

September 15, 2021

Tim Myllyoja  
Boyne Highlands  
600 Highland Drive  
Harbor Springs, MI 49740

RE: Project: Sludge-PFAS  
Pace Project No.: 50295391

Dear Tim Myllyoja:

Enclosed are the analytical results for sample(s) received by the laboratory on August 18, 2021. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Brian Hall  
brian.hall@pacelabs.com  
(616)975-4500  
Project Manager

Enclosures

cc: Tom Alonzi, Boyne Highlands



## REPORT OF LABORATORY ANALYSIS

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## SAMPLE SUMMARY

Project: Sludge-PFAS  
Pace Project No.: 50295391

Lab ID	Sample ID	Matrix	Date Collected	Date Received
50295391001	Biosolids (Sludge)	Solid	08/17/21 11:40	08/18/21 10:00

## REPORT OF LABORATORY ANALYSIS

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## Sample Conditions Upon Receipt Form (SCUR)

Date/Time: 01/18/21	Evaluated by: DW	WO# : 50295391		
Client: Boyne Highland	Project Manager: DTH	Profile ID: 7809	PM: BJH	Due Date: 09/10/21 CLIENT: GR-Boyne
Rush TAT Requested: YES ✓ NO	Due Date:			
Lab Notified of Rush or Short Holds: YES ✓ NO	Non Conformance Form Required: YES ✓ NO			
Samples Received Via: FedEx ✓ UPS Client	Pace Courier	Other: _____	Comments:	
Custody Seals Present and Intact:		YES	NO	✓ N/A
Received Sample Information Form(s): Drinking Waters Only		YES	NO	✓ N/A
USDA Regulated Soils: (AL, AR, CA, FL, GA, ID, LA, MS, NM, NY, NC, OK, OR, SC, TN, TX, WA or Puerto Rico)		YES	NO	✓ N/A
Short Holds Present (< 72 Hours):		YES	✓ NO	
Samples Received in Hold:		✓ YES	NO	
Custody Signatures Present:		✓ YES	NO	
Collector Signature Present:		✓ YES	NO	
Packing Material Used:		✓ YES	NO	
Samples Collected Today and On Ice:		YES	NO	✓ N/A
IR Gun #: 280 281	Digital Thermometer #: 282 283			
Ice Type: WET Bagged / WET Loose		1. Cooler Temp Upon Receipt: 4.1/4.6 °C		
Ice Location: TOP BOTTOM MIDDLE ✓ DISPERSED		Temp should be 0-6°C (Initial/Corrected)		
Temp Blank Received:		✓ YES	NO	
Containers Intact:		✓ YES	NO	
Correct Containers:		✓ YES	NO	
Sufficient Volume:		✓ YES	NO	
Sample pH Acceptable: All containers needing preservation are found to be in compliance with EPA recommendation		YES	NO	✓ N/A
pH Strip Lot #: Exceptions are VOA, coliform, LLHG, O&G, or any container with a septum cap or preserved with HCl		YES	NO	✓ N/A
Residual Chlorine Absent: Cl <sub>2</sub> Strip Lot #: (SVOC/Pest 625, PCB 608, Total/Amenable Cyanide)		YES	NO	✓ N/A
VOA Headspace Acceptable (<6mm):		YES	NO	✓ N/A
Trip Blank Received: HCl MeOH TSP OTHER		YES	✓ NO	
Comments:		2. Cooler Temp Upon Receipt: _____ °C		
		3. Cooler Temp Upon Receipt: _____ °C		
		4. Cooler Temp Upon Receipt: _____ °C		

**Report Prepared for:**

Brian Hall  
PACE Indianapolis  
5560 Corporate Exchange Ct.  
Grand Rapids MI 49512

**REPORT OF  
LABORATORY  
ANALYSIS  
FOR PFAAs**

**Report Prepared Date:**  
September 9, 2021

**Report Information:**

**Pace Project #:** 10575400  
**Sample Receipt Date:** 08/20/2021  
**Client Project #:** 50295391  
**Client Sub PO #:** N/A  
**State Cert #:** MN300001

**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 Kirsten Hogberg, your Pace Project Manager.

**This report has been reviewed by:**



September 14, 2021

Kirsten Hogberg, Project Manager  
(612) 607-6407  
(612) 607-6444 (fax)  
kirsten.hogberg@pacelabs.com



**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 one sample submitted by a representative of Pace Indianapolis. The sample was analyzed for thirty-six perfluorinated compounds using DOD QSM 5.3 for PFAS. Reporting limits were set to quantification limits.

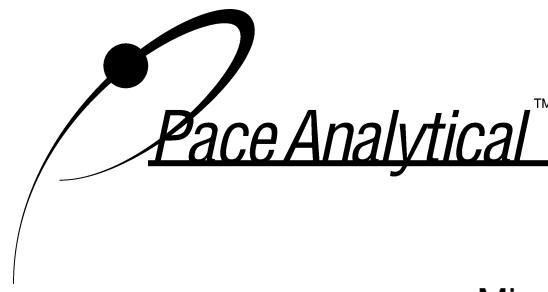
A laboratory method blank was prepared and analyzed with the sample batch as part of our routine quality control procedures. The results show the blank was free of the target perfluorinated compounds at the reporting limits. This indicates that the sample processing procedures did not significantly contribute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

A laboratory spike sample was also prepared with the sample batch using clean reference matrix that had been fortified with native standards. The recovery results were within the method limits. This spike indicates that extraction performed as expected. Matrix spikes were prepared with the sample batch using sample material from a separate project; results from that analysis will be provided upon request.

