DATA REPORT

DATA REPORT
PORT OF OLYMPIA SOURCE CONTROL INVESTIGATIONS

Prepared for

Port of Olympia

915 Washington Street NE

Olympia, Washington 98501

Prepared by

Anchor QEA, LLC

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June 2012

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TABLE OF CONTENTS

List of Tables

List of Figures

List of Appendices

LIST OF ACRONYMS AND ABBREVIATIONS

ARI	Analytical Resources, Inc.
City	City of Olympia
DQO	data quality objectives
Ecology	Washington State Department of Ecology
EMPC	estimated maximum potential concentration
ISGP	Industrial Stormwater General Permit
MLLW	mean lower low water
mg/L	milligrams per liter
MTCA	Model Toxics Control Act
NELAP	National Environmental Laboratories Accreditation Program
ng/kg	nanograms per kilogram
NPDES	National Pollutant Discharge Elimination System
NTU	Nephelometric Turbidity Unit
OPA	Olympians for Public Accountability
Order	Administrative Order
pg/L	picograms per liter
Port	Port of Olympia
QA	quality assurance
QC	quality control
RI/FS	Remedial Investigation and Feasibility Study
SOP	Standard Operating Procedure
TEQ	Toxic Equivalency Quotient
TOC	total organic carbon
USEPA	U.S. Environmental Protection Agency
WAC	Washington Administrative Code

1 INTRODUCTION

1.1 Report Overview

This data report is submitted in compliance with the requirements of Administrative Order (Order) No. 8499 and the associated Washington State Department of Ecology- (Ecology-) approved Final Work Plan (Anchor QEA 2011a). The Data Report summarizes the methods and results of a source control investigation performed by the Port of Olympia (Port). The Port is located in South Budd Inlet, Olympia, Washington (Figure 1). The purposes and objectives for that investigation are described in Section 1.2.

This data report complies with the requirements of Model Toxics Control Act (MTCA) Washington Administrative Code (WAC) Chapter 173-340-820 and the sampling, sample handling and analysis methods described in the Final Work Plan (Anchor QEA 2011a).

1.2 Purpose and Objectives

The Port is currently engaged in the investigation and cleanup of sediment contamination within a portion of Budd Inlet, and is currently conducting a Remedial Investigation and Feasibility Study (RI/FS) for sediments within a portion of Budd Inlet. This work is being overseen by Ecology under a recent Agreed Order Amendment (First Amendment to Agreed Order No. DE 6083; Ecology 2012).

Contaminants within Budd Inlet sediments include dioxin/furans from legacy and potential ongoing sources of contamination. A bay-wide assessment of sediment quality within Budd Inlet was recently completed on behalf of Ecology (SAIC 2008). That study identified dioxin/furans as ubiquitous throughout Budd Inlet surface sediments, with average dioxin/furan concentrations of 19.1 parts per trillion nanograms per kilogram (ng/kg) as measured using the Toxic Equivalency Quotient (TEQ) method.

In support of ongoing source control evaluation efforts, the Port conducted sampling in 2010 for dioxin/furan compounds within portions of storm drain systems located in the Port's terminal and log yard areas. Some of this sampling also addressed requirements of a settlement agreement with the group Olympians for Public Accountability (OPA).

The findings of the Port's earlier sampling studies are described in Section 2. Testing indicated the presence of elevated dioxin/furan concentrations in samples from three catch basins within a portion of the Port's marine terminal (specifically within storm basins A and B). The results indicated that neither the ongoing log yard activities nor the former Cascade Pole remediation site are the source of the dioxin/furan contamination trapped in the storm drainage system. Based on the available data, the source of the accumulated catch basin solids containing elevated dioxin/furan contamination appears to be the result of historical lumber handling activities or building fires on the marine terminal.

After detection of the elevated dioxin/furan contamination in the storm drain system at the marine terminal, the Port conducted system cleanings to remove the accumulated solids. The Port also conducted system inspections. In a letter to Ecology dated April 1, 2011, the Port stated its intention to conduct follow-up sampling of the storm drain system within the marine terminal area to ensure that the source of elevated dioxin/furan concentrations had been reduced through the completed system cleanouts. That sampling was to include the collection of solids from portions of the terminal storm drain system.

The Port met with Ecology to discuss the 2010 sampling data and the follow-up sampling methods. Ecology issued Administrative Order No. 8499 related to the completion of follow-up sampling studies. The specific sampling locations and methods were then defined in a Work Plan (Anchor QEA 2011a) approved by Ecology in August 2011.

1.3 Report Organization

This data report contains the information required by Task 3 in Administrative Order No. 8499 and is organized as follows:

- Section 2 of this report provides background information regarding the storm drain sampling work as discussed in the Final Work Plan (Anchor QEA 2011a).
- Section 3 describes sampling and analysis methods.
- Section 4 summarizes the results of catch basin monitoring, solids sampling, and basin stormwater monitoring consistent with Administrative Order No. 8499 requirements.
- Section 5 provides conclusions and recommendations.

Attachments to this data report include catch basin monitoring logs, copies of analytical data, and data validation findings. The Order also specified that any manifest or disposal receipts for disposal of sediments from catch basin cleanouts were to be attached to this data report. However, as described in Section 3, catch basin solids accumulations were minimal, and no cleanouts were required; therefore, there are no applicable manifests or disposal receipts to attach.

2 BACKGROUND

The Port owns property on the waterfront of Budd Inlet, including a mixed-use area, a marine cargo terminal, and portions of property leased to tenants for the operation of a log storage yard. Separated storm drainage systems owned and operated by the Port and by the City of Olympia (City) service these properties. The Port manages its storm drainage systems consistent with the requirements of its National Pollutant Discharge Elimination System (NPDES) Phase 2 Municipal Separated Storm Sewer Systems Permit. Portions of the marine terminal and log yard are regulated separately under two Industrial Stormwater General Permit.

The Port has also been conducting investigation and cleanup activities relating to contaminated marine sediments located within Budd Inlet. Those sediments are contaminated with dioxin/furan compounds. In support of ongoing source tracing and source control efforts, the Port conducted sampling of its storm drainage systems and industrial activities for dioxins during 2010. Results of that sampling are described in Section 2.1.

2.1 Previous Dioxin Sampling Results

During July and August 2010, the Port conducted chemical testing of storm drain solids for dioxin/furan compounds. The testing was not part of the Port's NPDES permit-required activities, but rather, was a separate action taken by the Port.

The testing included sampling of each of the four storm drain basins (A, B, C, and I) at the terminal. Locations of these basins are shown in Figure 2. Testing included sampling of solids trapped in portions of the storm drain system catch basins or other conveyance structures. Because most of the storm drainage structures date from the 1970s or 1980s, respectively, and because no previous sampling has been performed for these compounds within the drainage systems, the solids tested as part of this effort may date from previous decades.

Concentrations of dioxin/furans, expressed as a 2,3,7,8-TCDD TEQ were very low within the majority of the system. These concentrations, measured in ng/kg, are shown on Figure 2 and

in Table 1. There are no regulatory criteria applicable to storm drain solids. However, as a point of reference, studies compiled in support of the U.S. Environmental Protection Agency's (USEPA's) multi-year dioxin reassessment process estimate an urban soil background dioxin concentration of up to 21 ng TEQ/kg. Ecology's regional studies of background soil dioxin/furan levels are ongoing. However, data compiled as of August 2010 indicated that typical uncontaminated urban soils may contain dioxin/furan TEQ concentrations up to 21 ng/kg, with 90 percentile concentrations of 9.93 ng/kg (Bradley 2010). Within Budd Inlet, the average bay-wide surface sediment dioxin/furan concentrations have been measured at 19.1 ng TEQ/kg (SAIC 2008).

The two northerly storm drain basins (C and I), which together constitute the majority of the Port terminal and log handling areas, contained very low dioxin/furan concentrations (3.8 to 7.9 ng/kg). These concentrations are well below urban background concentrations estimated by the USEPA and Ecology, and are well below the Budd Inlet average sediment concentrations. None of the samples from the C or I basins included detectable concentrations of the dioxin congener 2,3,7,8-TCDD.

However, samples collected within basin A and the southern half of basin B contained elevated dioxin/furan compounds and detectable concentrations of 2,3,7,8-TCDD. These two areas are ranked as low-industrial areas and are not used for heavy log handling activities.

In response to the detection of the elevated dioxin/furan concentrations within basins A and B, the Port conducted a review of available information. The results of that review yielded the findings detailed in the following subsections.

