COMPLETION REPORT
BERTHS 2 AND 3 INTERIM ACTION CLEANUP

Prepared for

Port of Olympia

Prepared by

Anchor QEA, LLC
1423 Third Avenue
Suite 300
Seattle, WA 98101

June 2009

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1 INTRODUCTION

This Completion Report documents the work performed by the Port of Olympia (Port) during the Berths 2 and 3 Interim Cleanup Action Pilot Study in West Bay in Olympia, Washington (Figure 1). Interim action cleanup requirements at the site were more specifically described in the Agreed Order (AO) No. DE 6083, dated December 5, 2008, issued by the State of Washington, Department of Ecology (Ecology) and pursuant to the Model Toxics Control Act (MTCA) (Ecology 2008). The remedial activities at the site were performed in compliance with the Washington Administrative Code (WAC), Washington's Sediment Management Standards (SMS; Ecology 1995; WAC 173-204), and MTCA (Ecology 2001; WAC 173-340). This Completion Report describes the dredging, transport, disposal, clean cover placement, and confirmational sampling activities that occurred in January, February, and March 2009.

1.1 Background

Sediment quality in West Bay and South Budd Inlet is the focus of ongoing investigations by Ecology (SAIC 2007a, SAIC 2007b, and SAIC 2008; e.g., Budd Inlet Sediments Investigation). The Port and Ecology entered into an AO (Ecology 2008) for the Interim Action Pilot Study at Berths 2 and 3 at the Port's marine terminal. The Interim Action Plan (IAP; Exhibit C of the AO; Ecology 2008) provides a summary of project background, environmental conditions, cleanup requirements, the rationale for selection of the interim action, a description of the cleanup action, and monitoring and contingency actions. The cleanup plan was developed using information collected as part of the proposed Olympia Harbor Navigation Channel Maintenance Dredging Project and Ecology's Budd Inlet Sediments Investigation. The IAP was prepared to satisfy the requirements of Chapter 70.105D Revised Code of Washington (RCW), administered by Ecology under the MTCA Cleanup Regulation, Chapter 173-340 WAC.

1.2 Project Objectives

The objectives of the Interim Action Pilot Study are described in the IAP (Exhibit C of the AO; Ecology 2008) and summarized below:

1. Remove a significant amount of sediments that have elevated chemical concentrations.
2. Prevent increased risks to human health or the environment.
3. Conduct the Interim Action Pilot Study to collect information on how to investigate and design a more comprehensive cleanup of Port berthing areas in West Bay that will achieve cleanup standards.
4. Remove sediments to maintain a navigational depth of -39 feet mean lower low water (MLLW; plus up to an additional 2 feet of allowable overdepth) at Berths 2 and 3.

1.3 Project Description

Under Ecology's oversight, the Port was authorized to dredge up to a maximum volume of 22,300 cubic yards (cy) of sediments containing elevated levels of dioxin/furan within a portion of Berths 2 and 3 to an elevation of -39 feet MLLW (plus 2 feet of allowable overdepth). The dredged sediments exceeded the screening level guidance for dioxin/furan for disposal at the nearest Dredged Material Management Program (DMMP) unconfined open-water disposal site and, therefore, required removal, transport, and upland disposal. A thin layer of clean sand (approximately 6 inches minimum thickness) was required to be placed in the berth area to ensure that the interim action did not increase risks to human health or the environment. Dredging was initiated on January 19, 2009. Dredging was completed on February 24, 2009, and placement of clean cover was completed on March 3, 2009. If sloughing limits berthing capacity, the Port will consider returning during the 2009-2010 construction season in order to remove slough material from the underpier slope that may settle at the toe of the slope.

2 CONSTRUCTION ACTIVITIES

2.1 Timeline

The contractor began mobilizing their equipment to the site on January 13, 2009, and started dredging on January 19, 2009, at about 2:20 p.m. Dredging was conducted from January 19 to February 24, 2009. Placement of clean cover was conducted from February 27 to March 3, 2009. The contractor demobilized from the site on March 11, 2009.

2.2 Contractor Selection

The Request for Bids to construct the Berths 2 and 3 Interim Cleanup Action Pilot Study was advertised in the *Daily Journal of Commerce*, *The Olympian* newspaper, and on the Builder's Exchange website. A pre-bid conference was held on November 12, 2008. Sealed bids were submitted to the Port and opened on December 16, 2008.

Four bids were submitted. The lowest responsive bid was submitted by Pacific Pile and Marine (PPM), of Seattle, Washington, for $1,885,923. The Engineer's estimate for this project was $2,440,468, and bids ranged from $1,885,923 to $2,939,000. PPM was selected as the prime contractor and Notice to Proceed was issued on December 22, 2009.

2.2.1 Lessons Learned

Due to the critical nature of this project, short bid advertisement period, and tight construction window, the design team made outreach efforts to the local contracting community to let them know about the project prior to bid advertisement. In addition, the design team worked closely with the regulators to ensure that the selected contractor would have adequate time to complete the work. This coordination resulted in an extension of the in-water work window beyond that which is typically allowed in the region. The extended work window and contractor outreach efforts were likely helpful in generating multiple bids for the project.

Based on comments received during contractor outreach, factors that potentially limited the bid pool included the following:

- Tight tolerances for sand cover placement

- Concern over whether an environmental bucket would be required—this was perceived as causing constructability problems, and ultimately was not a requirement of the specifications
- Equipment and crews currently dedicated to other jobs were not available for contractors that did not bid. The late bid advertisement was a disadvantage in attracting bidders.

Given the limited in-water work windows in the region, contractor availability will likely be a continued issue for marine projects in the future.

2.3 General Construction Procedures

The contractor was required to dredge using a clamshell bucket and dredge to the grades shown on the construction drawings. The dredge template included a required dredge elevation of -39 feet MLLW in the majority of the berth, with a deeper keyway (10 feet wide) that had a required dredge elevation of -40 feet MLLW along the face of the berth. The contract included a 6-inch paid allowable overdepth beyond the required dredge elevation, and the maximum dredge elevation (for permit compliance) was set at -41 feet MLLW for the entire berth. The pre-dredge multibeam survey was completed by the Port in March 2008 and formed the basis for the dredge design.

When dredging operations were complete, the contractor was required to backfill the dredge footprint with a minimum of 6 inches of imported clean sand material.

The Port provided construction management and inspection of all construction activities with assistance from Anchor QEA, LLC (Anchor QEA). Water quality monitoring was provided by Anchor QEA under contract with the Port. Construction photographs, contractor daily reports, and Port inspector daily reports are located in Appendices A, B, and C, respectively.

2.4 Dredging Operations

2.4.1 Equipment

The contractor mobilized a derrick (*Pam Tay*) and flat-deck barges (*KP-1* and *KP-2)* to the site. The *Pam Tay* is 200 feet long by 50 feet wide, with a 12-foot draft. It was equipped with an American 9310 crawler crane with a 4-cy clamshell bucket. The derrick was equipped with a differential global positioning system (DGPS) with an antenna on the tip of the boom over the bucket. Dredgepack® software was used to allow the operator to know where the horizontal position of the bucket was relative to the dredge plan at any given time. The vertical position of the dredge bucket was determined by 1-foot markings on the cable and an electronic tide gauge that displayed real-time tide information. The *Pam Tay* was typically held in position using two spuds measuring 90 feet in length.

Dredged sediment was placed in one of two flat-deck barges (*KP-1* and *KP-2*, with 2,000-cy capacity each) and moved to the offloading area of the pier for offloading, transport, and disposal. Scuppers on the flat-deck barges were covered with filter fabric and hay bales, which filtered suspended solids from dewatering effluent before re-entering Budd Inlet. Barges were allowed to passively dewater at the site for up to 48 hours before being offloaded.

2.4.2 Dredging Activities

The dredge boundary is shown in Figure 2. Dredging started at the north end of the pier and proceeded to the south. Each dredge pass was approximately 50 feet wide, and the dredge cut was typically between 2 to 4 feet deep. The time to complete a dredge cycle was, on average, 1 minute 30 seconds for the dredge operator to position the clamshell bucket, lower the bucket to the sediment surface and take a bite of sediment, raise the bucket above the water surface, and release the material onto the flat-deck barge.

Within the keyway area, the contractor dredged the cut face in multiple lifts, with a vertical sidewall along the pier as required by the construction documents. The intent of the vertical cut face was to promote sidewall sloughing of underpier dredge material into the keyway so that this material could be removed with a dredging cleanup pass. The intent of the multiple-pass approach to the keyway cut was to limit the potential sloughing to a manageable volume of sediment that would have the least potential for damaging the pier structure during sloughing.

The post-dredge confirmatory survey conducted on February 20, 2009, showed several high spots above the required dredge elevation. The contractor was directed to dredge these high spots before the dredging work was accepted as complete. The following is a summary of dredge volumes for the project:

- Post-dredge survey compared to pre-dredge survey: approximately 8,700 cy (range of 8,670 to 8,770 from two independent calculation methods)
- Additional high spot cleanup volume (following the post-dredge survey): 100 tons based on rail car estimate (approximately 90 cy using the conversion discussed in Section 2.5).
- Potential additional volume due to differences between pre-dredge survey and post-dredge survey (see Section 2.4.3): approximately 725 cy assuming an average 3-inch difference between surveys

Summing the volumes presented above, an estimated 9,515 cy was dredged as part of the interim action. This volume was less than the permitted volume because the permitted volume assumed full allowable overdredge plus full underpier slope volumes. The contractor did not excavate all of the allowable overdredge and much of the underpier slope volume remains.

The contractor typically worked 12-hour days, including Saturdays, during the dredging phase of the project. The work day typically occurred from 6:00 a.m. to 6:00 p.m. There were no recorded lost days due to weather or equipment down-time.

Dredging was performed over approximately 19 of the 37 construction days and removed approximately 9,515 cy of material (including debris and overdredge). The contractor spent 75 percent of their daily time in production, or approximately 164 hours dredging the 9,515 cy of material. This time only includes actual dredging time, and equates to a gross production rate of 58 cy per hour. The total production time to dredge the 9,515 cy was approximately 218 hours. This time includes dredging, equipment movement, maintenance, downtime, and other non-productive time. Therefore, the net production rate was 43 cy per hour.

The contractor's bid price for dredging was $19/cy. Bids ranged from $16 to $33/cy, and the Engineer's estimate was $27.60/cy

2.4.3 Lessons Learned

The following are some of the lessons learned during the dredging phase of the work:

- The intent of the berth face dredging was to perform a vertical cut and allow the natural side slope to slough so that material would "run to" the dredge. This approach was proposed in lieu of specialized underpier dredging tactics that could be difficult to implement and that could potentially damage the existing structure. During construction, the side slopes stood much steeper than anticipated, and thus the volume of underpier material removed was much lower than expected. Future projects may want to consider whether the contractor can take other steps to mobilize slope sloughing under the pier or to directly drag material down the slope.
- Because underpier sloughing was not as extensive as anticipated, the final site condition has over-steepened slopes at the pier face line. Over the long term, it is anticipated that these slopes will slough into the berth. Future projects that rely on slope sloughing to remove underpier material would benefit from designing an even deeper keyway along the pier face to contain sloughed sediment.
- The pre-dredge survey was completed in March 2008—approximately 9 to 10 months before the start of construction. After reviewing the post-dredge bathymetry, the contractor noted discrepancies between the pre-dredge and post-dredge surveys in areas where work had not been done and suggested that there was a problem with the pre-dredge survey. The surveyor, upon further review, suggested that bottom conditions had actually changed over the 9-month period between the survey and start of work, and that the pre-dredge survey was, in fact, correct. In order to minimize the potential for these types of issues, ideally a pre-dredge survey would be completed as close to the start of construction as possible.
- In addition to questioning the pre-dredge survey, the contractor attempted to make claims about "survey accuracy" during negotiation of final pay volumes. Future

contracts could be improved by adding language that recognizes a standard survey error of 6 inches, and prohibiting the contractor from using this standard error as the basis for making a claim.

- Use of a real-time positioning system worked very well in controlling both vertical and horizontal dredge extents and staying within the permit limits.

2.5 Offloading and Disposal Activities

The offloading and disposal operation was performed by PPM using subcontract agreements with Wilder Construction, Tacoma Rail, and Waste Management. After up to 48 hours of passive dewatering on the barge, dredged sediments were removed from each barge with a Hitachi 550 excavator, which transferred sediment directly into lined, 100-ton, open-top rail gondolas. A front-end loader was placed onto the dredge material barge, and material was pushed into a central area of the barge for excavator access. The excavator removed material from the barge over a spill apron constructed on the wharf, and into the rail cars.

The shipping container liner was wrapped over the top of the sediment after the gondola was filled. To prevent spillage out of the top, each gondola was limited to about 70 tons of sediment (approximately two-thirds full) to allow for adequate free board. The barge was offloaded at an approximate rate of 10 to 12 gondolas per day.

Tacoma Rail delivered loaded gondolas to the main rail line where they were connected to a unit train and transported to Arlington, Oregon, for disposal at Waste Management, a Resource Conversation and Recovery Act (RCRA) Subtitle D landfill. Approximately 10,700 tons of sediment and debris were disposed of at the landfill. The resulting weight to volume conversion factor was approximately 1.12 tons per cy.

The contractor's bid price for offloading, transportation, and disposal was $115/cy. Bids ranged from $115 to $212.50/cy, and the Engineer's estimate was $140.30/cy.

2.5.1 Lessons Learned

The following are lessons learned during the offloading and disposal of the dredged sediment:

- Having ample upland space and rail access is essential to efficient material handling (offloading and disposal) operations. The project benefited by having available dock space immediately adjacent to the dredge area, as well as available rail for staging both full and empty gondolas. This extra rail staging area provided some contingency when rail cars were not being picked up or delivered in a timely fashion. If the project had relied on just-in-time rail car delivery, offloading and disposal could have been significantly slowed down, which would have had a cascading effect on the dredging production.

- Rail coordination was vital to the efficient offloading and disposal operation. The main line rail operator had particular schedule requirements for attaching the full gondolas to the unit train, and main line availability did not necessarily coincide with the dredge project needs. The Port maintained continued vigilance over the contractor to ensure that rail cars were being delivered and picked up in a timely fashion so that the work could stay on schedule.
- The spill apron worked as anticipated and resulted in no spills or loss of sediment during offloading.

2.6 Barge Decontamination

The haul barges were decontaminated after dredging was completed with the use of a front-end loader and manual labor to scrape and remove all sediment on the barge deck and place it into a lined container for upland disposal. The deck was swept to remove any loose material. Filter fabric and hay bales used to line the sideboards and scuppers around the perimeter of the deck line were also disposed of into a lined container for upland disposal.

