

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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TestAmerica Job ID: 580-77290-2

Client Project/Site: Portland Harbor Pre-Remedial Design

For:

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Authorized for release by:
5/31/2018 4:11:56 PM

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Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Cover Page	1
Table of Contents	2
Case Narrative	3
Definitions	5
Client Sample Results	6
QC Sample Results	8
Chronicle	11
Certification Summary	12
Sample Summary	13
Chain of Custody	14
Receipt Checklists	16
Field Data Sheets	18
Isotope Dilution Summary	21



Case Narrative

Client: AECOM
Project/Site: Portland Harbor Pre-Remedial Design

TestAmerica Job ID: 580-77290-2

Job ID: 580-77290-2

Laboratory: TestAmerica Seattle

Narrative

CASE NARRATIVE

Client: AECOM

Project: Portland Harbor Pre-Remedial Design

Report Number: 580-77290-2

This case narrative is in the form of an exception report, where only the anomalies related to this report, method specific performance and/or QA/QC issues are discussed. If there are no issues to report, this narrative will include a statement that documents that there are no relevant data issues.

It should be noted that samples with elevated Reporting Limits (RLs) resulting from a dilution may not be able to satisfy customer reporting limits in some cases. Such increases in the RLs are an unavoidable but acceptable consequence of sample dilution that enables quantification of target analytes within the calibration range of the instrument or that reduces the interferences thereby enabling the quantification of target analytes.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

RECEIPT

Two samples were received on 5/14/2018 3:10 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.9° C.

A sample container was provided to be archived frozen at the TestAmerica Sacramento laboratory pending potential additional analyses.

This report contains results of Dioxins / Furans by Method 1613B, performed by TestAmerica Sacramento.

Note: All samples which require thermal preservation are considered acceptable if the arrival temperature is within 2C of the required temperature or method specified range. For samples with a specified temperature of 4C, samples with a temperature ranging from just above freezing temperature of water to 6C shall be acceptable. Samples that are hand delivered immediately following collection may not meet these criteria, however they will be deemed acceptable according to NELAC standards, if there is evidence that the chilling process has begun, such as arrival on ice, etc.

DIOXIN/ FURAN

Samples PDI-SG-B077-BL1 (580-77290-1) and PDI-SG-B380-BL1 (580-77290-2) were analyzed for Dioxin/ Furan in accordance with 1613B. The samples were prepared on 05/19/2018 and analyzed on 05/23/2018 and 05/24/2018.

1,2,3,4,6,7,8-HpCDD, 1,2,3,4,6,7,8-HpCDF, 2,3,7,8-TCDF and OCDD were detected in method blank MB 320-224242/1-A at levels that were above the method detection limit but below the reporting limit. The values should be considered estimates, and have been flagged. If the associated sample reported a result above the MDL and/or RL, the result has been flagged.

EPA Method 1613B specifies a +/- 15 second retention time difference between the recovery standard in the initial calibration (ICAL) and the continuing calibration verification (CCV). The 13C-1,2,3,4-TCDD and 13C-1,2,3,7,8,9-HxCDD associated with the following samples run on instrument 10D5 exceeded this criteria: PDI-SG-B077-BL1 (580-77290-1), PDI-SG-B380-BL1 (580-77290-2), (CCV 320-224867/42), (CCV 320-224866/27), (LCS 320-224242/2-A), (LCSD 320-224242/3-A), (MB 320-224242/1-A) and (WDM 320-224866/28). This retention time shift is due to normal and reasonable column maintenance and does not affect the instrument chromatography resolution, sensitivity, or identification of target analytes. System retention times have been updated for proper analyte identification.

The Isotope Dilution Analyte (IDA) recovery associated with the following sample is below the method recommended limit: PDI-SG-B380-BL1 (580-77290-2). Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the sample(s). All detection limits are below the lower calibration.

Due to the matrix, the initial volumes used for the following samples deviated from the standard procedure: PDI-SG-B077-BL1

Case Narrative

Client: AECOM
Project/Site: Portland Harbor Pre-Remedial Design

TestAmerica Job ID: 580-77290-2

Job ID: 580-77290-2 (Continued)

Laboratory: TestAmerica Seattle (Continued)

(580-77290-1) and PDI-SG-B380-BL1 (580-77290-2). The reporting limits (RLs) have been adjusted proportionately. Samples are associated with preparation batch 320-224242.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

1

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4

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6

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12

13

Definitions/Glossary

Client: AECOM
Project/Site: Portland Harbor Pre-Remedial Design

TestAmerica Job ID: 580-77290-2

Qualifiers

Dioxin

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
q	The reported result is the estimated maximum possible concentration of this analyte, quantitated using the theoretical ion ratio. The measured ion ratio does not meet qualitative identification criteria and indicates a possible interference.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
*	Isotope Dilution analyte is outside acceptance limits.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: AECOM
Project/Site: Portland Harbor Pre-Remedial Design

