Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

June 10, 2019

1 Cp
2 Tc
3 Ss
4 Cn
5 Tr
6 Gl
7 Al
8 Sc

Cardno - Newark, DE

Sample Delivery Group:	L1100632
Samples Received:	05/19/2019
Project Number:	DEER PARK FIRE
Description:	
Site:	002
Report To:	Art Saunders 121 Continental Drive Suite 308 Newark, DE 19713

Entire Report Reviewed By:

Craig Cothron
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace National is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

90016053

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ONE LAB. NATIONWIDE.

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Ss: Sample Summary	3
Cn: Case Narrative	4
Tr: TRRP Summary	5
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WW-20190517-002-DAY15 L1100632-01 GW

Collected by	Collected date/time	Received date/time
CP / BF	05/17/19 11:30	05/19/19 08:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Subcontracted Analyses	WG1283918	1	06/10/19 00:00	06/10/19 00:00	CBM	Minneapolis, MN 55414

WW-20190517-002-DAY15 L1100632-02 GW

Collected by	Collected date/time	Received date/time
CP / BF	05/17/19 11:30	05/19/19 08:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Subcontracted Analyses	WG1283920	1	05/31/19 00:00	05/31/19 00:00	CBM	Subcontract

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Craig Cothron
Project Manager

Project Narrative

L1100632 -01, -02 contains subout data that is included after the chain of custody.

This data package consists of this signature page, the laboratory review checklist, and the following reportable data as applicable:

R1 - Field chain-of-custody documentation;

R2 - Sample identification cross-reference;

R3 - Test reports (analytical data sheets) for each environmental sample that includes:

a. Items consistent with NELAC Chapter 5,

b. dilution factors,

c. preparation methods,

d. cleanup methods, and

e. if required for the project, tentatively identified compounds (TICs).

R4 - Surrogate recovery data including:

a. Calculated recovery (%R), and

b. The laboratory's surrogate QC limits.

R5 - Test reports/summary forms for blank samples;

R6 - Test reports/summary forms for laboratory control samples (LCSs) including:

a. LCS spiking amounts,

b. Calculated %R for each analyte, and

c. The laboratory's LCS QC limits.

R7 - Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:

a. Samples associated with the MS/MSD clearly identified,

b. MS/MSD spiking amounts,

c. Concentration of each MS/MSD analyte measured in the parent and spiked samples,

d. Calculated %Rs and relative percent differences (RPDs), and

e. The laboratory's MS/MSD QC limits

R8 - Laboratory analytical duplicate (if applicable) recovery and precision:

a. The amount of analyte measured in the duplicate,

b. The calculated RPD, and

c. The laboratory's QC limits for analytical duplicates.

R9 - List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.

R10 - Other problems or anomalies.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Craig Cothron

Project Manager

1 Cp
2 Tc
3 Ss
4 Cn
5 Tr
6 Gl
7 Al
8 Sc

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

SDG	Sample Delivery Group.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description

The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.

ACCREDITATIONS & LOCATIONS

Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

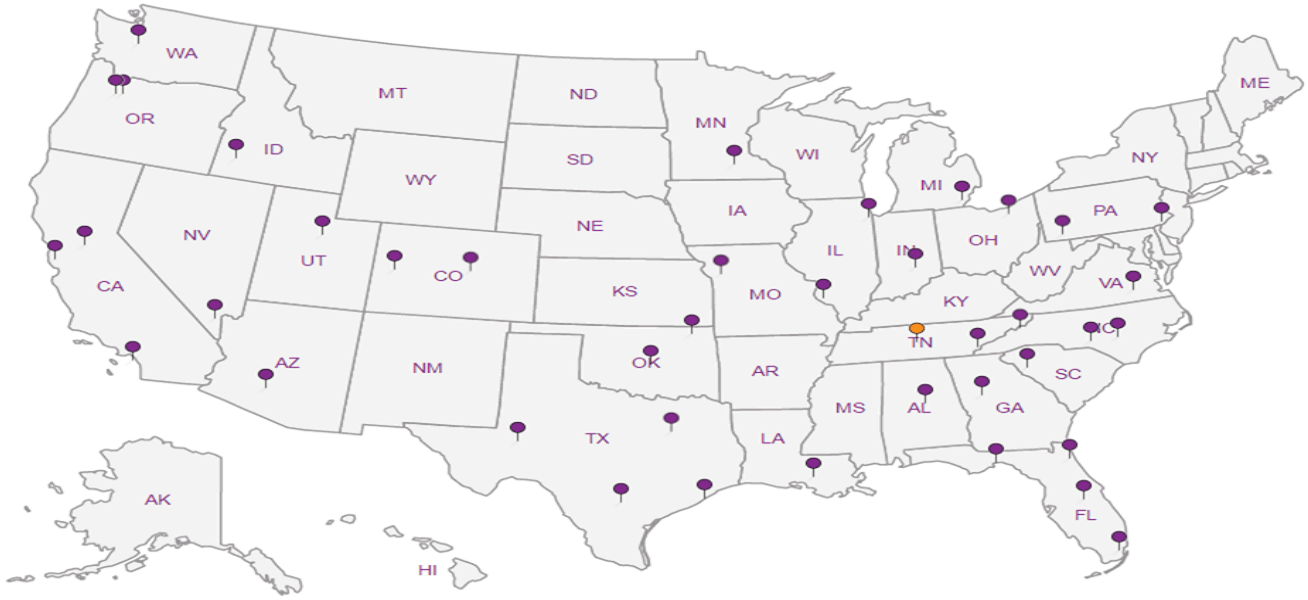
Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



Cardno - Newark, DE

121 Continental Drive Suite 308
Newark, DE 19713

Billing Information:
Accounts Payable
121 Continental Drive Suite 308
Newark, DE 19713

Report to: Art Saunders

Email To: Art.Saunders@cardno.com

Project Description:

City/State Collected:

Phone: 610-220-3957
Fax:

Client Project # Deer Park Fire

Lab Project # CARDNONDE-ITC

Collected by (print): Stphanie Healey

Site/Facility ID # 002

P.O. #

Collected by (signature):

Quote #

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
X Two Day ___ 10 Day (Rad Only)
___ Three Day

Date Results Needed

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

Pace Analytical® National Center for Testing & Innovation

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L1166632

Table #

Acctnum: CARDNONDE
Template: T150425
Prelogin: P709319
TSR: 034 - Craig Cothron
PB:

Shipped Via: FedEX Ground

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	1613/DIOXIN/FURANS 1L-Amb-NoPres	~~608.3 1L-Amb-NoPres~~	~~625.1AP9 1L-Amb-NoPres~~	CHLORIDE 250mlHDPE-NoPres	COD,NH3,PT,TKN,NORG 250mlHDPE-H2SO4	ETHGLY 40mlAmb-NoPres-WT	HG 245.7 Other	Metals 250mlHDPE-HNO3	OGHEX 1L-Clr-Add HCl	PFOS 250mlHDPE-NoPres	Remarks	Sample # (lab only)
		DW				27		X	X	X	X	X		X				
		WW				2									X			
		GW				4	X									X		
		GW				1							X					
WW-20190517-002-Day15	Grab	WW	–	5/17/19	1130	1									X			
WW-20190517-002-Day15	Comp	WW	–	5/17/19	1130	12	X			X	X	X	X	X		X		-01

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: *NOTE - composite 4 vials for V624.1AP9, SV504EDB/DBCP, and ETHGLY before running* *other* container for HG 245.7 is 500ml glass w/HCL

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier X _____

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: NP __Y __N
COC Signed/Accurate: Y __N
Bottles arrive intact: Y __N
Correct bottles used: Y __N
Sufficient volume sent: Y __N
If Applicable
VOA Zero Headspace: Y __N
Preservation Correct/Checked: Y __N

Relinquished by : (Signature)	Date: 5/18/19	Time: 1400	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	
Relinquished by: (Signature)	Date: 5/18/19	Time: 18:30	Received by: (Signature)	Temp: JWA3°C 1.6+.1=1.7° Bottles Received: 29	If preservation required by Login: Date/Time
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 5/19/19 Time: 083	Hold: / Condition: NCF / OK

Ana-Lab Corp.
P.O. Box 9000
Kilgore, TX 75663
903/984-0551

LELAP-accredited #02008

Report

Table of Contents

Printed 05/28/2019 Page 1 of 1

Pace Analytical/TN
12065 Lebanon Rd
Mt Juliet, TN 37122

Account
PAJL-A

Project
874879

This report consists of this Table of Contents and the following pages:

Report Name	Description	Pages
874879_r03_03_ProjectResults	Ana-Lab Project P:874879 C:PAJL Project Results t:304	2
874879_r10_05_ProjectQC	Ana-Lab Project P:874879 C:PAJL Project Quality Control Groups	1
874879_r99_09_CoC__1_of_1	Ana-Lab CoC PAJL 874879_1_of_1	2
	Total Pages:	5

Celebrating 1965-2015 50 ANA-LAB CORP. THE COMPLETE SERVICE LAB years of excellence

Ana-Lab Corp. P.O. Box 9000 Kilgore, TX 75663

Phone 903/984-0551 FAX 903/984-5914 e-Mail corp@ana-lab.com

Employee Owned Integrity Caring Continual Improvement

Results

Printed: 05/28/2019 11:53

874879

Account
PAJL-A

Report To

Pace Analytical/TN
12065 Lebanon Rd
Mt Juliet, TN 37122

Results

1785359 **WW-20190517-002 Day15** *Received:* 05/22/2019

Non-Potable Water *Collected by:* Client Pace Analytical/TN *PO:*
Taken: 05/17/2019 11:30:00

EPA 245.7 2 *Prepared:* 839880 05/24/2019 06:29:51 *Analyzed* 840114 05/24/2019 14:07:00 *LPS*

	Parameter	Results	Units	RL	Flag	CAS	Bottle
N	**Mercury, Total (low level)**	**<4.26**	**ng/L**	4.26		**7439-97-6**	02

Sample Preparation

1785359 **WW-20190517-002 Day15** *Received:* 05/22/2019

EPA 245.7 2 *Prepared:* 839880 05/24/2019 06:29:51 *Analyzed* 839880 05/24/2019 06:29:51 *LPS*

N	**Low Level Mercury Liquid Metals**	**50/47**	**ml**	01

Ana-Lab Corp. P.O. Box 9000 Kilgore, TX 75663

Phone 903/984-0551 FAX 903/984-5914 e-Mail corp@ana-lab.com

Employee Owned Integrity Caring Continual Improvement

Results

Printed: 05/28/2019 11:53

874879

Qualifiers:

We report results on an As Received or wet basis unless marked Dry Weight. Unless otherwise noted, testing was performed at Ana-labs corporate laboratory that holds the following Federal and State certificates: EPA Lab Number TX00063, US Department of Agriculture Soil Import Permit P330-17-00117, Texas Commission on Environmental Quality Commercial Drinking Water Lab Approval (Lab ID: TX219), Texas Commission on Environmental Quality NELAP T104704201-19-15, Louisiana Department of Environmental Quality Laboratory Certification (NELAP, LELAP) #02008, Louisiana Department of Health and Hospitals Drinking Water (NELAP) Certificate No LA026, Oklahoma Department of Environmental Quality TNI Laboratory Accreditation Program Certificate No. 2018-126, Arkansas Department of Environmental Quality Certification #18-068-0. The Accredited column designates accreditation by N -- NELAC, or z -- not covered under NELAC scope of accreditation.

These analytical results relate to the sample tested. This report may NOT be reproduced EXCEPT in FULL without written approval of Ana-Lab Corp. Unless otherwise specified, these test results meet the requirements of NELAC.

RL is the Reporting Limit (sample specific quantitation limit) and is at or above the Method Detection Limit (MDL). CAS is Chemical Abstract Service number. RL is our Reporting Limit, or Minimum Quantitation Level. The RL takes into account the Instrument Detection Limit (IDL), Method Detection Limit (MDL), and Practical Quantitation Limit (PQL), and any dilutions and/or concentrations performed during sample preparation (EQL). Our analytical result must be above this RL before we report a value in the 'Results' column of our report (without a 'J' flag). Otherwise, we report ND (Not Detected above RL), because the result is "<" (less than) the number in the RL column. MAL is Minimum Analytical Level and is typically from regulatory agencies. Unless we report a result in the result column, or interferences prevent it, we work to have our RL at or below the MAL.

