Pace Analytical™
www.pacelabs.com

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

Report Prepared for:

Luke Keyzer
City of Otsego MI
117 E. Orleans St.
Otsego MI 49078

REPORT OF LABORATORY ANALYSIS FOR PCDD/PCDF

Report Information:

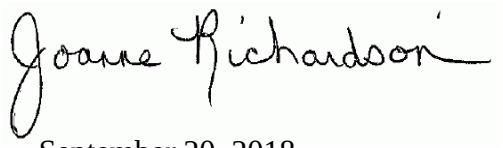
Pace Project #: 10446574
Sample Receipt Date: 09/07/2018
Client Project #: Dioxins+PCB's
Client Sub PO #: N/A
State Cert #: 9909

Invoicing & Reporting Options:

The report provided has been invoiced as a Level 2 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 Joanne Richardson, your Pace Project Manager.

This report has been reviewed by:



September 20, 2018

Joanne Richardson,
(612) 607-6453
(612) 607-6444 (fax)

Report Prepared Date:
September 20, 2018

Report of Laboratory Analysis

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

This report presents the results from the analyses performed on three samples submitted by a representative of the City of Otsego. The samples were 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. This report was revised to provide estimated detection limits.

The recoveries of the isotopically-labeled PCDD/PCDF internal standards in the sample extracts ranged from 48-110%. 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 the blank to contain a trace level of OCDD. This level was below the calibration range of the method. Also, OCDD was not detected in the field samples.

Laboratory spike samples were also prepared using clean reference matrix that had been fortified with native standard materials. The recoveries of the native compounds ranged from 85-112% with relative percent differences of 1.1-14.1%. These results were all within the target ranges for the method. Matrix spikes were not prepared with the sample batch.

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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

Appendix A

Sample Management

Pace Analytical®
www.pacelabs.com

CHAIN-OF-CUSTODY / Analytical Request Do

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

WO# : 10446574

10446574

2300162

Section A Required Client Information:
Company: City of Otsego
Address: 117 E. Orleans St.
Otsego, MI 49078
Email To: LKeyzer@cityofotsego.org
Phone: 269-492-4581 Fax:
Requested Due Date/TAT: ASAP

Section B Required Project Information:
Report To:
Copy To:
Purchase Order No.:
Project Name: Dioxins + PCB's.
Project Number:

Section C Invoice Information:
Attention:
Company Name: City of Otsego.
Address: 117 E. Orleans St.
Pace Quote Reference:
Pace Project Manager: Jeanne Richardson.
Pace Profile #: 38786

REGULATORY AGENCY
☐ NPDES ☐ GROUND WATER ☒ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER

Site Location STATE: MI

Section D Required Client Information

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

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

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE	SAMPLE TYPE	COLLECTED COMPOSITE START DATE	COMPOSITE START TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Y/N	Analysis Test: 2,3,7,8 TCDF	PCBS - Non + Mon	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	Well 3 A	DW	G		1:05														X			001
2	B	DW	G		1:07														X			002
3	C	DW	G				1:00													X		003
4	D	DW	G				1:02													X		004
5	Well 4 A	DW	G		12:40														X			005
6	B	DW	G		12:45														X			006
7	C	DW	G				12:47													X		007
8	D	DW	G				12:49													X		008
9	Well 5 A	DW	G		1:25														Y			009
10	B	DW	G		1:27														Y			010
11	C	DW	G				1:20													X		011
12	D	DW	G				1:22													X		012

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
				[signature] PACE	9/7/18	940	1.9	Y	N	Y
							0.2			

ORIGINAL

SAMPLER NAME AND SIGNATURE
PRINT Name of SAMPLER: Luke Keyzer
SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 09/06/18

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-C-010-rev.00, 09Nov2017

Sample Condition Upon Receipt

Client Name: CITY OF OTSEGO

Project #: WO# : 10446574

PM: JMR Due Date: 09/21/18

CLIENT: City of Otse

Courier: ☐Fed Ex ☑UPS ☐USPS ☐Client ☐Commercial ☐Pace ☐SpeeDee ☐Other:

Tracking Number: 12. V88 770 01 5086 2697 5149 1500

Custody Seal on Cooler/Box Present? ☐Yes ☑No **Seals Intact?** ☐Yes ☑No

Optional: Proj. Due Date: Proj. Name:

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

Thermometer Used: ☑G87A9170600254 ☐G87A9155100842 **Type of Ice:** ☑Wet ☐Blue ☐None ☐Dry ☐Melted