2.1.1 Dioxins Not Associated with Log Yard Activities

All three solids samples with elevated dioxin concentrations (A02CB, A08CB, and B27CB; Table 1) were taken from catch basins in the low industrial areas and had low total organic carbon (TOC) values (less than 10 percent). Samples taken from basin I and settling basin 2 (both high industrial areas maintained by Weyerhaeuser) had low dioxin concentrations and elevated TOC values (greater than 35 percent, consistent with typical observations for log-handling operations). The sampling data confirm that the detected dioxin/furans in basins A and B are not related to ongoing log yard activities, and rather represent historical pollutants

trapped in the storm drain system. These findings confirm previous log yard sweeping samples which showed dioxin concentrations of less than 4 ng/kg in accumulated log yard sweepings, well below typical urban soil background dioxin/furan concentrations (Bradley 2010).

2.1.2 Findings Not Related to Cascade Pole Cleanup Site

Portions of basin C are located over the remediated Cascade Pole cleanup site as shown in Figure 2. The test samples collected within these areas contained very low dioxin/furan concentrations. The sampling from this basin confirms that the Cascade Pole site does not impact sediments in the stormwater system.

2.1.3 Very Small Volume of Solids within System A and B

Basins A and B combined generate a very small volume of solids during routine system maintenance. These two basins combined generate typically no more than 1 cubic yard of solids per year during periodic catch basin cleanouts. The catch basins that were selected for sampling by the Port in August 2010 were chosen in part because most catch basins had insufficient material to sample.

2.1.4 No Evidence of a Release to the Environment

There is no evidence that the solids trapped in basins A or B catch basins were released to the environment. The absence of a release of sediments can be confirmed because the Port has been conducting extensive sediment monitoring adjacent to the basin B outfall (Anchor QEA, 2010). That sampling includes collection of sediment samples on the sand cover placed as part of the Port's Interim Action area. Three of the sampling stations are located just offshore of Outfall B, as shown in Figures 2 and 3. Sediment sampling data from these stations (5.9 to 9.1 ng TEQ/kg) remain well below Budd Inlet background concentrations of 19.1 ng TEQ/kg (SAIC 2008), and are not significantly different than other post-remediation monitoring sampling locations.

2.1.5 Summary

The specific source of the detected dioxin/furan compounds in the basin A and B catch basin solids has not been conclusively determined. However, potential legacy sources include the handling of finished lumber (which historically may have been treated with sap-stain preventatives) at the marine terminal during the 1980s and 1990s, or combustion sources associated with historical building fires at the marine terminal. No potential ongoing sources of the dioxin/furan compounds were identified.

2.2 Completed Source Control Activities

After receipt of the 2010 sampling data for the trapped storm system solids, the Port took numerous actions to ensure that legacy sources are controlled and that there is no release to the environment. These completed actions are detailed in the following subsections.

2.2.1 System Cleanouts

The Port conducted cleanouts of both basins A and B in 2010. The Port initially cleaned the majority of the system in 2010, with the exception of location A08CB. That location could not be cleaned at that time because it had a large personnel trailer located over the structure. This location was subsequently cleaned out by the Port. The solids removed from the system were managed by non-hazardous disposal at an appropriately permitted, off-site disposal facility operated by Waste Management.

2.2.2 Drain System Inspections

In addition to the system cleanout, inspections were completed within the A and B stormwater system between August 31 and December 2, 2010. The inspections were performed by Econo-Vac/CUES, Inc.

2.2.3 Offshore Sediment Monitoring

As described in Section 2.1, the most recent sediment monitoring event located offshore of the marine terminal (sampling event from December 2010; Anchor QEA 2011b) did not show any evidence of a release to the environment from the storm drain systems (Figure 3).

2.2.4 Review of Storm Basin A and B History

The Port conducted a review of the basin A and B drainage systems and historical terminal uses. The A and B storm system dates back to the 1970s and 1980s, respectively. The Port has used this property for material import, export, and storage since this time. Given the ubiquitous potential sources for dioxin/furans, it is difficult to identify a specific source for historic contamination. The most likely candidate sources for the elevated dioxin/furan compounds in the catch basin solids include former handling of finished lumber materials at the marine terminal and historical destruction by fire of certain marine terminal structures. No potential ongoing sources of dioxin/furan sediment contamination were identified within the marine terminal facility.

2.3 Ecology Coordination and Work Plan Development

After receipt of the sampling data for the trapped storm system solids, the Port provided Ecology with its analysis of site conditions and proposed sampling methodologies to assess the status of associated source control activities. This information was contained in a letter between the Port and Ecology dated April 1, 2011.

Subsequently, the Port met with Ecology on multiple occasions to discuss potential follow-up sampling methods. Additionally, Ecology issued Administrative Order No. 8499, requiring follow-up sampling of the Port's storm drainage system. The Port and Ecology developed a Final Work Plan specifying methods for follow-up sampling in storm drain basins A and B. Ecology approved the Final Work Plan in August of 2011.

3 MONITORING AND SAMPLING METHODS

This section describes the sampling and analysis methods used, consistent with the Final Work Plan (Anchor QEA 2011a). Sampling activities included the following:

- **Catch Basin Monitoring:** Monthly monitoring of solids accumulations was performed within select catch basins consistent with the FinalWork Plan.
- **Catch Basin Solids Sampling and Analysis:** Catch basins previously shown to contain elevated dioxin/furan compounds were resampled to assess the status of source control activities for these compounds. Sampling was performed consistent with the schedule specified in the Final Work Plan.
- **Basin Discharge Sampling and Analysis:** Sampling of stormwater discharges for dioxin was performed in each of the basins in which elevated dioxin/furans were noted in catch basin sediments. Water sampling in these basins included testing for concentrations of the dioxin congener 2,3,7,8-TCDD, total suspended solids, and turbidity. As noted below, the Port conducted two rounds of water sampling (January and April 2012).

3.1 Catch Basin Monitoring

Catch basins A02CB, A08CB, B27CB, and I-01CB were inspected on a monthly basis following Ecology approval of the Final Work Plan. Figure 2 illustrates provides the monitoring locations. Monitoring log sheets are included as Appendix A.

Based on the monthly inspections, solids accumulation within the catch basins was minimal. No cleanouts of the catch basins were required during the monitoring period.

3.2 Catch Basin Solids Sampling

Catch basin grab samples were collected from catch basins A02CB, A08CB, and B27CB. The test locations include each of the basins within which elevated dioxin/furan compounds were noted in trapped catch basin solids. Consistent with the Final Work Plan, no sampling was performed within basins C and I because measured solids within those basins contained dioxin/furan concentrations below typical urban background and Budd Inlet background

concentrations. None of the samples from these basins contained detectable concentrations of the congener 2,3,7,8-TCDD.

The Final Work Plan specified that sampling was to be performed following accumulation of catch basin solids to a height of at least 50 percent of the basin outlet. However, the depths of accumulation never reached the 50 percent value. Actual accumulations ranged from 3 to just over 15 centimeters (3 to 15 percent of the basin outlet) between August 2011 and June 2012.

Despite the low solids accumulations, grab samples of accumulated solids were collected in January 2012 from the designated locations for chemical testing. Sediment chemical and physical testing was conducted at Analytical Resources, Incorporated (ARI), located in Tukwila, Washington. ARI is accredited under the National Environmental Laboratories Accreditation Program (NELAP). Table 4 presents the testing parameters and target reporting limits used for sampling.

3.3 Basin Discharge Sampling

Water sampling was conducted for discharges from storm drain basins A and B. No water sampling was performed for storm drain basins C and I, because concentrations of dioxin/furan compounds in solids from storm drain basins C and I were below typical urban soil concentrations (Bradley 2010) and were also below average Budd Inlet sediment concentrations (SAIC 2008), and because the dioxin congener 2,3,7,8-TCDD was not detected in the solids samples from basins C and I.

Water sampling was performed at the same locations as the Industrial Stormwater General Permit (ISGP) stormwater monitoring required under the Port's ISGP. Water sampling was conducted in parallel with a permit sampling event. Sampling was performed using stormwater grab samples.

Because the Port's stormwater system is tidally inundated, the sampling was performed during a storm event occurring during low-tide conditions (i.e., a tidal elevation less than 3 feet above mean lower low water [MLLW]). The use of low-tide sampling was intended to

reduce the effects of tidal exchange and maximize the representativeness of the sampling for system stormwater discharges.

Stormwater samples were collected on January 31, 2012, from each of four locations:

- Sample of stormwater discharge from basin A
- Sample of stormwater discharge from basin B
- Field blank (clean ionized water) to control for potential sampling and analysis artifacts
- Equipment blank (equipment rinsate) to verify that any detected contamination is not associated with the field sampling and analysis procedures

Collected water samples were submitted for chemical analysis to Analytical Resources, Inc. (ARI), located in Tukwila, Washington. ARI is accredited under NELAP. Table 3 presents the storm basin discharge sampling design, including locations and test parameters, and Table 5 presents the analysis methods and target reporting limits. Sampling included testing for concentrations of the dioxin congener 2,3,7,8-TCDD, total suspended solids, and turbidity consistent with the requirements of Administrative Order No. 8499.

