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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:	580-79504-1
Analyses/Method:	Polycyclic Aromatic Hydrocarbons (PAHs), Polychlorinated Biphenyls (PCBs), Total Organic Carbon (TOC), Total Solids, and Grain Size
Validation Level:	Stage 2A / Level 4 on EPA split sample (PDI-SC-S229-9.9to12.5)
AECOM Project Number:	60566335, Task #2.12
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Reviewed by:	Stacy Louie/AECOM — File Name: 580-79504-1 DVR

SUMMARY

The data quality review of 47 subsurface sediment samples and two rinsate blanks collected on August 8 and August 9, 2018, has been completed. Samples were analyzed for PAHs by EPA Method 8270D modified by selected ion monitoring (SIM), PCBs by EPA Method 8082A, TOC by EPA Method 9060 (subsurface sediments) and Standard Method (SM) 5310B (water), total solids by American Society for Testing and Materials (ASTM) Method D-2216, moisture content at 70 degrees Celsius (°C), and grain size by ASTM Method D7928/D6913 by TestAmerica Laboratories, Incorporated (TA) located in Tacoma, Washington. 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, American Society for Testing & Materials (ASTM), 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 580-79504-1:

Sample ID	Laboratory ID
PDI-SC-S098-0to1.3	580-79504-1
PDI-SC-S098-1.3to3.3	580-79504-2
PDI-SC-S098-3.3to5.3	580-79504-3
PDI-SC-S098-3.3to5.3D (field duplicate of PDI-SC-S098-3.3to5.3)	580-79504-4
PDI-SC-S098-5.3to7.2	580-79504-5
PDI-SC-S098-7.2to8.2	580-79504-6
PDI-SC-S103-0to2	580-79504-7
PDI-SC-S103-2to4	580-79504-8
PDI-SC-S103-4to6	580-79504-9
PDI-SC-S103-6to8	580-79504-10
PDI-SC-S103-8to9.7	580-79504-11
PDI-SC-S103-9.7to10.7	580-79504-12
PDI-SC-S103-10.7to13.4	580-79504-13
PDI-SC-S176-0to2	580-79504-14
PDI-SC-S176-2to4	580-79504-15
PDI-SC-S176-4to5.5	580-79504-16
PDI-SC-S176-5.5to7.5	580-79504-17

Sample ID	Laboratory ID
PDI-SC-S176-7.5to9.5	580-79504-18
PDI-SC-S188-0-1.5	580-79504-19
PDI-SC-S198-0to2	580-79504-20
PDI-SC-S198-2to4	580-79504-21
PDI-SC-S198-2to4D (field duplicate of PDI-SC-S198-2to4)	580-79504-22
PDI-SC-S198-4to6	580-79504-23
PDI-SC-S198-6to8	580-79504-24
PDI-SC-S198-8to10	580-79504-25
PDI-SC-S198-10to11.8	580-79504-26
PDI-SC-S213-0to2	580-79504-27
PDI-SC-S213-2to4	580-79504-28
PDI-SC-S213-4to6	580-79504-29
PDI-SC-S213-6to8	580-79504-30
PDI-SC-S213-8to10	580-79504-31
PDI-SC-S213-10to11.8	580-79504-32
PDI-SC-S213-11.8to12.8	580-79504-33
PDI-SC-S229-0to2	580-79504-34
PDI-SC-S229-2to4	580-79504-35
PDI-SC-S229-4to6	580-79504-36
PDI-SC-S229-6to8	580-79504-37
PDI-SC-S229-8to9.9	580-79504-38
PDI-SC-S229-9.9to12.5 (EPA split sample)	580-79504-39
PDI-SC-S238-0to2	580-79504-40
PDI-SC-S238-2to4	580-79504-41
PDI-SC-S238-2to4D (field duplicate of PDI-SC-S238-2to4)	580-79504-42
PDI-SC-S238-4to6	580-79504-43
PDI-SC-S238-6to8	580-79504-44
PDI-SC-S238-8to10	580-79504-45
PDI-SC-S238-10to12.4	580-79504-46
PDI-SC-S238-12.4to13.4	580-79504-47
PDI-RB-SS-180809 (rinsate blank)	580-79504-49
PDI-RB-SS-180809-1900 (rinsate blank)	580-79504-50

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. Sample PDI-SC-S139 (sample ID: 580-79504-48) was only submitted for Atterberg Limits which are reported in 580-79504-3 and discussed under separate cover. The additional analyses other than Atterberg Limits associated with sample PDI-SC-S139 are reported in 580-79444-1.

ORGANIC ANALYSES

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

1. Holding Times – Acceptable except as noted below:

   PCBs by Method 8082A – The 14 day holding time indicated in the QAPP was exceeded in PDI-SC-S176-0to2, PDI-SC-S176-2to4, PDI-SC-S176-4to5.5, PDI-SC-S176-5.5to7.5, PDI-SC-S176-7.5to9.5, PDI-SC-S188-0-1.5, PDI-SC-S198-0to2, PDI-SC-S198-2to4, PDI-SC-S198-2to4D, PDI-SC-S198-4to6, PDI-SC-S198-6to8, PDI-SC-S198-8to10, and PDI-SC-S198-10to11.8 by 1 day. Data were not qualified based on this holding time exceedance as the EPA guidance in SW-846 indicates an extended holding time for PCBs.

