

# TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

## ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

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TestAmerica Job ID: 580-80213-10

Client Project/Site: Portland Harbor Pre-Remedial Design

For:

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Attn: Amy Dahl

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Authorized for release by:  
10/15/2018 1:45:01 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.*

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# Case Narrative

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

TestAmerica Job ID: 580-80213-10

**Job ID: 580-80213-10**

**Laboratory: TestAmerica Seattle**

## Narrative

### CASE NARRATIVE

Client: AECOM

Project: Portland Harbor Pre-Remedial Design

Report Number: 580-80213-10

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**

Three samples were received on 9/10/2018 12:40 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.3° C.

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

This report contains results for 1613B Dioxins / Furans, performed at TestAmerica Sacramento.

The following samples were activated for all on hold analysis by the client on 9/26/18: PDI-SG-B431 (580-80213-1) and PDI-SG-B479 (580-80213-2).

The Rinse Blank sample has been reported under separate cover.

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-B431 (580-80213-1) and PDI-SG-B479 (580-80213-2) were analyzed for Dioxin/ Furan in accordance with 1613B.** The samples were prepared on 09/27/2018 and 10/05/2018 and analyzed on 09/29/2018 and 10/09/2018.

1,2,3,4,7,8,9-HpCDF, 1,2,3,7,8,9-HxCDF, 1,2,3,7,8-PeCDF and OCDD were detected in method blank MB 320-248203/1-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.

Several analytes were detected in method blank MB 320-250114/1-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. Refer to the QC report for details.

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 3D5 exceeded this criteria: PDI-SG-B479 (580-80213-2), (CCV 320-248597/13), (LCS 320-248203/2-A), (LCSD 320-248203/3-A), (MB 320-248203/1-A) and (WDM 320-248597/14). This retention time shift is due to normal and reasonable column

# Case Narrative

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

TestAmerica Job ID: 580-80213-10

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## Job ID: 580-80213-10 (Continued)

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### Laboratory: TestAmerica Seattle (Continued)

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.

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-B431 (580-80213-1), (CCV 320-250803/39), (LCS 320-250114/2-A), (LCSD 320-250114/3-A) and (MB 320-250114/1-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.

Due to the matrix, the initial volumes used for the following samples deviated from the standard procedure: PDI-SG-B431 (580-80213-1) and PDI-SG-B479 (580-80213-2). The reporting limits (RLs) have been adjusted proportionately.

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

# Definitions/Glossary

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

TestAmerica Job ID: 580-80213-10

## 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.

## 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: 580-80213-10

**Client Sample ID: PDI-SG-B431**

**Lab Sample ID: 580-80213-1**

Date Collected: 09/07/18 12:08

Matrix: Solid

Date Received: 09/10/18 12:40

Percent Solids: 65.0

**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	0.016	B	0.0038	0.00010	ug/Kg	☼	10/05/18 16:22	10/09/18 23:55	1
1,2,3,4,6,7,8-HpCDF	0.0036	J B q	0.0038	0.000065	ug/Kg	☼	10/05/18 16:22	10/09/18 23:55	1
1,2,3,4,7,8,9-HpCDF	0.0016	J B	0.0038	0.000077	ug/Kg	☼	10/05/18 16:22	10/09/18 23:55	1
1,2,3,4,7,8-HxCDD	0.00033	J B	0.0038	0.000043	ug/Kg	☼	10/05/18 16:22	10/09/18 23:55	1
1,2,3,4,7,8-HxCDF	0.00074	J B	0.0038	0.000070	ug/Kg	☼	10/05/18 16:22	10/09/18 23:55	1
1,2,3,6,7,8-HxCDD	0.00099	J B	0.0038	0.000042	ug/Kg	☼	10/05/18 16:22	10/09/18 23:55	1
1,2,3,6,7,8-HxCDF	0.00029	J B	0.0038	0.000062	ug/Kg	☼	10/05/18 16:22	10/09/18 23:55	1
1,2,3,7,8,9-HxCDD	0.00070	J	0.0038	0.000040	ug/Kg	☼	10/05/18 16:22	10/09/18 23:55	1
1,2,3,7,8,9-HxCDF	0.0012	J B	0.0038	0.000042	ug/Kg	☼	10/05/18 16:22	10/09/18 23:55	1
1,2,3,7,8-PeCDD	0.00017	J B	0.0038	0.000043	ug/Kg	☼	10/05/18 16:22	10/09/18 23:55	1
1,2,3,7,8-PeCDF	0.00026	J B	0.0038	0.000029	ug/Kg	☼	10/05/18 16:22	10/09/18 23:55	1
2,3,4,6,7,8-HxCDF	0.00020	J	0.0038	0.000043	ug/Kg	☼	10/05/18 16:22	10/09/18 23:55	1
2,3,4,7,8-PeCDF	0.00016	J B	0.0038	0.000031	ug/Kg	☼	10/05/18 16:22	10/09/18 23:55	1
2,3,7,8-TCDD	ND		0.00076	0.000034	ug/Kg	☼	10/05/18 16:22	10/09/18 23:55	1
2,3,7,8-TCDF	0.00018	J B q	0.00076	0.000018	ug/Kg	☼	10/05/18 16:22	10/09/18 23:55	1
OCDD	0.15	B	0.0076	0.000085	ug/Kg	☼	10/05/18 16:22	10/09/18 23:55	1
OCDF	0.012	B	0.0076	0.000034	ug/Kg	☼	10/05/18 16:22	10/09/18 23:55	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C-1,2,3,4,6,7,8-HpCDD	54		23 - 140	10/05/18 16:22	10/09/18 23:55	1
13C-1,2,3,4,6,7,8-HpCDF	48		28 - 143	10/05/18 16:22	10/09/18 23:55	1
13C-1,2,3,4,7,8,9-HpCDF	54		26 - 138	10/05/18 16:22	10/09/18 23:55	1
13C-1,2,3,4,7,8-HxCDD	53		32 - 141	10/05/18 16:22	10/09/18 23:55	1
13C-1,2,3,4,7,8-HxCDF	51		26 - 152	10/05/18 16:22	10/09/18 23:55	1
13C-1,2,3,6,7,8-HxCDD	55		28 - 130	10/05/18 16:22	10/09/18 23:55	1
13C-1,2,3,6,7,8-HxCDF	50		26 - 123	10/05/18 16:22	10/09/18 23:55	1
13C-1,2,3,7,8,9-HxCDF	58		29 - 147	10/05/18 16:22	10/09/18 23:55	1
13C-1,2,3,7,8-PeCDD	55		25 - 181	10/05/18 16:22	10/09/18 23:55	1
13C-1,2,3,7,8-PeCDF	55		24 - 185	10/05/18 16:22	10/09/18 23:55	1
13C-2,3,4,6,7,8-HxCDF	53		28 - 136	10/05/18 16:22	10/09/18 23:55	1
13C-2,3,4,7,8-PeCDF	57		21 - 178	10/05/18 16:22	10/09/18 23:55	1
13C-2,3,7,8-TCDD	60		25 - 164	10/05/18 16:22	10/09/18 23:55	1
13C-2,3,7,8-TCDF	61		24 - 169	10/05/18 16:22	10/09/18 23:55	1
13C-OCDD	51		17 - 157	10/05/18 16:22	10/09/18 23:55	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
37Cl4-2,3,7,8-TCDD	93		35 - 197	10/05/18 16:22	10/09/18 23:55	1