Cooler Temp Read (°C): 0.2/1.9 **Cooler Temp Corrected (°C):** 0.2/1.9 **Biological Tissue Frozen?** ☐Yes ☐No ☑N/A

Temp should be above freezing to 6°C **Correction Factor:** none **Date and Initials of Person Examining Contents:** WJF 9/7/18

USDA Regulated Soil (☑N/A, water sample)

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?	☑Yes	☐No		1.
Chain of Custody Filled Out?	☑Yes	☐No		2.
Chain of Custody Relinquished?	☐Yes	☑No		3.
Sampler Name and/or Signature on COC?	☑Yes	☐No	☐N/A	4.
Samples Arrived within Hold Time?	☑Yes	☐No		5.
Short Hold Time Analysis (<72 hr)?	☐Yes	☑No		6.
Rush Turn Around Time Requested?	☐Yes	☑No		7.
Sufficient Volume?	☑Yes	☐No		8.
Correct Containers Used?	☑Yes	☐No		9.
-Pace Containers Used?	☑Yes	☐No		
Containers Intact?	☑Yes	☐No		10.
Filtered Volume Received for Dissolved Tests?	☐Yes	☐No	☑N/A	11. Note if sediment is visible in the dissolved container
Is sufficient information available to reconcile the samples to the COC? Matrix: WT	☑Yes	☐No		12. Date on containers says 9/6/18
All containers needing acid/base preservation have been checked?	☐Yes	☐No	☑N/A	13. ☐HNO_3 ☐H_2SO_4 ☐NaOH Positive for Res. Chlorine? Y N
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	Sample #
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxin/PFAS	☐Yes	☐No	☑N/A	Initial when completed: Lot # of added preservative:
Headspace in VOA Vials (>6mm)?	☐Yes	☐No	☑N/A	14.
Trip Blank Present?	☐Yes	☐No	☑N/A	15.
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: Joanne Richardson **Date:** 9-7-18

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).

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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 = Interferencepresent

J = Estimated value

L = Suppressive interference, analyte may be biased low

Nn = Value obtained from additional analysis

P = PCDEInterference

R = Recovery outside target range

S = Peak saturated

U = Analyte not detected

V = Result verified by confirmation analysis

X = %D Exceeds limits

Y = Calculated using average of daily RFs

* = SeeDiscussion

REPORT OF LABORATORY ANALYSIS

Appendix B

Sample Analysis Summary

Pace Analytical Services, LLC
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Method 1613B Sample Analysis Results

Client - City of Otsego MI

Client's Sample ID	Well 3 A,B,C,D		
Lab Sample ID	10446574001		
Filename	U180913B_11		
Injected By	ZMS		
Total Amount Extracted	1000 mL	Matrix	Water
% Moisture	NA	Dilution	NA
Dry Weight Extracted	NA	Collected	09/06/2018 13:05
ICAL ID	U180911	Received	09/07/2018 09:40
CCal Filename(s)	U180913B_01	Extracted	09/10/2018 13:05
Method Blank ID	BLANK-64562	Analyzed	09/13/2018 18:23

Native Isomers	Conc pg/L	EMPC pg/L	EDL pg/L		Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	-----	0.88		2,3,7,8-TCDF-13C	2.00	82
Total TCDF	ND	-----	0.88		2,3,7,8-TCDD-13C	2.00	83
					1,2,3,7,8-PeCDF-13C	2.00	89
2,3,7,8-TCDD	ND	-----	0.74		2,3,4,7,8-PeCDF-13C	2.00	86
Total TCDD	ND	-----	0.74		1,2,3,7,8-PeCDD-13C	2.00	100
					1,2,3,4,7,8-HxCDF-13C	2.00	94
1,2,3,7,8-PeCDF	ND	-----	0.51		1,2,3,6,7,8-HxCDF-13C	2.00	86
2,3,4,7,8-PeCDF	ND	-----	0.40		2,3,4,6,7,8-HxCDF-13C	2.00	84
Total PeCDF	ND	-----	0.46		1,2,3,7,8,9-HxCDF-13C	2.00	86
					1,2,3,4,7,8-HxCDD-13C	2.00	93
1,2,3,7,8-PeCDD	ND	-----	0.67		1,2,3,6,7,8-HxCDD-13C	2.00	80
Total PeCDD	ND	-----	0.67		1,2,3,4,6,7,8-HpCDF-13C	2.00	90
					1,2,3,4,7,8,9-HpCDF-13C	2.00	93
1,2,3,4,7,8-HxCDF	-----	0.79	0.54	IJ	1,2,3,4,6,7,8-HpCDD-13C	2.00	95
1,2,3,6,7,8-HxCDF	ND	-----	0.53		OCDD-13C	4.00	84
2,3,4,6,7,8-HxCDF	ND	-----	0.64				
1,2,3,7,8,9-HxCDF	ND	-----	0.82		1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	-----	0.63		1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	-----	0.62		2,3,7,8-TCDD-37Cl4	0.20	85
1,2,3,6,7,8-HxCDD	ND	-----	0.70				
1,2,3,7,8,9-HxCDD	ND	-----	0.55				
Total HxCDD	ND	-----	0.62				
1,2,3,4,6,7,8-HpCDF	-----	0.64	0.46	IJ	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	-----	0.72		Equivalence: 0.091 pg/L		
Total HpCDF	ND	-----	0.59		(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	ND	-----	0.74				
Total HpCDD	ND	-----	0.74				
OCDF	18	-----	2.2	J			
OCDD	ND	-----	4.0				

