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Data Validation Report

Project:	Portland Harbor Pre-Remedial Design Investigation and Baseline Sampling Portland Harbor Superfund Site Surface Sediment – Downtown/Upriver
Laboratory:	TestAmerica Laboratories, Incorporated, Seattle, WA
Laboratory Groups:	580-78527-1, 580-78527-6, and 580-78527-7
Analyses:	Petroleum Hydrocarbons, Metals, Total Organic Carbon (TOC), Tributyltin, Polycyclic Aromatic Hydrocarbons (PAHs), bis(2-Ethylhexyl)phthalate, Total Solids, and Grain Size
Validation Level:	Stage 2A
AECOM Project Number:	60566335, Task #2.12
Prepared by:	Chelsey Cook/AECOM — Completed on: October 30, 2018
Reviewed by:	Amy Dahl/AECOM — File Name: 580-78527-1_6_7 DVR

SUMMARY

The data quality review of 25 surface sediment samples and one rinsate blank collected between June 29 and July 1, 2018, has been completed. Samples were analyzed for total petroleum hydrocarbons (TPHs, diesel-range and motor oil-range) by Washington State Department of Ecology (Ecology) Method NWTPH-Dx; metals by United States Environmental Protection Agency (EPA) Method 6020B (arsenic, cadmium, copper, lead, zinc, and/or manganese), EPA Method 7471A (mercury in sediments), and EPA Method 7470A (mercury in waters); TOC by EPA Method 9060 (sediments) and Standard Method (SM) 5310B (waters); tributyltin by Krone et al.; PAHs by EPA Method 8270D modified by selected ion monitoring (SIM); bis(2-ethylhexyl) phthalate by EPA Method 8270D; total solids by American Society for Testing and Materials (ASTM) Method D-2216; moisture content at 70 degrees Celsius (°C); and/or 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)*, Ecology's *Analytical Methods for Petroleum Hydrocarbons*, June 1997, Standard Methods for the Examination of Water and Wastewater, Annual Book of ASTM Standards, ASTM, Philadelphia, Pennsylvania, and Krone CA et al., *A Method for Analysis of Butyltin Species and Measurement of Butyltins in Sediment and English Sole Livers from Puget Sound*, Marine Environmental Research, 1989. 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 groups 580-78527-1, 580-78527-6, and 580-78527-7:

Sample ID	Laboratory ID
PDI-SG-B434	580-78527-1
PDI-SG-B435	580-78527-2
PDI-SG-B441	580-78527-3
PDI-SG-B442	580-78527-4
PDI-SG-B439	580-78527-5
PDI-SG-B440	580-78527-6
PDI-SG-B445	580-78527-7
PDI-SG-B446	580-78527-8
PDI-SG-B447	580-78527-9

Sample ID	Laboratory ID
PDI-SG-B449	580-78527-10
PDI-SG-B443	580-78527-11
PDI-SG-B444	580-78527-12
PDI-SG-B448	580-78527-13
PDI-SG-B451	580-78527-14
PDI-SG-B455	580-78527-15
PDI-SG-B450	580-78527-16
PDI-SG-B454	580-78527-17
PDI-SG-B453	580-78527-18
PDI-SG-B453-D (Field duplicate of PDI-SG-B453)	580-78527-19
PDI-SG-B452	580-78527-20
PDI-SG-B457	580-78527-21
PDI-SG-B459	580-78527-22
PDI-SG-B460	580-78527-23
PDI-SG-B461	580-78527-24
PDI-SG-B461-D (Field duplicate of PDI-SG-B461)	580-78527-25
PDI-RB-180630 (rinsate blank)	580-78527-26

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 this sample set are included in Table 1.

SAMPLE RECEIPT

Upon receipt by TA, the sample jar information was compared to the 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. Manganese was not marked on the COC and was authorized by AECOM for PDI-SG-B441, PDI-SG-B455, PDI-SG-B454, and PDI-SG-B460. The sample ID for the rinsate blank was changed from PDI-SG-RB-20180630 to PDI-RB-180630 and authorized for manganese. The rinsate blank results were reported in laboratory group 580-78527-1 on 7/31/18. The rush grain size and metals results were reported in laboratory group 580-78527-6 on 7/27/18. The analyses placed on hold pending grain size results, were authorized by AECOM on 8/16/18. The sample portions originally submitted to TA Tacoma were not placed in frozen storage upon receipt. Frozen aliquots were retrieved from TA Sacramento and used for analysis. The analyses authorized on 8/16/18 are reported in laboratory group 580-79527-7.