# Client Sample Results

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

TestAmerica Job ID: 580-80213-10

**Client Sample ID: PDI-SG-B479**

**Lab Sample ID: 580-80213-2**

Date Collected: 09/07/18 09:58

Matrix: Solid

Date Received: 09/10/18 12:40

Percent Solids: 65.2

**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	0.016		0.0038	0.00026	ug/Kg	☼	09/27/18 14:12	09/29/18 10:01	1
1,2,3,4,6,7,8-HpCDF	0.0027	J q	0.0038	0.00015	ug/Kg	☼	09/27/18 14:12	09/29/18 10:01	1
1,2,3,4,7,8,9-HpCDF	0.00072	J B	0.0038	0.00018	ug/Kg	☼	09/27/18 14:12	09/29/18 10:01	1
1,2,3,4,7,8-HxCDD	0.00031	J q	0.0038	0.00017	ug/Kg	☼	09/27/18 14:12	09/29/18 10:01	1
1,2,3,4,7,8-HxCDF	ND		0.0038	0.00018	ug/Kg	☼	09/27/18 14:12	09/29/18 10:01	1
1,2,3,6,7,8-HxCDD	0.00074	J	0.0038	0.00017	ug/Kg	☼	09/27/18 14:12	09/29/18 10:01	1
1,2,3,6,7,8-HxCDF	ND		0.0038	0.00016	ug/Kg	☼	09/27/18 14:12	09/29/18 10:01	1
1,2,3,7,8,9-HxCDD	0.00062	J	0.0038	0.00016	ug/Kg	☼	09/27/18 14:12	09/29/18 10:01	1
1,2,3,7,8,9-HxCDF	0.00066	J B	0.0038	0.00014	ug/Kg	☼	09/27/18 14:12	09/29/18 10:01	1
1,2,3,7,8-PeCDD	ND		0.0038	0.00025	ug/Kg	☼	09/27/18 14:12	09/29/18 10:01	1
1,2,3,7,8-PeCDF	ND		0.0038	0.00013	ug/Kg	☼	09/27/18 14:12	09/29/18 10:01	1
2,3,4,6,7,8-HxCDF	ND		0.0038	0.00013	ug/Kg	☼	09/27/18 14:12	09/29/18 10:01	1
2,3,4,7,8-PeCDF	ND		0.0038	0.00014	ug/Kg	☼	09/27/18 14:12	09/29/18 10:01	1
2,3,7,8-TCDD	ND		0.00077	0.00014	ug/Kg	☼	09/27/18 14:12	09/29/18 10:01	1
2,3,7,8-TCDF	0.00018	J	0.00077	0.000081	ug/Kg	☼	09/27/18 14:12	09/29/18 10:01	1
OCDD	0.13	B	0.0077	0.00043	ug/Kg	☼	09/27/18 14:12	09/29/18 10:01	1
OCDF	0.010		0.0077	0.00030	ug/Kg	☼	09/27/18 14:12	09/29/18 10:01	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C-1,2,3,4,6,7,8-HpCDD	51		23 - 140	09/27/18 14:12	09/29/18 10:01	1
13C-1,2,3,4,6,7,8-HpCDF	44		28 - 143	09/27/18 14:12	09/29/18 10:01	1
13C-1,2,3,4,7,8,9-HpCDF	55		26 - 138	09/27/18 14:12	09/29/18 10:01	1
13C-1,2,3,4,7,8-HxCDD	64		32 - 141	09/27/18 14:12	09/29/18 10:01	1
13C-1,2,3,4,7,8-HxCDF	59		26 - 152	09/27/18 14:12	09/29/18 10:01	1
13C-1,2,3,6,7,8-HxCDD	57		28 - 130	09/27/18 14:12	09/29/18 10:01	1
13C-1,2,3,6,7,8-HxCDF	58		26 - 123	09/27/18 14:12	09/29/18 10:01	1
13C-1,2,3,7,8,9-HxCDF	66		29 - 147	09/27/18 14:12	09/29/18 10:01	1
13C-1,2,3,7,8-PeCDD	62		25 - 181	09/27/18 14:12	09/29/18 10:01	1
13C-1,2,3,7,8-PeCDF	63		24 - 185	09/27/18 14:12	09/29/18 10:01	1
13C-2,3,4,6,7,8-HxCDF	62		28 - 136	09/27/18 14:12	09/29/18 10:01	1
13C-2,3,4,7,8-PeCDF	64		21 - 178	09/27/18 14:12	09/29/18 10:01	1
13C-2,3,7,8-TCDD	67		25 - 164	09/27/18 14:12	09/29/18 10:01	1
13C-2,3,7,8-TCDF	74		24 - 169	09/27/18 14:12	09/29/18 10:01	1
13C-OCDD	36		17 - 157	09/27/18 14:12	09/29/18 10:01	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
37Cl4-2,3,7,8-TCDD	92		35 - 197	09/27/18 14:12	09/29/18 10:01	1