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

J = Estimated value
I = Interference present

REPORT OF LABORATORY ANALYSIS

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Method 1613B Sample Analysis Results

Client - City of Otsego MI

Client's Sample ID	Well 4 A,B,C,D		
Lab Sample ID	10446574005		
Filename	U180913B_12		
Injected By	ZMS		
Total Amount Extracted	992 mL	Matrix	Water
% Moisture	NA	Dilution	NA
Dry Weight Extracted	NA	Collected	09/06/2018 12:40
ICAL ID	U180911	Received	09/07/2018 09:40
CCal Filename(s)	U180913B_01	Extracted	09/10/2018 13:05
Method Blank ID	BLANK-64562	Analyzed	09/13/2018 19:11

Native Isomers	Conc pg/L	EMPC pg/L	EDL pg/L	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	-----	1.5	2,3,7,8-TCDF-13C	2.00	63
Total TCDF	ND	-----	1.5	2,3,7,8-TCDD-13C	2.00	62
				1,2,3,7,8-PeCDF-13C	2.00	75
2,3,7,8-TCDD	ND	-----	1.5	2,3,4,7,8-PeCDF-13C	2.00	81
Total TCDD	ND	-----	1.5	1,2,3,7,8-PeCDD-13C	2.00	87
				1,2,3,4,7,8-HxCDF-13C	2.00	110
1,2,3,7,8-PeCDF	ND	-----	1.1	1,2,3,6,7,8-HxCDF-13C	2.00	104
2,3,4,7,8-PeCDF	ND	-----	0.93	2,3,4,6,7,8-HxCDF-13C	2.00	103
Total PeCDF	ND	-----	0.99	1,2,3,7,8,9-HxCDF-13C	2.00	80
				1,2,3,4,7,8-HxCDD-13C	2.00	108
1,2,3,7,8-PeCDD	ND	-----	0.55	1,2,3,6,7,8-HxCDD-13C	2.00	95
Total PeCDD	ND	-----	0.55	1,2,3,4,6,7,8-HpCDF-13C	2.00	110
				1,2,3,4,7,8,9-HpCDF-13C	2.00	96
1,2,3,4,7,8-HxCDF	ND	-----	0.77	1,2,3,4,6,7,8-HpCDD-13C	2.00	108
1,2,3,6,7,8-HxCDF	ND	-----	1.0	OCDD-13C	4.00	86
2,3,4,6,7,8-HxCDF	ND	-----	0.41			
1,2,3,7,8,9-HxCDF	ND	-----	0.62	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	-----	0.71	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	-----	1.0	2,3,7,8-TCDD-37Cl4	0.20	66
1,2,3,6,7,8-HxCDD	ND	-----	0.76			
1,2,3,7,8,9-HxCDD	ND	-----	0.75			
Total HxCDD	ND	-----	0.85			
1,2,3,4,6,7,8-HpCDF	ND	-----	0.83	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	-----	1.3	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	-----	0.83			
Total HpCDD	ND	-----	0.83			
OCDF	ND	-----	0.72			
OCDD	ND	-----	2.1			

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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Method 1613B Sample Analysis Results

