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Data Validation Report

Project:	Portland Harbor Pre-Remedial Design Investigation and Baseline Sampling Portland Harbor Superfund Site Surface Sediment – Stratified Random
Laboratory:	ALS Environmental, Kelso, WA
Laboratory Group:	K1803759
Analyses/Method:	Chlorinated Pesticides, Tributyltin, Polycyclic Aromatic Hydrocarbons (PAHs), bis(2-Ethylhexyl)phthalate, and Total Solids
Validation Level:	Stage 2A
AECOM Project Number:	60566335 Task #2.12
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Reviewed by:	Jennifer Garner/AECOM — File Name: K1803759 DVR

SUMMARY

The data quality review of 31 surface sediment samples and one rinsate blank collected between April 20 and April 22, 2018, has been completed. Samples were analyzed for chlorinated pesticides by EPA Method 1699-modified (GC/MS/MS), tributyltin by Krone et al. or Unger et al., PAHs by EPA Method 8270D modified by selected ion monitoring (SIM), bis(2-ethylhexyl)phthalate by EPA Method 8270D, and/or total solids by EPA Method 160.3-modified at ALS Environmental (ALS) located in Kelso, Washington. The analyses were performed in general accordance with the methods specified in EPA's *Test Methods for Evaluating Solid Waste (SW-846)*, *Method 1699: Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS*, December 2007 (modified by ALS SOP SVM-PESTMS2), and *Methods for Chemical Analysis of Water and Wastes*, March 1983, 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*, Environmental Conservation Division, Northwest and Alaska Fisheries Center, National Marine Fisheries Service, NOAA, November, 1988, and Unger, MA et al., *Determination of Butyltins in Natural Waters by Flame Photometric Detection of Hexane Derivatives and Mass Spectrometric Confirmation, Chemosphere, 1886,16(4):461-470*. 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 K1803759:

Sample ID	Laboratory ID
PDI-SG-B226-BL1	K1803759-001
PDI-SG-B229-BL1	K1803759-002
PDI-SG-B231-BL1	K1803759-003
PDI-SG-B238-BL1	K1803759-004
PDI-SG-B240-BL1	K1803759-005
PDI-SG-B230-BL1	K1803759-006
PDI-SG-B232-BL1	K1803759-007
PDI-SG-B236-BL1	K1803759-008
PDI-SG-B239-BL1	K1803759-009
PDI-SG-B241-BL1	K1803759-010
PDI-SG-B245-BL1	K1803759-011
PDI-SG-B235-BL1	K1803759-012

Sample ID	Laboratory ID
PDI-SG-B227-BL1	K1803759-013
PDI-SG-B222-BL1	K1803759-014
PDI-SG-B282-BL1	K1803759-015
PDI-SG-B244-BL1	K1803759-016
PDI-SG-B248-BL1	K1803759-017
PDI-SG-B247-BL1	K1803759-018
PDI-SG-B249-BL1	K1803759-019
PDI-SG-B252-BL1	K1803759-020
PDI-SG-B254-BL1	K1803759-021
PDI-SG-B263-BL1	K1803759-022
PDI-SG-B300-BL1	K1803759-023
PDI-SG-B262-BL1	K1803759-024
PDI-SG-B262-BL1-D (Duplicate of PDI-SG-B262-BL1)	K1803759-025
PDI-SG-B286-BL1	K1803759-026
PDI-SG-B283-BL1	K1803759-027
PDI-SG-B277-BL1	K1803759-028
PDI-SG-B268-BL1	K1803759-029
PDI-SG-B275-BL1	K1803759-030
PDI-SG-B269-BL1	K1803759-031
PDI-SG-RB-VV-180422 (rinsate blank)	K1803759-032

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 ALS, the sample jar information was compared to the chain-of-custody (COC) and the cooler temperatures were recorded. No discrepancies related to sample identification were noted by ALS. One cooler was received outside the EPA-recommended temperature limits of greater than 0°C and less than or equal to 6°C at -0.5°C. The laboratory did not indicate that the samples in this cooler were frozen or otherwise compromised due to the low temperature; therefore, no data were qualified based on the low cooler temperature.

ORGANIC ANALYSES

Samples were analyzed for chlorinated pesticides, 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:

   Chlorinated Pesticides by EPA Method 1699-modified – Samples PDI-SG-B230-BL1, PDI-

SG-B232-BL1, and PDI-SG-B244-BL1 were re-extracted 75-77 days after sample collection. Per ALS-Kelso protocol, the samples were frozen in archive after the initial extraction and the samples were thawed for less than 14 days; therefore, the samples were not re-extracted outside the method-recommended holding time.

The extracts for PDI-SG-B247-BL1, PDI-SG-B263-BL1, PDI-SG-B300-BL1, PDI-SG-B262-BL1, PDI-SG-B262-BL1-D, PDI-SG-B286-BL1, PDI-SG-B283-BL1, PDI-SG-B277-BL1, PDI-SG-B268-BL1, PDI-SG-B275-BL1, and PDI-SG-B269-BL1 were analyzed 4-5 days past the analytical holding time of 40 days. The results for chlorinated pesticides in these samples were qualified as estimated and flagged 'J' or 'UJ' based on these holding time exceedances.

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

Chlorinated Pesticides by EPA Method 1699-modified – The percent differences (%Ds) for 2,4'-DDE exceeded the control limits of ±25% in the continuing calibration verifications (CCVs) analyzed on June 2, 2018, at 8:44 (32%) and June 2, 2018, at 19:23 (30%). 2,4'-DDE was not detected in the samples associated with these CCVs; therefore, no data were qualified based on these CCV results.

PAHs by EPA Method 8270D-SIM – The %Ds for indeno(1,2,3-cd)pyrene (24%) and benzo(g,h,i)perylene (24%) exceeded the control limits of ±20% in the CCV analyzed on April 25, 2018. Indeno(1,2,3-cd)pyrene and benzo(g,h,i)perylene were not detected in the associated sample (PDI-SG-RB-VV-180422); therefore, data were not qualified based on these CCV results.