# QC Sample Results

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

TestAmerica Job ID: 580-80213-10

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

**Lab Sample ID: MB 320-248203/1-A**  
**Matrix: Solid**  
**Analysis Batch: 248597**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 248203**

Analyte	MB Result	MB Qualifier	RL	EDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,3,4,6,7,8-HpCDD	ND		0.0050	0.00011	ug/Kg		09/27/18 14:12	09/29/18 03:35	1
1,2,3,4,6,7,8-HpCDF	ND		0.0050	0.000080	ug/Kg		09/27/18 14:12	09/29/18 03:35	1
1,2,3,4,7,8,9-HpCDF	0.000750	J	0.0050	0.00011	ug/Kg		09/27/18 14:12	09/29/18 03:35	1
1,2,3,4,7,8-HxCDD	ND		0.0050	0.00013	ug/Kg		09/27/18 14:12	09/29/18 03:35	1
1,2,3,4,7,8-HxCDF	ND		0.0050	0.00018	ug/Kg		09/27/18 14:12	09/29/18 03:35	1
1,2,3,6,7,8-HxCDD	ND		0.0050	0.00012	ug/Kg		09/27/18 14:12	09/29/18 03:35	1
1,2,3,6,7,8-HxCDF	ND		0.0050	0.00015	ug/Kg		09/27/18 14:12	09/29/18 03:35	1
1,2,3,7,8,9-HxCDD	ND		0.0050	0.00012	ug/Kg		09/27/18 14:12	09/29/18 03:35	1
1,2,3,7,8,9-HxCDF	0.00107	J	0.0050	0.00013	ug/Kg		09/27/18 14:12	09/29/18 03:35	1
1,2,3,7,8-PeCDD	ND		0.0050	0.00012	ug/Kg		09/27/18 14:12	09/29/18 03:35	1
1,2,3,7,8-PeCDF	0.000202	J	0.0050	0.000093	ug/Kg		09/27/18 14:12	09/29/18 03:35	1
2,3,4,6,7,8-HxCDF	ND		0.0050	0.00012	ug/Kg		09/27/18 14:12	09/29/18 03:35	1
2,3,4,7,8-PeCDF	ND		0.0050	0.00011	ug/Kg		09/27/18 14:12	09/29/18 03:35	1
2,3,7,8-TCDD	ND		0.0010	0.00017	ug/Kg		09/27/18 14:12	09/29/18 03:35	1
2,3,7,8-TCDF	ND		0.0010	0.00011	ug/Kg		09/27/18 14:12	09/29/18 03:35	1
OCDD	0.00144	J	0.010	0.00013	ug/Kg		09/27/18 14:12	09/29/18 03:35	1
OCDF	ND		0.010	0.00016	ug/Kg		09/27/18 14:12	09/29/18 03:35	1

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C-1,2,3,4,6,7,8-HpCDD	64		23 - 140	09/27/18 14:12	09/29/18 03:35	1
13C-1,2,3,4,6,7,8-HpCDF	60		28 - 143	09/27/18 14:12	09/29/18 03:35	1
13C-1,2,3,4,7,8,9-HpCDF	66		26 - 138	09/27/18 14:12	09/29/18 03:35	1
13C-1,2,3,4,7,8-HxCDD	59		32 - 141	09/27/18 14:12	09/29/18 03:35	1
13C-1,2,3,4,7,8-HxCDF	53		26 - 152	09/27/18 14:12	09/29/18 03:35	1
13C-1,2,3,6,7,8-HxCDD	60		28 - 130	09/27/18 14:12	09/29/18 03:35	1
13C-1,2,3,6,7,8-HxCDF	60		26 - 123	09/27/18 14:12	09/29/18 03:35	1
13C-1,2,3,7,8,9-HxCDF	69		29 - 147	09/27/18 14:12	09/29/18 03:35	1
13C-1,2,3,7,8-PeCDD	63		25 - 181	09/27/18 14:12	09/29/18 03:35	1
13C-1,2,3,7,8-PeCDF	61		24 - 185	09/27/18 14:12	09/29/18 03:35	1
13C-2,3,4,6,7,8-HxCDF	65		28 - 136	09/27/18 14:12	09/29/18 03:35	1
13C-2,3,4,7,8-PeCDF	57		21 - 178	09/27/18 14:12	09/29/18 03:35	1
13C-2,3,7,8-TCDD	58		25 - 164	09/27/18 14:12	09/29/18 03:35	1
13C-2,3,7,8-TCDF	60		24 - 169	09/27/18 14:12	09/29/18 03:35	1
13C-OCDD	63		17 - 157	09/27/18 14:12	09/29/18 03:35	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
37Cl4-2,3,7,8-TCDD	80		35 - 197	09/27/18 14:12	09/29/18 03:35	1

**Lab Sample ID: LCS 320-248203/2-A**  
**Matrix: Solid**  
**Analysis Batch: 248597**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 248203**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
1,2,3,4,6,7,8-HpCDD	0.100	0.105		ug/Kg		105	70 - 140
1,2,3,4,6,7,8-HpCDF	0.100	0.104		ug/Kg		104	82 - 122
1,2,3,4,7,8,9-HpCDF	0.100	0.107		ug/Kg		107	78 - 138
1,2,3,4,7,8-HxCDD	0.100	0.102		ug/Kg		102	70 - 164
1,2,3,4,7,8-HxCDF	0.100	0.107		ug/Kg		107	72 - 134

TestAmerica Seattle



# QC Sample Results

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

TestAmerica Job ID: 580-80213-10

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

**Lab Sample ID: LCS 320-248203/2-A**  
**Matrix: Solid**  
**Analysis Batch: 248597**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 248203**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
1,2,3,6,7,8-HxCDD	0.100	0.104		ug/Kg		104	76 - 134
1,2,3,6,7,8-HxCDF	0.100	0.108		ug/Kg		108	84 - 130
1,2,3,7,8,9-HxCDD	0.100	0.107		ug/Kg		107	64 - 162
1,2,3,7,8,9-HxCDF	0.100	0.115		ug/Kg		115	78 - 130
1,2,3,7,8-PeCDD	0.100	0.104		ug/Kg		104	70 - 142
1,2,3,7,8-PeCDF	0.100	0.106		ug/Kg		106	80 - 134
2,3,4,6,7,8-HxCDF	0.100	0.108		ug/Kg		108	70 - 156
2,3,4,7,8-PeCDF	0.100	0.104		ug/Kg		104	68 - 160
2,3,7,8-TCDD	0.0200	0.0213		ug/Kg		106	67 - 158
2,3,7,8-TCDF	0.0200	0.0211		ug/Kg		105	75 - 158
OCDD	0.200	0.210		ug/Kg		105	78 - 144
OCDF	0.200	0.214		ug/Kg		107	63 - 170