Client - City of Otsego MI

Client's Sample ID	Well 5 A,B,C,D		
Lab Sample ID	10446574009		
Filename	U180913B_13		
Injected By	ZMS		
Total Amount Extracted	955 mL	Matrix	Water
% Moisture	NA	Dilution	NA
Dry Weight Extracted	NA	Collected	09/06/2018 13:25
ICAL ID	U180911	Received	09/07/2018 09:40
CCal Filename(s)	U180913B_01	Extracted	09/10/2018 13:05
Method Blank ID	BLANK-64562	Analyzed	09/13/2018 19:58

Native Isomers	Conc pg/L	EMPC pg/L	EDL pg/L	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	-----	1.7	2,3,7,8-TCDF-13C	2.00	66
Total TCDF	ND	-----	1.7	2,3,7,8-TCDD-13C	2.00	67
				1,2,3,7,8-PeCDF-13C	2.00	75
2,3,7,8-TCDD	ND	-----	1.9	2,3,4,7,8-PeCDF-13C	2.00	48
Total TCDD	ND	-----	1.9	1,2,3,7,8-PeCDD-13C	2.00	92
				1,2,3,4,7,8-HxCDF-13C	2.00	83
1,2,3,7,8-PeCDF	ND	-----	0.80	1,2,3,6,7,8-HxCDF-13C	2.00	85
2,3,4,7,8-PeCDF	ND	-----	0.45	2,3,4,6,7,8-HxCDF-13C	2.00	79
Total PeCDF	ND	-----	0.63	1,2,3,7,8,9-HxCDF-13C	2.00	86
				1,2,3,4,7,8-HxCDD-13C	2.00	77
1,2,3,7,8-PeCDD	ND	-----	0.66	1,2,3,6,7,8-HxCDD-13C	2.00	72
Total PeCDD	ND	-----	0.66	1,2,3,4,6,7,8-HpCDF-13C	2.00	58
				1,2,3,4,7,8,9-HpCDF-13C	2.00	91
1,2,3,4,7,8-HxCDF	ND	-----	0.25	1,2,3,4,6,7,8-HpCDD-13C	2.00	93
1,2,3,6,7,8-HxCDF	ND	-----	0.32	OCDD-13C	4.00	71
2,3,4,6,7,8-HxCDF	ND	-----	0.29			
1,2,3,7,8,9-HxCDF	ND	-----	0.59	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	-----	0.36	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	-----	0.65	2,3,7,8-TCDD-37Cl4	0.20	68
1,2,3,6,7,8-HxCDD	ND	-----	0.57			
1,2,3,7,8,9-HxCDD	ND	-----	0.40			
Total HxCDD	ND	-----	0.54			
1,2,3,4,6,7,8-HpCDF	ND	-----	0.93	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	-----	0.83	Equivalence: 0.00 pg/L		
Total HpCDF	ND	-----	0.88	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	ND	-----	1.1			
Total HpCDD	ND	-----	1.1			
OCDF	ND	-----	0.61			
OCDD	ND	-----	2.3			

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

REPORT OF LABORATORY ANALYSIS

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Method 1613B Blank Analysis Results

Lab Sample Name	DFBLKFC		
Lab Sample ID	BLANK-64562	Matrix	Water
Filename	F180912A_09	Dilution	NA
Total Amount Extracted	1040 mL	Extracted	09/10/2018 13:05
ICAL ID	F180911	Analyzed	09/12/2018 13:28
CCal Filename(s)	F180911B_18	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	-----	2.0		2,3,7,8-TCDF-13C	2.00	78
Total TCDF	ND	-----	2.0		2,3,7,8-TCDD-13C	2.00	78
					1,2,3,7,8-PeCDF-13C	2.00	90
2,3,7,8-TCDD	ND	-----	2.7		2,3,4,7,8-PeCDF-13C	2.00	82
Total TCDD	ND	-----	2.7		1,2,3,7,8-PeCDD-13C	2.00	103
					1,2,3,4,7,8-HxCDF-13C	2.00	78
1,2,3,7,8-PeCDF	ND	-----	1.1		1,2,3,6,7,8-HxCDF-13C	2.00	85
2,3,4,7,8-PeCDF	ND	-----	0.70		2,3,4,6,7,8-HxCDF-13C	2.00	93
Total PeCDF	ND	-----	0.90		1,2,3,7,8,9-HxCDF-13C	2.00	94
					1,2,3,4,7,8-HxCDD-13C	2.00	81
1,2,3,7,8-PeCDD	ND	-----	1.4		1,2,3,6,7,8-HxCDD-13C	2.00	80
Total PeCDD	ND	-----	1.4		1,2,3,4,6,7,8-HpCDF-13C	2.00	70
					1,2,3,4,7,8,9-HpCDF-13C	2.00	87
1,2,3,4,7,8-HxCDF	ND	-----	0.68		1,2,3,4,6,7,8-HpCDD-13C	2.00	88
1,2,3,6,7,8-HxCDF	ND	-----	0.72		OCDD-13C	4.00	75
2,3,4,6,7,8-HxCDF	ND	-----	0.74				
1,2,3,7,8,9-HxCDF	ND	-----	1.0		1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	-----	0.79		1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	-----	0.94		2,3,7,8-TCDD-37Cl4	0.20	78
1,2,3,6,7,8-HxCDD	ND	-----	0.99				
1,2,3,7,8,9-HxCDD	ND	-----	0.91				
Total HxCDD	ND	-----	0.95				
1,2,3,4,6,7,8-HpCDF	ND	-----	0.98		Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	-----	1.0		Equivalence: 0.00098 pg/L		
Total HpCDF	ND	-----	1.00		(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	ND	-----	1.5				
Total HpCDD	ND	-----	1.5				
OCDF	ND	-----	2.3				
OCDD	3.3	-----	1.8	J			

