Pace Analytical™
www.pacelabs.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 #: 10426369
Sample Receipt Date: 04/06/2018
Client Project #: 4610324 Fleis & Vandenbrink
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 Chris Bremer, your Pace Project Manager.

This report has been reviewed by:

April 16, 2018

Chris Bremer, Client Services Manager
(612) 607-6390
(612) 607-6444 (fax)
chris.bremer@pacelabs.com

Report Prepared Date:
April 16, 2018

Report of Laboratory Analysis

DISCUSSION

This report presents the results from the analyses performed on two samples and one duplicate sample 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. The field blank was not reported since the water samples were free of the target analytes.

The recoveries of the isotopically-labeled surrogate standards in the sample extracts ranged from 82-95%. 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 84-133%, with relative percent differences of 3-24%. These results were within the method limits. A third lab spike was analyzed and included in the above summary.

It should be noted that Pace Analytical has not yet completed the certification process for all analytes in this method. Therfore, the results have been marked "N2" as qualified. Results for the low level spikes that were below the calibration range were flagged "J".

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

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

Appendix A

Sample Management

WO# : 10426369

10426369

)contracting Laboratory.

State Of Origin: MI

Pace Analytical®
www.pacelabs.com

Workorder: 4610324 **Workorder Name:** FV Cascade Twp **Owner Received Date:** 4/4/2018 **Results Requested By:** 4/16/2018

Report To	Subcontract To
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

Item	Sample ID	Sample Type	Collect Date/Time	Lab ID	Matrix	Preserved Containers: Other	Requested Analysis: PFAs by 537	LAB USE ONLY
1	Maintenance Garage	PS	4/4/2018 13:10	4610324001	Water	1	X	001
2	FB-13:12	PS	4/4/2018 13:12	4610324002	Water	1	X	002
3	Bathroom	PS	4/4/2018 13:35	4610324003	Water	1	X	003
4	FB-13:37	PS	4/4/2018 13:37	4610324004	Water	1	X	004
5								

Transfers	Released By	Date/Time	Received By	Date/Time
1		4518 1553		4/6/18 940
2				
3				

Comments

Cooler Temperature on Receipt 1.5 °C **Custody Seal** Y or (N) **Received on Ice** (Y) or N **Samples Intact** (Y) or 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.*

Pace Analytical	Document Name: Sample Condition Upon Receipt Form	Document Revised: 14Dec2017 Page 1 of 2
	Document No.: F-MN-L-213-rev.22	Issuing Authority: Pace Minnesota Quality Office

Sample Condition Upon Receipt

Client Name: Pace MI

Project #: **WO#: 10426369**

PM: MEM1 **Due Date: 04/16/18**

CLIENT: PASI-MI

Courier: ☐Fed Ex ☐UPS ☐USPS ☐Client ☐Commercial ☑Pace ☐SpeeDee ☐Other:

Tracking Number: 4372 1887 0703

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: PB **Temp Blank?** ☐Yes ☑No

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

Cooler Temp Read (°C): 1.3 **Cooler Temp Corrected (°C):** 1.5

Temp should be above freezing to 6°C **Correction Factor:** +0.2 **Biological Tissue Frozen?** ☐Yes ☐No ☑N/A

USDA Regulated Soil (☑N/A, water sample) **Date and Initials of Person Examining Contents:** ME 4/6/18

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?	☑Yes ☐No	1.
Chain of Custody Filled Out?	☑Yes ☐No	2.
Chain of Custody Relinquished?	☑Yes ☐No	3.
Sampler Name and/or Signature on COC?	☐Yes ☐No ☑N/A	4.
Samples Arrived within Hold Time?	☑Yes ☐No	5.
Short Hold Time Analysis (<72 hr)?	☐Yes ☑No	6.
Rush Turn Around Time Requested?	☐Yes ☑No	7.
Sufficient Volume?	☑Yes ☐No	8.
Correct Containers Used? -Pace Containers Used?	☑Yes ☐No ☑Yes ☐No	9.
Containers Intact?	☑Yes ☐No	10.
Filtered Volume Received for Dissolved Tests?	☐Yes ☐No ☑N/A	11. Note if sediment is visible in the dissolved container
Sample Labels Match COC? -Includes Date/Time/ID/Analysis Matrix: WT	☑Yes ☐No	12.
All containers needing acid/base preservation have been checked? All containers needing preservation are found to be in compliance with EPA recommendation? (HNO_3, H_2SO_4, <2pH, NaOH >9 Sulfide, NaOH>12 Cyanide) Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxin.	☐Yes ☐No ☑N/A ☐Yes ☐No ☑N/A ☑Yes ☐No ☐N/A	13. ☐HNO_3 ☐H_2SO_4 ☐NaOH Positive for Res. Chlorine? Y N Sample # Trizma Initial when completed: Lot # of added preservative:
Headspace in VOA Vials (>6mm)?	☐Yes ☐No ☑N/A	14.
Trip Blank Present? Trip Blank Custody Seals Present? Pace Trip Blank Lot # (if purchased):	☐Yes ☐No ☑N/A ☐Yes ☐No ☑N/A	15.