A second sampling event was conducted on April 11, 2012. This sampling event was conducted because method interferences were noted during analysis of the January samples, and to provide an improved sample count. Sampling methods were the same as those used in the January sampling event. Samples were submitted for chemical analysis to ARI, located in Tukwila. Dioxin analyses were subcontracted by ARI to Vista Analytical Labs (El Dorado Hills, California.).

3.4 Data Validation

All sampling and analysis data from the 2010 and 2012 sampling events were validated by Anchor QEA prior to use in this data report. Data were validated consistent with analytical protocols and quality assurance (QA) guidance of the USEPA's *Test Methods for the Evaluation of Solid Waste: Physical/Chemical Methods, 3rd Edition* (USEPA 1986, 1993), and the *U.S. EPA Contract Laboratory Program National Functional Guidelines for Data Review* (USEPA 2004, 2005). Data validation findings are summarized in Appendix C.

For data validation, the laboratory provided an electronic version of the data package (.pdf). Data packages were checked for completeness immediately upon receipt from the laboratory to ensure that data and QA/quality control (QC) information requested are present. Data quality were assessed by considering the following:

- Holding times
- All compounds of interest reported
- Method detection limits
- Reporting limits
- Labeled standard spike results
- Laboratory control samples/ongoing precision and recovery results
- Method blanks
- Sample replicate precision results

In addition to data packages, electronic data deliverables were provided in Anchor QEA's custom EQuIS format. The laboratory data were subject to a Level II or QA1 manual validation in accordance with the project-specific data quality objectives (DQOs) described in the Final Work Plan, analytical method criteria, and the laboratory's internal performance standards based on their Standard Operating Procedures (SOPs). Qualifiers were assigned based on *USEPA Contract Laboratory Program National Functional Guidelines for Data Review* (USEPA 2004, 2005). Laboratory data, which are electronically provided and loaded into the database, will undergo a 10 percent electronic verification against the laboratory data package. The accuracy of all manually entered data (i.e., qualifiers) were verified by a second party. Data tables and reports will be exported from EQuIS to Microsoft Excel tables.

4 RESULTS OF SUPPLEMENTAL TESTING

This section summarizes the results of supplemental catch basin monitoring, storm drain solids testing, and stormwater sampling conducted consistent with the Ecology-approved Final Work Plan (Anchor QEA 2011a).

4.1 Catch Basin Monitoring

The Final Work Plan specified that solids accumulations would be monitored monthly at four locations. These locations included the catch basins within the A and B basins where elevated dioxins were detected in catch basin solids. Also included was a location within basin I, which did not contain elevated dioxins during the 2010 sampling event. Locations monitored included the following:

- A02CB
- A08CB
- B27CB
- I-01CB

Catch basin monitoring logs are contained in Appendix A. Results of monitoring are summarized in Table 6.

Previous Port observations indicated that solids accumulation rates were very low within the catch basins of basins A and B, with cumulative solids generation rates for the two basins of approximately 1 cubic yard of solids each year. Findings of catch basin monitoring are consistent with these previous observations. Over the 11 months between Final Work Plan approval and June 2012, solids accumulations in the A and B basins were very low. Total accumulations ranged from 3 to just over 15 centimeters. These accumulations did not even approach the 50 percent (i.e., 50 percent of the distance between the sump bottom and the basin outlet) threshold, which had been established as the trigger for catch basin solids testing. Based on the low solids accumulation rates, it was not necessary to clean the catch basins during the monitoring period.

Solids accumulation rates within the I basin were somewhat greater and are consistent with previous observations. Solids accumulations in this basin reached approximately 25

centimeters (21 percent of the height to the basin outlet), with some variability observed between monitoring events suggesting potential solids shifting, settling or consolidation.

4.2 Solids Testing

Per the Final Work Plan, sampling was to be performed following accumulation of catch basin solids to a height of at least 50 percent of the basin outlet. However, maximum depths of accumulation never reached the 50 percent value as described in Section 4.1.

Despite the low solids accumulations rates, grab samples were collected for chemical analysis in January 2012 from the thin layer of solids that had accumulated in the test basins. Testing results from these grab samples are summarized in Table 7, along with the previous findings from 2010 chemical testing of the same catch basins.

Results demonstrated significant decreases in concentration in two of the three catch basins. Reductions in dioxin/furan concentrations were as follows:

- A08CB: 4.3 percent reduction (lowest solids accumulations)
- A02CB: 87 percent reduction
- B27CB: 78 percent reduction

Findings are consistent with the hypothesis that the source of the dioxin/furans is legacy solids that were trapped in the storm drain system. Substantial concentration reductions (up to 87 percent) were observed since the drain system cleanouts. The greatest reductions were observed in the catch basins with the higher accumulation of new solids, suggesting that the newly depositing stormwater solids have much lower solids concentrations than solids previously trapped in the system.

4.3 Stormwater Sampling

Table 8 summarizes the results of stormwater samples collected at each of the A and B basins. Sampling locations were the same locations as ISGP. No water sampling was performed for storm drain basins C and I, because concentrations of dioxin/furan compounds in solids from storm drain basins C and I were below typical urban soil concentrations (Bradley 2010) and

were also below average Budd Inlet sediment concentrations (SAIC 2008), and because the dioxin congener 2,3,7,8-TCDD was not detected in the solids samples from basins C and I.

Because the Port's stormwater system is tidally inundated, the sampling was performed during a storm event occurring during low-tide conditions (i.e., a tidal elevation less than 3 feet above MLLW). The use of low-tide sampling was intended to reduce the effects of tidal exchange and maximize the representativeness of the sampling for system stormwater discharges.

Stormwater samples were collected on two different sampling events. The first sample set was conducted January 31, 2012. The second sample set was collected on April 11, 2012. Each sampling event included samples collected from each of four locations:

- Sample of stormwater discharge from basin A
- Sample of stormwater discharge from basin B
- Field blank (clean ionized water) to control for potential sampling and analysis artifacts
- Equipment blank (equipment rinsate) to verify that any detected contamination is not associated with the field sampling and analysis procedures

Testing results from the sampling events are summarized in Table 8.

- **Basin A:** Concentrations of total suspended solids and turbidity from basin A ranged from 17 to 49.8 milligrams per liter (mg/L), and 9.8 to 13.1 Nephelometric Turbidity Unit (NTU), respectively. Dioxin analyses from the January sampling required re-analyses due to sample interferences. Results were below the method reporting limit and were J-flagged in data validation. Dioxin was not detected in the April re-sampling event at an estimated detection limit of 1.11 picograms per liter (pg/L or parts per quadrillion).
- **Basin B:** Concentrations of total suspended solids and turbidity ranged from 35.3 to 58 mg/L and 54 to 85 NTU, respectively. Dioxin was not detected in either sampling event. Results of the January analyses did not meet method identification criteria, with the estimated maximum potential concentration (EMPC) of 0.206 pg/L. Dioxin results from the April sampling event were nondetect at an estimated detection limit

of 1.74 pg/L.

Results of stormwater testing corroborate those from other studies performed recently by Brown & Caldwell. In that sampling, composite stormwater samples were collected and analyzed for dioxin. Dioxin was not detected in that sampling event (Brown & Caldwell 2012), indicating that stormwater from the terminal is not an ongoing source of dioxin to Budd Inlet.

4.4 Ongoing Activities

The Port continues to monitor solids accumulations within the four test catch basins (A02CB, A08CB, B27CB, I-021CB). Following completion of 12 months of monitoring in August 2012, the Port plans to conduct an additional cleanout of the A and B basins, despite the low solids accumulations.

The Port continues to work with Ecology on the assessment of sediment quality and the status of dioxin source control within the central portion of Budd Inlet. These activities are being performed under MTCA Agreed Order Amendment No. DE 6083 (Ecology 2012).

