

Intergovernmental  
Agreement for  
Remedial  
Investigation and  
Source Control  
Measures

DEQ No.  
LQVC-NWR-03-10

# Outfall Basins 43 and 44 Stormwater Investigations

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Technical Memorandum No. OF 43/44-1  
City of Portland Outfall Project  
ECSI No. 2425

■

October 2012

PREPARED BY



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# CITY OF PORTLAND ENVIRONMENTAL SERVICES



1120 SW Fifth Avenue, Room 1000, Portland, Oregon 97204 ■ Dan Saltzman, Commissioner ■ Dean Marriott, Director

TECHNICAL MEMORANDUM No. OF 43/44-1

## Outfall Basins 43 and 44 Stormwater Investigations

TO: Alex Liverman, Oregon Department of Environmental Quality (DEQ)

FROM: Linda Scheffler, City of Portland, Bureau of Environmental Services (BES)

COPIES: Dan Hafley, DEQ  
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DATE: October 25, 2012

SUBJECT: **Portland Harbor Source Investigations**

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### Introduction

This technical memorandum presents the results of the City of Portland (City) stormwater investigations conducted between March and May 2012 in Outfall Basins 43 and 44. The City conducted these investigations in response to findings and recommendations in the City's source investigation reports for these basins (BES, 2011a, 2011b).

Following a comprehensive source investigation of Basin 43, the City concluded that no major contaminant sources are present in the basin and that additional source tracing was not needed (BES, 2011a). Nonetheless, because previous stormwater and sediment trap investigations identified a potential low-level source of polychlorinated biphenyls (PCBs) to the current basin stormwater conveyance system, the City completed additional work in the basin to confirm that source control measures are not needed. Following completion of the City's combined sewer overflow (CSO) abatement project construction activities in the area, the City cleaned the storm lines and inlets along N. Albina Avenue as a best management practice (BMP). The City then collected and analyzed post-line cleanout stormwater samples from the downstream end of the conveyance system. Results of this investigation confirm that there are no current major PCB sources to Basin 43.

With regard to Basin 44, previous results of stormwater and sediment trap sampling indicated a source of PCBs in the basin. City source tracing results and data subsequently collected by PacifiCorp at its Albina Substation indicated that runoff from areas with erodible soils on and adjacent to the active substation properties likely contributed to the elevated PCB concentrations observed in the Basin 44 samples (BES, 2011b). PacifiCorp completed removal of contaminated erodible soil at and adjacent to the Albina Substation, cleaned portions of the Basin 44 conveyance system, implemented source control measures (SCMs) at the site, and collected performance monitoring data. The purpose of the City's current Basin 44 stormwater investigation was to collect data during a large storm event - conditions in which PCB-contaminated erodible soils could be mobilized to the Basin 44 conveyance system - to

supplement the data set being collected by PacifiCorp. Results indicate that there are no current major PCB sources in Basin 44.

These investigations are part of the City's ongoing Remedial Investigation associated with the Portland Harbor City of Portland Outfall Project being conducted pursuant to the August 13, 2003, Intergovernmental Agreement between DEQ and the City. Data collected under these investigations support ongoing DEQ and City efforts to identify, characterize and control discharges to the Basin 43 and Basin 44 municipal storm systems.

## Background

### River Mile 11E

Outfalls 43 and 44 discharge to the east side of the Willamette River at river mile (RM) 11.4 and RM 11.2, respectively. The area of the river between RM 11 and 11.6 (referred to as RM 11E) has been targeted for focused inriver and upland investigations in response to detections of elevated concentrations of PCBs and other contaminants in river sediment, water, and fish tissue samples collected from this area. The U.S. Environmental Protection Agency (EPA) has designated RM 11E as an Area of Potential Concern (AOPC) 25 (EPA, 2009). In addition to Outfalls 43 and 44, two other City outfalls (Outfalls 44A and 45), one Oregon Department of Transportation outfall, and approximately 13 private industrial outfalls also discharge to AOPC 25. These outfalls drain upland areas within the Albina district, which has a long history of industrial operations.

### Basin 43

#### Conveyance System Configuration and Drainage Basin

The current Outfall 43 conveyance system consists of a separated storm system serving approximately 13.5 acres of industrial area adjacent to the river. Figure 1 depicts the configuration of the Outfall 43 conveyance system and the approximate drainage basin boundary. This basin includes storm lines extending along N. River Street, N. Albina Avenue, and N. Interstate Avenue, drainage from the majority of the N. Tillamook ramp to N. Interstate Avenue, and a 56-inch-diameter outfall pipe.

#### Previous Investigations

The City initiated phased investigations in Basin 43 in 2008 as part of the City's evaluation of its basins discharging to RM 11E, to determine whether there were major contaminant sources in the basin. The source investigation in Basin 43 was planned and conducted in two phases (BES, 2008; BES, 2009). During Phase 1 of the investigation, the City collected stormwater grab samples and concurrent inline sediment trap samples at multiple locations as part of a screening step to help inform subsequent sampling for source tracing purposes (Phase 2).

Results indicated that total PCB concentrations were low (ranging between 0.00195 and 0.0645 µg/L) in stormwater samples and moderately elevated (not detected to 971 µg/Kg) in sediment trap samples collected near the downstream end of the current basin. However, PCB concentrations in solids were low (not detected to 51.5 µg/Kg) at targeted up-the-pipe locations, and no specific current PCB sources have been identified (BES, 2011a). Legacy contamination related to historical industrial activities in this area and offsite migration and incidental drag-out of PCB-contaminated erodible soils to this basin from identified sources in the vicinity may be resulting in PCB detections in the basin (BES, 2011a).

## Recent Source Control Activities

In February 2012, the City cleaned the N. Albina and N. River Street lines and associated catch basins (see Figure 1) as a BMP to remove any residual solids in the conveyance system following completion of the eastside CSO tunnel construction project.

## Basin 44

### Conveyance System Configuration and Drainage Basin

Outfall 44 is a 12-inch-diameter outfall that was constructed in approximately 1907. The outfall conveys stormwater drainage from approximately 17 acres of industrial land. Figure 2 depicts the configuration of the Outfall 44 conveyance system and the approximate drainage basin boundary. In addition to the 12-inch-diameter line to the outfall, the conveyance system includes branches along N. River and N. Loring Streets and the intersecting streets between the river and N. Interstate Avenue.

### Previous Investigations

As in Basin 43, the City initiated the Basin 44 source investigation in 2008 (BES, 2008; BES, 2009). The Basin 44 source investigation included evaluation of stormwater and sediment trap results from basin-level screening to determine the potential for sources to be present in the basin (Phase 1), as well as evaluation of results from stormwater, inline solids, and surface soil sampling at selected upgradient locations to identify potential sources within the basin (Phase 2).

Results of the source investigation indicated the presence of significant sources of PCBs to the Basin 44 stormwater conveyance. Based on the spatial pattern of PCB concentrations detected in the basin and observations during sampling activities, the City identified the PacifiCorp Albina Substation site as a potential PCB source (BES, 2011b). These results supported DEQ's request for PacifiCorp to enter the DEQ Voluntary Cleanup Program.

Data subsequently collected by PacifiCorp confirmed the presence of PCBs in erodible soils on and adjacent to the active substation properties and within areas discharging to the Basin 44 conveyance system (Bridgewater, 2011).

### Recent Source Control Activities

Both the City and PacifiCorp cleaned portions of the Basin 44 conveyance system during the course of the Basin 44 source investigation (BES, 2011b). In 2010, PacifiCorp removed contaminated erodible soils from current and former Albina Substation properties and adjacent rights-of-way, and implemented onsite SCMs to reduce overland stormwater discharges from substation properties to Basin 44 (Bridgewater, 2011).

## Stormwater Sample Collection and Analysis

### Investigation Overview

The specific objectives for this investigation were distinct for each basin. As noted above, the objective for Basin 43 was to verify that the basin does not include major current sources of PCBs. The objective for Basin 44 was to assess whether PCB-contaminated erodible soils continue to be discharged to the Basin 44 conveyance system. Given these basin-specific objectives, the investigations included different sampling strategies and targeted different storm events for the two basins. A total of four storm events were sampled between March and May 2012.

Stormwater samples were collected from Basin 44 during the first event and from Basin 43 during the subsequent three events. The investigation activities in each basin are described in further detail below.

## Field Activities

### Sampling Locations and Procedures

The City conducted the stormwater sampling activities consistent with the City's *Amended Programmatic Quality Assurance Project Plan* (BES, 2007a) and *Amended Programmatic Sampling and Analysis Plan* (BES, 2007b) for collection of water and solids samples for the City of Portland Outfalls Project. In Basin 43, the stormwater samples were obtained from a single location near the downstream end of the basin; this location was not accessible in 2008 or 2009 because of CSO construction activities. Stormwater samples were collected from six locations in Basin 44, all of which receive runoff from drainage areas with erodible soils on or adjacent to current or former substation properties. The Basin 43 and 44 sampling locations are summarized below and shown on Figures 1 and 2, respectively.

| Sample Location                                                                 | Description                                                                          | Sample Type |
|---------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-------------|
| <b>Basin 43</b>                                                                 |                                                                                      |             |
| Manhole ANR758<br>(N. River Street near<br>N. Interstate<br>Avenue)             | Within manhole                                                                       | Grab        |
| <b>Basin 44</b>                                                                 |                                                                                      |             |
| Manhole ABC352<br>(Intersection of N.<br>River Street and N.<br>Harding Avenue) | Upstream in 10-inch line entering manhole from northwest                             | Grab        |
|                                                                                 | Upstream in 10-inch line entering manhole from catch basin APD919                    | Grab        |
|                                                                                 | Upstream in 12-inch line entering manhole from northeast                             | Grab        |
|                                                                                 | Upstream in 8-inch line entering manhole from catch basins APL242, APL243 and APL244 | Grab        |
|                                                                                 | Upstream in 10-inch line entering manhole from southeast                             | Grab        |
| Catch basin APL246<br>(Intersection of N.<br>Loring St. and N.<br>Harding Ave.) | Overland flow to catch basin from substation property                                | Grab        |

A total of four samples (including one field duplicate) was collected from Basin 43, and a total of seven stormwater samples (including one field duplicate) was collected from Basin 44. Photographs of the sampling locations and stormwater flow conditions are provided in Attachment A. Field notes taken during sampling activities are provided in Attachment B.

## Storm Events Sampled

### Basin 43 Events

For purposes of characterizing stormwater discharges from the basin, the sample collection activities were scheduled to target a variety of stormwater runoff conditions as illustrated in the precipitation graphs (Figure 3) for the three sampled storm events. In general, the sampling events met the following criteria:<sup>1</sup>

- Antecedent dry period of at least 24 hours (as defined by <0.1 inches of rainfall over the previous 24 hours);
- Minimum predicted rainfall volume of >0.2 inches for the storm event; and
- Expected duration of the storm event of at least 3 hours.

In addition to the precipitation graphs shown on Figure 3, a summary of the characteristics of each storm event is included. Information on Figure 3 is from data collected at the Albina rain gage (located at 2920 N. Larrabee Avenue)<sup>2</sup>. Brief descriptions of the storm events sampled are provided below, based on sampling crew field notes and the average hourly rainfall data shown on Figure 3.

- *Basin 43 Event 1: April 19, 2012* — Less than 0.1 inch of rainfall was recorded at the Albina rain gage during the 31 hours preceding this event. The minimum forecasted rainfall for April 19 was 0.28 inch. Rainfall began between 7:00 and 8:00 a.m. PST on April 19, and the stormwater sample was collected at 9:10 a.m. By the time of sampling, approximately 0.19 inch of rainfall had been recorded at the rain gage. Rainfall ceased between 4:00 and 5:00 p.m. on April 19, with a cumulative total recorded rainfall of 0.54 inch for the storm event.
- *Basin 43 Event 2: May 21, 2012* — Less than 0.1 inch of rainfall was recorded at the Albina gage during the 15 days preceding this event. The minimum forecasted rainfall for this event was 0.28 inches. Rainfall began between 3:00 and 4:00 a.m. PST on May 21 but was light and intermittent until between 6:00 and 7:00 a.m., when it became steady with periods of heavier rainfall. Steady rainfall continued until between 10:00 and 11:00 a.m. on May 21. The stormwater sample was collected at 10:19 a.m. on May 21; by this time, approximately 0.26 inch of rainfall had been recorded. Intermittent rainfall continued until between 1:00 and 2:00 p.m. on May 21. Total cumulative rainfall recorded for this storm event was 0.29 inch.
- *Basin 43 Event 3: May 22, 2012* — Less than 0.1 inch of precipitation was recorded at the Albina gage for the 22 hours preceding this event. The minimum forecasted rainfall for this event was 0.42 inch. Rainfall began between 7:00 and 8:00 a.m. on May 22, and the

<sup>1</sup> These criteria were developed as part of the Portland Harbor Joint Source Control Strategy (JSCS) for implementation by upland sites. For the purposes of the City's basin-scale source investigations, the criteria are used as general guidelines for use with specific forecasts, to determine whether storms are likely to generate stormwater runoff representative of the entire drainage basin and thus should be targeted for sampling. For example, storms with predicted volumes of less than 0.2 inches may still deliver a concentrated pulse of rain, generating representative conveyance system flows in smaller drainage areas with a large percentage of impervious area. As a result, some storms are sampled which may be outside of recommended storm criteria but still representative of stormwater discharge from the basin.

<sup>2</sup> Station #117 in the City's Hydrological Data Retrieval and Alarm (HYDRA) system rain gage network ([http://or.water.usgs.gov/non-usgs/bes/raingage\\_info/](http://or.water.usgs.gov/non-usgs/bes/raingage_info/)).

sample was collected at 8:20 a.m. By the time of sampling, approximately 0.1 inch of rainfall had been recorded; a total of 0.32 inch was recorded by the time the event ended, between 1:00 and 2:00 p.m. PST on May 22.

Based on these sampling conditions, the target storm criteria were generally met and the stormwater samples from these three events collectively are considered to represent discharges under a variety of stormwater conditions.

#### **Basin 44 Event**

To meet the specific objective of evaluating storm runoff mobilizing erodible soils, the stormwater sampling in Basin 44 targeted a large single storm event meeting the following criteria:

- No antecedent dry period needed;
- Predicted rainfall volume of >0.5 inches; and
- Expected storm duration of more than 3 hours.

The targeted timing of sample collection in Basin 44 was near the peak intensity of the storm, when erodible solids were more likely to be mobilized by stormwater runoff. A qualifying storm event was predicted for March 14 – 15, 2012, and samples from this basin were collected on March 15. Figure 4 presents a precipitation graph and summary table of storm characteristics for this event based on data collected at the Albina rain gage. A brief description of the March 14 – 15 storm event is provided below, based on sampling crew field notes and the average hourly rainfall data shown on Figure 4.

- *Basin 44 Event: March 14 – 15, 2012* – The minimum forecasted rainfall for this event was 0.89 inches. Rainfall occurred intermittently throughout the morning and early afternoon of March 14, 2012, became steady after 3:00 p.m. PST<sup>3</sup> that day, and continued until between 11:00 a.m. and noon on March 15. The rainfall peaked in intensity between 5:00 and 6:00 a.m. on March 15 and remained heavy until about 10:00 a.m. The Basin 44 stormwater samples were collected between 10:04 and 10:47 a.m. on March 15. The total rainfall recorded at the Albina rain gage for the storm event was 1.19 inches.

Based on these sampling conditions, the target storm criteria were met and the stormwater samples from this event meet the Basin 44 sampling objectives.

## **Summary of Results**

The stormwater samples from both basins were analyzed for PCB Aroclors and total suspended solids (TSS). PCB Aroclor 1254 was detected in all of the samples collected from Basin 43. In the Basin 44 samples, PCB Aroclor 1248 was detected in one sample; PCBs were not detected in the other samples collected in Basin 44. The laboratory analytical results for the Basin 43 and Basin 44 stormwater samples are summarized in Tables 1 and 2, respectively, along with the Portland Harbor Joint Source Control (JSCS) screening level values (SLVs) for reference (DEQ/EPA, 2005).

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<sup>3</sup> In accordance with standard practice, all rain gage data are recorded in Pacific Standard Time (PST). Therefore, all sample times in the following descriptions are given in PST.

The total PCB concentrations are displayed on Figure 1 (Basin 43) and Figure 2 (Basin 44). The laboratory reports and data review memoranda are provided in Attachment C.

## Data Evaluation

### Basin 43

PCB Aroclor 1254 was detected at low concentrations (approximately 0.06 µg/L) in the stormwater samples from all three of the 2012 sampling events in Basin 43. The concentrations are within the range detected in the 2008 – 2009, pre-cleanout stormwater samples from this branch (between 0.00195 and 0.0645 µg/L) (BES, 2011a). Based on a comparison of results to the Portland Harbor industrial stormwater data compiled by DEQ (DEQ, 2010), data do not indicate the presence of major PCB sources in this basin.

### Basin 44

PCB concentrations were below detection limits for all but one of the March 2012 stormwater samples from Basin 44. PCBs (Aroclor 1248) were detected only in the stormwater sample collected from the N. River Street line that enters manhole ABC352 from the southeast. This line conveys flow from two catch basins on N. River St. and a catch basin on the active Albina Substation property. PacifiCorp plugged the site catch basin temporarily in August 2012 and has stated that it plans on permanently decommissioning this inlet in the spring of 2013 following visual observations during wet weather (Bridgewater, 2012). The total PCB concentration in this sample (0.08 µg/L) is within the lower range of Portland Harbor stormwater concentrations (DEQ, 2010) and is not indicative of a current major source to this line.

## Conclusions and Next Steps

The results of the 2012 stormwater investigations in Basins 43 and 44 indicate that there are no current major sources of PCBs to either of these conveyance systems. Based on these findings, the City is concluding source investigation efforts in Basins 43 and 44.

## References

- BES. 2007a. Amended Programmatic Quality Assurance Project Plan, City of Portland Outfalls Project, Revision to Programmatic Source Control Remedial Investigation Work Plan Appendix D. Prepared by the City of Portland, Bureau of Environmental Services, Portland Harbor Program. August 2007.
- BES. 2007b. Amended Programmatic Sampling and Analysis Plan, City of Portland Outfalls Remedial Investigation/Source Control Measures Project. Prepared by the City of Portland, Bureau of Environmental Services, Portland Harbor Program. August 2007.
- BES. 2008. Albina Riverlots: City Basin Information and Source Investigation Approach. Technical Memorandum, to K. Tarnow (DEQ) from D. Sanders and L. Scheffler (BES). [Attachment A: City Source Investigations for Basins 43, 44, and 44A, Fall 2008 / Winter 2009 Sampling and Analysis Plan.] December 18, 2008.