Trey Peery, MA, Project Manager

Ana-Lab Corp. P.O. Box 9000 Kilgore, TX 75663

Phone 903/984-0551 FAX 903/984-5914 e-Mail corp@ana-lab.com LELAP-accredited #02008

Employee Owned Integrity Caring Continual Improvement

Quality Control

Printed 05/28/2019

874879

Report To

Pace Analytical/TN
12065 Lebanon Rd
Mt Juliet, TN 37122

Account
PAJL-A

Analytical Set **840114** **EPA 245.7 2**

AWRL/MRL C

Parameter	Reading	Known	Units	Recover%	Limits%	File
Mercury, Total (low level)	4.42	5.00	ng/L	88.4	70.0 - 130	119967639

Blank

Parameter	PrepSet	Reading	MDL	MQL	Units	File
Mercury, Total (low level)	839880	ND	1.65	4.00	ng/L	119967643

CCV

Parameter	Reading	Known	Units	Recover%	Limits%	File
Mercury, Total (low level)	9.53	10.0	ng/L	95.3	76.0 - 124	119967642
	9.39	10.0	ng/L	93.9	76.0 - 124	119967653
	9.35	10.0	ng/L	93.5	76.0 - 124	119967664
	9.30	10.0	ng/L	93.0	76.0 - 124	119967675

ICL

Parameter	Reading	Known	Units	Recover%	Limits%	File
Mercury, Total (low level)	103	100	ng/L	103	90.0 - 110	119967641

ICV

Parameter	Reading	Known	Units	Recover%	Limits%	File
Mercury, Total (low level)	9.50	10.0	ng/L	95.0	90.0 - 110	119967640

LCS Dup

Parameter	PrepSet	LCS	LCSD	Known	Limits%	LCS%	LCSD%	Units	RPD	Limit%
Mercury, Total (low level)	839880	25.6	25.9	25.0	76.0 - 113	102	104	ng/L	1.17	50.0

MSD

Parameter	Sample	MS	MSD	UNK	Known	Limits	MS%	MSD%	Units	RPD	Limit%
Mercury, Total (low level)	1784895	29.4	28.8	2.02	26.6	67.0 - 111	103	101	ng/L	2.22	18.0
	1785307	28.5	28.5	ND	26.6	67.0 - 111	107	107	ng/L	0	18.0

* Out RPD is Relative Percent Difference: abs(r1-r2) / mean(r1,r2) * 100% Recover% is Recovery Percent: result / known * 100%

Blank - Method Blank; CCV - Continuing Calibration Verification; ICV - Initial Calibration Verification; AWRL/MRL C - Ambient Water Reporting Limit/Minimum Reporting Limit Check Std

1
2
3

874879 CoC Print Group 001 of 001

Sub-Contract Chain of Custody

Batch Date/Time: 05/20/19 13:44
Sub-Contract Lab: ANALABKTX
Address: 2600 Dudley Rd
City/State: Kilgore, TX 75662-3730
Contact: tayna.chitwood@ana-lab.com

WO: WG1283920
Results Due Date: 06/03/19
ESC Purchase Order #: L1100632
Send Reports to: Benita Miller
Email: Subcontract@escalabsciences.com

Pace Analytical®

12065 Lebanon Rd.
Mt. Juliet, TN 37122
call:(615)773-9756

Sample ID Container ID	Matrix	State	Collect Date	Description	Sample Number Lab Use Only	Sample Comments Lab Use Only
WW-20190517-002-DAY15 28268880	GW	~~DE~~ TX	05/17/19 11:30	Mercury 245.7 QC 3 Needed	2. L1100632-02	Mercury 245.7 QC 3 Needed

*=Container used for multiple Samples and/or Analyses

Relinquished by: BM Date 05/20/19
Recieved by: Fed Ex Date
Relinquished by: Fed Ex Date 5/21/19 1025
Recieved by: [illegible] Date 5/21/19 1025

See Attached for Tracking # and Temp

1785359

1
2
3

2 of 2

874879 CoC Print Group 001 of 001

Align FedEx Pouch Here

Pace Analytical®
National Center for Testing & Innovation

ORIGIN ID:BNAA (615) 758-5858
SHIPPING
PACE ANALYTICAL NATIONAL
12065 LEBANON PIKE

MOUNT JULIET, TN 37122
UNITED STATES US

SHIP DATE: 20MAY19
ACTWGT: 43.05 LB
CAD: 0113069/CAFE3811

BILL SENDER

TO MS. TAYNA CHITWOOD
ANA LAB
2600 DUDLEY RD

KILGORE TX 756623730
(615) 758-5858 REF: ANALABKTX
PO: ANALABKTX

FedEx Express

TUE - 21 MAY 3:00P
STANDARD OVERNIGHT

TRK# 0201 1023 1352 9739

XX GGGA

75662
TX-US SHV

Thermo#	Corr Fact	Temp(°C)
☐ 6205		
☐ 6443		
☐ 6444		
☑ 6093	0.0	27/27

Date 5/21 Time 1037 Tech RO

Pace Analytical Services, LLC.
1700 Elm Street
Minneapolis, MN 55414
Phone: 612.607.1700
Fax: 612.607.6444

www.pacelabs.com

Report Prepared for:

Benita Miller
Pace Analytical National
12065 Lebanon Road
Mount Juliet TN 37122

REPORT OF LABORATORY ANALYSIS FOR PFAAs

Report Prepared Date:

June 3, 2019

Report Information:

Pace Project #: 10475942
Sample Receipt Date: 05/21/2019
Client Project #: L1100632: WG1283918 PFA
Client Sub PO #: L1100632
State Cert #: 2926.01

Invoicing & Reporting Options:

This report has been reviewed by:

June 05, 2019

Nathan Boberg, Project Manager
612-360-0728
(612) 607-6444 (fax)
nathan.boberg@pacelabs.com

Report of Laboratory Analysis

This report should not be reproduced, except in full, without the written consent of Pace Analytical Services, Inc.

The results relate only to the samples included in this report.

DISCUSSION

This report presents the results from the analyses performed on one sample and one water duplicate submitted by a representative of Pace-National. The sample was analyzed for one perfluorinated compound using a modified version of USEPA Method 537 Rev. 1.1. Reporting limits were set to the quantitation 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.

Laboratory spike samples were 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. The RPDs (relative percent differences) between one designated spike and its duplicate were within the method limits. These spikes indicate that extraction was performed as expected.

The recoveries of the isotopically-labeled surrogate standards in the sample extract were within the target ranges specified in the method.

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

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

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

Minnesota Laboratory Certifications

Authority	Certificate #	Authority	Certificate #
A2LA	2926.01	Minnesota - Pet	1240
Alabama	40770	Mississippi	MN00064
Alaska - DW	MN00064	Missouri - DW	10100
Alaska - UST	17-009	Montana	CERT0092
Arizona	AZ0014	Nebraska	NE-OS-18-06
Arkansas - DW	MN00064	Nevada	MN00064
Arkansas - WW	88-0680	New Hampshire	2081
CNMI Saipan	MP0003	New Jersey (NE	MN002
California	2929	New York	11647
Colorado	MN00064	North Carolina	27700
Connecticut	PH-0256	North Carolina -	27700
EPA Region 8+	via MN 027-053	North Carolina -	530
Florida (NELAP	E87605	North Dakota	R-036
Georgia	959	Ohio - DW	41244
Guam	17-001r	Ohio - VAP	CL101
Hawaii	MN00064	Oklahoma	9507
Idaho	MN00064	Oregon - Primar	MN300001
Illinois	200011	Oregon - Secon	MN200001
Indiana	C-MN-01	Pennsylvania	68-00563
Iowa	368	Puerto Rico	MN00064
Kansas	E-10167	South Carolina	74003
Kentucky - DW	90062	South Dakota	NA
Kentucky - WW	90062	Tennessee	TN02818
Louisiana - DE	03086	Texas	T104704192
Louisiana - DW	MN00064	Utah (NELAP)	MN00064
Maine	MN00064	Virginia	460163
Maryland	322	Washington	C486
Massachusetts	M-MN064	West Virginia -	382
Michigan	9909	West Virginia -	9952C
Minnesota	027-053-137	Wisconsin	999407970
Minnesota - De	via MN 027-053	Wyoming - UST	2926.01

REPORT OF LABORATORY ANALYSIS

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

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

Reporting Flags

A = Reporting Limit based on signal to noise

B = Less than 10x higher than method blank level

C = Result obtained from confirmation analysis

D = Result obtained from analysis of diluted sample

E = Exceeds calibration range

I = Interference present

J = Estimated value

L = Suppressive interference, analyte may be biased low

Nn = Value obtained from additional analysis

P = PCDE Interference

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

* = See Discussion

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Appendix A

Sample Management

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

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

Sample ID Cross Reference

Client Sample ID	Pace Sample ID	Date Received	Sample Type
WW-20190517-002-DAY15	10475942001	05/21/2019	Water
WW-20190517-002-DAY15-Dup	10475942001-DUP	05/21/2019	Water

REPORT OF LABORATORY ANALYSIS

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately. 10475942

Page : 1 Of 1

Section A
Required Client Information:

Company:	Pace Analytical National
Address:	12065 Lebanon Road
	Mount Juliet, TN 37122
Email:	SuboutTeam@pacenational.com
Phone:	(615)773-9756 Fax: (615)758-5859
Requested Due Date:	3-Jun

Section B
Required Project Information:

Report To:	Pace Analytical National Subout Team
Copy To:	
Purchase Order #:	L1100632
Project Name:	n/a
Project #:	DEER PARK FIRE

Section C
Invoice Information:

Attention:	Art Saunders
Company Name:	
Address:	
Pace Quote:	
Pace Project Manager:	Nathan Boberg
Pace Profile #:	38076

Regulatory Agency:

State / Location: DE

WO# : 10475942

10475942

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID (One Character per box. (A-Z, 0-9 / , -) Sample Ids must be unique)	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED START DATE	COLLECTED START TIME	COLLECTED END DATE	COLLECTED END TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Analyses Test Y/N: 1613 DIOXIN/FURANS, PFOS - 537	Residual Chlorine (Y/N)	
1	WW-20190517-002-DAY15	WT				17-May	11:30		4	4								X		QC3 Needed 1201
2																				
3																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				

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

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
	Benita Miller BMI	20-May	15:07	Elizabeth D Zahn PACE	5/21/19	~~0500~~	ER2	5/21		
Pace Analytical National Batch: WG1283918						~~845~~	ER2	5/21		
Pace Analytical National SDGs: L1100632				ER2 5/21	~~1.4~~	950	1.4	Y	N	Y
Location: Minneapolis, MN 55414							TEMP in C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER:

SIGNATURE of SAMPLER: DATE Signed:

Pace Analytical	Document Name: **Sample Condition Upon Receipt Form**	Document Revised: 09May2019 Page 1 of 1
	Document No.: **F-MN-L-213-rev.28**	Issuing Authority: Pace Minnesota Quality Office

Sample Condition Upon Receipt

Client Name: Pace Analytical National

Project #: WO#: 10475942 PM: NB3 Due Date: 06/05/19 CLIENT: ESC_TN

Courier: [X] Fed Ex [ ] UPS [ ] USPS [ ] Client [ ] Pace [ ] SpeeDee [ ] Commercial See Exception [ ]

Tracking Number: 1023 1352 9772

Custody Seal on Cooler/Box Present? [X] Yes [ ] No ERZ 5/21/19 **Seals Intact?** [X] Yes [ ] No ERZ 5/21/19 **Biological Tissue Frozen?** [ ] Yes [ ] No [X] N/A

Packing Material: [ ] Bubble Wrap [X] Bubble Bags [ ] None [X] Other: PB **Temp Blank?** [X] Yes [ ] No

Thermometer: [ ] T1(0461) [X] T2(1336) [ ] T3(0459) [ ] T4(0254) [ ] T5(0489) **Type of Ice:** [X] Wet [ ] Blue [ ] None [ ] Dry [ ] Melted