Isotope Dilution	LCS LCS		Limits
	%Recovery	Qualifier	
13C-1,2,3,4,6,7,8-HpCDD	69		26 - 166
13C-1,2,3,4,6,7,8-HpCDF	70		21 - 158
13C-1,2,3,4,7,8,9-HpCDF	71		20 - 186
13C-1,2,3,4,7,8-HxCDD	69		21 - 193
13C-1,2,3,4,7,8-HxCDF	70		19 - 202
13C-1,2,3,6,7,8-HxCDD	72		25 - 163
13C-1,2,3,6,7,8-HxCDF	72		21 - 159
13C-1,2,3,7,8,9-HxCDF	74		17 - 205
13C-1,2,3,7,8-PeCDD	75		21 - 227
13C-1,2,3,7,8-PeCDF	75		21 - 192
13C-2,3,4,6,7,8-HxCDF	73		22 - 176
13C-2,3,4,7,8-PeCDF	75		13 - 328
13C-2,3,7,8-TCDD	72		20 - 175
13C-2,3,7,8-TCDF	73		22 - 152
13C-OCDD	69		13 - 199

Surrogate	LCS LCS		Limits
	%Recovery	Qualifier	
37Cl4-2,3,7,8-TCDD	81		31 - 191

**Lab Sample ID: LCSD 320-248203/3-A**  
**Matrix: Solid**  
**Analysis Batch: 248597**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 248203**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits		
							RPD	Limit	
1,2,3,4,6,7,8-HpCDD	0.100	0.103		ug/Kg		103	70 - 140	2	50
1,2,3,4,6,7,8-HpCDF	0.100	0.0997		ug/Kg		100	82 - 122	4	50
1,2,3,4,7,8,9-HpCDF	0.100	0.102		ug/Kg		102	78 - 138	5	50
1,2,3,4,7,8-HxCDD	0.100	0.101		ug/Kg		101	70 - 164	2	50
1,2,3,4,7,8-HxCDF	0.100	0.105		ug/Kg		105	72 - 134	2	50
1,2,3,6,7,8-HxCDD	0.100	0.0998		ug/Kg		100	76 - 134	4	50
1,2,3,6,7,8-HxCDF	0.100	0.106		ug/Kg		106	84 - 130	1	50
1,2,3,7,8,9-HxCDD	0.100	0.102		ug/Kg		102	64 - 162	4	50
1,2,3,7,8,9-HxCDF	0.100	0.110		ug/Kg		110	78 - 130	4	50
1,2,3,7,8-PeCDD	0.100	0.101		ug/Kg		101	70 - 142	3	50

TestAmerica Seattle

# QC Sample Results

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

TestAmerica Job ID: 580-80213-10

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

**Lab Sample ID: LCSD 320-248203/3-A**  
**Matrix: Solid**  
**Analysis Batch: 248597**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 248203**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,2,3,7,8-PeCDF	0.100	0.104		ug/Kg		104	80 - 134	2	50
2,3,4,6,7,8-HxCDF	0.100	0.112		ug/Kg		112	70 - 156	4	50
2,3,4,7,8-PeCDF	0.100	0.102		ug/Kg		102	68 - 160	3	50
2,3,7,8-TCDD	0.0200	0.0200		ug/Kg		100	67 - 158	6	50
2,3,7,8-TCDF	0.0200	0.0207		ug/Kg		103	75 - 158	2	50
OCDD	0.200	0.207		ug/Kg		104	78 - 144	2	50
OCDF	0.200	0.211		ug/Kg		105	63 - 170	2	50

Isotope Dilution	LCSD		Limits
	%Recovery	Qualifier	
13C-1,2,3,4,6,7,8-HpCDD	71		26 - 166
13C-1,2,3,4,6,7,8-HpCDF	73		21 - 158
13C-1,2,3,4,7,8,9-HpCDF	78		20 - 186
13C-1,2,3,4,7,8-HxCDD	72		21 - 193
13C-1,2,3,4,7,8-HxCDF	76		19 - 202
13C-1,2,3,6,7,8-HxCDD	72		25 - 163
13C-1,2,3,6,7,8-HxCDF	74		21 - 159
13C-1,2,3,7,8,9-HxCDF	77		17 - 205
13C-1,2,3,7,8-PeCDD	83		21 - 227
13C-1,2,3,7,8-PeCDF	81		21 - 192
13C-2,3,4,6,7,8-HxCDF	73		22 - 176
13C-2,3,4,7,8-PeCDF	82		13 - 328
13C-2,3,7,8-TCDD	75		20 - 175
13C-2,3,7,8-TCDF	71		22 - 152
13C-OCDD	73		13 - 199

Surrogate	LCSD		Limits
	%Recovery	Qualifier	
37Cl4-2,3,7,8-TCDD	82		31 - 191

**Lab Sample ID: MB 320-250114/1-A**  
**Matrix: Solid**  
**Analysis Batch: 250803**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 250114**