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5 CONCLUSIONS AND RECOMMENDATIONS

The results of the Source Control Investigation described in this data report are consistent with previous evaluations conducted in support of the Work Plan development (Anchor QEA 2011a). Results of supplemental testing indicate the following:

- **Low Rates of Solids Accumulation:** Solids monitoring confirms that stormwater solids accumulate very slowly within stormwater basins A and B. Solids accumulation rates were well below the accumulation rates that had been established as a trigger for solids sampling during the Work Plan development.
- **Substantial Concentration Reductions in Catch Basin Solids Since 2010:** The dioxin/furan concentrations measured in the catch basin solids from 2012 were much lower than those measured previously in 2010 prior to the cleanouts of basins A and B. Concentrations observed in 2012 were up to 87 percent lower than those observed in 2010. Results tend to confirm the Port's hypothesis that the dioxin contamination detected in 2010 was the result of legacy solids trapped in the storm drain system, rather than from an ongoing source, and that system cleanouts conducted by the Port have removed most of the affected solids.
- **Stormwater Findings:** Previous stormwater testing performed on behalf of the City by Brown & Caldwell did not detect dioxin (Brown & Caldwell 2012). The current sampling performed in January and April of 2012 was performed using ultra-low detection limits. No dioxin was detected in three of four samples, and none of the four samples exceeded the method reporting limit. Results suggest that stormwater from basins A and B is, at most, an insignificant source of dioxin to Budd Inlet. This result corroborates the results of previous post-remediation sediment monitoring near Outfall B which has consistently shown sediment dioxin/furan concentrations below Budd Inlet background concentrations (Anchor QEA 2011b).

Based on the findings of testing, it appears appropriate to continue to conduct periodic catch basin cleanouts within basins A and B to pursue continued reductions in dioxin/furan concentrations in catch basin solids. Based on the low solids accumulation rates observed, a cleanout frequency of once per year appears sufficient to remove all accumulated solids from these basins.

The Port is continuing to work with Ecology regarding sediment quality and source control investigations within Budd Inlet under MTCA Agreed Order Amendment No. DE 6083 (Ecology 2012).

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TABLES

Table 1
Summary of 2010 Chemical Testing Data for Trapped Storm Drain Solids

Sub-Basin	Sample	Total Dioxin/Furan Concentration (ng TEQ/kg) [2]	Total Organic Carbon (%)
Basins with Elevated Dioxin/Furans in Catch Basin Solids			
A	A08CB	164	1.63
	A02CB	1,960	5.88
B	B27CB	2,020	9.64
Basins with Background Dioxin/Furan Levels [3,4]			
C	C-101MH[1]	3.8 [3,4]	Not tested
	SB#2	7.9 [3,4]	44.2
	C-01MH[1]	6.3 [3,4]	Not tested
I	I-01CB	4.2 [3,4]	37.8

Notes:

ng/kg	nanograms per kilogram
TEQ	Toxic Equivalency
1	Not part of the Olympians for Public Accountability sampling event.
2	There are no regulatory criteria applicable to in-place storm drain solids.
3	Sample concentrations were lower than the 90th percentile of soil samples collected by Washington State Department of Ecology (Ecology) in uncontaminated urban areas (Bradley et. al 2010), the Model Toxics Control Act Method B and C soil cleanup levels, and average sediment quality within Budd Inlet sediments as measured by studies performed on behalf of Ecology (SAIC 2008).
4	The 2,3,7,8-TCDD congener was not detected in these samples.

Table 2
Sampling Design - Catch Basin Solids

Basin	Catch Basin [1]	Sample Type	
		Discrete Sample [1]	Testing Parameters [2]
Catch Basin Solids			
A	A02CB	X	D/F, TOC, TS
	A08CB	X	D/F, TOC, TS
B	B27CB	X	D/F, TOC, TS

Notes:

D/F	dioxin and furans
TOC	total organic carbon
TS	total solids
1	Discrete samples were collected after catch basin solids accumulated to greater than 50% of the height to the drainage outlet. If catch basin solids did not accumulate to this level prior to January 1st, 2012, solids were collected at a lower accumulation thickness or from an adjacent catch basin within the same sampling basin.
2	Additional samples shall be archived for potential follow-up testing.

Table 3
Sampling Design - Water Samples

Basin	Sample ID	Sample Type	
		Whole Water Grab Sample	Testing Parameters[2,3]
A	A01	X	Dioxin, TSS, Turbidity
B	B01	X	Dioxin, TSS, Turbidity
Field Blank	F01	X	Dioxin, TSS, Turbidity
Equipment Blank	E01	X	Dioxin, TSS, Turbidity

Notes:

TSS	Total Suspended Solids
1	Discrete samples were collected during a low-tide (less than +3.0 feet mean lower low water) storm event in parallel with Industrial Stormwater General Permit (ISGP) required sampling. Sampling locations were the same as those used to document compliance with ISGP permit conditions.
2	A and B sampling locations were the same as those included in the ISGP monitoring program.
3	Dioxin = 2,3,7,8-TCDD by Environmental Protection Agency, Method 1613B
4	Based on analytical interferences observed during the first sampling event, a second water sampling event was conducted, yielding two data sets for each sample location.

Table 4
Catch Basin Solids Sampling Parameters, Analytical Methods, and Target Reporting Limits

Parameter	Analytical Method	Units	Practical Quantitation Limit (PQL)	Laboratory Method Reporting Limit
Conventional Parameters				
Total solids	PSEP 1986	% wet wt	0.1	0.01
Total organic carbon (TOC)	PSEP 1986	% dry wt	0.1	0.05
Dioxin/Furans[a]				
Dioxins				
2,3,7,8-TCDD	1613B	ng/kg dry wt	--	1.0
1,2,3,7,8-PeCDD	1613B	ng/kg dry wt	--	5.0
1,2,3,4,7,8-HxCDD	1613B	ng/kg dry wt	--	5.0
1,2,3,6,7,8-HxCDD	1613B	ng/kg dry wt	--	5.0
1,2,3,7,8,9-HxCDD	1613B	ng/kg dry wt	--	5.0
1,2,3,4,6,7,8-HpCDD	1613B	ng/kg dry wt	--	5.0
OCDD	1613B	ng/kg dry wt	--	10
Furans				
2,3,7,8-TCDF	1613B	ng/kg dry wt	--	1.0
1,2,3,7,8-PeCDF	1613B	ng/kg dry wt	--	5.0
2,3,4,7,8,-PeCDF	1613B	ng/kg dry wt	--	5.0
1,2,3,4,7,8-HxCDF	1613B	ng/kg dry wt	--	5.0
1,2,3,6,7,8-HxCDF	1613B	ng/kg dry wt	--	5.0
1,2,3,7,8,9-HxCDF	1613B	ng/kg dry wt	--	5.0
2,3,4,6,7,8-HxCDF	1613B	ng/kg dry wt	--	5.0
1,2,3,4,6,7,8-HpCDF	1613B	ng/kg dry wt	--	5.0
1,2,3,4,7,8,9-HpCDF	1613B	ng/kg dry wt	--	5.0
OCDF	1613B	ng/kg dry wt	--	10

Notes:

ng/kg nanograms per kilogram

a Consistent with the Work Plan, Toxic Equivalency (TEQ) were calculated using WHO 2005 Mammalian toxic equivalency factor (TEFs) with ND=0, EMPC=0

Table 5
Water Sampling Parameters, Analytical Methods, and Target Reporting Limits

Parameter	Analytical Method	Units	Estimated Detection Limit (EDL)[1]	Practical Quantitation Limit (PQL)[2]	Laboratory Method Reporting Limit (MRL)[3]
Conventional Parameters					
Turbidity	180.1	NTU	--	--	0.05
Total Suspended Solids	SM2540 D-97	mg/L	--	--	1
Dioxin					
2,3,7,8-TCDD	1613B	pg/L	1.3	5	10.0

Notes:

1 The EDL is a sample and analyte specific detection limit that takes into account labeled standard recoveries, dilutions, and matrix interferences. The value provided in the work plan was an approximated EDL based on routine laboratory water results. Non-detect results were reported to the EDL.

2 The PQL was calculated by multiplying the EDL by 3.18 and rounding to the next whole integer per 40 CFR Part 136 Appendix A.

3 The MRL is defined by the lowest calibration standard used in the initial calibration.

NTU Nephelometric Turbidity Unit

mg/L milligrams per liter

pg/L picogram per liter

Table 6
Results of Catch Basin Solids Monitoring

Monitoring Point ID	A02CB*		A08CB*		B27CB*		I-01CB	
Depth of Sump - Outlet Pipe to Sump Bottom (cm)	45.7		45.7		99.1		119.4	
Depth of Accumulated Solids at Indicated Monitoring Date	(cm)	(% of Capacity)	(cm)	(% of Capacity)	(cm)	(% of Capacity)	(cm)	(% of Capacity)
9/29/2011	1.5	3%	1	2%	6.4	6%	17.8	15%
10/21/2011	2	4%	1	2%	8.5	9%	30.5	26%
11/17/2011	3.8	8%	4.5	10%	10.2	10%	49	41%
12/22/2011	5.5	12%	4	9%	10	10%	17.8	15%
1/31/2012*	5	11%	4	9%	9.6	10%	23	19%
2/28/2012	4.4	10%	4.9	11%	6.4	6%	19	16%
3/21/2012	4.4	10%	2.2	5%	8.8	9%	22.8	19%
4/13/2012	5.1	11%	2.5	5%	10.2	10%	25.4	21%
5/17/2012	5.1	11%	2.9	6%	12.7	13%	22.9	19%
6/11/2012	5.1	11%	3.2	7%	15.2	15%	20.3	17%

Notes:

Depth measurements are approximate. Sources of variation between measurements may include solids settling, shifting or consolidaiton between measurement dates.