ORGANIC ANALYSES

Samples were analyzed for TPHs, tributyltin, PAHs, and bis(2-ethylhexyl)phthalate by the methods identified in the introduction to this report.

1. Holding Times – Acceptable except as noted below:

   Tributyltin by Krone et al. – Tributyltin was extracted for PDI-RB-180630 1 day outside the 7 day holding time, qualified as estimated, and flagged 'UJ' based on the holding time exceedance.

2. Blanks – Acceptable except as noted below:

   General – One rinsate blank was submitted with this laboratory group. TPHs, tributyltin, PAHs, and bis(2-ethylhexyl)phthalate were not detected in this rinsate blank.

   bis(2-Ethylhexyl)phthalate by EPA Method 8270D – bis(2-Ethylhexyl)phthalate was detected in the method blanks associated with prep batches 284297 (4.15 ug/kg), 284408 (5.71 ug/kg), and 284577 (6.46 ug/kg) at concentrations between the method detection limits (MDLs) and reporting limits. bis(2-Ethylhexyl)phthalate was detected in PDI-SG-B434, PDI-SG-B435, PDI-SG-B440, PDI-SG-B447, PDI-SG-B449, PDI-SG-B452, PDI-SG-B454, and PDI-SG-B457 at concentrations between the MDLs and the reporting limits with elevated reporting limits due to dilutions required prior to analysis; therefore, the results were qualified as estimated and flagged 'J' based on these method blank results.

   PAHs by EPA Method 8270D-SIM – 2-Methylnaphthalene (0.213 ug/kg), naphthalene (0.761 ug/kg), and phenanthrene (0.330 ug/kg) were detected in the method blank associated with prep batch 284648 at concentrations between the MDLs and reporting limits. These analytes were not detected or detected in the associated samples at concentrations greater than the reporting limits; therefore, data were not qualified based on these method blank results.

   2-Methylnaphthalene (0.110 ug/kg), naphthalene (0.234 ug/kg), and phenanthrene (0.309 ug/kg) were detected in the method blank associated with prep batch 284296 at concentrations between the MDLs and reporting limits. These analytes were detected in the following samples at concentrations between the MDLs and reporting limits:

Samples	Analytes
PDI-SG-B434	2-Methylnaphthalene, Naphthalene
PDI-SG-B435	2-Methylnaphthalene
PDI-SG-B441	2-Methylnaphthalene, Naphthalene, Phenanthrene
PDI-SG-B442	2-Methylnaphthalene, Naphthalene, Phenanthrene
PDI-SG-B440	2-Methylnaphthalene, Naphthalene,
PDI-SG-B446	Naphthalene, Phenanthrene
PDI-SG-B447	2-Methylnaphthalene, Naphthalene
PDI-SG-B449	2-Methylnaphthalene
PDI-SG-B443	2-Methylnaphthalene, Naphthalene
PDI-SG-B448	2-Methylnaphthalene
PDI-SG-B450	Phenanthrene
PDI-SG-B451	2-Methylnaphthalene, Naphthalene, Phenanthrene
PDI-SG-B452	2-Methylnaphthalene, Naphthalene, Phenanthrene
PDI-SG-B461	2-Methylnaphthalene, Naphthalene, Phenanthrene
PDI-SG-B461-D	2-Methylnaphthalene, Naphthalene, Phenanthrene

The samples noted above were reported with elevated reporting limits due to dilutions required prior to analysis; therefore, these results were qualified as estimated and flagged 'J' based on these method blank results.

3. Surrogates – Acceptable except as noted below:

bis(2-Ethylhexyl)phthalate by EPA Method 8270D – The surrogate recoveries for terphenyl-d14 were above the control limits of 58-120% in the following samples:

Sample	%Recovery
PDI-SG-B442	132%
PDI-SG-B440	123%
PDI-SG-B447	127%
PDI-SG-B444	124%
PDI-SG-B450	123%
Method Blank	129%

Data were not qualified based on the surrogate recoveries in QC samples (method blank). bis(2-Ethylhexyl)phthalate was not detected in PDI-SG-B442, PDI-SG-B444, and PDI-SG-B450; therefore, data were not qualified based on the elevated surrogate recoveries. The results for bis(2-ethylhexyl)phthalate in PDI-SG-B440 and PDI-SG-B447 were qualified as estimated and flagged 'J' based on the method blank results and no additional qualification was necessary based on the elevated surrogate recoveries.

