

CITY OF CHARLOTTE

**BIOSOLIDS
(PFAS)**

AUGUST 2, 2021

Trace Analytical Laboratories, Inc.
2241 Black Creek Road
Muskegon, MI 49444-2673



231-773-5998 Phone
888-979-4469 Fax
www.trace-labs.com

August 30, 2021

Mr. Matt Griffith
Charlotte, City of
111 E. Lawrence
Charlotte, MI 48813

Phone: (517) 564-8860

RE: Trace ID: 21H0039

Dear Mr. Griffith:

Enclosed are your analytical results associated with your project for Biosolids 8/2/21. The results of this report relate only to the samples listed in the body of this report.

The results were obtained from Merit Laboratories, Inc

Thank you for working with Trace. If you have questions concerning this report, please contact me at 231.773.5998 or by email at tbrewer@trace-labs.com.

Sincerely,

A handwritten signature in black ink that reads "Timothy W. Brewer".

Tim Brewer
Project Manager

Enclosures



NJDEP Accreditation No. MI008

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SUBCONTRACT ORDER

21H0039

SENDING LABORATORY:

Trace Analytical Laboratories, Inc.
2241 Black Creek Road
Muskegon, MI 49444
Phone: 231.773.5998

RECEIVING LABORATORY:

Merit Laboratories, Inc
2680 East Lansing Dr.
East Lansing, MI 48823
Phone : (517) 332-0167

Project Manager: Tim Brewer

PO # 21H0039

Sample ID: Biosolids 21H0039-01
Matrix: Sludge Sampled: 08/02/21 07:30 TAT: Standard

26769.01

Analysis Needed:

PFAS- Biosolids- EGLE List

Released By

Date

Received By

Date

Released By

Date

Received By

Date

IR 5.3



Analytical Laboratory Report

Report ID: S26769.01(01)
Generated on 08/27/2021

Report to
Attention: Tim Brewer
Trace Analytical Laboratories
241 Black Creek Rd.
Muskegon, MI 49444

Phone: O: 231-773-5998 x238 FAX:
Email: TBrewer@trace-labs.com

Additional Contacts: Jon Mink

Report Summary

Lab Sample ID(s): S26769.01
Project: 21H0039
Collected Date(s): 08/02/2021
Submitted Date/Time: 08/03/2021 10:45
Sampled by: Unknown
L.O. #: 21H0039

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Report produced by
Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Lavery (johnlavery@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.

Methods may be modified for improved performance.

Results reported on a dry weight basis where applicable.

'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).

40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.

QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.

Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.

Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

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Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

FAS requirement: Section 9.3.8 of U.S. EPA Method 537.1 states "If the method analyte(s) found in the Field Sample is present in the FRB at a concentration greater than 1/3 the MRL, then all samples collected with that FRB are invalid and must be recollected and reanalyzed."

Samples submitted without an accompanying FRB may not be acceptable for compliance purposes.

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
MOD ELAP/ISO 17025	#69699
VBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001
Pennsylvania DEP	#68-05884

Qualifier Descriptions

Qualifier	Description
	Result is outside of stated limit criteria
	Compound also found in associated method blank
	Concentration exceeds calibration range
	Analysis run outside of holding time
	Estimated result due to extraction run outside of holding time
	Sample submitted and run outside of holding time
	Matrix interference with internal standard
	Estimated value less than reporting limit, but greater than MDL
	Elevated reporting limit due to low sample amount
	Result reported to MDL not RDL
	Analysis performed by outside laboratory. See attached report.
	Preliminary result
	Surrogate recovery outside of control limits
	No correction for total solids
	Elevated reporting limit due to matrix interference
	Elevated reporting limit due to high target concentration
	Value detected less than reporting limit, but greater than MDL
	Reported value estimated due to interference
	Analyte also found in associated method blank
	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
R/L/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
	EPA Methods
SM	Standard Methods
N	Linear
R	Branched

Method Summary

Method	Version
ASTM D7968-17M	ASTM Method D7968 - 17 Modified (Isotopic Dilution)
ASTM 2540B	Standard Method 2540 B 2011

