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Data Validation Report

Project:	Portland Harbor Pre-Remedial Design Investigation and Baseline Sampling Portland Harbor Superfund Site Subsurface Sediment – Deep/Nearshore Core Stations
Laboratory:	TestAmerica Laboratories, Incorporated, Seattle, WA
Laboratory Group:	580-80167-1
Analyses/Method:	Polycyclic Aromatic Hydrocarbons (PAHs), Polychlorinated Biphenyls (PCBs), Total Organic Carbon (TOC), Total Solids, and Grain Size
Validation Level:	Stage 2A
AECOM Project Number:	60566335, Task #2.12
Prepared by:	Debbie Casagrande/AECOM — Completed on: December 27, 2018
Reviewed by:	Stacy Louie/AECOM — File Name: 580-80167-1 DVR

SUMMARY

The data quality review of 32 subsurface sediment samples (includes 2 field duplicates [FDs]), and 2 Rinsate Blanks (RBs), 1 lined lexan core tube rinsate blank (LL), and 1 unlined aluminum rinsate blank (AL) collected on September 5 through 7, 2018, has been completed. Samples were analyzed for polycyclic aromatic hydrocarbons (PAHs) by U.S. Environmental Protection Agency (EPA) Method 8270D modified by selected ion monitoring (SIM), polychlorinated biphenyls (PCBs) by EPA Method 8082A, total organic carbon (TOC) by EPA Method 9060, total solids by American Society for Testing and Materials (ASTM) Method D-2216, moisture content at 70 degrees centigrade (°C), and grain size by ASTM Method D7928/D6913 by TestAmerica Laboratories, Incorporated (TA) located in Tacoma, Washington. Rinsate Blanks were analyzed for PAHs by EPA Method 8270D modified by SIM, PCBs by EPA Method 8082A, and TOC by Standard Method 5310B. The analyses were performed in general accordance with the methods specified in EPA's *Test Methods for Evaluating Solid Waste (SW-846)* and Annual Book of ASTM Standards, Philadelphia, Pennsylvania. The laboratory provided level 2 and level 4 data packages containing sample results, and associated quality assurance (QA) and quality control (QC) data, preparation logs, and raw instrument outputs (where applicable). The following samples are associated with laboratory group 580-80167-1:

Sample ID	Laboratory ID
PDI-SC-S129-0TO2	580-80167-1
PDI-SC-S129-2TO4	580-80167-2
PDI-SC-S129-4TO5.3	580-80167-3
PDI-SC-S155-0TO2.1	580-80167-4
PDI-SC-S155-2.1TO4.2	580-80167-5
PDI-SC-S155-4.2TO5.3	580-80167-6
PDI-SC-S121-0TO1.8	580-80167-7
PDI-SC-S121-1.8TO3.4	580-80167-8
PDI-SC-S255-0TO2.1	580-80167-9
PDI-SC-S255-0TO2.1D (FD of PDI-SC-S255-0TO2.1)	580-80167-10
PDI-SC-S255-2.1TO4.3	580-80167-11

Sample ID	Laboratory ID
PDI-SC-S260-0TO1.3	580-80167-20
PDI-SC-S260-1.3TO2.6	580-80167-21
PDI-SC-S260-2.6TO4.2	580-80167-22
PDI-SC-S260-4.2TO6	580-80167-23
PDI-SC-S260-6TO7	580-80167-24
PDI-SC-S019-0TO2	580-80167-25
PDI-SC-S019-2TO4	580-80167-26
PDI-SC-S019-4TO6	580-80167-27
PDI-SC-S019-6TO8	580-80167-28
PDI-SC-S019-8TO10	580-80167-29
PDI-SC-S019-10TO12	580-80167-30
PDI-SC-S019-12TO13.7	580-80167-31

Data Validation Report
Portland Harbor Pre-Remedial Design Investigation and Baseline Sampling
Subsurface Sediment – Deep/Nearshore Core Stations
TA Lab Group: 580-80167-1

Sample ID	Laboratory ID
PDI-SC-S112-0TO2	580-80167-12
PDI-SC-S112-2TO4	580-80167-13
PDI-SC-S112-4TO6	580-80167-14
PDI-RB-SS-180905 (Rinsate Blank)	580-80167-15
PDI-SC-S113C-0TO1.1	580-80167-16
PDI-SC-S113C-1.1TO3.1	580-80167-17
PDI-SC-S113C-3.1TO5.6	580-80167-18
PDI-SC-S113C-5.6TO6.6	580-80167-19