2. Initial and Continuing Calibration Verifications – Acceptable

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

Analytical Batch	Analyte	Column 1 %D	Column 2 %D
282692	1232	ok	high
	1248	ok	high
	1242	ok	high
	1254	ok	high
	1260	ok	high
282798	1242	high	low
	1221	high	ok
282920	1232	high	high
	1248	ok	high
	1242	ok	high
	1254	ok	high
	1260	low	high
	1016	ok	high
282922	1232	ok	high
	1242	ok	high
	1016	low	high
	1260	ok	high
283310	1232	high	high

Analytical Batch	Analyte	Column 1 %D	Column 2 %D
283310	1248	ok	high
	1242	high	high
	1221	high	ok
	1254	ok	high
	1016	ok	high
	1260	ok	high
	Surr. DCB	ok	high
283312	1232	high	high
	1248	ok	high
	1242	ok	high
	1254	ok	high
	1016	ok	high
	1260	ok	high
283634	1248	ok	low

Table notes
ok – acceptable
Surr. DCB – surrogate decachlorobiphenyl

Data were not qualified based on the surrogate %Ds. The above analytes were either not detected in the associated samples or reported from the passing column; therefore, data were not qualified based on the CCV %Ds with the following exceptions. The results for PCB-1016 in PDI-SC-S213-4to6, PDI-SC-S213-6to8, PDI-SC-S213-8to10, PDI-SC-S213-10to11.8, PDI-SC-S213-11.8to12.8, PDI-SC-S229-0to2, PDI-SC-S229-2to4, PDI-SC-S229-4to6, PDI-SC-S229-6to8, PDI-SC-S229-8to9.9, PDI-SC-S229-9.9to12.5, PDI-SC-S238-0to2, PDI-SC-S238-2to4, PDI-SC-S238-2to4D, PDI-SC-S238-4to6, PDI-SC-S238-6to8, PDI-SC-S238-8to10, and PDI-SC-S238-12.4to13.4 and PCB-1260 in PDI-SC-S213-2to4 were qualified as estimated and flagged 'J' based on the CCV %Ds.

3. Blanks – Acceptable except as noted below:

General – Two rinsate blanks were submitted with this laboratory group. Fluoranthene (0.026 ug/L), pyrene (0.027 ug/L), benzo[a]anthracene (0.0086 ug/L), and chrysene (0.015 ug/L) were detected in PDI-RB-SS-180809 at concentrations between the reporting limits and method detection limits (MDLs). Sediment data were not qualified based on rinsate blank results.

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

Prep Batch	Analyte	Result
281589	2-Methylnaphthalene	0.0926 ug/kg
	Benzo[a]anthracene	0.307 ug/kg
	Chrysene	0.404 ug/kg
	Fluoranthene	0.382 ug/kg
	Benzo[b]fluoranthene	0.323 ug/kg
	Benzo[k]fluoranthene	0.365 ug/kg
	Benzo[a]pyrene	0.337 ug/kg
	Naphthalene	0.264 ug/kg
	Indeno[1,2,3-cd]pyrene	0.517 ug/kg

Prep Batch	Analyte	Result
281589	Phenanthrene	0.307 ug/kg
	Dibenz(a,h)anthracene	0.383 ug/kg
	Pyrene	0.407 ug/kg
	Benzo[g,h,i]perylene	0.306 ug/kg
281889	Naphthalene	0.285 ug/kg
	Phenanthrene	0.145 ug/kg
281890	Naphthalene	0.175 ug/kg
	Phenanthrene	0.241 ug/kg
	Benzo[g,h,i]perylene	0.150 ug/kg
281928	Naphthalene	0.222 ug/kg
	Phenanthrene	0.204 ug/kg

The results for benzo[g,h,i]perylene in samples associated with prep batch 281890 and naphthalene and phenanthrene in samples associated with prep batch 281928 were either not detected or detected 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.

2-Methylnaphthalene in PDI-SC-S103-9.7to10.7, naphthalene in PDI-SC-S103-9.7to10.7, PDI-SC-S213-0to2, and PDI-SC-S213-2to4, and dibenz(a,h)anthracene in PDI-SC-S103-9.7to10.7, PDI-SC-S176-0to2, PDI-SC-S176-2to4, and PDI-SC-S176-4to5.5 were detected at concentrations between the MDLs and the reporting limits. These samples were diluted prior to analysis and therefore reported with elevated reporting limits; therefore, these results were qualified as estimated and flagged 'J' based on the method blank results.

2-Methylnaphthalene and benzo[a]anthracene in PDI-SC-S098-5.3to7.2 and PDI-SC-S098-7.2to8.2; chrysene PDI-SC-S098-7.2to8.2; fluoranthene in PDI-SC-S098-5.3to7.2; benzo[b]fluoranthene in PDI-SC-S098-5.3to7.2 and PDI-SC-S098-7.2to8.2; benzo[k]fluoranthene in PDI-SC-S098-3.3to5.3, PDI-SC-S098-3.3to5.3D, PDI-SC-S098-5.3to7.2, and PDI-SC-S098-7.2to8.2; benzo[a]pyrene in PDI-SC-S098-3.3to5.3D, PDI-SC-S098-5.3to7.2, and PDI-SC-S098-7.2to8.2; naphthalene in PDI-SC-S098-5.3to7.2, PDI-SC-S098-7.2to8.2, PDI-SC-S198-8to10, PDI-SC-S198-10to11.8, PDI-SC-S229-6to8, PDI-SC-S229-8to9.9, and PDI-SC-S229-9.9to12.5; indeno[1,2,3-cd]pyrene in PDI-SC-S098-5.3to7.2 and PDI-SC-S098-7.2to8.2; phenanthrene in PDI-SC-S098-5.3to7.2, PDI-SC-S198-8to10, PDI-SC-S198-10to11.8, PDI-SC-S229-6to8, PDI-SC-S229-8to9.9, and PDI-SC-S229-9.9to12.5; dibenz(a,h)anthracene in PDI-SC-S098-3.3to5.3, PDI-SC-S098-3.3to5.3D, and PDI-SC-S103-10.7to13.4; pyrene in PDI-SC-S098-5.3to7.2; and benzo[g,h,i]perylene in PDI-SC-S098-5.3to7.2 and PDI-SC-S098-7.2to8.2 were detected at concentrations between the reporting limits and MDLs; therefore, the results were qualified as not detected and flagged 'U' at the reporting limits.