Analyte	MB		RL	EDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
1,2,3,4,6,7,8-HpCDD	0.000189	J q	0.0050	0.000016	ug/Kg		10/05/18 16:22	10/09/18 21:37	1
1,2,3,4,6,7,8-HpCDF	0.000205	J	0.0050	0.000026	ug/Kg		10/05/18 16:22	10/09/18 21:37	1
1,2,3,4,7,8,9-HpCDF	0.000724	J	0.0050	0.000035	ug/Kg		10/05/18 16:22	10/09/18 21:37	1
1,2,3,4,7,8-HxCDD	0.000148	J	0.0050	0.000018	ug/Kg		10/05/18 16:22	10/09/18 21:37	1
1,2,3,4,7,8-HxCDF	0.0000995	J q	0.0050	0.000043	ug/Kg		10/05/18 16:22	10/09/18 21:37	1
1,2,3,6,7,8-HxCDD	0.0000589	J	0.0050	0.000017	ug/Kg		10/05/18 16:22	10/09/18 21:37	1
1,2,3,6,7,8-HxCDF	0.0000847	J	0.0050	0.000040	ug/Kg		10/05/18 16:22	10/09/18 21:37	1
1,2,3,7,8,9-HxCDD	ND		0.0050	0.000016	ug/Kg		10/05/18 16:22	10/09/18 21:37	1
1,2,3,7,8,9-HxCDF	0.00105	J	0.0050	0.000029	ug/Kg		10/05/18 16:22	10/09/18 21:37	1
1,2,3,7,8-PeCDD	0.0000395	J q	0.0050	0.000020	ug/Kg		10/05/18 16:22	10/09/18 21:37	1
1,2,3,7,8-PeCDF	0.000128	J	0.0050	0.000021	ug/Kg		10/05/18 16:22	10/09/18 21:37	1
2,3,4,6,7,8-HxCDF	ND		0.0050	0.000029	ug/Kg		10/05/18 16:22	10/09/18 21:37	1
2,3,4,7,8-PeCDF	0.0000504	J	0.0050	0.000024	ug/Kg		10/05/18 16:22	10/09/18 21:37	1
2,3,7,8-TCDD	ND		0.0010	0.000024	ug/Kg		10/05/18 16:22	10/09/18 21:37	1
2,3,7,8-TCDF	0.0000589	J	0.0010	0.000011	ug/Kg		10/05/18 16:22	10/09/18 21:37	1

TestAmerica Seattle

# QC Sample Results

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

TestAmerica Job ID: 580-80213-10

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

**Lab Sample ID: MB 320-250114/1-A**  
**Matrix: Solid**  
**Analysis Batch: 250803**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 250114**

Analyte	MB Result	MB Qualifier	RL	EDL	Unit	D	Prepared	Analyzed	Dil Fac
OCDD	0.00169	J	0.010	0.000027	ug/Kg		10/05/18 16:22	10/09/18 21:37	1
OCDF	0.000394	J	0.010	0.000027	ug/Kg		10/05/18 16:22	10/09/18 21:37	1
MB MB									
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C-1,2,3,4,6,7,8-HpCDD	79		23 - 140				10/05/18 16:22	10/09/18 21:37	1
13C-1,2,3,4,6,7,8-HpCDF	76		28 - 143				10/05/18 16:22	10/09/18 21:37	1
13C-1,2,3,4,7,8,9-HpCDF	77		26 - 138				10/05/18 16:22	10/09/18 21:37	1
13C-1,2,3,4,7,8-HxCDD	74		32 - 141				10/05/18 16:22	10/09/18 21:37	1
13C-1,2,3,4,7,8-HxCDF	69		26 - 152				10/05/18 16:22	10/09/18 21:37	1
13C-1,2,3,6,7,8-HxCDD	73		28 - 130				10/05/18 16:22	10/09/18 21:37	1
13C-1,2,3,6,7,8-HxCDF	69		26 - 123				10/05/18 16:22	10/09/18 21:37	1
13C-1,2,3,7,8,9-HxCDF	76		29 - 147				10/05/18 16:22	10/09/18 21:37	1
13C-1,2,3,7,8-PeCDD	73		25 - 181				10/05/18 16:22	10/09/18 21:37	1
13C-1,2,3,7,8-PeCDF	73		24 - 185				10/05/18 16:22	10/09/18 21:37	1
13C-2,3,4,6,7,8-HxCDF	69		28 - 136				10/05/18 16:22	10/09/18 21:37	1
13C-2,3,4,7,8-PeCDF	72		21 - 178				10/05/18 16:22	10/09/18 21:37	1
13C-2,3,7,8-TCDD	75		25 - 164				10/05/18 16:22	10/09/18 21:37	1
13C-2,3,7,8-TCDF	71		24 - 169				10/05/18 16:22	10/09/18 21:37	1
13C-OCDD	80		17 - 157				10/05/18 16:22	10/09/18 21:37	1
MB MB									
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
37Cl4-2,3,7,8-TCDD	96		35 - 197				10/05/18 16:22	10/09/18 21:37	1

**Lab Sample ID: LCS 320-250114/2-A**  
**Matrix: Solid**  
**Analysis Batch: 250803**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 250114**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
1,2,3,4,6,7,8-HpCDD	0.100	0.104		ug/Kg		104	70 - 140
1,2,3,4,6,7,8-HpCDF	0.100	0.106		ug/Kg		106	82 - 122
1,2,3,4,7,8,9-HpCDF	0.100	0.106		ug/Kg		106	78 - 138
1,2,3,4,7,8-HxCDD	0.100	0.103		ug/Kg		103	70 - 164
1,2,3,4,7,8-HxCDF	0.100	0.103		ug/Kg		103	72 - 134
1,2,3,6,7,8-HxCDD	0.100	0.104		ug/Kg		104	76 - 134
1,2,3,6,7,8-HxCDF	0.100	0.103		ug/Kg		103	84 - 130
1,2,3,7,8,9-HxCDD	0.100	0.108		ug/Kg		108	64 - 162
1,2,3,7,8,9-HxCDF	0.100	0.109		ug/Kg		109	78 - 130
1,2,3,7,8-PeCDD	0.100	0.105		ug/Kg		105	70 - 142
1,2,3,7,8-PeCDF	0.100	0.105		ug/Kg		105	80 - 134
2,3,4,6,7,8-HxCDF	0.100	0.102		ug/Kg		102	70 - 156
2,3,4,7,8-PeCDF	0.100	0.103		ug/Kg		103	68 - 160
2,3,7,8-TCDD	0.0200	0.0202		ug/Kg		101	67 - 158
2,3,7,8-TCDF	0.0200	0.0203		ug/Kg		101	75 - 158
OCDD	0.200	0.207		ug/Kg		103	78 - 144
OCDF	0.200	0.200		ug/Kg		100	63 - 170
LCS LCS							
Isotope Dilution	%Recovery	Qualifier	Limits				
13C-1,2,3,4,6,7,8-HpCDD	71		26 - 166				

