
PFBA	ND	2	0.65	1	01/05/2018 14:45	375-22-4	
PFPeA	ND	2	0.39	1	01/05/2018 14:45	2706-90-3	
PFDS	ND	2	0.49	1	01/05/2018 14:45	335-77-3	

#### Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	97	70 - 130	Pass
13C2_PFDA	2.0	2.0	98	70 - 130	Pass
d5-EtFOSAA	8.0	8.3	104	70 - 130	Pass

#### Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPrA	34250	21472 - 64417	25200 - 50401	Pass
13C2_PFOA	124651	73967 - 221901	81128 - 162256	Pass
13C4_PFOS	157134	91197 - 273592	110369 - 220739	Pass
d3-MeFOSAA	116658	63192 - 189576	70858 - 141716	Pass

50-150% of Ical area

70-140% of the preceding CCV area





### PFAA Blank Analysis Summary

Lab Sample ID	BLANK-59414	Total Amount Extracted	250 mL
Filename	10LCMS01_180105A_007	ICAL ID	171228B01
Matrix	Water	Starting CCal	10LCMS01_180105A_003
Date Extracted	01/02/2017	Ending CCal	10LCMS01_180105A_014

Compound	Concentration (ng/L)	PQL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
PFBS	ND	2	1	01/05/2018 11:15	375-73-5	
PFHxA	ND	2	1	01/05/2018 11:15	307-24-4	
PFHpA	ND	2	1	01/05/2018 11:15	375-85-9	
PFHxS	ND	2	1	01/05/2018 11:15	355-46-4	
PFOA	ND	2	1	01/05/2018 11:15	335-67-1	
PFNA	ND	2	1	01/05/2018 11:15	375-95-1	
PFOS	ND	2	1	01/05/2018 11:15	1763-23-1	
PFDA	ND	2	1	01/05/2018 11:15	335-76-2	
PFUdA	ND	2	1	01/05/2018 11:15	2058-94-8	
N-MeFOSAA	ND	4	1	01/05/2018 11:15	2355-31-9	
N-EtFOSAA	ND	4	1	01/05/2018 11:15	2991-50-6	
PFDoA	ND	2	1	01/05/2018 11:15	307-55-1	
PFTTrDA	ND	2	1	01/05/2018 11:15	72629-94-8	
PFTeDA	ND	2	1	01/05/2018 11:15	376-06-7	
PFBA	ND	2	1	01/05/2018 11:15	375-22-4	
PFPeA	ND	2	1	01/05/2018 11:15	2706-90-3	
PFDS	ND	2	1	01/05/2018 11:15	335-77-3	

#### Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	95	70 - 130	Pass
13C2_PFDA	2.0	1.7	85	70 - 130	Pass
d5-EtFOSAA	8.0	9.1	114	70 - 130	Pass

#### Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPrA	36878	21472 - 64417	24726 - 49452	Pass
13C2_PFOA	136431	73967 - 221901	89450 - 178900	Pass
13C4_PFOS	177156	91197 - 273592	115366 - 230732	Pass
d3-MeFOSAA	124143	63192 - 189576	89945 - 179890	Pass

50-150% of Ical area

70-140% of the preceding CCV area



**PFAA Laboratory Control Sample (LCS)**

LCS Lab Sample ID	LCS-59415	Matrix	Water
LCS Filename	10LCMS01_180105A_008	Dilution	1
Total Amount Extracted	251mL	Extracted	01/02/2017
ICAL ID	171228B01	Analyzed	01/05/2018 11:27
Start CCal Filename	10LCMS01_180105A_003	Injected By	QL
End CCal Filename	10LCMS01_180105A_014		
Method Blank Filename	10LCMS01_180105A_007		

Compound	Spiked (ng/L)	Recovered (ng/L)	Recovery %	Limits
PFBA	2.0	1.4	72	50.0 - 150.0
PFPeA	2.0	1.4	72	50.0 - 150.0
PFBS	1.8	1.4	78	50.0 - 150.0
PFHxA	2.0	1.5	77	50.0 - 150.0
PFHpA	2.0	1.4	72	50.0 - 150.0
PFHxS	1.9	1.5	82	50.0 - 150.0
PFOA	2.0	1.7	85	50.0 - 150.0
PFNA	2.0	1.8	89	50.0 - 150.0
PFOS	1.9	1.6	82	50.0 - 150.0
PFDA	2.0	1.5	75	50.0 - 150.0
PFUdA	2.0	1.6	79	50.0 - 150.0
N-MeFOSAA	4.0	2.6	66	50.0 - 150.0
N-EtFOSAA	4.0	3.6	91	50.0 - 150.0
PFDS	1.9	1.6	83	50.0 - 150.0
PFDoA	2.0	1.8	88	50.0 - 150.0
PFTrDA	2.0	2.1	106	50.0 - 150.0
PFTeDA	2.0	1.7	86	50.0 - 150.0

**Surrogate Standards**

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.7	87	50 - 150	Pass
13C2_PFDA	2.0	1.7	85	50 - 150	Pass
d5-EtFOSAA	8.0	6.6	83	50 - 150	Pass