Sample ID	Laboratory ID
PDI-SC-S019-13.7TO14.7	580-80167-32
PDI-RB-SS-180906 (Rinsate Blank)	580-80167-33
PDI-RB-LL-180907 (Lined Lexan Core Tube Rinsate Blank)	580-80167-34
PDI-RB-AL-180905 (Unlined Aluminum Rinsate Blank)	580-80167-35
PDI-SC-S019-10TO12D (FD of PDI-SC-S019-10TO12)	580-80167-36

Data validation is based on method performance criteria and QC criteria documented in the *Quality Assurance Project Plan (QAPP),* dated March 23, 2018, as amended. If data qualification was required, data were qualified based on the definitions and use of qualifying flags outlined in the EPA documents *USEPA National Functional Guidelines for Organic Superfund Methods Data Review*, January 2017, and *USEPA National Functional Guidelines for Inorganic Superfund Methods Data Review,* January 2017. Data qualifiers assigned to results reported in this sample set are included in Table 1.

SAMPLE RECEIPT

Upon receipt by TA, the sample jar information was compared to the associated chain-of-custody (COC) and the cooler temperatures were recorded. The coolers were received at temperatures within the EPA-recommended limits of greater than 0°C and less than or equal to 6°C.

As noted in the laboratory narrative, samples were placed in freezers at -10 degrees Celsius to extend holding time on September 12, 2018.

ORGANIC ANALYSES

Samples were analyzed for PAHs and PCBs by the methods identified in the introduction to this report.

1. Holding Times – Acceptable

2. Initial and Continuing Calibration Verifications – Acceptable except as noted below:

   PCBs by Method 8082A – The percent difference (%D) for the following analytes were recovered outside the control limits of ±20% for individual peaks in the continuing calibration verifications (CCVs) associated with the analytical batches below:

Analytical Batch	Analyte	Column 1C %D	Column 2C %D
284114	PBC-1016	ok	high
	PCB-1232	ok	high
	PCB-1248	ok	high
	PCB-1242	high	high
	PCB-1254	ok	high
	PCB-1260	ok	high
285909	PCB-1016	ok	high
	PBC-1221	ok	high
	PCB-1232	ok	high
	PCB-1242	ok	high
	PCB-1248	ok	high
	PCB-1254	ok	high
	PCB-1260	high	high
285967	PCB-1016	ok	high
	PCB-1242	ok	high
	PCB-1254	ok	high
	PCB-1260	ok	high
286074	PCB-1016	ok	high
	PCB-1221	low	ok
	PCB-1232	ok	high
	PCB-1242	low	ok
	PCB-1248	low	ok
	PCB-1254	low	high
	PCB-1260	ok	high

Notes:
ok = acceptable

The laboratory narrative only noted if the average %D for initial calibration check samples (ICVs) and CCVs did not meet the ±20% criteria. As part of this review, all CCV results were reviewed and the individual peaks were assessed using the ±20% criteria. As a result of that extended review, the following PCBs were qualified as estimated 'J' or flagged 'UJ' based on the CCV % D. See table below for qualified PCBs and Table 1 for qualified results.

Sample ID	Qualified PCBs
PDI-SC-S112-0TO2	PCB-1260 qualified in all samples.
PDI-SC-S112-2TO4	
PDI-SC-S112-4TO6	
PDI-SC-S121-1.8TO3.4	
PDI-SC-S129-2TO4	
PDI-SC-S129-4TO5.3	
PDI-SC-S155-0TO2.1	
PDI-SC-S155-2.1TO4.2	
PDI-SC-S255-0TO2.1	
PDI-SC-S255-0TO2.1D	
PDI-SC-S113C-0TO1.1	
PDI-SC-S255-2.1TO4.3	
PDI-SC-S019-0TO2	PCB-1016 qualified

Notes:
ID = identification
PCB = polychlorinated biphenyl

3. Blanks – Acceptable except as noted below:

General – Two rinsate blanks (PDI-RB-SS-180905 and PDI-RB-SS-180906), one lined lexan core tube rinsate blank (PDI-RB-LL-180907), and one unlined aluminum rinsate blank (unlined aluminum rinsate blank) were submitted with this laboratory group. PCBs were not detected in these rinsate blanks. However, naphthalene was detected in PDI-RB-SS-180906 (0.018 micrograms per liter [µg/L]) and PDI-RB-LL-180907 (0.019 µg/L) at concentrations below the reporting limit but above the method detection limit (MDL). Data were not qualified based on rinsate blank results.