The four injection internal standards (13C4 PFOA, 13C4 PFOS, 13C2\_PFDA, and 13C2\_PFHxA) pass for each analysis in the batch verifying that the instrument detector is working as expected.

Diminished extracted internal standard (EIS) recovery ("R" flagged) were present in samples, however, the use of the isotope dilution method generally precludes any adverse impact on those individual native compounds that have a directly associated standard.

Several samples have elevated EIS recoveries ("R" flagged) for FTS. While the use of the isotope dilution method generally precludes any adverse impact on those individual native compounds that have a directly associated standard, in the case of the FTS compounds, the recoveries are anomalously high, and are adversely impacted by matrix. The results for these native compounds should be considered estimated.



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	Missouri	10100
Alabama	40770	Montana	CERT0092
Alaska-DW	MN00064	Nebraska	NE-OS-18-06
Alaska-UST	17-009	Nevada	MN00064
Arizona	AZ0014	New Hampshire	2081
Arkansas - WW	88-0680	New Jersey	MN002
Arkansas-DW	MN00064	New York	11647
California	2929	North Carolina-	27700
Colorado	MN00064	North Carolina-	530
Connecticut	PH-0256	North Dakota	R-036
Florida	E87605	Ohio-DW	41244
Georgia	959	Ohio-VAP (170)	CL101
Hawaii	MN00064	Ohio-VAP (180)	CL110
Idaho	MN00064	Oklahoma	9507
Illinois	200011	Oregon- rimary	MN300001
Indiana	C-MN-01	Oregon-Second	MN200001
Iowa	368	Pennsylvania	68-00563
Kansas	E-10167	Puerto Rico	MN00064
Kentucky-DW	90062	South Carolina	74003
Kentucky-WW	90062	Tennessee	TN02818
Louisiana-DEQ	AI-84596	Texas	T104704192
Louisiana-DW	MN00064	Utah	MN00064
Maine	MN00064	Vermont	VT-027053137
Maryland	322	Virginia	460163
Michigan	9909	Washington	C486
Minnesota	027-053-137	West Virginia-D	382
Minnesota-Ag	via MN 027-053	West Virginia-D	9952C
Minnesota-Petr	1240	Wisconsin	999407970
Mississippi	MN00064	Wyoming-UST	via A2LA 2926.

## REPORT OF LABORATORY ANALYSIS

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## **Appendix A**

### **Sample Management**

## Transfer Chain of Custody



**Pace Analytical**  
www.pacelabs.com

Samples Pre-Logged into eCCoC.

Samples Pre-Logged into eCCoC.

Workorder: 50295391 Workorder Name: Sludge-PFAS

Samples Pre-Logged into eCCoC.

State Of Origin: MI

State Of Origin: MI

Cert. Needed:  Yes

Cert. Needed:  No

Owner Received Date: 8/18/2021 Results Requested By: 9/10/2021

Report To: Subcontractor

Brian Hall  
Pace Analytical Grand Rapids  
5560 Corporate Exchange Ct. SE  
Grand Rapids, MI 49512  
Phone (619)75-4500

PFAS MI ID28 - PGC MN

WO# : 10575400



Preserved Containers

Sample ID	Sample Type	Collect Date/Time	Lab ID	Matrix	Preserved	Date/Time	Comments
1	Biosolids (Sludge)	PS	8/17/2021 11:40	50295391001	Solid	1	X
2							OI
3							
4							
5							

Transfers	Released By	Date/Time	Received By	Date/Time
1			15 - PACE SLUDGE	8/17/2021 9:31
2				
3				

Cooler Temperature on Receipt 0.5 °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.



Document Name:  
**Sample Condition Upon Receipt (SCUR) - MN**

Document Revised: 14Apr2021

Page 1 of 1

Document No.:

ENV-FRM-MIN4-0150 Rev.02

Pace Analytical Services -  
MinneapolisSample Condition  
Upon Receipt

Client Name:

Pace-MI

Project #:

WO# : 10575400

Courier:

FedEx    UPS    USPS    Client  
 Pace    SpeeDee    Commercial

See Exceptions   
ENV-FRM-MIN4-0142

Tracking Number: S229 8618 9381

PM: KNH

Due Date: 09/10/21

CLIENT: PASI-INDI

Custody Seal on Cooler/Box Present?  Yes  NoSeals Intact?  Yes  NoBiological Tissue Frozen?  Yes  No  N/APacking Material:  Bubble Wrap  Bubble Bags  None  Other: \_\_\_\_\_Temp Blank?  Yes  NoThermometer:  T1(0461)  T2(1336)  T3(0459)  OS418-LS  
 T4(0254)  T5(0489)  160285052Type of Ice:  Wet  Blue  None  Dry  MeltedDid Samples Originate in West Virginia?  Yes  No Were All Container Temps Taken?  Yes  No  N/A

Temp should be above freezing to 6°C

Cooler Temp Read w/temp blank: 0.5 °C

Average Corrected Temp (no temp blank only): 0 °C

 See Exceptions

ENV-FRM-MIN4-0142

 1 Container

Correction Factor: 0.1

Cooler Temp Corrected w/temp blank: 0.5 °C

USDA Regulated Soil: ( N/A, water sample/Other: \_\_\_\_\_)