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

J = Estimated value

REPORT OF LABORATORY ANALYSIS

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Method 1613B Laboratory Control Spike Results

Lab Sample ID	LCS-64563		
Filename	F180912A_06	Matrix	Water
Total Amount Extracted	1050 mL	Dilution	NA
ICAL ID	F180911	Extracted	09/10/2018 13:05
CCal Filename	F180911B_18	Analyzed	09/12/2018 11:15
Method Blank ID	BLANK-64562	Injected By	SMT

Compound	Cs	Cr	Lower Limit	Upper Limit	% Rec.
2,3,7,8-TCDF	10	8.9	7.5	15.8	89
2,3,7,8-TCDD	10	8.7	6.7	15.8	87
1,2,3,7,8-PeCDF	50	46	40.0	67.0	92
2,3,4,7,8-PeCDF	50	46	34.0	80.0	91
1,2,3,7,8-PeCDD	50	44	35.0	71.0	88
1,2,3,4,7,8-HxCDF	50	49	36.0	67.0	99
1,2,3,6,7,8-HxCDF	50	45	42.0	65.0	90
2,3,4,6,7,8-HxCDF	50	44	35.0	78.0	88
1,2,3,7,8,9-HxCDF	50	45	39.0	65.0	91
1,2,3,4,7,8-HxCDD	50	46	35.0	82.0	92
1,2,3,6,7,8-HxCDD	50	52	38.0	67.0	103
1,2,3,7,8,9-HxCDD	50	51	32.0	81.0	102
1,2,3,4,6,7,8-HpCDF	50	50	41.0	61.0	99
1,2,3,4,7,8,9-HpCDF	50	42	39.0	69.0	85
1,2,3,4,6,7,8-HpCDD	50	45	35.0	70.0	89
OCDF	100	96	63.0	170.0	96
OCDD	100	95	78.0	144.0	95
2,3,7,8-TCDD-37Cl4	10	8.5	3.1	19.1	85
2,3,7,8-TCDF-13C	100	78	22.0	152.0	78
2,3,7,8-TCDD-13C	100	80	20.0	175.0	80
1,2,3,7,8-PeCDF-13C	100	97	21.0	192.0	97
2,3,4,7,8-PeCDF-13C	100	99	13.0	328.0	99
1,2,3,7,8-PeCDD-13C	100	110	21.0	227.0	110
1,2,3,4,7,8-HxCDF-13C	100	83	19.0	202.0	83
1,2,3,6,7,8-HxCDF-13C	100	90	21.0	159.0	90
2,3,4,6,7,8-HxCDF-13C	100	98	22.0	176.0	98
1,2,3,7,8,9-HxCDF-13C	100	100	17.0	205.0	102
1,2,3,4,7,8-HxCDD-13C	100	88	21.0	193.0	88
1,2,3,6,7,8-HxCDD-13C	100	86	25.0	163.0	86
1,2,3,4,6,7,8-HpCDF-13C	100	86	21.0	158.0	86
1,2,3,4,7,8,9-HpCDF-13C	100	98	20.0	186.0	98
1,2,3,4,6,7,8-HpCDD-13C	100	94	26.0	166.0	94
OCDD-13C	200	170	26.0	397.0	85

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 Laboratory Control Spike Results

