

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

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TestAmerica Job ID: 580-79055-2

Client Project/Site: Portland Harbor Pre-Remedial Design

For:

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Authorized for release by:
9/12/2018 12:53:22 PM

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

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

1

2

3

4

5

6

7

8

9

10

11

12

13



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	18
Field Data Sheets	20
Isotope Dilution Summary	21

Case Narrative

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

TestAmerica Job ID: 580-79055-2

Job ID: 580-79055-2

Laboratory: TestAmerica Seattle

Narrative

CASE NARRATIVE

Client: AECOM

Project: Portland Harbor Pre-Remedial Design

Report Number: 580-79055-2

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 7/23/2018 2:35 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 2.6° C and 5.3° C.

The following samples were activated by the client for all on hold analysis on 8/16/18: PDI-SG-B471 (580-79055-1) and PDI-SG-B472 (580-79055-2)

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

This report contains results for Dioxins/Furans by Method 1613B, performed at 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-B471 (580-79055-1) and PDI-SG-B472 (580-79055-2) were analyzed for Dioxin/ Furan in accordance with 1613B. The samples were prepared on 09/04/2018 and analyzed on 09/08/2018 and 09/11/2018.

Several analytes were detected in method blank MB 320-243668/1-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-B471 (580-79055-1), PDI-SG-B472 (580-79055-2), (CCV 320-244552/42), (CCV 320-244513/27), (LCS 320-243668/2-A), (LCSD 320-243668/3-A) and (MB 320-243668/1-A). 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 concentration of one or more analytes associated with the following sample exceeded the instrument calibration range: PDI-SG-B471 (580-79055-1). These analytes have been qualified; however, the peak(s) did not saturate the instrument detector. Historical data indicate that for the isotope dilution method, dilution and re-analysis will not produce significantly different results from those reported

Case Narrative

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

TestAmerica Job ID: 580-79055-2

Job ID: 580-79055-2 (Continued)

Laboratory: TestAmerica Seattle (Continued)

above the calibration range.

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

1

2

3

4

5

6

7

8

9

10

11

12

13

Definitions/Glossary

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

TestAmerica Job ID: 580-79055-2

Qualifiers

Dioxin

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
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.
E	Result exceeded calibration range.

