# 2014 DATA REPORT
# PORT OF OLYMPIA SOURCE CONTROL INVESTIGATION

**Prepared for**

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## LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| BMP | best management practice |
| City | City of Olympia |
| cm | centimeters |
| D/F | dioxin and furan |
| Ecology | Washington State Department of Ecology |
| ISGP | Industrial Stormwater General Permit |
| MTCA | Model Toxics Control Act |
| ng/kg | nanograms per kilogram |
| Order | Administrative Order |
| Port | Port of Olympia |
| TEQ | Toxic Equivalency Quotient |
| USEPA | U.S. Environmental Protection Agency |
| Work Plan | Source Control Monitoring Work Plan |
| Vista | Vista Laboratory |

# 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 Source Control Monitoring Work Plan (Work Plan; Anchor QEA 2013a). 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 Chapter 173-340-820, and the sampling, sample handling, and analysis methods described in the Work Plan (Anchor QEA 2013a).

## 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 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 dioxins and furans (D/Fs) from legacy and potential ongoing sources of contamination. A bay-wide assessment of sediment quality within Budd Inlet was completed on behalf of Ecology (SAIC 2008). That study identified D/Fs as ubiquitous throughout Budd Inlet surface sediments, with average D/F concentrations of 19.1 parts per trillion nanograms per kilogram (ng/kg) as measured using the Toxic Equivalency Quotient (TEQ) method (Van den Berg et al. 2006). Further sediment investigations conducted by Anchor QEA indicated that ongoing sources of D/F were likely present and highest in East Bay (near Moxlie Creek outfall), south of the Port's terminal near the marinas, and on the northwest shoreline of West Bay (Anchor QEA 2013b).

The Port has conducted several rounds of testing at select catch basins based on previous testing from 2010 that indicated the presence of elevated D/F concentrations in samples from three catch basins within a portion of the Port's marine terminal (specifically within stormwater Basins A and B) (Figure 2). The D/Fs were not elevated in other areas of the Port-owned properties and were not associated with current Port terminal or log storage yard operations (Anchor QEA 2011a). The source of the contaminants appeared to be most likely from legacy solids trapped in the storm drainage system from historical uses, including the storage of finished lumber and area-wide hog fuel burning atmospheric deposition. The Port responded to the elevated detections by implementing source control efforts including cleaning out the stormwater system and performing routine inspections of the catch basins to determine the need for additional cleanouts.

In 2012 the Port conducted source control monitoring to evaluate the status of source control efforts. The findings of that work were presented in a Data Report submitted to Ecology (Anchor QEA 2012). In summary, the concentrations of D/F decreased at all three locations, indicating that the source control efforts were successful.

Ecology requested that another round of sampling be conducted in 2013 to monitor the stormwater solids concentrations in Basins A and B, and monitor stormwater discharges from the associated outfalls. The Work Plan (Anchor QEA 2013a) describes the procedures to be used for monitoring and sampling activities and was submitted and approved by Ecology. This Data Report provides the monitoring and testing results of the activities performed in 2013.

## 1.3 Report Organization

This Data Report contains the information required by Task 3 in Order No. 8499 and is organized as follows:

- Section 2 of this report provides background information regarding the storm drain sampling work.
- Section 3 describes sampling and analysis methods.
- Section 4 summarizes the results of catch basin monitoring, solids sampling, and basin stormwater monitoring consistent with 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 specifies that any manifest or disposal receipts for disposal of sediments from catch basin cleanouts are to be attached to this Data Report; however, as described in Section 3, catch basin solids accumulations were minimal, and no cleanouts were required, so 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 Phase 2 Municipal Separated Storm Sewer Systems Permit. Portions of the marine terminal and log yard are regulated separately under two Industrial Stormwater General Permits.

The Port has also been conducting investigation and cleanup activities relating to contaminated marine sediments located within Budd Inlet. In support of ongoing source tracing and source control efforts, the Port conducted sampling of its storm drainage systems and industrial activities for D/Fs during 2010. This study revealed three locations with elevated concentrations. These catch basins were A02 and A08 in Basin A and B27 in Basin B (Figure 2). All of these catch basins are located on the southwest portion of the marine terminal outside of the log yard and Cascade Pole drainage area.

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 from the Port to Ecology dated April 1, 2011. Subsequently, the Port met with Ecology on multiple occasions to discuss potential follow-up sampling methods. Additionally, Ecology issued Order No. 8499, requiring follow-up sampling of the Port's storm drainage system. The Port and Ecology developed a Work Plan specifying methods for follow-up sampling in storm drain Basins A and B. Ecology approved the Work Plan in August of 2011, and sampling was conducted in January of 2012. Detailed results of this sampling were presented in a Source Control Investigations Data Report (Anchor QEA 2012).

## 2.1 2010 Study Conclusions

After the discovery of elevated D/F results, 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 D/F, it is difficult to identify a specific source for historic contamination. The most likely candidate sources for the elevated D/F compounds in the catch basin solids include former handling of finished lumber materials at the marine terminal, historical destruction by fire of certain marine terminal structures, and atmospheric deposition from historic hog fuel burners as identified in recent Budd Inlet investigations (Anchor QEA 2013b). No potential ongoing sources of D/F sediment contamination were identified within the marine terminal facility.