PAHs by Method 8270D-SIM – The following analytes were detected at concentrations between the method detection limits (MDLs) and the reporting limits:

Extraction Date	Analyte	Result (µg/kg)
10/5/2018	Benzo[a]anthracene	0.185 J
	Fluoranthene	0.777 J
	Phenanthrene	0.531 J
	Pyrene	0.815 J
10/12/2018	2-Methylnaphthalene	0.136 J
	Naphthalene	0.221 J
	Phenanthrene	0.278 J
10/14/2018	Fluoranthene	0.471 J
	Phenanthrene	0.411 J
	Pyrene	0.567 J

Notes:
µg/kg = micrograms per kilogram
J = estimated concentration

Benzo[a]anthracene, 2-methylnaphthalene, fluoranthene, naphthalene, phenanthrene, and pyrene were detected in the associated samples at concentrations greater than the reporting limits and greater than two times the method blank detections; therefore, data were not qualified based on these method blank results.

4. Surrogates – Acceptable except as noted below.

PCBs by EPA Method 8082A – The percent recoveries for decachlorobiphenyl and tetrachloro-m-xylene in the following samples were outside of the control limits of 54–142% and 58–122%, respectively:

Sample	Surrogate	% Recovery
PDI-SC-S129-2TO4	Tetrachloro-m-xylene	56
PDI-SC-S129-4TO5.3	Tetrachloro-m-xylene	48
PDI-SC-S155-0TO2.1	Tetrachloro-m-xylene	57
PDI-SC-S155-2.1TO4.2	Tetrachloro-m-xylene	55
PDI-SC-S155-4.2TO5.3	Tetrachloro-m-xylene	53
PDI-SC-S121-0TO1.8	Tetrachloro-m-xylene	57
PDI-SC-S121-1.8TO3.4	Decachlorobiphenyl	48
	Tetrachloro-m-xylene	46
PDI-SC-S255-0TO2.1	Tetrachloro-m-xylene	51
PDI-SC-S255-0TO2.1D	Decachlorobiphenyl	49
	Tetrachloro-m-xylene	53
PDI-SC-S255-2.1TO4.3	Decachlorobiphenyl	47
	Tetrachloro-m-xylene	41
PDI-SC-S112-0TO2	Tetrachloro-m-xylene	49
PDI-SC-S112-2TO4	Tetrachloro-m-xylene	49
PDI-SC-S112-4TO6	Tetrachloro-m-xylene	46
PDI-SC-S113C-3.1TO5.6	Tetrachloro-m-xylene	49
PDI-SC-S113C-3.1TO5.6MS	Tetrachloro-m-xylene	44
PDI-SC-S113C-3.1TO5.6SD	Tetrachloro-m-xylene	48
PDI-SC-S113C-5.6TO6.6	Decachlorobiphenyl	3
	Tetrachloro-m-xylene	10
PDI-SC-S260-2.6TO4.2	Tetrachloro-m-xylene	51
PDI-SC-S260-4.2TO6	Tetrachloro-m-xylene	53
PDI-SC-S260-6TO7	Tetrachloro-m-xylene	47
PDI-SC-S019-0TO2	Tetrachloro-m-xylene	42
PDI-SC-S019-2TO4MS	Tetrachloro-m-xylene	53
PDI-SC-S019-2TO4	Tetrachloro-m-xylene	55
PDI-SC-S019-2TO4SD	Tetrachloro-m-xylene	45
PDI-SC-S019-4TO6	Tetrachloro-m-xylene	42
PDI-SC-S019-6TO8	Tetrachloro-m-xylene	42
PDI-SC-S019-8TO10	Tetrachloro-m-xylene	49
PDI-SC-S019-10TO12	Tetrachloro-m-xylene	38
PDI-SC-S019-12TO13.7	Tetrachloro-m-xylene	44
PDI-SC-S019-13.7TO14.7	Tetrachloro-m-xylene	42
PDI-RB-AL-180905	Decachlorobiphenyl	25
PDI-SC-S019-10TO12D	Tetrachloro-m-xylene	35

Data were not qualified based on surrogate recoveries in QC samples. If one of the surrogate recoveries was acceptable the data were not qualified. Also, data were not qualified if sample dilution factors were ≥50. Qualified samples are listed below: PDI-SC-S121-1.8TO3.4, PDI-SC-S113C-5.6TO6.6, PDI-SC-S255-0TO2.1D, and PDI-SC-S255-2.1TO4.3.

PAHs by Method 8270D-SIM – The percent recoveries for terphenyl-d14 in the following sample was outside of the control limits of 57–120%:

Sample	Surrogate	% Recovery
PDI-SC-S113C-0TO1.1	4-Terphenyl-d14	0

No data were qualified for the surrogate spike recovery not meeting criteria, because the dilution factor for sample PDI-SC-S113C-0TO1.1 was 1,000.

