

# Data Validation Report

Project: Portland Harbor Pre-Remedial Design Investigation and Baseline Sampling  
 Portland Harbor Superfund Site  
 Subsurface Sediment – Nearshore Core Stations

Laboratory: TestAmerica Laboratories, Incorporated, Seattle, WA

Laboratory Group: 580-79099-1

Analyses/Method: Polycyclic Aromatic Hydrocarbons (PAHs), Polychlorinated Biphenyls Aroclors (PCBs), Total Organic Carbon (TOC), Total Solids, and Grain Size

Validation Level: Stage 4

AECOM Project

Number: 60566335, Task #2.12

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File Name: 580-79099-1 DVR

## SUMMARY

The data quality review of 30 subsurface sediment samples and one rinsate blank collected on July 23 and July 24, 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 the *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 580-79099-1:

Sample ID	Laboratory ID
PDI-SC-S045-0to2	580-79099-1
PDI-SC-S045-2to4	580-79099-2
PDI-SC-S045-4to6	580-79099-3
PDI-SC-S042-0to2	580-79099-4
PDI-SC-S042-2to4	580-79099-5
PDI-SC-S042-4to6	580-79099-6
PDI-SC-S061-0to3	580-79099-7
PDI-SC-S061-3to4.5	580-79099-8
PDI-SC-S061-4.5to6	580-79099-9
PDI-SC-S066-0to2	580-79099-10
PDI-SC-S066-2to4	580-79099-11
PDI-SC-S066-4to5.8	580-79099-12
PDI-SC-S066-5.8to6.6	580-79099-13
PDI-SC-S082-0to2	580-79099-14
PDI-SC-S082-2to4	580-79099-15
PDI-SC-S082-4to6	580-79099-16
PDI-SC-S095-0to2	580-79099-17

## Data Validation Report

### Portland Harbor Pre-Remedial Design Investigation and Baseline Sampling

#### Subsurface Sediment – Nearshore Core Stations

TA Lab Group: 580-79099-1

Sample ID	Laboratory ID
PDI-SC-S095-2to4	580-79099-18
PDI-SC-S095-4to6	580-79099-19
PDI-SC-S064-0to2	580-79099-20
PDI-SC-S064-2to3.5	580-79099-21
PDI-SC-S064-3.5to4.8	580-79099-22
PDI-SC-S154-0to1	580-79099-23
PDI-SC-S154-1to3	580-79099-24
PDI-SC-S154-3to4	580-79099-25
PDI-SC-S127-0to2	580-79099-26
PDI-SC-S127-2to4	580-79099-27
PDI-SC-S127-4to5.6	580-79099-28
PDI-SC-S127-2to4D (field duplicate of PDI-SC-S127-2to4)	580-79099-29
PDI-SC-S095-0to2D (field duplicate of PDI-SC-S095-0to2)	580-79099-30
PDI-RB-SS-180724 (rinsate blank)	580-79099-31

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. No discrepancies related to sample identification were noted by TA.

### 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:

PAHs by Method 8270D-SIM – The percent differences (%D) for benzo[a]anthracene (21.3%) and benzo[b]fluoranthene (20.1%) exceeded the control limits of ±20% in the continuing calibration verification (CCV) associated with the analytical batch 280341. The samples associated with this CCV were re-analyzed with acceptable CCV results and benzo[a]anthracene was reported from the re-analyses. Benzo[b]fluoranthene was reported from the initial analyses; therefore, the results for benzo[b]fluoranthene in PDI-SC-S061-0to3, PDI-SC-S061-3to4.5, PDI-SC-S061-4.5to6, PDI-SC-S066-0to2, PDI-SC-S066-2to4, PDI-SC-S066-4to5.8, PDI-SC-S066-5.8to6.6, PDI-SC-S082-0to2, PDI-SC-S082-2to4, PDI-SC-S095-



**Data Validation Report**  
**Portland Harbor Pre-Remedial Design Investigation and Baseline Sampling**  
**Subsurface Sediment – Nearshore Core Stations**  
**TA Lab Group: 580-79099-1**

0to2, PDI-SC-S095-4to6, PDI-SC-S064-0to2, PDI-SC-S154-0to1, PDI-SC-S154-3to4, PDI-SC-S127-0to2, PDI-SC-S127-2to4, PDI-SC-S127-4to5.6, PDI-SC-S127-2to4D, and PDI-SC-S095-0to2D were qualified as estimated and flagged 'J' based on the CCV %D.

PCBs by Method 8082A – The %D for one or more peaks for the following analytes were outside the control limits of  $\pm 20\%$  in the CCVs associated with the analytical batches listed below:

Analytical Batch	Analyte	Column 1 %D	Column 2 %D
280273	PCB-1248	ok	low
	PCB-1242	high	high
	PCB-1254	high	ok
	PCB-1221	ok	high/low
	PCB-1016	high	ok
	PCB-1260	ok	low
280274	PCB-1232	low	low
	PCB-1248	ok	low
	PCB-1242	ok	low
	PCB-1221	low	low
	PCB-1016	ok	low
	PCB-1260	ok	low
	Surr-DCB	ok	low
280527	PCB-1232	high	high
	PCB-1248	high	low
	PCB-1242	high	high
	PCB-1254	high	ok
	PCB-1221	ok	high/low
	PCB-1016	high	low
280814	PCB-1260	ok	low
	PCB-1232	high/low	low
	PCB-1248	ok	low
	PCB-1242	low	low
	PCB-1221	low	low
	PCB-1254	low	low
	PCB-1016	low	low
	Surr-DCB	low	low
281356	PCB-1232	high	high
	PCB-1248	high	high/low
	PCB-1242	high	high
	PCB-1221	high	high/low
	PCB-1254	high	high
	PCB-1016	high	high
	PCB-1260	high	ok
	Surr-DCB	high	ok