The following conclusions were made based on the system and historical review:

- D/Fs were not associated with log yard activities given that they were elevated in the low industrial areas and at very low concentrations in the high industrial areas (Basins C and I).
- Findings were not related to the Cascade Pole cleanup site because the associated drainage basin for this site (Basin C) had very low detections of D/Fs.
- Basins A and B have very little solids accumulation.
- There is no evidence of a release to the environment. Historical surface sediments adjacent to the A and B outfalls did not have elevated detections of D/Fs.
- Potential historical sources were identified, including handling of finished, potentially treated lumber, combustion sources related to a fire, and atmospheric deposition from historic hog fuel burners.

Additionally, as a response to the elevated concentrations of D/Fs, the Port conducted the following source control activities in 2010:

- System cleanouts of Basins A and B
- Drain system inspections in Basins A and B
- Offshore surface sediment monitoring

## 2.2 2012 Study Conclusions

Additional testing in 2012 included stormwater sampling in the A and B stormlines and catch basin solids sampling at the locations with elevated detections of D/Fs (A02, A08, and B27). A summary of the conclusions provided in the Source Control Investigations Data Report (Anchor QEA 2012) include:

- Solid accumulation rates were confirmed to be very low for Basins A and B.
- System cleanouts were not required based on low solids accumulation.
- Chemical testing was conducted on the small amount of accumulated solids and showed an overall reduction in D/F concentrations:
  - A08CB: 4.3 percent reduction (lowest solids accumulations)
  - A02CB: 87 percent reduction
  - B27CB: 78 percent reduction
- The greatest reductions were observed in the catch basins with higher accumulation of new solids, suggesting that newly deposited solids have lower concentrations.
- Stormwater sample results indicate that stormwater from Basins A and B are an insignificant source of D/Fs to Budd Inlet.

The Port agreed to conduct additional testing in 2013 and submitted the Work Plan (Anchor QEA 2013a) to Ecology. The remainder of this report will describe the monitoring and sampling efforts conducted under this Work Plan along with the associated data results.

# 3 MONITORING AND SAMPLING METHODS

This section describes the sampling and analysis methods used, consistent with the Work Plan (Anchor QEA 2013a). Sampling activities included the following:

- **Catch Basin Monitoring:** Monthly monitoring of solids accumulations was performed within select catch basins consistent with the Work Plan.
- **Catch Basin Solids Sampling and Analysis:** Catch basins previously shown to contain elevated D/F compounds, and that had enough accumulated solids to sample, were resampled to assess the status of source control activities for these compounds. Sampling was performed consistent with the schedule specified in the Work Plan.
- **Basin Discharge Sampling and Analysis:** Sampling of stormwater discharges for dioxin was performed in each of the basins in which elevated D/Fs 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.

## 3.1 Catch Basin Monitoring

Catch Basins A02CB, A08CB, B27CB, and I-01CB were inspected on a monthly basis following Ecology approval of the Work Plan. Figure 2 illustrates the monitoring locations. Monitoring log sheets are included as Appendix A and summarized in Table 1.

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 and A08CB. The test locations include each of the basins within which elevated D/F compounds were noted in trapped catch basin solids. Consistent with the Work Plan, no sampling was performed within Basins C and I because measured solids within those basins contained D/F concentrations below typical urban background and Budd Inlet background concentrations.

The Work Plan (Anchor QEA 2013a) 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. If not enough solids have accumulated by December 2013, samples could be collected with a lesser accumulation or at an adjacent catch basin. The depths of accumulation never reached the 50 percent value.

To meet the sampling requirements in the Work Plan, grab samples were collected in December 2013 from A02CB and A08CB despite the low solids accumulation in the catch basin. There was insufficient volume to sample B27CB and its adjacent locations (B26MH, B25CB, and B24MH). Sediment chemical and physical testing was conducted at Vista Laboratory (Vista), located in El Dorado Hills, California (for D/Fs) and Spectra Laboratory in Tacoma, Washington (for total organic carbon and total solids). Analytical laboratory data reports are provided in Appendix B.

## 3.3 Basin Discharge Sampling

Water sampling was conducted for discharges from storm drain Basins A and B at the same locations as the Industrial Stormwater General Permit (ISGP) monitoring locations and the 2012 stormwater sampling locations. 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 in low-tide conditions (i.e., a tidal elevation less than 3 feet above mean lower low water). 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.

Four samples were collected on October 1, 2013:

- 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 was

not associated with the field sampling and analysis procedures

Collected water samples were submitted for chemical analysis to Vista (for 2,3,7,8-TCDD), and TestAmerica Laboratory in Tacoma, Washington (for total suspended solids and turbidity). Analytical laboratory data reports are provided in Appendix B.

## 3.4 Data Validation

All sampling and analysis data from the 2013 sampling event were validated to a Stage 2A validation level by Anchor QEA prior to use in this Data Report. Data were validated consistent with analytical protocols and quality assurance guidance of the United States Environmental Protection Agency's (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 indicated that all data were usable and no qualifiers were required. The full data validation report is provided in Appendix C.

