1435 Norjohn Court, Unit 1, Burlington, ON, Canada L7L 0E6

SVOC DATA PACKAGE

Client Project Information

Project ID:
Project Description:
Contact: Emily Jones

ALSE Project Information

Project ID: FLS100

Contact: Breanne Dusureault
Submission ID(s): L2308151

Final Package Review by: _____

Date Reviewed: 15-Oct-19

1435 Norjohn Court, Unit 1, Burlington, ON, Canada L7L 0E6

SVOC DATA PACKAGE

SECTION 1: PROJECT NARRATIVE

ALSE Project Information

Project ID: FLS100

Contact: Breanne Dusureault

Submission ID(s): L2308151

Client Project Information

Project ID:

Project Description:

Contact: Emily Jones

Analytical Method: PCDD/F by TO9A via EPA M23/8290A

ALS Sample ID	Client Sample Descriptions	Matrix	Date Sampled	Date Received	Date Extracted	Date Analyzed
L2308151-1	HEISER-25745103	Puf	05-Jul-19	11-Jul-19	12-Jul-19	27-Jul-19
L2308151-2	RES-25745100	Puf	05-Jul-19	11-Jul-19	12-Jul-19	27-Jul-19
L2308151-3	CITY-25745101	Puf	05-Jul-19	11-Jul-19	12-Jul-19	27-Jul-19
WG3081836-1	Method Blank	QC	n/a	n/a	12-Jul-19	26-Jul-19
WG3081836-2	Laboratory Control Sample	QC	n/a	n/a	12-Jul-19	26-Jul-19

Comments and Notes:

a) Sample Integrity:

The samples were received at 24.2 degrees C., which is above the recommended storage and transportation temperature. However, the brief period at above the recommended temperature is not expected to have a negative impact on data quality.

b) Instrumental Analysis:

No criteria failures or exceedances.

I certify that this data package is in compliance with the terms and condition of the contract , both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this data package (hardcopy and/or electronic version) has been authorized by the Laboratory Manager or his designee, as verified by the following signature.

Steve Kennedy, Technical Supervisor

15-Oct-19
Date

1435 Norjohn Court, Unit 1, Burlington, ON, Canada L7L 0E6

SVOC DATA PACKAGE

SECTION 2: DATA SUMMARY REPORT

1435 Norjohn Court, Unit 1, Burlington, ON, Canada L7L 0E6
Phone: 905-331-3111, FAX: 905-331-4567

Certificate of Analysis

ALS Project Contact:	Breanne Dusureault	**Client Name:**	Floyd Snider
ALS Project ID:	FLS100	**Client Address:**	601 Union Street, Suite 600
ALS WO#:	L2308151		Seattle, WA, 98101
Date of Report	16-Oct-19		USA
Date of Sample Receipt	11-Jul-19	**Client Contact:**	Emily Jones
		Client Project ID:	

COMMENTS: **PCDD/F by EPA TO9A**

The samples were received at 24.2 degrees C., which is above the recommended storage and transportation temperature. However, the brief period at above the recommended temperature is not expected to have a negative impact on data quality.

Certified by:

Steve Kennedy
Technical Supervisor

ALS Life Sciences

Sample Analysis Summary Report

Sample Name	HEISER-25745103	RES-25745100	CITY-25745101
ALS Sample ID	L2308151-1	L2308151-2	L2308151-3
Sample Size	1	1	1
Sample size units	Puf	Puf	Puf
Percent Moisture	n/a	n/a	n/a
Sample Matrix	PUF	PUF	PUF
Sampling Date	5-Jul-19	5-Jul-19	5-Jul-19
Extraction Date	12-Jul-19	12-Jul-19	12-Jul-19
Target Analytes	**pg**	**pg**	**pg**
2,3,7,8-TCDD	<0.64	<0.66	<0.71
1,2,3,7,8-PeCDD	<0.29	<0.40	<0.50
1,2,3,4,7,8-HxCDD	<0.50	<0.39	<0.64
1,2,3,6,7,8-HxCDD	<0.46	<0.36	<0.55
1,2,3,7,8,9-HxCDD	<0.47	<0.37	<0.48
1,2,3,4,6,7,8-HpCDD	<0.93	1.10	3.05
OCDD	2.81	2.71	9.64
2,3,7,8-TCDF	<0.52	<0.58	<0.59
1,2,3,7,8-PeCDF	<0.44	<0.49	<0.47
2,3,4,7,8-PeCDF	<0.40	<0.44	<0.42
1,2,3,4,7,8-HxCDF	<0.30	<0.25	<0.28
1,2,3,6,7,8-HxCDF	<0.28	<0.23	<0.26
2,3,4,6,7,8-HxCDF	<0.29	<0.25	<0.27
1,2,3,7,8,9-HxCDF	<0.34	<0.29	<0.31
1,2,3,4,6,7,8-HpCDF	0.570	<0.27	0.730
1,2,3,4,7,8,9-HpCDF	<0.32	<0.32	<0.34
OCDF	0.630	<0.95	1.05
Field Spike Standards	**% Rec**	**% Rec**	**% Rec**
37Cl4-2,3,7,8-TCDD	102	102	99
13C12-1,2,3,4,7,8-HxCDD	99	95	96
13C12-2,3,4,7,8-PeCDF	103	106	96
13C12-1,2,3,4,7,8-HxCDF	90	90	83
13C12-1,2,3,4,7,8,9-HpCDF	85	89	74
Extraction Standards			
13C12-2,3,7,8-TCDD	69	68	70
13C12-1,2,3,7,8-PeCDD	77	80	79
13C12-1,2,3,6,7,8-HxCDD	69	68	76
13C12-1,2,3,4,6,7,8-HpCDD	70	71	76
13C12-OCDD	68	71	72
13C12-2,3,7,8-TCDF	72	69	72
13C12-1,2,3,7,8-PeCDF	72	73	73
13C12-1,2,3,6,7,8-HxCDF	70	66	74
13C12-1,2,3,4,6,7,8-HpCDF	68	67	73
Cleanup Standard			
13C12-1,2,3,7,8,9-HxCDF	NS	NS	NS
Homologue Group Totals	**pg**	**pg**	**pg**
Total-TCDD	<0.64	<0.66	<0.71
Total-PeCDD	<0.29	<0.40	<0.50
Total-HxCDD	<0.50	<0.39	<0.33
Total-HpCDD	0.670	1.10	5.97
Total-TCDF	<0.52	<0.58	<0.59
Total-PeCDF	<0.44	<0.49	<0.47
Total-HxCDF	<0.34	<0.29	<0.31
Total-HpCDF	0.570	<0.32	0.730
Toxic Equivalency - (WHO 2005)			
Lower Bound PCDD/F TEQ (WHO 2005)	0.00673	0.0118	0.0410
Mid Point PCDD/F TEQ (WHO 2005)	0.707	0.754	0.970
Upper Bound PCDD/F TEQ (WHO 2005)	1.40	1.50	1.73

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Quality Control Summary Report

Sample Name	Method Blank	Laboratory Control Sample
ALS Sample ID	WG3081836-1	WG3081836-2
Sample Size	1	1
Sample size units	Puf	n/a
Percent Moisture	n/a	n/a
Sample Matrix	QC	QC
Sampling Date	n/a	n/a
Extraction Date	12-Jul-19	12-Jul-19
Target Analytes	**pg**	**% Rec**
2,3,7,8-TCDD	<0.94	103
1,2,3,7,8-PeCDD	0.690	107
1,2,3,4,7,8-HxCDD	<0.63	107
1,2,3,6,7,8-HxCDD	<0.57	104
1,2,3,7,8,9-HxCDD	<0.66	109
1,2,3,4,6,7,8-HpCDD	<1.5	106
OCDD	5.48	100
2,3,7,8-TCDF	<0.67	101
1,2,3,7,8-PeCDF	<0.45	114
2,3,4,7,8-PeCDF	<0.40	94
1,2,3,4,7,8-HxCDF	<0.45	109
1,2,3,6,7,8-HxCDF	<0.41	116
2,3,4,6,7,8-HxCDF	0.500	108
1,2,3,7,8,9-HxCDF	<0.51	105
1,2,3,4,6,7,8-HpCDF	<0.36	113
1,2,3,4,7,8,9-HpCDF	<0.42	96
OCDF	<1.2	90
Field Spike Standards	**% Rec**	**% Rec**
37Cl4-2,3,7,8-TCDD	NS	NS
13C12-1,2,3,4,7,8-HxCDD	NS	NS
13C12-2,3,4,7,8-PeCDF	NS	NS
13C12-1,2,3,4,7,8-HxCDF	NS	NS
13C12-1,2,3,4,7,8,9-HpCDF	NS	NS
Extraction Standards		
13C12-2,3,7,8-TCDD	65	67
13C12-1,2,3,7,8-PeCDD	72	73
13C12-1,2,3,6,7,8-HxCDD	69	71
13C12-1,2,3,4,6,7,8-HpCDD	70	74
13C12-OCDD	68	70
13C12-2,3,7,8-TCDF	67	70
13C12-1,2,3,7,8-PeCDF	67	69
13C12-1,2,3,6,7,8-HxCDF	68	68
13C12-1,2,3,4,6,7,8-HpCDF	71	72
Cleanup Standard		
13C12-1,2,3,7,8,9-HxCDF	NS	NS
Homologue Group Totals	**pg**	
Total-TCDD	<0.94	
Total-PeCDD	0.690	
Total-HxCDD	<0.63	
Total-HpCDD	<0.43	
Total-TCDF	<0.67	
Total-PeCDF	<0.45	
Total-HxCDF	<0.51	
Total-HpCDF	<0.42	
Toxic Equivalency - (WHO 2005)		
Lower Bound PCDD/F TEQ (WHO 2005)	0.742	
Mid Point PCDD/F TEQ (WHO 2005)	1.53	
Upper Bound PCDD/F TEQ (WHO 2005)	2.23	

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Continuing Calibration Summary Report

Sample Name	CCV	CCV
ALS Sample ID	H7-19-CCV-0494	H7-19-CCV-0495
Sample Size	1	1
Sample size units	n/a	n/a
Percent Moisture	n/a	n/a
Sample Matrix	QC	QC
Sampling Date	n/a	n/a
Extraction Date	n/a	n/a
Target Analytes	**% Rec**	**% Rec**
2,3,7,8-TCDD	111	112
1,2,3,7,8-PeCDD	101	100
1,2,3,4,7,8-HxCDD	98	98
1,2,3,6,7,8-HxCDD	96	100
1,2,3,7,8,9-HxCDD	94	97
1,2,3,4,6,7,8-HpCDD	103	103
OCDD	100	102
2,3,7,8-TCDF	106	117
1,2,3,7,8-PeCDF	102	102
2,3,4,7,8-PeCDF	100	103
1,2,3,4,7,8-HxCDF	106	103
1,2,3,6,7,8-HxCDF	104	101
2,3,4,6,7,8-HxCDF	100	103
1,2,3,7,8,9-HxCDF	100	100
1,2,3,4,6,7,8-HpCDF	101	101
1,2,3,4,7,8,9-HpCDF	100	101
OCDF	105	102
Field Spike Standards	**% Rec**	**% Rec**
37Cl4-2,3,7,8-TCDD	104	105
13C12-1,2,3,4,7,8-HxCDD	95	99
13C12-2,3,4,7,8-PeCDF	99	99
13C12-1,2,3,4,7,8-HxCDF	106	102
13C12-1,2,3,4,7,8,9-HpCDF	98	98
Extraction Standards		
13C12-2,3,7,8-TCDD	100	98
13C12-1,2,3,7,8-PeCDD	96	99
13C12-1,2,3,6,7,8-HxCDD	105	102
13C12-1,2,3,4,6,7,8-HpCDD	98	100
13C12-OCDD	92	94
13C12-2,3,7,8-TCDF	101	99
13C12-1,2,3,7,8-PeCDF	98	98
13C12-1,2,3,6,7,8-HxCDF	106	103
13C12-1,2,3,4,6,7,8-HpCDF	101	101
Cleanup Standard		
13C12-1,2,3,7,8,9-HxCDF	102	102

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Sample Analysis Report

Sample Name	**HEISER-25745103**	Sampling Date	5-Jul-19		
ALS Sample ID	L2308151-1	Extraction Date	12-Jul-19		Approved:
Analysis Method	EPA TO9A	Sample Size	1	Puf	*T.Patterson*
Analysis Type	Sample	Percent Moisture	n/a		--e-signature--
Sample Matrix	PUF	Split Ratio	2		29-Jul-2019

Run Information	**Run 1**
Filename	7-190726A22
Run Date	27-Jul-19 04:18
Final Volume	10 uL
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS-7 DB5MSUSR826231H

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
2,3,7,8-TCDD	1	NotFnd	<0.64	0.64	U		10
1,2,3,7,8-PeCDD	1	NotFnd	<0.29	0.29	U		50
1,2,3,4,7,8-HxCDD	0.1	NotFnd	<0.50	0.50	U		50
1,2,3,6,7,8-HxCDD	0.1	NotFnd	<0.46	0.46	U		50
1,2,3,7,8,9-HxCDD	0.1	NotFnd	<0.47	0.47	U		50
1,2,3,4,6,7,8-HpCDD	0.01	35.86	<0.93	0.53	M,J,R	0.93	50
OCDD	0.0003	37.35	2.81	0.29	J,B		100
2,3,7,8-TCDF	0.1	NotFnd	<0.52	0.52	U		10
1,2,3,7,8-PeCDF	0.03	NotFnd	<0.44	0.44	U		50
2,3,4,7,8-PeCDF	0.3	NotFnd	<0.40	0.40	U		50
1,2,3,4,7,8-HxCDF	0.1	33.70	<0.30	0.30	M,U		50
1,2,3,6,7,8-HxCDF	0.1	33.79	<0.28	0.28	M,U	0.22	50
2,3,4,6,7,8-HxCDF	0.1	34.10	<0.29	0.29	M,U	0.19	50
1,2,3,7,8,9-HxCDF	0.1	NotFnd	<0.34	0.34	U		50
1,2,3,4,6,7,8-HpCDF	0.01	35.30	0.570	0.27	M,J		50
1,2,3,4,7,8,9-HpCDF	0.01	NotFnd	<0.32	0.32	U		50
OCDF	0.0003	37.43	0.630	0.30	M,J		100
Field Spike Standards	**pg**		**% Rec**	**Limits**			
37Cl4-2,3,7,8-TCDD	600	28.12	102	70-130			
13C12-1,2,3,4,7,8-HxCDD	6000	34.19	99	70-130			
13C12-2,3,4,7,8-PeCDF	6000	31.93	103	70-130			
13C12-1,2,3,4,7,8-HxCDF	6000	33.70	90	70-130			
13C12-1,2,3,4,7,8,9-HpCDF	6000	36.10	85	70-130			
Extraction Standards							
13C12-2,3,7,8-TCDD	4000	28.09	69	40-130			
13C12-1,2,3,7,8-PeCDD	4000	32.14	77	40-130			
13C12-1,2,3,6,7,8-HxCDD	4000	34.23	69	40-130			
13C12-1,2,3,4,6,7,8-HpCDD	4000	35.85	70	25-130			
13C12-OCDD	8000	37.34	68	25-130			
13C12-2,3,7,8-TCDF	4000	27.17	72	40-130			
13C12-1,2,3,7,8-PeCDF	4000	31.22	72	40-130			
13C12-1,2,3,6,7,8-HxCDF	4000	33.77	70	40-130			
13C12-1,2,3,4,6,7,8-HpCDF	4000	35.29	68	25-130			
Cleanup Standard							
13C12-1,2,3,7,8,9-HxCDF			NS				