2.7 Post-dredge Sand Cover Operations

After all of the dredging was complete and the elevations were confirmed by the post-dredge survey, the post-dredge sand cover was placed. As part of the contractor's submittal process, the proposed sand cover material was tested for grain size and chemistry. Results of the testing were reviewed and approved by the Port and Ecology for material acceptance. Appendix D includes copies of the chemical and grain size analytical results for the post-dredge sand cover material. Post-dredge sand cover material was obtained from the Glacier Northwest, Inc. quarry located in Dupont, Washington, and transported to the site by a flat-deck haul barge.

The post-dredge sand cover was placed using the derrick *Pam Tay* with a PPM-built "skiff box." The skiff box was a rectangular structure with a 6-cy capacity measuring 12 feet by 6 feet by 2 feet with controllable bottom doors that could be partially opened for a controlled release of material. A 3.5-cy capacity front-end loader with an on-board bucket scale operated on the material barge and loaded material directly into the skiff box. Due to the tight tolerances for the cover placement, the skiff box was loaded approximately one-half full, or 3 cy per placement.

Post-dredge sand cover placement occurred over 3 days with approximately 6,500 square yards (sy) of area covered. The contractor estimated that they would need to place 9 inches of material (1,760 cy) over the footprint to achieve the minimum 6-inch cover thickness. The average production rate for the 6-inch-thick cover was approximately 2,170 sy (or an estimated 586 cy) per day. The contractor spent approximately 20 hours placing the 6,500 sy of post-dredge sand cover material. This time only includes actual cover placement time, and equates to a gross production rate of 325 sy per hour. The total production time to place the 6,500 sy was 28 hours. This time includes backfilling, equipment movement, maintenance, downtime, and other non-productive time. Therefore, the net production rate was 232 sy per hour.

Post-dredge sand cover placement occurred from February 27 to March 3, 2009. Post-dredge sand cover work was verified by reviewing bucket placement maps generated by the contractor's Hypack computer system, as well as sediment profile imaging (SPI) described in Section 5.2.

The contractor's bid price for post-dredge sand cover was $18/sy. Bids ranged from $10 to $18.10/sy, and the Engineer's estimate was $24.15/sy.

2.7.1 Lessons Learned

The following are lessons learned during the sand cover placement:

- Cover placement was verified in part using SPI as described in Section 5.2. Initial review of the SPI results in the field suggested that the contractor may not have achieved the required thickness in some areas. However, closer review of the SPI photos indicated that smearing along the camera window was likely obscuring the full extent of cover thickness. Given this result, it is important that the limitations of SPI be understood and that any initial field review of these survey results be carefully checked before making a final determination regarding the acceptance of a contractor's cover placement. As discussed in Section 5.2, smearing of silt and clay can conceal the presence of other sediment beyond the optical window. In addition, SPI observations are limited to the length of the photographic window, which is approximately 8 inches.

- The production rate to place sand cover was significantly higher than anticipated. Past experience has shown production rates can vary significantly. We would not recommend relying on the production rate achieved by PPM to assess future sand placement.

3 WATER QUALITY MONITORING

Monitoring activities were conducted during the Interim Action Cleanup Pilot Study according to the Water Quality Monitoring and Sediment Sampling Plan (Sampling Plan; Appendix E). The Sampling Plan describes the water quality monitoring activities and the sediment monitoring activities and was approved by Ecology on January 16, 2009. The Sampling Plan is included in Appendix E and contains details of the sampling design and procedures used to collect the compliance monitoring samples. Specific monitoring activities and results are described in this section.

3.1 Water Quality Criteria

The waters for this project are designated as good quality marine waters by the State of Washington (WAC 173-201A). The Port monitored in situ turbidity and dissolved oxygen as the primary indicators of water quality. For good quality marine water bodies, turbidity shall not exceed 10 nephelometric turbidity units (NTUs) over background turbidity when the background turbidity is 50 NTUs or less, or there shall not be more than a 20 percent increase in turbidity when the background turbidity is more than 50 NTUs. The lowest 1-day minimum for dissolved oxygen in good quality marine water bodies is 5.0 milligrams per liter (mg/L).

3.2 Monitoring Locations and Depths

The monitoring distances for water quality measurements were located at 100- and 150-foot radiuses of the respective activity sites, with 150 feet being the compliance boundary. Each monitoring event consisted of measuring dissolved oxygen and turbidity at three locations on the 100-foot radius, three locations on the 150-foot radius, and one background location. Water depths were determined using a lead line at the monitoring location, which were recorded onto the field data log sheet. Measurements at the 100-foot distance served as an interim indicator of water quality closer to the site work activity, serving as an "early warning" and allowing modification of the operation of the activity to potentially avoid exceedances at the compliance boundary. A description of the process to modify the operation is described in Sections 3.5.1 and 3.5.2 of the Sampling Plan (Appendix E).

A representative background sampling station was located 1,000 feet up-current from active in-water work in an area unaffected by the active work. The background station was located to the south during ebb tides and to the north during flood tides. Figure 2 of Appendix E depicts the maximum location of background stations, depending on the tide, as well as a radial compliance boundary and a few representative water quality monitoring locations for early warning (100 feet from active in-water work) and compliance measurements (150 feet from active in-water work). The actual positions of early warning, compliance, and background stations were adjusted in the field using the best professional judgment of the monitoring crew. The adjustments were based on the location of active in-water work, the tidal cycle, and observations of the current. The actual positions were recorded in the field documentation (Appendix F).

3.3 Monitoring Methods and Equipment

In situ turbidity and dissolved oxygen were measured with a Hydrolab water quality meter (or equivalent) or a turbidometer and dissolved oxygen meter. Turbidity and dissolved oxygen data for each monitoring event and respective location were recorded on a field data sheet (Appendix F). At the conclusion of each monitoring event, results of the monitoring event were emailed to Lisa Pearson at the Ecology Toxics Cleanup Program.

3.4 Monitoring Frequency and Schedule

Compliance monitoring was conducted in one of three frequencies, depending on in-water work activities and previous monitoring results. As described in the Sampling Plan (Appendix E), monitoring was conducted according to intensive (every 4 hours), routine (once daily), or limited (visual inspection only) sampling regimens, as summarized below:

- *Intensive:* Turbidity and dissolved oxygen measurements collected every 4 hours during in-water work.
- *Routine:* Turbidity and dissolved oxygen measurements collected once daily during in-water work, or if turbidity plumes became visually evident.
- *Limited:* Turbidity and dissolved oxygen measurements collected only if turbidity plumes became visually evident during in-water work.

3.5 Comparison to Background

Sample measurements from each of the three depths at the early warning and compliance locations were compared to each of the three corresponding depths at the background station. Monitoring at the up-current background station was conducted at the start of each monitoring event during construction activities. Data collected from this station were used to compare to the corresponding compliance station depth interval.

In the event that turbidity or dissolved oxygen at the 100-foot early warning stations or the 150-foot compliance stations was above water quality criteria compared to the background station, the parameter above criteria (turbidity or dissolved oxygen) was re-collected to confirm the exceedance. In the event that a confirmed exceedance (two measurements in 5 to 10 minutes) was measured at a 100-foot early warning station, the Port was notified and the contractor modified their work activity. In addition, a confirmed exceedance at the 100-foot early warning station resulted in the collection of field parameters at the corresponding 150-foot compliance station (150 U, 150 D, or 150 W). In the event that turbidity or dissolved oxygen was confirmed to exceed water quality criteria (two measurements in 5 to 10 minutes) at the 150-foot compliance station, the Port was alerted to notify Ecology and the contractor stopped work pending implementation of additional best management practices (BMPs) beyond those taken to modify work activity for the 100-foot exceedance.

3.6 Sampling Results

Results of all turbidity and dissolved oxygen measurements during in-water activity are summarized in Table 1. Although the dredging activities qualified for "limited" water quality monitoring on January 26, 2009, the Port and Ecology opted to maintain a minimum monitoring level of "routine" to verify continued compliance during dredging throughout the project. Therefore, monitoring at the three early warning, compliance, and background stations was conducted throughout the project. No confirmed turbidity or dissolved oxygen exceedances were observed during dredging, offloading, or clean cover placement, except during the first day of dredging and one day during clean cover placement, each of which were at 100-foot early warning locations. However, no confirmed exceedances were observed at the 150-foot compliance boundary throughout the project.

On the first day of dredging on January 19, 2009, monitoring was conducted as intensive. As shown in Table 1, a confirmed turbidity exceedance of more than 10 NTU above background was observed for the bottom sample (PO-100D-090119-E1; 1 meter above bottom) at the 100-foot downcurrent early warning location. Background turbidity was 2.7 NTU, and the initial bottom downcurrent sample was measured at 13.7 NTU. The exceedance was confirmed with a second measurement of 19.3 NTU. This station was previously reported as the 150-foot compliance boundary station because the location of work activity was incorrectly measured from the dredge bucket. Because sediment was being offloaded into the barge, the distance in the downcurrent direction (to the north during the ebb tide) should have been measured from the nearest scupper hole on the barge that was draining water. The station was, therefore, reclassified the following day as the 100-foot downcurrent early warning location.

However, the response to this exceedance from the Port and contractor was treated as an exceedance at a compliance boundary station. The Port and Ecology were notified of the exceedance and the contractor temporarily stopped work and was instructed to modify the work activity. The contractor slowed the rate of ascent with the dredge bucket and associated cycle time, and turbidity was remeasured at this station 31 minutes following the measurement of the confirmed exceedance. Turbidity had fallen to 11.3 NTU in the bottom interval, which was within 10 NTU of background. A repeated measurement 10 minutes later (9.2 NTU) confirmed that the modification of the work had successfully reduced turbidity below water quality criteria. No other confirmed exceedances of water quality criteria at either the 100-foot or 150-foot compliance boundary were observed for the duration of dredging.

Monitoring was required to be conducted on an intensive schedule for the first 3 days of in-water work. According to the Sampling Plan (Appendix E), in the event that no exceedances occurred during the intensive monitoring, monitoring could be reduced to a routine schedule for 3 additional days. However, the Port elected to conduct intensive monitoring for an extended period of time from January 19 through 27, 2009 to ensure that water quality criteria were being met.

On January 28, 2009, Ecology approved a reduction in water quality monitoring to the routine level. This approval was based on 6 days of dredging and 4 days of offloading without a confirmed water quality exceedance. Monitoring during dredging activity remained on a routine level for the duration of the project.

On February 3, 2009, Ecology approved a reduction of the monitoring frequency during offloading activities to limited after 3 days of offloading without any confirmed water quality exceedances. Monitoring during off-loading was conducted at a limited level for the duration of the project.

Dredging and offloading occurred through February 24, 2009 without any confirmed water quality exceedances. On February 27, 2009, placement of clean sand cover was initiated. With the change in activity, water quality monitoring was conducted at an intensive level. Monitoring during placement of clean sand cover activities remained at the intensive level through March 3, 2009. One confirmed turbidity exceedance was observed at the up-current station along the 100-foot boundary on March 2, 2009. The contractor was notified to modify the work activity and slowed placement of sand. Turbidity levels at the 150-foot compliance boundary did not exceed water quality criteria while exceedances were observed at the 100-foot boundary. No other confirmed water quality exceedances were observed during placement of clean sand cover.

3.7 Visual Monitoring Results

Visual monitoring was conducted in accordance with the Sampling Plan (Appendix E) for turbidity plumes. No turbidity plumes were observed during capping or offloading activities. One small turbidity plume was observed as a result of filter fabric that was temporarily not covering one scupper hole on the dewatering barge on January 25, 2009; however, the plume dissipated rapidly and no confirmed exceedances of criteria were observed at the 100-foot early warning boundary during observation of the plume.

3.8 Deviations from the Sampling Plan

The Sampling Plan (Appendix E) specifies that for each monitoring event, field parameters were to be collected at the three 100-foot early warning stations as well as the three 150-foot compliance station. Beginning on January 20, 2009, the water quality sampling protocol was modified and accepted by Ecology to only require monitoring at the 150-foot compliance boundary when an exceedance was confirmed at the 100-foot early warning boundary. This change to the Sampling Plan was made to minimize the possibility that a confirmed exceedance at the 150-foot compliance boundary was caused by outside sources (e.g., storm drains or river silts spilling over Capitol Lake Dam). Any adverse effects on water quality directly attributable to construction activity would be detected first at the 100-foot early warning station. No other modifications were made to the Sampling Plan.

3.9 Fish Monitoring Results

Daily monitoring for distressed fish was performed during construction activities. No dead or distressed fish were observed for the duration of the project.

3.10 Quality Assurance

In accordance with Section 3.6 of the Sampling Plan (Appendix E), routine field calibration of turbidity and dissolved oxygen equipment was performed daily, and standard instrument operation procedures were followed. Documentation of field calibrations were recorded in the Field Notebook and are provided in Appendix F.

4 SEDIMENT MONITORING

Per the AO and IAP (Ecology 2008), sediment sampling was conducted on surface sediment (0 to 10 centimeters [cm]) of the newly exposed sediment surface following dredging in the berth area. A second sampling event was conducted following placement of clean cover in the berth area, underpier area, and at ambient locations outside of the berth area.

Several stations in the berth area and underpier area were previously sampled during pre-dredge sampling in September 2008. During that investigation, surface samples were collected from four berth area stations (three within the dredge area). Cores were also collected from each of these stations to estimate the post-dredge concentration (Z sample). During the same survey, cores were collected from four underpier stations (three adjacent to the berth area to be dredged) and composited across 2-foot intervals down to 4 feet below mudline.

The post-dredge sampling was conducted on February 26, 2009 from four locations in the berth area, as shown in Figure 3 (BA-24, BA-25, BA-26, and BA-27B). The post-cover sampling was conducted from the same four locations in the berth area, in addition to four underpier samples (UP-20, UP-21, UP-22, and UP-23B) and three ambient samples located away from the work area (BI-C16, BI-S37, and AM-28). The coordinates of each location sample are provided in Table 2.

Three of the berth area locations (BA-24, BA-25, and BA-26) were identical to locations sampled during the pre-dredge sampling. The fourth sample (BA-27B) was relocated to be within the dredge area. For the underpier samples, three of the four locations were identical to pre-dredge sampling locations where sediment was sampled using vibracores (UP-20, UP-21, and UP-22). The fourth sample (UP-23B) was relocated to be in the underpier area adjacent to the berth area dredging. Sampling was conducted according to the Ecology-approved Sampling Plan (Appendix E). Sediment chemistry results are presented in Table 3 and Figure 4. Laboratory results and validation reports are included in Appendices G and H, respectively.

4.1 Post-Dredge Surface Sediment – Berth Area

Post-dredge surface sediment (0 to 10 cm) dioxin concentrations in BA-24 through BA-27B ranged from 32.1 to 48.3 parts per trillion Toxic Equivalents (TEQ; average of 43.1 TEQ), with the lowest concentration located to the north (BA-27B). This average concentration was slightly higher than the average pre-dredge surface sediment concentration (22.3 TEQ), which was presented in the IAP (Exhibit C of the AO; Ecology 2008) and is shown on Figure 4. Figure 4 also provides the concentration of the predicted "Z" layer collected in September 2008, which was sampled from -40 to -41 feet MLLW from cores in the berth area (also presented in the IAP). The average post-dredge sediment surface (43.1 TEQ) was lower than the predicted "Z" layer in the dredged area, which ranged from 51.1 to 67.2, with an average concentration of 58.6 TEQ.