PAHs by EPA Method 8270D-SIM – The percent recovery for the surrogate terphenyl-d14 in sample PDI-SG-B460 (143%) exceeded the control limits of 57-120%. The sample was analyzed at a 10x dilution; therefore, data were not qualified based on the elevated surrogate recovery.

4. Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) – Acceptable except as noted below:

PAHs by EPA Method 8270D-SIM – The percent recovery for benzo[a]pyrene in the LCS (65%) associated with prep batch 284296 was below the control limits of 72-124%. The results for benzo[a]pyrene in PDI-SG-B434, PDI-SG-B435, PDI-SG-B441, PDI-SG-B442, PDI-SG-B439, PDI-SG-B440, PDI-SG-B445, PDI-SG-B446, PDI-SG-B447, PDI-SG-B449, PDI-SG-B443, PDI-SG-B444, PDI-SG-B448, PDI-SG-B451, PDI-SG-B450, PDI-SG-B452, PDI-SG-B459, PDI-SG-B461, and PDI-SG-B461-D were qualified as estimated and flagged 'J' or 'UJ' based on the LCS recovery.

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

bis(2-Ethylhexyl)phthalate by EPA Method 8270D – MS/MSDs were performed using PDI-SG-B435 and PDI-SG-B457. The percent recovery in the MSD (58%) for PDI-SG-B457, and the relative percent difference (RPD) for the MS/MSD pair (24%) for PDI-SG-B435 were outside of the control limits of 59-123% and 13%, respectively. As two of the three quality control parameters (MS, MSD, and/or RPD) were acceptable, data were not qualified for bis(2-ethylhexyl)phthalate based on these MS/MSD results.

PAHs by EPA Method 8270D-SIM – MS/MSDs were performed using PDI-SG-B434 and PDI-SG-B457. The following analytes were outside of the control limits:

Sample	Analyte	MS	MSD	RPD	Control Limits (matrix spike / RPD)
PDI-SG-B434	Acenaphthene	ok	121%	19%	68-120% / 12%
	Acenaphthylene	ok	ok	17%	68-120% / 12%
	Benzo[k]fluoranthene	ok	ok	18%	63-123% / 15%
	Dibenz(a,h)anthracene	ok	ok	14%	70-125% / 13%
PDI-SG-B457	Benzo[a]pyrene	71%	ok	ok	72-124% / 12%

ok - acceptable

As two of the three quality control parameters (MS, MSD, and/or RPD) were acceptable for acenaphthylene, benzo[k]fluoranthene, dibenz(a,h)anthracene, and benzo[a]pyrene, data were not qualified based on these MS/MSD results. The result for acenaphthene in PDI-SG-B434 was qualified as estimated and flagged 'J' based on the MS/MSD results.

TPHs by Method NWTPH-Dx – An MS/MSD was performed using PDI-SG-B457. Results were acceptable.

Tributyltin by Krone et al. – An MS/MSD was performed using PDI-SG-B457. Results were acceptable.

6. Field Duplicate – Acceptable except as noted below:

General – Field duplicates were submitted for PDI-SG-B453 and PDI-SG-B461 and identified as PDI-SG-B453-D and PDI-SG-B461-D, respectively. The results were comparable with the following exceptions.

PAHs by EPA Method 8270D-SIM – The RPD for 2-methylnaphthalene (54%) for the PDI-SG-B453 and PDI-SG-B453-D field duplicate pair, and anthracene (63%) for the PDI-SG-B461 and PDI-SG-B461-D field duplicate pair exceeded 50%. The sample concentrations for 2-methylnaphthalene and anthracene were less than five times the reporting limits in the associated samples; therefore, data were not qualified based on these elevated field duplicates RPDs.

7. Laboratory Duplicate

TPHs by Method NWTPH-Dx – Laboratory duplicates were performed using PDI-SG-B450 and PDI-SG-B461-D. Results were comparable.

