



Analytical Resources, Incorporated
Analytical Chemists and Consultants

14 December 2018

Karen Mixon
AECOM
1111 Third Avenue, Suite 1600
Seattle, WA 98101

RE: Portland Harbor Pre-Remedial Design

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)
18K0437

Associated SDG ID(s)
N/A

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclose Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: 18K0437		Turn-around Requested:		Date: 11/29/2018	
ARI Client Company: AECOM		Phone: (206) 438-2261 / (206) 438-2010		Page: 1 of 1	
Client Contact: Amy Dahl/Chelsey Cook				No. of Coolers: 1 Cooler Temps: 0.6°C	
Client Project Name: Portland Harbor Pre-Remedial Design Investigation and Baseline Sampling				Analysis Requested	
Client Project #: 60566335		Samplers:		Notes/Comments	
Sample ID	Date	Time	Matrix	No. Containers	
PDI-WS-T05-1811	11/27/18	15:44	W	2	✓
PDI-WS-T03-1811	11/27/18	16:22	W	5	✓
PDI-WS-T07-1811	11/28/18	13:18	W	2	✓
PDI-WS-T01-1811	11/28/18	14:26	W	2	✓
PDI-WS-T01-1811-D	11/28/18	14:26	W	2	✓
PDI-RB-PP-181129	11/29/18	10:00	W	2	✓
Comments/Special Instructions		Relinquished by: (Signature) [Signature]		Received by: (Signature) [Signature]	
		Printed Name: REBECCA TORTORELLO		Printed Name: Fedex	
		Company: AECOM		Company: Fedex	
		Date & Time: 11/29/18 15:00		Date & Time: 11/29/18 15:00	
		Relinquished by: (Signature) [Signature]		Received by: (Signature) [Signature]	
		Printed Name: Jacob Watter		Printed Name: ARI	
		Company: ARI		Company: ARI	
		Date & Time: 11/30/18 1047		Date & Time: 11/30/18 1047	



Analytical Resources, Incorporated
 Analytical Chemists and Consultants
 4611 South 134th Place, Suite 100
 Tukwila, WA 98168
 206-695-6200/206-695-6201 (fax)

Limits of Liability: ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, notwithstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.

Sample Retention Policy: Unless specified by workorder or contract, all water/soil samples submitted to ARI will be discarded or returned, no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer. Sediment samples submitted under PSDDA/PSEP/SMS protocol will be stored frozen for up to one year and then discarded.



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Project: Portland Harbor Pre-Remedial Design
Project Number: 60566335
Project Manager: Karen Mixon

Reported:
14-Dec-2018 14:01

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
PDI-WS-T05-1811	18K0437-01	Water	27-Nov-2018 15:44	30-Nov-2018 10:47
PDI-WS-T03-1811	18K0437-02	Water	27-Nov-2018 16:22	30-Nov-2018 10:47
PDI-WS-T07-1811	18K0437-03	Water	28-Nov-2018 13:18	30-Nov-2018 10:47
PDI-WS-T01-1811	18K0437-04	Water	28-Nov-2018 14:26	30-Nov-2018 10:47
PDI-WS-T01-1811-D	18K0437-05	Water	28-Nov-2018 14:26	30-Nov-2018 10:47
PDI-RB-PP-181129	18K0437-06	Water	29-Nov-2018 10:00	30-Nov-2018 10:47



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Work Order Case Narrative

Sample receipt

Samples as listed on the preceding page were received November 30, 2018 under ARI work order 18K0437. For details regarding sample receipt, please refer to the Cooler Receipt Form.

Pentachlorophenol - EPA Method SW8041A

The samples were extracted and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

The surrogate percent recoveries were within control limits.

The method blank was clean at the reporting limits.

The LCS percent recoveries were within control limits.

A matrix spike and matrix spike duplicate were prepared in conjunction with sample PDI-WS-T03-1811. The matrix spike/matrix spike duplicate percent recoveries and RPD were within QC limits.