5. Laboratory Control Sample – Acceptable except as noted below:

PAHs by Method 8270D-SIM

Preparation Batch 286471		
Analyte	**LCS**	**Control Limits**
Anthracene	144	46–127%

Notes:
LCS = laboratory control sample

The results for anthracene was qualified as estimated and flagged 'J' in PDI-SC-S019-2TO4 based on the LCS results.

6. Matrix Spike/Matrix Spike Duplicate (MS/MSD) – Acceptable except as noted below:

PAHs by Method 8270D-SIM

An MS/MSD was performed using PDI-SC-S019-2to4. The percent recoveries and RPDs for the following analytes were outside of the control limits:

Analyte	MS	MSD	RPD	Control Limits (Matrix Spike / RPD)
2-Methylnapthalene	14%	ok	ok	68–120% /12%
Acenaphthene	58%	46%	ok	68–120% / 12%
Anthracene	128%	17%	ok	73–125% /12%
Benzo[a]anthracene	ok	171	ok	66–120% / 14
Benzo[a]pyrene	32%	-4%	ok	72–124% / 12%
Benzo[b]fluoranthene	47%	12%	ok	63–121% / 10%
Benzo[g,h,i]perylene	-19%	28%	ok	63–120% / 14%
Benzo[k]fluoranthene	40%	18%	ok	63–123% / 15%
Chrysene	147%	27%	ok	69–120% / 10%
Dibenz(a,h)anthracene	50%	ok	19%	70–125% / 13%
Fluoranthene	197%	-5 %	ok	74–125% / 13%
Fluorene	29%	-13%	ok	73–120% / 13%
Indeno[1,2,3-cd]pyrene	-16%	38%	ok	65–121% / 15%
Naphthalene	50%	31%	ok	70–120% / 12%
Phenanthrene	217%	-225%	ok	73–120% / 11%
Pyrene	152%	-141%	ok	70–120% / 12%

Notes:
MS = Matrix Spike
MSD = Matrix Spike Duplicate
ok = acceptable
RPD = relative percent difference

The sample results for 2-methlynaphthalene, acenaphthene, anthracene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, chrysene, fluoranthene, fluorene, indeno[1,2,3-cd]pyrene, naphthalene, phenanthrene, and pyrene exceeded the spike amount by greater than 4 times, therefore no data were qualified for these analytes. The results for benzo[k]fluoranthene and dibenz(a,h)anthracene were qualified as estimated and flagged 'J' in PDI-SC-S019-2to4 based on the MS/MSD results.

An MS/MSD was performed using PDI-SC-S129-0to2. The percent recoveries and RPDs for the following analytes were outside of the control limits:

Analyte	MS	MSD	RPD	Control Limits (Matrix Spike / RPD)
Dibenz(a,h)anthracene	ok	ok	16%	70–125% /13%

Notes:
MS = Matrix Spike
MSD = Matrix Spike Duplicate
ok = acceptable
RPD = relative percent difference

As two of the three quality control parameters (MS, MSD, and RPD) were acceptable for dibenz(a,h)anthracene, this data was not qualified.

An MS/MSD was performed using PDI-SC-S113C-3.1to5.6. The percent recoveries and RPDs for the following analytes were outside of the control limits:

Analyte	MS	MSD	RPD	Control Limits (Matrix Spike / RPD)
Acenaphthene	ok	188%	ok	68–120% / 12%
Anthracene	ok	134%	ok	73–125% /12%
Fluoranthene	ok	162%	ok	74–125% / 13%
Fluorene	ok	133%	ok	73–120% / 13%
Indeno[1,2,3-cd]pyrene	132%	147%	ok	65–121% / 15%
Phenanthrene	ok	274%	ok	73–120% / 11%
Pyrene	ok	173%	ok	70–120% / 12%

Notes:
MS = Matrix Spike
MSD = Matrix Spike Duplicate
ok = acceptable
RPD = relative percent difference

The sample results for acenaphthene, fluoranthene, phenanthrene, and pyrene exceeded the spike amount by greater than 4 times, therefore no data were qualified for these analytes. As two of the three quality control parameters (MS, MSD, and RPD) were acceptable for anthracene and fluorene, these data were not qualified.

The result for indeno[1,2,3-cd]pyrene was qualified as estimated and flagged 'J' in PDI-SC-S113C-3.1to5.6 based on the MS/MSD results.