- BES. 2009. Subject: City of Portland Outfalls Project, Source Investigations for Basins 43, 44, and 44A, Amendment to Fall 2008 / Winter 2009 Sampling and Analysis Plan. Letter to K. Tarnow (DEQ) from L. Scheffler (BES). February 5, 2009.
- BES. 2011a. Outfall Basin 43 Source Investigation Report, City of Portland Outfall Project, ECSI No. 2425. June 2011.
- BES. 2011b. Outfall Basin 44 Source Investigation Report, City of Portland Outfall Project, ECSI No. 2425. December 2011.
- Bridgewater Group, Inc. 2011. Interim Stormwater Source Control Measures Completion Report, Albina Substation. Prepared for PacifiCorp Environmental Remediation Company. December 2011.
- Bridgewater Group, Inc. 2012. Email communication from Jeff Dresser (Bridgewater) to Dan Hafley (DEQ) re: PacifiCorp Albina Substation Update. October 2, 2012.
- DEQ. 2010. "Tool for Evaluating Stormwater Data" – Appendix E to Guidance for Evaluating the Stormwater Pathway at Upland Sites. January 2009 (updated October 2010).
- DEQ/EPA. 2005. Portland Harbor Joint Source Control Strategy, Final, dated December 2005 (updated July 2007).
- EPA. 2009. Portland Harbor Superfund Site; Administrative Order of Consent for Remedial Investigation and Feasibility Study; Docket No. CERCLA-10-2001-0240 – Areas of Potential Concern. Letter from Chip Humphrey and Eric Blischke (EPA) to Robert Wyatt (Northwest Natural and Lower Willamette Group). June 23, 2009.

## Tables

Table 1 – Basin 43 Stormwater Results

Table 2 – Basin 44 Stormwater Results

## Figures

Figure 1 – Outfall Basin 43 – Total PCB Aroclors

Figure 2 – Outfall Basin 44 – Total PCB Aroclors

Figure 3 – Outfall 43 Storm Event Precipitation Graphs

Figure 4 – Outfall 44 Storm Event Precipitation Graph

## Attachments

Attachment A – Photographs

Attachment B – Field Notes

Attachment C – Laboratory Results

## Tables

**Table 1**  
**Basin 43 Stormwater Results**

|                                            |                           | Manhole ANR758 - Within Manhole |                         |                                        |                         | JSCS Stormwater SLVs <sup>(1)</sup> |                                 |                          |                           |
|--------------------------------------------|---------------------------|---------------------------------|-------------------------|----------------------------------------|-------------------------|-------------------------------------|---------------------------------|--------------------------|---------------------------|
| Class                                      | Analyte                   | Units                           | Event 1                 | Event 1                                | Event 2                 | Event 3                             | Human Health                    | Human Health             | Ecological <sup>(4)</sup> |
|                                            |                           |                                 | W12D180-01<br>4/19/2012 | (Duplicate)<br>W12D180-02<br>4/19/2012 | W12E189-01<br>5/21/2012 | W12E190-01<br>5/22/2012             | Fish Consumption <sup>(2)</sup> | Ingestion <sup>(3)</sup> |                           |
| Total Suspended Solids (SM 2540D)          |                           |                                 |                         |                                        |                         |                                     |                                 |                          |                           |
|                                            | TSS                       | mg/L                            | 20                      | 20                                     | 8                       | 32                                  | --                              | --                       | --                        |
| Polychlorinated Biphenyl (PCBs) (EPA 8082) |                           |                                 |                         |                                        |                         |                                     |                                 |                          |                           |
|                                            | Aroclor 1016/1242         | µg/L                            | 0.0250 U                | 0.0250 U                               | 0.0250 U                | 0.0250 U                            | --                              | --                       | --                        |
|                                            | Aroclor 1221              | µg/L                            | 0.0500 U                | 0.0500 U                               | 0.0500 U                | 0.0500 U                            | --                              | 0.034                    | 0.28                      |
|                                            | Aroclor 1232              | µg/L                            | 0.0250 U                | 0.0250 U                               | 0.0250 U                | 0.0250 U                            | --                              | 0.034                    | 0.58                      |
|                                            | Aroclor 1248              | µg/L                            | 0.0250 U                | 0.0250 U                               | 0.0250 U                | 0.0250 U                            | --                              | 0.034                    | 0.081                     |
|                                            | Aroclor 1254              | µg/L                            | 0.0576                  | 0.0574                                 | 0.0599                  | 0.0635                              | --                              | 0.034                    | 0.033                     |
|                                            | Aroclor 1260              | µg/L                            | 0.0250 U                | 0.0250 U                               | 0.0250 U                | 0.0250 U                            | --                              | 0.034                    | 94                        |
|                                            | Aroclor 1262              | µg/L                            | 0.0250 U                | 0.0250 U                               | 0.0250 U                | 0.0250 U                            | --                              | --                       | --                        |
|                                            | Aroclor 1268              | µg/L                            | 0.0250 U                | 0.0250 U                               | 0.0250 U                | 0.0250 U                            | --                              | --                       | --                        |
|                                            | Total PCBs <sup>(5)</sup> | µg/L                            | 0.0576                  | 0.0574                                 | 0.0599                  | 0.0635                              | 0.000064                        | 0.034                    | 0.014                     |

**Notes:**

U = The analyte was not detected above the reported sample quantification limit.

-- = No JSCS screening level is available.

µg/L = micrograms per liter

mg/L = milligrams per liter

<sup>(1)</sup> JSCS SLVs = Portland Harbor Joint Source Control Strategy Screening Level Values (DEQ/EPA Final December 2005, Amended July 2007)

<sup>(2)</sup> The SLVs for chemicals in water taken up by fish for human consumption represent EPA's NRWQC values. If no NRWQC values are available, then DEQ's AWQC values are listed for the constituent.

<sup>(3)</sup> The SLVs for chemicals in water for human ingestion represent the most conservative value between EPA's MCLs and Region 9 PRGs.

<sup>(4)</sup> The SLVs for chemicals in water for ecological exposure represent EPA's NRWQC values. If no NRWQC values are available, then DEQ's AWQC values are listed for the constituent. If no AWQC values are available, then Oak Ridge National Laboratory Tier II SCV Technology Benchmark values are listed for the constituent.

<sup>(5)</sup> Total PCBs are calculated by assigning "0" to undetected constituents.

■ = Highlighted values have been selected by DEQ for initial upland source control screening evaluations.

**bold** = Concentration exceeds DEQ's SLV.

**Table 2**  
**Basin 44 Stormwater Results**

|                                             |                           | Manhole ABC352                         |                                                     |                                     |            |                                                                 |                                        | Catch Basin APL246                              |            | JSCS Stormwater SLVs <sup>(1)</sup>             |                                          |                           |
|---------------------------------------------|---------------------------|----------------------------------------|-----------------------------------------------------|-------------------------------------|------------|-----------------------------------------------------------------|----------------------------------------|-------------------------------------------------|------------|-------------------------------------------------|------------------------------------------|---------------------------|
|                                             |                           | Upstream in 10" line<br>from northwest | Upstream in northwest<br>10" line from CB<br>APD919 | Upstream in 12" line from northeast |            | Upstream in 8"<br>line from CBs<br>APL242, APL243<br>and APL244 | Upstream in 10"<br>line from southeast | Overland flow to CB from<br>substation property |            |                                                 |                                          |                           |
| Class                                       | Analyte                   | Units                                  | W12C139-01                                          | W12C139-02                          | W12C139-03 | (Duplicate)<br>W12C139-07                                       | W12C139-04                             | W12C139-05                                      | W12C139-06 | Human Health<br>Fish Consumption <sup>(2)</sup> | Human Health<br>Ingestion <sup>(3)</sup> | Ecological <sup>(4)</sup> |
|                                             |                           |                                        | 3/15/2012                                           | 3/15/2012                           | 3/15/2012  | 3/15/2012                                                       | 3/15/2012                              | 3/15/2012                                       | 3/15/2012  |                                                 |                                          |                           |
| Total Suspended Solids (SM 2540D)           |                           |                                        |                                                     |                                     |            |                                                                 |                                        |                                                 |            |                                                 |                                          |                           |
|                                             | TSS                       | mg/L                                   | 58                                                  | 50                                  | 20         | 22                                                              | 9                                      | 16                                              | 2 U        | --                                              | --                                       | --                        |
| Polychlorinated Biphenyls (PCBs) (EPA 8082) |                           |                                        |                                                     |                                     |            |                                                                 |                                        |                                                 |            |                                                 |                                          |                           |
|                                             | Aroclor 1016/1242         | µg/L                                   | 0.0250 U                                            | 0.0250 U                            | 0.0250 U   | 0.0250 U                                                        | 0.0250 U                               | 0.0250 U                                        | 0.0250 U   | --                                              | --                                       | --                        |
|                                             | Aroclor 1221              | µg/L                                   | 0.0500 U                                            | 0.0500 U                            | 0.0500 U   | 0.0500 U                                                        | 0.0500 U                               | 0.0500 U                                        | 0.0500 U   | --                                              | 0.034                                    | 0.28                      |
|                                             | Aroclor 1232              | µg/L                                   | 0.0250 U                                            | 0.0250 U                            | 0.0250 U   | 0.0250 U                                                        | 0.0250 U                               | 0.0250 U                                        | 0.0250 U   | --                                              | 0.034                                    | 0.58                      |
|                                             | Aroclor 1248              | µg/L                                   | 0.0250 U                                            | 0.0250 U                            | 0.0250 U   | 0.0250 U                                                        | 0.0250 U                               | 0.0811                                          | 0.0250 U   | --                                              | 0.034                                    | 0.081                     |
|                                             | Aroclor 1254              | µg/L                                   | 0.0250 U                                            | 0.0250 U                            | 0.0250 U   | 0.0250 U                                                        | 0.0250 U                               | 0.0250 U                                        | 0.0250 U   | --                                              | 0.034                                    | 0.033                     |
|                                             | Aroclor 1260              | µg/L                                   | 0.0250 U                                            | 0.0250 U                            | 0.0250 U   | 0.0250 U                                                        | 0.0250 U                               | 0.0250 U                                        | 0.0250 U   | --                                              | 0.034                                    | 94                        |
|                                             | Aroclor 1262              | µg/L                                   | 0.0250 U                                            | 0.0250 U                            | 0.0250 U   | 0.0250 U                                                        | 0.0250 U                               | 0.0250 U                                        | 0.0250 U   | --                                              | --                                       | --                        |
|                                             | Aroclor 1268              | µg/L                                   | 0.0250 U                                            | 0.0250 U                            | 0.0250 U   | 0.0250 U                                                        | 0.0250 U                               | 0.0250 U                                        | 0.0250 U   | --                                              | --                                       | --                        |
|                                             | Total PCBs <sup>(5)</sup> | µg/L                                   | ND                                                  | ND                                  | ND         | ND                                                              | ND                                     | 0.0811                                          | ND         | 0.000064                                        | 0.034                                    | 0.014                     |

**Notes:**

CB = catch basin

U = The analyte was not detected above the reported sample quantification limit.

-- = No JSCS screening is level available.

ND = PCBs were not detected.

µg/L = micrograms per liter

mg/L = milligrams per liter

<sup>(1)</sup> JSCS SLVs = Portland Harbor Joint Source Control Strategy Screening Level Values (DEQ/EPA Final December 2005, Amended July 2007)

<sup>(2)</sup> The SLVs for chemicals in water taken up by fish for human consumption represent EPA's NRWQC values. If no NRWQC values are available, then DEQ's AWQC values are listed for the constituent.

<sup>(3)</sup> The SLVs for chemicals in water for human ingestion represent the most conservative value between EPA's MCLs and Region 9 PRGs.

<sup>(4)</sup> The SLVs for chemicals in water for ecological exposure represent EPA's NRWQC values. If no NRWQC values are available, then DEQ's AWQC values are listed for the constituent. If no AWQC values are available, then Oak Ridge National Laboratory Tier II SCV Technology Benchmark values are listed for the constituent.

<sup>(5)</sup> Total PCBs are calculated by assigning "0" to undetected constituents.

■ = Highlighted values have been selected by DEQ for initial upland source control screening evaluations.

**bold** = Concentration exceeds DEQ's SLV.

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## Figures

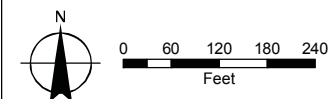


#### LEGEND

- Outfall Basin 43
- Sample Location
- Stormwater Sample
- City Outfall
- Non-City Outfall
- Storm Line
- Lines Cleaned in February 2012
- Manhole (MH)
- Catch Basin (CB)
- ★ DEQ ECSI Site
- Tax Lot
- River Mile Tenths

#### NOTES:

PCB results presented in micrograms per liter ( $\mu\text{g/L}$ ).  
A portion of the historical MS4 drainage area to Outfall 43 was diverted to the combined sewer system in 2011.



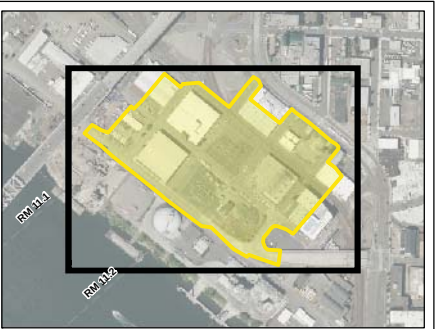
**FIGURE 1**  
**Outfall Basin 43**  
**Total PCB Aroclors**

**Disclaimer:**  
Information contained on this map is accurate according to available records, however the City of Portland makes no warranty, expressed or implied, as to the completeness or accuracy of the information published.

**Prepared By:**  
SSI, October 26, 2012  
005\_SORIOF\_Basin\_44\_44

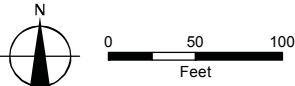
**Source:**  
City of Portland BES,  
Aerial Photo 2011





- LEGEND**
- Outfall Basin 44
  - Sample Locations
  - Stormwater Sample (03/15/12)
  - Storm Line
  - Manhole (MH)
  - Catch Basin (CB)
  - Stormceptor
  - DEQ ECSI Site
  - Tax Lot
  - River Mile Tenths