Note: Each West Virginia Sample must have temp taken (no temp blanks)

Temp should be above freezing to 6°C **Cooler Temp Read w/temp blank:** 1.4 °C **Average Corrected Temp (no temp blank only):** °C See Exceptions [ ]

Correction Factor: +0.1 **Cooler Temp Corrected w/temp blank:** 1.5 °C

USDA Regulated Soil: ([X] N/A, water sample/Other:)

Did samples originate in a quarantine zone within the United States: AL, AR, CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX or VA (check maps)? [ ] Yes [ ] No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? [ ] Yes [ ] No

Date/Initials of Person Examining Contents: ERZ 5/21/19

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?	[X] Yes [ ] No	1.
Chain of Custody Relinquished?	[X] Yes [ ] No	2.
Sampler Name and/or Signature on COC?	[ ] Yes [X] No [ ] N/A	3.
Samples Arrived within Hold Time?	[X] Yes [ ] No	4.
Short Hold Time Analysis (<72 hr)?	[ ] Yes [X] No	5. [ ] Fecal Coliform [ ] HPC [ ] Total Coliform/E coli [ ] BOD/cBOD [ ] Hex Chrome [ ] Turbidity [ ] Nitrate [ ] Nitrite [ ] Orthophos [ ] Other
Rush Turn Around Time Requested?	[ ] Yes [X] No	6.
Sufficient Volume?	[X] Yes [ ] No	7.
Correct Containers Used? -Pace Containers Used?	[X] Yes [ ] No [X] Yes [ ] No	8.
Containers Intact?	[X] Yes [ ] No	9.
Field Filtered Volume Received for Dissolved Tests?	[ ] Yes [ ] No [X] N/A	10. Is sediment visible in the dissolved container? [ ] Yes [ ] No
Is sufficient information available to reconcile the samples to the COC? Matrix: [X] Water [ ] Soil [ ] Oil [ ] Other	[X] Yes [ ] No	11. If no, write ID/ Date/Time on Container Below: See Exception [ ]
All containers needing acid/base preservation have been checked?	[ ] Yes [ ] No [X] N/A	12. Sample #
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO_3, H_2SO_4, <2pH, NaOH >9 Sulfide, NaOH>12 Cyanide)	[ ] Yes [ ] No [X] N/A	[ ] NaOH [ ] HNO_3 [ ] H_2SO_4 [ ] Zinc Acetate
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxin/PFAS	[ ] Yes [ ] No [X] N/A	Positive for Res. Chlorine? [ ] Yes [ ] No pH Paper Lot# See Exception [ ] Res. Chlorine | 0-6 Roll | 0-6 Strip | 0-14 Strip
Headspace in VOA Vials (greater than 6mm)?	[ ] Yes [ ] No [X] N/A	13. See Exception [ ]
Trip Blank Present? Trip Blank Custody Seals Present?	[ ] Yes [ ] No [X] N/A [ ] Yes [ ] No [X] N/A	14. Pace Trip Blank Lot # (if purchased):

CLIENT NOTIFICATION/RESOLUTION **Field Data Required?** [ ] Yes [ ] No

Person Contacted: Date/Time:

Comments/Resolution:

Project Manager Review: Nathan Boberg **Date:** 5/22/19

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).

Labeled by: ERZ

QC Matric lot #: 187814 **TRIZMA Lot #:** 183004/18F285 **Extract Start:** 05/23/19 00:00
Time of Spiking: 05/23/19 00:00 **Optima H2O Lot #:** 187814 **Extract End:** 05/23/19 00:00
SPE Cartridge: S322-0024 **Methanol Lot #:** 187805 **Setup By:** QL
Balance: 10BALQ

	Lot Number	Amount	Initials	Expiration	Dispenser	Witness
Internal	12332-190	100	NH	11/22/19	Q503	wm
Surrogate	12332-187	100	QL	11/10/19	Q503	
Native Lo	12332-167	10	QL	10/19/19	Q523	
Native Mid	12332-167	100	QL	10/19/19	Q503	
Native Hi						
GenX IS	12332-175	200	QL	10/25/19	Q497	

#	Sample ID	GenX IS	Surrogate	Natives	Full Bottle Weight	Empty Bottle Weight	Amount Extracted	Comments
1	BLANK-70748	X	X		286.9	36.9	250.0	
2	LCS-70749	X	X	X	278.7	36.9	241.8	
3	LCS-70750	X	X	X	281.4	37.1	244.3	
4	LCSD-70751	X	X	X	277.9	36.1	241.8	
5	10475010001	X	X		283.4	37.4	246.0	
6	10475128001	X	X		291.3	36.3	254.9	
7	10475799001	X	X		281.5	37.6	243.9	
8	10475940001	X	X		282.7	37.2	245.5	
9	10475943001	X	X		285.6	37.5	248.1	
10	10475942001	X	X		281.6	37.7	243.8	
11	10475944001	X	X		282.7	37.3	245.4	
12	10475899001	X	X		290.1	36.5	253.5	
13	10475899002	X	X		286.4	36.3	250.1	
14	10475899003	X	X		285.6	36.3	249.3	
15	10475899004	X	X		284.6	36.6	247.9	
16	10475899005	X	X		294.5	36.6	257.9	
17	10475899006	X	X		293.9	36.6	257.4	
18	10475899007	X	X		289.2	36.9	252.3	
19	10475899008	X	X		289.9	36.8	253.1	
20	10475899009	X	X		290.7	36.5	254.2	
21	10475899010	X	X		290.6	36.4	254.2	
22	10475899011	X	X		291.3	36.7	254.5	
23	10475942001-DUP	X	X		281.6	36.9	244.7	

EB-24667

Appendix B

Sample Analysis Summary

Pace Analytical Services, LLC
1700 Elm Street, Suite 200
Minneapolis, MN 55414
(612) 607-1700

Method 537 (Modified)

Sample Analysis Summary

Client's Sample ID	WW-20190517-002-DAY15	Date Extracted	05/23/2019
Lab Sample ID	10475942001	Total Amount Extracted	244 mL
Filename	B190528D_029	ICAL ID	190528A02
Matrix	Water	Starting CCal	B190528D_026
Collected	05/17/2019	Ending CCal	B190528D_036
Received	05/21/2019	Method Blank Filename	B190528D_006

Compound	Concentration (ng/L)	PQL (ng/L)	MDL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
PFOS	ND	2.0	0.64	1	05/29/2019 11:57	1763-23-1	N2

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.7	83	70 - 130	Pass
13C2_PFDA	2.0	1.6	82	70 - 130	Pass
d5-EtFOSAA	8.0	6.1	77	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPrOPrA	173232	112299 - 336896	146886 - 293771	Pass
13C2_PFOA	460819	213002 - 639005	309137 - 618274	Pass
13C4_PFOS	590812	281769 - 845307	407703 - 815405	Pass
d3-MeFOSAA	411645	170979 - 512936	241559 - 483118	Pass

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

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply. A complete list of accreditations/certifications is available upon request.

Pace Analytical Services, LLC
1700 Elm Street, Suite 200
Minneapolis, MN 55414
(612) 607-1700

Method 537 (Modified)

Sample Analysis Summary

Client's Sample ID	WW-20190517-002-DAY15-Dup	Date Extracted	05/23/2019
Lab Sample ID	10475942001-DUP	Total Amount Extracted	245 mL
Filename	B190528D_030	ICAL ID	190528A02
Matrix	Water	Starting CCal	B190528D_026
Collected	05/17/2019	Ending CCal	B190528D_036
Received	05/21/2019	Method Blank Filename	B190528D_006

Compound	Concentration (ng/L)	PQL (ng/L)	MDL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
PFOS	ND	2.0	0.64	1	05/29/2019 12:09	1763-23-1	N2

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.7	84	70 - 130	Pass
13C2_PFDA	2.0	1.7	84	70 - 130	Pass
d5-EtFOSAA	8.0	6.1	76	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPrOPrA	172371	112299 - 336896	146886 - 293771	Pass
13C2_PFOA	462142	213002 - 639005	309137 - 618274	Pass
13C4_PFOS	568889	281769 - 845307	407703 - 815405	Pass
d3-MeFOSAA	407722	170979 - 512936	241559 - 483118	Pass

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

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply. A complete list of accreditations/certifications is available upon request.

Appendix C

QC and Calibration Results Summary

Pace Analytical Services, LLC
1700 Elm Street, Suite 200
Minneapolis, MN 55414
(612) 607-1700

Method 537 (Modified) Blank Analysis Summary

Lab Sample ID	BLANK-70748	Total Amount Extracted	250 mL
Filename	B190528D_006	ICAL ID	190528A02
Matrix	Water	Starting CCal	B190528D_002
Date Extracted	05/23/2019	Ending CCal	B190528D_017

Compound	Concentration (ng/L)	PQL (ng/L)	MDL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
PFOS	ND	1.9	0.62	1	05/29/2019 07:27	1763-23-1	N2

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.4	72	70 - 130	Pass
13C2_PFDA	2.0	1.8	90	70 - 130	Pass
d5-EtFOSAA	8.0	6.6	83	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPrOPrA	162593	112299 - 336896	144803 - 289606	Pass
13C2_PFOA	446836	213002 - 639005	303170 - 606340	Pass
13C4_PFOS	582591	281769 - 845307	406916 - 813832	Pass
d3-MeFOSAA	377224	170979 - 512936	245751 - 491502	Pass

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

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply. A complete list of accreditations/certifications is available upon request.

Pace Analytical Services, LLC
1700 Elm Street, Suite 200
Minneapolis, MN 55414
(612) 607-1700

Method 537 (Modified) Laboratory Control Sample (LCS)

LCS Lab Sample ID	LCS-70749		
LCS Filename	B190528D_007	Matrix	Water
Total Amount Extracted	242mL	Dilution	1
ICAL ID	190528A02	Extracted	05/23/2019
Start CCal Filename	B190528D_002	Analyzed	05/29/2019 07:39
End CCal Filename	B190528D_017	Injected By	WM
Method Blank Filename	B190528D_006		

Compound	**Spiked** (ng/L)	**Recovered** (ng/L)	**Recovery** %	**Limits**
PFOS	2.0	1.9 J	98	50.0 - 150.0

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.5	76	70 - 130	Pass
13C2_PFDA	2.0	1.7	85	70 - 130	Pass
d5-EtFOSAA	8.0	6.0	75	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPrOPrA	163024	112299 - 336896	144803 - 289606	Pass
13C2_PFOA	458128	213002 - 639005	303170 - 606340	Pass
13C4_PFOS	596588	281769 - 845307	406916 - 813832	Pass
d3-MeFOSAA	405275	170979 - 512936	245751 - 491502	Pass

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

Pace Analytical Services, LLC
1700 Elm Street, Suite 200
Minneapolis, MN 55414
(612) 607-1700

Method 537 (Modified) Laboratory Control Sample (LCS)

LCS Lab Sample ID	LCS-70750		
LCS Filename	B190528D_008	Matrix	Water
Total Amount Extracted	244mL	Dilution	1
ICAL ID	190528A02	Extracted	05/23/2019
Start CCal Filename	B190528D_002	Analyzed	05/29/2019 07:51
End CCal Filename	B190528D_017	Injected By	WM
Method Blank Filename	B190528D_006		

Compound	**Spiked** (ng/L)	**Recovered** (ng/L)	**Recovery** %	**Limits**
PFOS	20	21	109	70.0 - 130.0

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.8	91	70 - 130	Pass
13C2_PFDA	2.0	1.9	96	70 - 130	Pass
d5-EtFOSAA	8.0	7.4	92	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPrOPrA	194865	112299 - 336896	144803 - 289606	Pass
13C2_PFOA	438275	213002 - 639005	303170 - 606340	Pass
13C4_PFOS	560959	281769 - 845307	406916 - 813832	Pass
d3-MeFOSAA	363068	170979 - 512936	245751 - 491502	Pass

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

Pace Analytical Services, LLC
1700 Elm Street, Suite 200
Minneapolis, MN 55414
(612) 607-1700

Method 537 (Modified) Laboratory Control Sample Duplicate (LCSD)