**Data Validation Report**  
**Portland Harbor Pre-Remedial Design Investigation and Baseline Sampling**  
**Subsurface Sediment – Nearshore Core Stations**  
**TA Lab Group: 580-79099-1**

Analytical Batch	Analyte	Column 1 %D	Column 2 %D
281356	Surr-TMX	high	high

ok - acceptable  
 Surr. DCB – surrogate decachlorobiphenyl  
 Surr. TMX – surrogate tetrachloro-m-xylene

Data were not qualified based on the surrogate %Ds. The above analytes were either not detected in the associated samples for high %Ds or reported from the passing column; therefore, data were not qualified based on the CCV %Ds with the following exceptions. The results for PCB-1254 in PDI-SC-S082-2to4, PDI-SC-S082-0to2, PDI-SC-S042-0to2, PDI-SC-S042-2to4, PDI-SC-S042-4to6, PDI-SC-S082-4to6, and PDI-RB-SS-180724; PCB-1232 in PDI-SC-S154-3to4, PDI-SC-S127-0to2, PDI-SC-S127-2to4, PDI-SC-S154-0to1, and PDI-RB-SS-180724; PCB-1221 in PDI-SC-S154-3to4, PDI-SC-S127-0to2, PDI-SC-S127-2to4, and PDI-RB-SS-180724; PCB-1242 in PDI-SC-S154-0to1 and PDI-RB-SS-180724; PCB-1260 in PDI-SC-S061-0to3, PDI-SC-S061-3to4.5, PDI-SC-S154-0to1, and PDI-RB-SS-180724; PCB-1248 and PCB-1221 in PDI-SC-S045-0to2, PDI-SC-S045-2to4, PDI-SC-S045-4to6, PDI-SC-S042-0to2, PDI-SC-S042-2to4, PDI-SC-S042-4to6, PDI-SC-S066-2to4, PDI-SC-S082-4to6, PDI-SC-S095-2to4, PDI-SC-S064-2to3.5, PDI-SC-S127-4to5.6, PDI-SC-S127-2to4D, and PDI-SC-S095-0to2D; and PCB-1016 in PDI-RB-SS-180724 were qualified as estimated and flagged 'J' or 'UJ' based on the CCV %Ds.

3. Blanks – Acceptable except as noted below:

General – One rinsate blank was submitted with this laboratory group. PAHs and PCBs were not detected in this rinsate blank.

PAHs by Method 8270D-SIM – The following analytes were detected in the method blanks:

Prep Batch	Analyte	Result
280203	2-Methylnaphthalene	0.590 J ug/kg
	Acenaphthylene	0.160 J ug/kg
	Acenaphthene	0.237 J ug/kg
	Anthracene	0.140 J ug/kg
	Benzo[a]anthracene	0.203 J ug/kg
	Fluorene	0.226 J ug/kg
	Benzo[k]fluoranthene	0.162 J ug/kg
	Benzo[a]pyrene	0.146 J ug/kg
	Naphthalene	0.391 J ug/kg
	Phenanthrene	0.653 J ug/kg
	Pyrene	0.212 J ug/kg
280231	2-Methylnaphthalene	0.159 J ug/kg
	Naphthalene	0.409 J ug/kg
	Phenanthrene	0.183 J ug/kg
280319	2-Methylnaphthalene	0.251 J ug/kg
	Acenaphthylene	0.305 J ug/kg
280319	Acenaphthene	0.171 J ug/kg
	Anthracene	0.271 J ug/kg
	Fluoranthene	0.346 J ug/kg
	Fluorene	0.382 J ug/kg
	Naphthalene	0.466 J ug/kg
	Phenanthrene	1.82 ug/kg
Pyrene	0.210 J ug/kg	

J – detected between the method detection limit (MDL) and reporting limit

**Data Validation Report**  
**Portland Harbor Pre-Remedial Design Investigation and Baseline Sampling**  
**Subsurface Sediment – Nearshore Core Stations**  
**TA Lab Group: 580-79099-1**

The results for benzo[k]fluoranthene and benzo[a]pyrene in samples associated with prep batch 280203 and acenaphthene, fluoranthene, and pyrene in samples associated with prep batch 280319 were 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.

Acenaphthylene, acenaphthene, anthracene, fluorene, and 2-methylnaphthalene in PDI-SC-S045-0to2; acenaphthylene in PDI-SC-S042-0to2; benzo[a]anthracene and pyrene in PDI-SC-S045-2to4; naphthalene and phenanthrene in PDI-SC-S154-0to1; 2-methylnaphthalene and acenaphthylene in PDI-SC-S082-4to6; and 2-methylnaphthalene, acenaphthylene, anthracene, fluorene, naphthalene, and phenanthrene in PDI-SC-S154-1to3 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 phenanthrene in PDI-SC-S045-2to4; 2-methylnaphthalene, benz(a)anthracene, fluorene, naphthalene, phenanthrene, and pyrene in PDI-SC-S045-4to6; and 2-methylnaphthalene, naphthalene, and phenanthrene in PDI-SC-S154-3to4 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 (DCB) and tetrachloro-m-xylene (TMX) in the following samples were outside of the control limits of 54-142% and 58-122%, respectively, as follows:

Sample	DCB % Recovery	TMX % Recovery
PDI-SC-S061-3to4.5	ok	54%
PDI-SC-S061-4.5to6	ok	33%
PDI-SC-S066-0to2	ok	54%
PDI-SC-S066-4to5.8	52%	53%
PDI-SC-S066-5.8to6.6	ok	54%
PDI-SC-S082-0to2	224%	50%
PDI-SC-S064-3.5to4.8	ok	55%
PDI-SC-S154-1to3	ok	134%
MS (PDI-SC-S154-1to3)	ok	166%
MSD (PDI-SC-S154-1to3)	ok	163%
PDI-SC-S154-3to4	ok	44%
PDI-SC-S127-0to2	46%	491%
PDI-SC-S127-2to4	ok	40%
PDI-SC-S042-4to6	51%	55%
PDI-SC-S064-2to3.5	ok	53%

ok – acceptable

Data were not qualified based on surrogate recoveries in QC samples (MS and MSD). Data were not qualified based on surrogate recoveries if one of the surrogate recoveries was acceptable. The PCB results in PDI-SC-S066-4to5.8, PDI-SC-S082-0to2, PDI-SC-S127-

## Data Validation Report

### Portland Harbor Pre-Remedial Design Investigation and Baseline Sampling

#### Subsurface Sediment – Nearshore Core Stations

TA Lab Group: 580-79099-1

0to2, and PDI-SC-S042-4to6 were qualified as estimated and flagged 'J' or 'UJ' based on the surrogate recoveries if not already qualified as estimated based on the CCV %Ds.

5. Internal Standards – Acceptable except as noted below:

PCBs by EPA Method 8082A – The internal standard response in PDI-SC-S154-1to3 was outside of the acceptance limit on one column. The results were reported from the other column which met the internal standard criteria; therefore, no data were qualified based on this internal standard response except for PCB-1254 which was reported from the column with the failing internal standard response and was qualified as estimated and flagged 'J' based on the internal standard response.

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

PAHs by Method 8270D-SIM – The percent recoveries for the following analytes were outside of the control limits for the LCS, LCSD, or relative percent difference (RPD):

Prep Batch	Analyte	LCS	LCSD	RPD	Control Limits (LCS / RPD)
280203	Indeno[1,2,3-cd]pyrene	127%	--	--	65-121%
280340	Acenaphthene	ok	63%	ok	64-120% / 20%
	Anthracene	ok	ok	22%	46-127% / 19%
	Pyrene	ok	ok	23%	57-133% / 21%

ok – acceptable -- - not analyzed

As two of the three quality control parameters (LCS, LCSD, and/or RPD) were acceptable for acenaphthene, anthracene, and pyrene, data were not qualified based on the LCSD or RPD results. The results for indeno[1,2,3-cd]pyrene in PDI-SC-S045-0to2, PDI-SC-S042-0to2, PDI-SC-S042-2to4, and PDI-SC-S042-4to6 were qualified as estimated and flagged 'J' based on the elevated LCS recovery.

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

PAHs by Method 8270D-SIM – MS/MSDs were performed using PDI-SC-S061-0to3 and PDI-SC-S154-1to3. 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-S061-0to3	Chrysene	29%	ok	18%	69-120% / 10%
	Fluoranthene	8%	67%	ok	74-125% / 13%
	Benzo[b]fluoranthene	16%	ok	20%	63-121% / 10%
	Benzo[a]pyrene	37%	ok	18%	72-124% / 12%
	Indeno[1,2,3-cd]pyrene	60%	ok	ok	65-121% / 15%
	Pyrene	-34%	23%	ok	70-120% / 12%
	Benzo[a]anthracene	60%	ok	ok	66-120% / 14%
PDI-SC-S154-1to3	Chrysene	68%	49%	16%	69-120% / 10%
	Naphthalene	68%	57%	ok	70-120% / 12%

**Data Validation Report**  
**Portland Harbor Pre-Remedial Design Investigation and Baseline Sampling**  
**Subsurface Sediment – Nearshore Core Stations**  
**TA Lab Group: 580-79099-1**

Sample	Analyte	MS	MSD	RPD	Control Limits (Matrix Spike / RPD)
PDI-SC-S154-1to3	2-Methylnaphthalene	ok	ok	14%	68-120% / 12%
	Anthracene	ok	ok	15%	73-125% / 12%
	Benzo[a]anthracene	ok	ok	17%	66-120% / 14%
	Benzo[a]pyrene	ok	65%	ok	72-124% / 12%
	Benzo[b]fluoranthene	ok	56%	18%	63-121% / 10%
	Fluoranthene	ok	68%	ok	74-125% / 13%
	Phenanthrene	ok	71%	19%	73-120% / 11%
	Pyrene	ok	65%	ok	70-120% / 12%

ok - acceptable

As two of the three quality control parameters (MS, MSD, and/or RPD) were acceptable, data were not qualified for indeno[1,2,3-cd]pyrene and benzo[a]anthracene in PDI-SC-S061-0to3 and 2-methylnaphthalene, anthracene, benzo[a]pyrene, benzo[a]anthracene, fluoranthene, and pyrene in PDI-SC-S154-1to3. The concentrations of fluoranthene and pyrene in PDI-SC-S061-0to3 were greater than four times the spike added; therefore, these data were not qualified based on the MS/MSD results. The results for chrysene and benzo[a]pyrene in PDI-SC-S061-0to3, and chrysene and benzo[b]fluoranthene in PDI-SC-S154-1to3 were qualified as estimated and flagged 'J' based on the MS/MSD results. Benzo[b]fluoranthene in PDI-SC-S061-0to3 and naphthalene and phenanthrene in PDI-SC-S154-1to3 were qualified as estimated and flagged 'J' based on the method blank results or CCV %Ds and no additional qualification was necessary based on the MS/MSD results.

PCBs by EPA Method 8082A – An MS/MSD was performed using PDI-SC-S154-1to3. The percent recoveries for the following analytes were outside of the control limits:

Analyte	MS	MSD	RPD	Control Limits (Matrix Spike / RPD)
PCB-1016	1,482%	2,604%	61%	64-120% / 21%
PCB-1260	7,457%	8,600%	ok	63-130% / 25%

ok – acceptable

PCB-1254 was identified in the sample at 12 ug/kg. Matrix interference and the presence of PCB-1254 at a concentration similar to the spiking concentrations affected the spike recoveries for PCB-1016 and PCB-1260. The sample data were not qualified based on the elevated MS/MSD results.