**NOTES:**  
PCB Aroclor concentrations in micrograms per liter (µg/L)  
ND = not detected  
US = Upstream



**FIGURE 2**  
Outfall Basin 44  
Total PCB Aroclors

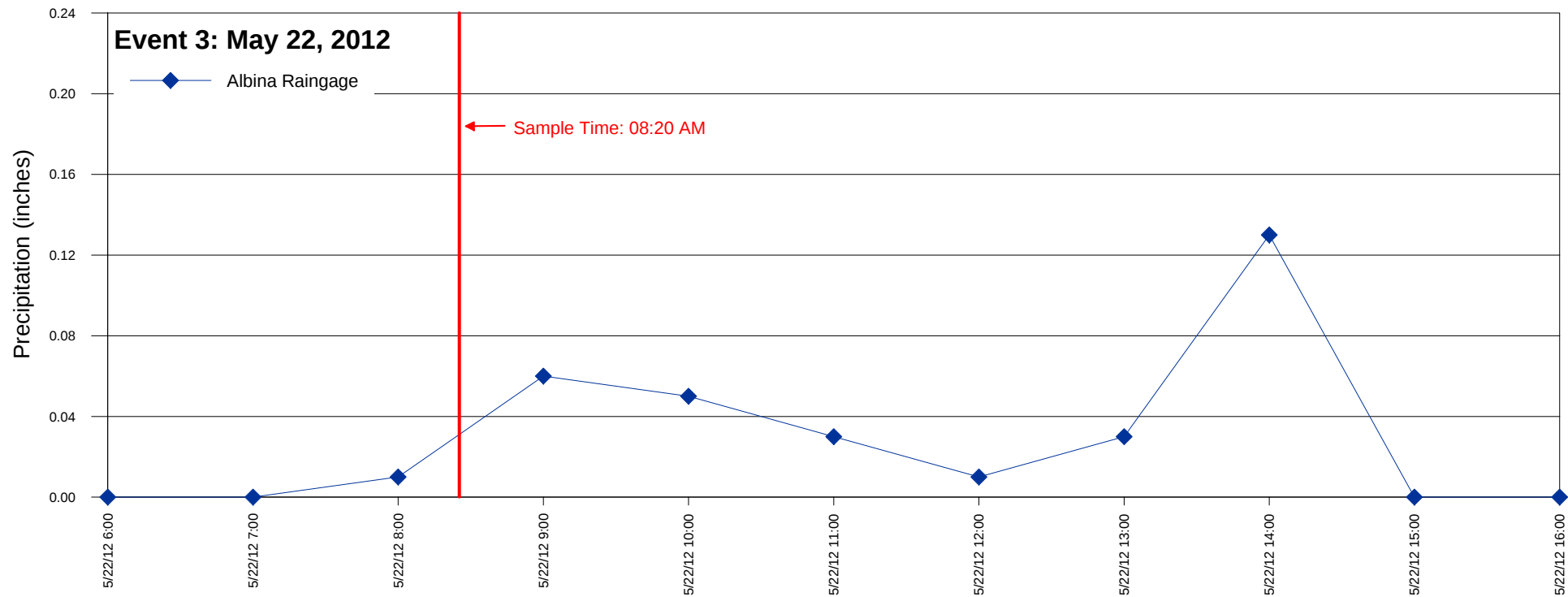
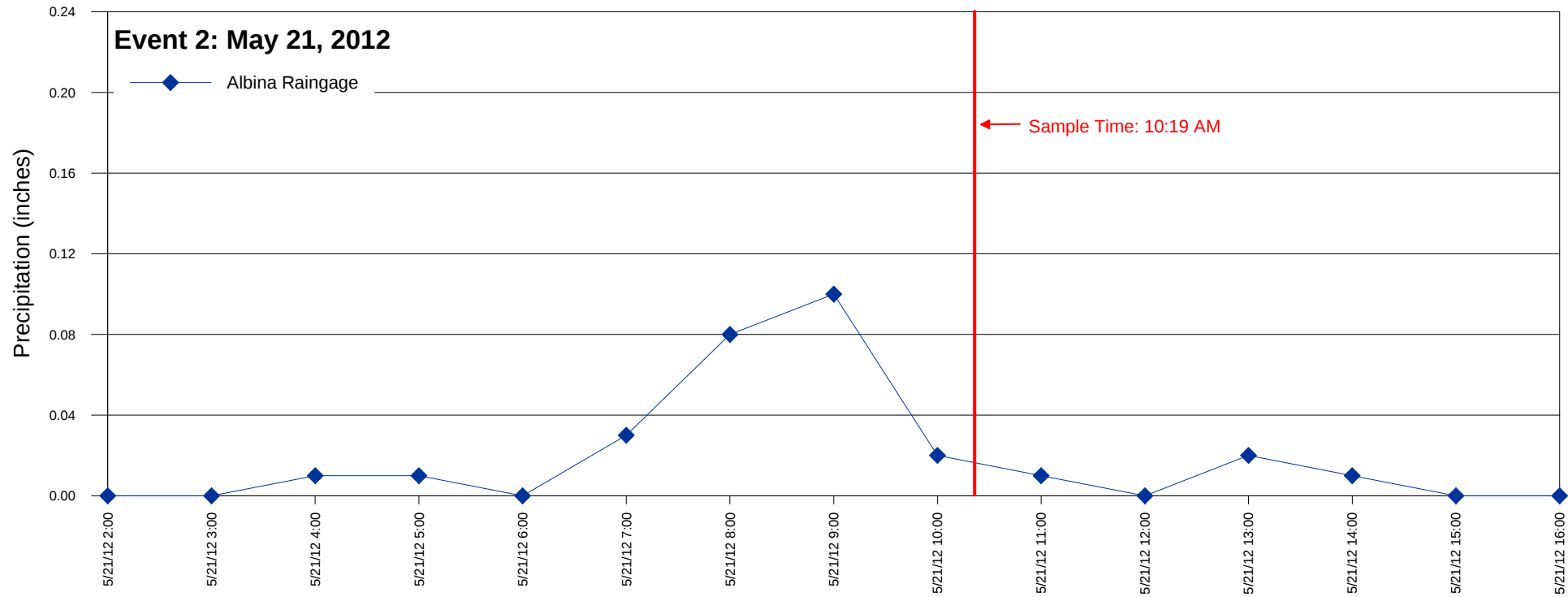
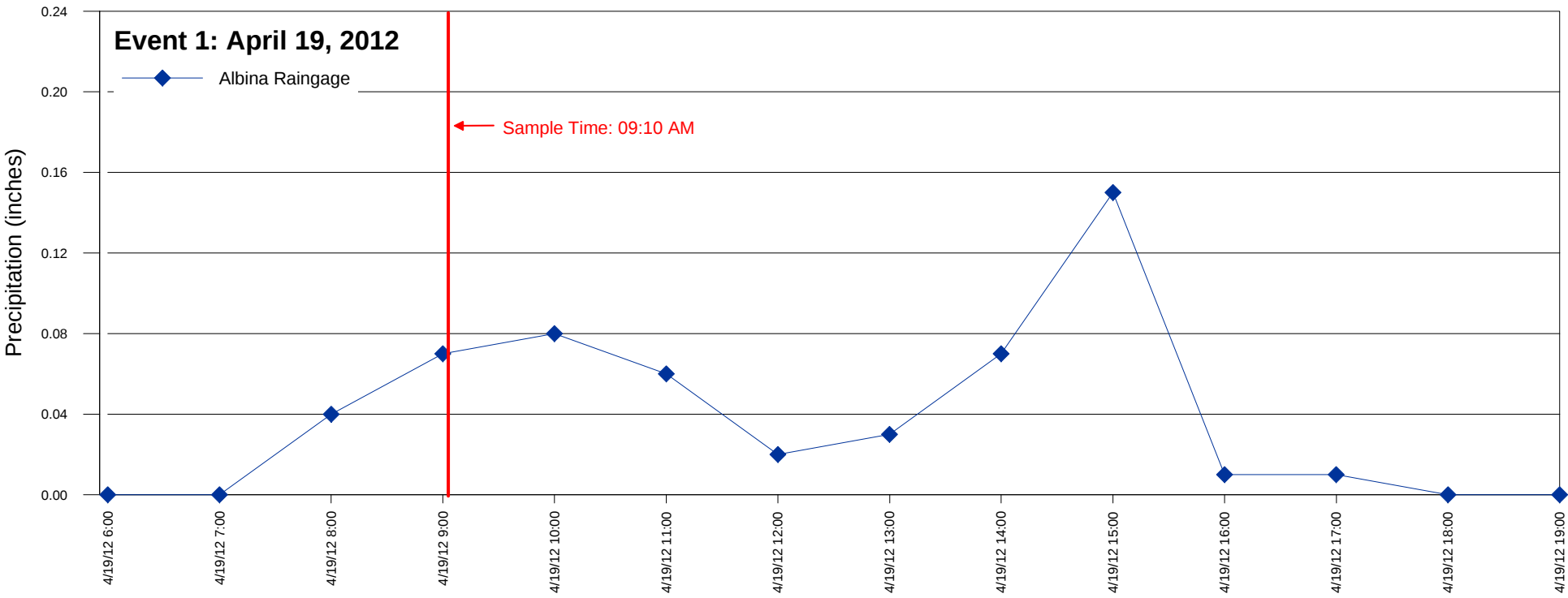
**Disclaimer:**  
Information contained on this map is accurate according to available records, however the City of Portland makes no warranty, expressed or implied, as to the completeness or accuracy of the information published.

**Prepared By:**  
GSI, October 26, 2012  
005\_SCIR/OF\_Basin\_43\_44

**Source:**  
City of Portland BES,  
Aerial Photo 2011

**ENVIRONMENTAL SERVICES**  
CITY OF PORTLAND  
1120 SW Fifth Avenue, Room 1000  
Portland Oregon, 97204-1912

**Figure 3**  
Basin 43  
Storm Event Precipitation Graphs



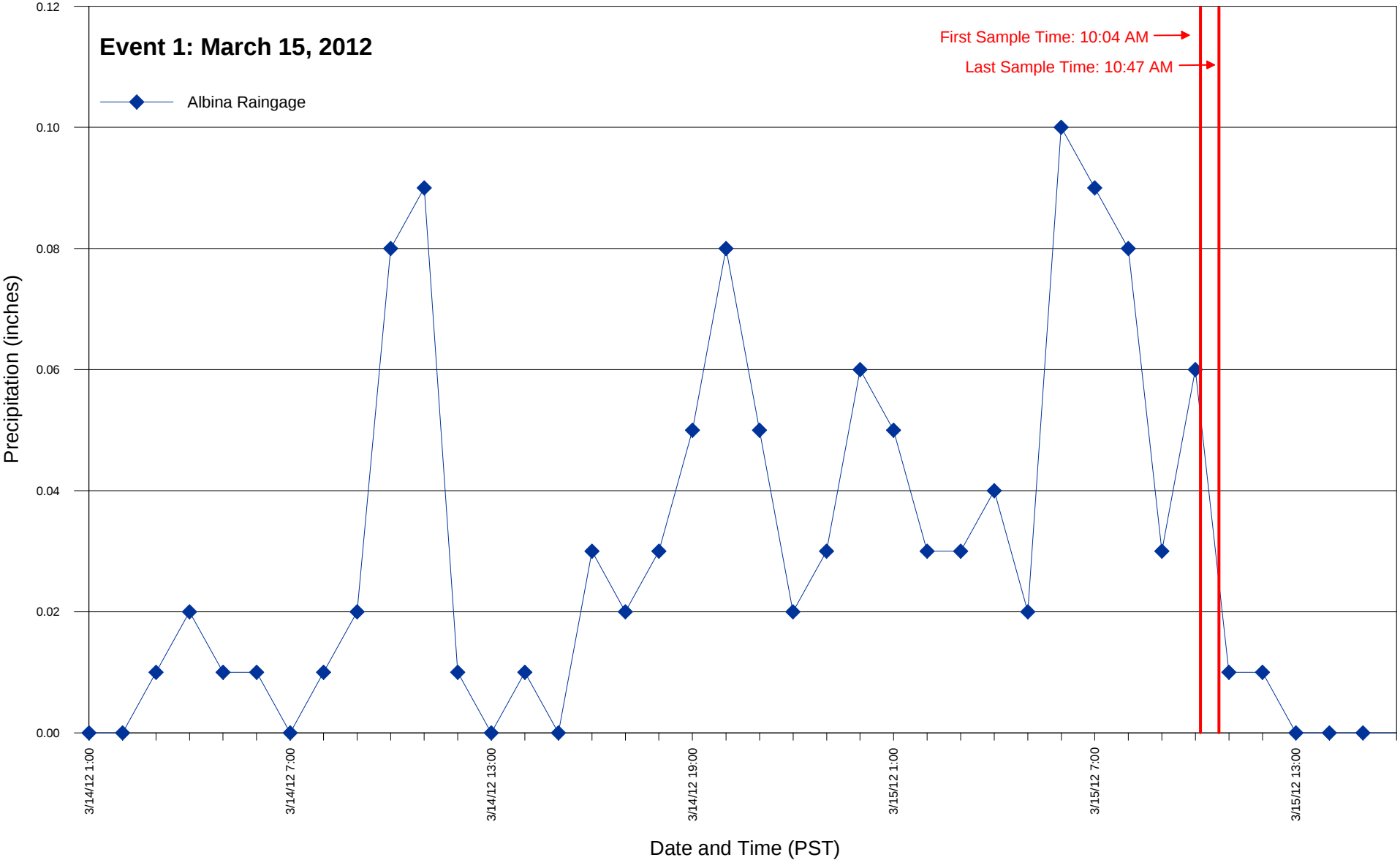
| Event Number       | Sample Date and Time (PST) | Sample Type | Antecedent Dry Period <sup>(1)</sup> | Minimum Forecasted Rainfall Total (inches) <sup>(2)</sup> |
|--------------------|----------------------------|-------------|--------------------------------------|-----------------------------------------------------------|
| Basin 43 – Event 1 | 4/19/2012 9:10             | Grab        | 31 hours                             | 0.28                                                      |
| Basin 43 – Event 2 | 5/21/2012 10:19            | Grab        | 15 days                              | 0.28                                                      |
| Basin 43 – Event 3 | 5/22/2012 8:20             | Grab        | 22 hours                             | 0.42                                                      |

PST = Pacific Standard Time  
Sample times were converted to PST from Pacific Daylight Time  
Rain gage data obtained from USGS, Oregon Water Science Center (<http://or.water.usgs.gov/non-usgs/bes/>)  
(1) Cumulative rainfall during this time less than 0.10 inches.  
(2) Minimum forecasted rainfall data provided by Extended Range Forecasting, Inc.

**Figure 4**

Outfall 44

Storm Event Precipitation Graph



| Event Number       | Sample Date and Time (PST) | Sample Type | Minimum Forecasted Rainfall Total (inches) <sup>(1)</sup> |
|--------------------|----------------------------|-------------|-----------------------------------------------------------|
| Basin 44 – Event 1 | 3/15/2012 10:04-10:47      | Grab        | 0.89                                                      |

PST = Pacific Standard Time  
Rain gage data obtained from USGS, Oregon Water Science Center (<http://or.water.usgs.gov/non-usgs/bes/>)  
(1) Minimum forecasted rainfall data provided by Extended Range Forecasting, Inc.

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# **Attachment A**

## **Field Photographs**

## Basin 43 Stormwater Sampling



**Photo 1 (April 19, 2012).** Manhole ANR758 in N. River Street. View is to the northwest.

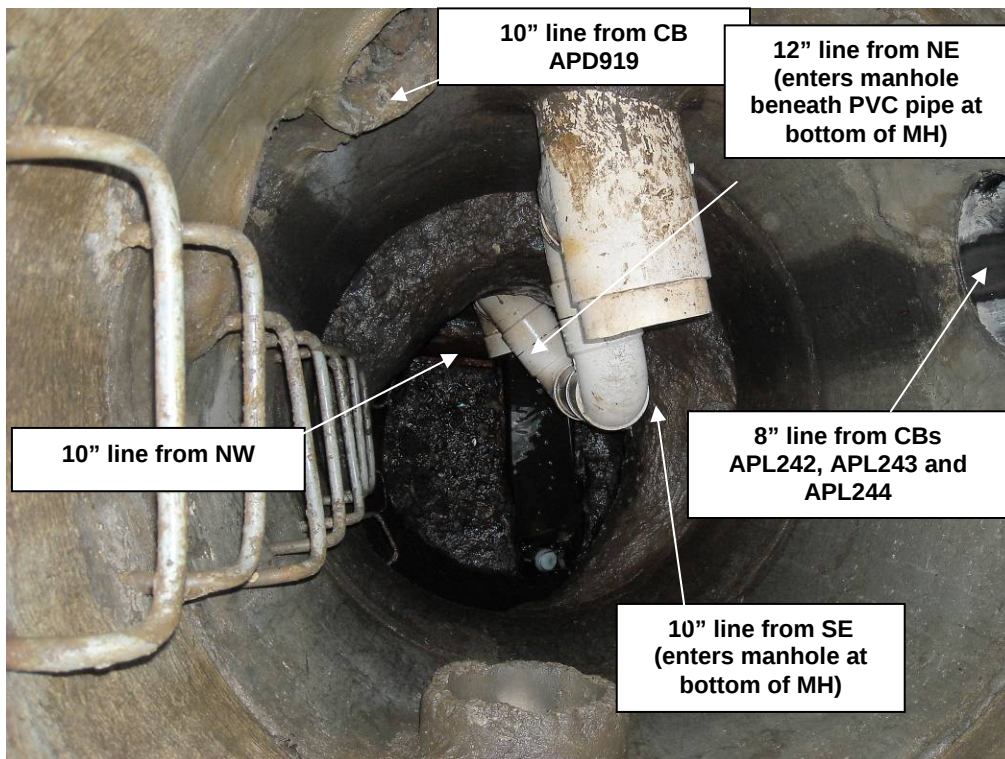


**Photo 2 (April 19, 2012).** Stormwater flow entering Manhole ANR758 from the northwest.

## Basin 44 Stormwater Sampling



**Photo 3 (March 15, 2012).** Manhole ABC352 during stormwater sampling event. Catch basin APD919 is visible in foreground. View is to the southeast.



**Photo 4 (undated).** Sampling locations inside Manhole ABC352.



**Photo 5 (March 15, 2012).** Collecting stormwater sample from 8" line from catch basins APL242, APL243 and APL244.



**Photo 6 (March 15, 2012).** Flow in 10-inch lateral entering Manhole ABC352 from the southeast.



**Photo 7 (March 15, 2012).** Collecting samples from incoming lines to manhole ABC352.



**Photo 8 (March 15, 2012).** Catch basin APL246 during Basin 44 sampling event. View is to the south-southwest.



**Photo 9 (March 15, 2012).** Collecting sample of runoff into catch basin APL246.

## **Attachment B**

### **Field Notes**

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## ***Basin 43 Event 1: April 19, 2012***

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Page \_\_\_\_\_ of \_\_\_\_\_

Project Portland Harbor  
Location OF 43 - ANR 758  
Subject Stormwater Gab Event #1

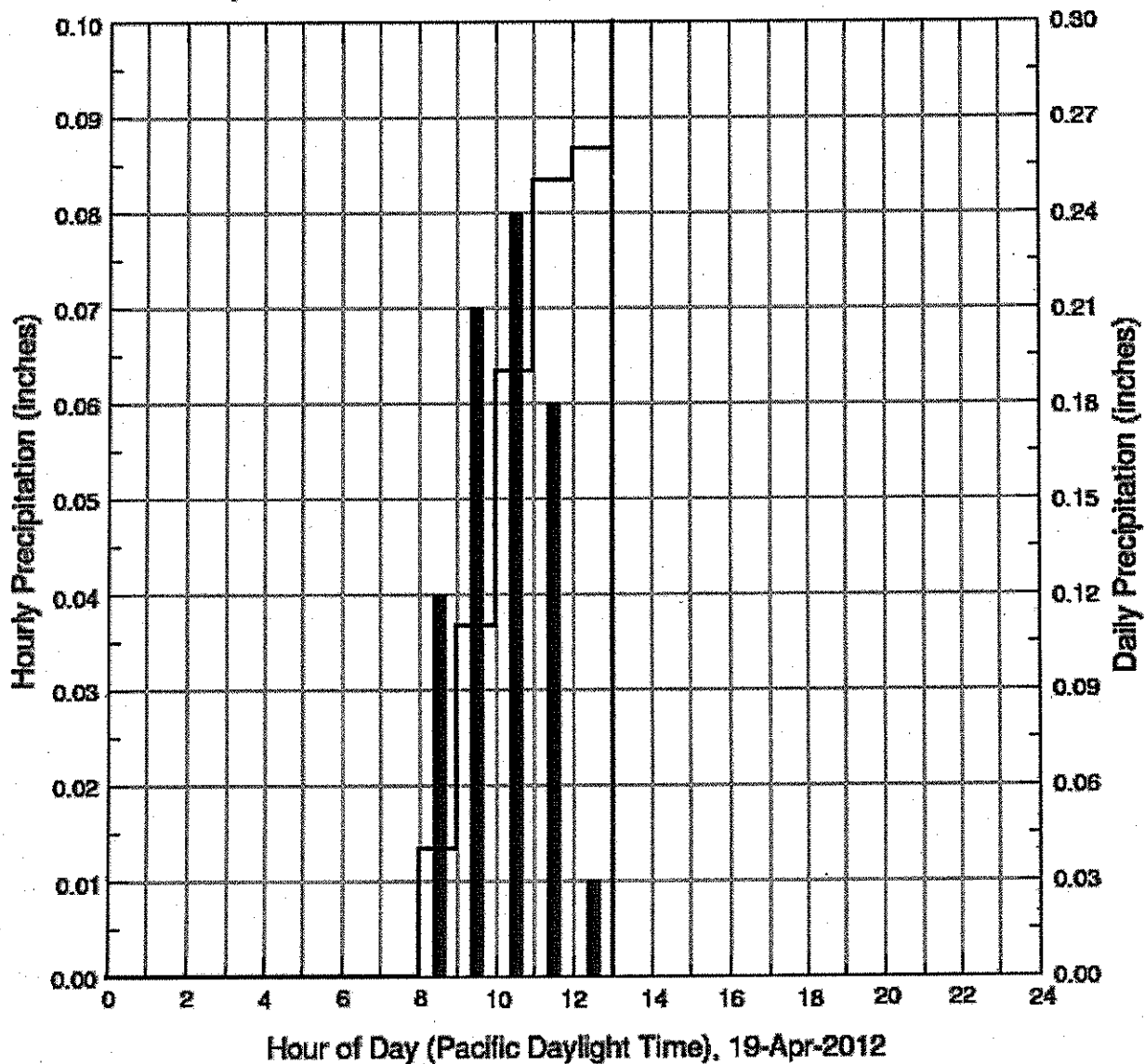
Project No. \_\_\_\_\_  
Date 4/19/12  
By PHA

- 1003 - Arrived at site, steady light rain, approx. 0.1" of rain has registered on Albion RG since 7:00am.
- 1010 - Collected sample steady flow in line, still a light rain falling.  
- Collected duplicate.
- 1043 - Submitted samples to lab.