LCSD Lab Sample ID	LCSD-70751		
LCSD Filename	B190528D_009	LCS Filename	B190528D_007
Total Amount Extracted	242mL	Matrix	Water
ICAL ID	190528A02	Dilution	1
Start CCal Filename	B190528D_002	Extracted	05/23/2019
End CCal Filename	B190528D_017	Analyzed	05/29/2019 08:02
Method Blank Filename	B190528D_006	Injected By	WM

Compound	**Spiked** (ng/L)	**Recovered** (ng/L)	**Recovery** %	**Recovery Limits**	**RPD** %
PFOS	2.0	2.0	103	50.0 - 150.0	5

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.7	87	70 - 130	Pass
13C2_PFDA	2.0	2.0	98	70 - 130	Pass
d5-EtFOSAA	8.0	7.4	92	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPrOPrA	202548	112299 - 336896	144803 - 289606	Pass
13C2_PFOA	479159	213002 - 639005	303170 - 606340	Pass
13C4_PFOS	593827	281769 - 845307	406916 - 813832	Pass
d3-MeFOSAA	387292	170979 - 512936	245751 - 491502	Pass

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

Pace Analytical Services, LLC
1700 Elm Street, Suite 200
Minneapolis, MN 55414
(612) 607-1700

PFAA Initial Calibration Response Factor Summary

ICAL ID	**190528A02**	Data Files:	CS-1	B190528A_008	09:18
Calibration Date	05/28/2019		CS-2	B190528A_009	09:30
Instrument	10LCMS02		CS-3	B190528A_003	08:20
Column Phase	C18		CS-4	B190528A_004	08:31
Column ID No.	H18-061776		CS-5	B190528A_005	08:43
Analyst	NH		CS-6	B190528A_006	08:55

Response Factors

Compound	Type	CAL1	CAL2	CAL3	CAL4	CAL5	CAL6	Slope	R^2
13C3_PFPrOPrA	L	14900	14000	13400	14100	13700	14100	14000	0.999
13C2_PFOA	L	216000	216000	214000	212000	217000	204000	213000	1.000
13C4_PFOS	L	100000	102000	98900	96600	96600	94500	98200	0.999
d3-MeFOSAA	L	42900	44200	43400	42300	41900	41700	42700	1.000
13C2_PFHxA	L	1.14	1.11	1.13	1.13	1.09	1.13	1.12	1.000
13C2_PFDA	L	5.18	5.04	5.41	5.26	5.36	5.08	5.22	0.999
d5-EtFOSAA	L	0.866	0.804	0.770	0.761	0.796	0.749	0.791	0.998
PFBA	L	1.01	0.895	0.906	0.915	0.855	0.881	0.878	1.000
PFPeA	L	1.02	1.01	1.03	1.01	0.968	0.977	0.978	1.000
PFBS	L	0.469	0.430	0.451	0.440	0.432	0.445	0.442	1.000
PFHxA	L	1.12	1.06	1.06	1.05	1.02	1.02	1.03	1.000
PFPrOPrA	L	1.79	1.54	1.48	1.36	1.39	1.26	1.29	0.998
PFHpA	L	1.16	1.05	1.09	1.10	0.993	1.02	1.02	1.000
NaDONA	L	17.6	17.3	18.6	17.0	17.3	14.9	15.5	0.995
PFHxS	L	0.369	0.357	0.361	0.358	0.352	0.363	0.361	1.000
PFOA	L	0.975	0.969	1.00	0.982	0.934	0.943	0.944	1.000
PFNA	L	1.90	1.87	1.77	1.82	1.86	1.72	1.75	0.999
PFOS	L	0.986	0.992	1.07	1.10	1.03	1.02	1.03	1.000
PFDA	L	4.20	4.09	4.42	4.43	4.31	4.08	4.15	0.999
PFUdA	L	7.57	6.71	7.21	7.17	7.12	6.53	6.68	0.998
N-MeFOSAA	L	1.12	1.06	1.12	1.06	1.09	1.09	1.09	1.000
N-EtFOSAA	L	1.25	1.14	1.16	1.12	1.19	1.08	1.10	0.998
PFDS	L	2.69	2.47	2.53	2.55	2.64	2.55	2.56	1.000
PFDoA	L	4.82	4.75	4.97	4.86	4.89	4.67	4.73	1.000
PFTrDA	L	5.18	4.60	4.97	4.95	4.82	4.61	4.67	0.999
PFTeDA	L	1.86	1.74	1.86	1.87	1.93	1.85	1.87	1.000
PFHxDA	L	3.34	2.94	3.41	3.53	3.31	3.26	3.28	1.000
PFODA	L	1.54	1.53	1.60	1.70	1.62	1.62	1.62	1.000

Slope: Linear calibration

Pace Analytical Services, LLC
1700 Elm Street, Suite 200
Minneapolis, MN 55414
(612) 607-1700

PFAA Initial Calibration Recovery Summary

ICAL ID	**190528A02**	Data Files:	CS-1	B190528A_008	09:18
Calibration Date	05/28/2019		CS-2	B190528A_009	09:30
Instrument	10LCMS02		CS-3	B190528A_003	08:20
Column Phase	C18		CS-4	B190528A_004	08:31
Column ID No.	H18-061776		CS-5	B190528A_005	08:43
Analyst	NH		CS-6	B190528A_006	08:55

%Recoveries

Compound	CAL1	CAL2	CAL3	CAL4	CAL5	CAL6
13C3_PFPrOPrA	106	100	96	100	98	100
13C2_PFOA	101	101	101	99	102	96
13C4_PFOS	102	104	101	98	98	96
d3-MeFOSAA	100	103	102	99	98	98
13C2_PFHxA	102	99	101	101	97	101
13C2_PFDA	99	96	104	101	103	97
d5-EtFOSAA	110	102	97	96	101	95
PFBA	115	102	103	104	97	100
PFPeA	104	104	105	103	99	100
PFBS	106	97	102	99	98	101
PFHxA	109	103	104	103	100	100
PFPrOPrA	139	119	114	105	107	98
PFHpA	114	103	107	108	98	100
NaDONA	114	111	120	110	111	96
PFHxS	102	99	100	99	98	101
PFOA	103	103	106	104	99	100
PFNA	109	107	101	104	106	98
PFOS	96	97	104	107	101	99
PFDA	101	99	107	107	104	98
PFUdA	113	100	108	107	107	98
N-MeFOSAA	103	97	102	98	100	100
N-EtFOSAA	113	103	106	102	108	98
PFDS	105	96	99	100	103	99
PFDoA	102	100	105	103	103	99
PFTrDA	111	99	106	106	103	99
PFTeDA	99	93	99	100	103	99
PFHxDA	102	90	104	108	101	99
PFODA	95	94	99	105	100	100

Pace Analytical Services, LLC
1700 Elm Street, Suite 200
Minneapolis, MN 55414
(612) 607-1700

Method 537 (Modified) Calibration Verification Summary

ICV

Lab Calibration ID	ICV-12332-189	Instrument ID	10LCMS02
Run File Name	B190528A_010	Column ID	H18-061776
Injected By	WM	Ical ID	190528A02
Analyzed	05/28/2019 09:42		

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	19	19	97	70.0-130.0	471810

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	96	70 - 130	Pass
13C2_PFDA	2.0	2.0	99	70 - 130	Pass
d5-EtFOSAA	8.0	8.3	104	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPrOPrA	223888	112299 - 336896	---	Pass
13C2_PFOA	440105	213002 - 639005	---	Pass
13C4_PFOS	568125	281769 - 845307	---	Pass
d3-MeFOSAA	346021	170979 - 512936	---	Pass

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

Pace Analytical Services, LLC
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Minneapolis, MN 55414
(612) 607-1700

Method 537 (Modified) Calibration Verification Summary

ICV

Lab Calibration ID	ICV-12332-189	Instrument ID	10LCMS02
Run File Name	B190528A_010	Column ID	H18-061776
Injected By	WM	Ical ID	190528A02
Analyzed	05/28/2019 09:42		

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	19	19	97	70.0-130.0	471810

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	96	70 - 130	Pass
13C2_PFDA	2.0	2.0	99	70 - 130	Pass
d5-EtFOSAA	8.0	8.3	104	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPrOPrA	223888	112299 - 336896	---	Pass
13C2_PFOA	440105	213002 - 639005	---	Pass
13C4_PFOS	568125	281769 - 845307	---	Pass
d3-MeFOSAA	346021	170979 - 512936	---	Pass

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

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Method 537 (Modified) Calibration Verification Summary

CCV

Lab Calibration ID	CAL-12332-188-01	Instrument ID	10LCMS02
Run File Name	B190528D_002	Column ID	H18-061776
Injected By	WM	Ical ID	190528A02
Analyzed	05/29/2019 06:40	Level	Low

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	1.9	2.0	105	50.0-150.0	52291

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	95	70 - 130	Pass
13C2_PFDA	2.0	2.0	100	70 - 130	Pass
d5-EtFOSAA	8.0	9.4	117	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPrOPrA	206862	112299 - 336896	153560 - 307120	Pass
13C2_PFOA	433100	213002 - 639005	311637 - 623274	Pass
13C4_PFOS	581309	281769 - 845307	416385 - 832770	Pass
d3-MeFOSAA	351073	170979 - 512936	257471 - 514943	Pass

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

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Method 537 (Modified) Calibration Verification Summary

CCV

Lab Calibration ID	CAL-12332-188-03	Instrument ID	10LCMS02
Run File Name	B190528D_017	Column ID	H18-061776
Injected By	WM	Ical ID	190528A02
Analyzed	05/29/2019 09:36	Level	Mid

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	9.6	9.9	103	70.0-130.0	245874

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	2.0	98	70 - 130	Pass
13C2_PFDA	2.0	2.0	100	70 - 130	Pass
d5-EtFOSAA	8.0	8.5	107	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPrOPrA	205348	112299 - 336896	144803 - 289606	Pass
13C2_PFOA	424976	213002 - 639005	303170 - 606340	Pass
13C4_PFOS	556382	281769 - 845307	406916 - 813832	Pass
d3-MeFOSAA	355371	170979 - 512936	245751 - 491502	Pass

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

Pace Analytical Services, LLC
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Method 537 (Modified) Calibration Verification Summary

CCV

Lab Calibration ID	CAL-12332-188-05	Instrument ID	10LCMS02
Run File Name	B190528D_026	Column ID	H18-061776
Injected By	WM	Ical ID	190528A02
Analyzed	05/29/2019 11:22	Level	High

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	38	38	100	70.0-130.0	994172

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	93	70 - 130	Pass
13C2_PFDA	2.0	2.1	105	70 - 130	Pass
d5-EtFOSAA	8.0	8.4	105	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPrOPrA	209837	112299 - 336896	143743 - 287487	Pass
13C2_PFOA	441625	213002 - 639005	297483 - 594966	Pass
13C4_PFOS	582432	281769 - 845307	389468 - 778935	Pass
d3-MeFOSAA	345084	170979 - 512936	248760 - 497520	Pass

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

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(612) 607-1700

Method 537 (Modified) Calibration Verification Summary

CCV

Lab Calibration ID	CAL-12332-188-01	Instrument ID	10LCMS02
Run File Name	B190528D_036	Column ID	H18-061776
Injected By	WM	Ical ID	190528A02
Analyzed	05/29/2019 13:20	Level	Low

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	1.9	2.0	104	50.0-150.0	49132

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	96	70 - 130	Pass
13C2_PFDA	2.0	2.0	101	70 - 130	Pass
d5-EtFOSAA	8.0	8.7	108	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPrOPrA	200502	112299 - 336896	146886 - 293771	Pass
13C2_PFOA	437671	213002 - 639005	309137 - 618274	Pass
13C4_PFOS	553169	281769 - 845307	407703 - 815405	Pass
d3-MeFOSAA	351558	170979 - 512936	241559 - 483118	Pass

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

Pace Analytical Services, LLC.
1700 Elm Street
Minneapolis, MN 55414
Phone: 612.607.1700
Fax: 612.607.6444

www.pacelabs.com

Report Prepared for:

Benita Miller
Pace Analytical National
12065 Lebanon Road
Mount Juliet TN 37122

REPORT OF LABORATORY ANALYSIS FOR PCDD/PCDF

Report Prepared Date:

June 4, 2019

Report Information:

Pace Project #: 10475783
Sample Receipt Date: 05/21/2019
Client Project #: L1100632: WG1283918
Client Sub PO #: L1100632
State Cert #: T104704192

Invoicing & Reporting Options:

The report provided has been invoiced as a Level 3 PCDD/PCDF 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 Nathan Boberg, your Pace Project Manager.