Cooler Receipt Form

ARI Client: AECom

Project Name: Portland Harbor

COC No(s): NA

Delivered by: FedEx UPS Courier Hand Delivered Other: _____

Assigned ARI Job No: 18K0437

Tracking No: 784090272108 NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler? YES NO

Were custody papers included with the cooler? YES NO

Were custody papers properly filled out (ink, signed, etc.) YES NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry) 0.6°C

Time: 1047

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: 0005206

Cooler Accepted by: JSW Date: 11/30/18 Time: 1047

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? YES NO

What kind of packing material was used? ... Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other: Trashbag

Was sufficient ice used (if appropriate)? YES NO

Were all bottles sealed in individual plastic bags? YES NO

Did all bottles arrive in good condition (unbroken)? YES NO

Were all bottle labels complete and legible? YES NO

Did the number of containers listed on COC match with the number of containers received? YES NO

Did all bottle labels and tags agree with custody papers? YES NO

Were all bottles used correct for the requested analyses? YES NO

Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)... NA YES NO

Were all VOC vials free of air bubbles? NA YES NO

Was sufficient amount of sample sent in each bottle? YES NO

Date VOC Trip Blank was made at ARI NA

Was Sample Split by ARI: NA YES Date/Time: _____ Equipment: _____ Split by: _____

Samples Logged by: JSW Date: 11/30/18 Time: 1135

**** Notify Project Manager of discrepancies or concerns ****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: _____ Date: _____

<p>Small Air Bubbles ~ 2mm</p>	<p>Peabubbles 2-4 mm</p>	<p>LARGE Air Bubbles > 4 mm</p>	<p>Small → "sm" (< 2 mm)</p> <p>Peabubbles → "pb" (2 to < 4 mm)</p> <p>Large → "lg" (4 to < 6 mm)</p> <p>Headspace → "hs" (> 6 mm)</p>
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Reported:
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PDI-WS-T05-1811
18K0437-01 (Water)

Phenols

Method: EPA 8041A
Instrument: ECD8 Analyst: yz

Sampled: 11/27/2018 15:44

Analyzed: 12/11/2018 17:04

Sample Preparation: Preparation Method: EPA 3510C SepF
Preparation Batch: BGL0041 Sample Size: 500 mL
Prepared: 04-Dec-2018 Final Volume: 5 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Pentachlorophenol	87-86-5	1	0.014	0.025	0.022	ug/L	J
Surrogate: 2,4,6-Tribromophenol				10-181 %	90.8	%	
Surrogate: 2,4,6-Tribromophenol [2C]				10-181 %	76.4	%	



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PDI-WS-T03-1811
18K0437-02 (Water)

Phenols

Method: EPA 8041A
Instrument: ECD8 Analyst: yz

Sampled: 11/27/2018 16:22

Analyzed: 12/11/2018 17:21

Sample Preparation: Preparation Method: EPA 3510C SepF
Preparation Batch: BGL0041 Sample Size: 500 mL
Prepared: 04-Dec-2018 Final Volume: 5 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Pentachlorophenol	87-86-5	1	0.014	0.025	ND	ug/L	U
Surrogate: 2,4,6-Tribromophenol				10-181 %	90.6	%	
Surrogate: 2,4,6-Tribromophenol [2C]				10-181 %	88.7	%	



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PDI-WS-T07-1811
18K0437-03 (Water)

Phenols

Method: EPA 8041A
Instrument: ECD8 Analyst: yz

Sampled: 11/28/2018 13:18

Analyzed: 12/11/2018 18:15

Sample Preparation: Preparation Method: EPA 3510C SepF
Preparation Batch: BGL0041 Sample Size: 500 mL
Prepared: 04-Dec-2018 Final Volume: 5 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Pentachlorophenol	87-86-5	1	0.014	0.025	ND	ug/L	U
Surrogate: 2,4,6-Tribromophenol				10-181 %	89.5	%	
Surrogate: 2,4,6-Tribromophenol [2C]				10-181 %	80.9	%	



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PDI-WS-T01-1811
18K0437-04 (Water)

Phenols

Method: EPA 8041A
Instrument: ECD8 Analyst: yz

Sampled: 11/28/2018 14:26

Analyzed: 12/11/2018 18:33

Sample Preparation: Preparation Method: EPA 3510C SepF
Preparation Batch: BGL0041 Sample Size: 500 mL
Prepared: 04-Dec-2018 Final Volume: 5 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Pentachlorophenol	87-86-5	1	0.014	0.025	ND	ug/L	U
Surrogate: 2,4,6-Tribromophenol				10-181 %	112	%	
Surrogate: 2,4,6-Tribromophenol [2C]				10-181 %	99.7	%	