CLIENT NOTIFICATION/RESOLUTION

Person Contacted: Date/Time: Field Data Required? ☐Yes ☐No

Comments/Resolution:

Project Manager Review: Mega McCabe Date: 4/6/18

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).

WO# : 4610324

4610324

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: of 2178688

Section A Required Client

Company: Cascade Twp
Address:
Email To:
Phone: 231-239-1656 Fax:
Requested Due Date/TAT: standard

Section B Report To: FTV Engineering
Copy To: Brian Rice (brianr@fveng.com), Barrett Walquist (bwalquist@fveng.com)
Purchase Order No.:
Project Name: Cascade Twp PFAS
Project Number:

Section C Invoice Information:
Attention: Anne Hagedorn
Company Name: Plos / VandenBrink Engineering
Address: 2960 Lucerne Dr. SE GR
Pace Quote Reference:
Pace Project Manager: Nathan Eklund
Pace Profile #:

REGULATORY AGENCY
☐ NPDES ☐ GROUND WATER ☒ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER

Site Location STATE: MI

Section D Required Client Information

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Matrix Codes (MATRIX / CODE)
Drinking Water DW; Water WT; Waste Water WW; Product P; Soil/Solid SL; Oil OL; Wipe WP; Air AR; Tissue TS; Other OT

ITEM #	SAMPLE ID	MATRIX CODE	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COMPOSITE START TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	537 M (PFC) & 21 compound	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	Maintenance Garage	DW	G			04/4/18	13:10		2								X	Y	X		-001
2	FB-13:12	DW	G			04/4/18	13:12		1								X	Y	X		-002
3	Bathroom FB-13:37	DW	G			4/4/18	13:35		2								X	Y	X		-003
4		DW	G			4/4/18	13:37		1								X	Y	X		-004
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					

(30-23)

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
Hold field blanks until it's determined if corresponding well samples have impacts - do not exceed hold times	FTV	04/4/18	13:54	Alberta Pace	04/04/18	1354	

ORIGINAL

SAMPLER NAME AND SIGNATURE
PRINT Name of SAMPLER: Barrett Walquist
SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 04/04/18

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-Q-020rev.07, 15-May-2007

SAMPLE RECEIVING / LOG-IN CHECKLIST

Pace Analytical®

Client	FV - Cascade	Work Order #:	4610324
Receipt Record Page/Line #	(30-23)	New / Add To	
		Project Chemist	Sample #s 001-004

Recorded by (initials/date): AW 04/04/18

☑ Cooler ☐ Box ☐ Other____ Qty Received: 1

Thermometer Used: ☐ IR Gun (#202) ☐ Digital Thermometer (#54) ☐ Other (#_____) ☐ See Additional Cooler Information Form

	Cooler 1	Cooler 2	Cooler 3	Cooler 4
Cooler # / Time	— / 1651			
Custody Seals	☑ None ☐ Present / Intact ☐ Present / Not Intact	☐ None ☐ Present / Intact ☐ Present / Not Intact	☐ None ☐ Present / Intact ☐ Present / Not Intact	☐ None ☐ Present / Intact ☐ Present / Not Intact
Coolant Type	☐ Loose Ice ☑ Bagged Ice ☐ Blue Ice ☐ None	☐ Loose Ice ☐ Bagged Ice ☐ Blue Ice ☐ None	☐ Loose Ice ☐ Bagged Ice ☐ Blue Ice ☐ None	☐ Loose Ice ☐ Bagged Ice ☐ Blue Ice ☐ None
Coolant Location	Dispersed / Top / Middle / Bottom (Bottom marked)	Dispersed / Top / Middle / Bottom	Dispersed / Top / Middle / Bottom	Dispersed / Top / Middle / Bottom
Temp Blank Present	☐ Yes ☑ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
If Present, Temperature Blank Location is	☐ Representative ☐ Not Representative	☐ Representative ☐ Not Representative	☐ Representative ☐ Not Representative	☐ Representative ☐ Not Representative