Date/Initials of Person Examining Contents: 8/20/21 H

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  NoDid 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 and Filled Out?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	1.	
Chain of Custody Relinquished?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	2.	
Sampler Name and/or Signature on COC?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input checked="" type="checkbox"/> N/A	3.	
Samples Arrived within Hold Time?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	4.	
Short Hold Time Analysis (<72 hr)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	5. <input type="checkbox"/> Fecal Coliform <input type="checkbox"/> HPC <input type="checkbox"/> Total Coliform/E coli <input type="checkbox"/> BOD/cBOD <input type="checkbox"/> Hex Chrome <input type="checkbox"/> Turbidity <input type="checkbox"/> Nitrate <input type="checkbox"/> Nitrite <input type="checkbox"/> Orthophos <input type="checkbox"/> Other	
Rush Turn Around Time Requested?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	6.	
Sufficient Volume?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	7.	
Correct Containers Used? -Pace Containers Used?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	8.	
Containers Intact?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	9.	
Field Filtered Volume Received for Dissolved Tests?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	10. Is sediment visible in the dissolved container? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Is sufficient information available to reconcile the samples to the COC?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	11. If no, write ID/ Date/Time on Container Below: See Exception <input type="checkbox"/> ENV-FRM-MIN4-0142	
Matrix: <input type="checkbox"/> Water <input checked="" type="checkbox"/> Soil <input type="checkbox"/> Oil <input type="checkbox"/> Other			
All containers needing acid/base preservation have been checked?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	12. Sample #	
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>10 Cyanide)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	<input type="checkbox"/> NaOH <input type="checkbox"/> HNO <sub>3</sub> <input type="checkbox"/> H <sub>2</sub> SO <sub>4</sub> <input type="checkbox"/> Zinc Acetate	
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxin/PFAS	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Positive for Res. <input type="checkbox"/> Yes Chlorine? <input type="checkbox"/> No	pH Paper Lot# <input type="checkbox"/> See Exception <input type="checkbox"/> ENV-FRM-MIN4-0142
Extra labels present on soil VOA or WIDRO containers? Headspace in VOA Vials (greater than 6mm)?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Res. Chlorine <input type="checkbox"/>	0-6 Roll <input type="checkbox"/>
Trip Blank Present? Trip Blank Custody Seals Present?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	0-6 Strip <input type="checkbox"/>	0-14 Strip <input type="checkbox"/>
		13.	See Exception <input type="checkbox"/> ENV-FRM-MIN4-0140
		14.	Pace Trip Blank Lot # (if purchased):

## CLIENT NOTIFICATION/RESOLUTION

Field Data Required?  Yes  No

Person Contacted: \_\_\_\_\_

Date/Time: \_\_\_\_\_

Comments/Resolution: \_\_\_\_\_

Project Manager Review: *Kirsten Heffner*

Date: 8/20/2021

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 Conditions Upon Receipt Form (SCUR)

Date/Time: 8/18/21	Evaluated by: PN	WO# : 50295391		
Client: BRYNE Highland	Project Manager: BTH	PM: BJH	Due Date: 09/10/21	
Profile ID: 7809		CLIENT: GR-Bryne		
Rush TAT Requested: YES NO	Due Date:			
Lab Notified of Rush or Short Holds: YES NO		Non Conformance Form Required: YES NO		
Samples Received Via: FedEx UPS Client	Pace Courier	Other:		Comments:
Custody Seals Present and Intact:		YES	NO	N/A
Received Sample Information Form(s): Drinking Waters Only		YES	NO	N/A
USDA Regulated Soils: (AL, AR, CA, FL, GA, ID, LA, MS, NM, NY, NC, OK, OR, SC, TN, TX, WA or Puerto Rico)		YES	NO	N/A
Short Holds Present (< 72 Hours):		YES	NO	
Samples Received in Hold:		YES	NO	
Custody Signatures Present:		YES	NO	
Collector Signature Present:		YES	NO	
Packing Material Used:		YES	NO	
Samples Collected Today and On Ice:		YES	NO	N/A
IR Gun #: 280 281	Digital Thermometer #: 282 283			
Ice Type: WET Bagged / WET Loose BLUE NONE	1. Cooler Temp Upon Receipt: 4.1 / 4.3 °C			
Ice Location: TOP BOTTOM MIDDLE DISPERSED	Temp should be 0-6°C (Initial/Corrected)			
Temp Blank Received:		YES	NO	
Containers Intact:		YES	NO	
Correct Containers:		YES	NO	
Sufficient Volume:		YES	NO	
Sample pH Acceptable: All containers needing preservation are found to be in compliance with EPA recommendation		YES	NO	N/A
pH Strip Lot #: Exceptions are VOA, coliform, LLHg, O&G, or any container with a septum cap or preserved with HCl		YES	NO	
Residual Chlorine Absent: Cl <sub>2</sub> Strip Lot #: (SVOC/Pest 625, PCB 608, Total/Amenable Cyanide)		YES	NO	N/A
VOA Headspace Acceptable (<6mm):		YES	NO	N/A
Trip Blank Received: HCl MeOH TSP OTHER		YES	NO	
Comments:	2. Cooler Temp Upon Receipt: _____ °C			
	3. Cooler Temp Upon Receipt: _____ °C			
	4. Cooler Temp Upon Receipt: _____ °C			

## Reporting Flags

- A = Reporting Limit based on signal to noise (EDL)
- 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
- L = Suppressive interference, analyte may be biased low
- 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

## REPORT OF LABORATORY ANALYSIS

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## **Appendix B**

### **Sample Analysis Summary**



Pace Analytical Services, LLC  
1700 Elm Street, Suite 200  
Minneapolis, MN 55414  
Phone: 612.607.1700  
Fax: 612.607.6444  
[www.pacelabs.com](http://www.pacelabs.com)