4.2 Post-Cover Surface Sediment

4.2.1 Berth Area

Post-cover surface sediment concentrations at samples BA-24 through BA-27B ranged from 0.03 to 0.51 TEQ (average of 0.16 TEQ), which are below pre-dredge surface sediment concentrations. If sloughing of the underpier slope continues, sediment from the underpier area is expected to effect surface sediment concentrations of the clean cover around the toe of slope adjacent to the pier. This could result in localized changes to surface sediment conditions in the vicinity of these sampling locations, but is not expected to extend into the entire berth.

4.2.2 Underpier Area

Samples collected from the four underpier locations (UP-20 through UP-23B) ranged from 32.3 to 46.0 TEQ (average 38.9 TEQ). The underpier samples were collected in March 2009 to establish a baseline concentration in the underpier area for comparison purposes during future sampling events. Underpier sampling from the September 2008 event was composited across the upper 2-foot interval and, therefore, followed a different methodology than the March 2009 surface sediment samples (0 to 10 cm). Although direct comparisons cannot be made between these two sets of results, the average March 2009 surface sediment concentration (38.9 TEQ) is similar to the average of the 0 to 2-foot intervals collected in the underpier locations adjacent to the dredge area (37.4 TEQ).

Post-dredge bathymetry results (Section 5) suggest that sloughing of underpier sediment did not reach the locations of the September 2008 and March 2009 sampling locations. However, as discussed in Section 5, future sloughing of the underpier slope could result in changes to surface sediment conditions in the vicinity of these sampling locations.

4.2.3 Ambient Samples

Samples collected from the three ambient locations outside of the dredge area ranged from 23.3 to 24.7 TEQ (average 23.8 TEQ). Two of these samples (BI-C16 and BI-S37) were previously sampled as part of Ecology's 2007 study (SAIC 2008). Sample BI-C16 is located just beyond the edge of the dredge area. The concentration in 2007 at this location was 19.2 TEQ. The sample concentration collected from March 2009 was 24.7 TEQ.

Sample BI-S37 is located approximately 200 feet to the east of the edge of the dredge area. The concentration in 2007 at this location was 15.2 TEQ, and the sample concentration collected from March 2009 was 23.3 TEQ. The third ambient sample is located about 150 feet north of the edge of the dredge area. The sample concentration collected from March 2009 was 23.3 TEQ.

Although March 2009 concentrations at BI-C16 and BI-S37 were slightly higher than the 2007 results, the small increase is likely not attributable to dredging activities at Berths 2 and 3. The absence of exceedances of water quality criteria at the 150-foot compliance boundary suggests that suspended sediment from the dredged area was insufficient to cause increases in surface sediment concentrations at the ambient locations. These slight increases are likely the result of natural variability of sediment conditions in Budd Inlet or other activities unrelated to the Berths 2 and 3 project.

5 SURVEYS

5.1 Pre-Construction, Interim, Post-Dredge, and Post-Cover Bathymetric Surveys

The Port hired a third party independent hydrographic surveyor, David Evans and Associates (DEA) to perform bathymetric surveying during the project. Surveys were performed before construction began at the site (pre-construction survey), at the mid-point of dredging to assess underpier slopes (interim survey), after the dredging was complete (post-dredge survey), and after the post-dredge sand cover was complete (post-cover, or final survey). Figures providing bathymetry survey results are provided in Appendix I. These surveys were used to verify that the required dredging elevations were achieved, and to provide conditions information on underpier slopes and on the post-cover bathymetry. These surveys were also used as the basis for computing dredge quantities for contractor payment. Each survey was performed using a Reson Seabat 8101 multi-beam fathometer integrated with an Applanix POS/MV positioning and motion reference system. Horizontal and vertical location controls were provided by using real time kinematic global positioning system (RTK-GPS) and locally surveyed monuments. The horizontal datum used in the surveys was Washington State Plan South, North American Datum of 1983 (NAD83/91) and the vertical datum was the National Ocean Service (NOS) MLLW (1960-1978 epoch).

The bathymetric survey performance dates were as follows:

- Pre-construction: March 27, 2008
- Interim: February 4, 2009
- Post-dredge: February 20, 2009
- Post-cover: March 9, 2009

5.2 Sediment Profile Imaging Survey

An SPI survey was conducted following placement of the clean sand cover on March 3, 2009 to confirm the sand cover thickness. Procedures used to complete the SPI survey are included in Attachment A of the Sampling Plan (Appendix E).

A total of 24 SPI stations were identified within the dredged and covered area in Attachment A of the Sampling Plan (Appendix E). A minimum of three replicate images were taken at each of the 24 stations. At many of these stations, the camera overpenetrated into the sand cover. An additional three replicate images were collected from stations where overpenetration occurred. In addition to the 24 stations located within the dredged and covered area, seven additional locations were selected beyond the dredge boundary (Stations 25 through 31). Figure 5 provides the exact location of each of the image locations along with placement locations of sand using the skiff box across the dredge area. Each image is included in Appendix J.

Table 4 summarizes cover thickness observations for each replicate image. A minimum placement of 6 inches of sand was verified at nearly all replicate locations; however, several factors limited verification of cover thickness. These factors included overpenetration, underpenetration, and smearing of the SPI unit. When the SPI overpenetrates, the sediment surface is not shown on the image, resulting in the inability to verify the full thickness of placed sand. Similarly, underpenetration can also occur, which can prevent conclusive observations about cover thickness. However, the optical window measures approximately 8 inches in height, and estimates of sand thickness can be made based on the viewable area. Another factor that limited verification of cover thickness is smearing of fine grained silt and clay on the optical window. Smearing can conceal the presence of other sediment beyond the optical window. In many cases, sand grains were observed throughout the viewable area, but cover thickness could not be verified due to the presence of substantial smearing.

Despite these limiting factors, 6 inches or more of sand cover was observed at replicates of each of the 24 stations located within the dredged and covered area. During a meeting with Ecology on March 6, 2009 to review the SPI images, Ecology agreed that adequate cover had been placed throughout the dredged area and had, therefore, met the requirements described in the IAP (Exhibit C of the AO; Ecology 2008).

6 UNDERPIER SLOPE OBSERVATIONS

Material was removed from the cut face in multiple lifts with a vertical sidewall along the pier to promote sidewall sloughing of underpier material into the keyway. A multiple pass approach was used to limit the potential sloughing to a manageable volume that would have the least potential for damaging the pier structure during sloughing.

During construction, the side slopes stood much steeper than anticipated. Completion of an interim multibeam bathymetric survey by a third party surveyor selected by the Port on February 9, 2009 indicated slopes as steep as 0.5H:1V (horizontal:vertical). The post-dredge survey completed on February 20, 2009 and post-cover survey on March 9, 2009 also confirmed near-vertical slopes. A small amount of sloughing into the berth area occurred in the 2 weeks between the post-cover survey and post-dredge survey. However, the berth area affected by this sloughing is anticipated to be localized and restricted to the area immediately adjacent to the pierface. Additional sloughing may continue in the future until the slope reaches a steady state. The Port will continue to monitor water depths along the pierface in order to assess sloughing and water depths and the potential need for additional dredging.

7 DEVIATIONS FROM PLANS

There were no deviations from the Ecology-approved Contract Drawings and Technical Specifications.

8 SUMMARY OF LESSONS LEARNED

The cooperation between Ecology, the Port, and the contractor helped the construction stay on schedule, and the interim action was completed on a tight timeframe during a relatively short construction window. A longer construction window may have improved contractor bid response and would have eased the schedule.

Dredging a vertical cut at the face of the pier in multiple lifts to induce controlled sloughing and allow removal of underpier sediment was successful at preventing large slope sloughing events that may have resulted in damaging the existing piles. However, this controlled dredging at the face of the pier resulted in slopes standing at a steeper angle than was anticipated using traditional engineering evaluation methods. Future dredging designs should consider if there are other measures the contractor can take to help induce underpier sloughing in a controlled manner. This would facilitate removal by conventional dredging of the sloughed material at the toe of the cut slope.

The method of offloading sediment at the dock was effective at minimizing loss of sediment. Also, the available Port land and rail access immediately adjacent to the dredging allowed for efficient transloading operations. One critical aspect noted was the need for sufficient railcar storage to accommodate rail availability on future projects. Off-site transportation of dredged material became a critical path task when the availability of rail cars did not match the anticipated schedule. Completion of this project during the tight construction window was successful, in part, because of the active role the Port played in tracking rail car movement and engaging the contractor when issues developed related to rail transport.

Barge dewatering was subject to a maximum 48-hour timeframe before offloading became mandatory. No water quality impacts were observed during sediment dewatering on barges. Longer dewatering periods on the barge for future projects would provide more flexibility to the contractor.

Finally, overdredging during marine construction is being subjected to more regulatory agency (e.g., U.S. Army Corps of Engineers [USACE]) scrutiny. Frequent contractor progress surveys provide more timely evidence of overdredging; therefore, future projects may require more emphasis on conducting and reviewing contractor progress surveys in order to help minimize the potential for overdredging.

Clean sand cover placed along the pierface is expected to continue to receive sediment sloughing from the underpier slope. Placement of clean sand cover in the keyway served to temporarily provide a new sediment surface, which was quickly covered by sediment that sloughed from the underpier slope. For future projects, the value of the sand cover in the keyway should be evaluated considering the likelihood for underpier sloughing to continue after placement and until the slope is fully stabilized. Future dredging events in the berth area will require this clean sand cover to be removed and disposed of at an approved landfill, resulting in additional costs.

9 NEXT STEPS

Surface sediment sampling and bathymetry monitoring will be conducted as required in the Sampling Plan (Appendix E). This includes surface sediment sampling from each of the 11 stations that were sampled following cover placement, and collection of bathymetry in the berth area and underpier area in June 2009, December 2009, June 2010, and December 2010. Results will be provided to Ecology and USACE in written and electronic format.

Additional dredging along the toe of the slope may be required based on the results of the bathymetric surveys. Dredging may be needed if these surveys indicate that additional sloughing is continuing to contribute sediment into the berth area and limiting navigation depths along the pier face. Any additional dredging activities, if necessary, will be coordinated with Ecology during the planning and design phase.

10 AFFIDAVIT

The Interim Cleanup Action Pilot Study for Berths 2 and 3 in West Bay, Olympia, Washington, has been completed in substantial compliance with the Agreed Order and Interim Action Plan dated December 2008 and the Technical Specifications dated November 2008.