Parameter Summary

Parameter	Synonym	Cas #
PFBA	Perfluorobutanoic Acid	375-22-4
PFPeA	Perfluoropentanoic Acid	2706-90-3
4:2 FTSA	4:2 Fluorotelomer Sulfonic Acid	757124-72-4
PFHxA	Perfluorohexanoic Acid	307-24-4
PFBS	Perfluorobutane sulfonic Acid	375-73-5
PFHpA	Perfluoroheptanoic Acid	375-85-9
PFPeS	Perfluoropentane Sulfonic Acid	2706-91-4
6:2 FTSA	6:2 Fluorotelomer Sulfonic Acid	27619-97-2
PFOSA	Perfluorooctanoic Acid	335-67-1
PFHxS	Perfluorohexane Sulfonic Acid	355-46-4
PFHxS-LN	Perfluorohexane Sulfonic Acid - LN	355-46-4-LN
PFHxS-BR	Perfluorohexane Sulfonic Acid - BR	355-46-4-BR
PFNA	Perfluorononanoic Acid	375-95-1
8:2 FTSA	8:2 Fluorotelomer Sulfonic Acid	39108-34-4
PFHpS	Perfluoroheptane Sulfonic Acid	375-92-8
PFDA	Perfluorodecanoic Acid	335-76-2
1-MeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid	2355-31-9
EtFOSAA	N-Ethyl Perfluorooctane Sulfonamidoacetic Acid	2991-50-6
PFOS	Perfluorooctane Sulfonic Acid	1763-23-1
PFOS-LN	Perfluorooctane Sulfonic Acid - LN	1763-23-1-LN
PFOS-BR	Perfluorooctane Sulfonic Acid - BR	1763-23-1-BR
PFUnDA	Perfluoroundecanoic Acid	2058-94-8
PFNS	Perfluorononane Sulfonic Acid	68259-12-1
PFDoDA	Perfluorododecanoic Acid	307-55-1
PFDS	Perfluorodecane Sulfonic Acid	335-77-3
PFTrDA	Perfluorotridecanoic Acid	72629-94-8
PFOSA	Perfluorooctane Sulfonamide	754-91-6
PFTeDA	Perfluorotetradecanoic Acid	376-06-7
11-Cl-PF3OUdS	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	763051-92-9
9-Cl-PF3ONS	9-chlorohexadecafluoro-3-oxanone1-sulfonic acid	756426-58-1
PFONDA	4,8-dioxa-3H-perfluorononanoic acid	919005-14-4
PFPO-DA	Hexafluoropropylene oxide dimer	13252-13-6

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
26769.01	Biosolids 21H0039-01	Sludge	08/02/21 07:30

ab Sample ID: S26769.01

Sample Tag: Biosolids 21H0039-01

Collected Date/Time: 08/02/2021 07:30

Matrix: Sludge

DOC Reference:

Sample Containers

Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
500ml Plastic	None	Yes	5.3	IR
15ml Centrifuge Tube	None	Yes	5.3	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Initial wt. (g) / Final wt. (g) / Volume (ml)*	9.12/7.00/10	ASTM D7968-17M	08/19/21 16:00	KCV	

Inorganics

Method: SM2540B, Run Date: 08/04/21 15:40, Analyst: ELR

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	5.7	1		%	1		

Organics

8 PFAs, Method: ASTM D7968-17M, Run Date: 08/23/21 02:05, Analyst: KCV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
FBA*	Not detected	1.7		ug/kg	82.8	375-22-4	
FPeA*	Not detected	0.83		ug/kg	82.8	2706-90-3	
:2 FTSA*	Not detected	0.83		ug/kg	82.8	757124-72-4	I
FHxA*	5.2	0.83		ug/kg	82.8	307-24-4	
FBS*	Not detected	0.83		ug/kg	82.8	375-73-5	
FHpA*	Not detected	0.83		ug/kg	82.8	375-85-9	
FPeS*	Not detected	0.83		ug/kg	82.8	2706-91-4	
:2 FTSA*	Not detected	0.83		ug/kg	82.8	27619-97-2	I
FOA*	Not detected	0.83		ug/kg	82.8	335-67-1	
FHxS*	Not detected	0.83		ug/kg	82.8	355-46-4	
FHxS-LN*	Not detected	0.83		ug/kg	82.8	355-46-4-LN	
FHxS-BR*	Not detected	0.83		ug/kg	82.8	355-46-4-BR	
FNA*	Not detected	0.83		ug/kg	82.8	375-95-1	
:2 FTSA*	Not detected	0.83		ug/kg	82.8	39108-34-4	I
FHpS*	Not detected	0.83		ug/kg	82.8	375-92-8	
FDA*	Not detected	0.83		ug/kg	82.8	335-76-2	I
I-MeFOSAA*	7.7	0.83		ug/kg	82.8	2355-31-9	
tFOSAA*	2.6	0.83		ug/kg	82.8	2991-50-6	
FOS*	1.8	0.83		ug/kg	82.8	1763-23-1	
FOS-LN*	1.2	0.83		ug/kg	82.8	1763-23-1-LN	
FOS-BR*	Not detected	0.83		ug/kg	82.8	1763-23-1-BR	
FUnDA*	Not detected	0.83		ug/kg	82.8	2058-94-8	I
FNS*	Not detected	0.83		ug/kg	82.8	68259-12-1	
FDoDA*	Not detected	0.83		ug/kg	82.8	307-55-1	I
FDS*	Not detected	0.83		ug/kg	82.8	335-77-3	
FTrDA*	Not detected	0.83		ug/kg	82.8	72629-94-8	I
OSA*	Not detected	0.83		ug/kg	82.8	754-91-6	
FTeDA*	Not detected	0.83		ug/kg	82.8	376-06-7	
1Cl-PF3OUdS*	Not detected	0.83		ug/kg	82.8	763051-92-9	
Cl-PF3ONS*	Not detected	0.83		ug/kg	82.8	756426-58-1	