Cooler 1 temperatures:

	Observed °C	Correction Factor °C	Actual °C
Temp Blank:	Ø	Ø	Ø
Sample 1:	5.3	0	5.3
Sample 2:	3.7	0	3.7
Sample 3:	4.8	0	4.8

3 Sample Average °C: (each cooler)

☐ Cooler ID on COC? ☐ VOC Trip Blank received? (each cooler)

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 ______

COC Information

☑ Pace COC ☐ Other ______

COC ID Numbers: 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 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_2SO_4

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/lids?
	☐	☑	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

☐ Trip Blank received ☐ Trip Blank not listed on COC

Cooler Received (Date/Time)	Paperwork Delivered (Date/Time)	≤1 Hour Goal Met?
AW 04/04/18	AW 04/04/18	Yes / No

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

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 = Interferencepresent

J = Estimated value

Nn = Value obtained from additional analysis

P = PCDEInterference

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

* = SeeDiscussion

Appendix B

Sample Analysis Summary

PFAA Sample Analysis Summary

Client's Sample ID	Maintenance Garage	Date Extracted	04/10/2018
Lab Sample ID	4610324001	Total Amount Extracted	250 mL
Filename	10LCMS02_180411C_028	ICAL ID	180411B02
Matrix	Water	Starting CCal	10LCMS02_180411C_015
Collected	04/04/2018	Ending CCal	10LCMS02_180411C_036
Received	04/06/2018	Method Blank Filename	10LCMS02_180411C_021

Compound	Concentration (ng/L)	PQL (ng/L)	MDL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
PFBS	ND	1.8	0.32	1	04/12/201800:55	375-73-5	N2
PFHxA	ND	2.0	0.39	1	04/12/201800:55	307-24-4	N2
PFHpA	ND	2.0	0.65	1	04/12/201800:55	375-85-9	N2
PFHxS	ND	1.9	0.62	1	04/12/201800:55	355-46-4	N2
PFOA	ND	2.0	0.43	1	04/12/201800:55	335-67-1	N2
PFNA	ND	2.0	0.69	1	04/12/201800:55	375-95-1	N2
PFOS	ND	1.9	0.45	1	04/12/201800:55	1763-23-1	N2
PFDA	ND	2.0	0.39	1	04/12/201800:55	335-76-2	N2
PFUdA	ND	2.0	0.55	1	04/12/201800:55	2058-94-8	N2
N-MeFOSAA	ND	4.0	0.99	1	04/12/201800:55	2355-31-9	N2
N-EtFOSAA	ND	4.0	1.3	1	04/12/201800:55	2991-50-6	N2
PFDoA	ND	2.0	0.47	1	04/12/201800:55	307-55-1	N2
PFTrDA	ND	2.0	0.45	1	04/12/201800:55	72629-94-8	N2
PFTeDA	ND	2.0	0.37	1	04/12/201800:55	376-06-7	N2
PFPrOPrA	ND	4.0	1.4	1	04/12/201800:55	62037-80-3	N2
PFBA	ND	2.0	0.62	1	04/12/201800:55	375-22-4	N2
PFPeA	ND	2.0	0.37	1	04/12/201800:55	2706-90-3	N2
PFDS	ND	1.9	0.47	1	04/12/201800:55	335-77-3	N2
NaDONA	ND	4.0	1.5	1	04/12/201800:55	958445-44-8	N2
PFHxDA	ND	2.0	0.51	1	04/12/201800:55	67905-19-5	N2
PFODA	ND	2.0	0.60	1	04/12/201800:55	16517-11-6	N2

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.7	86	70 - 130	Pass
13C2_PFDA	2.0	1.9	95	70 - 130	Pass
d5-EtFOSAA	8.0	7.0	88	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPrOPrA	265889	149905 - 449715	223701 - 447402	Pass
13C2_PFOA	585724	272310 - 816931	394301 - 788601	Pass
13C4_PFOS	795211	373077 - 1119231	557220 - 1114440	Pass
d3-MeFOSAA	488904	232679 - 698038	343535 - 687071	Pass

50-150% of Ical area
70-140% of the preceding CCV area
N2 = The lab does not hold NELAC/TNI accreditation for this parameter.