Homologue Group Totals	**# peaks**	**Conc. pg**	**EDL pg**		
Total-TCDD	0	<0.64	0.64	U	10
Total-PeCDD	0	<0.29	0.29	U	50
Total-HxCDD	0	<0.50	0.50	U	50
Total-HpCDD	1	0.670	0.53		50
Total-TCDF	0	<0.52	0.52	U	10
Total-PeCDF	0	<0.44	0.44	U	50
Total-HxCDF	0	<0.34	0.34	U	50
Total-HpCDF	1	0.570	0.32		50

Toxic Equivalency - (WHO 2005)	**pg**
Lower Bound PCDD/F TEQ (WHO 2005)	0.00673
Mid Point PCDD/F TEQ (WHO 2005)	0.707
Upper Bound PCDD/F TEQ (WHO 2005)	1.40

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor
TEQ	Indicates the Toxic Equivalency
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that a target analyte was detected below the calibrated range.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
B	Indicates that this target was detected in the blank at greater than 10% of the sample concentration.
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
EMPC	Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure
NS	Indicates that this standard was not spiked to sample

ALS Life Sciences

Sample Analysis Report

Sample Name	**RES-25745100**	Sampling Date	5-Jul-19		
ALS Sample ID	L2308151-2	Extraction Date	12-Jul-19		Approved:
Analysis Method	EPA TO9A	Sample Size	1	Puf	*T.Patterson*
Analysis Type	Sample	Percent Moisture	n/a		--e-signature--
Sample Matrix	PUF	Split Ratio	2		29-Jul-2019

Run Information	**Run 1**
Filename	7-190726A23
Run Date	27-Jul-19 05:00
Final Volume	10 uL
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS-7 DB5MSUSR826231H

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
2,3,7,8-TCDD	1	NotFnd	<0.66	0.66	U		10
1,2,3,7,8-PeCDD	1	NotFnd	<0.40	0.40	U		50
1,2,3,4,7,8-HxCDD	0.1	NotFnd	<0.39	0.39	U		50
1,2,3,6,7,8-HxCDD	0.1	NotFnd	<0.36	0.36	U		50
1,2,3,7,8,9-HxCDD	0.1	NotFnd	<0.37	0.37	U		50
1,2,3,4,6,7,8-HpCDD	0.01	35.86	1.10	0.34	M,J		50
OCDD	0.0003	37.36	2.71	0.29	J,B		100
2,3,7,8-TCDF	0.1	NotFnd	<0.58	0.58	U		10
1,2,3,7,8-PeCDF	0.03	NotFnd	<0.49	0.49	U		50
2,3,4,7,8-PeCDF	0.3	NotFnd	<0.44	0.44	U		50
1,2,3,4,7,8-HxCDF	0.1	NotFnd	<0.25	0.25	U		50
1,2,3,6,7,8-HxCDF	0.1	NotFnd	<0.23	0.23	U		50
2,3,4,6,7,8-HxCDF	0.1	NotFnd	<0.25	0.25	U		50
1,2,3,7,8,9-HxCDF	0.1	NotFnd	<0.29	0.29	U		50
1,2,3,4,6,7,8-HpCDF	0.01	NotFnd	<0.27	0.27	U		50
1,2,3,4,7,8,9-HpCDF	0.01	NotFnd	<0.32	0.32	U		50
OCDF	0.0003	37.44	<0.95	0.25	M,J,R	0.95	100

Field Spike Standards	**pg**		**% Rec**	**Limits**
37Cl4-2,3,7,8-TCDD	600	28.12	102	70-130
13C12-1,2,3,4,7,8-HxCDD	6000	34.18	95	70-130
13C12-2,3,4,7,8-PeCDF	6000	31.93	106	70-130
13C12-1,2,3,4,7,8-HxCDF	6000	33.70	90	70-130
13C12-1,2,3,4,7,8,9-HpCDF	6000	36.10	89	70-130
Extraction Standards				
13C12-2,3,7,8-TCDD	4000	28.09	68	40-130
13C12-1,2,3,7,8-PeCDD	4000	32.14	80	40-130
13C12-1,2,3,6,7,8-HxCDD	4000	34.23	68	40-130
13C12-1,2,3,4,6,7,8-HpCDD	4000	35.85	71	25-130
13C12-OCDD	8000	37.34	71	25-130
13C12-2,3,7,8-TCDF	4000	27.17	69	40-130
13C12-1,2,3,7,8-PeCDF	4000	31.22	73	40-130
13C12-1,2,3,6,7,8-HxCDF	4000	33.76	66	40-130
13C12-1,2,3,4,6,7,8-HpCDF	4000	35.29	67	25-130
Cleanup Standard				
13C12-1,2,3,7,8,9-HxCDF			NS	

Homologue Group Totals	**# peaks**	**Conc. pg**	**EDL pg**		
Total-TCDD	0	<0.66	0.66	U	10
Total-PeCDD	0	<0.40	0.40	U	50
Total-HxCDD	0	<0.39	0.39	U	50
Total-HpCDD	1	1.10	0.34		50
Total-TCDF	0	<0.58	0.58	U	10
Total-PeCDF	0	<0.49	0.49	U	50
Total-HxCDF	0	<0.29	0.29	U	50
Total-HpCDF	0	<0.32	0.32	U	50

Toxic Equivalency - (WHO 2005)	**pg**
Lower Bound PCDD/F TEQ (WHO 2005)	0.0118
Mid Point PCDD/F TEQ (WHO 2005)	0.754
Upper Bound PCDD/F TEQ (WHO 2005)	1.50

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor
TEQ	Indicates the Toxic Equivalency
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that a target analyte was detected below the calibrated range.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
B	Indicates that this target was detected in the blank at greater than 10% of the sample concentration.
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
EMPC	Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure
NS	Indicates that this standard was not spiked to sample

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Sample Analysis Report

Sample Name	**CITY-25745101**	Sampling Date	5-Jul-19		
ALS Sample ID	L2308151-3	Extraction Date	12-Jul-19		Approved:
Analysis Method	EPA TO9A	Sample Size	1	Puf	*T.Patterson*
Analysis Type	Sample	Percent Moisture	n/a		--e-signature--
Sample Matrix	PUF	Split Ratio	2		29-Jul-2019

Run Information	**Run 1**
Filename	7-190726A24
Run Date	27-Jul-19 05:42
Final Volume	10 uL
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS-7 DB5MSUSR826231H

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
2,3,7,8-TCDD	1	NotFnd	<0.71	0.71	U		10
1,2,3,7,8-PeCDD	1	NotFnd	<0.50	0.50	U		50
1,2,3,4,7,8-HxCDD	0.1	34.20	<0.64	0.33	M,J,R	0.64	50
1,2,3,6,7,8-HxCDD	0.1	34.23	<0.55	0.30	M,J,R	0.55	50
1,2,3,7,8,9-HxCDD	0.1	34.35	<0.48	0.31	M,J,R	0.48	50
1,2,3,4,6,7,8-HpCDD	0.01	35.86	3.05	0.55	J		50
OCDD	0.0003	37.35	9.64	0.33	M,J,B		100
2,3,7,8-TCDF	0.1	NotFnd	<0.59	0.59	U		10
1,2,3,7,8-PeCDF	0.03	NotFnd	<0.47	0.47	U		50
2,3,4,7,8-PeCDF	0.3	NotFnd	<0.42	0.42	U		50
1,2,3,4,7,8-HxCDF	0.1	33.70	<0.28	0.28	M,U	0.26	50
1,2,3,6,7,8-HxCDF	0.1	NotFnd	<0.26	0.26	U		50
2,3,4,6,7,8-HxCDF	0.1	NotFnd	<0.27	0.27	U		50
1,2,3,7,8,9-HxCDF	0.1	NotFnd	<0.31	0.31	U		50
1,2,3,4,6,7,8-HpCDF	0.01	35.29	0.730	0.29	M,J		50
1,2,3,4,7,8,9-HpCDF	0.01	NotFnd	<0.34	0.34	U		50
OCDF	0.0003	37.44	1.05	0.54	M,J		100

Field Spike Standards	**pg**		**% Rec**	**Limits**
37Cl4-2,3,7,8-TCDD	600	28.12	99	70-130
13C12-1,2,3,4,7,8-HxCDD	6000	34.18	96	70-130
13C12-2,3,4,7,8-PeCDF	6000	31.92	96	70-130
13C12-1,2,3,4,7,8-HxCDF	6000	33.69	83	70-130
13C12-1,2,3,4,7,8,9-HpCDF	6000	36.10	74	70-130
Extraction Standards				
13C12-2,3,7,8-TCDD	4000	28.09	70	40-130
13C12-1,2,3,7,8-PeCDD	4000	32.14	79	40-130
13C12-1,2,3,6,7,8-HxCDD	4000	34.23	76	40-130
13C12-1,2,3,4,6,7,8-HpCDD	4000	35.85	76	25-130
13C12-OCDD	8000	37.34	72	25-130
13C12-2,3,7,8-TCDF	4000	27.17	72	40-130
13C12-1,2,3,7,8-PeCDF	4000	31.20	73	40-130
13C12-1,2,3,6,7,8-HxCDF	4000	33.76	74	40-130
13C12-1,2,3,4,6,7,8-HpCDF	4000	35.29	73	25-130
Cleanup Standard				
13C12-1,2,3,7,8,9-HxCDF			NS	

Homologue Group Totals	**# peaks**	**Conc. pg**	**EDL pg**		
Total-TCDD	0	<0.71	0.71	U	10
Total-PeCDD	0	<0.50	0.50	U	50
Total-HxCDD	0	<0.33	0.33	U	50
Total-HpCDD	2	5.97	0.55		50
Total-TCDF	0	<0.59	0.59	U	10
Total-PeCDF	0	<0.47	0.47	U	50
Total-HxCDF	0	<0.31	0.31	U	50
Total-HpCDF	1	0.730	0.34		50

Toxic Equivalency - (WHO 2005)	**pg**
Lower Bound PCDD/F TEQ (WHO 2005)	0.0410
Mid Point PCDD/F TEQ (WHO 2005)	0.970
Upper Bound PCDD/F TEQ (WHO 2005)	1.73

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor
TEQ	Indicates the Toxic Equivalency
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that a target analyte was detected below the calibrated range.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
B	Indicates that this target was detected in the blank at greater than 10% of the sample concentration.
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
EMPC	Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure
NS	Indicates that this standard was not spiked to sample

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SVOC DATA PACKAGE

SECTION 3: METHOD SUMMARY

PCDD/F METHOD SUMMARY
Methods 23/0023A/1613B/8290/TO-9A

Introduction:

This summary is to provide ALSE Burlington PCDD/F method details in order to provide persons reviewing or validating this data package sufficient information to re-construct the sample calculation, data verification and review. It incorporates the analysis of PCDD/F via the following reference methods:

US EPA Office of Water, Method 1613B
US EPA Office of Solid Waste, SW846 Methods 8290A and 0023/8290A
US EPA Office of Research & Development Method TO-9A.
US EPA Office of Air Quality Planning & Standards Method 23.

Any deviations to what is listed herein would be listed in the project narrative.

To avoid the confusion and conflicting nomenclature within the methods, we have defined the labeled standards in terms relating to the time of addition to the sample or extract. Therefore;

The Field or Sampling Standards are added prior to field sampling
The Extraction Standards are added prior to extraction
The Clean-up Standards are added prior to extract clean-up
The Injection Standards are added prior to extract injection.

Calibration Standard Levels:

Six levels of standard are available for calibration as listed in Table 1. The low point (the CS0) is below method requirements and therefore is optional.

Table 1: Calibration Standards

		CS0	CS1	CS2	CS3	CS4	CS5
Natives	2,3,7,8-TCDD	0.1	0.5	2	10	40	200
	2,3,7,8-TCDF	0.1	0.5	2	10	40	200
	1,2,3,7,8-PeCDD	0.5	2.5	10	50	200	1000
	1,2,3,7,8-PeCDF	0.5	2.5	10	50	200	1000
	2,3,4,7,8-PeCDF	0.5	2.5	10	50	200	1000
	1,2,3,4,7,8-HxCDD	0.5	2.5	10	50	200	1000
	1,2,3,6,7,8-HxCDD	0.5	2.5	10	50	200	1000
	1,2,3,7,8,9-HxCDD	0.5	2.5	10	50	200	1000
	1,2,3,4,7,8-HxCDF	0.5	2.5	10	50	200	1000
	1,2,3,6,7,8-HxCDF	0.5	2.5	10	50	200	1000
	1,2,3,7,8,9-HxCDF	0.5	2.5	10	50	200	1000
	2,3,4,6,7,8-HxCDF	0.5	2.5	10	50	200	1000
	1,2,3,4,6,7,8-HpCDD	0.5	2.5	10	50	200	1000
	1,2,3,4,6,7,8-HpCDF	0.5	2.5	10	50	200	1000
	1,2,3,4,7,8,9-HpCDF	0.5	2.5	10	50	200	1000
	OCDD	1	5	20	100	400	2000
	OCDF	1	5	20	100	400	2000
Labeled	2,3,7,8-TCDD-$^{13}C_{12}$	100	100	100	100	100	100
	2,3,7,8-TCDF-$^{13}C_{12}$	100	100	100	100	100	100
	1,2,3,7,8-PeCDD-$^{13}C_{12}$	100	100	100	100	100	100
	1,2,3,7,8-PeCDF-$^{13}C_{12}$	100	100	100	100	100	100
	2,3,4,7,8-PeCDF-$^{13}C_{12}$	100	100	100	100	100	100
	1,2,3,4,7,8-HxCDD-$^{13}C_{12}$	100	100	100	100	100	100
	1,2,3,6,7,8-HxCDD-$^{13}C_{12}$	100	100	100	100	100	100
	1,2,3,4,7,8-HxCDF-$^{13}C_{12}$	100	100	100	100	100	100
	1,2,3,6,7,8-HxCDF-$^{13}C_{12}$	100	100	100	100	100	100
	1,2,3,7,8,9-HxCDF-$^{13}C_{12}$	100	100	100	100	100	100
	2,3,4,6,7,8-HxCDF-$^{13}C_{12}$	100	100	100	100	100	100
	1,2,3,4,6,7,8-HpCDD-$^{13}C_{12}$	100	100	100	100	100	100
	1,2,3,4,6,7,8-HpCDF-$^{13}C_{12}$	100	100	100	100	100	100
	1,2,3,4,7,8,9-HpCDF-$^{13}C_{12}$	100	100	100	100	100	100
	OCDD-$^{13}C_{12}$	200	200	200	200	200	200
	2,3,7,8-TCDD-$^{37}Cl_4$	0.1	0.5	2	10	40	200
Injection	1,2,3,4-TCDD-$^{13}C_{12}$	100	100	100	100	100	100
	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	100	100	100	100	100	100

Calibration Control Limits

The initial and continuing calibration control limits for all methods are presented in Table 2 below. For the initial calibration CS1 and for each calibration verification CS3, the signal to noise ratio for each quantification ion for labelled and non-labelled analytes must be greater than or equal to 10:1