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: 580-79055-2

Client Sample ID: PDI-SG-B471

Lab Sample ID: 580-79055-1

Date Collected: 07/21/18 10:45

Matrix: Solid

Date Received: 07/23/18 14:35

Percent Solids: 51.7

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	0.33	B	0.0049	0.0018	ug/Kg	☼	09/04/18 09:00	09/08/18 14:08	1
1,2,3,4,6,7,8-HpCDF	0.047	B	0.0049	0.00057	ug/Kg	☼	09/04/18 09:00	09/08/18 14:08	1
1,2,3,4,7,8,9-HpCDF	0.0035	J B	0.0049	0.00061	ug/Kg	☼	09/04/18 09:00	09/08/18 14:08	1
1,2,3,4,7,8-HxCDD	0.0029	J B	0.0049	0.00021	ug/Kg	☼	09/04/18 09:00	09/08/18 14:08	1
1,2,3,4,7,8-HxCDF	0.0038	J B	0.0049	0.00025	ug/Kg	☼	09/04/18 09:00	09/08/18 14:08	1
1,2,3,6,7,8-HxCDD	0.016		0.0049	0.00021	ug/Kg	☼	09/04/18 09:00	09/08/18 14:08	1
1,2,3,6,7,8-HxCDF	0.0032	J B	0.0049	0.00025	ug/Kg	☼	09/04/18 09:00	09/08/18 14:08	1
1,2,3,7,8,9-HxCDD	0.0072	B	0.0049	0.00019	ug/Kg	☼	09/04/18 09:00	09/08/18 14:08	1
1,2,3,7,8,9-HxCDF	0.0031	J B	0.0049	0.00017	ug/Kg	☼	09/04/18 09:00	09/08/18 14:08	1
1,2,3,7,8-PeCDD	0.0017	J	0.0049	0.00014	ug/Kg	☼	09/04/18 09:00	09/08/18 14:08	1
1,2,3,7,8-PeCDF	0.0015	J B	0.0049	0.00028	ug/Kg	☼	09/04/18 09:00	09/08/18 14:08	1
2,3,4,6,7,8-HxCDF	0.0013	J	0.0049	0.00019	ug/Kg	☼	09/04/18 09:00	09/08/18 14:08	1
2,3,4,7,8-PeCDF	0.0017	J	0.0049	0.00029	ug/Kg	☼	09/04/18 09:00	09/08/18 14:08	1
2,3,7,8-TCDD	0.00076	J q	0.00097	0.000028	ug/Kg	☼	09/04/18 09:00	09/08/18 14:08	1
OCDD	4.5	E B	0.0097	0.0013	ug/Kg	☼	09/04/18 09:00	09/08/18 14:08	1
OCDF	0.12	B	0.0097	0.000087	ug/Kg	☼	09/04/18 09:00	09/08/18 14:08	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C-1,2,3,4,6,7,8-HpCDD	45		23 - 140	09/04/18 09:00	09/08/18 14:08	1
13C-1,2,3,4,6,7,8-HpCDF	39		28 - 143	09/04/18 09:00	09/08/18 14:08	1
13C-1,2,3,4,7,8,9-HpCDF	47		26 - 138	09/04/18 09:00	09/08/18 14:08	1
13C-1,2,3,4,7,8-HxCDD	42		32 - 141	09/04/18 09:00	09/08/18 14:08	1
13C-1,2,3,4,7,8-HxCDF	44		26 - 152	09/04/18 09:00	09/08/18 14:08	1
13C-1,2,3,6,7,8-HxCDD	43		28 - 130	09/04/18 09:00	09/08/18 14:08	1
13C-1,2,3,6,7,8-HxCDF	45		26 - 123	09/04/18 09:00	09/08/18 14:08	1
13C-1,2,3,7,8,9-HxCDF	47		29 - 147	09/04/18 09:00	09/08/18 14:08	1
13C-1,2,3,7,8-PeCDD	42		25 - 181	09/04/18 09:00	09/08/18 14:08	1
13C-1,2,3,7,8-PeCDF	44		24 - 185	09/04/18 09:00	09/08/18 14:08	1
13C-2,3,4,6,7,8-HxCDF	47		28 - 136	09/04/18 09:00	09/08/18 14:08	1
13C-2,3,4,7,8-PeCDF	45		21 - 178	09/04/18 09:00	09/08/18 14:08	1
13C-2,3,7,8-TCDD	52		25 - 164	09/04/18 09:00	09/08/18 14:08	1
13C-OCDD	37		17 - 157	09/04/18 09:00	09/08/18 14:08	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
37Cl4-2,3,7,8-TCDD	128		35 - 197	09/04/18 09:00	09/08/18 14:08	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	ND		0.00097	0.000043	ug/Kg	☼	09/04/18 09:00	09/11/18 00:00	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C-2,3,7,8-TCDF	89		24 - 169	09/04/18 09:00	09/11/18 00:00	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
37Cl4-2,3,7,8-TCDD	115		35 - 197	09/04/18 09:00	09/11/18 00:00	1