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-S098-5.3to7.2	Tetrachloro-m-xylene	56%
PDI-SC-S103-2to4	Tetrachloro-m-xylene	51%
PDI-SC-S103-4to6	Tetrachloro-m-xylene	26%

Sample	Surrogate	% Recovery
PDI-SC-S103-6to8	Decachlorobiphenyl	44%
	Tetrachloro-m-xylene	47%
PDI-SC-S103-8to9.7	Decachlorobiphenyl	51%
	Tetrachloro-m-xylene	48%
PDI-SC-S103-9.7to10.7	Decachlorobiphenyl	50%
	Tetrachloro-m-xylene	57%
PDI-SC-S176-0to2	Tetrachloro-m-xylene	51%
PDI-SC-S176-2to4	Tetrachloro-m-xylene	57%
MS (PDI-SC-S176-2to4)	Tetrachloro-m-xylene	52%
PDI-SC-S176-4to5.5	Tetrachloro-m-xylene	44%
PDI-SC-S176-5.5to7.5	Tetrachloro-m-xylene	56%
PDI-SC-S176-7.5to9.5	Decachlorobiphenyl	53%
	Tetrachloro-m-xylene	57%
PDI-SC-S188-0-1.5	Decachlorobiphenyl	49%
PDI-SC-S198-0to2	Decachlorobiphenyl	193%
PDI-SC-S198-2to4	Tetrachloro-m-xylene	54%
PDI-SC-S198-2to4D	Tetrachloro-m-xylene	55%
PDI-SC-S198-4to6	Tetrachloro-m-xylene	41%
PDI-SC-S198-6to8	Tetrachloro-m-xylene	51%
PDI-SC-S198-10to11.8	Tetrachloro-m-xylene	57%
PDI-SC-S213-0to2	Tetrachloro-m-xylene	56%
PDI-SC-S213-8to10	Decachlorobiphenyl	159%
PDI-SC-S213-8to10 - DL	Decachlorobiphenyl	175%

DL – dilution
MS – matrix spike

Data were not qualified based on surrogate recoveries in QC samples (MS). As one of the surrogate recoveries was acceptable for all samples except PDI-SC-S103-6to8, PDI-SC-S103-8to9.7, PDI-SC-S103-9.7to10.7, and PDI-SC-S176-7.5to9.5 data were not qualified based on the other surrogate recovery. The PCB results in PDI-SC-S103-6to8, PDI-SC-S103-8to9.7, PDI-SC-S103-9.7to10.7, and PDI-SC-S176-7.5to9.5 were qualified as estimated and flagged 'J' or 'UJ' based on the surrogate recoveries.

5. Internal Standards – Acceptable

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

   PAHs by Method 8270D-SIM – The percent recovery for benzo[b]fluoranthene in the LCS (132%) associated with prep batch 281889 exceeded the control limits of 63-121%. The results for benzo[b]fluoranthene in PDI-SC-S103-4to6, PDI-SC-S176-5.5to7.5, PDI-SC-S176-7.5to9.5, PDI-SC-S188-0-1.5, PDI-SC-S198-0to2, PDI-SC-S198-2to4, PDI-SC-S198-2to4D, PDI-SC-S198-4to6, PDI-SC-S198-6to8, and PDI-SC-S198-8to10 were qualified as estimated and flagged 'J' based on this LCS recovery.

7. 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-S213-2to4. Results were acceptable.

MS/MSDs were performed using PDI-SC-S176-2to4 and PDI-SC-S103-4to6. The percent recoveries for the following analytes were outside of the control limits:

Sample	Analyte	MS	MSD	RPD	Control Limits (Matrix Spike / RPD)
PDI-SC-S176-2to4	Phenanthrene	ok	64%	ok	73-120% / 11%
PDI-SC-S103-4to6	Acenaphthene	ok	245%	26%	68-120% / 12%
	Anthracene	131%	301%	36%	73-125% / 12%
	Benzo[a]anthracene	126%	560%	33%	66-120% / 14%
	Benzo[a]pyrene	231%	993%	41%	72-124% / 12%
	Benzo[b]fluoranthene	230%	1143%	43%	63-121% / 10%
	Benzo[g,h,i]perylene	161%	630%	33%	63-120% / 14%
	Benzo[k]fluoranthene	189%	554%	45%	63-123% / 15%
	Chrysene	-12%	581%	45%	69-120% / 10%
	Dibenz(a,h)anthracene	131%	241%	27%	70-125% / 13%
	Fluoranthene	353%	1733%	43%	74-125% / 13%
	Fluorene	ok	145%	ok	70-120% / 13%
	Indeno[1,2,3-cd]pyrene	206%	724%	33%	65-121% / 15%
	Naphthalene	ok	67%	ok	70-120% / 12%
	Phenanthrene	124%	787%	36%	73-120% / 11%
	Pyrene	334%	1733%	40%	70-120% / 12%

ok - acceptable

As two of the three quality control parameters (MS, MSD, and relative percent difference [RPD]) were acceptable, data were not qualified for naphthalene and fluorene in PDI-SC-S103-4to6 and phenanthrene in PDI-SC-S176-2to4. The concentrations of benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, chrysene, fluoranthene, indeno[1,2,3-cd]pyrene, phenanthrene, and pyrene in PDI-SC-S103-4to6 were greater than four times the spike added; therefore, data were not qualified based on these MS/MSD results. The results for acenaphthene, anthracene, and dibenz(a,h)anthracene in PDI-SC-S103-4to6 were qualified as estimated and flagged 'J' based on the MS/MSD results.

PCBs by EPA Method 8082A – Acceptable except as noted below:

An MS/MSD was performed using PDI-SC-S103-4to6. Results were acceptable.