Table 2: Calibration Control Limits

	1613B		M23 & TO-9A		8290A	
	Initial Cal.	Cal. Ver.	Initial Cal.	Cal. Ver.	Initial Cal.	Cal. Ver.
	%RSD	ng/mL	%RSD	% Diff	%RSD	% Diff
Natives						
2,3,7,8-TCDD	20	7.8-12.9	25	25	20	20*
2,3,7,8-TCDF	20	8.4-12.0	25	25	20	20*
1,2,3,7,8-PeCDD	20	39-65	25	25	20	20*
1,2,3,7,8-PeCDF	20	41-60	25	25	20	20*
2,3,4,7,8-PeCDF	20	41-61	25	25	20	20*
1,2,3,4,7,8-HxCDD	20	39-64	25	25	20	20*
1,2,3,6,7,8-HxCDD	20	39-64	25	25	20	20*
1,2,3,7,8,9-HxCDD	35	41-61	25	25	20	20*
1,2,3,4,7,8-HxCDF	20	45-56	25	25	20	20*
1,2,3,6,7,8-HxCDF	20	44-57	25	25	20	20*
1,2,3,7,8,9-HxCDF	20	45-56	25	25	20	20*
2,3,4,6,7,8-HxCDF	20	44-57	25	25	20	20*
1,2,3,4,6,7,8-HpCDD	20	43-58	25	25	20	20*
1,2,3,4,6,7,8-HpCDF	20	45-55	25	25	20	20*
1,2,3,4,7,8,9-HpCDF	20	43-58	25	25	20	20*
OCDD	20	79-126	25	25	20	20*
OCDF	35	63-159	30	30	20	20*
Labels						
2,3,7,8-TCDD-$^{13}C_{12}$	35	82-121	25	25	30	30**
2,3,7,8-TCDF-$^{13}C_{12}$	35	71-140	30	30	30	30**
1,2,3,7,8-PeCDD-$^{13}C_{12}$	35	62-160	30	30	30	30**
1,2,3,7,8-PeCDF-$^{13}C_{12}$	35	76-130	30	30	30	30**
2,3,4,7,8-PeCDF-$^{13}C_{12}$	35	77-130	25	25	30	30**
1,2,3,4,7,8-HxCDD-$^{13}C_{12}$	35	85-117	25	25	30	30**
1,2,3,6,7,8-HxCDD-$^{13}C_{12}$	35	85-118	25	25	30	30**
1,2,3,4,7,8-HxCDF-$^{13}C_{12}$	35	76-131	25	25	30	30**
1,2,3,6,7,8-HxCDF-$^{13}C_{12}$	35	70-143	30	30	30	30**
1,2,3,7,8,9-HxCDF-$^{13}C_{12}$	35	74-135	-	-	-	-
2,3,4,6,7,8-HxCDF-$^{13}C_{12}$	35	73-137	30	30	30	30**
1,2,3,4,6,7,8-HpCDD-$^{13}C_{12}$	35	72-138	30	30	30	30**
1,2,3,4,6,7,8-HpCDF-$^{13}C_{12}$	35	78-129	30	30	30	30**
1,2,3,4,7,8,9-HpCDF-$^{13}C_{12}$	35	77-129	25	25	30	30**
OCDD-$^{13}C_{12}$	35	96-415	30	30	30	30**
2,3,7,8-TCDD-$^{37}Cl_4$	35	7.9-12.7	25	25	30	30**

* 25% is allowed for a post-run verification but when the value is above 20%, then the analyte quantification must be as per 8290A Section 8.3.2.4 and corrective action is required before more samples can be analyzed.
**35% is allowed for a post-run verification but when the value is above 30%, then the analyte quantification must be as per 8290A Section 8.3.2.4 and corrective action is required before more samples can be analyzed.

LCS Criteria:

The laboratory control sample (LCS) or the On-Going Precision and Accuracy (OPR) recovery criteria are listed in Table 3

Table 3: Acceptance Criteria for IPR and OPR[a]

	Test Conc.	IPR		OPR
		s[b]	X[c]	
	ng/L	ng/L	ng/L	ng/L
Natives				
2,3,7,8-TCDD	10	2.8	8.3-12.9	6.7-15.8
2,3,7,8-TCDF	10	2	8.7-13.7	7.5-15.8
1,2,3,7,8-PeCDD	50	7.5	38-66	35-71
1,2,3,7,8-PeCDF	50	7.5	43-62	40-67
2,3,4,7,8-PeCDF	50	8.6	36-75	34-80
1,2,3,4,7,8-HxCDD	50	9.4	39-76	35-82
1,2,3,6,7,8-HxCDD	50	7.7	42-62	38-67
1,2,3,7,8,9-HxCDD	50	11.1	37-71	32-81
1,2,3,4,7,8-HxCDF	50	8.7	41-59	36-67
1,2,3,6,7,8-HxCDF	50	6.7	46-60	42-65
1,2,3,7,8,9-HxCDF	50	6.4	42-61	39-65
2,3,4,6,7,8-HxCDF	50	7.4	37-74	35-78
1,2,3,4,6,7,8-HpCDD	50	7.7	38-65	35-70
1,2,3,4,6,7,8-HpCDF	50	6.3	45-56	41-61
1,2,3,4,7,8,9-HpCDF	50	8.1	43-63	39-69
OCDD	100	19	89-127	78-144
OCDF	100	27	74-146	63-170
Labels				
2,3,7,8-TCDD-$^{13}C_{12}$	100	37	28-134	20-175
2,3,7,8-TCDF-$^{13}C_{12}$	100	35	31-113	22-152
1,2,3,7,8-PeCDD-$^{13}C_{12}$	100	39	27-184	21-227
1,2,3,7,8-PeCDF-$^{13}C_{12}$	100	34	27-156	21-192
2,3,4,7,8-PeCDF-$^{13}C_{12}$	100	38	16-297	13-328
1,2,3,4,7,8-HxCDD-$^{13}C_{12}$	100	41	29-147	21-193
1,2,3,6,7,8-HxCDD-$^{13}C_{12}$	100	38	34-122	25-163
1,2,3,4,7,8-HxCDF-$^{13}C_{12}$	100	43	27-152	19-202
1,2,3,6,7,8-HxCDF-$^{13}C_{12}$	100	35	30-122	21-159
1,2,3,7,8,9-HxCDF-$^{13}C_{12}$	100	40	24-157	17-205
2,3,4,6,7,8-HxCDF-$^{13}C_{12}$	100	37	29-136	22-176
1,2,3,4,6,7,8-HpCDD-$^{13}C_{12}$	100	35	34-129	26-166
1,2,3,4,6,7,8-HpCDF-$^{13}C_{12}$	100	41	32-110	21-158
1,2,3,4,7,8,9-HpCDF-$^{13}C_{12}$	100	40	28-141	20-186
OCDD-$^{13}C_{12}$	200	95	41-276	26-397
2,3,7,8-TCDD-$^{37}Cl_4$	10	3.6	3.9-15.4	3.1-19.1

[a] Assuming a final volume of 20uL
[b] s = standard deviation
[c] X = Average Concentration

Extraction/Clean-up & Sampling Standard Recovery Limts:

Table 4: Extraction, Clean-up, Injection & Sampling Standard Recovery Limits

	1613B or 8290A (non Stack)		M23 or 0023A/8290A or TO-9A	
	(% Rec.)	Ref.	(% Rec.)	Ref.
Extraction Standard				
2,3,7,8-TCDD-$^{13}C_{12}$	25-164	a	40-130	b
2,3,7,8-TCDF-$^{13}C_{12}$	24-169	a	40-130	b
1,2,3,7,8-PeCDD-$^{13}C_{12}$	25-181	a	40-130	b
1,2,3,7,8-PeCDF-$^{13}C_{12}$	24-185	a	40-130	b
2,3,4,7,8-PeCDF-$^{13}C_{12}$	21-178	a	-	
1,2,3,4,7,8-HxCDD-$^{13}C_{12}$	32-141	a	-	
1,2,3,6,7,8-HxCDD-$^{13}C_{12}$	28-130	a	40-130	b
1,2,3,4,7,8-HxCDF-$^{13}C_{12}$	26-152	a	-	
1,2,3,6,7,8-HxCDF-$^{13}C_{12}$	26-123	a	40-130	b
1,2,3,7,8,9-HxCDF-$^{13}C_{12}$	29-147	a	-	
2,3,4,6,7,8-HxCDF-$^{13}C_{12}$	28-136	a	40-130	c,d
1,2,3,4,6,7,8-HpCDD-$^{13}C_{12}$	23-140	a	25-130	b
1,2,3,4,6,7,8-HpCDF-$^{13}C_{12}$	28-143	a	25-130	b
1,2,3,4,7,8,9-HpCDF-$^{13}C_{12}$	26-138	a	-	
OCDD-$^{13}C_{12}$	17-157	a	25-130	b
Clean-up Standard				
2,3,7,8-TCDD-$^{37}Cl_4$	35-197	a	-	
1,2,3,7,8,9-HxCDF-$^{13}C_{12}$	-		40-130	b
Injection Standard				
1,2,3,4-TCDD-$^{13}C_{12}$	30-300	d	30-300	d
1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	30-300	d	30-300	d
Sampling Standard				
2,3,7,8-TCDD-$^{37}Cl_4$	-		70-130	b
2,3,4,7,8-PeCDF-$^{13}C_{12}$	-		70-130	b
1,2,3,4,7,8-HxCDD-$^{13}C_{12}$	-		70-130	b
1,2,3,4,7,8-HxCDF-$^{13}C_{12}$	-		70-130	b
1,2,3,4,7,8,9-HpCDF-$^{13}C_{12}$	-		70-130	b

References & Notes

[a] from OW method 1613B

[b] from OAQPS method 23

[c] this extraction standard is not required in methods 23 and 0023A/8290A

[d] ALS In-house criteria

Reporting Limits:

Unless indicated in the otherwise, the PCDD/F data is reported down to 2.5:1 signal to noise for each isomer grouping for each extract injection. This is consistent to SW846 8290 defined protocols (i.e. EDL or Estimated Detection Limit) and is commonly applied throughout the industry to all the HRMS PCDD/F methods applicable to this method summary.

Method Blank:

The method blank levels must be below the response to the low calibration standard, CS0 or CS1, whichever low calibration point is being applied to the project.

MS/MSD:

The % relative difference between the MS and MSD spike recoveries should be less than or equal to 20%.

Instrument/Run Performance Criteria:

1. Elution windows must be defined by a 'Window Performance Mix' at the beginning of each 12-hour run sequence
2. GC performance criteria of 25% maximum valley between 2,3,7,8-TCDD and it's neared eluting isomers (DB5) or 2,3,7,8-TCDF and it's nearest eluting isomers (DB225).
3. At the beginning of and just following the end of each 12 hour run sequence, the instrument must be checked to demonstrate a resolution of 10,000 for each quantification window.
4. For method 1613B, the relative retention times (RRT) of the compounds in the daily CS3 calibration verification must fall into the ranges presented in Table 4.
5. For all calibrations, QC samples and field samples, the absolute retention time (RT) for 1,2,3,4-TCDD-13C12 must be >25.0 min on a DB5 column and >15.0 min on a DB225 column.
6. The RT in the daily CS3 verification standards must be within 15 seconds of the CS3 in the initial calibration run.
7. The maximum time between scans within a descriptor is 1 second.
8. Lock mass deviations to the average response must be less than or equal 20%.

Laboratory Duplicates:

The % relative difference between duplicates should be less than or equal to 25% but only where the response is greater than the low calibration standard.

Analyte Identification Criteria:

1. Ion ratio must be within 15% of theoretical or within 10% of the most recent CS3.
2. The retention time (RT) of the peak maxima for each pair of quantification ions must be no more than 2 seconds (i.e. 2 scans) difference.
3. The retention time (RT) of the peak maxima of all 2,3,7,8- substituted native analytes must be within -1 to +3 seconds of the RT of corresponding $^{13}C_{12}$-labelled isomer of that injection run.
4. For those native analytes without a corresponding labelled isomer, the relative retention time (RRT) must be within 0.005 of the relative retention time observed in the daily CS3 run.
5. When there is a significant PCDPE interference observed, then a peak in the PCDF channel is not confirmed to be PCDF. [Significant PCDPE interference is identified when there is a PCDPE parent ion peak 10% or more of the response of a peak at the same RT (i.e. within 2 seconds) in the corresponding PCDF channel.]
6. For any peak to be identified as a positive PCDD/F response, that peak must be within the retention time windows defined by the daily analysis of Window Performance Mixture.