**Internal Standards**

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPrA	32014	21472 - 64417	24726 - 49452	Pass
13C2_PFOA	139576	73967 - 221901	89450 - 178900	Pass
13C4_PFOS	160252	91197 - 273592	115366 - 230732	Pass
d3-MeFOSAA	134040	63192 - 189576	89945 - 179890	Pass

50-150% of Ical area

70-140% of the preceding CCV area



**PFAA Laboratory Control Sample (LCS)**

LCS Lab Sample ID	LCS-59416	Matrix	Water
LCS Filename	10LCMS01_180105A_009	Dilution	1
Total Amount Extracted	249mL	Extracted	01/02/2017
ICAL ID	171228B01	Analyzed	01/05/2018 11:39
Start CCal Filename	10LCMS01_180105A_003	Injected By	QL
End CCal Filename	10LCMS01_180105A_014		
Method Blank Filename	10LCMS01_180105A_007		

Compound	Spiked (ng/L)	Recovered (ng/L)	Recovery %	Limits
PFBA	20	18	89	70.0 - 130.0
PFPeA	20	18	87	70.0 - 130.0
PFBS	18	17	93	70.0 - 130.0
PFHxA	20	18	87	70.0 - 130.0
PFHpA	20	19	95	70.0 - 130.0
PFHxS	19	19	103	70.0 - 130.0
PFOA	20	19	97	70.0 - 130.0
PFNA	20	20	99	70.0 - 130.0
PFOS	19	19	99	70.0 - 130.0
PFDA	20	18	91	70.0 - 130.0
PFUdA	20	19	95	70.0 - 130.0
N-MeFOSAA	40	32	79	70.0 - 130.0
N-EtFOSAA	40	38	96	70.0 - 130.0
PFDS	19	18	94	70.0 - 130.0
PFDoA	20	19	97	70.0 - 130.0
PFTTrDA	20	23	114	70.0 - 130.0
PFTeDA	20	21	106	70.0 - 130.0

**Surrogate Standards**

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	97	70 - 130	Pass
13C2_PFDA	2.0	1.8	89	70 - 130	Pass
d5-EtFOSAA	8.0	7.5	93	70 - 130	Pass

**Internal Standards**

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPrOPrA	32044	21472 - 64417	24726 - 49452	Pass
13C2_PFOA	130626	73967 - 221901	89450 - 178900	Pass
13C4_PFOS	157681	91197 - 273592	115366 - 230732	Pass
d3-MeFOSAA	123894	63192 - 189576	89945 - 179890	Pass

50-150% of Ical area

70-140% of the preceding CCV area



**PFAA Laboratory Control Sample Duplicate (LCSD)**

LCSD Lab Sample ID	LCSD-59417	LCS Filename	10LCMS01_180105A_009
LCSD Filename	10LCMS01_180105A_010	Matrix	Water
Total Amount Extracted	250mL	Dilution	1
ICAL ID	171228B01	Extracted	01/02/2017
Start CCal Filename	10LCMS01_180105A_003	Analyzed	01/05/2018 11:52
End CCal Filename	10LCMS01_180105A_014	Injected By	QL
Method Blank Filename	10LCMS01_180105A_007		

Compound	Spiked (ng/L)	Recovered (ng/L)	Recovery %	Recovery Limits	RPD %
PFBA	20	17	85	70.0 - 130.0	5
PFPeA	20	17	85	70.0 - 130.0	3
PFBS	18	18	104	70.0 - 130.0	11
PFHxA	20	18	88	70.0 - 130.0	1
PFHpA	20	17	85	70.0 - 130.0	11
PFHxS	19	20	108	70.0 - 130.0	5
PFOA	20	19	95	70.0 - 130.0	2
PFNA	20	19	94	70.0 - 130.0	5
PFOS	19	18	93	70.0 - 130.0	6
PFDA	20	20	99	70.0 - 130.0	8
PFUdA	20	19	94	70.0 - 130.0	1
N-MeFOSAA	40	32	80	70.0 - 130.0	2
N-EtFOSAA	40	43	108	70.0 - 130.0	12
PFDS	19	19	101	70.0 - 130.0	7
PFDoA	20	21	106	70.0 - 130.0	9
PFTrDA	20	23	115	70.0 - 130.0	0
PFTeDA	20	21	104	70.0 - 130.0	2

**Surrogate Standards**

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	93	70 - 130	Pass
13C2_PFDA	2.0	1.9	96	70 - 130	Pass
d5-EtFOSAA	8.0	7.4	92	70 - 130	Pass

**Internal Standards**

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPrA	32379	21472 - 64417	24726 - 49452	Pass
13C2_PFOA	121832	73967 - 221901	89450 - 178900	Pass
13C4_PFOS	160078	91197 - 273592	115366 - 230732	Pass
d3-MeFOSAA	119266	63192 - 189576	89945 - 179890	Pass

50-150% of Ical area

70-140% of the preceding CCV area