8. Field Duplicate – Acceptable except as noted below:

General – Field duplicates were submitted for PDI-SC-S127-2to4 and PDI-SC-S095-0to2 and identified as PDI-SC-S127-2to4D and PDI-SC-S095-0to2D, respectively. Results were comparable with the following exceptions.

PAHs by Method 8270D-SIM – The RPD for 2-methylnaphthalene (61%) in the PDI-SC-S127-2to4 and PDI-SC-S127-2to4D field duplicate pair exceeded 50%; therefore, the results for 2-methylnaphthalene in PDI-SC-S127-2to4 and PDI-SC-S127-2to4D were qualified as estimated and flagged 'J' based on the elevated field duplicate RPD.



## Data Validation Report

### Portland Harbor Pre-Remedial Design Investigation and Baseline Sampling

#### Subsurface Sediment – Nearshore Core Stations

TA Lab Group: 580-79099-1

PCBs by EPA Method 8082A – PCB-1260 was not detected in PDI-SC-S127-2to4 but was detected (24 ug/kg) in PDI-SC-S127-2to4D. The RPD could not be calculated but the concentration in PDI-SC-S127-2to4D was greater than five times the reporting limit; therefore, the results for PCB-1260 in PDI-SC-S127-2to4 and PDI-SC-S127-2to4D were qualified as estimated and flagged 'J' or 'UJ' based on these field duplicate results.

#### 9. Calculation Checks – Acceptable

A calculation check was performed for sample results on one sample per calibration. 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 – The reporting limits for PAHs reported as not detected in PDI-SC-S045-2to4, PDI-SC-S154-0to1, and PDI-SC-S154-1to3 were raised because of the dilutions that were required prior to analysis due to the nature of the sample matrix. The elevated reporting limits did not exceed the cleanup level for carcinogenic PAHs (12 ug/kg).

#### 11. Other Items of Note:

PCBs by EPA Method 8082A – The laboratory noted that all sediment samples in this laboratory group required a copper clean-up to reduce matrix interferences caused by sulfur.

The laboratory noted that PDI-SC-S095-0to2, PDI-SC-S154-0to1, PDI-SC-S154-1to3, PDI-SC-S045-0to2, PDI-SC-S042-0to2, PDI-SC-S042-2to4, PDI-SC-S064-2to3.5, PDI-SC-S127-4to5.6, and PDI-SC-S127-0to2 appeared to contain PCBs, however, due to either multiple overlapping Aroclors, weathering, or other environmental processes, the PCBs in the samples do not closely match any of the laboratory's Aroclor standards used for instrument calibration. The PCBs present are quantified and reported as the predominant Aroclor or mixture of Aroclors. The results for PCB-1260 in PDI-SC-S095-0to2, PDI-SC-S045-0to2, PDI-SC-S064-2to3.5, and PDI-SC-S127-4to5.6 were qualified as estimated and flagged 'J' based on this identification issue. The results for PCB-1254 in PDI-SC-S154-1to3, PDI-SC-S042-0to2, and PDI-SC-S042-2to4; PCB-1232, PCB-1242, and PCB-1260 in PDI-SC-S154-0to1; and PCB-1260 in PDI-SC-S127-0to2 were qualified as estimated and flagged 'J' based on the CCV %Ds, surrogate recoveries, or internal standard results and no further qualification was necessary based on this identification issue.

The laboratory noted that PDI-SC-S061-3to4.5, PDI-SC-S066-0to2, PDI-SC-S064-0to2, and PDI-SC-S064-3.5to4.8 contained more than one Aroclor with insufficient separation to quantify individually. The results for PCB-1260 in PDI-SC-S066-0to2, PDI-SC-S064-0to2, and PDI-SC-S064-3.5to4.8 were qualified as estimated and flagged 'J' based on this identification issue. The result for PCB-1260 in PDI-SC-S061-3to4.5 was qualified as



## Data Validation Report

### Portland Harbor Pre-Remedial Design Investigation and Baseline Sampling

#### Subsurface Sediment – Nearshore Core Stations

TA Lab Group: 580-79099-1

estimated and flagged 'J' based on the CCV %D and no further qualification was necessary based on this identification issue.

The RPD between the primary and confirmation column exceeded 40% for PCB-1254 in PDI-SC-S042-4to6, PDI-SC-S082-4to6, and PDI-SC-S154-1to3; PCB-1260 in PDI-SC-S061-3to4.5, PDI-SC-S154-0to1, and PDI-SC-S127-4to5.6; and PCB-1242 in PDI-SC-S154-0to1. The PCBs noted above were qualified for CCV or identification issues and were not qualified for 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 all samples in this laboratory group by 3-4 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 was one rinsate blank submitted with this laboratory group. TOC was detected in PDI-RB-SS-180724 (0.25 mg/L) at a concentration between the reporting limit and MDL. Sediment data were not qualified based on rinsate blank results.

TOC was detected in a continuing calibration blank (CCB) from analytical batch 280598 (705 mg/kg) and the initial calibration blank (ICB) from analytical batch 280722 (299 mg/kg) between the MDLs and reporting limits. The associated sample concentrations were significantly above the blank contamination or TOC was not detected in the bracketing CCBs; therefore, data were not qualified based on these blank detections.

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

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

TOC by Method 9060 – An MS/MSD was performed using PDI-SC-S154-1to3. Results were acceptable.

6. Field Duplicate – Acceptable

Field duplicates were submitted for PDI-SC-S127-2to4 and PDI-SC-S095-0to2 and identified as PDI-SC-S127-2to4D and PDI-SC-S095-0to2D, respectively. Results were comparable.