3. Blanks – Acceptable except as noted below:

General – Two rinsate blanks were collected on April 22 and April 23, 2018, were reported with this laboratory group (ID K1803759-032) and laboratory group K1803850 (ID K1803850-026), and are applicable to the samples collected in this laboratory group. The following analytes were detected in the rinsate blanks:

Date	Analysis	Analyte	Result
April 22, 2018 (K1803759-032)	Chlorinated Pesticides	4,4'-DDT	0.74 ng/L
		trans-Nonachlor	0.15 J ng/L
	PAHs	Naphthalene	0.0025 J ug/L
		2-Methylnaphthalene	0.0015 J ug/L
		Phenanthrene	0.0025 J ug/L
		Fluoranthene	0.00091 J ug/L
		Pyrene	0.0012 J ug/L
		Benz(a)anthracene	0.0029 J ug/L
	bis(2-Ethylhexyl)phthalate	bis(2-Ethylhexyl)phthalate	035 J ug/L

Date	Analysis	Analyte	Result
April 23, 2018 (K1803850-026)	PAHs	Naphthalene	0.0054 J ug/L
		2-Methylnaphthalene	0.0029 J ug/L
		Phenanthrene	0.0032 J ug/L
		Fluoranthene	0.0022 J ug/L
		Pyrene	0.0040 J ug/L
		Benz(a)anthracene	0.0026 J ug/L
		Chrysene	0.0010 J ug/L
	bis(2-Ethylhexyl)phthalate	bis(2-Ethylhexyl)phthalate	0.22 J ug/L

J - result detected at concentration between the method detection limit (MDL) and the reporting limit

The results for naphthalene, phenanthrene, benz(a)anthracene, and bis(2-ethylhexyl)phthalate in the rinsate blank collected on April 22, 2018 (K1803759-032) and naphthalene, phenanthrene, pyrene, benz(a)anthracene, and bis(2-ethylhexyl)phthalate in the rinsate blank collected on April 23, 2018 (K1803850-026) were qualified as not detected based on the associated method blank results. Sediment data were not qualified based on rinsate blank detections.

Chlorinated Pesticides by EPA Method 1699-modified – Heptachlor (0.13 ug/L) was detected at a concentration between the MDL and the reporting limit in the method blank extracted on April 26, 2018. Heptachlor was not detected in the associated sample; therefore, data were not qualified based on this method blank result.

PAHs by EPA Method 8270D-SIM – The following analytes were detected at concentrations between the MDLs and the reporting limits in the method blank extracted on April 24, 2018.

Analyte	Result (ug/L)
Naphthalene	0.0016
Phenanthrene	0.0023
Benz(a)anthracene	0.0023

The results for naphthalene, phenanthrene, and benz(a)anthracene in PDI-SG-RB-VV-180422 were reported at concentrations between the MDLs and reporting limits, were qualified as not detected, and were flagged ‘U’ at the reporting limits based on these method blank results.

bis(2-Ethylhexyl)phthalate by EPA Method 8270D – bis(2-Ethylhexyl)phthalate (0.18 ug/L) was detected at a concentration between the MDL and the reporting limit in the method blank extracted on April 24, 2018. The result for bis(2-ethylhexyl)phthalate in PDI-SG-RB-VV-180422 was reported at a concentration between the MDL and reporting limit, was qualified as not detected, and was flagged ‘U’ at the reporting limit based on this method blank result.

4. Surrogates – Acceptable except as noted below:

PAHs by EPA Method 8270D-SIM – The percent recovery for fluorene-d10 (41%) in the matrix spike performed using PDI-SG-B247-BL1 was below the control limits of 42-106%. Data were not qualified based on surrogate recoveries in matrix spikes.

5. Internal Standards – Acceptable except as noted below:

   PAHs by Method 8270D-SIM – The internal standard area counts for chrysene-d12 (high) in PDI-SG-B263-BL1 and PDI-SG-B275-BL1 were outside the control limits of 50-200% due to matrix interferences. The laboratory re-analyzed these samples at dilutions and all of the internal standard area counts were within the control limits. The PAHs associated with the internal standard chrysene-d12 were reported from the dilution analyses of PDI-SG-B263-BL1 and PDI-SG-B275-BL1; therefore, data were not qualified in these samples based on these internal standard area counts.

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

   Chlorinated Pesticides by EPA Method 1699-modified – The percent recoveries for one or more chlorinated pesticides in the following LCSs and/or LCSDs were outside the control limits:

Extraction Date	Analyte	LCS	LCSD	Control limits
4/27/18 (sediments)	alpha-Chlordane	150%	NA	74-130%
	cis-Nonachlor	196%	NA	69-134%
	gamma-Chlordane	131%	NA	76-128%
	trans-Nonachlor	151%	NA	76-124%
5/2/18 (sediments)	4,4'-DDD	129%	NA	74-117%
	alpha-Chlordane	149%	NA	74-130%
	cis-Nonachlor	169%	NA	69-134%
	gamma-Chlordane	157%	NA	76-128%
	trans-Nonachlor	170%	NA	76-124%
7/6/18 (sediments)	2,4'-DDT	133%	NA	77-118%
	4,4'-DDT	123%	NA	78-116%
	alpha-Chlordane	162%	NA	74-130%
	cis-Nonachlor	191%	NA	69-134%
	gamma-Chlordane	148%	NA	76-128%
	trans-Nonachlor	169%	NA	76-124%
4/26/18 (rinsate blank)	Aldrin	ok	77%	81-113%
	cis-Nonachlor	168%	ok	59-138%

ok – acceptable NA – not applicable

cis-Nonachlor was not detected in the samples associated with the LCS extracted on April 27, 2018; therefore, data were not qualified for this analyte based on the elevated LCS recovery. The results for alpha-chlordane in PDI-SG-B236-BL1; gamma-chlordane in PDI-SG-B238-BL1, PDI-SG-B241-BL1, and PDI-SG-B248-BL1; and trans-nonachlor in PDI-SG-B229-BL1, PDI-SG-B248-BL1, and PDI-SG-B254-BL1 were qualified as estimated and flagged 'J' based on the elevated LCS recoveries.