TestAmerica Job ID: 580-77290-2

Client Sample ID: PDI-SG-B077-BL1

Date Collected: 05/11/18 10:50

Date Received: 05/14/18 15:10

Lab Sample ID: 580-77290-1

Matrix: Solid

Percent Solids: 36.5

Method: 1613B - Dioxins and Furans (HRGC/HRMS)

Analyte	Result	Qualifier	RL	EDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,3,4,6,7,8-HpCDD	0.13	B	0.0067	0.00051	ug/Kg	☼	05/19/18 08:17	05/23/18 19:03	1
1,2,3,4,6,7,8-HpCDF	0.019	B q	0.0067	0.00032	ug/Kg	☼	05/19/18 08:17	05/23/18 19:03	1
1,2,3,4,7,8,9-HpCDF	0.0012	J	0.0067	0.00030	ug/Kg	☼	05/19/18 08:17	05/23/18 19:03	1
1,2,3,4,7,8-HxCDD	0.0011	J	0.0067	0.000088	ug/Kg	☼	05/19/18 08:17	05/23/18 19:03	1
1,2,3,4,7,8-HxCDF	0.0028	J	0.0067	0.00013	ug/Kg	☼	05/19/18 08:17	05/23/18 19:03	1
1,2,3,6,7,8-HxCDD	0.0040	J	0.0067	0.000081	ug/Kg	☼	05/19/18 08:17	05/23/18 19:03	1
1,2,3,6,7,8-HxCDF	0.0012	J	0.0067	0.00011	ug/Kg	☼	05/19/18 08:17	05/23/18 19:03	1
1,2,3,7,8,9-HxCDD	0.0032	J	0.0067	0.000079	ug/Kg	☼	05/19/18 08:17	05/23/18 19:03	1
1,2,3,7,8,9-HxCDF	0.00023	J	0.0067	0.000055	ug/Kg	☼	05/19/18 08:17	05/23/18 19:03	1
1,2,3,7,8-PeCDD	0.00074	J	0.0067	0.00012	ug/Kg	☼	05/19/18 08:17	05/23/18 19:03	1
1,2,3,7,8-PeCDF	0.00097	J	0.0067	0.000069	ug/Kg	☼	05/19/18 08:17	05/23/18 19:03	1
2,3,4,6,7,8-HxCDF	0.00064	J	0.0067	0.000067	ug/Kg	☼	05/19/18 08:17	05/23/18 19:03	1
2,3,4,7,8-PeCDF	0.00075	J	0.0067	0.000083	ug/Kg	☼	05/19/18 08:17	05/23/18 19:03	1
2,3,7,8-TCDD	0.000097	J	0.0013	0.000080	ug/Kg	☼	05/19/18 08:17	05/23/18 19:03	1
OCDD	1.1	B	0.013	0.00037	ug/Kg	☼	05/19/18 08:17	05/23/18 19:03	1
OCDF	0.075		0.013	0.00011	ug/Kg	☼	05/19/18 08:17	05/23/18 19:03	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C-1,2,3,4,6,7,8-HpCDD	46		23 - 140				05/19/18 08:17	05/23/18 19:03	1
13C-1,2,3,4,6,7,8-HpCDF	41		28 - 143				05/19/18 08:17	05/23/18 19:03	1
13C-1,2,3,4,7,8,9-HpCDF	55		26 - 138				05/19/18 08:17	05/23/18 19:03	1
13C-1,2,3,4,7,8-HxCDD	48		32 - 141				05/19/18 08:17	05/23/18 19:03	1
13C-1,2,3,4,7,8-HxCDF	44		26 - 152				05/19/18 08:17	05/23/18 19:03	1
13C-1,2,3,6,7,8-HxCDD	48		28 - 130				05/19/18 08:17	05/23/18 19:03	1
13C-1,2,3,6,7,8-HxCDF	44		26 - 123				05/19/18 08:17	05/23/18 19:03	1
13C-1,2,3,7,8,9-HxCDF	58		29 - 147				05/19/18 08:17	05/23/18 19:03	1
13C-1,2,3,7,8-PeCDD	59		25 - 181				05/19/18 08:17	05/23/18 19:03	1
13C-1,2,3,7,8-PeCDF	67		24 - 185				05/19/18 08:17	05/23/18 19:03	1
13C-2,3,4,6,7,8-HxCDF	52		28 - 136				05/19/18 08:17	05/23/18 19:03	1
13C-2,3,4,7,8-PeCDF	60		21 - 178				05/19/18 08:17	05/23/18 19:03	1
13C-2,3,7,8-TCDD	63		25 - 164				05/19/18 08:17	05/23/18 19:03	1
13C-OCDD	41		17 - 157				05/19/18 08:17	05/23/18 19:03	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
37Cl4-2,3,7,8-TCDD	116		35 - 197				05/19/18 08:17	05/23/18 19:03	1

