



18 February 2019

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.

|                                 |                             |
|---------------------------------|-----------------------------|
| <u>Associated Work Order(s)</u> | <u>Associated SDG ID(s)</u> |
| 19A0436                         | N/A                         |

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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



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

|  |  |   |
|--|--|---|
| ARI Assigned Number: 1940436   | Turn-around Requested:                 | Date: 01/29/2019                            |
| ARI Client Company: AECOM  | Phone: (206) 438-2261 / (206) 438-2010 | Page: 1 of 1                                |
| Client Contact: Amy Dahl/Chelsey Cook  |  | No. of Coolers: 2 Cooler Temps: 1.3°C 2.2°C |
| Client Project Name: Portland Harbor Pre-Remedial Design Investigation and Baseline Sampling |  |   |

|                            |              |
|----------------------------|--------------|
| Client Project #: 60566335 | Samplers: MT |
|----------------------------|--------------|

| Sample ID            | Date     | Time  | Matrix | No. Containers | Analysis Requested |     |     |  |  |  | Notes/Comments |  |
|----------------------|----------|-------|--------|----------------|--------------------|-----|-----|--|--|--|----------------|--|
|                      |          |       |        |                | PCP 8041           | TOC | DOC |  |  |  |                |  |
| PDI-WS-T06-1901      | 01/27/19 | 10:40 | W      | 12             | ✓                  | ✓   | ✓   |  |  |  |                |  |
| PDI-WS-T07-1901      | 01/26/19 | 09:46 | W      | 4              | ✓                  | ✓   | ✓   |  |  |  |                |  |
| PDI-RB-PP-190127     | 01/27/19 | 15:50 | W      | 4              | ✓                  | ✓   | ✓   |  |  |  |                |  |
| PDI-WS-T07-1901-D    | 01/26/19 | 09:46 | W      | 4              | ✓                  | ✓   | ✓   |  |  |  |                |  |
| per AECOM AV 1/30/19 |          |       |        |                |                    |     |     |  |  |  |                |  |

|                               |                               |                            |                              |                          |
|-------------------------------|-------------------------------|----------------------------|------------------------------|--------------------------|
| Comments/Special Instructions | Relinquished by: (Signature)  | Received by: (Signature)   | Relinquished by: (Signature) | Received by: (Signature) |
|                               | Printed Name: Jennifer R. ... | Printed Name: Jacob Walte  | Printed Name:                | Printed Name:            |
|                               | Company: AECOM                | Company: ARI               | Company:                     | Company:                 |
|                               | Date & Time: 01/29/19 1100    | Date & Time: 01/30/19 1315 | Date & Time:                 | Date & Time:             |

**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 PSSDA/PSEP/SMS protocol will be stored frozen for up to one year and then discarded.



WORK ORDER

19A0436

Client: AECOM Project Manager: Amanda Volgardsen  
Project: Portland Harbor Pre-Remedial Design Project Number: Portland Harbor

Preservation Confirmation

| Container ID | Container Type          | pH   |
|--------------|-------------------------|------|
| 19A0436-01 A | Glass NM, Amber, 500 mL |      |
| 19A0436-01 B | Glass NM, Amber, 500 mL |      |
| 19A0436-01 C | Glass NM, Amber, 500 mL |      |
| 19A0436-01 D | Glass NM, Amber, 500 mL |      |
| 19A0436-01 E | Glass NM, Amber, 500 mL |      |
| 19A0436-01 F | Glass NM, Amber, 500 mL |      |
| 19A0436-01 G | Miscellaneous Container | Pass |
| 19A0436-01 H | Miscellaneous Container | Pass |
| 19A0436-01 I | Miscellaneous Container | Pass |
| 19A0436-01 J | Miscellaneous Container | Pass |
| 19A0436-01 K | Miscellaneous Container | Pass |
| 19A0436-01 L | Miscellaneous Container | Pass |
| 19A0436-02 A | Glass NM, Amber, 500 mL |      |
| 19A0436-02 B | Glass NM, Amber, 500 mL |      |
| 19A0436-02 C | Miscellaneous Container | Pass |
| 19A0436-02 D | Miscellaneous Container | Pass |
| 19A0436-03 A | Glass NM, Amber, 500 mL |      |
| 19A0436-03 B | Glass NM, Amber, 500 mL |      |
| 19A0436-03 C | Miscellaneous Container | Pass |
| 19A0436-03 D | Miscellaneous Container | Pass |
| 19A0436-04 A | Glass NM, Amber, 500 mL |      |
| 19A0436-04 B | Glass NM, Amber, 500 mL |      |
| 19A0436-04 C | Miscellaneous Container | Pass |
| 19A0436-04 D | Miscellaneous Container | Pass |

