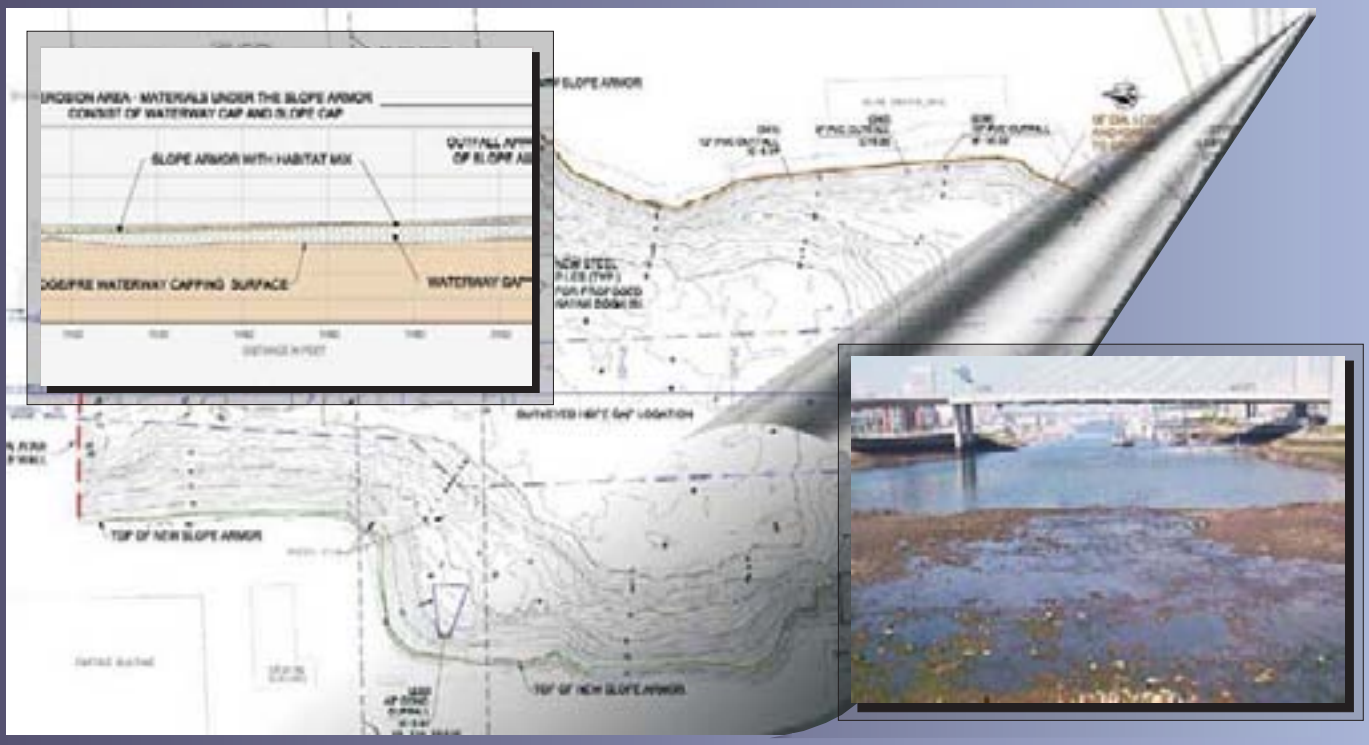
ASSESSMENT OF UTILITIES' CAP RECONTAMINATION AND DATA SUMMARY REPORT

Head of Thea Foss Waterway Remediation Project



Prepared for:

PacifiCorp Environmental Remediation Company
And
Puget Sound Energy

Prepared by:

Dalton, Olmsted & Fuglevand, Inc.
And
TetraTech EC, Inc.

July 2005

ASSESSMENT OF UTILITIES' CAP RECONTAMINATION AND DATA SUMMARY HEAD OF THEA FOSS WATERWAY REMEDIATION TACOMA, WASHINGTON

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TACOMA, WASHINGTON

INTRODUCTION

This report was prepared on behalf of the "*Utilities*" consisting of the Advance Ross Sub Company, PacifiCorp Environmental Remediation Company, and Puget Sound Energy. The purpose of the report is to present an assessment of the likely cause of recontamination of the Utilities' cap that was discovered in September 2005 and summarize pertinent data. The area for which the Utilities are responsible is known as the *"Utilities' Work Area"*. Data summarized in this report was collected in the period between when remedial construction was complete (February 2004) and April 2005.

The Thea Foss Waterway is part of the CB/NT Superfund site, located in Tacoma, Washington. The waterway (previously known as the City Waterway) extends north to south along approximately 1.5 miles of the downtown shoreline of the City of Tacoma (City)(Figure 1). In the RD/RA Consent Decree (CD) between EPA and the Utilities, the Utilities are responsible for cleanup of Remedial Action Areas (RAs) 23 and 24 (RA23/24) from waterway station 72+00 to 80+00. As a result of CD negotiations with the City, the Utilities also agreed to take responsibility for the southern portions of RAs 19b, 20 and 22 as described in a confidential agreement between the Utilities and the City. As a result, the Utilities' Work Area extends from waterway station 70+10 located north of the SR509 bridge, to the southern end of the waterway (station 80+00), including shoreline areas at or below an elevation of +12 feet mean lower low water (MLLW National Tidal Datum Epoch 1960-1978) (Figure 2). A "transition zone" is present between the City's Work Area and the Utilities' Work Area and extends from waterway station 70+00 to 70+10. A structural submarine sheet pile wall was installed as a delineator between the two work areas. The Utilities' Work Area covers an area of approximately 9.0 acres.

Construction of the Utilities' remedy was completed in February 2004 (DOF 2004a). The selected remedy for the Utilities' Work Area was containment of contaminated sediments south of waterway station 70+10. The primary components of the remedy are listed below and are shown on Figure 2.

- Sheet pile wall at waterway station 70+10.
- Rock buttress in transition zone from 70+00 to 70+10.
- Dredging beneath the current location of the scour protection apron at the head of the waterway and placement of capping and scour protection material where stormwater discharges from outfalls known as the Twin 96" outfalls.
- Placement of a high-density polyethylene (HDPE) cap over the former location of the "*SR509 seep*".
- Placement of a sand cap over contaminated sediments and the SR509 seep HDPE cap.
- Placement of slope cap and armor material on waterway slopes.

In additional to the physical remedy components described above, the Utilities' remedy also includes the following:

- **Deauthorization of the navigation channel south of 70+00**. This requires an act of Congress and representatives of the Utilities are working with congressional staff to achieve deauthorization.

- **Institutional Control Plan.** The Utilities are working with the City, EPA and others to finalize the plan. Once the plan is approved by EPA, the Utilities will implement the provisions of the plan.

The City is responsible for remediation north of the sheet pile wall installed at waterway station 70+10. Immediately north of the Utilities' Work Area, the City's selected remedy consists of dredging and capping to maintain the required navigation depth of –19 feet MLLW. During the 2004 to 2005 construction season, the City completed dredging and partial capping in part of the area next to the sheet pile wall (RA20 and RA22). Placement of a grout mat and final cap was completed in RA19B (also adjacent to the sheet pile wall) during the previous 2003 to 2004 construction season.

RELATIONSHIP BETWEEN CITY DATA REPORT AND UTILITIES' RECONTAMINATION AND DATA REPORT

Because of the close proximity of the City's Work Area to the Utilities remediated work areas, the Utilities requested that the City assist the Utilities to perform pre-dredging and post-dredging sampling within the Utilities Work Area. The City prepared a data report (Floyd Snider 2005) that includes a large portion, but not all, of the supporting data and observations presented in this report. The City report also contains some supporting information not included in this report.

The City's data report contains the following information that is not included in the Utilities' report:

- Data validation and laboratory data sheets for sediment samples analyzed by the City.
- Field log books/daily observations prepared by both the City and Utilities representatives.
- Photographs and photographic logs prepared by both the City and Utilities representatives.
- Water quality information (turbidity, dissolved oxygen, salinity, temperature) collected by the City and Utilities. Note the field procedures used to collect the data are presented in a technical memorandum prepared by Tetra Tech-EC (2005) that is included in Appendix C.
- Underwater video of the Foss Landing Marina and RA19A near Alber's Mill marina.
- Underwater video of the sheet pile wall buttress.

Information contained in this report that is not presented in the City's data report includes the following:

- Data validation and laboratory data sheets for sediment samples analyzed on behalf of the Utilities.
- Results of certain surface and core sediment quality data in the City's work area (the City intends to include this information in their construction report). The Utilities have included the data in this report to provide a comprehensive record of the sample analyses that occurred during February 2004 and April 2005.
- Technical memoranda on each field sampling event.
- Utilities' Operation Maintenance Monitoring Plan (OMMP) Year 0 data
- Results of physical observations made during low tides
- Petroleum hydrocarbon (TPH) analyses
- Grain size analyses

SUMMARY AND FINDINGS

- Construction of the Utilities' remedy was completed, with the exception of the rock buttress on the north side of the sheet pile wall, in February 2004. The City installed the rock buttress for the Utilities on December 17, 2004 and January 6, 2005. EPA approved the Utilities' RA Construction Report (DOF2004a) with submittal of errata pages (dated August 25, 2004) that responded to several EPA comments on the draft report. A draft of the RA Completion Report (DOF 2004c) was submitted to EPA in early October 2004. Comments were received in a letter from EPA dated February 15, 2005. Final approval of the Utilities' completion report is dependent on channel deauthorization (by Congress) and approval/implementation of the institutional control plan.

- Physical observations of the head of the waterway (south of station 70+10) during low tides indicate the Utilities' remedy is functioning as intended.

- The first round of OMMP sampling occurred in April 2004 (herein termed Year 0 sampling) and consisted of surface sediment sampling (compliance [0 to 10 cm] and early warning [0 to 2 cm]) and core sampling. The April 2004 sediment quality data provided baseline sediment quality data soon after the Utilities' sand cap was installed and indicated that stormwater constituents, with the potential to exceed sediment quality objectives (SQOs) in the future, were accumulating on the cap.

- Remedial action areas RA19B, RA20 and RA22 are within the City's Work Area immediately adjacent to the north side of the sheet pile wall. The remedy for these areas is dredging of contaminated sediment to a predetermined elevation and capping the remaining contaminated sediment. Dredging and capping (with a grout mat and thin sand cap) in RA19B occurred during the previous construction season (2003-2004). Dredging in RA20 and RA22 occurred between August 31 and December 8, 2004, with most of the

dredging immediately next to the wall being completed between August 31 and September 17, 2004. Some dredging in RA21 occurred between November 29 and December 2, 2004.

- Placement of the initial lift of sand cap in RA22 largely occurred between September 24 and September 29, 2004. Some additional capping in RA22 occurred on January 3, 2005. The initial lift of sand cap in RA20 was placed between September 24, 2004 and January 3, 2005.

- Pre-dredge surface sediment samples in the vicinity of the sheet pile wall were obtained on August 20 and August 30, 2004. Post-dredge surface sediment samples were obtained in mid-September and early October 2004, soon after the initial dredging was completed in RA20 and RA22. Additional sediment samples (including surface samples and cores) were obtained in November and December 2004.

- Samples obtained immediately after the initial dredging in RA20 and RA22 indicated significant recontamination of the Utilities' Cap had occurred. A new fine-grained silt layer that had been first noticed when samples were obtained in April 2004 had substantially increased in thickness. Thicknesses had increased from less than 1 cm up to approximately 12 cm. Surface sediment quality had degraded to the point where SQOs for multiple constituents were exceeded. These changes occurred in a matter of two to three weeks during the period when the City's contractor was dredging in RA20 and RA22.

- The City identified three possible sources of recontamination including stormwater discharges, upward migration of contaminants through the cap and lateral migration of contaminated sediments (during City construction activities including dredging).

- Two cores were obtained from the most contaminated area and samples from various depths were analyzed. The cores sediment quality data showed no evidence of upward contaminant migration through the Utilities' cap. The core data indicated a top-down re-contamination source.

- Analysis by the Utilities technical consultants of the timing of recontamination, comparison of the pre-dredge and post-dredge sample analyses, core data, and construction methods indicate that the primary source of recontamination was migration of contaminated sediment particulates from RA20/RA22 into the northern portion of the Utilities' Work Area. In our opinion, the contaminated sediment migration into the Utilities' Work Area was caused by the City's construction activities, especially dredging during incoming tides. City staff agreed with this opinion during the stormwater meeting on April 26, 2005.

- While stormwater does not appear to be the primary cause of recontamination observed in mid-September 2004, the available data indicate that stormwater is contributing

contamination to surface sediment, especially BEHP. Additional monitoring is necessary to more fully assess the impacts of stormwater discharges to the waterway.

- Fine-grained surface sediment has been deposited in the turning basin south of the SR509 bridge. This sediment generally does not contain constituents above SQOs (as of December 2004), although concentrations of BEHP appear to be elevated.

- A portion of the surface sediment in the south turning basin is likely from winnowing of the fish mix placed on the scour protection apron coupled with the hydrodynamic system within the head of the waterway adjusting to changed bathymetry. Surface samples from the turning basin were different in appearance from those obtained north of the bridge.

CONCEPTUAL MODEL

The available data indicate that the sand cap is functioning as intended and that recontamination is occurring from "top-down" sources. Remedial work completed by the City, including dredging, that mostly occurred between September to December 2004 caused re-suspension and southward migration of contaminated sediment into the Utilities' work area. Fine grained contaminated sediment accumulated on the Utilities' cap. The accumulation thins in a southerly direction from where the dredging occurred. Contaminant concentrations also decline in a southerly direction. The portion of the Utilities' work area impacted by the dredging appears to generally lie between the sheetpile wall at water way station 70+10 and the SR509 bridge.

Fine grained sediment also has accumulated in the area between the SR509 bridge and the scour protection apron (in the small boat turning basin). The source of this sediment appears to be winnowing of fines from the scour protection apron and from stormwater discharges. Contaminant concentrations in the fine grained sediment south of the bridge are lower as compared to the fine grained sediment north of the bridge. However, contaminants typically associated with stormwater discharges are present in the fine grained sediment.

Conditions near the head of the waterway need to stabilize before the impact of stormwater discharges can be further evaluated. Construction of the Utilities' remedy has changed the hydrodynamics and additional monitoring is required to assess the long-term contributions of stormwater to surface sediment in Thea Foss. Such monitoring should allow the hydrodynamic changes to stabilize and the impacts of stormwater recontamination to be differentiated from the construction recontamination that occurred in 2004. This issue will be further evaluated using the results of Year 1 OMMP samples collected in May 2005.

OMMP PHYSICAL OBSERVATIONS AND SAMPLING

As part of the remedial design work, the Utilities prepared an Operation, Maintenance and Monitoring Plan (OMMP) that was approved by EPA (Tetra Tech-FW et al. 2003). The objectives of the Utilities' OMMP are as follows:

- Confirm long-term attainment of Sediment Quality Objectives (SQOs) specified in the Record of Decision (ROD)(EPA 1989) and Explanation of Significant Differences (ESDs)(EPA 1997; 2000).

- Evaluate the effectiveness of source control.

- Evaluate the enhancement of habitat function and fisheries resources.

To meet these objectives, the initial OMMP work consisted of making observations of the physical condition of the containment cap during low tides and completing surface and subsurface sampling of the capping materials approximately one month after remedial construction was completed. For completeness, Year 0 OMMP sampling results are included in summaries presented below. Year 1 OMMP sampling was completed in May 2005 and the results of this sampling will be submitted to EPA in a separate report.

Physical Observations – February 2004 to April 2005

Physical observations of the Utilities' Work Area were made during predicted low tides as listed below.

- May 7, 2004 -3.32 feet MLLW @ 1:38pm
- July 1, 2004 -3.6 feet MLLW @ 10:44am
- July 2, 2004 -4.1 feet MLLW @ 11:32am
- September 24, 2004 -0.52 feet MLLW @ 8:05am
- December 9, 2004 +6.8 feet MLLW @ 8:17am
- April 27, 2005 -2.4 feet MLLW @ 1:53pm

The results of the physical observations are documented in several technical memoranda that are presented in DOF (2004, included as Appendix A) and DOF (2005a and b; included in Appendix B). Overall, the physical observations indicated the following:

- The scour protection apron is functioning as intended. No obvious signs of significant erosion were observed after remedial construction was completed.
- Side slopes showed no visible evidence of slope erosion, sloughing etc.
- Gas bubbles were observed throughout the head of the waterway during lower tides, however, no rising NAPL sheens were observed in the former SR509 seep area or

elsewhere in the Utilities' Work Area, including in early July 2004, when the lowest daylight tides of Year 1 occurred (approximately –3.6 to –4.1 feet MLLW).

- While surface sheens were observed at times in the vicinity of the Foss Landing Marina and City's Work Area during the City's dredging and capping remedial work (2004 to 2005 construction season), no sheens were observed during the site visit on April 27, 2005.

Year 0 OMMP Sampling

Year 0 sediment sampling was completed between April 7 and 9, 2004 approximately one month after remedial construction was completed. The purpose of the sampling was to establish baseline sediment quality soon after the sand cap was installed. The results of the sampling are summarized in DOF (2004b) and are presented in Attachment A.

Sample Types

Four types of samples were collected as outlined in the OMMP during the Year 0 sampling as discussed below. Sample locations are shown on Figure 2.

- **Compliance Samples**. Fourteen waterway cap samples (WC-1 to WC-14) and thirteen slope cap samples were collected from the point of compliance (i.e. top ten cm of capping material). The thirteen slope cap samples were formed into four composite samples (SC-1 to SC-4).

- **Early Warning Recontamination Samples**. Fourteen early warning samples (RC-1 to RC-14) were collected to provide warning from possible *"top-down"* recontamination of the cap. The early warning samples were collected from depths of 0 to 2 cm from the cap surface.

- **Core Samples**. Five core samples were obtained to provide a baseline to evaluate possible future *"bottom-up"* recontamination of the waterway cap. Core depths below mudline ranged from 1.3 to 3.3 feet.

Analytical Parameters

The compliance and core samples collected during the Year 0 OMMP sampling were analyzed for the following constituents:

- Semivolatile Organic Compounds (inc. PAHs, phthalates, chlorobenzenes, and other miscellaneous compounds)
- Metals (mercury, zinc, and lead)
- p,p'-Dichlorodiphenyltrichloroethane (DDT) and associated (derivative) compounds
- Polychlorinated Biphenyls (PCBs as Aroclors)

- Conventional parameters (TOC and grain size)

The chemical analytes for monitoring early warning signs of top-down recontamination in newly deposited sediment (0 to 2 cm) include:

- Polycyclic Aromatic Hydrocarbons (PAHs)
- Metals (lead, zinc and mercury)
- bis(2-Ethylhexyl)phthalate (BEHP)
- Polychlorinated Biphenyls (PCBs)
- Conventional Parameters (TOC and grain size)

In addition to the analytes listed above, several other metals were analyzed as part of the Year 0 OMMP sampling because they are often constituents in stormwater discharges (a possible source of top-down recontamination). These additional metals included antimony, arsenic, cadmium, chromium, copper, nickel and silver.

The analyses were completed by Analytical Resources Inc. (ARI) located in Tukwila, Washington. DMD, Inc. (Raleigh Farlow) reviewed and validated the analytical data. Laboratory data sheets and DMD's validation report are presented in DOF (2004b; see Appendix A). A summary of the Year 0 analytical data is presented in Table 2.

Summary of Year 0 Sediment Quality

Compliance Samples. None of the constituents analyzed in the compliance samples (0 to 10 cm) were detected at concentrations greater than the SQOs. Most of the analyzed constituents were either not detected or the maximum concentration was detected at less than 10% of their respective SQO. The maximum concentrations of copper (168 mg/kg) and BEHP (550 mg/kg) were detected at the greatest percentage of the SQO (approximately 42% to 43%). These constituents were likely derived from stormwater discharges.

Early Warning Samples. At the mudline surface, a fine-grained silty material was observed to have accumulated in the several months since the final capping material was placed. This fine-grained material ranged from a thin coating up to approximately 1 cm thick.

Higher constituent concentrations were generally detected in the early warning samples (0 to 2 cm) as compared to the compliance samples (0 to 10 cm). The maximum early-warning concentration of BEHP (3,000 mg/kg) exceeded the SQO of 1,300 ug/kg at location RC-14. BEHP also exceeded the SQO at location RC-13 (1,400 ug/kg). Concentrations of high molecular weight PAHs (HPAHs) were also detected at higher percentages of the SQOs as compared to the compliance samples. The spatial concentration patterns indicated a source located at the head of the waterway. Concentrations of BEHP and HPAHs were highly correlated (R=0.99) also indicating the same source.

Core Samples. Six cores were obtained throughout the Utilities' Work Area and samples from various depths were chemically analyzed for constituents specified in the OMMP. Constituent concentrations were well below the SQOs and the core sample results showed no evidence of bottom-up migration from underlying contaminated sediment.

Recontamination Observations and Sampling

Time Line

During the previous construction season (2003-2004), remedial work was completed in RA19A and RA19B. In August 2004, the City began remedial construction for the 2004-2005 construction season. A detailed time line of significant activities during this period is presented as Figure 4.

The Utilities were notified by the City on August 12, 2004 that dredging adjacent to the Utilities' Work Area would be occurring. On August 23, 2004 the Utilities raised concerns over the potential for cap recontamination due to the dredging activities and requested that the City and EPA take appropriate actions to minimize the potential impacts (e.g., limit dredging to outgoing tides, use of silt curtains, etc.). A partial silt curtain was deployed by the contractor, however, the Utilities' recommendation that dredging only occur during outgoing tides was not heeded by the City or their contractor. Furthermore, the partial silt curtain was allowed to enter the Utilities' Work Area and allowed contaminated sediment to directly accumulate on portions of the Utilities' cap.

On August 20, 2004, the City collected pre-dredge samples (0 to 10 cm) from two locations within the Utilities' Work Area including WC-11 and WC-12. Additional pre-dredge samples were collected by the Utilities on August 30, 2004 from locations RC-11 (0 to 2 cm) and Site 15 (0 to 2 cm; 0 to 10 cm). The additional samples were collected to allow a more thorough comparison of the pre-dredge and post-dredge sample results with baseline sediment quality established in April 2004 as part of the Utilities OMMP.

The initial work began on August 31, 2004 and consisted of dredging contaminated sediment from RA22 and the southern portion of RA20 (located on the immediate north side of the Utilities' Work Area – Figure 3) and placing the initial lift of capping material. Most of the dredging in RA20 and RA22 by the City's contractor (Manson) was completed between August 31 and September 17, 2004. Post-dredge sampling completed on September 18, 2004 indicated recontamination of the Utilities' cap had occurred during the dredging period.

Some additional dredging occurred in late September and between late October and early December (Floyd Snider 2005). Dredging in RA21 occurred between November 29 and December 2, 2004. Partial capping of RA20 and RA22 was completed between September 24, 2004 and January 3, 2005.

Dredging and Capping Observations

During performance of remedial activities in RA20 and RA22 by Manson, technical staff from TetraTech-FW were on-site daily to observe the dredging and associated activities from August 31 to October 5, 2004 and intermittently from November 13, 2004 to January 6, 2005 when activities were conducted adjacent to the Utilities Work Area. Water quality (WQ) measurements were made from the end of the Foss Landing dock near Site 15 and visual observations were recorded for the presence of surface sheens. The WQ measurements included turbidity, dissolved oxygen and temperature and provide a very general indication of changes in water quality during work activities. A detailed report prepared by Tetra-Tech-EC (2005) that documents their measurements and observations is included in Appendix C. Following is a general summary.

- The southern most dredging occurred along waterway station 70+10 within RA20 and RA22, most of which was done between August 31 and September 17, 2004. During dredging activities, Manson employed a silt curtain and absorbent boom in the dredge area. The silt curtain extended six feet below the water surface but did not extend to the mudline. The gap between the bottom of the silt curtain and the mudline varied with tidal levels between approximately 6 to 8 feet during lower tides and 15 to 17 feet during higher tides (based on a bottom elevation of –12 to –13 feet MLLW (DOF 2004a). The position of the silt curtain and boom were affected by tides, winds, and currents as well as by positioning by the contractor. At times, the silt curtain/boom entered the Utilities' Work Area (Figure 5).

- Conversations with a representative of the U.S. Army Corps of Engineers while the dredging was being conducted and confirmed in a telephone conversation on May 5, 2005 indicated that he observed, at times during the dredging, particulates (based on turbidity observations) escaping from beneath the partial silt curtain (USACE 2005).

- Beginning on September 2, WQ measurements were made continuously approximately three feet above the mudline each day that observations took place. The location of the WQ monitoring station varied with the activity, but was always located on the north edge of the Foss Landing marina dock. Most measurements were made near "Site 15." Increased turbidity was generally correlated with dredging activities, placement of sand cap and rock, and vessel activity (especially the Workhorse tug boat) as measured at the probe location. Increased turbidity occurred during ebb and flood tide transitions with fluctuations often being higher during flood tides.

- Dredging by the City's contractor began on August 31, 2004 in RA20 using a standard (open) digging bucket. Significant amounts of wood debris and sawdust were encountered. On September 7, 2004, the contractor switched to an environmental dredging bucket. Wood debris (e.g., logs, chips, stumps, sawdust) continued to be encountered in RA20 and RA22. Sheens on the water surface and rising sheens were

observed both inside and outside of the silt curtain containment. Rising sheens were generally small irregular or disk shaped NAPL globs with a density similar to sea water. While oily sheens were noted throughout RA20 during the dredging activities, no rising sheens were noted near the Foss Landing Marina prior to September 9. Dredging was being conducted in the eastern portion of RA-22 near 70+10 on September 8 and 9 just prior to observing the first rising sheens on the afternoon of September 9. The dredging on these days was conducted on a flooding tide and the silt curtain extended south of station 70+10 into the Utilities' Work area near Site 15 as shown on Figures 5a and 5d.

- After September 9th, rising sheens were observed both inside and outside the silt curtain. Rising sheens were most often observed during flood tides, however there were three instances where it was observed during ebb tides; in all three instances it occurred in conjunction with dredging and the Workhorse activities.

- Gas bubbles were observed throughout the head of the waterway during low tides. No surface sheens were associated with rising gas bubbles.

- The heaviest occurrence of surface sheens and rising sheens inside and outside the containment boom was observed on September 16 when dredging occurred along the wall near 70+10 (see Figures 5b, 5c and 5d). Rising sheens increased and spread after the onset of dredging and declined after dredging stopped.

- In response to the incidence of rising sheens, underwater video surveys were conducted on September 17, 2004 by both the City and Utilities. No direct evidence of rising sheens were documented in these surveys, however, fine-grained material and evidence of wood chips on the surface were noted close to the sheetpile wall on both the Utilities' cap and in the City's dredge area.

- The Workhorse tug was a support vessel used by the City's contractor. As noted above, turbidity measurements increased when the tug was working near the Foss Landing dock. Rising sheens and surface sheens often were observed in the vicinity of the tug when working in the vicinity of 70+10. Sheens disappeared after the Workhorse stopped work or left the work area near 70+10.

- Placement of the initial sand cap layer and slope material took place intermittently between September 18th and January 3, 2005 in RA20 and RA22. Typically, the silt curtain was not employed during cap placement activities. In addition, rock placement for the transition buttress was conducted in early December with placement of habitat mix over the rock buttress on January 5-6, 2005.

Divers Observations

On December 14 and 15, 2004, bottom observations were made by divers from Grette and Associates for the City of Tacoma (Tetra Tech-FW 2004d). Diving was carried out within the Utilities Work Area in the Head of the Thea Foss Waterway between 70+10 and 74+50 and within the City of Tacoma's (the City) remedial areas (RA) 19B and 19A. The City's purpose for diving in the Utilities and City's Work Areas, as described by Grette and Associates LLC. and Floyd Snider Inc personnel, was to conduct and document the following:

1. Any imperfections or breaks in the Utilities' sand cap between 70+10 and 74+50.
2. The presence of sheens on or within surface sediment in the Utilities' or the City's Work Areas.
3. Measure and/or estimate the thickness of silt on the top of cap material within the Utilities' and City's Work Areas.
4. Install stakes, with one centimeter increments, at seven locations on three transects within RA19A and RA19B. The intent is to measure the height of the silt at these stakes at later dates to determine the approximate amount of sedimentation that is occurring at these locations.
5. The condition and height above the mudline of the sheetpile wall at 70+10 and the types of material present on the north and south sides of the sheetpile wall.

The surveys were conducted by scuba diving operations and consisted of diving within the Foss Landing Marina (between 72+00 and 70+10), under the SR509 bridge and at the Outfall 243 pipe (between 74+50 and 72+00) and at the sheetpile wall at 70+10 on December 14, 2004. On December 15, 2004, this consisted of diving at one transect within RA19B, two transects within RA19A, and at the sheetpile wall at 70+10. Divers made the following observations while scuba diving on December 14 and 15, 2004:

1. No sheens or active bubbling were observed on the sediment surface within the dive area (70+10 to 74+50).
2. A silt layer which was on top of sand and angular gravel cap material ranged in thickness from approximately a couple centimeters to 0.5 ft (15 cm) and was nearly continuous from between 70+10 and 74+50.
3. On the north side of the sheetpile at 70+10 the mudline (rip rap) was found to be 3 – 4 ft (91 – 122 cm) below the top of the sheetpile wall.
4. On the south side of the sheetpile at 70+10 the mudline (silt and sand cap) was found to be 1 – 2 ft (30 – 61 cm) below the top of the sheetpile wall.
5. A surface silt layer, which ranged from 0 – 0.4 ft (0 to >11.5 cm) in thickness, was present at Transects #1 – #3 (in RA19A and RA19B). The silt layer was generally thicker offshore than near the shoreline.

6. No breaks in the Utilities' cap were observed.

Sediment Sampling and Analyses

In anticipation of the dredging and to provide a baseline to evaluate the possible effects of dredging on sediment quality, *"pre-dredge"* and *"post-dredge"* samples were obtained at locations within both the Utilities' and City's Work Areas. Analytical Resources Inc. (ARI) completed the laboratory analyses while DMD Inc. completed the data quality reviews for the Utilities. A list of the samples collected is presented in Table 1 and sample locations are presented on Figure 3. Analytical results are summarized in Tables 2 to 6. Laboratory data sheets (Utilities' samples) and data quality reviews are presented in Appendix D (on CD-ROM as pdf files).

Sampling was completed in several phases as described below.

- **Pre-Dredge Surface Samples – August 20, 2004 (Utilities' Work Area)**. Sediment samples were collected by Floyd-Snider and Parametrix. Surface sediment samples (0 to 10 cm) from stations WC-11 and WC-12 were collected using a Van Veen sampler. Analytical results are summarized in Table 2. Field sampling procedures, data tables and sample descriptions are contained in memoranda prepared by KPFF for the City of Tacoma (KPFF 2004a; Appendix C) and Tetra Tech-FW for the Utilities (Tetra Tech-FW, 2004a; Appendix C).

- **Pre-Dredge Surface Samples – August 30, 2004 (Utilities' Work Area)**. Additional surface samples were obtained prior to the start of dredging by Tetra Tech-FW for the Utilities. Floyd-Snider staff collected split samples for the City. Samples (0 to 2 cm) were obtained from stations RC-11 and Site 15, and 0 to 10 cm samples were obtained from Site 15. A Petite Ponar sampler was used to collect the samples from Foss Landing marina floats. Analytical results are summarized in Table 2. Field procedures, data tables and sample descriptions are contained in memoranda prepared by Tetra Tech-FW (2004a; Appendix C) and KPFF (2004a; Appendix C).

- **During-Dredging Sheen Sampling – September 17, 2004 (Utilities' Work Area).** A sheen sample was obtained from the water surface adjacent to the Foss Landing Marina on September 17, 2004. The sample was collected on a Teflon net and analyzed by ARI for selected semivolatile organic compounds (SVOCs) and total petroleum hydrocarbons (TPH). The sampling method and results are summarized in a memorandum prepared by DMD, Inc. that is included in Appendix E.

- **Post-Dredge Surface Samples – September 17, 2004 (City's Work Area)**. Four sediment samples were collected by Parametrix for the City on September 17, 2004. The samples were of the post-dredge sediment surface prior to capping in RA20 and RA22. Samples were designated as RA20-001, RA22-001, RA22-002, and RA22-003. Analytical results are summarized in Table 4.

- **Post-Dredge Surface Samples – September 18, 2004 (Utilities' Work Area)**. Tetra Tech-FW collected sediment at two locations, including WC/RC-11 and Site 15. Floyd Snider staff collected split samples. Samples were obtained from depths of 0 to 2 cm and 0 to 10 cm from both locations (total of four samples). A Petite Ponar sampler was used to collect the samples from Foss Landing marina floats. Analytical results are summarized in Table 2. Field procedures, data tables and sample descriptions are contained in memoranda prepared by Tetra Tech-FW (2004a; Appendix C) and KPFF (2004a; Appendix C).

- **Post-Dredge Surface Samples – October 7, 2004 (City's Work Area)**. Two sediment samples were collected by Parametrix for the City on October 7, 2004. The samples were of the first-lift cap surface RA20 and RA22. Samples were designated as RA20-005 and RA22-004. Analytical results are summarized in Table 4.

- **Post-Dredge Surface Samples – November 9, 2004 (City's Work Area)**. Fifteen surface sediment samples were collected from seven locations in RAs 19B, 20, 21 and 22 by Parametrix. Two separate samples were collected at each location including a sample from 0 to 2 cm and a sample from 0 to 10 cm. A third sample was collected for the 0 to 2 cm interval at station CA-22-05 and was designated as sample CA-22-05B. Samples from RA19B were from the final capping material that was placed over the grout mat. Samples from RA20 and RA22 were from areas where the first lift of sand capping material had been placed and samples from RA21 were from an area where dredging had not been completed. Analytical results are summarized in Table 4. Field procedures, data tables and sample descriptions are contained in memoranda prepared by Tetra Tech FW (2004b) and KPFF (2004b; Appendix C).

- **Post-Dredge Core Samples – November 22, 2004 (Utilities' Work Area)**. Cores (UA-01 at WC-11 and UA-02 at Site 15) were advanced to a depth of approximately 80 cm (2.6 feet) to assess whether bottom-up migration was contributing to the observed recontamination of the Utilities' cap upper surface. Vibra-core sampling equipment was provided by Parametrix. At each station, two cores were advanced and later composited to provide sufficient volume for split samples to be obtained by representatives of the Utilities and City. The Utilities were represented by staff from Tetra-Tech-FW. Analytical results are summarized in Table 5. Field procedures, data tables and sample descriptions are contained in memoranda prepared by Tetra Tech-FW (2004c; Appendix C) and KPFF (2004c; Appendix C).

- **Post-Dredge Core Samples – November 29 and 30, 2004 (City's Work Area).** Cores were collected from five stations using a Vibracore by Parametrix in RAs 20, 21 and 22. The cores were designated as CA-20-01, CA-20-04, CA-21-07, CA22-02 and CA-22-05 and penetrated to depths below mudline of between 49-inches and 96-inches. Analytical results are summarized in Table 6. Field procedures, data tables and sample descriptions

are contained in memoranda prepared by Tetra Tech FW (2004c; Appendix C) and KPFF (2005b; Appendix C).

- **Post-Dredge Surface Samples – November 30 to December 9, 2004 (Utilities' Work Area).** Surface sediment samples were collected from twenty-five stations by Tetra Tech-FW in accordance with the revised Surface Sediment Sampling Plan (DOF 2004d). Samples were obtained from depths of 0 to 10 cm, and of fine-grained sediment (regardless of thickness) that had accumulated on the cap (up to 12 cm thick). City representatives collected split samples and analyzed thirteen samples. Analytical results are summarized in Table 3. Field procedures, data tables and sample descriptions are contained in memoranda prepared by Tetra Tech-EC (2004e; Appendix C) and KPFF (2005a; Appendix C).

- **Post-Dredge Surface Samples – December 2, 2004 (City's Work Area)**. Six surface sediment samples were collected from three locations within RA19A (Figure 3). Samples were obtained from depths of between 0 to 2 cm and 0 to 10 cm. Station designations are RA19A-022, RA19A-023 and RA19A-024. Analytical results are summarized in Table 4. Field procedures, data tables and sample descriptions are contained in memoranda prepared by Tetra Tech-FW (2004f; Appendix C) and KPFF (2005c; Appendix C).

UTILITIES' CAPPING MATERIALS

The Utilities' waterway cap consists of uncontaminated sandy material that was installed by the end of February 2004 (DOF 2004a). As part of the EPA approved specifications, physical and chemical testing of the capping material was required prior to placement in the waterway. As noted in the construction report (DOF 2004a, p.12 Attachment 5), *"Chemical concentrations of the imported material were found to be at or below the detection limit for each compound listed in Attachment 1 to the specifications and below the Commencement Bay Sediment Quality Objectives"*.