PFAA Sample Analysis Summary

Client's Sample ID	Maintenance Garage - DUP	Date Extracted	04/10/2018
Lab Sample ID	4610324001-DUP	Total Amount Extracted	252 mL
Filename	10LCMS02_180411C_035	ICAL ID	180411B02
Matrix	Water	Starting CCal	10LCMS02_180411C_015
Collected	04/04/2018	Ending CCal	10LCMS02_180411C_036
Received	04/06/2018	Method Blank Filename	10LCMS02_180411C_021

Compound	Concentration (ng/L)	PQL (ng/L)	MDL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
PFBS	ND	1.7	0.32	1	04/12/201802:21	375-73-5	N2
PFHxA	ND	2.0	0.39	1	04/12/201802:21	307-24-4	N2
PFHpA	ND	2.0	0.64	1	04/12/201802:21	375-85-9	N2
PFHxS	ND	1.9	0.62	1	04/12/201802:21	355-46-4	N2
PFOA	ND	2.0	0.43	1	04/12/201802:21	335-67-1	N2
PFNA	ND	2.0	0.68	1	04/12/201802:21	375-95-1	N2
PFOS	ND	1.9	0.45	1	04/12/201802:21	1763-23-1	N2
PFDA	ND	2.0	0.39	1	04/12/201802:21	335-76-2	N2
PFUdA	ND	2.0	0.55	1	04/12/201802:21	2058-94-8	N2
N-MeFOSAA	ND	4.0	0.99	1	04/12/201802:21	2355-31-9	N2
N-EtFOSAA	ND	4.0	1.3	1	04/12/201802:21	2991-50-6	N2
PFDoA	ND	2.0	0.47	1	04/12/201802:21	307-55-1	N2
PFTrDA	ND	2.0	0.45	1	04/12/201802:21	72629-94-8	N2
PFTeDA	ND	2.0	0.37	1	04/12/201802:21	376-06-7	N2
PFPrOPrA	ND	4.0	1.4	1	04/12/201802:21	62037-80-3	N2
PFBA	ND	2.0	0.61	1	04/12/201802:21	375-22-4	N2
PFPeA	ND	2.0	0.37	1	04/12/201802:21	2706-90-3	N2
PFDS	ND	1.9	0.47	1	04/12/201802:21	335-77-3	N2
NaDONA	ND	4.0	1.5	1	04/12/201802:21	958445-44-8	N2
PFHxDA	ND	2.0	0.51	1	04/12/201802:21	67905-19-5	N2
PFODA	ND	2.0	0.60	1	04/12/201802:21	16517-11-6	N2

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.8	89	70 - 130	Pass
13C2_PFDA	2.0	1.8	90	70 - 130	Pass
d5-EtFOSAA	8.0	7.0	87	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPrOPrA	266650	149905 - 449715	223701 - 447402	Pass
13C2_PFOA	552351	272310 - 816931	394301 - 788601	Pass
13C4_PFOS	787596	373077 - 1119231	557220 - 1114440	Pass
d3-MeFOSAA	467554	232679 - 698038	343535 - 687071	Pass

50-150% of Ical area
70-140% of the preceding CCV area
N2 = The lab does not hold NELAC/TNI accreditation for this parameter.

PFAA Sample Analysis Summary

Client's Sample ID	Bathroom	Date Extracted	04/10/2018
Lab Sample ID	4610324003	Total Amount Extracted	245 mL
Filename	10LCMS02_180411C_030	ICAL ID	180411B02
Matrix	Water	Starting CCal	10LCMS02_180411C_015
Collected	04/04/2018	Ending CCal	10LCMS02_180411C_036
Received	04/06/2018	Method Blank Filename	10LCMS02_180411C_021

