

Trace Analytical Laboratories, Inc.
2241 Black Creek Road
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August 13, 2021

James Green
Fleis and Vandenbrink Engineers
2960 Lucerne Drive, SE
Grand Rapids, MI 49546

Phone: (517) 522-3092
Fax: 517-522-3423

RE: Trace ID: 21G0794

Enclosed are your analytical results associated with your project for Biosolids PFAS 7/21/21. 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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Analytical Laboratory Report

Report ID: S26444.01(01)
Generated on 08/12/2021

Report to

Attention: Tim Brewer
Trace Analytical Laboratories
2241 Black Creek Rd.
Muskegon, MI 49444

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

Additional Contacts: Jon Mink

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)

Report Summary

Lab Sample ID(s): S26444.01
Project: 21G0794
Collected Date(s): 07/21/2021
Submitted Date/Time: 07/22/2021 11:20
Sampled by: GH
P.O. #: 21G0794

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Maya Murshak
Technical Director



Analytical Laboratory Report

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)

PFAS 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
DOD ELAP/ISO 17025	#69699
WBENC	#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
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
ASTM D7968-17M	ASTM Method D7968 - 17 Modified (Isotopic Dilution)
SM2540B	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
PFOA	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
N-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
PFTTrDA	Perfluorotridecanoic Acid	72629-94-8
FOSA	Perfluorooctane Sulfonamide	754-91-6
PFTeDA	Perfluorotetradecanoic Acid	376-06-7
11Cl-PF3OUdS	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	763051-92-9
9Cl-PF3ONS	9-chlorohexadecafluoro-3-oxanone1-sulfonic acid	756426-58-1
ADONA	4,8-dioxa-3H-perfluorononanoic acid	919005-14-4
HFPO-DA	Hexafluoropropylene oxide dimer	13252-13-6



Analytical Laboratory Report

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S26444.01	Biosolids 21G0794-01	Sludge	07/21/21 12:30



Analytical Laboratory Report

Lab Sample ID: S26444.01

Sample Tag: Biosolids 21G0794-01

Collected Date/Time: 07/21/2021 12:30

Matrix: Sludge

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	500ml Plastic	None	Yes	6.0	IR
1	15ml Centrifuge Tube	None	Yes	6.0	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Initial wt. (g) / Final wt. (g) / Volume (ml)*	9.12/6.94/10	ASTM D7968-17M	08/06/21 11:49	JGH	

Inorganics

Method: SM2540B, Run Date: 07/22/21 16:00, Analyst: ELR

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	0.47	1		%	1		

Organics

28 PFAs, Method: ASTM D7968-17M, Run Date: 08/10/21 00:50, Analyst: JGH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PFBA*	Not detected	4.9		ug/kg	976	375-22-4	
PFPeA*	7.3	2		ug/kg	976	2706-90-3	
4:2 FTSA*	Not detected	2		ug/kg	976	757124-72-4	I
PFHxA*	4.2	2		ug/kg	976	307-24-4	
PFBS*	Not detected	2		ug/kg	976	375-73-5	
PFHpA*	Not detected	2		ug/kg	976	375-85-9	
PFPeS*	Not detected	2		ug/kg	976	2706-91-4	
6:2 FTSA*	Not detected	2		ug/kg	976	27619-97-2	I
PFOA*	11	2		ug/kg	976	335-67-1	
PFHxS*	Not detected	2		ug/kg	976	355-46-4	
PFHxS-LN*	Not detected	2		ug/kg	976	355-46-4-LN	
PFHxS-BR*	Not detected	2		ug/kg	976	355-46-4-BR	
PFNA*	2.6	2		ug/kg	976	375-95-1	
8:2 FTSA*	Not detected	2		ug/kg	976	39108-34-4	I
PFHpS*	Not detected	2		ug/kg	976	375-92-8	
PFDA*	10	2		ug/kg	976	335-76-2	
N-MeFOSAA*	5.4	2		ug/kg	976	2355-31-9	
EtFOSAA*	2.4	2		ug/kg	976	2991-50-6	
PFOS*	22	2		ug/kg	976	1763-23-1	
PFOS-LN*	18	2		ug/kg	976	1763-23-1-LN	
PFOS-BR*	2.1	2		ug/kg	976	1763-23-1-BR	
PFUnDA*	Not detected	2		ug/kg	976	2058-94-8	I
PFNS*	Not detected	2		ug/kg	976	68259-12-1	
PFDoDA*	3.4	2		ug/kg	976	307-55-1	
PFDS*	2	2		ug/kg	976	335-77-3	
PFTTrDA*	Not detected	2		ug/kg	976	72629-94-8	
FOSA*	4.1	2		ug/kg	976	754-91-6	
PFTeDA*	Not detected	2		ug/kg	976	376-06-7	
11CI-PF3OUdS*	Not detected	2		ug/kg	976	763051-92-9	
9CI-PF3ONS*	Not detected	2		ug/kg	976	756426-58-1	