The samples associated with the LCS extracted on May 2, 2018, were qualified as estimated based on holding time exceedance as described in Section 1; therefore, no further qualification was necessary.

2,4'-DDT, alpha-chlordane, cis-nonachlor, gamma-chlordane, and trans-nonachlor were not detected in the samples associated with the LCS extracted on July 6, 2018; therefore, data were not qualified for these analytes based on the elevated LCS recoveries. The results for 4,4'-DDT in PDI-SG-B230-BL1 and PDI-SG-B232-BL1 were qualified as estimated and flagged 'J' based on the elevated LCS recovery.

As two of the three quality control parameters (LCS, LCSD, and/or relative percent difference [RPD]) were acceptable, data were not qualified for aldrin and cis-nonachlor based on the LCS/LCSD extracted on April 26, 2018.

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

General – An MS/MSD was not performed in association with the rinsate blank. Precision and accuracy were assessed using the LCS/LCSD results.

MS/MSDs were performed using PDI-SG-B239-BL1 and PDI-SG-B247-BL1 for all sediment organic analyses. Results were acceptable except as follows.

Chlorinated Pesticides by EPA Method 1699-modified – The percent recoveries for the following analytes were outside the control limits:

Sample	Analyte	MS	MSD	Control limit	RPD CL = 40%
PDI-SG-B239-BL1	Aldrin	ok	ok	52-151%	55%
	cis-Nonachlor	229%	223%	27-144%	ok
	trans-Nonachlor	ok	176%	35-153%	ok
PDI-SG-B247-BL1	Aldrin	ok	ok	52-151%	43%
	cis-Nonachlor	165%	158%	27-144%	ok
	trans-Nonachlor	161%	ok	35-153%	ok

ok – acceptable CL - control limit RPD – relative percent difference

Results for the pesticides noted in the above table were either reported as not detected or 2 out of 3 quality control parameters (MS, MSD, and/or RPD) were acceptable; therefore, no data were qualified based on these MS/MSD results.

PAHs by EPA Method 8270D-SIM – The following percent recoveries and RPDs were outside the control limits.

Sample Identification	Analyte	MS	MSD	Control Limit	RPD CL = 40%
PDI-SG-B239-BL1	Pyrene	135%	141%	33-125%	ok
PDI-SG-B247-BL1	Naphthalene	30%	ok	37-104%	ok
	2-Methylnaphthalene	31%	ok	39-115%	ok
	Acenaphthylene	33%	ok	39-115%	ok
	Acenaphthene	34%	ok	41-116%	ok
	Fluorene	37%	ok	43-117%	ok
	Phenanthrene	34%	ok	42-119%	ok
	Anthracene	38%	ok	42-124%	ok
	Fluoranthene	35%	ok	42-130%	ok

Sample Identification	Analyte	MS	MSD	Control Limit	RPD CL = 40%
PDI-SG-B247-BL1 (continued)	Chrysene	39%	ok	40-134%	ok
	Benzo(k)fluoranthene	36%	ok	40-125%	ok
	Indeno(1,2,3-cd)pyrene	35%	ok	37-143%	62%
	Benzo(g,h,i)perylene	27%	ok	35-140%	57%

ok – acceptable CL - control limits

As 2 out of 3 quality control parameters (MS, MSD, and/or RPD) were acceptable for naphthalene, 2-methylnaphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, chrysene, and benzo(k)fluoranthene, no data were qualified based on these MS/MSD results in PDI-SG-B247-BL1 . The results for pyrene in PDI-SG-B239-BL1 and indeno(1,2,3-cd)pyrene, and benzo(g,h,i)perylene in PDI-SG-B247-BL1 were qualified as estimated and flagged 'J' based on these MS/MSD results.

8. Field Duplicate – Acceptable except as noted below:

General – A field duplicate was submitted for PDI-SG-B262-BL1 and identified as PDI-SG-B262-BL1-D. A field duplicate was submitted for PDI-SG-B240-BL1 (reported with this laboratory group as K1803759-005) and identified as PDI-SG-B240-BL1 (reported in laboratory group K1803850 as K1803850-029). Results for both field duplicate pairs were comparable except as noted below.

Sample ID	Field Duplicate ID	Analysis	Analyte	RPD
PDI-SG-B262-BL1	PDI-SG-B262-BL1-D	Chlorinated Pesticides	4,4'-DDT	56%
			Dieldrin	NC
			trans-Nonachlor	NC
		bis(2-Ethylhexyl)phthalate	bis(2-Ethylhexyl)phthalate	82%
PDI-SG-B240-BL1 (K1803759-005)	PDI-SG-B240-BL1 (K1803850-029)	Chlorinated Pesticides	Dieldrin	NC
		PAHs	Benz(a)anthracene	53%
			Benzo(a)pyrene	59%
		Tributyltin	Tributyltin	134%

The concentrations for 4,4'-DDT, dieldrin, trans-nonachlor, and bis(2-ethylhexyl)phthalate in PDI-SG-B262-BL1 and PDI-SG-B262-BL1-D and dieldrin in PDI-SG-B240-BL1 (K1803759-005) and PDI-SG-B240-BL1 (K1803850-029) were less than five times the reporting limits; therefore, no data were qualified for these analytes based on the field duplicate RPDs. The results for benz(a)anthracene, benzo(a)pyrene, and tributyltin in PDI-SG-B240-BL1 (K1803759-005) and PDI-SG-B240-BL1 (K1803850-029) were qualified as estimated and flagged 'J' based on the elevated field duplicate RPDs.