Matrix interference with internal standard



Analytical Laboratory Report

Lab Sample ID: S26769.01 (continued)

Sample Tag: Biosolids 21H0039-01

8 PFAs, Method: ASTM D7968-17M, Run Date: 08/23/21 02:05, Analyst: KCV (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PFONA*	Not detected	0.83		ug/kg	82.8	919005-14-4	
PFPO-DA*	Not detected	0.83		ug/kg	82.8	13252-13-6	I

Matrix interference with internal standard

Lab Set ID:S26769

Client:TRACE (Trace Analytical Laboratories)

Project: 21H0039

Submitted:08/03/2021 10:45 Login User: MMC

Attention: Tim Brewer

Address: Trace Analytical Laboratories
2241 Black Creek Rd.
Muskegon, MI 49444

Phone: O: 231-773-5998 FAX:
Email: TBrewer@trace-labs.com

Selection		Description	Note
Sample Receiving			
01.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> N/A Samples are received at 4C +/- 2C Thermometer #	IR 5.3
02.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> N/A Received on ice/ cooling process begun	
03.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> N/A Samples shipped	UPS
04.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A Samples left in 24 hr. drop box	
05.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> N/A Are there custody seals/tape or is the drop box locked	
Chain of Custody			
06.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> N/A COC adequately filled out	
07.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> N/A COC signed and relinquished to the lab	
08.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> N/A Sample tag on bottles match COC	
09.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A Subcontracting needed? Subcontracted to:	
Preservation			
10.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> N/A Do sample have correct chemical preservation	
11.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A Completed pH checks on preserved samples? (no VOAs)	
12.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A Did any samples need to be preserved in the lab?	
Bottle Conditions			
13.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> N/A All bottles intact	
14.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> N/A Appropriate analytical bottles are used	
15.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> N/A Merit bottles used	
16.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> N/A Sufficient sample volume received	
17.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A Samples require laboratory filtration	
18.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> N/A Samples submitted within holding time	
19.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Trace Analytical Laboratories, Inc.
2241 Black Creek Road
Muskegon, MI 49444-2673



231-773-5998 Phone
888-979-4469 Fax
www.trace-labs.com

SUBCONTRACT ORDER

21H0039

SENDING LABORATORY:

Trace Analytical Laboratories, Inc.
2241 Black Creek Road
Muskegon, MI 49444
Phone: 231.773.5998

RECEIVING LABORATORY:

Merit Laboratories, Inc
2680 East Lansing Dr.
East Lansing, MI 48823
Phone: (517) 332-0167

Project Manager: Tim Brewer

PO # 21H0039

Matrix: Sludge
Sampled: 08/02/21 07:30
TAT: Standard

Sample ID: Biosolids 21H0039-01
26769.01

Analysis Needed:

PFAS-Biosolids- ECLF List

Released By: *daylydubny*
Date: 8/02/21

Received By:

Date:

8/3/21 1045

Received By:

Date:

8/3/21 1045

Released By:

Date:

8/3/21

M. O'Neil

IR 5.3

Page ____ of ____

Trace Use:	
Logged By:	<i>[Signature]</i>
Checked By:	<i>[Signature]</i>
Soil Volatiles Preserved (circle if applicable):	
MeOH	Low Level
	Lab
Sampling Time:	

in executing this writ of custody, the writ acknowledges the terms as set

Form 70-Z.1

Report ID: 21H0039 TRACE_Farmed_Out FINAL 08 30 21 1537

Trace Analytical Laboratories, Inc.
2241 Black Creek Road
Muskegon, MI 49444-2673



231-773-5998 Phone
888-979-4469 Fax
www.trace-labs.com

21H0039
Charlotte, City of
Project Manager: Tim Brewer

Sample Log In Checklist

Date: 8/02/21	Original Observation	Corrected Temperature	IR-9 (CF: +0.1°C)	IR-10 (CF: +0.1°C)	20812743 (CF: -0.3°C)	Temp Blank	Client Sample
Time: 16:00							
Logged by: <i>ML</i>							
Package Description: Cooler							
Package Temp °C	-1.5	-1.4					
Representative Sample Temp °C	0.7	0.4					