This report has been reviewed by:

June 05, 2019

Nathan Boberg, Project Manager
612-360-0728
(612) 607-6444 (fax)
nathan.boberg@pacelabs.com

Report of Laboratory Analysis

This report should not be reproduced, except in full, without the written consent of Pace Analytical Services, Inc.

The results relate only to the samples included in this report.

Pace Analytical Services, LLC.
1700 Elm Street
Minneapolis, MN 55414
Phone: 612.607.1700
Fax: 612.607.6444

DISCUSSION

This report presents the results from the analysis performed on one sample submitted by a representative of Pace Analytical National. The sample was analyzed for the presence or absence of polychlorodibenzo-p-dioxins (PCDDs) and polychlorodibenzofurans (PCDFs) using USEPA Method 1613B. The reporting limits were based on signal-to-noise measurements. Estimated Maximum Possible Concentration (EMPC) values were treated as positives in the toxic equivalence calculations.

The recoveries of the isotopically-labeled PCDD/PCDF internal standards in the sample extract ranged from 64-102%. All of the labeled standard recoveries obtained for this project were within the target ranges specified in Method 1613B. Also, since the quantification of the native 2,3,7,8-substituted congeners was based on isotope dilution, the data were automatically corrected for recovery and accurate values were obtained.

Values were flagged "I" where incorrect isotope ratios were obtained. Concentrations below the calibration range were flagged "J" and should be regarded as estimates.

A laboratory method blank was prepared and analyzed with the sample batch as part of our routine quality control procedures. The results show that PCDDs and PCDFs were not detected.

Laboratory spike samples were also prepared with the sample batch using clean reference matrix that had been fortified with native standard materials. The results show that the spiked native compounds were recovered at 92-120% with relative percent differences of 0.9-9.2%. These results were within the target ranges for the method. Matrix spikes were not prepared with the sample batch.

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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	Minnesota - Pet	1240
Alabama	40770	Mississippi	MN00064
Alaska - DW	MN00064	Missouri - DW	10100
Alaska - UST	17-009	Montana	CERT0092
Arizona	AZ0014	Nebraska	NE-OS-18-06
Arkansas - DW	MN00064	Nevada	MN00064
Arkansas - WW	88-0680	New Hampshire	2081
CNMI Saipan	MP0003	New Jersey (NE	MN002
California	2929	New York	11647
Colorado	MN00064	North Carolina	27700
Connecticut	PH-0256	North Carolina -	27700
EPA Region 8+	via MN 027-053	North Carolina -	530
Florida (NELAP	E87605	North Dakota	R-036
Georgia	959	Ohio - DW	41244
Guam	17-001r	Ohio - VAP	CL101
Hawaii	MN00064	Oklahoma	9507
Idaho	MN00064	Oregon - Primar	MN300001
Illinois	200011	Oregon - Secon	MN200001
Indiana	C-MN-01	Pennsylvania	68-00563
Iowa	368	Puerto Rico	MN00064
Kansas	E-10167	South Carolina	74003
Kentucky - DW	90062	South Dakota	NA
Kentucky - WW	90062	Tennessee	TN02818
Louisiana - DE	03086	Texas	T104704192
Louisiana - DW	MN00064	Utah (NELAP)	MN00064
Maine	MN00064	Virginia	460163
Maryland	322	Washington	C486
Massachusetts	M-MN064	West Virginia -	382
Michigan	9909	West Virginia -	9952C
Minnesota	027-053-137	Wisconsin	999407970
Minnesota - De	via MN 027-053	Wyoming - UST	2926.01

REPORT OF LABORATORY ANALYSIS

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

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

Reporting Flags

A = Reporting Limit based on signal to noise

B = Less than 10x higher than method blank level

C = Result obtained from confirmation analysis

D = Result obtained from analysis of diluted sample

E = Exceeds calibration range

I = Interference present

J = Estimated value

L = Suppressive interference, analyte may be biased low

Nn = Value obtained from additional analysis

P = PCDE Interference

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

* = See Discussion

REPORT OF LABORATORY ANALYSIS

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Appendix A

Sample Management

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

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

Sample ID Cross Reference

Client Sample ID	Pace Sample ID	Date Received	Sample Type
WW-20190517-002-DAY15	10475783001	05/21/2019	Water

REPORT OF LABORATORY ANALYSIS

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CHAIN-OF-CUSTODY / Analytical Request Document

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

Page : 1 Of 1

Section A
Required Client Information:

Company:	Pace Analytical National
Address:	12065 Lebanon Road
	Mount Juliet, TN 37122
Email:	SuboutTeam@pacenational.com
Phone:	(615)773-9756 Fax: (615)758-5859
Requested Due Date:	3-Jun

Section B
Required Project Information:

Report To:	Pace Analytical National Subout Team
Copy To:	
Purchase Order #:	L1100632
Project Name:	n/a
Project #:	DEER PARK FIRE

Section C
Invoice Information:

Attention:	Art Saunders
Company Name:	
Address:	
Pace Quote:	
Pace Project Manager:	Nathan Boberg
Pace Profile #:	38076

Regulatory Agency
State / Location
DE

WO#: 10475783

10475783

ITEM #	SAMPLE ID (One Character per box. (A-Z, 0-9 / , -) Sample Ids must be unique)	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED START DATE	COLLECTED START TIME	COLLECTED END DATE	COLLECTED END TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Analyses Test Y/N	1613 DIOXIN/FURANS, PFOS - 537	Resid	
1	WW-20190517-002-DAY15	WT				17-May	11:30		4	4									X		QC3 Needed 1201
2																					0
3																					
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					

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

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
	Benita Miller (BM)	20-May	15:07	Elizabeth M Johnsday PACE	5/21/19	~~1500~~	ER2	5/21		
Pace Analytical National Batch: WG1283918						~~845~~	ER2	5/21		
Pace Analytical National SDGs: L1100632				ER2 5/21		~~1.4~~ 950	1.4	Y	N	Y
Location: Minneapolis, MN 55414										
							TEMP in C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER:

SIGNATURE of SAMPLER: DATE Signed:

Pace Analytical	Document Name: **Sample Condition Upon Receipt Form**	Document Revised: 09May2019 Page 1 of 1
	Document No.: **F-MN-L-213-rev.28**	Issuing Authority: Pace Minnesota Quality Office

Sample Condition Upon Receipt

WO#: 10475783
PM: NB3 Due Date: 06/05/19
CLIENT: ESC_TN

Client Name: Pace Analytical National

Project #:

Courier: ☒ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Pace ☐ SpeeDee ☐ Commercial See Exception ☐

Tracking Number: 1023 1352 9772

Custody Seal on Cooler/Box Present? ☒ Yes ~~☒ No~~ ERZ 5/21/19 **Seals Intact?** ☒ Yes ~~☒ No~~ ERZ 5/21/19 **Biological Tissue Frozen?** ☐ Yes ☐ No ☒ N/A

Packing Material: ☐ Bubble Wrap ☒ Bubble Bags ☐ None ☒ Other: PB **Temp Blank?** ☒ Yes ☐ No

Thermometer: ☐ T1(0461) ☒ T2(1336) ☐ T3(0459) ☐ T4(0254) ☐ T5(0489) **Type of Ice:** ☒ Wet ☐ Blue ☐ None ☐ Dry ☐ Melted

Note: Each West Virginia Sample must have temp taken (no temp blanks)

Temp should be above freezing to 6°C **Cooler Temp Read w/temp blank:** 1.4 °C **Average Corrected Temp (no temp blank only):** _____ °C See Exceptions ☐

Correction Factor: +0.1 **Cooler Temp Corrected w/temp blank:** 1.5 °C

USDA Regulated Soil: (☒ N/A, water sample/Other: _____) **Date/Initials of Person Examining Contents:** ERZ 5/21/19

Did samples originate in a quarantine zone within the United States: AL, AR, CA, FL, GA, ID, LA. MS, NC, NM, NY, OK, OR, SC, TN, TX or VA (check maps)? ☐ Yes ☐ No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☐ No

If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.

				COMMENTS:
Chain of Custody Present and Filled Out?	☒ Yes	☐ No		1.
Chain of Custody Relinquished?	☒ Yes	☐ No		2.
Sampler Name and/or Signature on COC?	☐ Yes	☒ No	☐ N/A	3.
Samples Arrived within Hold Time?	☒ Yes	☐ No		4.
Short Hold Time Analysis (<72 hr)?	☐ Yes	☒ No		5. ☐ Fecal Coliform ☐ HPC ☐ Total Coliform/E coli ☐ BOD/cBOD ☐ Hex Chrome ☐ Turbidity ☐ Nitrate ☐ Nitrite ☐ Orthophos ☐ Other _____
Rush Turn Around Time Requested?	☐ Yes	☒ No		6.
Sufficient Volume?	☒ Yes	☐ No		7.
Correct Containers Used?	☒ Yes	☐ No		8.
-Pace Containers Used?	☒ Yes	☐ No		
Containers Intact?	☒ Yes	☐ No		9.
Field Filtered Volume Received for Dissolved Tests?	☐ Yes	☐ No	☒ N/A	10. Is sediment visible in the dissolved container? ☐ Yes ☐ No
Is sufficient information available to reconcile the samples to the COC? Matrix: ☒ Water ☐ Soil ☐ Oil ☐ Other _____	☒ Yes	☐ No		11. **If no, write ID/ Date/Time on Container Below:** See Exception ☐
All containers needing acid/base preservation have been checked?	☐ Yes	☐ No	☒ N/A	12. Sample #
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO_3, H_2SO_4, <2pH, NaOH >9 Sulfide, NaOH>12 Cyanide)	☐ Yes	☐ No	☒ N/A	☐ NaOH ☐ HNO_3 ☐ H_2SO_4 ☐ Zinc Acetate
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxin/PFAS	☐ Yes	☐ No	☒ N/A	Positive for Res. Chlorine? ☐ Yes ☐ No **pH Paper Lot#** See Exception ☐ Res. Chlorine | 0-6 Roll | 0-6 Strip | 0-14 Strip
Headspace in VOA Vials (greater than 6mm)?	☐ Yes	☐ No	☒ N/A	13. See Exception ☐
Trip Blank Present?	☐ Yes	☐ No	☒ N/A	14.
Trip Blank Custody Seals Present?	☐ Yes	☐ No	☒ N/A	Pace Trip Blank Lot # (if purchased): _____

CLIENT NOTIFICATION/RESOLUTION **Field Data Required?** ☐ Yes ☐ No

Person Contacted: _____ Date/Time: _____

Comments/Resolution: _____

Project Manager Review: Nathan Boberg **Date:** 5/22/19

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).

