

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 13, 2021

Mr. Matthew Carstens  
Fleis and Vandenbrink Engineers  
1696 S. Parker St.  
Marine City, MI 48039

Phone: (989) 992-2850  
Fax: (616) 977-1005

RE: Trace ID: 21G0719

Dear Mr. Carstens:

Enclosed are your analytical results associated with your project for FVOP Marine City. 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](mailto: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: S26398.01(01)  
Generated on 08/11/2021

## 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): S26398.01  
Project: 21G0719  
Collected Date(s): 07/19/2021  
Submitted Date/Time: 07/21/2021 10:25  
Sampled by: MC  
P.O. #: 21G0719

## Table of Contents

Cover Page (Page 1)  
General Report Notes (Page 2)  
Report Narrative (Page 2)  
Laboratory Certifications (Page 3)  
Qualifier Descriptions (Page 3)  
Glossary of Abbreviations (Page 3)  
Method Summary (Page 4)  
Sample Summary (Page 5)

Maya Murshak  
Technical Director



# Analytical Laboratory Report

## General Report Notes

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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

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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
S26398.01	Biosolids PFAS Kit 21G0719-01	Sludge	07/19/21 13:30



# Analytical Laboratory Report

Lab Sample ID: S26398.01

Sample Tag: Biosolids PFAS Kit 21G0719-01

Collected Date/Time: 07/19/2021 13:30

Matrix: Sludge

COC Reference:

## Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	500ml Plastic	None	Yes	5.9	IR
1	15ml Centrifuge Tube	None	Yes	5.9	IR

## Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Initial wt. (g) / Final wt. (g) / Volume (ml)*	9.29/7.07/10	ASTM D7968-17M	08/06/21 11:49	JGH	

## Inorganics

Method: SM2540B, Run Date: 07/21/21 15:40, Analyst: ELR

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	2.3	1		%	1		

## Organics

28 PFAs, Method: ASTM D7968-17M, Run Date: 08/10/21 00:11, Analyst: JGH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PFBA*	Not detected	3.9		ug/kg	196	375-22-4	
PFPeA*	2.3	2		ug/kg	196	2706-90-3	
4:2 FTSA*	Not detected	2		ug/kg	196	757124-72-4	I
PFHxA*	2.5	2		ug/kg	196	307-24-4	
PFBS*	Not detected	2		ug/kg	196	375-73-5	
PFHpA*	Not detected	2		ug/kg	196	375-85-9	
PFPeS*	Not detected	2		ug/kg	196	2706-91-4	
6:2 FTSA*	Not detected	2		ug/kg	196	27619-97-2	I
PFOA*	13	2		ug/kg	196	335-67-1	
PFHxS*	Not detected	2		ug/kg	196	355-46-4	
PFHxS-LN*	Not detected	2		ug/kg	196	355-46-4-LN	
PFHxS-BR*	Not detected	2		ug/kg	196	355-46-4-BR	
PFNA*	Not detected	2		ug/kg	196	375-95-1	
8:2 FTSA*	Not detected	2		ug/kg	196	39108-34-4	I
PFHpS*	Not detected	2		ug/kg	196	375-92-8	
PFDA*	7.6	2		ug/kg	196	335-76-2	
N-MeFOSAA*	2	2		ug/kg	196	2355-31-9	I
EtFOSAA*	2.9	2		ug/kg	196	2991-50-6	I
PFOS*	8.6	2		ug/kg	196	1763-23-1	
PFOS-LN*	7.5	2		ug/kg	196	1763-23-1-LN	
PFOS-BR*	Not detected	2		ug/kg	196	1763-23-1-BR	
PFUnDA*	Not detected	2		ug/kg	196	2058-94-8	
PFNS*	Not detected	2		ug/kg	196	68259-12-1	
PFDoDA*	Not detected	2		ug/kg	196	307-55-1	
PFDS*	Not detected	2		ug/kg	196	335-77-3	
PFTTrDA*	Not detected	2		ug/kg	196	72629-94-8	
FOSA*	Not detected	2		ug/kg	196	754-91-6	I
PFTeDA*	Not detected	2		ug/kg	196	376-06-7	
11Cl-PF3OUdS*	Not detected	2		ug/kg	196	763051-92-9	
9Cl-PF3ONS*	Not detected	2		ug/kg	196	756426-58-1	