Method: 1613B - Dioxins and Furans (HRGC/HRMS) - RA

Analyte	Result	Qualifier	RL	EDL	Unit	D	Prepared	Analyzed	Dil Fac
2,3,7,8-TCDF	0.0012	J B	0.0013	0.00011	ug/Kg	☼	05/19/18 08:17	05/24/18 05:43	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C-2,3,7,8-TCDF	76		24 - 169				05/19/18 08:17	05/24/18 05:43	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
37Cl4-2,3,7,8-TCDD	109		35 - 197				05/19/18 08:17	05/24/18 05:43	1

TestAmerica Seattle

Client Sample Results

Client: AECOM
Project/Site: Portland Harbor Pre-Remedial Design

TestAmerica Job ID: 580-77290-2

Client Sample ID: PDI-SG-B380-BL1

Date Collected: 05/13/18 10:45

Date Received: 05/14/18 15:10

Lab Sample ID: 580-77290-2

Matrix: Solid

Percent Solids: 54.1

Method: 1613B - Dioxins and Furans (HRGC/HRMS)

Analyte	Result	Qualifier	RL	EDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,3,4,6,7,8-HpCDD	0.15	B	0.0046	0.00056	ug/Kg	☼	05/19/18 08:17	05/23/18 19:49	1
1,2,3,4,6,7,8-HpCDF	0.022	B	0.0046	0.00031	ug/Kg	☼	05/19/18 08:17	05/23/18 19:49	1
1,2,3,4,7,8,9-HpCDF	ND		0.0046	0.00090	ug/Kg	☼	05/19/18 08:17	05/23/18 19:49	1
1,2,3,4,7,8-HxCDD	0.0012	J	0.0046	0.00011	ug/Kg	☼	05/19/18 08:17	05/23/18 19:49	1
1,2,3,4,7,8-HxCDF	0.0021	J	0.0046	0.00022	ug/Kg	☼	05/19/18 08:17	05/23/18 19:49	1
1,2,3,6,7,8-HxCDD	0.0046		0.0046	0.00010	ug/Kg	☼	05/19/18 08:17	05/23/18 19:49	1
1,2,3,6,7,8-HxCDF	0.0022	J	0.0046	0.00018	ug/Kg	☼	05/19/18 08:17	05/23/18 19:49	1
1,2,3,7,8,9-HxCDD	0.0030	J	0.0046	0.000096	ug/Kg	☼	05/19/18 08:17	05/23/18 19:49	1
1,2,3,7,8,9-HxCDF	0.00026	J	0.0046	0.000096	ug/Kg	☼	05/19/18 08:17	05/23/18 19:49	1
1,2,3,7,8-PeCDD	0.00081	J	0.0046	0.00011	ug/Kg	☼	05/19/18 08:17	05/23/18 19:49	1
1,2,3,7,8-PeCDF	0.00052	J	0.0046	0.00010	ug/Kg	☼	05/19/18 08:17	05/23/18 19:49	1
2,3,4,6,7,8-HxCDF	0.00054	J q	0.0046	0.00012	ug/Kg	☼	05/19/18 08:17	05/23/18 19:49	1
2,3,4,7,8-PeCDF	0.00061	J	0.0046	0.00012	ug/Kg	☼	05/19/18 08:17	05/23/18 19:49	1
2,3,7,8-TCDD	0.00041	J q	0.00092	0.000067	ug/Kg	☼	05/19/18 08:17	05/23/18 19:49	1
2,3,7,8-TCDF	0.00091	J B	0.00092	0.000088	ug/Kg	☼	05/19/18 08:17	05/23/18 19:49	1
OCDD	2.1	B	0.0092	0.00057	ug/Kg	☼	05/19/18 08:17	05/23/18 19:49	1
OCDF	0.11		0.0092	0.00015	ug/Kg	☼	05/19/18 08:17	05/23/18 19:49	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C-1,2,3,4,6,7,8-HpCDD	36		23 - 140	05/19/18 08:17	05/23/18 19:49	1
13C-1,2,3,4,6,7,8-HpCDF	32		28 - 143	05/19/18 08:17	05/23/18 19:49	1
13C-1,2,3,4,7,8,9-HpCDF	18 *		26 - 138	05/19/18 08:17	05/23/18 19:49	1
13C-1,2,3,4,7,8-HxCDD	46		32 - 141	05/19/18 08:17	05/23/18 19:49	1
13C-1,2,3,4,7,8-HxCDF	42		26 - 152	05/19/18 08:17	05/23/18 19:49	1
13C-1,2,3,6,7,8-HxCDD	46		28 - 130	05/19/18 08:17	05/23/18 19:49	1
13C-1,2,3,6,7,8-HxCDF	43		26 - 123	05/19/18 08:17	05/23/18 19:49	1
13C-1,2,3,7,8,9-HxCDF	53		29 - 147	05/19/18 08:17	05/23/18 19:49	1
13C-1,2,3,7,8-PeCDD	56		25 - 181	05/19/18 08:17	05/23/18 19:49	1
13C-1,2,3,7,8-PeCDF	62		24 - 185	05/19/18 08:17	05/23/18 19:49	1
13C-2,3,4,6,7,8-HxCDF	48		28 - 136	05/19/18 08:17	05/23/18 19:49	1
13C-2,3,4,7,8-PeCDF	58		21 - 178	05/19/18 08:17	05/23/18 19:49	1
13C-2,3,7,8-TCDD	62		25 - 164	05/19/18 08:17	05/23/18 19:49	1
13C-2,3,7,8-TCDF	69		24 - 169	05/19/18 08:17	05/23/18 19:49	1
13C-OCDD	32		17 - 157	05/19/18 08:17	05/23/18 19:49	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
37Cl4-2,3,7,8-TCDD	115		35 - 197	05/19/18 08:17	05/23/18 19:49	1