TestAmerica Seattle

# QC Sample Results

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

TestAmerica Job ID: 580-80213-10

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

**Lab Sample ID: LCS 320-250114/2-A**  
**Matrix: Solid**  
**Analysis Batch: 250803**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 250114**

<i>Isotope Dilution</i>	LCS LCS		<i>Limits</i>
	%Recovery	Qualifier	
13C-1,2,3,4,6,7,8-HpCDF	68		21 - 158
13C-1,2,3,4,7,8,9-HpCDF	69		20 - 186
13C-1,2,3,4,7,8-HxCDD	66		21 - 193
13C-1,2,3,4,7,8-HxCDF	63		19 - 202
13C-1,2,3,6,7,8-HxCDD	66		25 - 163
13C-1,2,3,6,7,8-HxCDF	63		21 - 159
13C-1,2,3,7,8,9-HxCDF	69		17 - 205
13C-1,2,3,7,8-PeCDD	66		21 - 227
13C-1,2,3,7,8-PeCDF	65		21 - 192
13C-2,3,4,6,7,8-HxCDF	62		22 - 176
13C-2,3,4,7,8-PeCDF	65		13 - 328
13C-2,3,7,8-TCDD	68		20 - 175
13C-2,3,7,8-TCDF	66		22 - 152
13C-OCDD	72		13 - 199
<i>Surrogate</i>	LCS LCS		<i>Limits</i>
	%Recovery	Qualifier	
37Cl4-2,3,7,8-TCDD	96		31 - 191

**Lab Sample ID: LCSD 320-250114/3-A**  
**Matrix: Solid**  
**Analysis Batch: 250803**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 250114**

<i>Analyte</i>	<i>Spike Added</i>	<i>LCSD Result</i>	<i>LCSD Qualifier</i>	<i>Unit</i>	<i>D</i>	<i>%Rec</i>	<i>%Rec. Limits</i>	<i>RPD</i>	<i>RPD Limit</i>
1,2,3,4,6,7,8-HpCDD	0.100	0.104		ug/Kg		104	70 - 140	0	50
1,2,3,4,6,7,8-HpCDF	0.100	0.105		ug/Kg		105	82 - 122	0	50
1,2,3,4,7,8,9-HpCDF	0.100	0.105		ug/Kg		105	78 - 138	1	50
1,2,3,4,7,8-HxCDD	0.100	0.102		ug/Kg		102	70 - 164	1	50
1,2,3,4,7,8-HxCDF	0.100	0.103		ug/Kg		103	72 - 134	1	50
1,2,3,6,7,8-HxCDD	0.100	0.105		ug/Kg		105	76 - 134	0	50
1,2,3,6,7,8-HxCDF	0.100	0.104		ug/Kg		104	84 - 130	2	50
1,2,3,7,8,9-HxCDD	0.100	0.106		ug/Kg		106	64 - 162	1	50
1,2,3,7,8,9-HxCDF	0.100	0.108		ug/Kg		108	78 - 130	1	50
1,2,3,7,8-PeCDD	0.100	0.104		ug/Kg		104	70 - 142	1	50
1,2,3,7,8-PeCDF	0.100	0.104		ug/Kg		104	80 - 134	1	50
2,3,4,6,7,8-HxCDF	0.100	0.101		ug/Kg		101	70 - 156	1	50
2,3,4,7,8-PeCDF	0.100	0.104		ug/Kg		104	68 - 160	1	50
2,3,7,8-TCDD	0.0200	0.0203		ug/Kg		101	67 - 158	0	50
2,3,7,8-TCDF	0.0200	0.0206		ug/Kg		103	75 - 158	2	50
OCDD	0.200	0.208		ug/Kg		104	78 - 144	1	50
OCDF	0.200	0.203		ug/Kg		101	63 - 170	1	50
<i>Isotope Dilution</i>	LCSD LCSD		<i>Limits</i>						
	%Recovery	Qualifier							
13C-1,2,3,4,6,7,8-HpCDD	78		26 - 166						
13C-1,2,3,4,6,7,8-HpCDF	74		21 - 158						
13C-1,2,3,4,7,8,9-HpCDF	76		20 - 186						
13C-1,2,3,4,7,8-HxCDD	71		21 - 193						
13C-1,2,3,4,7,8-HxCDF	69		19 - 202						
13C-1,2,3,6,7,8-HxCDD	72		25 - 163						

TestAmerica Seattle

# QC Sample Results

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

TestAmerica Job ID: 580-80213-10

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

Lab Sample ID: LCSD 320-250114/3-A

Matrix: Solid

Analysis Batch: 250803

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 250114

<i>Isotope Dilution</i>	<i>LCSD LCSD</i>		<i>Limits</i>
	<i>%Recovery</i>	<i>Qualifier</i>	
13C-1,2,3,6,7,8-HxCDF	66		21 - 159
13C-1,2,3,7,8,9-HxCDF	75		17 - 205
13C-1,2,3,7,8-PeCDD	72		21 - 227
13C-1,2,3,7,8-PeCDF	72		21 - 192
13C-2,3,4,6,7,8-HxCDF	69		22 - 176
13C-2,3,4,7,8-PeCDF	71		13 - 328
13C-2,3,7,8-TCDD	73		20 - 175
13C-2,3,7,8-TCDF	71		22 - 152
13C-OCDD	78		13 - 199
<i>Surrogate</i>	<i>LCSD LCSD</i>		<i>Limits</i>
37Cl4-2,3,7,8-TCDD	98		31 - 191

# Lab Chronicle

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

TestAmerica Job ID: 580-80213-10

**Client Sample ID: PDI-SG-B431**

**Date Collected: 09/07/18 12:08**

**Date Received: 09/10/18 12:40**

**Lab Sample ID: 580-80213-1**

**Matrix: Solid**

**Percent Solids: 65.0**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	HRMS-Sox			250114	10/05/18 16:22	SR1	TAL SAC
Total/NA	Analysis	1613B		1	250803	10/09/18 23:55	AS	TAL SAC

**Client Sample ID: PDI-SG-B479**

**Date Collected: 09/07/18 09:58**

**Date Received: 09/10/18 12:40**

**Lab Sample ID: 580-80213-2**

**Matrix: Solid**

**Percent Solids: 65.2**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	HRMS-Sox			248203	09/27/18 14:12	SR1	TAL SAC
Total/NA	Analysis	1613B		1	248597	09/29/18 10:01	KSS	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: 580-80213-10

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	12-31-20
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

\* Accreditation/Certification renewal pending - accreditation/certification considered valid.