Client Sample Results

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

TestAmerica Job ID: 580-79055-2

Client Sample ID: PDI-SG-B472

Lab Sample ID: 580-79055-2

Date Collected: 07/21/18 12:20

Matrix: Solid

Date Received: 07/23/18 14:35

Percent Solids: 55.4

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	0.023	B	0.0045	0.00012	ug/Kg	☼	09/04/18 09:00	09/08/18 14:54	1
1,2,3,4,6,7,8-HpCDF	0.0041	J B	0.0045	0.000068	ug/Kg	☼	09/04/18 09:00	09/08/18 14:54	1
1,2,3,4,7,8,9-HpCDF	0.00099	J B q	0.0045	0.000073	ug/Kg	☼	09/04/18 09:00	09/08/18 14:54	1
1,2,3,4,7,8-HxCDD	0.00038	J B	0.0045	0.000031	ug/Kg	☼	09/04/18 09:00	09/08/18 14:54	1
1,2,3,4,7,8-HxCDF	0.00041	J B	0.0045	0.000045	ug/Kg	☼	09/04/18 09:00	09/08/18 14:54	1
1,2,3,6,7,8-HxCDD	0.00095	J	0.0045	0.000029	ug/Kg	☼	09/04/18 09:00	09/08/18 14:54	1
1,2,3,6,7,8-HxCDF	0.00037	J B	0.0045	0.000046	ug/Kg	☼	09/04/18 09:00	09/08/18 14:54	1
1,2,3,7,8,9-HxCDD	0.00093	J B	0.0045	0.000028	ug/Kg	☼	09/04/18 09:00	09/08/18 14:54	1
1,2,3,7,8,9-HxCDF	0.0022	J B	0.0045	0.000029	ug/Kg	☼	09/04/18 09:00	09/08/18 14:54	1
1,2,3,7,8-PeCDD	0.00019	J	0.0045	0.000042	ug/Kg	☼	09/04/18 09:00	09/08/18 14:54	1
1,2,3,7,8-PeCDF	0.00037	J B q	0.0045	0.000047	ug/Kg	☼	09/04/18 09:00	09/08/18 14:54	1
2,3,4,6,7,8-HxCDF	0.00013	J q	0.0045	0.000033	ug/Kg	☼	09/04/18 09:00	09/08/18 14:54	1
2,3,4,7,8-PeCDF	0.00012	J	0.0045	0.000047	ug/Kg	☼	09/04/18 09:00	09/08/18 14:54	1
2,3,7,8-TCDD	ND		0.00089	0.000018	ug/Kg	☼	09/04/18 09:00	09/08/18 14:54	1
2,3,7,8-TCDF	0.00027	J B	0.00089	0.000016	ug/Kg	☼	09/04/18 09:00	09/08/18 14:54	1
OCDD	0.21	B	0.0089	0.00010	ug/Kg	☼	09/04/18 09:00	09/08/18 14:54	1
OCDF	0.014	B	0.0089	0.000037	ug/Kg	☼	09/04/18 09:00	09/08/18 14:54	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C-1,2,3,4,6,7,8-HpCDD	46		23 - 140	09/04/18 09:00	09/08/18 14:54	1
13C-1,2,3,4,6,7,8-HpCDF	40		28 - 143	09/04/18 09:00	09/08/18 14:54	1
13C-1,2,3,4,7,8,9-HpCDF	47		26 - 138	09/04/18 09:00	09/08/18 14:54	1
13C-1,2,3,4,7,8-HxCDD	39		32 - 141	09/04/18 09:00	09/08/18 14:54	1
13C-1,2,3,4,7,8-HxCDF	41		26 - 152	09/04/18 09:00	09/08/18 14:54	1
13C-1,2,3,6,7,8-HxCDD	41		28 - 130	09/04/18 09:00	09/08/18 14:54	1
13C-1,2,3,6,7,8-HxCDF	39		26 - 123	09/04/18 09:00	09/08/18 14:54	1
13C-1,2,3,7,8,9-HxCDF	46		29 - 147	09/04/18 09:00	09/08/18 14:54	1
13C-1,2,3,7,8-PeCDD	39		25 - 181	09/04/18 09:00	09/08/18 14:54	1
13C-1,2,3,7,8-PeCDF	41		24 - 185	09/04/18 09:00	09/08/18 14:54	1
13C-2,3,4,6,7,8-HxCDF	44		28 - 136	09/04/18 09:00	09/08/18 14:54	1
13C-2,3,4,7,8-PeCDF	43		21 - 178	09/04/18 09:00	09/08/18 14:54	1
13C-2,3,7,8-TCDD	51		25 - 164	09/04/18 09:00	09/08/18 14:54	1
13C-2,3,7,8-TCDF	56		24 - 169	09/04/18 09:00	09/08/18 14:54	1
13C-OCDD	37		17 - 157	09/04/18 09:00	09/08/18 14:54	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
37Cl4-2,3,7,8-TCDD	123		35 - 197	09/04/18 09:00	09/08/18 14:54	1