8. Reporting Limits – Acceptable except as noted below:

General – Analyte concentrations detected between the MDLs and the reporting limits are reported by the laboratory with 'J' flags. Laboratory 'J'-flagged results are considered estimated results. As the results are between the MDLs and the reporting limits, there is a greater level of uncertainty associated with the numerical results.

PAHs by EPA Method 8270D-SIM – The reporting limits for all samples in this laboratory group were raised because of the dilutions that were required prior to analysis due to the nature of the sample matrix. The reporting limits for multiple analytes in multiple samples

reported as not detected exceeded the cleanup level for carcinogenic PAHs (12 ug/kg) but the MDLs did not.

bis(2-Ethylhexyl)phthalate by EPA Method 8270D – The reporting limits for all samples in this laboratory group were raised because of the dilutions that were required prior to analysis due to the nature of the sample matrix. The reporting limits for the results reported as not detected in PDI-SG-B441, PDI-SG-B442, PDI-SG-B439, PDI-SG-B445, PDI-SG-B446, PDI-SG-B443, PDI-SG-B444, PDI-SG-B448, PDI-SG-B451, PDI-SG-B455, PDI-SG-B450, PDI-SG-B453, PDI-SG-B453-D, PDI-SG-B460, PDI-SG-B461, and PDI-SG-B461-D exceeded the cleanup level (135 ug/kg), but the MDL did not. The reporting limit and MDL exceeded the cleanup level for bis(2-ethylhexyl)phthalate in PDI-SG-B459.

TPHs by Method NWTPH-Dx – The laboratory indicated that the diesel-range hydrocarbon elution patterns were later than the typical diesel pattern in PDI-SG-B434, PDI-SG-B435, PDI-SG-B441, PDI-SG-B442, PDI-SG-B439, PDI-SG-B440, PDI-SG-B445, PDI-SG-B446, PDI-SG-B447, PDI-SG-B449, PDI-SG-B443, PDI-SG-B444, PDI-SG-B448, PDI-SG-B451, PDI-SG-B455, PDI-SG-B450, PDI-SG-B454, PDI-SG-B453, PDI-SG-B453-D, PDI-SG-B452, PDI-SG-B457, PDI-SG-B459, PDI-SG-B460, PDI-SG-B461, and PDI-SG-B461-D.

9. Other Items of Note:

bis(2-Ethylhexyl)phthalate by EPA Method 8270D – The laboratory noted that the percent differences (%Ds) for the surrogate terphenyl-d14 in the continuing calibration verifications (CCVs) associated with analytical batches 284567 and 284702 were outside the control limits of ±20% (high). As the surrogate recoveries in the associated samples were acceptable, data were not qualified based on these high surrogate %Ds.

TPHs by Method NWTPH-Dx – The laboratory noted that the %D for the surrogate o-terphenyl in the CCV associated with analytical batch 284604 was outside the control limits of ±20% (high). As the surrogate recoveries in the associated samples were acceptable, data were not qualified based on these high surrogate %Ds.

PAHs by EPA Method 8270D-SIM – The laboratory noted that the %D for the surrogate terphenyl-d14 in the CCV associated with analytical batch 285645 was outside the control limits of ±20% (low). As the surrogate recoveries in the associated samples were acceptable, data were not qualified based on this high surrogate %D.

The laboratory noted that the %Ds for indeno[1,2,3-cd]pyrene and dibenz(a,h)anthracene in the CCVs associated with analytical batch 285320 were outside the control limits of ±20% (high). As the associated samples were QC samples (method blank and LCS), data were not qualified based on these high surrogate %Ds.

METALS ANALYSES

Samples were analyzed for metals by the methods identified in the introduction to this report.

1. Holding Times – Acceptable except as noted below:

Mercury by Method 7471A – As noted under sample receipt, all samples in this laboratory group were frozen by TA upon receipt. The holding time for mercury is not extended by freezing; therefore the holding time remains 28 days to final analysis. The holding time for mercury in all samples except PDI-RB-180630 was exceeded by 25 to 27 days due to a delay

in the authorization for analysis. The results for mercury in these samples were qualified as estimated and flagged 'J' based on the holding time exceedance.