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TABLES

Table 1
Water Quality Monitoring Results

Date	Station ID	Sample ID	Time	Water Depth (feet)	Turbidity (NTU) Sample Depth (feet)			Dissolved Oxygen (mg/L) Sample Depth (feet)			Exceedance	Activity
					Bottom	Mid	Surface	Bottom	Mid	Surface	Yes / No	Dredge (D) / Offload (O) / Cover Placement (C)
1/19/2009	PO-BG	PO-BG-090119-E1	1420	50	2.7	2.64	3.9	7.51	7.37	11.08	n/a	D
1/19/2009	PO-100D*	PO-100D-090119-E1	1454	50	13.7/18	5.53	1.89	7.15	7.96	9.47	Yes	D
1/19/2009	PO-100W	PO-100W-090119-E1	1518	45	2.17	1.63	4.83	7.78	7.88	9.01	No	D
1/19/2009	PO-100D*	PO-100D-090119-E1a	1529	48	19.3	--	--	--	--	--	Yes	D
1/19/2009	PO-100U	PO-100U-090119-E1	1550	45	2.49	1.81	2.44	7.77	7.76	8.63	No	D
1/19/2009	PO-100D*	PO-100D-090119-E1b	1600	35	11.3	--	--	--	--	--	No	D
1/19/2009	PO-100D*	PO-100D-090119-E1c	1610	45	9.22	--	--	--	--	--	No	D
1/19/2009	PO-150D	PO-150U-090119-E1	1617	40	2.12	1.73	1.45	7.38	7.34	7.68	No	D
1/19/2009	PO-150W	PO-150W-090119-E1	1630	40	2.57	2.37	5.95	7.24	7.63	9.27	No	D
1/19/2009	PO-150D	PO-150D-090119-E1d	1649	40	7.46	5.09	4.88	7.54	7.57	8.32	No	D
1/20/2009	PO-BG	PO-BG-090119-E1	808	48	3.57	2.28	3.12	6.95	7.89	11.32	n/a	D
1/20/2009	PO-100U	PO-100U-090119-E1	835	49	6.88	2.44	4.93	7.08	7.65	10.5	No	D
1/20/2009	PO-100W	PO-100W-090119-E1	845	46	2.43	1.8	4.71	7.36	7.71	10.34	No	D
1/20/2009	PO-100D	PO-100D-090119-E1	858	43	2.34	2.52	5.18	7.11	7.37	9.36	No	D
1/20/2009	PO-BG	PO-BG-090119-E2	1312	49	2.67	1.64	4.01	7.04	7.88	9.92	n/a	D
1/20/2009	PO-100U	PO-100U-090119-E2	1331	40	3.73	2.13	4.3	6.96	7.99	9.91	No	D
1/20/2009	PO-100W	PO-100W-090119-E2	1346	45	2.31	1.64	4.71	7.06	7.24	10.3	No	D
1/20/2009	PO-100D	PO-100D-090119-E2	1400	50	8.47	3.79	5.45	7.08	7.88	10.3	No	D
1/21/2009	PO-BG	PO-BG-090121-E1	900	54	2.83	2.16	2.52	6.89	6.4	9.09	n/a	D
1/21/2009	PO-100U	PO-100U-090121-E1	930	38	2.98	2.51	2.91	6.71	6.6	9.85	No	D
1/21/2009	PO-100W	PO-100W-090121-E1	945	46	2.31	14.2	4.17	6.8	7.04	9.62	Yes	D
1/21/2009	PO-100W	PO-100W-090121-E1a	1000	46	--	3.4	--	--	6.94	--	No	D
1/21/2009	PO-100D	PO-100D-090121-E1	1010	52	8.09	5.79	8.91	6.99	6.72	9.27	No	D
1/21/2009	PO-100W	PO-100W-090121-E1b	1250	46	2.41	2.85	3.75	6.84	6.77	8.23	No	D
1/21/2009	PO-BG	PO-BG-090121-E2	1315	43	2.6	1.85	2.24	6.69	7.25	8.72	n/a	D
1/21/2009	PO-100U	PO-100U-090121-E2	1335	48	6.03	3.35	2.06	6.61	6.82	8.29	No	D
1/21/2009	PO-100W	PO-100W-090121-E2	1358	46	2.34	2.21	2.24	6.63	6.73	8.72	No	D
1/21/2009	PO-100D	PO-100D-090121-E2	1412	47	4.65	3.54	2.83	6.61	7.2	7.27	No	D
1/21/2009	PO-BG	PO-BG-090121-E3	1700	40	2.76	2.14	1.88	6.82	6.89	8.19	n/a	D
1/21/2009	PO-100U	PO-100U-090121-E3	1719	47	7.95	2.25	2.45	7.03	6.66	8.28	No	D
1/21/2009	PO-100W	PO-100W-090121-E3	1731	41	6.25	1.86	2.62	6.98	6.92	8.49	No	D
1/21/2009	PO-100D	PO-100D-090121-E3	1742	44	9.7	5.45	7.72	7.67	7.01	8.05	No	D
1/22/2009	PO-BG	PO-BG-090122-E1	845	52	4.68	3.13	4.12	6.21	5.99	5.98	n/a	D
1/22/2009	PO-100U	PO-100U-090122-E1	910	55	5.2	5.2	3.49	5.96	6.99	7.3	No	D
1/22/2009	PO-100W	PO-100W-090122-E1	925	50	2.1	2.56	4.4	5.94	5.81	7.44	No	D
1/22/2009	PO-100D	PO-100D-090122-E1	937	54	6.33	2.48	6.16	5.89	5.67	6.76	No	D
1/23/2009	PO-BG	PO-BG-090123-E1	1154	39	3.51	1.42	2.17	6.37	6.5	8.5	n/a	O
1/23/2009	PO-100U	PO-100U-090123-E1	1205	42	2.29	2.13	2.65	6.3	6.69	8.37	No	O
1/23/2009	PO-100W	PO-100W-090123-E1	1215	49	2.68	2.04	2.78	6.28	6.57	8.5	No	O
1/23/2009	PO-100D	PO-100D-090123-E1	1225	46	2.15	2.11	2	6.25	6.5	8.4	No	O
1/23/2009	PO-BG	PO-BG-090123-E2	1435	40	2.19	1.87	3.4	6.21	6.42	8.49	n/a	O
1/23/2009	PO-100U	PO-100U-090123-E2	1445	45	2.37	1.68	3.87	6.32	6.68	9.2	No	O
1/23/2009	PO-100W	PO-100W-090123-E2	1455	48	2.17	2.2	3.26	6.37	6.42	8.8	No	O
1/23/2009	PO-100D	PO-100D-090123-E2	1500	53	2.5	1.95	3.13	6.21	6.84	9.37	No	O
1/24/2009	PO-BG	PO-BG-090124-E1	830	42	2	1.47	3.39	6.52	7.6	8.37	n/a	O
1/24/2009	PO-100U	PO-100U-09012-E1	845	44	3.94	2.02	2.92	6.15	7.32	8.6	No	O
1/24/2009	PO-100W	PO-100W-090124-E1	855	48	2.38	1.16	3.09	6.39	6.63	8.21	No	O
1/24/2009	PO-100D	PO-100D-090124-E1	915	30	2.38	1.47	2.67	6.34	6.2	8.71	No	O
1/24/2009	PO-BG	PO-BG-090124-E2	1315	40	1.81	1.72	2.22	6.53	6.59	7.7	n/a	O
1/24/2009	PO-100U	PO-100U-090124-E2	1535	49	3.99	1.44	1.98	6.51	6.55	7.81	No	O
1/24/2009	PO-100W	PO-100W-090124-E2	1347	51	2.37	2.27	2.14	6.46	6.42	7.62	No	O
1/24/2009	PO-100D	PO-100D-090124-E2	1350	44	2.07	1.19	1.84	6.45	6.56	7.24	No	O
1/25/2009	PO-BG	PO-BG-090125-E1	855	43	1.95	1.54	2.59	6.21	6.62	7.1	n/a	D
1/25/2009	PO-100U	PO-100U-090125-E1	905	40	2.2	1.69	2.45	6.94	6.54	8.4	No	D
1/25/2009	PO-100W	PO-100W-090125-E1	916	45	2.34	1.68	2.4	6.27	6.7	8.55	No	D
1/25/2009	PO-100D	PO-100D-090125-E1	930	49	12.6	1.84	5.89	6.17	6.9	8.3	Yes	D
1/25/2009	PO-100D	PO-100D-090125-E1b	938	49	4.83	--	--	--	--	--	No	D
1/25/2009	PO-BG	PO-BG-090125-E2	1450	53	2.39	2.02	2.89	6.48	6.62	8.6	n/a	D
1/25/2009	PO-100U	PO-100U-090125-E2	1500	46	3.21	3.89	4.17	6.9	7.02	8.08	No	D
1/25/2009	PO-100W	PO-100W-090125-E2	1520	48	1.76	1.86	3.22	7.05	7.01	8.65	No	D
1/25/2009	PO-100D	PO-100D-090125-E2	1523	54	3.54	3.14	15.8	6.38	7.25	8.69	Yes	D
1/25/2009	PO-100D	PO-100D-090125-E2b	1533	54	--	--	7.18	--	--	--	No	D
1/26/2009	PO-BG	PO-BG-090126-E1	1030	48	4.65	2.95	3.1	7.61	7.37	11.87	n/a	D
1/26/2009	PO-100U	PO-100U-090126-E1	1055	40	12.1	8.71	10.8	7.8	7.1	7.65	No	D
1/26/2009	PO-100W	PO-100W-090126-E1	1113	48	2.67	2.52	6.1	7.22	7.43	8.01	No	D
1/26/2009	PO-100D	PO-100D-090126-E1	1126	49	7.53	2.5	5.07	7.15	8.01	8.9	No	D
1/26/2009	PO-BG	PO-BG-090126-E2	1506	49	3.7	2.44	1.81	7.82	7.06	9.6	n/a	D
1/26/2009	PO-100U	PO-100U-090126-E2	1515	49	20.9	--	--	8.49	7.9	7.91	Yes	D
1/26/2009	PO-100U	PO-100U-090126-E2a	1540	49	3.33	3.01	8.7	7.09	7.74	9.02	No	D
1/26/2009	PO-100W	PO-100W-090126-E2	1552	46	9.9	2.29	5.57	7.8	7.2	8.8	No	D
1/26/2009	PO-100D	PO-100D-090126-E2	1604	55	3.03	3.72	5.18	7.1	8.47	9.16	No	D
1/27/2009	PO-BG	PO-BG-090127-E1	950	36	2.64	2.63	3.19	8.33	9.44	9.5	n/a	O
1/27/2009	PO-100U	PO-100U-090127-E1	1045	36	2.55	3.18	2.58	7.75	8.95	8	No	O
1/27/2009	PO-100W	PO-100W-090127-E1	1100	40	3.2	3.2	3.19	9.4	8.7	7.7	No	O
1/27/2009	PO-100D	PO-100D-090127-E1	1110	48	4.1	4.01	5.1	8	8.2	8.3	No	O
1/27/2009	PO-BG	PO-BG-090127-E2	1440	35	3.89	5.1	4.42	7.58	7.46	8.09	n/a	O
1/27/2009	PO-100U	PO-100U-090127-E2	1502	52	4.48	4.01	2.24	9.9	8.88	8.92	No	O
1/27/2009	PO-100W	PO-100W-090127-E2	1509	51	3.41	3.72	1.7	8.95	8.96	9.15	No	O
1/27/2009	PO-100D	PO-100D-090127-E2	1516	53	5.24	3	3.17	9.54	8.75	8.95	No	O
1/28/2009	PO-BG	PO-BG-090128-E1	1325	45	2.7	2.51	2.6	8.26	8.1	8.25	n/a	D/O
1/28/2009	PO-100U	PO-100U-090128-E1	1335	47	3.2	2.9	7.4	8.33	8.13	8.37	No	D/O
1/28/2009	PO-100W	PO-100W-090128-E1	1340	48	4.2	2.6	3.1	8.19	8.21	8.29	No	D/O
1/28/2009	PO-100D	PO-100D-090128-E1	1350	50	2.6	2.42	2.27	8.24	8.52	8.6	No	D/O

Table 1
Water Quality Monitoring Results

Date	Station ID	Sample ID	Time	Water Depth (feet)	Turbidity (NTU) Sample Depth (feet) Bottom	Turbidity (NTU) Mid	Turbidity (NTU) Surface	Dissolved Oxygen (mg/L) Sample Depth (feet) Bottom	Dissolved Oxygen (mg/L) Mid	Dissolved Oxygen (mg/L) Surface	Exceedance Yes / No	Activity Dredge (D) / Offload (O) / Cover Placement (C)
1/29/2009	**PO-BG**	**PO-BG-090128-E1**	**1140**	**41**	**8.5**	**8.4**	**9.7**	**8.27**	**8.54**	**8.4**	**n/a**	**O**
1/29/2009	PO-100U	PO-100U-090128-E1	1145	48	9.5	9.2	9.8	8.71	8.39	8.42	No	O
1/29/2009	PO-100W	PO-100W-090128-E1	1150	50	10.1	8.7	9.1	8.84	9.07	8.74	No	O
1/29/2009	PO-100D	PO-100D-090128-E1	1154	48	10.1	7.6	9	8.67	9.02	9.07	No	O
1/30/2009	**PO-BG**	**PO-BG-090130-E1**	**1055**	**52**	**1.4**	**1.8**	**1.7**	**9.12**	**8.84**	**10.15**	**n/a**	**O**
1/30/2009	PO-100U	PO-100U-090130-E1	1100	50	2.1	2.2	2.7	9.63	9.04	12.19	No	O
1/30/2009	PO-100W	PO-100W-090130-E1	1105	48	1.9	2.9	4.1	9.65	9.22	11.64	No	O
1/30/2009	PO-100D	PO-100D-090130-E1	1110	49	2.6	2.1	3.4	10	9.48	10.69	No	O
1/31/2009	**PO-BG**	**PO-BG-090130-E1**	**1045**	**52**	**2.4**	**5.2**	**4.7**	**9.33**	**9.7**	**9.39**	**n/a**	**D**
1/31/2009	PO-100U	PO-100U-090130-E1	1050	52	6.3	11.1	12.6	9.72	9.52	9.42	No	D
1/31/2009	PO-100W	PO-100W-090130-E1	1055	43	5.1	9.4	10.1	9.84	9.48	9.89	No	D
1/31/2009	PO-100D	PO-100D-090130-E1	1100	48	8.4	12.6	13.6	9.67	9.81	10.89	No	D
2/2/2009	**PO-BG**	**PO-BG-090202-E1**	**1311**	**22**	**1.02**	**1.5**	**0.12**	**8.76**	**9.5**	**13.12**	**n/a**	**D**
2/2/2009	PO-100U	PO-100U-090202-E1	1322	43	2.4	2.27	1.04	9.56	9.6	10.9	No	D
2/2/2009	PO-100W	PO-100W-090202-E1	1325	41	1.74	1.7	4.12	9.91	10.03	11.22	No	D
2/2/2009	PO-100D	PO-100D-090202-E1	1328	44	2.7	2.15	4.1	9.46	10.68	12.3	No	D
2/3/2009	**PO-BG**	**PO-BG-090302-E1**	**1433**	**43**	**1**	**0.25**	**1.3**	**9.22**	**9.53**	**10.44**	**n/a**	**O**
2/3/2009	PO-100U	PO-100U-090302-E1	1515	46	1.08	0.51	0.7	9.44	9.58	11.25	No	O
2/3/2009	PO-100W	PO-100W-090302-E1	1520	38	2.3	1.14	3.3	9.46	10.12	10.92	No	O
2/3/2009	PO-100D	PO-100D-090302-E1	1530	44	3.1	5.5	5.5	9.68	9.68	11.14	No	O
2/5/2009	**PO-BG**	**PO-BG-090205-E1**	**1415**	**48**	**3.19**	**0.88**	**1.5**	**8.87**	**8.81**	**9.73**	**n/a**	**D**
2/5/2009	PO-100U	PO-100U-090205-E1	1435	43	1.95	0.85	1.48	8.97	9.03	9.28	No	D
2/5/2009	PO-100W	PO-100W-090205-E1	1450	42	1.44	0.76	3.95	9.15	9.21	11.21	No	D
2/5/2009	PO-100D	PO-100D-090205E1	1500	45	3.24	2.77	4.79	9.11	9.02	10.47	No	D
2/6/2009	**PO-BG**	**PO-BG(N)-090206-E1**	**1025**	**44**	**1.45**	**0.94**	**1.76**	**8.23**	**8.36**	**8.39**	**n/a**	**D**
2/6/2009	PO-100U	PO-100U-090206-E1	1040	49	1.52	0.77	1.87	8.19	8.11	8.87	No	D
2/6/2009	PO-100W	PO-100W-090206-E1	1125	45	1.94	1.66	4.36	8.39	8.46	8.98	No	D
2/6/2009	PO-100D	PO-100D-090206-E1	1135	52	3.98	9.14	6.09	8.37	8.69	9.06	No	D
2/10/2009	**PO-BG**	**PO-BG-090210-E1**	**1145**	**43**	**1.2**	**2.3**	**0.54**	**9.4**	**9.02**	**8.9**	**n/a**	**D**
2/10/2009	PO-100U	PO-100U-090210-E1	1158	44	2.94	4.04	3.7	9.69	9.6	10.85	No	D
2/10/2009	PO-100W	PO-100W-090210-E1	1205	42	3.3	2.43	2.04	9.06	9.4	11.86	No	D
2/10/2009	PO-100D	PO-100D-090210-E1	1208	44	9.5	11.5	9.41	8.87	8.84	10.05	No	D
2/11/2009	**PO-BG**	**PO-BG-090211-E1**	**1143**	**42**	**2.7**	**1.15**	**1.4**	**9.52**	**10.87**	**10.97**	**n/a**	**D**
2/11/2009	PO-100U	PO-100U-090211-E1	1145	44	9.5	5.1	7.9	9.67	10.04	11.1	No	D
2/11/2009	PO-100W	PO-100W-090211-E1	1151	38	5.5	5.12	3.1	9.49	10.73	11.92	No	D
2/11/2009	PO-100D	PO-100D-090211-E1	1200	45	6.45	8.78	7.24	9.4	8.99	13.3	No	D
2/14/2009	**PO-BG**	**PO-BG-E1**	**1140**	**43**	**1.08**	**0.41**	**1.7**	**9.4**	**9.74**	**11.19**	**n/a**	**D**
2/14/2009	PO-100U	PO-100U-E1	1154	43	3.1	3.7	2.2	9.17	9.89	12.6	No	D
2/14/2009	PO-100W	PO-100W-E1	1157	38	1.65	3.9	4.2	8.83	9.3	11.7	No	D
2/14/2009	PO-100D	PO-100D-E1	1201	43	7.6	7.1	7.27	9.09	9.52	10.75	No	D
2/16/2009	**PO-BG**	**PO-BG-090216-E1**	**1033**	**42**	**1.74**	**1.7**	**1.52**	**8.64**	**8.53**	**8.62**	**n/a**	**D**
2/16/2009	PO-100U	PO-100U-090216-E1	1055	48	7.28	1.08	1.9	8.37	8.73	9.38	No	D
2/16/2009	PO-100W	PO-100W-090216-E1	1120	44	2.08	1.18	0.86	8.81	8.74	9.21	No	D
2/16/2009	PO-100D	PO-100D-090216-E1	1134	47	4.9	3.25	7.36	8.32	8.51	9.11	No	D
2/17/2009	**PO-BG**	**PO-BG-090217-E1**	**1130**	**43**	**2.48**	**1.8**	**0.9**	**8.67**	**8.62**	**9.16**	**n/a**	**D**
2/17/2009	PO-100U	PO-100U-090217-E1	1138	40	5.8	7.7	1.21	9.3	9.08	9.64	No	D
2/17/2009	PO-100W	PO-100W-090217-E1	1144	43	5.22	2.88	1.2	8.91	9.13	9.16	No	D
2/17/2009	PO-100D	PO-100D-090217-E1	1149	45	6.88	7.65	8.8	8.36	8.68	9.1	No	D
2/19/2009	**PO-BG**	**PO-BG-090219-E1**	**1414**	**43**	**2.6**	**1.8**	**2.7**	**8.83**	**9.35**	**10.25**	**n/a**	**D**
2/19/2009	PO-100U	PO-100U-090219-E1	1420	41	6.41	7.7	4.92	8.89	9	9.56	No	D
2/19/2009	PO-100W	PO-100W-090219-E1	1425	41	4.1	3.9	3.2	8.96	9.6	10.8	No	D
2/19/2009	PO-100D	PO-100D-090219-E1	1430	44	4.7	5.9	5.5	8.65	9.34	9.73	No	D
2/24/2009	**PO-BG**	**PO-BG-090224-E1**	**1430**	**43**	**2.4**	**1.7**	**0.9**	**8.23**	**7.9**	**8.31**	**n/a**	**D/O**
2/24/2009	PO-100U	PO-100U-090224-E1	1442	43	3	1.8	1.8	8.15	8.18	8.2	No	D/O
2/24/2009	PO-100W	PO-100W-090224-E1	1450	38	2.4	3.4	2.1	8.71	8.99	8.8	No	D/O
2/24/2009	PO-100D	PO-100D-090217-E1	1503	41	4.4	5.6	8.91	8.91	8.71	8.66	No	D/O
2/25/2009	**PO-BG**	**PO-BG-E1**	**1545**	**44**	**1.3**	**2.7**	**1.5**	**8.38**	**8.65**	**9.8**	**n/a**	**Decon**
2/25/2009	PO-100U	PO-100U-E1	1550	44	3.8	3.9	0.7	8.2	8.18	8.8	No	Decon
2/25/2009	PO-100W	PO-100W-E1	1555	38	4.6	6.4	1.7	8.52	8.56	9.68	No	Decon
2/25/2009	PO-100D	PO-100D-E1	1600	38	7.5	6.9	8.9	8.47	8.47	8.94	No	Decon
2/27/2009	**PO-BG**	**PO-BG-090227-E1**	**1020**	**43**	**1.6**	**2.7**	**2.1**	**8.14**	**8.58**	**10.73**	**n/a**	**C**
2/27/2009	PO-100U	PO-100U-090227-E1	1025	43	3.7	4.4	2.6	8.32	8.72	9.94	No	C
2/27/2009	PO-100W	PO-100W-090227-E1	1028	38	4.8	5.1	1.2	8.37	8.71	10.33	No	C
2/27/2009	PO-100D	PO-100D-090227-E1	1032	43	4.4	7	6.1	8.15	8.19	10.65	No	C
2/27/2009	**PO-BG**	**PO-BG-090227-E2**	**1115**	**24**	**1.4**	**2.1**	**1.2**	**7.95**	**8.34**	**9.38**	**n/a**	**C**
2/27/2009	PO-100U	PO-100U-090227-E2	1119	43	3.7	6.8	3.2	8.06	8.34	8.75	No	C
2/27/2009	PO-100W	PO-100W-090227-E2	1122	38	1.8	1.9	2.6	8.17	8.56	9.5	No	C
2/27/2009	PO-100D	PO-100D-090227-E2	1124	43	7.7	5.2	5.7	8.15	8.34	8.98	No	C
2/27/2009	**PO-BG**	**PO-BG-090227-E3**	**1505**	**34**	**1.9**	**1.8**	**0.9**	**8.85**	**9.13**	**10.33**	**n/a**	**C**
2/27/2009	PO-100U	PO-100U-090227-E3	1509	43	7.9	8.2	6.3	8.41	8.76	9.82	No	C
2/27/2009	PO-100W	PO-100W-090227-E3	1514	38	4.9	5.3	4.4	8.36	8.55	9.75	No	C
2/27/2009	PO-100D	PO-100D-090227-E3	1519	43	5.6	5.1	5.6	8.29	8.4	8.99	No	C
3/2/2009	**PO-BG**	**PO-BG-090302-E1**	**1147**	**42**	**2.6**	**2.8**	**1.6**	**7.86**	**7.97**	**8.24**	**n/a**	**C**
3/2/2009	**PO-BG**	**PO-BG 090302-E2**	**1408**	**39**	**1.15**	**1.05**	**1.78**	**8.24**	**8.01**	**8.38**	**n/a**	**C**
3/2/2009	PO-100U	PO-100U-090302-E2	1432	38	8.1	11.87	16.71	8.56	8.38	9.57	Yes	C
3/2/2009	PO-100W	PO-100W-090302-E2	1448	34	1.13	1.4	2.8	7.95	7.93	7.96	No	C
3/2/2009	PO-100D	PO-100D-090302-E2	1503	41	1.14	1.1	1.4	7.75	7.82	7.8	No	C
3/2/2009	PO-100U	PO-100U-090302-E2a	1508	38	18.6	22.1	17.1	7.82	7.67	7.84	Yes	C
3/2/2009	PO-150U	PO-150U-090302-E2a	1515	39	1.4	10.2	10.7	7.86	7.8	7.92	No	C
3/2/2009	PO-100U	PO-100U-090302-E2b	1601	38	17.3	13.4	4.6	8.95	7.91	7.81	Yes	C
3/2/2009	PO-150U	PO -150U-090302-E2b	1604	39	9.3	5.8	3.2	7.93	7.87	7.81	No	C
3/2/2009	PO-100U	Po-100U-090302-E2c	1625	39	3.6	8.9	3.1	7.73	7.88	8	No	C
3/3/2009	**PO-BG**	**PO-BG-090303-E1**	**840**	**54**	**1.27**	**1.14**	**6.28**	**7.68**	**7.79**	**8.27**	**n/a**	**C**
3/3/2009	PO-100U	PO-100U-090303-E1	855	54	1.87	2.38	4.3	7.75	7.89	8.24	No	C
3/3/2009	PO-100W	PO-100W-090303-E1	908	48	1.67	1.5	1.76	7.66	7.94	8.32	No	C
3/3/2009	PO-100D	PO-100D-090303-E1	915	55	1.5	8.5	3.15	7.65	7.83	8.15	No	C