# 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 Work Plan (Anchor QEA 2013a).

## 4.1 Catch Basin Monitoring

The 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 D/Fs were detected in catch basin solids. Also included was a location within Basin I, which did not contain elevated D/Fs 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 1.

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 Work Plan approval and December 2013, solids accumulations in the A and B basins were very low. Actual accumulations ranged from 0.6 to 3.8 centimeters (cm) in A02CB and B27CB, and 0.6 to 15 cm in A08CB. 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 51 cm (43 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 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 accumulation rates, grab samples were collected for chemical analysis in December 2013 from the thin layer of solids that had accumulated in the test basins. Testing results from these grab samples are summarized in Table 2, along with the previous findings from 2010 and 2012 chemical testing of the same catch basins.

Overall concentration trends (from 2010 to 2013) from the three locations are as follows:

- A08CB: 66.6 percent reduction
- A02CB: 22 percent reduction
- B27CB: 78 percent reduction (between 2010 and 2012; no additional results were obtained in 2013)

Findings show that overall D/F concentrations have decreased since the 2010 sampling but have increased at one location (A02CB) since the 2012 sampling event. Since only 3.8 cm of solids accumulated in the A02CB catch basin, it is possible that legacy material that had accumulated on the sidewalls was dislodged and included in the collected material. Other possibilities could be the increased truck traffic associated with the maintenance dredging project in November and December of 2013, or the regular rail traffic that runs through this area to access the loading areas near the pierface. A downward concentration trend between 2012 and 2013 was observed at location A08CB, which is only 500 feet away but outside of the truck path and rail line.

## 4.3 Stormwater Sampling

Table 3 summarizes the results of stormwater samples collected at each of the A and B basins. Sampling locations were the same locations as ISGP and the same as the 2012 sampling events. Stormwater samples were all non-detect, just as the results were from the April 2012 event, indicating that stormwater from the terminal is not an ongoing source of dioxin to Budd Inlet.

## 4.4 Ongoing Activities

Each month, the Port visually inspects several catch basins including A02CB, A08CB, B27CB, I-021CB. In the near future, the Port plans to conduct additional cleanouts of the A and B basins as part of routine maintenance, despite the low solids accumulations. The Port continues to implement best management practices (BMPs) as part of complying with its obligations under the ISGP to minimize the amount of solids that flow into the storm system. The BMPs include regular sweeping of the Marine Terminal with both mechanical and vacuum sweeper trucks, catch basin inserts, and restriction of activities in the vicinity of catch basins in the A basin.

The Port continues to work with Ecology on the assessment of sediment quality and the status of D/F source control within Budd Inlet. These activities are being performed under MTCA Agreed Order Amendment No. DE 6083 (Ecology 2012). In 2013, the Port collected 65 surface grab samples and 50 subsurface cores around the Port's peninsula. Figure 2 shows the interpolated surface sediment D/F concentrations in the vicinity of the Port's Marine Terminal. As seen in this figure, concentrations in sediment near the A outfall has been between 2.3 and 5.7 ng/kg TEQ (including samples collected in March 2013). Sediment near the B outfall contains concentrations from 3.8 to 24.5 ng/kg TEQ (including samples collected in March 2013). These results suggest flow from these outfalls is not an ongoing source of D/F to Budd Inlet.

Other source investigation activities being conducted by the Port include collecting samples from City catch basins near outfalls with elevated surface sediment concentrations (near Moxlie Creek, East Bay Redevelopment Site, and West Bay western shore locations). D/F TEQ concentrations in eight samples ranged from 12.5 ng/kg to 855 ng/kg in residential and

commercial areas, suggesting that normal urban activities, such as vehicle emissions and other commercial and recreational activities, are contributing to elevated D/F levels that may concentrate in stormwater systems. These sampling and testing results are being incorporated into the final Investigation Report.

# 5 CONCLUSIONS AND RECOMMENDATIONS

The results of the Source Control Monitoring Investigation described in this Data Report are consistent with previous evaluations and 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 Work Plan development.
- **Catch Basin Solids Findings:** The D/F concentrations measured in the catch basin solids from 2012 and 2013 were lower than those measured previously in 2010 prior to the cleanouts of Basins A and B. The sample collected from A08CB has continuously decreased, which does support the original hypothesis that the elevated detections were legacy contamination; however, the concentration observed in A02CB has increased since the 2012 event (Table 2). These results suggest that either legacy contamination that had accumulated on the catch basin walls was accidentally included in the sample grab due to the very low sediment accumulation present at the time of sampling (3.8 cm) or that recent activities may have contributed to elevated D/F concentrations in the southern portion of Basin A. This is a low industrial area within the marine terminal, outside of the logyard. The main use of this area since the 2012 sample collection has been truck traffic primarily associated with the 2013 maintenance dredging event, equipment traffic, and ongoing rail traffic. Both of these activities generate D/Fs via exhaust; however, localized studies have not been conducted to determine how much contribution could originate from these sources. A sample could not be collected from B27CB due to insufficient material available.
- **Stormwater Findings:** No dioxin was detected in stormwater samples. Results suggest that despite elevated concentrations of D/F in catch basins, stormwater from Basins A and B is not a source of dioxin to Budd Inlet. This result corroborates the Budd Inlet investigations conducted by the Port in 2013, which show that sediment adjacent to the A and B outfalls are not elevated compared to the rest of lower Budd Inlet (Figure 2).