QC Sample Results

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

TestAmerica Job ID: 580-79055-2

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

Lab Sample ID: MB 320-243668/1-A
Matrix: Solid
Analysis Batch: 244513

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 243668

Analyte	MB Result	MB Qualifier	RL	EDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,3,4,6,7,8-HpCDD	0.0000959	J q	0.0050	0.000019	ug/Kg		09/04/18 09:00	09/08/18 00:37	1
1,2,3,4,6,7,8-HpCDF	0.0000768	J q	0.0050	0.000016	ug/Kg		09/04/18 09:00	09/08/18 00:37	1
1,2,3,4,7,8,9-HpCDF	0.000310	J	0.0050	0.000018	ug/Kg		09/04/18 09:00	09/08/18 00:37	1
1,2,3,4,7,8-HxCDD	0.000159	J	0.0050	0.000014	ug/Kg		09/04/18 09:00	09/08/18 00:37	1
1,2,3,4,7,8-HxCDF	0.0000528	J	0.0050	0.000027	ug/Kg		09/04/18 09:00	09/08/18 00:37	1
1,2,3,6,7,8-HxCDD	ND		0.0050	0.000014	ug/Kg		09/04/18 09:00	09/08/18 00:37	1
1,2,3,6,7,8-HxCDF	0.0000606	J	0.0050	0.000026	ug/Kg		09/04/18 09:00	09/08/18 00:37	1
1,2,3,7,8,9-HxCDD	0.0000441	J q	0.0050	0.000013	ug/Kg		09/04/18 09:00	09/08/18 00:37	1
1,2,3,7,8,9-HxCDF	0.000917	J	0.0050	0.000019	ug/Kg		09/04/18 09:00	09/08/18 00:37	1
1,2,3,7,8-PeCDD	ND		0.0050	0.000023	ug/Kg		09/04/18 09:00	09/08/18 00:37	1
1,2,3,7,8-PeCDF	0.000169	J	0.0050	0.000021	ug/Kg		09/04/18 09:00	09/08/18 00:37	1
2,3,4,6,7,8-HxCDF	ND		0.0050	0.000021	ug/Kg		09/04/18 09:00	09/08/18 00:37	1
2,3,4,7,8-PeCDF	ND		0.0050	0.000024	ug/Kg		09/04/18 09:00	09/08/18 00:37	1
2,3,7,8-TCDD	ND		0.0010	0.000028	ug/Kg		09/04/18 09:00	09/08/18 00:37	1
2,3,7,8-TCDF	0.0000573	J q	0.0010	0.000011	ug/Kg		09/04/18 09:00	09/08/18 00:37	1
OCDD	0.000744	J	0.010	0.000017	ug/Kg		09/04/18 09:00	09/08/18 00:37	1
OCDF	0.000163	J	0.010	0.000018	ug/Kg		09/04/18 09:00	09/08/18 00:37	1

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C-1,2,3,4,6,7,8-HpCDD	88		23 - 140	09/04/18 09:00	09/08/18 00:37	1
13C-1,2,3,4,6,7,8-HpCDF	83		28 - 143	09/04/18 09:00	09/08/18 00:37	1
13C-1,2,3,4,7,8,9-HpCDF	86		26 - 138	09/04/18 09:00	09/08/18 00:37	1
13C-1,2,3,4,7,8-HxCDD	68		32 - 141	09/04/18 09:00	09/08/18 00:37	1
13C-1,2,3,4,7,8-HxCDF	76		26 - 152	09/04/18 09:00	09/08/18 00:37	1
13C-1,2,3,6,7,8-HxCDD	71		28 - 130	09/04/18 09:00	09/08/18 00:37	1
13C-1,2,3,6,7,8-HxCDF	78		26 - 123	09/04/18 09:00	09/08/18 00:37	1
13C-1,2,3,7,8,9-HxCDF	76		29 - 147	09/04/18 09:00	09/08/18 00:37	1
13C-1,2,3,7,8-PeCDD	64		25 - 181	09/04/18 09:00	09/08/18 00:37	1
13C-1,2,3,7,8-PeCDF	65		24 - 185	09/04/18 09:00	09/08/18 00:37	1
13C-2,3,4,6,7,8-HxCDF	77		28 - 136	09/04/18 09:00	09/08/18 00:37	1
13C-2,3,4,7,8-PeCDF	63		21 - 178	09/04/18 09:00	09/08/18 00:37	1
13C-2,3,7,8-TCDD	73		25 - 164	09/04/18 09:00	09/08/18 00:37	1
13C-2,3,7,8-TCDF	69		24 - 169	09/04/18 09:00	09/08/18 00:37	1
13C-OCDD	80		17 - 157	09/04/18 09:00	09/08/18 00:37	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
37Cl4-2,3,7,8-TCDD	123		35 - 197	09/04/18 09:00	09/08/18 00:37	1