Table 4: Quantitation References and Method 1613B RT References and RRT

Analyte	Stack/Ambient Quantitation Reference	Method 1613B RT Reference Solids/ Waters Quantitation Reference	Method 1613B RRT
Compounds using 1,2,3,4-TCDD-$^{13}C_{12}$ as injection standard			
2,3,7,8-TCDF	2,3,7,8-TCDF-$^{13}C_{12}$	2,3,7,8-TCDF-$^{13}C_{12}$	0.999-1.003
2,3,7,8-TCDD	2,3,7,8-TCDD-$^{13}C_{12}$	2,3,7,8-TCDD-$^{13}C_{12}$	0.999-1.002
1,2,3,7,8-PeCDF	1,2,3,7,8-PeCDF-$^{13}C_{12}$	1,2,3,7,8-PeCDF-$^{13}C_{12}$	0.999-1.002
2,3,4,7,8-PeCDF	1,2,3,7,8-PeCDF-$^{13}C_{12}$	2,3,4,7,8-PeCDF-$^{13}C_{12}$	0.999-1.002
1,2,3,7,8-PeCDD	1,2,3,7,8-PeCDD-$^{13}C_{12}$	1,2,3,7,8-PeCDD-$^{13}C_{12}$	0.999-1.002
2,3,7,8-TCDF-$^{13}C_{12}$	1,2,3,4-TCDD-$^{13}C_{12}$	1,2,3,4-TCDD-$^{13}C_{12}$	0.923-1.103
2,3,7,8-TCDD-$^{13}C_{12}$	1,2,3,4-TCDD-$^{13}C_{12}$	1,2,3,4-TCDD-$^{13}C_{12}$	0.976-1.043
2,3,7,8-TCDD-$^{37}Cl_4$	2,3,7,8-TCDD-$^{13}C_{12}$	1,2,3,4-TCDD-$^{13}C_{12}$	0.989-1.052
1,2,3,7,8-PeCDF-$^{13}C_{12}$	1,2,3,4-TCDD-$^{13}C_{12}$	1,2,3,4-TCDD-$^{13}C_{12}$	1.000-1.425
2,3,4,7,8-PeCDF-$^{13}C_{12}$	1,2,3,7,8-PeCDF-$^{13}C_{12}$	1,2,3,4-TCDD-$^{13}C_{12}$	1.011-1.526
1,2,3,7,8-PeCDD-$^{13}C_{12}$	1,2,3,4-TCDD-$^{13}C_{12}$	1,2,3,4-TCDD-$^{13}C_{12}$	1.000-1.567
Compounds using 1,2,3,7,8,9-HxCDD-$^{13}C_{12}$ as injection standard			
1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF-$^{13}C_{12}$	1,2,3,4,7,8-HxCDF-$^{13}C_{12}$	0.999-1.001
1,2,3,6,7,8-HxCDF	1,2,3,6,7,8-HxCDF-$^{13}C_{12}$	1,2,3,6,7,8-HxCDF-$^{13}C_{12}$	0.997-1.005
1,2,3,7,8,9-HxCDF	1,2,3,6,7,8-HxCDF-$^{13}C_{12}$	1,2,3,7,8,9-HxCDF-$^{13}C_{12}$	0.999-1.001
2,3,4,6,7,8-HxCDF	2,3,4,6,7,8-HxCDF-$^{13}C_{12}$	2,3,4,6,7,8-HxCDF-$^{13}C_{12}$	0.999-1.001
1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD-$^{13}C_{12}$	1,2,3,4,7,8-HxCDD-$^{13}C_{12}$	0.999-1.001
1,2,3,6,7,8-HxCDD	1,2,3,6,7,8-HxCDD-$^{13}C_{12}$	1,2,3,6,7,8-HxCDD-$^{13}C_{12}$	0.998-1.004
1,2,3,7,8,9-HxCDD[a]	1,2,3,6,7,8-HxCDD-$^{13}C_{12}$	[a]	1.000-1.019
1,2,3,4,6,7,8-HpCDF	1,2,3,4,6,7,8-HpCDF-$^{13}C_{12}$	1,2,3,4,6,7,8-HpCDF-$^{13}C_{12}$	0.999-1.001
1,2,3,4,7,8,9-HpCDF	1,2,3,4,6,7,8-HpCDF-$^{13}C_{12}$	1,2,3,4,7,8,9-HpCDF-$^{13}C_{12}$	0.999-1.001
1,2,3,4,6,7,8-HpCDD	1,2,3,4,6,7,8-HpCDD-$^{13}C_{12}$	1,2,3,4,6,7,8-HpCDD-$^{13}C_{12}$	0.999-1.001
OCDF	OCDD-$^{13}C_{12}$	OCDD-$^{13}C_{12}$	0.999-1.008
OCDD	OCDD-$^{13}C_{12}$	OCDD-$^{13}C_{12}$	0.999-1.001
1,2,3,4,7,8-HxCDF-$^{13}C_{12}$	1,2,3,6,7,8-HxCDF-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	0.944-0.970
1,2,3,6,7,8-HxCDF-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	0.949-0.975
1,2,3,7,8,9-HxCDF-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	0.977-1.047
2,3,4,6,7,8-HxCDF-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	0.959-1.021
1,2,3,4,7,8-HxCDD-$^{13}C_{12}$	1,2,3,6,7,8-HxCDD-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	0.977-1.000
1,2,3,6,7,8-HxCDD-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	0.981-1.003
1,2,3,4,6,7,8-HpCDF-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	1.043-1.085
1,2,3,4,7,8,9-HpCDF-$^{13}C_{12}$	1,2,3,4,6,7,8-HpCDF-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	1.057-1.151
1,2,3,4,6,7,8-HpCDD-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	1.086-1.110
OCDD-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	1.032-1.311

[a] For solids/waters via 1612B, 1,2,3,7,8,9-HXCDD is quantified against the average responses of 1,2,3,4,7,8-HxCDD-$^{13}C_{12}$ and 1,2,3,6,7,8-HxCDD-$^{13}C_{12}$ while 1,2,3,6,7,8-HxCDD-$^{13}C_{12}$ is the RT reference.

Table 5: HRMS Instrumental Descriptor Parameters

Descriptor	Exact M/Z	M/Z Type	Elemental Composition	Substance	Type	Theoretical Ion Ratio	Ion Ratio QC Limits Upper	Lower
1	303.9016	M	$^{12}C_{12}\ ^{1}H_4\ ^{35}Cl_4\ ^{16}O$	TCDF	Native	0.77	0.65	0.89
	305.8987	M+2	$^{12}C_{12}\ ^{1}H_4\ ^{35}Cl_3\ ^{37}Cl\ ^{16}O$	TCDF	Native			
	315.9419	M	$^{13}C_{12}\ ^{1}H_4\ ^{35}Cl_4\ ^{16}O$	TCDF	^{13}C	0.77	0.65	0.89
	317.9389	M+2	$^{13}C_{12}\ ^{1}H_4\ ^{35}Cl_3\ ^{37}Cl\ ^{16}O$	TCDF	^{13}C			
	316.9824	Lock	$^{12}C_9\ ^{19}F_{11}$	PFK	Lock			
	319.8965	M	$^{12}C_{12}\ ^{1}H_4\ ^{35}Cl_4\ ^{16}O_2$	TCDD	Native	0.77	0.65	0.89
	321.8936	M+2	$^{12}C_{12}\ ^{1}H_4\ ^{35}Cl_3\ ^{37}Cl\ ^{16}O_2$	TCDD	Native			
	327.8847	M+8	$^{12}C_{12}\ ^{1}H_4\ ^{37}Cl_4\ ^{16}O_2$	TCDD	^{37}Cl			
	331.9368	M	$^{13}C_{12}\ ^{1}H_4\ ^{35}Cl_4\ ^{16}O_2$	TCDD	^{13}C	0.77	0.65	0.89
	333.9339	M+2	$^{13}C_{12}\ ^{1}H_4\ ^{35}Cl_3\ ^{37}Cl\ ^{16}O_2$	TCDD	^{13}C			
	339.8597	M+2	$^{12}C_{12}\ ^{1}H_3\ ^{35}Cl_4\ ^{37}Cl\ ^{16}O$	PeCDF	Native	1.55	1.32	1.78
	341.8568	M+4	$^{12}C_{12}\ ^{1}H_3\ ^{35}Cl_3\ ^{37}Cl_2\ ^{16}O$	PeCDF	Native			
	351.9	M+2	$^{13}C_{12}\ ^{1}H_3\ ^{35}Cl_4\ ^{37}Cl\ ^{16}O$	PeCDF	^{13}C	1.55	1.32	1.78
	353.897	M+4	$^{13}C_{12}\ ^{1}H_3\ ^{35}Cl_3\ ^{37}Cl_2\ ^{16}O$	PeCDF	^{13}C			
	375.8364	M+2	$^{12}C_{12}\ ^{1}H_4\ ^{35}Cl_5\ ^{37}Cl\ ^{16}O$	HxCDPE	Cl-DPE			
	409.7974	M+2	$^{12}C_{12}\ ^{1}H_3\ ^{35}Cl_6\ ^{37}Cl\ ^{16}O$	HpCDPE	Cl-DPE			
2	339.8597	M+2	$^{12}C_{12}\ ^{1}H_3\ ^{35}Cl_4\ ^{37}Cl\ ^{16}O$	PeCDF	Native	1.55	1.32	1.78
	341.8568	M+4	$^{12}C_{12}\ ^{1}H_3\ ^{35}Cl_3\ ^{37}Cl_2\ ^{16}O$	PeCDF	Native			
	351.9	M+2	$^{13}C_{12}\ ^{1}H_3\ ^{35}Cl_4\ ^{37}Cl\ ^{16}O$	PeCDF	^{13}C	1.55	1.32	1.78
	353.897	M+4	$^{13}C_{12}\ ^{1}H_3\ ^{35}Cl_3\ ^{37}Cl_2\ ^{16}O$	PeCDF	^{13}C			
	353.8576	M	$^{12}C_{12}\ ^{1}H_3\ ^{35}Cl_5\ ^{16}O_2$	PeCDD	Native	0.63	0.54	0.72
	355.8546	M+2	$^{12}C_{12}\ ^{1}H_3\ ^{35}Cl_4\ ^{37}Cl\ ^{16}O_2$	PeCDD	Native			
	366.9792	Lock	$^{12}C_{10}\ ^{19}F_{13}$	PFK	Lock			
	365.8978	M	$^{13}C_{12}\ ^{1}H_3\ ^{35}Cl_5\ ^{16}O_2$	PeCDD	^{13}C	0.63	0.54	0.72
	367.8949	M+2	$^{13}C_{12}\ ^{1}H_3\ ^{35}Cl_4\ ^{37}\ Cl\ ^{16}O_2$	PeCDD	^{13}C			
	409.7974	M+2	$^{12}C_{12}\ ^{1}H_3\ ^{35}Cl_6\ ^{37}Cl\ ^{16}O$	HpCDPE	Cl-DPE			
3	373.8207	M+2	$^{12}C_{12}\ ^{1}H_2\ ^{35}Cl_5\ ^{37}Cl\ ^{16}O$	HxCDF	Native	1.24	1.05	1.43
	375.8178	M+4	$^{12}C_{12}\ ^{1}H_2\ ^{35}Cl_4\ ^{37}Cl_2\ ^{16}O$	HxCDF	Native			
	380.976	Lock	$^{12}C_8\ ^{19}F_5$	PFK	Lock			
	383.8639	M	$^{13}C_{12}\ ^{1}H_2\ ^{35}Cl_6\ ^{16}O$	HxCDF	^{13}C	0.51	0.43	0.59
	385.861	M+2	$^{13}C_{12}\ ^{1}H_2\ ^{35}Cl_5\ ^{37}Cl\ ^{16}O$	HxCDF	^{13}C			
	389.8156	M+2	$^{12}C_{12}\ ^{1}H_2\ ^{35}Cl_5\ ^{37}Cl\ ^{16}O_2$	HxCDD	Native	1.24	1.05	1.43
	391.8127	M+4	$^{12}C_{12}\ ^{1}H_2\ ^{35}Cl_4\ ^{37}Cl_2\ ^{16}O_2$	HxCDD	Native			
	401.8559	M+2	$^{13}C_{12}\ ^{1}H_2\ ^{35}Cl_5\ ^{37}Cl\ ^{16}O_2$	HxCDD	^{13}C	1.24	1.05	1.43
	403.853	M+4	$^{13}C_{12}\ ^{1}H_2\ ^{35}Cl_4\ ^{37}Cl_2\ ^{16}O_2$	HxCDD	^{13}C			
	445.7555	M+4	$^{12}C_{12}\ ^{1}H_2\ ^{35}Cl_6\ ^{37}Cl_2\ ^{16}O$	OCDPE	Cl-DPE			
4	409.7789	M+4	$^{12}C_{12}\ ^{1}H\ ^{35}Cl_5\ ^{37}Cl_2\ ^{16}O$	HpCDF	Native	1.88	1.60	2.16
	411.7759	M+6	$^{12}C_{12}\ ^{1}H\ ^{35}Cl_4\ ^{37}Cl_3\ ^{16}O$	HpCDF	Native			
	417.8253	M	$^{13}C_{12}\ ^{1}H\ ^{35}Cl_7\ ^{16}O$	HpCDF	^{13}C	0.44	0.37	0.51
	419.822	M+2	$^{13}C_{12}\ ^{1}H\ ^{35}Cl_6\ ^{37}Cl\ ^{16}O$	HpCDF	^{13}C			
	423.7767	M+2	$^{12}C_{12}\ ^{1}H\ ^{35}Cl_6\ ^{37}Cl\ ^{16}O_2$	HpCDD	Native	1.04	0.88	1.20
	425.7737	M+4	$^{12}C_{12}\ ^{1}H\ ^{35}Cl_5\ ^{37}Cl_2\ ^{16}O_2$	HpCDD	Native			
	430.9728	Lock	$^{12}C_9\ ^{19}F_{17}$	PFK	Lock			
	435.8169	M+2	$^{13}C_{12}\ ^{1}H\ ^{35}Cl_6\ ^{37}Cl\ ^{16}O_2$	HpCDD	^{13}C	1.04	0.88	1.20
	437.814	M+4	$^{13}C_{12}\ ^{1}H\ ^{35}Cl_5\ ^{37}Cl_2\ ^{16}O_2$	HpCDD	^{13}C			
	479.7165	M+4	$^{12}C_{12}\ ^{1}H\ ^{35}Cl_7\ ^{37}Cl_2\ ^{16}O$	NCDPE	Cl-DPE			
5	441.7428	M+2	$^{12}C_{12}\ ^{35}Cl_7\ ^{37}Cl\ ^{16}O$	OCDF	Native	0.89	0.76	1.02
	443.7399	M+4	$^{12}C_{12}\ ^{35}Cl_6\ ^{37}Cl2\ ^{16}O$	OCDF	Native			
	454.9728	Lock	$^{12}C_{11}\ ^{19}F_{17}$	PFK	Lock			
	457.7377	M+2	$^{12}C_{12}\ ^{35}Cl_7\ ^{37}Cl\ ^{16}O_2$	OCDD	Native	0.89	0.76	1.02
	459.7348	M+4	$^{12}C_{12}\ ^{35}Cl_6\ ^{37}Cl_2\ ^{16}O_2$	OCDD	Native			
	469.778	M+2	$^{13}C_{12}\ ^{35}Cl_7\ ^{37}Cl\ ^{16}O_2$	OCDD	^{13}C	0.89	0.76	1.02
	471.775	M+4	$^{13}C_{12}\ ^{35}Cl_6\ ^{37}Cl_2\ ^{16}O_2$	OCDD	^{13}C			
	513.6775	M+4	$^{12}C_{12}\ ^{35}Cl_8\ ^{37}Cl_2\ ^{16}O$	DCDPE	Cl-DPE			

Data Calculations:

a) Analyte Concentrations:

The relative response factor of each target relative to the standard against which it is to be calculated is determined using the area responses of both quantification ions via equation 9.1.
In cases where a native target is calculated against an exact labelled analogue, the quantification will be considered to be by isotope dilution. In other cases, the quantification will be considered to be by internal standard.

$$RRF = \frac{(A1_t + A2_t)\ C_s}{(A1_s + A2_s)\ C_t} \qquad \text{Equ. 9.1}$$

Where,
$A1_t + A2_t$ = The areas of the two quantification ions for the target analyte
$A1_s + A2_s$ = The areas of the two quantification ions for the labelled compound against which the target analyte will be calculated.
C_t = The concentration in the calibration standard of the target analyte.
C_s = The concentration in the calibration standard of the labelled compound against which the target will be calculated.

For all analytes to be quantified and from the initial calibration series of standard injections, a table of RRFs is prepared. The relative standard deviation (%RSD, or the coefficient of variance) is checked to confirm that the appropriate method criteria has been met as listed in Table 3. The average of the five or six levels of standard for each analyte, RRF_{av} is applied for quantification of samples according to Equations 9.2 and 9.3 below.

$$\text{Amount in sample (pg)} = \frac{(A1_n + A2_n)\ Q_l}{(A1_l + A2_l)\ (RRF_{av})} \qquad \text{Equ. 9.2}$$

$$\text{Concentration in sample (pg/g or pg/l)} = \frac{(A1_n + A2_n)\ Q_l}{(A1_l + A2_l)\ (RRF_{av})\ (W_s)} \qquad \text{Equ. 9.3}$$

Where,
Q_l = The amount (pg) of labelled compound added to the sample
W_s = The weight (g) or volume (l) of sample

b) Extraction, Clean-up, and Sampling Standard Recovery Calculation:

The extraction, clean-up, and sampling standard recoveries are determined by Equation 9.4 below.

% Recovery = (Amount in sample)/(Amount added to sample) X 100 Equ. 9.4

c) Estimated Detection Limit

$$EDL = \frac{2.5 \times H_x \times Q_{es}}{H_{es} \times W \times RFF_{av}} \qquad \text{Equ. 9.5}$$

Where,

EDL = estimated detection limit for homologous 2,3,7,8-Substituted PCDD/Fs

H_x = sum of the height of the noise level for each quantification ions for the unlabelled PCDD/Fs.