Labeled by: ERZ

Appendix B

Sample Analysis Summary

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

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

Method 1613B Sample Analysis Results

Client - Pace Analytical National

Client's Sample ID	WW-20190517-002-DAY15			
Lab Sample ID	10475783001			
Filename	U190604A_11			
Injected By	SMT			
Total Amount Extracted	961 mL	Matrix	Water	
% Moisture	NA	Dilution	NA	
Dry Weight Extracted	NA	Collected	05/17/2019	11:30
ICAL ID	U190530	Received	05/21/2019	09:50
CCal Filename(s)	U190604A_06	Extracted	05/31/2019	13:00
Method Blank ID	BLANK-70836	Analyzed	06/04/2019	14:33

Native Isomers	**Conc** pg/L	**EMPC** pg/L	**EDL** pg/L	**Internal Standards**	**ng's Added**	**Percent Recovery**
2,3,7,8-TCDF	ND	-----	0.53	2,3,7,8-TCDF-13C	2.00	72
Total TCDF	ND	-----	0.53	2,3,7,8-TCDD-13C	2.00	84
				1,2,3,7,8-PeCDF-13C	2.00	73
2,3,7,8-TCDD	ND	-----	1.9	2,3,4,7,8-PeCDF-13C	2.00	77
Total TCDD	ND	-----	1.9	1,2,3,7,8-PeCDD-13C	2.00	102
				1,2,3,4,7,8-HxCDF-13C	2.00	64
1,2,3,7,8-PeCDF	ND	-----	0.31	1,2,3,6,7,8-HxCDF-13C	2.00	65
2,3,4,7,8-PeCDF	ND	-----	0.57	2,3,4,6,7,8-HxCDF-13C	2.00	68
Total PeCDF	ND	-----	0.44	1,2,3,7,8,9-HxCDF-13C	2.00	74
				1,2,3,4,7,8-HxCDD-13C	2.00	79
1,2,3,7,8-PeCDD	ND	-----	0.50	1,2,3,6,7,8-HxCDD-13C	2.00	69
Total PeCDD	ND	-----	0.50	1,2,3,4,6,7,8-HpCDF-13C	2.00	76
				1,2,3,4,7,8,9-HpCDF-13C	2.00	86
1,2,3,4,7,8-HxCDF	ND	-----	0.57	1,2,3,4,6,7,8-HpCDD-13C	2.00	96
1,2,3,6,7,8-HxCDF	ND	-----	0.50	OCDD-13C	4.00	73
2,3,4,6,7,8-HxCDF	ND	-----	0.45			
1,2,3,7,8,9-HxCDF	ND	-----	0.19	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	-----	0.43	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	-----	0.35	2,3,7,8-TCDD-37Cl4	0.20	88
1,2,3,6,7,8-HxCDD	ND	-----	0.53			
1,2,3,7,8,9-HxCDD	ND	-----	0.25			
Total HxCDD	ND	-----	0.38			
1,2,3,4,6,7,8-HpCDF	ND	-----	1.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	-----	1.2	Equivalence: 0.00 pg/L		
Total HpCDF	ND	-----	1.1	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	ND	-----	2.4			
Total HpCDD	ND	-----	2.4			
OCDF	ND	-----	1.9			
OCDD	ND	-----	1.7			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).
EMPC = Estimated Maximum Possible Concentration
EDL = Estimated Detection Limit

ND = Not Detected
NA = Not Applicable
NC = Not Calculated

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

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

2,3,7,8-TCDD Toxic Equivalency (TEQ) Calculations

Pace Analytical National

Client's Sample ID	WW-20190517-002-DAY15		
Lab Sample ID	10475783001		
Filename	U190604A_11		
Injected By	SMT		
Total Amount Extracted	961 mL	Matrix	Water
% Moisture	NA	Dilution	NA
Dry Weight Extracted	NA	Collected	05/17/2019 11:30
ICAL ID	U190530	Received	05/21/2019 09:50
CCal Filename(s)	U190604A_06	Extracted	05/31/2019 13:00
Method Blank ID	BLANK-70836	Analyzed	06/04/2019 14:33

Parameter	Conc pg/L	RL pg/L	WHO2005	LB	MB	UB
2,3,7,8-TCDF	ND	0.53	0.10000	0.0000	0.0263	0.0526
Total TCDF	ND	0.53	0.00000	0.0000	0.0000	0.0000
2,3,7,8-TCDD	ND	1.9	1.00000	0.0000	0.9660	1.9321
Total TCDD	ND	1.9	0.00000	0.0000	0.0000	0.0000
1,2,3,7,8-PeCDF	ND	0.31	0.03000	0.0000	0.0047	0.0093
2,3,4,7,8-PeCDF	ND	0.57	0.30000	0.0000	0.0855	0.1710
Total PeCDF	ND	0.44	0.00000	0.0000	0.0000	0.0000
1,2,3,7,8-PeCDD	ND	0.50	1.00000	0.0000	0.2504	0.5008
Total PeCDD	ND	0.50	0.00000	0.0000	0.0000	0.0000
1,2,3,4,7,8-HxCDF	ND	0.57	0.10000	0.0000	0.0286	0.0572
1,2,3,6,7,8-HxCDF	ND	0.50	0.10000	0.0000	0.0250	0.0500
2,3,4,6,7,8-HxCDF	ND	0.45	0.10000	0.0000	0.0223	0.0445
1,2,3,7,8,9-HxCDF	ND	0.19	0.10000	0.0000	0.0093	0.0186
Total HxCDF	ND	0.43	0.00000	0.0000	0.0000	0.0000
1,2,3,4,7,8-HxCDD	ND	0.35	0.10000	0.0000	0.0175	0.0351
1,2,3,6,7,8-HxCDD	ND	0.53	0.10000	0.0000	0.0265	0.0529
1,2,3,7,8,9-HxCDD	ND	0.25	0.10000	0.0000	0.0127	0.0254
Total HxCDD	ND	0.38	0.00000	0.0000	0.0000	0.0000
1,2,3,4,6,7,8-HpCDF	ND	1.0	0.01000	0.0000	0.0052	0.0104
1,2,3,4,7,8,9-HpCDF	ND	1.2	0.01000	0.0000	0.0059	0.0117
Total HpCDF	ND	1.1	0.00000	0.0000	0.0000	0.0000
1,2,3,4,6,7,8-HpCDD	ND	2.4	0.01000	0.0000	0.0118	0.0236
Total HpCDD	ND	2.4	0.00000	0.0000	0.0000	0.0000
OCDF	ND	1.9	0.00030	0.0000	0.0003	0.0006
OCDD	ND	1.7	0.00030	0.0000	0.0003	0.0005
				0.00 pg/L	**1.5 pg/L**	**3.0 pg/L**

Final values are valid to only 2 significant figures
TEQs for Totals classes include contributions from non 2,3,7,8 isomers only
LB = Lower Bound, Where "ND", TEQ Conc = 0
MB = Medium Bound, Where "ND", TEQ Conc = (LOD/2) * (TEF Factor)
UB = Upper Bound, Where "ND", TEQ Conc = LOD * (TEF Factor)
RL = Reporting Limit

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Appendix C

QC and Calibration Results Summary

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

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

Method 1613B Blank Analysis Results

Lab Sample Name	DFBLKZM		
Lab Sample ID	BLANK-70836	Matrix	Water
Filename	U190604A_10	Dilution	NA
Total Amount Extracted	927 mL	Extracted	05/31/2019 13:00
ICAL ID	U190530	Analyzed	06/04/2019 13:48
CCal Filename(s)	U190604A_06	Injected By	SMT

Native Isomers	Conc pg/L	EMPC pg/L	EDL pg/L		Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	-----	0.92		2,3,7,8-TCDF-13C	2.00	68
Total TCDF	ND	-----	0.92		2,3,7,8-TCDD-13C	2.00	79
					1,2,3,7,8-PeCDF-13C	2.00	65
2,3,7,8-TCDD	ND	-----	1.4		2,3,4,7,8-PeCDF-13C	2.00	69
Total TCDD	ND	-----	1.4		1,2,3,7,8-PeCDD-13C	2.00	87
					1,2,3,4,7,8-HxCDF-13C	2.00	58
1,2,3,7,8-PeCDF	ND	-----	0.75		1,2,3,6,7,8-HxCDF-13C	2.00	57
2,3,4,7,8-PeCDF	ND	-----	0.66		2,3,4,6,7,8-HxCDF-13C	2.00	61
Total PeCDF	ND	-----	0.71		1,2,3,7,8,9-HxCDF-13C	2.00	66
					1,2,3,4,7,8-HxCDD-13C	2.00	68
1,2,3,7,8-PeCDD	ND	-----	0.62		1,2,3,6,7,8-HxCDD-13C	2.00	59
Total PeCDD	ND	-----	0.62		1,2,3,4,6,7,8-HpCDF-13C	2.00	63
					1,2,3,4,7,8,9-HpCDF-13C	2.00	73
1,2,3,4,7,8-HxCDF	ND	-----	0.60		1,2,3,4,6,7,8-HpCDD-13C	2.00	83
1,2,3,6,7,8-HxCDF	ND	-----	0.60		OCDD-13C	4.00	64
2,3,4,6,7,8-HxCDF	ND	-----	0.53				
1,2,3,7,8,9-HxCDF	ND	-----	0.73		1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	-----	0.61		1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	-----	0.98		2,3,7,8-TCDD-37Cl4	0.20	90
1,2,3,6,7,8-HxCDD	ND	-----	1.1				
1,2,3,7,8,9-HxCDD	ND	-----	1.2				
Total HxCDD	ND	-----	1.1				
1,2,3,4,6,7,8-HpCDF	ND	-----	1.2		Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	-----	1.3		Equivalence: 0.00077 pg/L		
Total HpCDF	ND	-----	1.3		(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	ND	-----	1.4				
Total HpCDD	ND	-----	1.4				
OCDF	ND	-----	1.7				
OCDD	-----	2.6	2.0	IJ			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).
EMPC = Estimated Maximum Possible Concentration
EDL = Estimated Detection Limit

J = Estimated value
I = Interference present

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Minneapolis, MN 55414

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

2,3,7,8-TCDD Toxic Equivalency (TEQ) Calculations

Pace Analytical National

Client's Sample ID	DFBLKZM		
Lab Sample ID	BLANK-70836		
Filename	U190604A_10		
Injected By	SMT		
Total Amount Extracted	927 mL	Matrix	Water
% Moisture	NA	Dilution	NA
Dry Weight Extracted	NA	Collected	05/29/2019 13:56
ICAL ID	U190530	Received	05/29/2019 13:56
CCal Filename(s)	U190604A_06	Extracted	05/31/2019 13:00
Method Blank ID		Analyzed	06/04/2019 13:48

Parameter	Conc pg/L	RL pg/L	WHO2005	LB	MB	UB
2,3,7,8-TCDF	ND	0.92	0.10000	0.0000	0.0460	0.0920
Total TCDF	ND	0.92	0.00000	0.0000	0.0000	0.0000
2,3,7,8-TCDD	ND	1.4	1.00000	0.0000	0.7164	1.4328
Total TCDD	ND	1.4	0.00000	0.0000	0.0000	0.0000
1,2,3,7,8-PeCDF	ND	0.75	0.03000	0.0000	0.0112	0.0224
2,3,4,7,8-PeCDF	ND	0.66	0.30000	0.0000	0.0995	0.1990
Total PeCDF	ND	0.71	0.00000	0.0000	0.0000	0.0000
1,2,3,7,8-PeCDD	ND	0.62	1.00000	0.0000	0.3109	0.6218
Total PeCDD	ND	0.62	0.00000	0.0000	0.0000	0.0000
1,2,3,4,7,8-HxCDF	ND	0.60	0.10000	0.0000	0.0301	0.0602
1,2,3,6,7,8-HxCDF	ND	0.60	0.10000	0.0000	0.0298	0.0595
2,3,4,6,7,8-HxCDF	ND	0.53	0.10000	0.0000	0.0265	0.0529
1,2,3,7,8,9-HxCDF	ND	0.73	0.10000	0.0000	0.0363	0.0725
Total HxCDF	ND	0.61	0.00000	0.0000	0.0000	0.0000
1,2,3,4,7,8-HxCDD	ND	0.98	0.10000	0.0000	0.0491	0.0982
1,2,3,6,7,8-HxCDD	ND	1.1	0.10000	0.0000	0.0544	0.1089
1,2,3,7,8,9-HxCDD	ND	1.2	0.10000	0.0000	0.0592	0.1183
Total HxCDD	ND	1.1	0.00000	0.0000	0.0000	0.0000
1,2,3,4,6,7,8-HpCDF	ND	1.2	0.01000	0.0000	0.0062	0.0125
1,2,3,4,7,8,9-HpCDF	ND	1.3	0.01000	0.0000	0.0063	0.0127
Total HpCDF	ND	1.3	0.00000	0.0000	0.0000	0.0000
1,2,3,4,6,7,8-HpCDD	ND	1.4	0.01000	0.0000	0.0068	0.0137
Total HpCDD	ND	1.4	0.00000	0.0000	0.0000	0.0000
OCDF	ND	1.7	0.00030	0.0000	0.0003	0.0005
OCDD	ND	2.0	0.00030	0.0008	0.0008	0.0008
				0.00077 pg/L	**1.5 pg/L**	**3.0 pg/L**