Based on the 2010, 2012, and 2013 findings, sediment with elevated D/F concentrations in Port catch basins is not being transported via stormwater to Budd Inlet (Figure 2). The Port

will continue to visually inspect catch basins as part of its BMPs. Additionally, the Port proposes to conduct annual catch basin cleanouts as part of regular maintenance in these areas regardless of accumulation. This allows for continual removal of potential contamination, either legacy material or recently deposited sediment from truck, equipment, and/or train emissions. The Port believes that conducting regular cleanouts is effective at minimizing potential transport of contaminated catch basin solids to Budd Inlet, and prefers not to continue to let them accumulate for additional sampling. The Port does not propose further sample collection at this time.

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**
**Results of Catch Basin Solids Monitoring**

| Monitoring Point ID | A08CB | | A02CB | | 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) |
| 1/30/2013 | 2.54 | 6% | 0 | 0% | 3.81 | 4% | 10.61 | 9% |
| 2/20/2013 | 5.08 | 11% | 0 | 0% | 3.81 | 4% | 11.43 | 10% |
| 3/21/2013 | 2.54 | 6% | 0 | 0% | 1.27 | 1% | 22.86 | 19% |
| 4/25/2013 | 0.5 | 1% | 0 | 0% | 0.5 | 1% | 22.86 | 19% |
| 5/15/2013 | 0.63 | 1% | 0 | 0% | 0.5 | 1% | 29.2 | 24% |
| 6/27/2013 | 7 | 15% | 0.64 | 1% | 0 | 0% | 24.4 | 20% |
| 7/18/2013 | 12.7 | 28% | 0.64 | 1% | 0 | 0% | 48.2 | 40% |
| 8/28/2013 | 15.3 | 33% | 1.9 | 4% | 0.6 | 1% | 50.8 | 43% |
| 9/30/2013 | NA | -- | 3.2 | 7% | 1.3 | 1% | 20.3 | 17% |
| 10/31/2013 | 8.9 | 19% | 1.3 | 3% | 0.635 | 1% | 15.24 | 13% |
| 11/28/2013 | 1.9 | 4% | 3.8 | 8% | 0.5 | 1% | 24.1 | 20% |
| 12/23/2013* | 3.81 | 8% | 3.81 | 8% | 0.635 | 1% | 26.7 | 22% |

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 December 23, 2013.

cm centimeters

NA not accessible

**Table 2**
**Comparison of Dioxin/Furan Concentrations in 2010, 2012, and 2013 Catch Basin Solids**

| Basin | Basin A | | | | | | Basin B | |
|---|---|---|---|---|---|---|---|---|
| Location | A08CB | | | A02CB | | | B27CB[1] | |
| Sample ID | SBA-SHALLOW | A08CB-20120126 | A08CB-201361223 | SBA-TERMINUS | A02CB-20120126 | A02CB-201361223 | SBB-SHALLOW | B27CB-20120126 |
| Sample Date | 8/9/2010 | 1/26/2012 | 12/23/2013 | 8/9/2010 | 1/26/2012 | 12/23/2013 | 8/9/2010 | 1/26/2012 |
| **Conventional Parameters (percent)** | | | | | | | | |
| Total organic carbon | 1.63 | 14.6 J | 3.66 | 5.88 | R | 12.7 | 9.64 | 33.1 |
| Total solids | 59 | 40.4 | 70 | 37.1 | 19.1 | 17 | 44.9 | 18.1 |
| **Dioxin Furans (ng/kg)** | | | | | | | | |
| 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) | 1.96 | 2.43 | 0.911 | 15.3 | 3.97 | 14.2 | 18.9 | 5.87 |
| 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD) | 38.4 | 40 | 12.9 | 169 | 42.8 | 238 | 223 | 78.2 |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD) | 76.6 | 85.8 | 22.7 | 601 | 114 | 549 | 738 | 212 |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD) | 229 | 231 | 78.2 | 2690 J | 349 | 2780 | 2410 J | 458 |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD) | 182 | 183 | 51.9 | 2240 J | 218 | 1100 | 2360 J | 401 |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD) | 5040 | 3870 | 1590 | 75200 J | 8130 | 52300 | 71400 J | 12800 |
| 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | 24600 J | 20300 | 12600 | 687000 J | 64900 | 393000 | 627000 J | 109000 |
| 2,3,7,8-Tetrachlorodibenzofuran (TCDF) | 7.39 | 6.22 | 2.21 | 9.07 | 3.05 | 34.7 | 15.6 | 4.27 |
| 1,2,3,7,8-Pentachlorodibenzofuran (PeCDF) | 18 | 14.2 | 4.9 | 33.3 | 9.62 | 120 | 93.5 | 19.5 |
| 2,3,4,7,8-Pentachlorodibenzofuran (PeCDF) | 13.3 | 13.6 | 5.36 | 27.1 | 9.09 | 120 | 83.4 | 23.4 |
| 1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF) | 34.3 | 28.8 | 9.72 | 310 | 59.7 | 322 | 643 | 157 |
| 1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF) | 23 | 23.2 | 6.96 | 177 | 41.8 | 252 | 272 | 88 |
| 1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF) | 1.67 J | 11.3 | 2.12 | 8.27 | 17.7 | 374 | 18.2 | 35.4 |
| 2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF) | 18.3 | 30.9 | 9.31 | 112 | 61.8 | 49.4 | 149 | 120 |
| 1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF) | 387 | 469 | 108 | 14700 J | 1640 | 4660 | 14900 | 3050 |
| 1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF) | 18.6 | 24.1 | 5.71 | 789 | 134 | 335 | 853 | 274 |
| 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | 1190 J | 1360 | 213 | 115000 J | 8760 | 20600 | 107000 J | 17100 |
| 2005 WHO, ND = 0 | 164 | 157 | 54.8 | 1960 | 257 | 1530 | 2020 | 438 |
| **Percent Reduction in Dioxin/Furan TEQ (compared to 2010)** | NA | 4.3% | 66.6% | NA | 87% | 22% | NA | 78% |