Compound	Concentration (ng/L)	PQL (ng/L)	MDL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
PFBS	ND	1.8	0.33	1	04/12/201801:19	375-73-5	N2
PFHxA	ND	2.0	0.40	1	04/12/201801:19	307-24-4	N2
PFHpA	ND	2.0	0.66	1	04/12/201801:19	375-85-9	N2
PFHxS	ND	1.9	0.63	1	04/12/201801:19	355-46-4	N2
PFOA	ND	2.0	0.44	1	04/12/201801:19	335-67-1	N2
PFNA	ND	2.0	0.70	1	04/12/201801:19	375-95-1	N2
PFOS	ND	2.0	0.46	1	04/12/201801:19	1763-23-1	N2
PFDA	ND	2.0	0.40	1	04/12/201801:19	335-76-2	N2
PFUdA	ND	2.0	0.56	1	04/12/201801:19	2058-94-8	N2
N-MeFOSAA	ND	4.1	1.0	1	04/12/201801:19	2355-31-9	N2
N-EtFOSAA	ND	4.1	1.4	1	04/12/201801:19	2991-50-6	N2
PFDoA	ND	2.0	0.48	1	04/12/201801:19	307-55-1	N2
PFTrDA	ND	2.0	0.46	1	04/12/201801:19	72629-94-8	N2
PFTeDA	ND	2.0	0.38	1	04/12/201801:19	376-06-7	N2
PFPrOPrA	ND	4.1	1.4	1	04/12/201801:19	62037-80-3	N2
PFBA	ND	2.0	0.63	1	04/12/201801:19	375-22-4	N2
PFPeA	ND	2.0	0.38	1	04/12/201801:19	2706-90-3	N2
PFDS	ND	2.0	0.48	1	04/12/201801:19	335-77-3	N2
NaDONA	ND	4.1	1.5	1	04/12/201801:19	958445-44-8	N2
PFHxDA	ND	2.0	0.52	1	04/12/201801:19	67905-19-5	N2
PFODA	ND	2.0	0.62	1	04/12/201801:19	16517-11-6	N2

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.6	82	70 - 130	Pass
13C2_PFDA	2.0	1.9	95	70 - 130	Pass
d5-EtFOSAA	8.0	6.6	83	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPrOPrA	247670	149905 - 449715	223701 - 447402	Pass
13C2_PFOA	572061	272310 - 816931	394301 - 788601	Pass
13C4_PFOS	790669	373077 - 1119231	557220 - 1114440	Pass
d3-MeFOSAA	479869	232679 - 698038	343535 - 687071	Pass

50-150% of Ical area
70-140% of the preceding CCV area
N2 = The lab does not hold NELAC/TNI accreditation for this parameter.

PFAA Blank Analysis Summary

Lab Sample ID	BLANK-61670	Total Amount Extracted	253 mL
Filename	10LCMS02_180411C_021	ICAL ID	180411B02
Matrix	Water	Starting CCal	10LCMS02_180411C_015
Date Extracted	04/10/2018	Ending CCal	10LCMS02_180411C_036

Compound	Concentration (ng/L)	PQL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
PFBS	ND	1.7	1	04/11/2018 23:29	375-73-5	N2
PFHxA	ND	2.0	1	04/11/2018 23:29	307-24-4	N2
PFHpA	ND	2.0	1	04/11/2018 23:29	375-85-9	N2
PFHxS	ND	1.9	1	04/11/2018 23:29	355-46-4	N2
PFOA	ND	2.0	1	04/11/2018 23:29	335-67-1	N2
PFNA	ND	2.0	1	04/11/2018 23:29	375-95-1	N2
PFOS	ND	1.9	1	04/11/2018 23:29	1763-23-1	N2
PFDA	ND	2.0	1	04/11/2018 23:29	335-76-2	N2
PFUdA	ND	2.0	1	04/11/2018 23:29	2058-94-8	N2
N-MeFOSAA	ND	4.0	1	04/11/2018 23:29	2355-31-9	N2
N-EtFOSAA	ND	4.0	1	04/11/2018 23:29	2991-50-6	N2
PFDoA	ND	2.0	1	04/11/2018 23:29	307-55-1	N2
PFTrDA	ND	2.0	1	04/11/2018 23:29	72629-94-8	N2
PFTeDA	ND	2.0	1	04/11/2018 23:29	376-06-7	N2
PFPrOPrA	ND	4.0	1	04/11/2018 23:29	62037-80-3	N2
PFBA	ND	2.0	1	04/11/2018 23:29	375-22-4	N2
PFPeA	ND	2.0	1	04/11/2018 23:29	2706-90-3	N2
PFDS	ND	1.9	1	04/11/2018 23:29	335-77-3	N2
NaDONA	ND	4.0	1	04/11/2018 23:29	958445-44-8	N2
PFHxDA	ND	2.0	1	04/11/2018 23:29	67905-19-5	N2
PFODA	ND	2.0	1	04/11/2018 23:29	16517-11-6	N2