TestAmerica Seattle

QC Sample Results

Client: AECOM
Project/Site: Portland Harbor Pre-Remedial Design

TestAmerica Job ID: 580-77290-2

Method: 1613B - Dioxins and Furans (HRGC/HRMS)

Lab Sample ID: MB 320-224242/1-A

Matrix: Solid

Analysis Batch: 224866

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 224242

Analyte	MB Result	MB Qualifier	RL	EDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,3,4,6,7,8-HpCDD	0.000114	J q	0.0050	0.000037	ug/Kg		05/19/18 07:16	05/23/18 00:03	1
1,2,3,4,6,7,8-HpCDF	0.0000563	J q	0.0050	0.000024	ug/Kg		05/19/18 07:16	05/23/18 00:03	1
1,2,3,4,7,8,9-HpCDF	ND		0.0050	0.000029	ug/Kg		05/19/18 07:16	05/23/18 00:03	1
1,2,3,4,7,8-HxCDD	ND		0.0050	0.000051	ug/Kg		05/19/18 07:16	05/23/18 00:03	1
1,2,3,4,7,8-HxCDF	ND		0.0050	0.00013	ug/Kg		05/19/18 07:16	05/23/18 00:03	1
1,2,3,6,7,8-HxCDD	ND		0.0050	0.000046	ug/Kg		05/19/18 07:16	05/23/18 00:03	1
1,2,3,6,7,8-HxCDF	ND		0.0050	0.00011	ug/Kg		05/19/18 07:16	05/23/18 00:03	1
1,2,3,7,8,9-HxCDD	ND		0.0050	0.000045	ug/Kg		05/19/18 07:16	05/23/18 00:03	1
1,2,3,7,8,9-HxCDF	ND		0.0050	0.000065	ug/Kg		05/19/18 07:16	05/23/18 00:03	1
1,2,3,7,8-PeCDD	ND		0.0050	0.000077	ug/Kg		05/19/18 07:16	05/23/18 00:03	1
1,2,3,7,8-PeCDF	ND		0.0050	0.000043	ug/Kg		05/19/18 07:16	05/23/18 00:03	1
2,3,4,6,7,8-HxCDF	ND		0.0050	0.000076	ug/Kg		05/19/18 07:16	05/23/18 00:03	1
2,3,4,7,8-PeCDF	ND		0.0050	0.000046	ug/Kg		05/19/18 07:16	05/23/18 00:03	1
2,3,7,8-TCDD	ND		0.0010	0.000077	ug/Kg		05/19/18 07:16	05/23/18 00:03	1
2,3,7,8-TCDF	0.000102	J q	0.0010	0.000054	ug/Kg		05/19/18 07:16	05/23/18 00:03	1
OCDD	0.000158	J q	0.010	0.000041	ug/Kg		05/19/18 07:16	05/23/18 00:03	1
OCDF	ND		0.010	0.000078	ug/Kg		05/19/18 07:16	05/23/18 00:03	1