Attachments

## Albina Rain Gage - 2920 N. Larrabee Av.

City of Portland HYDRA Precipitation Network - Provisional Data



This graph is a PNG image [\[help\]](#).

[U.S. Department of the Interior](#) | [U.S. Geological Survey](#)

URL: <http://or.water.usgs.gov/non-usgs/bes/albina.1day.html>

Page Contact Information: [Stewart Rounds](#)

Page Last Modified: Thursday - Mar 1, 2012 at 22:05:06 EST

***Basin 43 Event 2: May 21, 2012***

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Page 1 of 1

Project Portland Harbor - Basin 43 Stormwater

Project No.                     

Location Basin 43 - 43-SW7

Date 5/21/12

Subject Event 2 stormwater grab

By MJS, MOD

(ANR 758)

1115: on-site at 43-SW7 to continued steady light rain. Had rained 0.13" as of 0900 with a several burst of more intense rain in the past 2 hours.

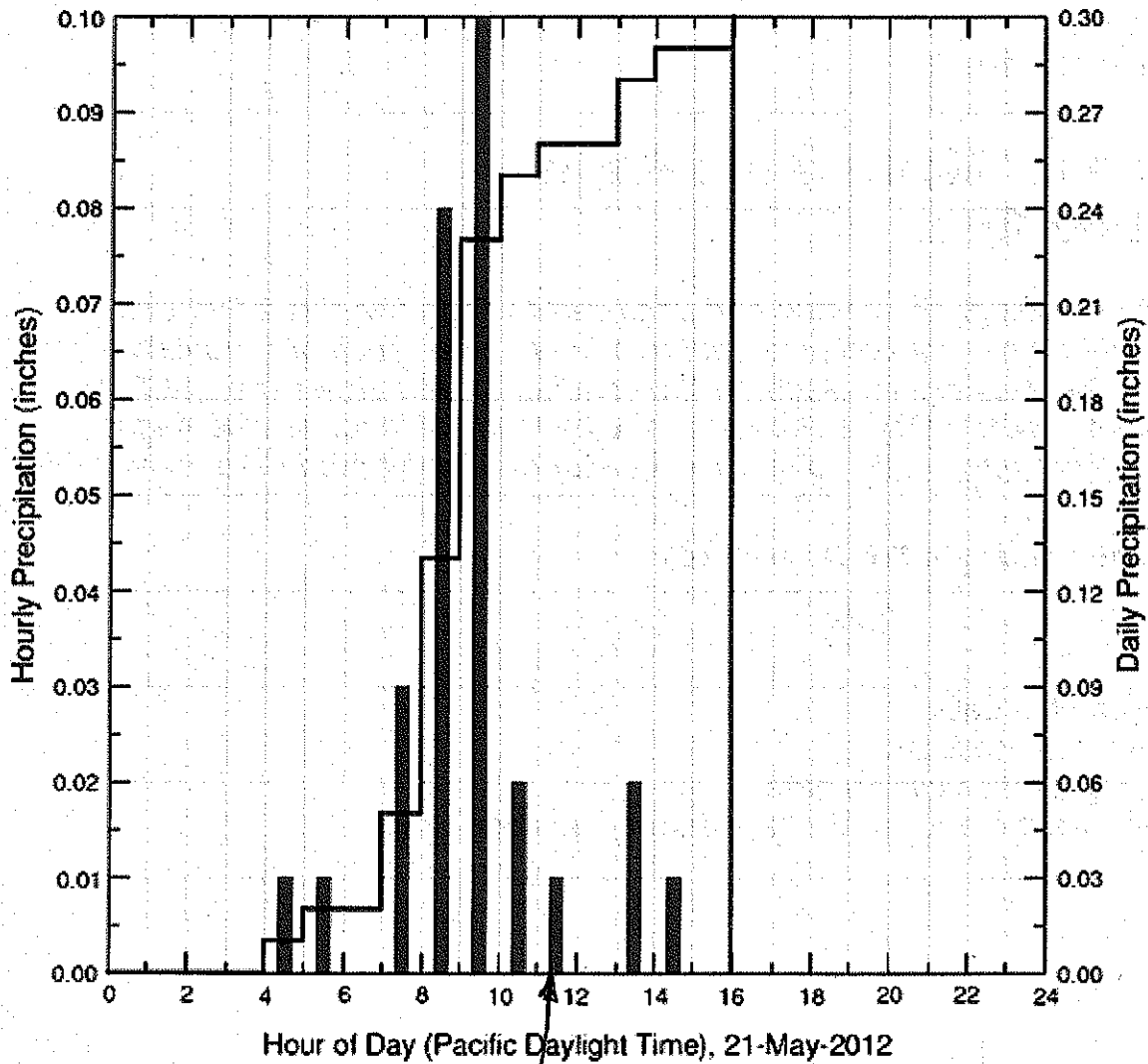
Abundant flow currently in the manhole.

collected sample at 1119. Sample was moderately turbid. Took photos of flow in manhole, runoff conditions in the vicinity, and a photo of sample bottle to indicate color and turbidity of sample.

Attachments

# Albina Rain Gage - 2920 N. Larrabee Ave.

City of Portland HYDRA Precipitation Network - Provisional Data



This graph is a PNG image [\[help\]](#).

[U.S. Department of the Interior](#) | [U.S. Geological Survey](#)

URL: <http://or.water.usgs.gov/non-usgs/bes/albina.1day.html>

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***Basin 43 Event 3: May 22, 2012***

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Page 1 of 1

Project Portland Harbor - Basin 43 Stormwater

Project No. \_\_\_\_\_

Location Basin 43 - 43 SW 7

Date 5/22/12

Subject Event #3

By MJS

0830 light rain beginning at lab.

0850 rain intensifying, will go out to site.

0916 - on-site to steady moderate rain. There is currently run off throughout the area and abundant flow in the manhole -

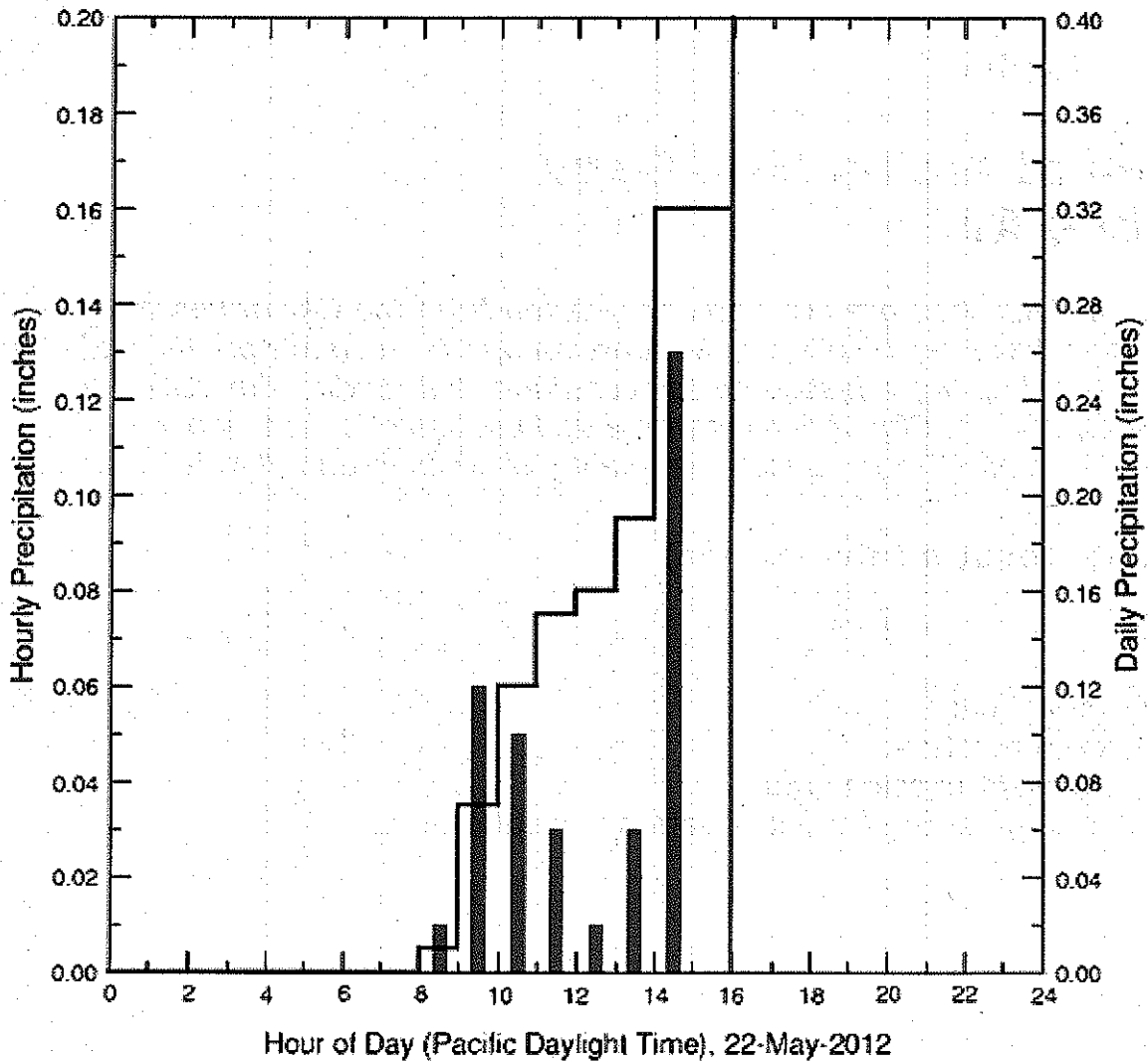
0920 - Collected sample. Sample is moderately turbid with some visible suspended material.

Took photos of flow in manhole, run off in area around manhole and sample to gauge turbidity.

Attachments

Albina Rain Gage - 2920 N. Larrabee Ave.

City of Portland HYDRA Precipitation Network - Provisional Data



This graph is a PNG image [\[help\]](#).

[U.S. Department of the Interior](#) | [U.S. Geological Survey](#)

URL: <http://or.water.usgs.gov/non-usgs/bes/albina.1day.html>

Page Contact Information: [Stewart Rounds](#)

Page Last Modified: Thursday - Mar 1, 2012 at 22:05:06 EST

***Basin 44 Event: March 15, 2012***

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Page 1 of 2

Project Portland Harbor - Basin 44  
Location Basin 44  
Subject Basin 44 stormwater sampling

Project No.         
Date 3/15/12  
By MJS, ECH, JSM

1059 - on-site at 44-SW19 to continuous heavy rain fall. There is some visible ~~runoff~~ from runoff draining off of the substation property. Removed catch basin grate and used a decontaminated stainless steel funnel to direct flow into a decontaminated stainless steel beaker. Filled sample bottles with the beaker. Sample had very low turbidity.

1112 - on site at ABE352 (44-SW15 through 44-SW19). Runoff actively ~~runoff~~ flowing from outlets in MH.

1120 - Entrain <sup>(new)</sup> filled decontaminated stainless steel beaker from 44-SW15. Filled sample bottles from beaker. Sample ~~ECH~~ has low to moderate turbidity.

1123 - Entrain filled new decontaminated stainless steel beaker from 44-SW17. Filled sample bottles from beaker. Sample has low to moderate turbidity.

1127 Installed pig into PVC pipe in order to block flow down interlocking with sample collection from 44-SW14, 44-SW16 and 44-SW18. Also installed pigs in ~~at~~ <sup>at</sup> 44-SW15 and 44-SW17.

Attachments



Page 2 of 2

Project Portland Harbor - Basin 44

Project No.           

Location Basin 44

Date 3/15/12

Subject Basin 44 Stormwater sampling

By MJS, ECH, JTM

1133 Rainfall has ceased. Area still has moderate amounts of runoff. Flow still coming from outlets in pipe.

1140 Post pieging entrant note inflow and infiltration in MH.

1142 Entrant filled new decontaminated stainless steel beaker from 44-SW14. Filled sample bottles from beaker. Sample is moderately turbid.

1143 Entrant filled new decontaminated stainless steel beaker from 44-SW15. Filled sample bottles from beaker. Sample is moderately turbid. Duplicate samples collected at 44-SW15.

1147 Entrant filled new decontaminated stainless steel beaker from 44-SW18. Filled sample bottles from beaker. Sample is low to moderately turbid.

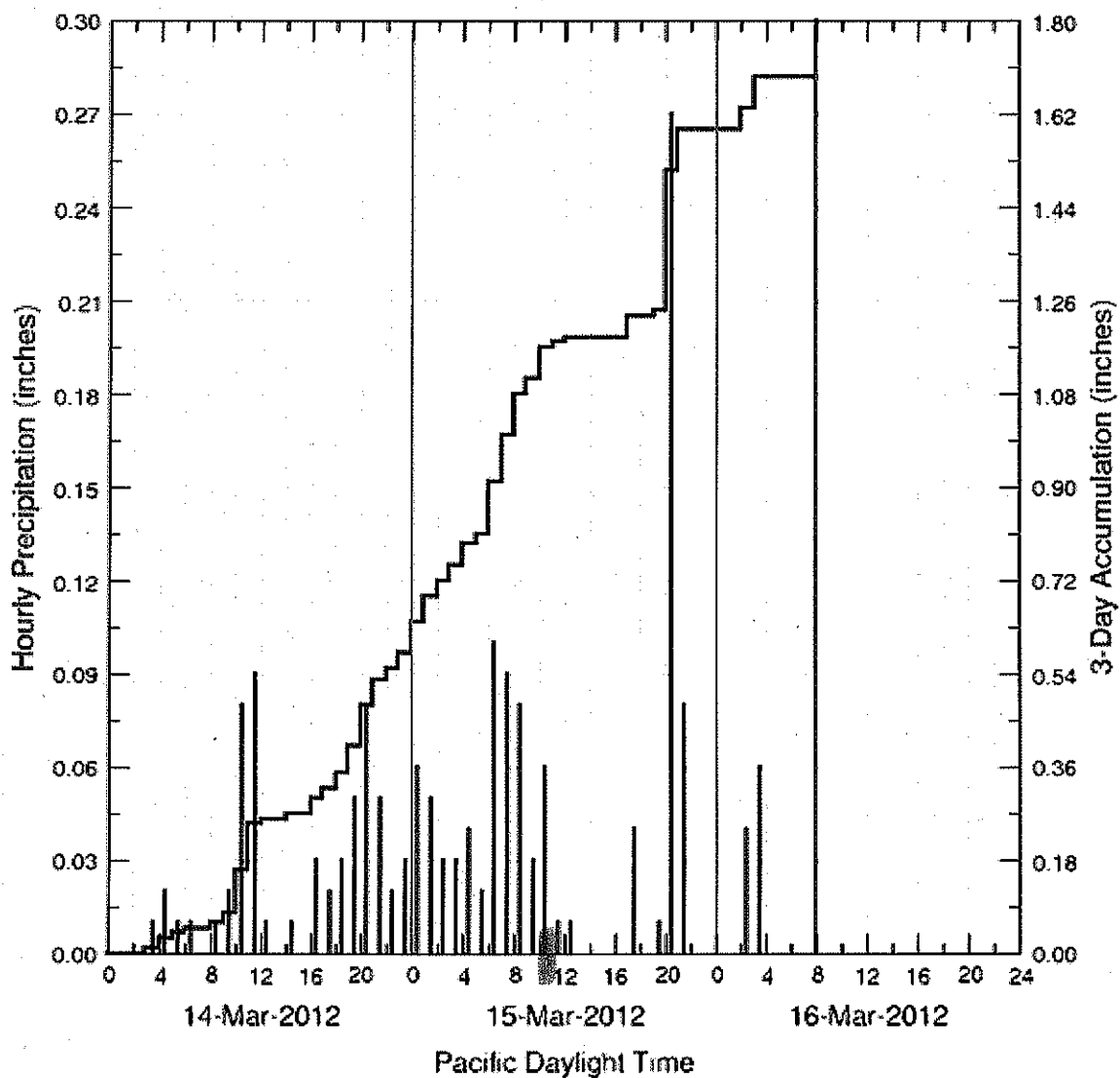
1154 Removed piez

1208 Departed to WPCU to relinquish samples.

Attachments

Albina Rain Gage - 2920 N. Larrabee Ave.

City of Portland HYDRA Precipitation Network - Provisional Data



This graph is a PNG image [\[help\]](#).

[U.S. Department of the Interior](#) | [U.S. Geological Survey](#)

URL: <http://or.water.usgs.gov/non-usgs/bes/albina.3day.html>

Page Contact Information: [Stewart Rounds](#)

Page Last Modified: Thursday - Mar 1, 2012 at 22:05:06 EST

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**Attachment C**  
**Laboratory Results and QA/QC Review**  
**(on CD only)**

## ***Basin 43 Event 1: April 19, 2012***



55 SW Yamhill Street, Suite 400 Portland, OR 97204  
P: 503.239.8799 F: 503.239.8940  
info@gsiwatersolutions.com www.gsiwatersolutions.com

## **Laboratory Data QA/QC Review Upland Source Control Investigation City Outfall Basin 43**

**To:** File  
**From:** Andrew Davidson, GSI Water Solutions, Inc.  
**Date:** July 12, 2012

This memorandum presents a quality assurance/quality control (QA/QC) review of the laboratory data generated from a source control investigation sampling event conducted by the City of Portland (City) in Outfall Basin 43 on April 19, 2012. One field sample (W12D180-01) and one field duplicate sample (W12D180-02) were collected and submitted for analyses.

The laboratory analyses for these source control program samples were completed by the City's Bureau of Environmental Services (BES) Water Pollution Control Laboratory (WPCL) as listed.

- BES WPCL
  - o Total Suspended Solids (TSS) – SM 2540D
  - o Polychlorinated Biphenyls (PCB) Aroclors – EPA 8082

The WPCL laboratory report for all analyses associated with this sampling event is attached.

The following QA/QC review of the analytical data is based on the available documentation provided by WPCL. The QA/QC review consisted of reviewing the following elements from the laboratory report, if applicable and/or available:

- Chain-of-custody – for completeness and continuous custody
- Analysis conducted within holding times
- Chemicals of interest detected in method blanks
- Internal standard recoveries within accuracy control limits
- Surrogate recoveries within laboratory control limits

- Matrix spike and matrix spike duplicate (MS/MSD) sample results within laboratory control limits
- Laboratory control and duplicate laboratory control (LC/DLC) sample recoveries within laboratory control limits
- Relative percent differences (RPDs) for laboratory duplicate samples within laboratory control limits.

The results of the QA/QC review of the laboratory reports are presented below.