I-Matrix interference with internal standard



# Analytical Laboratory Report

Lab Sample ID: S26398.01 (continued)  
Sample Tag: Biosolids PFAS Kit 21G0719-01

28 PFAs, Method: ASTM D7968-17M, Run Date: 08/10/21 00:11, Analyst: JGH (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
ADONA*	Not detected	2		ug/kg	196	919005-14-4	
HFPO-DA*	Not detected	2		ug/kg	196	13252-13-6	



# Merit Laboratories Login Checklist

Lab Set ID:S26398

Client:TRACE (Trace Analytical Laboratories)

Project: 21G0719

Submitted:07/21/2021 10:25 Login User: SRS

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
<b>Sample Receiving</b>		
01. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples are received at 4C +/- 2C Thermometer #	IR 5.9
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	
<b>Chain of Custody</b>		
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:	
<b>Preservation</b>		
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?	
<b>Bottle Conditions</b>		
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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Muskegon, MI 49444-2673



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

## SUBCONTRACT ORDER

21G0719

### 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 # 21G0719**

20398.01

Sample ID: Biosolids PFAS Kit 21G0719-01  
Matrix: Solid

Sampled: 07/19/21 13:30 TAT: Standard

Sampled By: MC

### *Analysis Needed:*

PFAS- Biosolids- EGLE List

Released By Hayley B. Smith 7/20/21  
Date

Received By

Date

7/24/21 10:25

Date

Received By

Date

Released By

Date

Received By

Date

# TRACE

ANALYTICAL LABORATORIES, INC.

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

Phone 231.773.5998  
Fax 888.979.4469  
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Page 1 of 1

Trace ID No.  
**21G0719**

**Report Results To:**

Company Name: FLERIS & VANDENBROEK

Report To: NIGHT CARSTENS

Mailing Address: 16090 S. PARKER ST.

City, State, Zip Code: MARINE CITY MI 48039

Office Phone: 989.992.2850

Email Address: MARSTENS@FV-OPERATIONS.COM

**Bill To:**

PO #:

Contact Name:

Billing Address (if different):

City, State, Zip Code:

Phone Number:

Billing Email Address:

**Turnaround Requirements:**

☒ Standard, 5-10 Days

☐ 3 Day\*

☐ 1 Day\*

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

**Matrix Key:**

S = Soil / Solid      W = Wipes

W = Water            LW = Liquid Waste

SL = Sludge          A = Air

OI = Oil                D = Drinking Water

**Trace No.**

**Date Collected**

**Time Collected**

**Client Sample ID**

**Metals Field Filtered (Y / N)**

**Matrix**

**Number of Containers**

**Preservation**

Cool

HCl

HNO<sub>3</sub>

H<sub>2</sub>SO<sub>4</sub>

NaOH

Other

**Analysis Requested**

**Remarks**

**Possible Health Hazards?**

**Project Name:** FVOP MARINE CITY

**Sampled By:** MC

**Trace No.**

**Date Collected**

**Time Collected**

**Client Sample ID**

**Metals Field Filtered (Y / N)**

**Matrix**

**Number of Containers**

**Preservation**

Cool

HCl

HNO<sub>3</sub>

H<sub>2</sub>SO<sub>4</sub>

NaOH

Other

**Trace No.**

**Date Collected**

**Time Collected**

**Client Sample ID**

**Metals Field Filtered (Y / N)**

**Matrix**

**Number of Containers**

**Preservation**

Cool

HCl

HNO<sub>3</sub>

H<sub>2</sub>SO<sub>4</sub>

NaOH

Other

**Analysis Requested**

**Remarks**

**Possible Health Hazards?**

**Trace No.**

**Date Collected**

**Time Collected**

**Client Sample ID**

**Metals Field Filtered (Y / N)**

**Matrix**

**Number of Containers**

**Preservation**

Cool

HCl

HNO<sub>3</sub>

H<sub>2</sub>SO<sub>4</sub>

NaOH

Other

**Analysis Requested**

**Remarks**

**Possible Health Hazards?**

**Trace No.**

**Date Collected**

**Time Collected**

**Client Sample ID**

**Metals Field Filtered (Y / N)**

**Matrix**

**Number of Containers**

**Preservation**

Cool

HCl

HNO<sub>3</sub>

H<sub>2</sub>SO<sub>4</sub>

NaOH

Other

**Analysis Requested**

**Remarks**

**Possible Health Hazards?**

**Trace No.**

**Date Collected**

**Time Collected**

**Client Sample ID**

**Metals Field Filtered (Y / N)**

**Matrix**

**Number of Containers**

**Preservation**

Cool

HCl

HNO<sub>3</sub>

H<sub>2</sub>SO<sub>4</sub>

NaOH

Other

**Analysis Requested**

**Remarks**

**Possible Health Hazards?**

**Trace No.**

**Date Collected**

**Time Collected**

**Client Sample ID**

**Metals Field Filtered (Y / N)**

**Matrix**

**Number of Containers**

**Preservation**

Cool

HCl

HNO<sub>3</sub>

H<sub>2</sub>SO<sub>4</sub>

NaOH

Other

**Analysis Requested**

**Remarks**

**Possible Health Hazards?**

**Trace No.**

**Date Collected**

**Time Collected**

**Client Sample ID**

**Metals Field Filtered (Y / N)**

**Matrix**

**Number of Containers**

**Preservation**

Cool

HCl

HNO<sub>3</sub>

H<sub>2</sub>SO<sub>4</sub>

NaOH

Other

**Analysis Requested**

**Remarks**

**Possible Health Hazards?**

**Trace No.**

**Date Collected**

**Time Collected**

**Client Sample ID**

**Metals Field Filtered (Y / N)**

**Matrix**

**Number of Containers**

**Preservation**

Cool

HCl

HNO<sub>3</sub>

H<sub>2</sub>SO<sub>4</sub>

NaOH

Other

**Analysis Requested**

**Remarks**

**Possible Health Hazards?**

**Trace No.**

**Date Collected**

**Time Collected**

**Client Sample ID**

**Metals Field Filtered (Y / N)**

**Matrix**

**Number of Containers**

**Preservation**

Cool

HCl

HNO<sub>3</sub>

H<sub>2</sub>SO<sub>4</sub>

NaOH

Other

**Analysis Requested**

**Remarks**

**Possible Health Hazards?**

**Trace No.**

**Date Collected**

**Time Collected**

**Client Sample ID**

**Metals Field Filtered (Y / N)**

**Matrix**

**Number of Containers**

**Preservation**

Cool

HCl

HNO<sub>3</sub>

H<sub>2</sub>SO<sub>4</sub>

NaOH

Other

**Analysis Requested**

**Remarks**

**Possible Health Hazards?**

**Trace No.**

**Date Collected**

**Time Collected**

**Client Sample ID**

**Metals Field Filtered (Y / N)**

**Matrix**

**Number of Containers**

**Preservation**

Cool

HCl

HNO<sub>3</sub>

H<sub>2</sub>SO<sub>4</sub>

NaOH

Other

**Analysis Requested**

**Remarks**

**Possible Health Hazards?**

**Trace No.**

**Date Collected**

**Time Collected**

**Client Sample ID**

**Metals Field Filtered (Y / N)**

**Matrix**

**Number of Containers**

**Preservation**

Cool

HCl

HNO<sub>3</sub>

H<sub>2</sub>SO<sub>4</sub>

NaOH

Other

Report ID: 21G0719 TRACE Farmed Out FINAL 08 13 21 1024

Trace Analytical Laboratories, Inc.  
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**21G0719**

Fleis and Vandenbrink Engin  
Project Manager: Tim Brewer

**Sample Log In Checklist**

Date: 7/20/21	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: 12:07							
Logged by: <i>YH</i>							
Package Description: Cooler							
Package Temp °C	22.6	22.7	✓				
Representative Sample Temp °C	24.9	24.5		✓	✓		

**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:**

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.

Report ID: 21G0719 TRACE\_Farmed\_Out FINAL 08 13 21 1024