MS/MSDs were performed using PDI-SC-S176-2to4 and PDI-SC-S213-2to4. The percent recoveries for the following analytes were outside of the control limits:

Sample	Analyte	MS	MSD	RPD	Control Limits (Matrix Spike / RPD)
PDI-SC-S176-2to4	PCB-1016	158%	179%	ok	64-120% / 21%
	PCB-1260	-17%	10%	ok	63-130% / 25%

Sample	Analyte	MS	MSD	RPD	Control Limits (Matrix Spike / RPD)
PDI-SC-S213-2to4	PCB-1016	301%	393%	24%	64-120% / 21%
PDI-SC-S213-2to4	PCB-1260	-783%	-763%	ok	63-130% / 25%

ok – acceptable

PCB-1016 was not detected in PDI-SC-S176-2to4 and PDI-SC-S213-2to4; therefore, data were not qualified based on these elevated MS/MSD results. The concentration of PCB-1260 in PDI-SC-S213-2to4 was greater than four times the spike added; therefore, data were not qualified based on the MS/MSD results. The result for PCB-1260 in PDI-SC-S176-2to4 was qualified as estimated and flagged 'J' based on the MS/MSD results.

8. Field Duplicate – Acceptable except as noted below:

General – Field duplicates were submitted for PDI-SC-S098-3.3to5.3, PDI-SC-S198-2to4, and PDI-SC-S238-2to4 and identified as PDI-SC-S098-3.3to5.3D, PDI-SC-S198-2to4D, and PDI-SC-S238-2to4D, respectively. Results were comparable with the following exceptions.

PAHs by Method 8270D-SIM – The RPDs for benzo[a]pyrene (72%), benzo[b]fluoranthene (54%), benzo[g,h,i]perylene (86%), benzo[k]fluoranthene (52%), and indeno[1,2,3-cd]pyrene (60%) in the PDI-SC-S098-3.3to5.3 and PDI-SC-S098-3.3to5.3D field duplicate pair exceeded 50%. The samples concentrations for the analytes above were less than five times the reporting limits; therefore, data were not qualified based on the elevated field duplicate RPDs.

9. Calculation Checks – Acceptable

A calculation check was performed for PDI-SC-S229-9.9to12.5. The review confirmed the final results were correct as reported.

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

General – Chromatograms/spectra were reviewed to confirm target analytes were properly identified. The review confirmed target analytes were properly identified and reported by the laboratory.

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.

PAHs by Method 8270D-SIM – Samples PDI-SC-S098-0to1.3, PDI-SC-S098-1.3to3.3, PDI-SC-S103-0to2, PDI-SC-S103-2to4, PDI-SC-S103-4to6, PDI-SC-S103-6to8, PDI-SC-S103-8to9.7, PDI-SC-S103-9.7to10.7, PDI-SC-S176-0to2, PDI-SC-S176-2to4, PDI-SC-S176-4to5.5, PDI-SC-S176-5.5to7.5, PDI-SC-S176-7.5to9.5, PDI-SC-S188-0-1.5, PDI-SC-S198-0to2, PDI-SC-S198-2to4, PDI-SC-S198-2to4D, PDI-SC-S198-4to6, PDI-SC-S213-0to2, PDI-SC-S213-2to4, PDI-SC-S213-4to6, PDI-SC-S213-6to8, PDI-SC-S213-8to10, PDI-SC-S213-10to11.8, PDI-SC-S213-11.8to12.8, PDI-SC-S229-0to2, PDI-SC-S229-2to4, PDI-SC-S238-0to2, PDI-SC-S238-2to4, PDI-SC-S238-2to4D, PDI-SC-S238-4to6, PDI-SC-S238-6to8, PDI-SC-S238-8to10, PDI-SC-S238-10to12.4, and PDI-SC-S238-12.4to13.4 required dilution prior to analysis to bring the concentration of target analytes within the calibration range and/or

due to the nature of the sample matrix. The elevated reporting limits for analytes reported as not detected did not exceed the cleanup level.

PCBs by EPA Method 8082A – The reporting limits for several PCBs reported as not detected in PDI-SC-S188-0-1.5 were elevated due to the dilution necessary to quantitate the high concentration of Aroclor 1254 present in the sample. The reporting limits and MDLs exceeded the cleanup level for total PCBs.

11. Other Items of Note:

PCBs by EPA Method 8082A – The laboratory noted that PDI-SC-S213-4to6, PDI-SC-S213-6to8, PDI-SC-S229-0to2, PDI-SC-S238-4to6, PDI-SC-S238-10to12.4, and PDI-SC-S238-12.4to13.4 contained more than one Aroclor with insufficient separation to be able to quantify individually. The PCBs present are quantified as the predominant Aroclor. The results for PCB-1254 in PDI-SC-S213-4to6, PDI-SC-S213-6to8, PDI-SC-S229-0to2, PDI-SC-S238-4to6, and PDI-SC-S238-12.4to13.4 and PCB-1260 in PDI-SC-S238-10to12.4 were qualified as estimated and flagged 'J' based on this identification issue.

The RPD between the primary and confirmation column exceeded 40% for Aroclors 1254 or 1260 in PDI-SC-S213-8to10, PDI-SC-S213-10to11.8, PDI-SC-S238-8to10, and PDI-SC-S238-12.4to13.4. Aroclor 1254 in PDI-SC-S238-12.4to13.4 was qualified for identification issues and was not qualified for confirmation column RPD. Aroclor 1260 in PDI-SC-S213-10to11.8 and PDI-SC-S238-8to10 and Aroclor 1254 in PDI-SC-S213-8to10 were qualified 'J' based on the confirmation column RPD.