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

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

Chlorinated Pesticides by EPA Method 1699-modified – The reporting limits for one or more pesticides reported as not detected in multiple samples were elevated due to the moisture

content and/or dilution due to matrix interference. The reporting limits and MDLs for dieldrin exceeded the cleanup level in all the sediment samples in laboratory group K1803759.

Tributyltin by Krone et al. - The reporting limits for tributyltin reported as not detected in multiple samples were elevated due to moisture content. The elevated reporting limits and MDLs do not exceed the cleanup level.

PAHs by EPA Method 8270D-SIM – The results for dibenz(a,h)anthracene in PDI-SG-B247-BL1, PDI-SG-B300-BL1, PDI-SG-B262-BL1, PDI-SG-B262-BL1-D, PDI-SG-B286-BL1, and PDI-SG-B268-BL1 were flagged 'X' by the laboratory to indicate poor peak resolution. The results for dibenz(a,h)anthracene in these samples were qualified as estimated and flagged 'J' due to poor peak resolution.

The reporting limits for all PAHs reported as not detected in PDI-SG-RB-VV-180422 were elevated due to limited sample volume.

CONVENTIONAL ANALYSES

Soil samples were analyzed for total solids by EPA Method 160.3-modified.

1. Holding Times – Acceptable

2. Laboratory Duplicate – Acceptable

   Laboratory duplicates were performed using PDI-SG-B239-BL1, PDI-SG-B247-BL1, PDI-SG-B254-BL1, and PDI-SG-B269-BL1. Results were comparable.

3. Field Duplicate – Acceptable

   A field duplicate was submitted for PDI-SG-B262-BL1 and identified as PDI-SG-B262-BL1-D. Results were comparable. A field duplicate was submitted for PDI-SG-B240-BL1 (reported with this laboratory group as K1803759-005) and identified as PDI-SG-B240-BL1 (reported in laboratory group K1803850 as K1803850-029). Results were comparable.

4. Reporting Limits – Acceptable

OVERALL ASSESSMENT OF DATA

The data reported in this laboratory group is considered usable for meeting project objectives. The completeness for laboratory group K1803759 is 100%.

Table 1
QA/QC Data Summary Review
Portland Harbor
Surface Sediment - Stratified Random
ALS Kelso Laboratory Group: K1803759