Sample Receipt

Yes	No	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Received on ice or other coolant
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Ice still present upon receipt
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Custody seals present
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Trace Courier
<input type="checkbox"/>	<input type="checkbox"/>	Client Drop-off
<input type="checkbox"/>	<input type="checkbox"/>	Yes
<input type="checkbox"/>	<input type="checkbox"/>	No
<input type="checkbox"/>	<input type="checkbox"/>	UPS
<input type="checkbox"/>	<input type="checkbox"/>	Fed Ex
<input type="checkbox"/>	<input type="checkbox"/>	US Mail
<input type="checkbox"/>	<input type="checkbox"/>	Other

Sample Condition

Yes	No	N/A	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All sample containers arrived unbroken and labeled
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sufficient sample to run requested analyses
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Correct chemical preservative added to samples
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Samples preserved at Trace
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Chemical preservation verified, check EMD pH test strip used (if applicable)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	pH 0-2.5 (Lot: HC029115)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	pH 11.0-13.0 (Lot: HC022540)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Other
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Air bubbles absent from VOAs

Chain of Custody (COC)

Yes	No	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	All bottle labels agree with COC
<input checked="" type="checkbox"/>	<input type="checkbox"/>	COC filled out properly
<input checked="" type="checkbox"/>	<input type="checkbox"/>	COC signed by client

Notes:

Form 70-A.39
Effective 7/2/21

TRACE Analytical Laboratories, Inc.

CERTIFICATE OF ANALYSIS

This report shall not be reproduced, except in full, without the written consent of Trace Analytical Laboratories, Inc.



Quality Control Report

Report ID: QC-S26769-01
Generated on 08/27/2021

Report to
Attention: Tim Brewer
Trace Analytical Laboratories
241 Black Creek Rd.
Muskegon, MI 49444

Report Produced by
Merit Laboratories
2680 East Lansing Drive
East Lansing, MI 48823

Phone: O: 231-773-5998 x238 FAX:

Phone: (517) 332-0167 FAX: (517) 332-6333

Report Summary

Lab Sample ID(s): S26769.01
Project: 21H0039
Submitted Date/Time: 08/03/2021 10:45
Sampled by: Unknown
L.O. #: 21H0039

QC Report Sections

Cover Page (Page 1)
Analysis Summary (Page 2)
Rep Batch Summary (Page 3)
Internal Standards per Lab Sample (Page 4)
Internal Standards per QC Sample (Pages 5-7)
Batch QC Results (Pages 8-12)

Report Flag Descriptions

QC result is outside of indicated control limits
V: Surrogate result not applicable due to sample dilution

certify that this data package is in compliance with the terms and conditions of the program, and project, and contractual requirements both technically and for completeness. Release of the data contained in this hardcopy data package and its computer-readable data submitted has been authorized by the Quality Assurance Manager and his/her designee, as verified by the following signature.

Barbara Ball
Quality Assurance Manager

Lab Sample ID: S26769.01

Sample Tag: Biosolids 21H0039-01

Collected Date/Time: 08/02/2021 07:30

Matrix: Sludge

COC Reference:

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	08/04/21 15:40	TS210804A	TS210804A	No	BLK/LCS/DUP
Organics - Volatiles						
28 PFAs	ASTM D7968-17M	08/23/21 02:05	AK210822	PF210819S1	Yes	BLK/LCS/LCSD/MS/DU

Inorganics, Prep Batch ID: TS210804A

Surrogates: No, QC Types: BLK/LCS/DUP

Sample ID	Analysis	Method	Run Date/Time	Batch ID
S26769.01	Total Solids	SM2540B	08/04/21 15:40	TS210804A

Organics - Volatiles, Prep Batch ID: PF210819S1

Surrogates: Yes, QC Types: BLK/LCS/LCSD/MS/DUP

Sample ID	Analysis	Method	Run Date/Time	Batch ID
S26769.01	28 PFAs	ASTM D7968-17M	08/23/21 02:05	AK210822

Lab Sample ID: S26769.01

Sample Tag: Biosolids 21H0039-01

Collected Date/Time: 08/02/2021 07:30

Matrix: Sludge

COC Reference:

Organics - Volatiles, Analysis: 28 PFAs

Run in Batch: AK210822, Run Date: 08/23/2021 02:05, Matrix: SO, Dilution: 82.8

Internal Standard	Flags	%Rec	LCL	UCL
M2-4:2FTSA	*	496.8	50.0	150.0
M2-6:2FTSA	*	502.6	50.0	150.0
M2-8:2FTSA	*	518.0	50.0	150.0
M2PFTeDA		25.1	12.0	218.0
M3PFBS		95.4	50.0	150.0
M3PFHxS		105.8	50.0	150.0
M4PFHpA		72.9	50.0	150.0
M5PFHxA		94.1	50.0	150.0
M5PFPeA		85.1	50.0	150.0
M6PFDA	*	42.9	50.0	150.0
M7PFUnDA	*	21.2	50.0	150.0
M8FOSA		127.1	50.0	150.0
M8PFOA		84.3	50.0	150.0
M8PFOS		66.5	50.0	150.0
M9-PFNA		96.1	50.0	150.0
MPFBA		59.8	50.0	150.0
MPFDoDA	*	20.6	50.0	150.0
M3N-MeFOSAA		63.8	50.0	150.0
M5EtFOSAA		95.7	50.0	150.0
MHFPO-DA	*	369.2	50.0	150.0

Organics - Volatiles, Prep Batch ID: PF210819S1

QC Types: BLK/LCS/LCSD/MS/DUP

Blank (BLK)

Lab Sample ID: AK210822.BLK210819

Run in Batch: AK210822, Run Date: 08/22/2021 20:14, Prep Date: 08/19/2021, Matrix: SO, Dilution: 1

Internal Standard	Flags	%Rec	LCL	UCL
V2-4:2FTSA		86.9	50.0	150.0
V2-6:2FTSA		94.0	50.0	150.0
V2-8:2FTSA		98.7	50.0	150.0
V2PFTeDA		151.0	12.0	218.0
V3PFBS		101.7	50.0	150.0
V3PFHxS		104.3	50.0	150.0
V4PFHpA		97.7	50.0	150.0
V5PFHxA		100.3	50.0	150.0
V5PFPeA		99.4	50.0	150.0
V6PFDA		91.5	50.0	150.0
V7PFUnDA		98.7	50.0	150.0
V8FOSA		103.0	50.0	150.0
V8PFOA		91.3	50.0	150.0
V8PFOS		112.7	50.0	150.0
V9-PFNA		107.3	50.0	150.0
VPFBA		99.6	50.0	150.0
VPFDoDA		106.0	50.0	150.0
d3N-MeFOSAA		92.9	50.0	150.0
d5EtFOSAA		95.4	50.0	150.0
VHFPO-DA		113.2	50.0	150.0

Laboratory Control Sample (LCS)

Lab Sample ID: AK210822.LCS210819

Run in Batch: AK210822, Run Date: 08/22/2021 19:35, Prep Date: 08/19/2021, Matrix: SO, Dilution: 1

Internal Standard	Flags	%Rec	LCL	UCL
V2-4:2FTSA		83.7	50.0	150.0
V2-6:2FTSA		100.7	50.0	150.0
V2-8:2FTSA		106.3	50.0	150.0
V2PFTeDA		120.6	12.0	218.0
V3PFBS		100.8	50.0	150.0
V3PFHxS		99.1	50.0	150.0
V4PFHpA		94.6	50.0	150.0
V5PFHxA		92.6	50.0	150.0
V5PFPeA		96.8	50.0	150.0
V6PFDA		101.9	50.0	150.0
V7PFUnDA		90.3	50.0	150.0
V8FOSA		97.9	50.0	150.0
V8PFOA		97.7	50.0	150.0
V8PFOS		107.7	50.0	150.0
V9-PFNA		105.4	50.0	150.0
VPFBA		98.6	50.0	150.0
VPFDoDA		99.0	50.0	150.0
d3N-MeFOSAA		95.9	50.0	150.0
d5EtFOSAA		101.1	50.0	150.0
VHFPO-DA		116.1	50.0	150.0

Laboratory Control Sample Duplicate (LCSD)

Lab Sample ID: AK210822.LCSD210819, Parent Sample ID: AK210822.LCS210819

Run in Batch: AK210822, Run Date: 08/22/2021 19:54, Prep Date: 08/19/2021, Matrix: SO, Dilution: 1

Internal Standard	Flags	%Rec	LCL	UCL
M2-4:2FTSA		91.5	50.0	150.0
M2-6:2FTSA		97.1	50.0	150.0
M2-8:2FTSA		100.9	50.0	150.0
M2PFTeDA		147.8	12.0	218.0
M3PFBS		96.8	50.0	150.0
M3PFHxS		103.3	50.0	150.0
M4PFHpA		87.8	50.0	150.0
M5PFHxA		103.3	50.0	150.0
M5PFPeA		99.3	50.0	150.0
M6PFDA		106.5	50.0	150.0
M7PFUnDA		101.8	50.0	150.0
M8FOSA		101.5	50.0	150.0
M8PFOA		90.4	50.0	150.0
M8PFOS		112.8	50.0	150.0
M9-PFNA		106.4	50.0	150.0
MPFBA		98.9	50.0	150.0
MPFDoDA		102.9	50.0	150.0
M3N-MeFOSAA		93.4	50.0	150.0
M5EtFOSAA		104.6	50.0	150.0
MHFPO-DA		118.6	50.0	150.0