Table 1
Water Quality Monitoring Results

Notes:

Background measurements shown in bold
U = Upstream of in-water work activity
W = West of in-water work activity
D = Downstream of in-water work activity
Exceedance if turbidity > 10 NTU above background or dissolved oxygen < 5.0 mg/L.
* This station was previously reported as the 150-foot compliance boundary station because the location of work activity was incorrectly measured from the dredge bucket. Because sediment was being offloaded into the barge, the distance in the downcurrent direction (to the north during the ebb tide) should have been measured from the nearest scupper hole on the barge that was draining water. The station was, therefore, reclassified as the 100-foot downcurrent early warning location.

Table 2
2009 Post-Dredge and Post-Cover Surface Sediment Sample Coordinates

Station ID		Actual Coordinates[1]			
		Latitude (°N)	Longitude (°W)	Northing (feet)	Easting (feet)
UP	*Underpier coordinates (same for pre-cover February 2009 and post-cover March 2009)*				
	PO-UP-20-SE	47 03.2034	122 54.3436	636401	1040845
	PO-UP-21-SE	47 03.2457	122 54.3508	636659	1040823
	PO-UP-22-SE	47 03.2790	122 54.3557	636862	1040809
	PO-UP-23B-SE	47 03.3133	122 54.3608	637071	1040794
BA	*Post-dredge pre-cover berth area coordinates (February 2009)*				
	PO-BA-24-SE	47 03.2003	122 54.3590	636384	1040781
	PO-BA-25-SE	47 03.2437	122 54.3615	636648	1040778
	PO-BA-26-SE	47 03.2767	122 54.3644	636849	1040772
	PO-BA-27B-SE	47 03.3122	122 54.3745	637066	1040737
	Post-cover berth area coordinates (March 2009)				
	PO-BA-24-SE	47 03.2003	122 54.3601	636384	1040776
	PO-BA-25-SE	47 03.2271	122 54.3606	636547	1040779
	PO-BA-26-SE	47 03.2772	122 54.3652	636852	1040769
	PO-BA-27B-SE	47 03.3122	122 54.3762	637066	1040730
Ambient	*Post-cover ambient coordinates (March 2009)*				
	PO-AM-28-SE	47 03.3418	122 54.3982	637249	1040644
	BI-S37	47 03.2881	122 54.4397	636928	1040462
	BI-C16	47 03.2228	122 54.3922	636525	1040647

Notes:
1 Washington South Zone, NAD 83 geographic and state plane coordinates – U.S. survey feet

Table 3
2009 Post-Dredge and Post-Cover Surface Sediment Sample Results

	Post-Dredge Survey (February 2009)				Post-Cover Survey (March 2009)										
	Berth Area				Berth Area				Underpier Area				Ambient Samples		
	BA-24	BA-25	BA-26	BA-27B	BA-24	BA-25	BA-26	BA-27B	UP-20	UP-21	UP-22	UP-23B	BI-C16	BI-S37	AM-28
Sample Date	2/26/09	2/26/09	2/26/09	2/26/09	3/13/09	3/16/09	3/16/09	3/13/09	3/13/09	3/13/09	3/13/09	3/13/09	3/13/09	3/13/09	3/13/09
Sample Interval	0 - 10 cm	0 - 10 cm	0 - 10 cm	0 - 10 cm	0 - 10 cm	0 - 10 cm	0 - 10 cm	0 - 10 cm	0 - 10 cm	0 - 10 cm	0 - 10 cm	0 - 10 cm	0 - 10 cm	0 - 10 cm	0 - 10 cm
Conventional Parameters (pct)															
Total organic carbon	4.0	4.1	4.7	3.4	0.09 J	0.07 J	0.2 U	0.2 U	4.5	3.5	4.2	5.1	3.5	3.5	3.7
Total solids	25	30	30	28	87	89	86	90	27	32	25	26	27	28	26
Grain Size (pct)															
Cobbles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gravel	0.4	2	4.4	0.8	30	35	33	38	1	0.8	1.7	0.5	0	0	0
Sand	17	28	35	29	70	64	67	61	42	53	45	52	47	34	44
Silt	71	60	49	60	0.2	0.2	0.1	0.1	44	35	43	38	37	51	41
Clay	11	11	11	9.4	0.4	0.4	0.3	0.4	13	11	10	8.9	16	15	15
Fines (Silt + Clay)	82	71	60	69.4	0.6	0.6	0.4	0.5	57	46	53	46.9	53	66	56
Dioxin Furans (ng/kg)															
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	0.836 J	0.998	0.979	0.739 J	0.0901 U	0.0343 U	0.102 U	0.0939 U	0.803	0.712	0.711	0.791	0.575	0.717	0.634
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	5.36	4.88	5.43	4.16	0.142 U	0.168 U	0.1 U	0.0594 U	4.39	3.51	4.44	4.91	3.18	3.28	3.28
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	10.5	9.72	9.67	7.97	0.22 U	0.114 U	0.127 U	0.214 U	9.63	10.3	9.18	10.3	5.98	6.4	6.3
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	52.6	55	56.8	43	0.245 U	0.776 J	0.151 U	0.229 U	39.2	40.8	37.8	44.1	30.6	29.7	28.7
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	21.8	21.7	20.7	16.3	0.259 U	0.566 J	0.149 U	0.23 U	18.3	18	17.4	20.3	12.7	12.7	12.6
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	1770	1420	1640	922	4.57	26.1	1.99 J	2.77	1440	1990	944	1110	721	603	635
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	18000 J	13600 J	13800 J	7340	43.1	209	19	26	15700 J	23100 J	8140	9630	6590	4490	5080
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	3.76	3.86	3.71	3.31	0.0577 U	0.0377 U	0.0323 U	0.0479 U	2.67	2.39	2.74	3.21	2.64	3.05	2.67
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	3.93	4.22	4.25	3.55	0.138 U	0.0607 U	0.0705 U	0.09 U	2.81	2.36 J	3.03	3.33	2.57	2.61	2.44 J
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	7.95	8.94	9.24	7.3	0.124 U	0.0529 U	0.0653 U	0.0808 U	5.48	5.25	6.21	7.97	5.05	5.15	5.01
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	18.9	21.1	23.3	16.1	0.0484 U	0.0367 U	0.122 U	0.0505 U	14.5	14.1	16.6	20.6	12	11.9	12.1
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	8.5	9.06	8.94	7.12	0.0449 U	0.0387 U	0.113 U	0.0539 U	6.93	6.24	7.26	8.17	5.59	5.77	5.49
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	3.7	4.35	4.58	3.91	0.0658 U	0.051 U	0.165 U	0.0694 U	2.71	2.62	2.88 J	3.8	2.45 J	2.46 J	2.25 J
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	12.6	13.6	13.7	10.5	0.047 U	0.0377 U	0.12 U	0.05 U	10.1	9.46	10.4	12.7	8.06	8.6	7.96
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	298	335	315	247	0.973 J	4.22	0.325 J	0.651 J	257	258	258	297	196	206	195
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	12.5	12.7	12.8	8.66	0.13 U	0.416 J	0.104 U	0.104 U	12	11.9	11.2	12.7	7.38	6.86	7.19
1,2,3,4,5,6,7,8-Octachlorodibenzofuran (OCDF)	673	686	690	433	1.8 J	16.6	0.526 J	2.23 J	842	869	669	787	363	346	410
Total Tetrachlorodibenzo-p-dioxin (TCDD)	41 J	33.3 J	31.8 J	32.8 J	0.256 J	0.228 J	0.26 J	0.11 J	28.9 J	20.8 J	28.9 J	28.2 J	26 J	30.2 J	28.8 J
Total Pentachlorodibenzo-p-dioxin (PeCDD)	81.2 J	70 J	72.9 J	60.3 J	0.142 U	0.168 U	0.1 U	0.0594 U	58.1 J	52.5	57.1	57.7 J	51.3	58.7 J	51.6
Total Hexachlorodibenzo-p-dioxin (HxCDD)	737	597	680	354	2.01	4.75 J	0.663 J	0.802 J	564	860	380	428	322	288 J	282
Total Heptachlorodibenzo-p-dioxin (HpCDD)	8060	5190	6530	2350	16.9	55	7.18	6.78	6420	11200	2710	3120	2350	1420	1600
Total Tetrachlorodibenzofuran (TCDF)	58.8 J	56.3 J	50.8	45.8 J	0.0577 U	0.0377 U	0.176 J	0.0479 U	38 J	34.5 J	43.4 J	46.4 J	37.7	41.8 J	38.9 J
Total Pentachlorodibenzofuran (PeCDF)	91.7	97.6 J	103	85.9 J	0.119 J	0.366 J	0.0367 J	0.0627 J	70.5 J	63.9	77.2 J	90.3 J	63.2 J	64.2	63.3 J
Total Hexachlorodibenzofuran (HxCDF)	367	410	411 J	319	1.05 J	3.69 J	0.311 J	0.758 J	290 J	288 J	307 J	374 J	250 J	255 J	242 J
Total Heptachlorodibenzofuran (HpCDF)	871	950	915 J	673	2.79	14.1 J	0.924 J	2	835	879	756	904	547	555	535
Total Dioxin/Furan TEQ (U = 0)	48.3	44.5	47.5	32.1	0.07	0.51	0.03	0.04	39.4	46.0	32.3	37.8	24.7	23.3	23.3