PCBs by EPA Method 8082A

An MS/MSD was performed using PDI-SC-S113C-3.1to5.6. The percent recoveries for the following analytes were outside of the control limits:

Analyte	MS	MSD	RPD	Control Limits (Matrix Spike / RPD)
PCB-1016	53%	56%	ok	64–120% / 21%
PCB-1260	51%	56%	ok	63–130% / 25%

Notes:
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = relative percent difference

The results for PCB-1016 and PCB-1260 were qualified and flagged 'UJ' in PDI-SC-S113C-3.1to5.6 based on the MS/MSD results.

An MS/MSD was performed using PDI-SC-S019-2to4. The percent recoveries for the following analytes were outside of the control limits:

Analyte	MS	MSD	RPD	Control Limits (Matrix Spike / RPD)
PCB-1016	134%	124%	ok	64–120% / 21%

Notes:
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = relative percent difference

PCB-1016 was not detected in sample PDI-SC-S019-2to4, therefore no results were qualified based on the high MS/MSD results.

7. Field Duplicate – Acceptable except as noted below:

PAHs by Method 8270D-SIM – Field duplicates were performed using PDI-SC-S255-0TO2.1 and PDI-SC-S019-10TO12. Results were comparable, except for acenaphthylene in sample PDI-SC-S255-0TO2.1, and benzo[a]pyrene, benzo[b]fluoranthene, chrysene, dibenz[a,h]anthracene, and indeno[1,23-cd]pyrene in sample PDI-SC-S019-10TO12, and their associated field duplicate sample. These results have been qualified as estimated and flagged 'J'.

PCBs by EPA Method 8082A – Field duplicates were performed using PDI-SC-S255-0TO2.1 and PDI-SC-S019-10TO12. Results were comparable.

8. Reporting Limits and Chromatographic Review – Acceptable except as noted below:

General – One or more results were flagged 'J' by the laboratory to indicate the reported concentrations were above the MDLs but below the reporting limits. Laboratory 'J'-flagged results are considered estimated. As the result is between the MDL and the reporting limit, there is a greater level of uncertainty associated with the numerical result.

PCBs by EPA Method 8082A – Chromatograms were reviewed to confirm target analytes were properly identified. The review confirmed target analytes were properly identified and reported by the laboratory.

PAHs by Method 8270D-SIM – The following samples were diluted due to the nature of the sample matrix: PDI-SC-S129-0to2 (580-80167-1), PDI-SC-S129-0to2 MS (580-80167-1 MS), PDI-SC-S129-0to2 MSD (580-80167-1 MSD), PDI-SC-S129-2to4 (580-80167-2), PDI-SC-S129-4to5.3 (580-80167-3), PDI-SC-S155-0to2.1 (580-80167-4), PDI-SC-S155-2.1to4.2 (580-80167-5), PDI-SC-S121-0to1.8 (580-80167-7), PDI-SC-S121-1.8to3.4 (580-80167-8), PDI-SC-S255-0to2.1 (580-80167-9), PDI-SC-S255-0to2.1D (580-80167-10), PDI-SC-S255-2.1to4.3 (580-80167-11), PDI-SC-S112-0to2 (580-80167-12), PDI-SC-S112-2to4 (580-80167-13), PDI-SC-S112-4to6 (580-80167-14), PDI-SC-S113C-0to1.1 (580-80167-16), PDI-SC-S113C-1.1to3.1 (580-80167-17), PDI-SC-S260-0to1.3 (580-80167-20), PDI-SC-S019-4to6 (580-80167-27), PDI-SC-S019-6to8 (580-80167-28), PDI-SC-S019-8to10 (580-80167-29), PDI-SC-S019-10to12 (580-80167-30), PDI-SC-S019-12to13.7 (580-80167-31), PDI-SC-S019-13.7to14.7 (580-80167-32) and PDI-SC-S019-10to12D (580-80167-36). Elevated reporting limits (RLs) are provided.

Other Items of Note:

PCBs by EPA Method 8082A – The %RPD between the primary and secondary column exceeded 40%. In accordance with the laboratory's standard operating procedure, the lower result was reported. The following sample results are qualified 'J' as estimated.

Sample Name	Analtye	Final Result (µg/kg)
PDI-SC-S019-0TO2	Aroclor 1016	22
PDI-SC-S121-1.8TO3.4	Aroclor 1260	1.6 J

Notes:
µg/kg = micrograms per kilogram
J = estimated concentration

PCBs by EPA Method 8082A – The laboratory noted that sample PDI-SC-S113C-0to1.1 (580-80167-16) is being reported as PCB-1260 with peak three being non-detect due to having an uncharacteristically high recovery compared to the other four peaks. Per SOP standards, only three peaks are needed to positively identify a PCB Aroclor. The sample has been quantified and reported as PCB-1260. The result for PCB-1260 was qualified as estimated and flagged 'J' based on this identification issue.