Matrix Spike (MS)

Lab Sample ID: AK210822.2695601M, Parent Sample ID: S26956.01

Run in Batch: AK210822, Run Date: 08/22/2021 21:12, Prep Date: 08/19/2021, Matrix: SO, Dilution: 10.2

Internal Standard	Flags	%Rec	LCL	UCL
M2-4:2FTSA	*	606.6	50.0	150.0
M2-6:2FTSA	*	341.9	50.0	150.0
M2-8:2FTSA	*	462.5	50.0	150.0
M2PFTeDA		184.9	12.0	218.0
M3PFBS		117.9	50.0	150.0
M3PFHxS		119.9	50.0	150.0
M4PFHpA		111.3	50.0	150.0
M5PFHxA		111.8	50.0	150.0
M5PFPeA		109.4	50.0	150.0
M6PFDA		119.2	50.0	150.0
M7PFUnDA		128.0	50.0	150.0
M8FOSA		120.4	50.0	150.0
M8PFOA		106.1	50.0	150.0
M8PFOS		134.8	50.0	150.0
M9-PFNA		130.3	50.0	150.0
MPFBA		108.1	50.0	150.0
MPFDoDA	*	152.5	50.0	150.0
M3N-MeFOSAA		128.0	50.0	150.0
M5EtFOSAA		117.4	50.0	150.0
MHFPO-DA		108.8	50.0	150.0

Duplicate (DUP)

Lab Sample ID: AK210822.2695602D, Parent Sample ID: S26956.02

Run in Batch: AK210822, Run Date: 08/22/2021 21:51, Prep Date: 08/19/2021, Matrix: SO, Dilution: 11.4

Internal Standard	Flags	%Rec	LCL	UCL
V2-4:2FTSA		147.6	50.0	150.0
V2-6:2FTSA	*	150.6	50.0	150.0
V2-8:2FTSA	*	210.8	50.0	150.0
V2PFTeDA		152.1	12.0	218.0
V3PFBS		104.0	50.0	150.0
V3PFHxS		116.7	50.0	150.0
V4PFHpA		101.4	50.0	150.0
V5PFHxA		104.9	50.0	150.0
V5PFPeA		103.2	50.0	150.0
V6PFDA		116.7	50.0	150.0
V7PFUnDA		116.4	50.0	150.0
V8FOSA		110.4	50.0	150.0
V8PFOA		109.6	50.0	150.0
V8PFOS		113.8	50.0	150.0
V9-PFNA		129.0	50.0	150.0
VPFBA		108.0	50.0	150.0
VPFDoDA		125.3	50.0	150.0
d3N-MeFOSAA		117.3	50.0	150.0
d5EtFOSAA		127.7	50.0	150.0
VHFPO-DA		114.2	50.0	150.0

rganics, Prep Batch ID: TS210804A
urrogates: No, QC Types: BLK/LCS/DUP

Blank (BLK)

Lab Sample ID: TS210804A.LRB1

Run in Batch: TS210804A, Run Date: 08/04/2021 15:40, Prep Date: 08/04/2021, Matrix: Liquid, Dilution: 1

Analyte	Flags	Conc	RDL	Units
Total Solids		ND	1	%

Laboratory Control Sample (LCS)

Lab Sample ID: TS210804A.LCS1

Run in Batch: TS210804A, Run Date: 08/04/2021 15:40, Prep Date: 08/04/2021, Matrix: Liquid, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL
Total Solids		100	90	110

Duplicate (DUP)

Lab Sample ID: TS210804A.DP1, Parent Sample ID: S26748.01

Run in Batch: TS210804A, Run Date: 08/04/2021 15:40, Prep Date: 08/04/2021, Matrix: Soil, Dilution: 1

Analyte	Flags	RPD	RPD CL
Total Solids		0	5

Duplicate (DUP)

Lab Sample ID: TS210804A.DP2, Parent Sample ID: S26795.02

Run in Batch: TS210804A, Run Date: 08/04/2021 15:40, Prep Date: 08/04/2021, Matrix: Soil, Dilution: 1

Analyte	Flags	RPD	RPD CL
Total Solids		1	5

rganics - Volatiles, Prep Batch ID: PF210819S1
 urrogates: Yes, QC Types: BLK/LCS/LCSD/MS/DUP