Lab Sample ID: LCS 320-243668/2-A
Matrix: Solid
Analysis Batch: 244513

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 243668

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
1,2,3,4,6,7,8-HpCDD	0.100	0.0998		ug/Kg		100	70 - 140
1,2,3,4,6,7,8-HpCDF	0.100	0.108		ug/Kg		108	82 - 122
1,2,3,4,7,8,9-HpCDF	0.100	0.109		ug/Kg		109	78 - 138
1,2,3,4,7,8-HxCDD	0.100	0.109		ug/Kg		109	70 - 164
1,2,3,4,7,8-HxCDF	0.100	0.110		ug/Kg		110	72 - 134

TestAmerica Seattle

QC Sample Results

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

TestAmerica Job ID: 580-79055-2

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

Lab Sample ID: LCS 320-243668/2-A
Matrix: Solid
Analysis Batch: 244513

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 243668

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
1,2,3,6,7,8-HxCDD	0.100	0.109		ug/Kg		109	76 - 134
1,2,3,6,7,8-HxCDF	0.100	0.109		ug/Kg		109	84 - 130
1,2,3,7,8,9-HxCDD	0.100	0.116		ug/Kg		116	64 - 162
1,2,3,7,8,9-HxCDF	0.100	0.110		ug/Kg		110	78 - 130
1,2,3,7,8-PeCDD	0.100	0.102		ug/Kg		102	70 - 142
1,2,3,7,8-PeCDF	0.100	0.108		ug/Kg		108	80 - 134
2,3,4,6,7,8-HxCDF	0.100	0.111		ug/Kg		111	70 - 156
2,3,4,7,8-PeCDF	0.100	0.108		ug/Kg		108	68 - 160
2,3,7,8-TCDD	0.0200	0.0191		ug/Kg		96	67 - 158
2,3,7,8-TCDF	0.0200	0.0214		ug/Kg		107	75 - 158
OCDD	0.200	0.201		ug/Kg		100	78 - 144
OCDF	0.200	0.229		ug/Kg		114	63 - 170

Isotope Dilution	LCS LCS		Limits
	%Recovery	Qualifier	
13C-1,2,3,4,6,7,8-HpCDD	88		26 - 166
13C-1,2,3,4,6,7,8-HpCDF	82		21 - 158
13C-1,2,3,4,7,8,9-HpCDF	87		20 - 186
13C-1,2,3,4,7,8-HxCDD	66		21 - 193
13C-1,2,3,4,7,8-HxCDF	74		19 - 202
13C-1,2,3,6,7,8-HxCDD	71		25 - 163
13C-1,2,3,6,7,8-HxCDF	75		21 - 159
13C-1,2,3,7,8,9-HxCDF	77		17 - 205
13C-1,2,3,7,8-PeCDD	66		21 - 227
13C-1,2,3,7,8-PeCDF	66		21 - 192
13C-2,3,4,6,7,8-HxCDF	77		22 - 176
13C-2,3,4,7,8-PeCDF	63		13 - 328
13C-2,3,7,8-TCDD	72		20 - 175
13C-2,3,7,8-TCDF	70		22 - 152
13C-OCDD	80		13 - 199