Notes:

NA not accessible

ng/kg nanograms per kilogram

J Estimated value

R Data result rejected; dryweight corrected. The total organic carbon result was elevated due to an artifact associated with dryweight measurement.

TEQ Toxic Equivalency

[1] Catch Basin B27 did not have enough accumulated sediment to sample in 2013.

**Table 3**
**Comparison of Dioxin/Furan Results in 2012 and 2013 Stormwater Samples**

| Sample Location | A01SW | | | B01SW | | |
|---|---|---|---|---|---|---|
| Sample ID | A01SW-20120131 | A01SW-20120411 | A01SW20131001 | B01SW-20120131 | B01SW-20120411 | B01SW20131001 |
| Sample Date | 1/31/2012 | 4/11/2012 | 10/1/2013 | 1/31/2012 | 4/11/2012 | 10/1/2013 |
| Sample Type | Water | Water | Water | Water | Water | Water |
| **Conventional Parameters (mg/l)** | | | | | | |
| Total suspended solids | **49.8** | **17** | 10 U | **58** | **35.3** | **15** |
| **Conventional Parameters (NTU)** | | | | | | |
| Turbidity | **13.1** | **9.8** | **6.5** | **85** | **54** | **26.3** |
| **Dioxin (pg/l)** | | | | | | |
| 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) | **1.10 J** | 1.11 U | 0.587 U | **0.206 EMPC** | 1.74 U | 0.7 U |

| Sample Location | Equipment Blanks | | | Field Blanks | | |
|---|---|---|---|---|---|---|
| Sample ID | E01SW-20120131 | E01SW-20120411 | E01SW20131001 | F01SW-20120131 | F01SW-20120411 | F01SW20131001 |
| Sample Date | 1/31/2012 | 4/11/2012 | 10/1/2013 | 1/31/2012 | 4/11/2012 | 10/1/2013 |
| Sample Type | Water | Water | Water | Water | Water | Water |
| **Conventional Parameters (mg/l)** | | | | | | |
| Total suspended solids | 1.1 U | 1 U | --[1] | 1.1 U | 1 U | --[1] |
| **Conventional Parameters (NTU)** | | | | | | |
| Turbidity | 0.05 U | 0.05 U | --[1] | 0.05 U | 0.05 U | --[1] |
| **Dioxin (pg/l)** | | | | | | |
| 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) | 1.63 U | 1.22 U | 0.618 U | 0.129 U | 1.37 U | 0.501 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