**Sample Analysis Summary**  
PFAS by Isotope Dilution

**Page 1 of 4**

Client Sample ID	Biosolids (Sludge)	Extraction Date	08/24/2021 10:00
Lab Sample ID	50295391001	Total Amount Extracted	5.09g
Lab File ID	Q210827A_025	Ical ID	210826A01
Matrix	Soil	CCal File	Q210827A_017
Collected	08/17/2021 11:40	Ending CCal File	Q210827A_028
Received	08/20/2021 09:30	Blank File	Q210827A_015

Compound	Concentration (ng/Kg)	QL (ng/Kg)	RL (ng/Kg)	DL (ng/Kg)	Dil.	CAS No.	Qual.
PFBA	ND	98	98	23	1	375-22-4	
PFPeA	ND	98	98	26	1	2706-90-3	
HFPO-DA	ND	98	98	29	1	13252-13-6	
PFBS	ND	87	87	22	1	375-73-5	
PFHxA	310	98	98	29	1	307-24-4	
4:2 FTS	ND	92	92	31	1	757124-72-4	
PFPeS	ND	92	92	18	1	2706-91-4	
PFHpA	ND	98	98	22	1	375-85-9	
DONA	ND	93	93	38	1	919005-14-4	
PFHxS	ND	89	89	22	1	355-46-4	
PFOA	170	98	98	22	1	335-67-1	
6:2 FTS	ND	93	93	31	1	27619-97-2	
PFHpS	ND	93	93	25	1	375-92-8	
PFNA	ND	98	98	28	1	375-95-1	
PFOSAm	260	98	98	23	1	754-91-6	
PFOS	440	91	91	27	1	1763-23-1	
PFDA	560	98	98	21	1	335-76-2	
8:2 FTS	ND	94	94	25	1	39108-34-4	
9-CI-PF3ON	ND	92	92	14	1	756426-58-1	
PFNS	ND	94	94	18	1	68259-12-1	
PFUnDA	ND	98	98	28	1	2058-94-8	
NMeFOSAA	1100	98	98	23	1	2355-31-9	
NEtFOSAA	610	98	98	24	1	2991-50-6	
PFDS	ND	95	95	25	1	335-77-3	
PFDOA	200	98	98	26	1	307-55-1	
11-CI-PF3OUdS	ND	93	93	16	1	763051-92-9	
PFTrDA	ND	98	98	21	1	72629-94-8	
PFODA	ND	98	98	25	1	16517-11-6	

**Injection Internal Standards**

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Qualifiers
13C2_PFHxA	980	1000	107	50-150	
13C4_PFOA	980	1100	111	50-150	
13C2_PFDA	980	930	95	50-150	
13C4_PFOS	940	840	89	50-150	

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**Sample Analysis Summary**  
PFAS by Isotope Dilution

**Page 2 of 4**

Client Sample ID	Biosolids (Sludge)	Extraction Date	08/24/2021 10:00
Lab Sample ID	50295391001	Total Amount Extracted	5.09g
Lab File ID	Q210827A_025	Ical ID	210826A01
Matrix	Soil	CCal File	Q210827A_017
Collected	08/17/2021 11:40	Ending CCal File	Q210827A_028
Received	08/20/2021 09:30	Blank File	Q210827A_015

**Extracted Internal Standards**

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Qualifiers
13C4_PFBA	980	520	53	50-150	
13C5_PFPeA	980	690	70	50-150	
13C3_PFBS	910	740	81	50-150	
13C2_4:2FTS	920	2100	232	50-150	R
13C5_PFHxA	980	750	77	50-150	
13C4_PFHxA	980	740	76	50-150	
13C3_PFHxS	930	630	67	50-150	
13C2_6:2FTS	930	1500	166	50-150	R
13C8_PFOA	980	690	70	50-150	
13C9_PFNA	980	660	67	50-150	
13C8_PFOS	940	690	73	50-150	
13C2_8:2FTS	940	1400	154	50-150	R
13C6_PFDA	980	590	60	50-150	
d3-MeFOSAA	980	940	96	50-150	
13C8_PFOSA	980	700	71	50-150	
d5-EtFOSAA	980	1000	105	50-150	
13C7_PFUdA	980	710	72	50-150	
13C2_PFDa	980	700	71	50-150	
13C2_PFTeDA	980	630	64	50-150	
13C3_HFPO-DA	980	810	82	50-150	
13C2_PFHxDA	980	240	24	50-150	R
d7-N-MeFOSE	980	260	27	10-150	
d9-N-EtFOSE	980	340	35	10-150	
d3-N-MeFOSA	980	72	7	10-150	R
d5-N-EtFOSA	980	72	7	10-150	R

**Injection Internal Standards**

Compound	Ion Abund. Ratio	Reference Ratio	Retention Time	Reference Time	Qualifiers
13C2_PFHxA	N/A	N/A	6.29	6.29	
13C4_PFOA	N/A	N/A	7.63	7.66	
13C2_PFDA	N/A	N/A	8.99	9.06	
13C4_PFOS	N/A	N/A	9.47	9.46	

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**Sample Analysis Summary**  
PFAS by Isotope Dilution

**Page 3 of 4**

Client Sample ID	Biosolids (Sludge)	Extraction Date	08/24/2021 10:00
Lab Sample ID	50295391001	Total Amount Extracted	5.09g
Lab File ID	Q210827A_025	Ical ID	210826A01
Matrix	Soil	CCal File	Q210827A_017
Collected	08/17/2021 11:40	Ending CCal File	Q210827A_028
Received	08/20/2021 09:30	Blank File	Q210827A_015