Lab Sample ID	LCSD-64564		
Filename	F180912A_07	Matrix	Water
Total Amount Extracted	1030 mL	Dilution	NA
ICAL ID	F180911	Extracted	09/10/2018 13:05
CCal Filename	F180911B_18	Analyzed	09/12/2018 12:00
Method Blank ID	BLANK-64562	Injected By	SMT

Compound	Cs	Cr	Lower Limit	Upper Limit	% Rec.
2,3,7,8-TCDF	10	9.7	7.5	15.8	97
2,3,7,8-TCDD	10	9.6	6.7	15.8	96
1,2,3,7,8-PeCDF	50	51	40.0	67.0	102
2,3,4,7,8-PeCDF	50	47	34.0	80.0	95
1,2,3,7,8-PeCDD	50	46	35.0	71.0	92
1,2,3,4,7,8-HxCDF	50	52	36.0	67.0	103
1,2,3,6,7,8-HxCDF	50	50	42.0	65.0	100
2,3,4,6,7,8-HxCDF	50	47	35.0	78.0	94
1,2,3,7,8,9-HxCDF	50	46	39.0	65.0	92
1,2,3,4,7,8-HxCDD	50	53	35.0	82.0	106
1,2,3,6,7,8-HxCDD	50	52	38.0	67.0	105
1,2,3,7,8,9-HxCDD	50	56	32.0	81.0	112
1,2,3,4,6,7,8-HpCDF	50	52	41.0	61.0	105
1,2,3,4,7,8,9-HpCDF	50	46	39.0	69.0	92
1,2,3,4,6,7,8-HpCDD	50	47	35.0	70.0	94
OCDF	100	110	63.0	170.0	106
OCDD	100	98	78.0	144.0	98
2,3,7,8-TCDD-37Cl4	10	9.9	3.1	19.1	99
2,3,7,8-TCDF-13C	100	100	22.0	152.0	100
2,3,7,8-TCDD-13C	100	100	20.0	175.0	100
1,2,3,7,8-PeCDF-13C	100	110	21.0	192.0	112
2,3,4,7,8-PeCDF-13C	100	120	13.0	328.0	117
1,2,3,7,8-PeCDD-13C	100	130	21.0	227.0	132
1,2,3,4,7,8-HxCDF-13C	100	98	19.0	202.0	98
1,2,3,6,7,8-HxCDF-13C	100	100	21.0	159.0	102
2,3,4,6,7,8-HxCDF-13C	100	110	22.0	176.0	112
1,2,3,7,8,9-HxCDF-13C	100	120	17.0	205.0	117
1,2,3,4,7,8-HxCDD-13C	100	98	21.0	193.0	98
1,2,3,6,7,8-HxCDD-13C	100	100	25.0	163.0	102
1,2,3,4,6,7,8-HpCDF-13C	100	97	21.0	158.0	97
1,2,3,4,7,8,9-HpCDF-13C	100	110	20.0	186.0	106
1,2,3,4,6,7,8-HpCDD-13C	100	110	26.0	166.0	106
OCDD-13C	200	180	26.0	397.0	91

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	City of Otsego MI		
Spike 1 ID	LCS-64563	Spike 2 ID	LCSD-64564
Spike 1 Filename	F180912A_06	Spike 2 Filename	F180912A_07

Compound	Spike 1 %REC	Spike 2 %REC	%RPD
2,3,7,8-TCDF	89	97	8.6
2,3,7,8-TCDD	87	96	9.8
1,2,3,7,8-PeCDF	92	102	10.3
2,3,4,7,8-PeCDF	91	95	4.3
1,2,3,7,8-PeCDD	88	92	4.4
1,2,3,4,7,8-HxCDF	99	103	4.0
1,2,3,6,7,8-HxCDF	90	100	10.5
2,3,4,6,7,8-HxCDF	88	94	6.6
1,2,3,7,8,9-HxCDF	91	92	1.1
1,2,3,4,7,8-HxCDD	92	106	14.1
1,2,3,6,7,8-HxCDD	103	105	1.9
1,2,3,7,8,9-HxCDD	102	112	9.3
1,2,3,4,6,7,8-HpCDF	99	105	5.9
1,2,3,4,7,8,9-HpCDF	85	92	7.9
1,2,3,4,6,7,8-HpCDD	89	94	5.5
OCDF	96	106	9.9
OCDD	95	98	3.1

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

REPORT OF LABORATORY ANALYSIS