CONVENTIONAL ANALYSES

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

1. Holding Times – Acceptable except as noted below:

Moisture Content at 70°C – The 7-day holding time indicated for total solids in the QAPP was exceeded for PDI-SC-S098-3.3to5.3D, PDI-SC-S103-9.7to10.7, PDI-SC-S103-10.7to13.4, PDI-SC-S176-0to2, PDI-SC-S176-2to4, PDI-SC-S176-4to5.5, PDI-SC-S176-5.5to7.5, PDI-SC-S176-7.5to9.5, PDI-SC-S188-0-1.5, PDI-SC-S198-0to2, PDI-SC-S198-2to4, PDI-SC-S198-2to4D, PDI-SC-S198-4to6, PDI-SC-S198-6to8, PDI-SC-S198-8to10, PDI-SC-S198-10to11.8, PDI-SC-S213-0to2, PDI-SC-S213-2to4, PDI-SC-S213-4to6, PDI-SC-S213-6to8, PDI-SC-S213-8to10, PDI-SC-S213-10to11.8, PDI-SC-S213-11.8to12.8, PDI-SC-S229-0to2, PDI-SC-S229-2to4, PDI-SC-S229-4to6, PDI-SC-S229-6to8, PDI-SC-S229-8to9.9, PDI-SC-S229-9.9to12.5, PDI-SC-S238-0to2, PDI-SC-S238-2to4, PDI-SC-S238-2to4D, PDI-SC-S238-4to6, PDI-SC-S238-6to8, PDI-SC-S238-8to10, PDI-SC-S238-10to12.4, and PDI-SC-S238-12.4to13.4 by 5-15 days due to an oversight by the laboratory. No data qualifiers were assigned based on the holding time exceedance.

2. Initial and Continuing Calibrations – Acceptable

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

TOC by EPA Method 9060 – There were two rinsate blanks submitted with this laboratory group. TOC was detected in PDI-RB-SS-180809 (0.31 mg/L) and PDI-RB-SS-180809-1900

(0.35 mg/L) at concentrations between the reporting limits and MDLs. Data were not qualified based on rinsate blank results.

4. Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) - Acceptable

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

   TOC by Method 9060 – MS/MSDs were performed using PDI-SC-S176-2to4 and PDI-SC-S213-2to4. Results were acceptable.

   An MS/MSD was performed using PDI-SC-S103-4to6. The percent recovery in the MSD (67%) and the RPD for the MS/MSD pair (41%) were outside the control limits of 68-149% and 32%, respectively. The results for TOC in PDI-SC-S103-4to6 were qualified as estimated and flagged 'J' based on the MS/MSD results.

   TOC by Method SM 5310B – An MS/MSD was performed using PDI-RB-SS-180809. Results were acceptable.

6. Field Duplicate – Acceptable

   Field duplicates were submitted for PDI-SC-S098-3.3to5.3, PDI-SC-S198-2to4, and PDI-SC-S238-2to4 and identified as PDI-SC-S098-3.3to5.3D, PDI-SC-S198-2to4D, and PDI-SC-S238-2to4D, respectively. Results were comparable.

7. Laboratory Replicate – Acceptable

   TOC by Method 9060 – Laboratory duplicates and triplicates were performed using PDI-SC-S176-2to4, PDI-SC-S213-2to4, and PDI-SC-S103-4to6. Results were comparable.

   TOC by Method SM 5310B – A laboratory duplicate was performed using PDI-RB-SS-180809. Results were comparable.

   Total Solids by Method D2216 – Laboratory duplicates were performed using PDI-SC-S098-3.3to5.3, PDI-SC-S213-10to11.8, and PDI-SC-S238-12.4to13.4. Results were comparable.

   Moisture Content at 70°C – Laboratory duplicates were performed using PDI-SC-S198-6to8 and PDI-SC-S098-0to1.3. Results were comparable.

8. Calculation Checks – Acceptable

   A calculation check was performed for PDI-SC-S229-9.9to12.5. The review confirmed the final results were correct as reported.

9. Reporting Limits – Acceptable

   TOC by Method 9060 – One or more results in multiple samples were reported at concentrations between the reporting limits and the MDLs and were flagged 'J' by the laboratory. As described above, laboratory 'J'-flagged results are considered estimated results.

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.

The laboratory noted that there was a 6% increase in percent fines from the #230 sieve to the first hydrometer reading. The number increased because the sample was heterogeneous. This error is inherent for the method; therefore, data were not qualified based on these grain size results.

1. Laboratory Duplicate – Acceptable

   The laboratory performed duplicate analysis at a rate of 1 per 20 samples per their internal requirements. Laboratory duplicates were performed using PDI-SC-S098-0to1.3 and PDI-SC-S198-6to8. Results were comparable.

OVERALL ASSESSMENT OF DATA

The data reported in this laboratory group is considered usable for meeting project objectives. The completeness for laboratory group 580-79504-1 is 100%.

Table 1
QA/QC Data Summary Review
Portland Harbor
Subsurface Sediment - Deep Core Stations
TestAmerica Laboratory Group: 580-79504-1