7. Laboratory Replicate – Acceptable except as noted below:

TOC by Method 9060 – A laboratory duplicate and triplicate were performed using PDI-SC-S154-1to3. The RPD for TOC (21%) in the triplicate exceeded the control limit of 20%. The result for TOC in PDI-SC-S154-1to3 was less than five times the reporting limit; therefore, data were not qualified based on the elevated laboratory triplicate RPD.



## Data Validation Report

### Portland Harbor Pre-Remedial Design Investigation and Baseline Sampling

#### Subsurface Sediment – Nearshore Core Stations

TA Lab Group: 580-79099-1

Total Solids by Method D2216 – A laboratory duplicate was performed using PDI-SC-S042-4to6. Results were comparable.

Moisture Content at 70°C – Laboratory duplicates were performed using PDI-SC-S082-2to4 and PDI-SC-S127-2to4D. Results were comparable.

8. Calculation Checks – Acceptable

A calculation check was performed for sample results on one sample per calibration, where applicable. 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.

1. Laboratory Duplicate – Acceptable

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-S082-2to4. 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 group 580-79099-1 is 100%.

**Table 1**  
**QA/QC Data Summary Review**  
**Portland Harbor**  
**Subsurface Sediment - Deep Core Stations**  
**TestAmerica Laboratory Group: 580-79099-1**