2. Blanks – Acceptable except as noted below:

   General – One rinsate blank was submitted with this laboratory group. Arsenic (0.00023 mg/L), zinc (0.0027 mg/L), and manganese (0.0014 mg/L) were detected in this rinsate blank at concentrations between the MDLs and reporting limits. Sediment data were not qualified based on rinsate blank results.

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

4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) and Post-Digestion Spike (PDS, where applicable) – Acceptable except as noted below:

   Metals by Method 6020B – An MS/MSD and PDS were performed using PDI-RB-180630. Results were acceptable.

   An MS/MSD and PDS were performed using PDI-SG-B457. The percent recoveries for manganese in the MS (-79%) and the MSD (-27%) were outside of the control limits of 80-120%. The sample concentration for manganese in PDI-SG-B457 was greater than four times the spike added; therefore, data were not qualified based on the MS/MSD results.

   Mercury by Method 7471A – An MS/MSD was performed using PDI-SG-B457. The percent recovery for mercury in the MS (325%) and the RPD for the MS/MSD pair (80%) exceeded the control limits of 80-120% and 20%, respectively. The result for mercury in PDI-SG-B457 was qualified as estimated and flagged 'J' based on holding time and no additional qualification was necessary based on the MS/MSD results.

5. Field Duplicate – Acceptable

   General – Field duplicates were submitted for PDI-SG-B453 and PDI-SG-B461 and identified as PDI-SG-B453-D and PDI-SG-B461-D, respectively. The results were comparable with the following exceptions.

   Mercury by Method 7471A – The RPD for mercury (149%) for the PDI-SG-B453 and PDI-SG-B453-D field duplicate pair exceeded 50%. The sample concentrations for mercury were less than five times the reporting limits; therefore, data were not qualified based on the elevated field duplicates RPDs.

6. Laboratory Duplicate – Acceptable

   Metals by Method 6020B – Laboratory duplicates were performed using PDI-RB-180630 and PDI-SG-B457. Results were comparable.

   Mercury by Method 7471A – A laboratory duplicate was performed using PDI-SG-B457. Results were comparable.

7. Serial Dilution – Acceptable

   Metals by Method 6020B – Serial dilutions were performed using PDI-RB-180630 and PDI-SG-B457. Results were comparable.

8. Reporting Limits – Acceptable

   General – 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.

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:

   Total Solids by ASTM Method D-2216 and Moisture Content at 70°C – The 7-day holding time indicated for total solids in the QAPP was exceeded for multiple sediment samples by 3 to 66 days. No data qualifiers were assigned based on this holding time exceedance.

2. Blanks – Acceptable except as noted below:

   TOC by Method 9060 – One rinsate blank was submitted with this laboratory group. TOC (1.3 mg/L) was detected in this rinsate blank at a concentration above the reporting limit. Sediment data were not qualified based on rinsate blank results.

   TOC was detected in the method blanks associated with analytical batches 278318 (198 mg/kg) and 284419 (244 mg/kg) at concentrations between the MDLs and the reporting limits. TOC was detected in the associated samples significantly above the method blank detections; therefore, data were not qualified based on these method blank results.

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

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

   TOC by Method 9060 – An MS/MSD was performed using PDI-SG-B457. The RPD for the MS/MSD pair (39%) exceeded the control limit of 32%. The percent recovery for TOC in the MS and MSD were acceptable; therefore, data were not qualified based on the elevated RPD.

5. Field Duplicate – Acceptable

   General – Field duplicates were submitted for PDI-SG-B453 and PDI-SG-B461 and identified as PDI-SG-B453-D and PDI-SG-B461-D, respectively. The results were comparable.

6. Laboratory Replicate – Acceptable

   TOC by Method 9060 – A laboratory duplicate and triplicate were performed using PDI-SG-B457. Results were comparable.

   Total Solids by ASTM Method D-2216 – Laboratory duplicates were performed using PDI-SG-B460 and PDI-SG-B452. Results were comparable.

   Moisture Content at 70°C – Laboratory duplicates were performed using PDI-SG-B434 and PDI-SG-B452. 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

   The laboratory performed duplicate analysis at a rate of 1 per 20 samples per their internal requirements. Laboratory duplicates were performed using PDI-SG-B434 and PDI-SG-B452. Results were comparable.