Sample ID	Laboratory ID	Method	Analyte	Laoratory Result	Units	Final Result	Reason Code
PDI-SC-S098-3.3TO5.3	580-79504-3	SW8270DSIM	Benzo(k)fluoranthene	0.84 J	ug/kg	1.1 U	bl
PDI-SC-S098-3.3TO5.3	580-79504-3	SW8270DSIM	Dibenz(a,h)anthracene	0.35 J	ug/kg	1.1 U	bl
PDI-SC-S098-3.3TO5.3D	580-79504-4	SW8270DSIM	Benzo(a)pyrene	1.1 J	ug/kg	1.2 U	bl
PDI-SC-S098-3.3TO5.3D	580-79504-4	SW8270DSIM	Benzo(k)fluoranthene	0.49 J	ug/kg	1.2 U	bl
PDI-SC-S098-3.3TO5.3D	580-79504-4	SW8270DSIM	Dibenz(a,h)anthracene	0.27 J	ug/kg	1.2 U	bl
PDI-SC-S098-5.3TO7.2	580-79504-5	SW8270DSIM	2-Methylnaphthalene	1.0 J	ug/kg	1.3 U	bl
PDI-SC-S098-5.3TO7.2	580-79504-5	SW8270DSIM	Benz(a)anthracene	0.38 J	ug/kg	1.3 U	bl
PDI-SC-S098-5.3TO7.2	580-79504-5	SW8270DSIM	Benzo(a)pyrene	0.46 J	ug/kg	1.3 U	bl
PDI-SC-S098-5.3TO7.2	580-79504-5	SW8270DSIM	Benzo(b)fluoranthene	0.44 J	ug/kg	1.3 U	bl
PDI-SC-S098-5.3TO7.2	580-79504-5	SW8270DSIM	Benzo(g,h,i)perylene	0.31 J	ug/kg	1.3 U	bl
PDI-SC-S098-5.3TO7.2	580-79504-5	SW8270DSIM	Benzo(k)fluoranthene	0.15 J	ug/kg	1.3 U	bl
PDI-SC-S098-5.3TO7.2	580-79504-5	SW8270DSIM	Fluoranthene	1.0 J	ug/kg	1.3 U	bl
PDI-SC-S098-5.3TO7.2	580-79504-5	SW8270DSIM	Indeno(1,2,3-cd)pyrene	0.44 J	ug/kg	1.3 U	bl
PDI-SC-S098-5.3TO7.2	580-79504-5	SW8270DSIM	Naphthalene	0.83 J	ug/kg	1.3 U	bl
PDI-SC-S098-5.3TO7.2	580-79504-5	SW8270DSIM	Phenanthrene	1.2 J	ug/kg	1.3 U	bl
PDI-SC-S098-5.3TO7.2	580-79504-5	SW8270DSIM	Pyrene	1.1 J	ug/kg	1.3 U	bl
PDI-SC-S098-7.2TO8.2	580-79504-6	SW8270DSIM	2-Methylnaphthalene	0.63 J	ug/kg	1.3 U	bl
PDI-SC-S098-7.2TO8.2	580-79504-6	SW8270DSIM	Benz(a)anthracene	0.75 J	ug/kg	1.3 U	bl
PDI-SC-S098-7.2TO8.2	580-79504-6	SW8270DSIM	Benzo(a)pyrene	0.86 J	ug/kg	1.3 U	bl
PDI-SC-S098-7.2TO8.2	580-79504-6	SW8270DSIM	Benzo(b)fluoranthene	0.91 J	ug/kg	1.3 U	bl
PDI-SC-S098-7.2TO8.2	580-79504-6	SW8270DSIM	Benzo(g,h,i)perylene	0.70 J	ug/kg	1.3 U	bl
PDI-SC-S098-7.2TO8.2	580-79504-6	SW8270DSIM	Benzo(k)fluoranthene	0.40 J	ug/kg	1.3 U	bl
PDI-SC-S098-7.2TO8.2	580-79504-6	SW8270DSIM	Chrysene	0.98 J	ug/kg	1.3 U	bl
PDI-SC-S098-7.2TO8.2	580-79504-6	SW8270DSIM	Indeno(1,2,3-cd)pyrene	0.84 J	ug/kg	1.3 U	bl
PDI-SC-S098-7.2TO8.2	580-79504-6	SW8270DSIM	Naphthalene	0.73 J	ug/kg	1.3 U	bl
PDI-SC-S103-4TO6	580-79504-9	SW8270DSIM	Acenaphthene	1,300	ug/kg	1,300 J	m,md
PDI-SC-S103-4TO6	580-79504-9	SW8270DSIM	Anthracene	960	ug/kg	960 J	m,md
PDI-SC-S103-4TO6	580-79504-9	SW8270DSIM	Benzo(b)fluoranthene	5,500	ug/kg	5,500 J	l
PDI-SC-S103-4TO6	580-79504-9	SW8270DSIM	Dibenz(a,h)anthracene	830	ug/kg	830 J	m,md
PDI-SC-S103-4TO6	580-79504-9	SW9060	Total Organic Carbon	39,000	mg/kg	390,00 J	m,md
PDI-SC-S103-6TO8	580-79504-10	SW8082A	Aroclor 1016	3.7 U	ug/kg	3.7 UJ	s
PDI-SC-S103-6TO8	580-79504-10	SW8082A	Aroclor 1221	3.7 U	ug/kg	3.7 UJ	s
PDI-SC-S103-6TO8	580-79504-10	SW8082A	Aroclor 1232	3.7 U	ug/kg	3.7 UJ	s
PDI-SC-S103-6TO8	580-79504-10	SW8082A	Aroclor 1242	3.7 U	ug/kg	3.7 UJ	s
PDI-SC-S103-6TO8	580-79504-10	SW8082A	Aroclor 1248	3.7 U	ug/kg	3.7 UJ	s
PDI-SC-S103-6TO8	580-79504-10	SW8082A	Aroclor 1254	3.7 U	ug/kg	3.7 UJ	s
PDI-SC-S103-6TO8	580-79504-10	SW8082A	Aroclor 1260	6.6	ug/kg	6.6 J	s
PDI-SC-S103-8TO9.7	580-79504-11	SW8082A	Aroclor 1016	2.9 U	ug/kg	2.9 UJ	s
PDI-SC-S103-8TO9.7	580-79504-11	SW8082A	Aroclor 1221	2.9 U	ug/kg	2.9 UJ	s
PDI-SC-S103-8TO9.7	580-79504-11	SW8082A	Aroclor 1232	2.9 U	ug/kg	2.9 UJ	s
PDI-SC-S103-8TO9.7	580-79504-11	SW8082A	Aroclor 1242	2.9 U	ug/kg	2.9 UJ	s
PDI-SC-S103-8TO9.7	580-79504-11	SW8082A	Aroclor 1248	2.9 U	ug/kg	2.9 UJ	s
PDI-SC-S103-8TO9.7	580-79504-11	SW8082A	Aroclor 1254	2.9 U	ug/kg	2.9 UJ	s
PDI-SC-S103-8TO9.7	580-79504-11	SW8082A	Aroclor 1260	4.2	ug/kg	4.2 J	s
PDI-SC-S103-9.7TO10.7	580-79504-12	SW8270DSIM	2-Methylnaphthalene	2.8 J	ug/kg	2.8 J	bl
PDI-SC-S103-9.7TO10.7	580-79504-12	SW8082A	Aroclor 1016	2.7 U	ug/kg	2.7 UJ	s
PDI-SC-S103-9.7TO10.7	580-79504-12	SW8082A	Aroclor 1221	2.7 U	ug/kg	2.7 UJ	s
PDI-SC-S103-9.7TO10.7	580-79504-12	SW8082A	Aroclor 1232	2.7 U	ug/kg	2.7 UJ	s
PDI-SC-S103-9.7TO10.7	580-79504-12	SW8082A	Aroclor 1242	2.7 U	ug/kg	2.7 UJ	s
PDI-SC-S103-9.7TO10.7	580-79504-12	SW8082A	Aroclor 1248	2.7 U	ug/kg	2.7 UJ	s
PDI-SC-S103-9.7TO10.7	580-79504-12	SW8082A	Aroclor 1254	2.7 U	ug/kg	2.7 UJ	s
PDI-SC-S103-9.7TO10.7	580-79504-12	SW8082A	Aroclor 1260	2.7 U	ug/kg	2.7 UJ	s
PDI-SC-S103-9.7TO10.7	580-79504-12	SW8270DSIM	Dibenz(a,h)anthracene	10 J	ug/kg	10 J	bl
PDI-SC-S103-9.7TO10.7	580-79504-12	SW8270DSIM	Naphthalene	7.5 J	ug/kg	7.5 J	bl
PDI-SC-S103-10.7TO13.4	580-79504-13	SW8270DSIM	Dibenz(a,h)anthracene	0.99 J	ug/kg	1.2 U	bl
PDI-SC-S176-0TO2	580-79504-14	SW8270DSIM	Dibenz(a,h)anthracene	18 J	ug/kg	18 J	bl