JSW reservation Confirmed By

01/30/19 Date

All TOC - samples delivered to Conventional Lab = pH < 2  
1-30-19  
uw



AECOM  
1111 Third Avenue, Suite 1600  
Seattle WA, 98101

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

Reported:  
18-Feb-2019 14:03

**ANALYTICAL REPORT FOR SAMPLES**

| Sample ID         | Laboratory ID | Matrix | Date Sampled      | Date Received     |
|-------------------|---------------|--------|-------------------|-------------------|
| PDI-WS-T06-1901   | 19A0436-01    | Water  | 27-Jan-2019 10:40 | 30-Jan-2019 13:15 |
| PDI-WS-T07-1901   | 19A0436-02    | Water  | 26-Jan-2019 09:46 | 30-Jan-2019 13:15 |
| PDI-RB-PP-190127  | 19A0436-03    | Water  | 27-Jan-2019 15:50 | 30-Jan-2019 13:15 |
| PDI-WS-T07-1901-D | 19A0436-04    | Water  | 26-Jan-2019 09:46 | 30-Jan-2019 13:15 |



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Project Manager: Karen Mixon

Reported:  
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## Work Order Case Narrative

### Sample receipt

Samples as listed on the preceding page were received January 30, 2019 under ARI work order 19A0436. 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-T06-1901. The matrix spike/matrix spike duplicate percent recoveries and RPD were within QC limits.

### Total and Dissolved Organic Carbon - Method SM5310

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

Initial and continuing calibrations were within method requirements.

The method blanks were clean at the reporting limits.

The LCS percent recoveries were within control limits.

Duplicates, matrix spikes and matrix spike duplicates were prepared in conjunction with sample PDI-WS-T06-1901. The matrix spike, matrix spike duplicate and duplicate percent recoveries and/or RPD were within QC limits.



WORK ORDER

19A0436

Client: AECOM

Project Manager: Amanda Volgardsen

Project: Portland Harbor Pre-Remedial Design

Project Number: Portland Harbor

Preservation Confirmation

| Container ID | Container Type             |       | pH |      |
|--------------|----------------------------|-------|----|------|
| 19A0436-01 A | Glass NM, Amber, 500 mL    |       |    |      |
| 19A0436-01 B | Glass NM, Amber, 500 mL    |       |    |      |
| 19A0436-01 C | Glass NM, Amber, 500 mL    |       |    |      |
| 19A0436-01 D | Glass NM, Amber, 500 mL    |       |    |      |
| 19A0436-01 E | Glass NM, Amber, 500 mL    |       |    |      |
| 19A0436-01 F | Glass NM, Amber, 500 mL    |       |    |      |
| 19A0436-01 G | Miscellaneous Container    | H2SO4 | <2 | Pass |
| 19A0436-01 H | Miscellaneous Container    | H2SO4 | <2 | Pass |
| 19A0436-01 I | Miscellaneous Container    | H2SO4 | <2 | Pass |
| 19A0436-01 J | FF Miscellaneous Container | H2SO4 | <2 | Pass |
| 19A0436-01 K | FF Miscellaneous Container | H2SO4 | <2 | Pass |
| 19A0436-01 L | FF Miscellaneous Container | H2SO4 | <2 | Pass |
| 19A0436-02 A | Glass NM, Amber, 500 mL    |       |    |      |
| 19A0436-02 B | Glass NM, Amber, 500 mL    |       |    |      |
| 19A0436-02 C | Miscellaneous Container    | H2SO4 | <2 | Pass |
| 19A0436-02 D | FF Miscellaneous Container | H2SO4 | <2 | Pass |
| 19A0436-03 A | Glass NM, Amber, 500 mL    |       |    |      |
| 19A0436-03 B | Glass NM, Amber, 500 mL    |       |    |      |
| 19A0436-03 C | Miscellaneous Container    | H2SO4 | <2 | Pass |
| 19A0436-03 D | FF Miscellaneous Container | H2SO4 | <2 | Pass |
| 19A0436-04 A | Glass NM, Amber, 500 mL    |       |    |      |
| 19A0436-04 B | Glass NM, Amber, 500 mL    |       |    |      |
| 19A0436-04 C | Miscellaneous Container    | H2SO4 | <2 | Pass |
| 19A0436-04 D | FF Miscellaneous Container | H2SO4 | <2 | Pass |