Sample ID	Laboratory ID	Method	Analyte	Laboratory Result	Units	Final Result	Reason Code
PDI-SC-S045-0TO2	580-79099-1	SW8270DSIM	2-Methylnaphthalene	2.9 J	ug/kg	2.9 J	bl
PDI-SC-S045-0TO2	580-79099-1	SW8270DSIM	Acenaphthene	2.3 J	ug/kg	2.3 J	bl
PDI-SC-S045-0TO2	580-79099-1	SW8270DSIM	Acenaphthylene	2.6 J	ug/kg	2.6 J	bl
PDI-SC-S045-0TO2	580-79099-1	SW8270DSIM	Anthracene	5.6 J	ug/kg	5.6 J	bl
PDI-SC-S045-0TO2	580-79099-1	SW8082A	Aroclor 1221	2.5 U	ug/kg	2.5 UJ	c
PDI-SC-S045-0TO2	580-79099-1	SW8082A	Aroclor 1248	2.5 U	ug/kg	2.5 UJ	c
PDI-SC-S045-0TO2	580-79099-1	SW8082A	Aroclor 1260	0.55 J	ug/kg	0.55 J	q
PDI-SC-S045-0TO2	580-79099-1	SW8270DSIM	Fluorene	2.3 J	ug/kg	2.3 J	bl
PDI-SC-S045-0TO2	580-79099-1	SW8270DSIM	Indeno(1,2,3-cd)pyrene	19	ug/kg	19 J	l
PDI-SC-S045-2TO4	580-79099-2	SW8270DSIM	2-Methylnaphthalene	0.34 J	ug/kg	2.6 U	bl
PDI-SC-S045-2TO4	580-79099-2	SW8082A	Aroclor 1221	2.6 U	ug/kg	2.6 UJ	c
PDI-SC-S045-2TO4	580-79099-2	SW8082A	Aroclor 1248	2.6 U	ug/kg	2.6 UJ	c
PDI-SC-S045-2TO4	580-79099-2	SW8270DSIM	Benz(a)anthracene	0.96 J	ug/kg	0.96 J	bl
PDI-SC-S045-2TO4	580-79099-2	SW8270DSIM	Phenanthrene	0.63 J	ug/kg	2.6 U	bl
PDI-SC-S045-2TO4	580-79099-2	SW8270DSIM	Pyrene	0.57 J	ug/kg	0.57 J	bl
PDI-SC-S045-4TO6	580-79099-3	SW8270DSIM	2-Methylnaphthalene	0.43 J	ug/kg	1.3 U	bl
PDI-SC-S045-4TO6	580-79099-3	SW8082A	Aroclor 1221	2.7 U	ug/kg	2.7 UJ	c
PDI-SC-S045-4TO6	580-79099-3	SW8082A	Aroclor 1248	2.7 U	ug/kg	2.7 UJ	c
PDI-SC-S045-4TO6	580-79099-3	SW8270DSIM	Benz(a)anthracene	0.61 J	ug/kg	1.3 U	bl
PDI-SC-S045-4TO6	580-79099-3	SW8270DSIM	Fluorene	0.14 J	ug/kg	1.3 U	bl
PDI-SC-S045-4TO6	580-79099-3	SW8270DSIM	Naphthalene	0.41 J	ug/kg	1.3 U	bl
PDI-SC-S045-4TO6	580-79099-3	SW8270DSIM	Phenanthrene	0.41 J	ug/kg	1.3 U	bl
PDI-SC-S045-4TO6	580-79099-3	SW8270DSIM	Pyrene	0.28 J	ug/kg	1.3 U	bl
PDI-SC-S042-0TO2	580-79099-4	SW8270DSIM	Acenaphthylene	17 J	ug/kg	17 J	bl
PDI-SC-S042-0TO2	580-79099-4	SW8082A	Aroclor 1221	7.1 U	ug/kg	7.1 UJ	c
PDI-SC-S042-0TO2	580-79099-4	SW8082A	Aroclor 1248	7.1 U	ug/kg	7.1 UJ	c
PDI-SC-S042-0TO2	580-79099-4	SW8082A	Aroclor 1254	48	ug/kg	48 J	c
PDI-SC-S042-0TO2	580-79099-4	SW8270DSIM	Indeno(1,2,3-cd)pyrene	180	ug/kg	180 J	l
PDI-SC-S042-2TO4	580-79099-5	SW8082A	Aroclor 1221	5.7 U	ug/kg	5.7 UJ	c
PDI-SC-S042-2TO4	580-79099-5	SW8082A	Aroclor 1248	5.7 U	ug/kg	5.7 UJ	c
PDI-SC-S042-2TO4	580-79099-5	SW8082A	Aroclor 1254	27	ug/kg	27 J	c
PDI-SC-S042-2TO4	580-79099-5	SW8270DSIM	Indeno(1,2,3-cd)pyrene	440	ug/kg	440 J	l
PDI-SC-S042-4TO6	580-79099-6	SW8082A	Aroclor 1016	5.9 U	ug/kg	5.9 UJ	s
PDI-SC-S042-4TO6	580-79099-6	SW8082A	Aroclor 1221	5.9 U	ug/kg	5.9 UJ	c
PDI-SC-S042-4TO6	580-79099-6	SW8082A	Aroclor 1232	5.9 U	ug/kg	5.9 UJ	s
PDI-SC-S042-4TO6	580-79099-6	SW8082A	Aroclor 1242	5.9 U	ug/kg	5.9 UJ	s
PDI-SC-S042-4TO6	580-79099-6	SW8082A	Aroclor 1248	5.9 U	ug/kg	5.9 UJ	c
PDI-SC-S042-4TO6	580-79099-6	SW8082A	Aroclor 1254	16	ug/kg	16 J	c
PDI-SC-S042-4TO6	580-79099-6	SW8082A	Aroclor 1260	5.9 U	ug/kg	5.9 UJ	s
PDI-SC-S042-4TO6	580-79099-6	SW8270DSIM	Indeno(1,2,3-cd)pyrene	580	ug/kg	580 J	l
PDI-SC-S061-0TO3	580-79099-7	SW8082A	Aroclor 1260	2.4 U	ug/kg	2.4 UJ	c
PDI-SC-S061-0TO3	580-79099-7	SW8270DSIM	Benzo(a)pyrene	630	ug/kg	630 J	m,md
PDI-SC-S061-0TO3	580-79099-7	SW8270DSIM	Benzo(b)fluoranthene	770	ug/kg	770 J	c
PDI-SC-S061-0TO3	580-79099-7	SW8270DSIM	Chrysene	560	ug/kg	560 J	m,md
PDI-SC-S061-3TO4.5	580-79099-8	SW8082A	Aroclor 1260	6.5	ug/kg	6.5 J	c
PDI-SC-S061-3TO4.5	580-79099-8	SW8270DSIM	Benzo(b)fluoranthene	32,000	ug/kg	32,000 J	c
PDI-SC-S061-4.5TO6	580-79099-9	SW8270DSIM	Benzo(b)fluoranthene	590	ug/kg	590 J	c
PDI-SC-S066-0TO2	580-79099-10	SW8082A	Aroclor 1260	1.0 J	ug/kg	1.0 J	q
PDI-SC-S066-0TO2	580-79099-10	SW8270DSIM	Benzo(b)fluoranthene	62	ug/kg	62 J	c
PDI-SC-S066-2TO4	580-79099-11	SW8082A	Aroclor 1221	6.2 U	ug/kg	6.2 UJ	c
PDI-SC-S066-2TO4	580-79099-11	SW8082A	Aroclor 1248	6.2 U	ug/kg	6.2 UJ	c
PDI-SC-S066-2TO4	580-79099-11	SW8270DSIM	Benzo(b)fluoranthene	1,800	ug/kg	1,800 J	c
PDI-SC-S066-4TO5.8	580-79099-12	SW8082A	Aroclor 1016	2.7 U	ug/kg	2.7 UJ	s
PDI-SC-S066-4TO5.8	580-79099-12	SW8082A	Aroclor 1221	2.7 U	ug/kg	2.7 UJ	s
PDI-SC-S066-4TO5.8	580-79099-12	SW8082A	Aroclor 1232	2.7 U	ug/kg	2.7 UJ	s
PDI-SC-S066-4TO5.8	580-79099-12	SW8082A	Aroclor 1242	2.7 U	ug/kg	2.7 UJ	s
PDI-SC-S066-4TO5.8	580-79099-12	SW8082A	Aroclor 1248	2.7 U	ug/kg	2.7 UJ	s
PDI-SC-S066-4TO5.8	580-79099-12	SW8082A	Aroclor 1254	2.7 U	ug/kg	2.7 UJ	s
PDI-SC-S066-4TO5.8	580-79099-12	SW8082A	Aroclor 1260	2.7 U	ug/kg	2.7 UJ	s

**Table 1**  
**QA/QC Data Summary Review**  
**Portland Harbor**  
**Subsurface Sediment - Deep Core Stations**  
**TestAmerica Laboratory Group: 580-79099-1**