H_{es} = Sum of the heights of responses of both quantification ions for the labelled extraction standard.

W = weight of volume of sample

RRF_{av} = average relative response factor

Q_{es} = Amount of extraction standard added

Chromatogram Annotation Codes

All manually integrated peaks are expanded and reprinted with the following annotations:

* Analyst Initials	AA
* Date	YYMMDD
* integration code	CC

The Syntax is:	Example:
AAYYMMDDCC	SK111220MB

Code	Mnemonic	Description
MB	Manual Baseline	The peak was manually integrated because the initial baseline was determined incorrectly by the software
MS	Manual Split	The peak was manually integrated because the peak was incorrectly or not split by the software
MJ/MC	Manual Join/Manual Combine	The peak was manually integrated because the peak was split by the software and the peak should be integrated as a single peak
MA	Manual Add	The peak was manually integrated because the signal:noise ratio was judged to be >2.5
MD	Manual Delete	The peak was excluded because the signal:noise ratio was judged to be <2.5
MX	Manual Exclude	The peak was excluded due to an interference
NH	Noise Height	The noise height for detection limit calculation was manually defined, over-riding the software chosen value
MT	Manual Time	The peak retention time was manually chosen

The following explanatory annotation codes may appear on the chromatograms of peaks that have been reviewed:

Code	Mnemonic	Description
+	Detected Peak	A peak was detected at this mass and retention time that was above 2.5:1 signal to noise
<	Below Detection Limit	The signal at this mass and retention time was below 2.5:1 signal to noise
EMPC	Estimated Maximum Possible Concentration	The signal at this mass and retention time is an interference such that the target compound could not be confirmed
X-RT	Not Detected due to Retention Time non-conformance	The signal at this retention time could not be used to positively identify the target compound because of retention time non-conformance (apex of quantification and confirmation ions do not maximize within the same two seconds, or the retention time of the peak does not fall within the expected range with respect to its labeled analogue)
X-LOC	Not Detected due to interference from a higher level of chlorination	The signal at this retention time is attributable to a fragment from a co-eluting compound at a higher level of chlorination, and cannot be used to positively identify the target. The result is expressed as an Estimated Maximum Possible Concentration (EMPC)
X-DPE	Not Detected due to diphenyl ether interference	The signal at this retention time is attributable to interference from a chlorinated diphenyl ether, and cannot be used to positively identify the target. The result is expressed as an Estimated Maximum Possible Concentration (EMPC)
X-IF	Not Detected due to interference	The signal at this retention time is attributable to a co-eluting interference, and cannot be used to positively identify the target. The result is expressed as an Estimated Maximum Possible Concentration (EMPC)

Deviations from the Primary Reference Methods:

The following changes and clarifications apply:

1) The calibration standards as listed in Table 2 are applied appropriately to all of the reference methods listed above. Such an application of one standard calibration series to all of these methods is within the scope of each and every one of the methods. The calibration standard set CS1 through CS5 is consistent with the standards concentration listing in method 1613B Table 4. The CS0 extends the calibration range below what is required by all of the methods. Table 4 defines the use of each of the labelled standards relative to each of the methods.

a. Method 1613B lists a larger suite of labelled extraction standards than does method 8290A. Additional labelled extraction standards have been added into the 8290A analysis to enhance the method and the data quality. These additions to the method constitute performance based enhancements and are within the scope of SW846 Method 8290A.

b. The levels presented in the calibration table of method 8290A are recommended values only. Changes to these concentrations, especially to expand the range, are within the scope of the method. Therefore application of the 1613B calibration standards to method 8290A is compliant with the scope of the method.

c. TO-9A is also a performance based method. It specifically states that different extraction standards and different concentrations of standards from those listed in TO-9A Table 3 is acceptable (see Section 6.8 of reference method).

d. Although OAQPS reference method 23 is not a performance based method, application of the 1613B standards has been defined as within the scope of the method. (see Appendix B)

2) Chlorinated Diphenyl Ether interferences: Both methods 1613B and 8290A indicate that any instrumental response showing the presence of a chlorinated diphenyl ether response and that coelutes with a PCDF represents an interference on that analyte (see Sections 18.3 and 7.8.4.4 respectively). This apparent zero tolerance does not take into account that the response in the diphenyl ether channel may be trivial relative to the corresponding PCDF. For this 'Standard Method', we have defined a chlorinated diphenyl ether interference as the presence of a **significant** response within the chlorinated diphenyl ether channel (rather than zero response) and defined significant as a response equal to or greater than 10% of the peak response in the PCDF channel.

3) When the primary analysis is performed using a DB5MS GC column, 2,3,7,8-TCDF can be resolved to a valley height of 60% from the closest-eluting isomers for this column, providing good quantification of this target without further confirmation. Confirmation of 2,3,7,8-TCDF concentrations above the level of the lowest calibration standard are performed on a second column on a contract basis when requested. Confirmation of additional 2,3,7,8-subtituted PCDD/F isomers is also available when requested.

4) Although not categorically stated in all associated PCDD/F methods, we maintain that each and every individual clean-up procedure is, by definition, performance-based and optional. There is not an expectation within the industry to follow exactly the descriptions of clean-ups in reference methods. Adaptations which meet or exceed the required performance criteria are therefore acceptable within the scope of each reference method. The reference method descriptions are intended as guidelines or templates available to help the laboratory to define effective in-house clean-up methods. The objective within the laboratory is to provide quality clean extracts to the instrument for analysis. Each individual clean-up is part of the laboratory's 'arsenal' in order to achieve this objective.

5) There are differences within the individual reference methods as to the precise spiking protocols for adding extraction standards and native spikes (for LCS, MS and MSD). To ensure consistency within the laboratory between PCDD/F and related methods, the PCDD/F preparative 'Specific Method' requires solids (including stack and ambient sorbants/filters) to be spiked in the soxhlet thimble from a nonane solution and waters are spiked before filtering from an acetone solution. This is consistent with the 8290A approach.

6) Sub-sampling of solids and pre-extraction processing is done in a manner that minimizes potential for cross-contamination. These processes are designed around SW846 protocols rather than 1613B protocols. Solids are sub-sampled directly from the bottle as submitted to the laboratory wherever practical. If the sample is submitted such that homogenization in the bottle is impractical (eg. the bottle is too full or lumps cannot be broken down), then transferring the sample to a tray or another bottle maybe in order.

7) The concentrations of labelled and native spiking solutions are not consistent with those listed in all of the reference methods. These concentrations are prepared at levels convenient and expedient for accurate laboratory processing.

8) With respect to extraction standard recovery limits on non-stack samples analyzed via method 8290A, the limits are based upon the inter-laboratory performance limits defined in method 1613B rather than the relatively arbitrary limits of 35-140% suggested in Section 8.4 of method 8290A.

9) With respect to ions monitored for P5CDD and H7CDF:

a. The 358 ion has a potential for interference from PCB (hexachlorobiphenyls) dependent upon levels of PCBs in the sample and the instrument tuning. Of particular concern is PCB-169 which on a DB5MS column elutes very close to 1,2,3,7,8-P5CDD and which is not removed for the PCDD/F extracts even by carbon clean-up. To eliminate the potential of such interferences from PCB on the 358 mass, we choose to monitor the alternate ion pair of 354 and 356.

b. Similarly, the 408 ion of native H7CDF is prone to problematic interferences arising from 13C12-labeled heptachlorinated biphenyls. To eliminate the potential of such interferences from PCB on the 358 mass, we choose to monitor the alternate ion pair of 410 and 412.

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SVOC DATA PACKAGE

SECTION 4: CALIBRATION DATA

Including:

for Multi-Point Calibration(s)

- Multi-Point Calibration Tables
- Individual Quantitation Reports

for Continuing Calibration(s)

- Individual Quantitation Reports

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Calibration Summary Report

Calibration Level	Filename	Run Date
CS-1	7-190724A03	24-Jul-2019 17:20
CS-2	7-190724A02	24-Jul-2019 16:37
CS-3	7-190724A01	24-Jul-2019 15:56
CS-4	7-190724A07	24-Jul-2019 20:08
CS-5	7-190724A06	24-Jul-2019 19:26

Approved: *T.Patterson*
--e-signature--
29-Jul-2019

Relative Response Factors

Target Analytes	CS-1	CS-2	CS-3	CS-4	CS-5	Mean	% RSD
2,3,7,8-TCDD	1.000	0.999	1.261	1.155	1.148	1.113	10%
1,2,3,7,8-PeCDD	0.816	0.895	0.923	0.948	0.914	0.899	6%
1,2,3,4,7,8-HxCDD	0.734	0.841	0.871	0.905	0.896	0.849	8%
1,2,3,6,7,8-HxCDD	0.828	0.914	0.940	1.005	0.944	0.926	7%
1,2,3,7,8,9-HxCDD	0.808	0.879	0.909	0.981	0.906	0.897	7%
1,2,3,4,6,7,8-HpCDD	0.836	0.884	0.946	1.000	0.965	0.926	7%
OCDD	0.927	0.937	0.938	1.010	0.962	0.955	4%
2,3,7,8-TCDF	0.781	0.788	0.913	0.904	0.870	0.851	7%
1,2,3,7,8-PeCDF	0.790	0.834	0.864	0.908	0.881	0.855	5%
2,3,4,7,8-PeCDF	0.841	0.940	0.950	1.035	0.988	0.951	8%
1,2,3,4,7,8-HxCDF	0.863	0.896	0.911	0.965	0.937	0.914	4%
1,2,3,6,7,8-HxCDF	0.937	0.964	0.993	1.041	0.984	0.984	4%
2,3,4,6,7,8-HxCDF	0.869	0.899	0.920	0.972	0.943	0.921	4%
1,2,3,7,8,9-HxCDF	0.729	0.749	0.818	0.874	0.853	0.805	8%
1,2,3,4,6,7,8-HpCDF	0.794	0.849	0.888	0.936	0.910	0.875	6%
1,2,3,4,7,8,9-HpCDF	0.667	0.695	0.764	0.786	0.788	0.740	8%
OCDF	1.005	1.081	1.082	1.185	1.137	1.098	6%
Field Spike Standards							
37Cl4-2,3,7,8-TCDD	1.079	1.082	1.203	1.145	1.262	1.154	7%
13C12-1,2,3,4,7,8-HxCDD	0.836	0.911	0.903	0.911	0.938	0.900	4%
13C12-2,3,4,7,8-PeCDF	1.042	1.025	1.043	1.067	1.049	1.045	1%
13C12-1,2,3,4,7,8-HxCDF	0.878	0.849	0.856	0.878	0.866	0.865	2%
13C12-1,2,3,4,7,8,9-HpCDF	0.785	0.802	0.813	0.832	0.856	0.818	3%
Extraction Standards							
13C12-2,3,7,8-TCDD	0.897	0.899	0.909	0.908	0.934	0.909	2%
13C12-1,2,3,7,8-PeCDD	0.688	0.726	0.725	0.748	0.842	0.746	8%
13C12-1,2,3,6,7,8-HxCDD	1.088	1.109	1.099	1.083	1.094	1.095	1%
13C12-1,2,3,4,6,7,8-HpCDD	0.775	0.893	0.865	0.815	0.863	0.842	6%
13C12-OCDD	0.641	0.776	0.766	0.729	0.857	0.754	10%
13C12-2,3,7,8-TCDF	1.421	1.421	1.462	1.421	1.467	1.438	2%
13C12-1,2,3,7,8-PeCDF	1.000	1.046	1.047	1.042	1.181	1.063	6%
13C12-1,2,3,6,7,8-HxCDF	1.263	1.385	1.362	1.280	1.303	1.319	4%
13C12-1,2,3,4,6,7,8-HpCDF	0.885	1.008	0.957	0.909	0.934	0.939	5%
Cleanup Standard							
13C12-1,2,3,7,8,9-HxCDF	1.029	1.121	1.108	1.085	1.109	1.090	3%

ALS Life Sciences

Calibration Report

ALS Sample ID **H7-19-CCV-CS1-0017**
Analysis Method EPA M23
Analysis Type Calibration

Filename	Inst #	Column	Run Date	Approved:	*T.Patterson*
7-190724A03	HRMS-7	DB5MSUSR826231H	24-Jul-2019 17:20		--e-signature-- 29-Jul-2019

Target Analytes	Ret. Time	Ion Ratio	Concentration ng/mL	Response	RRF
2,3,7,8-TCDD	28.05	0.71	0.50	5.56E+03	1.000
1,2,3,7,8-PeCDD	32.12	1.53	2.50	1.74E+04	0.816
1,2,3,4,7,8-HxCDD	34.16	1.22	2.50	1.57E+04	0.734
1,2,3,6,7,8-HxCDD	34.21	1.30	2.50	1.77E+04	0.828
1,2,3,7,8,9-HxCDD	34.34	1.21	2.50	1.72E+04	0.808
1,2,3,4,6,7,8-HpCDD	35.82	1.01	2.50	1.27E+04	0.836
OCDD	37.32	0.90	5.00	2.33E+04	0.927
2,3,7,8-TCDF	27.13	0.75	0.50	6.88E+03	0.781
1,2,3,7,8-PeCDF	31.18	1.55	2.50	2.45E+04	0.790
2,3,4,7,8-PeCDF	31.89	1.57	2.50	2.61E+04	0.841
1,2,3,4,7,8-HxCDF	33.67	1.13	2.50	2.14E+04	0.863
1,2,3,6,7,8-HxCDF	33.73	1.16	2.50	2.32E+04	0.937
2,3,4,6,7,8-HxCDF	34.06	1.16	2.50	2.15E+04	0.869
1,2,3,7,8,9-HxCDF	34.48	1.23	2.50	1.81E+04	0.729
1,2,3,4,6,7,8-HpCDF	35.27	1.90	2.50	1.38E+04	0.794
1,2,3,4,7,8,9-HpCDF	36.08	1.79	2.50	1.16E+04	0.667
OCDF	37.41	0.89	5.00	2.53E+04	1.005
Field Spike Standards					
37Cl4-2,3,7,8-TCDD	28.06	0.00	0.50	6.00E+03	1.079
13C12-1,2,3,4,7,8-HxCDD	34.15	1.26	100.00	7.13E+05	0.836
13C12-2,3,4,7,8-PeCDF	31.88	1.56	100.00	1.29E+06	1.042
13C12-1,2,3,4,7,8-HxCDF	33.66	0.51	100.00	8.70E+05	0.878
13C12-1,2,3,4,7,8,9-HpCDF	36.07	0.46	100.00	5.45E+05	0.785
Extraction Standards					
13C12-2,3,7,8-TCDD	28.04	0.787	100	1.11E+06	0.897
13C12-1,2,3,7,8-PeCDD	32.1	1.57	100	8.54E+05	0.688
13C12-1,2,3,6,7,8-HxCDD	34.2	1.247	100	8.54E+05	1.088
13C12-1,2,3,4,6,7,8-HpCDD	35.82	1.072	100	6.08E+05	0.775
13C12-OCDD	37.32	0.884	200	1.01E+06	0.641
13C12-2,3,7,8-TCDF	27.11	0.747	100	1.76E+06	1.421
13C12-1,2,3,7,8-PeCDF	31.17	1.601	100	1.24E+06	1
13C12-1,2,3,6,7,8-HxCDF	33.73	0.532	100	9.90E+05	1.263
13C12-1,2,3,4,6,7,8-HpCDF	35.26	0.443	100	6.94E+05	0.885
Cleanup Standard					
13C12-1,2,3,7,8,9-HxCDF	34.48	0.511	100	8.07E+05	1.029
Injection Standards					
13C12-1234-TCDD IS	27.35	0.791	100	1240529.3	12405.293
13C12-123789-HxCDD IS	34.33	1.25	100.00	7.84E+05	7841.906