OVERALL ASSESSMENT OF DATA

The data reported in this laboratory group, as qualified, is considered usable for meeting project objectives. The completeness for laboratory groups 580-78527-1, 580-78527-6, and 580-78527-7 is 100%.

Table 1
QA/QC Data Summary Review
Portland Harbor
Surface Sediment - Downtown/Upriver
TestAmerica Laboratory Groups: 580-78527-1, 580-78527-6, and 580-78527-7

Sample ID	Laboratory ID	Method	Analyte	Laboratory Result	Units	Final Result	Reason Code
PDI-SG-B434	580-78527-1	SW7471A	Mercury	0.045	mg/kg	0.045 J	h
PDI-SG-B434	580-78527-1	SW8270DSIM	Benzo(a)pyrene	9.6 J	ug/kg	9.6 J	l
PDI-SG-B434	580-78527-1	SW8270D	Bis(2-ethylhexyl)phthalate	200 J	ug/kg	200 J	bl
PDI-SG-B434	580-78527-1	SW8270DSIM	2-Methylnaphthalene	6.5 J	ug/kg	6.5 J	bl
PDI-SG-B434	580-78527-1	SW8270DSIM	Naphthalene	15 J	ug/kg	15 J	bl
PDI-SG-B434	580-78527-1	SW8270DSIM	Acenaphthene	2.3 J	ug/kg	2.3 J	m,md
PDI-SG-B435	580-78527-2	SW7471A	Mercury	0.056	mg/kg	0.056 J	h
PDI-SG-B435	580-78527-2	SW8270DSIM	Benzo(a)pyrene	13 J	ug/kg	13 J	l
PDI-SG-B435	580-78527-2	SW8270D	Bis(2-ethylhexyl)phthalate	69 J	ug/kg	69 J	bl
PDI-SG-B435	580-78527-2	SW8270DSIM	2-Methylnaphthalene	8.5 J	ug/kg	8.5 J	bl
PDI-SG-B441	580-78527-3	SW7471A	Mercury	0.027 J	mg/kg	0.027 J	h
PDI-SG-B441	580-78527-3	SW8270DSIM	Phenanthrene	14 J	ug/kg	14 J	bl
PDI-SG-B441	580-78527-3	SW8270DSIM	Naphthalene	7.8 J	ug/kg	7.8 J	bl
PDI-SG-B441	580-78527-3	SW8270DSIM	2-Methylnaphthalene	4.0 J	ug/kg	4.0 J	bl
PDI-SG-B441	580-78527-3	SW8270DSIM	Benzo(a)pyrene	12 J	ug/kg	12 J	l
PDI-SG-B442	580-78527-4	SW7471A	Mercury	0.082	mg/kg	0.082 J	h
PDI-SG-B442	580-78527-4	SW8270DSIM	Phenanthrene	20 J	ug/kg	20 J	bl
PDI-SG-B442	580-78527-4	SW8270DSIM	Naphthalene	13 J	ug/kg	13 J	bl
PDI-SG-B442	580-78527-4	SW8270DSIM	2-Methylnaphthalene	6.0 J	ug/kg	6.0 J	bl
PDI-SG-B442	580-78527-4	SW8270DSIM	Benzo(a)pyrene	11 J	ug/kg	11 J	l
PDI-SG-B439	580-78527-5	SW8270DSIM	Benzo(a)pyrene	42	ug/kg	42 J	l
PDI-SG-B439	580-78527-5	SW7471A	Mercury	0.58	mg/kg	0.58 J	h
PDI-SG-B440	580-78527-6	SW7471A	Mercury	0.053	mg/kg	0.053 J	h
PDI-SG-B440	580-78527-6	SW8270DSIM	Benzo(a)pyrene	25	ug/kg	25 J	l
PDI-SG-B440	580-78527-6	SW8270D	Bis(2-ethylhexyl)phthalate	88 J	ug/kg	88 J	bl
PDI-SG-B440	580-78527-6	SW8270DSIM	Naphthalene	11 J	ug/kg	11 J	bl
PDI-SG-B440	580-78527-6	SW8270DSIM	2-Methylnaphthalene	7.9 J	ug/kg	7.9 J	bl