Sample ID	Laboratory ID	Method	Analyte	Laboratory Result	Units	Final Result	Reason Code
PDI-SC-S066-4TO5.8	580-79099-12	SW8270DSIM	Benzo(b)fluoranthene	1,500	ug/kg	1,500 J	c
PDI-SC-S066-5.8TO6.6	580-79099-13	SW8270DSIM	Benzo(b)fluoranthene	1,400	ug/kg	1,400 J	c
PDI-SC-S082-0TO2	580-79099-14	SW8082A	Aroclor 1016	3.8 U	ug/kg	3.8 UJ	s
PDI-SC-S082-0TO2	580-79099-14	SW8082A	Aroclor 1221	3.8 U	ug/kg	3.8 UJ	s
PDI-SC-S082-0TO2	580-79099-14	SW8082A	Aroclor 1232	3.8 U	ug/kg	3.8 UJ	s
PDI-SC-S082-0TO2	580-79099-14	SW8082A	Aroclor 1242	3.8 U	ug/kg	3.8 UJ	s
PDI-SC-S082-0TO2	580-79099-14	SW8082A	Aroclor 1248	3.8 U	ug/kg	3.8 UJ	s
PDI-SC-S082-0TO2	580-79099-14	SW8082A	Aroclor 1254	45	ug/kg	45 J	c
PDI-SC-S082-0TO2	580-79099-14	SW8082A	Aroclor 1260	3.8 U	ug/kg	3.8 UJ	s
PDI-SC-S082-0TO2	580-79099-14	SW8270DSIM	Benzo(b)fluoranthene	2,300	ug/kg	2,300 J	c
PDI-SC-S082-2TO4	580-79099-15	SW8082A	Aroclor 1254	23	ug/kg	23 J	c
PDI-SC-S082-2TO4	580-79099-15	SW8270DSIM	Benzo(b)fluoranthene	1,300	ug/kg	1,300 J	c
PDI-SC-S082-4TO6	580-79099-16	SW8270DSIM	2-Methylnaphthalene	9.6 J	ug/kg	9.6 J	bl
PDI-SC-S082-4TO6	580-79099-16	SW8270DSIM	Acenaphthylene	6.9 J	ug/kg	6.9 J	bl
PDI-SC-S082-4TO6	580-79099-16	SW8082A	Aroclor 1221	2.9 U	ug/kg	2.9 UJ	c
PDI-SC-S082-4TO6	580-79099-16	SW8082A	Aroclor 1248	2.9 U	ug/kg	2.9 UJ	c
PDI-SC-S082-4TO6	580-79099-16	SW8082A	Aroclor 1254	1.4 J	ug/kg	1.4 J	c
PDI-SC-S095-0TO2	580-79099-17	SW8082A	Aroclor 1260	36	ug/kg	36 J	q
PDI-SC-S095-0TO2	580-79099-17	SW8270DSIM	Benzo(b)fluoranthene	31,000	ug/kg	31,000 J	c
PDI-SC-S095-2TO4	580-79099-18	SW8082A	Aroclor 1221	6.7 U	ug/kg	6.7 UJ	c
PDI-SC-S095-2TO4	580-79099-18	SW8082A	Aroclor 1248	6.7 U	ug/kg	6.7 UJ	c
PDI-SC-S095-4TO6	580-79099-19	SW8270DSIM	Benzo(b)fluoranthene	16,000	ug/kg	16,000 J	c
PDI-SC-S064-0TO2	580-79099-20	SW8082A	Aroclor 1260	9.5	ug/kg	9.5 J	q
PDI-SC-S064-0TO2	580-79099-20	SW8270DSIM	Benzo(b)fluoranthene	1,900	ug/kg	1,900 J	c
PDI-SC-S064-2TO3.5	580-79099-21	SW8082A	Aroclor 1221	6.7 U	ug/kg	6.7 UJ	c
PDI-SC-S064-2TO3.5	580-79099-21	SW8082A	Aroclor 1248	6.7 U	ug/kg	6.7 UJ	c
PDI-SC-S064-2TO3.5	580-79099-21	SW8082A	Aroclor 1260	18	ug/kg	18 J	q
PDI-SC-S064-3.5TO4.8	580-79099-22	SW8082A	Aroclor 1260	14	ug/kg	14 J	q
PDI-SC-S154-0TO1	580-79099-23	SW8082A	Aroclor 1232	51	ug/kg	51 J	c
PDI-SC-S154-0TO1	580-79099-23	SW8082A	Aroclor 1242	32	ug/kg	32 J	c
PDI-SC-S154-0TO1	580-79099-23	SW8082A	Aroclor 1260	20	ug/kg	20 J	c
PDI-SC-S154-0TO1	580-79099-23	SW8270DSIM	Naphthalene	82 J	ug/kg	82 J	bl
PDI-SC-S154-0TO1	580-79099-23	SW8270DSIM	Phenanthrene	140 J	ug/kg	140 J	bl
PDI-SC-S154-0TO1	580-79099-23	SW8270DSIM	Benzo(b)fluoranthene	220	ug/kg	220 J	c
PDI-SC-S154-1TO3	580-79099-24	SW8270DSIM	2-Methylnaphthalene	9.8 J	ug/kg	9.8 J	bl
PDI-SC-S154-1TO3	580-79099-24	SW8270DSIM	Acenaphthylene	23 J	ug/kg	23 J	bl
PDI-SC-S154-1TO3	580-79099-24	SW8270DSIM	Anthracene	12 J	ug/kg	12 J	bl
PDI-SC-S154-1TO3	580-79099-24	SW8082A	Aroclor 1254	12	ug/kg	12 J	i
PDI-SC-S154-1TO3	580-79099-24	SW8270DSIM	Benzo(b)fluoranthene	100	ug/kg	100 J	m,md
PDI-SC-S154-1TO3	580-79099-24	SW8270DSIM	Chrysene	110	ug/kg	110 J	m,md
PDI-SC-S154-1TO3	580-79099-24	SW8270DSIM	Fluorene	8.8 J	ug/kg	8.8 J	bl
PDI-SC-S154-1TO3	580-79099-24	SW8270DSIM	Naphthalene	26 J	ug/kg	26 J	bl
PDI-SC-S154-1TO3	580-79099-24	SW8270DSIM	Phenanthrene	50 J	ug/kg	50 J	bl
PDI-SC-S154-3TO4	580-79099-25	SW8270DSIM	2-Methylnaphthalene	0.69 J	ug/kg	1.3 U	bl
PDI-SC-S154-3TO4	580-79099-25	SW8082A	Aroclor 1221	2.6 U	ug/kg	2.6 UJ	c
PDI-SC-S154-3TO4	580-79099-25	SW8082A	Aroclor 1232	2.6 U	ug/kg	2.6 UJ	c
PDI-SC-S154-3TO4	580-79099-25	SW8270DSIM	Naphthalene	0.55 J	ug/kg	1.3 U	bl
PDI-SC-S154-3TO4	580-79099-25	SW8270DSIM	Phenanthrene	0.77 J	ug/kg	1.3 U	bl
PDI-SC-S154-3TO4	580-79099-25	SW8270DSIM	Benzo(b)fluoranthene	1.4	ug/kg	1.4 J	c
PDI-SC-S127-0TO2	580-79099-26	SW8082A	Aroclor 1016	2.9 U	ug/kg	2.9 UJ	s
PDI-SC-S127-0TO2	580-79099-26	SW8082A	Aroclor 1221	2.9 U	ug/kg	2.9 UJ	c
PDI-SC-S127-0TO2	580-79099-26	SW8082A	Aroclor 1232	2.9 U	ug/kg	2.9 UJ	c
PDI-SC-S127-0TO2	580-79099-26	SW8082A	Aroclor 1242	2.9 U	ug/kg	2.9 UJ	s
PDI-SC-S127-0TO2	580-79099-26	SW8082A	Aroclor 1248	2.9 U	ug/kg	2.9 UJ	s
PDI-SC-S127-0TO2	580-79099-26	SW8082A	Aroclor 1254	2.9 U	ug/kg	2.9 UJ	s
PDI-SC-S127-0TO2	580-79099-26	SW8082A	Aroclor 1260	10	ug/kg	10 J	s
PDI-SC-S127-0TO2	580-79099-26	SW8270DSIM	Benzo(b)fluoranthene	7,800	ug/kg	7,800 J	c
PDI-SC-S127-2TO4	580-79099-27	SW8270DSIM	2-Methylnaphthalene	85	ug/kg	85 J	fd
PDI-SC-S127-2TO4	580-79099-27	SW8082A	Aroclor 1221	2.9 U	ug/kg	2.9 UJ	c