ACCUMULATION OF FINE-GRAINED SEDIMENT

In early April 2004, during OMMP sampling (DOF 2004b), a thin layer of fine-grained silty material was observed to have accumulated since the Utilities' cap was placed. The fine-grained material ranged from a thin coating up to approximately 1 cm thick and appeared to decrease in thickness in a northerly direction from the head of the waterway.

In late August 2004 and prior to dredging, approximately 1 cm of fine-grained silt was observed on the Utilities' cap surface near the sheet pile wall (stations WC/RC11, WC-12 and Site 15 on August 20th and 30th – Tetra Tech-FW, 2004a). By September 18, 2004, after dredging was completed but before partial capping began, the accumulated fine-grained sediment thickness had increased to between 3 cm and 7 cm near the sheet pile wall. The data indicated the thickest

deposits were near the sheet pile wall where dredging had occurred and thinned in a southerly direction.

During supplemental sampling completed in late November and early December 2004, the thickness of fine-grained sediment was measured at various locations near the head of the waterway as summarized in Table 7. Table 7 lists sediment thicknesses reported by Tetra Tech-FW and Floyd-Snider (2005). For the most part, the thicknesses reported by the two groups are similar (i.e. within one or two centimeters). The variability between the Utilities' and City's measurements can likely be accounted for by which observation was recorded when multiple samplings were completed at any given location. Often the thickness of fine-grained sediment varied between different sampling runs.

In late 2004, the Utilities recorded fine-grained sediment accumulations of between 1 cm and 12 cm while the City recorded average thicknesses of between 0.5 cm and 14 cm. The Utilities' thickness data is plotted on Figure 6. As shown on the figure, relatively greater thicknesses of fine-grained sediment were measured near the sheet pile wall (5 cm to 12 cm) and in the turning basin, south of the SR509 bridge (5 cm to 12 cm).

Figure 7 shows the change in fine-grained sediment thicknesses with time at locations RC/WC11 and Site 15 located near the northern boundary of the Utilities' Work Area. Between April 2004 and the end of August 2004, approximately 1 cm of sediment had accumulated on the cap surface near the sheet pile wall. After contaminated sediment dredging on the north side of the wall in September 2004, sediment thicknesses had increased. At RC/WC11 sediment thickness increased from approximately 1 cm to 3 cm. At Site 15 fine-grained sediment thickness increased from 3 to 7 cm .

By early December 2004, fine-grained sediment thicknesses had increased further. At RC/WC11, the thickness increased to approximately 7 cm (from 3 cm) and at Site 15 the thickness increased to 12 cm (from 7 cm).The additional accumulation of fine- grained sediment occurred after placement of the initial lift of capping material in RA20 and RA22. Note that wood chips, similar to the work chips dredged from RA22, were observed in the Site 15 sample collected on November 30, 2004 at a depth of approximately 5 cm. Wood chips were also noted in underwater video on the sediment surface near the sheet pile wall on September 16, 2004.

NAPL SURFACE SHEENS AND SHEEN TESTING

In general two types of sheens were observed during the City's remedial work including; a platy sheen typical of coal tar derived materials and a more iridescent petroleum-like sheen. During the dredging activities, both types of sheens were observed in the general area where dredging occurred. Figures 5b, 5c and 5d show photographs of a dredge sequence that occurred on September 16, 2004. This sequence shows how the silt curtain/containment boom moved into the Utilities' Work Area with incoming tides. The photographs also show petroleum-like sheens released during the dredging of contaminated material and how these sheens moved into the Utilities' Work Area with the incoming tide.

The target dredge depth in RA22 was –24 feet MLLW. The occurrence of sheens during dredging was expected based on the dredge depth, test data from cores collected as part of the pre-design and design studies, and other information. For example, test data at core RD2-C20 (collected in 1995, Hart Crowser 1997), located on the north side of the sheet pile wall (Figure 3) indicates concentrations of low molecular weight polycyclic aromatic hydrocarbons (LPAHs) and high molecular weight PAHs (HPAHs) indicative of a coal tar derived non-aqueous phase liquid (NAPL). LPAHs were detected at 2,399,000 ug/kg and HPAHs were detected at 1,042400 ug/kg in samples collected from depths of 6 to 10 feet (-18 feet to –22 feet MLLW). Dredging such materials would be expected to cause the release of platy sheens typical of coal tar derived materials.

Petroleum-like sheens were also expected. Petroleum hydrocarbons are common storm water contaminants and are present in contaminated sediment in the Thea Foss Waterway (DOF 1999). Testing of fine-grained sediment that had accumulated on the Utilities' cap by December 2004 indicated petroleum hydrocarbon concentrations up to 6,200 mg/kg (sum of diesel and lube-oil range hydrocarbons for sample S19 – see Table 3). Note that the Washington State Department of Ecology has set the cleanup level for diesel and heavy (lube)-oil range hydrocarbons at 2,000 mg/kg to prevent accumulation of free product in the subsurface (Model Toxics Control Act – Chapter 173-340 WAC, amended February 2001).

A surface sheen sample was obtained from the water surface adjacent to the Foss Landing Marina on September 17, 2004. The sample was submitted to ARI for analysis of selected semivolatile organic compounds (SVOCs) and total petroleum hydrocarbons (TPH). The results are summarized in a memorandum prepared by DMD, Inc. that is included with this report in Appendix E. Lubricant-range petroleum hydrocarbons were the predominant material found in the sample. DMD concluded that the sheen material is characteristic of urban-derived organic contamination. The GC-FID profile showed no similarities with the NAPL associated with the former SR-509 seep. The data indicate that petroleum hydrocarbon contaminated sediments with potential for releasing sheen were disturbed during dredging, which resulted in the generation of a surface sheen in the vicinity of dredging activities. The presence of petroleum sheen is consistent with the GC-FID traces of sediment in Thea Foss that are very similar to a GC-FID trace of a mixture of 30W, 40W and 50W motor oils (DOF 1999).

SUMMARY OF RECONTAMINATION ASSESSMENT ANALYTICAL RESULTS

The following discussion summarizes the various sample analytical results that were obtained to assess recontamination of the Utilities' Cap. The purpose of the summaries is to provide a basis to evaluate and interpret the data with respect to the likely source or sources of recontamination and the factors that are affecting sediment quality. Interpretative discussions follow the summary of analytical results.

Comparison of Split Sample Results

During the sampling events completed between August and December 2004, the Utilities split samples with the City. A comparison of the split sample results is presented below.

August/September 2004 Surface Sediment Samples

Five split-sediment samples from RC11 and Site 15 were analyzed by the City's laboratory for the City and by Analytical Resources Inc. (ARI) for the Utilities in August and September 2004. The split sample results are summarized in Table 8 and are graphically shown on Figure 8.

Overall, the results of the Utilities' analyses are generally consistent and similar to the City's results. In some cases, the Utilities' concentrations were higher and in some cases the City's concentrations were higher. More importantly, for purposes of this evaluation, the concentration trends (pre-dredge/post-dredge) were generally consistent between the split sample analyses.

Site 15 and RC-11 Sediment Core Data – November 2004

Seven split-sediment samples from Site 15 and RC-11 were analyzed by the City's laboratory and by Analytical Resources Inc. (ARI) for the Utilities in November 2004. The results are presented in Table 5. Overall the analytical results are comparable between the split-sample data sets. As examples, City and Utilities sample concentrations for mercury, HPAHs and BEHP are listed below:

Split Sample Results – Core Data – November 2004

Depth (cm)	Mercury (mg/kg) City/Utilities	HPAHs (ug/kg) City/Utilities	BEHP (ug/kg) City/Utilities
Site 15			
10 to 20	0.018 / <0.05	83 / 145	17 / 42
30 to 40	0.008 / <0.05	200 / 470	38 / 120
50 to 60	0.008 / <0.05	15 / 22	12 / 19
70 to 80	0.006 / <0.05	21 / 26	3 / <20
RC-11			
10 to 20	0.008 / <0.04	28 / <20	9 / 27
30 to 40	<0.005 / <0.04	48 / 1336	9 / 22
50 to 60	<0.005 / <0.05	<1.1 / <19	<2 / <19

The variability between most of the sample analyses is what would be expected for sediment samples analyzed by different laboratories. The concentrations trends are also similar (i.e. the sample concentrations fluctuate upward or downward in a similar manner). However, there was a significant difference in the HPAH concentration results between the 30 cm to 40 cm samples from the core at RC-11. The difference is likely related to sample variability.

December 2004 Surface Sediment Samples

Two split surface sediment samples (WC-10 and WC-12) were analyzed by the City's laboratory and by Analytical Resources Inc. (ARI) for the Utilities in December 2004. The results are presented in Table 3. Concentrations of selected constituents are compared below:

Split Sample Results – Surface Samples – December 2004

Depth (cm)	Mercury (mg/kg) City/Utilities	HPAHs (ug/kg) City/Utilities	BEHP (ug/kg) City/Utilities	PCBs (ug/kg) City/Utilities
WC-10				
0 to 10	0.06 / 0.13	2782 / 3980	464 / 620	73 / 19
WC-12				
0 to 10	0.12 / 0.24	3481 / 8130	309 / 880	157 / 92

The results are similar. Some of ARI's concentrations are higher than the City's and some of the City's concentrations are higher than ARI's.

Summary of August/September 2004 – Pre- and Post-Dredge Samples (Utilities' Work Area).

In August and September 2004, pre- and post-dredge samples were obtained from 0 to 2 cm and 0 to 10 cm at stations Site 15 and RC-11. Comparison of the various sample results are discussed below.

Comparison of the 0 to 2 cm and 0 to 10 cm Samples

Figure 9 shows a graphical presentation of the City's sample results for RC11 and Site 15 and presents a comparison between the 0 to 2 cm and 0 to 10 cm sample concentrations. Constituent concentrations in the 0 to 2 cm samples are higher in concentration as compared to the 0 to 10 cm samples except for lead and zinc at RC11. For example, at RC11, a mercury concentration of 1.48 mg/kg was detected in the 0 to 2 cm sample as compared to 0.74 mg/kg in the 0 to 10 cm sample. Similarly, at Site 15, HPAH and BEHP concentrations were 148,900 ug/kg and 12,000 ug/kg, respectively, in the 0 to 2 cm samples, as compared to 80,700 ug/kg and 4,500 ug/kg, respectively, in the 0 to 10 cm samples.

The City's results suggest that the RC11 post-dredge lead and zinc concentrations are slightly higher in the 0 to 10 cm samples as compared to the 0 to 2 cm samples. However, the City's analyses of post-dredge samples yielded results that may be biased low based on the trends of other analytes and compared to the Utilities' split sample analyses as summarized below:

RC-11 Post-Dredge Concentrations (0 to 2 cm)

Work Area	Lead (mg/kg)	Zinc (mg/kg)
Utilities	238	280
City	160	205

Comparison of the Post-Dredge RC11 and Site 15 – 0 to 2 cm Samples

Figure 10 shows a graphical comparison of the post-dredge 0 to 2 cm sample results from RC11 and Site 15. With the exception of BEHP, constituent concentrations were lower at RC11 as compared to Site 15. For example, a mercury concentration of 1.48 mg/kg was detected at Site 15 as compared to 0.83 mg/kg at RC11. Similarly, a PCB concentration of 530 mg/kg was detected at Site 15 as compared to 301 mg/kg at RC11.

BEHP was detected at a concentration of 12,000 ug/kg in post-dredge, 0 to 2 cm sediment at both Site 15 and RC11. Lower, but similar concentrations (4,300 mg/kg to 4,500 mg/kg) were detected in the post-dredge 0 to 10 cm samples from these locations.

Using the coordinates of the sampling stations, the distance of the stations from 70+10 was determined. Site 15 is estimated to be 26 feet south of 70+10 and RC11 is estimated to be 69 feet south of 70+10. These measurements indicate that site RC11 is, at a minimum, approximately 40 to 45 feet further from the dredging as compared to Site 15. As noted above, concentrations at Site 15 are generally higher than at RC11 that indicate a surface sediment concentration gradient exists in a southward direction from the dredging activities completed in RA20 and RA22.

Comparison to Sediment Quality Objectives (SQOs)

Figures 9 and 10 also compare the sample analytical results with the SQOs for samples obtained from RC-11 and Site 15 in mid-September, immediately after dredging was completed in RA20 and RA22. The following table lists those constituents that exceeded their respective SQO and the exceedance factor (concentration divided by the SQO – an exceedance factor greater than 1.0 indicates that the SOQ was exceeded).

SQO Exceedance Factors – September 2004 Surface Samples

Constituent Exceeds SQO	RC-11 0 to 2cm	RC-11 0 to 10 cm	Site 15 0 to 2 cm	Site 15 0 to10 cm
Mercury	**1.4**	0.73	**2.5**	**1.3**
LPAHs	**5.9**	**2.6**	**19.5**	**11.9**
HPAHs	**3.3**	**2.2**	**8.8**	**4.7**
BEHP	**9.2**	**3.3**	**9.2**	**3.5**
4',4-DDD	**1.3**	0.92	**3.4**	**1.3**
PCBs	**1.0**	0.63	**1.8**	**1.3**

Mercury, LPAHs, HPAHs, BEHP, 4'4-DDD, and PCBs exceed the SQO in one or more samples. The exceedance factors are higher in the 0 to 2 cm samples as compared to the 0 to 10 cm samples and in samples collected from Site 15 as compared to RC-11.

Summary of December 2004 – Post-Dredge Samples (Utilities' Work Area)

An extensive set of surface sediment samples were collected in late November and early December 2004 to assess what changes to sediment quality may have occurred since the recontamination was detected in mid-September 2004. Samples were obtained of the fine-grained sediment overlying the Utilities Cap (2 to 12 cm thick) and at the point of compliance (0 to 10 cm).

Fine-Grained Sediment Quality

Figures 11 to 18 show the concentration patterns of metals (lead, zinc, mercury), LPAHs, HPAHs, 4,4'-DDD, Total PCBs, and BEHP in fine grained sediment that lies above capping material near the Head of the Thea Foss Waterway. Fine-grained sediment thicknesses were previously discussed and are shown on Figure 6. In the Utilities' Work Area and RA19B located in the City Work Area, the fine-grained sediment lies on the final cap surface. In RA20 and RA22, the fine-grained material lies on the first lift of capping material.

The highest constituent concentrations were generally detected on the south side of the sheet pile wall in the Utilities' Work Area and near the southern boundary of RA22 and RA19B. For example, LPAH concentrations of between 17,470 ug/kg to 23,780 ug/kg were detected in samples from S-15 and S-21 in the Utilities' Work Area and LPAH concentrations ranged from 28,970 ug/kg to 40,236 ug/kg in samples from RA19B-06 and CA22-05 in the City's Work Area (Figure 14). Similarly, the highest constituent concentrations of lead, zinc, mercury, HPAHs, 4,4'-DDD, and Total PCBs were generally detected in these areas.

The pattern of BEHP concentrations in fine-grained sediment was different from those of the other detected constituents. As shown on Figure 18, the highest BEHP concentration (4,500 ug/kg) was detected at station RC-07, located on the south side of SR509 near the west bank (and Outfall 235). Relatively high concentrations (i.e. greater than 1,300 ug/kg) were detected throughout most of the Utilities' Work Area. Furthermore, very low BEHP concentrations were detected in RA20, RA22 and RA19B within the City's Work Area on the north side of the sheet pile wall.

Comparison to Sediment Quality Objectives (SQOs). Figures 11 to 18 also show the general areas where constituent concentrations exceed the SQOs in fine-grained sediment. Lead and zinc did not exceed their respective SQO. However, SQOs were exceeded for mercury, LPAHs, HPAHs, 4,4'-DDD, Total PCBs and BEHP. Most of the SQO exceedances occurred north of the SR509 bridge with the exception of BEHP. The BEHP SQO of 1,300 ug/kg was exceeded in fine-grained sediment throughout most of the Utilities' Work Area (Figure 18).

Figures 19 to 24 show the areas where SQOs were exceeded in samples obtained from 0 to 10 cm depths. The exceedance patterns are similar to those for fine-grained sediment. Mercury, LPAHs, HPAHs, 4,4'-DDD, and Total PCBs exceeded their respective SQO. Most of the

exceedances occurred in the immediate vicinity of the sheet pile wall. LPAHs also exceeded its SQO near the north boundary of RA19B and RA22.

As with the fine-grained sediment constituent concentration patterns, the BEHP exceedance concentration pattern in 0 to 10 cm samples varied from that of the other constituents. The BEHP SQO was exceeded in an area north of the SR509 bridge and south of the bridge as illustrated on Figure 24.

Summary of November 2004 Core Samples (Utilities' Work Area)

Two cores were obtained from the Utilities' Work Area on November 9, 2004. Samples up to 80 cm (about 2.6 feet) below mudline were analyzed. As agreed upon with EPA and the City at the November 15, 2004 meeting, the purpose of the cores was to assess whether the recontamination that was discovered on the Utilities' cap surface in September 2004 was the result of bottom up migration through the cap. Core UA-01 was collected from the area of RC/WC-11 and UA-02 was collected from the area of Site 15. The analytical results are summarized in Table 5 while the results are graphically shown on Figures 25 to 28.

Figure 25 shows the percentage of fines (<62.5 um) contained in the samples. As illustrated on the figure, surface sediment (0 to 10 cm) is substantially finer than the underlying sediment. For example, at Site 15 the percentage of fines in the surface sample was over 50% as compared to the underlying sample (10 to 20 cm) that had a fines content of less than 5%.

Figures 26 to 28 show that concentrations of lead, mercury, zinc, LPAHs, HPAHs, BEHP, 4,4'-DDD, PCBs and sum of diesel and heavy-oil range petroleum hydrocarbons (TPH) are substantially higher in the surface sediment as compared to the underlying capping material. For example, at Site 15 a mercury concentration of 0.67 mg/kg (above the SQO of 0.59 mg/kg) was detected in the surface sample that compares with mercury concentrations less than 0.05 mg/kg in the underlying cap material samples. Similarly, the surface LPAH concentration at Site 15 was 13,320 ug/kg (above the SQO of 5,200 ug/kg) that compares with underlying LPAH concentrations of between 10 ug/kg and 340 ug/kg.

Summary of November 2004 Core Samples (City Work Area)

Five cores were obtained from the City's Work Area in late November 2004. Samples up to 150 cm (about 4.9 feet) below mudline were analyzed. Four of the cores (CA20-01, CA20-04, CA22-02 and CA22-05) were obtained after dredging was completed to characterize the quality of sediment that would lie below the City's cap. Core CA21-07 was obtained to characterize the quality of sediment that would be dredged at a later time. The results of analysis of core samples are summarized in Table 6.

No SQO exceedances were detected in samples from the core obtained in RA22. However, samples from cores in RA20 exceeded their respected SQO in one or more samples for LPAHs,

HPAHs, pesticides, and PCBs in the sediments to be capped. The maximum exceedance factors of sediment collected in cores from RA20 are summarized below.

Maximum SQO Exceedance Factors – Core Data – RA20

Constituent	Core/Depth (cm)	Exceedance Factor
Acenaphthene	CA20-04 / 28 to 58	3.3
Anthracene	CA20-04 / 28 to 58	1.9
Fluorene	CA20-04 / 28 to 58	1.7
Phenanthrene	CA20-04 / 28 to 58	2.4
Total LPAHs	CA20-04 / 28 to 58	1.9
Benzo(b)pyrene	CA20-04 / 28 to 58	1.3
Benzo(ghi)perylene	CA20-04 / 28 to 58	1.8
Dibenzo(ah)anthracene	CA20-04 / 28 to 58	1.9
Fluoranthene	CA20-04 / 28 to 58	1.2
Indeno(123-cd)pyrene	CA20-04 / 28 to 58	1.6
Total HPAHs	CA20-04 / 28 to 58	1.1
bis(2-Ethylhexyl)phthalate	CA20-01 / 60 to 90	1.5
4,4'-DDD	CA20-01 / 60 to 90	8.9
4,4'-DDE	CA20-01 / 60 to 90	10
4,4'-DDT	CA20-01 / 60 to 90	3.2
Total PCBs	CA20-01 / 60 to 90	7.6

The sediment to be dredged in RA21, based on core CA21-07, exceeded SQOs for zinc, dibenzofuran, both individual and total LPAHs and HPAHs, pesticides and PCBs. The greatest exceedance factor (62.8) was for LPAHs.

Concentration Trends with Time

Figure 29 shows constituent concentrations for 0 to 2 cm samples for stations RC11 and Site 15 using data from samples collected on April 8 (Year 0 OMMP), August 30 (prior to dredging) and September 18, 2004 (after initial dredging). At station RC11, contaminant concentrations were similar or showed some gradual increase between April and the end of August. For example, at RC11 PCB concentrations increased from 11 ug/kg to 62 ug/kg, HPAHs increased from 881 ug/kg to 3,980 ug/kg and BEHP increased from 280 ug/kg to 1,600 ug/kg. However, contaminant concentrations dramatically increased at stations RC11 and Site 15 between the pre-dredge sampling (August 30, 2004) and the post-dredge sampling (September 18, 2004). Concentrations of mercury, lead, zinc, LPAHs, HPAHs, BEHP, 4,4'-DDD and PCBs substantially increased in a matter of approximately three weeks.

Similar concentration trends were also observed in the 0 to 10 cm samples collected in April, August and September 2004 as shown on Figure 30. Concentrations of mercury, lead, zinc, LPAHs, HPAHs, BEHP, 4,4'-DDD, and PCBs increased, but the increase was less dramatic as compared to the 0 to 2 cm samples.

Samples obtained from stations RC/WC-11 and Site 15 in late November 2004 indicate changes in concentration of some of the constituents of concern. LPAHs, HPAHs, and BEHP appeared to have decreased (Figure 30) while concentrations of 4,4'-DDD appear to have increased. Concentrations of lead, zinc and PCBs do not appear to have changed significantly. The plot of mercury concentrations suggests a decrease between samples obtained in late November 2004. A 0 to 10 cm sample obtained on November 22, 2004 from the core at Site 15 had a mercury concentration 0.67 mg/kg while a 0 to 10 cm surface sample obtained on November 30, 2004 and analyzed by the City had a mercury concentration of 0.33 mg/kg. The differences in the mercury concentrations likely was caused by sampling and analytical variability.

DATA EVALUATION AND INTERPRETATION

Recontamination Mechanisms – Utilities' Work Area

In their draft SAP (Floyd Snider 2005) and press releases, the City proposed that three possible causes of the increases in constituent concentrations on the Utilities' cap be evaluated including the following:

- Upward contaminant migration through the cap
- Discharge from stormwater outfalls
- Contaminant migration from dredging

Each of these possibilities and various lines of evidence that provide insight to the cause of the recontamination are discussed below.

The available data indicate that the primary cause of recontamination was suspension of contaminated sediments by dredging with migration and deposition in the Utilities' Work Area. This conclusion is based on physical observation of the dredging activities, pre- and post-dredge surface sediment sampling and core sampling. There is also evidence that storm water discharges are contributing to recontamination of the Utilities' Cap. Core data indicate that the Utilities' cap is functioning as intended to physically and chemically contain underlying contaminated sediment.

Integrity of Utilities' Cap

Between September and February 2004, the Utilities placed an uncontaminated, minimum 3-ft. thick sand cap over contaminated sediment in the Utilities' Work Area. The cap was designed to both physically and chemically contain the underlying sediment.

Prior to implementation of the remedy in the Utilities' Work Area, NAPL surface sheens were observed on the west bank (Standard Chemical seep) and beneath the SR-509 bridge (SR509 seep) (Figure 2). The surface NAPL sheens at the SR-509 seep appeared associated with the discharge of naturally occurring gases along a preferential pathway apparently caused by the

pulling/removal of piles during construction of the SR509 bridge. Sheens were observed during low tides and when gas bubbles were observed. Since the cap was installed, no sheens have been observed in the SR-509 seep area. While the naturally occurring gases continue to discharge (gas bubbles continued to be observed on the water surface throughout the head of Thea Foss) during low tides, no sheens associated with the gas bubbles have been recorded.

Work completed as part of the Year 0 OMMP sampling in April 2004 (DOF 2004b) indicated that discharge from the stormwater outfalls was releasing contaminants (primarily in the particulate phase) that were accumulating on the cap. However, in April 2004 no SQO exceedances at the point of compliance (0 to 10 cm) had occurred.

The available data indicate that upward contaminant migration through the cap is not the cause of the recontamination. This finding is based on the following lines of evidence:

- Sediment cores obtained at stations RC/WC-11 and Site 15 show no evidence of significant upward migration of contaminants through the Utilities' Cap (Figures 26 to 28). These cores were obtained in the area where the highest contaminant concentrations were detected in surface sediment on the Utilities' cap.

- The highest contaminant concentrations are in surface sediment. Contaminant concentrations are higher in the 0 to 2 cm samples as compared to the 0 to 10 cm samples collected in September 2004. If a bottom-up source were the cause of the recontamination, the 0 to 10 cm samples would have similar or higher levels of contamination as compared to the 0 to 2 cm samples. This is not the case.

- Many of the contaminants now detected at relatively higher concentrations in surface sediment at RC/WC-11 and Site 15 do not migrate readily through porous media. Metals such as lead and organic contaminants such as HPAHs and PCBs have low water solubility's (are highly hydrophobic) and their mobilities are controlled by movement of associated solids (contaminated particulate matter) and do not migrate readily through capping material.

- If bottom-up migration were the cause of the recontamination, recontamination would be expected to be gradual in nature. Contaminant concentrations dramatically increased in a matter of two to three weeks and were detected immediately after dredging in RA20 and RA22. No such increases occurred during the previous six months after the cap had been installed or during the time between when recontamination was discovered (September 2004) and the cores were obtained (late November 2004).

Discharge from Stormwater Outfalls

The pollutants found to have recontaminated the surface of the cap are associated with urban stormwater discharges. Furthermore, sampling completed as part of the Utilities' OMMP in April 2004 indicates that gradual recontamination from stormwater discharge is likely occurring.

Recontamination directly from stormwater discharges is not expected to occur as rapidly as that found at RC11 and Site 15. Some higher contaminant discharges might be expected during "first flush" events when contaminated solids that accumulated over dry periods are washed into storm drains during the on-set of wetter weather. However, it is unlikely that this mechanism would cause such a dramatic increase in contaminant concentrations in so short a time.

Rainfall for the Tacoma Narrows Airport is shown on Figure 31. While the summer months are generally drier in the Puget Sound Region, significant rainfall events occurred in August 2004 prior to the August 30th sampling. Rainfall occurred in early September, however the intensity of the events was greater in August as compared to September. If first rainfall flushing of urban contaminants were a significant contributor to recontamination, the effects would likely already have been reflected in the samples collected on August 30th.

The concentration patterns, with the exception of BEHP, are also generally inconsistent with stormwater being the primary cause of the recontamination observed in September 2004. Higher concentrations are detected in the vicinity of the sheet pile wall and the northern boundaries of RA20 and RA22. Concentrations decline in a southerly direction towards the potential stormwater sources (outfalls 237A, 237B, 243 and 235).

BEHP concentration patterns near the head of the waterway (Figures 18 and 24) are distinctly different from those of the other recontamination constituents. The patterns suggest that the relatively high BEHP concentrations in surface sediment are the result of stormwater discharges. The highest BEHP concentrations were detected near the discharge of outfall 235 and relatively high BEHP concentrations were detected in surface samples from RC/WC-01 located on the immediate north side of the scour protection apron.

Fine-grained material up to 12 cm thick has accumulated on the Utilities' cap surface south of the SR509 bridge and the concentration patterns of other constituents indicate that these contaminants are being contributed by stormwater (such as mercury, HPAHs, and 4,4'-DDD). The source of the fine-grained material appears, at least in part, to be winnowing of the fish mix material placed on the scour protection apron. Physical observation of the samples from the turning basin indicates they are stratified as compared to samples north of the bridge.

Construction of the Utilities' remedy has changed the hydrodynamics of the head of the waterway. Additional monitoring is required to assess the long-term contribution of stormwater to surface sediment in Thea Foss. Such monitoring would allow the hydrodynamic changes to stabilize and the impacts of stormwater recontamination to be differentiated from the construction recontamination that occurred in September 2004.

Contaminant Migration from Dredging

Remedial work in the vicinity of station 70+10 was completed during the 2003-04 construction season (RA19) and between late August and mid-September 2004 (RA20 and RA22). Dredging and activities associated with dredging (e.g. tug boat movements, prop wash) and resuspension

of contaminated sediments in the water column appear to be the primary mechanism of recontamination of surface sediment at stations RC11 and Site 15 by mid-September 2004. This is based on the following lines of evidence.

- Dredging of contaminated sediment occurred immediately adjacent to the Utilities' Work Area where recontamination occurred. Dredging also occurred, at times, during incoming tides when contaminated resuspended sediment would likely have migrated in a southward direction into the Utilities' Work Area.

- While the City's contractor used a silt curtain to attempt to limit migration of resuspended sediments, the silt curtain only extended to a depth of six feet. Furthermore, the "containment area", at times, extended into the Utilities' Work Area as illustrated on Figure 5. Figures 5a and 5d show the silt curtain to have been pushed southward by the tide near and up to the Foss Landing Dock. Site 15 is located at the northwest corner of the dock, literally at the very edge of the containment area. Conversations with a representative of the U.S. Army Corps of Engineers also indicated that, at times, he observed particulates migrating out of the contaminant area below the bottom of the silt curtain (USACE 2005).

- Contaminant concentrations dramatically increased between August 30th and September 18th (Figures 29 and 30). This is the period when dredging activities and some capping occurred in RA20 and RA22. TetraTech's observations also indicated that prop wash from the Workhorse tug also caused suspension of contaminated sediment that would migrate onto the Utilities' cap during incoming tides. When the Workhorse was operating near the sheet pile wall, turbidity increased based on WQ measurements and sheens were observed.

- The suite of contaminants detected in surface sediment at stations RC11 and Site 15 were present in sediment dredged from the waterway. The quality of dredged sediment is represented by data collected in core RD2-C20 as part of the City's Round 2 Pre-Design investigations (Hart Crowser 1996). The location of RD2-C20 is shown on Figure 3. Figures 32 (Site 15) and 33 (RC11) compare the pre- and post-dredge sediment quality (0 to 2 cm) with the quality of surface sediment (0 to 10 cm) and subsurface sediment (average from 0 to 10 feet) at RD2-C20. As illustrated on the figures, the contaminants in the dredged sediment are consistent with the contaminants found in surface sediment at RC11 and Site 15.

Possible Cause of Decline in Some Sediment Concentrations – September to December 2004

At Site 15, after the September 2004 sampling, an additional five centimeters of sediment accumulated on the cap surface prior to the December 2004 sampling (Figure 7). As shown on Figure 30, concentrations of some constituents appear to have declined between the September and December 2004 sampling events. These constituents include LPAHs, HPAHs and BEHP. Concentrations of other constituents either remained approximately the same (lead, zinc, total

PCBs) or increased (4,4'-DDD). The December 2004 0 to 10 cm sample would consist predominately of the newly deposited material.

Possible mechanisms that could cause the concentration decline include migration and accumulation of clean capping material during capping in RA20 and RA22 or migration/accumulation of dredge materials with lower concentrations of LPAHs, HPAHs, and BEHP. Migration/accumulation of the finer fraction of clean capping material does not seem likely. Presumably this material was uncontaminated and its accumulation would have caused all the constituent concentrations to decline in the 0 to 10 cm samples. More likely, the nature of the material being dredged and re-deposited as sediment changed.

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TABLE 1 - List of Sediment Samples - April 2004 to April 2005

Thea Foss Waterway
Tacoma, Washington

LOCATION	OMMP Sampling-April 2004					
	Northing (b)	Easting (b)	Date	Sample Depth (cm)	Purpose	Chem. Analy. (Y/N)
UTILITIES' WORK AREA						
Waterway Cap Samples						
RC-01	701989.7	1160559.8	4/8/2004	0 to 2	Top-down recon.	Y
RC-02	702128	1160705.3	4/8/2004	0 to 2	Top-down recon.	Y
RC-03	702098.6	1160513.1	4/8/2004	0 to 2	Top-down recon.	Y
RC-04	702222.7	1160562.3	4/8/2004	0 to 2	Top-down recon.	Y
RC-05	702357.9	1160640.6	4/8/2004	0 to 2	Top-down recon.	Y
RC-06	702255	1160440.8	4/8/2004	0 to 2	Top-down recon.	Y
RC-07	702387.4	1160456.6	4/8/2004	0 to 2	Top-down recon.	Y
RC-08	702433	1160568.2	4/8/2004	0 to 2	Top-down recon.	Y
RC-09	702452.4	1160653.5	4/8/2004	0 to 2	Top-down recon.	Y
RC-10	702585	1160567	4/8/2004	0 to 2	Top-down recon.	Y
RC-11	702721.3	1160666.4	4/8/2004	0 to 2	Top-down recon.	Y
RC-12	702721.3	1160504.1	4/9/2004	0 to 2	Top-down recon.	Y
RC-13	701891.9	1160546.4	4/8/2004	0 to 2	Top-down recon.	Y
RC-14	701865.3	1160722.7	4/8/2004	0 to 2	Top-down recon.	Y
S-15	-----	-----	-----	-----	-----	-----
S16	-----	-----	-----	-----	-----	-----
S17	-----	-----	-----	-----	-----	-----
S18	-----	-----	-----	-----	-----	-----
S19	-----	-----	-----	-----	-----	-----
S20	-----	-----	-----	-----	-----	-----
S21	-----	-----	-----	-----	-----	-----
S22	-----	-----	-----	-----	-----	-----
S23	-----	-----	-----	-----	-----	-----
S24	-----	-----	-----	-----	-----	-----
S25	-----	-----	-----	-----	-----	-----
S26	-----	-----	-----	-----	-----	-----
S27	-----	-----	-----	-----	-----	-----
S28	-----	-----	-----	-----	-----	-----
S29	-----	-----	-----	-----	-----	-----
S30	-----	-----	-----	-----	-----	-----
WC-01	701989.7	1160559.8	4/8/2004	0 to 10	Compliance	Y
WC-02	702127.7	1160696.9	4/8/2004	0 to 10	Compliance	Y
WC-03	702101.8	1160513.8	4/8/2004	0 to 10	Compliance	Y
WC-04	702216.6	1160565.3	4/8/2004	0 to 10	Compliance	Y
WC-05	702360.9	1160640.9	4/8/2004	0 to 10	Compliance	Y
WC-06	702256.5	1160431.5	4/8/2004	0 to 10	Compliance	Y
WC-07	702390.8	1160456.7	4/8/2004	0 to 10	Compliance	Y
WC-08	702433	1160568.2	4/8/2004	0 to 10	Compliance	Y
WC-09	702452.4	1160653.5	4/8/2004	0 to 10	Compliance	Y
WC-10	702588.3	1160567.1	4/9/2004	0 to 10	Compliance	Y
WC-11	702724.5	1160666	4/8/2004	0 to 10	Compliance	Y
WC-12	702722.6	1160496.6	4/9/2004	0 to 10	Compliance	Y
WC-13	702476.7	1160602.7	4/8/2004	0 to 10	Compliance	Y
WC-14	702390.3	1160620	4/9/2004	0 to 10	Compliance	Y
S15	-----	-----	-----	-----	-----	-----
S16	-----	-----	-----	-----	-----	-----
S17	-----	-----	-----	-----	-----	-----
S18	-----	-----	-----	-----	-----	-----
S19	-----	-----	-----	-----	-----	-----
S20	-----	-----	-----	-----	-----	-----
S21	-----	-----	-----	-----	-----	-----
S22	-----	-----	-----	-----	-----	-----
S23	-----	-----	-----	-----	-----	-----
S24	-----	-----	-----	-----	-----	-----