Sample ID	Laboratory ID	Method	Analyte	Laboratory Result	Units	Final Result	Reason Code
PDI-SG-B229-BL1	K1803759-002	CWA1699M	trans-Nonachlor	0.30 J	ug/kg	0.30 J	l
PDI-SG-B238-BL1	K1803759-004	CWA1699M	gamma-Chlordane	0.39 J	ug/kg	0.39 J	l
PDI-SG-B240-BL1	K1803759-005	SW8270DSIM	Benz(a)anthracene	36	ug/kg	36 J	fd
PDI-SG-B240-BL1	K1803759-005	SW8270DSIM	Benzo(a)pyrene	48	ug/kg	48 J	fd
PDI-SG-B240-BL1	K1803759-005	Unger/Krone	Tri-n-butyltin	19	ug/kg	19 J	fd
PDI-SG-B230-BL1	K1803759-006	CWA1699M	4,4'-DDT	1.5 J	ug/kg	1.5 J	l
PDI-SG-B232-BL1	K1803759-007	CWA1699M	4,4'-DDT	0.77 J	ug/kg	0.77 J	l
PDI-SG-B236-BL1	K1803759-008	CWA1699M	alpha-Chlordane	0.38 J	ug/kg	0.38 J	l
PDI-SG-B239-BL1	K1803759-009	SW8270DSIM	Pyrene	180	ug/kg	180 J	m
PDI-SG-B241-BL1	K1803759-010	CWA1699M	gamma-Chlordane	0.42 J	ug/kg	0.42 J	l
PDI-SG-B248-BL1	K1803759-017	CWA1699M	gamma-Chlordane	0.41 J	ug/kg	0.41 J	l
PDI-SG-B248-BL1	K1803759-017	CWA1699M	trans-Nonachlor	0.35 J	ug/kg	0.35 J	l
PDI-SG-B247-BL1	K1803759-018	CWA1699M	2,4-DDD	0.63 U	ug/kg	0.63 UJ	h
PDI-SG-B247-BL1	K1803759-018	CWA1699M	2,4-DDE	0.63 U	ug/kg	0.63 UJ	h
PDI-SG-B247-BL1	K1803759-018	CWA1699M	2,4-DDT	0.63 U	ug/kg	0.63 UJ	h
PDI-SG-B247-BL1	K1803759-018	CWA1699M	4,4'-DDD	0.91	ug/kg	0.91 J	h
PDI-SG-B247-BL1	K1803759-018	CWA1699M	4,4'-DDE	2.0	ug/kg	2.0 J	h
PDI-SG-B247-BL1	K1803759-018	CWA1699M	4,4'-DDT	0.34 J	ug/kg	0.34 J	h
PDI-SG-B247-BL1	K1803759-018	CWA1699M	Aldrin	0.63 U	ug/kg	0.63 UJ	h
PDI-SG-B247-BL1	K1803759-018	CWA1699M	alpha-Chlordane	1.3 U	ug/kg	1.3 UJ	h
PDI-SG-B247-BL1	K1803759-018	CWA1699M	cis-Nonachlor	0.63 U	ug/kg	0.63 UJ	h
PDI-SG-B247-BL1	K1803759-018	CWA1699M	Dieldrin	1.3 U	ug/kg	1.3 UJ	h
PDI-SG-B247-BL1	K1803759-018	CWA1699M	gamma-BHC (Lindane)	0.63 U	ug/kg	0.63 UJ	h
PDI-SG-B247-BL1	K1803759-018	CWA1699M	gamma-Chlordane	1.3 U	ug/kg	1.3 UJ	h
PDI-SG-B247-BL1	K1803759-018	CWA1699M	Heptachlor	0.63 U	ug/kg	0.63 UJ	h
PDI-SG-B247-BL1	K1803759-018	CWA1699M	trans-Nonachlor	1.3 U	ug/kg	1.3 UJ	h
PDI-SG-B247-BL1	K1803759-018	SW8270DSIM	Benzo(g,h,i)perylene	29	ug/kg	29 J	m,md
PDI-SG-B247-BL1	K1803759-018	SW8270DSIM	Dibenz(a,h)anthracene	5.6 X	ug/kg	5.6 J	q
PDI-SG-B247-BL1	K1803759-018	SW8270DSIM	Indeno(1,2,3-cd)pyrene	24	ug/kg	24 J	m,md
PDI-SG-B254-BL1	K1803759-021	CWA1699M	trans-Nonachlor	0.50 J	ug/kg	0.50 J	l
PDI-SG-B263-BL1	K1803759-022	CWA1699M	2,4-DDD	0.61 J	ug/kg	0.61 J	h
PDI-SG-B263-BL1	K1803759-022	CWA1699M	2,4-DDE	0.64 U	ug/kg	0.64 UJ	h
PDI-SG-B263-BL1	K1803759-022	CWA1699M	2,4-DDT	0.64 U	ug/kg	0.64 UJ	h
PDI-SG-B263-BL1	K1803759-022	CWA1699M	4,4'-DDD	2.3	ug/kg	2.3 J	h
PDI-SG-B263-BL1	K1803759-022	CWA1699M	4,4'-DDE	3.4	ug/kg	3.4 J	h
PDI-SG-B263-BL1	K1803759-022	CWA1699M	4,4'-DDT	1.0	ug/kg	1.0 J	h
PDI-SG-B263-BL1	K1803759-022	CWA1699M	Aldrin	0.64 U	ug/kg	0.64 UJ	h
PDI-SG-B263-BL1	K1803759-022	CWA1699M	alpha-Chlordane	1.3 U	ug/kg	1.3 UJ	h
PDI-SG-B263-BL1	K1803759-022	CWA1699M	cis-Nonachlor	0.64 U	ug/kg	0.64 UJ	h
PDI-SG-B263-BL1	K1803759-022	CWA1699M	Dieldrin	1.3 U	ug/kg	1.3 UJ	h
PDI-SG-B263-BL1	K1803759-022	CWA1699M	gamma-BHC (Lindane)	0.64 U	ug/kg	0.64 UJ	h
PDI-SG-B263-BL1	K1803759-022	CWA1699M	gamma-Chlordane	1.3 U	ug/kg	1.3 UJ	h
PDI-SG-B263-BL1	K1803759-022	CWA1699M	Heptachlor	0.64 U	ug/kg	0.64 UJ	h
PDI-SG-B263-BL1	K1803759-022	CWA1699M	trans-Nonachlor	1.3 U	ug/kg	1.3 UJ	h
PDI-SG-B300-BL1	K1803759-023	CWA1699M	2,4-DDD	0.67 U	ug/kg	0.67 UJ	h
PDI-SG-B300-BL1	K1803759-023	CWA1699M	2,4-DDE	0.67 U	ug/kg	0.67 UJ	h
PDI-SG-B300-BL1	K1803759-023	CWA1699M	2,4-DDT	0.67 U	ug/kg	0.67 UJ	h
PDI-SG-B300-BL1	K1803759-023	CWA1699M	4,4'-DDD	0.95	ug/kg	0.95 J	h
PDI-SG-B300-BL1	K1803759-023	CWA1699M	4,4'-DDE	2.2	ug/kg	2.2 J	h
PDI-SG-B300-BL1	K1803759-023	CWA1699M	4,4'-DDT	0.54 J	ug/kg	0.54 J	h
PDI-SG-B300-BL1	K1803759-023	CWA1699M	Aldrin	0.67 U	ug/kg	0.67 UJ	h
PDI-SG-B300-BL1	K1803759-023	CWA1699M	alpha-Chlordane	1.3 U	ug/kg	1.3 UJ	h
PDI-SG-B300-BL1	K1803759-023	CWA1699M	cis-Nonachlor	0.67 U	ug/kg	0.67 UJ	h
PDI-SG-B300-BL1	K1803759-023	CWA1699M	Dieldrin	1.3 U	ug/kg	1.3 UJ	h
PDI-SG-B300-BL1	K1803759-023	CWA1699M	gamma-BHC (Lindane)	0.67 U	ug/kg	0.67 UJ	h
PDI-SG-B300-BL1	K1803759-023	CWA1699M	gamma-Chlordane	1.3 U	ug/kg	1.3 UJ	h
PDI-SG-B300-BL1	K1803759-023	CWA1699M	Heptachlor	0.67 U	ug/kg	0.67 UJ	h
PDI-SG-B300-BL1	K1803759-023	CWA1699M	trans-Nonachlor	1.3 U	ug/kg	1.3 UJ	h
PDI-SG-B300-BL1	K1803759-023	SW8270DSIM	Dibenz(a,h)anthracene	2.5 X	ug/kg	2.5 J	q
PDI-SG-B262-BL1	K1803759-024	CWA1699M	2,4-DDD	0.61 U	ug/kg	0.61 UJ	h
PDI-SG-B262-BL1	K1803759-024	CWA1699M	2,4-DDE	0.61 U	ug/kg	0.61 UJ	h
PDI-SG-B262-BL1	K1803759-024	CWA1699M	2,4-DDT	0.61 U	ug/kg	0.61 UJ	h
PDI-SG-B262-BL1	K1803759-024	CWA1699M	4,4'-DDD	1.3	ug/kg	1.3 J	h
PDI-SG-B262-BL1	K1803759-024	CWA1699M	4,4'-DDE	2.5	ug/kg	2.5 J	h
PDI-SG-B262-BL1	K1803759-024	CWA1699M	4,4'-DDT	1.6	ug/kg	1.6 J	h