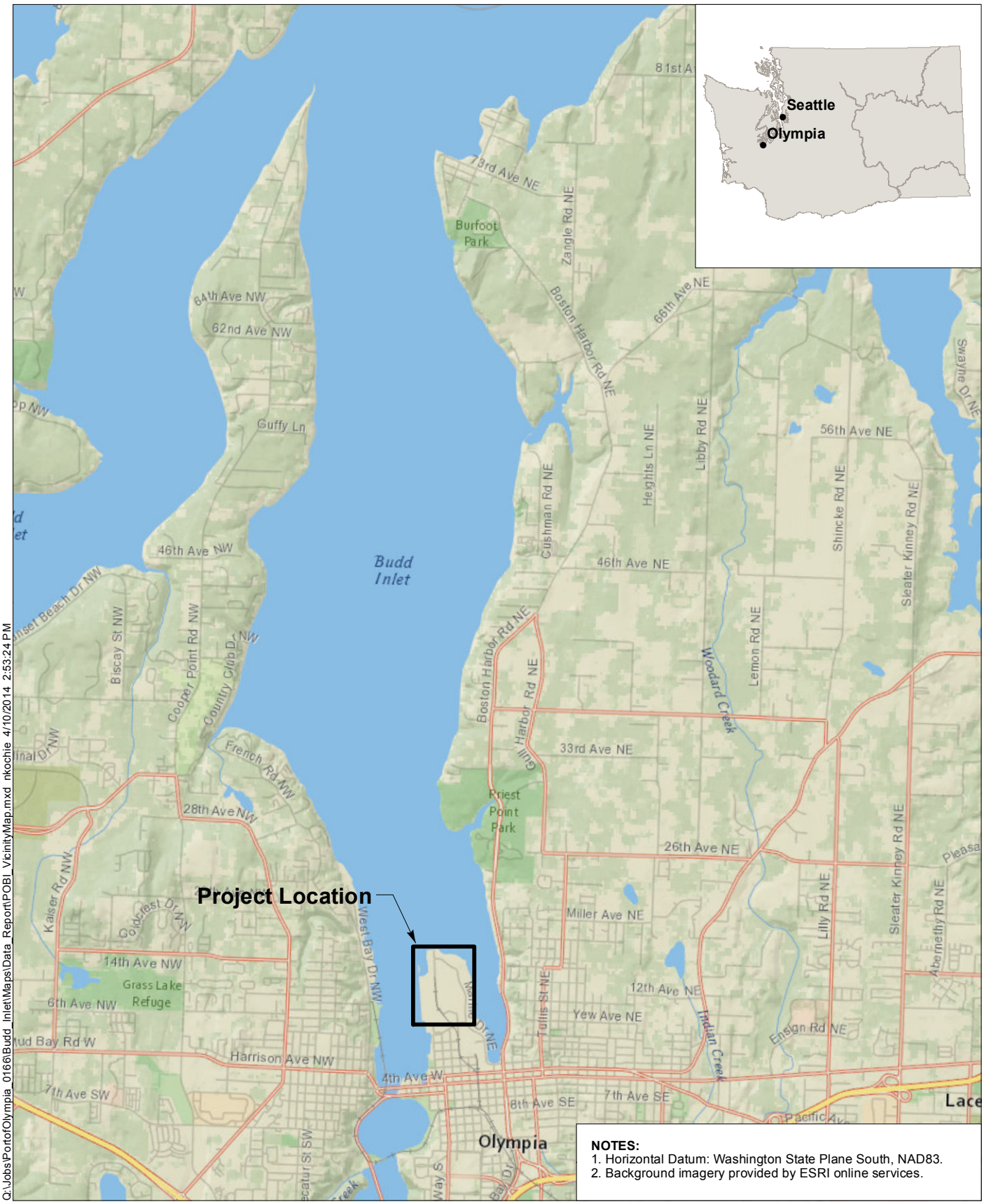
mg/l milligrams per liter

NTU nephelometric turbidity units

pg/l picograms per liter

[1] Turbidity and total suspended solids were not analyzed in the 2013 field quality control.

# FIGURES




**NOTES:**
1. Horizontal Datum: Washington State Plane South, NAD83.
2. Background imagery provided by ESRI online services.

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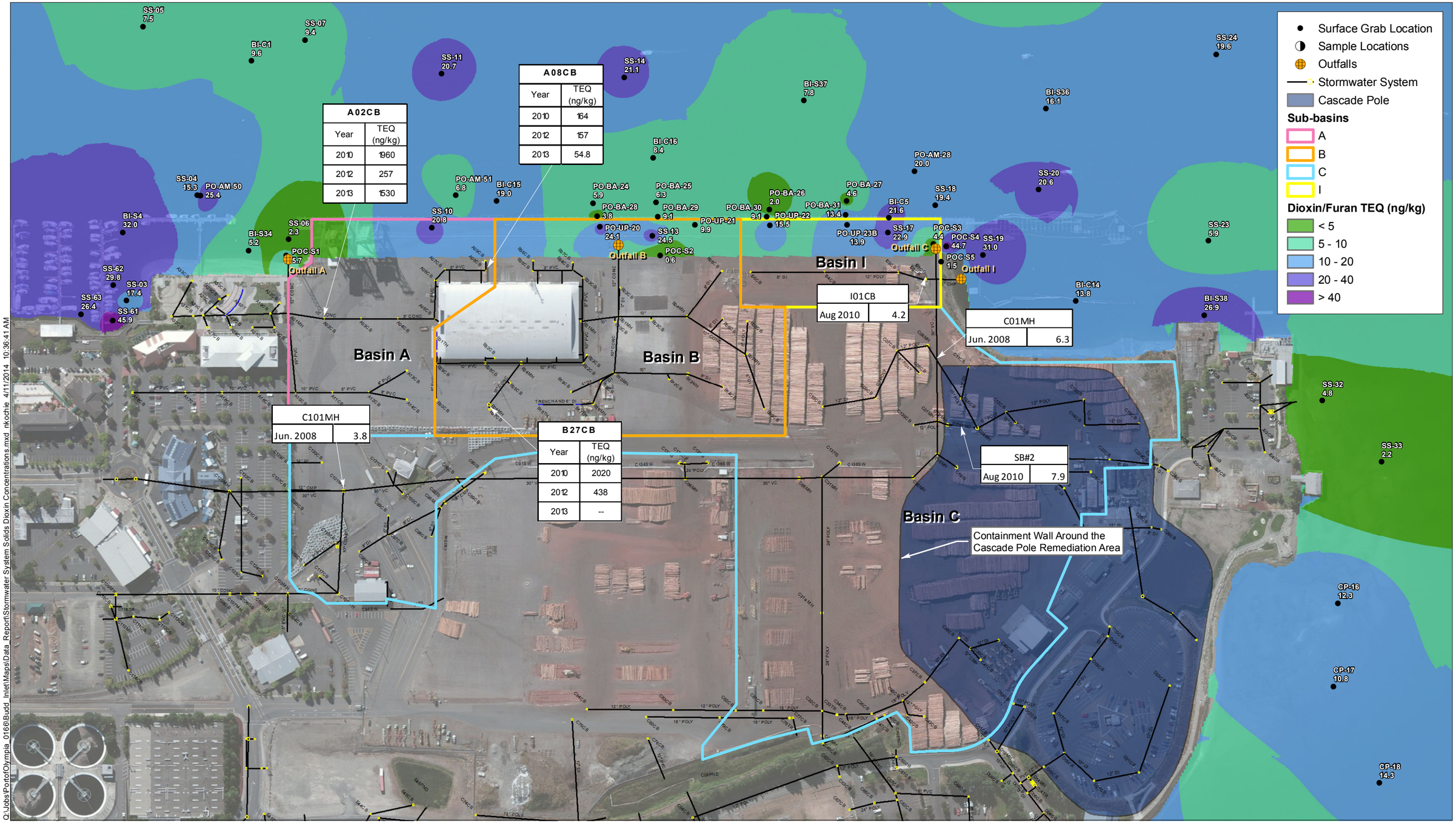
ANCHOR QEA