Final values are valid to only 2 significant figures
TEQs for Totals classes include contributions from non 2,3,7,8 isomers only
LB = Lower Bound, Where "ND", TEQ Conc = 0
MB = Medium Bound, Where "ND", TEQ Conc = (LOD/2) * (TEF Factor)
UB = Upper Bound, Where "ND", TEQ Conc = LOD * (TEF Factor)
RL = Reporting Limit

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Minneapolis, MN 55414

Tel: 612-607-1700
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Method 1613B Laboratory Control Spike Results

Lab Sample ID	LCS-70837		
Filename	U190604A_07	Matrix	Water
Total Amount Extracted	911 mL	Dilution	NA
ICAL ID	U190530	Extracted	05/31/2019 13:00
CCal Filename	U190604A_06	Analyzed	06/04/2019 11:35
Method Blank ID	BLANK-70836	Injected By	SMT

Compound	Cs	Cr	Lower Limit	Upper Limit	% Rec.
2,3,7,8-TCDF	10	10	7.5	15.8	101
2,3,7,8-TCDD	10	10	6.7	15.8	104
1,2,3,7,8-PeCDF	50	53	40.0	67.0	106
2,3,4,7,8-PeCDF	50	55	34.0	80.0	109
1,2,3,7,8-PeCDD	50	46	35.0	71.0	92
1,2,3,4,7,8-HxCDF	50	58	36.0	67.0	115
1,2,3,6,7,8-HxCDF	50	55	42.0	65.0	109
2,3,4,6,7,8-HxCDF	50	55	35.0	78.0	109
1,2,3,7,8,9-HxCDF	50	55	39.0	65.0	111
1,2,3,4,7,8-HxCDD	50	56	35.0	82.0	112
1,2,3,6,7,8-HxCDD	50	56	38.0	67.0	113
1,2,3,7,8,9-HxCDD	50	58	32.0	81.0	117
1,2,3,4,6,7,8-HpCDF	50	54	41.0	61.0	108
1,2,3,4,7,8,9-HpCDF	50	51	39.0	69.0	101
1,2,3,4,6,7,8-HpCDD	50	53	35.0	70.0	106
OCDF	100	94	63.0	170.0	94
OCDD	100	110	78.0	144.0	109
2,3,7,8-TCDD-37Cl4	10	9.9	3.1	19.1	99
2,3,7,8-TCDF-13C	100	77	22.0	152.0	77
2,3,7,8-TCDD-13C	100	90	20.0	175.0	90
1,2,3,7,8-PeCDF-13C	100	76	21.0	192.0	76
2,3,4,7,8-PeCDF-13C	100	75	13.0	328.0	75
1,2,3,7,8-PeCDD-13C	100	100	21.0	227.0	102
1,2,3,4,7,8-HxCDF-13C	100	62	19.0	202.0	62
1,2,3,6,7,8-HxCDF-13C	100	60	21.0	159.0	60
2,3,4,6,7,8-HxCDF-13C	100	62	22.0	176.0	62
1,2,3,7,8,9-HxCDF-13C	100	69	17.0	205.0	69
1,2,3,4,7,8-HxCDD-13C	100	76	21.0	193.0	76
1,2,3,6,7,8-HxCDD-13C	100	64	25.0	163.0	64
1,2,3,4,6,7,8-HpCDF-13C	100	74	21.0	158.0	74
1,2,3,4,7,8,9-HpCDF-13C	100	85	20.0	186.0	85
1,2,3,4,6,7,8-HpCDD-13C	100	92	26.0	166.0	92
OCDD-13C	200	150	26.0	397.0	74

Cs = Concentration Spiked (ng/mL)
Cr = Concentration Recovered (ng/mL)
Rec. = Recovery (Expressed as Percent)
Control Limit Reference: Method 1613, Table 6, 10/94 Revision
R = Recovery outside of control limits
Nn = Value obtained from additional analysis
* = See Discussion

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Tel: 612-607-1700
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Method 1613B Laboratory Control Spike Results

Lab Sample ID	LCSD-70838		
Filename	U190604A_08	Matrix	Water
Total Amount Extracted	943 mL	Dilution	NA
ICAL ID	U190530	Extracted	05/31/2019 13:00
CCal Filename	U190604A_06	Analyzed	06/04/2019 12:18
Method Blank ID	BLANK-70836	Injected By	SMT

Compound	Cs	Cr	Lower Limit	Upper Limit	% Rec.
2,3,7,8-TCDF	10	10	7.5	15.8	102
2,3,7,8-TCDD	10	11	6.7	15.8	114
1,2,3,7,8-PeCDF	50	54	40.0	67.0	108
2,3,4,7,8-PeCDF	50	56	34.0	80.0	113
1,2,3,7,8-PeCDD	50	48	35.0	71.0	96
1,2,3,4,7,8-HxCDF	50	59	36.0	67.0	117
1,2,3,6,7,8-HxCDF	50	58	42.0	65.0	116
2,3,4,6,7,8-HxCDF	50	53	35.0	78.0	106
1,2,3,7,8,9-HxCDF	50	55	39.0	65.0	110
1,2,3,4,7,8-HxCDD	50	56	35.0	82.0	111
1,2,3,6,7,8-HxCDD	50	58	38.0	67.0	116
1,2,3,7,8,9-HxCDD	50	60	32.0	81.0	120
1,2,3,4,6,7,8-HpCDF	50	56	41.0	61.0	112
1,2,3,4,7,8,9-HpCDF	50	52	39.0	69.0	104
1,2,3,4,6,7,8-HpCDD	50	53	35.0	70.0	105
OCDF	100	95	63.0	170.0	95
OCDD	100	110	78.0	144.0	114
2,3,7,8-TCDD-37Cl4	10	8.8	3.1	19.1	88
2,3,7,8-TCDF-13C	100	69	22.0	152.0	69
2,3,7,8-TCDD-13C	100	82	20.0	175.0	82
1,2,3,7,8-PeCDF-13C	100	71	21.0	192.0	71
2,3,4,7,8-PeCDF-13C	100	72	13.0	328.0	72
1,2,3,7,8-PeCDD-13C	100	96	21.0	227.0	96
1,2,3,4,7,8-HxCDF-13C	100	60	19.0	202.0	60
1,2,3,6,7,8-HxCDF-13C	100	58	21.0	159.0	58
2,3,4,6,7,8-HxCDF-13C	100	62	22.0	176.0	62
1,2,3,7,8,9-HxCDF-13C	100	69	17.0	205.0	69
1,2,3,4,7,8-HxCDD-13C	100	71	21.0	193.0	71
1,2,3,6,7,8-HxCDD-13C	100	62	25.0	163.0	62
1,2,3,4,6,7,8-HpCDF-13C	100	68	21.0	158.0	68
1,2,3,4,7,8,9-HpCDF-13C	100	78	20.0	186.0	78
1,2,3,4,6,7,8-HpCDD-13C	100	90	26.0	166.0	90
OCDD-13C	200	140	26.0	397.0	69

Cs = Concentration Spiked (ng/mL)
Cr = Concentration Recovered (ng/mL)
Rec. = Recovery (Expressed as Percent)
Control Limit Reference: Method 1613, Table 6, 10/94 Revision
R = Recovery outside of control limits
Nn = Value obtained from additional analysis
* = See Discussion

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Method 1613B

Spike Recovery Relative Percent Difference (RPD) Results

Client	Pace Analytical National		
Spike 1 ID	LCS-70837	Spike 2 ID	LCSD-70838
Spike 1 Filename	U190604A_07	Spike 2 Filename	U190604A_08

Compound	Spike 1 %REC	Spike 2 %REC	%RPD
2,3,7,8-TCDF	101	102	1.0
2,3,7,8-TCDD	104	114	9.2
1,2,3,7,8-PeCDF	106	108	1.9
2,3,4,7,8-PeCDF	109	113	3.6
1,2,3,7,8-PeCDD	92	96	4.3
1,2,3,4,7,8-HxCDF	115	117	1.7
1,2,3,6,7,8-HxCDF	109	116	6.2
2,3,4,6,7,8-HxCDF	109	106	2.8
1,2,3,7,8,9-HxCDF	111	110	0.9
1,2,3,4,7,8-HxCDD	112	111	0.9
1,2,3,6,7,8-HxCDD	113	116	2.6
1,2,3,7,8,9-HxCDD	117	120	2.5
1,2,3,4,6,7,8-HpCDF	108	112	3.6
1,2,3,4,7,8,9-HpCDF	101	104	2.9
1,2,3,4,6,7,8-HpCDD	106	105	0.9
OCDF	94	95	1.1
OCDD	109	114	4.5

%REC = Percent Recovered
RPD = The difference between the two values divided by the mean value

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Method 1613B
Initial Calibration (ICAL) - Response Factor Summary

ICAL ID	**U190530**	Data Files:		Time	Injected
Calibration Date	05/30/2019	CS-1	U190530A_09	16:42	SMT
Instrument	10MSHR06 (U)	CS-2	U190530A_08	15:55	SMT
Column Phase	ZB-5MS 0.25mm	CS-3	U190530A_07	15:10	SMT
Column ID No.	1010640	CS-4	U190530A_11	18:15	SMT
		CS-5	U190530A_10	17:28	SMT

Isomer	CS-1	CS-2	CS-3	CS-4	CS-5	Ave RF	%RSD
2,3,7,8-TCDF	0.9808	0.9970	0.9677	0.9500	0.9401	0.9671	2.37
2,3,7,8-TCDD	1.0449	1.0549	1.0696	0.9922	0.9818	1.0287	3.81
1,2,3,7,8-PeCDF	0.9046	0.8950	0.9142	0.8911	0.8649	0.8940	2.07
2,3,4,7,8-PeCDF	1.0269	1.0008	0.9696	0.9887	0.9697	0.9911	2.42
1,2,3,7,8-PeCDD	0.9442	0.9422	0.9395	0.9334	0.9228	0.9364	0.92
1,2,3,4,7,8-HxCDF	1.2384	1.1454	1.0771	1.0875	1.0816	1.1260	6.10
1,2,3,6,7,8-HxCDF	1.0964	1.0468	1.0953	1.0230	1.0276	1.0578	3.39
2,3,4,6,7,8-HxCDF	1.1264	1.1369	1.1246	1.1261	1.1537	1.1335	1.08
1,2,3,7,8,9-HxCDF	1.0097	1.1238	1.0535	1.0785	1.0104	1.0552	4.58
1,2,3,4,7,8-HxCDD	1.0354	0.9851	0.9841	0.9309	0.9715	0.9814	3.81
1,2,3,6,7,8-HxCDD	0.9774	0.9504	0.9863	0.9922	0.9587	0.9730	1.84
1,2,3,7,8,9-HxCDD	0.8716	0.8552	0.9630	0.9227	0.9332	0.9092	4.91
1,2,3,4,6,7,8-HpCDF	1.3105	1.3756	1.2664	1.3877	1.2927	1.3266	3.98
1,2,3,4,7,8,9-HpCDF	1.3794	1.4049	1.3690	1.3438	1.3607	1.3716	1.66
1,2,3,4,6,7,8-HpCDD	1.0846	1.0586	1.0298	1.0642	1.0286	1.0532	2.27
OCDF	1.3294	1.1772	1.1869	1.3214	1.2516	1.2533	5.73
OCDD	1.0761	1.0859	1.0170	1.0591	1.0423	1.0561	2.60
Total PeCDF	0.9657	0.9479	0.9419	0.9399	0.9173	0.9425	1.84
Total HxCDF	1.1177	1.1132	1.0876	1.0788	1.0683	1.0931	1.97
Total HxCDD	0.9615	0.9302	0.9778	0.9486	0.9545	0.9545	1.83
Total HpCDF	1.3449	1.3903	1.3177	1.3658	1.3267	1.3491	2.18
2,3,7,8-TCDF-13C	1.2999	1.3426	1.3190	1.3504	1.3220	1.3268	1.52
2,3,7,8-TCDD-13C	0.9373	0.9537	0.9999	0.9230	0.9674	0.9563	3.10
2,3,7,8-TCDD-37Cl4	1.0768	1.0815	0.9369	0.9545	0.9746	1.0049	6.88
1,2,3,7,8-PeCDF-13C	1.0750	1.0972	1.0479	1.0667	1.1558	1.0885	3.82
2,3,4,7,8-PeCDF-13C	1.0363	1.0684	1.0956	1.0442	1.1166	1.0722	3.16
1,2,3,7,8-PeCDD-13C	0.6666	0.7136	0.7113	0.6539	0.7486	0.6988	5.50
1,2,3,4,7,8-HxCDF-13C	1.1107	1.1884	1.1142	1.1913	1.1779	1.1565	3.50
1,2,3,6,7,8-HxCDF-13C	1.3610	1.4449	1.2741	1.4375	1.4269	1.3889	5.20
2,3,4,6,7,8-HxCDF-13C	1.2528	1.2370	1.1465	1.2330	1.2060	1.2151	3.45
1,2,3,7,8,9-HxCDF-13C	0.9931	0.9520	0.9203	0.9690	1.0146	0.9698	3.76
1,2,3,4,7,8-HxCDD-13C	0.9496	0.9598	0.8674	0.9581	0.9803	0.9430	4.64
1,2,3,6,7,8-HxCDD-13C	1.1416	1.1510	1.0752	1.1417	1.1558	1.1330	2.91
1,2,3,4,6,7,8-HpCDF-13C	1.0867	1.0758	1.0161	1.0566	1.1114	1.0693	3.34
1,2,3,4,7,8,9-HpCDF-13C	0.8266	0.7592	0.7078	0.7801	0.7948	0.7737	5.72
1,2,3,4,6,7,8-HpCDD-13C	0.8080	0.8010	0.7628	0.7720	0.8318	0.7951	3.52
OCDD-13C	0.7148	0.7074	0.6625	0.6893	0.7756	0.7099	5.90