* Solids samples were collected from catch basins A02CB, A08CB and B27CB for chemical testing on January 26, 2012.

cm centimeter

Table 7

Comparison of Dioxin/Furan Concentrations in 2010 and 2012 Catch Basin Solids

Basin	Basin A				Basin B	
Location	A08CB		A02CB		B27CB	
Sample ID	SBA-SHALLOW	A08CB-20120126	SBA-TERMINUS	A02CB-20120126	SBB-SHALLOW	B27CB-20120126
Sample Date	8/9/2010	1/26/2012	8/9/2010	1/26/2012	8/9/2010	1/26/2012
Conventional Parameters (pecent)						
Total organic carbon	1.63	14.6 J	5.88	R	9.64	33.1
Total solids	59	40.4	37.1	19.1	44.9	18.1
Dioxin Furans (ng/kg)						
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	1.96	2.43	15.3	3.97	18.9	5.87
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	38.4	40	169	42.8	223	78.2
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	76.6	85.8	601	114	738	212
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	229	231	2690 J	349	2410 J	458
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	182	183	2240 J	218	2360 J	401
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	5040	3870	75200 J	8130	71400 J	12800
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	24600 J	20300	687000 J	64900	627000 J	109000
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	7.39	6.22	9.07	3.05	15.6	4.27
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	18	14.2	33.3	9.62	93.5	19.5
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	13.3	13.6	27.1	9.09	83.4	23.4
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	34.3	28.8	310	59.7	643	157
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	23	23.2	177	41.8	272	88
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	1.67 J	11.3	8.27	17.7	18.2	35.4
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	18.3	30.9	112	61.8	149	120
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	387	469	14700 J	1640	14900	3050
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	18.6	24.1	789	134	853	274
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	1190 J	1360	115000 J	8760	107000 J	17100
Total Tetrachlorodibenzo-p-dioxin (TCDD)	5.98	9.91	52.1	17	60.6	26.3
Total Pentachlorodibenzo-p-dioxin (PeCDD)	92.2	123	517	141	695	251
Total Hexachlorodibenzo-p-dioxin (HxCDD)	1060	1190	7130	1600	8120	2530
Total Heptachlorodibenzo-p-dioxin (HpCDD)	6570	6570	74600	13500	71400	21900
Total Tetrachlorodibenzofuran (TCDF)	35	34.7	145	42.9	247	73.9
Total Pentachlorodibenzofuran (PeCDF)	337	430	1050	386	2230	764
Total Hexachlorodibenzofuran (HxCDF)	1050	1050	7520	1780	10900	3490
Total Heptachlorodibenzofuran (HpCDF)	1270	1410	34400	5910	35300	12300
2005 WHO, ND = 0	164	157	1960	257	2020	438
Percent Reduction in Dioxin/Furan TEQ (2010-2012)	NA	4.3%	NA	87%	NA	78%

Notes:

ng/kg nanograms per kilogram

R Data result rejected; dryweight corrected. TOC result was elevated due to an artifact associated with dryweight measurement.

TEQ Toxic Equivalency

Table 8
Stormwater Sampling Results

Sample Location	A01SW		B01SW	
Sample ID	A01SW-20120131	A01SW-20120411	B01SW-20120131	B01SW-20120411
Sample Date	1/31/2012	4/11/2012	1/31/2012	4/11/2012
Sample Type	Water	Water	Water	Water
Conventional Parameters (mg/l)				
Total suspended solids	**49.8**	**17**	**58**	**35.3**
Conventional Parameters (ntu)				
Turbidity	**13.1**	**9.8**	**85**	**54**
Dioxin (pg/l)				
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	1.10 J	1.11 U	0.206 EMPC	1.74 U

Sample Location	Equipment Blanks		Field Blanks	
Sample ID	E01SW-20120131	E01SW-20120411	F01SW-20120131	F01SW-20120411
Sample Date	1/31/2012	4/11/2012	1/31/2012	4/11/2012
Sample Type	Water	Water	Water	Water
Conventional Parameters (mg/l)				
Total suspended solids	1.1 U	1 U	1.1 U	1 U
Conventional Parameters (ntu)				
Turbidity	0.05 U	0.05 U	0.05 U	0.05 U
Dioxin (pg/l)				
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	1.63 U	1.22 U	0.129 U	1.37 U

Notes:

Bold Detected Result. Results meet all data acceptance criteria.

EMPC Estimated maximum potential concentration. Analytes that have a signal to noise ratio greater than 2.5 for the quantitation and confirmation ions but ion ratios are not within method limits are qualified as EMPC. Because not all of the identification criteria have been met and therefore the presence of the analyte cannot be confirmed, these results are treated as non-detects at the EMPC level reported.

J Estimated value

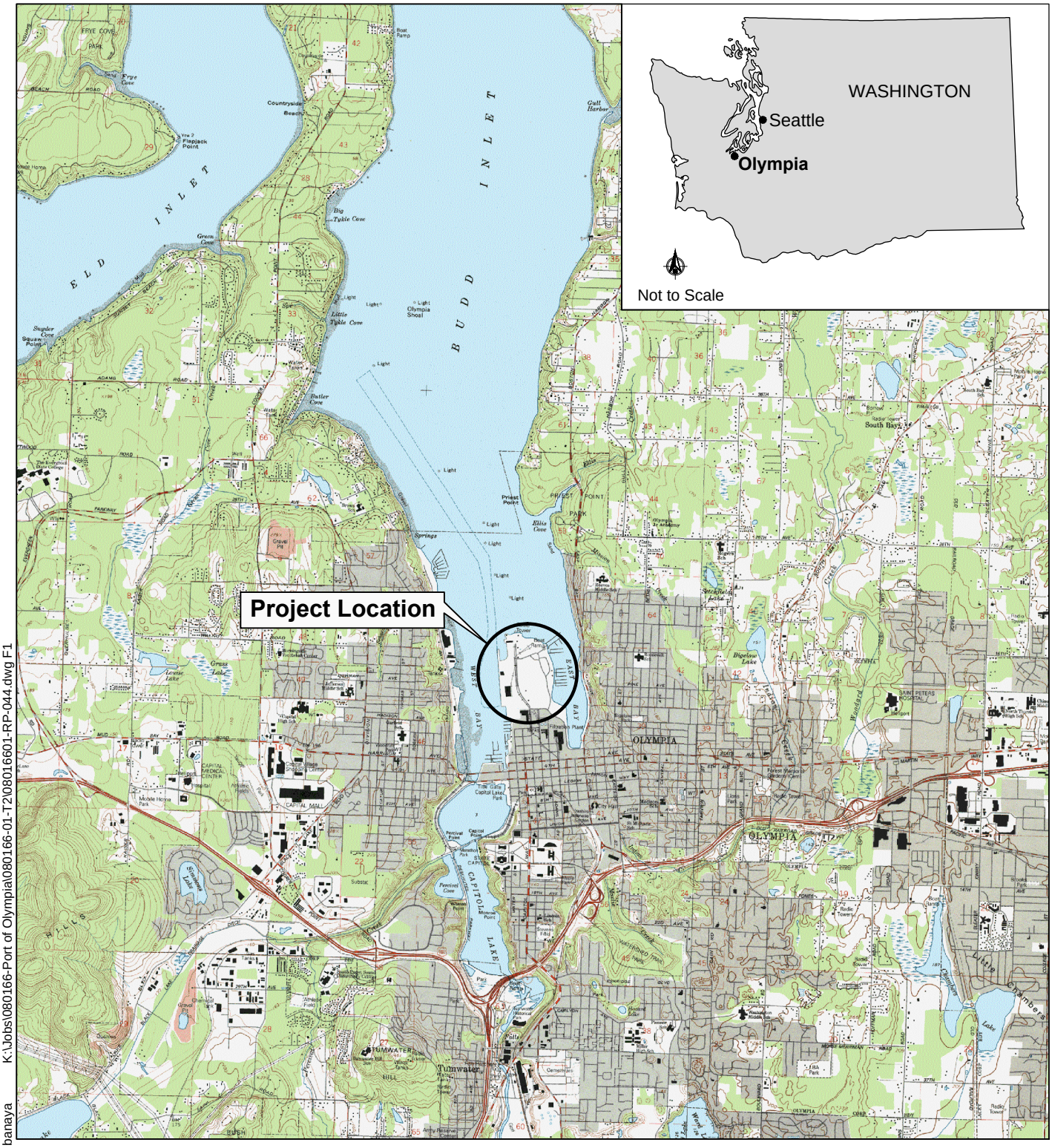
U Compound analyzed, but not detected above detection limit