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Calibration Report

ALS Sample ID **H7-19-CCV-CS2-0017**
Analysis Method EPA M23
Analysis Type Calibration

Filename	Inst #	Column	Run Date	Approved:	*T.Patterson*
7-190724A02	HRMS-7	DB5MSUSR826231H	24-Jul-2019 16:37		--e-signature-- 29-Jul-2019

Target Analytes	Ret. Time	Ion Ratio	Concentration ng/mL	Response	RRF
2,3,7,8-TCDD	28.08	0.78	2.00	1.71E+04	0.999
1,2,3,7,8-PeCDD	32.12	1.67	10.00	6.17E+04	0.895
1,2,3,4,7,8-HxCDD	34.15	1.25	10.00	5.75E+04	0.841
1,2,3,6,7,8-HxCDD	34.21	1.27	10.00	6.25E+04	0.914
1,2,3,7,8,9-HxCDD	34.33	1.25	10.00	6.02E+04	0.879
1,2,3,4,6,7,8-HpCDD	35.82	1.03	10.00	4.88E+04	0.884
OCDD	37.32	0.85	20.00	8.97E+04	0.937
2,3,7,8-TCDF	27.16	0.77	2.00	2.13E+04	0.788
1,2,3,7,8-PeCDF	31.19	1.56	10.00	8.29E+04	0.834
2,3,4,7,8-PeCDF	31.89	1.55	10.00	9.34E+04	0.940
1,2,3,4,7,8-HxCDF	33.66	1.21	10.00	7.66E+04	0.896
1,2,3,6,7,8-HxCDF	33.73	1.16	10.00	8.24E+04	0.964
2,3,4,6,7,8-HxCDF	34.06	1.21	10.00	7.69E+04	0.899
1,2,3,7,8,9-HxCDF	34.48	1.23	10.00	6.41E+04	0.749
1,2,3,4,6,7,8-HpCDF	35.27	1.94	10.00	5.29E+04	0.849
1,2,3,4,7,8,9-HpCDF	36.07	1.93	10.00	4.33E+04	0.695
OCDF	37.4	0.88	20.00	1.04E+05	1.081
Field Spike Standards					
37Cl4-2,3,7,8-TCDD	28.08	0.00	2.00	1.85E+04	1.082
13C12-1,2,3,4,7,8-HxCDD	34.15	1.26	100.00	6.23E+05	0.911
13C12-2,3,4,7,8-PeCDF	31.88	1.57	100.00	1.02E+06	1.025
13C12-1,2,3,4,7,8-HxCDF	33.66	0.52	100.00	7.26E+05	0.849
13C12-1,2,3,4,7,8,9-HpCDF	36.07	0.43	100.00	4.99E+05	0.802
Extraction Standards					
13C12-2,3,7,8-TCDD	28.05	0.793	100	8.55E+05	0.899
13C12-1,2,3,7,8-PeCDD	32.1	1.582	100	6.90E+05	0.726
13C12-1,2,3,6,7,8-HxCDD	34.2	1.261	100	6.84E+05	1.109
13C12-1,2,3,4,6,7,8-HpCDD	35.81	1.012	100	5.51E+05	0.893
13C12-OCDD	37.31	0.884	200	9.58E+05	0.776
13C12-2,3,7,8-TCDF	27.13	0.773	100	1.35E+06	1.421
13C12-1,2,3,7,8-PeCDF	31.18	1.481	100	9.94E+05	1.046
13C12-1,2,3,6,7,8-HxCDF	33.73	0.538	100	8.55E+05	1.385
13C12-1,2,3,4,6,7,8-HpCDF	35.26	0.443	100	6.22E+05	1.008
Cleanup Standard					
13C12-1,2,3,7,8,9-HxCDF	34.47	0.512	100	6.92E+05	1.121
Injection Standards					
13C12-1234-TCDD IS	27.38	0.787	100	950730.5	9507.305
13C12-123789-HxCDD IS	34.33	1.27	100.00	6.17E+05	6172.903

ALS Life Sciences

Calibration Report

ALS Sample ID **H7-19-CCV-CS3-0017**
Analysis Method EPA M23
Analysis Type Calibration

Filename	Inst #	Column	Run Date	Approved:	*T.Patterson*
7-190724A01	HRMS-7	DB5MSUSR826231H	24-Jul-2019 15:56		--e-signature-- 29-Jul-2019

Target Analytes	Ret. Time	Ion Ratio	Concentration ng/mL	Response	RRF
2,3,7,8-TCDD	28.06	0.76	10.00	1.43E+05	1.261
1,2,3,7,8-PeCDD	32.12	1.66	50.00	4.18E+05	0.923
1,2,3,4,7,8-HxCDD	34.15	1.22	50.00	3.88E+05	0.871
1,2,3,6,7,8-HxCDD	34.21	1.23	50.00	4.19E+05	0.940
1,2,3,7,8,9-HxCDD	34.34	1.19	50.00	4.05E+05	0.909
1,2,3,4,6,7,8-HpCDD	35.82	1.03	50.00	3.32E+05	0.946
OCDD	37.32	0.88	100.00	5.83E+05	0.938
2,3,7,8-TCDF	27.14	0.75	10.00	1.67E+05	0.913
1,2,3,7,8-PeCDF	31.19	1.52	50.00	5.65E+05	0.864
2,3,4,7,8-PeCDF	31.9	1.52	50.00	6.22E+05	0.950
1,2,3,4,7,8-HxCDF	33.67	1.19	50.00	5.03E+05	0.911
1,2,3,6,7,8-HxCDF	33.74	1.16	50.00	5.48E+05	0.993
2,3,4,6,7,8-HxCDF	34.06	1.17	50.00	5.08E+05	0.920
1,2,3,7,8,9-HxCDF	34.48	1.22	50.00	4.52E+05	0.818
1,2,3,4,6,7,8-HpCDF	35.27	1.84	50.00	3.45E+05	0.888
1,2,3,4,7,8,9-HpCDF	36.08	1.81	50.00	2.97E+05	0.764
OCDF	37.41	0.89	100.00	6.72E+05	1.082
Field Spike Standards					
37Cl4-2,3,7,8-TCDD	28.06	0.00	10.00	1.37E+05	1.203
13C12-1,2,3,4,7,8-HxCDD	34.15	1.36	100.00	8.05E+05	0.903
13C12-2,3,4,7,8-PeCDF	31.89	1.55	100.00	1.36E+06	1.043
13C12-1,2,3,4,7,8-HxCDF	33.66	0.51	100.00	9.46E+05	0.856
13C12-1,2,3,4,7,8,9-HpCDF	36.07	0.44	100.00	6.32E+05	0.813
Extraction Standards					
13C12-2,3,7,8-TCDD	28.05	0.804	100	1.14E+06	0.909
13C12-1,2,3,7,8-PeCDD	32.1	1.595	100	9.06E+05	0.725
13C12-1,2,3,6,7,8-HxCDD	34.21	1.191	100	8.91E+05	1.099
13C12-1,2,3,4,6,7,8-HpCDD	35.81	1.046	100	7.02E+05	0.865
13C12-OCDD	37.31	0.905	200	1.24E+06	0.766
13C12-2,3,7,8-TCDF	27.13	0.754	100	1.83E+06	1.462
13C12-1,2,3,7,8-PeCDF	31.18	1.586	100	1.31E+06	1.047
13C12-1,2,3,6,7,8-HxCDF	33.73	0.519	100	1.10E+06	1.362
13C12-1,2,3,4,6,7,8-HpCDF	35.26	0.446	100	7.77E+05	0.957
Cleanup Standard					
13C12-1,2,3,7,8,9-HxCDF	34.47	0.524	100	8.99E+05	1.108
Injection Standards					
13C12-1234-TCDD IS	27.36	0.809	100	1250070.6	12500.706
13C12-123789-HxCDD IS	34.33	1.23	100.00	8.11E+05	8111.065

ALS Life Sciences

Calibration Report

ALS Sample ID **H7-19-CCV-CS4-0017**
Analysis Method EPA M23
Analysis Type Calibration

Filename	Inst #	Column	Run Date	Approved:	*T.Patterson*
7-190724A07	HRMS-7	DB5MSUSR826231H	24-Jul-2019 20:08		--e-signature-- 29-Jul-2019

Target Analytes	Ret. Time	Ion Ratio	Concentration ng/mL	Response	RRF
2,3,7,8-TCDD	28.04	0.77	40.00	5.30E+05	1.155
1,2,3,7,8-PeCDD	32.1	1.64	200.00	1.79E+06	0.948
1,2,3,4,7,8-HxCDD	34.15	1.31	200.00	1.73E+06	0.905
1,2,3,6,7,8-HxCDD	34.2	1.17	200.00	1.92E+06	1.005
1,2,3,7,8,9-HxCDD	34.32	1.23	200.00	1.88E+06	0.981
1,2,3,4,6,7,8-HpCDD	35.81	1.03	200.00	1.44E+06	1.000
OCDD	37.31	0.88	400.00	2.60E+06	1.010
2,3,7,8-TCDF	27.11	0.76	40.00	6.49E+05	0.904
1,2,3,7,8-PeCDF	31.17	1.55	200.00	2.39E+06	0.908
2,3,4,7,8-PeCDF	31.88	1.52	200.00	2.73E+06	1.035
1,2,3,4,7,8-HxCDF	33.66	1.18	200.00	2.18E+06	0.965
1,2,3,6,7,8-HxCDF	33.73	1.18	200.00	2.36E+06	1.041
2,3,4,6,7,8-HxCDF	34.05	1.17	200.00	2.20E+06	0.972
1,2,3,7,8,9-HxCDF	34.47	1.17	200.00	1.98E+06	0.874
1,2,3,4,6,7,8-HpCDF	35.26	1.86	200.00	1.50E+06	0.936
1,2,3,4,7,8,9-HpCDF	36.07	1.86	200.00	1.26E+06	0.786
OCDF	37.39	0.89	400.00	3.05E+06	1.185
Field Spike Standards					
37Cl4-2,3,7,8-TCDD	28.04	0.00	40.00	5.26E+05	1.145
13C12-1,2,3,4,7,8-HxCDD	34.14	1.33	100.00	8.71E+05	0.911
13C12-2,3,4,7,8-PeCDF	31.87	1.56	100.00	1.41E+06	1.067
13C12-1,2,3,4,7,8-HxCDF	33.65	0.52	100.00	9.93E+05	0.878
13C12-1,2,3,4,7,8,9-HpCDF	36.05	0.45	100.00	6.68E+05	0.832
Extraction Standards					
13C12-2,3,7,8-TCDD	28.01	0.78	100	1.15E+06	0.908
13C12-1,2,3,7,8-PeCDD	32.09	1.564	100	9.45E+05	0.748
13C12-1,2,3,6,7,8-HxCDD	34.19	1.144	100	9.56E+05	1.083
13C12-1,2,3,4,6,7,8-HpCDD	35.8	1.033	100	7.20E+05	0.815
13C12-OCDD	37.3	0.887	200	1.29E+06	0.729
13C12-2,3,7,8-TCDF	27.1	0.786	100	1.80E+06	1.421
13C12-1,2,3,7,8-PeCDF	31.16	1.571	100	1.32E+06	1.042
13C12-1,2,3,6,7,8-HxCDF	33.71	0.517	100	1.13E+06	1.28
13C12-1,2,3,4,6,7,8-HpCDF	35.24	0.447	100	8.03E+05	0.909
Cleanup Standard					
13C12-1,2,3,7,8,9-HxCDF	34.46	0.525	100	9.58E+05	1.085
Injection Standards					
13C12-1234-TCDD IS	27.34	0.798	100	1264239.9	12642.399
13C12-123789-HxCDD IS	34.32	1.15	100.00	8.83E+05	8834.065

ALS Life Sciences

Calibration Report

ALS Sample ID **H7-19-CCV-CS5-0017**
Analysis Method EPA M23
Analysis Type Calibration

Filename	Inst #	Column	Run Date	Approved:	*T.Patterson*
7-190724A06	HRMS-7	DB5MSUSR826231H	24-Jul-2019 19:26		--e-signature--
					29-Jul-2019

Target Analytes	Ret. Time	Ion Ratio	Concentration ng/mL	Response	RRF
2,3,7,8-TCDD	28.04	0.79	200.00	2.33E+06	1.148
1,2,3,7,8-PeCDD	32.1	1.62	1000.00	8.37E+06	0.914
1,2,3,4,7,8-HxCDD	34.15	1.23	1000.00	8.38E+06	0.896
1,2,3,6,7,8-HxCDD	34.2	1.23	1000.00	8.83E+06	0.944
1,2,3,7,8,9-HxCDD	34.32	1.23	1000.00	8.48E+06	0.906
1,2,3,4,6,7,8-HpCDD	35.81	1.03	1000.00	7.13E+06	0.965
OCDD	37.31	0.88	2000.00	1.41E+07	0.962
2,3,7,8-TCDF	27.11	0.76	200.00	2.77E+06	0.870
1,2,3,7,8-PeCDF	31.17	1.54	1000.00	1.13E+07	0.881
2,3,4,7,8-PeCDF	31.88	1.53	1000.00	1.27E+07	0.988
1,2,3,4,7,8-HxCDF	33.66	1.17	1000.00	1.04E+07	0.937
1,2,3,6,7,8-HxCDF	33.73	1.18	1000.00	1.10E+07	0.984
2,3,4,6,7,8-HxCDF	34.05	1.18	1000.00	1.05E+07	0.943
1,2,3,7,8,9-HxCDF	34.47	1.18	1000.00	9.51E+06	0.853
1,2,3,4,6,7,8-HpCDF	35.26	1.84	1000.00	7.27E+06	0.910
1,2,3,4,7,8,9-HpCDF	36.05	1.86	1000.00	6.30E+06	0.788
OCDF	37.39	0.89	2000.00	1.67E+07	1.137
Field Spike Standards					
37Cl4-2,3,7,8-TCDD	28.04	0.00	200.00	2.56E+06	1.262
13C12-1,2,3,4,7,8-HxCDD	34.14	1.25	100.00	8.78E+05	0.938
13C12-2,3,4,7,8-PeCDF	31.87	1.56	100.00	1.35E+06	1.049
13C12-1,2,3,4,7,8-HxCDF	33.65	0.51	100.00	9.65E+05	0.866
13C12-1,2,3,4,7,8,9-HpCDF	36.05	0.44	100.00	6.85E+05	0.856
Extraction Standards					
13C12-2,3,7,8-TCDD	28.02	0.785	100	1.02E+06	0.934
13C12-1,2,3,7,8-PeCDD	32.09	1.602	100	9.15E+05	0.842
13C12-1,2,3,6,7,8-HxCDD	34.19	1.255	100	9.36E+05	1.094
13C12-1,2,3,4,6,7,8-HpCDD	35.8	1.04	100	7.39E+05	0.863
13C12-OCDD	37.3	0.897	200	1.47E+06	0.857
13C12-2,3,7,8-TCDF	27.1	0.758	100	1.59E+06	1.467
13C12-1,2,3,7,8-PeCDF	31.16	1.548	100	1.28E+06	1.181
13C12-1,2,3,6,7,8-HxCDF	33.72	0.501	100	1.11E+06	1.303
13C12-1,2,3,4,6,7,8-HpCDF	35.24	0.445	100	8.00E+05	0.934
Cleanup Standard					
13C12-1,2,3,7,8,9-HxCDF	34.46	0.514	100	9.49E+05	1.109
Injection Standards					
13C12-1234-TCDD IS	27.35	0.788	100	1086981.5	10869.815
13C12-123789-HxCDD IS	34.32	1.24	100.00	8.56E+05	8558.793