Table 1
QA/QC Data Summary Review
Portland Harbor
Surface Sediment - Stratified Random
ALS Kelso Laboratory Group: K1803759

Sample ID	Laboratory ID	Method	Analyte	Laboratory Result	Units	Final Result	Reason Code
PDI-SG-B262-BL1	K1803759-024	CWA1699M	Aldrin	0.61 U	ug/kg	0.61 UJ	h
PDI-SG-B262-BL1	K1803759-024	CWA1699M	alpha-Chlordane	1.2 U	ug/kg	1.2 UJ	h
PDI-SG-B262-BL1	K1803759-024	CWA1699M	cis-Nonachlor	0.61 U	ug/kg	0.61 UJ	h
PDI-SG-B262-BL1	K1803759-024	CWA1699M	Dieldrin	1.2 U	ug/kg	1.2 UJ	h
PDI-SG-B262-BL1	K1803759-024	CWA1699M	gamma-BHC (Lindane)	0.61 U	ug/kg	0.61 UJ	h
PDI-SG-B262-BL1	K1803759-024	CWA1699M	gamma-Chlordane	0.45 J	ug/kg	0.45 J	h
PDI-SG-B262-BL1	K1803759-024	CWA1699M	Heptachlor	0.61 U	ug/kg	0.61 UJ	h
PDI-SG-B262-BL1	K1803759-024	CWA1699M	trans-Nonachlor	0.62 J	ug/kg	0.62 J	h
PDI-SG-B262-BL1	K1803759-024	SW8270DSIM	Dibenz(a,h)anthracene	4.6 X	ug/kg	4.6 J	q
PDI-SG-B262-BL1-D	K1803759-025	CWA1699M	2,4-DDD	0.61 U	ug/kg	0.61 UJ	h
PDI-SG-B262-BL1-D	K1803759-025	CWA1699M	2,4-DDE	0.61 U	ug/kg	0.61 UJ	h
PDI-SG-B262-BL1-D	K1803759-025	CWA1699M	2,4-DDT	0.61 U	ug/kg	0.61 UJ	h
PDI-SG-B262-BL1-D	K1803759-025	CWA1699M	4,4'-DDD	1.4	ug/kg	1.4 J	h
PDI-SG-B262-BL1-D	K1803759-025	CWA1699M	4,4'-DDE	2.6	ug/kg	2.6 J	h
PDI-SG-B262-BL1-D	K1803759-025	CWA1699M	4,4'-DDT	0.90	ug/kg	0.90 J	h
PDI-SG-B262-BL1-D	K1803759-025	CWA1699M	Aldrin	0.61 U	ug/kg	0.61 UJ	h
PDI-SG-B262-BL1-D	K1803759-025	CWA1699M	alpha-Chlordane	1.2 U	ug/kg	1.2 UJ	h
PDI-SG-B262-BL1-D	K1803759-025	CWA1699M	cis-Nonachlor	0.61 U	ug/kg	0.61 UJ	h
PDI-SG-B262-BL1-D	K1803759-025	CWA1699M	Dieldrin	0.61 J	ug/kg	0.61 J	h
PDI-SG-B262-BL1-D	K1803759-025	CWA1699M	gamma-BHC (Lindane)	0.61 U	ug/kg	0.61 UJ	h
PDI-SG-B262-BL1-D	K1803759-025	CWA1699M	gamma-Chlordane	0.42 J	ug/kg	0.42 J	h
PDI-SG-B262-BL1-D	K1803759-025	CWA1699M	Heptachlor	0.61 U	ug/kg	0.61 UJ	h
PDI-SG-B262-BL1-D	K1803759-025	CWA1699M	trans-Nonachlor	1.2 U	ug/kg	1.2 UJ	h
PDI-SG-B262-BL1-D	K1803759-025	SW8270DSIM	Dibenz(a,h)anthracene	5.2 X	ug/kg	5.2 J	q
PDI-SG-B286-BL1	K1803759-026	CWA1699M	2,4-DDD	0.57 U	ug/kg	0.57 UJ	h
PDI-SG-B286-BL1	K1803759-026	CWA1699M	2,4-DDE	0.57 U	ug/kg	0.57 UJ	h
PDI-SG-B286-BL1	K1803759-026	CWA1699M	2,4-DDT	0.57 U	ug/kg	0.57 UJ	h
PDI-SG-B286-BL1	K1803759-026	CWA1699M	4,4'-DDD	1.3	ug/kg	1.3 J	h
PDI-SG-B286-BL1	K1803759-026	CWA1699M	4,4'-DDE	2.3	ug/kg	2.3 J	h
PDI-SG-B286-BL1	K1803759-026	CWA1699M	4,4'-DDT	0.46 J	ug/kg	0.46 J	h
PDI-SG-B286-BL1	K1803759-026	CWA1699M	Aldrin	0.57 U	ug/kg	0.57 UJ	h