## **Chain-of-Custody**

The chain-of-custody forms showed continuous custody of the samples. The chain-of-custody procedures appear to have been adequate indicating that sample integrity was maintained throughout the sample collection and delivery process.

## **Analysis Holding Times**

Samples were extracted and analyzed within the recommended holding times for all analyses.

## **Method Blanks**

A method blank was processed during the laboratory analyses of total suspended solids and PCB Aroclors. No analytes were detected in either method blank.

## **Surrogate Recoveries**

Surrogates were analyzed during the PCB Aroclor analysis. All surrogate recoveries were within laboratory acceptance limits.

## **Laboratory Control/Duplicate Laboratory Control Samples**

An LC sample was processed during the TSS analysis. The LC recovery was within laboratory control limits. LC/DLC samples were processed during the laboratory analysis of PCB Aroclors. LC/DLC sample recoveries and RPDs were within laboratory acceptance limits.

## **Laboratory Duplicate**

WPCL processed four laboratory duplicate samples during the TSS analysis. All RPDs were within laboratory acceptance limits.



City of Portland  
**Water Pollution Control Laboratory**

6543 N. Burlington Ave. / Portland OR 97203 (503) 823-5600 fax (503) 823-5656



May 01, 2012

Linda Scheffler  
Director's Office

---

Work Order  
**W12D180**

Project  
**Portland Harbor**

Received  
04/19/12 10:43

---

Enclosed are the results of analysis for the above work order. If you have questions concerning this report, please contact your project coordinator Peter Abrams at 503-823-5533.

Renee Chauvin  
Laboratory Coordinator QA/QC



**City of Portland**  
**Water Pollution Control Laboratory**  
6543 N. Burlington Ave. / Portland OR 97203 (503) 823-5600 fax (503) 823-5656



**LABORATORY ANALYSIS REPORT**

|                                                                                                                            |                                                                               |
|----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| Project: <b>Portland Harbor</b><br>Work Order: <b>W12D180</b><br>Received: 4/19/12 10:43<br>Submitted By: Field Operations | Client: Director's Office<br>Project Mgr: Linda Scheffler<br>WQDB #: Janus329 |
|----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|

| Sample          | Laboratory ID | Matrix     | Type | Sample Collection Date |                | Qualifier |
|-----------------|---------------|------------|------|------------------------|----------------|-----------|
|                 |               |            |      | Start                  | End            |           |
| 43_SW7          | W12D180-01    | Stormwater | Grab | 04/19/12 10:10         | 04/19/12 10:10 |           |
| Field Duplicate | W12D180-02    | Stormwater | Grab | 04/19/12 00:00         | 04/19/12 00:00 |           |

| Analyte | Result | Units | MDL | MRL | Dilution | Batch | Prepared | Analyzed | Method | Qualifier |
|---------|--------|-------|-----|-----|----------|-------|----------|----------|--------|-----------|
|---------|--------|-------|-----|-----|----------|-------|----------|----------|--------|-----------|

**General Chemistry**

**Total Suspended Solids**

43\_SW7 : W12D180-01

|                        |    |      |   |   |         |          |          |          |
|------------------------|----|------|---|---|---------|----------|----------|----------|
| Total suspended solids | 20 | mg/L | 2 | 2 | B12D334 | 04/20/12 | 04/20/12 | SM 2540D |
|------------------------|----|------|---|---|---------|----------|----------|----------|

Field Duplicate : W12D180-02

|                        |    |      |   |   |         |          |          |          |
|------------------------|----|------|---|---|---------|----------|----------|----------|
| Total suspended solids | 20 | mg/L | 2 | 2 | B12D334 | 04/20/12 | 04/20/12 | SM 2540D |
|------------------------|----|------|---|---|---------|----------|----------|----------|

**Polychlorinated Biphenyls (PCBs)**

**PCB Aroclors by GC-ECD**

43\_SW7 : W12D180-01

|                   |        |      |        |        |   |         |          |          |          |
|-------------------|--------|------|--------|--------|---|---------|----------|----------|----------|
| Aroclor 1016/1242 | ND     | ug/L | 0.0250 | 0.0250 | 1 | B12D405 | 04/25/12 | 04/26/12 | EPA 8082 |
| Aroclor 1221      | ND     | ug/L | 0.0500 | 0.0500 | 1 | B12D405 | 04/25/12 | 04/26/12 | EPA 8082 |
| Aroclor 1232      | ND     | ug/L | 0.0250 | 0.0250 | 1 | B12D405 | 04/25/12 | 04/26/12 | EPA 8082 |
| Aroclor 1248      | ND     | ug/L | 0.0250 | 0.0250 | 1 | B12D405 | 04/25/12 | 04/26/12 | EPA 8082 |
| Aroclor 1254      | 0.0576 | ug/L | 0.0250 | 0.0250 | 1 | B12D405 | 04/25/12 | 04/26/12 | EPA 8082 |
| Aroclor 1260      | ND     | ug/L | 0.0250 | 0.0250 | 1 | B12D405 | 04/25/12 | 04/26/12 | EPA 8082 |
| Aroclor 1262      | ND     | ug/L | 0.0250 | 0.0250 | 1 | B12D405 | 04/25/12 | 04/26/12 | EPA 8082 |
| Aroclor 1268      | ND     | ug/L | 0.0250 | 0.0250 | 1 | B12D405 | 04/25/12 | 04/26/12 | EPA 8082 |

| Surrogate            | Result | Expected | %Rec | Limits(%) |         |          |          |          |  |
|----------------------|--------|----------|------|-----------|---------|----------|----------|----------|--|
| Tetrachloro-m-xylene | 0.0281 | 0.0510   | 55%  | 34.4-103  | B12D405 | 04/25/12 | 04/26/12 | EPA 8082 |  |
| Decachlorobiphenyl   | 0.0473 | 0.0510   | 93%  | 25.1-138  | B12D405 | 04/25/12 | 04/26/12 | EPA 8082 |  |

Field Duplicate : W12D180-02

|                   |        |      |        |        |   |         |          |          |          |
|-------------------|--------|------|--------|--------|---|---------|----------|----------|----------|
| Aroclor 1016/1242 | ND     | ug/L | 0.0250 | 0.0250 | 1 | B12D405 | 04/25/12 | 04/26/12 | EPA 8082 |
| Aroclor 1221      | ND     | ug/L | 0.0500 | 0.0500 | 1 | B12D405 | 04/25/12 | 04/26/12 | EPA 8082 |
| Aroclor 1232      | ND     | ug/L | 0.0250 | 0.0250 | 1 | B12D405 | 04/25/12 | 04/26/12 | EPA 8082 |
| Aroclor 1248      | ND     | ug/L | 0.0250 | 0.0250 | 1 | B12D405 | 04/25/12 | 04/26/12 | EPA 8082 |
| Aroclor 1254      | 0.0574 | ug/L | 0.0250 | 0.0250 | 1 | B12D405 | 04/25/12 | 04/26/12 | EPA 8082 |
| Aroclor 1260      | ND     | ug/L | 0.0250 | 0.0250 | 1 | B12D405 | 04/25/12 | 04/26/12 | EPA 8082 |
| Aroclor 1262      | ND     | ug/L | 0.0250 | 0.0250 | 1 | B12D405 | 04/25/12 | 04/26/12 | EPA 8082 |

Reported: 05/01/12 15:18

*The results in this report apply only to the samples analyzed. Qualifiers and case narrative comments are essential to interpretation of the analytical results. Report reproductions and/or data summaries without qualifiers and comments are incomplete.*

Renee Chauvin, Laboratory Coordinator QA/QC



City of Portland  
Water Pollution Control Laboratory

6543 N. Burlington Ave. / Portland OR 97203 (503) 823-5600 fax (503) 823-5656



Project: **Portland Harbor**  
Work Order: **W12D180**

Client: Director's Office  
Project Mgr: Linda Scheffler

| Analyte | Result | Units | MDL | MRL | Dilution | Batch | Prepared | Analyzed | Method | Qualifier |
|---------|--------|-------|-----|-----|----------|-------|----------|----------|--------|-----------|
|---------|--------|-------|-----|-----|----------|-------|----------|----------|--------|-----------|

**Polychlorinated Biphenyls (PCBs)**

PCB Aroclors by GC-ECD

Field Duplicate : W12D180-02

|                      |               |      |                 |             |                  |         |          |          |          |
|----------------------|---------------|------|-----------------|-------------|------------------|---------|----------|----------|----------|
| Aroclor 1268         | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12D405 | 04/25/12 | 04/26/12 | EPA 8082 |
| <b>Surrogate</b>     | <b>Result</b> |      | <b>Expected</b> | <b>%Rec</b> | <b>Limits(%)</b> |         |          |          |          |
| Tetrachloro-m-xylene | 0.0324        |      | 0.0521          | 62%         | 34.4-103         | B12D405 | 04/25/12 | 04/26/12 | EPA 8082 |
| Decachlorobiphenyl   | 0.0472        |      | 0.0521          | 91%         | 25.1-138         | B12D405 | 04/25/12 | 04/26/12 | EPA 8082 |

Reported: 05/01/12 15:18

The results in this report apply only to the samples analyzed. Qualifiers and case narrative comments are essential to interpretation of the analytical results. Report reproductions and/or data summaries without qualifiers and comments are incomplete.

Renee Chauvin, Laboratory Coordinator QA/QC



City of Portland  
Water Pollution Control Laboratory

6543 N. Burlington Ave. / Portland OR 97203 (503) 823-5600 fax (503) 823-5656



Project: **Portland Harbor**  
Work Order: **W12D180**

Client: Director's Office  
Project Mgr: Linda Scheffler

**Quality Control Report**

**General Chemistry - QC**

| Analyte                                            | Result | Units | MDL | MRL | Spike Level | Source Result | %Rec (Limits) | RPD (Limit) | Prepared: Analyzed | Qualifier |
|----------------------------------------------------|--------|-------|-----|-----|-------------|---------------|---------------|-------------|--------------------|-----------|
| <b>Total Suspended Solids - Batch B12D334</b>      |        |       |     |     |             |               |               |             |                    |           |
| <b>Blank (B12D334-BLK1)</b>                        |        |       |     |     |             |               |               |             |                    |           |
| Total suspended solids                             | ND     | mg/L  | 2   | 2   |             |               |               |             | 04/20/12 :04/20/12 |           |
| <b>LCS (B12D334-BS1)</b>                           |        |       |     |     |             |               |               |             |                    |           |
| Total suspended solids                             | 103    | mg/L  |     |     | 100         |               | 103 (90-110)  |             | 04/20/12 :04/20/12 |           |
| <b>Duplicate (B12D334-DUP1) Source: W12D180-01</b> |        |       |     |     |             |               |               |             |                    |           |
| Total suspended solids                             | 20     | mg/L  | 2   | 2   |             | 20            | 5 (20)        |             | 04/20/12 :04/20/12 |           |
| <b>Duplicate (B12D334-DUP2) Source: W12D182-01</b> |        |       |     |     |             |               |               |             |                    |           |
| Total suspended solids                             | ND     | mg/L  | 2   | 2   |             | ND            | (20)          |             | 04/20/12 :04/20/12 |           |
| <b>Duplicate (B12D334-DUP3) Source: W12D183-01</b> |        |       |     |     |             |               |               |             |                    |           |
| Total suspended solids                             | 523    | mg/L  | 2   | 2   |             | 517           | 1 (20)        |             | 04/20/12 :04/20/12 |           |
| <b>Duplicate (B12D334-DUP4) Source: W12D189-03</b> |        |       |     |     |             |               |               |             |                    |           |
| Total suspended solids                             | 3      | mg/L  | 2   | 2   |             | 3             | 0 (20)        |             | 04/20/12 :04/20/12 |           |

**Polychlorinated Biphenyls (PCBs) - QC**

| Analyte                                       | Result | Units | MDL    | MRL    | Spike Level | Source Result | %Rec (Limits)  | RPD (Limit) | Prepared: Analyzed | Qualifier |
|-----------------------------------------------|--------|-------|--------|--------|-------------|---------------|----------------|-------------|--------------------|-----------|
| <b>PCB Aroclors by GC-ECD - Batch B12D405</b> |        |       |        |        |             |               |                |             |                    |           |
| <b>Blank (B12D405-BLK1)</b>                   |        |       |        |        |             |               |                |             |                    |           |
| Aroclor 1016/1242                             | ND     | ug/L  | 0.0250 | 0.0250 |             |               |                |             | 04/25/12 :04/26/12 |           |
| Aroclor 1221                                  | ND     | ug/L  | 0.0500 | 0.0500 |             |               |                |             | 04/25/12 :04/26/12 |           |
| Aroclor 1232                                  | ND     | ug/L  | 0.0250 | 0.0250 |             |               |                |             | 04/25/12 :04/26/12 |           |
| Aroclor 1248                                  | ND     | ug/L  | 0.0250 | 0.0250 |             |               |                |             | 04/25/12 :04/26/12 |           |
| Aroclor 1254                                  | ND     | ug/L  | 0.0250 | 0.0250 |             |               |                |             | 04/25/12 :04/26/12 |           |
| Aroclor 1260                                  | ND     | ug/L  | 0.0250 | 0.0250 |             |               |                |             | 04/25/12 :04/26/12 |           |
| Aroclor 1262                                  | ND     | ug/L  | 0.0250 | 0.0250 |             |               |                |             | 04/25/12 :04/26/12 |           |
| Aroclor 1268                                  | ND     | ug/L  | 0.0250 | 0.0250 |             |               |                |             | 04/25/12 :04/26/12 |           |
| <b>Surrogate</b>                              |        |       |        |        |             |               |                |             |                    |           |
| Tetrachloro-m-xylene                          | 0.0198 |       |        | ug/L   | 0.0500      |               | 40             |             | 04/25/12 :04/26/12 |           |
| Decachlorobiphenyl                            | 0.0503 |       |        | ug/L   | 0.0500      |               | 101            |             | 04/25/12 :04/26/12 |           |
| <b>LCS (B12D405-BS1)</b>                      |        |       |        |        |             |               |                |             |                    |           |
| Aroclor 1016/1242                             | 0.1725 | ug/L  | 0.0250 | 0.0250 | 0.250       |               | 69 (55-116)    |             | 04/25/12 :04/26/12 |           |
| Aroclor 1260                                  | 0.2363 | ug/L  | 0.0250 | 0.0250 | 0.250       |               | 95 (54.8-122)  |             | 04/25/12 :04/26/12 |           |
| <b>Surrogate</b>                              |        |       |        |        |             |               |                |             |                    |           |
| Tetrachloro-m-xylene                          | 0.0208 |       |        | ug/L   | 0.0500      |               | 42 (34.4-103)  |             | 04/25/12 :04/26/12 |           |
| Decachlorobiphenyl                            | 0.0513 |       |        | ug/L   | 0.0500      |               | 103 (25.1-138) |             | 04/25/12 :04/26/12 |           |
| <b>LCS Dup (B12D405-BSD1)</b>                 |        |       |        |        |             |               |                |             |                    |           |
| Aroclor 1016/1242                             | 0.2006 | ug/L  | 0.0250 | 0.0250 | 0.250       |               | 80 (55-116)    | 15 (20)     | 04/25/12 :04/26/12 |           |

Reported: 05/01/12 15:18

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Renee Chauvin, Laboratory Coordinator QA/QC



City of Portland  
Water Pollution Control Laboratory

6543 N. Burlington Ave. / Portland OR 97203 (503) 823-5600 fax (503) 823-5656



Project: **Portland Harbor**  
Work Order: **W12D180**

Client: Director's Office  
Project Mgr: Linda Scheffler

**Polychlorinated Biphenyls (PCBs) - QC**

| Analyte                                       | Result | Units | MDL    | MRL    | Spike Level | Source Result | %Rec (Limits) | RPD (Limit) | Prepared: Analyzed | Qualifier |
|-----------------------------------------------|--------|-------|--------|--------|-------------|---------------|---------------|-------------|--------------------|-----------|
| <b>PCB Aroclors by GC-ECD - Batch B12D405</b> |        |       |        |        |             |               |               |             |                    |           |
| <b>LCS Dup (B12D405-BSD1)</b>                 |        |       |        |        |             |               |               |             |                    |           |
| Aroclor 1260                                  | 0.2360 | ug/L  | 0.0250 | 0.0250 | 0.250       |               | 94 (54.8-122) | 0.1 (20)    | 04/25/12 :04/26/12 |           |
| <b>Surrogate</b>                              |        |       |        |        |             |               |               |             |                    |           |
| Tetrachloro-m-xylene                          | 0.0205 |       |        | ug/L   | 0.0500      |               | 41 (34.4-103) |             | 04/25/12 :04/26/12 |           |
| Decachlorobiphenyl                            | 0.0495 |       |        | ug/L   | 0.0500      |               | 99 (25.1-138) |             | 04/25/12 :04/26/12 |           |

**Definitions**

|        |                        |     |                                                      |
|--------|------------------------|-----|------------------------------------------------------|
| DET    | Analyte Detected       | ND  | Analyte Not Detected at or above the reporting limit |
| MRL    | Method Reporting Limit | MDL | Method Detection Limit                               |
| NR     | Not Reportable         | dry | Sample results reported on a dry weight basis        |
| % Rec. | Percent Recovery       | RPD | Relative Percent Difference                          |

Reported: 05/01/12 15:18

Renee Chauvin, Laboratory Coordinator QA/QC

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***Basin 43 Event 2: May 21, 2012***



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## **Laboratory Data QA/QC Review Upland Source Control Investigation City Outfall Basin 43**

**To:** File  
**From:** Andrew Davidson, GSI Water Solutions, Inc.  
**Date:** July 12, 2012

This memorandum presents a quality assurance/quality control (QA/QC) review of the laboratory data generated from a source control investigation sampling event conducted by the City of Portland (City) in Outfall Basin 43 on May 21, 2012. One field sample (W12E189-01) was collected and submitted for analyses.

The laboratory analyses for this source control program sample were completed by the City's Bureau of Environmental Services (BES) Water Pollution Control Laboratory (WPCL) as listed.

- BES WPCL
  - o Total Suspended Solids (TSS) – SM 2540D
  - o Polychlorinated Biphenyls (PCB) Aroclors – EPA 8082

The WPCL laboratory report for all analyses associated with this sampling event is attached.

The following QA/QC review of the analytical data is based on the available documentation provided by WPCL. The QA/QC review consisted of reviewing the following elements from the laboratory report, if applicable and/or available:

- Chain-of-custody – for completeness and continuous custody
- Analysis conducted within holding times
- Chemicals of interest detected in method blanks
- Internal standard recoveries within accuracy control limits
- Surrogate recoveries within laboratory control limits

- Matrix spike and matrix spike duplicate (MS/MSD) sample results within laboratory control limits
- Laboratory control and duplicate laboratory control (LC/DLC) sample recoveries within laboratory control limits
- Relative percent differences (RPDs) for laboratory duplicate samples within laboratory control limits.