**Extracted Internal Standards**

Compound	Ion Abund. Ratio	Reference Ratio	Retention Time	Reference Time	Qualifiers
13C4 PFBA	N/A	N/A	4.77	4.80	
13C5 PFPeA	N/A	N/A	5.60	5.60	
13C3 PFBS	N/A	N/A	6.56	6.55	
13C2 4:2FTS	N/A	N/A	6.00	5.99	R
13C5 PFHxA	N/A	N/A	6.29	6.28	
13C4 PFHpA	N/A	N/A	6.97	6.96	
13C3 PFHxS	N/A	N/A	8.06	8.08	
13C2 6:2FTS	N/A	N/A	7.28	7.29	R
13C8 PFOA	N/A	N/A	7.63	7.64	
13C9 PFNA	N/A	N/A	8.31	8.33	
13C8 PFOS	N/A	N/A	9.47	9.52	
13C2 8:2FTS	N/A	N/A	8.60	8.63	R
13C6 PFDA	N/A	N/A	9.00	9.03	
d3-MeFOSAA	N/A	N/A	8.86	8.90	
13C8 PFOSA	N/A	N/A	11.38	11.42	
d5-EtFOSAA	N/A	N/A	9.17	9.21	
13C7 PFUdA	N/A	N/A	9.67	9.72	
13C2 PFDoA	N/A	N/A	10.35	10.41	
13C2 PFTeDA	N/A	N/A	11.66	11.71	
13C3 HFPO-DA	N/A	N/A	6.56	6.56	
13C2 PFHxDA	N/A	N/A	12.79	12.79	R
d7-N-MeFOSE	N/A	N/A	13.06	13.08	
d9-N-EtFOSE	N/A	N/A	13.53	13.53	
d3-N-MeFOSA	N/A	N/A	13.26	13.26	R
d5-N-EtFOSA	N/A	N/A	13.71	13.70	R

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**Sample Analysis Summary**  
PFAS by Isotope Dilution

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Client Sample ID	Biosolids (Sludge)	Extraction Date	08/24/2021 10:00
Lab Sample ID	50295391001	Total Amount Extracted	5.09g
Lab File ID	Q210827A_025	Ical ID	210826A01
Matrix	Soil	CCal File	Q210827A_017
Collected	08/17/2021 11:40	Ending CCal File	Q210827A_028
Received	08/20/2021 09:30	Blank File	Q210827A_015

**Native Analytes**

Compound	Ion Abund. Ratio	Reference Ratio	Retention Time	Reference Time	Qualifiers
PFBA	N/A	N/A	4.78	4.82	
PFPeA	N/A	N/A	5.61	5.63	
HFPO-DA	0.000	0.350	0.00	6.61	
PFBS	0.260	0.390	6.56	6.54	
PFHxA	0.130	0.0930	6.30	6.32	
4:2 FTS	0.000	1.10	0.00	5.99	
PFPeS	0.000	0.410	0.00	7.32	
PFHpA	0.690	0.620	6.98	6.96	
DONA	1.50	0.490	7.23	7.25	
PFHxS	0.000	0.300	0.00	8.05	
PFOA	0.310	0.290	7.64	7.66	
6:2 FTS	1.60	1.10	7.28	7.30	
PFHpS	0.000	0.450	0.00	8.79	
PFNA	0.250	0.290	8.32	8.32	
PFOSAm	N/A	N/A	11.39	11.40	
PFOS	0.240	0.230	9.49	9.46	
PFDA	0.240	0.220	9.00	9.02	
8:2 FTS	1.70	1.50	8.61	8.62	
9-Cl-PF3ON	0.000	0.0420	0.00	10.00	
PFNS	0.000	0.220	0.00	10.16	
PFUnDA	0.200	0.160	9.68	9.71	
NMeFOSAA	0.760	0.690	8.88	8.89	
NetFOSAA	0.450	0.510	9.19	9.20	
PFDS	0.350	0.250	10.83	10.92	
PFDOA	0.180	0.210	10.36	10.44	
11-Cl-PF3OUdS	0.000	0.0310	11.34	11.37	
PFTrDA	0.250	0.220	11.03	11.10	
PFODA	0.000	0.190	13.65	13.62	

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## Method Blank Analysis Summary

PFAS by Isotope Dilution

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Client Sample ID	BLKLJ	Extraction Date	08/24/2021 10:00
Lab Sample ID	BLANK-92528	Total Amount Extracted	5.07g
Lab File ID	Q210827A_015	Ical ID	210826A01
Matrix	Soil	CCal File	Q210827A_008
Collected	08/23/2021 09:14	Ending CCal File	Q210827A_017
Received	08/23/2021 09:14	Blank File	

Compound	Concentration (ng/Kg)	QL (ng/Kg)	RL (ng/Kg)	DL (ng/Kg)	Dil.	CAS No.	Qual.
PFBA	ND	99	99	23	1	375-22-4	
PFPeA	ND	99	99	26	1	2706-90-3	
HFPO-DA	ND	99	99	29	1	13252-13-6	
PFBS	ND	87	87	22	1	375-73-5	
PFHxA	ND	99	99	30	1	307-24-4	
4:2 FTS	ND	92	92	31	1	757124-72-4	
PFPeS	ND	93	93	18	1	2706-91-4	
PFHpA	ND	99	99	22	1	375-85-9	
DONA	ND	93	93	38	1	919005-14-4	
PFHxS	ND	90	90	22	1	355-46-4	
PFOA	ND	99	99	22	1	335-67-1	
6:2 FTS	ND	94	94	32	1	27619-97-2	
PFHpS	ND	94	94	25	1	375-92-8	
PFNA	ND	99	99	28	1	375-95-1	
PFOSAm	ND	99	99	23	1	754-91-6	
PFOS	ND	91	91	27	1	1763-23-1	
PFDA	ND	99	99	21	1	335-76-2	
8:2 FTS	ND	95	95	26	1	39108-34-4	
9-CI-PF3ON	ND	92	92	14	1	756426-58-1	
PFNS	ND	95	95	18	1	68259-12-1	
PFUnDA	ND	99	99	28	1	2058-94-8	
NMeFOSAA	ND	99	99	23	1	2355-31-9	
NEtFOSAA	ND	99	99	24	1	2991-50-6	
PFDS	ND	95	95	25	1	335-77-3	
PFDOA	ND	99	99	26	1	307-55-1	
11-CI-PF3OUdS	ND	93	93	16	1	763051-92-9	
PFTrDA	ND	99	99	21	1	72629-94-8	
PFODA	ND	99	99	25	1	16517-11-6	