LOCATION	OMMP Sampling-April 2004					
	Northing (b)	Easting (b)	Date	Sample Depth (cm)	Purpose	Chem. Analy. (Y/N)
S25	-----	-----	-----	-----	-----	-----
S26	-----	-----	-----	-----	-----	-----
S27	-----	-----	-----	-----	-----	-----
S28	-----	-----	-----	-----	-----	-----
S29	-----	-----	-----	-----	-----	-----
S30	-----	-----	-----	-----	-----	-----
Slope Cap Samples						
SC-01A	702476.1	1160442.4	-----	0 to 10	Compliance	Y
SC-01B	702586	1160481.2	-----	0 to 10	Compliance	Y
SC-01C	702740.1	1160460.6	-----	0 to 10	Compliance	Y
SC-02A	702168.4	1160401.2	-----	0 to 10	Compliance	Y
SC-02B	702259.3	1160383.6	-----	0 to 10	Compliance	Y
SC-02C	702356.5	1160375.6	-----	0 to 10	Compliance	Y
SC-03A	701813	1160749.4	-----	0 to 10	Compliance	Y
SC-03B	702115.2	1160758	-----	0 to 10	Compliance	Y
SC-03C	702246.8	1160732.9	-----	0 to 10	Compliance	Y
SC-04A	702386.4	1160765.9	-----	0 to 10	Compliance	Y
SC-04B	702546.4	1160749	-----	0 to 10	Compliance	Y
SC-04C	702671.3	1160726.2	-----	0 to 10	Compliance	Y
SC-04D	702739.6	1160722.7	-----	0 to 10	Compliance	Y
Waterway Cap Core Spls.						
WCBU-4A	702218	1160568	-----	0-1 feet	Bottom-up recon.	Y
WCBU-4B	702218	1160568	-----	1-2 feet	Bottom-up recon.	Y
WCBU-4C	702218	1160568	-----	2-3 feet	Bottom-up recon.	Y
WCBU-5A	702367.5	1160642.1	-----	0-1.3 feet	Bottom-up recon.	Y
WCBU-6A	702263.8	1160440.4	-----	0-1 feet	Bottom-up recon.	Y
WCBU-6B	702263.8	1160440.4	-----	1-2 feet	Bottom-up recon.	Y
WCBU-10A	702590.9	1160562.7	-----	0-1 feet	Bottom-up recon.	Y
WCBU-10B	702590.9	1160562.7	-----	1-2 feet	Bottom-up recon.	Y
WCBU-10C	702590.9	1160562.7	-----	2-3.3 feet	Bottom-up recon.	Y
WCBU-12A	702719.7	1160514.3	-----	0-1.7 feet	Bottom-up recon.	Y
RC-11 (UA-01)	-----	-----	-----	-----	-----	-----
RC-11 (UA-01)	-----	-----	-----	-----	-----	-----
RC-11 (UA-01)	-----	-----	-----	-----	-----	-----
RC-11 (UA-01)	-----	-----	-----	-----	-----	-----
RC-11 (UA-01)	-----	-----	-----	-----	-----	-----
RC-11 (UA-01)	-----	-----	-----	-----	-----	-----
S-15 (UA-02)	-----	-----	-----	-----	-----	-----
S-15 (UA-02)	-----	-----	-----	-----	-----	-----
S-15 (UA-02)	-----	-----	-----	-----	-----	-----
S-15 (UA-02)	-----	-----	-----	-----	-----	-----
S-15 (UA-02)	-----	-----	-----	-----	-----	-----
S-15 (UA-02)	-----	-----	-----	-----	-----	-----
S-15 (UA-02)	-----	-----	-----	-----	-----	-----
CITY WORK AREA						
Waterway Cap Samples						
RA20-001	-----	-----	-----	-----	-----	-----
RA20-005	-----	-----	-----	-----	-----	-----
RA22-001	-----	-----	-----	-----	-----	-----
RA22-002	-----	-----	-----	-----	-----	-----
RA22-003	-----	-----	-----	-----	-----	-----
RA22-004	-----	-----	-----	-----	-----	-----
CA20-01	-----	-----	-----	-----	-----	-----
CA22-02	-----	-----	-----	-----	-----	-----
CA19B-03	-----	-----	-----	-----	-----	-----

TABLE 1 - List of Sediment Samples - April 2004 to April 2005

LOCATION	OMMP Sampling-April 2004					
	Northing (b)	Easting (b)	Date	Sample Depth (cm)	Purpose	Chem. Analy. (Y/N)
CA20-04	-----	-----	-----	-----	-----	-----
CA22-05	-----	-----	-----	-----	-----	-----
CA19B-06	-----	-----	-----	-----	-----	-----
CA21-07	-----	-----	-----	-----	-----	-----
RA19A-022	-----	-----	-----	-----	-----	-----
RA19A-023	-----	-----	-----	-----	-----	-----
RA19A-024	-----	-----	-----	-----	-----	-----
Waterway Core Samples						
RA20-01	-----	-----	-----	-----	-----	-----
RA20-01	-----	-----	-----	-----	-----	-----
RA20-01	-----	-----	-----	-----	-----	-----
RA20-04	-----	-----	-----	-----	-----	-----
RA21-07	-----	-----	-----	-----	-----	-----
RA21-07	-----	-----	-----	-----	-----	-----
RA21-07	-----	-----	-----	-----	-----	-----
RA21-07	-----	-----	-----	-----	-----	-----
RA21-07	-----	-----	-----	-----	-----	-----
RA22-02	-----	-----	-----	-----	-----	-----
RA22-05	-----	-----	-----	-----	-----	-----

Notes: (a) - Final coordinates not provided to Utilities
(b) - Datum: WA State Plane Zone South, NAD83, US Survey Feet

LOCATION	Pre-Dredge Sampling - August 2004					
	Northing	Easting	Date	Sample Depth (cm)	Purpose	Chem. Analy. (Y/N)
UTILITIES' WORK AREA						
Waterway Cap Samples						
RC-01	-----	-----	-----	-----	-----	-----
RC-02	-----	-----	-----	-----	-----	-----
RC-03	-----	-----	-----	-----	-----	-----
RC-04	-----	-----	-----	-----	-----	-----
RC-05	-----	-----	-----	-----	-----	-----
RC-06	-----	-----	-----	-----	-----	-----
RC-07	-----	-----	-----	-----	-----	-----
RC-08	-----	-----	-----	-----	-----	-----
RC-09	-----	-----	-----	-----	-----	-----
RC-10	-----	-----	-----	-----	-----	-----
RC-11	702722	1160669	8/30/2004	0 to 2	pre-dredge	Y
RC-12	-----	-----	-----	-----	-----	-----
RC-13	-----	-----	-----	-----	-----	-----
RC-14	-----	-----	-----	-----	-----	-----
S-15	702760	1160600	8/30/2004	0 to 2	pre-dredge	Y
S16	-----	-----	-----	-----	-----	-----
S17	-----	-----	-----	-----	-----	-----
S18	-----	-----	-----	-----	-----	-----
S19	-----	-----	-----	-----	-----	-----
S20	-----	-----	-----	-----	-----	-----
S21	-----	-----	-----	-----	-----	-----
S22	-----	-----	-----	-----	-----	-----
S23	-----	-----	-----	-----	-----	-----
S24	-----	-----	-----	-----	-----	-----
S25	-----	-----	-----	-----	-----	-----
S26	-----	-----	-----	-----	-----	-----
S27	-----	-----	-----	-----	-----	-----
S28	-----	-----	-----	-----	-----	-----
S29	-----	-----	-----	-----	-----	-----
S30	-----	-----	-----	-----	-----	-----
WC-01	-----	-----	-----	-----	-----	-----
WC-02	-----	-----	-----	-----	-----	-----
WC-03	-----	-----	-----	-----	-----	-----
WC-04	-----	-----	-----	-----	-----	-----
WC-05	-----	-----	-----	-----	-----	-----
WC-06	-----	-----	-----	-----	-----	-----
WC-07	-----	-----	-----	-----	-----	-----
WC-08	-----	-----	-----	-----	-----	-----
WC-09	-----	-----	-----	-----	-----	-----
WC-10	-----	-----	-----	-----	-----	-----
WC-11	702723	1160652	8/20/2004	0 to 10	pre-dredge	Y
WC-12	702719	1160515	8/20/2004	0 to 10	pre-dredge	Y
WC-13	-----	-----	-----	-----	-----	-----
WC-14	-----	-----	-----	-----	-----	-----
S15	702760	1160600	8/30/2004	0 to 10	pre-dredge	Y
S16	-----	-----	-----	-----	-----	-----
S17	-----	-----	-----	-----	-----	-----
S18	-----	-----	-----	-----	-----	-----
S19	-----	-----	-----	-----	-----	-----
S20	-----	-----	-----	-----	-----	-----
S21	-----	-----	-----	-----	-----	-----
S22	-----	-----	-----	-----	-----	-----
S23	-----	-----	-----	-----	-----	-----
S24	-----	-----	-----	-----	-----	-----

LOCATION	Pre-Dredge Sampling - August 2004					
	Northing	Easting	Date	Sample Depth (cm)	Purpose	Chem. Analy. (Y/N)
S25	-----	-----	-----	-----	-----	-----
S26	-----	-----	-----	-----	-----	-----
S27	-----	-----	-----	-----	-----	-----
S28	-----	-----	-----	-----	-----	-----
S29	-----	-----	-----	-----	-----	-----
S30	-----	-----	-----	-----	-----	-----
Slope Cap Samples						
SC-01A	-----	-----	-----	-----	-----	-----
SC-01B	-----	-----	-----	-----	-----	-----
SC-01C	-----	-----	-----	-----	-----	-----
SC-02A	-----	-----	-----	-----	-----	-----
SC-02B	-----	-----	-----	-----	-----	-----
SC-02C	-----	-----	-----	-----	-----	-----
SC-03A	-----	-----	-----	-----	-----	-----
SC-03B	-----	-----	-----	-----	-----	-----
SC-03C	-----	-----	-----	-----	-----	-----
SC-04A	-----	-----	-----	-----	-----	-----
SC-04B	-----	-----	-----	-----	-----	-----
SC-04C	-----	-----	-----	-----	-----	-----
SC-04D	-----	-----	-----	-----	-----	-----
Waterway Cap Core Spls.						
WCBU-4A	-----	-----	-----	-----	-----	-----
WCBU-4B	-----	-----	-----	-----	-----	-----
WCBU-4C	-----	-----	-----	-----	-----	-----
WCBU-5A	-----	-----	-----	-----	-----	-----
WCBU-6A	-----	-----	-----	-----	-----	-----
WCBU-6B	-----	-----	-----	-----	-----	-----
WCBU-10A	-----	-----	-----	-----	-----	-----
WCBU-10B	-----	-----	-----	-----	-----	-----
WCBU-10C	-----	-----	-----	-----	-----	-----
WCBU-12A	-----	-----	-----	-----	-----	-----
RC-11 (UA-01)	-----	-----	-----	-----	-----	-----
RC-11 (UA-01)	-----	-----	-----	-----	-----	-----
RC-11 (UA-01)	-----	-----	-----	-----	-----	-----
RC-11 (UA-01)	-----	-----	-----	-----	-----	-----
RC-11 (UA-01)	-----	-----	-----	-----	-----	-----
RC-11 (UA-01)	-----	-----	-----	-----	-----	-----
S-15 (UA-02)	-----	-----	-----	-----	-----	-----
S-15 (UA-02)	-----	-----	-----	-----	-----	-----
S-15 (UA-02)	-----	-----	-----	-----	-----	-----
S-15 (UA-02)	-----	-----	-----	-----	-----	-----
S-15 (UA-02)	-----	-----	-----	-----	-----	-----
S-15 (UA-02)	-----	-----	-----	-----	-----	-----
S-15 (UA-02)	-----	-----	-----	-----	-----	-----
S-15 (UA-02)	-----	-----	-----	-----	-----	-----
CITY WORK AREA						
Waterway Cap Samples						
RA20-001	-----	-----	-----	-----	-----	-----
RA20-005	-----	-----	-----	-----	-----	-----
RA22-001	-----	-----	-----	-----	-----	-----
RA22-002	-----	-----	-----	-----	-----	-----
RA22-003	-----	-----	-----	-----	-----	-----
RA22-004	-----	-----	-----	-----	-----	-----
CA20-01	-----	-----	-----	-----	-----	-----
CA22-02	-----	-----	-----	-----	-----	-----
CA19B-03	-----	-----	-----	-----	-----	-----

TABLE 1 - List of Sediment Samples - April 2004 to April 2005

LOCATION	Pre-Dredge Sampling - August 2004					
	Northing	Easting	Date	Sample Depth (cm)	Purpose	Chem. Analy. (Y/N)
CA20-04	-----	-----	-----	-----	-----	-----
CA22-05	-----	-----	-----	-----	-----	-----
CA19B-06	-----	-----	-----	-----	-----	-----
CA21-07	-----	-----	-----	-----	-----	-----
RA19A-022	-----	-----	-----	-----	-----	-----
RA19A-023	-----	-----	-----	-----	-----	-----
RA19A-024	-----	-----	-----	-----	-----	-----
Waterway Core Samples						
RA20-01	-----	-----	-----	-----	-----	-----
RA20-01	-----	-----	-----	-----	-----	-----
RA20-01	-----	-----	-----	-----	-----	-----
RA20-04	-----	-----	-----	-----	-----	-----
RA21-07	-----	-----	-----	-----	-----	-----
RA21-07	-----	-----	-----	-----	-----	-----
RA21-07	-----	-----	-----	-----	-----	-----
RA21-07	-----	-----	-----	-----	-----	-----
RA21-07	-----	-----	-----	-----	-----	-----
RA22-02	-----	-----	-----	-----	-----	-----
RA22-05	-----	-----	-----	-----	-----	-----

Notes: (a) - Final coordinates not provided to Utilities
(b) - Datum: WA State Plane Zone South, NAD83, US Survey Feet

LOCATION	Post-Dredge Sampling - Sept./Oct. 2004					
	Northing	Easting	Date	Sample Depth (cm)	Purpose	Chem. Analy. (Y/N)
UTILITIES' WORK AREA						
Waterway Cap Samples						
RC-01	-----	-----	-----	-----	-----	-----
RC-02	-----	-----	-----	-----	-----	-----
RC-03	-----	-----	-----	-----	-----	-----
RC-04	-----	-----	-----	-----	-----	-----
RC-05	-----	-----	-----	-----	-----	-----
RC-06	-----	-----	-----	-----	-----	-----
RC-07	-----	-----	-----	-----	-----	-----
RC-08	-----	-----	-----	-----	-----	-----
RC-09	-----	-----	-----	-----	-----	-----
RC-10	-----	-----	-----	-----	-----	-----
RC-11	702711	1160670	9/18/2004	0 to 2	post-dredge	Y
RC-12	-----	-----	-----	-----	-----	-----
RC-13	-----	-----	-----	-----	-----	-----
RC-14	-----	-----	-----	-----	-----	-----
S-15	702749	1160599	9/18/2004	0 to 2	post-dredge	Y
S16	-----	-----	-----	-----	-----	-----
S17	-----	-----	-----	-----	-----	-----
S18	-----	-----	-----	-----	-----	-----
S19	-----	-----	-----	-----	-----	-----
S20	-----	-----	-----	-----	-----	-----
S21	-----	-----	-----	-----	-----	-----
S22	-----	-----	-----	-----	-----	-----
S23	-----	-----	-----	-----	-----	-----
S24	-----	-----	-----	-----	-----	-----
S25	-----	-----	-----	-----	-----	-----
S26	-----	-----	-----	-----	-----	-----
S27	-----	-----	-----	-----	-----	-----
S28	-----	-----	-----	-----	-----	-----
S29	-----	-----	-----	-----	-----	-----
S30	-----	-----	-----	-----	-----	-----
WC-01	-----	-----	-----	-----	-----	-----
WC-02	-----	-----	-----	-----	-----	-----
WC-03	-----	-----	-----	-----	-----	-----
WC-04	-----	-----	-----	-----	-----	-----
WC-05	-----	-----	-----	-----	-----	-----
WC-06	-----	-----	-----	-----	-----	-----
WC-07	-----	-----	-----	-----	-----	-----
WC-08	-----	-----	-----	-----	-----	-----
WC-09	-----	-----	-----	-----	-----	-----
WC-10	-----	-----	-----	-----	-----	-----
WC-11	702711	1160670	9/18/2004	0 to 10	post-dredge	Y
WC-12	-----	-----	-----	-----	-----	-----
WC-13	-----	-----	-----	-----	-----	-----
WC-14	-----	-----	-----	-----	-----	-----
S15	702766	1160603	9/18/2004	0 to 10	post-dredge	Y
S16	-----	-----	-----	-----	-----	-----
S17	-----	-----	-----	-----	-----	-----
S18	-----	-----	-----	-----	-----	-----
S19	-----	-----	-----	-----	-----	-----
S20	-----	-----	-----	-----	-----	-----
S21	-----	-----	-----	-----	-----	-----
S22	-----	-----	-----	-----	-----	-----
S23	-----	-----	-----	-----	-----	-----
S24	-----	-----	-----	-----	-----	-----

LOCATION	Post-Dredge Sampling - Sept./Oct. 2004					
	Northing	Easting	Date	Sample Depth (cm)	Purpose	Chem. Analy. (Y/N)
S25	-----	-----	-----	-----	-----	-----
S26	-----	-----	-----	-----	-----	-----
S27	-----	-----	-----	-----	-----	-----
S28	-----	-----	-----	-----	-----	-----
S29	-----	-----	-----	-----	-----	-----
S30	-----	-----	-----	-----	-----	-----
Slope Cap Samples						
SC-01A	-----	-----	-----	-----	-----	-----
SC-01B	-----	-----	-----	-----	-----	-----
SC-01C	-----	-----	-----	-----	-----	-----
SC-02A	-----	-----	-----	-----	-----	-----
SC-02B	-----	-----	-----	-----	-----	-----
SC-02C	-----	-----	-----	-----	-----	-----
SC-03A	-----	-----	-----	-----	-----	-----
SC-03B	-----	-----	-----	-----	-----	-----
SC-03C	-----	-----	-----	-----	-----	-----
SC-04A	-----	-----	-----	-----	-----	-----
SC-04B	-----	-----	-----	-----	-----	-----
SC-04C	-----	-----	-----	-----	-----	-----
SC-04D	-----	-----	-----	-----	-----	-----
Waterway Cap Core Spls.						
WCBU-4A	-----	-----	-----	-----	-----	-----
WCBU-4B	-----	-----	-----	-----	-----	-----
WCBU-4C	-----	-----	-----	-----	-----	-----
WCBU-5A	-----	-----	-----	-----	-----	-----
WCBU-6A	-----	-----	-----	-----	-----	-----
WCBU-6B	-----	-----	-----	-----	-----	-----
WCBU-10A	-----	-----	-----	-----	-----	-----
WCBU-10B	-----	-----	-----	-----	-----	-----
WCBU-10C	-----	-----	-----	-----	-----	-----
WCBU-12A	-----	-----	-----	-----	-----	-----
RC-11 (UA-01)						
RC-11 (UA-01)	-----	-----	-----	-----	-----	-----
RC-11 (UA-01)	-----	-----	-----	-----	-----	-----
RC-11 (UA-01)	-----	-----	-----	-----	-----	-----
RC-11 (UA-01)	-----	-----	-----	-----	-----	-----
RC-11 (UA-01)	-----	-----	-----	-----	-----	-----
S-15 (UA-02)	-----	-----	-----	-----	-----	-----
S-15 (UA-02)	-----	-----	-----	-----	-----	-----
S-15 (UA-02)	-----	-----	-----	-----	-----	-----
S-15 (UA-02)	-----	-----	-----	-----	-----	-----
S-15 (UA-02)	-----	-----	-----	-----	-----	-----
S-15 (UA-02)	-----	-----	-----	-----	-----	-----
S-15 (UA-02)	-----	-----	-----	-----	-----	-----
S-15 (UA-02)	-----	-----	-----	-----	-----	-----
CITY WORK AREA						
Waterway Cap Samples						
RA20-001	(a)	(a)	9/17/2004	0 to 10	Post-dredge	Y
RA20-005	(a)	(a)	10/7/2004	0 to 10	Post-dredge	Y
RA22-001	(a)	(a)	9/17/2004	0 to 10	Post-dredge	Y
RA22-002	(a)	(a)	9/17/2004	0 to 10	Post-dredge	Y
RA22-003	(a)	(a)	9/17/2004	0 to 10	Post-dredge	Y
RA22-004	(a)	(a)	10/7/2004	0 to 10	Post-dredge	Y
CA20-01	-----	-----	-----	-----	-----	-----
CA22-02	-----	-----	-----	-----	-----	-----
CA19B-03	-----	-----	-----	-----	-----	-----

TABLE 1 - List of Sediment Samples - April 2004 to April 2005

LOCATION	Post-Dredge Sampling - Sept./Oct. 2004					
	Northing	Easting	Date	Sample Depth (cm)	Purpose	Chem. Analy. (Y/N)
CA20-04	-----	-----	-----	-----	-----	-----
CA22-05	-----	-----	-----	-----	-----	-----
CA19B-06	-----	-----	-----	-----	-----	-----
CA21-07	-----	-----	-----	-----	-----	-----
RA19A-022	-----	-----	-----	-----	-----	-----
RA19A-023	-----	-----	-----	-----	-----	-----
RA19A-024	-----	-----	-----	-----	-----	-----
Waterway Core Samples						
RA20-01	-----	-----	-----	-----	-----	-----
RA20-01	-----	-----	-----	-----	-----	-----
RA20-01	-----	-----	-----	-----	-----	-----
RA20-04	-----	-----	-----	-----	-----	-----
RA21-07	-----	-----	-----	-----	-----	-----
RA21-07	-----	-----	-----	-----	-----	-----
RA21-07	-----	-----	-----	-----	-----	-----
RA21-07	-----	-----	-----	-----	-----	-----
RA21-07	-----	-----	-----	-----	-----	-----
RA22-02	-----	-----	-----	-----	-----	-----
RA22-05	-----	-----	-----	-----	-----	-----

Notes: (a) - Final coordinates not provided to Utilities
(b) - Datum: WA State Plane Zone South, NAD83, US Survey Feet

LOCATION	Post-Dredge Sampling - Nov./Dec., 2004					
	Northing	Easting	Date	Sample Depth (cm)	Purpose	Chem. Analy. (Y/N)
UTILITIES' WORK AREA						
Waterway Cap Samples						
RC-01	701991.4	1160549.3	12/9/2004	0 to 2	fine grain sed. recont.	Y
RC-02	702121.6	1160701.6	12/2/2004	0 to 8	fine grain sed. recont.	Y
RC-03	702100.8	1160504.3	12/2/2004	0 to 12	fine grain sed. recont.	Y
RC-04	702217.5	1160562.1	12/1/2004	0 to 9	fine grain sed. recont.	Y
RC-05	702361.2	1160640.4	12/2/2004	0 to 11	fine grain sed. recont.	Y
RC-06	702256	1160430.8	12/2/2004	0 to 5	fine grain sed. recont.	Y
RC-07	702373.7	1160459.6	12/2/2004	0 to 4	fine grain sed. recont.	Y
RC-08	702436.1	1160563.2	12/1/2004	0 to 5	fine grain sed. recont.	Y
RC-09	702452.4	1160653.5	12/1/2004	0 to 6	fine grain sed. recont.	Y
RC-10	702582.9	1160564.9	12/1/2004	0 to 3	fine grain sed. recont.	Y
RC-11	702715.8	1160665.2	11/30/2004	0 to 7	archive	N
RC-12	702724.4	1160513.6	12/1/2004	0 to 3	fine grain sed. recont.	Y
RC-13	702895.3	1160542.7	12/9/2004	0 to 2	fine grain sed. recont.	Y
RC-14	702873.6	1160723.4	12/9/2004	0 to 2	fine grain sed. recont.	Y
S-15	702760.7	1160595.1	11/30/2004	0 to 12	archive	N
S16	702641.9	1160666.7	11/30/2004	0 to 5	fine grain sed. recont.	Y
S17	702546.9	1160673.6	11/30/2004	0 to 2	fine grain sed. recont.	Y
S18	702481.5	1160699.9	12/1/2004	0 to 7	fine grain sed. recont.	Y
S19	702670.5	1160600	11/30/2004	0 to 4	fine grain sed. recont.	Y
S20	702537.4	1160602.5	11/30/2004	0 to 2	fine grain sed. recont.	Y
S21	702726.7	1160547.8	12/1/2004	0 to 7	fine grain sed. recont.	Y
S22	702646.5	1160544.2	12/1/2004	0 to 8	fine grain sed. recont.	Y
S23	702624.5	1160506.6	12/1/2004	0 to 3	fine grain sed. recont.	Y
S24	702551.2	1160509	12/1/2004	0 to 3	fine grain sed. recont.	Y
S25	702678.2	1160665.5	11/30/2004	0 to 7	archive	N
S26	702590.6	1160668.5	11/30/2004	0 to 2	archive	N
S27	702705.2	1160597.3	11/30/2004	0 to 5	archive	N
S28	702589.5	1160600.3	11/30/2004	0 to 2	archive	N
S29	702607.1	1160556.6	12/1/2004	0 to 4	archive	N
S30	702470.9	1160510.9	12/4/2004	0 to 1	archive	N
WC-01	701991.4	1160549.3	12/9/2004	0 to 10	compliance	Y
WC-02	702121.6	1160701.6	12/2/2004	0 to 10	compliance	Y
WC-03	702100.8	1160504.3	12/2/2004	0 to 10	compliance	Y
WC-04	702217.5	1160562.1	12/1/2004	0 to 10	compliance	Y
WC-05	702361.2	1160640.4	12/2/2004	0 to 10	compliance	Y
WC-06	702256	1160430.8	12/2/2004	0 to 10	archive	N
WC-07	702373.7	1160459.6	12/2/2004	0 to 10	compliance	Y
WC-08	702436.1	1160563.2	12/1/2004	0 to 10	archive	N
WC-09	702452.4	1160653.5	12/1/2004	0 to 10	compliance	Y
WC-10	702582.9	1160564.9	12/1/2004	0 to 10	compliance	Y
WC-11	702715.8	1160665.2	11/30/2004	0 to 10	compliance	Y
WC-12	702724.4	1160513.6	12/1/2004	0 to 10	compliance	Y
WC-13	-----	-----	-----	-----	-----	-----
WC-14	-----	-----	-----	-----	-----	-----
S15	702760.7	1160595.1	11/30/2004	0 to 10	compliance	Y
S16	702641.9	1160666.7	11/30/2004	0 to 10	compliance	Y
S17	702546.9	1160673.6	11/30/2004	0 to 10	compliance	Y
S18	702481.5	1160699.9	12/1/2004	0 to 10	compliance	Y
S19	702670.5	1160600	11/30/2004	0 to 10	compliance	Y
S20	702537.4	1160602.5	11/30/2004	0 to 10	compliance	Y
S21	702726.7	1160547.8	12/1/2004	0 to 10	compliance	Y
S22	702646.5	1160544.2	12/1/2004	0 to 10	compliance	Y
S23	702624.5	1160506.6	12/1/2004	0 to 10	archive	N
S24	702551.2	1160509	12/1/2004	0 to 10	compliance	Y

LOCATION	Post-Dredge Sampling - Nov./Dec., 2004					
	Northing	Easting	Date	Sample Depth (cm)	Purpose	Chem. Analy. (Y/N)
S25	702678.2	1160665.5	11/30/2004	0 to 10	archive	N
S26	702590.6	1160668.5	11/30/2004	0 to 10	archive	N
S27	702705.2	1160597.3	11/30/2004	0 to 10	archive	N
S28	702589.5	1160600.3	11/30/2004	0 to 10	archive	N
S29	702607.1	1160556.6	12/1/2004	0 to 10	compliance	Y
S30	702470.9	1160510.9	12/1/2004	0 to 10	archive	N
Slope Cap Samples						
SC-01A	-----	-----	-----	-----	-----	-----
SC-01B	-----	-----	-----	-----	-----	-----
SC-01C	-----	-----	-----	-----	-----	-----
SC-02A	-----	-----	-----	-----	-----	-----
SC-02B	-----	-----	-----	-----	-----	-----
SC-02C	-----	-----	-----	-----	-----	-----
SC-03A	-----	-----	-----	-----	-----	-----
SC-03B	-----	-----	-----	-----	-----	-----
SC-03C	-----	-----	-----	-----	-----	-----
SC-04A	-----	-----	-----	-----	-----	-----
SC-04B	-----	-----	-----	-----	-----	-----
SC-04C	-----	-----	-----	-----	-----	-----
SC-04D	-----	-----	-----	-----	-----	-----
Waterway Cap Core Spls.						
WCBU-4A	-----	-----	-----	-----	-----	-----
WCBU-4B	-----	-----	-----	-----	-----	-----
WCBU-4C	-----	-----	-----	-----	-----	-----
WCBU-5A	-----	-----	-----	-----	-----	-----
WCBU-6A	-----	-----	-----	-----	-----	-----
WCBU-6B	-----	-----	-----	-----	-----	-----
WCBU-10A	-----	-----	-----	-----	-----	-----
WCBU-10B	-----	-----	-----	-----	-----	-----
WCBU-10C	-----	-----	-----	-----	-----	-----
WCBU-12A	-----	-----	-----	-----	-----	-----
RC-11 (UA-01)	702725	1160649.5	11/22/2004	0 to 10	Bottom-up recon.	Y
RC-11 (UA-01)	702725	1160649.5	11/22/2004	10 to 20	Bottom-up recon.	Y
RC-11 (UA-01)	702725	1160649.5	11/22/2004	20 to 30	Bottom-up recon.	Y
RC-11 (UA-01)	702725	1160649.5	11/22/2004	30 to 40	Bottom-up recon.	Y
RC-11 (UA-01)	702725	1160649.5	11/22/2004	40 to 50	Bottom-up recon.	Y
RC-11 (UA-01)	702725	1160649.5	11/22/2004	50 to 60	Bottom-up recon.	Y
S-15 (UA-02)	702758	1160600.5	11/22/2004	0 to 10	Bottom-up recon.	Y
S-15 (UA-02)	702758	1160600.5	11/22/2004	10 to 20	Bottom-up recon.	Y
S-15 (UA-02)	702758	1160600.5	11/22/2004	20 to 30	Bottom-up recon.	Y
S-15 (UA-02)	702758	1160600.5	11/22/2004	30 to 40	Bottom-up recon.	Y
S-15 (UA-02)	702758	1160600.5	11/22/2004	40 to 50	Bottom-up recon.	Y
S-15 (UA-02)	702758	1160600.5	11/22/2004	50 to 60	Bottom-up recon.	Y
S-15 (UA-02)	702758	1160600.5	11/22/2004	60 to 70	Bottom-up recon.	Y
S-15 (UA-02)	702758	1160600.5	11/22/2004	70 to 80	Bottom-up recon.	Y
CITY WORK AREA						
Waterway Cap Samples						
RA20-001	-----	-----	-----	-----	-----	-----
RA20-005	-----	-----	-----	-----	-----	-----
RA22-001	-----	-----	-----	-----	-----	-----
RA22-002	-----	-----	-----	-----	-----	-----
RA22-003	-----	-----	-----	-----	-----	-----
RA22-004	-----	-----	-----	-----	-----	-----
CA20-01	702852.5	1160664.6	11/9/2004	0 to 2; 0 to 10	top of first lift cap	Y
CA22-02	702849.4	1160552.4	11/9/2004	0 to 2; 0 to 10	top of first lift cap	Y
CA19B-03	702842.6	1160480.8	11/9/2004	0 to 2; 0 to 10	final lift over grout mat	Y

TABLE 1 - List of Sediment Samples - April 2004 to April 2005

LOCATION	Post-Dredge Sampling - Nov./Dec., 2004					
	Northing	Easting	Date	Sample Depth (cm)	Purpose	Chem. Analy. (Y/N)
CA20-04	702971.7	1160664	11/9/2004	0 to 2; 0 to 10	top of first lift cap	Y
CA22-05	702955.8	1160546.9	11/9/2004	0 to 2; 0 to 10	top of first lift cap	Y
CA19B-06	702953.4	1160450.1	11/9/2004	0 to 2; 0 to 10	final lift over grout mat	Y
CA21-07	703029.2	1160538.1	11/9/2004	0 to 2; 0 to 10	pre-dredge surface	Y
RA19A-022	704177	1160325	12/2/2004	0 to 2; 0 to 10	final surface	Y
RA19A-023	703798	1160352	12/2/2004	0 to 2; 0 to 10	final surface	Y
RA19A-024	703314.5	11600360.2	12/2/2004	0 to 2; 0 to 10	final surface	Y
Waterway Core Samples						
RA20-01	702859.9	1160667.9	11/30/2004	29 to 60	cont. remain below cap	Y
RA20-01	702859.9	1160667.9	11/30/2004	60 to 90	cont. remain below cap	Y
RA20-01	702859.9	1160667.9	11/30/2004	90 to 104	cont. remain below cap	Y
RA20-04	702969.2	1160634.9	11/30/2004	26 to 58	cont. remain below cap	Y
RA21-07	703029.2	1160538.1	11/30/2004	10 to 40	sed. to be dredged	Y
RA21-07	703029.2	1160538.1	11/30/2004	40 to 70	sed. to be dredged	Y
RA21-07	703029.2	1160538.1	11/30/2004	70 to 100	sed. to be dredged	Y
RA21-07	703029.2	1160538.1	11/30/2004	100 to 130	sed. to be dredged	Y
RA21-07	703029.2	1160538.1	11/30/2004	130 to 150	sed. to be dredged	Y
RA22-02	702847	1160554.6	11/29/2004	33 to 63	cont. remain below cap	Y
RA22-05	702955.8	1160546.9	11/29/2004	60 to 90	cont. remain below cap	Y

Notes: (a) - Final coordinates not provided to Utilities
(b) - Datum: WA State Plane Zone South, NAD83, US Survey Feet

TABLE 2 - Summary of Sediment Quality Data - Utilities' Work Area - April to September 2004

Head of Thea Foss Waterway
Tacoma, Washington

PARAMETER					Sb	As	Cd	Cr	Cu	Pb	Hg	Ni	Ag	Zn
Units					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SQO					150	57	5.1	---	390	450	0.59	140	6.1	410
Location	Depth Below Mudline	Sample Date	% solids	% TOC	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Waterway Cap Samples														
RC-01	recon. sed. (2 cm)	4/8/2004	79.8	2.4	6 UJ	6	0.2 U	33.2	44.1	25	0.06 U	28	0.3 U	74.3
RC-02	recon. sed. (2 cm)	4/8/2004	50.7	5.3	9 UJ	9 U	0.4 U	27.5	71.3	20	0.1 U	27	0.6 U	71
RC-03	recon. sed. (2 cm)	4/8/2004	37.8	6.7	10 UJ	10 U	0.5 U	40	112	44	0.1	36	0.8 U	115
RC-04	recon. sed. (2 cm)	4/8/2004	55.2	6.3	9 UJ	9 U	0.4 U	27.1	71.8	19	0.08	25	0.5 U	70
RC-05	recon. sed. (2 cm)	4/8/2004	46.2	5.3	10 UJ	10 U	0.4 U	33	87.3	19	0.09	29	0.6 U	70
RC-Dup1	RC-05 dup.(2 cm)	4/8/2004	45.4	5.2	10 UJ	10 U	0.4 U	31	85.1	19	0.09 U	28	0.6 U	69
RC-06	recon. sed. (2 cm)	4/8/2004	57.4	4.7	9 UJ	9 U	0.4 U	22.9	54.5	18	0.08 U	21	0.5 U	56
RC-07	recon. sed. (2 cm)	4/8/2004	84.1	1.3	6 UJ	6 U	0.2 U	19.9	49.5	6	0.05 U	19	0.3 U	40.6
RC-08	recon. sed. (2 cm)	4/8/2004	79.7	0.92	6 UJ	6 U	0.3 U	17.8	32.8	5	0.06 U	16	0.4 U	33.0
RC-09	recon. sed. (2 cm)	4/8/2004	67.3	2.9	8 UJ	8 U	0.3 U	25.6	64.0	15	0.07 U	23	0.5 U	53.3
RC-10	recon. sed. (2 cm)	4/9/2004	68.1	3.2	7 UJ	7 U	0.3 U	21.9	54.7	11	0.06 U	20	0.5	43.7
RC-11	recon. sed. (2 cm)	4/8/2004	67.6	3.0	8 UJ	20	0.5	25.2	132	35	0.13	28	0.5 U	82.8
RC-12	recon. sed. (2 cm)	4/9/2004	88.4	0.37	5 UJ	5 U	0.2 U	27.3	48.5	4	0.05 U	22	0.3 U	43.9
RC-13	recon. sed. (2 cm)	4/8/2004	78.5	3.3	7 UJ	8	0.3 U	26.4	58.5	42	0.07	31	0.4 U	99.3
RC-14	recon. sed. (2 cm)	4/8/2004	65.9	7.0	8 UJ	9	0.5	30.1	73.3	54	0.10	31	0.5 U	167
WC-01	cap compl. sed. (10 cm)	4/8/2004	86.9	1.5	5 UJ	5 U	0.2 U	19.1	28.9	6	0.04 U	23	0.3 U	41.0
WC-02	cap compl. sed. (10 cm)	4/8/2004	61.6	3.5	8 UJ	8 U	0.3 U	23.6	60.9	15	0.08 U	23	0.5 U	58
WC-03	cap compl. sed. (10 cm)	4/8/2004	50.8	7.1	10 UJ	10 U	0.4 U	26	65.6	20	0.07	24	0.6 U	63
WC-04	cap compl. sed. (10 cm)	4/8/2004	70.0	4.6	7 UJ	7 U	0.3 U	24.0	55.2	13	0.06 U	22	0.4 U	52.2
WC-Dup1	WC-04 dup.	4/8/2004	67.7	6.2	7 UJ	7 U	0.3 U	23.2	62.0	13	0.05	21	0.4 U	48.2
WC-05	cap compl. sed. (10 cm)	4/8/2004	58.7	4.5	8 UJ	8 U	0.3 U	24.2	60.4	10	0.11	23	0.5 U	48
WC-06	cap compl. sed. (10 cm)	4/8/2004	73.0	3.5	7 UJ	7 U	0.3 U	19.1	40.0	7	0.06 U	18	0.4 U	38.8
WC-07	cap compl. sed. (10 cm)	4/8/2004	86.6	0.19	6 UJ	6 U	0.2 U	18.2	32.2	2	0.04 U	16	0.3 U	30.7
WC-08	cap compl. sed. (10 cm)	4/8/2004	82.6	0.88	6 UJ	6 U	0.2 U	17.2	33.9	4	0.05 U	16	0.3 U	31.8
WC-09	cap compl. sed. (10 cm)	4/8/2004	71.7	3.0	7 UJ	7 U	0.3 U	18.4	39.8	7	0.05 U	18	0.4 U	37.4
WC-10	cap compl. sed. (10 cm)	4/9/2004	79.4	1.4	6 UJ	6 U	0.3 U	19.1	35.9	4	0.06 U	17	0.4 U	34.5
WC-11	cap compl. sed. (10 cm)	4/8/2004	84.2	2.1	6 UJ	16	0.2 U	21.5	168	14	0.05	24	0.4 U	60.5
WC-12	cap compl. sed. (10 cm)	4/9/2004	86.9	0.19	6 UJ	6 U	0.2 U	19.8	35.6	3	0.05 U	19	0.3 U	35.9
WC-13	cap compl. sed. (10 cm)	4/8/2004	84.7	0.96	5 UJ	5 U	0.2 U	24.2	44.0	4	0.05 U	22	0.3 U	38.5
WC-14	cap compl. sed. (10 cm)	4/9/2004	74.4	2.3	7 UJ	7 U	0.3 U	18.2	36.1	4	0.05 U	18	0.4 U	34.4
Slope Cap Samples														
SC-01	slope cap (composite)	4/8/2004	91.5	0.22	5 UJ	5 U	0.2 U	18.9	30.7	3	0.05 U	19	0.3 U	33.0
SC-02	slope cap (composite)	4/8/2004	90.3	0.18	5 UJ	5 U	0.2 U	19.7	41.6	2 U	0.04 U	18	0.3 U	31.1
SC-03	slope cap (composite)	4/8/2004	89.3	0.54	5 UJ	5 U	0.2 U	19.8	33.9	4	0.04 U	20	0.3	36.3
SC-04	slope cap (composite)	4/8/2004	91.9	0.31	5 UJ	5 U	0.2 U	20.4	52.3	4	0.04 U	22	0.3 U	35.7
Waterway Cap Core Samples														
WCBU-4A	core - 0-1 feet	4/7/2004	84.1	0.89	6 UJ	6 U	0.2 U	19.7	36.0	3	0.04 U	20	0.3 U	35.3
WCBU-4B	core - 1-2 feet	4/7/2004	91.7	0.14	10 UJ	10 U	0.5 U	26	37.0	5 U	0.05 U	22	0.8 U	38
WCBU-4C	core - 2-3 feet	4/7/2004	90.8	0.04	5 UJ	5 U	0.2 U	18.3	40.8	2 U	0.05 U	18	0.3 U	36.9
WCBU-5A	core - 0-1.3 feet	4/7/2004	89.0	0.25	6 UJ	6 U	0.2 U	16.5	30.4	2 U	0.05 U	16	0.3 U	28.9
WCBU-6A	core - 0-1 feet	4/7/2004	82.8	1.6	6 UJ	6 U	0.2 U	18.0	40.5	3	0.04 U	18	0.3 U	39.4
WCBU-6B	core - 1-2 feet	4/7/2004	86.4	0.40	6 UJ	6 U	0.2 U	26.0	42.6	3	0.04 U	21	0.3 U	40.0
WCBU-10A	core - 0-1 feet	4/7/2004	88.7	0.40	5 UJ	5 U	0.2 U	17.4	31.2	3	0.04 U	17	0.3 U	33.7