# Sample Summary

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

TestAmerica Job ID: 580-80213-10

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-80213-1	PDI-SG-B431	Solid	09/07/18 12:08	09/10/18 12:40
580-80213-2	PDI-SG-B479	Solid	09/07/18 09:58	09/10/18 12:40

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580-80213 Chain of Custody

**SURFACE SEDIMENT  
CHAIN OF CUSTODY**

**TestAmerica-Seattle**  
5755-8th-Street-East  
Tacoma, WA 98224-1317  
Ph: 253-922-2310 Fax: 253-922-5047

**Client Contact**  
AECOM  
1111 3rd Ave Suite 1600  
Seattle, WA 98101  
Phone: (206) 438-2700 Fax: 1-(866) 495-5288  
Project Name: Portland Harbor Pre-Remedial Design Investigation and Baseline Sampling  
Portland, OR  
Project #: 60566335 Study: Surface Water Sediment  
Sample Type: D/U

**Project Contact:** Amy Dahl / Chelsey Cook  
Tel: (206) 438-2261 / (206) 438-2010  
Analysis Turnaround Time  
Calendar (C) or Work Days (W)  
21 days (water)  
Other ASAP (63 only)

**Site Contact:** Jennifer Ray  
Laboratory Contact: Elaine-Walker  
Carrier: Courier

9/10/2018 COC No: 1 of 1 pages

Sample Date	Sample Time	Matrix	QC Sample	Sampler's Initials	Total No. of Cont.	Fraction	PCB Congeners 168A	PCDD/Fs 1613B	TPH Diesel, Metals, Mercury NWTPH-Dx, 6020B, 7471A	Crain size ASTM D7928/D6913	Total organic carbon, Total solids 9060 (104C & 70C)	Archive Archive -20 C	PAHs, BEHP, Tributyltin, 8270-SIM, 8270-LT, Kron/Unger	WQ - PCB Congeners 168A	WQ - PCDD/Fs 1613B	WQ - TPH Diesel NWTPH-Dx	WQ - Metals, Mercury 6020B, 7470	WQ - Total Organic Carbon SMS10B	WQ - PAHs 8270-SIM	WQ - Pesticides 1669M	WQ - BEHP EPA 8270D-LL	WQ - Tributyltin Kron/Unger		
9/7/2018	12:08	SS		MSH	7		H	H	H	x	H	H	H											
9/7/2018	9:58	SS		MSH	7		H	H	H	x	H	H	H											
9/7/2018	14:50	W		JH	14									x	x	x	x	x	x	x	x	x	x	

**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)

**Sample Disposal**  
 Return To Client  Dispose By Lab  Archive For 12 Months

**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: *[Signature]* Date/Time: 9/10/18 1204  
 Relinquished by: *[Signature]* Date/Time: 9/10/18 1240  
 Relinquished by: *[Signature]* Date/Time:   
 Company: AECOM  
 Company: M.E.  
 Company:   
 Received by: *[Signature]* Date/Time: 9/10/18 1204  
 Received by: *[Signature]* Date/Time:   
 Received by: *[Signature]* Date/Time:   
 Company: M.E.  
 Company:   
 Company:   
 Date/Time: 9/10/18 1204





## SURFACE SEDIMENT CHAIN OF CUSTODY

580-80213 Chain of Custody

<b>TestAmerica-Seattle</b> 5755-8th-Street-East Tacoma, WA 98424-1317 Ph: 253-922-2310 Fax: 253-922-5047		<b>SURFACE SEDIMENT CHAIN OF CUSTODY</b>										9/10/2018 COC No. 1									
<b>Client Contact</b> AECOM 1111 3rd Ave Suite 1600 Seattle, WA 98101 Phone: (206) 438-2700 Fax: 1+(866) 495-5288		<b>Project Contact: Amy Dahl / Chelsey Cook</b> Tel: (206) 438-2261 / (206) 438-2010				<b>Site Contact: Jennifer Ray</b> Laboratory Contact: Elaine-Walker				<b>Carrier: Courier</b>				1 of 1 pages							
<b>Analysis Turnaround Time</b> Calendar (C) or Work Days (W)		Fraction PCB Congeners 1668A PCDD/Fs 1613B TPH Diesel, Metal, Mercury NWT/PH-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-LL, Kron/Unger WQ - PCB Congeners 1668A WQ - PCDD/Fs 1613B WQ - TPH Diesel NWT/PH-Dx WQ - Metals, Mercury 6020B, 7470 WQ - Total Organic Carbon SM4310B WQ - PAHs 8270-SIM WQ - Pesticides 1669M WQ - BEHP EPA 8270B-1-L WQ - Tributyltin Kron/Unger	<input checked="" type="checkbox"/> 21 days (water)	<input checked="" type="checkbox"/> Other ASAP (GS only)																	
Project Name: Portland Harbor Pre-Remedial Design Investigation and Baseline Sampling																					
Portland, OR Project #: 60566335 Study: Surface Water Sediment																					
Sample Type: D/U																					
Sample Identification		Sample Date	Sample Time	Matrix	QC Sample	Sampler's Initials	Total No. of Cont.	Sample Specific Notes:													
PDI-SG-B431		9/7/2018	12:08	SS		MSH	7														
PDI-SG-B479		9/7/2018	9:58	SS		MSH	7														
PDI-RB-VV-090718		9/7/2018	14:50	W		JH	14														
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: <i>[Signature]</i> Company: AECOM		Date/Time: 9/10/18 1204		Relinquished by: <i>[Signature]</i> Company: M.E.		Date/Time: 9/10/18 1240		Received by: <i>[Signature]</i> Company: T.A. Sen		Date/Time: 9/11/18 0950											
Relinquished by: <i>[Signature]</i> Company: TAYOR		Date/Time: 9/10/18 1700																			