Notes:

Bold = Detected result

J = Estimated value

U = Compound analyzed, but not detected above detection limit

Data Validated by LDC, Level III

TEQ values calculated using World Health Organization (2005)

Table 4
Sediment Profile Imaging Results

Station	Rep	Date	Time	Water Depth (ft)	Mudline Depth (ft MLLW)	Sample Location: Northing (y)	Easting (x)	Latitude	Longitude	Cover Thickness Observations
Within Dredged and Covered Area										
Oly-01	A	3/3/2009	1032	5.0	-40.9	637079.4565	1040772.777	47 03.3146	122 54.3660	> 4 inches of sand present; cover thickness not verified due to inadequate penetration
Oly-01	B	3/3/2009	1033	4.9	-39.6	637074.3177	1040761.814	47 03.3137	122 54.3686	6 inches or greater
Oly-01	C	3/3/2009	1034	4.9	-40.0	637063.3686	1040761.896	47 03.3119	122 54.3685	6 inches or greater
Oly-02	A	3/3/2009	1100	4.9	-40.8	637000.2437	1040757.892	47 03.3015	122 54.3690	6 inches or greater; smearing present
Oly-02	B	3/3/2009	1101	4.9	-40.8	637004.9396	1040763.438	47 03.3023	122 54.3677	6 inches or greater
Oly-02	C	3/3/2009	1102	4.9	-40.5	637014.0279	1040764.546	47 03.3038	122 54.3675	6 inches or greater
Oly-03	A	3/3/2009	1334	4.2	-39.7	636919.6757	1040767.486	47 03.2883	122 54.3661	6 inches or greater
Oly-03	B	3/3/2009	1335	4.2	-40.1	636941.9914	1040773.57	47 03.2920	122 54.3648	6 inches or greater; smearing present
Oly-03	C	3/3/2009	1336	4.2	-40.2	636934.3463	1040765.024	47 03.2907	122 54.3668	6 inches or greater
Oly-04	A	3/3/2009	1324	4.4	-41.5	636844.9934	1040783.495	47 03.2761	122 54.3617	6 inches or greater
Oly-04	B	3/3/2009	1325	4.4	-41.2	636857.221	1040781.374	47 03.2781	122 54.3623	6 inches or greater
Oly-04	C	3/3/2009	1326	4.3	-40.9	636874.2966	1040779.817	47 03.2809	122 54.3628	6 inches or greater; smearing present
Oly-05	A	3/3/2009	1320	4.3	-40.6	636782.9189	1040784.926	47 03.2659	122 54.3609	6 inches or greater
Oly-05	B	3/3/2009	1321	4.3	-40.7	636785.3492	1040785	47 03.2663	122 54.3609	6 inches or greater; smearing present
Oly-05	C	3/3/2009	1322	4.3	-40.7	636798.0957	1040785.804	47 03.2684	122 54.3608	6 inches or greater
Oly-06	A	3/3/2009	1314	4.4	-40.3	636699.8699	1040796.107	47 03.2523	122 54.3576	6 inches or greater
Oly-06	B	3/3/2009	1315	4.4	-41.0	636714.6926	1040788.663	47 03.2547	122 54.3595	6 inches or greater
Oly-06	C	3/3/2009	1316	4.4	-41.0	636719.5279	1040789.642	47 03.2555	122 54.3593	6 inches or greater; smearing present
Oly-07	A	3/3/2009	1257	4.5	-41.8	636637.3272	1040792.952	47 03.2420	122 54.3579	6 inches or greater
Oly-07	B	3/3/2009	1258	4.4	-40.5	636634.1626	1040797.012	47 03.2415	122 54.3569	Cover thickness not verified due to overpenetration and substantial smearing; sand grains observed throughout viewable area
Oly-07	C	3/3/2009	1259	4.4	-40.2	636654.909	1040794.736	47 03.2449	122 54.3576	6 inches or greater; smearing present
Oly-07	D	3/3/2009	1452	4.0	-40.9	636634.188	1040796.182	47 03.2415	122 54.3571	6 inches or greater
Oly-07	E	3/3/2009	1453	4.0	-41.0	636656.7191	1040795.206	47 03.2452	122 54.3575	> 4 inches of sand present; cover thickness not verified due to inadequate penetration
Oly-07	F	3/3/2009	1454	3.9	-40.7	636625.0743	1040795.903	47 03.2400	122 54.3571	6 inches or greater
Oly-08	A	3/3/2009	1249	4.6	-41.7	636551.139	1040807.363	47 03.2279	122 54.3538	Cover thickness not verified due to inadequate penetration; smearing present
Oly-08	B	3/3/2009	1250	4.5	-40.7	636569.7465	1040795.462	47 03.2309	122 54.3568	Cover thickness not verified due to overpenetration and substantial smearing; sand grains observed throughout viewable area
Oly-08	C	3/3/2009	1251	4.5	-41.1	636553.2025	1040799.529	47 03.2282	122 54.3557	Cover thickness not verified due to overpenetration and substantial smearing; sand grains observed throughout viewable area
Oly-08	D	3/3/2009	1447	4.0	-41.4	636549.405	1040804.401	47 03.2276	122 54.3545	> 4 inches of sand present; cover thickness not verified due to inadequate penetration
Oly-08	E	3/3/2009	1448	3.9	-40.5	636567.7717	1040800.39	47 03.2306	122 54.3556	6 inches or greater; smearing present
Oly-08	F	3/3/2009	1449	4.0	-40.8	636555.6075	1040800.434	47 03.2286	122 54.3555	> 3 inches of sand present; cover thickness not verified due to inadequate penetration
Oly-09	A	3/3/2009	1218	4.6	-40.5	636478.5583	1040814.293	47 03.2160	122 54.3516	6 inches or greater
Oly-09	B	3/3/2009	1219	4.6	-40.2	636482.3431	1040809.836	47 03.2166	122 54.3527	6 inches or greater
Oly-09	C	3/3/2009	1219	4.7	-41.9	636490.9506	1040806.774	47 03.2180	122 54.3535	Cover thickness not verified due to substantial smearing; sand grains observed throughout viewable area
Oly-10	A	3/3/2009	1212	4.6	-40.2	636412.4968	1040806.874	47 03.2051	122 54.3529	Cover thickness not verified due to substantial smearing; sand grains observed throughout viewable area
Oly-10	B	3/3/2009	1213	4.6	-39.9	636416.193	1040805.324	47 03.2057	122 54.3533	Cover thickness not verified due to overpenetration and substantial smearing; sand grains observed throughout viewable area
Oly-10	C	3/3/2009	1214	4.6	-40.0	636411.0283	1040815.142	47 03.2049	122 54.3509	6 inches or greater; smearing present
Oly-10	D	3/3/2009	1437	3.9	-40.0	636401.345	1040813.6	47 03.2033	122 54.3512	6 inches or greater; smearing present
Oly-10	E	3/3/2009	1437	3.9	-40.0	636414.7751	1040811.931	47 03.2055	122 54.3517	6 inches or greater
Oly-10	F	3/3/2009	1438	3.9	-40.1	636428.8128	1040810.281	47 03.2078	122 54.3522	6 inches or greater
Oly-11	A	3/3/2009	1118	4.8	-40.4	636324.5873	1040817.908	47 03.1907	122 54.3496	Cover thickness not verified due to overpenetration and substantial smearing; sand grains observed throughout viewable area
Oly-11	B	3/3/2009	1119	4.7	-39.2	636334.4606	1040813.221	47 03.1923	122 54.3508	Cover thickness not verified due to overpenetration and substantial smearing; sand grains observed throughout viewable area
Oly-11	C	3/3/2009	1120	4.7	-38.5	636344.3085	1040809.365	47 03.1939	122 54.3518	6 inches or greater; smearing present
Oly-11	D	3/3/2009	1425	4.0	-40.2	636323.4988	1040813.718	47 03.1905	122 54.3506	6 inches or greater; smearing present
Oly-11	E	3/3/2009	1427	4.0	-39.9	636341.0933	1040815.086	47 03.1934	122 54.3504	6 inches or greater; smearing present
Oly-11	F	3/3/2009	1428	4.0	-39.9	636356.4348	1040810.567	47 03.1959	122 54.3516	> 4 inches of sand present; cover thickness not verified due to inadequate penetration
Oly-12	A	3/3/2009	1045	4.9	-39.6	637076.5339	1040729.048	47 03.3139	122 54.3765	6 inches or greater
Oly-12	B	3/3/2009	1046	4.9	-39.7	637066.9393	1040724.599	47 03.3123	122 54.3775	Cover thickness not verified due to overpenetration and substantial smearing; sand grains observed throughout viewable area
Oly-12	C	3/3/2009	1047	4.9	-39.7	637078.7241	1040717.062	47 03.3142	122 54.3794	Cover thickness not verified due to overpenetration and substantial smearing; sand grains observed throughout viewable area
Oly-12	D	3/3/2009	1517	3.9	-41.1	637065.7115	1040724.977	47 03.3121	122 54.3774	> 4 inches of sand present; cover thickness not verified due to inadequate penetration
Oly-12	E	3/3/2009	1518	3.9	-41.1	637068.8761	1040720.917	47 03.3126	122 54.3784	6 inches or greater; smearing present
Oly-12	F	3/3/2009	1519	3.9	-41.1	637064.2182	1040714.125	47 03.3118	122 54.3800	6 inches or greater; smearing present