### Injection Internal Standards

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Qualifiers
13C2_PFHxA	990	1000	106	50-150	
13C4_PFOA	990	960	97	50-150	
13C2_PFDA	990	960	98	50-150	
13C4_PFOS	940	1000	106	50-150	

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**Method Blank Analysis Summary**  
PFAS by Isotope Dilution

**Page 2 of 4**

Client Sample ID	BLKLJ	Extraction Date	08/24/2021 10:00
Lab Sample ID	BLANK-92528	Total Amount Extracted	5.07g
Lab File ID	Q210827A_015	Ical ID	210826A01
Matrix	Soil	CCal File	Q210827A_008
Collected	08/23/2021 09:14	Ending CCal File	Q210827A_017
Received	08/23/2021 09:14	Blank File	

**Extracted Internal Standards**

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Qualifiers
13C4_PFBA	990	870	89	50-150	
13C5_PFPeA	990	800	81	50-150	
13C3_PFBS	920	770	84	50-150	
13C2_4:2FTS	920	820	89	50-150	
13C5_PFHxA	990	850	86	50-150	
13C4_PFHxA	990	830	84	50-150	
13C3_PFHxS	930	790	85	50-150	
13C2_6:2FTS	940	970	104	50-150	
13C8_PFOA	990	940	95	50-150	
13C9_PFNA	990	1000	102	50-150	
13C8_PFOS	940	780	83	50-150	
13C2_8:2FTS	940	860	91	50-150	
13C6_PFDA	990	910	92	50-150	
d3-MeFOSAA	990	1100	110	50-150	
13C8_PFOSA	990	940	95	50-150	
d5-EtFOSAA	990	860	88	50-150	
13C7_PFUdA	990	880	90	50-150	
13C2_PFDa	990	950	97	50-150	
13C2_PFTeDA	990	880	89	50-150	
13C3_HFPO-DA	990	790	81	50-150	
13C2_PFHxDA	990	840	86	50-150	
d7-N-MeFOSE	990	870	88	10-150	
d9-N-EtFOSE	990	760	77	10-150	
d3-N-MeFOSA	990	860	87	10-150	
d5-N-EtFOSA	990	820	84	10-150	

**Injection Internal Standards**

Compound	Ion Abund. Ratio	Reference Ratio	Retention Time	Reference Time	Qualifiers
13C2_PFHxA	N/A	N/A	6.30	6.29	
13C4_PFOA	N/A	N/A	7.65	7.66	
13C2_PFDA	N/A	N/A	9.02	9.06	
13C4_PFOS	N/A	N/A	9.51	9.46	

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## Method Blank Analysis Summary

PFAS by Isotope Dilution

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Client Sample ID	BLKLJ	Extraction Date	08/24/2021 10:00
Lab Sample ID	BLANK-92528	Total Amount Extracted	5.07g
Lab File ID	Q210827A_015	Ical ID	210826A01
Matrix	Soil	CCal File	Q210827A_008
Collected	08/23/2021 09:14	Ending CCal File	Q210827A_017
Received	08/23/2021 09:14	Blank File	

### Extracted Internal Standards

Compound	Ion Abund. Ratio	Reference Ratio	Retention Time	Reference Time	Qualifiers
13C4 PFBA	N/A	N/A	4.76	4.80	
13C5 PFPeA	N/A	N/A	5.60	5.60	
13C3 PFBS	N/A	N/A	6.57	6.55	
13C2 4:2FTS	N/A	N/A	6.01	5.99	
13C5 PFHxA	N/A	N/A	6.30	6.28	
13C4 PFHpA	N/A	N/A	6.98	6.96	
13C3 PFHxS	N/A	N/A	8.08	8.08	
13C2 6:2FTS	N/A	N/A	7.30	7.29	
13C8 PFOA	N/A	N/A	7.65	7.64	
13C9 PFNA	N/A	N/A	8.34	8.33	
13C8 PFOS	N/A	N/A	9.51	9.52	
13C2 8:2FTS	N/A	N/A	8.63	8.63	
13C6 PFDA	N/A	N/A	9.02	9.03	
d3-MeFOSAA	N/A	N/A	8.89	8.90	
13C8 PFOSA	N/A	N/A	11.41	11.42	
d5-EtFOSAA	N/A	N/A	9.20	9.21	
13C7 PFUdA	N/A	N/A	9.71	9.72	
13C2 PFDoA	N/A	N/A	10.39	10.41	
13C2 PFTeDA	N/A	N/A	11.71	11.71	
13C3 HFPO-DA	N/A	N/A	6.57	6.56	
13C2 PFHxDA	N/A	N/A	12.83	12.87	
d7-N-MeFOSE	N/A	N/A	13.08	13.08	
d9-N-EtFOSE	N/A	N/A	13.56	13.53	
d3-N-MeFOSA	N/A	N/A	13.29	13.26	
d5-N-EtFOSA	N/A	N/A	13.73	13.70	