RS 1.6/1.6

# Chain of Custody Record



**Client Information (Sub Contract Lab)**  
 Client Contact: Walker, Elaine M  
 Shipping/Receiving: Elaine.Walker@testamericainc.com  
 Company: TestAmerica Laboratories, Inc.  
 Address: 880 Riverside Parkway, West Sacramento, CA 95605  
 Phone: 916-373-5600 (Tel) 916-372-1059 (Fax)  
 Email:  
 Project Name: Portland Harbor Pre-Remedial Design  
 Site:  
 Due Date Requested: 9/28/2018  
 TAT Requested (days):  
 Lab POC: Walker, Elaine M  
 E-Mail: Elaine.Walker@testamericainc.com  
 Carrier Tracking No(s):  
 State of Origin: Oregon  
 Page: Page 1 of 1  
 Job #: 580-80213-1  
 Preservation Codes:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix (W=Water, B=Soil, O=Other)	Preservation Code	1613B/HRMS, Sox P (MOD) Full List who Totals		1613B/HRMS, Sox P (MOD) Pull List who Totals		Total Number of Containers	Special Instructions/Notes
						Formal (Yes/No)	Field (Yes/No)	Formal (Yes/No)	Field (Yes/No)		
PDI-SG-B431 (580-80213-1)	9/7/18	12:08 Pacific	Solid			X		X		2	
PDI-SG-B479 (580-80213-2)	9/7/18	09:58 Pacific	Solid			X		X		2	
PDI-RB-VV-090718 (580-80213-3)	9/7/18	14:50 Pacific	Water			X		X		2	

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/test/matrix being analyzed, the samples must be shipped back to TestAmerica Laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to TestAmerica Laboratories, Inc.

**Possible Hazard Identification**  
 Unconfirmed  
 Deliverable Requested: I, II, III, IV, Other (specify)  
 Primary Deliverable Rank: 2  
 Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)  
 Return To Client  Disposal By Lab  Archive For \_\_\_\_\_ Months  
 Special Instructions/QC Requirements:

Empty Kit Relinquished by: \_\_\_\_\_ Date: \_\_\_\_\_  
 Relinquished by: \_\_\_\_\_ Date/Time: 9/10/18 17:00 Company: JAPOR  
 Relinquished by: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Company: \_\_\_\_\_  
 Relinquished by: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Company: \_\_\_\_\_  
 Custody Seal Intact: \_\_\_\_\_ Custody Seal No.: 492286  
 Cooler Temperature(s) °C and Other Remarks: 0.0

## Login Sample Receipt Checklist

Client: AECOM

Job Number: 580-80213-10

**Login Number: 80213**

**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.	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 <6mm (1/4").	True	
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: 580-80213-10

## 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)
580-80213-1	PDI-SG-B431	54	48	54	53	51	55	50	58
580-80213-2	PDI-SG-B479	51	44	55	64	59	57	58	66
MB 320-248203/1-A	Method Blank	64	60	66	59	53	60	60	69
MB 320-250114/1-A	Method Blank	79	76	77	74	69	73	69	76

### Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	PeCDD (25-181)	PeCDF (24-185)	<sup>13</sup> CHxCF (28-136)	PeCF (21-178)	TCDD (25-164)	TCDF (24-169)	OCDD (17-157)
580-80213-1	PDI-SG-B431	55	55	53	57	60	61	51
580-80213-2	PDI-SG-B479	62	63	62	64	67	74	36
MB 320-248203/1-A	Method Blank	63	61	65	57	58	60	63
MB 320-250114/1-A	Method Blank	73	73	69	72	75	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  
 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  
<sup>13</sup>CHxCF = 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 320-248203/2-A	Lab Control Sample	69	70	71	69	70	72	72	74
LCS 320-250114/2-A	Lab Control Sample	71	68	69	66	63	66	63	69
LCSD 320-248203/3-A	Lab Control Sample Dup	71	73	78	72	76	72	74	77
LCSD 320-250114/3-A	Lab Control Sample Dup	78	74	76	71	69	72	66	75

### Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	PeCDD (21-227)	PeCDF (21-192)	<sup>13</sup> CHxCF (22-176)	PeCF (13-328)	TCDD (20-175)	TCDF (22-152)	OCDD (13-199)
LCS 320-248203/2-A	Lab Control Sample	75	75	73	75	72	73	69
LCS 320-250114/2-A	Lab Control Sample	66	65	62	65	68	66	72
LCSD 320-248203/3-A	Lab Control Sample Dup	83	81	73	82	75	71	73
LCSD 320-250114/3-A	Lab Control Sample Dup	72	72	69	71	73	71	78

#### Surrogate Legend

HpCDD = 13C-1,2,3,4,6,7,8-HpCDD

TestAmerica Seattle

# Isotope Dilution Summary

Client: AECOM

Project/Site: Portland Harbor Pre-Remedial Design

TestAmerica Job ID: 580-80213-10

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

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**Presley, Kim**

---

**From:** Walker, M Elaine  
**Sent:** Wednesday, September 26, 2018 1:36 PM  
**To:** 'Dahl, Amy'  
**Cc:** Cook, Chelsey; Presley, Kim  
**Subject:** RE: authorization of D/U sample

Got it Amy, thanks.

**M. ELAINE WALKER**  
Project Manager

**TestAmerica**  
THE LEADER IN ENVIRONMENTAL TESTING

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Tacoma, WA 98424  
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---

**From:** Dahl, Amy [<mailto:amy.dahl@aecom.com>]  
**Sent:** Wednesday, September 26, 2018 12:57 PM  
**To:** Walker, M Elaine  
**Cc:** Cook, Chelsey  
**Subject:** PH: authorization of D/U sample

**External Email**

---

Hi Elaine, all analysis has been authorized for the following sample currently logged in under sample group 580-80213-1:

580-80213-2 PDI-SG-B479

Keep the other sample on hold for now:

580-80213-1 PDI-SG-B431

Thank you,

PRIVILEGED AND CONFIDENTIAL / JOINT DEFENSE COMMUNICATION / ATTORNEY CLIENT WORK PRODUCT

**Amy Dahl, PhD**  
Chemist, Environment, Pacific Northwest  
D +1-206-438-2261  
[amy.dahl@aecom.com](mailto:amy.dahl@aecom.com)

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1111 Third Avenue, Suite 1600