CONVENTIONAL ANALYSES

Samples were analyzed for TOC and total solids by the methods identified in the introduction to this report.

1. Holding Times – Acceptable

ASTM D-2216 – The 7-day holding time indicated for total solids in the QAPP was exceeded for all samples in the laboratory group by 7 to 8 days due to an oversight by the laboratory. No data qualifiers were assigned based on the holding time exceedance.

2. Blanks – Acceptable where applicable, except as noted below:

   TOC by Method SW9060 – Laboratory method blanks and continuing calibration blanks were analyzed with the samples, as appropriate.

   TOC by Method SM5310B

Analysis Date	Analyte	Result (mg/L)
9/18/2018	TOC	0.520 J

   Notes:
   J = estimated concentration
   mg/L = milligrams per liter
   TOC = total organic carbon

   TOC was qualified as not detected in samples PDI-RB-SS-180906, PDI-RB-LL-180907, and PDI-RB-AL-180905.

3. Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) – Acceptable

4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) – Acceptable

   TOC by Method 9060 – MS/MSDs were performed using PDI-SC-S113C-3.1to5.6 and PDI-SC-S019-2to4. Results were acceptable.

5. Field Duplicate – Acceptable

   TOC by Method 9060 – Field duplicates were performed using PDI-SC-S255-0TO2.1 and PDI-SC-S019-10TO12. Results were comparable.

   Total Solids by Method D2216 – Field duplicates were performed using PDI-SC-S255-0TO2.1 and PDI-SC-S019-10TO12. Results were comparable.

   Moisture Content at 70°C – Field duplicates were performed using PDI-SC-S255-0TO2.1 and PDI-SC-S019-10TO12. Results were comparable.

6. Laboratory Replicate – Acceptable

   TOC by Method 9060 – Laboratory duplicates and triplicates were performed using PDI-SC-S113C-3.1to5.6 and PDI-SC-S019-2to4. Results were comparable.

   Total Solids by Method D2216 – Laboratory duplicates were performed using PDI-SC-S255-0TO2.1D and PDI-SC-S019-10TO12. Results were comparable.

   Moisture Content at 70°C – Laboratory duplicates were performed using PDI-SC-S129-0TO2 and PDI-SC-S260-0TO1.3. Results were comparable.

7. Reporting Limits – Acceptable

GRAIN SIZE ANALYSES

Samples were analyzed for grain size by the methods identified in the introduction to this report. The data were reviewed to confirm that the required grain size fractions identified in the QAPP were reported for each sample.

1. Laboratory Duplicate – Acceptable except as noted below:

   The laboratory performed duplicate analysis at a rate of 1 per 20 samples per their internal requirements. A laboratory duplicate was performed on PDI-SC-S129-0TO2 and PDI-SC-S260-0TO1.3. Results were comparable, except for the gravel fraction for sample PDI-SC-S260-0TO1.3 which was assigned an 'L' qualifier to indicate that the grain size fraction was greater than 5 percent of the total combined fractions and the RPD for the duplicate analysis on the sample fraction was greater than 20%.

OVERALL ASSESSMENT OF DATA

The data reported in this laboratory group is considered usable for meeting project objectives. The completeness for laboratory group 580-80167-1 is 100%.

Table 1
QA/QC Data Summary Review
Portland Harbor
Subsurface Sediment - Deep/Nearshore Core Stations
TestAmerica Laboratory Group: 580-80167-1