PDI-SG-B286-BL1	K1803759-026	CWA1699M	alpha-Chlordane	1.1 U	ug/kg	1.1 UJ	h
PDI-SG-B286-BL1	K1803759-026	CWA1699M	cis-Nonachlor	0.57 U	ug/kg	0.57 UJ	h
PDI-SG-B286-BL1	K1803759-026	CWA1699M	Dieldrin	1.1 U	ug/kg	1.1 UJ	h
PDI-SG-B286-BL1	K1803759-026	CWA1699M	gamma-BHC (Lindane)	0.57 U	ug/kg	0.57 UJ	h
PDI-SG-B286-BL1	K1803759-026	CWA1699M	gamma-Chlordane	1.1 U	ug/kg	1.1 UJ	h
PDI-SG-B286-BL1	K1803759-026	CWA1699M	Heptachlor	0.57 U	ug/kg	0.57 UJ	h
PDI-SG-B286-BL1	K1803759-026	CWA1699M	trans-Nonachlor	1.1 U	ug/kg	1.1 UJ	h
PDI-SG-B286-BL1	K1803759-026	SW8270DSIM	Dibenz(a,h)anthracene	9.8 X	ug/kg	9.8 J	q
PDI-SG-B283-BL1	K1803759-027	CWA1699M	2,4-DDD	0.40 J	ug/kg	0.40 J	h
PDI-SG-B283-BL1	K1803759-027	CWA1699M	2,4-DDE	0.55 U	ug/kg	0.55 UJ	h
PDI-SG-B283-BL1	K1803759-027	CWA1699M	2,4-DDT	0.55 U	ug/kg	0.55 UJ	h
PDI-SG-B283-BL1	K1803759-027	CWA1699M	4,4'-DDD	1.6	ug/kg	1.6 J	h
PDI-SG-B283-BL1	K1803759-027	CWA1699M	4,4'-DDE	2.4	ug/kg	2.4 J	h
PDI-SG-B283-BL1	K1803759-027	CWA1699M	4,4'-DDT	0.39 J	ug/kg	0.39 J	h
PDI-SG-B283-BL1	K1803759-027	CWA1699M	Aldrin	0.55 U	ug/kg	0.55 UJ	h
PDI-SG-B283-BL1	K1803759-027	CWA1699M	alpha-Chlordane	1.1 U	ug/kg	1.1 UJ	h
PDI-SG-B283-BL1	K1803759-027	CWA1699M	cis-Nonachlor	0.55 U	ug/kg	0.55 UJ	h
PDI-SG-B283-BL1	K1803759-027	CWA1699M	Dieldrin	1.1 U	ug/kg	1.1 UJ	h
PDI-SG-B283-BL1	K1803759-027	CWA1699M	gamma-BHC (Lindane)	0.55 U	ug/kg	0.55 UJ	h
PDI-SG-B283-BL1	K1803759-027	CWA1699M	gamma-Chlordane	1.1 U	ug/kg	1.1 UJ	h
PDI-SG-B283-BL1	K1803759-027	CWA1699M	Heptachlor	0.55 U	ug/kg	0.55 UJ	h
PDI-SG-B283-BL1	K1803759-027	CWA1699M	trans-Nonachlor	1.1 U	ug/kg	1.1 UJ	h
PDI-SG-B277-BL1	K1803759-028	CWA1699M	2,4-DDD	0.55	ug/kg	0.55 J	h
PDI-SG-B277-BL1	K1803759-028	CWA1699M	2,4-DDE	0.50 U	ug/kg	0.50 UJ	h
PDI-SG-B277-BL1	K1803759-028	CWA1699M	2,4-DDT	0.50 U	ug/kg	0.50 UJ	h
PDI-SG-B277-BL1	K1803759-028	CWA1699M	4,4'-DDD	2.4	ug/kg	2.4 J	h
PDI-SG-B277-BL1	K1803759-028	CWA1699M	4,4'-DDE	2.8	ug/kg	2.8 J	h
PDI-SG-B277-BL1	K1803759-028	CWA1699M	4,4'-DDT	0.30 J	ug/kg	0.30 J	h
PDI-SG-B277-BL1	K1803759-028	CWA1699M	Aldrin	0.50 U	ug/kg	0.50 UJ	h
PDI-SG-B277-BL1	K1803759-028	CWA1699M	alpha-Chlordane	1.0 U	ug/kg	1.0 UJ	h
PDI-SG-B277-BL1	K1803759-028	CWA1699M	cis-Nonachlor	0.50 U	ug/kg	0.50 UJ	h
PDI-SG-B277-BL1	K1803759-028	CWA1699M	Dieldrin	1.0 U	ug/kg	1.0 UJ	h
PDI-SG-B277-BL1	K1803759-028	CWA1699M	gamma-BHC (Lindane)	0.50 U	ug/kg	0.50 UJ	h
PDI-SG-B277-BL1	K1803759-028	CWA1699M	gamma-Chlordane	1.0 U	ug/kg	1.0 UJ	h