REPORT OF LABORATORY ANALYSIS

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Method 1613B
Initial Calibration (ICAL) - Isotope Ratio Summary

ICAL ID	**U190530**	Data Files:		Time	Injected
Calibration Date	05/30/2019	CS-1	U190530A_09	16:42	SMT
Instrument	10MSHR06 (U)	CS-2	U190530A_08	15:55	SMT
Column Phase	ZB-5MS 0.25mm	CS-3	U190530A_07	15:10	SMT
Column ID No.	1010640	CS-4	U190530A_11	18:15	SMT
		CS-5	U190530A_10	17:28	SMT

Isomer	CS-1	CS-2	CS-3	CS-4	CS-5	Limits
2,3,7,8-TCDF	0.73	0.77	0.79	0.77	0.78	0.65 - 0.89
2,3,7,8-TCDD	0.75	0.74	0.80	0.76	0.79	0.65 - 0.89
1,2,3,7,8-PeCDF	1.48	1.57	1.51	1.52	1.55	1.32 - 1.78
2,3,4,7,8-PeCDF	1.56	1.57	1.50	1.51	1.56	1.32 - 1.78
1,2,3,7,8-PeCDD	0.62	0.61	0.63	0.62	0.61	0.52 - 0.70
1,2,3,4,7,8-HxCDF	1.30	1.21	1.22	1.25	1.23	1.05 - 1.43
1,2,3,6,7,8-HxCDF	1.22	1.28	1.25	1.24	1.24	1.05 - 1.43
2,3,4,6,7,8-HxCDF	1.26	1.21	1.22	1.29	1.25	1.05 - 1.43
1,2,3,7,8,9-HxCDF	1.23	1.21	1.17	1.27	1.24	1.05 - 1.43
1,2,3,4,7,8-HxCDD	1.21	1.25	1.26	1.25	1.25	1.05 - 1.43
1,2,3,6,7,8-HxCDD	1.17	1.21	1.28	1.24	1.27	1.05 - 1.43
1,2,3,7,8,9-HxCDD	1.13	1.24	1.27	1.26	1.24	1.05 - 1.43
1,2,3,4,6,7,8-HpCDF	0.97	1.10	1.11	1.07	1.07	0.88 - 1.20
1,2,3,4,7,8,9-HpCDF	1.03	1.06	1.03	1.06	1.04	0.88 - 1.20
1,2,3,4,6,7,8-HpCDD	1.06	1.05	1.03	1.01	1.06	0.88 - 1.20
OCDF	0.91	0.90	0.96	0.87	0.91	0.76 - 1.02
OCDD	0.84	0.90	0.88	0.88	0.89	0.76 - 1.02
1,2,3,4-TCDD-13C	0.80	0.80	0.79	0.79	0.82	0.65 - 0.89
1,2,3,7,8,9-HxCDD-13C	1.21	1.29	1.27	1.23	1.15	1.05 - 1.43
2,3,7,8-TCDF-13C	0.78	0.78	0.78	0.79	0.80	0.65 - 0.89
2,3,7,8-TCDD-13C	0.79	0.78	0.78	0.78	0.80	0.65 - 0.89
1,2,3,7,8-PeCDF-13C	1.59	1.53	1.54	1.58	1.54	1.32 - 1.78
2,3,4,7,8-PeCDF-13C	1.61	1.57	1.53	1.53	1.53	1.32 - 1.78
1,2,3,7,8-PeCDD-13C	1.56	1.54	1.57	1.57	1.60	1.32 - 1.78
1,2,3,4,7,8-HxCDF-13C	0.51	0.54	0.51	0.51	0.51	0.43 - 0.59
1,2,3,6,7,8-HxCDF-13C	0.52	0.51	0.53	0.52	0.52	0.43 - 0.59
2,3,4,6,7,8-HxCDF-13C	0.53	0.52	0.52	0.52	0.51	0.43 - 0.59
1,2,3,7,8,9-HxCDF-13C	0.51	0.56	0.53	0.55	0.54	0.43 - 0.59
1,2,3,4,7,8-HxCDD-13C	1.25	1.29	1.29	1.27	1.26	1.05 - 1.43
1,2,3,6,7,8-HxCDD-13C	1.25	1.27	1.29	1.25	1.21	1.05 - 1.43
1,2,3,4,6,7,8-HpCDF-13C	0.46	0.46	0.45	0.48	0.46	0.37 - 0.51
1,2,3,4,7,8,9-HpCDF-13C	0.45	0.47	0.43	0.43	0.46	0.37 - 0.51
1,2,3,4,6,7,8-HpCDD-13C	1.09	1.08	1.10	1.02	1.03	0.88 - 1.20
OCDD-13C	0.90	0.90	0.89	0.90	0.92	0.76 - 1.02

REPORT OF LABORATORY ANALYSIS

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Method 1613B Analysis Results
PCDD/PCDF Calibration Verification
Labeled Analytes

Lab Name	CS3/CPM-11321-155		
Filename	U190604A_06	Instrument ID	10MSHR06 (U)
Injected By	SMT	GC Column ID	1010640
Analyzed	06/04/2019 10:39	ICAL ID	U190530

Native Isomers	m/z's Forming Ratio (1)	Ion Abund. Ratio	QC Limits (2)	Conc Found	Conc. Range (ng/ml) (3)
Labeled Compounds					
1,2,3,4-TCDD-13C	M/M+2	0.79	0.65 - 0.89	-----	-----
2,3,7,8-TCDD-13C	M/M+2	0.78	0.65 - 0.89	116.0	82 - 121
1,2,3,7,8-PeCDD-13C	M+2/M+4	1.56	1.32 - 1.78	118.1	62 - 160
1,2,3,4,7,8-HxCDD-13C	M+2/M+4	1.25	1.05 - 1.43	92.8	85 - 117
1,2,3,6,7,8-HxCDD-13C	M+2/M+4	1.22	1.05 - 1.43	91.0	85 - 118
1,2,3,7,8,9-HxCDD-13C	M+2/M+4	1.22	1.05 - 1.43	-----	-----
1,2,3,4,6,7,8-HpCDD-13C	M+2/M+4	1.07	0.88 - 1.20	119.8	72 - 138
OCDD-13C	M+2/M+4	0.92	0.76 - 1.02	223.6	96 - 415
2,3,7,8-TCDF-13C	M/M+2	0.79	0.65 - 0.89	94.0	71 - 140
1,2,3,7,8-PeCDF-13C	M+2/M+4	1.52	1.32 - 1.78	89.2	76 - 130
2,3,4,7,8-PeCDF-13C	M+2/M+4	1.50	1.32 - 1.78	94.9	77 - 130
1,2,3,4,7,8-HxCDF-13C	M/M+2	0.50	0.43 - 0.59	81.3	76 - 131
1,2,3,6,7,8-HxCDF-13C	M/M+2	0.49	0.43 - 0.59	74.6	70 - 143
2,3,4,6,7,8-HxCDF-13C	M/M+2	0.52	0.43 - 0.59	76.7	73 - 137
1,2,3,7,8,9-HxCDF-13C	M/M+2	0.52	0.43 - 0.59	86.6	74 - 135
1,2,3,4,6,7,8-HpCDF-13C	M/M+2	0.46	0.37 - 0.51	100.9	78 - 129
1,2,3,4,7,8,9-HpCDF-13C	M/M+2	0.45	0.37 - 0.51	108.4	77 - 129
Cleanup Standard					
2,3,7,8-TCDD-37Cl4	M+2/M+4	(4)		10.3	7.9 - 12.7

1. See Table 8, Method 1613, for m/z specifications.

2. Ion Abundance Ratio Control Limits from Table 9, Method 1613.

3. Contract-required concentration range as specified in Table 6, Method 1613, under VER (10/94 Revision).

4. No ion abundance ratio; report concentration found.

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Method 1613B Analysis Results
PCDD/PCDF Calibration Verification
Native Analytes

Lab Name	CS3/CPM-11321-155		
Filename	U190604A_06	Instrument ID	10MSHR06 (U)
Injected By	SMT	GC Column ID	1010640
Analyzed	06/04/2019 10:39	ICAL ID	U190530

Native Isomers	m/z's Forming Ratio (1)	Ion Abund. Ratio	QC Limits (2)	Conc Found	Conc. Range (ng/ml) (3)
2,3,7,8-TCDD	M/M+2	0.74	0.65 - 0.89	9.0	7.8 - 12.9
1,2,3,7,8-PeCDD	M+2/M+4	0.61	0.52 - 0.70	44.0	39 - 65
1,2,3,4,7,8-HxCDD	M+2/M+4	1.26	1.05 - 1.43	46.2	39 - 64
1,2,3,6,7,8-HxCDD	M+2/M+4	1.26	1.05 - 1.43	44.3	39 - 64
1,2,3,7,8,9-HxCDD	M+2/M+4	1.24	1.05 - 1.43	49.0	41 - 61
1,2,3,4,6,7,8-HpCDD	M+2/M+4	1.07	0.88 - 1.20	47.3	43 - 58
OCDD	M+2/M+4	0.88	0.76 - 1.02	87.0	79 - 126
2,3,7,8-TCDF	M/M+2	0.84	0.65 - 0.89	8.7	8.4 - 12.0
1,2,3,7,8-PeCDF	M+2/M+4	1.54	1.32 - 1.78	47.2	41 - 60
2,3,4,7,8-PeCDF	M+2/M+4	1.49	1.32 - 1.78	45.6	41 - 61
1,2,3,4,7,8-HxCDF	M+2/M+4	1.25	1.05 - 1.43	46.2	45 - 56
1,2,3,6,7,8-HxCDF	M+2/M+4	1.32	1.05 - 1.43	47.9	44 - 57
2,3,4,6,7,8-HxCDF	M+2/M+4	1.21	1.05 - 1.43	47.7	44 - 57
1,2,3,7,8,9-HxCDF	M+2/M+4	1.23	1.05 - 1.43	46.4	45 - 56
1,2,3,4,6,7,8-HpCDF	M+2/M+4	1.00	0.88 - 1.20	45.2	45 - 55
1,2,3,4,7,8,9-HpCDF	M+2/M+4	1.02	0.88 - 1.20	45.8	43 - 58
OCDF	M+2/M+4	0.90	0.76 - 1.02	73.7	63 - 159

1. See Table 8, Method 1613, for m/z specifications.

2. Ion Abundance Ratio Control Limits from Table 9, Method 1613.

3. Contract-required concentration range as specified in Table 6, Method 1613, under VER (10/94 Revision).

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