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C-1,2,3,4,6,7,8-HpCDD	64		23 - 140	05/19/18 07:16	05/23/18 00:03	1
13C-1,2,3,4,6,7,8-HpCDF	67		28 - 143	05/19/18 07:16	05/23/18 00:03	1
13C-1,2,3,4,7,8,9-HpCDF	72		26 - 138	05/19/18 07:16	05/23/18 00:03	1
13C-1,2,3,4,7,8-HxCDD	63		32 - 141	05/19/18 07:16	05/23/18 00:03	1
13C-1,2,3,4,7,8-HxCDF	63		26 - 152	05/19/18 07:16	05/23/18 00:03	1
13C-1,2,3,6,7,8-HxCDD	69		28 - 130	05/19/18 07:16	05/23/18 00:03	1
13C-1,2,3,6,7,8-HxCDF	66		26 - 123	05/19/18 07:16	05/23/18 00:03	1
13C-1,2,3,7,8,9-HxCDF	71		29 - 147	05/19/18 07:16	05/23/18 00:03	1
13C-1,2,3,7,8-PeCDD	64		25 - 181	05/19/18 07:16	05/23/18 00:03	1
13C-1,2,3,7,8-PeCDF	71		24 - 185	05/19/18 07:16	05/23/18 00:03	1
13C-2,3,4,6,7,8-HxCDF	66		28 - 136	05/19/18 07:16	05/23/18 00:03	1
13C-2,3,4,7,8-PeCDF	70		21 - 178	05/19/18 07:16	05/23/18 00:03	1
13C-2,3,7,8-TCDD	72		25 - 164	05/19/18 07:16	05/23/18 00:03	1
13C-2,3,7,8-TCDF	78		24 - 169	05/19/18 07:16	05/23/18 00:03	1
13C-OCDD	59		17 - 157	05/19/18 07:16	05/23/18 00:03	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
37Cl4-2,3,7,8-TCDD	115		35 - 197	05/19/18 07:16	05/23/18 00:03	1

Lab Sample ID: LCS 320-224242/2-A

Matrix: Solid

Analysis Batch: 224866

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 224242

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
1,2,3,4,6,7,8-HpCDD	0.100	0.109		ug/Kg		109	70 - 140
1,2,3,4,6,7,8-HpCDF	0.100	0.0990		ug/Kg		99	82 - 122
1,2,3,4,7,8,9-HpCDF	0.100	0.0963		ug/Kg		96	78 - 138
1,2,3,4,7,8-HxCDD	0.100	0.0996		ug/Kg		100	70 - 164
1,2,3,4,7,8-HxCDF	0.100	0.0987		ug/Kg		99	72 - 134

TestAmerica Seattle

QC Sample Results

Client: AECOM
Project/Site: Portland Harbor Pre-Remedial Design

TestAmerica Job ID: 580-77290-2

Method: 1613B - Dioxins and Furans (HRGC/HRMS) (Continued)

Lab Sample ID: LCS 320-224242/2-A

Matrix: Solid

Analysis Batch: 224866

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 224242

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,2,3,6,7,8-HxCDD	0.100	0.0905		ug/Kg		90	76 - 134
1,2,3,6,7,8-HxCDF	0.100	0.0997		ug/Kg		100	84 - 130
1,2,3,7,8,9-HxCDD	0.100	0.113		ug/Kg		113	64 - 162
1,2,3,7,8,9-HxCDF	0.100	0.0983		ug/Kg		98	78 - 130
1,2,3,7,8-PeCDD	0.100	0.107		ug/Kg		107	70 - 142
1,2,3,7,8-PeCDF	0.100	0.0962		ug/Kg		96	80 - 134
2,3,4,6,7,8-HxCDF	0.100	0.0993		ug/Kg		99	70 - 156
2,3,4,7,8-PeCDF	0.100	0.0998		ug/Kg		100	68 - 160
2,3,7,8-TCDD	0.0200	0.0207		ug/Kg		103	67 - 158
2,3,7,8-TCDF	0.0200	0.0180		ug/Kg		90	75 - 158
OCDD	0.200	0.211		ug/Kg		106	78 - 144
OCDF	0.200	0.210		ug/Kg		105	63 - 170

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
13C-1,2,3,4,6,7,8-HpCDD	61		26 - 166
13C-1,2,3,4,6,7,8-HpCDF	61		21 - 158
13C-1,2,3,4,7,8,9-HpCDF	68		20 - 186
13C-1,2,3,4,7,8-HxCDD	56		21 - 193
13C-1,2,3,4,7,8-HxCDF	55		19 - 202
13C-1,2,3,6,7,8-HxCDD	63		25 - 163
13C-1,2,3,6,7,8-HxCDF	56		21 - 159
13C-1,2,3,7,8,9-HxCDF	67		17 - 205
13C-1,2,3,7,8-PeCDD	63		21 - 227
13C-1,2,3,7,8-PeCDF	71		21 - 192
13C-2,3,4,6,7,8-HxCDF	60		22 - 176
13C-2,3,4,7,8-PeCDF	63		13 - 328
13C-2,3,7,8-TCDD	68		20 - 175
13C-2,3,7,8-TCDF	75		22 - 152
13C-OCDD	56		13 - 199