Table 4
Sediment Profile Imaging Results

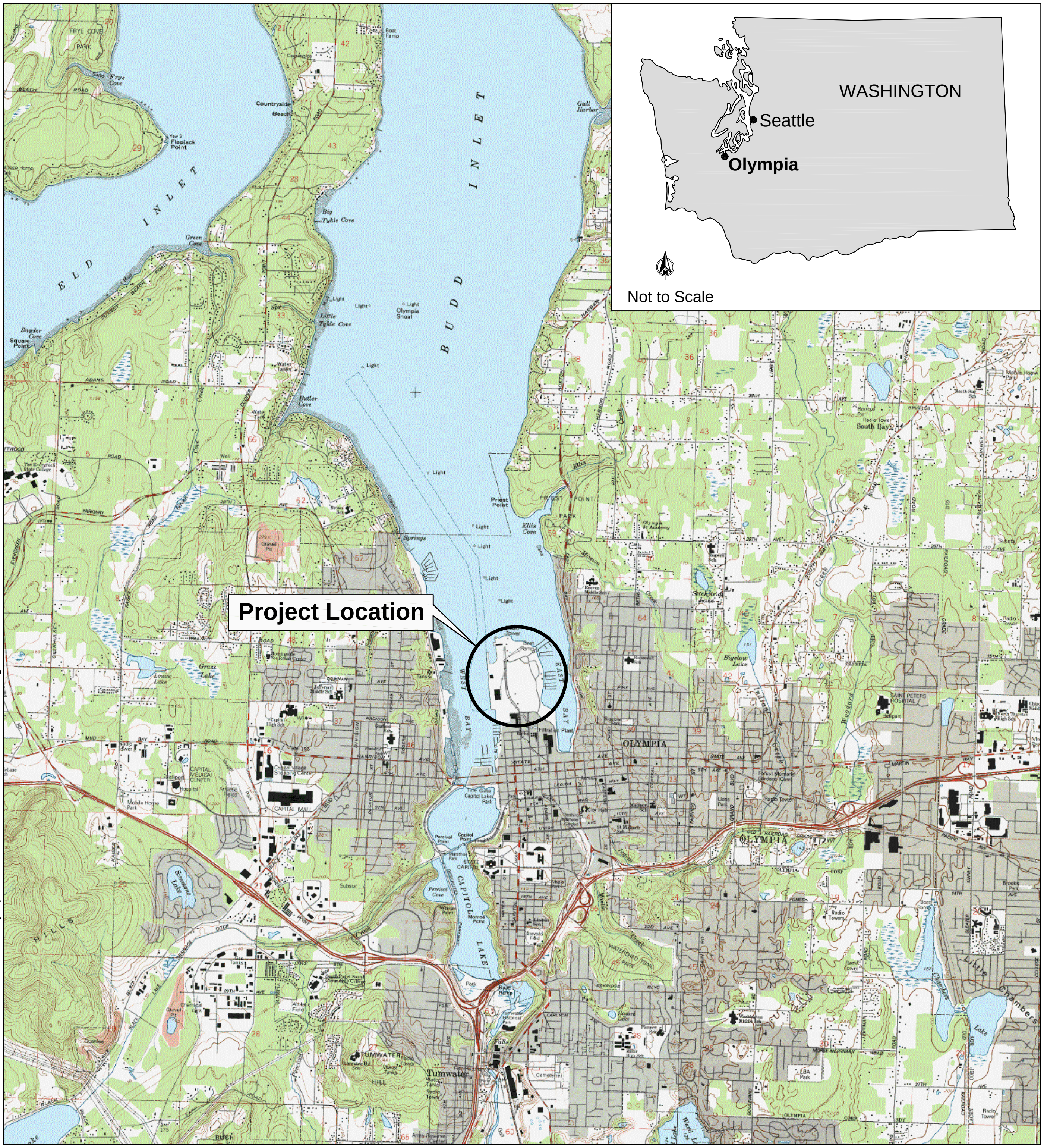
Station	Rep	Date	Time	Water Depth (ft)	Mudline Depth (ft MLLW)	Sample Location: Northing (y)	Easting (x)	Latitude	Longitude	Cover Thickness Observations
Oly-13	A	3/3/2009	1329	4.3	-40.8	636845.2101	1040736.536	47 03.2759	122 54.3730	6 inches or greater
Oly-13	B	3/3/2009	1330	4.3	-40.8	636858.298	1040746.079	47 03.2781	122 54.3708	6 inches or greater; smearing present
Oly-13	C	3/3/2009	1331	4.3	-41.2	636859.6906	1040740.303	47 03.2783	122 54.3722	6 inches or greater; smearing present
Oly-14	A	3/3/2009	1302	4.5	-41.7	636630.0882	1040751.168	47 03.2406	122 54.3679	6 inches or greater; smearing present
Oly-14	B	3/3/2009	1303	4.6	-42.4	636634.1892	1040756.281	47 03.2413	122 54.3667	Cover thickness not verified due to overpenetration and substantial smearing; sand grains observed throughout viewable area
Oly-14	C	3/3/2009	1304	4.5	-42.1	636645.7585	1040755.803	47 03.2432	122 54.3669	Cover thickness not verified due to overpenetration and substantial smearing; sand grains observed throughout viewable area
Oly-14	D	3/3/2009	1505	3.9	-41.0	636631.1893	1040754.943	47 03.2408	122 54.3670	> 2 inches of sand present; cover thickness not verified due to inadequate penetration
Oly-14	E	3/3/2009	1506	3.9	-41.1	636623.911	1040754.305	47 03.2396	122 54.3671	Cover thickness not verified due to overpenetration and substantial smearing; sand grains observed throughout viewable area
Oly-14	F	3/3/2009	1507	3.9	-41.1	636621.0125	1040749.644	47 03.2391	122 54.3682	> 3 inches of sand present; cover thickness not verified due to inadequate penetration
Oly-15	A	3/3/2009	1243	4.6	-41.4	636550.0264	1040764.104	47 03.2275	122 54.3642	6 inches or greater
Oly-15	B	3/3/2009	1243	4.6	-41.4	636558.5452	1040763.948	47 03.2289	122 54.3643	6 inches or greater
Oly-15	C	3/3/2009	1244	4.5	-40.8	636568.3552	1040761.338	47 03.2305	122 54.3650	6 inches or greater
Oly-16	A	3/3/2009	1223	4.6	-40.4	636487.0028	1040756.777	47 03.2171	122 54.3655	6 inches or greater
Oly-16	B	3/3/2009	1224	4.6	-40.5	636497.7112	1040764.586	47 03.2189	122 54.3637	6 inches or greater; smearing present
Oly-16	C	3/3/2009	1225	4.5	-40.2	636475.1674	1040765.976	47 03.2152	122 54.3632	> 4 inches of sand present; cover thickness not verified due to inadequate penetration
Oly-17	A	3/3/2009	1207	4.5	-38.9	636410.5486	1040771.07	47 03.2046	122 54.3615	6 inches or greater; smearing present
Oly-17	B	3/3/2009	1208	4.6	-39.7	636408.5358	1040777.243	47 03.2043	122 54.3600	6 inches or greater; smearing present
Oly-17	C	3/3/2009	1208	4.5	-39.3	636424.0293	1040767.74	47 03.2068	122 54.3624	6 inches or greater; smearing present
Oly-18	A	3/3/2009	1113	4.8	-39.2	636328.1579	1040780.609	47 03.1911	122 54.3586	6 inches or greater; smearing present
Oly-18	B	3/3/2009	1114	4.8	-39.6	636335.0946	1040772.508	47 03.1922	122 54.3606	6 inches or greater
Oly-18	C	3/3/2009	1110	4.8	-40.0	636346.664	1040772.03	47 03.1941	122 54.3608	6 inches or greater; smearing present
Oly-19	A	3/3/2009	1052	4.9	-40.2	637058.6247	1040678.211	47 03.3107	122 54.3886	Cover thickness not verified due to overpenetration and substantial smearing
Oly-19	B	3/3/2009	1053	4.8	-39.6	637060.4854	1040677.021	47 03.3110	122 54.3889	Cover thickness not verified due to underpenetration and substantial smearing; sand grains observed throughout viewable area
Oly-19	C	3/3/2009	1054	4.9	-39.9	637058.65	1040677.381	47 03.3107	122 54.3888	Cover thickness not verified due to overpenetration and substantial smearing; sand grains observed throughout much of viewable area
Oly-19	D	3/3/2009	1523	4.1	-42.9	637061.207	1040673.302	47 03.3111	122 54.3898	> 4 inches of sand present; cover thickness not verified due to inadequate penetration
Oly-19	E	3/3/2009	1524	4.0	-42.0	637071.7133	1040667.804	47 03.3128	122 54.3912	6 inches or greater; smearing present
Oly-19	F	3/3/2009	1527	3.9	-41.7	637085.3708	1040678.612	47 03.3151	122 54.3887	6 inches or greater
Oly-20	A	3/3/2009	1308	4.4	-40.3	636614.7479	1040715.787	47 03.2379	122 54.3763	6 inches or greater; smearing present
Oly-20	B	3/3/2009	1308	4.4	-41.0	636628.1653	1040714.534	47 03.2401	122 54.3767	6 inches or greater
Oly-20	C	3/3/2009	1309	4.4	-41.0	636634.8361	1040715.153	47 03.2412	122 54.3766	6 inches or greater; smearing present
Oly-20	D	3/3/2009	1511	3.8	-39.9	636615.2541	1040719.128	47 03.2380	122 54.3755	Cover thickness not verified due to overpenetration and substantial smearing; sand grains observed throughout viewable area
Oly-20	E	3/3/2009	1512	3.9	-40.6	636634.1905	1040716.38	47 03.2411	122 54.3763	> 4 inches of sand present; cover thickness not verified due to inadequate penetration
Oly-20	F	3/3/2009	1513	3.9	-41.0	636626.8868	1040716.573	47 03.2399	122 54.3762	> 5 inches of sand present; cover thickness not verified due to inadequate penetration
Oly-21	A	3/3/2009	1237	4.5	-40.4	636543.1802	1040709.447	47 03.2261	122 54.3773	6 inches or greater
Oly-21	B	3/3/2009	1238	4.5	-40.5	636555.8634	1040712.328	47 03.2282	122 54.3767	Cover thickness not verified due to overpenetration and substantial smearing; sand grains observed throughout viewable area
Oly-21	C	3/3/2009	1239	4.6	-41.2	636546.4455	1040722.015	47 03.2267	122 54.3743	6 inches or greater
Oly-22	A	3/3/2009	1230	4.6	-40.6	636473.8021	1040711.07	47 03.2147	122 54.3764	6 inches or greater; smearing present
Oly-22	B	3/3/2009	1231	4.6	-41.0	636475.4348	1040717.355	47 03.2150	122 54.3749	> 5 inches of sand present; cover thickness not verified due to inadequate penetration
Oly-22	C	3/3/2009	1231	4.6	-41.1	636488.6368	1040723.161	47 03.2172	122 54.3736	6 inches or greater; smearing present
Oly-23	A	3/3/2009	1202	4.6	-39.4	636408.6517	1040713.654	47 03.2040	122 54.3753	6 inches or greater; smearing present
Oly-23	B	3/3/2009	1203	4.6	-40.1	636415.7272	1040720.936	47 03.2052	122 54.3736	6 inches or greater
Oly-23	C	3/3/2009	1204	4.6	-39.8	636403.3856	1040726.794	47 03.2032	122 54.3721	Cover thickness not verified due to overpenetration and substantial smearing; sand grains observed throughout viewable area
Oly-23	D	3/3/2009	1441	4.0	-40.5	636407.2845	1040718.6	47 03.2038	122 54.3741	6 inches or greater
Oly-23	E	3/3/2009	1442	4.0	-40.6	636418.2456	1040738.054	47 03.2057	122 54.3695	6 inches or greater; worm present
Oly-23	F	3/3/2009	1443	4.0	-40.6	636398.5123	1040727.061	47 03.2024	122 54.3720	6 inches or greater
Oly-24	A	3/3/2009	1108	4.8	-40.1	636335.6908	1040733.041	47 03.1921	122 54.3701	6 inches or greater; smearing present
Oly-24	B	3/3/2009	1109	4.9	-40.5	636341.1083	1040734.869	47 03.1930	122 54.3697	6 inches or greater
Oly-24	C	3/3/2009	1110	4.9	-40.5	636338.716	1040733.549	47 03.1926	122 54.3700	6 inches or greater; smearing present

Table 4
Sediment Profile Imaging Results

Station	Rep	Date	Time	Water Depth (ft)	Mudline Depth (ft MLLW)	Sample Location Northing (y)	Easting (x)	Latitude	Longitude	Cover Thickness Observations
Beyond Dredged and Covered Area										
Oly-25	A	3/3/2009	1541	4.3	-45.6	636956.1577	1040707.918	47 03.2940	122 54.3807	Not located within covered area
Oly-25	B	3/3/2009	1542	4.2	-45.0	636969.3978	1040712.479	47 03.2962	122 54.3797	Not located within covered area
Oly-25	C	3/3/2009	1543	4.2	-45.0	636954.2843	1040709.524	47 03.2937	122 54.3803	Not located within covered area
Oly-26	A	3/3/2009	1547	4.0	-42.5	636837.4769	1040710.946	47 03.2745	122 54.3791	Not located within covered area
Oly-26	B	3/3/2009	1548	3.9	-41.9	636845.1734	1040697.881	47 03.2757	122 54.3823	Not located within covered area
Oly-26	C	3/3/2009	1549	3.9	-41.5	636835.2367	1040704.644	47 03.2741	122 54.3806	Not located within covered area
Oly-27	A	3/3/2009	1553	4.1	-44.2	636748.845	1040745.648	47 03.2601	122 54.3701	Not located within covered area
Oly-27	B	3/3/2009	1554	4.0	-43.3	636758.845	1040736.81	47 03.2617	122 54.3723	Not located within covered area
Oly-27	C	3/3/2009	1555	4.0	-42.9	636745.9211	1040741.818	47 03.2596	122 54.3710	Not located within covered area
Oly-28	A	3/3/2009	1600	3.4	-36.2	636476.816	1040672.093	47 03.2150	122 54.3858	Not located within covered area
Oly-28	B	3/3/2009	1602	3.4	-36.2	636488.4361	1040669.954	47 03.2169	122 54.3864	Not located within covered area
Oly-28	C	3/3/2009	1602	3.4	-36.2	636462.7783	1040673.743	47 03.2127	122 54.3853	Not located within covered area
Oly-29	A	3/3/2009	1605	3.3	-35.6	636475.5516	1040633.816	47 03.2146	122 54.3950	Not located within covered area
Oly-29	B	3/3/2009	1606	3.3	-35.9	636474.1464	1040640.007	47 03.2144	122 54.3935	Not located within covered area
Oly-29	C	3/3/2009	1607	3.3	-35.6	636468.995	1040629.459	47 03.2135	122 54.3960	Not located within covered area
Oly-30	A	3/3/2009	1610	3.1	-33.3	636470.8193	1040589.614	47 03.2136	122 54.4056	Not located within covered area
Oly-30	B	3/3/2009	1611	3.1	-33.3	636482.3633	1040589.966	47 03.2155	122 54.4056	Not located within covered area
Oly-30	C	3/3/2009	1612	3.0	-33.0	636489.1861	1040585.603	47 03.2166	122 54.4067	Not located within covered area
Oly-31	A	3/3/2009	1535	3.6	-38.3	637062.487	1040631.364	47 03.3111	122 54.3999	Not located within covered area
Oly-31	B	3/3/2009	1536	3.7	-39.0	637076.9042	1040637.207	47 03.3135	122 54.3986	Not located within covered area
Oly-31	C	3/3/2009	1537	3.7	-39.1	637083.6636	1040634.919	47 03.3146	122 54.3992	Not located within covered area

Notes:
Vertical viewable area is approximately 8 inches.

FIGURES



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

May 22, 2009 9:35am heriksen K:\Jobs\080166-Port of Olympia\080166-01-T2\08016601-RP-002.dwg F1

Figure 1
Vicinity Map
Berth 2 and 3 Interim Action Completion Report
Port of Olympia

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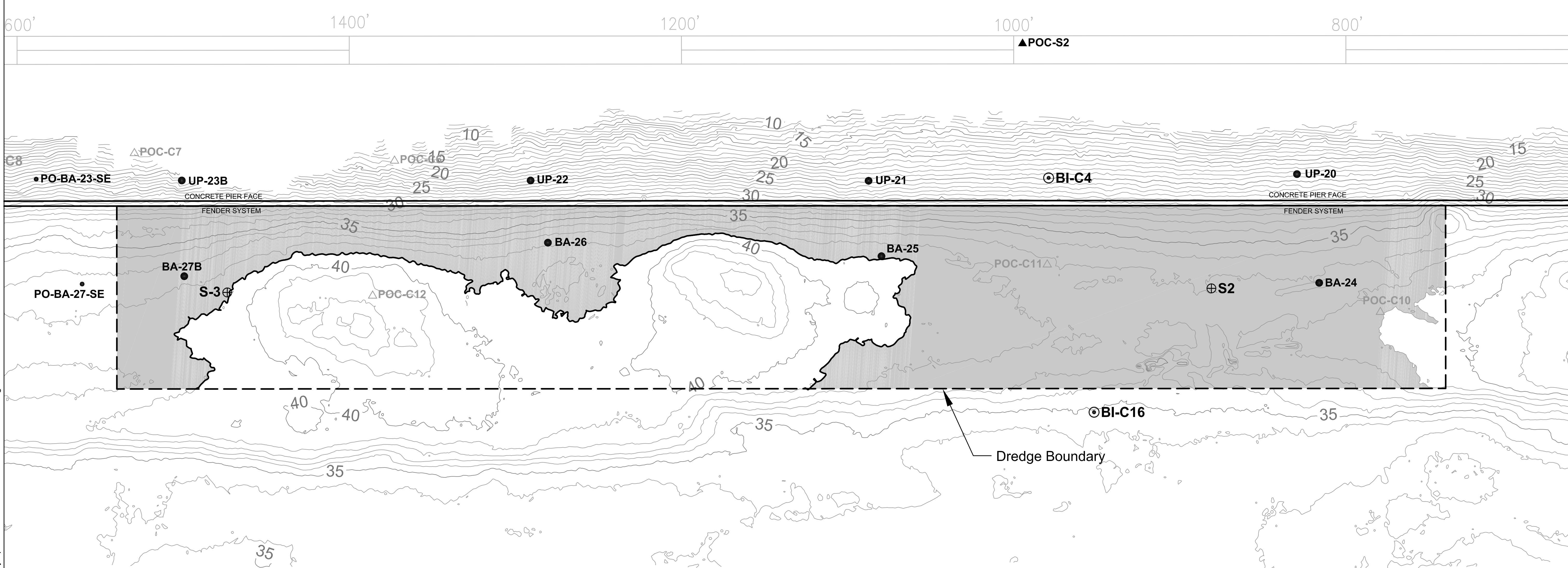