TABLE 2 - Summary of Sediment Quality Data - Utilities' Work Area - April to September 2004

PARAMETER					Sb	As	Cd	Cr	Cu	Pb	Hg	Ni	Ag	Zn
Units					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SQO					150	57	5.1	---	390	450	0.59	140	6.1	410
Location	Depth Below Mudline	Sample Date	% solids	% TOC	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
WCBU-Dup1	core - 0-1 feet (dup. 10A	4/7/2004	88.3	0.32	6 UJ	6 U	0.2 U	**16.1**	**31.2**	**3**	0.04 U	**17**	0.3 U	**31.0**
WCBU-10B	core - 1-2 feet	4/7/2004	94.7	0.15	5 UJ	5 U	0.2 U	**20.2**	**46.7**	**2**	0.05 U	**20**	0.3 U	**35.6**
WCBU-10C	core - 2-3.3 feet	4/7/2004	93.1	0.30	5 UJ	5 U	0.2 U	**13.1**	**21.1**	2 U	0.04 U	**12**	0.3 U	**19.9**
WCBU-12A	core - 0-1.7 feet	4/7/2004	90.9	0.02 U	5 UJ	5 U	0.2 U	**20.1**	**39.4**	**2**	0.04 U	**20**	0.3 U	**34.3**
Other Sediment Samples														
RC-11(pre-City dredge)	Utilities' recon. sed (2cm	8/30/2004	71.3	-----	-----	**18**	-----	-----	**127**	**30**	**0.1**	**22**	-----	**86.3**
RC-11(pre-City dredge)	City recon. sed. (2 cm)	8/30/2004	58.9	1.6	-----	-----	-----	-----	-----	**45.7**	**0.19**	-----	-----	**99.6**
RC-11(post-City dredge	Utilities' recon. sed. (2 cr	9/18/2004	34.4	-----	-----	**20**	-----	-----	**168**	**238**	**0.80**	**37**	-----	**280**
RC-11(post-City dredge	City recon. sed. (2 cm)	9/18/2004	39.1	3.2	-----	-----	-----	-----	-----	**160**	**0.83**	-----	-----	**205**
WC-11(pre-City dredge	City compl. sed. (10 cm)	8/20/2004	66.3	3.6	-----	-----	-----	-----	-----	**43.7**	**0.15**	-----	-----	**90.3**
WC-11(post-City dredg	City compl. sed. (10 cm)	9/18/2004	54	2.8	-----	-----	-----	-----	-----	**167**	**0.43**	-----	-----	**239**
WC-12(pre-City dredge	City compl. sed. (10 cm)	8/20/2004	-----	0.90	-----	-----	-----	-----	-----	**14.5**	**0.07**	-----	-----	**44.8**
Site 15(pre-City dredge	Utilities' recon. sed (2cm	8/30/2004	49.1	-----	-----	**20**	-----	-----	**101**	**80**	**0.20**	**27**	-----	**131**
Site 15(pre-City dredge	City recon. sed. (2 cm)	8/30/2004	50.5	1.6	-----	-----	-----	-----	-----	**72.1**	**0.31**	-----	-----	**123**
Site 15(pre-City dredge	Utilities' compl. sed (10c	8/30/2004	64.8	-----	-----	**11**	-----	-----	**81.5**	**33**	**0.12**	**21**	-----	**79.6**
Site 15(pre-City dredge	City compl. sed. (10 cm)	8/30/2004	62.6	0.96	-----	-----	-----	-----	-----	**33.8**	**0.22**	-----	-----	**79.6**
Site 15(post-City dredge	Utilities' recon. sed (2cm	9/18/2004	34.3	-----	-----	**20**	-----	-----	**167**	**335**	**1.40**	**43**	-----	**363**
Site 15(post-City dredge	City recon. sed. (2 cm)	9/18/2004	38.8	3.5	-----	-----	-----	-----	-----	**296**	**1.48**	-----	-----	**360**
Site 15(post-City dredge	City compl. sed. (10 cm)	9/18/2004	48.1	3.1	-----	-----	-----	-----	-----	**181**	**0.74**	-----	-----	**235**

Notes: U = nondetected at the associated value
UJ = nondetect may be biased low due to low spike recoveries
J = associated value is considered an estimate
nd - Not detected

TABLE 2 - Summary of Sediment Quality Data - Utilities' Work Area - April to September 2004

PARAMETER		% gravel	% cs. sand	% med. sand	% fine sand	% silt	% clay	% fines	1,3-Dichloro benzene	1,4-Dichloro benzene	1,2-Dichloro benzene	1,2,4-Trichloro-benzene
Units									(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		-----	-----	-----	-----	-----	-----	-----	170	110	50	51
Location	Depth Below Mudline	> 2000 µm	2000-500 µm	500-250 µm	250-62 µm	62.5-3.9 µm	< 3.9 µm	< 62.5 µm	-----	-----	-----	-----
Waterway Cap Samples												
RC-01	recon. sed. (2 cm)	25	40	17	6.1	7.2	4.9	12	----	----	----	----
RC-02	recon. sed. (2 cm)	1.2	8.7	21	33	19	18	36	----	----	----	----
RC-03	recon. sed. (2 cm)	0.1	4.9	3.7	18	40	34	73	----	----	----	----
RC-04	recon. sed. (2 cm)	4.1	18	20	24	18	16	34	----	----	----	----
RC-05	recon. sed. (2 cm)	0.1	5.6	8.0	32	32	22	54	----	----	----	----
RC-Dup1	RC-05 dup.(2 cm)	3.4	3.6	7.9	33	31	21	53	----	----	----	----
RC-06	recon. sed. (2 cm)	2.2	2.9	17	52	14	12	26	----	----	----	----
RC-07	recon. sed. (2 cm)	26	27	22	18	3.0	3.2	6.2	----	----	----	----
RC-08	recon. sed. (2 cm)	1.6	18	39	37	2.5	2.7	5.2	----	----	----	----
RC-09	recon. sed. (2 cm)	2.2	9.3	25	39	14	10	25	----	----	----	----
RC-10	recon. sed. (2 cm)	5.3	11	16	48	12	7.6	20	----	----	----	----
RC-11	recon. sed. (2 cm)	48	17	0.7	10	15	9.0	24	----	----	----	----
RC-12	recon. sed. (2 cm)	29	47	17	5.0	0.8	1.1	1.9	----	----	----	----
RC-13	recon. sed. (2 cm)	28	34	12	7.9	10	7.9	18	----	----	----	----
RC-14	recon. sed. (2 cm)	13	31	11	11	20	14	34	----	----	----	----
WC-01	cap compl. sed. (10 cm)	28	42	16	6.1	4.8	3.0	7.8	39 U	39 U	39 U	39 U
WC-02	cap compl. sed. (10 cm)	8.2	14	23	32	14	10	24	39 U	39 U	39 U	39 U
WC-03	cap compl. sed. (10 cm)	0.5	8.4	16	33	26	17	43	40 U	40 U	40 U	40 U
WC-04	cap compl. sed. (10 cm)	14	25	20	25	9.8	6.4	16	20 U	20 U	20 U	20 U
WC-Dup1	WC-04 dup.	14	24	20	25	11	6.7	18	20 U	20 U	20 U	20 U
WC-05	cap compl. sed. (10 cm)	3.2	13	17	36	20	11	31	20 U	20 U	20 U	20 U
WC-06	cap compl. sed. (10 cm)	0.7	16	36	37	6.5	4.2	11	20 U	20 U	20 U	20 U
WC-07	cap compl. sed. (10 cm)	33	37	18	9.2	2.0	0.5	2.5	19 U	19 U	19 U	19 U
WC-08	cap compl. sed. (10 cm)	19	28	27	23	1.6	1.7	3.3	19 U	19 U	19 U	19 U
WC-09	cap compl. sed. (10 cm)	4.4	13	26	45	7.1	4.0	11	20 U	20 U	20 U	20 U
WC-10	cap compl. sed. (10 cm)	7.9	18	29	38	4.3	2.8	7.1	20 U	20 U	20 U	20 U
WC-11	cap compl. sed. (10 cm)	57	18	4.5	7.7	8.6	4.4	13	39 U	39 U	39 U	39 U
WC-12	cap compl. sed. (10 cm)	20	44	23	11	1.1	0.9	2.0	19 U	19 U	19 U	19 U
WC-13	cap compl. sed. (10 cm)	31	30	19	14	3.4	2.3	5.7	20 U	20 U	20 U	20 U
WC-14	cap compl. sed. (10 cm)	2.8	18	30	41	5.4	3.6	9.0	19 U	19 U	19 U	19 U
Slope Cap Samples												
SC-01	slope cap (composite)	13	27	32	27	0.7	0.6	1.3	19 U	19 U	19 U	19 U
SC-02	slope cap (composite)	30	34	21	14	0.4	0.7	1.1	19 U	19 U	19 U	19 U
SC-03	slope cap (composite)	18	37	24	15	4.3	2.4	6.7	20 U	20 U	20 U	20 U
SC-04	slope cap (composite)	20	43	25	11	0.9	0.2	1.1	19 U	19 U	19 U	19 U
Waterway Cap Core Samples												
WCBU-4A	core - 0-1 feet	15	33	26	22	2.6	1.3	3.9	19 U	19 U	19 U	19 U
WCBU-4B	core - 1-2 feet	25	43	21	9.8	0.8	0.5	1.3	19 U	19 U	19 U	19 U
WCBU-4C	core - 2-3 feet	28	44	19	7.3	1.1	0.5	1.6	19 U	19 U	19 U	19 U
WCBU-5A	core - 0-1.3 feet	29	30	22	18	0.8	0.4	1.2	19 U	19 U	19 U	19 U
WCBU-6A	core - 0-1 feet	28	27	21	21	2.0	1.2	3.2	20 U	20 U	20 U	20 U
WCBU-6B	core - 1-2 feet	35	34	18	10	1.9	1.5	3.4	20 U	20 U	20 U	20 U
WCBU-10A	core - 0-1 feet	11	24	31	32	1.5	0.6	2.1	20 U	20 U	20 U	20 U

TABLE 2 - Summary of Sediment Quality Data - Utilities' Work Area - April to September 2004

PARAMETER		% gravel	% cs. sand	% med. sand	% fine sand	% silt	% clay	% fines	1,3-Dichlorobenzene	1,4-Dichlorobenzene	1,2-Dichlorobenzene	1,2,4-Trichlorobenzene
Units									(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		-----	-----	-----	-----	-----	-----	-----	**170**	**110**	**50**	**51**
Location	**Depth Below Mudline**	> 2000 µm	2000-500 µm	500-250 µm	250-62 µm	62.5-3.9 µm	< 3.9 µm	< 62.5 µm	-----	-----	-----	-----
WCBU-Dup1	core - 0-1 feet (dup. 10A	14	23	31	31	1.1	0.7	1.8	20 U	20 U	20 U	20 U
WCBU-10B	core - 1-2 feet	34	35	20	10	0.2	0.6	0.8	20 U	20 U	20 U	20 U
WCBU-10C	core - 2-3.3 feet	35	40	17	7.2	0.4	0.9	1.3	19 U	19 U	19 U	19 U
WCBU-12A	core - 0-1.7 feet	27	35	24	13	1.1	0.4	1.5	20 U	20 U	20 U	20 U
Other Sediment Samples												
RC-11(pre-City dredge)	Utilities' recon. sed (2cm	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
RC-11(pre-City dredge)	City recon. sed. (2 cm)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
RC-11(post-City dredge	Utilities' recon. sed. (2 cr	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
RC-11(post-City dredge	City recon. sed. (2 cm)	-----	-----	-----	-----	-----	-----	-----	79 U	79 U	85 U	85 U
WC-11(pre-City dredge	City compl. sed. (10 cm)	-----	-----	-----	-----	-----	-----	-----	6 U	6 U	5 U	6 U
WC-11(post-City dredg	City compl. sed. (10 cm)	-----	-----	-----	-----	-----	-----	-----	78 U	78 U	78 U	78 U
WC-12(pre-City dredge	City compl. sed. (10 cm)	-----	-----	-----	-----	-----	-----	-----	5 U	5 U	4 U	5 U
Site 15(pre-City dredge	Utilities' recon. sed (2cm	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Site 15(pre-City dredge	City recon. sed. (2 cm)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Site 15(pre-City dredge	Utilities' compl. sed (10c	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Site 15(pre-City dredge	City compl. sed. (10 cm)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Site 15(post-City dredge	Utilities' recon. sed (2cm	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Site 15(post-City dredge	City recon. sed. (2 cm)	-----	-----	-----	-----	-----	-----	-----	78 U	78 U	78 U	78 U
Site 15(post-City dredge	City compl. sed. (10 cm)	-----	-----	-----	-----	-----	-----	-----	78 U	78 U	78 U	78 U

Notes: U = nondetected at the associated value
UJ = nondetect may be biased low due to low spike recoveries
J = associated value is considered an estimate
nd - Not detected

TABLE 2 - Summary of Sediment Quality Data - Utilities' Work Area - April to September 2004

Head of Thea Foss Waterway
Tacoma, Washington

PARAMETER		Dibenzo-furan	Naphthalene	Acenaph-thylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	2-Methyl-naphthalene	Total LPAHs	Fluoranthene	Pyrene
Units		(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		**540**	**2100**	**1300**	**500**	**540**	**1500**	**960**	**670**	**5200**	**2500**	**3300**
Location	**Depth Below Mudline**	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Waterway Cap Samples												
RC-01	recon. sed. (2 cm)	----	39 U	39 U	39 U	39 U	**160**	39 U	39 U	**160**	**480**	**360**
RC-02	recon. sed. (2 cm)	----	**47**	20 U	**22**	20 U	**99**	**29**	20 U	**197**	**230**	**160**
RC-03	recon. sed. (2 cm)	----	**130**	20 U	**67**	**41**	**240**	**73**	**35**	**586**	**500**	**360**
RC-04	recon. sed. (2 cm)	----	**44**	19 U	**24**	19 U	**98**	**25**	19 U	**191**	**180**	**150**
RC-05	recon. sed. (2 cm)	----	**34**	20 U	20 U	20 U	**40**	20 U	20 U	**74**	**73**	**49**
RC-Dup1	RC-05 dup.(2 cm)	----	**36**	20 U	20 U	20 U	**47**	20 U	20 U	**83**	**72**	**53**
RC-06	recon. sed. (2 cm)	----	**54**	39 U	39 U	39 U	**110**	39 U	39 U	**164**	**230**	**160**
RC-07	recon. sed. (2 cm)	----	19 U	19 U	19 U	19 U	**26**	19 U	19 U	**26**	**55**	**39**
RC-08	recon. sed. (2 cm)	----	19 U	19 U	19 U	19 U	**28**	19 U	19 U	**28**	**50**	**37**
RC-09	recon. sed. (2 cm)	----	**56**	38 U	38 U	38 U	**74**	38 U	38 U	**130**	**120**	**110**
RC-10	recon. sed. (2 cm)	----	**44**	19 U	**22**	19 U	**67**	**26**	19 U	**159**	**91**	**74**
RC-11	recon. sed. (2 cm)	----	**110**	39 U	**42**	39 U	**130**	**56**	39 U	**338**	**200**	**150**
RC-12	recon. sed. (2 cm)	----	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	**22**	20 U
RC-13	recon. sed. (2 cm)	----	38 U	38 U	38 U	38 U	**260**	**43**	38 U	**303**	**870**	**510**
RC-14	recon. sed. (2 cm)	----	77 U	77 U	77 U	77 U	**570**	**88**	77 U	**658**	**1600**	**890**
WC-01	cap compl. sed. (10 cm)	----	39 U	39 U	39 U	39 U	**85**	39 U	39 U	**85**	**250**	**140**
WC-02	cap compl. sed. (10 cm)	----	39 U	39 U	39 U	39 U	**70**	39 U	39 U	**70**	**150**	**120**
WC-03	cap compl. sed. (10 cm)	----	**78**	40 U	**41**	40 U	**85**	40 U	40 U	**204**	**120**	**110**
WC-04	cap compl. sed. (10 cm)	----	**78**	20 U	**51**	**26**	**120**	**40**	**21**	**336**	**160**	**120**
WC-Dup1	WC-04 dup.	----	**92**	20 U	**61**	**30**	**140**	**45**	**24**	**392**	**190**	**140**
WC-05	cap compl. sed. (10 cm)	----	**25**	20 U	20 U	20 U	**39**	20 U	20 U	**64**	**63**	**50**
WC-06	cap compl. sed. (10 cm)	----	20 U	20 U	20 U	20 U	**33**	20 U	20 U	**33**	**78**	**67**
WC-07	cap compl. sed. (10 cm)	----	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
WC-08	cap compl. sed. (10 cm)	----	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	**26**	19 U
WC-09	cap compl. sed. (10 cm)	----	**21**	20 U	20 U	20 U	**36**	20 U	20 U	**57**	**67**	**53**
WC-10	cap compl. sed. (10 cm)	----	**22**	20 U	20 U	20 U	**46**	**20**	20 U	**88**	**53**	**61**
WC-11	cap compl. sed. (10 cm)	----	**41**	39 U	39 U	39 U	**53**	39 U	39 U	**94**	**110**	**73**
WC-12	cap compl. sed. (10 cm)	----	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
WC-13	cap compl. sed. (10 cm)	----	20 U	20 U	20 U	20 U	**21**	20 U	20 U	**21**	**53**	**37**
WC-14	cap compl. sed. (10 cm)	----	19 U	19 U	19 U	19 U	**20**	19 U	19 U	**20**	**38**	**28**
Slope Cap Samples												
SC-01	slope cap (composite)	----	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
SC-02	slope cap (composite)	----	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
SC-03	slope cap (composite)	----	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	**43**	**30**
SC-04	slope cap (composite)	----	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
Waterway Cap Core Samples												
WCBU-4A	core - 0-1 feet	19 U	19 U	19 U	19 U	19 U	**33**	19 U	19 U	**33**	**54**	**50**
WCBU-4B	core - 1-2 feet	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
WCBU-4C	core - 2-3 feet	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
WCBU-5A	core - 0-1.3 feet	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
WCBU-6A	core - 0-1 feet	20 U	20 U	20 U	20 U	20 U	**30**	20 U	20 U	**30**	**41**	**30**
WCBU-6B	core - 1-2 feet	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
WCBU-10A	core - 0-1 feet	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U

TABLE 2 - Summary of Sediment Quality Data - Utilities' Work Area - April to September 2004

PARAMETER		Dibenzo-furan	Naphthalene	Acenaph-thylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	2-Methyl-naphthalene	Total LPAHs	Fluoranthene	Pyrene
Units		(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		**540**	**2100**	**1300**	**500**	**540**	**1500**	**960**	**670**	**5200**	**2500**	**3300**
Location	**Depth Below Mudline**	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
WCBU-Dup1	core - 0-1 feet (dup. 10A	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
WCBU-10B	core - 1-2 feet	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
WCBU-10C	core - 2-3.3 feet	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
WCBU-12A	core - 0-1.7 feet	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Other Sediment Samples												
RC-11(pre-City dredge)	Utilities' recon. sed (2cm	<200	<200	<200	<200	<200	**240**	<200	-----	**240**	**520**	**360**
RC-11(pre-City dredge)	City recon. sed. (2 cm)	<99	**210**	<99	**99**	<99	**430**	**180**	<99	**919**	**680**	**1000**
RC-11(post-City dredge	Utilities' recon. sed. (2 cr	**800**	**4500**	**980**	**5500**	**3200**	**15000**	**5800**	-----	**34980**	**12000**	**11000**
RC-11(post-City dredge	City recon. sed. (2 cm)	**740**	**3700**	**410**	**3100**	**2300**	**17000**	**4400**	**2200**	**30910**	**4400**	**19000**
WC-11(pre-City dredge	City compl. sed. (10 cm)	**18**	**115**	**45.3**	**106**	**58.2**	**330**	**146**	**55.3**	**800**	**452**	**490**
WC-11(post-City dredg	City compl. sed. (10 cm)	**340**	**2000**	**220**	**1500**	**970**	**6000**	**2200**	**570**	**12890**	**3800**	**9400**
WC-12(pre-City dredge	City compl. sed. (10 cm)	**5.4**	**59.2**	**17.6**	**34.4**	**18.4**	**93.8**	**41.2**	**18.2**	**283**	**145**	**174**
Site 15(pre-City dredge	Utilities' recon. sed (2cm	<200	**780**	**210**	**780**	**460**	**2300**	**1100**	-----	**5630**	**3200**	**2200**
Site 15(pre-City dredge	City recon. sed. (2 cm)	**160**	**950**	**120**	**700**	**460**	**2200**	**1000**	**400**	**5430**	**2100**	**3500**
Site 15(pre-City dredge	Utilities' compl. sed (10c	<200	**280**	<200	**200**	<200	**580**	**360**	-----	**1420**	**1000**	**690**
Site 15(pre-City dredge	City compl. sed. (10 cm)	<99	**270**	<99	**150**	**110**	**560**	**230**	**99**	**1320**	**710**	**960**
Site 15(post-City dredge	Utilities' recon. sed (2cm	**1800**	**11000**	**2000**	**14000**	**8000**	**35000**	**14000**	-----	**84000**	**24000**	**22000**
Site 15(post-City dredge	City recon. sed. (2 cm)	**2400**	**14000**	**1300**	**14000**	**9300**	**48000**	**15000**	**4400**	**101600**	**26000**	**45000**
Site 15(post-City dredge	City compl. sed. (10 cm)	**1300**	**8200**	**820**	**7700**	**5400**	**28000**	**9200**	**2700**	**62020**	**16000**	**22000**

Notes:
U = nondetected at the associated value
UJ = nondetect may be biased low due to low spike recoveries
J = associated value is considered an estimate
nd - Not detected

TABLE 2 - Summary of Sediment Quality Data - Utilities' Work Area - April to September 2004

PARAMETER		Benzo(a)-anthracene	Chrysene	Benzo(b)-fluoranthene	Benzo(k)-fluoranthene	Benzofluoranthenes	Benzo(a)-pyrene	Indeno(1,2,3-cd)pyrene	Dibenz(a,h)anthracene	Benzo(g,h,i)-perylene	Total HPAHs
Units		(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		**1600**	**2800**	----	----	**3600**	**1600**	**690**	**230**	**720**	**17000**
Location	**Depth Below Mudline**	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Waterway Cap Samples											
RC-01	recon. sed. (2 cm)	**140**	**260**	**320**	**220**	**540**	**170**	**90**	39 U	**87**	**2667**
RC-02	recon. sed. (2 cm)	**70**	**100**	**100**	**79**	**179**	**64**	**27**	20 U	**24**	**1033**
RC-03	recon. sed. (2 cm)	**150**	**220**	**190**	**210**	**400**	**140**	**56**	20 U	**53**	**2279**
RC-04	recon. sed. (2 cm)	**56**	**82**	**76**	**74**	**150**	**56**	**23**	19 U	**21**	**868**
RC-05	recon. sed. (2 cm)	**22**	**30**	**23**	**19 J**	**42**	**20**	20 U	20 U	20 U	**259**
RC-Dup1	RC-05 dup.(2 cm)	**23**	**30**	**20**	**18 J**	**38**	**20 J**	20 U	20 U	20 U	**236**
RC-06	recon. sed. (2 cm)	**75**	**110**	**91**	**69**	**160**	**68**	**44**	39 U	**43**	**1050**
RC-07	recon. sed. (2 cm)	**20**	**32**	**25**	**27**	**52**	**20**	19 U	19 U	19 U	**270**
RC-08	recon. sed. (2 cm)	**20**	**28**	**20**	**19 J**	**39**	**19**	19 U	19 U	19 U	**213**
RC-09	recon. sed. (2 cm)	**51**	**69**	**44**	**47**	**91**	**45**	38 U	38 U	38 U	**577**
RC-10	recon. sed. (2 cm)	**36**	**44**	**28**	**29**	**57**	**33**	19 U	19 U	19 U	**392**
RC-11	recon. sed. (2 cm)	**78**	**100**	**74**	**66**	**140**	**73**	39 U	39 U	39 U	**881**
RC-12	recon. sed. (2 cm)	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	**22**
RC-13	recon. sed. (2 cm)	**240**	**410**	**500**	**330**	**830**	**260**	**120**	38 U	**110**	**4180**
RC-14	recon. sed. (2 cm)	**460**	**760**	**740**	**640**	**1380**	**480**	**210**	77 U	**200**	**7360**
WC-01	cap compl. sed. (10 cm)	**75**	**130**	**120**	**85**	**205**	**79**	**53**	39 U	**50**	**1187**
WC-02	cap compl. sed. (10 cm)	**54**	**78**	**74**	**62**	**136**	**50**	39 U	39 U	39 U	**724**
WC-03	cap compl. sed. (10 cm)	**45**	**60**	**58**	**42**	**100**	40 U	40 U	40 U	40 U	**535**
WC-04	cap compl. sed. (10 cm)	**54**	**72**	**54**	**66**	**120**	**47**	20 U	20 U	20 U	**693**
WC-Dup1	WC-04 dup.	**64**	**81**	**70**	**66**	**136**	**55**	20 U	20 U	20 U	**802**
WC-05	cap compl. sed. (10 cm)	20 U	**24**	**21**	**20**	**41**	20 U	20 U	20 U	20 U	**219**
WC-06	cap compl. sed. (10 cm)	**24**	**38**	**28**	**32**	**60**	**27**	**18 J**	20 U	**18 J**	**354**
WC-07	cap compl. sed. (10 cm)	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
WC-08	cap compl. sed. (10 cm)	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	**26**
WC-09	cap compl. sed. (10 cm)	**22**	**30**	**34**	20 U	34	**21**	20 U	20 U	20 U	**261**
WC-10	cap compl. sed. (10 cm)	**22**	**28**	20 U	20 U	20 U	**22**	20 U	20 U	20 U	**186**
WC-11	cap compl. sed. (10 cm)	**41**	**52**	39 U	**44**	**44**	**41**	39 U	39 U	39 U	**405**
WC-12	cap compl. sed. (10 cm)	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
WC-13	cap compl. sed. (10 cm)	20 U	**27**	20 U	**21**	**21**	20 U	20 U	20 U	20 U	**159**
WC-14	cap compl. sed. (10 cm)	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	**66**
Slope Cap Samples											
SC-01	slope cap (composite)	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
SC-02	slope cap (composite)	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
SC-03	slope cap (composite)	20 U	**23**	**25**	**22**	**22**	20 U	20 U	20 U	20 U	**165**
SC-04	slope cap (composite)	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
Waterway Cap Core Samples											
WCBU-4A	core - 0-1 feet	**20**	**27**	**22**	**19 J**	**41 J**	**20**	19 U	19 U	19 U	**193**
WCBU-4B	core - 1-2 feet	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
WCBU-4C	core - 2-3 feet	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
WCBU-5A	core - 0-1.3 feet	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
WCBU-6A	core - 0-1 feet	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	**71**
WCBU-6B	core - 1-2 feet	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
WCBU-10A	core - 0-1 feet	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U

TABLE 2 - Summary of Sediment Quality Data - Utilities' Work Area - April to September 2004

PARAMETER		Benzo(a)-anthracene	Chrysene	Benzo(b)-fluoranthene	Benzo(k)-fluoranthene	Benzofluoranthenes	Benzo(a)-pyrene	Indeno(1,2,3-cd)pyrene	Dibenz(a,h)anthracene	Benzo(g,h,i)-perylene	Total HPAHs
Units		(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		**1600**	**2800**	----	----	**3600**	**1600**	**690**	**230**	**720**	**17000**
Location	**Depth Below Mudline**	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
WCBU-Dup1	core - 0-1 feet (dup. 10A	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
WCBU-10B	core - 1-2 feet	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
WCBU-10C	core - 2-3.3 feet	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
WCBU-12A	core - 0-1.7 feet	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Other Sediment Samples											
RC-11(pre-City dredge)	Utilities' recon. sed (2cm	<200	**230**	<200	<200	<200	**220**	<200	<200	<200	**1330**
RC-11(pre-City dredge)	City recon. sed. (2 cm)	**330**	**420**	-----	-----	**700**	**350**	**220**	<99	**280**	**3980**
RC-11(post-City dredge	Utilities' recon. sed. (2 cr	**5200**	**5300**	**3600**	**3600**	**7200**	**5100**	**1800**	**550**	**1500**	**49650**
RC-11(post-City dredge	City recon. sed. (2 cm)	**5800**	**6300**	-----	-----	**8100**	**5500**	**2500**	**950**	**2900**	**55450**
WC-11(pre-City dredge	City compl. sed. (10 cm)	**163**	**195**	-----	-----	**278**	**170**	**115**	**54.6**	**130**	**2048**
WC-11(post-City dredg	City compl. sed. (10 cm)	**2100**	**2400**	-----	-----	**3900**	**2600**	**1300**	**340**	**1500**	**27340**
WC-12(pre-City dredge	City compl. sed. (10 cm)	**60**	**70**	-----	-----	**109**	**59.6**	**41.5**	**24.2**	**48.6**	**732**
Site 15(pre-City dredge	Utilities' recon. sed (2cm	**1200**	**1400**	**1100**	**1200**	**2300**	**1300**	**560**	**200**	**470**	**12830**
Site 15(pre-City dredge	City recon. sed. (2 cm)	**1000**	**1400**	-----	-----	**2200**	**1400**	**740**	**210**	**890**	**13440**
Site 15(pre-City dredge	Utilities' compl. sed (10c	**400**	**480**	**420**	**360**	**780**	**460**	<200	<200	<200	**3810**
Site 15(pre-City dredge	City compl. sed. (10 cm)	**380**	**440**	-----	-----	**750**	**450**	**280**	<99	**340**	**4310**
Site 15(post-City dredge	Utilities' recon. sed (2cm	**10000**	**10000**	**6200**	**6200**	**12400**	**9900**	**3100**	**1100**	**2600**	**95100**
Site 15(post-City dredge	City recon. sed. (2 cm)	**15000**	**16000**	-----	-----	**19000**	**14000**	**5500**	**2000**	**6400**	**148900**
Site 15(post-City dredge	City compl. sed. (10 cm)	**7500**	**8100**	-----	-----	**11000**	**7800**	**3300**	**1200**	**3800**	**80700**

Notes:

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J = associated value is considered an estimate
nd - Not detected

TABLE 2 - Summary of Sediment Quality Data - Utilities' Work Area - April to September 2004