Table 1
QA/QC Data Summary Review
Portland Harbor
Surface Sediment - Stratified Random
ALS Kelso Laboratory Group: K1803759

Sample ID	Laboratory ID	Method	Analyte	Laboratory Result	Units	Final Result	Reason Code
PDI-SG-B277-BL1	K1803759-028	CWA1699M	Heptachlor	0.50 U	ug/kg	0.50 UJ	h
PDI-SG-B277-BL1	K1803759-028	CWA1699M	trans-Nonachlor	1.0 U	ug/kg	1.0 UJ	h
PDI-SG-B268-BL1	K1803759-029	CWA1699M	2,4-DDD	0.45 J	ug/kg	0.45 J	h
PDI-SG-B268-BL1	K1803759-029	CWA1699M	2,4-DDE	0.56 U	ug/kg	0.56 UJ	h
PDI-SG-B268-BL1	K1803759-029	CWA1699M	2,4-DDT	0.56 U	ug/kg	0.56 UJ	h
PDI-SG-B268-BL1	K1803759-029	CWA1699M	4,4'-DDD	1.7	ug/kg	1.7 J	h
PDI-SG-B268-BL1	K1803759-029	CWA1699M	4,4'-DDE	2.4	ug/kg	2.4 J	h
PDI-SG-B268-BL1	K1803759-029	CWA1699M	4,4'-DDT	0.45 J	ug/kg	0.45 J	h
PDI-SG-B268-BL1	K1803759-029	CWA1699M	Aldrin	0.56 U	ug/kg	0.56 UJ	h
PDI-SG-B268-BL1	K1803759-029	CWA1699M	alpha-Chlordane	1.1 U	ug/kg	1.1 UJ	h
PDI-SG-B268-BL1	K1803759-029	CWA1699M	cis-Nonachlor	0.56 U	ug/kg	0.56 UJ	h
PDI-SG-B268-BL1	K1803759-029	CWA1699M	Dieldrin	1.1 U	ug/kg	1.1 UJ	h
PDI-SG-B268-BL1	K1803759-029	CWA1699M	gamma-BHC (Lindane)	0.56 U	ug/kg	0.56 UJ	h
PDI-SG-B268-BL1	K1803759-029	CWA1699M	gamma-Chlordane	1.1 U	ug/kg	1.1 UJ	h
PDI-SG-B268-BL1	K1803759-029	CWA1699M	Heptachlor	0.56 U	ug/kg	0.56 UJ	h
PDI-SG-B268-BL1	K1803759-029	CWA1699M	trans-Nonachlor	1.1 U	ug/kg	1.1 UJ	h
PDI-SG-B268-BL1	K1803759-029	SW8270DSIM	Dibenz(a,h)anthracene	8.0 X	ug/kg	8.0 J	q
PDI-SG-B275-BL1	K1803759-030	CWA1699M	2,4-DDD	1.7	ug/kg	1.7 J	h
PDI-SG-B275-BL1	K1803759-030	CWA1699M	2,4-DDE	0.50	ug/kg	0.50 J	h
PDI-SG-B275-BL1	K1803759-030	CWA1699M	2,4-DDT	0.47 U	ug/kg	0.47 UJ	h
PDI-SG-B275-BL1	K1803759-030	CWA1699M	4,4'-DDD	5.6	ug/kg	5.6 J	h
PDI-SG-B275-BL1	K1803759-030	CWA1699M	4,4'-DDE	7.1	ug/kg	7.1 J	h
PDI-SG-B275-BL1	K1803759-030	CWA1699M	4,4'-DDT	0.84	ug/kg	0.84 J	h
PDI-SG-B275-BL1	K1803759-030	CWA1699M	Aldrin	0.46 U	ug/kg	0.46 UJ	h
PDI-SG-B275-BL1	K1803759-030	CWA1699M	alpha-Chlordane	0.92 U	ug/kg	0.92 UJ	h
PDI-SG-B275-BL1	K1803759-030	CWA1699M	cis-Nonachlor	0.49 U	ug/kg	0.49 UJ	h
PDI-SG-B275-BL1	K1803759-030	CWA1699M	Dieldrin	1.0 U	ug/kg	1.0 UJ	h
PDI-SG-B275-BL1	K1803759-030	CWA1699M	gamma-BHC (Lindane)	0.46 U	ug/kg	0.46 UJ	h
PDI-SG-B275-BL1	K1803759-030	CWA1699M	gamma-Chlordane	0.92 U	ug/kg	0.92 UJ	h
PDI-SG-B275-BL1	K1803759-030	CWA1699M	Heptachlor	0.46 U	ug/kg	0.46 UJ	h
PDI-SG-B275-BL1	K1803759-030	CWA1699M	trans-Nonachlor	0.92 U	ug/kg	0.92 UJ	h
PDI-SG-B269-BL1	K1803759-031	CWA1699M	2,4-DDD	0.57 J	ug/kg	0.57 J	h
PDI-SG-B269-BL1	K1803759-031	CWA1699M	2,4-DDE	0.57 U	ug/kg	0.57 UJ	h
PDI-SG-B269-BL1	K1803759-031	CWA1699M	2,4-DDT	0.57 U	ug/kg	0.57 UJ	h
PDI-SG-B269-BL1	K1803759-031	CWA1699M	4,4'-DDD	1.9	ug/kg	1.9 J	h
PDI-SG-B269-BL1	K1803759-031	CWA1699M	4,4'-DDE	2.9	ug/kg	2.9 J	h
PDI-SG-B269-BL1	K1803759-031	CWA1699M	4,4'-DDT	0.29 J	ug/kg	0.29 J	h
PDI-SG-B269-BL1	K1803759-031	CWA1699M	Aldrin	0.57 U	ug/kg	0.57 UJ	h
PDI-SG-B269-BL1	K1803759-031	CWA1699M	alpha-Chlordane	1.1 U	ug/kg	1.1 UJ	h
PDI-SG-B269-BL1	K1803759-031	CWA1699M	cis-Nonachlor	0.57 U	ug/kg	0.57 UJ	h
PDI-SG-B269-BL1	K1803759-031	CWA1699M	Dieldrin	0.69 J	ug/kg	0.69 J	h
PDI-SG-B269-BL1	K1803759-031	CWA1699M	gamma-BHC (Lindane)	0.57 U	ug/kg	0.57 UJ	h
PDI-SG-B269-BL1	K1803759-031	CWA1699M	gamma-Chlordane	1.1 U	ug/kg	1.1 UJ	h
PDI-SG-B269-BL1	K1803759-031	CWA1699M	Heptachlor	0.57 U	ug/kg	0.57 UJ	h
PDI-SG-B269-BL1	K1803759-031	CWA1699M	trans-Nonachlor	1.1 U	ug/kg	1.1 UJ	h
PDI-SG-RB-VV-180422	K1803759-032	SW8270D	Bis(2-ethylhexyl)phthalate	0.35 J	ug/L	1.0 U	bl
PDI-SG-RB-VV-180422	K1803759-032	SW8270DSIM	Benz(a)anthracene	0.0029 J	ug/L	0.021 U	bl
PDI-SG-RB-VV-180422	K1803759-032	SW8270DSIM	Naphthalene	0.0025 J	ug/L	0.021 U	bl
PDI-SG-RB-VV-180422	K1803759-032	SW8270DSIM	Phenanthrene	0.0025 J	ug/L	0.021 U	bl

h- holding time
bl - laboratory blank contamination
fd - field duplicate RPD
J - estimated value
m - matrix spike recovery
md - matrix spike/matrix spike duplicate RPD
l - lcs recovery
ug/kg - microgram per kilogram
ug/L - microgram per liter
q - quantitation issue
RPD - relative percent difference
U - Compound was analyzed for, but not detected above the value shown.
X - poor peak resolution

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.