*JSW*

*01/30/19*

Preservation Confirmed By

Date



# Cooler Receipt Form

ARI Client: AECom

Project Name: Portland Harbor

COC No(s): \_\_\_\_\_ (NA)

Delivered by: Fed-Ex UPS Courier Hand Delivered Other: \_\_\_\_\_

Assigned ARI Job No: 1940436

Tracking No: 7852 0523 9045 NA

7852 0523 9056

**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)

Time 1315 1.3°C 2.2°C

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

Temp Gun ID#: 0005706

Cooler Accepted by: JSW Date: 01/30/19 Time: 1315

**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: \_\_\_\_\_

Was sufficient ice used (if appropriate)?  NA  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: 01/30/19 Time: 1427 Labels checked by: ADD

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

| Sample ID on Bottle  | Sample ID on COC        | Sample ID on Bottle | Sample ID on COC |
|--|-------------------------|---------------------|------------------|
| <u>ROI-WS-PP-190127</u>                                    | <u>ROI-RR-PP-190127</u> |                     |                  |
| <u>JSW</u>   |                         |                     |                  |
| <u>01/30/19</u>  |                         |                     |                  |
| <b>Additional Notes, Discrepancies, &amp; Resolutions:</b> |                         |                     |                  |
| <u>TOC container is marked w/ asterisk. Element</u>        |                         |                     |                  |
| <u>sample ID "1940436-03C"</u>                             |                         |                     |                  |
| <u>client labels list 500mL AG as 1-L AG.</u>              |                         |                     |                  |
| By: <u>JSW</u>   | Date: <u>01/30/19</u>   |                     |                  |



|   |  |                                |
|---|--|--------------------------------|
| AECOM<br>1111 Third Avenue, Suite 1600<br>Seattle WA, 98101 | Project: Portland Harbor Pre-Remedial Design<br>Project Number: 60566335<br>Project Manager: Karen Mixon | Reported:<br>18-Feb-2019 14:03 |
|---|--|--------------------------------|

**PDI-WS-T06-1901**  
**19A0436-01 (Water)**

**Phenols**

|                              |                                    |                     |                             |
|------------------------------|------------------------------------|---------------------|-----------------------------|
| Method: EPA 8041A            | Preparation Method: EPA 3510C SepF | Sample Size: 500 mL | Sampled: 01/27/2019 10:40   |
| Instrument: ECD8 Analyst: yz | Preparation Batch: BHA0862         | Final Volume: 5 mL  | Analyzed: 02/16/2019 15:51  |
| Sample Preparation:          | Prepared: 01-Feb-2019              |                     | Extract ID: 19A0436-01 A 01 |

| Analyte                                     | CAS Number | Dilution | Detection Limit | Reporting Limit | Result          | Units         | Notes |
|---|------------|----------|-----------------|-----------------|-----------------|---------------|-------|
| Pentachlorophenol                           | 87-86-5    | 1        | 0.014           | 0.025           | ND              | ug/L          | U     |
| <i>Surrogate: 2,4,6-Tribromophenol</i>      |            |          |                 |                 | <i>10-181 %</i> | <i>108 %</i>  |       |
| <i>Surrogate: 2,4,6-Tribromophenol [2C]</i> |            |          |                 |                 | <i>10-181 %</i> | <i>99.8 %</i> |       |





|   |  |                                |
|---|--|--------------------------------|
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|---|--|--------------------------------|

**PDI-WS-T06-1901**  
**19A0436-01 (Water)**

**Wet Chemistry**

Method: SM 5310 B-00 Sampled: 01/27/2019 10:40  
Instrument: TOC-LCSH Analyst: BF Analyzed: 01/31/2019 13:36  
Sample Preparation: Extract ID: 19A0436-01 G  
Preparation Method: No Prep Wet Chem  
Preparation Batch: BHA0829 Sample Size: 20 mL  
Prepared: 31-Jan-2019 Final Volume: 20 mL

| Analyte              | CAS Number | Dilution | Detection Limit | Reporting Limit | Result      | Units | Notes |
|----------------------|------------|----------|-----------------|-----------------|-------------|-------|-------|
| Total Organic Carbon |            | 1        | 0.50            | 0.50            | <b>1.83</b> | mg/L  |       |