Surrogate	LCS LCS		Limits
	%Recovery	Qualifier	
37Cl4-2,3,7,8-TCDD	124		31 - 191

Lab Sample ID: LCSD 320-243668/3-A
Matrix: Solid
Analysis Batch: 244513

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 243668

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec.		RPD Limit
							Limits	RPD	
1,2,3,4,6,7,8-HpCDD	0.100	0.0967		ug/Kg		97	70 - 140	3	50
1,2,3,4,6,7,8-HpCDF	0.100	0.102		ug/Kg		102	82 - 122	6	50
1,2,3,4,7,8,9-HpCDF	0.100	0.105		ug/Kg		105	78 - 138	4	50
1,2,3,4,7,8-HxCDD	0.100	0.104		ug/Kg		104	70 - 164	5	50
1,2,3,4,7,8-HxCDF	0.100	0.105		ug/Kg		105	72 - 134	4	50
1,2,3,6,7,8-HxCDD	0.100	0.104		ug/Kg		104	76 - 134	5	50
1,2,3,6,7,8-HxCDF	0.100	0.105		ug/Kg		105	84 - 130	3	50
1,2,3,7,8,9-HxCDD	0.100	0.117		ug/Kg		117	64 - 162	0	50
1,2,3,7,8,9-HxCDF	0.100	0.107		ug/Kg		107	78 - 130	3	50
1,2,3,7,8-PeCDD	0.100	0.0992		ug/Kg		99	70 - 142	3	50

TestAmerica Seattle

QC Sample Results

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

TestAmerica Job ID: 580-79055-2

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

Lab Sample ID: LCSD 320-243668/3-A
Matrix: Solid
Analysis Batch: 244513

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 243668

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,2,3,7,8-PeCDF	0.100	0.105		ug/Kg		105	80 - 134	3	50
2,3,4,6,7,8-HxCDF	0.100	0.107		ug/Kg		107	70 - 156	4	50
2,3,4,7,8-PeCDF	0.100	0.104		ug/Kg		104	68 - 160	4	50
2,3,7,8-TCDD	0.0200	0.0183		ug/Kg		91	67 - 158	4	50
2,3,7,8-TCDF	0.0200	0.0208		ug/Kg		104	75 - 158	3	50
OCDD	0.200	0.196		ug/Kg		98	78 - 144	2	50
OCDF	0.200	0.223		ug/Kg		112	63 - 170	2	50

Isotope Dilution	LCSD		Limits
	%Recovery	Qualifier	
13C-1,2,3,4,6,7,8-HpCDD	88		26 - 166
13C-1,2,3,4,6,7,8-HpCDF	81		21 - 158
13C-1,2,3,4,7,8,9-HpCDF	88		20 - 186
13C-1,2,3,4,7,8-HxCDD	65		21 - 193
13C-1,2,3,4,7,8-HxCDF	70		19 - 202
13C-1,2,3,6,7,8-HxCDD	70		25 - 163
13C-1,2,3,6,7,8-HxCDF	71		21 - 159
13C-1,2,3,7,8,9-HxCDF	77		17 - 205
13C-1,2,3,7,8-PeCDD	67		21 - 227
13C-1,2,3,7,8-PeCDF	67		21 - 192
13C-2,3,4,6,7,8-HxCDF	76		22 - 176
13C-2,3,4,7,8-PeCDF	63		13 - 328
13C-2,3,7,8-TCDD	74		20 - 175
13C-2,3,7,8-TCDF	71		22 - 152
13C-OCDD	80		13 - 199

Surrogate	LCSD		Limits
	%Recovery	Qualifier	
37Cl4-2,3,7,8-TCDD	125		31 - 191

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Lab Chronicle

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

TestAmerica Job ID: 580-79055-2

Client Sample ID: PDI-SG-B471

Date Collected: 07/21/18 10:45

Date Received: 07/23/18 14:35

Lab Sample ID: 580-79055-1

Matrix: Solid

Percent Solids: 51.7

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	HRMS-Sox			243668	09/04/18 09:00	SR1	TAL SAC
Total/NA	Analysis	1613B		1	244552	09/08/18 14:08	AS	TAL SAC
Total/NA	Prep	HRMS-Sox	RA		243668	09/04/18 09:00	SR1	TAL SAC
Total/NA	Analysis	1613B	RA	1	245034	09/11/18 00:00	AS	TAL SAC