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## Method Blank Analysis Summary

PFAS by Isotope Dilution

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Client Sample ID	BLKLJ	Extraction Date	08/24/2021 10:00
Lab Sample ID	BLANK-92528	Total Amount Extracted	5.07g
Lab File ID	Q210827A_015	Ical ID	210826A01
Matrix	Soil	CCal File	Q210827A_008
Collected	08/23/2021 09:14	Ending CCal File	Q210827A_017
Received	08/23/2021 09:14	Blank File	

### Native Analytes

Compound	Ion Abund. Ratio	Reference Ratio	Retention Time	Reference Time	Qualifiers
PFBA	N/A	N/A	0.00	4.82	
PFPeA	N/A	N/A	5.61	5.63	
HFPO-DA	0.000	0.350	0.00	6.61	
PFBS	0.000	0.380	0.00	6.54	
PFHxA	0.000	0.0790	6.31	6.32	
4:2 FTS	0.000	0.860	0.00	5.99	
PFPeS	0.000	0.440	0.00	7.32	
PFHpA	0.000	0.630	0.00	6.96	
DONA	0.000	0.420	0.00	7.25	
PFHxS	0.000	0.310	0.00	8.05	
PFOA	0.000	0.230	0.00	7.66	
6:2 FTS	0.000	1.10	0.00	7.30	
PFHpS	0.000	0.420	0.00	8.79	
PFNA	0.000	0.270	0.00	8.32	
PFOSAm	N/A	N/A	11.43	11.40	
PFOS	0.000	0.230	9.52	9.46	
PFDA	0.000	0.180	0.00	9.02	
8:2 FTS	0.000	1.50	0.00	8.62	
9-Cl-PF3ON	0.000	0.0480	0.00	10.00	
PFNS	0.000	0.240	10.20	10.16	
PFUnDA	0.490	0.170	9.72	9.71	
NMeFOSAA	0.000	0.770	0.00	8.89	
NetFOSAA	0.000	0.490	0.00	9.20	
PFDS	0.000	0.270	0.00	10.92	
PFDOA	0.000	0.180	0.00	10.44	
11-Cl-PF3OUdS	0.000	0.0260	0.00	11.37	
PFTrDA	0.000	0.190	0.00	11.10	
PFODA	0.000	0.190	0.00	13.62	

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**LCS Analysis Summary**  
PFAS by Isotope Dilution

**Page 1 of 4**

Lab Sample ID	LCS-92529	Instrument ID	10LCMS01
Run File Name	Q210827A_016	Column ID	112EB00094
Analyzed	08/27/2021 15:16	Ical ID	210826A01
Injected By	NH	Level	L

**Injection Internal Standards**

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Qualifiers
13C2_PFHxA	980	950	97	50-150	
13C4_PFOA	980	790	81	50-150	
13C2_PFDA	980	1100	107	50-150	
13C4_PFOS	940	1100	114	50-150	

**Extracted Internal Standards**

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Qualifiers
13C4_PFBA	980	780	79	50-150	
13C5_PFPeA	980	740	76	50-150	
13C3_PFBs	910	680	75	50-150	
13C2_4:2FTS	920	730	80	50-150	
13C5_PFHxA	980	830	84	50-150	
13C4_PFHpA	980	770	78	50-150	
13C3_PFHxS	930	670	72	50-150	
13C2_6:2FTS	930	870	93	50-150	
13C8_PFOA	980	810	83	50-150	
13C9_PFNA	980	910	93	50-150	
13C8_PFOS	940	840	90	50-150	
13C2_8:2FTS	940	800	85	50-150	
13C6_PFDA	980	960	98	50-150	
d3-MeFOSAA	980	1100	116	50-150	
13C8_PFOSA	980	830	84	50-150	
d5-EtFOSAA	980	680	69	50-150	
13C7_PFUdA	980	890	90	50-150	
13C2_PFDa	980	920	93	50-150	
13C2_PFTeDA	980	790	80	50-150	
13C3_HFPO-DA	980	700	71	50-150	
13C2_PFHxDA	980	770	78	50-150	
d7-N-MeFOSE	980	760	77	10-150	
d9-N-EtFOSE	980	690	70	10-150	
d3-N-MeFOSA	980	830	85	10-150	
d5-N-EtFOSA	980	780	79	10-150	

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**LCS Analysis Summary**  
PFAS by Isotope Dilution

**Page 2 of 4**

Lab Sample ID	LCS-92529	Instrument ID	10LCMS01
Run File Name	Q210827A_016	Column ID	112EB00094
Analyzed	08/27/2021 15:16	Ical ID	210826A01
Injected By	NH	Level	L