Feet
0 2,750 5,500

**Figure 1**
Vicinity Map
Data Report
Port of Olympia Source Control Investigation




Q:\Jobs\Portof\Olympia_01666\Budd_Inlet\Maps\Data_Report\Stormwater System Solids Dioxin Concentrations.mxd nkochie 4/11/2014 10:36:41 AM

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
0 125 250 375 500

**Figure 2**
Stormwater System Layout and Dioxin/Furan Concentrations
Data Report
Port of Olympia Source Control Investigation

# APPENDIX A
# CATCH BASIN MONITORING LOGS

# Catch Basin Inspection Log

| Catch Basin | Inspection Date | Depth of Solids (cm) | Cleanout Status[2] | Sample Collection Date/Time[1] | Observations (sheen, etc.) |
|---|---|---|---|---|---|
| A02CB | 1/30/13 | Ø | NA | | |
| A08CB | 1/30/13 | <2.54 | NA | | |
| B27CB | 1/30/13 | 3.81 | NA | | |
| 1-01CB | 1/30/13 | 10.61 | NA | | |
| A02CB | 2/20/13 | Ø | | | |
| A08CB | | 5.08 | NA | | |
| B27CB | | 3.81 | | | |
| 1-01CB | | 11.43 | | | |
| A02CB | 3/21/13 | Ø | NA | | |
| A08CB | | 2.54 | | | |
| B27CB | | 1.27 | | | slight sheen - organic material around CB (on asphalt) |
| 101CB | | 22.86 | | | |
| A02CB | 4/25/13 | Ø | | | |
| A08CB | | .5 | NA | | |
| B27CB | | .5 | | | |
| 101CB | | 22.86 | | | |
| A02CB | 5/15/13 | Ø | | | |
| A08 CB | | .63 | NA | | |
| B27CB | | .5 | | | |
| 101CB | | 29.2 | | | |
| A02CB | 6/27 | .64 | | | |
| A08CB | | 7.0 | NA | | |
| B27CB | | Ø | | | |
| 101CB | | 24.4 | | | |

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: Paul Nickelson + Barb Tope

Signature: Barb Tope

Total Sump = A02CB - 45.7 cm
A08CB - 45.7 cm
B27CB - 99.1 cm
101CB - 119.4 cm

# Catch Basin Inspection Log

| Catch Basin | Inspection Date | Depth of Solids (cm) | Cleanout Status[2] | Sample Collection Date/Time[1] | Observations (sheen, etc.) |
|---|---|---|---|---|---|
| A02CB | 7/18/13 | .64 | NA | | |
| A08CB | " | 12.7 | " | | |
| B27CB | " | Ø | " | | |
| I-01CB | " | 48.2 | " | | |
| A02CB | 8/28/13 | 1.9 | NA | | |
| A08CB | " | 15.3 | " | | |
| B27CB | " | .6 | " | | |
| 101CB | " | 50.8 | " | | |
| A02CB | 9/30/13 | 3.2 | NA | | |
| A08CB | " | NOT ACCESSIBLE | " | | |
| B27CB | " | 1.3 | " | | |
| 101CB | " | 20.3 | " | | |
| A02CB | 10/31/13 | 1.3 | NA | | |
| A08CB | " | 8.9 | " | | |
| B27CB | " | .635 | " | | |
| 101CB | " | 15.24 | " | | |
| A02CB | 11/28 | 3.8 | NA | | |
| A08CB | " | ~~8~~ 1.9 | BAT | | |
| B27CB | " | .5 | " | | |
| 101CB | " | 24.1 | " | | |
| A02CB | 12/23 | 3.81 | | 12/23/13 | odor, woody debris |
| A08CB | " | 3.81 | | 12/23/13 | debris - shells + feathers |
| B27CB | " | .635 | | X Not enough | sediment to sample BAT |
| 101CB | " | 26.7 | | X | No sampling required BAT |