Client Sample ID: PDI-SG-B472

Date Collected: 07/21/18 12:20

Date Received: 07/23/18 14:35

Lab Sample ID: 580-79055-2

Matrix: Solid

Percent Solids: 55.4

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	HRMS-Sox			243668	09/04/18 09:00	SR1	TAL SAC
Total/NA	Analysis	1613B		1	244552	09/08/18 14:54	AS	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: 580-79055-2

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
Nevada	State Program	9	WA000502019-1	07-31-19
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	07-31-19
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
ANAB	DoD ELAP		L2468	01-20-21
Arizona	State Program	9	AZ0708	08-11-19
Arkansas DEQ	State Program	6	88-0691	06-17-19
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-19
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-19
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
Louisiana	NELAP	6	30612	06-30-19
Maine	State Program	1	CA0004	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-19
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-19
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	07-31-19
USDA	Federal		P330-18-00239	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

Sample Summary

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

TestAmerica Job ID: 580-79055-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-79055-1	PDI-SG-B471	Solid	07/21/18 10:45	07/23/18 14:35
580-79055-2	PDI-SG-B472	Solid	07/21/18 12:20	07/23/18 14:35

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**SURFACE SEDIMENT
CHAIN OF CUSTODY**

Project Contact: Amy Dahl / Chelsey Cook
Tel: (206) 438-2261 / (206) 438-7010
Analysis Turnaround Time
Calendar (C) or Work Days (W)
 21 days
 Other ASAP

Sample Date	Sample Time	Matrix	QC Sample	Sampler's Initials	Total No. of Cont.
7/21/2018	10:45	SS		ED	7
7/21/2018	12:20	SS		ED	7

Fraction	PCB Congeners 168A	PCD/Rs 1613B	TPH Diesel, Metals, Mercury, WTPH-Dx, 6020B, 7471A	Grain size ASTM D7928/D6913	Total organic carbon, Total solids 9060 (104C & 70C)	Archive Archive-20 C	PAHs, BEHP, Tributyltin, 8270-SIM, 8270-LI, Kron/Unger	Attention Limits ASTM D4318
	H	H	H	x	H	H	H	
	H	H	H	x	H	H	H	H

Carrier: Courier
Site Contact: Jennifer Ray
Laboratory Contact: Elaine Walker
COC No: 1 of 4 pages



Container Type: WMG-Wide Mouth Glass Jar, P=HDPE, PP-Polypropylene, AG=amber glass, G=glass, RC=Resin Column
Preservative: HCl = Hydrochloric Acid, H3PO4 = Phosphoric Acid, HNO3 = Nitric Acid
Fraction: D = Dissolved, PRT = Particulate, T = Total (unfiltered)

Special Instructions/QC Requirements & Comments:
Analyze samples for grain size ASAP, Hold (H) remaining analyses pending further instruction.
Separate reports for each lab.

Relinquished by: *Michael M...*
Relinquished by: *Jenina M...*
Relinquished by: *Jenina M...*

Company: AECOM
Date/Time: 7/23-18 1410
Company: M.E.
Date/Time: 7/23/18 1435

Received by: *Jenina M...*
Received by: *Jenina M...*
Received by: *Jenina M...*

Company: M.E.
Date/Time: 7/23/18 1410
Company: TAPOR
Date/Time: 7/23/18 1435
Company: M.E.
Date/Time: 7/23/18 1410

26, 5-3



Revised

Test/Analysis Section
 1735 8th Street East
 Tacoma, WA 98404-1117
 Phone: 253-922-4316 Fax: 253-922-5047
 Client Contact:
 ARCOM
 1111 3rd Ave Suite 1000
 Seattle, WA 98101
 Phone: (206) 438-7400 Fax: (1) (866) 495-5288
 Project Name: Portland Harbor Pre-Remedial Design
 Investigation and Baseline Sampling
 Portland, OR
 Project #: 60560335 Study: Surface Sediment
 Sample Type: DU