Blank (BLK)

ab Sample ID: AK210822.BLK210819

un in Batch: AK210822, Run Date: 08/22/2021 20:14, Prep Date: 08/19/2021, Matrix: SO, Dilution: 1

nalyte	Flags	Conc	RDL	Units
FBA		ND	10	ng/kg
FPeA		ND	4	ng/kg
:2 FTSA		ND	2	ng/kg
FHxA		ND	2	ng/kg
FBS		ND	2	ng/kg
FPO-DA		ND	2	ng/kg
FHpA		ND	2	ng/kg
DONA		ND	2	ng/kg
FPeS		ND	2	ng/kg
:2 FTSA		ND	2	ng/kg
FOA		ND	2	ng/kg
FHxS-BR		ND	2	ng/kg
FHxS		ND	2	ng/kg
FHxS-LN		ND	2	ng/kg
FNA		ND	2	ng/kg
:2 FTSA		ND	2	ng/kg
FHpS		ND	2	ng/kg
-MeFOSAA		ND	2	ng/kg
FDA		ND	2	ng/kg
tFOSAA		ND	4	ng/kg
FOS-BR		ND	2	ng/kg
FOS		ND	2	ng/kg
FOS-LN		ND	2	ng/kg
FUnDA		ND	2	ng/kg
CL-PF3ONS		ND	2	ng/kg
FNS		ND	2	ng/kg
FDoDA		ND	2	ng/kg
FDS		ND	2	ng/kg
FTrDA		ND	2	ng/kg
OSA		ND	2	ng/kg
1CL-PF3OUdS		ND	2	ng/kg
FTeDA		ND	4	ng/kg

Laboratory Control Sample (LCS)

ab Sample ID: AK210822.LCS210819

un in Batch: AK210822, Run Date: 08/22/2021 19:35, Prep Date: 08/19/2021, Matrix: SO, Dilution: 1

nalyte	Flags	% Rec	LCL	UCL
FBA		112.0	70.0	130.0
FPeA		106.0	70.0	130.0
:2 FTSA	*	134.0	70.0	130.0
FHxA		106.0	70.0	130.0
FBS		111.0	70.0	130.0
FPO-DA		112.0	70.0	130.0
FHpA		99.6	70.0	130.0
DONA		109.0	70.0	130.0
FPeS		98.2	70.0	130.0

Organics - Volatiles, Prep Batch ID: PF210819S1 (continued)

Surrogates: Yes, QC Types: BLK/LCS/LCSD/MS/DUP

Laboratory Control Sample (LCS) (continued)

Lab Sample ID: AK210822.LCS210819

Run in Batch: AK210822, Run Date: 08/22/2021 19:35, Prep Date: 08/19/2021, Matrix: SO, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL
2 FTSA		97.5	70.0	130.0
FOA		96.4	70.0	130.0
FHxS		118.0	70.0	130.0
FNA		104.0	70.0	130.0
2 FTSA		99.4	70.0	130.0
FHpS		107.0	70.0	130.0
MeFOSAA		107.0	70.0	130.0
FDA		105.0	70.0	130.0
FOSAA		115.0	70.0	130.0
FOS		79.2	70.0	130.0
FUnDA		113.0	70.0	130.0
CL-PF3ONS		107.0	70.0	130.0
FNS		97.8	70.0	130.0
FDoDA		111.0	70.0	130.0
FDS		96.7	70.0	130.0
FTrDA		103.0	70.0	130.0
OSA		108.0	70.0	130.0
CL-PF3OUdS		115.0	70.0	130.0
FTeDA		90.3	70.0	130.0

Laboratory Control Sample Duplicate (LCSD)

Lab Sample ID: AK210822.LCSD210819, Parent Sample ID: AK210822.LCS210819

Run in Batch: AK210822, Run Date: 08/22/2021 19:54, Prep Date: 08/19/2021, Matrix: SO, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL	RPD	RPD CL
FBA		107.0	70.0	130.0	4.6	30.0
FPeA		98.5	70.0	130.0	7.3	30.0
2 FTSA		102.0	70.0	130.0	27.1	30.0
FHxA		99.3	70.0	130.0	6.5	30.0
FBS		109.0	70.0	130.0	1.8	30.0
FPO-DA		111.0	70.0	130.0	0.9	30.0
FHpA		114.0	70.0	130.0	13.5	30.0
DONA		106.0	70.0	130.0	2.8	30.0
FPeS		104.0	70.0	130.0	5.7	30.0
2 FTSA		98.1	70.0	130.0	0.6	30.0
FOA		99.8	70.0	130.0	3.5	30.0
FHxS		113.0	70.0	130.0	4.3	30.0
FNA		96.8	70.0	130.0	7.2	30.0
2 FTSA		116.0	70.0	130.0	15.4	30.0
FHpS		91.0	70.0	130.0	16.2	30.0
MeFOSAA		103.0	70.0	130.0	3.8	30.0
FDA		93.3	70.0	130.0	11.8	30.0
FOSAA		118.0	70.0	130.0	2.6	30.0
FOS		74.8	70.0	130.0	5.7	30.0
FUnDA		94.4	70.0	130.0	17.9	30.0
CL-PF3ONS		101.0	70.0	130.0	5.8	30.0
FNS		95.2	70.0	130.0	2.7	30.0