Surrogate	LCS %Recovery	LCS Qualifier	Limits
37Cl4-2,3,7,8-TCDD	113		31 - 191

Lab Sample ID: LCSD 320-224242/3-A

Matrix: Solid

Analysis Batch: 224866

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 224242

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
1,2,3,4,6,7,8-HpCDD	0.100	0.106		ug/Kg		106	70 - 140	3	50
1,2,3,4,6,7,8-HpCDF	0.100	0.0957		ug/Kg		96	82 - 122	3	50
1,2,3,4,7,8,9-HpCDF	0.100	0.0938		ug/Kg		94	78 - 138	3	50
1,2,3,4,7,8-HxCDD	0.100	0.0918		ug/Kg		92	70 - 164	8	50
1,2,3,4,7,8-HxCDF	0.100	0.0956		ug/Kg		96	72 - 134	3	50
1,2,3,6,7,8-HxCDD	0.100	0.0900		ug/Kg		90	76 - 134	1	50
1,2,3,6,7,8-HxCDF	0.100	0.0963		ug/Kg		96	84 - 130	3	50
1,2,3,7,8,9-HxCDD	0.100	0.115		ug/Kg		115	64 - 162	2	50
1,2,3,7,8,9-HxCDF	0.100	0.0961		ug/Kg		96	78 - 130	2	50
1,2,3,7,8-PeCDD	0.100	0.103		ug/Kg		103	70 - 142	4	50

TestAmerica Seattle

QC Sample Results

Client: AECOM
Project/Site: Portland Harbor Pre-Remedial Design

TestAmerica Job ID: 580-77290-2

Method: 1613B - Dioxins and Furans (HRGC/HRMS) (Continued)

Lab Sample ID: LCSD 320-224242/3-A

Matrix: Solid

Analysis Batch: 224866

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 224242

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,2,3,7,8-PeCDF	0.100	0.0939		ug/Kg		94	80 - 134	2	50
2,3,4,6,7,8-HxCDF	0.100	0.0955		ug/Kg		95	70 - 156	4	50
2,3,4,7,8-PeCDF	0.100	0.0942		ug/Kg		94	68 - 160	6	50
2,3,7,8-TCDD	0.0200	0.0197		ug/Kg		99	67 - 158	5	50
2,3,7,8-TCDF	0.0200	0.0174		ug/Kg		87	75 - 158	3	50
OCDD	0.200	0.204		ug/Kg		102	78 - 144	3	50
OCDF	0.200	0.202		ug/Kg		101	63 - 170	4	50

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
13C-1,2,3,4,6,7,8-HpCDD	64		26 - 166
13C-1,2,3,4,6,7,8-HpCDF	63		21 - 158
13C-1,2,3,4,7,8,9-HpCDF	70		20 - 186
13C-1,2,3,4,7,8-HxCDD	55		21 - 193
13C-1,2,3,4,7,8-HxCDF	54		19 - 202
13C-1,2,3,6,7,8-HxCDD	61		25 - 163
13C-1,2,3,6,7,8-HxCDF	59		21 - 159
13C-1,2,3,7,8,9-HxCDF	69		17 - 205
13C-1,2,3,7,8-PeCDD	65		21 - 227
13C-1,2,3,7,8-PeCDF	72		21 - 192
13C-2,3,4,6,7,8-HxCDF	64		22 - 176
13C-2,3,4,7,8-PeCDF	61		13 - 328
13C-2,3,7,8-TCDD	69		20 - 175
13C-2,3,7,8-TCDF	75		22 - 152
13C-OCDD	58		13 - 199

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
37Cl4-2,3,7,8-TCDD	113		31 - 191

TestAmerica Seattle

Lab Chronicle

Client: AECOM
Project/Site: Portland Harbor Pre-Remedial Design

TestAmerica Job ID: 580-77290-2

Client Sample ID: PDI-SG-B077-BL1

Date Collected: 05/11/18 10:50

Date Received: 05/14/18 15:10

Lab Sample ID: 580-77290-1

Matrix: Solid

Percent Solids: 36.5

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	HRMS-Sox			224242	05/19/18 08:17	SR1	TAL SAC
Total/NA	Analysis	1613B		1	224867	05/23/18 19:03	ALM	TAL SAC
Total/NA	Prep	HRMS-Sox	RA		224242	05/19/18 08:17	SR1	TAL SAC
Total/NA	Analysis	1613B	RA	1	225340	05/24/18 05:43	KSS	TAL SAC

Client Sample ID: PDI-SG-B380-BL1

Date Collected: 05/13/18 10:45

Date Received: 05/14/18 15:10

Lab Sample ID: 580-77290-2

Matrix: Solid

Percent Solids: 54.1

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	HRMS-Sox			224242	05/19/18 08:17	SR1	TAL SAC
Total/NA	Analysis	1613B		1	224867	05/23/18 19:49	ALM	TAL SAC