PDI-SG-B445	580-78527-7	SW7471A	Mercury	0.066	mg/kg	0.066 J	h
PDI-SG-B445	580-78527-7	SW8270DSIM	Benzo(a)pyrene	26	ug/kg	26 J	l
PDI-SG-B446	580-78527-8	SW7471A	Mercury	0.055	mg/kg	0.055 J	h
PDI-SG-B446	580-78527-8	SW8270DSIM	Phenanthrene	6.3 J	ug/kg	6.3 J	bl
PDI-SG-B446	580-78527-8	SW8270DSIM	Naphthalene	3.8 J	ug/kg	3.8 J	bl
PDI-SG-B446	580-78527-8	SW8270DSIM	Benzo(a)pyrene	16 U	ug/kg	16 UJ	l
PDI-SG-B447	580-78527-9	SW7471A	Mercury	0.068	mg/kg	0.068 J	h
PDI-SG-B447	580-78527-9	SW8270D	Bis(2-ethylhexyl)phthalate	150 J	ug/kg	150 J	bl
PDI-SG-B447	580-78527-9	SW8270DSIM	Naphthalene	16 J	ug/kg	16 J	bl
PDI-SG-B447	580-78527-9	SW8270DSIM	2-Methylnaphthalene	6.5 J	ug/kg	6.5 J	bl
PDI-SG-B447	580-78527-9	SW8270DSIM	Benzo(a)pyrene	36	ug/kg	36 J	l
PDI-SG-B449	580-78527-10	SW7471A	Mercury	0.073	mg/kg	0.073 J	h
PDI-SG-B449	580-78527-10	SW8270D	Bis(2-ethylhexyl)phthalate	70 J	ug/kg	70 J	bl
PDI-SG-B449	580-78527-10	SW8270DSIM	2-Methylnaphthalene	6.5 J	ug/kg	6.5 J	bl
PDI-SG-B449	580-78527-10	SW8270DSIM	Benzo(a)pyrene	18 J	ug/kg	18 J	l
PDI-SG-B443	580-78527-11	SW7471A	Mercury	0.044 J	mg/kg	0.044 J	h
PDI-SG-B443	580-78527-11	SW8270DSIM	Naphthalene	12 J	ug/kg	12 J	bl
PDI-SG-B443	580-78527-11	SW8270DSIM	2-Methylnaphthalene	2.6 J	ug/kg	2.6 J	bl
PDI-SG-B443	580-78527-11	SW8270DSIM	Benzo(a)pyrene	8.7 J	ug/kg	8.7 J	l
PDI-SG-B444	580-78527-12	SW7471A	Mercury	0.045	mg/kg	0.045 J	h
PDI-SG-B444	580-78527-12	SW8270DSIM	Benzo(a)pyrene	12 J	ug/kg	12 J	l
PDI-SG-B448	580-78527-13	SW7471A	Mercury	0.066	mg/kg	0.066 J	h
PDI-SG-B448	580-78527-13	SW8270DSIM	2-Methylnaphthalene	7.6 J	ug/kg	7.6 J	bl
PDI-SG-B448	580-78527-13	SW8270DSIM	Benzo(a)pyrene	22	ug/kg	22 J	l
PDI-SG-B451	580-78527-14	SW7471A	Mercury	0.042	mg/kg	0.042 J	h
PDI-SG-B451	580-78527-14	SW8270DSIM	Phenanthrene	9.9 J	ug/kg	9.9 J	bl
PDI-SG-B451	580-78527-14	SW8270DSIM	Naphthalene	7.5 J	ug/kg	7.5 J	bl
PDI-SG-B451	580-78527-14	SW8270DSIM	2-Methylnaphthalene	1.3 J	ug/kg	1.3 J	bl
PDI-SG-B451	580-78527-14	SW8270DSIM	Benzo(a)pyrene	6.0 J	ug/kg	6.0 J	l
PDI-SG-B455	580-78527-15	SW7471A	Mercury	0.049	mg/kg	0.049 J	h
PDI-SG-B450	580-78527-16	SW7471A	Mercury	0.075	mg/kg	0.075 J	h
PDI-SG-B450	580-78527-16	SW8270DSIM	Phenanthrene	3.6 J	ug/kg	3.6 J	bl
PDI-SG-B450	580-78527-16	SW8270DSIM	Benzo(a)pyrene	15 U	ug/kg	15 UJ	l
PDI-SG-B454	580-78527-17	SW7471A	Mercury	0.036 J	mg/kg	0.036 J	h