Table 1
QA/QC Data Summary Review
Portland Harbor
Subsurface Sediment - Deep Core Stations
TestAmerica Laboratory Group: 580-79504-1

Sample ID	Laboratory ID	Method	Analyte	Laoratory Result	Units	Final Result	Reason Code
PDI-SC-S176-2TO4	580-79504-15	SW8082A	Aroclor 1260	33	ug/kg	33 J	m
PDI-SC-S176-2TO4	580-79504-15	SW8270DSIM	Dibenz(a,h)anthracene	27 J	ug/kg	27 J	bl
PDI-SC-S176-4TO5.5	580-79504-16	SW8270DSIM	Dibenz(a,h)anthracene	11 J	ug/kg	11 J	bl
PDI-SC-S176-5.5TO7.5	580-79504-17	SW8270DSIM	Benzo(b)fluoranthene	17	ug/kg	17 J	l
PDI-SC-S176-7.5TO9.5	580-79504-18	SW8082A	Aroclor 1016	2.8 U	ug/kg	2.8 UJ	s
PDI-SC-S176-7.5TO9.5	580-79504-18	SW8082A	Aroclor 1221	2.8 U	ug/kg	2.8 UJ	s
PDI-SC-S176-7.5TO9.5	580-79504-18	SW8082A	Aroclor 1232	2.8 U	ug/kg	2.8 UJ	s
PDI-SC-S176-7.5TO9.5	580-79504-18	SW8082A	Aroclor 1242	2.8 U	ug/kg	2.8 UJ	s
PDI-SC-S176-7.5TO9.5	580-79504-18	SW8082A	Aroclor 1248	2.8 U	ug/kg	2.8 UJ	s
PDI-SC-S176-7.5TO9.5	580-79504-18	SW8082A	Aroclor 1254	2.8 U	ug/kg	2.8 UJ	s
PDI-SC-S176-7.5TO9.5	580-79504-18	SW8082A	Aroclor 1260	2.8 U	ug/kg	2.8 UJ	s
PDI-SC-S176-7.5TO9.5	580-79504-18	SW8270DSIM	Benzo(b)fluoranthene	14	ug/kg	14 J	l
PDI-SC-S188-0-1.5	580-79504-19	SW8270DSIM	Benzo(b)fluoranthene	4,600	ug/kg	4,600 J	l
PDI-SC-S198-0TO2	580-79504-20	SW8270DSIM	Benzo(b)fluoranthene	310	ug/kg	310 J	l
PDI-SC-S198-2TO4	580-79504-21	SW8270DSIM	Benzo(b)fluoranthene	180	ug/kg	180 J	l
PDI-SC-S198-2TO4D	580-79504-22	SW8270DSIM	Benzo(b)fluoranthene	170	ug/kg	170 J	l
PDI-SC-S198-4TO6	580-79504-23	SW8270DSIM	Benzo(b)fluoranthene	91	ug/kg	91 J	l
PDI-SC-S198-6TO8	580-79504-24	SW8270DSIM	Benzo(b)fluoranthene	4.7	ug/kg	4.7 J	l
PDI-SC-S198-8TO10	580-79504-25	SW8270DSIM	Benzo(b)fluoranthene	1.5	ug/kg	1.5 J	l
PDI-SC-S198-8TO10	580-79504-25	SW8270DSIM	Naphthalene	1.2 J	ug/kg	1.5 U	bl
PDI-SC-S198-8TO10	580-79504-25	SW8270DSIM	Phenanthrene	1.3 J	ug/kg	1.5 U	bl
PDI-SC-S198-10TO11.8	580-79504-26	SW8270DSIM	Naphthalene	0.67 J	ug/kg	1.2 U	bl
PDI-SC-S198-10TO11.8	580-79504-26	SW8270DSIM	Phenanthrene	0.51 J	ug/kg	1.2 U	bl
PDI-SC-S213-0TO2	580-79504-27	SW8270DSIM	Naphthalene	54 J	ug/kg	54 J	bl
PDI-SC-S213-2TO4	580-79504-28	SW8082A	Aroclor 1260	320	ug/kg	320 J	c
PDI-SC-S213-2TO4	580-79504-28	SW8270DSIM	Naphthalene	53 J	ug/kg	53 J	bl
PDI-SC-S213-4TO6	580-79504-29	SW8082A	Aroclor 1254	230	ug/kg	230 J	q
PDI-SC-S213-4TO6	580-79504-29	SW8082A	Aroclor 1016	4.5 U	ug/kg	4.5 UJ	c
PDI-SC-S213-6TO8	580-79504-30	SW8082A	Aroclor 1254	180	ug/kg	180 J	q
PDI-SC-S213-6TO8	580-79504-30	SW8082A	Aroclor 1016	4.0 U	ug/kg	4.0 UJ	c
PDI-SC-S213-8TO10	580-79504-31	SW8082A	Aroclor 1254	170	ug/kg	170 J	r
PDI-SC-S213-8TO10	580-79504-31	SW8082A	Aroclor 1016	3.4 U	ug/kg	3.4 UJ	c
PDI-SC-S213-10TO11.8	580-79504-32	SW8082A	Aroclor 1260	240	ug/kg	240 J	r