Laboratory References:

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Accreditation/Certification Summary

Client: AECOM

TestAmerica Job ID: 580-77290-2

Project/Site: Portland Harbor Pre-Remedial Design

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Laboratory: TestAmerica Sacramento

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-020	01-20-21
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-19
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-19
Kansas	NELAP	7	E-10375	10-31-18
L-A-B	DoD ELAP		L2468	01-20-21
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-19
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

TestAmerica Seattle

Sample Summary

Client: AECOM

Project/Site: Portland Harbor Pre-Remedial Design

TestAmerica Job ID: 580-77290-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-77290-1	PDI-SG-B077-BL1	Solid	05/11/18 10:50	05/14/18 15:10
580-77290-2	PDI-SG-B380-BL1	Solid	05/13/18 10:45	05/14/18 15:10

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TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Ver: 09/20/2016

Login Sample Receipt Checklist

Client: AECOM

Job Number: 580-77290-2

Login Number: 77290

List Source: TestAmerica Seattle

List Number: 1

Creator: O'Connell, Jason I

Question	Answer	Comment
Radioactivity wasn't checked or is $\leq$ background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Client: AECOM

Job Number: 580-77290-2

Login Number: 77290

List Number: 3

Creator: Gooch, Mayce

List Source: TestAmerica Sacramento

List Creation: 05/16/18 05:15 PM

Question	Answer	Comment
Radioactivity wasn't checked or is <= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	0.5c,5.8c
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	False	Received project as a subcontract.
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Sacramento Sample Receiving Notes

Job: _____

Tracking # 442307502967 (1-3) SO/PO/FO

Use this form to record Sample Custody Seal, Cooler Custody Seal, Temperature & corrected Temperature & other observations.
File in the job folder with the COC.

Notes: _____

Therm. ID: AK-2 / AK-3 / AK-4 / AK-5 / HACCP / Other

Ice ☒ Wet ☒ Gel _____ Other _____

Cooler Custody Seal: seal

Sample Custody Seal: _____

Cooler ID: 5063

Temp: Observed 5.00

From: Temp Blank ☐ Sample ☒

NCM Filed: Yes ☐ No ☐

	Yes	No	NA
Perchlorate has headspace?	☐	☐	☒
CoC is complete w/o discrepancies?	☒	☐	☐
Samples received within holding time?	☒	☐	☐
Sample preservatives verified?	☐	☐	☒
Cooler compromised/tampered with?	☐	☒	☐
Samples compromised/tampered with?	☐	☒	☐
Samples w/o discrepancies?	☒	☐	☐
Sample containers have legible labels?	☒	☐	☐
Containers are not broken or leaking?	☒	☐	☐
Sample date/times are provided.	☒	☐	☐
Appropriate containers are used?	☒	☐	☐
Sample bottles are completely filled?	☒	☐	☐
Zero headspace?*	☐	☐	☒
Multiphasic samples are not present?	☒	☐	☐
Sample temp OK?	☒	☐	☐
Sample out of temp?	☐	☒	☐

Initials: LUR Date: 05-16-18 Time: 9:10

*Containers requiring zero headspace have no headspace, or bubble < 6 mm (1/4")

Sacramento Sample Receiving Notes

Job: _____

Tracking # 442307502909 ⁽³⁻³⁾ SO / EO / FO

Use this form to record Sample Custody Seal, Cooler Custody Seal, Temperature & corrected Temperature & other observations. File in the job folder with the COC.

Notes: _____

Therm. ID: AK-2 / AK-3 / AK-4 / AK-5 / HACCP / Other

Ice X Wet X Gel _____ Other _____

Cooler Custody Seal: Seal

Sample Custody Seal: -

Cooler ID: 5-407 3 of 3

Temp: Observed 5.4C

From: Temp Blank ☐ Sample ☒

NCM Filed: Yes ☐ No ☐

	Yes	No	NA
Perchlorate has headspace?	☐	☐	☒
CoC is complete w/o discrepancies?	☒	☐	☐
Samples received within holding time?	☒	☐	☐
Sample preservatives verified?	☐	☐	☒
Cooler compromised/tampered with?	☐	☒	☐
Samples compromised/tampered with?	☐	☒	☐
Samples w/o discrepancies?	☒	☐	☐
Sample containers have legible labels?	☒	☐	☐
Containers are not broken or leaking?	☒	☐	☐
Sample date/times are provided.	☒	☐	☐
Appropriate containers are used?	☒	☐	☐
Sample bottles are completely filled?	☒	☐	☐
Zero headspace?*	☐	☐	☒
Multiphasic samples are not present?	☒	☐	☐
Sample temp OK?	☒	☐	☐
Sample out of temp?	☐	☒	☐