Table 1
QA/QC Data Summary Review
Portland Harbor
Surface Sediment - Downtown/Upriver
TestAmerica Laboratory Groups: 580-78527-1, 580-78527-6, and 580-78527-7

Sample ID	Laboratory ID	Method	Analyte	Laboratory Result	Units	Final Result	Reason Code
PDI-SG-B454	580-78527-17	SW8270D	Bis(2-ethylhexyl)phthalate	65 J	ug/kg	65 J	bl
PDI-SG-B453	580-78527-18	SW7471A	Mercury	0.28	mg/kg	0.28 J	h
PDI-SG-B453-D	580-78527-19	SW7471A	Mercury	0.041 J	mg/kg	0.041 J	h
PDI-SG-B452	580-78527-20	SW7471A	Mercury	0.031 J	mg/kg	0.031 J	h
PDI-SG-B452	580-78527-20	SW8270D	Bis(2-ethylhexyl)phthalate	71 J	ug/kg	71 J	bl
PDI-SG-B452	580-78527-20	SW8270DSIM	2-Methylnaphthalene	4.5 J	ug/kg	4.5 J	bl
PDI-SG-B452	580-78527-20	SW8270DSIM	Naphthalene	10 J	ug/kg	10 J	bl
PDI-SG-B452	580-78527-20	SW8270DSIM	Phenanthrene	12 J	ug/kg	12 J	bl
PDI-SG-B452	580-78527-20	SW8270DSIM	Benzo(a)pyrene	10 J	ug/kg	10 J	l
PDI-SG-B457	580-78527-21	SW7471A	Mercury	0.11	mg/kg	0.11 J	h
PDI-SG-B457	580-78527-21	SW8270D	Bis(2-ethylhexyl)phthalate	82 J	ug/kg	82 J	bl
PDI-SG-B459	580-78527-22	SW7471A	Mercury	0.075	mg/kg	0.075 J	h
PDI-SG-B459	580-78527-22	SW8270DSIM	Benzo(a)pyrene	470	ug/kg	470 J	l
PDI-SG-B460	580-78527-23	SW7471A	Mercury	0.053 J	mg/kg	0.053 J	h
PDI-SG-B461	580-78527-24	SW7471A	Mercury	0.048	mg/kg	0.048 J	h
PDI-SG-B461	580-78527-24	SW8270DSIM	Phenanthrene	16 J	ug/kg	16 J	bl
PDI-SG-B461	580-78527-24	SW8270DSIM	Naphthalene	11 J	ug/kg	11 J	bl
PDI-SG-B461	580-78527-24	SW8270DSIM	2-Methylnaphthalene	4.9 J	ug/kg	4.9 J	bl
PDI-SG-B461	580-78527-24	SW8270DSIM	Benzo(a)pyrene	9.0 J	ug/kg	9.0 J	l
PDI-SG-B461-D	580-78527-25	SW7471A	Mercury	0.041	mg/kg	0.041 J	h
PDI-SG-B461-D	580-78527-25	SW8270DSIM	Phenanthrene	14 J	ug/kg	14 J	bl
PDI-SG-B461-D	580-78527-25	SW8270DSIM	Naphthalene	7.2 J	ug/kg	7.2 J	bl
PDI-SG-B461-D	580-78527-25	SW8270DSIM	2-Methylnaphthalene	3.0 J	ug/kg	3.0 J	bl
PDI-SG-B461-D	580-78527-25	SW8270DSIM	Benzo(a)pyrene	8.5 J	ug/kg	8.5 J	l
PDI-RB-180630	580-78527-26	TA-MS-0346	Tributyltin	0.46 U	ug/L	0.46 UJ	h

Notes:
bl - laboratory blank contamination
h - holding time
J - estimated value
l - laboratory control sample recovery
m - matrix spike recovery
md - matrix spike/matrix spike duplicate RPD
mg/kg - milligram per kilogram
RPD - relative percent difference
U - Compound was analyzed for, but not detected above the value shown.
ug/kg - microgram per kilogram
ug/L - microgram per liter