Project Contact: Andy Dault / Cheryl Coakley
 Tel: (360) 438-2261 / (206) 438-2010
Analysis Turnaround Time
 Calendar (C) or Work Days (W)
 21 days
 Other ASAP
Carrier: Counter

Sample ID	Sample Date	Sample Time	Matrix	QC Sample	Sampler's Initials	Total No. of Coals	Analysis	Carrier	Sample Specific Notes
PDI-SG-B471	7/21/2018	10:45	SS	ED	ED	7	PCB Congeners 1684 PAHs, BHP, Toluene, Xylenes, Styrene, NVT, PAHs, G200 TCB Grain Size ASTM D7924/D6913 Total Organic Carbon, Total Solids 986 (104C & 10C) Archive Archive - 20 C ATTENDING LIMITS DYSIG		
PDI-SG-B472	7/21/2018	12:20	SS	ED	ED	7	PCB Congeners 1684 PAHs, BHP, Toluene, Xylenes, Styrene, NVT, PAHs, G200 TCB Grain Size ASTM D7924/D6913 Total Organic Carbon, Total Solids 986 (104C & 10C) Archive Archive - 20 C ATTENDING LIMITS DYSIG		Per Action Added on 7/21/18

Container Type: VMG-Wide Mouth Glass Jar, P-HDPE, PP-Polypropylene, AG-amber glass, G-glass, RC-Resin Column
Preservative: HCl = Hydrochloric Acid, H3PO4 = Phosphoric Acid, HNO3 = Nitric Acid
Fraction: D = Dissolved, PRT = Particulate, T = Total (unfiltered)

Relinquished by: Michael M...
Relinquished by: Aquina M...
Relinquished by: Per Action

Date/Time: 7/23/18 1410
Date/Time: 7/23/18 1435
Date/Time: 7/23/18 1435

Company: AECOM
Company: M-E
Company: TAPOR

Received by: Aquina M...
Received by: Per Action
Received by: Per Action

Date/Time: 7/23/18 1410
Date/Time: 7/23/18 1435
Date/Time: 7/23/18 1435

Company: M-E
Company: TAPOR
Company: SEN TA

Returned by Lab: **Archive For 12 Months:**

2de, 503

IRB = 1.1/1.1 W/C.S

Login Sample Receipt Checklist

Client: AECOM

Job Number: 580-79055-2

Login Number: 79055

List Source: TestAmerica Seattle

List Number: 1

Creator: Antonson, Angeline D

Question	Answer	Comment
Radioactivity wasn't checked or is </= 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.	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").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



Login Sample Receipt Checklist

Client: AECOM

Job Number: 580-79055-2

Login Number: 79055
List Number: 2
Creator: Gooch, Mayce

List Source: TestAmerica Sacramento
List Creation: 07/24/18 01:02 PM

Question	Answer	Comment
Radioactivity wasn't checked or is \leq 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	2.5c
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 <math><6\text{mm}</math> (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Isotope Dilution Summary

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

TestAmerica Job ID: 580-79055-2

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)
580-79055-1	PDI-SG-B471	45	39	47	42	44	43	45	47
580-79055-1 - RA	PDI-SG-B471								
580-79055-2	PDI-SG-B472	46	40	47	39	41	41	39	46
MB 320-243668/1-A	Method Blank	88	83	86	68	76	71	78	76

		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)
580-79055-1	PDI-SG-B471	42	44	47	45	52		37
580-79055-1 - RA	PDI-SG-B471						89	
580-79055-2	PDI-SG-B472	39	41	44	43	51	56	37
MB 320-243668/1-A	Method Blank	64	65	77	63	73	69	80

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 320-243668/2-A	Lab Control Sample	88	82	87	66	74	71	75	77
LCS 320-243668/3-A	Lab Control Sample Dup	88	81	88	65	70	70	71	77

		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 320-243668/2-A	Lab Control Sample	66	66	77	63	72	70	80
LCS 320-243668/3-A	Lab Control Sample Dup	67	67	76	63	74	71	80

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: 580-79055-2

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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