PDI-SC-S213-10TO11.8	580-79504-32	SW8082A	Aroclor 1016	3.9 U	ug/kg	3.9 UJ	c
PDI-SC-S213-11.8TO12.8	580-79504-33	SW8082A	Aroclor 1016	3.7 U	ug/kg	3.7 UJ	c
PDI-SC-S229-0TO2	580-79504-34	SW8082A	Aroclor 1254	130	ug/kg	130 J	q
PDI-SC-S229-0TO2	580-79504-34	SW8082A	Aroclor 1016	4.5 U	ug/kg	4.5 UJ	c
PDI-SC-S229-2TO4	580-79504-35	SW8082A	Aroclor 1016	3.2 U	ug/kg	3.2 UJ	c
PDI-SC-S229-4TO6	580-79504-36	SW8082A	Aroclor 1016	2.6 U	ug/kg	2.6 UJ	c
PDI-SC-S229-6TO8	580-79504-37	SW8270DSIM	Naphthalene	0.62 J	ug/kg	1.4 U	bl
PDI-SC-S229-6TO8	580-79504-37	SW8270DSIM	Phenanthrene	1.3 J	ug/kg	1.4 U	bl
PDI-SC-S229-6TO8	580-79504-37	SW8082A	Aroclor 1016	2.7 U	ug/kg	2.7 UJ	c
PDI-SC-S229-8TO9.9	580-79504-38	SW8270DSIM	Naphthalene	0.52 J	ug/kg	1.2 U	bl
PDI-SC-S229-8TO9.9	580-79504-38	SW8270DSIM	Phenanthrene	0.73 J	ug/kg	1.2 U	bl
PDI-SC-S229-8TO9.9	580-79504-38	SW8082A	Aroclor 1016	2.6 U	ug/kg	2.6 UJ	c
PDI-SC-S229-9.9TO12.5	580-79504-39	SW8270DSIM	Naphthalene	0.41 J	ug/kg	1.4 U	bl
PDI-SC-S229-9.9TO12.5	580-79504-39	SW8270DSIM	Phenanthrene	0.57 J	ug/kg	1.4 U	bl
PDI-SC-S229-9.9TO12.5	580-79504-39	SW8082A	Aroclor 1016	2.7 U	ug/kg	2.7 UJ	c
PDI-SC-S238-0TO2	580-79504-40	SW8082A	Aroclor 1016	4.0 U	ug/kg	4.0 UJ	c
PDI-SC-S238-2TO4	580-79504-41	SW8082A	Aroclor 1016	3.8 U	ug/kg	3.8 UJ	c
PDI-SC-S238-2TO4D	580-79504-42	SW8082A	Aroclor 1016	4.0 U	ug/kg	4.0 UJ	c
PDI-SC-S238-4TO6	580-79504-43	SW8082A	Aroclor 1254	180	ug/kg	180 J	q
PDI-SC-S238-4TO6	580-79504-43	SW8082A	Aroclor 1016	3.9 U	ug/kg	3.9 UJ	c
PDI-SC-S238-6TO8	580-79504-44	SW8082A	Aroclor 1016	3.3 U	ug/kg	3.3 UJ	c

Table 1
QA/QC Data Summary Review
Portland Harbor
Subsurface Sediment - Deep Core Stations
TestAmerica Laboratory Group: 580-79504-1

Sample ID	Laboratory ID	Method	Analyte	Laoratory Result	Units	Final Result	Reason Code
PDI-SC-S238-8TO10	580-79504-45	SW8082A	Aroclor 1260	110	ug/kg	110 J	r
PDI-SC-S238-8TO10	580-79504-45	SW8082A	Aroclor 1016	3.5 U	ug/kg	3.5 UJ	c
PDI-SC-S238-10TO12.4	580-79504-46	SW8082A	Aroclor 1260	240	ug/kg	240 J	q
PDI-SC-S238-12.4TO13.4	580-79504-47	SW8082A	Aroclor 1254	92	ug/kg	92 J	q
PDI-SC-S238-12.4TO13.4	580-79504-47	SW8082A	Aroclor 1016	3.5 U	ug/kg	3.5 UJ	c

Notes:
bl - laboratory blank contamination
c - calibration issue
J - estimated value
l - laboratory control sample
m - matrix spike recovery
md - matrix spike/matrix spike duplicate RPD
r - dual column RPD
s - surrogate recovery
ug/kg - microgram per kilogram
q - quantitation issue
RPD - relative percent difference
U - Compound was analyzed for, but not detected above the value shown.
Note: Line items where the laboratory result contains a "J" and the final result contains a “U” with a data validation reason code "bl" indicate that the final result is reported as not detected (“U” flag) at the reporting limit.