mg/l milligrams per liter

ntu nephelometric turbidity units

pg/l picograms per liter

FIGURES



K:\Jobs\080166-Port of Olympia\080166-01-T2\08016601-RP-044.dwg F1

May 16, 2011 1:57pm banaya

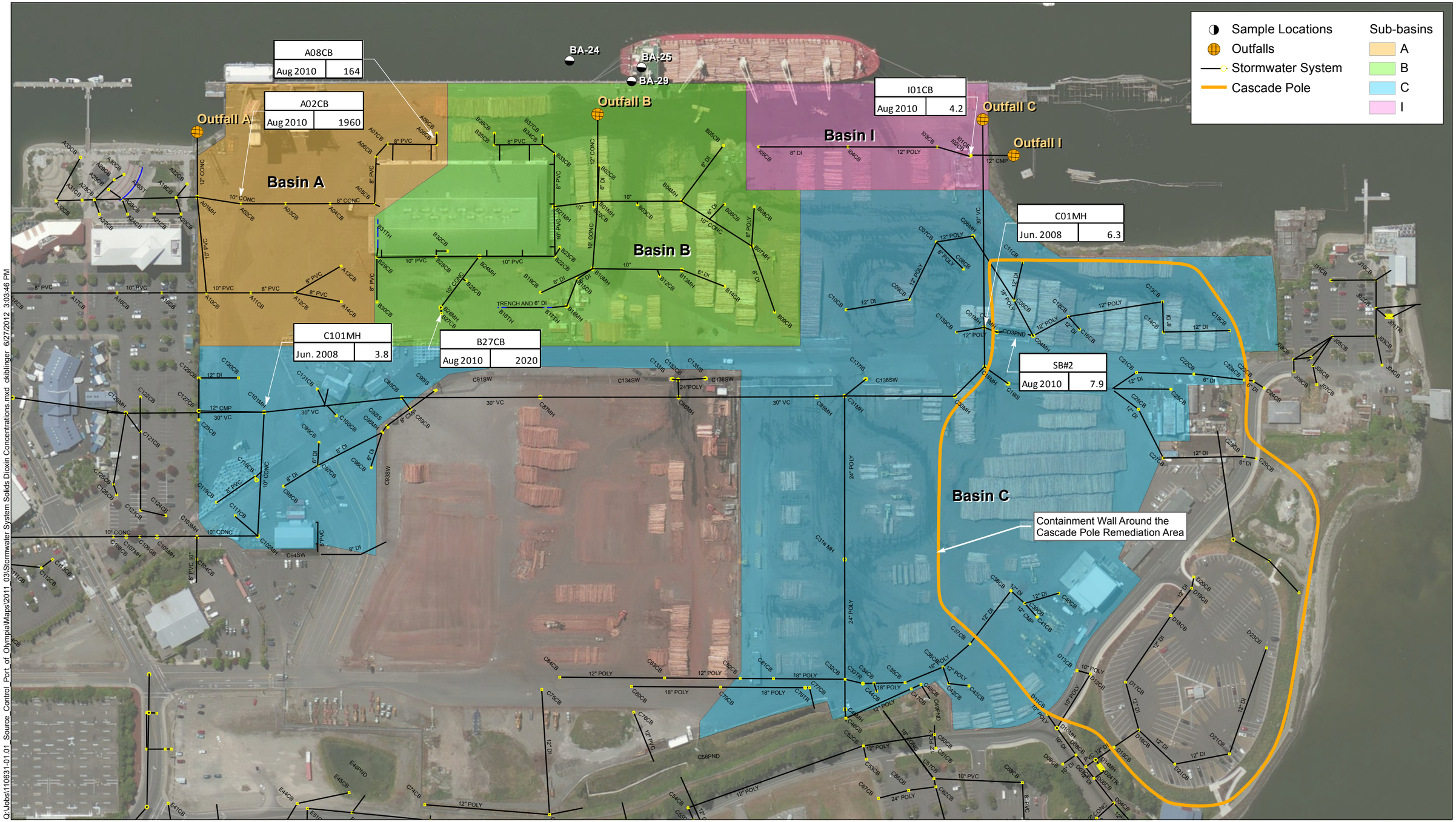
SOURCE: Base map prepared from Terrain Navigator Pro USGS 7.5 minute quadrangle maps of Tumwater and Lacey, WA.

0 1

Scale in Feet

ANCHOR QEA

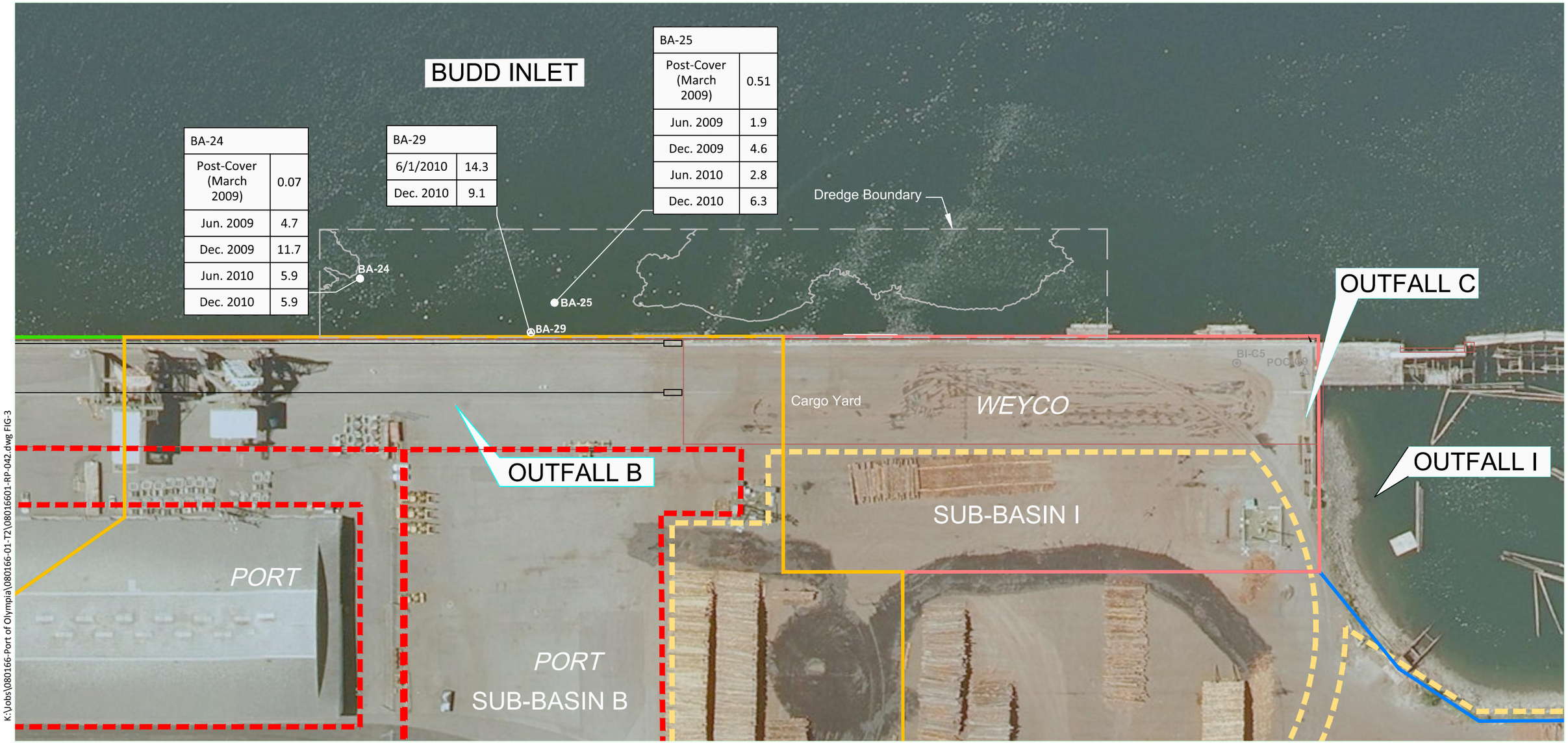
Figure 1
Vicinity Map
Work Plan
Port of Olympia



Data are total Dioxin/Furan TEQ (Mammal, U=0) in ng/kg.
Sample from C01MH was taken out of the storm drain line that drains to outfall C.