Sample Preparation: Extract ID: 19A0436-01 L  
Preparation Method: No Prep Wet Chem  
Preparation Batch: BHA0836 Sample Size: 20 mL  
Prepared: 31-Jan-2019 Final Volume: 20 mL

| Analyte                             | CAS Number | Dilution | Detection Limit | Reporting Limit | Result      | Units | Notes |
|-------------------------------------|------------|----------|-----------------|-----------------|-------------|-------|-------|
| Dissolved Organic Carbon, Dissolved |            | 1        | 0.50            | 0.50            | <b>2.07</b> | mg/L  |       |



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Reported:  
18-Feb-2019 14:03

**PDI-WS-T07-1901**  
**19A0436-02 (Water)**

**Phenols**

Method: EPA 8041A Sampled: 01/26/2019 09:46  
Instrument: ECD8 Analyst: yz Analyzed: 02/16/2019 16:45

Sample Preparation: Preparation Method: EPA 3510C SepF Extract ID: 19A0436-02 A 01  
Preparation Batch: BHA0862 Sample Size: 500 mL  
Prepared: 01-Feb-2019 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     |
| <i>Surrogate: 2,4,6-Tribromophenol</i>      |            |          |                 |                 | 10-181 % | 117   | %     |
| <i>Surrogate: 2,4,6-Tribromophenol [2C]</i> |            |          |                 |                 | 10-181 % | 106   | %     |



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Reported:  
18-Feb-2019 14:03

**PDI-WS-T07-1901**  
**19A0436-02 (Water)**

**Wet Chemistry**

Method: SM 5310 B-00 Sampled: 01/26/2019 09:46  
Instrument: TOC-LCSH Analyst: BF Analyzed: 01/31/2019 14:49

Sample Preparation: Preparation Method: No Prep Wet Chem Extract ID: 19A0436-02 C  
Preparation Batch: BHA0829 Sample Size: 20 mL  
Prepared: 31-Jan-2019 Final Volume: 20 mL

| Analyte              | CAS Number | Dilution | Detection Limit | Reporting Limit | Result      | Units | Notes |
|----------------------|------------|----------|-----------------|-----------------|-------------|-------|-------|
| Total Organic Carbon |            | 1        | 0.50            | 0.50            | <b>2.16</b> | mg/L  |       |

Sample Preparation: Preparation Method: No Prep Wet Chem Extract ID: 19A0436-02 D  
Preparation Batch: BHA0836 Sample Size: 20 mL  
Prepared: 31-Jan-2019 Final Volume: 20 mL

| Analyte                             | CAS Number | Dilution | Detection Limit | Reporting Limit | Result      | Units | Notes |
|-------------------------------------|------------|----------|-----------------|-----------------|-------------|-------|-------|
| Dissolved Organic Carbon, Dissolved |            | 1        | 0.50            | 0.50            | <b>2.20</b> | mg/L  |       |



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**Reported:**  
18-Feb-2019 14:03

**PDI-RB-PP-190127**  
**19A0436-03 (Water)**

**Phenols**

Method: EPA 8041A Sampled: 01/27/2019 15:50  
Instrument: ECD8 Analyst: yz Analyzed: 02/16/2019 17:03

Sample Preparation: Preparation Method: EPA 3510C SepF Extract ID: 19A0436-03 A 01  
Preparation Batch: BHA0862 Sample Size: 500 mL  
Prepared: 01-Feb-2019 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     |
| <i>Surrogate: 2,4,6-Tribromophenol</i>      |            |          |                 |                 | <i>10-181 %</i> | <i>103 %</i>  |       |
| <i>Surrogate: 2,4,6-Tribromophenol [2C]</i> |            |          |                 |                 | <i>10-181 %</i> | <i>95.8 %</i> |       |



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**Reported:**  
18-Feb-2019 14:03

**PDI-RB-PP-190127**  
**19A0436-03 (Water)**

**Wet Chemistry**

Method: SM 5310 B-00 Sampled: 01/27/2019 15:50  
Instrument: TOC-LCSH Analyst: BF Analyzed: 01/31/2019 15:49