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: Paul Mickelson + Barb Tope

Signature: Barb Tope

# APPENDIX B
# ANALYTICAL LABORATORY TESTING DATA [ON CD]

# APPENDIX C
# DATA VALIDATION REPORT

ANCHOR QEA

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Seattle, Washington 98101
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www.anchorqea.com

# DATA VALIDATION REVIEW REPORT – EPA STAGE 2A

| | |
|---|---|
| **Project:** | Port of Olympia |
| **Date:** | February 20, 2014 |

This report summarizes the review of analytical results for two sediment samples, two water samples, one equipment blank, and one field blank collected on October 1, 2013 and December 23, 2013. The samples were collected by the Port of Olympia and submitted to Vista Analytical (Vista) in El Dorado Hills, California, Spectra Labs in Tacoma, Washington (WA), and TestAmerica in Tukwila, WA. The samples were analyzed for the following parameters:

- Polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (PCDD/F) by USEPA methods 8290 and 1613B
- Total metals by USEPA methods 6010B and 7471A
- Total organic carbon (TOC) by Puget Sound Estuary Program (PSEP) and Plumb, 1981
- 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
- Chemical oxygen demand (COD) by USEPA method 410.4

Vista sample data group (SDG) numbers 1300672 and 1300896, TestAmerica SDG number 580-40661-2, and an unnumbered data summary report dated 01/16/2014 from Spectra were reviewed in this report. The data summary report from Spectra labs does not contain QC information; therefore, only limited parameters could be verified in this data validation. Samples reviewed in this report are presented in Table 1.

**Table 1**
**Samples Reviewed**

| Sample ID | Lab ID | Matrix | Analyses Requested |
|---|---|---|---|
| A01SW-20131001 | 1300672-01 | Water | PCDD/F |
| A02 | 580-40661-6 | Water | TSS, Metals, COD |
| B01SW-20131001 | 1300672-02 | Water | PCDD/F |
| MH1 | 580-40661-5 | Water | TSS, Metals, COD |

| Sample ID | Lab ID | Matrix | Analyses Requested |
|---|---|---|---|
| F01SW-20131001 | 1300672-03 | Water | PCDD/F |
| E01SW-20131001 | 1300672-04 | Water | PCDD/F |
| A02CB-20131223 | 1300896-01 | Sediment | PCDD/F |
| A02CB-20131223 | NA | Sediment | TOC, TS |
| A08CB-20131223 | 1300896-02 | Sediment | PCDD/F |
| A08CB-20131223 | NA | Sediment | TOC, TS |

## 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 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)

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 the labs 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 580-40661-2, which were received at 15.3 and 15.6 degrees Celsius (°C). Samples were received within 1 day of collection (well iced) 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 exception of the samples under SDG 580-40661-2. The TSS analyses were performed a few hours past the 7-day hold time. This slight exceedance is not expected to affect the results. No qualifiers were applied.

## Laboratory Method Blanks

Laboratory method blanks were analyzed at the required frequencies. All method blanks were free of target analytes.

## Field Quality Control

### *Field and Equipment Blanks*

One field blanks and one 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.

## Labeled Compound Recoveries

All surrogate and labeled compound recoveries were within the laboratory control limits.

## Column Confirmation

Confirmation analyses were performed for detected 2,3,7,8-TCDF results analyzed on the ZB-5MS column.

## Laboratory Control Sample and Laboratory Control Sample Duplicate

Laboratory control samples (LCS) and ongoing precision and recovery (OPR) samples were analyzed at the required frequencies. All LCS and OPR analyses yielded percent recovery (%R) values within laboratory control limits.

## Matrix Spike and Matrix Spike Duplicate

Matrix spike (MS) and matrix spike duplicate (MSD) samples were not analyzed.

## Laboratory Replicates

Laboratory replicates were analyzed for TSS and were both non-detect.

## Method Reporting Limits

Laboratory 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 labeled compound, LCS and OPR %R values. Precision was also acceptable as demonstrated by the laboratory duplicate. All data were deemed acceptable as reported.

## 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

## REFERENCES

USEPA (U.S. Environmental Protection Agency), 1986. *Test methods for Evaluating Solid Waste: Physical/Chemical Methods*. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. EPA 530/SW-846.

USEPA, 2004. *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation (OSRTI). EPA 540-R-04-004. October.

USEPA, 2005. *USEPA Contract Laboratory Program National Functional Guidelines for Chlorinated Dibenzo-p-Dioxins (CDDs) and Chlorinated Dibenzofurans (CDFs) Data Review*. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation (OSRTI). EPA 540-R-05-001. September 2005.