Sample ID	Laboratory ID	Method	Analyte	Laboratory Result	Final Result	Units	Reason Code
PDI-SC-S129-2TO4	580-80167-2	SW8082A	Aroclor 1260	5.4	5.4 J	µg/kg	c
PDI-SC-S129-4TO5.3	580-80167-3	SW8082A	Aroclor 1260	10	10 J	µg/kg	c
PDI-SC-S155-0TO2.1	580-80167-4	SW8082A	Aroclor 1260	1.6 J	1.6 J	µg/kg	c
PDI-SC-S155-2.1TO4.2	580-80167-5	SW8082A	Aroclor 1260	19	19 J	µg/kg	c
PDI-SC-S121-1.8TO3.4	580-80167-8	SW8082A	Aroclor 1260	1.6 J	1.6 J	µg/kg	s,c,r
PDI-SC-S121-1.8TO3.4	580-80167-8	SW8082A	Aroclor 1254	2.6 U	2.6 UJ	µg/kg	s
PDI-SC-S121-1.8TO3.4	580-80167-8	SW8082A	Aroclor 1221	2.6 U	2.6 UJ	µg/kg	s
PDI-SC-S121-1.8TO3.4	580-80167-8	SW8082A	Aroclor 1232	2.6 U	2.6 UJ	µg/kg	s
PDI-SC-S121-1.8TO3.4	580-80167-8	SW8082A	Aroclor 1248	2.6 U	2.6 UJ	µg/kg	s
PDI-SC-S121-1.8TO3.4	580-80167-8	SW8082A	Aroclor 1016	2.6 U	2.6 UJ	µg/kg	s
PDI-SC-S121-1.8TO3.4	580-80167-8	SW8082A	Aroclor 1242	2.6 U	2.6 UJ	µg/kg	s
PDI-SC-S255-0TO2.1	580-80167-9	SW8082A	Aroclor 1260	4.8	4.8 J	µg/kg	c
PDI-SC-S255-0TO2.1	580-80167-9	SW8270DSIM	Acenaphthylene	15	15 J	µg/kg	fd
PDI-SC-S255-0TO2.1D	580-80167-10	SW8082A	Aroclor 1260	3.5	3.5 J	µg/kg	s,c
PDI-SC-S255-0TO2.1D	580-80167-10	SW8082A	Aroclor 1254	3.0 U	3.0 UJ	µg/kg	s
PDI-SC-S255-0TO2.1D	580-80167-10	SW8082A	Aroclor 1221	3.0 U	3.0 UJ	µg/kg	s
PDI-SC-S255-0TO2.1D	580-80167-10	SW8082A	Aroclor 1232	3.0 U	3.0 UJ	µg/kg	s
PDI-SC-S255-0TO2.1D	580-80167-10	SW8082A	Aroclor 1248	3.0 U	3.0 UJ	µg/kg	s
PDI-SC-S255-0TO2.1D	580-80167-10	SW8082A	Aroclor 1016	3.0 U	3.0 UJ	µg/kg	s
PDI-SC-S255-0TO2.1D	580-80167-10	SW8082A	Aroclor 1242	3.0 U	3.0 UJ	µg/kg	s
PDI-SC-S255-0TO2.1D	580-80167-10	SW8270DSIM	Acenaphthylene	8.9	8.9 J	µg/kg	fd
PDI-SC-S255-2.1TO4.3	580-80167-11	SW8082A	Aroclor 1260	120	120 J	µg/kg	s,c
PDI-SC-S255-2.1TO4.3	580-80167-11	SW8082A	Aroclor 1254	3.1 U	3.1 UJ	µg/kg	s
PDI-SC-S255-2.1TO4.3	580-80167-11	SW8082A	Aroclor 1221	3.1 U	3.1 UJ	µg/kg	s
PDI-SC-S255-2.1TO4.3	580-80167-11	SW8082A	Aroclor 1232	3.1 U	3.1 UJ	µg/kg	s
PDI-SC-S255-2.1TO4.3	580-80167-11	SW8082A	Aroclor 1248	3.1 U	3.1 UJ	µg/kg	s
PDI-SC-S255-2.1TO4.3	580-80167-11	SW8082A	Aroclor 1016	3.1 U	3.1 UJ	µg/kg	s
PDI-SC-S255-2.1TO4.3	580-80167-11	SW8082A	Aroclor 1242	3.1 U	3.1 UJ	µg/kg	s

Table 1
QA/QC Data Summary Review
Portland Harbor
Subsurface Sediment - Deep/Nearshore Core Stations
TestAmerica Laboratory Group: 580-80167-1