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.7	87	70 - 130	Pass
13C2_PFDA	2.0	2.0	100	70 - 130	Pass
d5-EtFOSAA	8.0	6.0	75	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPrOPrA	277330	149905 - 449715	223701 - 447402	Pass
13C2_PFOA	557020	272310 - 816931	394301 - 788601	Pass
13C4_PFOS	759508	373077 - 1119231	557220 - 1114440	Pass
d3-MeFOSAA	446197	232679 - 698038	343535 - 687071	Pass

50-150% of Ical area
70-140% of the preceding CCV area

N2 = The lab does not hold NELAC/TNI accreditation for this parameter.

PFAA Laboratory Control Sample (LCS)

LCS Lab Sample ID	LCS-61671		
LCS Filename	10LCMS02_180411C_017	Matrix	Water
Total Amount Extracted	247mL	Dilution	1
ICAL ID	180411B02	Extracted	04/10/2018
Start CCal Filename	10LCMS02_180411C_015	Analyzed	04/11/2018 22:40
End CCal Filename	10LCMS02_180411C_036	Injected By	QL
Method Blank Filename	10LCMS02_180411C_021		

Compound	Spiked (ng/L)	Recovered (ng/L)		Recovery %	Limits
PFBA	2.0	2.0		101	50.0 - 150.0
PFPeA	2.0	2.3		114	50.0 - 150.0
PFBS	1.8	1.9		109	50.0 - 150.0
PFHxA	2.0	2.1		105	50.0 - 150.0
PFPrOPrA	4.1	5.4		133	50.0 - 150.0
PFHpA	2.0	2.0	J	98	50.0 - 150.0
NaDONA	4.1	5.4		132	50.0 - 150.0
PFHxS	1.9	2.2		117	50.0 - 150.0
PFOA	2.0	2.2		111	50.0 - 150.0
PFNA	2.0	2.1		105	50.0 - 150.0
PFOS	1.9	2.1		106	50.0 - 150.0
PFDA	2.0	2.4		116	50.0 - 150.0
PFUdA	2.0	2.2		107	50.0 - 150.0
N-MeFOSAA	4.1	4.2		103	50.0 - 150.0
N-EtFOSAA	4.1	3.7	J	91	50.0 - 150.0
PFDS	1.9	2.2		113	50.0 - 150.0
PFDoA	2.0	2.1		102	50.0 - 150.0
PFTrDA	2.0	2.2		109	50.0 - 150.0
PFTeDA	2.0	2.0	J	97	50.0 - 150.0
PFHxDA	2.0	1.8	J	89	50.0 - 150.0
PFODA	2.0	1.8	J	90	50.0 - 150.0

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	94	50 - 150	Pass
13C2_PFDA	2.0	2.0	100	50 - 150	Pass
d5-EtFOSAA	8.0	6.1	76	50 - 150	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPrOPrA	278789	149905 - 449715	223701 - 447402	Pass
13C2_PFOA	542600	272310 - 816931	394301 - 788601	Pass
13C4_PFOS	761755	373077 - 1119231	557220 - 1114440	Pass
d3-MeFOSAA	459080	232679 - 698038	343535 - 687071	Pass

50-150% of Ical area
70-140% of the preceding CCV area

PFAA Laboratory Control Sample (LCS)

LCS Lab Sample ID	LCS-61673		
LCS Filename	10LCMS02_180411C_019	Matrix	Water
Total Amount Extracted	256mL	Dilution	1
ICAL ID	180411B02	Extracted	04/10/2018
Start CCal Filename	10LCMS02_180411C_015	Analyzed	04/11/2018 23:04
End CCal Filename	10LCMS02_180411C_036	Injected By	QL
Method Blank Filename	10LCMS02_180411C_021		