Sample Preparation: Preparation Method: No Prep Wet Chem Extract ID: 19A0436-03 C  
Preparation Batch: BHA0829 Sample Size: 20 mL  
Prepared: 31-Jan-2019 Final Volume: 20 mL

| Analyte              | CAS Number | Dilution | Detection Limit | Reporting Limit | Result      | Units | Notes |
|----------------------|------------|----------|-----------------|-----------------|-------------|-------|-------|
| Total Organic Carbon |            | 1        | 0.50            | 0.50            | <b>1.33</b> | mg/L  |       |

Sample Preparation: Preparation Method: No Prep Wet Chem Extract ID: 19A0436-03 D  
Preparation Batch: BHA0836 Sample Size: 20 mL  
Prepared: 31-Jan-2019 Final Volume: 20 mL

| Analyte                             | CAS Number | Dilution | Detection Limit | Reporting Limit | Result | Units | Notes |
|-------------------------------------|------------|----------|-----------------|-----------------|--------|-------|-------|
| Dissolved Organic Carbon, Dissolved |            | 1        | 0.50            | 0.50            | ND     | mg/L  | U     |



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**PDI-WS-T07-1901-D**  
**19A0436-04 (Water)**

**Phenols**

Method: EPA 8041A Sampled: 01/26/2019 09:46  
Instrument: ECD8 Analyst: yz Analyzed: 02/16/2019 17:21

Sample Preparation: Preparation Method: EPA 3510C SepF Extract ID: 19A0436-04 A 01  
Preparation Batch: BHA0862 Sample Size: 500 mL  
Prepared: 01-Feb-2019 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     |
| <i>Surrogate: 2,4,6-Tribromophenol</i>      |            |          |                 |                 | 10-181 % | 118   | %     |
| <i>Surrogate: 2,4,6-Tribromophenol [2C]</i> |            |          |                 |                 | 10-181 % | 107   | %     |



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Reported:  
18-Feb-2019 14:03

**PDI-WS-T07-1901-D**  
**19A0436-04 (Water)**

**Wet Chemistry**

Method: SM 5310 B-00 Sampled: 01/26/2019 09:46  
Instrument: TOC-LCSH Analyst: BF Analyzed: 01/31/2019 16:07

Sample Preparation: Preparation Method: No Prep Wet Chem Extract ID: 19A0436-04 C  
Preparation Batch: BHA0829 Sample Size: 20 mL  
Prepared: 31-Jan-2019 Final Volume: 20 mL

| Analyte              | CAS Number | Dilution | Detection Limit | Reporting Limit | Result      | Units | Notes |
|----------------------|------------|----------|-----------------|-----------------|-------------|-------|-------|
| Total Organic Carbon |            | 1        | 0.50            | 0.50            | <b>2.17</b> | mg/L  |       |

Sample Preparation: Preparation Method: No Prep Wet Chem Extract ID: 19A0436-04 D  
Preparation Batch: BHA0836 Sample Size: 20 mL  
Prepared: 31-Jan-2019 Final Volume: 20 mL

| Analyte                             | CAS Number | Dilution | Detection Limit | Reporting Limit | Result      | Units | Notes |
|-------------------------------------|------------|----------|-----------------|-----------------|-------------|-------|-------|
| Dissolved Organic Carbon, Dissolved |            | 1        | 0.50            | 0.50            | <b>2.09</b> | mg/L  |       |



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Reported:  
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### Phenols - Quality Control

#### Batch BHA0862 - 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 |
|--------------------------------------|--------|-----------------|-----------------|-------|-------------|---|------|-------------|-----|-----------|-------|
| <b>Blank (BHA0862-BLK1)</b>          |        |                 |                 |       |             | Prepared: 01-Feb-2019 Analyzed: 16-Feb-2019 15:16 |      |             |     |           |       |
| Pentachlorophenol                    | ND     | 0.014           | 0.025           | ug/L  |             |   |      |             |     |           | U     |
| Surrogate: 2,4,6-Tribromophenol      | 0.227  |                 |                 | ug/L  | 0.250       |   | 90.7 | 10-181      |     |           |       |
| Surrogate: 2,4,6-Tribromophenol [2C] | 0.220  |                 |                 | ug/L  | 0.250       |   | 87.9 | 10-181      |     |           |       |