**Table 1**  
**QA/QC Data Summary Review**  
**Portland Harbor**  
**Subsurface Sediment - Deep Core Stations**  
**TestAmerica Laboratory Group: 580-79099-1**

Sample ID	Laboratory ID	Method	Analyte	Laboratory Result	Units	Final Result	Reason Code
PDI-SC-S127-2TO4	580-79099-27	SW8082A	Aroclor 1232	2.9 U	ug/kg	2.9 UJ	c
PDI-SC-S127-2TO4	580-79099-27	SW8082A	Aroclor 1260	2.9 U	ug/kg	2.9 UJ	fd
PDI-SC-S127-2TO4	580-79099-27	SW8270DSIM	Benzo(b)fluoranthene	920	ug/kg	920 J	c
PDI-SC-S127-4TO5.6	580-79099-28	SW8082A	Aroclor 1221	2.6 U	ug/kg	2.6 UJ	c
PDI-SC-S127-4TO5.6	580-79099-28	SW8082A	Aroclor 1248	2.6 U	ug/kg	2.6 UJ	c
PDI-SC-S127-4TO5.6	580-79099-28	SW8082A	Aroclor 1260	36	ug/kg	36 J	q
PDI-SC-S127-4TO5.6	580-79099-28	SW8270DSIM	Benzo(b)fluoranthene	230	ug/kg	230 J	c
PDI-SC-S127-2TO4D	580-79099-29	SW8270DSIM	2-Methylnaphthalene	160	ug/kg	160 J	fd
PDI-SC-S127-2TO4D	580-79099-29	SW8082A	Aroclor 1221	3.0 U	ug/kg	3.0 UJ	c
PDI-SC-S127-2TO4D	580-79099-29	SW8082A	Aroclor 1248	3.0 U	ug/kg	3.0 UJ	c
PDI-SC-S127-2TO4D	580-79099-29	SW8082A	Aroclor 1260	24	ug/kg	24 J	fd
PDI-SC-S127-2TO4D	580-79099-29	SW8270DSIM	Benzo(b)fluoranthene	1,100	ug/kg	1,100 J	c
PDI-SC-S095-0TO2D	580-79099-30	SW8082A	Aroclor 1221	6.8 U	ug/kg	6.8 UJ	c
PDI-SC-S095-0TO2D	580-79099-30	SW8082A	Aroclor 1248	6.8 U	ug/kg	6.8 UJ	c
PDI-SC-S095-0TO2D	580-79099-30	SW8270DSIM	Benzo(b)fluoranthene	29,000	ug/kg	29,000 J	c
PDI-RB-SS-180724	580-79099-31	SW8082A	Aroclor 1016	0.46 U	ug/L	0.46 UJ	c
PDI-RB-SS-180724	580-79099-31	SW8082A	Aroclor 1221	0.46 U	ug/L	0.46 UJ	c
PDI-RB-SS-180724	580-79099-31	SW8082A	Aroclor 1232	0.46 U	ug/L	0.46 UJ	c
PDI-RB-SS-180724	580-79099-31	SW8082A	Aroclor 1242	0.46 U	ug/L	0.46 UJ	c
PDI-RB-SS-180724	580-79099-31	SW8082A	Aroclor 1254	0.46 U	ug/L	0.46 UJ	c
PDI-RB-SS-180724	580-79099-31	SW8082A	Aroclor 1260	0.46 U	ug/L	0.46 UJ	c

Notes:

- bl - laboratory blank contamination
- c - calibration issue
- fd - field duplicate RPD
- i - internal standard
- J - estimated value
- l - laboratory control sample
- m - matrix spike recovery
- md - matrix spike/matrix spike duplicate RPD
- q - quantitation issue
- RPD - relative percent difference
- s - surrogate recovery
- U - Compound was analyzed for, but not detected above the value shown.
- ug/kg - microgram per kilogram
- ug/L - microgram per liter

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.