Continuing Calibration Report

Sample Name	**CCV**	Sampling Date	n/a		
ALS Sample ID	H7-19-CCV-0494	Extraction Date	n/a		Approved:
Analysis Method	EPA M23	Sample Size	1	n/a	*T.Patterson*
Analysis Type	CCV	Percent Moisture	n/a		--e-signature--
Sample Matrix	QC	Split Ratio	1		29-Jul-2019

Run Information	**Run 1**
Filename	7-190726A11
Run Date	26-Jul-19 20:26
Final Volume	10 uL
Dilution Factor	1
Analysis Units	%
Instrument - Column	HRMS-7 DB5MSUSR826231H

Target Analytes	**pg/uL**	**Ret. Time**	**% Rec**	**Limits**	**Flags**
2,3,7,8-TCDD	10	28.11	111	75-125	
1,2,3,7,8-PeCDD	50	32.15	101	75-125	
1,2,3,4,7,8-HxCDD	50	34.18	98	75-125	
1,2,3,6,7,8-HxCDD	50	34.23	96	75-125	
1,2,3,7,8,9-HxCDD	50	34.36	94	75-125	
1,2,3,4,6,7,8-HpCDD	50	35.85	103	75-125	
OCDD	100	37.34	100	75-125	
2,3,7,8-TCDF	10	27.19	106	75-125	
1,2,3,7,8-PeCDF	50	31.22	102	75-125	
2,3,4,7,8-PeCDF	50	31.93	100	75-125	
1,2,3,4,7,8-HxCDF	50	33.70	106	75-125	
1,2,3,6,7,8-HxCDF	50	33.77	104	75-125	
2,3,4,6,7,8-HxCDF	50	34.09	100	75-125	
1,2,3,7,8,9-HxCDF	50	34.50	100	75-125	
1,2,3,4,6,7,8-HpCDF	50	35.29	101	75-125	
1,2,3,4,7,8,9-HpCDF	50	36.10	100	75-125	
OCDF	100	37.43	105	70-130	
Field Spike Standards	**pg/uL**		**% Rec**	**Limits**	
37Cl4-2,3,7,8-TCDD	10	28.11	104	75-125	
13C12-1,2,3,4,7,8-HxCDD	100	34.17	95	75-125	
13C12-2,3,4,7,8-PeCDF	100	31.92	99	75-125	
13C12-1,2,3,4,7,8-HxCDF	100	33.69	106	75-125	
13C12-1,2,3,4,7,8,9-HpCDF	100	36.09	98	75-125	
Extraction Standards					
13C12-2,3,7,8-TCDD	100	28.09	100	75-125	
13C12-1,2,3,7,8-PeCDD	100	32.13	96	70-130	
13C12-1,2,3,6,7,8-HxCDD	100	34.23	105	75-125	
13C12-1,2,3,4,6,7,8-HpCDD	100	35.85	98	70-130	
13C12-OCDD	200	37.34	92	70-130	
13C12-2,3,7,8-TCDF	100	27.17	101	70-130	
13C12-1,2,3,7,8-PeCDF	100	31.20	98	70-130	
13C12-1,2,3,6,7,8-HxCDF	100	33.75	106	70-130	
13C12-1,2,3,4,6,7,8-HpCDF	100	35.29	101	70-130	
Cleanup Standard	**pg/uL**				
13C12-1,2,3,7,8,9-HxCDF	100	34.50	102	40-130	

ALS Life sciences

Continuing Calibration Report

Sample Name	**CCV**	Sampling Date	n/a		
ALS Sample ID	H7-19-CCV-0495	Extraction Date	n/a		Approved:
Analysis Method	EPA M23	Sample Size	1	n/a	*T.Patterson*
Analysis Type	CCV	Percent Moisture	n/a		--e-signature--
Sample Matrix	QC	Split Ratio	1		29-Jul-2019

Run Information	**Run 1**
Filename	7-190726A25
Run Date	27-Jul-19 06:24
Final Volume	10 uL
Dilution Factor	1
Analysis Units	%
Instrument - Column	HRMS-7 DB5MSUSR826231H

Target Analytes	**pg/uL**	**Ret. Time**	**% Rec**	**Limits**	**Flags**
2,3,7,8-TCDD	10	28.12	112	75-125	
1,2,3,7,8-PeCDD	50	32.15	100	75-125	
1,2,3,4,7,8-HxCDD	50	34.18	98	75-125	
1,2,3,6,7,8-HxCDD	50	34.23	100	75-125	
1,2,3,7,8,9-HxCDD	50	34.36	97	75-125	
1,2,3,4,6,7,8-HpCDD	50	35.85	103	75-125	
OCDD	100	37.34	102	75-125	
2,3,7,8-TCDF	10	27.19	117	75-125	
1,2,3,7,8-PeCDF	50	31.22	102	75-125	
2,3,4,7,8-PeCDF	50	31.93	103	75-125	
1,2,3,4,7,8-HxCDF	50	33.70	103	75-125	
1,2,3,6,7,8-HxCDF	50	33.77	101	75-125	
2,3,4,6,7,8-HxCDF	50	34.09	103	75-125	
1,2,3,7,8,9-HxCDF	50	34.50	100	75-125	
1,2,3,4,6,7,8-HpCDF	50	35.29	101	75-125	
1,2,3,4,7,8,9-HpCDF	50	36.10	101	75-125	
OCDF	100	37.43	102	70-130	
Field Spike Standards	**pg/uL**		**% Rec**	**Limits**	
37Cl4-2,3,7,8-TCDD	10	28.12	105	75-125	
13C12-1,2,3,4,7,8-HxCDD	100	34.17	99	75-125	
13C12-2,3,4,7,8-PeCDF	100	31.92	99	75-125	
13C12-1,2,3,4,7,8-HxCDF	100	33.69	102	75-125	
13C12-1,2,3,4,7,8,9-HpCDF	100	36.09	98	75-125	
Extraction Standards					
13C12-2,3,7,8-TCDD	100	28.09	98	75-125	
13C12-1,2,3,7,8-PeCDD	100	32.13	99	70-130	
13C12-1,2,3,6,7,8-HxCDD	100	34.23	102	75-125	
13C12-1,2,3,4,6,7,8-HpCDD	100	35.84	100	70-130	
13C12-OCDD	200	37.33	94	70-130	
13C12-2,3,7,8-TCDF	100	27.17	99	70-130	
13C12-1,2,3,7,8-PeCDF	100	31.20	98	70-130	
13C12-1,2,3,6,7,8-HxCDF	100	33.75	103	70-130	
13C12-1,2,3,4,6,7,8-HpCDF	100	35.28	101	70-130	
Cleanup Standard	**pg/uL**				
13C12-1,2,3,7,8,9-HxCDF	100	34.50	102	40-130	

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SECTION 5: QC SAMPLE DATA

Including:

- Laboratory Method Blank Analysis Reports
- Laboratory Control Sample Analysis Reports
- Matrix Spike Analysis Reports
- Other QC Sample Analysis Reports (where applicable)

ALS Life Sciences

Laboratory Method Blank Analysis Report

Sample Name	**Method Blank**	Sampling Date	n/a		
ALS Sample ID	WG3081836-1	Extraction Date	12-Jul-19		Approved:
Analysis Method	EPA TO9A	Sample Size	1	Puf	*T.Patterson*
Analysis Type	Blank	Percent Moisture	n/a		--e-signature--
Sample Matrix	QC	Split Ratio	2		29-Jul-2019

Run Information	**Run 1**
Filename	7-190726A15
Run Date	26-Jul-19 23:23
Final Volume	10 uL
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS-7 DB5MSUSR826231H

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
2,3,7,8-TCDD	1	NotFnd	<0.94	0.94	U		10
1,2,3,7,8-PeCDD	1	32.16	0.690	0.48	M,J		50
1,2,3,4,7,8-HxCDD	0.1	NotFnd	<0.63	0.63	U		50
1,2,3,6,7,8-HxCDD	0.1	NotFnd	<0.57	0.57	U		50
1,2,3,7,8,9-HxCDD	0.1	34.35	<0.66	0.59	M,J,R	0.66	50
1,2,3,4,6,7,8-HpCDD	0.01	35.85	<1.5	0.43	M,J,R	1.5	50
OCDD	0.0003	37.35	5.48	0.38	J		100
2,3,7,8-TCDF	0.1	NotFnd	<0.67	0.67	U		10
1,2,3,7,8-PeCDF	0.03	NotFnd	<0.45	0.45	U		50
2,3,4,7,8-PeCDF	0.3	NotFnd	<0.40	0.40	U		50
1,2,3,4,7,8-HxCDF	0.1	33.70	<0.45	0.45	M,U	0.32	50
1,2,3,6,7,8-HxCDF	0.1	NotFnd	<0.41	0.41	U		50
2,3,4,6,7,8-HxCDF	0.1	34.10	0.500	0.44	M,J		50
1,2,3,7,8,9-HxCDF	0.1	NotFnd	<0.51	0.51	U		50
1,2,3,4,6,7,8-HpCDF	0.01	NotFnd	<0.36	0.36	U		50
1,2,3,4,7,8,9-HpCDF	0.01	NotFnd	<0.42	0.42	U		50
OCDF	0.0003	37.44	<1.2	0.56	M,J,R	1.2	100

Field Spike Standards	**% Rec**
37Cl4-2,3,7,8-TCDD	NS
13C12-1,2,3,4,7,8-HxCDD	NS
13C12-2,3,4,7,8-PeCDF	NS
13C12-1,2,3,4,7,8-HxCDF	NS
13C12-1,2,3,4,7,8,9-HpCDF	NS

Extraction Standards				
13C12-2,3,7,8-TCDD	4000	28.11	65	40-130
13C12-1,2,3,7,8-PeCDD	4000	32.14	72	40-130
13C12-1,2,3,6,7,8-HxCDD	4000	34.23	69	40-130
13C12-1,2,3,4,6,7,8-HpCDD	4000	35.85	70	25-130
13C12-OCDD	8000	37.34	68	25-130
13C12-2,3,7,8-TCDF	4000	27.19	67	40-130
13C12-1,2,3,7,8-PeCDF	4000	31.20	67	40-130
13C12-1,2,3,6,7,8-HxCDF	4000	33.76	68	40-130
13C12-1,2,3,4,6,7,8-HpCDF	4000	35.28	71	25-130

Cleanup Standard	**pg**
13C12-1,2,3,7,8,9-HxCDF	NS

Homologue Group Totals	**# peaks**	**Conc. pg**	**EDL pg**		
Total-TCDD	0	<0.94	0.94	U	10
Total-PeCDD	1	0.690	0.48		50
Total-HxCDD	0	<0.63	0.63	U	50
Total-HpCDD	0	<0.43	0.43	U	50
Total-TCDF	0	<0.67	0.67	U	10
Total-PeCDF	0	<0.45	0.45	U	50
Total-HxCDF	0	<0.51	0.51	U	50
Total-HpCDF	0	<0.42	0.42	U	50

Toxic Equivalency - (WHO 2005)	**pg**
Lower Bound PCDD/F TEQ (WHO 2005)	0.742
Mid Point PCDD/F TEQ (WHO 2005)	1.53
Upper Bound PCDD/F TEQ (WHO 2005)	2.23

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor
TEQ	Indicates the Toxic Equivalency
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that a target analyte was detected below the calibrated range.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
EMPC	Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure
NS	Indicates that this standard was not spiked to sample

Laboratory Control Sample Analysis Report

Sample Name	**Laboratory Control Sample**	Sampling Date	n/a		
ALS Sample ID	WG3081836-2	Extraction Date	12-Jul-19		Approved:
Analysis Method	EPA TO9A	Sample Size	1	n/a	*T.Patterson*
Analysis Type	LCS	Percent Moisture	n/a		--e-signature--
Sample Matrix	QC	Split Ratio	2		29-Jul-2019

Run Information	**Run 1**
Filename	7-190726A12
Run Date	26-Jul-19 21:17
Final Volume	10 uL
Dilution Factor	1
Analysis Units	%
Instrument - Column	HRMS-7 DB5MSUSR826231H

Target Analytes	**pg**	**Ret. Time**	**% Rec**	**Limits**	**Flags**
2,3,7,8-TCDD	400	28.14	103	70-130	
1,2,3,7,8-PeCDD	2000	32.15	107	70-130	
1,2,3,4,7,8-HxCDD	2000	34.19	107	70-130	
1,2,3,6,7,8-HxCDD	2000	34.24	104	70-130	
1,2,3,7,8,9-HxCDD	2000	34.36	109	70-130	
1,2,3,4,6,7,8-HpCDD	2000	35.85	106	70-130	
OCDD	4000	37.35	100	70-130	
2,3,7,8-TCDF	400	27.22	101	70-130	
1,2,3,7,8-PeCDF	2000	31.23	114	70-130	
2,3,4,7,8-PeCDF	2000	31.94	94	70-130	
1,2,3,4,7,8-HxCDF	2000	33.70	109	70-130	
1,2,3,6,7,8-HxCDF	2000	33.77	116	70-130	
2,3,4,6,7,8-HxCDF	2000	34.10	108	70-130	
1,2,3,7,8,9-HxCDF	2000	34.51	105	70-130	
1,2,3,4,6,7,8-HpCDF	2000	35.29	113	70-130	
1,2,3,4,7,8,9-HpCDF	2000	36.10	96	70-130	
OCDF	4000	37.44	90	70-130	
Field Spike Standards			**% Rec**		
37Cl4-2,3,7,8-TCDD			NS		
13C12-1,2,3,4,7,8-HxCDD			NS		
13C12-2,3,4,7,8-PeCDF			NS		
13C12-1,2,3,4,7,8-HxCDF			NS		
13C12-1,2,3,4,7,8,9-HpCDF			NS		
Extraction Standards					
13C12-2,3,7,8-TCDD	4000	28.12	67	40-130	
13C12-1,2,3,7,8-PeCDD	4000	32.14	73	40-130	
13C12-1,2,3,6,7,8-HxCDD	4000	34.23	71	40-130	
13C12-1,2,3,4,6,7,8-HpCDD	4000	35.85	74	25-130	
13C12-OCDD	8000	37.34	70	25-130	
13C12-2,3,7,8-TCDF	4000	27.20	70	40-130	
13C12-1,2,3,7,8-PeCDF	4000	31.22	69	40-130	
13C12-1,2,3,6,7,8-HxCDF	4000	33.76	68	40-130	
13C12-1,2,3,4,6,7,8-HpCDF	4000	35.29	72	25-130	
Cleanup Standard	**pg**				
13C12-1,2,3,7,8,9-HxCDF			NS		