Initials: DT Date: 5/16/18 Time: 9/0

*Containers requiring zero headspace have no headspace, or bubble < 6 mm (1/4")

Isotope Dilution Summary

Client: AECOM
Project/Site: Portland Harbor Pre-Remedial Design

TestAmerica Job ID: 580-77290-2

Method: 1613B - Dioxins and Furans (HRGC/HRMS)

Matrix: Solid

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	HpCDD (23-140)	HpCDF (28-143)	HpCDF2 (26-138)	HxCDD (32-141)	HxCDF (26-152)	HxDD (28-130)	HxDF (26-123)	HxCF (29-147)
580-77290-1	PDI-SG-B077-BL1	46	41	55	48	44	48	44	58
580-77290-1 - RA	PDI-SG-B077-BL1								
580-77290-2	PDI-SG-B380-BL1	36	32	18 *	46	42	46	43	53
MB 320-224242/1-A	Method Blank	64	67	72	63	63	69	66	71

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PeCDD (25-181)	PeCDF (24-185)	13CHxCF (28-136)	PeCF (21-178)	TCDD (25-164)	TCDF (24-169)	OCDD (17-157)	
580-77290-1	PDI-SG-B077-BL1	59	67	52	60	63		41	
580-77290-1 - RA	PDI-SG-B077-BL1						76		
580-77290-2	PDI-SG-B380-BL1	56	62	48	58	62	69	32	
MB 320-224242/1-A	Method Blank	64	71	66	70	72	78	59	

Surrogate Legend

HpCDD = 13C-1,2,3,4,6,7,8-HpCDD
 HpCDF = 13C-1,2,3,4,6,7,8-HpCDF
 HpCDF2 = 13C-1,2,3,4,7,8,9-HpCDF
 HxCDD = 13C-1,2,3,4,7,8-HxCDD
 HxCDF = 13C-1,2,3,4,7,8-HxCDF
 HxDD = 13C-1,2,3,6,7,8-HxCDD
 HxDF = 13C-1,2,3,6,7,8-HxCDF
 HxCF = 13C-1,2,3,7,8,9-HxCDF
 PeCDD = 13C-1,2,3,7,8-PeCDD
 PeCDF = 13C-1,2,3,7,8-PeCDF
 13CHxCF = 13C-2,3,4,6,7,8-HxCDF
 PeCF = 13C-2,3,4,7,8-PeCDF
 TCDD = 13C-2,3,7,8-TCDD
 TCDF = 13C-2,3,7,8-TCDF
 OCDD = 13C-OCDD

Method: 1613B - Dioxins and Furans (HRGC/HRMS)

Matrix: Solid

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	HpCDD (26-166)	HpCDF (21-158)	HpCDF2 (20-186)	HxCDD (21-193)	HxCDF (19-202)	HxDD (25-163)	HxDF (21-159)	HxCF (17-205)
LCS 320-224242/2-A	Lab Control Sample	61	61	68	56	55	63	56	67
LCSD 320-224242/3-A	Lab Control Sample Dup	64	63	70	55	54	61	59	69

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PeCDD (21-227)	PeCDF (21-192)	13CHxCF (22-176)	PeCF (13-328)	TCDD (20-175)	TCDF (22-152)	OCDD (13-199)	
LCS 320-224242/2-A	Lab Control Sample	63	71	60	63	68	75	56	
LCSD 320-224242/3-A	Lab Control Sample Dup	65	72	64	61	69	75	58	

Surrogate Legend

HpCDD = 13C-1,2,3,4,6,7,8-HpCDD
 HpCDF = 13C-1,2,3,4,6,7,8-HpCDF
 HpCDF2 = 13C-1,2,3,4,7,8,9-HpCDF
 HxCDD = 13C-1,2,3,4,7,8-HxCDD
 HxCDF = 13C-1,2,3,4,7,8-HxCDF

TestAmerica Seattle

Isotope Dilution Summary

Client: AECOM

Project/Site: Portland Harbor Pre-Remedial Design

TestAmerica Job ID: 580-77290-2

HxDD = 13C-1,2,3,6,7,8-HxCDD
HxDF = 13C-1,2,3,6,7,8-HxCDF
HxCF = 13C-1,2,3,7,8,9-HxCDF
PeCDD = 13C-1,2,3,7,8-PeCDD
PeCDF = 13C-1,2,3,7,8-PeCDF
13CHxCF = 13C-2,3,4,6,7,8-HxCDF
PeCF = 13C-2,3,4,7,8-PeCDF
TCDD = 13C-2,3,7,8-TCDD
TCDF = 13C-2,3,7,8-TCDF
OCDD = 13C-OCDD

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