I-Matrix interference with internal standard



Analytical Laboratory Report

Lab Sample ID: S26444.01 (continued)

Sample Tag: Biosolids 21G0794-01

28 PFAs, Method: ASTM D7968-17M, Run Date: 08/10/21 00:50, Analyst: JGH (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
ADONA*	Not detected	2		ug/kg	976	919005-14-4	
HFPO-DA*	Not detected	2		ug/kg	976	13252-13-6	

Merit Laboratories Login Checklist

Lab Set ID:S26444

Client:TRACE (Trace Analytical Laboratories)

Project: 21G0794

Submitted:07/22/2021 11:20 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 6.0
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? Subcontacted to:
Preservation		
10.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" 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: _____

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SUBCONTRACT ORDER

21G0794

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 # 21G0794

Matrix: Sludge
Sampled: 07/21/21 12:30
TAT: Standard

Sample ID: Biosolids 21G0794-01

26444.01

Sampled By: GH-Trace

Analysis Needed:

PFAS- Biosolids- EGLE List

WTR
Released By

7/21/21

Date

WPS
Released By

7/22/21 1120

Date

Received By

M Chilcote

Date

7/22/21 1120

Received By

IP 6.0

Date

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Page _____ of _____

Trace ID No.
21G0794

CHAIN-OF-CUSTODY RECORD

Report Results To:

Company Name: Milca

Report To:

Mailing Address:

City, State, Zip Code:

Office Phone:

Email Address:

PO #:

Contact Name:

Billing Address (if different):

City, State, Zip Code:

Phone Number:

Billing Email Address:

Trace Use:

Logged By: NC

Checked By: BN

Soil Volatiles Preserved (circle if applicable):

MeOH Low Level Lab

Sampling Time:

Turnaround Requirements:

☐ Standard, 5-10 Days

☐ 3 Day*

☐ 1 Day*

Matrix Key:

S = Soil / Solid

W = Water

SL = Sludge

OI = Oil

WI = Wipes

LW = Liquid Waste

A = Air

D = Drinking Water

*Results provided end of business day, requires prior approval.

Project Name: Pfas

Sampled By: GH

Trace No.

Date Collected

Time Collected

Client Sample ID

Metals Field Filtered (Y / N)

Matrix

Number of Containers

Cool

HCl

HNO₃

H₂SO₄

NaOH

Other

Preservation

Remarks

Pfas Bio solid

Y

6/4

12:30

7/21/21

15:06

2)

4)

Released By

Received By

Date

Time

Possible Health Hazards?

Please Sign

Released By

Received By

Date

Time

Released By

Received By

Date

Time

Possible Health Hazards?

2)

4)

Released By

Received By

Date

Time

Possible Health Hazards?

☐

Check this box if you would not like your samples analyzed if received outside of the conditions outlined in the Trace Sample Acceptance Policy at www.trace-labs.com/downloads.

Form 70-Z-1

CERTIFICATE OF ANALYSIS

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21G0794

Fleis and Vandenbrink Engir

Project Manager: Tim Brewer

Sample Log In Checklist

Date: 7/21/21	Original Observation	Corrected Temperature	IR-9 (CF: +0.1°C)	IR-10 (CF: +0.1°C)	20B12743 (CF: -0.3°C)	Temp Blank	Client Sample
Time: 15:06							
Logged by: NC							
Package Description: Cooler							
Package Temp °C	-0.6	-0.5					
Representative Sample Temp °C	4.4	4.5	4.1				

Sample Receipt

Yes No

☒ ☐ Received on ice or other coolant

☒ ☐ Ice still present upon receipt

☐ ☒ Custody seals present

☒ Trace Courier

☐ Client Drop-off

☐ Yes ☐ No Custody seals intact (if applicable)

☐ UPS

☐ Fed Ex

☐ US Mail

☐ Other

Sample Condition

Yes No N/A

☒ ☐ ☐ All sample containers arrived unbroken and labeled

☒ ☐ ☐ Sufficient sample to run requested analyses

☐ ☐ ☒ Correct chemical preservative added to samples

☐ ☐ ☒ Samples preserved at Trace

☐ ☐ ☒ Chemical preservation verified, check EMD pH test strip used (if applicable)

☐ pH 0-2.5 (Lot: HC029115)

☐ pH 11.0-13.0 (Lot: HC022540)

☐ Other

☐ ☐ ☒ Air bubbles absent from VOAs

Chain of Custody (COC)

Yes No

☒ ☐ All bottle labels agree with COC

☒ ☐ COC filled out properly

☒ ☐ COC signed by client

Notes:

CERTIFICATE OF ANALYSIS

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