PARAMETER		Dimethyl-phthalate	Di-n-butyl-phthalate	Diethyl-phthalate	Butylbenzyl-phthalate	*bis* (2-Ethylhexyl)-phthalate	Di-n-octyl-phthalate	4,4'-DDE	4,4'-DDD	4,4'-DDT
Units		(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		**160**	**1400**	**200**	**900**	**1300**	**6200**	**9**	**16**	**34**
Location	**Depth Below Mudline**	-----	-----	-----	-----	-----	-----	-----	-----	-----
Waterway Cap Samples										
RC-01	recon. sed. (2 cm)	39 U	**48**	39 U	**91**	**1300**	**45**	0.38 U	**0.44**	2.3 U
RC-02	recon. sed. (2 cm)	20 U	20 U	20 U	**29**	**470**	**120**	0.39 U	**0.68**	1.3 U
RC-03	recon. sed. (2 cm)	20 U	**19 J**	20 U	**62**	**1100**	**58**	1.1 U	**0.78**	1.4 U
RC-04	recon. sed. (2 cm)	19 U	19 U	19 U	**27**	**360**	19 U	0.39 U	**0.75**	1.3 U
RC-05	recon. sed. (2 cm)	20 U	20 U	20 U	20 U	**110**	20 U	0.39 U	**0.66**	0.39 U
RC-Dup1	RC-05 dup.(2 cm)	20 U	20 U	20 U	20 U	**100**	20 U	0.39 U	0.39 U	0.39 U
RC-06	recon. sed. (2 cm)	39 U	39 U	39 U	**38 J**	**500**	**38 J**	0.39 U	**0.65**	1.7 U
RC-07	recon. sed. (2 cm)	19 U	19 U	19 U	19 U	**180**	**19**	0.38 U	0.38 U	0.38 U
RC-08	recon. sed. (2 cm)	19 U	19 U	19 U	19 U	**110**	19 U	0.39 U	0.39 U	0.39 U
RC-09	recon. sed. (2 cm)	38 U	38 U	38 U	38 U	**230**	38 U	0.38 U	**0.88**	1.7 U
RC-10	recon. sed. (2 cm)	19 U	19 U	19 U	19 U	**80**	19 U	0.39 U	**0.55**	0.39 U
RC-11	recon. sed. (2 cm)	39 U	39 U	39 U	39 U	**280**	39 U	1.6 U	**1.7**	2.4 U
RC-12	recon. sed. (2 cm)	20 U	20 U	20 U	20 U	**60**	20 U	0.39 U	0.39 U	0.39 U
RC-13	recon. sed. (2 cm)	38 U	**57**	38 U	**130**	**1400**	**98**	3.4 U	**1.1**	3.7 U
RC-14	recon. sed. (2 cm)	77 U	77 U	77 U	**180**	**3000**	**150**	3.1 U	**1.7**	4.9 U
WC-01	cap compl. sed. (10 cm)	39 U	39 U	39 U	39 U	**550**	**41**	0.39 U	0.39 U	0.39 U
WC-02	cap compl. sed. (10 cm)	39 U	39 U	39 U	39 U	**330**	39 U	0.39 U	**0.64**	1.1 U
WC-03	cap compl. sed. (10 cm)	40 U	40 U	40 U	40 U	**240**	40 U	0.40 U	**0.68**	1.1 U
WC-04	cap compl. sed. (10 cm)	20 U	20 U	20 U	20 U	**260**	20 U	0.39 U	**0.77**	0.93 U
WC-Dup1	WC-04 dup.	20 U	20 U	20 U	20 U	**290**	**25**	0.40 U	**0.89**	1.1 U
WC-05	cap compl. sed. (10 cm)	20 U	20 U	20 U	20 U	**76**	20 U	0.39 U	0.39 U	0.50 U
WC-06	cap compl. sed. (10 cm)	20 U	20 U	20 U	20 U	**160**	20 U	0.40 U	0.40 U	0.55 U
WC-07	cap compl. sed. (10 cm)	19 U	19 U	19 U	19 U	19 U	19 U	0.39 U	0.39 U	0.39 U
WC-08	cap compl. sed. (10 cm)	19 U	19 U	19 U	19 U	**49**	19 U	0.38 U	0.38 U	0.38 U
WC-09	cap compl. sed. (10 cm)	20 U	20 U	20 U	20 U	**120**	20 U	0.39 U	0.39 U	0.39 U
WC-10	cap compl. sed. (10 cm)	20 U	20 U	20 U	20 U	**63**	20 U	0.40 U	0.40 U	0.40 U
WC-11	cap compl. sed. (10 cm)	39 U	39 U	39 U	39 U	**220**	39 U	0.38 U	**0.54**	0.96 U
WC-12	cap compl. sed. (10 cm)	19 U	19 U	19 U	19 U	19 U	19 U	0.38 U	0.38 U	0.38 U
WC-13	cap compl. sed. (10 cm)	20 U	20 U	20 U	20 U	**100**	20 U	0.39 U	0.39 U	0.39 U
WC-14	cap compl. sed. (10 cm)	19 U	**32**	19 U	19 U	**76**	19 U	0.39 U	0.39 U	0.39 U
Slope Cap Samples										
SC-01	slope cap (composite)	19 U	19 U	19 U	19 U	**26**	19 U	0.39 U	0.39 U	0.39 U
SC-02	slope cap (composite)	19 U	**35**	19 U	19 U	**31**	19 U	0.40 U	0.40 U	0.40 U
SC-03	slope cap (composite)	20 U	**24**	20 U	20 U	**91**	20 U	0.40 U	0.40 U	0.40 U
SC-04	slope cap (composite)	19 U	19 U	19 U	19 U	**94**	19 U	0.38 U	0.38 U	0.38 U
Waterway Cap Core Samples										
WCBU-4A	core - 0-1 feet	19 U	19 U	19 U	**23**	**73**	19 U	0.38 U	0.38 U	0.38 U
WCBU-4B	core - 1-2 feet	19 U	19 U	19 U	19 U	19 U	19 U	0.39 U	0.39 U	0.39 U
WCBU-4C	core - 2-3 feet	19 U	19 U	19 U	19 U	19 U	19 U	0.39 U	0.39 U	0.39 U
WCBU-5A	core - 0-1.3 feet	19 U	19 U	19 U	19 U	**46**	19 U	0.39 U	0.39 U	0.39 U
WCBU-6A	core - 0-1 feet	20 U	20 U	20 U	20 U	**92**	20 U	0.40 U	0.40 U	0.40 U
WCBU-6B	core - 1-2 feet	20 U	20 U	20 U	20 U	**63**	20 U	0.40 U	0.40 U	0.40 U
WCBU-10A	core - 0-1 feet	20 U	20 U	20 U	20 U	**69**	20 U	0.39 U	0.39 U	0.39 U

TABLE 2 - Summary of Sediment Quality Data - Utilities' Work Area - April to September 2004

PARAMETER		Dimethyl-phthalate	Di-n-butyl-phthalate	Diethyl-phthalate	Butylbenzyl-phthalate	*bis* (2-Ethylhexyl)-phthalate	Di-n-octyl-phthalate	4,4'-DDE	4,4'-DDD	4,4'-DDT
Units		(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		**160**	**1400**	**200**	**900**	**1300**	**6200**	**9**	**16**	**34**
Location	**Depth Below Mudline**	-----	-----	-----	-----	-----	-----	-----	-----	-----
WCBU-Dup1	core - 0-1 feet (dup. 10A	20 U	20 U	**21**	20 U	**75**	20 U	0.39 U	0.39 U	0.39 U
WCBU-10B	core - 1-2 feet	20 U	20 U	20 U	20 U	20 U	20 U	0.40 U	0.40 U	0.40 U
WCBU-10C	core - 2-3.3 feet	19 U	19 U	19 U	19 U	**37**	19 U	0.39 U	0.39 U	0.39 U
WCBU-12A	core - 0-1.7 feet	20 U	20 U	20 U	20 U	**49**	20 U	0.40 U	0.40 U	0.40 U
Other Sediment Samples										
RC-11(pre-City dredge)	Utilities' recon. sed (2cm	<200	<200	<200	<200	**940**	<200	<3.2	<3.2	<3.2
RC-11(pre-City dredge)	City recon. sed. (2 cm)	**19**	<99	<99	**220**	**1600**	**140**	<2.4	<2.4	**3.6**
RC-11(post-City dredge	Utilities' recon. sed. (2 cr	<470	<470	<470	**820**	**6400**	<470	<10	**29**	<21
RC-11(post-City dredge	City recon. sed. (2 cm)	<79	**190**	<79	**1200**	**12000**	**1800**	**11.3**	**20.9**	**18.6**
WC-11(pre-City dredge	City compl. sed. (10 cm)	<13.5	<12.5	<24.9	<14.8	**447B**	<12.7	<0.29	**0.859**	<0.34
WC-11(post-City dredg	City compl. sed. (10 cm)	<78	**120**	<78	**940**	**4300**	**1500**	**8.4**	**14.7**	**13.8**
WC-12(pre-City dredge	City compl. sed. (10 cm)	<11.5	**18.3**	<21.2	<12.6	**171B**	<10.8	<0.23	<0.24	<0.27
Site 15(pre-City dredge	Utilities' recon. sed (2cm	<200	<200	<200	**480**	**2400**	<200	<3.2	**9**	<11
Site 15(pre-City dredge	City recon. sed. (2 cm)	**24**	**100**	<100	**450**	**3100**	**180**	<3.4	**6.9**	**12.1**
Site 15(pre-City dredge	Utilities' compl. sed (10c	<200	<200	<200	**240**	**980**	<200	<3.2	<3.2	<3.2
Site 15(pre-City dredge	City compl. sed. (10 cm)	**11**	<99	<99	**180**	**1100**	<99	<2.7	<2.7	**3.4**
Site 15(post-City dredge	Utilities' recon. sed (2cm	<510	<510	<510	**630**	**5100**	<510	<16	**64**	<16
Site 15(post-City dredge	City recon. sed. (2 cm)	<78	**250**	<78	**940**	**12000**	**1600**	**13.8**	**53.9**	**47**
Site 15(post-City dredge	City compl. sed. (10 cm)	<78	**190**	<78	**780**	**4500**	**1500**	**11.8**	**20.9**	**19**

Notes: U = nondetected at the associated value
UJ = nondetect may be biased low due to low spike recoveries
J = associated value is considered an estimate
nd - Not detected

TABLE 2 - Summary of Sediment Quality Data - Utilities' Work Area - April to September 2004

PARAMETER		Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs
Units		(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		----	----	----	----	----	----	----	300
Location	Depth Below Mudline	-----	-----	-----	-----	-----	-----	-----	-----
Waterway Cap Samples									
RC-01	recon. sed. (2 cm)	3.8 U	7.6 U	3.8 U	3.8 U	3.8 U	**5.7**	3.8 U	**5.7**
RC-02	recon. sed. (2 cm)	3.9 U	7.8 U	3.9 U	3.9 U	3.9 U	**6.3**	3.9 U	**6.3**
RC-03	recon. sed. (2 cm)	3.9 U	7.9 U	3.9 U	3.9 U	3.9 U	**7.2**	3.9 U	**7.2**
RC-04	recon. sed. (2 cm)	3.9 U	7.7 U	3.9 U	3.9 U	3.9 U	**5.7**	3.9 U	**5.7**
RC-05	recon. sed. (2 cm)	3.9 U	7.8 U	3.9 U	3.9 U	3.9 U	**4.3**	3.9 U	**4.3**
RC-Dup1	RC-05 dup.(2 cm)	3.9 U	7.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	nd
RC-06	recon. sed. (2 cm)	3.9 U	7.9 U	3.9 U	3.9 U	3.9 U	**9.2**	3.9 U	**9.2**
RC-07	recon. sed. (2 cm)	3.8 U	7.6 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	nd
RC-08	recon. sed. (2 cm)	3.9 U	7.7 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	nd
RC-09	recon. sed. (2 cm)	3.8 U	7.6 U	3.8 U	3.8 U	3.8 U	**6.5**	3.8 U	**6.5**
RC-10	recon. sed. (2 cm)	3.9 U	7.8 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	nd
RC-11	recon. sed. (2 cm)	3.9 U	7.9 U	3.9 U	3.9 U	3.9 U	**11**	3.9 U	**11**
RC-12	recon. sed. (2 cm)	3.9 U	7.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	nd
RC-13	recon. sed. (2 cm)	3.9 U	7.8 U	3.9 U	3.9 U	3.9 U	13 U	3.9 U	nd
RC-14	recon. sed. (2 cm)	3.9 U	7.7 U	3.9 U	3.9 U	3.9 U	14 U	3.9 U	nd
WC-01	cap compl. sed. (10 cm)	3.9 U	7.8 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	nd
WC-02	cap compl. sed. (10 cm)	3.9 U	7.8 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	nd
WC-03	cap compl. sed. (10 cm)	4.0 U	7.9 U	4.0 U	4.0 U	4.0 U	**5.7**	4.0 U	**5.7**
WC-04	cap compl. sed. (10 cm)	3.9 U	7.8 U	3.9 U	3.9 U	3.9 U	**5.4**	3.9 U	**5.4**
WC-Dup1	WC-04 dup.	4.0 U	8.0 U	4.0 U	4.0 U	4.0 U	**5.6**	4.0 U	**5.6**
WC-05	cap compl. sed. (10 cm)	3.9 U	7.8 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	nd
WC-06	cap compl. sed. (10 cm)	4.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	nd
WC-07	cap compl. sed. (10 cm)	3.9 U	7.8 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	nd
WC-08	cap compl. sed. (10 cm)	3.8 U	7.6 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	nd
WC-09	cap compl. sed. (10 cm)	3.9 U	7.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	nd
WC-10	cap compl. sed. (10 cm)	4.0 U	7.9 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	nd
WC-11	cap compl. sed. (10 cm)	3.8 U	7.6 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	nd
WC-12	cap compl. sed. (10 cm)	3.8 U	7.7 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	nd
WC-13	cap compl. sed. (10 cm)	3.9 U	7.8 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	nd
WC-14	cap compl. sed. (10 cm)	3.9 U	7.7 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	nd
Slope Cap Samples									
SC-01	slope cap (composite)	3.9 U	7.7 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	nd
SC-02	slope cap (composite)	4.0 U	7.9 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	nd
SC-03	slope cap (composite)	4.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	nd
SC-04	slope cap (composite)	3.8 U	7.7 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	nd
Waterway Cap Core Samples									
WCBU-4A	core - 0-1 feet	3.8 U	7.6 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	nd
WCBU-4B	core - 1-2 feet	3.9 U	7.8 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	nd
WCBU-4C	core - 2-3 feet	3.9 U	7.8 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	nd
WCBU-5A	core - 0-1.3 feet	3.9 U	7.8 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	nd
WCBU-6A	core - 0-1 feet	4.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	nd
WCBU-6B	core - 1-2 feet	4.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	nd
WCBU-10A	core - 0-1 feet	3.9 U	7.8 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	nd

TABLE 2 - Summary of Sediment Quality Data - Utilities' Work Area - April to September 2004

PARAMETER		Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs
Units		(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		----	----	----	----	----	----	----	**300**
Location	**Depth Below Mudline**	-----	-----	-----	-----	-----	-----	-----	-----
WCBU-Dup1	core - 0-1 feet (dup. 10A	3.9 U	7.8 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	nd
WCBU-10B	core - 1-2 feet	4.0 U	7.9 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	nd
WCBU-10C	core - 2-3.3 feet	3.9 U	7.7 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	nd
WCBU-12A	core - 0-1.7 feet	4.0 U	7.9 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	nd
Other Sediment Samples									
RC-11(pre-City dredge)	Utilities' recon. sed (2cm	<32	<32	<32	<32	<32	<32	<32	<32
RC-11(pre-City dredge)	City recon. sed. (2 cm)	<13	<13	<13	<13	<13	**27**	**35**	**62**
RC-11(post-City dredge	Utilities' recon. sed. (2 cı	<33	<33	<33	<33	**66**	**130**	**84**	**280**
RC-11(post-City dredge	City recon. sed. (2 cm)	<19	<19	<19	<19	<19	**162**	**139**	**301**
WC-11(pre-City dredge	City compl. sed. (10 cm)	<4	<4	<4	<4	<4	**54.1**	**39.5**	**93.6**
WC-11(post-City dredg	City compl. sed. (10 cm)	<17	<17	<17	<17	<17	**103**	**86**	**189**
WC-12(pre-City dredge	City compl. sed. (10 cm)	<3.4	<3.4	<3.4	<3.4	<3.4	**13.7**	**14.7**	**28.4**
Site 15(pre-City dredge	Utilities' recon. sed (2cm	<32	<32	<32	<32	<32	**72**	**47**	**119**
Site 15(pre-City dredge	City recon. sed. (2 cm)	<19	<19	<19	<19	<19	**48**	**46**	**94**
Site 15(pre-City dredge	Utilities' compl. sed (10c	<32	<32	<32	<32	<32	**35**	<32	**35**
Site 15(pre-City dredge	City compl. sed. (10 cm)	<15	<15	<15	<15	<15	**36**	**39**	**75**
Site 15(post-City dredge	Utilities' recon. sed (2cm	<33	<33	<33	<33	**130**	**230**	**180**	**540**
Site 15(post-City dredge	City recon. sed. (2 cm)	<20	<20	<20	<20	<20	**287**	**243**	**530**
Site 15(post-City dredge	City compl. sed. (10 cm)	<17	<17	<17	<17	<17	**218**	**163**	**381**

Notes: U = nondetected at the associated value
UJ = nondetect may be biased low due to low spike recoveries
J = associated value is considered an estimate
nd - Not detected

TABLE 3 - Summary of Surface Sediment Quality Data - Utilities' Work Area -November/December 2004

Head of Thea Foss Waterway
Tacoma, Washington

PARAMETER							As	Cu	Pb	Hg	Ni	Zn
Units					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SQO					Diesel	Lube-Oil	57	390	450	0.59	140	410
Location	Depth Below Mudline	Sample Date	% solids	% TOC	TPH-Dx	Range	-----	-----	-----	-----	-----	-----
Fine Grained Sediment												
RC-01	0 to 2 cm	12/9/2004	77.7	-----	96	430	7	39.7	27	0.06	24	71.9
RC-02	0 to 8 cm	12/2/2004	48.9	-----	340	1700	10 U	91.3	70	0.1	30	164
RC-03	0 to 12 cm	12/2/2004	48.1	-----	93	420	10 U	84.4	34	0.1	29	90
RC-04	0 to 9 cm	12/1/2004	49.1	-----	40	210	10	76.8	49	0.16	27	128
RC-05	0 to 11 cm	12/2/2004	46.9	-----	140	710	10 U	92.6	54	0.2	30	117
RC-06	0 to 5 cm	12/2/2004	49	-----	220	870	10	94.4	83	0.24	28	153
RC-07	0 to 4 cm	12/2/2004	37.6	-----	550	2100	20	118	140	0.4	32	238
RC-08	0 to 5 cm	12/1/2004	52.1	-----	370	850	10	89	100	0.34	30	180
RC-09	0 to 6 cm	12/1/2004	56.4	-----	130	350	10	76.8	64	0.21	26	126
RC-10	0 to 3 cm	12/1/2004	49.6	-----	520	1700	10	95.3	123	0.48	27	182
RC-12	0 to 3 cm	12/1/2004	46.1	-----	380	720	20	123	190	0.8	33	241
RC-13	0 to 2 cm	12/9/2004	75.2	-----	96	450	6	38.6	23	0.06	25	71.2
RC-14	0 to 2 cm	12/9/2004	66.7	-----	230	1400	7	50.9	52	0.08	30	135
S-16	0 to 5 cm	11/30/2004	43	-----	1600	4200	20	162	220	0.75	38	279
S-17	0 to 2 cm	11/30/2004	49.8	-----	800	2200	13	119	125	0.48	26	173
S-18	0 to 7 cm	12/1/2004	53.7	-----	39	110	10	77	56	0.16	26	122
S-19	0 to 4 cm	11/30/2004	42.3	-----	1700	4500	20	122	182	0.70	29	220
S-20	0 to 2 cm	11/30/2004	62.7	-----	620	2000	11	126	74	0.43	21	111
S-21	0 to 7 cm	12/1/2004	42.3	-----	660	1200	20	127	207	0.9	34	257
S-22	0 to 8 cm	12/1/2004	49.4	-----	860	1800	10	73.1	89	0.42	22	133
S-23	0 to 3 cm	12/1/2004	56.1	-----	230	500	12	75.8	98	0.35	24	145
S-24	0 to 3 cm	12/1/2004	52.9	-----	180	420	10	89.8	113	0.4	28	175
Compliance Samples												
WC-01	0 to 10 cm	12/9/2004	78.9	-----	91	440	6 U	37.4	22	0.07	25	68.5
WC-02 (City)	0 to 10 cm	12/2/2004	52	4.2	-----	-----	-----	-----	49.4	0.08	-----	107 B
WC-03 (City)	0 to 10 cm	12/2/2004	42	6.5	-----	-----	-----	-----	42	0.08	-----	93 B
WC-04	0 to 10 cm	12/1/2004	54.3	-----	71	380	9 U	67.2	35	0.12	25	95
WC-05	0 to 10 cm	12/2/2004	44.9	-----	190	790	10 U	100	70	0.3	31	138
WC-07	0 to 10 cm	12/2/2004	63.8	-----	140	740	9 U	56	42	0.11	20	93
WC-09	0 to 10 cm	12/1/2004	61.4	-----	37	110	9	57.4	32	0.11	22	81
WC-10	0 to 10 cm	12/1/2004	78.3	-----	110	250	7	48.2	27	0.13	19	66
WC-10 (City)	0 to 10 cm	12/1/2004	74.4	1.4	-----	-----	-----	-----	31	0.06	-----	55 B
WC-11 (Utilities' core)	0 to 10 cm	11/22/2004	60.4	-----	190	545	15	139	91	0.36	25	135
WC-11 (City)	0 to 10 cm	11/30/2004	59.6	4.8	-----	-----	-----	-----	158	0.24	-----	168 B
WC-12	0 to 10 cm	12/1/2004	68.6	-----	120	270	9	65.6	68	0.24	23	111
WC-12 (City)	0 to 10 cm	12/1/2004	65.7	3	-----	-----	-----	-----	72	0.12	-----	90 B
S-15 (Utilities' core)	0 to 10 cm	11/22/2004	53.1	-----	1100	2300	11	104	140	0.67	27	179
S-15 (City)	0 to 10 cm	11/30/2004	43.7	7.7	-----	-----	-----	-----	240	0.33	-----	232 B
S-16	0 to 10 cm	11/30/2004	49.9	-----	760	2200	20	148	148	0.55	35	207
S-17 (City)	0 to 10 cm	11/30/2004	74.4	1.9	-----	-----	-----	-----	39	0.08	-----	64 B
S-18 (City)	0 to 10 cm	12/1/2004	65.1	2.5	-----	-----	-----	-----	26	0.10	-----	55 B
S-19	0 to 10 cm	11/30/2004	57.5	-----	610	1900	15	127	103	0.36	25	146

TABLE 3 - Summary of Surface Sediment Quality Data - Utilities' Work Area -November/December 2004

Head of Thea Foss Waterway
Tacoma, Washington

PARAMETER							As	Cu	Pb	Hg	Ni	Zn
Units					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SQO					Diesel	Lube-Oil	57	390	450	0.59	140	410
Location	Depth Below Mudline	Sample Date	% solids	% TOC	TPH-Dx Range	Range	-----	-----	-----	-----	-----	-----
S-20 (City)	0 to 10 cm	11/30/2004	61.5	2.2	-----	-----	-----	-----	56	0.12	-----	84 B
S-21 (City)	0 to 10 cm	12/1/2004	48.7	4.1	-----	-----	-----	-----	147	0.24	-----	159 B
S-22 (City)	0 to 10 cm	12/1/2004	66.5	1.9	-----	-----	-----	-----	45	0.12 J	-----	72 B
S-24 (City)	0 to 10 cm	12/1/2004	78.2	1	-----	-----	-----	-----	26	0.05	-----	49 B
S-29 (City)	0 to 10 cm	12/1/2004	70.3	1.7	-----	-----	-----	-----	49	0.09	-----	72 B
Duplicate Samples												
S-32 (Dup of S-16)	0 to 10 cm	11/30/2004	51.1	-----	580	1700	20	157	153	0.51	32	207
S-33 (Dup of S-21)	0 to 7 cm	12/1/2004	41.9	-----	490	960	20	145	202	0.81	32	251
S-34 (Dup of WC-04)	0 to 10 cm	12/1/2004	55.1	-----	31	100	9 U	67.7	33	0.11	26	98

Notes: U - Not detected at indicated value

J - The numerical value is an estimated quantity.

B - The analyte was detected in the associated method blank.

nd - Not detected

----- - Not analyzed

TABLE 3 - Summary of Surface Sediment Quality Data - Utilities' Work Area -November/December 2004

Head of Thea Foss Waterway
Tacoma, Washington

PARAMETER		% gravel	% v. cs. sand	% cs. sand	% med. sand	% fine sand	% v. fine sand	% silt	% clay	% fines	1,3-Dichloro-benzene	1,4-Dichloro-benzene
Units											(ug/kg)	(ug/kg)
SQO		-----	-----	-----	-----	-----		-----	-----	-----	**170**	**110**
Location	**Depth Below Mudline**	> 2000 µm	1000-2000 um	500-1000 µm	250-500 µm	125-250 µm	62-125 um	3.9-62 µm	< 3.9 µm	< 62.5 µm	-----	-----
Fine Grained Sediment												
RC-01	0 to 2 cm	25.8	19.7	31.5	14.0	1.8	1.0	3.8	2.5	6.3	-----	-----
RC-02	0 to 8 cm	0.7	1.7	5.1	18.4	23.0	6.8	30.6	13.7	44.3	-----	-----
RC-03	0 to 12 cm	1.1	0.7	1.5	9.9	18.5	14.1	33.7	20.5	54.2	-----	-----
RC-04	0 to 9 cm	5.9	5.1	8.7	14.3	12.6	7.7	29.7	15.8	45.5	-----	-----
RC-05	0 to 11 cm	0.2	0.6	1.0	7.8	17.8	14.7	39.4	18.7	58.1	-----	-----
RC-06	0 to 5 cm	0.9	0.6	3.2	16.5	22.7	3.4	37.0	15.6	52.6	-----	-----
RC-07	0 to 4 cm	47.3	1.2	2.3	6.3	6.3	3.3	23.9	9.3	33.2	-----	-----
RC-08	0 to 5 cm	4.1	4.2	10.7	17.7	12.0	4.2	31.1	16.0	47.1	-----	-----
RC-09	0 to 6 cm	0.0	0.5	3.5	19.3	26.3	10.2	25.8	14.4	40.2	-----	-----
RC-10	0 to 3 cm	6.9	1.8	4.7	15.1	14.1	5.6	35.6	16.3	51.9	-----	-----
RC-12	0 to 3 cm	5.9	2.6	4.3	7.0	6.9	6.6	47.3	19.5	66.8	-----	-----
RC-13	0 to 2 cm	46.3	12.2	18.9	11.2	3.5	1.6	3.9	2.4	6.3	-----	-----
RC-14	0 to 2 cm	31.6	11.9	24.1	12.4	6.4	4.9	8.4	4.3	12.7	-----	-----
S-16	0 to 5 cm	24.3	0.4	1.9	2.4	3.7	5.5	42.1	19.5	61.6	-----	-----
S-17	0 to 2 cm	23.2	8.8	5.7	4.8	5.1	4.7	32.8	14.9	47.7	-----	-----
S-18	0 to 7 cm	2.0	1.4	3.6	16.9	25.4	10.8	25.0	14.8	39.8	-----	-----
S-19	0 to 4 cm	21.1	2.1	2.4	3.2	5.0	6.6	40.4	19.1	59.5	-----	-----
S-20	0 to 2 cm	37.8	3.4	5.8	14.0	13.7	4.5	13.1	7.6	20.7	-----	-----
S-21	0 to 7 cm	0.7	1.0	3.2	7.9	10.1	8.4	47.5	21.2	68.7	-----	-----
S-22	0 to 8 cm	1.8	0.9	4.5	18.6	19.7	6.8	32.3	15.5	47.9	-----	-----
S-23	0 to 3 cm	1.6	1.5	6.2	26.3	20.9	4.6	25.3	13.4	38.7	-----	-----
S-24	0 to 3 cm	5.6	2.9	7.0	18.1	17.3	6.1	29.2	13.8	43.0	-----	-----
Compliance Samples												
WC-01	0 to 10 cm	46.8	10.4	18.8	12.2	3.3	1.1	4.7	2.5	7.2	-----	-----
WC-02 (City)	0 to 10 cm	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
WC-03 (City)	0 to 10 cm	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
WC-04	0 to 10 cm	4.5	4.0	9.6	18.9	17.9	7.6	22.6	14.8	37.4	-----	-----
WC-05	0 to 10 cm	0.5	0.4	1.0	6.2	16.2	14.4	41.7	19.5	61.2	-----	-----
WC-07	0 to 10 cm	21.3	2.8	6.7	24.1	23.9	3.8	11.3	6.0	17.3	-----	-----
WC-09	0 to 10 cm	1.1	0.6	2.0	17.7	34.6	12.7	19.5	11.8	31.3	-----	-----
WC-10	0 to 10 cm	10.5	6.6	10.7	26.3	25.3	5.6	9.7	5.3	15.0	-----	-----
WC-10 (City)	0 to 10 cm	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
WC-11 (Utilities' core)	0 to 10 cm	36.3	6.0	5.4	7.2	7.1	5.3	20.3	12.4	32.7	-----	-----
WC-11 (City)	0 to 10 cm	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
WC-12	0 to 10 cm	33.6	13.0	10.7	10.3	5.2	2.2	16.7	8.4	25.1	-----	-----
WC-12 (City)	0 to 10 cm	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
S-15 (Utilities' core)	0 to 10 cm	5.4	3.9	5.0	10.5	14.0	8.8	34.6	17.8	52.4	-----	-----
S-15 (City)	0 to 10 cm	-----	-----	-----	-----	-----	-----	-----	-----	-----		
S-16	0 to 10 cm	58.6	2.6	2.4	2.2	3.1	3.5	17.7	9.8	27.5	-----	-----
S-17 (City)	0 to 10 cm	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
S-18 (City)	0 to 10 cm	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
S-19	0 to 10 cm	52.4	7.1	7.1	2.4	2.2	3.7	16.2	8.9	25.1	-----	-----

TABLE 3 - Summary of Surface Sediment Quality Data - Utilities' Work Area -November/December 2004

Head of Thea Foss Waterway
Tacoma, Washington

PARAMETER		% gravel	% v. cs. sand	% cs. sand	% med. sand	% fine sand	% v. fine sand	% silt	% clay	% fines	1,3-Dichloro-benzene	1,4-Dichloro-benzene
Units											(ug/kg)	(ug/kg)
SQO		-----	-----	-----	-----	-----		-----	-----	-----	**170**	**110**
Location	**Depth Below Mudline**	> 2000 µm	1000-2000 um	500-1000 µm	250-500 µm	125-250 µm	62-125 um	3.9-62 µm	< 3.9 µm	< 62.5 µm	-----	-----
S-20 (City)	0 to 10 cm	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
S-21 (City)	0 to 10 cm	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
S-22 (City)	0 to 10 cm	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
S-24 (City)	0 to 10 cm	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
S-29 (City)	0 to 10 cm	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Duplicate Samples												
S-32 (Dup of S-16)	0 to 10 cm	47.2	3.3	2.7	2.8	3.7	4.1	23.6	12.6	36.2	-----	-----
S-33 (Dup of S-21)	0 to 7 cm	0.4	0.8	3.0	7.6	10.3	8.0	49.3	20.7	70.0	-----	-----
S-34 (Dup of WC-04)	0 to 10 cm	3.0	5.3	7.8	19.3	18.4	7.8	23.6	14.8	38.4	-----	-----

Notes: U - Not detected at indicated value

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B - The analyte was detected in the associated method blank.

nd - Not detected

----- - Not analyzed

TABLE 3 - Summary of Surface Sediment Quality Data - Utilities' Work Area -November/December 2004

Head of Thea Foss Waterway
Tacoma, Washington

PARAMETER		1,2-Dichloro-benzene	1,2,4-Trichloro-benzene	Dibenzo-furan	2-Methyl-naphthalene	Acenaphthene	Acenaph-thylene	Anthracene	Fluorene	Naphthalene	Phenanthrene
Units		(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		**50**	**51**	**540**	**670**	**500**	**1300**	**960**	**540**	**2100**	**1500**
Location	**Depth Below Mudline**	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Fine Grained Sediment											
RC-01	0 to 2 cm	-----	-----	57 U	57 U	57 U	57 U	**91**	57 U	**120**	**340**
RC-02	0 to 8 cm	-----	-----	120 U	120 U	120 U	120 U	**210**	120 U	**140**	**650**
RC-03	0 to 12 cm	-----	-----	99 U	99 U	99 U	99 U	**120**	99 U	**120**	**270**
RC-04	0 to 9 cm	-----	-----	120 U	120 U	**130**	120 U	**240**	120 U	**220**	**600**
RC-05	0 to 11 cm	-----	-----	110 U	110 U	110 U	110 U	**150**	110 U	**110**	**320**
RC-06	0 to 5 cm	-----	-----	130 U	130 U	**220**	130 U	**320**	**130**	**430**	**740**
RC-07	0 to 4 cm	-----	-----	180 U	**280**	**530**	180 U	**760**	**320**	**860**	**1800**
RC-08	0 to 5 cm	-----	-----	150 U	**360**	**710**	**200**	**1000**	**420**	**990**	**1800**
RC-09	0 to 6 cm	-----	-----	120 U	**200**	**380**	**140**	**660**	**240**	**580**	**1100**
RC-10	0 to 3 cm	-----	-----	**190**	**690**	**1600**	**410**	**2200**	**870**	**1800**	**3500**
RC-12	0 to 3 cm	-----	-----	250 U	**320**	**1200**	250 U	**1500**	**620**	**760**	**2600**
RC-13	0 to 2 cm	-----	-----	58 U	58 U	58 U	58 U	58 U	58 U	58 U	**200**
RC-14	0 to 2 cm	-----	-----	69 U	69 U	69 U	69 U	69 U	69 U	69 U	**260**
S-16	0 to 5 cm	-----	-----	**170**	**500**	**1400**	**330**	**1900**	**700**	**1300**	**2800**
S-17	0 to 2 cm	-----	-----	**91**	**310**	**650**	**190**	**1100**	**370**	**850**	**1500**
S-18	0 to 7 cm	-----	-----	120 U	120 U	**240**	120 U	**440**	**150**	**300**	**760**
S-19	0 to 4 cm	-----	-----	**220**	**640**	**1900**	**340**	**2400**	**980**	**1600**	**3900**
S-20	0 to 2 cm	-----	-----	**50**	**160**	**320**	**110**	**600**	**210**	**420**	**940**
S-21	0 to 7 cm	-----	-----	**300**	**740**	**3100**	**530**	**3400**	**1600**	**1400**	**6700**
S-22	0 to 8 cm	-----	-----	160 U	**410**	**1200**	**280**	**1600**	**620**	**1000**	**2400**
S-23	0 to 3 cm	-----	-----	140 U	**220**	**650**	**190**	**940**	**350**	**500**	**1600**
S-24	0 to 3 cm	-----	-----	150 U	**730**	**1000**	**170**	**860**	**420**	**2600**	**1600**
Compliance Samples											
WC-01	0 to 10 cm	-----	-----	59 U	59 U	59 U	59 U	59 U	59 U	59 U	**220**
WC-02 (City)	0 to 10 cm	-----	-----	**11.8**	**22.3**	**34.5**	**18 J**	**92.9**	**31.7**	**52.7**	**230 J**
WC-03 (City)	0 to 10 cm	-----	-----	**9.1 J**	**19.9**	**33.4**	**20.9 J**	**62.5**	**28**	**65.4**	**152 J**
WC-04	0 to 10 cm	-----	-----	140 U	140 U	140 U	140 U	**170**	140 U	**160**	**400**
WC-05	0 to 10 cm	-----	-----	120 U	120 U	**140**	120 U	**260**	120 U	**180**	**580**
WC-07	0 to 10 cm	-----	-----	62 U	62 U	**78**	62 U	**120**	62 U	**120**	**270**
WC-09	0 to 10 cm	-----	-----	89 U	89 U	**140**	89 U	**250**	89 U	**190**	**440**
WC-10	0 to 10 cm	-----	-----	67 U	**110**	**240**	67 U	**340**	**130**	**270**	**570**
WC-10 (City)	0 to 10 cm	-----	-----	**30.4 J**	**125**	**201**	90 U	**268**	**115**	**274**	**507**
WC-11 (Utilities' core)	0 to 10 cm	-----	-----	**83**	**200**	**670**	**160**	**880**	**360**	**500**	**1500**
WC-11 (City)	0 to 10 cm	-----	-----	34 UJ	**118**	**205**	**125**	**259**	**141**	**303**	**435**
WC-12	0 to 10 cm	-----	-----	100 U	**170**	**630**	**130**	**820**	**340**	**380**	**1500**
WC-12 (City)	0 to 10 cm	-----	-----	**39.3 J**	**137**	**306**	**100**	**401**	**199**	**297**	**712**
S-15 (Utilities' core)	0 to 10 cm	-----	-----	**250**	**410**	**2300**	**320**	**2300**	**1300**	**890**	**5800**
S-15 (City)	0 to 10 cm			**404**	**1040**	**3690**	**1390**	**4260**	**2410**	**2010**	**8980**
S-16	0 to 10 cm	-----	-----	**75**	**210**	**560**	**110**	**800**	**300**	**550**	**1200**
S-17 (City)	0 to 10 cm	-----	-----	**30.1 J**	**89.1**	**178**	**83**	**194**	**130**	**270**	**376**
S-18 (City)	0 to 10 cm	-----	-----	**11**	**45.3**	**62.1**	**34.8 J**	**123**	**52.6**	**122**	**202 J**
S-19	0 to 10 cm	-----	-----	**95**	**250**	**760**	**150**	**1000**	**390**	**660**	**1700**

TABLE 3 - Summary of Surface Sediment Quality Data - Utilities' Work Area -November/December 2004

Head of Thea Foss Waterway
Tacoma, Washington

PARAMETER		1,2-Dichloro-benzene	1,2,4-Trichloro-benzene	Dibenzo-furan	2-Methyl-naphthalene	Acenaphthene	Acenaph-thylene	Anthracene	Fluorene	Naphthalene	Phenanthrene
Units		(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		**50**	**51**	**540**	**670**	**500**	**1300**	**960**	**540**	**2100**	**1500**
Location	**Depth Below Mudline**	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
S-20 (City)	0 to 10 cm	-----	-----	**80.6**	**286**	**572**	**235**	**620**	**344**	**521**	**1380**
S-21 (City)	0 to 10 cm	-----	-----	**206**	**719**	**1840**	**816**	**1960**	**1330**	**1070**	**4400**
S-22 (City)	0 to 10 cm	-----	-----	**76.9**	**243**	**469**	**150**	**717**	**362**	**610**	**1190**
S-24 (City)	0 to 10 cm	-----	-----	**16.6 J**	**72.2**	**127**	**48.2**	**181**	**82.5**	**199**	**326**
S-29 (City)	0 to 10 cm	-----	-----	**93.8**	**328**	**515 J**	**182**	**757**	**384**	**844**	**1260**
Duplicate Samples											
S-32 (Dup of S-16)	0 to 10 cm	-----	-----	**92**	**280**	**770**	**170**	**1100**	**400**	**680**	**1700**
S-33 (Dup of S-21)	0 to 7 cm	-----	-----	**410**	**900**	**4000**	**660**	**4300**	**2100**	**1900**	**8600**
S-34 (Dup of WC-04)	0 to 10 cm	-----	-----	98 U	98 U	**110**	98 U	**190**	98 U	**170**	**440**

Notes: U - Not detected at indicated value

J - The numerical value is an estimated quantity.