Sample ID	Laboratory ID	Method	Analyte	Laboratory Result	Final Result	Units	Reason Code
PDI-SC-S112-0TO2	580-80167-12	SW8082A	Aroclor 1260	16	16 J	µg/kg	c
PDI-SC-S112-2TO4	580-80167-13	SW8082A	Aroclor 1260	16	16 J	µg/kg	c
PDI-SC-S112-4TO6	580-80167-14	SW8082A	Aroclor 1260	18	18 J	µg/kg	c
PDI-SC-S113C-0TO1.1	580-80167-16	SW8082A	Aroclor 1260	14	14 J	µg/kg	c,q
PDI-SC-S113C-3.1TO5.6	580-80167-18	SW8082A	Aroclor 1260	2.5 U	2.5 UJ	µg/kg	m
PDI-SC-S113C-3.1TO5.6	580-80167-18	SW8082A	Aroclor 1016	2.5 U	2.5 UJ	µg/kg	m
PDI-SC-S113C-3.1TO5.6	580-80167-18	SW8270DSIM	Indeno(1,2,3-cd)pyrene	560	560 J	µg/kg	m
PDI-SC-S113C-5.6TO6.6	580-80167-19	SW8082A	Aroclor 1260	2.5 U	2.5 UJ	µg/kg	s
PDI-SC-S113C-5.6TO6.6	580-80167-19	SW8082A	Aroclor 1254	2.5 U	2.5 UJ	µg/kg	s
PDI-SC-S113C-5.6TO6.6	580-80167-19	SW8082A	Aroclor 1221	2.5 U	2.5 UJ	µg/kg	s
PDI-SC-S113C-5.6TO6.6	580-80167-19	SW8082A	Aroclor 1232	2.5 U	2.5 UJ	µg/kg	s
PDI-SC-S113C-5.6TO6.6	580-80167-19	SW8082A	Aroclor 1248	2.5 U	2.5 UJ	µg/kg	s
PDI-SC-S113C-5.6TO6.6	580-80167-19	SW8082A	Aroclor 1016	2.5 U	2.5 UJ	µg/kg	s
PDI-SC-S113C-5.6TO6.6	580-80167-19	SW8082A	Aroclor 1242	2.5 U	2.5 UJ	µg/kg	s
PDI-SC-S260-0TO1.3	580-80167-20	D7928/D6913	Gravel	6.6	6.6 L	%	ld
PDI-SC-S019-0TO2	580-80167-25	SW8082A	Aroclor 1016	22	22 J	µg/kg	c,r
PDI-SC-S019-2TO4	580-80167-26	SW8270DSIM	Benzo(k)fluoranthene	1000	1000 J	µg/kg	m
PDI-SC-S019-2TO4	580-80167-26	SW8270DSIM	Dibenz(a,h)anthracene	300	300 J	µg/kg	m,md
PDI-SC-S019-2TO4	580-80167-26	SW8270DSIM	Anthracene	6400	6400 J	µg/kg	l
PDI-SC-S019-10TO12	580-80167-30	SW8270DSIM	Indeno(1,2,3-cd)pyrene	350	350 J	µg/kg	fd
PDI-SC-S019-10TO12	580-80167-30	SW8270DSIM	Benzo(b)fluoranthene	400	400 J	µg/kg	fd
PDI-SC-S019-10TO12	580-80167-30	SW8270DSIM	Chrysene	450	450 J	µg/kg	fd
PDI-SC-S019-10TO12	580-80167-30	SW8270DSIM	Benzo(a)pyrene	370	370 J	µg/kg	fd
PDI-SC-S019-10TO12	580-80167-30	SW8270DSIM	Dibenz(a,h)anthracene	51	51 J	µg/kg	fd
PDI-RB-SS-180906	580-80167-33	SM5310B	Total Organic Carbon	0.85 J	1.0 U	mg/L	bl
PDI-RB-LL-180907	580-80167-34	SM5310B	Total Organic Carbon	0.77 J	1.0 U	mg/L	bl
PDI-RB-AL-180905	580-80167-35	SM5310B	Total Organic Carbon	0.99 J	1.0 U	mg/L	bl
PDI-SC-S019-10TO12D	580-80167-36	SW8270DSIM	Indeno(1,2,3-cd)pyrene	590	590 J	µg/kg	fd

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Portland Harbor
Subsurface Sediment - Deep/Nearshore Core Stations
TestAmerica Laboratory Group: 580-80167-1

Sample ID	Laboratory ID	Method	Analyte	Laboratory Result	Final Result	Units	Reason Code
PDI-SC-S019-10TO12D	580-80167-36	SW8270DSIM	Benzo(b)fluoranthene	670	670 J	µg/kg	fd
PDI-SC-S019-10TO12D	580-80167-36	SW8270DSIM	Chrysene	750	750 J	µg/kg	fd
PDI-SC-S019-10TO12D	580-80167-36	SW8270DSIM	Benzo(a)pyrene	660	660 J	µg/kg	fd
PDI-SC-S019-10TO12D	580-80167-36	SW8270DSIM	Dibenz(a,h)anthracene	100	100 J	µg/kg	fd

% = percent
µg/kg = micrograms per kilogram
bl = laboratory blank contamination
c = calibration issue
fd = field duplicate relative percent difference
ID = identification
J = estimated concentration
l = LCS recoveries
ld = laboratory duplicate RPD
L = the grain size fraction greater than 5 percent of total combined fractions and the RPD for duplicate analysis on the sample fraction was greater than 20%
m = matrix spike recovery
md = matrix spike/matrix spike duplicate relative percent difference
mg/L = milligrams per liter
q = quantitation issue
r = dual column relative percent difference
s = surrogate recovery
U = not detected
UJ = estimated reporting limit