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PDI-WS-T01-1811-D
18K0437-05 (Water)

Phenols

Method: EPA 8041A
Instrument: ECD8 Analyst: yz

Sampled: 11/28/2018 14:26

Analyzed: 12/11/2018 18:51

Sample Preparation: Preparation Method: EPA 3510C SepF
Preparation Batch: BGL0041 Sample Size: 460 mL
Prepared: 04-Dec-2018 Final Volume: 5 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Pentachlorophenol	87-86-5	1	0.015	0.027	ND	ug/L	U
Surrogate: 2,4,6-Tribromophenol				10-181 %	82.0	%	
Surrogate: 2,4,6-Tribromophenol [2C]				10-181 %	72.7	%	



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Reported:
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PDI-RB-PP-181129
18K0437-06 (Water)

Phenols

Method: EPA 8041A
Instrument: ECD8 Analyst: VTS

Sampled: 11/29/2018 10:00

Analyzed: 12/11/2018 19:08

Sample Preparation: Preparation Method: EPA 3510C SepF
Preparation Batch: BGL0041 Sample Size: 500 mL
Prepared: 04-Dec-2018 Final Volume: 5 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Pentachlorophenol	87-86-5	1	0.014	0.025	ND	ug/L	U
Surrogate: 2,4,6-Tribromophenol				10-181 %	94.1	%	
Surrogate: 2,4,6-Tribromophenol [2C]				10-181 %	79.3	%	



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Phenols - Quality Control

Batch BGL0041 - EPA 3510C SepF

Instrument: ECD8 Analyst: yz

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BGL0041-BLK1)											
						Prepared: 04-Dec-2018 Analyzed: 11-Dec-2018 16:28					
Pentachlorophenol	ND	0.014	0.025	ug/L							U
Surrogate: 2,4,6-Tribromophenol	0.211			ug/L	0.250		84.5	10-181			
Surrogate: 2,4,6-Tribromophenol [2C]	0.184			ug/L	0.250		73.5	10-181			
LCS (BGL0041-BS1)											
						Prepared: 04-Dec-2018 Analyzed: 11-Dec-2018 16:46					
Pentachlorophenol	0.171	0.014	0.025	ug/L	0.250		68.3	36-159			
Surrogate: 2,4,6-Tribromophenol	0.229			ug/L	0.250		91.8	10-181			
Surrogate: 2,4,6-Tribromophenol [2C]	0.197			ug/L	0.250		78.7	10-181			
Matrix Spike (BGL0041-MS1)											
			Source: 18K0437-02			Prepared: 04-Dec-2018 Analyzed: 11-Dec-2018 17:39					
Pentachlorophenol	0.190	0.014	0.025	ug/L	0.250	ND	76.0	36-159			
Surrogate: 2,4,6-Tribromophenol	0.238			ug/L	0.250		95.0	10-181			
Surrogate: 2,4,6-Tribromophenol [2C]	0.221			ug/L	0.250		88.3	10-181			
Recovery limits for target analytes in MS/MSD QC samples are advisory only.											
Matrix Spike Dup (BGL0041-MSD1)											
			Source: 18K0437-02			Prepared: 04-Dec-2018 Analyzed: 11-Dec-2018 17:57					
Pentachlorophenol	0.186	0.014	0.025	ug/L	0.250	ND	74.4	36-159	2.02	30	
Surrogate: 2,4,6-Tribromophenol	0.246			ug/L	0.250		98.3	10-181			
Surrogate: 2,4,6-Tribromophenol [2C]	0.218			ug/L	0.250		87.0	10-181			
Recovery limits for target analytes in MS/MSD QC samples are advisory only.											



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Certified Analyses included in this Report

Analyte

Certifications

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	17-015	02/07/2019
CALAP	California Department of Public Health CAELAP	2748	06/30/2019
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	02/07/2019
DoD-ELAP DW	DoD-Environmental Laboratory Accreditation - Drinking Water	66169	02/07/2019
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006-011	05/12/2019
WADOE	WA Dept of Ecology	C558	06/30/2019
WA-DW	Ecology - Drinking Water	C558	06/30/2019



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Notes and Definitions

J	Estimated concentration value detected below the reporting limit.
U	This analyte is not detected above the applicable reporting or detection limit.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.