B - The analyte was detected in the associated method blank.

nd - Not detected

----- - Not analyzed

TABLE 3 - Summary of Surface Sediment Quality Data - Utilities' Work Area -November/December 2004

Head of Thea Foss Waterway
Tacoma, Washington

PARAMETER		Total LPAHs	Benzo(a)-anthracene	Benzo(a)-pyrene	Benzo(b)-fluoranthene	Benzo(k)-fluoranthene	Benzofluoranthenes	Benzo(g,h,i)-perylene	Chrysene	Dibenz(a,h)-anthracene	Fluoranthene
Units		(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		**5200**	**1600**	**1600**	----	----	**3600**	**720**	**2800**	**230**	**2500**
Location	**Depth Below Mudline**	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Fine Grained Sediment											
RC-01	0 to 2 cm	**551**	**250**	**320**	280	280	**560**	**180**	**380**	57 U	**680**
RC-02	0 to 8 cm	**1000**	**540**	**680**	670	670	**1340**	**280**	**790**	120 U	**1500**
RC-03	0 to 12 cm	**510**	**230**	**260**	250	250	**500**	<99	**300**	99 U	**590**
RC-04	0 to 9 cm	**1190**	**480**	**610**	600	600	**1200**	**220**	**660**	120 U	**1500**
RC-05	0 to 11 cm	**580**	**230**	**280**	200	200	**400**	**150**	**300**	110 U	**580**
RC-06	0 to 5 cm	**1840**	**500**	**610**	510	510	**1020**	**220**	**630**	130 U	**1200**
RC-07	0 to 4 cm	**4550**	**1300**	**1600**	1300	1300	**2600**	**550**	**1600**	180 U	**3100**
RC-08	0 to 5 cm	**5480**	**1300**	**1500**	1300	1300	**2600**	**500**	**1500**	150 U	**3300**
RC-09	0 to 6 cm	**3300**	**950**	**1100**	980	980	**1960**	**390**	**1100**	120 U	**2500**
RC-10	0 to 3 cm	**11070**	**2400**	**2700**	2000	2000	**4000**	**660**	**2500**	**220**	**5500**
RC-12	0 to 3 cm	**7000**	**1500**	**1600**	1200	830	**2030**	**750**	**1600**	250 U	**3100**
RC-13	0 to 2 cm	**200**	**160**	**210**	210	210	**420**	**97**	**250**	58 U	**440**
RC-14	0 to 2 cm	**260**	**200**	**240**	250	250	**500**	**100**	**300**	69 U	**580**
S-16	0 to 5 cm	**8930**	**2200**	**2500**	1800	1800	**3600**	**680**	**2300**	**220**	**4600**
S-17	0 to 2 cm	**4970**	**1400**	**1600**	1400	1200	**2600**	**480**	**1500**	**200**	**2900**
S-18	0 to 7 cm	**1890**	**680**	**800**	740	740	**1480**	**270**	**820**	120 U	**1800**
S-19	0 to 4 cm	**11760**	**2600**	**2800**	2000	2000	**4000**	**790**	**2600**	**260**	**5800**
S-20	0 to 2 cm	**2760**	**800**	**950**	730	730	**1460**	**270**	**870**	**94**	**1700**
S-21	0 to 7 cm	**17470**	**2800**	**3100**	1700	1700	**3400**	**820**	**3100**	**320**	**5900**
S-22	0 to 8 cm	**7510**	**1700**	**1800**	1300	1300	**2600**	**490**	**1800**	**160**	**3800**
S-23	0 to 3 cm	**4450**	**1100**	**1300**	740	740	**1480**	**460**	**1300**	**190**	**2400**
S-24	0 to 3 cm	**7380**	**1100**	**1200**	830	830	**1660**	**390**	**1200**	150 U	**2400**
Compliance Samples											
WC-01	0 to 10 cm	**220**	**180**	**240**	220	220	**440**	**130**	**290**	59 U	**490**
WC-02 (City)	0 to 10 cm	**482**	**183**	**194**	-----	-----	**341**	**130**	**265 B**	**39.3**	**820**
WC-03 (City)	0 to 10 cm	**382**	**121**	**125**	-----	-----	**243**	**92.9**	**170**	**34.9**	**356**
WC-04	0 to 10 cm	**730**	**320**	**400**	400	400	**800**	**140**	**440**	140 U	**950**
WC-05	0 to 10 cm	**1160**	**420**	**490**	350	350	**700**	**290**	**550**	120 U	**1100**
WC-07	0 to 10 cm	**588**	**200**	**240**	200	200	**400**	**99**	**280**	62 U	**490**
WC-09	0 to 10 cm	**1020**	**360**	**410**	380	380	**760**	**140**	**420**	89 U	**1000**
WC-10	0 to 10 cm	**1660**	**400**	**450**	350	350	**700**	**120**	**460**	67 U	**960**
WC-10 (City)	0 to 10 cm	**1490**	**286**	**312**	-----	-----	436 U	**168**	**328**	**87**	**634**
WC-11 (Utilities' core)	0 to 10 cm	**4270**	**860**	**990**	720	720	**1440**	**290**	**910**	**90**	**1900**
WC-11 (City)	0 to 10 cm	**1586**	**357**	**379**	-----	-----	**521**	**211**	**471**	**69**	**876**
WC-12	0 to 10 cm	**3970**	**830**	**880**	490	490	**980**	**460**	**880**	**110**	**1700**
WC-12 (City)	0 to 10 cm	**2152**	**324**	**316**	-----	-----	**433**	**179**	**355**	**73.6**	**709**
S-15 (Utilities' core)	0 to 10 cm	**13320**	**1900**	**2100**	1200	1200	**2400**	**620**	**2100**	**310**	**3700**
S-15 (City)	0 to 10 cm	**23780**	**3200**	**3600**	-----	-----	**3900**	**1450**	**3350**	**651**	**7390**
S-16	0 to 10 cm	**3730**	**930**	**1000**	800	800	**1600**	**280**	**990**	**60**	**2000**
S-17 (City)	0 to 10 cm	**1320**	**269**	**333**	-----	-----	**507**	**175**	**293**	**93.2**	**790**
S-18 (City)	0 to 10 cm	**642**	**176**	**170**	-----	-----	**260**	**88**	**199**	**27.7**	**659**
S-19	0 to 10 cm	**4910**	**1200**	**1200**	860	860	**1720**	**350**	**1200**	**120**	**2200**

TABLE 3 - Summary of Surface Sediment Quality Data - Utilities' Work Area -November/December 2004

Head of Thea Foss Waterway
Tacoma, Washington

PARAMETER		Total LPAHs	Benzo(a)-anthracene	Benzo(a)-pyrene	Benzo(b)-fluoranthene	Benzo(k)-fluoranthene	Benzofluoranthenes	Benzo(g,h,i)-perylene	Chrysene	Dibenz(a,h)-anthracene	Fluoranthene
Units		(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		**5200**	**1600**	**1600**	----	----	**3600**	**720**	**2800**	**230**	**2500**
Location	**Depth Below Mudline**	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
S-20 (City)	0 to 10 cm	**3958**	**687**	**741**	-----	-----	**958**	**347**	**730**	**171**	**1530**
S-21 (City)	0 to 10 cm	**12135**	**1760**	**1740**	-----	-----	**2210**	**875**	**1860**	**277**	**3530**
S-22 (City)	0 to 10 cm	**3741**	**762**	**763**	-----	-----	**1040**	**421**	**872**	**114**	**1390**
S-24 (City)	0 to 10 cm	**1036**	**212**	**231**	-----	-----	**342**	**128**	**314**	**73.1**	**522**
S-29 (City)	0 to 10 cm	**4270**	**908**	**931**	-----	-----	**1270**	**516**	**1070**	**100**	**1620**
Duplicate Samples											
S-32 (Dup of S-16)	0 to 10 cm	**5100**	**1300**	**1400**	1000	1000	**2000**	**420**	**1400**	**140**	**2700**
S-33 (Dup of S-21)	0 to 7 cm	**22460**	**3700**	**4000**	2400	2400	**4800**	**960**	**3900**	**390**	**8000**
S-34 (Dup of WC-04)	0 to 10 cm	**910**	**360**	**440**	450	450	**900**	**160**	**490**	98 U	**1100**

Notes: U - Not detected at indicated value

J - The numerical value is an estimated quantity.

B - The analyte was detected in the associated method blank.

nd - Not detected

----- - Not analyzed

TABLE 3 - Summary of Surface Sediment Quality Data - Utilities' Work Area -November/December 2004

Head of Thea Foss Waterway
Tacoma, Washington

PARAMETER		Indeno(1,2,3-cd)pyrene	Pyrene	Total HPAHs	Dimethyl-phthalate	Diethyl-phthalate	Di-n-butyl-phthalate	Butylbenzyl-phthalate	*bis* (2-Ethylhexyl)-phthalate	Di-n-octyl-phthalate	4,4'-DDE	4,4'-DDD	4,4'-DDT
Units		(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		**690**	**3300**	**17000**	**160**	**200**	**1400**	**900**	**1300**	**6200**	**9**	**16**	**34**
Location	**Depth Below Mudline**	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Fine Grained Sediment													
RC-01	0 to 2 cm	**230**	**560**	**3160**	57 U	57 U	57 U	**120**	**1300 B**	57 U	2.0 U	2.0 U	2.0 U
RC-02	0 to 8 cm	**340**	**1100**	**6570**	120 U	120 U	120 U	**270**	**2700 B**	120 U	1.9 U	**2.4**	3.7 U
RC-03	0 to 12 cm	**120**	**520**	**2520**	99 U	99 U	99 U	99 U	**940 B**	99 U	2.0 U	2.0 U	2.0 U
RC-04	0 to 9 cm	**260**	**940**	**5870**	120 U	120 U	120 U	**180**	**1800 B**	120 U	2.0 U	**1.4 J**	2.0 U
RC-05	0 to 11 cm	**190**	**500**	**2630**	110 U	110 U	110 U	**120**	**940 B**	110 U	2.0 U	2.0 U	2.0 U
RC-06	0 to 5 cm	**260**	**930**	**5370**	130 U	130 U	130 U	**190**	**1700 B**	130 U	1.9 U	**2.9**	1.9 U
RC-07	0 to 4 cm	**650**	**2200**	**13600**	180 U	180 U	180 U	**420**	**4500 B**	180 U	2.0 U	**3.0**	2.0 U
RC-08	0 to 5 cm	**600**	**2800**	**14100**	150 U	150 U	150 U	**400**	**3100 B**	150 U	2.0 U	**3.5**	2.0 U
RC-09	0 to 6 cm	**480**	**2000**	**10480**	120 U	120 U	120 U	**290**	**2600 B**	120 U	1.9 U	**3.9**	1.9 U
RC-10	0 to 3 cm	**930**	**4500**	**23410**	180 U	180 U	**470 B**	**360**	**2800 B**	180 U	2.0 U	**7.0**	2.0 U
RC-12	0 to 3 cm	**890**	**3100**	**14570**	250 U	250 U	250 U	**300**	**1800 B**	250 U	1.9 U	**15**	13 U
RC-13	0 to 2 cm	**120**	**340**	**2037**	58 U	58 U	58 U	**85**	**830 B**	58 U	2.0 U	2.0 U	2.0 U
RC-14	0 to 2 cm	**130**	**430**	**2480**	69 U	69 U	69 U	**85**	**790 B**	69 U	1.9 U	1.9 U	**3.2**
S-16	0 to 5 cm	**850**	**4500**	**21450**	60 U	60 U	**100**	**460**	**3600**	60 U	5.6 U	**12**	13 U
S-17	0 to 2 cm	**560**	**2600**	**13840**	47 U	47 U	**84**	**320**	**2900**	47 U	1.9 U	**4.8**	1.9 U
S-18	0 to 7 cm	**340**	**1400**	**7590**	120 U	120 U	120 U	**270**	**2000 B**	120 U	2.0 U	**2.9**	2.0 U
S-19	0 to 4 cm	**1100**	**5700**	**25650**	70 U	70 U	**72**	**410**	**3200**	70 U	3.4 U	**7.9**	2.0 U
S-20	0 to 2 cm	**340**	**1600**	**8084**	31 U	31 U	**55**	**460**	**1500**	31 U	2.0 U	**1.7**	2.0 U
S-21	0 to 7 cm	**1100**	**5400**	**25940**	230 U	230 U	230 U	**280**	**2000 B**	230 U	8.8 U	**26**	26 U
S-22	0 to 8 cm	**660**	**3200**	**16210**	160 U	160 U	160 U	**320**	**2200 B**	160 U	2.0 U	**3.5**	2.0 U
S-23	0 to 3 cm	**600**	**2100**	**10930**	140 U	140 U	140 U	**190**	**1500 B**	140 U	2.0 U	**4.6**	2.0 U
S-24	0 to 3 cm	**520**	**1900**	**10370**	150 U	150 U	150 U	**260**	**2000 B**	150 U	1.9 U	**6.5**	1.9 U
Compliance Samples													
WC-01	0 to 10 cm	**160**	**390**	**2320**	59 U	59 U	59 U	**70**	**810 B**	59 U	2.0 U	2.0 U	2.0 U
WC-02 (City)	0 to 10 cm	**106**	**441**	**2519**	**3.7 J**	**6.7 J**	**59 J**	**4.0**	**371 J**	**54**	**3.5 J**	**5.5**	**13**
WC-03 (City)	0 to 10 cm	**89.4**	**393**	**1625**	5 UJ	8 UJ	**36 B**	4.9 U	**275 JB**	4 U	**3.7 J**	**3.7 J**	**12**
WC-04	0 to 10 cm	**170**	**600**	**3820**	140 U	140 U	140 U	140 U	**1000 B**	140 U	2.0 U	**2.1**	**20**
WC-05	0 to 10 cm	**340**	**890**	**4780**	120 U	120 U	120 U	**230**	**1300 B**	120 U	2.0 U	**2.4**	2.0 U
WC-07	0 to 10 cm	**120**	**380**	**2209**	62 U	62 U	62 U	**100**	**3800 B**	62 U	1.9 U	**1.7 J**	1.9 U
WC-09	0 to 10 cm	**180**	**690**	**3960**	89 U	89 U	89 U	**130**	**900 B**	89 U	2.0 U	2.0 U	2.0 U
WC-10	0 to 10 cm	**150**	**740**	**3980**	67 U	67 U	67 U	67 U	**620 B**	67 U	2.0 U	**1.3 J**	2.0 U
WC-10 (City)	0 to 10 cm	**144**	**823**	**2782**	26 U	47 UJ	51 UJB	28 U	**464**	24 U	**1.7 J**	**2.0 J**	**5.9**
WC-11 (Utilities' core)	0 to 10 cm	**390**	**2000**	**8870**	26 U	26 U	**27**	**210**	**1500**	26 U	1.9 U	**6.5**	1.9 U
WC-11 (City)	0 to 10 cm	**179**	**947**	**4010**	32 U	59 UJ	56 UJB	**186 J**	**675**	**89 J**	**11**	**13**	**16**
WC-12	0 to 10 cm	**590**	**1700**	**8130**	100 U	100 U	100 U	**180**	**880 B**	100 U	2.0 U	**5.7**	2.0 U
WC-12 (City)	0 to 10 cm	**146**	**945**	**3481**	150 U	150 UJ	**150 B**	299 U	**309**	299 U	**6.1**	**2.9**	**8.1**
S-15 (Utilities' core)	0 to 10 cm	**860**	**4800**	**18790**	48 U	48 U	48 U	**120**	**1100**	48 U	10 U	**28**	23 U
S-15 (City)	0 to 10 cm	**1330**	**10200**	**35071**	44 U	80 UJ	193 UJB	48 U	**1250**	41 U	**23**	**35**	**30**
S-16	0 to 10 cm	**360**	**2100**	**9320**	47 U	47 U	47 U	**240**	**1600**	47 U	2.0 U	**6.2**	2.0 U
S-17 (City)	0 to 10 cm	**170**	**988**	**3618**	25 U	47 UJ	63 UJB	28 U	**698 J**	**124**	2.3 U	**2.5**	**6.4**
S-18 (City)	0 to 10 cm	**78**	**323**	**1981**	3 UJ	5 UJ	**43 B**	**92**	**313 JB**	3 U	**1.4**	**2.6**	**8.6**
S-19	0 to 10 cm	**450**	**2300**	**10740**	34 U	34 U	**53**	**220**	**1600**	34 U	2.0 U	**7.7**	2.0 U

TABLE 3 - Summary of Surface Sediment Quality Data - Utilities' Work Area -November/December 2004

Head of Thea Foss Waterway
Tacoma, Washington

PARAMETER		Indeno(1,2,3-cd)pyrene	Pyrene	Total HPAHs	Dimethyl-phthalate	Diethyl-phthalate	Di-n-butyl-phthalate	Butylbenzyl-phthalate	*bis* (2-Ethylhexyl)-phthalate	Di-n-octyl-phthalate	4,4'-DDE	4,4'-DDD	4,4'-DDT
Units		(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		**690**	**3300**	**17000**	**160**	**200**	**1400**	**900**	**1300**	**6200**	**9**	**16**	**34**
Location	**Depth Below Mudline**	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
S-20 (City)	0 to 10 cm	**348**	**2070**	**7582**	31 U	56 UJ	84 UJB	**274 J**	**674**	29 U	2.9 UJ	**4.4**	**11**
S-21 (City)	0 to 10 cm	**770**	**4760**	**17782**	39 U	73 UJ	37 UJ	43 U	**652**	**187 J**	**14**	**18**	**19**
S-22 (City)	0 to 10 cm	**385**	**1760**	**7507**	29 U	53 U	**121 J**	**220 J**	**1310**	**63 J**	**2.4 J**	**5.2**	**7.8**
S-24 (City)	0 to 10 cm	**129**	**645**	**2596**	25 U	45 UJ	23 UJ	27 U	**558**	23 U	**1.0 J**	**1.8 J**	**5.7**
S-29 (City)	0 to 10 cm	**448**	**2070 J**	**8933**	29 U	52 UJ	**130 J**	**307**	**1940**	**96 J**	**2.1 J**	**4.9**	**7.7**
Duplicate Samples													
S-32 (Dup of S-16)	0 to 10 cm	**520**	**2600**	**12480**	44 U	<44	**64**	**240**	**2400**	44 U	2.0 U	**3.0**	2.0 U
S-33 (Dup of S-21)	0 to 7 cm	**1300**	**7200**	**34250**	230 U	<230	<230	**340**	**2600 B**	230 U	2.0 U	**5.2**	2.0 U
S-34 (Dup of WC-04)	0 to 10 cm	**200**	**730**	**4380**	98 U	<98	<98	**140**	**1300 B**	98 U	2.0 U	**1.5 J**	2.0 U

Notes: U - Not detected at indicated value

J - The numerical value is an estimated quantity.

B - The analyte was detected in the associated method blank.

nd - Not detected

----- - Not analyzed

TABLE 3 - Summary of Surface Sediment Quality Data - Utilities' Work Area -November/December 2004

PARAMETER		Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs
Units		(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		----	----	----	----	----	----	----	**300**
Location	Depth Below Mudline	-----	-----	-----	-----	-----	-----	-----	-----
Fine Grained Sediment									
RC-01	0 to 2 cm	20 U	20 U	20 U	20 U	20 U	20 U	39 U	39 U
RC-02	0 to 8 cm	19 U	19 U	19 U	19 U	19 U	**30**	**23**	**53**
RC-03	0 to 12 cm	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
RC-04	0 to 9 cm	20 U	20 U	20 U	20 U	20 U	**22 J**	20 U	**22**
RC-05	0 to 11 cm	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
RC-06	0 to 5 cm	19 U	19 U	19 U	19 U	19 U	**34**	**24**	**58**
RC-07	0 to 4 cm	20 U	20 U	20 U	20 U	20 U	**31**	**23**	**54**
RC-08	0 to 5 cm	19 U	19 U	19 U	19 U	**25**	**32**	**21 J**	**78**
RC-09	0 to 6 cm	19 U	19 U	19 U	19 U	**25**	**42**	**27**	**94**
RC-10	0 to 3 cm	20 U	20 U	20 U	20 U	**38**	**52**	**33**	**123**
RC-12	0 to 3 cm	19 U	19 U	19 U	19 U	**64**	**89**	**59**	**212**
RC-13	0 to 2 cm	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
RC-14	0 to 2 cm	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
S-16	0 to 5 cm	19 U	19 U	19 U	19 U	**43**	**100**	**79**	**222**
S-17	0 to 2 cm	19 U	19 U	19 U	19 U	**20 J**	**42**	**26**	**88**
S-18	0 to 7 cm	20 U	20 U	20 U	20 U	**22 J**	**35**	**23 J**	**80**
S-19	0 to 4 cm	20 U	20 U	20 U	20 U	**30**	**59**	**40**	**129**
S-20	0 to 2 cm	20 U	20 U	20 U	20 U	20 U	**18**	20 U	**18**
S-21	0 to 7 cm	20 U	20 U	20 U	20 U	**90**	**160**	**120**	**370**
S-22	0 to 8 cm	20 U	20 U	20 U	20 U	**23**	**32**	**19 J**	**74**
S-23	0 to 3 cm	20 U	20 U	20 U	20 U	**30**	**40**	**26**	**96**
S-24	0 to 3 cm	19 U	19 U	19 U	19 U	**36**	**56**	**37**	**129**
Compliance Samples									
WC-01	0 to 10 cm	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
WC-02 (City)	0 to 10 cm	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	**34.5**	**31.9**	**66**
WC-03 (City)	0 to 10 cm	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	**30**	**26**	**56 J**
WC-04	0 to 10 cm	20 U	20 U	20 U	20 U	20 U	**22 J**	20 U	**22**
WC-05	0 to 10 cm	20 U	20 U	20 U	20 U	20 U	**24**	20 U	**24**
WC-07	0 to 10 cm	19 U	19 U	19 U	19 U	19 U	**21 J**	19 U	**21**
WC-09	0 to 10 cm	20 U	20 U	20 U	20 U	**18 J**	**28**	**18 J**	**64**
WC-10	0 to 10 cm	20 U	20 U	20 U	20 U	20 U	**19 J**	20 U	**19**
WC-10 (City)	0 to 10 cm	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	**36.6**	**36.1**	**73**
WC-11 (Utilities' core)	0 to 10 cm	19 U	19 U	19 U	19 U	**23**	**48**	**28**	**99**
WC-11 (City)	0 to 10 cm	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	**111**	**96**	**207**
WC-12	0 to 10 cm	20 U	20 U	20 U	20 U	**24**	**41**	**27**	**92**
WC-12 (City)	0 to 10 cm	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	**81.7**	**75.5**	**157**
S-15 (Utilities' core)	0 to 10 cm	19 U	19 U	19 U	19 U	**62**	**120**	**93**	**275**
S-15 (City)	0 to 10 cm	6.2 U	6.2 U	6.2 U	6.2 U	6.2 U	**165**	**170**	**335**
S-16	0 to 10 cm	20 U	20 U	20 U	20 U	**25 J**	**50**	**31**	**106**
S-17 (City)	0 to 10 cm	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	**41.4**	**34.7**	**76**
S-18 (City)	0 to 10 cm	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	**38.1**	**31.8**	**70**
S-19	0 to 10 cm	20 U	20 U	20 U	20 U	**30**	**61**	**44**	**135**

TABLE 3 - Summary of Surface Sediment Quality Data - Utilities' Work Area -November/December 2004

PARAMETER		Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs
Units		(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		----	----	----	----	----	----	----	**300**
Location	**Depth Below Mudline**	-----	-----	-----	-----	-----	-----	-----	-----
S-20 (City)	0 to 10 cm	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	**61.9**	**59.9**	**121.8**
S-21 (City)	0 to 10 cm	5.8 U	5.8 U	5.8 U	5.8 U	5.8 U	**145**	**145**	**290**
S-22 (City)	0 to 10 cm	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	**60.3**	**47.5**	**108**
S-24 (City)	0 to 10 cm	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	**27.4**	**29.0**	**56**
S-29 (City)	0 to 10 cm	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	**66**	**49.7**	**116**
Duplicate Samples									
S-32 (Dup of S-16)	0 to 10 cm	20 U	20 U	20 U	20 U	20 U	**31**	20 U	**31**
S-33 (Dup of S-21)	0 to 7 cm	20 U	20 U	20 U	20 U	**25**	**35**	**22 J**	**82**
S-34 (Dup of WC-04)	0 to 10 cm	20 U	20 U	20 U	20 U	20 U	**21 J**	20 U	**21**

Notes: U - Not detected at indicated value

J - The numerical value is an estimated quantity.

B - The analyte was detected in the associated method blank.

nd - Not detected

----- - Not analyzed

TABLE 4 - Summary of Surface Sediment Quality Data - City Work Area - September to December 2004

PARAMETER					Sb	As	Cd	Cr	Cu	Pb	Hg	Ni	Ag	Zn
Units					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SQO					150	57	5.1	---	390	450	0.59	140	6.1	410
Location	Depth Below Mudline	Sample Date	% solids	% TOC	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Waterway Cap Samples - Utilities Work Area														
Sediment Samples - City's Work Area														
RA20-001(post dredge surface)	0 to 10cm	9/17/2004	36.1	14.6	-----	**20.7**	-----	-----	**262**	**863**	**1.3**	-----	-----	**346**
RA22-001 (post dredge surface)	0 to 10cm	9/17/2004	55.1	3.6	-----	**9**	-----	-----	**79.4**	**114**	**0.82 J**	-----	-----	**141**
RA22-002 (post dredge surface)	0 to 10cm	9/17/2004	45.1	4.5	-----	**10.6**	-----	-----	**103**	**219**	**1.31 J**	-----	-----	**221**
RA22-003 (post dredge surface)	0 to 10cm	9/17/2004	54.1	2.9	-----	**7.6**	-----	-----	**63.8**	**133**	**0.66 J**	-----	-----	**137**
RA20-005 (first lift cap)	0 to 10cm	10/7/2004	92.6	0.19	-----	**1.2 J**	-----	-----	**11**	**1.7**	**0.01**	-----	-----	**16.3**
RA22-004 (first lift cap)	0 to 10cm	10/7/2004	89.1	0.62	-----	**1.8**	-----	-----	**15.5**	**9.8**	**0.03**	-----	-----	**26**
CA-20-01 (first lift cap)	0 to 2 cm	11/9/2004	80.9	1.28	-----	**4.92**	-----	-----	**30.9**	**37.3**	**0.11**	-----	-----	**55.4**
CA-20-01 (first lift cap)	0 to 10cm	11/9/2004	90.4	0.69	-----	**3.14**	-----	-----	**16.6**	**13.7**	**0.02**	-----	-----	**29.7**
CA-22-02 (first lift cap)	0 to 2 cm	11/9/2004	53.6	5.84	-----	**10.1**	-----	-----	**90.7**	**176**	**0.31**	-----	-----	**175**
CA-22-02 (first lift cap)	0 to 10cm	11/9/2004	80.8	1.01	-----	**3.34**	-----	-----	**24.3**	**30.7**	**0.06**	-----	-----	**46.2**
CA-19B-03 (final cap over grout mat)	0 to 2 cm	11/9/2004	50.9	4.7	-----	**11.3**	-----	-----	**93.1**	**165**	**0.27**	-----	-----	**178**
CA-19B-03 (final cap over grout mat)	0 to 10cm	11/9/2004	78.4	3.99	-----	**3.23**	-----	-----	**30.8**	**44.4**	**0.14**	-----	-----	**53.5**
CA-20-04 (first lift cap)	0 to 2 cm	11/9/2004	44.1	4.82	-----	**13**	-----	-----	**115**	**200**	**0.30**	-----	-----	**212**
CA-20-04 (first lift cap)	0 to 10cm	11/9/2004	82.3	2.9	-----	**3.52**	-----	-----	**25.4**	**31.5**	**0.06**	-----	-----	**44.3**
CA-22-05 (first lift cap)	0 to 10cm	11/9/2004	84.7	4.04	-----	**3.18**	-----	-----	**23.2**	**36**	**0.12**	-----	-----	**45**
CA-22-05B (first lift	0 to 2 cm	11/9/2004	34.8	8.29	-----	**17.5**	-----	-----	**181**	**390**	**0.74**	-----	-----	**372**
CA-22-05 (first lift cap)	0 to 2 cm	11/9/2004	96.2	0.15	-----	**1.53 J**	-----	-----	**5.62**	**2.24**	**0.005 J**	-----	-----	**14.1**
CA-19B-06 (final cap over grout mat)	0 to 2 cm	11/9/2004	37.1	7.14	-----	**14.6**	-----	-----	**139**	**251**	**0.48**	-----	-----	**279**
CA-19B-06 (final cap over grout mat)	0 to 10cm	11/9/2004	77.7	2.06	-----	**4.45**	-----	-----	**34.1**	**46.2**	**0.10**	-----	-----	**65.1**
CA-21-07 (pre-dredge)	0 to 2 cm	11/9/2004	40.8	6.24	-----	**16.3**	-----	-----	**147**	**343**	**0.35**	-----	-----	**298**
CA-21-07 (pre-dredge)	0 to 10cm	11/9/2004	36.3	7.58	-----	**19.5**	-----	-----	**189**	**434**	**1.06**	-----	-----	**459**
CA-20-08 (dup CA20-01 0 to 10 cm)	0 to 10 cm	11/9/2004	89.7	0.38	-----	**2.69**	-----	-----	**14.6**	**10.1**	**0.03**	-----	-----	**29.6**
RA-19A-022 (final surface)	0 to 2 cm	12/2/2004	85.4	1.21	-----	**2.47**	-----	-----	**17**	**10.1 J**	**0.04**	-----	-----	**29.6**
RA-19A-022 (final surface)	0 to 10cm	12/2/2004	96.2	0.37	-----	**1.6 J**	-----	-----	**9.73**	**5.4 J**	0.005 U	-----	-----	**21.7**
RA-19A-023 (final surface)	0 to 2 cm	12/2/2004	77	1.3	-----	**3.66**	-----	-----	**27.6**	**25.4 J**	**0.07**	-----	-----	**74.4**
RA-19A-023 (final surface)	0 to 10cm	12/2/2004	93.1	0.15	-----	**1.7 J**	-----	-----	**11.2**	**3.7 J**	**0.014 J**	-----	-----	**18.7**
RA-19A-024 (final surface)	0 to 2 cm	12/2/2004	41.1	5	-----	**11.3**	-----	-----	**98.7**	**152 J**	**0.38**	-----	-----	**178**
RA-19A-024	0 to 10cm	12/2/2004	78.7	1.28	-----	**3.35**	-----	-----	**26.9**	**28.6 J**	**0.05**	-----	-----	**47.5**

TABLE 4 - Summary of Surface Sediment Quality Data - City Work Area - September to December 2004

PARAMETER					Sb	As	Cd	Cr	Cu	Pb	Hg	Ni	Ag	Zn
Units					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SQO					**150**	**57**	**5.1**	**---**	**390**	**450**	**0.59**	**140**	**6.1**	**410**
Location	**Depth Below Mudline**	**Sample Date**	**% solids**	**% TOC**	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
RA19A-025 (dup of RA19A-022 0 to 10cm)	0 to 10 cm	12/2/2004	95.5	0.37	-----	**2.16**	-----	-----	**6.62**	**1.51 J**	0.005 U	-----	-----	**12.2**

Notes: *U = nondetected at the associated value*
UJ = nondetect may be biased low due to low spike recoveries
J = associated value is considered an estimate
nd - Not detected

TABLE 4 - Summary of Surface Sediment Quality Data - City Work Area - September to December 2004

Head of Thea Foss Waterway
Tacoma, Washington

PARAMETER		% gravel	% cs. sand	% med. sand	% fine sand	% silt	% clay	% fines	1,2-Dichloro-benzene	1,3-Dichloro-benzene	1,4-Dichloro-benzene	1,2,4-Trichloro-benzene
Units									(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		-----	-----	-----	-----	-----	-----	-----	**50**	**170**	**110**	**51**
Location	**Depth Below Mudline**	> 2000 µm	2000-500 µm	500-250 µm	250-62 µm	62.5-3.9 µm	< 3.9 µm	< 62.5 µm	-----	-----	-----	-----
Waterway Cap Samples - Utilities Work Area												
Sediment Samples - City's Work Area												
RA20-001(post dredge surface)	0 to 10cm	-----	-----	-----	-----	-----	-----	-----	3.7 UJ	4.7 UJ	4.6 UJ	4.7 UJ
RA22-001 (post dredge surface)	0 to 10cm	-----	-----	-----	-----	-----	-----	-----	2.4 UJ	3.1 UJ	3.0 UJ	3.1 UJ
RA22-002 (post dredge surface)	0 to 10cm	-----	-----	-----	-----	-----	-----	-----	3.0 U	3.7 U	3.7 U	3.7 U
RA22-003 (post dredge surface)	0 to 10cm	-----	-----	-----	-----	-----	-----	-----	2.5 U	3.1 U	3.1 U	3.1 U
RA20-005 (first lift cap)	0 to 10cm	-----	-----	-----	-----	-----	-----	-----	0.73 U	0.91 U	0.90 U	0.91 U
RA22-004 (first lift cap)	0 to 10cm	-----	-----	-----	-----	-----	-----	-----	0.75 U	0.94 U	0.93 U	0.94 U
CA-20-01 (first lift cap)	0 to 2 cm	-----	-----	-----	-----	-----	-----	-----	0.81 U	1.0 U	1.0 U	1.0 U
CA-20-01 (first lift cap)	0 to 10cm	-----	-----	-----	-----	-----	-----	-----	0.73 U	0.92 U	0.91 U	0.91 U
CA-22-02 (first lift cap)	0 to 2 cm	-----	-----	-----	-----	-----	-----	-----	1.25 U	1.57 U	1.55 U	1.57 U
CA-22-02 (first lift cap)	0 to 10cm	-----	-----	-----	-----	-----	-----	-----	0.81 U	1.02 U	1.00 U	1.01 U
CA-19B-03 (final cap over grout mat)	0 to 2 cm	-----	-----	-----	-----	-----	-----	-----	1.32 U	1.65 U	1.63 U	1.65 U
CA-19B-03 (final cap over grout mat)	0 to 10cm	-----	-----	-----	-----	-----	-----	-----	0.85 U	1.06 U	1.05 U	1.06 U
CA-20-04 (first lift cap)	0 to 2 cm	-----	-----	-----	-----	-----	-----	-----	1.51 U	1.89 U	1.86 U	1.88 U
CA-20-04 (first lift cap)	0 to 10cm	-----	-----	-----	-----	-----	-----	-----	0.80 U	1.00 U	0.99 U	1.00 U
CA-22-05 (first lift cap)	0 to 10cm	-----	-----	-----	-----	-----	-----	-----	0.77 U	0.97 U	0.95 U	0.96 U
CA-22-05B (first lift	0 to 2 cm	-----	-----	-----	-----	-----	-----	-----	1.86 U	2.34 U	2.31 U	2.33 U
CA-22-05 (first lift cap)	0 to 2 cm	-----	-----	-----	-----	-----	-----	-----	0.68 U	0.86 U	0.85 U	0.85 U
CA-19B-06 (final cap over grout mat)	0 to 2 cm	-----	-----	-----	-----	-----	-----	-----	1.82 U	2.28 U	2.25 U	2.27 U
CA-19B-06 (final cap over grout mat)	0 to 10cm	-----	-----	-----	-----	-----	-----	-----	0.86 U	1.08 U	1.07 U	1.08 U
CA-21-07 (pre-dredge)	0 to 2 cm	-----	-----	-----	-----	-----	-----	-----	1.60 U	2.00 U	1.98 U	2.00 U
CA-21-07 (pre-dredge)	0 to 10cm	-----	-----	-----	-----	-----	-----	-----	1.84 U	2.31 U	2.28 U	2.30 U
CA-20-08 (dup CA20-01 0 to 10 cm)	0 to 10 cm	-----	-----	-----	-----	-----	-----	-----	0.73 U	0.92 U	0.91 U	0.92 U
RA-19A-022 (final surface)	0 to 2 cm	-----	-----	-----	-----	-----	-----	-----	0.77 U	0.97 U	0.96 U	0.96 U
RA-19A-022 (final surface)	0 to 10cm	-----	-----	-----	-----	-----	-----	-----	0.70 U	0.88 U	0.87 U	0.88 U
RA-19A-023 (final surface)	0 to 2 cm	-----	-----	-----	-----	-----	-----	-----	0.88 U	1.10 U	1.08 U	1.09 U
RA-19A-023 (final surface)	0 to 10cm	-----	-----	-----	-----	-----	-----	-----	0.71 U	0.90 U	0.88 U	0.89 U
RA-19A-024 (final surface)	0 to 2 cm	-----	-----	-----	-----	-----	-----	-----	1.63 U	2.04 U	2.02 U	2.04 U
RA-19A-024	0 to 10cm	-----	-----	-----	-----	-----	-----	-----	0.84 U	1.05 U	1.04 U	1.05 U