Compound	Spiked (ng/L)	Recovered (ng/L)	Recovery %	Limits
PFBA	19	18	94	70.0 - 130.0
PFPeA	19	19	99	70.0 - 130.0
PFBS	17	18	105	70.0 - 130.0
PFHxA	19	18	94	70.0 - 130.0
PFPrOPrA	39	44	113	70.0 - 130.0
PFHpA	19	19	95	70.0 - 130.0
NaDONA	39	45	115	70.0 - 130.0
PFHxS	18	20	107	70.0 - 130.0
PFOA	19	19	99	70.0 - 130.0
PFNA	19	18	94	70.0 - 130.0
PFOS	19	18	99	70.0 - 130.0
PFDA	19	20	101	70.0 - 130.0
PFUdA	19	21	105	70.0 - 130.0
N-MeFOSAA	39	35	90	70.0 - 130.0
N-EtFOSAA	39	34	88	70.0 - 130.0
PFDS	19	20	108	70.0 - 130.0
PFDoA	19	21	109	70.0 - 130.0
PFTrDA	19	20	102	70.0 - 130.0
PFTeDA	19	18	91	70.0 - 130.0
PFHxDA	19	17	90	70.0 - 130.0
PFODA	19	18	91	70.0 - 130.0

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.7	87	70 - 130	Pass
13C2_PFDA	2.0	2.0	100	70 - 130	Pass
d5-EtFOSAA	8.0	6.3	79	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPrOPrA	289020	149905 - 449715	223701 - 447402	Pass
13C2_PFOA	557720	272310 - 816931	394301 - 788601	Pass
13C4_PFOS	785082	373077 - 1119231	557220 - 1114440	Pass
d3-MeFOSAA	462804	232679 - 698038	343535 - 687071	Pass

50-150% of Ical area
70-140% of the preceding CCV area

PFAA Laboratory Control Sample Duplicate (LCSD)

LCSD Lab Sample ID	LCSD-61672		
LCSD Filename	10LCMS02_180411C_018	LCS Filename	10LCMS02_180411C_017
Total Amount Extracted	259mL	Matrix	Water
ICAL ID	180411B02	Dilution	1
Start CCal Filename	10LCMS02_180411C_015	Extracted	04/10/2018
End CCal Filename	10LCMS02_180411C_036	Analyzed	04/11/2018 22:52
Method Blank Filename	10LCMS02_180411C_021	Injected By	QL

Compound	Spiked (ng/L)	Recovered (ng/L)	Recovery %	Recovery Limits	RPD %
PFBA	1.9	1.7 J	89	50.0 - 150.0	17
PFPeA	1.9	2.0	104	50.0 - 150.0	14
PFBS	1.7	1.8	106	50.0 - 150.0	8
PFHxA	1.9	1.9 J	97	50.0 - 150.0	13
PFPrOPrA	3.9	4.2	110	50.0 - 150.0	24
PFHpA	1.9	1.9 J	98	50.0 - 150.0	5
NaDONA	3.9	4.5	116	50.0 - 150.0	18
PFHxS	1.8	2.1	117	50.0 - 150.0	5
PFOA	1.9	2.1	106	50.0 - 150.0	9
PFNA	1.9	2.0	104	50.0 - 150.0	6
PFOS	1.9	1.9	100	50.0 - 150.0	11
PFDA	1.9	2.0	104	50.0 - 150.0	15
PFUdA	1.9	2.0	103	50.0 - 150.0	9
N-MeFOSAA	3.9	3.4 J	88	50.0 - 150.0	21
N-EtFOSAA	3.9	3.3 J	84	50.0 - 150.0	13
PFDS	1.9	1.9 J	100	50.0 - 150.0	18
PFDoA	1.9	1.9 J	98	50.0 - 150.0	9
PFTrDA	1.9	1.8 J	94	50.0 - 150.0	20
PFTeDA	1.9	1.8 J	93	50.0 - 150.0	9
PFHxDA	1.9	1.7 J	90	50.0 - 150.0	4
PFODA	1.9	1.8 J	91	50.0 - 150.0	3

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	95	50 - 150	Pass
13C2_PFDA	2.0	2.0	100	50 - 150	Pass
d5-EtFOSAA	8.0	6.0	74	50 - 150	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPrOPrA	306958	149905 - 449715	223701 - 447402	Pass
13C2_PFOA	548106	272310 - 816931	394301 - 788601	Pass
13C4_PFOS	771427	373077 - 1119231	557220 - 1114440	Pass
d3-MeFOSAA	462320	232679 - 698038	343535 - 687071	Pass

50-150% of Ical area
70-140% of the preceding CCV area