**Native Analytes**

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Qualifiers	CAS No.
PFBA	200	210	106	71-135		375-22-4
PFPeA	200	210	107	69-132		2706-90-3
HFPO-DA	200	180	92	70-140		13252-13-6
PFBS	170	160	89	72-128		375-73-5
PFHxA	200	190	96	70-132		307-24-4
4:2 FTS	180	140	77	62-145		757124-72-4
PFPeS	180	180	96	73-123		2706-91-4
PFHpA	200	160	79	71-131		375-85-9
DONA	190	150	82	70-140		919005-14-4
PFHxS	180	190	106	67-130		355-46-4
PFOA	200	190	97	69-133		335-67-1
6:2 FTS	190	220	115	64-140		27619-97-2
PFHpS	190	180	95	70-132		375-92-8
PFNA	200	190	95	72-129		375-95-1
PFOSAm	200	190	96	67-137		754-91-6
PFOS	180	190	105	68-136		1763-23-1
PFDA	200	170	86	69-133		335-76-2
8:2 FTS	190	190	98	65-137		39108-34-4
9-CI-PF3ON	180	190	106	70-140		756426-58-1
PFNS	190	180	95	69-125		68259-12-1
PFUnDA	200	180	89	64-136		2058-94-8
NMeFOSAA	200	180	90	63-144		2355-31-9
NETFOSAA	200	220	110	61-139		2991-50-6
PFDS	190	180	93	59-134		335-77-3
PFDOA	200	190	97	69-135		307-55-1
11-CI-PF3OUDs	190	160	87	70-140		763051-92-9
PFTrDA	200	200	101	66-139		72629-94-8
PFODA	200	170	88	70-140		16517-11-6

**Injection Internal Standards**

Compound	Ion Abund. Ratio	Reference Ratio	Retention Time	Reference Time	Qualifiers
13C2 PFHxA	N/A	N/A	6.29	6.29	
13C4 PFOA	N/A	N/A	7.65	7.66	
13C2 PFDA	N/A	N/A	9.03	9.06	
13C4 PFOS	N/A	N/A	9.50	9.46	

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**LCS Analysis Summary**  
PFAS by Isotope Dilution

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Lab Sample ID	LCS-92529	Instrument ID	10LCMS01
Run File Name	Q210827A_016	Column ID	112EB00094
Analyzed	08/27/2021 15:16	Ical ID	210826A01
Injected By	NH	Level	L

**Extracted Internal Standards**

Compound	Ion Abund. Ratio	Reference Ratio	Retention Time	Reference Time	Qualifiers
13C4 PFBA	N/A	N/A	4.75	4.80	
13C5 PFPeA	N/A	N/A	5.59	5.60	
13C3 PFBS	N/A	N/A	6.55	6.55	
13C2 4:2FTS	N/A	N/A	6.00	5.99	
13C5 PFHxA	N/A	N/A	6.29	6.28	
13C4 PFHpa	N/A	N/A	6.97	6.96	
13C3 PFHxs	N/A	N/A	8.08	8.08	
13C2 6:2FTS	N/A	N/A	7.30	7.29	
13C8 PFOA	N/A	N/A	7.65	7.64	
13C9 PFNA	N/A	N/A	8.33	8.33	
13C8 PFOS	N/A	N/A	9.51	9.52	
13C2 8:2FTS	N/A	N/A	8.63	8.63	
13C6 PFDA	N/A	N/A	9.03	9.03	
d3-MeFOSAA	N/A	N/A	8.89	8.90	
13C8 PFOSA	N/A	N/A	11.41	11.42	
d5-EtFOSAA	N/A	N/A	9.20	9.21	
13C7 PFUdA	N/A	N/A	9.71	9.72	
13C2 PFDoA	N/A	N/A	10.39	10.41	
13C2 PFTeDA	N/A	N/A	11.70	11.71	
13C3 HFPO-DA	N/A	N/A	6.56	6.56	
13C2 PFHxDA	N/A	N/A	12.83	12.87	
d7-N-MeFOSE	N/A	N/A	13.08	13.08	
d9-N-EtFOSE	N/A	N/A	13.55	13.53	
d3-N-MeFOSA	N/A	N/A	13.28	13.26	
d5-N-EtFOSA	N/A	N/A	13.72	13.70	

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**LCS Analysis Summary**  
PFAS by Isotope Dilution

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Lab Sample ID	LCS-92529	Instrument ID	10LCMS01
Run File Name	Q210827A_016	Column ID	112EB00094
Analyzed	08/27/2021 15:16	Ical ID	210826A01
Injected By	NH	Level	L

**Native Analytes**

Compound	Ion Abund. Ratio	Reference Ratio	Retention Time	Reference Time	Qualifiers
PFBA	N/A	N/A	4.76	4.82	
PFPeA	N/A	N/A	5.60	5.63	
HFPO-DA	0.33	0.35	6.59	6.61	
PFBS	0.38	0.38	6.56	6.54	
PFHxA	0.09	0.07	6.30	6.32	
4:2 FTS	1.20	0.86	6.00	5.99	
PFPeS	0.40	0.44	7.34	7.32	
PFHpA	0.67	0.63	6.98	6.96	
DONA	0.51	0.42	7.23	7.25	
PFHxS	0.28	0.31	8.08	8.05	
PFOA	0.28	0.23	7.66	7.66	
6:2 FTS	0.70	1.10	7.30	7.30	
PFHpS	0.39	0.42	8.81	8.79	
PFNA	0.25	0.27	8.34	8.32	
PFOSAm	N/A	N/A	11.42	11.40	
PFOS	0.20	0.23	9.52	9.46	
PFDA	0.21	0.18	9.04	9.02	
8:2 FTS	1.20	1.50	8.63	8.62	
9-CI-PF3ON	0.03	0.04	10.02	10.00	
PFNS	0.25	0.24	10.20	10.16	
PFUnDA	0.18	0.17	9.72	9.71	
NMeFOSAA	0.84	0.77	8.90	8.89	
NEtFOSAA	0.45	0.49	9.22	9.20	
PFDS	0.26	0.27	10.87	10.92	
PFDOA	0.21	0.18	10.39	10.44	
11-CI-PF3OUdS	0.03	0.02	11.34	11.37	
PFTrDA	0.21	0.19	11.07	11.10	
PFODA	0.20	0.19	13.59	13.62	

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