The results of the QA/QC review of the laboratory reports are presented below.

## **Chain-of-Custody**

The chain-of-custody forms showed continuous custody of the samples. The chain-of-custody procedures appear to have been adequate indicating that sample integrity was maintained throughout the sample collection and delivery process.

## **Analysis Holding Times**

Samples were extracted and analyzed within the recommended holding times for all analyses.

## **Method Blanks**

A method blank was processed during the laboratory analyses of total suspended solids and PCB Aroclors. No analytes were detected in either method blank.

## **Surrogate Recoveries**

Surrogates were analyzed during the PCB Aroclor analysis. All surrogate recoveries were within laboratory acceptance limits.

## **Laboratory Control/Duplicate Laboratory Control Samples**

An LC sample was processed during the analysis of total suspended solids. The LC sample recovery was well within laboratory control limits. LC/DLC samples were processed during the laboratory analysis of PCB Aroclors. LC/DLC sample recoveries and RPDs were within laboratory acceptance limits for the PCB Aroclor analysis.

## **Laboratory Duplicate**

WPCL processed three laboratory duplicate samples during the TSS analysis. RPDs were within laboratory acceptance limits for two out of the three samples. For the one sample outside of laboratory control limits, WPCL reports that the control limit is not applicable because the TSS concentration is less than five times the reporting limit.



City of Portland  
**Water Pollution Control Laboratory**

6543 N. Burlington Ave. / Portland OR 97203 (503) 823-5600 fax (503) 823-5656



June 04, 2012

Linda Scheffler  
Director's Office

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Work Order  
**W12E189**

Project  
**Portland Harbor**

Received  
05/22/12 15:58

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Enclosed are the results of analysis for the above work order. If you have questions concerning this report, please contact your project coordinator Peter Abrams at 503-823-5533.

Renee Chauvin  
Laboratory Coordinator QA/QC



City of Portland  
Water Pollution Control Laboratory  
6543 N. Burlington Ave. / Portland OR 97203 (503) 823-5600 fax (503) 823-5656



LABORATORY ANALYSIS REPORT

Project: **Portland Harbor**  
Work Order: **W12E189**  
Received: 5/22/12 15:58  
Submitted By: Field Operations

Client: Director's Office  
Project Mgr: Linda Scheffler  
WQDB #: Janus329

| Sample | Laboratory ID | Matrix     | Type | Sample Collection Date |                | Qualifier |
|--------|---------------|------------|------|------------------------|----------------|-----------|
|        |               |            |      | Start                  | End            |           |
| 43_SW7 | W12E189-01    | Stormwater | Grab | 05/21/12 11:19         | 05/21/12 11:19 |           |

| Analyte | Result | Units | MDL | MRL | Dilution | Batch | Prepared | Analyzed | Method | Qualifier |
|---------|--------|-------|-----|-----|----------|-------|----------|----------|--------|-----------|
|---------|--------|-------|-----|-----|----------|-------|----------|----------|--------|-----------|

**43\_SW7 : W12E189-01**

**General Chemistry**

|                        |   |      |   |   |  |         |          |          |          |  |
|------------------------|---|------|---|---|--|---------|----------|----------|----------|--|
| Total suspended solids | 8 | mg/L | 2 | 2 |  | B12E433 | 05/24/12 | 05/24/12 | SM 2540D |  |
|------------------------|---|------|---|---|--|---------|----------|----------|----------|--|

**Polychlorinated Biphenyls (PCBs)**

PCB Aroclors by GC-ECD

|                      |               |      |                 |             |                  |         |          |          |          |  |
|----------------------|---------------|------|-----------------|-------------|------------------|---------|----------|----------|----------|--|
| Aroclor 1016/1242    | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12E480 | 05/29/12 | 05/30/12 | EPA 8082 |  |
| Aroclor 1221         | ND            | ug/L | 0.0500          | 0.0500      | 1                | B12E480 | 05/29/12 | 05/30/12 | EPA 8082 |  |
| Aroclor 1232         | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12E480 | 05/29/12 | 05/30/12 | EPA 8082 |  |
| Aroclor 1248         | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12E480 | 05/29/12 | 05/30/12 | EPA 8082 |  |
| Aroclor 1254         | 0.0599        | ug/L | 0.0250          | 0.0250      | 1                | B12E480 | 05/29/12 | 05/30/12 | EPA 8082 |  |
| Aroclor 1260         | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12E480 | 05/29/12 | 05/30/12 | EPA 8082 |  |
| Aroclor 1262         | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12E480 | 05/29/12 | 05/30/12 | EPA 8082 |  |
| Aroclor 1268         | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12E480 | 05/29/12 | 05/30/12 | EPA 8082 |  |
| <b>Surrogate</b>     | <b>Result</b> |      | <b>Expected</b> | <b>%Rec</b> | <b>Limits(%)</b> |         |          |          |          |  |
| Tetrachloro-m-xylene | 0.0413        |      | 0.0500          | 83%         | 34.4-103         | B12E480 | 05/29/12 | 05/30/12 | EPA 8082 |  |
| Decachlorobiphenyl   | 0.0422        |      | 0.0500          | 84%         | 25.1-138         | B12E480 | 05/29/12 | 05/30/12 | EPA 8082 |  |

Reported: 06/04/12 15:04

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Renee Chauvin, Laboratory Coordinator QA/QC



City of Portland  
Water Pollution Control Laboratory

6543 N. Burlington Ave. / Portland OR 97203 (503) 823-5600 fax (503) 823-5656



Project: **Portland Harbor**  
Work Order: **W12E189**

Client: Director's Office  
Project Mgr: Linda Scheffler

**Quality Control Report**

**General Chemistry - QC**

| Analyte                                            | Result | Units | MDL | MRL | Spike Level | Source Result | %Rec (Limits) | RPD (Limit) | Prepared: Analyzed | Qualifier |
|----------------------------------------------------|--------|-------|-----|-----|-------------|---------------|---------------|-------------|--------------------|-----------|
| <b>Total Suspended Solids - Batch B12E433</b>      |        |       |     |     |             |               |               |             |                    |           |
| <b>Blank (B12E433-BLK1)</b>                        |        |       |     |     |             |               |               |             |                    |           |
| Total suspended solids                             | ND     | mg/L  | 2   | 2   |             |               |               |             | 05/24/12 :05/24/12 |           |
| <b>LCS (B12E433-BS1)</b>                           |        |       |     |     |             |               |               |             |                    |           |
| Total suspended solids                             | 97     | mg/L  |     |     | 100         |               | 97 (90-110)   |             | 05/24/12 :05/24/12 |           |
| <b>Duplicate (B12E433-DUP1) Source: W12E188-02</b> |        |       |     |     |             |               |               |             |                    |           |
| Total suspended solids                             | 9      | mg/L  | 2   | 2   |             | 7             |               | 24 (20)     | 05/24/12 :05/24/12 | M8        |
| <b>Duplicate (B12E433-DUP2) Source: W12E195-01</b> |        |       |     |     |             |               |               |             |                    |           |
| Total suspended solids                             | 472    | mg/L  | 2   | 2   |             | 468           |               | 0.9 (20)    | 05/24/12 :05/24/12 |           |
| <b>Duplicate (B12E433-DUP3) Source: W12E201-04</b> |        |       |     |     |             |               |               |             |                    |           |
| Total suspended solids                             | 17     | mg/L  | 2   | 2   |             | 18            |               | 8 (20)      | 05/24/12 :05/24/12 |           |

**Polychlorinated Biphenyls (PCBs) - QC**

| Analyte                                       | Result | Units | MDL    | MRL    | Spike Level | Source Result | %Rec (Limits)  | RPD (Limit) | Prepared: Analyzed | Qualifier |
|-----------------------------------------------|--------|-------|--------|--------|-------------|---------------|----------------|-------------|--------------------|-----------|
| <b>PCB Aroclors by GC-ECD - Batch B12E480</b> |        |       |        |        |             |               |                |             |                    |           |
| <b>Blank (B12E480-BLK1)</b>                   |        |       |        |        |             |               |                |             |                    |           |
| Aroclor 1016/1242                             | ND     | ug/L  | 0.0250 | 0.0250 |             |               |                |             | 05/29/12 :05/29/12 |           |
| Aroclor 1221                                  | ND     | ug/L  | 0.0500 | 0.0500 |             |               |                |             | 05/29/12 :05/29/12 |           |
| Aroclor 1232                                  | ND     | ug/L  | 0.0250 | 0.0250 |             |               |                |             | 05/29/12 :05/29/12 |           |
| Aroclor 1248                                  | ND     | ug/L  | 0.0250 | 0.0250 |             |               |                |             | 05/29/12 :05/29/12 |           |
| Aroclor 1254                                  | ND     | ug/L  | 0.0250 | 0.0250 |             |               |                |             | 05/29/12 :05/29/12 |           |
| Aroclor 1260                                  | ND     | ug/L  | 0.0250 | 0.0250 |             |               |                |             | 05/29/12 :05/29/12 |           |
| Aroclor 1262                                  | ND     | ug/L  | 0.0250 | 0.0250 |             |               |                |             | 05/29/12 :05/29/12 |           |
| Aroclor 1268                                  | ND     | ug/L  | 0.0250 | 0.0250 |             |               |                |             | 05/29/12 :05/29/12 |           |
| <b>Surrogate</b>                              |        |       |        |        |             |               |                |             |                    |           |
| Tetrachloro-m-xylene                          | 0.0340 |       |        | ug/L   | 0.0500      |               | 68             |             | 05/29/12 :05/29/12 |           |
| Decachlorobiphenyl                            | 0.0447 |       |        | ug/L   | 0.0500      |               | 89             |             | 05/29/12 :05/29/12 |           |
| <b>LCS (B12E480-BS1)</b>                      |        |       |        |        |             |               |                |             |                    |           |
| Aroclor 1016/1242                             | 0.2298 | ug/L  | 0.0250 | 0.0250 | 0.250       |               | 92 (55-116)    |             | 05/29/12 :05/29/12 |           |
| Aroclor 1260                                  | 0.2538 | ug/L  | 0.0250 | 0.0250 | 0.250       |               | 102 (54.8-122) |             | 05/29/12 :05/29/12 |           |
| <b>Surrogate</b>                              |        |       |        |        |             |               |                |             |                    |           |
| Tetrachloro-m-xylene                          | 0.0316 |       |        | ug/L   | 0.0500      |               | 63 (34.4-103)  |             | 05/29/12 :05/29/12 |           |
| Decachlorobiphenyl                            | 0.0441 |       |        | ug/L   | 0.0500      |               | 88 (25.1-138)  |             | 05/29/12 :05/29/12 |           |
| <b>LCS Dup (B12E480-BSD1)</b>                 |        |       |        |        |             |               |                |             |                    |           |
| Aroclor 1016/1242                             | 0.2351 | ug/L  | 0.0250 | 0.0250 | 0.250       |               | 94 (55-116)    | 2 (20)      | 05/29/12 :05/29/12 |           |
| Aroclor 1260                                  | 0.2557 | ug/L  | 0.0250 | 0.0250 | 0.250       |               | 102 (54.8-122) | 0.7 (20)    | 05/29/12 :05/29/12 |           |
| <b>Surrogate</b>                              |        |       |        |        |             |               |                |             |                    |           |

Reported: 06/04/12 15:04

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Renee Chauvin, Laboratory Coordinator QA/QC



City of Portland  
Water Pollution Control Laboratory

6543 N. Burlington Ave. / Portland OR 97203 (503) 823-5600 fax (503) 823-5656



Project: **Portland Harbor**  
Work Order: **W12E189**

Client: Director's Office  
Project Mgr: Linda Scheffler

**Polychlorinated Biphenyls (PCBs) - QC**

| Analyte                                | Result | Units | MDL | MRL | Spike Level | Source Result | %Rec (Limits) | RPD (Limit) | Prepared: Analyzed | Qualifier |
|----------------------------------------|--------|-------|-----|-----|-------------|---------------|---------------|-------------|--------------------|-----------|
| PCB Aroclors by GC-ECD - Batch B12E480 |        |       |     |     |             |               |               |             |                    |           |
| LCS Dup (B12E480-BSD1)                 |        |       |     |     |             |               |               |             |                    |           |
| <b>Surrogate</b>                       |        |       |     |     |             |               |               |             |                    |           |
| Tetrachloro-m-xylene                   | 0.0342 |       |     |     | ug/L 0.0500 |               | 68 (34.4-103) |             | 05/29/12 :05/29/12 |           |
| Decachlorobiphenyl                     | 0.0448 |       |     |     | ug/L 0.0500 |               | 90 (25.1-138) |             | 05/29/12 :05/29/12 |           |

**Qualifiers**

M8 The matrix duplicate control limit is not applicable at concentrations less than 5 times the reporting limit.

**Definitions**

|        |                        |     |                                                      |
|--------|------------------------|-----|------------------------------------------------------|
| DET    | Analyte Detected       | ND  | Analyte Not Detected at or above the reporting limit |
| MRL    | Method Reporting Limit | MDL | Method Detection Limit                               |
| NR     | Not Reportable         | dry | Sample results reported on a dry weight basis        |
| % Rec. | Percent Recovery       | RPD | Relative Percent Difference                          |

Reported: 06/04/12 15:04

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Renee Chauvin, Laboratory Coordinator QA/QC

Page 5 of 5

***Basin 43 Event 3: May 22, 2012***



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info@gsiwatersolutions.com www.gsiwatersolutions.com

## **Laboratory Data QA/QC Review Upland Source Control Investigation City Outfall Basin 43**

**To:** File  
**From:** Andrew Davidson, GSI Water Solutions, Inc.  
**Date:** July 12, 2012

This memorandum presents a quality assurance/quality control (QA/QC) review of the laboratory data generated from a source control investigation sampling event conducted by the City of Portland (City) in Outfall Basin 43 on May 22, 2012. One field sample (W12E190-01) was collected and submitted for analyses.

The laboratory analyses for this source control program sample were completed by the City's Bureau of Environmental Services (BES) Water Pollution Control Laboratory (WPCL) as listed.

- BES WPCL
  - o Total Suspended Solids (TSS) – SM 2540D
  - o Polychlorinated Biphenyls (PCB) Aroclors – EPA 8082

The WPCL laboratory report for all analyses associated with this sampling event is attached.

The following QA/QC review of the analytical data is based on the available documentation provided by WPCL. The QA/QC review consisted of reviewing the following elements from the laboratory report, if applicable and/or available:

- Chain-of-custody – for completeness and continuous custody
- Analysis conducted within holding times
- Chemicals of interest detected in method blanks
- Internal standard recoveries within accuracy control limits
- Surrogate recoveries within laboratory control limits

- Matrix spike and matrix spike duplicate (MS/MSD) sample results within laboratory control limits
- Laboratory control and duplicate laboratory control (LC/DLC) sample recoveries within laboratory control limits
- Relative percent differences (RPDs) for laboratory duplicate samples within laboratory control limits.

The results of the QA/QC review of the laboratory reports are presented below.

## **Chain-of-Custody**

The chain-of-custody forms showed continuous custody of the samples. The chain-of-custody procedures appear to have been adequate indicating that sample integrity was maintained throughout the sample collection and delivery process.

## **Analysis Holding Times**

Samples were extracted and analyzed within the recommended holding times for the all analyses.

## **Method Blanks**

A method blank was processed during the laboratory analyses of total suspended solids and PCB Aroclors. No analytes were detected in either method blank.

## **Surrogate Recoveries**

Surrogates were analyzed during the PCB Aroclor analysis. All surrogate recoveries were within laboratory acceptance limits.

## **Laboratory Control/Duplicate Laboratory Control Samples**

An LC sample was processed during the analysis of total suspended solids. The LC sample recovery was well within laboratory control limits. LC/DLC samples were processed during the laboratory analysis of PCB Aroclors. LC/DLC sample recoveries and RPDs were within laboratory acceptance limits for the PCB Aroclor analysis.

## **Laboratory Duplicate**

WPCL processed three laboratory duplicate samples during the TSS analysis. RPDs were within laboratory acceptance limits for two out of the three samples. For the one sample outside of laboratory control limits, WPCL reports that the control limit is not applicable because the TSS concentration is less than five times the reporting limit.



City of Portland  
**Water Pollution Control Laboratory**

6543 N. Burlington Ave. / Portland OR 97203 (503) 823-5600 fax (503) 823-5656



June 04, 2012

Linda Scheffler  
Director's Office

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Work Order  
**W12E190**

Project  
**Portland Harbor**

Received  
05/22/12 15:58

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Enclosed are the results of analysis for the above work order. If you have questions concerning this report, please contact your project coordinator Peter Abrams at 503-823-5533.

Renee Chauvin  
Laboratory Coordinator QA/QC



City of Portland  
Water Pollution Control Laboratory  
6543 N. Burlington Ave. / Portland OR 97203 (503) 823-5600 fax (503) 823-5656



LABORATORY ANALYSIS REPORT

Project: **Portland Harbor**  
Work Order: **W12E190**  
Received: 5/22/12 15:58  
Submitted By: Field Operations

Client: Director's Office  
Project Mgr: Linda Scheffler  
WQDB #: Janus329

| Sample | Laboratory ID | Matrix     | Type | Sample Collection Date |                | Qualifier |
|--------|---------------|------------|------|------------------------|----------------|-----------|
|        |               |            |      | Start                  | End            |           |
| 43_SW7 | W12E190-01    | Stormwater | Grab | 05/22/12 09:20         | 05/22/12 09:20 |           |

| Analyte | Result | Units | MDL | MRL | Dilution | Batch | Prepared | Analyzed | Method | Qualifier |
|---------|--------|-------|-----|-----|----------|-------|----------|----------|--------|-----------|
|---------|--------|-------|-----|-----|----------|-------|----------|----------|--------|-----------|

**43\_SW7 : W12E190-01**

**General Chemistry**

|                        |    |      |   |   |  |         |          |          |          |  |
|------------------------|----|------|---|---|--|---------|----------|----------|----------|--|
| Total suspended solids | 32 | mg/L | 2 | 2 |  | B12E433 | 05/24/12 | 05/24/12 | SM 2540D |  |
|------------------------|----|------|---|---|--|---------|----------|----------|----------|--|

**Polychlorinated Biphenyls (PCBs)**

PCB Aroclors by GC-ECD

|                      |               |      |                 |             |                  |         |          |          |          |  |
|----------------------|---------------|------|-----------------|-------------|------------------|---------|----------|----------|----------|--|
| Aroclor 1016/1242    | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12E480 | 05/29/12 | 05/30/12 | EPA 8082 |  |
| Aroclor 1221         | ND            | ug/L | 0.0500          | 0.0500      | 1                | B12E480 | 05/29/12 | 05/30/12 | EPA 8082 |  |
| Aroclor 1232         | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12E480 | 05/29/12 | 05/30/12 | EPA 8082 |  |
| Aroclor 1248         | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12E480 | 05/29/12 | 05/30/12 | EPA 8082 |  |
| Aroclor 1254         | 0.0635        | ug/L | 0.0250          | 0.0250      | 1                | B12E480 | 05/29/12 | 05/30/12 | EPA 8082 |  |
| Aroclor 1260         | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12E480 | 05/29/12 | 05/30/12 | EPA 8082 |  |
| Aroclor 1262         | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12E480 | 05/29/12 | 05/30/12 | EPA 8082 |  |
| Aroclor 1268         | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12E480 | 05/29/12 | 05/30/12 | EPA 8082 |  |
| <b>Surrogate</b>     | <b>Result</b> |      | <b>Expected</b> | <b>%Rec</b> | <b>Limits(%)</b> |         |          |          |          |  |
| Tetrachloro-m-xylene | 0.0410        |      | 0.0488          | 84%         | 34.4-103         | B12E480 | 05/29/12 | 05/30/12 | EPA 8082 |  |
| Decachlorobiphenyl   | 0.0421        |      | 0.0488          | 86%         | 25.1-138         | B12E480 | 05/29/12 | 05/30/12 | EPA 8082 |  |

Reported: 06/04/12 15:07

The results in this report apply only to the samples analyzed. Qualifiers and case narrative comments are essential to interpretation of the analytical results. Report reproductions and/or data summaries without qualifiers and comments are incomplete.