R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
NS	Indicates that this standard was not spiked to sample

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SECTION 6: INTERNAL RECORDS

Including:

- Prep Logs
- Independent calculation checks
- Others as listed below:

Extraction Workup Sheet

Batch ID:	WG3081836
WG3081836	

Analysis:	PUFS - M23/1668A (HR)

Prep Procedure: BU-TM-1110 Overall HR Prep, BU-TP-1101 8270D Prep, BU-TP-2100 PAH Prep Method

Analyst:	Jackson Peaty

Date:	12-Jul-19

SUBSAMPLING

Sample I.D.	Client I.D.	Media Prep L#
WG3081836-1	Method Blank	L2293145-7
WG3081836-2	Laboratory Control Sample	L2293145-8
WG3081836-3	Extraction and Injection STD.	—
L2308151-1	HEISER-25745103	L2293145-4
L2308151-2	RES-25745100	L2293145-5
L2308151-3	CITY-25745101	L2293145-6 could not read label MM 15-Jul-19

BATCH TRACKING

	Date/Time/Initials
Client Labels Checked:	JT
Media transfer to soxhlet:	12-Jul-19 2:00PM JP
Rotovap Rinses:	
liquid/liquid extraction:	—
Soxhlet Start Time: 12-Jul-19	12-Jul-19 ~~3:00~~ 3:00PM JP
3 Soxhlets Reflux Properly:	JP
5 Soxhlet End Time:	JP 13-July 10:50am
	—
	—
	—
	—
Rotovap Reduction + verify	15-Jul-19 AP
Extract split:	15-Jul-19 AP
Acid Silica Column:	15-Jul-19 AP
Solvent exchange:	16-Jul-19 NA
Alumina Column:	16-Jul-19 NA
Carbon Column:	16-July-2019 1500 KS
	—
Micro/Robo Vial:	16-Jul-19 NA / 16-July-19 KS (DX)
Update to LIMS:	16-July-2019 2100 KS

Batch ID:	WG3081836

DX Extraction Standard:

Sample I.D.	Volume (ul)	Spiked (Checkmark)
WG3081836-1	40	✓
WG3081836-2	40	✓
WG3081836-3	40	✓
L2294320-1	40	✓
L2294320-2	40	✓
L2294320-3	40	✓
L2301798-1	40	✓
L2301798-2	40	✓
L2301798-3	40	✓
L2308151-1	40	✓
L2308151-2	40	✓
L2308151-3	40	✓

Syringe ID: 320

Standard: M23-ES#2- 035H

Spike Date: 12- July - 2019

Spike Witnessing

	Witness's Initials
Chemist:	JT
Witness:	SA
Correct Syringe Obtained:	SA
Correct Standard Obtained:	SA
Correct Technique Followed:	SA

PCB Extraction Standard:

Sample I.D.	Volume (ul)	(Checkmark) Spiked
WG3081836-1	40	✓
WG3081836-2	40	✓
WG3081836-3	40	✓
L2294320-1	40	✓
L2294320-2	40	✓
L2294320-3	40	✓
L2301798-1	40	✓
L2301798-2	40	✓
L2301798-3	40	✓
L2308151-1	40	✓
L2308151-2	40	✓
L2308151-3	40	✓

Syringe ID: 118

Standard: 1668A-ES#2- 055E

Spike Date: 12- July- 2019

Spike Witnessing

	Chemist's Initials
Chemist:	JP
Witness:	SA
Correct Syringe Obtained:	SA
Correct Standard Obtained:	SA
Correct Technique Followed:	SA

Batch ID:	WG3081836

Batch ID:	WG3081836

DX Native Standard:

Sample I.D.	Volume (ul)	(Checkmark) Spiked
WG3081836-2	40	✓
WG3081836-3	40	✓

Syringe ID: 322

Standard: 1613B-NS#3- 022B

Date & Initials: 12-July-2019 JP

PCB Native Standard:

Sample I.D.	Volume (ul)	(Checkmark) Spiked
WG3081836-2	40	✓
WG3081836-3	40	✓

Syringe ID: 323

Standard: 1668A-NS#1- 36F

Date & Initials: 12-July- 2019 JP

DX Cleanup Standard:

Sample I.D.	Volume (ul)	(Checkmark) Spiked
WG3081836-1	20	✓
WG3081836-2	20	✓
WG3081836-3	N/A	N/A
L2294320-1	20	✓
L2294320-2	20	✓
L2294320-3	20	✓
L2301798-1	20	✓
L2301798-2	20	✓
L2301798-3	20	✓
L2308151-1	20	✓
L2308151-2	20	✓
L2308151-3	20	✓

Syringe ID: 361

Standard: 1613B-CL#2-0604F

Date & Initials: 15-Jul-19 AP

Chemist's Initials

Correct Syringe Obtained: AP

Chemist's Initials

Correct Standard Obtained: AP

Chemist's Initials

Correct Technique Followed: AP

PCB Cleanup Standard:

Sample I.D.	Volume (ul)	(Checkmark) Spiked
WG3081836-1	20	✓
WG3081836-2	20	✓
WG3081836-3	N/A	N/A
L2294320-1	20	✓
L2294320-2	20	✓
L2294320-3	20	✓
L2301798-1	20	✓
L2301798-2	20	✓
L2301798-3	20	✓
L2308151-1	20	✓
L2308151-2	20	✓
L2308151-3	20	✓

Syringe ID: 360

Standard: 1668A-CL#2-31B

Date & Initials: 15-Jul-19 AP

Chemist's Initials

Correct Syringe Obtained: AP

Chemist's Initials

Correct Standard Obtained: AP

Chemist's Initials

Correct Technique Followed: AP

Batch ID:	WG3081836

DX Injection Standard:

Sample I.D.	Volume (ul)	Spiked (Checkmark)
WG3081836-1	10	✓
WG3081836-2	10	✓
WG3081836-3	10	✓
L2294320-1	10	✓
L2294320-2	10	✓
L2294320-3	10	✓
L2301798-1	10	✓
L2301798-2	10	✓
L2301798-3	10	✓
L2308151-1	10	✓
L2308151-2	10	✓
L2308151-3	10	✓
	10	
	10	
	10	
	10	

Syringe ID: 335

Standard: 1613B-IS#1- 0150

Date & Initials: 16 July 2019

Chemist's Initials

Correct Syringe Obtained:

Chemist's Initials

Correct Standard Obtained:

Chemist's Initials

Correct Technique Followed:

PCB Injection Standard:

Sample I.D.	Volume (ul)	Spiked (Checkmark)
WG3081836-1	5	✓
WG3081836-2	5	✓
WG3081836-3	5	✓
L2294320-1	5	✓
L2294320-2	5	✓
L2294320-3	5	✓
L2301798-1	5	✓
L2301798-2	5	✓
L2301798-3	5	✓
L2308151-1	5	✓
L2308151-2	5	✓
L2308151-3	5	
	5	
	5	
	5	
	5	

Syringe ID: 365

Standard: 1668A-IS#2- 0110

Date & Initials: 16-July-2019 NA

Chemist's Initials

Correct Syringe Obtained: NA

Chemist's Initials

Correct Standard Obtained: NA

Chemist's Initials

Correct Technique Followed: NA

Batch ID:	WG3081836

Reagent Lot Numbers:

Reagent	Lot#	Manufacturer
Acetone	104291	
Hexane	104312	
DCM	104598	
Toluene	104369	
Nonane	ORG-WAKONON- 046	
1:1 DCM:HEX	ORG-DH2- 558	
Sodium Sulphate	ORG-SSU- 2108 -2110	
Acid Silica	ORG-ASI- 8728	
Neutral Silica	ORG-NSI- 1931	
Alumina	ORG-ALU- 429	
1% Deactivated Silica	ORG-2%DAS- —	
Chromacarb	ORG-CC- 249	

Batch ID:	WG3081836

Procedure:

This batchsheet is a guideline only. Please see test procedure for complete set of instructions.
Extraction:
- PUFS were prepared off site, for MB and LCS use empty thimble
- Place Puf into a pre-cleaned thimble
- Spike with Extraction Standard (plus Native for LCS and ENI).
- Dean-Stark Soxhlet extract in Toluene for 16 hours (check with team lead or supervisor)
Rotovap:
- Rotovap and reduce to ~2mL.
- Transfer to a calibrated c-tube (marked at 1ml, 2ml) with 3x2ml hexane
- Mix well then quantitatively spilt the extract **1/2 DX/PCB 1/2 Archive**

Batch ID:	WG3081836

DX/PCB:
- Perform Acid Silica column
`- Solvent Exchange (reduce to **~50ul**, bulk back up to 1ml Hexane, vortex well.
`- Perform Alumina Column:
- Pre-elute the Alumina Column with 7ml Hexane
- Place F1 c-tube under the column, then load the sample with 3x1ml Hexane rinses
- F1 (Archive) 1mL Hexane
- F2 (DX/PCB) 14mL 1:1 DCM:Hexane
-Split Alumina F2 1/2 PCB 1/2 DX

Micro-Vial:
PCB:
- Blow down to ~1/2ml
- Vortex **very** well.
- Transfer every last drop to a micro-vial (Marked at 20uL with nonane).
- Blow down to the line
- Spike PCB Injection Standard, cap and vortex. **FV=25ul**
DX:
- Solvent Exchange to Hexane (Reduce to Just Dry then bulk back up to 1ml Hexane)
- ChromaCarb: - 4cm of well-packed chroma-carb.
- Pre-elute Carbon with 5ml Hexane
- Transfer with 3x1ml Hexane
- F1 = **10ml** 1:1 DCM:Hexane (Archive)
- After dripping has stopped Invert Column.
- F2 = 14ml Toluene (DX and PCB)
- After the column has stopped dripping reduce the **F2** portion down to ~1/2ml.
- Vortex well, then transfer to a micro-vial without rinses.
- Blow the micro-vial down to just-dry.
- Spike with Injection Standard, Cap the micro-vial, and Vortex. **FV=10ul**

Batch ID:	WG3081836

Comments:

NOTE: Label and Save All Columns including Acid Silica Columns

L2294320-D2-3 both samples were split @ 10mL & 5mL samples were very gel-like & were not blowing down further than 9mL. 5mL put through acid column as per MSM 15-JUL-19 AP

Approval of Deviation from Standard Method

☐ Procedure does deviate from Standard Method. **Approved (Supervisor/Manager):** _____ **(Batch Writer):** _____

WG3081836			Prep Analyst:		
PUFS - M23/1668A (HR)			Date:		
	Very Good	Meets Method Req	Some Outliers	Very Poor	Comments / Was spl/batch sent for rework? Why?
MB					
LCS					
DUP					
ES rec					

ALS Life Sciences

Sample Calculation Report

CS3 RRF Check

Approved: *T.Patterson* --e-signature-- 29-Jul-2019

RRF = (Response of 2,3,7,8-TCDD / Response of 13C12-2,3,7,8-TCDD) x (Concentration of 13C12-2,3,7,8-TCDD / Concentration of TCDD)

							Calculated Value	Value from TargetLyn x
RRF	**=**	**143318.60** / **1136712.10**	**x**	**100** / **10**		**=**	**1.26**	**1.26**

Calculation of OCDD amount in L2294320-1

pg = (Response of OCDD / Response of 13C12-OCDD) x (pg of 13C12-OCDD spiked / Mean RRF * Sample Size)

pg	**=**	**354.8** / **1056147.7**	**x**	**8000** / **0.95**	*****	**1.00**	**=**	**2.81**	**2.81**

Calculation of 13C12-2,3,7,8-TCDD Recovery in L2294320-1

% Recovery = (Response of 13C12-2,3,7,8-TCDD / Response of 13C12-1,2,3,4-TCDD) x (pg of 13C12-1,2,3,4-TCDD spiked * 100 / Mean RRF * Amount Spiked)

% Recovery	**=**	**871298.6** / **1389812.9**	**x**	**2000** / **0.91**	*****	**100** / **2000**	**=**	**69**	**69 %**

1435 Norjohn Court, Unit 1, Burlington, ON, Canada L7L 0E6

SVOC DATA PACKAGE

SECTION 7: SHIPPING/RECEIVING DOCUMENTS

Including:

- Airbills
- Chain-of-Custody Records
- Sample Log-in Sheet(s) - where applicable
- Others as listed below:

L2308151

[For lab use only]

ANALYTICAL REQUEST FORM

1. ☒ **REGULAR Status**

☐ **RUSH Status Requested - ADDITIONAL CHARGE**
RESULTS REQUIRED BY _____
DATE
CONTACT ALS PRIOR TO SENDING SAMPLES

2. Date 7/5/19 Purchase Order No. _____

3. Company Name: Floyd|Snider
Address: 601 Union St Suite 600
Seattle WA 98101
Person to Contact: Emily Jones
Telephone (719) 292-2078
Fax Telephone ( )
E-mail Address: emily.jones@floydsnider.com
Billing Address (if different from above)

4. Quote No. Email quote
ALS Project Manager: **Ron McLeod**

5. **Sample Collection**
Sampling Site Seattle
Industrial Process: Air Emissions
Date of Collection 7/5/19
Time Collected 1119, 1200, 1237
Date of Shipment ~~7/5/19~~ 7/7/19
Chain of Custody No.: -

6. How did you first learn about ALS?
Referred to by SKC / T&B Systems

7. **REQUEST FOR ANALYSES**

Client Sample Number	Matrix*	Sample/Area Volume	ANALYSES REQUESTED - Use method number if known	Units**	Lab Comments
Heiser-25745103	Lo-Vol PUF tube	1 Filter	PCBs by Method 1668; Dioxins by Method 8290A	1	1
Res-25745100	Lo-Vol PUF tube		PCBs by Method 1668; Dioxins by Method 8290A	1	2
City-25745101	Lo-Vol PUF tube		PCBs by Method 1668; Dioxins by Method 8290A	1	3
			City 7/5/19		

* Specify: Solid sorbent tube, e.g. Charcoal; Filter type; Impinger solution; Bulk sample; Blood; Urine; Tissue; Soil; Water; Other

** 1. µg/sample 2. mg/m^3 3. ppm 4. % 5. µg/m^3 6. _____ (other) Please indicate one or more units in the column entitled Units**

Comments _____

Possible Contamination and/or Chemical Hazards _____

7. **Chain of Custody (Optional)**

Relinquished by	Corey H. Wilson	Date/Time	7/5/19 1300
Received by	AARON BURTON	Date/Time	11-July-2019 12:30 24.2°C
Relinquished by		Date/Time	
Received by		Date/Time	

1435 Norjohn Court #1 / Burlington, ON Canada, L7L 0E6 **800-356-9135 or 801-266-7700 / FAX: 801-268-9992**
ALS Environmental

Sample Receiving Log

Date/Time Received	Client ID	Number/Description of Containers	Temp. on Receipt*	Condition of Samples, Courier & Tracking Information	Receiver's Initials	Date/Time Login Completed	Submission ID	Sample ID Range
11-July-2019 12:30	Floyd / Snider	3 x PUFs	24.2°C	>10°C FedEx 7883 3469 3751	MJ	11-July-2019 14:00	L2308151	-1-3

*Temperatures were recorded using:

☑ Oakton infraPro' dedicated I.R. gun (serial #97800270)

☐ Other (specify): _____