Feet
0 100 200 300 400

Figure 2
Stormwater System Layout and August 2010 Sampling Dioxin/Furan Concentrations
Data Report
Port of Olympia



K:\Jobs\080166-Port of Olympia\080166-01-T2\08016601-RP-042.dwg FIG-3

May 16, 2011 1:56pm banaya

SOURCE: Image prepared from ESRI 2009
HORIZONTAL DATUM: Washington State Plane South, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

NOTES:

1. Data are total Dioxin/Furan TEQ (Mammal, U=0) in ng/kg
2. Surface sediment is 0-10 cm.

0 100
Scale in Feet

ANCHOR QEA

Figure 3
Surface Sediment Dioxin/Furan Concentrations
Work Plan
Port of Olympia

APPENDIX A
CATCH BASIN MONITORING LOGS

Catch Basin Inspection Log

Depth of bottom of sump to outlet pipe

Catch Basin	Inspection Date	Depth of Solids (cm)	Cleanout Status[2]	Sample Collection Date/Time[1]	Observations (sheen, etc.)	
A02CB	9/29/11	1.5	Not Required	N/A	looks good	45.7
A08CB	9/29/11	1	not Required	N/A	Looks Ok	~~45.7~~
B27CB	9/29/11	6.4	not Required	N/A	Ok	99.1
I-01CB	9/29/11	17.8	not Required	Sample not required	Ok	119.4
A02CB	10/25/11	2	not Req	N/A	looks good	
A08CB	10/21/11	1	not Req	N/A	looks good	
B27CB	10/21/11	8.5	not Req	N/A	look good	
I-01CB	10/21/11	30.5	not Req	Sample not required	looks ok 25°	
A02CB	11/17/11	3.8	not Req	N/A	Looks good	
A08CB	11/17/11	4.5	not Req	N/A	Looks good	45.7
B27CB	11/17/11	10.2	not Req	N/A	Looks Ok	~~45.7~~
I-01CB	11/17/11	49	not Req	Sample not required	Floating debri 41°	
A02CB	12/22/11	5.5	not Req	N/A	good	
A08CB	12/22/11	4	not Req	N/A	good	
B27CB	12/22/11	10	not Req	N/A	good	
I-01CB	12/22/11	17.8	not Req	Sample not required	Floating debri	
A02CB	1/31/12	5	not Req	N/A	good	
A08CB	1/31/12	4	not Req	N/A	good	
B27CB	1/31/12	9.6	not Req	N/A	good	
I-01CB	1/31/12	23	not Req	Sample not required	good	
A02CB	2/28/12	4.4	not Req	N/A	good	
A08CB	2/28/12	1.9	not Req	N/A	good	
B27CB	2/28/12	6.4	not Req	N/A	good	
I-01CB	2/28/12	19	not Req	Sample not required	Floating debri	

Notes:

Catch basins designated for sampling under the Work Plan shall be inspected monthly. Analytical samples shall be collected prior to cleanout of the catch basins.

1 NA (not applicable) if insufficient solids for sample collection

2 Required or Not Required (cleanouts required if solids have accumulated to a height 60% of the basin outlet).

cm centimeter

Inspected by: Dave Mickelson

Signature:

Catch Basin Inspection Log

Catch Basin	Inspection Date	Depth of Solids (cm)	Cleanout Status[2]	Sample Collection Date/Time[1]	Observations (sheen, etc.)
A02CB	3/21/12	4.4	not Req	N/A	hooked good
A08CB	3/21/12	2.2		N/A	Smells Like Bird droppings
B27CB	3/21/12	8.8		N/A	Ok
I-01CB	3/21/12	22.8		Sample not required	Floating Bark peices
A02CB	4/13/12	5.1	not Req	N/A	Looked good
A08CB	4/13/12	2.5		N/A	Ok
B27CB	4/13/12	10.2		N/A	Ok
I-01CB	4/13/12	25.4		Sample not required	Floating Bark peices
A02CB	5/17/12	5.1	not Req	N/A	Ok
A08CB	5/17/12	2.9	not Req	N/A	Ok
B27CB	5/17/12	12.7	not Req	N/A	Ok
I-01CB	5/17/12	22.9	not Req	Sample not required	Ok
A02CB	6/11/12	5.1	not Req	N/A	new Filter Looked good
A08CB	6/11/12	3.2	not Req	N/A	Ok
B27CB	6/11/12	15.2	not Req	N/A	new Filter-Looked Ok
I-01CB	6/11/12	20.3	not Req	Sample not required	Ok
A02CB					
A08CB					
B27CB					
I-01CB				Sample not required	
A02CB					
A08CB					
B27CB					
I-01CB				Sample not required	

Notes:

Catch basins designated for sampling under the Work Plan shall be inspected monthly. Analytical samples shall be collected prior to cleanout of the catch basins.

1 NA (not applicable) if insufficient solids for sample collection

2 Required or Not Required (cleanouts required if solids have accumulated to a height 60% of the basin outlet).

cm centimeter

Inspected by: RAUL Mickelson

Signature:

Total
Sump = A02 = 45.7 cm
A08 = 45.7 cm
B27 = 99.1 cm
I02 = 119.4 cm

APPENDIX B
ANALYTICAL LABORATORY TESTING DATA (ON CD)

APPENDIX C
DATA VALIDATION REPORT

ANCHOR QEA

720 Olive Way, Suite 1900
Seattle, Washington 98101
Phone 206.287.9130
Fax 206.287.9131
www.anchorqea.com

DATA VALIDATION REVIEW REPORT – EPA STAGE 2A

Project:	Port of Olympia
Date:	June 28, 2012

This report summarizes the review of analytical results for eight sediment samples, four water samples, two equipment blanks, and two field blanks collected August 9, 2010, January 26 and 31, and April 11, 2012. The samples were collected by Anchor QEA, LLC (Anchor QEA), and submitted to Columbia Analytical Services (CAS) in Kelso, Washington, and Houston, Texas, and Analytical Resources, Inc. (ARI) in Tukwila, Washington. The samples were analyzed for the following parameters:

- Semivolatile organic compounds (SVOCs) by U.S. Environmental Protection Agency (USEPA) method 8270C
- Polycyclic aromatic hydrocarbons (PAHs) by USEPA method 8270C SIM
- Polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (PCDD/F) by USEPA methods 8290 and 1613B
- Aroclor polychlorinated biphenyls (PCBs) by USEPA method 8082
- Diesel-range organics (DRO) and residual range organics (RRO) by Northwest total petroleum hydrocarbon – diesel extended range (NWTPHDx)
- Gasoline range organics (GRO) by NWTPH – gasoline extended range (NWTPHGx)
- Total metals by USEPA methods 6010B and 7471A
- Total organic carbon (TOC) by Puget Sound Estuary Program (PSEP) and Plumb, 1981
- Conductivity (cond) by Standard Method (SM) 2510B
- Grain size (GS) by PSEP
- Total solids (TS) by USEPA method 160.3 Modified
- Total suspended solids (TSS) by USEPA method 160.2
- Turbidity (turb) by USEPA method 180.1

CAS sample data group (SDG) number K1008440 and ARI SDG numbers UG75, UG77, and UQ00 were reviewed in this report. Samples reviewed in this report are presented in Table 1.

Table 1
Samples Reviewed

Sample ID	Lab ID	Matrix	Analyses Requested
SBA-SHALLOW	K1008440-001	Sediment	SVOCs, PAHs, PCDD/F, PCBs, DRO, RRO, GRO, metals, TOC, cond, GS, TS
SBA-TERMINUS	K1008440-002	Sediment	SVOCs, PAHs, PCDD/F, PCBs, DRO, RRO, GRO, metals, TOC, cond, GS, TS
SBB-SHALLOW	K1008440-003	Sediment	SVOCs, PAHs, PCDD/F, PCBs, DRO, RRO, GRO, metals, TOC, cond, GS, TS
SB2-08-09-10	K1008440-004	Sediment	SVOCs, PAHs, PCDD/F, PCBs, DRO, RRO, GRO, metals, TOC, cond, GS, TS
SBI-TERMINUS	K1008440-005	Sediment	SVOCs, PAHs, PCDD/F, PCBs, DRO, RRO, GRO, metals, TOC, cond, GS, TS
A01SW-20120131	UG75A	Water	PCDD/F, TSS, turb
E01SW-20120131	UG75B	Water	PCDD/F, TSS, turb
F01SW-20120131	UG75C	Water	PCDD/F, TSS, turb
B01SW-20120131	UG75D	Water	PCDD/F, TSS, turb
B27CB-20120126	UG77A	Sediment	PCDD/F, TOC, TS
A08CB-20120126	UG77B	Sediment	PCDD/F, TOC, TS
A02CB-20120126	UG77C	Sediment	PCDD/F, TOC, TS
B01SW-20120411	UQ00A	Water	PCDD/F, TSS, turb
E01SW-20120411	UQ00B	Water	PCDD/F, TSS, turb
F01SW-20120411	UQ00C	Water	PCDD/F, TSS, turb
A01SW-20120411	UQ00D	Water	PCDD/F, TSS, turb

Data Validation and Qualifications

The following comments refer to the laboratory's performance in meeting the quality assurance/quality control (QA/QC) guidelines outlined in the analytical and laboratory procedures. Laboratory results were reviewed using the following guidelines:

- *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review* (USEPA 1999)
- *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (USEPA 2004)
- *USEPA Contract Laboratory Program National Functional Guidelines for Chlorinated Dibenzo-p-Dioxins (CDDs) and Chlorinated Dibenzofurans (CDFs) Data Review* (USEPA 2005)

- *USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review* (USEPA 2008)

Laboratory and method QC criteria were also used as stated in USEPA 1986 (SW-846, Third Edition), *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*, update 1, August 1993; update II, January 1995; update IIA, February 1994; update IIB, August 1995; update III, June 1997; update IIIA, May 1999; update IIIB, June 2008; update IVA and IVB, January 2008. Unless noted in this report, laboratory results for the samples listed were within QC criteria.