Renee Chauvin, Laboratory Coordinator QA/QC



City of Portland  
Water Pollution Control Laboratory

6543 N. Burlington Ave. / Portland OR 97203 (503) 823-5600 fax (503) 823-5656



Project: **Portland Harbor**  
Work Order: **W12E190**

Client: Director's Office  
Project Mgr: Linda Scheffler

**Quality Control Report**

**General Chemistry - QC**

| Analyte                                            | Result | Units | MDL | MRL | Spike Level | Source Result | %Rec (Limits) | RPD (Limit) | Prepared: Analyzed | Qualifier |
|----------------------------------------------------|--------|-------|-----|-----|-------------|---------------|---------------|-------------|--------------------|-----------|
| <b>Total Suspended Solids - Batch B12E433</b>      |        |       |     |     |             |               |               |             |                    |           |
| <b>Blank (B12E433-BLK1)</b>                        |        |       |     |     |             |               |               |             |                    |           |
| Total suspended solids                             | ND     | mg/L  | 2   | 2   |             |               |               |             | 05/24/12 :05/24/12 |           |
| <b>LCS (B12E433-BS1)</b>                           |        |       |     |     |             |               |               |             |                    |           |
| Total suspended solids                             | 97     | mg/L  |     |     | 100         |               | 97 (90-110)   |             | 05/24/12 :05/24/12 |           |
| <b>Duplicate (B12E433-DUP1) Source: W12E188-02</b> |        |       |     |     |             |               |               |             |                    |           |
| Total suspended solids                             | 9      | mg/L  | 2   | 2   |             | 7             |               | 24 (20)     | 05/24/12 :05/24/12 | M8        |
| <b>Duplicate (B12E433-DUP2) Source: W12E195-01</b> |        |       |     |     |             |               |               |             |                    |           |
| Total suspended solids                             | 472    | mg/L  | 2   | 2   |             | 468           |               | 0.9 (20)    | 05/24/12 :05/24/12 |           |
| <b>Duplicate (B12E433-DUP3) Source: W12E201-04</b> |        |       |     |     |             |               |               |             |                    |           |
| Total suspended solids                             | 17     | mg/L  | 2   | 2   |             | 18            |               | 8 (20)      | 05/24/12 :05/24/12 |           |

**Polychlorinated Biphenyls (PCBs) - QC**

| Analyte                                       | Result | Units | MDL    | MRL    | Spike Level | Source Result | %Rec (Limits)  | RPD (Limit) | Prepared: Analyzed | Qualifier |
|-----------------------------------------------|--------|-------|--------|--------|-------------|---------------|----------------|-------------|--------------------|-----------|
| <b>PCB Aroclors by GC-ECD - Batch B12E480</b> |        |       |        |        |             |               |                |             |                    |           |
| <b>Blank (B12E480-BLK1)</b>                   |        |       |        |        |             |               |                |             |                    |           |
| Aroclor 1016/1242                             | ND     | ug/L  | 0.0250 | 0.0250 |             |               |                |             | 05/29/12 :05/29/12 |           |
| Aroclor 1221                                  | ND     | ug/L  | 0.0500 | 0.0500 |             |               |                |             | 05/29/12 :05/29/12 |           |
| Aroclor 1232                                  | ND     | ug/L  | 0.0250 | 0.0250 |             |               |                |             | 05/29/12 :05/29/12 |           |
| Aroclor 1248                                  | ND     | ug/L  | 0.0250 | 0.0250 |             |               |                |             | 05/29/12 :05/29/12 |           |
| Aroclor 1254                                  | ND     | ug/L  | 0.0250 | 0.0250 |             |               |                |             | 05/29/12 :05/29/12 |           |
| Aroclor 1260                                  | ND     | ug/L  | 0.0250 | 0.0250 |             |               |                |             | 05/29/12 :05/29/12 |           |
| Aroclor 1262                                  | ND     | ug/L  | 0.0250 | 0.0250 |             |               |                |             | 05/29/12 :05/29/12 |           |
| Aroclor 1268                                  | ND     | ug/L  | 0.0250 | 0.0250 |             |               |                |             | 05/29/12 :05/29/12 |           |
| <b>Surrogate</b>                              |        |       |        |        |             |               |                |             |                    |           |
| Tetrachloro-m-xylene                          | 0.0340 |       |        | ug/L   | 0.0500      |               | 68             |             | 05/29/12 :05/29/12 |           |
| Decachlorobiphenyl                            | 0.0447 |       |        | ug/L   | 0.0500      |               | 89             |             | 05/29/12 :05/29/12 |           |
| <b>LCS (B12E480-BS1)</b>                      |        |       |        |        |             |               |                |             |                    |           |
| Aroclor 1016/1242                             | 0.2298 | ug/L  | 0.0250 | 0.0250 | 0.250       |               | 92 (55-116)    |             | 05/29/12 :05/29/12 |           |
| Aroclor 1260                                  | 0.2538 | ug/L  | 0.0250 | 0.0250 | 0.250       |               | 102 (54.8-122) |             | 05/29/12 :05/29/12 |           |
| <b>Surrogate</b>                              |        |       |        |        |             |               |                |             |                    |           |
| Tetrachloro-m-xylene                          | 0.0316 |       |        | ug/L   | 0.0500      |               | 63 (34.4-103)  |             | 05/29/12 :05/29/12 |           |
| Decachlorobiphenyl                            | 0.0441 |       |        | ug/L   | 0.0500      |               | 88 (25.1-138)  |             | 05/29/12 :05/29/12 |           |
| <b>LCS Dup (B12E480-BSD1)</b>                 |        |       |        |        |             |               |                |             |                    |           |
| Aroclor 1016/1242                             | 0.2351 | ug/L  | 0.0250 | 0.0250 | 0.250       |               | 94 (55-116)    | 2 (20)      | 05/29/12 :05/29/12 |           |
| Aroclor 1260                                  | 0.2557 | ug/L  | 0.0250 | 0.0250 | 0.250       |               | 102 (54.8-122) | 0.7 (20)    | 05/29/12 :05/29/12 |           |
| <b>Surrogate</b>                              |        |       |        |        |             |               |                |             |                    |           |

Reported: 06/04/12 15:07

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Renee Chauvin, Laboratory Coordinator QA/QC



City of Portland  
Water Pollution Control Laboratory

6543 N. Burlington Ave. / Portland OR 97203 (503) 823-5600 fax (503) 823-5656



Project: **Portland Harbor**  
Work Order: **W12E190**

Client: Director's Office  
Project Mgr: Linda Scheffler

**Polychlorinated Biphenyls (PCBs) - QC**

| Analyte                                | Result | Units | MDL | MRL | Spike Level | Source Result | %Rec (Limits) | RPD (Limit) | Prepared: Analyzed | Qualifier |
|----------------------------------------|--------|-------|-----|-----|-------------|---------------|---------------|-------------|--------------------|-----------|
| PCB Aroclors by GC-ECD - Batch B12E480 |        |       |     |     |             |               |               |             |                    |           |
| LCS Dup (B12E480-BSD1)                 |        |       |     |     |             |               |               |             |                    |           |
| <b>Surrogate</b>                       |        |       |     |     |             |               |               |             |                    |           |
| Tetrachloro-m-xylene                   | 0.0342 |       |     |     | ug/L 0.0500 |               | 68 (34.4-103) |             | 05/29/12 :05/29/12 |           |
| Decachlorobiphenyl                     | 0.0448 |       |     |     | ug/L 0.0500 |               | 90 (25.1-138) |             | 05/29/12 :05/29/12 |           |

**Qualifiers**

M8 The matrix duplicate control limit is not applicable at concentrations less than 5 times the reporting limit.

**Definitions**

|        |                        |     |                                                      |
|--------|------------------------|-----|------------------------------------------------------|
| DET    | Analyte Detected       | ND  | Analyte Not Detected at or above the reporting limit |
| MRL    | Method Reporting Limit | MDL | Method Detection Limit                               |
| NR     | Not Reportable         | dry | Sample results reported on a dry weight basis        |
| % Rec. | Percent Recovery       | RPD | Relative Percent Difference                          |

Reported: 06/04/12 15:07

Renee Chauvin, Laboratory Coordinator QA/QC

*The results in this report apply only to the samples analyzed. Qualifiers and case narrative comments are essential to interpretation of the analytical results. Report reproductions and/or data summaries without qualifiers and comments are incomplete.*



***Basin 44 Event: March 15, 2012***



55 SW Yamhill Street, Suite 400 Portland, OR 97204  
P: 503.239.8799 F: 503.239.8940  
info@gsiwatersolutions.com www.gsiwatersolutions.com

## **Laboratory Data QA/QC Review Upland Source Control Investigation City Outfall Basin 44**

**To:** File  
**From:** Andrew Davidson, GSI Water Solutions, Inc.  
**Date:** July 12, 2012

This memorandum presents a quality assurance/quality control (QA/QC) review of the laboratory data generated from a source control investigation sampling event conducted by the City of Portland (City) in Outfall Basin 44 on March 15, 2012. Six field samples (W12C139-01 – W12C139-06) and one field duplicate sample (W12C139-07) were collected and submitted for analyses.

The laboratory analyses for these source control program samples were completed by the City's Bureau of Environmental Services (BES) Water Pollution Control Laboratory (WPCL) as listed.

- BES WPCL
  - o Total Suspended Solids (TSS) – SM 2540D
  - o Polychlorinated Biphenyls (PCB) Aroclors – EPA 8082

The WPCL laboratory report for all analyses associated with this sampling event is attached.

The following QA/QC review of the analytical data is based on the available documentation provided by WPCL. The QA/QC review consisted of reviewing the following elements from the laboratory report, if applicable and/or available:

- Chain-of-custody – for completeness and continuous custody
- Analysis conducted within holding times
- Chemicals of interest detected in method blanks
- Internal standard recoveries within accuracy control limits
- Surrogate recoveries within laboratory control limits

- Matrix spike and matrix spike duplicate (MS/MSD) sample results within laboratory control limits
- Laboratory control and duplicate laboratory control (LC/DLC) sample recoveries within laboratory control limits
- Relative percent differences (RPDs) for laboratory duplicate samples within laboratory control limits.

The results of the QA/QC review of the laboratory reports are presented below.

## **Chain-of-Custody**

The chain-of-custody forms showed continuous custody of the samples. The chain-of-custody procedures appear to have been adequate indicating that sample integrity was maintained throughout the sample collection and delivery process.

## **Analysis Holding Times**

Samples were extracted and analyzed within the recommended holding times for all analyses.

## **Method Blanks**

A method blank was processed during the laboratory analyses of total suspended solids and PCB Aroclors. No analytes were detected in either method blank.

## **Surrogate Recoveries**

Surrogates were analyzed during the PCB Aroclor analysis. All surrogate recoveries were within laboratory acceptance limits.

## **Laboratory Control/Duplicate Laboratory Control Samples**

An LC sample was processed during the TSS analysis. The LC recovery was within laboratory control limits. LC/DLC samples were processed during the laboratory analysis of PCB Aroclors. LC/DLC sample recoveries and RPDs were within laboratory acceptance limits.

## **Laboratory Duplicate**

WPCL processed two laboratory duplicate samples during the TSS analysis. All RPDs were within laboratory acceptance limits.



City of Portland  
**Water Pollution Control Laboratory**

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March 27, 2012

Linda Scheffler  
Director's Office

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Work Order  
**W12C139**

Project  
**Portland Harbor**

Received  
03/15/12 12:33

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Enclosed are the results of analysis for the above work order. If you have questions concerning this report, please contact your project coordinator Peter Abrams at 503-823-5533.

Renee Chauvin  
Laboratory Coordinator QA/QC



City of Portland  
**Water Pollution Control Laboratory**  
6543 N. Burlington Ave. / Portland OR 97203 (503) 823-5600 fax (503) 823-5656



**LABORATORY ANALYSIS REPORT**

Project: **Portland Harbor**  
Work Order: **W12C139**  
Received: 3/15/12 12:33  
Submitted By: Field Operations

Client: Director's Office  
Project Mgr: Linda Scheffler  
WQDB #: Janus329

| Sample          | Laboratory ID | Matrix     | Type | Sample Collection Date |                | Qualifier |
|-----------------|---------------|------------|------|------------------------|----------------|-----------|
|                 |               |            |      | Start                  | End            |           |
| 44_SW14         | W12C139-01    | Stormwater | Grab | 03/15/12 11:42         | 03/15/12 11:42 |           |
| 44_SW15         | W12C139-02    | Stormwater | Grab | 03/15/12 11:20         | 03/15/12 11:20 |           |
| 44_SW16         | W12C139-03    | Stormwater | Grab | 03/15/12 11:43         | 03/15/12 11:43 |           |
| 44_SW17         | W12C139-04    | Stormwater | Grab | 03/15/12 11:23         | 03/15/12 11:23 |           |
| 44_SW18         | W12C139-05    | Stormwater | Grab | 03/15/12 11:47         | 03/15/12 11:47 |           |
| 44_SW19         | W12C139-06    | Stormwater | Grab | 03/15/12 11:04         | 03/15/12 11:04 |           |
| Field Duplicate | W12C139-07    | Stormwater | Grab | 03/15/12 00:00         | 03/15/12 00:00 |           |

| Analyte | Result | Units | MDL | MRL | Dilution | Batch | Prepared | Analyzed | Method | Qualifier |
|---------|--------|-------|-----|-----|----------|-------|----------|----------|--------|-----------|
|---------|--------|-------|-----|-----|----------|-------|----------|----------|--------|-----------|

**General Chemistry**

**Total Suspended Solids**

|                              |    |      |   |   |  |         |          |          |          |  |
|------------------------------|----|------|---|---|--|---------|----------|----------|----------|--|
| 44_SW14 : W12C139-01         |    |      |   |   |  |         |          |          |          |  |
| Total suspended solids       | 58 | mg/L | 2 | 2 |  | B12C269 | 03/16/12 | 03/16/12 | SM 2540D |  |
| 44_SW15 : W12C139-02         |    |      |   |   |  |         |          |          |          |  |
| Total suspended solids       | 50 | mg/L | 2 | 2 |  | B12C269 | 03/16/12 | 03/16/12 | SM 2540D |  |
| 44_SW16 : W12C139-03         |    |      |   |   |  |         |          |          |          |  |
| Total suspended solids       | 20 | mg/L | 2 | 2 |  | B12C269 | 03/16/12 | 03/16/12 | SM 2540D |  |
| 44_SW17 : W12C139-04         |    |      |   |   |  |         |          |          |          |  |
| Total suspended solids       | 9  | mg/L | 2 | 2 |  | B12C269 | 03/16/12 | 03/16/12 | SM 2540D |  |
| 44_SW18 : W12C139-05         |    |      |   |   |  |         |          |          |          |  |
| Total suspended solids       | 16 | mg/L | 2 | 2 |  | B12C269 | 03/16/12 | 03/16/12 | SM 2540D |  |
| 44_SW19 : W12C139-06         |    |      |   |   |  |         |          |          |          |  |
| Total suspended solids       | ND | mg/L | 2 | 2 |  | B12C269 | 03/16/12 | 03/16/12 | SM 2540D |  |
| Field Duplicate : W12C139-07 |    |      |   |   |  |         |          |          |          |  |
| Total suspended solids       | 22 | mg/L | 2 | 2 |  | B12C269 | 03/16/12 | 03/16/12 | SM 2540D |  |

Reported: 03/27/12 12:17

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Renee Chauvin, Laboratory Coordinator QA/QC



City of Portland  
Water Pollution Control Laboratory

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Project: **Portland Harbor**  
Work Order: **W12C139**

Client: **Director's Office**  
Project Mgr: **Linda Scheffler**

| Analyte | Result | Units | MDL | MRL | Dilution | Batch | Prepared | Analyzed | Method | Qualifier |
|---------|--------|-------|-----|-----|----------|-------|----------|----------|--------|-----------|
|---------|--------|-------|-----|-----|----------|-------|----------|----------|--------|-----------|

**Polychlorinated Biphenyls (PCBs)**

PCB Aroclors by GC-ECD

44\_SW14 : W12C139-01

|                   |    |      |        |        |   |         |          |          |          |
|-------------------|----|------|--------|--------|---|---------|----------|----------|----------|
| Aroclor 1016/1242 | ND | ug/L | 0.0250 | 0.0250 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1221      | ND | ug/L | 0.0500 | 0.0500 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1232      | ND | ug/L | 0.0250 | 0.0250 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1248      | ND | ug/L | 0.0250 | 0.0250 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1254      | ND | ug/L | 0.0250 | 0.0250 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1260      | ND | ug/L | 0.0250 | 0.0250 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1262      | ND | ug/L | 0.0250 | 0.0250 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1268      | ND | ug/L | 0.0250 | 0.0250 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |

|                      |               |                 |             |                  |         |          |          |          |  |
|----------------------|---------------|-----------------|-------------|------------------|---------|----------|----------|----------|--|
| <b>Surrogate</b>     | <b>Result</b> | <b>Expected</b> | <b>%Rec</b> | <b>Limits(%)</b> |         |          |          |          |  |
| Tetrachloro-m-xylene | 0.0292        | 0.0500          | 58%         | 34.4-103         | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |  |
| Decachlorobiphenyl   | 0.0438        | 0.0500          | 88%         | 25.1-138         | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |  |