Organics - Volatiles, Prep Batch ID: PF210819S1 (continued)

Surrogates: Yes, QC Types: BLK/LCS/LCSD/MS/DUP

Laboratory Control Sample Duplicate (LCSD) (continued)

Lab Sample ID: AK210822.LCSD210819, Parent Sample ID: AK210822.LCS210819

Run in Batch: AK210822, Run Date: 08/22/2021 19:54, Prep Date: 08/19/2021, Matrix: SO, Dilution: 1

analyte	Flags	% Rec	LCL	UCL	RPD	RPD CL
FDoDA		114.0	70.0	130.0	2.7	30.0
FDS		91.8	70.0	130.0	5.2	30.0
FTrDA		113.0	70.0	130.0	9.3	30.0
OSA		103.0	70.0	130.0	4.7	30.0
1CL-PF3OUdS		114.0	70.0	130.0	0.9	30.0
FTeDA		101.0	70.0	130.0	11.2	30.0

Matrix Spike (MS)

Lab Sample ID: AK210822.2695601M, Parent Sample ID: S26956.01

Run in Batch: AK210822, Run Date: 08/22/2021 21:12, Prep Date: 08/19/2021, Matrix: SO, Dilution: 10.2

analyte	Flags	% Rec	LCL	UCL
FBA		115.7	70.0	130.0
FPeA		103.9	70.0	130.0
:2 FTSA		107.8	70.0	130.0
FHxA		107.8	70.0	130.0
FBS		100.0	70.0	130.0
FHpA		117.6	70.0	130.0
FPeS		92.2	70.0	130.0
:2 FTSA		103.9	70.0	130.0
FOA		102.0	70.0	130.0
FHxS		113.7	70.0	130.0
FNA		125.5	70.0	130.0
:2 FTSA		100.0	70.0	130.0
FHpS		92.2	70.0	130.0
FDA		117.6	70.0	130.0
-MeFOSAA		105.9	70.0	130.0
tFOSAA		115.7	70.0	130.0
FOS		74.5	70.0	130.0
FUnDA		105.9	70.0	130.0
FNS		96.1	70.0	130.0
FDoDA		90.2	70.0	130.0
FDS		90.2	70.0	130.0
FTrDA		100.0	70.0	130.0
OSA		105.9	70.0	130.0
FTeDA		88.2	70.0	130.0
1CL-PF3OUdS		102.0	70.0	130.0
CL-PF3ONS		94.1	70.0	130.0
DONA		107.8	70.0	130.0
FPO-DA		107.8	70.0	130.0

Duplicate (DUP)

Lab Sample ID: AK210822.2695602D, Parent Sample ID: S26956.02

Run in Batch: AK210822, Run Date: 08/22/2021 21:51, Prep Date: 08/19/2021, Matrix: SO, Dilution: 11.4

analyte	Flags	RPD	RPD CL
FBA		NC	30.0
FPeA		NC	30.0

Organics - Volatiles, Prep Batch ID: PF210819S1 (continued)

Surrogates: Yes, QC Types: BLK/LCS/LCSD/MS/DUP

Duplicate (DUP) (continued)

Lab Sample ID: AK210822.2695602D, Parent Sample ID: S26956.02

Run in Batch: AK210822, Run Date: 08/22/2021 21:51, Prep Date: 08/19/2021, Matrix: SO, Dilution: 11.4

Analyte	Flags	RPD	RPD CL
2 FTSA		NC	30.0
FHxA		NC	30.0
FBS		NC	30.0
FHpA		NC	30.0
FPeS		NC	30.0
2 FTSA		NC	30.0
FOA		5.1	30.0
FHxS		NC	30.0
FHxS-LN		NC	30.0
FHxS-BR		NC	30.0
FNA		NC	30.0
2 FTSA		NC	30.0
FHpS		NC	30.0
FDA		NC	30.0
-MeFOSAA		NC	30.0
tFOSAA		NC	30.0
FOS		12.2	30.0
FOS-LN		7.8	30.0
FOS-BR		25.4	30.0
FUnDA		NC	30.0
FNS		NC	30.0
FDoDA		NC	30.0
FDS		NC	30.0
FTrDA		NC	30.0
OSA		NC	30.0
FTeDA		NC	30.0
1CL-PF3OUds		NC	30.0
CL-PF3ONS		NC	30.0
DONA		NC	30.0
FPO-DA		NC	30.0