|                                      |       |       |       |      |       |   |      |        |  |  |  |
|--------------------------------------|-------|-------|-------|------|-------|---|------|--------|--|--|--|
| <b>LCS (BHA0862-BS1)</b>             |       |       |       |      |       | Prepared: 01-Feb-2019 Analyzed: 16-Feb-2019 15:34 |      |        |  |  |  |
| Pentachlorophenol                    | 0.216 | 0.014 | 0.025 | ug/L | 0.250 |   | 86.3 | 36-159 |  |  |  |
| Surrogate: 2,4,6-Tribromophenol      | 0.274 |       |       | ug/L | 0.250 |   | 110  | 10-181 |  |  |  |
| Surrogate: 2,4,6-Tribromophenol [2C] | 0.256 |       |       | ug/L | 0.250 |   | 102  | 10-181 |  |  |  |

|                                      |       |       |       |      |       |  |      |        |  |  |  |
|--------------------------------------|-------|-------|-------|------|-------|--|------|--------|--|--|--|
| <b>Matrix Spike (BHA0862-MS1)</b>    |       |       |       |      |       | Source: 19A0436-01 Prepared: 01-Feb-2019 Analyzed: 16-Feb-2019 16:09 |      |        |  |  |  |
| Pentachlorophenol                    | 0.240 | 0.014 | 0.025 | ug/L | 0.250 | ND   | 96.0 | 36-159 |  |  |  |
| Surrogate: 2,4,6-Tribromophenol      | 0.297 |       |       | ug/L | 0.250 |  | 119  | 10-181 |  |  |  |
| Surrogate: 2,4,6-Tribromophenol [2C] | 0.278 |       |       | ug/L | 0.250 |  | 111  | 10-181 |  |  |  |

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

|  |       |       |       |      |       |  |      |        |      |    |  |
|--|-------|-------|-------|------|-------|--|------|--------|------|----|--|
| <b>Matrix Spike Dup (BHA0862-MSD1)</b> |       |       |       |      |       | Source: 19A0436-01 Prepared: 01-Feb-2019 Analyzed: 16-Feb-2019 16:27 |      |        |      |    |  |
| Pentachlorophenol                      | 0.227 | 0.014 | 0.025 | ug/L | 0.250 | ND   | 90.8 | 36-159 | 5.48 | 30 |  |
| Surrogate: 2,4,6-Tribromophenol        | 0.253 |       |       | ug/L | 0.250 |  | 101  | 10-181 |      |    |  |
| Surrogate: 2,4,6-Tribromophenol [2C]   | 0.223 |       |       | ug/L | 0.250 |  | 89.0 | 10-181 |      |    |  |

Recovery limits for target analytes in MS/MSD QC samples are advisory only.





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Seattle WA, 98101

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

Reported:  
18-Feb-2019 14:03

**Wet Chemistry - Quality Control**

**Batch BHA0829 - No Prep Wet Chem**

Instrument: TOC-LCSH Analyst: BF

| QC Sample/Analyte   | Result | Detection Limit | Reporting Limit | Units | Spike Level | Source Result  | %REC | %REC Limits | RPD  | RPD Limit | Notes |
|---|--------|-----------------|-----------------|-------|-------------|--|------|-------------|------|-----------|-------|
| <b>Blank (BHA0829-BLK1)</b>   |        |                 |                 |       |             |  |      |             |      |           |       |
|   |        |                 |                 |       |             | Prepared: 31-Jan-2019 Analyzed: 31-Jan-2019 12:48                    |      |             |      |           |       |
| Total Organic Carbon  | ND     | 0.50            | 0.50            | mg/L  |             |  |      |             |      |           | U     |
| <b>LCS (BHA0829-BS1)</b>  |        |                 |                 |       |             |  |      |             |      |           |       |
|   |        |                 |                 |       |             | Prepared: 31-Jan-2019 Analyzed: 31-Jan-2019 13:14                    |      |             |      |           |       |
| Total Organic Carbon  | 18.66  | 0.50            | 0.50            | mg/L  | 20.00       |  | 93.3 | 90-110      |      |           |       |
| <b>Duplicate (BHA0829-DUP1)</b>   |        |                 |                 |       |             |  |      |             |      |           |       |
|   |        |                 |                 |       |             | Source: 19A0436-01 Prepared: 31-Jan-2019 Analyzed: 31-Jan-2019 13:54 |      |             |      |           |       |
| Total Organic Carbon  | 1.74   | 0.50            | 0.50            | mg/L  |             | 1.83   |      |             | 5.10 | 20        |       |
| <b>Matrix Spike (BHA0829-MS1)</b>   |        |                 |                 |       |             |  |      |             |      |           |       |
|   |        |                 |                 |       |             | Source: 19A0436-01 Prepared: 31-Jan-2019 Analyzed: 31-Jan-2019 14:13 |      |             |      |           |       |
| Total Organic Carbon  | 17.31  | 0.50            | 0.50            | mg/L  | 20.04       | 1.83   | 77.2 | 75-125      |      |           |       |
| Recovery limits for target analytes in MS/MSD QC samples are advisory only. |        |                 |                 |       |             |  |      |             |      |           |       |
| <b>Matrix Spike Dup (BHA0829-MSD1)</b>                                      |        |                 |                 |       |             |  |      |             |      |           |       |
|   |        |                 |                 |       |             | Source: 19A0436-01 Prepared: 31-Jan-2019 Analyzed: 31-Jan-2019 14:31 |      |             |      |           |       |
| Total Organic Carbon  | 18.01  | 0.50            | 0.50            | mg/L  | 20.04       | 1.83   | 80.7 | 75-125      | 3.96 | 20        |       |
| Recovery limits for target analytes in MS/MSD QC samples are advisory only. |        |                 |                 |       |             |  |      |             |      |           |       |