TABLE 4 - Summary of Surface Sediment Quality Data - City Work Area - September to December 2004

PARAMETER		% gravel	% cs. sand	% med. sand	% fine sand	% silt	% clay	% fines	1,2-Dichloro-benzene	1,3-Dichloro-benzene	1,4-Dichloro-benzene	1,2,4-Trichloro-benzene
Units									(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		-----	-----	-----	-----	-----	-----	-----	**50**	**170**	**110**	**51**
Location	**Depth Below Mudline**	> 2000 µm	2000-500 µm	500-250 µm	250-62 µm	62.5-3.9 µm	< 3.9 µm	< 62.5 µm	-----	-----	-----	-----
RA19A-025 (dup of RA19A-022 0 to 10cm)	0 to 10 cm	-----	-----	-----	-----	-----	-----	-----	0.68 U	0.86 U	0.84 U	0.85 U

Notes: *U = nondetected at the associated value*
UJ = nondetect may be biased low due to low spike recoveries
J = associated value is considered an estimate
nd - Not detected

TABLE 4 - Summary of Surface Sediment Quality Data - City Work Area - September to December 2004

Head of Thea Foss Waterway
Tacoma, Washington

PARAMETER		Dibenzo-furan	2-Methyl-naphthalene	Acenaphthene	Acenaph-thylene	Anthracene	Fluorene	Naphthalene	Phenanthrene	Total LPAHs	Benzo(a)-anthracene	Benzo(a)-pyrene
Units		(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		540	670	500	1300	960	540	2100	1500	5200	1600	1600
Location	Depth Below Mudline	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Waterway Cap Samples - Utilities Work Area												
Sediment Samples - City's Work Area												
RA20-001(post dredge surface)	0 to 10cm	48.2	169 J	325 J	150 J	416 J	228 J	202 J	1010 J	2331	552 J	656 J
RA22-001 (post dredge surface)	0 to 10cm	947	6510	9320 J	1610 J	8470 J	5740 J	10000 J	20700 J	55840	6470 J	7120 J
RA22-002 (post dredge surface)	0 to 10cm	798	5390	6860	1260	6400	4090	9860	15000	43470	4580	5060
RA22-003 (post dredge surface)	0 to 10cm	512	2950	5610	1040	6070	2660	7960	12400	35740	4090	4750
RA20-005 (first lift cap)	0 to 10cm	0.49 U	1.9 J	5.0	2.1	3.4	2.4	4.7	10.3	27.9	6.6	7.3
RA22-004 (first lift cap)	0 to 10cm	28.3	89.3	225	41.6	196	112	218	371	1164	161	159
CA-20-01 (first lift cap)	0 to 2 cm	102	435	887	159	889	521	1100	2000	5991	826	979
CA-20-01 (first lift cap)	0 to 10cm	12.6	47.7	106	33.9	181	52.6	103	290	814	159	147
CA-22-02 (first lift cap)	0 to 2 cm	152	688	1590	335	1460	852	1660	3440	10025	1300	1140
CA-22-02 (first lift cap)	0 to 10cm	48.3	254	522	91	358	229	560	881	2895	308	302
CA-19B-03 (final cap over grout mat)	0 to 2 cm	135	457	12700	430	1640	701	964	3270	20162	1210	1280
CA-19B-03 (final cap over grout mat)	0 to 10cm	80.3	223	674	160	669	391	451	1580	4148	473	605
CA-20-04 (first lift cap)	0 to 2 cm	136	589	1370	342	1200	747	1200	2950	8398	1130	1180
CA-20-04 (first lift cap)	0 to 10cm	74.3	328	650	154	557	336	759	1340	4124	717	598
CA-22-05 (first lift cap)	0 to 10cm	164	1070	1730	214	1370	844	2280	3470	10978	965	794
CA-22-05B (first lift	0 to 2 cm	295	3890	6580	606	5690	4620	6150	12700	40236	7390	7300
CA-22-05 (first lift cap)	0 to 2 cm	17.4	78.4	171	35.3	163	72.5	129	394	1043	132	143
CA-19B-06 (final cap over grout mat)	0 to 2 cm	503	2220	4910	1130	4820	2660	2230	11000	28970	4130	4160
CA-19B-06 (final cap over grout mat)	0 to 10cm	102	318	893	216	986	392	786	1910	5501	844	764
CA-21-07 (pre-dredge)	0 to 2 cm	375	1940	4060	627	3440	1960	3120	8020	23167	2270	2280
CA-21-07 (pre-dredge)	0 to 10cm	169	652	1800	463	1430	865	1150	3610	9970	1290	1440
CA-20-08 (dup CA20-01 0 to 10 cm)	0 to 10 cm	16.2	77.6	110	27.9	126	55.6	221	226	844	113	114
RA-19A-022 (final surface)	0 to 2 cm	11.5	37.8	51.7	30.7	76.6	36.6	117	158	508	80.2	115
RA-19A-022 (final surface)	0 to 10cm	2.5 J	8.15	7.84	6.13	9.01	7.54	25.4	26.1	90.2	19.8	21.9
RA-19A-023 (final surface)	0 to 2 cm	15.2	74.4	91.5	49	179	76	213	291	974	179	189
RA-19A-023 (final surface)	0 to 10cm	4.68 J	16.3	17.9	8.49	18.7	15.1	48.8	41.1	166	31.7	32.1
RA-19A-024 (final surface)	0 to 2 cm	63.7	264	578	265	826	483	620	1660	4696	771	759
RA-19A-024	0 to 10cm	23.9	98.3	174	73.8	308	129	289	445	1517	253	257

TABLE 4 - Summary of Surface Sediment Quality Data - City Work Area - September to December 2004

PARAMETER		Dibenzo-furan	2-Methyl-naphthalene	Acenaphthene	Acenaph-thylene	Anthracene	Fluorene	Naphthalene	Phenanthrene	Total LPAHs	Benzo(a)-anthracene	Benzo(a)-pyrene
Units		(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		**540**	**670**	**500**	**1300**	**960**	**540**	**2100**	**1500**	**5200**	**1600**	**1600**
Location	**Depth Below Mudline**	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
RA19A-025 (dup of RA19A-022 0 to 10cm)	0 to 10 cm	**3.3 J**	**8.46**	**9.16**	**5.38**	**10.2**	**7.71**	**24.3**	**19.2**	**84.4**	**15.6**	**21.2**

Notes:
U = nondetected at the associated value
UJ = nondetect may be biased low due to low spike recoveries
J = associated value is considered an estimate
nd - Not detected

TABLE 4 - Summary of Surface Sediment Quality Data - City Work Area - September to December 2004

Head of Thea Foss Waterway
Tacoma, Washington

PARAMETER		Benzofluoranthenes	Benzo(g,h,i)-perylene	Chrysene	Dibenz(a,h)-anthracene	Fluoranthene	Indeno(1,2,3-cd)pyrene	Pyrene	Total HPAHs	Dimethyl-phthalate	Diethyl-phthalate	Di-n-butyl-phthalate
Units		(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		**3600**	**720**	**2800**	**230**	**2500**	**690**	**3300**	**17000**	**160**	**200**	**1400**
Location	**Depth Below Mudline**	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Waterway Cap Samples - Utilities Work Area												
Sediment Samples - City's Work Area												
RA20-001(post dredge surface)	0 to 10cm	**818**	**291 J**	**612 J**	**108 J**	**792 J**	**264 J**	**1220 J**	**5313 J**	**13 J**	**21 J**	**85 J**
RA22-001 (post dredge surface)	0 to 10cm	**7360**	**2320 J**	**6600 J**	**932 J**	**10400 J**	**2250 J**	**13300 J**	**56752**	**19 J**	**17 J**	**85 J**
RA22-002 (post dredge surface)	0 to 10cm	**6270**	**1750**	**4310**	**787**	**8330**	**1730**	**10400**	**43217**	8.5 U	**23.5 J**	**87.7**
RA22-003 (post dredge surface)	0 to 10cm	**6740**	**1650**	**4340**	**760**	**6960**	**1670**	**8640**	**39600**	**9.2 J**	**19.3 J**	**65.3**
RA20-005 (first lift cap)	0 to 10cm	**9.9**	**3.8**	**4.9**	0.66 U	**14.7**	**3.8**	**19.4**	**70.4**	2.1 U	**4.6 J**	**16.1**
RA22-004 (first lift cap)	0 to 10cm	**172**	**79.2**	**176**	**35.1**	**282**	**69.6**	**412**	**1546**	2.2 U	4.0 U	**22.7**
CA-20-01 (first lift cap)	0 to 2 cm	**1130**	**0.57**	**699**	**93.7**	**1780**	**212**	**2060**	**7780**	2.3 U	4.3 U	44.6 U
CA-20-01 (first lift cap)	0 to 10cm	**159**	**67.6**	**156**	0.67 U	**304**	**54.8**	**399**	**1446**	2.1 U	3.9 U	7.3 U
CA-22-02 (first lift cap)	0 to 2 cm	**1310**	**501**	**1060**	**152**	**2470**	**377**	**2930**	**11240**	3.6 U	6.7 U	**76.9**
CA-22-02 (first lift cap)	0 to 10cm	**299**	**135**	**276**	**53**	**620**	**62.8**	**825**	**2881**	2.3 U	4.3 U	2.2 U
CA-19B-03 (final cap over grout mat)	0 to 2 cm	**1540**	**591**	**1270**	**190**	**2580**	**393**	**2790**	**11844**	3.8 U	7.0 U	3.5 U
CA-19B-03 (final cap over grout mat)	0 to 10cm	**633**	**181**	**582**	0.73 U	**1180**	**161**	**1330**	**5145**	2.4 U	4.5 U	2.3 U
CA-20-04 (first lift cap)	0 to 2 cm	**1470**	**507**	**1160**	**159**	**1980**	**439**	**2540**	**10565**	4.3 U	8.0 U	4.0 U
CA-20-04 (first lift cap)	0 to 10cm	**731**	**198**	**635**	**78.2**	**1030**	**141**	**1490**	**5618**	2.3 U	4.2 U	41.4 U
CA-22-05 (first lift cap)	0 to 10cm	**922**	**252**	**908**	**90.3**	**2120**	**202**	**2770**	**9023**	2.2 U	4.1 U	2.1 U
CA-22-05B (first lift	0 to 2 cm	2.5 U	**3330**	**4390**	**749**	2.8 U	**3140**	**10500**	**36799**	5.4 U	9.9 U	5.0 U
CA-22-05 (first lift cap)	0 to 2 cm	**149**	**56**	**113**	0.62 U	**244**	**54.8**	**312**	**1204**	2.0 U	3.6 U	10.8 U
CA-19B-06 (final cap over grout mat)	0 to 2 cm	**4900**	**621**	**4040**	**329**	**7240**	**1740**	**9440**	**36600**	5.2 U	9.7 U	4.9 U
CA-19B-06 (final cap over grout mat)	0 to 10cm	**896**	**244**	**6510**	**73.6**	**1530**	**232**	**1820**	**12914**	2.5 U	4.6 U	2.3 U
CA-21-07 (pre-dredge)	0 to 2 cm	**2560**	**1110**	**2250**	**292**	**4090**	**990**	**5700**	**21542**	4.6 U	8.5 U	**117**
CA-21-07 (pre-dredge)	0 to 10cm	**1630**	**424**	**1130**	**262**	**2230**	**344**	**3310**	**12060**	5.3 U	9.8 U	**106**
CA-20-08 (dup CA20-01 0 to 10 cm)	0 to 10 cm	**143**	**52.7**	**108**	**13.2**	**226**	**40.7**	**293**	**1104**	2.1 U	3.9 U	2.0 U
RA-19A-022 (final surface)	0 to 2 cm	**186**	**56.7**	**126**	**16.7**	**242**	**49.1**	**302**	**1174**	**4.4 J**	**14.1**	34.9 U
RA-19A-022 (final surface)	0 to 10cm	**38.4**	**16.4**	**23.8**	0.64 U	**48.2**	**15.3**	**57.4**	**241**	2.0 U	3.7 U	13.0 U
RA-19A-023 (final surface)	0 to 2 cm	**259**	**87.4**	**213**	**25.1**	**338**	**70.1**	**401**	**1762**	2.5 U	**9.4 J**	23.3 U
RA-19A-023 (final surface)	0 to 10cm	**55.3**	**21.4**	**32.7**	0.65 U	**69.4**	**18.7**	**91.2**	**353**	2.1 U	**6.2 J**	11.0 U
RA-19A-024 (final surface)	0 to 2 cm	**895**	**289**	**845**	**103**	**1600**	**286**	**2140**	**7688**	**23 J**	**53.1**	61.0 U
RA-19A-024	0 to 10cm	**285**	**105**	**259**	**36.3**	**526**	**84.4**	**692**	**2498**	2.4 U	4.5 U	27.4 U

TABLE 4 - Summary of Surface Sediment Quality Data - City Work Area - September to December 2004

PARAMETER		Benzofluoranthenes	Benzo(g,h,i)-perylene	Chrysene	Dibenz(a,h)-anthracene	Fluoranthene	Indeno(1,2,3-cd)pyrene	Pyrene	Total HPAHs	Dimethyl-phthalate	Diethyl-phthalate	Di-n-butyl-phthalate
Units		(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		**3600**	**720**	**2800**	**230**	**2500**	**690**	**3300**	**17000**	**160**	**200**	**1400**
Location	**Depth Below Mudline**	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
RA19A-025 (dup of RA19A-022 0 to 10cm)	0 to 10 cm	**35**	**12.9**	**22.9**	0.62 U	**38.9**	**14.2**	**47.1**	**208**	2.0 U	3.6 U	14.7 U

Notes:

U = nondetected at the associated value
UJ = nondetect may be biased low due to low spike recoveries
J = associated value is considered an estimate
nd - Not detected

TABLE 4 - Summary of Surface Sediment Quality Data - City Work Area - September to December 2004

Head of Thea Foss Waterway
Tacoma, Washington

PARAMETER		Butylbenzyl-phthalate	*bis* (2-Ethylhexyl)-phthalate	Di-n-octyl-phthalate	4,4'-DDD	4,4'-DDE	4,4'-DDT	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs
Units		(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		900	1300	6200	16	9	34	----	----	----	----	----	----	----	300
Location	Depth Below Mudline	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Waterway Cap Samples - Utilities Work Area															
Sediment Samples - City's Work Area															
RA20-001(post dredge surface)	0 to 10cm	**204 J**	**1810 J**	**71.9 J**	**47.3**	**15.3**	**88**	6.3 U	6.3 U	6.3 U	6.3 U	6.3 U	**620**	**567**	**1187**
RA22-001 (post dredge surface)	0 to 10cm	**1560 J**	**62 J**	**56.0 J**	**20.1**	**12**	**18.8**	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	**174**	**148**	**322**
RA22-002 (post dredge surface)	0 to 10cm	**105**	**408**	**33.0 J**	**33.3**	**19.6**	**31.6**	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	**266**	**248**	**514**
RA22-003 (post dredge surface)	0 to 10cm	**90.6**	**383**	**24.8 J**	**25.9**	**14.1**	**22.7**	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	**193**	**168**	**361**
RA20-005 (first lift cap)	0 to 10cm	**14.2 J**	**46.7**	2.0 U	0.20 U	0.20 U	0.23 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	1.7 U	1.7 U	3.1 U
RA22-004 (first lift cap)	0 to 10cm	2.4 U	**120**	2.0 U	**1.88 J**	**0.23 J**	**1.03 J**	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	1.8 U	**11.9**	**11.9**
CA-20-01 (first lift cap)	0 to 2 cm	**205**	**174**	2.2 U	**4.13**	**3.14**	**6.9**	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	**40.6**	**37.4**	**78.0**
CA-20-01 (first lift cap)	0 to 10cm	2.3 U	**116**	2.0 U	**0.61 J**	0.18 U	0.21 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	**8.4 J**	**8.3 J**	**16.7**
CA-22-02 (first lift cap)	0 to 2 cm	4.0 U	3.4 U	3.4 U	**12.4**	**12.7**	**24.5**	4.6 U	4.6 U	4.6 U	4.6 U	4.6 U	**172**	**171**	**343**
CA-22-02 (first lift cap)	0 to 10cm	2.6 U	**134**	2.2 U	**2.66**	**1.97**	**4.2**	2.9 U	2.9 U	2.9 U	2.9 U	2.9 U	1.6 U	**29.3**	**29**
CA-19B-03 (final cap over grout mat)	0 to 2 cm	4.2 U	**270**	3.6 U	**18.7**	**13.7**	**26.4**	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	**185**	**194**	**379**
CA-19B-03 (final cap over grout mat)	0 to 10cm	2.7 U	**162**	2.3 U	**4.79**	**4.11**	**8.0**	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	**49.9**	**61.9**	**112**
CA-20-04 (first lift cap)	0 to 2 cm	**239**	**201**	4.1 U	**21.8**	**16.2**	**34.4**	6.2 U	6.2 U	6.2 U	6.2 U	6.2 U	**216**	**217**	**433**
CA-20-04 (first lift cap)	0 to 10cm	2.5 U	**190**	2.2 U	**2.7**	**2.2 J**	**4.9**	3.4 U	3.4 U	3.4 U	3.4 U	3.4 U	**32.4**	**33.3**	**66**
CA-22-05 (first lift cap)	0 to 10cm	2.4 U	**165**	2.1 U	**4.06**	**2.88**	**6.06**	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	**35.9**	**38.5**	**74**
CA-22-05B (first lift	0 to 2 cm	5.9 U	5.0 U	5.1 U	**49.5**	**17.8**	**61.9**	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	**405**	**434**	**839**
CA-22-05 (first lift cap)	0 to 2 cm	2.2 U	55.6 U	1.9 U	0.18 U	0.18 U	0.21 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	1.5 U	**4.3 J**	**4.3**
CA-19B-06 (final cap over grout mat)	0 to 2 cm	**509**	**317**	4.9 U	**28.4**	**10.3**	**44.2**	5.8 U	5.8 U	5.8 U	5.8 U	5.8 U	**284**	**278**	**562**
CA-19B-06 (final cap over grout mat)	0 to 10cm	**160**	**239**	2.3 U	**3.18**	**2.67**	**5.55**	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	**33.1**	**41.2**	**74**
CA-21-07 (pre-dredge)	0 to 2 cm	5.0 U	**385**	4.3 U	**41.9**	**13.2**	**53.3**	5.8 U	5.8 U	5.8 U	5.8 U	5.8 U	**361**	**334**	**695**
CA-21-07 (pre-dredge)	0 to 10cm	5.8 U	5.0 U	5.0 U	**69.9**	**54.9**	**62.8**	5.7 U	5.7 U	5.7 U	5.7 U	5.7 U	**452**	**431**	**883**
CA-20-08 (dup CA20-01 0 to 10 cm)	0 to 10 cm	56.1 U	**121**	2.0 U	**0.68 J**	0.19 U	0.23 U	2.9 U	2.9 U	2.9 U	2.9 U	2.9 U	**8.4 J**	**10.2**	**19**
RA-19A-022 (final surface)	0 to 2 cm	2.4 U	**192**	**37.6**	**1.1 J**	0.2 U	**5.48**	3.4 U	3.4 U	3.4 U	3.4 U	3.4 U	**19.3**	**18.6**	**38**
RA-19A-022 (final surface)	0 to 10cm	**18.1 J**	44.3 U	**9.0 J**	**2.14**	0.2 U	**4.05**	2.9 U	2.9 U	2.9 U	2.9 U	2.9 U	1.6 U	**31.8 J**	**32**
RA-19A-023 (final surface)	0 to 2 cm	**89.1 J**	**256**	**11.9 J**	**3.63**	**1.2 J**	**8.45**	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	**39.4**	**39.1**	**79**
RA-19A-023 (final surface)	0 to 10cm	2.3 U	54.4 U	1.9 U	**2.74**	**2.0 J**	**5.41**	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	**64.1 J**	**60.7 J**	**125**
RA-19A-024 (final surface)	0 to 2 cm	5.1 U	**474**	**91.1**	**23.6**	**19.5**	**35.1**	6.7 U	6.7 U	6.7 U	6.7 U	6.7 U	**176**	**166**	**342**
RA-19A-024	0 to 10cm	**69.6**	**200**	2.3 U	**3.13**	**1.7 J**	**7.46**	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U	**46.8**	**44.2**	**91**

TABLE 4 - Summary of Surface Sediment Quality Data - City Work Area - September to December 2004

Head of Thea Foss Waterway
Tacoma, Washington

PARAMETER		Butylbenzyl-phthalate	*bis* (2-Ethylhexyl)-phthalate	Di-n-octyl-phthalate	4,4'-DDD	4,4'-DDE	4,4'-DDT	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs
Units		(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		**900**	**1300**	**6200**	**16**	**9**	**34**	----	----	----	----	----	----	----	**300**
Location	**Depth Below Mudline**	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
RA19A-025 (dup of RA19A-022 0 to 10cm)	0 to 10 cm	2.2 U	**57.2**	1.9 U	0.20 U	0.20 U	0.23 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	1.6 U	**4.2 J**	**4.2**

Notes:

U = nondetected at the associated value
UJ = nondetect may be biased low due to low spike recoveries
J = associated value is considered an estimate
nd - Not detected

TABLE 5 - Summary of Core Sediment Quality Data - Utilities' Work Area - November 22, 2004

Thea Foss Waterway
Tacoma, Washington

PARAMETER						As	Cu	Pb	Hg	Ni	Zn	gravel	v. cs. sand
Units				(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	%	%
SQO				-----	-----	57	390	450	0.59	140	410	-----	-----
Location	Depth Below Mudline	Sample Date	% solids	Diesel-Range TPH-Dx	Lube-Range	-----	-----	-----	-----	-----	-----	> 2000 µm	1000-2000 µm
Utilities' Split Sample Results													
Site 15	0 to 10 cm	11/22/04	53.1	**1100**	**2300**	**11**	**104**	**140**	**0.67**	**27**	**179**	5.4	3.9
(TT-UA-02)	10 to 20 cm	11/22/04	84.8	**9.5**	**35**	**9**	**85.1**	**5**	0.05 U	**19**	**42.2**	49.5	8.8
	30 to 40 cm	11/22/04	84.0	**27**	**77**	6 U	**31.8**	**5**	0.05 U	**17**	**33.6**	20.4	11.7
	50 to 60 cm	11/22/04	84.9	5 U	**12**	6 U	**37.5**	2 U	0.05 U	**20**	**36.5**	23.4	15.1
	70 to 80 cm	11/22/04	85.4	5 U	10 U	5 U	**34.1**	2 U	0.05 U	**17**	**32.9**	36.5	18.7
RC 11	0 to 10 cm	11/22/04	60.4	**190**	**545**	**15**	**139**	**91**	**0.36**	**25**	**135**	36.3	6
(TT-UA-01)	10 to 20 cm	11/22/04	88.6	5 U	**22**	**6**	**59.3**	**3**	0.04 U	**17**	**38.6**	50.5	11.3
	30 to 40 cm	11/22/04	87.2	5 U	**13**	6 U	**30.4**	2 U	0.04 U	**16**	**32.4**	28.1	9.6
	50 to 60 cm	11/22/04	87.4	5 U	10 U	6 U	**34.7**	2 U	0.05 U	**19**	**31.9**	27.3	14.6
City's Split Sample Results													
Site 15	0 to 10 cm	11/22/04	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
(TT-UA-02)	10 to 20 cm	11/22/04	87.8	-----	-----	-----	-----	**4.1**	**0.018 J**	-----	**38.2**	-----	-----
	20 to 30 cm	11/22/04	90.5	-----	-----	-----	-----	**1.5**	**0.006 J**	-----	**24.1**	-----	-----
	30 to 40 cm	11/22/04	83.0	-----	-----	-----	-----	**4.7**	**0.008 J**	-----	**27.3**	-----	-----
	40 to 50 cm	11/22/04	83.1	-----	-----	-----	-----	**4.8**	**0.020 J**	-----	**23.0**	-----	-----
	50 to 60 cm	11/22/04	87.5	-----	-----	-----	-----	**1.5**	**0.008 J**	-----	**25.5**	-----	-----
	60 to 70 cm	11/22/04	88.2	-----	-----	-----	-----	**1.1**	**0.007 J**	-----	**28.3**	-----	-----
	70 to 80 cm	11/22/04	88.8	-----	-----	-----	-----	**0.9 J**	**0.006 J**	-----	**26.5**	-----	-----
RC 11	0 to 10 cm	11/22/04	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
(TT-UA-01)	10 to 20 cm	11/22/04	91.4	-----	-----	-----	-----	**2.0**	**0.008 J**	-----	**27.0**	-----	-----
	20 to 30 cm	11/22/04	86.5	-----	-----	-----	-----	**1.6**	**0.010 J**	-----	**37.7**	-----	-----
	30 to 40 cm	11/22/04	88.1	-----	-----	-----	-----	**1.2**	0.005 U	-----	**25.2**	-----	-----
	40 to 50 cm	11/22/04	85.9	-----	-----	-----	-----	**0.77 J**	**0.010 J**	-----	**26.1**	-----	-----
	50 to 60 cm	11/22/04	89.5	-----	-----	-----	-----	**0.70 J**	0.005 U	-----	**18.3**	-----	-----

Notes: U - Not detected at indicated value
J - The numerical value is an estimated quantity.
B - The analyte was detected in the associated method blank.

TABLE 5 - Summary of Core Sediment Quality Data - Utilities' Work Area - November 22, 2004

Thea Foss Waterway
Tacoma, Washington

PARAMETER		cs. sand	med. sand	fine sand	v. fine sand	silt	clay	fines	1,3-Dichloro-benzene	1,4-Dichloro-benzene	1,2-Dichloro-benzene
Units		%	%	%	%	%	%	%	(ug/kg)	(ug/kg)	(ug/kg)
SQO		-----	-----	-----	-----	-----	-----	-----	**170**	**110**	**50**
Location	**Depth Below Mudline**	500-1000 µm	500-250 µm	250-125 µm	125-62 µm	62.5-3.9 µm	< 3.9 µm	< 62.5 µm	-----	-----	-----
Utilities' Split Sample Results											
Site 15	0 to 10 cm	5	10.5	14	8.8	34.6	17.8	52.4	-----	-----	-----
(TT-UA-02)	10 to 20 cm	9.3	14.8	11	2.3	2.7	1.6	4.3	-----	-----	-----
	30 to 40 cm	15.8	27.4	18.3	2.3	2.4	1.6	4	-----	-----	-----
	50 to 60 cm	19.3	24.4	13	2	1.9	0.8	2.7	-----	-----	-----
	70 to 80 cm	18.6	17.3	6.4	0.4	1.4	0.5	1.9	-----	-----	-----
RC 11	0 to 10 cm	5.4	7.2	7.1	5.3	20.3	12.4	32.7	-----	-----	-----
(TT-UA-01)	10 to 20 cm	10.5	13.1	9.7	2.2	1.6	1.1	2.7	-----	-----	-----
	30 to 40 cm	14.4	28.3	16.9	1.7	0.5	0.6	1.1	-----	-----	-----
	50 to 60 cm	17.7	23.8	13.4	1.4	0.7	1.1	1.8	-----	-----	-----
City's Split Sample Results											
Site 15	0 to 10 cm	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
(TT-UA-02)	10 to 20 cm	-----	-----	-----	-----	-----	-----	-----	0.95 U	0.94 U	0.76 U
	20 to 30 cm	-----	-----	-----	-----	-----	-----	-----	0.92 U	0.91 U	0.73 U
	30 to 40 cm	-----	-----	-----	-----	-----	-----	-----	0.99 U	0.97 U	0.79 U
	40 to 50 cm	-----	-----	-----	-----	-----	-----	-----	1.00 U	0.99 U	0.80 U
	50 to 60 cm	-----	-----	-----	-----	-----	-----	-----	0.93 U	0.92 U	0.74 U
	60 to 70 cm	-----	-----	-----	-----	-----	-----	-----	0.97 U	0.95 U	0.77 U
	70 to 80 cm	-----	-----	-----	-----	-----	-----	-----	0.94 U	0.93 U	0.75 U
RC 11	0 to 10 cm	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
(TT-UA-01)	10 to 20 cm	-----	-----	-----	-----	-----	-----	-----	0.92 U	0.91 U	0.73 U
	20 to 30 cm	-----	-----	-----	-----	-----	-----	-----	0.97 U	0.96 U	0.77 U
	30 to 40 cm	-----	-----	-----	-----	-----	-----	-----	0.94 U	0.93 U	0.75 U
	40 to 50 cm	-----	-----	-----	-----	-----	-----	-----	0.95 U	0.94 U	0.76 U
	50 to 60 cm	-----	-----	-----	-----	-----	-----	-----	0.92 U	0.91 U	0.73 U

Notes: U - Not detected at indicated value
J - The numerical value is an estimated quantity.
B - The analyte was detected in the associated method blank.

TABLE 5 - Summary of Core Sediment Quality Data - Utilities' Work Area - November 22, 2004

Thea Foss Waterway
Tacoma, Washington

PARAMETER		1,2,4-Trichloro-benzene	Dibenzo-furan	Naphthalene	Acenaph-thylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	2-Methyl-naphthalene	Total LPAHs
Units		(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		51	540	2100	1300	500	540	1500	960	670	5200
Location	Depth Below Mudline	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Utilities' Split Sample Results											
Site 15	0 to 10 cm	-----	**250**	**890**	**320**	**2300**	**1300**	**5800**	**2300**	**410**	**13320**
(TT-UA-02)	10 to 20 cm	-----	19 U	19 U	19 U	19 U	19 U	**42**	19 U	19 U	**42**
	30 to 40 cm	-----	20 U	**36**	20 U	**45**	20 U	**61**	**35**	20 U	**177**
	50 to 60 cm	-----	19 U	**21**	19 U	19 U	19 U	19 U	19 U	19 U	**21**
	70 to 80 cm	-----	**79**	**47**	20 U	**87**	**76**	**160**	20 U	20 U	**370**
RC 11	0 to 10 cm	-----	**83**	**500**	**160**	**670**	**360**	**1500**	**880**	**200**	**4270**
(TT-UA-01)	10 to 20 cm	-----	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
	30 to 40 cm	-----	19 U	19 U	19 U	19 U	19 U	**72**	**130**	19 U	**202**
	50 to 60 cm	-----	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
City's Split Sample Results											
Site 15	0 to 10 cm	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
(TT-UA-02)	10 to 20 cm	0.95 U	0.52 U	**8.7**	**2.8**	**7.8**	**5.5**	**17.2**	**10.0**	**3.2**	**55**
	20 to 30 cm	0.91 U	0.50 U	**1.8 J**	0.63 U	**1.5 J**	**1.5 J**	**2.9**	**1.1 J**	**1.0 J**	**10**
	30 to 40 cm	0.98 U	0.53 U	**16.8**	**6.32**	**17.2**	**9.35**	**39.4**	**23.8**	**7.6**	**120**
	40 to 50 cm	1.00 U	**1.3 J**	**18.0**	**4.8**	**16.7**	**5.6**	**21.8**	**13.8**	**5.2**	**86**
	50 to 60 cm	0.93 U	0.51 U	**15.0**	0.65 U	**6.0**	**1.7 J**	**2.6**	**2.6**	**2.2 J**	**30**
	60 to 70 cm	0.96 U	**4.3 J**	**18.6**	**0.75 J**	**11.5**	**3.3**	**3.0**	**1.3 J**	**2.0 J**	**40**
	70 to 80 cm	0.94 U	**28.6**	**23.8**	**0.74 J**	**39.4**	**22.9**	**52.6**	0.42 U	**3.42**	**143**
RC 11	0 to 10 cm	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
(TT-UA-01)	10 to 20 cm	0.92 U	0.50 U	**2.1 J**	**1.5 J**	**0.95 J**	0.70 U	**2.2**	**2.3**	0.56 U	**9**
	20 to 30 cm	0.97 U	0.53 U	**2.9**	**3.2**	**2.2 J**	**2.5**	**5.8**	**2.1**	**1.4 J**	**20**
	30 to 40 cm	0.94 U	0.51 U	**1.2 J**	**2.6**	**0.74 J**	**1.3 J**	**2.3**	**2.4**	**0.93 J**	**11**
	40 to 50 cm	0.95 U	0.52 U	0.99 U	0.66 U	0.57 U	0.72 U	0.66 U	0.43 U	0.58 U	0.99 U
	50 to 60 cm	0.92 U	0.50 U	0.96 U	0.64 U	0.55 U	0.70 U	0.64 U	0.41 U	0.56 U	0.96 U

Notes: U - Not detected at indicated value
J - The numerical value is an estimated quantity.
B - The analyte was detected in the associated method blank.

TABLE 5 - Summary of Core Sediment Quality Data - Utilities' Work Area - November 22, 2004

Thea Foss Waterway
Tacoma, Washington

PARAMETER		Fluoranthene	Pyrene	Benzo(a)-anthracene	Chrysene	Benzo(b)-fluoranthene	Benzo(k)-fluoranthene	Benzofluor-anthenes	Benzo(a)-pyrene	Indeno(1,2,3-cd)pyrene	Dibenz(a,h)-anthracene
Units		(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		**2500**	**3300**	**1600**	**2800**	----	----	**3600**	**1600**	**690**	**230**
Location	**Depth Below Mudline**	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Utilities' Split Sample Results											
Site 15	0 to 10 cm	**3700**	**4800**	**1900**	**2100**	**1200**	**1200**	**2400**	**2100**	**860**	**310**
(TT-UA-02)	10 to 20 cm	**42**	**58**	**21**	**24**	19 U	19 U	19 U	19 U	19 U	19 U
	30 to 40 cm	**88**	**120**	**41**	**48**	**26**	**41**	**67**	**43**	**32**	20 U
	50 to 60 cm	19 U	**22**	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
	70 to 80 cm	**26**	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
RC 11	0 to 10 cm	**1900**	**2000**	**860**	**910**	**720**	**720**	**1440**	**990**	**390**	**90**
(TT-UA-01)	10 to 20 cm	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
	30 to 40 cm	**230**	**330**	**160**	**160**	**76**	**76**	**152**	**160**	**76**	19 U
	50 to 60 cm	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
City's Split Sample Results											
Site 15	0 to 10 cm	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
(TT-UA-02)	10 to 20 cm	**13.7**	**21.0**	**8.1**	**8.5**	-----	-----	**11.7**	**9.1**	**4.8**	0.69 U
	20 to 30 cm	**4.0**	**2.9**	1.1 U	0.77 U	-----	-----	0.98 U	0.68 U	0.49 U	0.67 U
	30 to 40 cm	**31.4**	**50.1**	**19.4**	**20.5**	-----	-----	**28.7**	**24.9**	**12.2**	0.72 U
	40 to 50 cm	**34.1**	**34.6**	**22.6**	**20.5**	-----	-----	**24.3**	**16.9**	**9.24**	0.73 U
	50 to 60 cm	**7.0**	**7.7**	1.1 U	0.78 U	-----	-----	0.99 U	0.69 U	0.50 U	0.68 U
	60 to 70 cm	**3.3**	**3.8**	1.1 U	0.81 U	-----	-----	1.0 U	**1.8**	<0.52	0.70 U
	70 to 80 cm	**12.5**	**8.8**	1.1 U	0.79 U	-----	-----	1.0 U	<0.70	<0.51	0.69 U
RC 11	0 to 10 cm	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
(TT-UA-01)	10 to 20 cm	**5.6**	**9.6**	<1.1	**3.7**	-----	-----	**4.1 J**	**1.8 J**	**1.2 J**	0.67 U
	20 to 30 cm	**16.7**	**25.9**	**5.4**	**7.5**	-----	-----	**9.6**	**5.3**	**3.1**	0.71 U
	30 to 40 cm	**9.0**	**15.9**	1.1 U	**5.6**	-----	-----	**6.6**	**6.1**	**2.0 J**	0.69 U
	40 to 50 cm	1.1 U	0.38 U	1.1 U	0.80 U	-----	-----	1.0 U	0.71 U	0.51 U	0.69 U
	50 to 60 cm	1.1 U	0.37 U	1.1 U	0.77 U	-----	-----	0.98 U	0.68 U	0.49 U	0.67 U

Notes: U - Not detected at indicated value
J - The numerical value is an estimated quantity.
B - The analyte was detected in the associated method blank.