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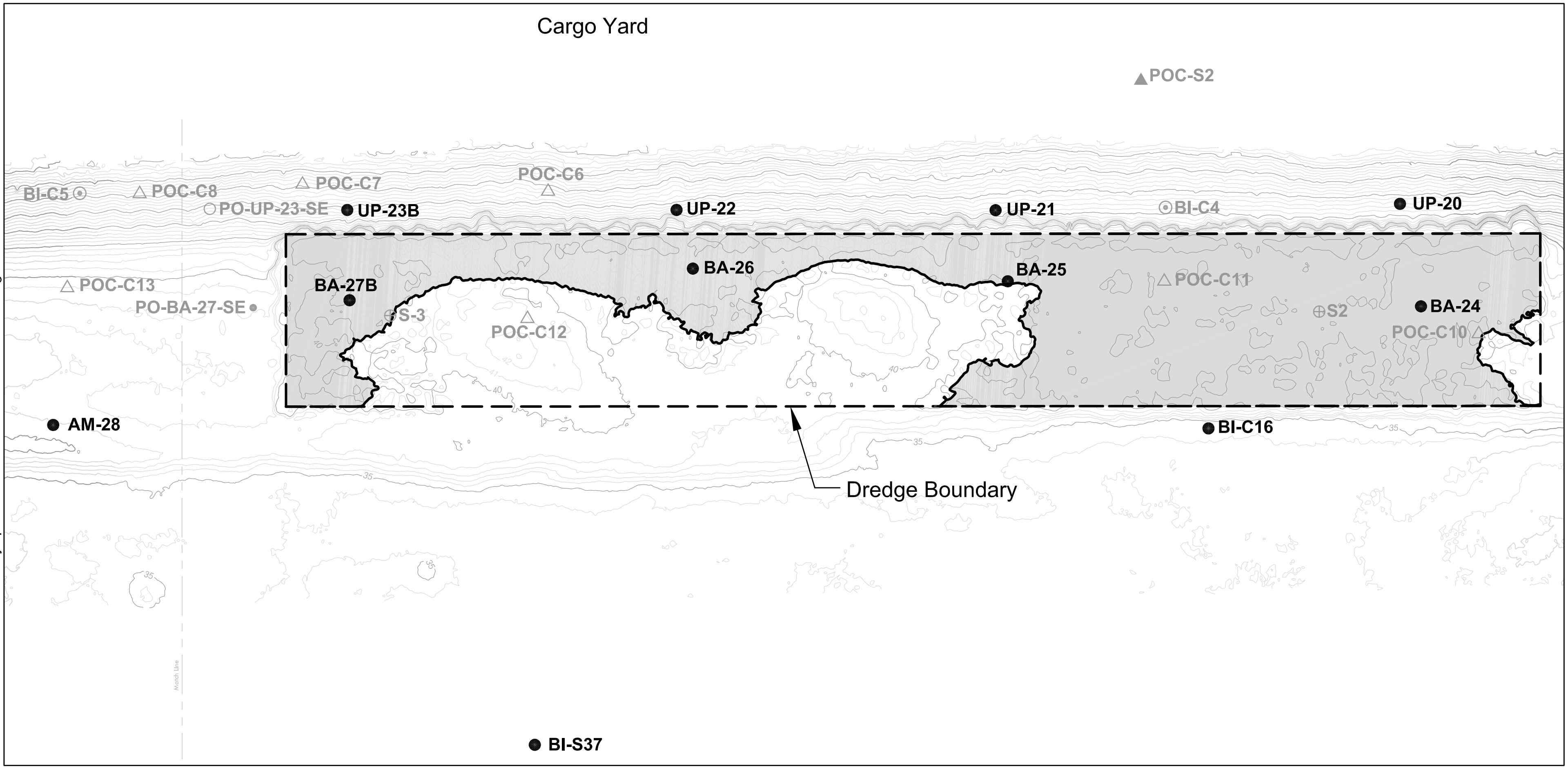
May 22, 2009 9:34am heriksen

HORIZONTAL DATUM: Washington State Plane - South Zone (NAD 83(91)), U.S. Survey feet.
VERTICAL DATUM: Mean Lower Low Water (MLLW).
NOTES:
1. Bathymetric survey provided by David Evans and Associates, Inc., dated March 27, 2008.
2. Contour interval is 1 foot.

	Dredged Area
BA-27 ●	2009 Sediment Grab Location
S4 ⊕	Core Sample - DMMP 2006
BI-C4 ⊙	Core Sample - Ecology 2007
POC-S2 ▲	Surface Sample - Port 2007
POC-S5 △	Core Sample - Port 2007
PO-UP-22-SE ○	Core Sample - Port 2008
PO-BA-27-SE •	Core Sample - Port 2008

0 60
Scale in Feet

Figure 2
Dredge Boundary
Berth 2 and 3 Interim Action Completion Report
Port of Olympia



HORIZONTAL DATUM: Horizontal datum is Washington State Plane - South Zone (NAD 83(91)), U.S. survey feet.
VERTICAL DATUM: Vertical datum is Mean Lower Low Water (MLLW).
NOTES:
1. Bathymetric survey provided by David Evans and Associates, Inc., dated March 9, 2009.
2. Contour interval is 1 foot.

(shaded box)	Dredged Area
BA-27 ●	2009 Sediment Grab Location
S4 ⊕	Core Sample - DMMP 2006
BI-C4 ⊙	Core Sample - Ecology 2007
POC-S2 ▲	Surface Sample - Port 2007
POC-S5 △	Core Sample - Port 2007
PO-UP-22-SE ○	Core Sample - Port 2008
PO-BA-27-SE ●	Core Sample - Port 2008

0 100
Scale in Feet

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May 22, 2009 9:19am heriksen

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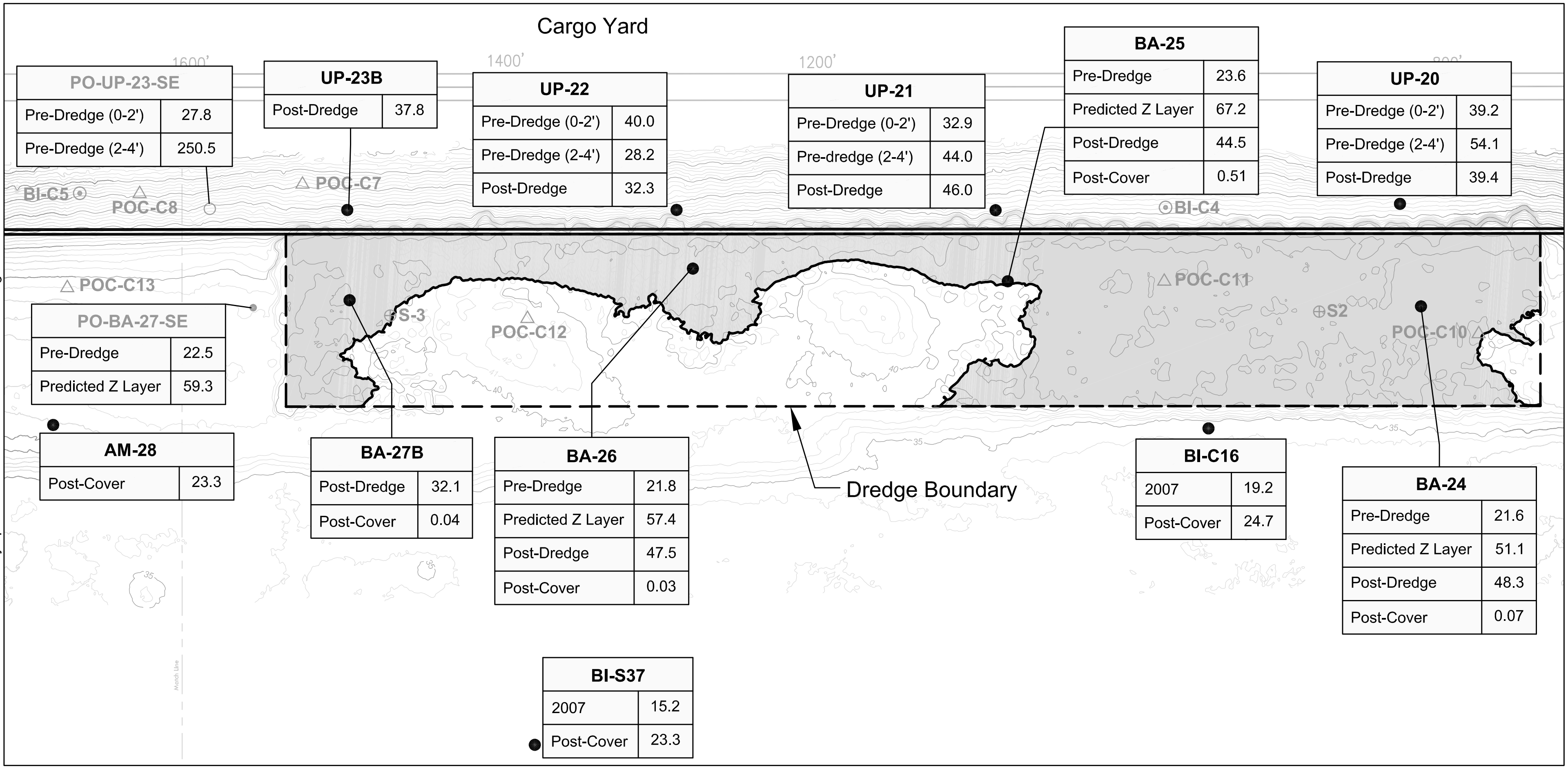
Figure 3
2009 Post-Dredge and Post-Cover Sampling Locations
Berth 2 and 3 Interim Completion Report
Port of Olympia



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May 22, 2009 9:18am heriksen

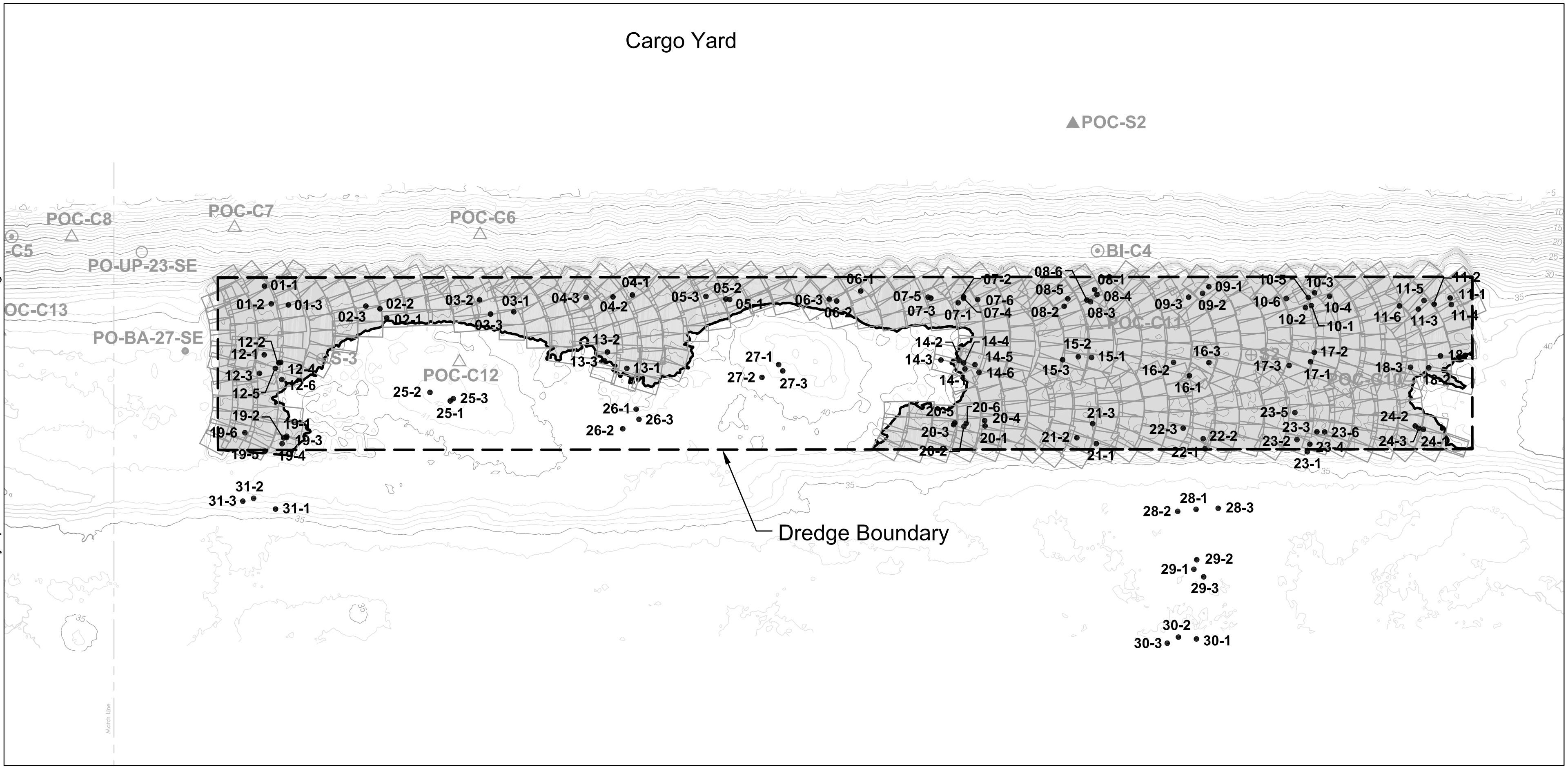
HORIZONTAL DATUM: Horizontal datum is Washington State Plane - South Zone (NAD 83(91)), U.S. survey feet.
VERTICAL DATUM: Vertical datum is Mean Lower Low Water (MLLW).
NOTES:
1. Bathymetric survey provided by David Evans and Associates, Inc., dated March 9, 2009.
2. Contour interval is 1 foot.

Dredged Area
BA-27 2009 Sediment Grab Location
S4 Core Sample - DMMP 2006
BI-C4 Core Sample - Ecology 2007
POC-S2 Surface Sample - Port 2007
POC-S5 Core Sample - Port 2007
PO-UP-22-SE Core Sample - Port 2008
PO-BA-27-SE Core Sample - Port 2008

0 100
Scale in Feet

ANCHOR QEA

Figure 4
Pre- and Post-Construction Dioxin Concentrations
Berth 2 and 3 Interim Completion Report
Port of Olympia



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May 22, 2009 9:33am heriksen

HORIZONTAL DATUM: Horizontal datum is Washington State Plane - South Zone (NAD 83(91)), U.S. survey feet.
VERTICAL DATUM: Vertical datum is Mean Lower Low Water (MLLW).
NOTES:
1. Bathymetric survey provided by David Evans and Associates, Inc., dated March 9, 2009.
2. Contour interval is 1 foot.

Dredged Area

01-1 • SPI Sample Location

Sand Cap Bucket Placement Location

0 100
Scale in Feet

ANCHOR QEA

Figure 5
Sediment Profile Imaging (SPI) Sampling Locations
Berth 2 and 3 Interim Action Completion Report
Port of Olympia

APPENDICES (on CD)