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

Reported:  
18-Feb-2019 14:03

Wet Chemistry - Quality Control

Batch BHA0836 - No Prep Wet Chem

Instrument: TOC-LCSH Analyst: BF

| QC Sample/Analyte   | Result | Detection Limit | Reporting Limit | Units | Spike Level | Source Result  | %REC | %REC Limits | RPD  | RPD Limit | Notes |
|---|--------|-----------------|-----------------|-------|-------------|--|------|-------------|------|-----------|-------|
| <b>Blank (BHA0836-BLK1)</b>   |        |                 |                 |       |             | Prepared: 31-Jan-2019 Analyzed: 31-Jan-2019 20:17                    |      |             |      |           |       |
| Dissolved Organic Carbon, Dissolved   | ND     | 0.50            | 0.50            | mg/L  |             |  |      |             |      |           | U     |
| <b>LCS (BHA0836-BS1)</b>  |        |                 |                 |       |             | Prepared: 31-Jan-2019 Analyzed: 31-Jan-2019 20:36                    |      |             |      |           |       |
| Dissolved Organic Carbon, Dissolved   | 18.68  | 0.50            | 0.50            | mg/L  | 20.00       |  | 93.4 | 90-110      |      |           |       |
| <b>Duplicate (BHA0836-DUP1)</b>   |        |                 |                 |       |             | Source: 19A0436-01 Prepared: 31-Jan-2019 Analyzed: 31-Jan-2019 21:13 |      |             |      |           |       |
| Dissolved Organic Carbon, Dissolved   | 2.00   | 0.50            | 0.50            | mg/L  |             | 2.07   |      |             | 3.59 | 20        |       |
| <b>Matrix Spike (BHA0836-MS1)</b>   |        |                 |                 |       |             | Source: 19A0436-01 Prepared: 31-Jan-2019 Analyzed: 31-Jan-2019 21:31 |      |             |      |           |       |
| Dissolved Organic Carbon, Dissolved   | 17.43  | 0.50            | 0.50            | mg/L  | 20.04       | 2.07   | 76.7 | 75-125      |      |           |       |
| Recovery limits for target analytes in MS/MSD QC samples are advisory only. |        |                 |                 |       |             |  |      |             |      |           |       |
| <b>Matrix Spike Dup (BHA0836-MSD1)</b>                                      |        |                 |                 |       |             | Source: 19A0436-01 Prepared: 31-Jan-2019 Analyzed: 31-Jan-2019 21:49 |      |             |      |           |       |
| Dissolved Organic Carbon, Dissolved   | 18.36  | 0.50            | 0.50            | mg/L  | 20.04       | 2.07   | 81.3 | 75-125      | 5.20 | 20        |       |

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    |
|------------------------------|-------------------|
| <b>SM 5310 B-00 in Water</b> |                   |
| Dissolved Organic Carbon     | WADOE,WA-DW,NELAP |
| Total Organic Carbon         | WA-DW,WADOE,NELAP |

| 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        | 01/01/2021 |
| 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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18-Feb-2019 14:03

**Notes and Definitions**

- U This analyte is not detected above the reporting limit (RL) or if noted, not detected above the limit of detection (LOD).
- 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.