44\_SW15 : W12C139-02

|                   |    |      |        |        |   |         |          |          |          |
|-------------------|----|------|--------|--------|---|---------|----------|----------|----------|
| Aroclor 1016/1242 | ND | ug/L | 0.0250 | 0.0250 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1221      | ND | ug/L | 0.0500 | 0.0500 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1232      | ND | ug/L | 0.0250 | 0.0250 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1248      | ND | ug/L | 0.0250 | 0.0250 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1254      | ND | ug/L | 0.0250 | 0.0250 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1260      | ND | ug/L | 0.0250 | 0.0250 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1262      | ND | ug/L | 0.0250 | 0.0250 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1268      | ND | ug/L | 0.0250 | 0.0250 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |

|                      |               |                 |             |                  |         |          |          |          |  |
|----------------------|---------------|-----------------|-------------|------------------|---------|----------|----------|----------|--|
| <b>Surrogate</b>     | <b>Result</b> | <b>Expected</b> | <b>%Rec</b> | <b>Limits(%)</b> |         |          |          |          |  |
| Tetrachloro-m-xylene | 0.0298        | 0.0515          | 58%         | 34.4-103         | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |  |
| Decachlorobiphenyl   | 0.0405        | 0.0515          | 79%         | 25.1-138         | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |  |

44\_SW16 : W12C139-03

|                   |    |      |        |        |   |         |          |          |          |
|-------------------|----|------|--------|--------|---|---------|----------|----------|----------|
| Aroclor 1016/1242 | ND | ug/L | 0.0250 | 0.0250 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1221      | ND | ug/L | 0.0500 | 0.0500 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1232      | ND | ug/L | 0.0250 | 0.0250 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1248      | ND | ug/L | 0.0250 | 0.0250 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1254      | ND | ug/L | 0.0250 | 0.0250 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1260      | ND | ug/L | 0.0250 | 0.0250 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1262      | ND | ug/L | 0.0250 | 0.0250 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1268      | ND | ug/L | 0.0250 | 0.0250 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |

|                      |               |                 |             |                  |         |          |          |          |  |
|----------------------|---------------|-----------------|-------------|------------------|---------|----------|----------|----------|--|
| <b>Surrogate</b>     | <b>Result</b> | <b>Expected</b> | <b>%Rec</b> | <b>Limits(%)</b> |         |          |          |          |  |
| Tetrachloro-m-xylene | 0.0295        | 0.0510          | 58%         | 34.4-103         | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |  |
| Decachlorobiphenyl   | 0.0447        | 0.0510          | 88%         | 25.1-138         | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |  |

44\_SW17 : W12C139-04

|                   |    |      |        |        |   |         |          |          |          |
|-------------------|----|------|--------|--------|---|---------|----------|----------|----------|
| Aroclor 1016/1242 | ND | ug/L | 0.0250 | 0.0250 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1221      | ND | ug/L | 0.0500 | 0.0500 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1232      | ND | ug/L | 0.0250 | 0.0250 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |

Reported: 03/27/12 12:17

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Renee Chauvin, Laboratory Coordinator QA/QC



City of Portland  
Water Pollution Control Laboratory

6543 N. Burlington Ave. / Portland OR 97203 (503) 823-5600 fax (503) 823-5656



Project: **Portland Harbor**  
Work Order: **W12C139**

Client: **Director's Office**  
Project Mgr: **Linda Scheffler**

| Analyte | Result | Units | MDL | MRL | Dilution | Batch | Prepared | Analyzed | Method | Qualifier |
|---------|--------|-------|-----|-----|----------|-------|----------|----------|--------|-----------|
|---------|--------|-------|-----|-----|----------|-------|----------|----------|--------|-----------|

**Polychlorinated Biphenyls (PCBs)**

PCB Aroclors by GC-ECD

44\_SW17 : W12C139-04

|                      |               |      |                 |             |                  |         |          |          |          |
|----------------------|---------------|------|-----------------|-------------|------------------|---------|----------|----------|----------|
| Aroclor 1248         | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1254         | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1260         | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1262         | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1268         | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| <b>Surrogate</b>     | <b>Result</b> |      | <b>Expected</b> | <b>%Rec</b> | <b>Limits(%)</b> |         |          |          |          |
| Tetrachloro-m-xylene | 0.0328        |      | 0.0495          | 66%         | 34.4-103         | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Decachlorobiphenyl   | 0.0404        |      | 0.0495          | 82%         | 25.1-138         | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |

44\_SW18 : W12C139-05

|                      |               |      |                 |             |                  |         |          |          |          |
|----------------------|---------------|------|-----------------|-------------|------------------|---------|----------|----------|----------|
| Aroclor 1016/1242    | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1221         | ND            | ug/L | 0.0500          | 0.0500      | 1                | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1232         | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1248         | 0.0811        | ug/L | 0.0250          | 0.0250      | 1                | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1254         | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1260         | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1262         | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1268         | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| <b>Surrogate</b>     | <b>Result</b> |      | <b>Expected</b> | <b>%Rec</b> | <b>Limits(%)</b> |         |          |          |          |
| Tetrachloro-m-xylene | 0.0278        |      | 0.0500          | 56%         | 34.4-103         | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Decachlorobiphenyl   | 0.0442        |      | 0.0500          | 88%         | 25.1-138         | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |

44\_SW19 : W12C139-06

|                      |               |      |                 |             |                  |         |          |          |          |
|----------------------|---------------|------|-----------------|-------------|------------------|---------|----------|----------|----------|
| Aroclor 1016/1242    | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1221         | ND            | ug/L | 0.0500          | 0.0500      | 1                | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1232         | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1248         | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1254         | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1260         | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1262         | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1268         | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| <b>Surrogate</b>     | <b>Result</b> |      | <b>Expected</b> | <b>%Rec</b> | <b>Limits(%)</b> |         |          |          |          |
| Tetrachloro-m-xylene | 0.0311        |      | 0.0500          | 62%         | 34.4-103         | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Decachlorobiphenyl   | 0.0448        |      | 0.0500          | 90%         | 25.1-138         | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |

Field Duplicate : W12C139-07

|                   |    |      |        |        |   |         |          |          |          |
|-------------------|----|------|--------|--------|---|---------|----------|----------|----------|
| Aroclor 1016/1242 | ND | ug/L | 0.0250 | 0.0250 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1221      | ND | ug/L | 0.0500 | 0.0500 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1232      | ND | ug/L | 0.0250 | 0.0250 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1248      | ND | ug/L | 0.0250 | 0.0250 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1254      | ND | ug/L | 0.0250 | 0.0250 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1260      | ND | ug/L | 0.0250 | 0.0250 | 1 | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |

Reported: 03/27/12 12:17

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Renee Chauvin, Laboratory Coordinator QA/QC



City of Portland  
Water Pollution Control Laboratory

6543 N. Burlington Ave. / Portland OR 97203 (503) 823-5600 fax (503) 823-5656



Project: **Portland Harbor**  
Work Order: **W12C139**

Client: Director's Office  
Project Mgr: Linda Scheffler

| Analyte | Result | Units | MDL | MRL | Dilution | Batch | Prepared | Analyzed | Method | Qualifier |
|---------|--------|-------|-----|-----|----------|-------|----------|----------|--------|-----------|
|---------|--------|-------|-----|-----|----------|-------|----------|----------|--------|-----------|

**Polychlorinated Biphenyls (PCBs)**

PCB Aroclors by GC-ECD

Field Duplicate : W12C139-07

|                      |               |      |                 |             |                  |         |          |          |          |
|----------------------|---------------|------|-----------------|-------------|------------------|---------|----------|----------|----------|
| Aroclor 1262         | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Aroclor 1268         | ND            | ug/L | 0.0250          | 0.0250      | 1                | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| <b>Surrogate</b>     | <b>Result</b> |      | <b>Expected</b> | <b>%Rec</b> | <b>Limits(%)</b> |         |          |          |          |
| Tetrachloro-m-xylene | 0.0268        |      | 0.0485          | 55%         | 34.4-103         | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |
| Decachlorobiphenyl   | 0.0428        |      | 0.0485          | 88%         | 25.1-138         | B12C311 | 03/19/12 | 03/21/12 | EPA 8082 |

Reported: 03/27/12 12:17

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Renee Chauvin, Laboratory Coordinator QA/QC



City of Portland  
Water Pollution Control Laboratory  
6543 N. Burlington Ave. / Portland OR 97203 (503) 823-5600 fax (503) 823-5656



Project: **Portland Harbor**  
Work Order: **W12C139**

Client: Director's Office  
Project Mgr: Linda Scheffler

**Quality Control Report**

**General Chemistry - QC**

| Analyte                                            | Result | Units | MDL | MRL | Spike Level | Source Result | %Rec (Limits) | RPD (Limit) | Prepared: Analyzed | Qualifier |
|----------------------------------------------------|--------|-------|-----|-----|-------------|---------------|---------------|-------------|--------------------|-----------|
| <b>Total Suspended Solids - Batch B12C269</b>      |        |       |     |     |             |               |               |             |                    |           |
| <b>Blank (B12C269-BLK1)</b>                        |        |       |     |     |             |               |               |             |                    |           |
| Total suspended solids                             | ND     | mg/L  | 2   | 2   |             |               |               |             | 03/16/12 :03/16/12 |           |
| <b>LCS (B12C269-BS1)</b>                           |        |       |     |     |             |               |               |             |                    |           |
| Total suspended solids                             | 97     | mg/L  |     |     | 100         |               | 97 (90-110)   |             | 03/16/12 :03/16/12 |           |
| <b>Duplicate (B12C269-DUP1) Source: W12C139-01</b> |        |       |     |     |             |               |               |             |                    |           |
| Total suspended solids                             | 59     | mg/L  | 2   | 2   |             | 58            | 0.9 (20)      |             | 03/16/12 :03/16/12 |           |
| <b>Duplicate (B12C269-DUP2) Source: W12C144-02</b> |        |       |     |     |             |               |               |             |                    |           |
| Total suspended solids                             | 78     | mg/L  | 2   | 2   |             | 84            | 7 (20)        |             | 03/16/12 :03/16/12 |           |

**Polychlorinated Biphenyls (PCBs) - QC**

| Analyte                                       | Result | Units | MDL    | MRL    | Spike Level | Source Result | %Rec (Limits) | RPD (Limit) | Prepared: Analyzed | Qualifier |
|-----------------------------------------------|--------|-------|--------|--------|-------------|---------------|---------------|-------------|--------------------|-----------|
| <b>PCB Aroclors by GC-ECD - Batch B12C311</b> |        |       |        |        |             |               |               |             |                    |           |
| <b>Blank (B12C311-BLK1)</b>                   |        |       |        |        |             |               |               |             |                    |           |
| Aroclor 1016/1242                             | ND     | ug/L  | 0.0250 | 0.0250 |             |               |               |             | 03/19/12 :03/22/12 |           |
| Aroclor 1221                                  | ND     | ug/L  | 0.0500 | 0.0500 |             |               |               |             | 03/19/12 :03/22/12 |           |
| Aroclor 1232                                  | ND     | ug/L  | 0.0250 | 0.0250 |             |               |               |             | 03/19/12 :03/22/12 |           |
| Aroclor 1248                                  | ND     | ug/L  | 0.0250 | 0.0250 |             |               |               |             | 03/19/12 :03/22/12 |           |
| Aroclor 1254                                  | ND     | ug/L  | 0.0250 | 0.0250 |             |               |               |             | 03/19/12 :03/22/12 |           |
| Aroclor 1260                                  | ND     | ug/L  | 0.0250 | 0.0250 |             |               |               |             | 03/19/12 :03/22/12 |           |
| Aroclor 1262                                  | ND     | ug/L  | 0.0250 | 0.0250 |             |               |               |             | 03/19/12 :03/22/12 |           |
| Aroclor 1268                                  | ND     | ug/L  | 0.0250 | 0.0250 |             |               |               |             | 03/19/12 :03/22/12 |           |
| <b>Surrogate</b>                              |        |       |        |        |             |               |               |             |                    |           |
| Tetrachloro-m-xylene                          | 0.0215 |       |        | ug/L   | 0.0500      |               | 43            |             | 03/19/12 :03/22/12 |           |
| Decachlorobiphenyl                            | 0.0426 |       |        | ug/L   | 0.0500      |               | 85            |             | 03/19/12 :03/22/12 |           |
| <b>LCS (B12C311-BS1)</b>                      |        |       |        |        |             |               |               |             |                    |           |
| Aroclor 1016/1242                             | 0.1968 | ug/L  | 0.0250 | 0.0250 | 0.250       |               | 79 (55-116)   |             | 03/19/12 :03/22/12 |           |
| Aroclor 1260                                  | 0.2198 | ug/L  | 0.0250 | 0.0250 | 0.250       |               | 88 (54.8-122) |             | 03/19/12 :03/22/12 |           |
| <b>Surrogate</b>                              |        |       |        |        |             |               |               |             |                    |           |
| Tetrachloro-m-xylene                          | 0.0259 |       |        | ug/L   | 0.0500      |               | 52 (34.4-103) |             | 03/19/12 :03/22/12 |           |
| Decachlorobiphenyl                            | 0.0464 |       |        | ug/L   | 0.0500      |               | 93 (25.1-138) |             | 03/19/12 :03/22/12 |           |
| <b>LCS Dup (B12C311-BSD1)</b>                 |        |       |        |        |             |               |               |             |                    |           |
| Aroclor 1016/1242                             | 0.2000 | ug/L  | 0.0250 | 0.0250 | 0.250       |               | 80 (55-116)   | 2 (20)      | 03/19/12 :03/22/12 |           |
| Aroclor 1260                                  | 0.2190 | ug/L  | 0.0250 | 0.0250 | 0.250       |               | 88 (54.8-122) | 0.4 (20)    | 03/19/12 :03/22/12 |           |
| <b>Surrogate</b>                              |        |       |        |        |             |               |               |             |                    |           |
| Tetrachloro-m-xylene                          | 0.0249 |       |        | ug/L   | 0.0500      |               | 50 (34.4-103) |             | 03/19/12 :03/22/12 |           |
| Decachlorobiphenyl                            | 0.0452 |       |        | ug/L   | 0.0500      |               | 90 (25.1-138) |             | 03/19/12 :03/22/12 |           |

Reported: 03/27/12 12:17

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Renee Chauvin, Laboratory Coordinator QA/QC



City of Portland  
Water Pollution Control Laboratory

6543 N. Burlington Ave. / Portland OR 97203 (503) 823-5600 fax (503) 823-5656



Project: **Portland Harbor**  
Work Order: **W12C139**

Client: Director's Office  
Project Mgr: Linda Scheffler

**Definitions**

|        |                        |     |                                                      |
|--------|------------------------|-----|------------------------------------------------------|
| DET    | Analyte Detected       | ND  | Analyte Not Detected at or above the reporting limit |
| MRL    | Method Reporting Limit | MDL | Method Detection Limit                               |
| NR     | Not Reportable         | dry | Sample results reported on a dry weight basis        |
| % Rec. | Percent Recovery       | RPD | Relative Percent Difference                          |

Reported: 03/27/12 12:17

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Renee Chauvin, Laboratory Coordinator QA/QC



City of Portland  
Chain-of-Custody



Bureau of Environmental Services

Date: 3/15/12

Work Order #: W120139

Collected By: MSJ, ECH, JJM

|                                |                    |
|--------------------------------|--------------------|
| Client Name: Director's Office | Matrix: Stormwater |
| Project Name: Portland Harbor  |                    |

Requested Analyses

| Special Instructions: |             |             |             |             |     |                          |  |  |  |  |  |  |  |  |  |  |  |  |   | # of Containers                                                                     | Remarks |
|-----------------------|-------------|-------------|-------------|-------------|-----|--------------------------|--|--|--|--|--|--|--|--|--|--|--|--|---|-------------------------------------------------------------------------------------|---------|
| Basin 44 Stormwater   |             |             |             |             |     |                          |  |  |  |  |  |  |  |  |  |  |  |  |   |                                                                                     |         |
| Lab Number            | Location ID | Sample Date | Sample Time | Sample Type | TSS | PCB Aroclors (Low-level) |  |  |  |  |  |  |  |  |  |  |  |  |   |                                                                                     |         |
| 01                    | 44_SW14     | 3/15/12     | 1142        | G           | •   | •                        |  |  |  |  |  |  |  |  |  |  |  |  | 2 | SW44-ABC352-MMY-NW<br>N Harding & River, 10" lat from NW                            |         |
| 02                    | 44_SW15     | 3/15/12     | 1129        | G           | •   | •                        |  |  |  |  |  |  |  |  |  |  |  |  | 2 | SW44-ABC352-MMY-NWCB<br>N Harding & River, 10" perched lat from NW CB               |         |
| 03                    | 44_SW16     | 3/15/12     | 1143        | G           | •   | •                        |  |  |  |  |  |  |  |  |  |  |  |  | 2 | SW44-ABC352-MMY-NE<br>N Harding & River, 12" lat from NE                            |         |
| 04                    | 44_SW17     | 3/15/12     | 1123        | G           | •   | •                        |  |  |  |  |  |  |  |  |  |  |  |  | 2 | SW44-ABC352-MMY-E<br>N Harding & River, 8" perched lat from East                    |         |
| 05                    | 44_SW18     | 3/15/12     | 1147        | G           | •   | •                        |  |  |  |  |  |  |  |  |  |  |  |  | 2 | SW44-ABC352-MMY-SW<br>N Harding & River, 10" lat from SE                            |         |
| 06                    | 44_SW19     | 3/15/12     | 1104        | G           | •   | •                        |  |  |  |  |  |  |  |  |  |  |  |  | 2 | SW44-APL246-MMY<br>N Loring & Harding, overland flow to CB from substation property |         |
| 07                    | FIELDUP     | 3/15/12     | 1143        | G           | •   | •                        |  |  |  |  |  |  |  |  |  |  |  |  | 2 | Field Duplicate                                                                     |         |

|                              |               |                              |               |                          |               |
|------------------------------|---------------|------------------------------|---------------|--------------------------|---------------|
| Relinquished By: [Signature] | Date: 3/15/12 | Relinquished By: [Signature] | Date: 3/15/12 | Received By: [Signature] | Date: 3/15/12 |
| Printed Name: [Name]         | Time: 1233    | Printed Name: [Name]         | Time: 1233    | Printed Name: [Name]     | Time: 1233    |