Field Documentation

Field documentation was checked for completeness and accuracy. The chain-of-custody forms were signed by CAS and ARI at the time of sample receipt; the samples were received cold and in good condition with the exception of the samples received in association with SDG UQ00, which were received at 13.3 degrees Celsius (°C). Samples were received within 1 day of collection and the results are not expected to be impacted; therefore, no data were qualified.

Holding Times and Sample Preservation and Analytical Methods

Samples were appropriately preserved and analyzed within holding times with the following exceptions:

- SDG K1008440 Conventionals – The conductivity analyses were performed 11 days past the 28-day hold time. Associated sample results have been qualified "J" to indicate they are estimated.
- SDG UG77 Conventionals – The TOC analysis of sample A08CB-20120126 was performed 5 days past the 14-day hold time. This result has been qualified "J" to indicate it is estimated.

See Table 2 for qualified data.

Laboratory Method Blanks

Laboratory method blanks were analyzed at the required frequencies. All method blanks were free of target analytes, with the exception of some PCDD/F analytes at levels between the estimated detection limit (EDL) and the method reporting limit (MRL) in the method

blanks associated with the sediment samples. All sample results were significantly higher than (>5x) the levels detected in the method blanks; therefore, no data were qualified.

Field Quality Control

Field and Equipment Blanks

Two field blanks and two equipment blanks were collected in association with the water sample sets and were free of target analytes.

Field Duplicates

No field duplicates were collected in association with these sample sets.

Surrogate and Labeled Compound Recoveries

All surrogate and labeled compound recoveries were within the laboratory control limits with the following exceptions:

- SDG K1008440:
  - NWTPHDx - N-triacontane in sample SBB-Shallow recovered above the control limit. Associated sample results have been qualified "J" to indicate a potentially high bias.
  - SVOCs – 2-Fluorobiphenyl recovered above the control limit in sample SBI-Terminus. No SVOCs were detected in the sample and all other surrogates recovered with limits so no data were qualified.
  - PCDD/F – Several labeled compounds recovered below control limits. Associated sample results have been qualified "J" to indicate a potentially low bias.

See Table 2 for qualified data.

Column Confirmation

No PCBs were detected in the samples. Confirmation analyses were performed for detected 2,3,7,8-TCDF results analyzed on the DB-5 column. Confirmation of this analyte was not necessary when samples were analyzed on the RTX-Dioxin2 column because the minimum valley requirement between the isomers was confirmed.

Laboratory Control Sample and Laboratory Control Sample Duplicate

Laboratory control samples (LCS) and laboratory control sample duplicates (LCSD) were analyzed at the required frequencies. All LCS/LCSD analyses yielded percent recovery (%R) and/or RPD values within laboratory control limits.

Matrix Spike and Matrix Spike Duplicate

Matrix spike (MS) and matrix spike duplicate (MSD) samples were analyzed at required frequencies. All MS/MSD analyses yielded %R and/or RPD values within laboratory control limits.

Standard Reference Material

Standard reference material (SRM) samples were analyzed for TOC and PCDD/F analyses associated with SDG UG77 and resulted in recoveries within specified limits with the exceptions of four PCDD/F results. These recovered slightly above control limits; however, concentrations for this SRM are not certified; therefore, no data were qualified.

Laboratory Replicates

Laboratory replicates were analyzed at the required frequencies and all results were within required limits.

Estimated Maximum Potential Concentration

Several PCDD/F results were qualified by the laboratories as Estimated Maximum Potential Concentration (EMPC) due to ion ratio failures. These results were already qualified as estimated by the laboratory so no further qualification was necessary.

Sample Results

The TOC result for sample A02CB-20120126 was reported as 144 percent dry weight. The laboratory indicated that sample mass was lost during the total solids analysis which biased that result low and subsequently biased the TOC result high. This TOC result has been rejected because it is not possible that it is greater than 100 percent.

Method Reporting Limits

Reporting limits were deemed acceptable as reported. All values were reported using the laboratory reporting limits. Values were reported as undiluted, or when reported as diluted, the reporting limit accurately reflects the dilution factor.

Overall Assessment

As was determined by this evaluation, the laboratory followed the specified analytical methods and all requested sample analyses were completed. Accuracy was acceptable as demonstrated by the surrogate, labeled compound, SRM, LCS/LCSD, and MS/MSD %R values, with the exceptions noted previously. Precision was also acceptable as demonstrated by the laboratory duplicates, MS/MSD, and LCS/LCSD RPD values, with the exceptions noted previously. Most data were deemed acceptable as reported; all other data are acceptable as qualified. Table 2 summarizes the qualifiers applied to samples reviewed in this report.

Data Qualifier Definitions

U	Indicates the compound or analyte was analyzed for but not detected at or above the specified limit
J	Indicates an estimated value
R	Indicates data is rejected and unusable
UJ	Indicates the compound or analyte was analyzed for but not detected and the specified limit reported is estimated
DNR	Do not report

Table 2
Data Qualification Summary

Sample ID	Parameter	Analyte	Reported Result	Qualified Result	Reason
A08CB-20120126	Conventionals	Total organic carbon	14.6 %	14.6J %	Analyzed past hold time
A02CB-20120126	Conventionals	Total organic carbon	144%	R	Result > 100%
SB2-08-09-10	Conventionals	Conductivity	795 µmhos/cm	795J µmhos/cm	Analyzed past hold time
SBA-Shallow	Conventionals	Conductivity	594 µmhos/cm	594J µmhos/cm	Analyzed past hold time
	PCDD/F	OCDD	24600BD ng/kg	24600J ng/kg	Low labeled standard %R
		OCDF	1190B ng/kg	1190J ng/kg	
SBA-Terminus	PCDD/F	1,2,3,4,6,7,8-HpCDD	75200D ng/kg	75200J ng/kg	Low labeled standard %R
		1,2,3,4,6,7,8-HpCDF	14700D ng/kg	14700J ng/kg	
		1,2,3,6,7,8-HxCDD	2690D ng/kg	2690J ng/kg	
		1,2,3,7,8,9-HxCDD	2240D ng/kg	2240J ng/kg	
		OCDD	687000D ng/kg	687000J ng/kg	
		OCDF	115000D ng/kg	115000J ng/kg	
	Conventionals	Conductivity	13500 µmhos/cm	13500J µmhos/cm	Analyzed past hold time
SBB-Shallow	PCDD/F	1,2,3,4,6,7,8-HpCDD	71400D ng/kg	71400J ng/kg	Low labeled standard %R
		1,2,3,6,7,8-HxCDD	2410D ng/kg	2410J ng/kg	
		1,2,3,7,8,9-HxCDD	2360D ng/kg	2360J ng/kg	
		OCDD	627000D ng/kg	627000J ng/kg	
		OCDF	107000D ng/kg	107000J ng/kg	
	Conventionals	Conductivity	6410 µmhos/cm	6410J µmhos/cm	Analyzed past hold time
	TPH	DRO	750DH mg/kg	750J mg/kg	High surrogate %R
		RRO	7500DO mg/kg	7500J mg/kg	
SBI-Terminus	Conventionals	Conductivity	14800 µmhos/cm	14800J µmhos/cm	Analyzed past hold time
	PCDD/F	OCDD	661B ng/kg	661J ng/kg	Low labeled standard %R
		OCDF	122B ng/kg	122J ng/kg	

Notes:
µmhos/cm = micromhos per centimeter
ng/kg = nanograms per kilogram

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