TABLE 5 - Summary of Core Sediment Quality Data - Utilities' Work Area - November 22, 2004

Thea Foss Waterway
Tacoma, Washington

PARAMETER		Benzo(g,h,i)-perylene	Total HPAHs	Dimethyl-phthalate	Di-n-butyl-phthalate	Diethyl-phthalate	Butylbenzyl-phthalate	*bis* (2-Ethylhexyl)-phthalate	Di-n-octyl-phthalate	4,4'-DDE	4,4'-DDD	4,4'-DDT
Units		(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		**720**	**17000**	**160**	**1400**	**200**	**900**	**1300**	**6200**	**9**	**16**	**34**
Location	**Depth Below Mudline**	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Utilities' Split Sample Results												
Site 15	0 to 10 cm	**620**	**18790**	48 U	48 U	48 U	**120**	**1100**	48 U	10 U	**28**	23 U
(TT-UA-02)	10 to 20 cm	19 U	**145**	19 U	19 U	**21**	19 U	**42**	19 U	2 U	2 U	2 U
	30 to 40 cm	**31**	**470**	20 U	20 U	20 U	20 U	**120**	20 U	2 U	2 U	2 U
	50 to 60 cm	19 U	**22**	19 U	19 U	**24**	19 U	**19**	19 U	2 U	2 U	2 U
	70 to 80 cm	20 U	**26**	20 U	20 U	20 U	20 U	20 U	20 U	2 U	2 U	2 U
RC 11	0 to 10 cm	**290**	**8870**	26 U	**27**	26 U	**210**	**1500**	26 U	1.9 U	**6.5**	1.9 U
(TT-UA-01)	10 to 20 cm	20 U	20 U	20 U	20 U	20 U	20 U	**27**	20 U	1.9 U	1.9 U	1.9 U
	30 to 40 cm	**68**	**1336**	19 U	19 U	**25**	19 U	**22**	19 U	1.9 U	1.9 U	1.9 U
	50 to 60 cm	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	1.9 U	1.9 U	1.9 U
City's Split Sample Results												
Site 15	0 to 10 cm	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
(TT-UA-02)	10 to 20 cm	**6.1**	**82.9**	2.2 U	**3.7 JB**	**4.0 JB**	**10.0 JB**	**16.8 J**	2.1 U	0.21 U	0.21 U	0.25 U
	20 to 30 cm	0.52 U	**6.9**	2.1 U	**4.2 JB**	3.9 U	2.3 U	2.0 U	2.0 U	0.21 U	0.22 U	0.25 U
	30 to 40 cm	**13.1**	**200**	2.3 U	2.1 U	4.2 U	2.5 U	**37.9**	2.1 U	0.23 U	0.23 U	0.27 U
	40 to 50 cm	**10.1**	**172**	2.3 U	**6.2 JB**	4.2 U	2.5 U	**37.6**	2.2 U	0.24 U	0.24 U	0.28 U
	50 to 60 cm	0.53 U	**14.7**	2.2 U	**2.5 JB**	4.0 U	2.3 U	**11.9 J**	**14.9**	0.21 U	0.21 U	0.25 U
	60 to 70 cm	0.55 U	**8.9**	2.2 U	**3.0 JB**	4.1 U	2.4 U	2.1 U	2.1 U	0.21 U	0.21 U	0.25 U
	70 to 80 cm	0.53 U	**21.3**	2.2 U	2.0 U	4.0 U	2.4 U	**2.9 J**	2.0 U	0.22 U	0.23 U	0.26 U
RC 11	0 to 10 cm	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
(TT-UA-01)	10 to 20 cm	**1.9 J**	**27.9**	2.1 U	**4.2 JB**	3.9 U	**7.1 JB**	**9.3 J**	2.0 U	0.22 U	0.22 U	0.26 U
	20 to 30 cm	**3.4**	**77.0**	2.2 U	**5.1 JB**	4.1 U	2.4 U	**16.7 J**	**5.5**	0.22 U	0.23 U	0.26 U
	30 to 40 cm	**3.1**	**48.2**	2.2 U	**3.1 JB**	4.0 U	2.4 U	**9.4 J**	2.0 U	0.22 U	0.23 U	0.26 U
	40 to 50 cm	0.54 U	1.1 U	2.2 U	**2.5 JB**	4.0 U	2.4 U	**3.2 J**	2.1 U	0.23 U	0.24 U	0.27 U
	50 to 60 cm	0.52 U	1.1 U	2.1 U	**2.9 JB**	3.9 U	2.3 U	2.0 U	2.0 U	0.22 U	0.22 U	0.26 U

Notes: U - Not detected at indicated value
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TABLE 5 - Summary of Core Sediment Quality Data - Utilities' Work Area - November 22, 2004

Thea Foss Waterway
Tacoma, Washington

PARAMETER		Aroclor 1016	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1221	Aroclor 1232	Total PCBs
Units		(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		----	----	----	----	----	----	----	300
Location	Depth Below Mudline	-----	-----	-----	-----	-----	-----	-----	-----
Utilities' Split Sample Results									
Site 15	0 to 10 cm	19 U	19 U	**62**	**120**	**93**	19 U	19 U	**275**
(TT-UA-02)	10 to 20 cm	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
	30 to 40 cm	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
	50 to 60 cm	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
	70 to 80 cm	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
RC 11	0 to 10 cm	19 U	19 U	**23**	**48**	**28**	19 U	19 U	**99**
(TT-UA-01)	10 to 20 cm	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
	30 to 40 cm	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
	50 to 60 cm	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
City's Split Sample Results									
Site 15	0 to 10 cm	-----	-----	-----	-----	-----	-----	-----	-----
(TT-UA-02)	10 to 20 cm	3.1 U	3.1 U	3.1 U	1.7 U	1.7 U	3.1 U	3.1 U	3.1 U
	20 to 30 cm	3.1 U	3.1 U	3.1 U	1.7 U	1.7 U	3.1 U	3.1 U	3.1 U
	30 to 40 cm	3.4 U	3.4 U	3.4 U	1.9 U	**6.9**	3.4 U	3.4 U	**6.9**
	40 to 50 cm	3.5 U	3.5 U	3.5 U	1.9 U	**7.9**	3.5 U	3.5 U	**7.9**
	50 to 60 cm	3.1 U	3.1 U	3.1 U	1.7 U	1.7 U	3.1 U	3.1 U	3.1 U
	60 to 70 cm	3.1 U	3.1 U	3.1 U	1.7 U	1.7 U	3.1 U	3.1 U	3.1 U
	70 to 80 cm	3.3 U	3.3 U	3.3 U	1.8 U	1.8 U	3.3 U	3.3 U	3.3 U
RC 11	0 to 10 cm	-----	-----	-----	-----	-----	-----	-----	-----
(TT-UA-01)	10 to 20 cm	3.2 U	3.2 U	3.2 U	1.8 U	1.8 U	3.2 U	3.2 U	3.2 U
	20 to 30 cm	3.3 U	3.3 U	3.3 U	1.8 U	1.8 U	3.3 U	3.3 U	3.3 U
	30 to 40 cm	3.3 U	3.3 U	3.3 U	1.8 U	1.8 U	3.3 U	3.3 U	3.3 U
	40 to 50 cm	3.4 U	3.4 U	3.4 U	1.9 U	1.9 U	3.4 U	3.4 U	3.4 U
	50 to 60 cm	3.2 U	3.2 U	3.2 U	1.8 U	1.8 U	3.2 U	3.2 U	3.2 U

Notes: U - Not detected at indicated value
J - The numerical value is an estimated quantity.
B - The analyte was detected in the associated method blank.

TABLE 6 - Summary of Core Sediment Qualiy Data- City Work Area - November 29 and 30, 2004

Thea Foss Waterway
Tacoma, Washington

PARAMETER					As	Cu	Pb	Hg	Zn	1,2-Dichloro-benzene	1,3-Dichloro-benzene	1,4-Dichloro-benzene	1,2,4-Trichloro-benzene	Dibenzo-furan
Units					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO					57	390	450	0.59	410	50	170	110	51	540
Location	Depth Below Mudline	Sample Date	% solids	% TOC	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
RA20-01(a) (CA20-01)	29 to 60 cm	11/29/2004	54.4	7.8	**13.6**	**129**	**437**	**0.13**	**232**	12.4 U	15.6 U	15.4 U	15.5 U	8.4 U
	60 to 90 cm	11/29/2004	47.7	8.9	**18.7**	**174**	**405**	**0.25**	**389**	14.1 U	17.7 U	17.4 U	17.6 U	9.6 U
	90 to 104 cm	11/29/2004	50.8	6.8	**14.6**	**146**	**273**	**0.28**	**308**	12.9 U	16.2 U	16.0 U	16.1 U	8.8 U
RA20-04(a) (CA20-04)	26 to 58 cm	11/30/2004	51.2	7.2	**12.6**	**154**	**276**	**0.28**	**377**	12.7 U	15.9 U	15.7 U	15.9 U	**227**
RA22-02(a) (CA22-02)	33 to 63 cm	11/29/2004	83.8	0.7	**12.7**	**7.91**	**2.62**	0.006 U	**17.2**	0.8 U	1.0 U	1.0 U	1.0 U	**14.1**
RA22-05(a) (CA22-05)	60 to 90 cm	11/29/2004	85.5	1.0	**2.67**	**4.71**	**0.65 J**	0.005 U	**12.7**	0.8 U	1.0 U	1.0 U	1.0 U	0.5 U
RA21-07(b)	10 to 40 cm	11/30/2004	40.2	9.0	**15.4**	**170**	**402**	**0.39**	**429**	16.8 U	21.1 U	20.8 U	21.0 U	**33 J**
(CA21-07)	40 to 70 cm	11/30/2004	38.4	11.0	**8.21**	**149**	**301**	**0.54**	**422**	16.9 U	21.2 U	20.9 U	21.1 U	**4480**
	70 to 100 cm	11/30/2004	48.8	5.8	**7.55**	**94**	**149**	**0.52**	**248**	13.6 U	17.1 U	16.9 U	17.0 U	**2000**
	100 to 130 cm	11/30/2004	74.4	0.9	**4.69**	**16.8**	**17**	**0.11**	**39.6**	8.8 U	11.1 U	10.9 U	11.0 U	**667**
	130 to 150 cm	11/30/2004	81.7	0.3	**3.48**	**9.04**	**1.32**	0.006 U	**18**	0.8 U	1.0 U	1.0 U	1.0 U	**1.3 J**

Notes: (a) Cores in RA20 and RA22 characterize quality of sediment that will remain below cap
(b) Core RA21 characterizes sediment in dredge area
U - Not detected at indicated value
J - The numerical value is an estimated quantity.
B - The analyte was detected in the associated method blank.
nd - Not detected

TABLE 6 - Summary of Core Sediment Qualiy Data- City Work Area - November 29 and 30, 2004

Thea Foss Waterway
Tacoma, Washington

PARAMETER		2-Methyl-naphthalene	Acenaphthene	Acenaph-thylene	Anthracene	Fluorene	Naphthalene	Phenanthrene	Total LPAHs	Benzo(a)-anthracene	Benzo(a)-pyrene	Benzofluor-anthenes
Units		(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		**670**	**500**	**1300**	**960**	**540**	**2100**	**1500**	**5200**	**1600**	**1600**	**3600**
Location	**Depth Below Mudline**	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
RA20-01(a)	29 to 60 cm	**97.2**	**163**	**192**	**381**	**141**	**169**	**556**	**1699**	**721**	**731**	**964**
(CA20-01)	60 to 90 cm	**67.8 J**	**67.1 J**	**122 J**	**149 J**	**71.2 J**	**97.1 J**	**275 J**	**849**	**372 J**	**372**	**658 J**
	90 to 104 cm	**79.7**	**72.8**	**68.7**	**107**	**107**	**124**	**287**	**846**	**422**	**363**	**630**
RA20-04(a)	26 to 58 cm	**396**	**1650**	**516**	**1840**	**916**	**781**	**3530**	**9629**	**1480**	**2070**	**2510**
(CA20-04)												
RA22-02(a)	33 to 63 cm	**147**	**158**	**16**	**83.4**	**65.6**	**540**	**248**	**1258**	**47.6**	**80.3**	**88.2**
(CA22-02)												
RA22-05(a)	60 to 90 cm	**1.9 J**	**2.8**	**1.8 J**	**1.5 J**	**2.1 J**	**3.1**	**6.0**	**19**	1.2 U	0.74 U	1.1 U
(CA22-05)												
RA21-07(b)	10 to 40 cm	**105 J**	**145 J**	**76 J**	**187 J**	**77 J**	**146 J**	**277 J**	**1012**	**243 J**	**427 J**	**737 J**
(CA21-07)	40 to 70 cm	**38100**	**48700**	**4870**	**35700**	**22400**	**78800**	**98000**	**326570**	**21200**	**23700**	**26000**
	70 to 100 cm	**15300**	**21600**	**3620**	**19100**	**12300**	**25600**	**44600**	**142120**	**12100**	**13900**	**15900**
	100 to 130 cm	**938**	**5930**	**1810**	**11100**	**3550**	**1290**	**23400**	**48018**	**7250**	**6520**	**7290**
	130 to 150 cm	**5.1**	**9.31**	**4.44**	**9.64**	**6.41**	**7.32**	**26.5**	**69**	**7.18**	**8.83**	**12**

Notes: (a) Cores in RA20 and RA22 characterize quality of sediment that will remain below cap
(b) Core RA21 characterizes sediment in dredge area
U - Not detected at indicated value
J - The numerical value is an estimated quantity.
B - The analyte was detected in the associated method blank.
nd - Not detected

TABLE 6 - Summary of Core Sediment Qualiy Data- City Work Area - November 29 and 30, 2004

Thea Foss Waterway
Tacoma, Washington

PARAMETER		Benzo(g,h,i)-perylene	Chrysene	Dibenz(a,h)-anthracene	Fluoranthene	Indeno(1,2,3-cd)pyrene	Pyrene	Total HPAHs	Dimethyl-phthalate	Diethyl-phthalate	Di-n-butyl-phthalate	Butylbenzyl-phthalate
Units		(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		**720**	**2800**	**230**	**2500**	**690**	**3300**	**17000**	**160**	**200**	**1400**	**900**
Location	**Depth Below Mudline**	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
RA20-01(a)	29 to 60 cm	**419**	**664**	11.3 U	**1100**	**403**	**1560**	**6562**	38.5 U	66.0 U	**168 J**	39.1 U
(CA20-01)	60 to 90 cm	**389 J**	**437 J**	12.9 U	**655 J**	**416**	**793 J**	**4092**	40.6 U	74.8 U	37.7 U	44.4 U
	90 to 104 cm	**346**	**324**	11.8 U	**529**	**296**	**567**	**3477**	37.2 U	68.5 U	34.5	40.6 U
RA20-04(a)	26 to 58 cm	**1270**	**1920**	**427**	**3060**	**1090**	**4620**	**18447**	36.6 U	67.5 U	**298**	40.0 U
(CA20-04)												
RA22-02(a)	33 to 63 cm	**48.6**	**63.4**	0.74 U	**104**	**36**	**144**	**612**	2.3 U	**8.1 J**	14.3 U	2.5 U
(CA22-02)												
RA22-05(a)	60 to 90 cm	0.56 U	0.83 U	0.72 U	**2.7**	0.53 UJ	**3.7**	**6**	2.3 U	**6.6 J**	16.7 U	**15.0 J**
(CA22-05)												
RA21-07(b)	10 to 40 cm	**306 J**	**505 J**	15.4 U	**564 J**	**307 J**	**682 J**	**3771**	48.5 U	89.3 U	**193 J**	52.9 U
(CA21-07)	40 to 70 cm	**11200**	**22300**	**1770**	**40700**	**10700**	**51500**	**209070**	48.7 U	89.7 U	**430**	53.2 U
	70 to 100 cm	**6490**	**14200**	**1300**	**24100**	**5570**	**30900**	**124460**	39.3 U	72.4 U	**278**	42.9 U
	100 to 130 cm	**2560**	**7070**	**1130**	**18400**	**2270**	**11100**	**63590**	25.5 U	46.9 U	23.7	27.8 U
	130 to 150 cm	**8.41**	**8.79**	0.7 U	**17.9**	**6.83**	**20**	**90**	2.3 U	**5.2 J**	11.4 UJ	2.6 U

Notes: (a) Cores in RA20 and RA22 characterize quality of sediment that will remain below cap
(b) Core RA21 characterizes sediment in dredge area
U - Not detected at indicated value
J - The numerical value is an estimated quantity.
B - The analyte was detected in the associated method blank.
nd - Not detected

TABLE 6 - Summary of Core Sediment Qualiy Data- City Work Area - November 29 and 30, 2004

Thea Foss Waterway
Tacoma, Washington

PARAMETER		*bis* (2-Ethylhexyl)-phthalate	Di-n-octyl-phthalate	4,4'-DDD	4,4'-DDE	4,4'-DDT	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs
Units		(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO		**1300**	**6200**	**16**	**9**	**34**	----	----	----	----	----	----	----	**300**
Location	**Depth Below Mudline**	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
RA20-01(a)	29 to 60 cm	**1760**	33.6 U	**51.9 J**	**35.2 J**	**72.5 J**	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	**828**	**635**	**1463**
(CA20-01)	60 to 90 cm	**1960**	38.2 U	**142 J**	**90 J**	**109 J**	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	**1310**	**968**	**2278**
	90 to 104 cm	**1000**	34.9 U	0.36 UJ	0.36 UJ	0.42 UJ	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U	**348**	**386**	**734**
RA20-04(a)	26 to 58 cm	**1680**	34.4 U	**116.0 J**	**56.8 J**	**57.0 J**	5.8 U	5.8 U	5.8 U	5.8 U	5.8 U	**724**	**567**	**1291**
(CA20-04)														
RA22-02(a)	33 to 63 cm	39.4 U	2.2 U	0.20 UJ	0.19 UJ	0.23 UJ	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U	1.9 U	1.9 U	nd
(CA22-02)														
RA22-05(a)	60 to 90 cm	**13.3 J**	2.1 U	0.2 UJ	0.2 UJ	0.2 UJ	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	1.7 U	1.7 U	nd
(CA22-05)														
RA21-07(b)	10 to 40 cm	**1250 J**	45.5 U	**100 J**	**100 J**	**101 J**	7.3 U	7.3 U	7.3 U	7.3 U	7.3 U	**743**	**753**	**1496**
(CA21-07)	40 to 70 cm	45.5 U	45.7 U	**30.9 J**	**35.2 J**	**51.4 J**	7.6 U	7.6 U	7.6 U	7.6 U	7.6 U	**181 J**	**309 J**	**490**
	70 to 100 cm	**952**	36.9 U	0.41 UJ	0.40 UJ	0.47 UJ	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	3.3 U	**48.2**	**48**
	100 to 130 cm	23.8 U	23.9 U	0.26 UJ	0.25 UJ	0.30 UJ	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	2 U	**9.6 J**	**10**
	130 to 150 cm	11.1 UJ	2.2 U	0.22 UJ	0.22 UJ	0.25 UJ	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	1.8 U	1.8 U	nd

Notes: (a) Cores in RA20 and RA22 characterize quality of sediment that will remain below cap
(b) Core RA21 characterizes sediment in dredge area
U - Not detected at indicated value
J - The numerical value is an estimated quantity.
B - The analyte was detected in the associated method blank.
nd - Not detected

TABLE 7 – Summary of Fines Thicknesses and Sample Descriptions

Thea Foss Waterway
Tacoma, WA

Location	Easting	Northing	Date	Time	Fines Util. (cm)	Fines City (cm)	Description
RC/WC-01	1160549.3	701991.4	12/09/04	2100	1	0.5	1 cm dark brown SILT over dark brown SAND with coarse gravel. 2-3 cm black SAND indicating organic material. Leaves on surface.
RC/WC-02	1160701.6	702121.6	12/02/04	823	8	8	5-6 cm dark gray SILT over 1 cm brown SILT over gray/brown fine SAND. Sheen spots on water surface, more upon homogenizing. Slight to moderate H2S odor. Clam hole, leaf.
RC/WC-03	1160504.3	702100.8	12/02/04	848	12	10	2 mm olive brown SILT over 5 cm dark gray SILT over 3 cm light brown SILT over gray SAND at 12 cm bgs. Sheen spots on surface and 1 tiny clam.
RC/WC-04	1160562.1	702217.5	12/01/04	1214	9	8.5	2 mm olive brown SILT over ~2 cm dark gray SILT over ~2 cm brown SILT over ~2 cm dark gray SILT over ~2 cm brown SILT over gray/brown fine SAND. Sheen spots on surface and upon homogenizing. One dead crab. Slight H2S odor.
RC/WC-05	1160640.4	702361.2	12/02/04	913	11	14	2 mm olive brown SILT over 6-8 cm dark gray SILT over 3-5 cm brown SILT over fine SAND. SAND pocket at 8 cm bgs. Layers of silts not clearly stratified. Sheen spots on surface and overlying water.
RC/WC-06	1160430.8	702256	12/02/04	1011	5	4.5	2 mm olive brown SILT over 3-4 cm dark gray SILT over gray fine SAND. Trace sheen spots.
RC/WC-07	1160459.6	702373.7	12/02/04	943	4	4	2 mm olive brown SILT over 4 cm dark gray SILT with gravel and 2 large rocks over gray fine SAND. Sheen spots upon homogenizing. Slight to moderate H2S odor. Leaves, worm, barnacles.
RC/WC-08	1160563.2	702436.1	12/01/04	1505	5	4.5	5 cm dark gray SILT over brown fine to medium SAND. Silt and wood chip pocket at 6-10 cm. Sheen spots upon homogenizing.
RC/WC-09	1160653.5	702452.4	12/01/04	1424	6	6	2 mm olive brown SILT over 4 cm dark gray SILT over 2 cm brown SILT over gray/brown fine to medium SAND. Sheen spots upon homogenizing.
RC/WC-10	1160564.9	702582.9	12/01/04	1125	3	2	2 mm olive brown SILT over 3 cm dark gray SILT over gray/brown fine to medium SAND. Sheen spots on surface. Worm and worm tube.
RC/WC-11	1160665.2	702715.8	11/30/04	1323	7	7.5	2 mm olive brown SILT over 7 cm dark gray SILT over gray angular GRAVEL. Trace sheen spots on surface, more upon homogenizing. Slight H2S and petroleum odor.
RC/WC-12	1160513.6	702724.4	12/01/04	846	3	2.5	2 mm olive brown SILT over 3-5 cm dark gray SILT over brown medium to coarse SAND. Sheen spots.
RC-13	1160542.7	701895.3	12/09/04	2135	1	0.5	1 cm medium/fine SILT over SAND with coarse gravel. Black decaying material at 1 cm below surface. No odor.
RC-14	1160723.4	701873.6	12/09/04	2150	1	0.5	1 cm SILT over dark brown SAND with coarse gravel below. Black SAND layer at 2 cm. No odor
S-15	1160595.1	702760.7	11/30/04	1010	12	12	2 mm olive brown SILT over 12 cm dark gray SILT over gray angular GRAVEL. Some wood chips at 5 cm bgs. Sheen spots on surface and upon homogenizing. Slight H2S odor.
S-16	1160666.7	702641.9	11/30/04	1438	5	7	2 mm olive brown SILT over 5 cm dark gray SILT over gray angular GRAVEL. Sheen spots in dark gray SILT and upon homogenizing. Slight petroleum odor.
S-17	1160673.6	702546.9	11/30/04	1545	2	1.5	2 mm olive brown SILT over 1.5-2 cm dark gray SILT over 3 cm gray coarse SAND over gray angular GRAVEL.
S-18	1160699.9	702481.5	12/01/04	1350	7	8	2 mm olive brown SILT over 5-7 cm dark gray SILT over 2 cm brown SILT over brown fine to medium SAND. Sheen spots upon homogenizing.
S-19	1160600.0	702670.5	11/30/04	1105	4	4	2 mm olive brown SILT over 4 cm dark gray SILT over gray angular GRAVEL. Sheen spots. Slight petroleum odor.
S-20	1160602.5	702537.4	11/30/04	1240	2	1.5	1 mm olive brown SILT over 1-2 cm dark gray SILT over gray medium SAND. Trace sheen spots. Twig.
S-21	1160547.8	702726.7	12/01/04	1003	7	7	2 mm olive brown SILT over 7 cm dark gray SILT with some wood chips and twigs over brown fine SAND. Sheen spots on surface, particles on overlying water breaking up into sheen.
S-22	1160544.2	702646.5	12/01/04	1035	8	3	2 mm olive brown SILT over 8 cm dark gray SILT over gray/brown fine to medium SAND. Sheen spots on surface. Twigs.

TABLE 7 – Summary of Fines Thicknesses and Sample Descriptions

Location	Easting	Northing	Date	Time	Fines Util. (cm)	Fines City (cm) 2	Description
S-23	1160506.6	702624.5	12/01/04	913	3	2	2 mm olive brown SILT over 3-5 cm dark gray SILT over brown medium to coarse SAND. Sheen spots noted upon homogenizing.
S-24	1160509.0	702551.2	12/01/04	939	2	2	2 mm olive brown SILT over 2 cm dark gray SILT over gray/brown medium SAND. Sheen spot on surface, more spots upon homogenizing.
S-25	1160665.5	702678.2	11/30/04	1359	7	7	2 mm olive brown SILT over 7 cm dark gray SILT over gray angular GRAVEL. Sheen spots in dark gray SILT on surface. Moderate H2S odor. Mussel shells in surface, worm tube into gravel.
S-26	1160668.5	702590.6	11/30/04	1505	2	1.5	2 mm olive brown SILT over 1-2 cm dark gray SILT over gray angular GRAVEL. Trace sheen spots.
S-27	1160597.3	702705.2	11/30/04	1040	5	5	2 mm olive brown SILT over 4-6 cm dark gray SILT over gray angular GRAVEL. Some wood chips in SILT layer. Sheen spots on surface and upon homogenizing. Several shells on surface and worm tube. Slight H2S odor.
S-28	1160600.3	702589.5	11/30/04	1140	2	2	2 mm olive brown SILT over 2 cm dark gray SILT over gray angular GRAVEL. Trace sheen spots upon homogenizing. Worm tubes.
S-29	1160556.6	702607.1	12/01/04	1059	4	3	2 mm olive brown SILT over 4 cm dark gray SILT over brown fine SAND grading to medium SAND. Sheen spots. Slight H2S odor. Twigs.
S-30	1160510.9	702470.9	12/01/04	1544	1	1	1 cm brown SILT over gray/brown coarse SAND.

[1]Datum: WA State Plane Zone South, NAD 83, US survey feet.

[2] City data from draft supplemental data report – Figure 3.2 – April 18, 2005

TABLE 8 - Comparison of Split Sample Results

Thea Foss Waterway
Tacoma,Washington

PARAMETER					As	Cu	Pb	Hg	Ni	Zn	Dibenzo-furan
Units					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ug/kg)
SQO					57	390	450	0.59	140	410	540
Location	Depth Below Mudline	Sample Date	% solids	% TOC	-----	-----	-----	-----	-----	-----	-----
Pre-Dredge Spls.											
RC-11(Utilities')	0 to 2cm	8/30/2004	71.3		18	127	30	0.1	22	86.3	<200
RC-11(City)	0 to 2cm	8/30/2004	58.9	1.6	-----	-----	45.7	0.19	-----	99.6	<99
Site 15(Utilities')	0 to 2cm	8/30/2004	49.1		20	101	80	0.20	27	131	<200
Site 15(City)	0 to 2cm	8/30/2004	50.5	1.6	-----	-----	72.1	0.31	-----	123	160
Site 15(Utilities')	0 to 10 cm	8/30/2004	64.8		11	81.5	33	0.12	21	79.6	<200
Site 15(City)	0 to 10 cm	8/30/2004	62.6	0.96	-----	-----	33.8	0.22	-----	79.6	<99
Post-Dredge Spls.											
RC-11(Utilities')	0 to 2cm	9/18/2004	34.4		20	168	238	0.80	37	280	800
RC-11(City)	0 to 2cm	9/18/2004	39.1	3.2	-----	-----	160	0.83	-----	205	740
Site 15(Utilities')	0 to 2cm	9/18/2004	34.3		20	167	335	1.40	43	363	1800
Site 15(City)	0 to 2cm	9/18/2004	38.8	3.5	-----	-----	296	1.48	-----	360	2400

TABLE 8 - Comparison of Split Sample Results

Thea Foss Waterway
Tacoma,Washington

PARAMETER			Naphthalene	Acenaph-thylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	2-Methyl-naphthalene
Units			(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO			**2100**	**1300**	**500**	**540**	**1500**	**960**	**670**
Location	**Depth Below Mudline**	**Sample Date**	-----	-----	-----	-----	-----	-----	-----
Pre-Dredge Spls.									
RC-11(Utilities')	0 to 2cm	8/30/2004	<200	<200	<200	<200	**240**	<200	-----
RC-11(City)	0 to 2cm	8/30/2004	**210**	<99	**99**	<99	**430**	**180**	<99
Site 15(Utilities')	0 to 2cm	8/30/2004	**780**	**210**	**780**	**460**	**2300**	**1100**	-----
Site 15(City)	0 to 2cm	8/30/2004	**950**	**120**	**700**	**460**	**2200**	**1000**	**400**
Site 15(Utilities')	0 to 10 cm	8/30/2004	**280**	<200	**200**	<200	**580**	**360**	-----
Site 15(City)	0 to 10 cm	8/30/2004	**270**	<99	**150**	**110**	**560**	**230**	**99**
Post-Dredge Spls.									
RC-11(Utilities')	0 to 2cm	9/18/2004	**4500**	**980**	**5500**	**3200**	**15000**	**5800**	-----
RC-11(City)	0 to 2cm	9/18/2004	**3700**	**410**	**3100**	**2300**	**17000**	**4400**	**2200**
Site 15(Utilities')	0 to 2cm	9/18/2004	**11000**	**2000**	**14000**	**8000**	**35000**	**14000**	-----
Site 15(City)	0 to 2cm	9/18/2004	**14000**	**1300**	**14000**	**9300**	**48000**	**15000**	**4400**

TABLE 8 - Comparison of Split Sample Results

Thea Foss Waterway
Tacoma,Washington

PARAMETER			Total LPAHs	Fluoranthene	Pyrene	Benzo(a)-anthracene	Chrysene	Benzo(b)-fluoranthene	Benzo(k)-fluoranthene	Benzofluoranthenes
Units			(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO			**5200**	**2500**	**3300**	**1600**	**2800**	----	----	**3600**
Location	**Depth Below Mudline**	**Sample Date**	-----	-----	-----	-----	-----	-----	-----	-----
Pre-Dredge Spls.										
RC-11(Utilities')	0 to 2cm	8/30/2004	**240**	**520**	**360**	<200	**230**	<200	<200	<200
RC-11(City)	0 to 2cm	8/30/2004	**919**	**680**	**1000**	**330**	**420**	-----	-----	**700**
Site 15(Utilities')	0 to 2cm	8/30/2004	**5630**	**3200**	**2200**	**1200**	**1400**	**1100**	**1200**	**2300**
Site 15(City)	0 to 2cm	8/30/2004	**5430**	**2100**	**3500**	**1000**	**1400**	-----	-----	**2200**
Site 15(Utilities')	0 to 10 cm	8/30/2004	**1420**	**1000**	**690**	**400**	**480**	**420**	**360**	**780**
Site 15(City)	0 to 10 cm	8/30/2004	**1320**	**710**	**960**	**380**	**440**	-----	-----	**750**
Post-Dredge Spls.										
RC-11(Utilities')	0 to 2cm	9/18/2004	**34980**	**12000**	**11000**	**5200**	**5300**	**3600**	**3600**	**7200**
RC-11(City)	0 to 2cm	9/18/2004	**30910**	**4400**	**19000**	**5800**	**6300**	-----	-----	**8100**
Site 15(Utilities')	0 to 2cm	9/18/2004	**84000**	**24000**	**22000**	**10000**	**10000**	**6200**	**6200**	**12400**
Site 15(City)	0 to 2cm	9/18/2004	**101600**	**26000**	**45000**	**15000**	**16000**	-----	-----	**19000**

TABLE 8 - Comparison of Split Sample Results

Thea Foss Waterway
Tacoma,Washington

PARAMETER			Benzo(a)-pyrene	Indeno(1,2,3-cd)pyrene	Dibenz(a,h)-anthracene	Benzo(g,h,i)-perylene	Total HPAHs	Dimethyl-phthalate	Di-n-butyl-phthalate	Diethyl-phthalate
Units			(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO			**1600**	**690**	**230**	**720**	**17000**	**160**	**1400**	**200**
Location	**Depth Below Mudline**	**Sample Date**	-----	-----	-----	-----	-----	-----	-----	-----
Pre-Dredge Spls.										
RC-11(Utilities')	0 to 2cm	8/30/2004	**220**	<200	<200	<200	**1330**	<200	<200	<200
RC-11(City)	0 to 2cm	8/30/2004	**350**	**220**	<99	**280**	**3980**	**19**	<99	<99
Site 15(Utilities')	0 to 2cm	8/30/2004	**1300**	**560**	**200**	**470**	**12830**	<200	<200	<200
Site 15(City)	0 to 2cm	8/30/2004	**1400**	**740**	**210**	**890**	**13440**	**24**	**100**	<100
Site 15(Utilities')	0 to 10 cm	8/30/2004	**460**	<200	<200	<200	**3810**	<200	<200	<200
Site 15(City)	0 to 10 cm	8/30/2004	**450**	**280**	<99	**340**	**4310**	**11**	<99	<99
Post-Dredge Spls.										
RC-11(Utilities')	0 to 2cm	9/18/2004	**5100**	**1800**	**550**	**1500**	**49650**	<470	<470	<470
RC-11(City)	0 to 2cm	9/18/2004	**5500**	**2500**	**950**	**2900**	**55450**	<79	**190**	<79
Site 15(Utilities')	0 to 2cm	9/18/2004	**9900**	**3100**	**1100**	**2600**	**95100**	<510	<510	<510
Site 15(City)	0 to 2cm	9/18/2004	**14000**	**5500**	**2000**	**6400**	**148900**	<78	**250**	<78

TABLE 8 - Comparison of Split Sample Results

Thea Foss Waterway
Tacoma,Washington

PARAMETER			Butylbenzyl-phthalate	*bis* (2-Ethylhexyl)-phthalate	Di-n-octyl-phthalate	4,4'-DDE	4,4'-DDD	4,4'-DDT	Aroclor 1016	Aroclor 1242	Aroclor 1248
Units			(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO			**900**	**1300**	**6200**	**9**	**16**	**34**	----	----	----
Location	**Depth Below Mudline**	**Sample Date**	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pre-Dredge Spls.											
RC-11(Utilities')	0 to 2cm	8/30/2004	<200	**940**	<200	<3.2	<3.2	<3.2	<32	<32	<32
RC-11(City)	0 to 2cm	8/30/2004	**220**	**1600**	**140**	<2.4	<2.4	**3.6**	<13	<13	<13
Site 15(Utilities')	0 to 2cm	8/30/2004	**480**	**2400**	<200	<3.2	**9**	<11	<32	<32	<32
Site 15(City)	0 to 2cm	8/30/2004	**450**	**3100**	**180**	<3.4	**6.9**	**12.1**	<19	<19	<19
Site 15(Utilities')	0 to 10 cm	8/30/2004	**240**	**980**	<200	<3.2	<3.2	<3.2	<32	<32	<32
Site 15(City)	0 to 10 cm	8/30/2004	**180**	**1100**	<99	<2.7	<2.7	**3.4**	<15	<15	<15
Post-Dredge Spls.											
RC-11(Utilities')	0 to 2cm	9/18/2004	**820**	**6400**	<470	<10	**29**	<21	<33	<33	**66**
RC-11(City)	0 to 2cm	9/18/2004	**1200**	**12000**	**1800**	**11.3**	**20.9**	**18.6**	<19	<19	<19
Site 15(Utilities')	0 to 2cm	9/18/2004	**630**	**5100**	<510	<16	**64**	<16	<33	<33	**130**
Site 15(City)	0 to 2cm	9/18/2004	**940**	**12000**	**1600**	**13.8**	**53.9**	**47**	<20	<20	<20

TABLE 8 - Comparison of Split Sample Results

PARAMETER			Aroclor 1254	Aroclor 1260	Aroclor 1221	Aroclor 1232	Total PCBs
Units			(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO			----	----	----	----	**300**
Location	**Depth Below Mudline**	**Sample Date**	-----	-----	-----	-----	-----
Pre-Dredge Spls.							
RC-11(Utilities')	0 to 2cm	8/30/2004	<32	<32	<32	<32	<32
RC-11(City)	0 to 2cm	8/30/2004	**27**	**35**	<13	<13	**62**
Site 15(Utilities')	0 to 2cm	8/30/2004	**72**	**47**	<32	<32	**119**
Site 15(City)	0 to 2cm	8/30/2004	**48**	**46**	<19	<19	**94**
Site 15(Utilities')	0 to 10 cm	8/30/2004	**35**	<32	<32	<32	**35**
Site 15(City)	0 to 10 cm	8/30/2004	**36**	**39**	<15	<15	**75**
Post-Dredge Spls.							
RC-11(Utilities')	0 to 2cm	9/18/2004	**130**	**84**	<33	<33	**280**
RC-11(City)	0 to 2cm	9/18/2004	**162**	**139**	<19	<19	**301**
Site 15(Utilities')	0 to 2cm	9/18/2004	**230**	**180**	<33	<33	**540**
Site 15(City)	0 to 2cm	9/18/2004	**287**	**243**	<20	<20	**530**

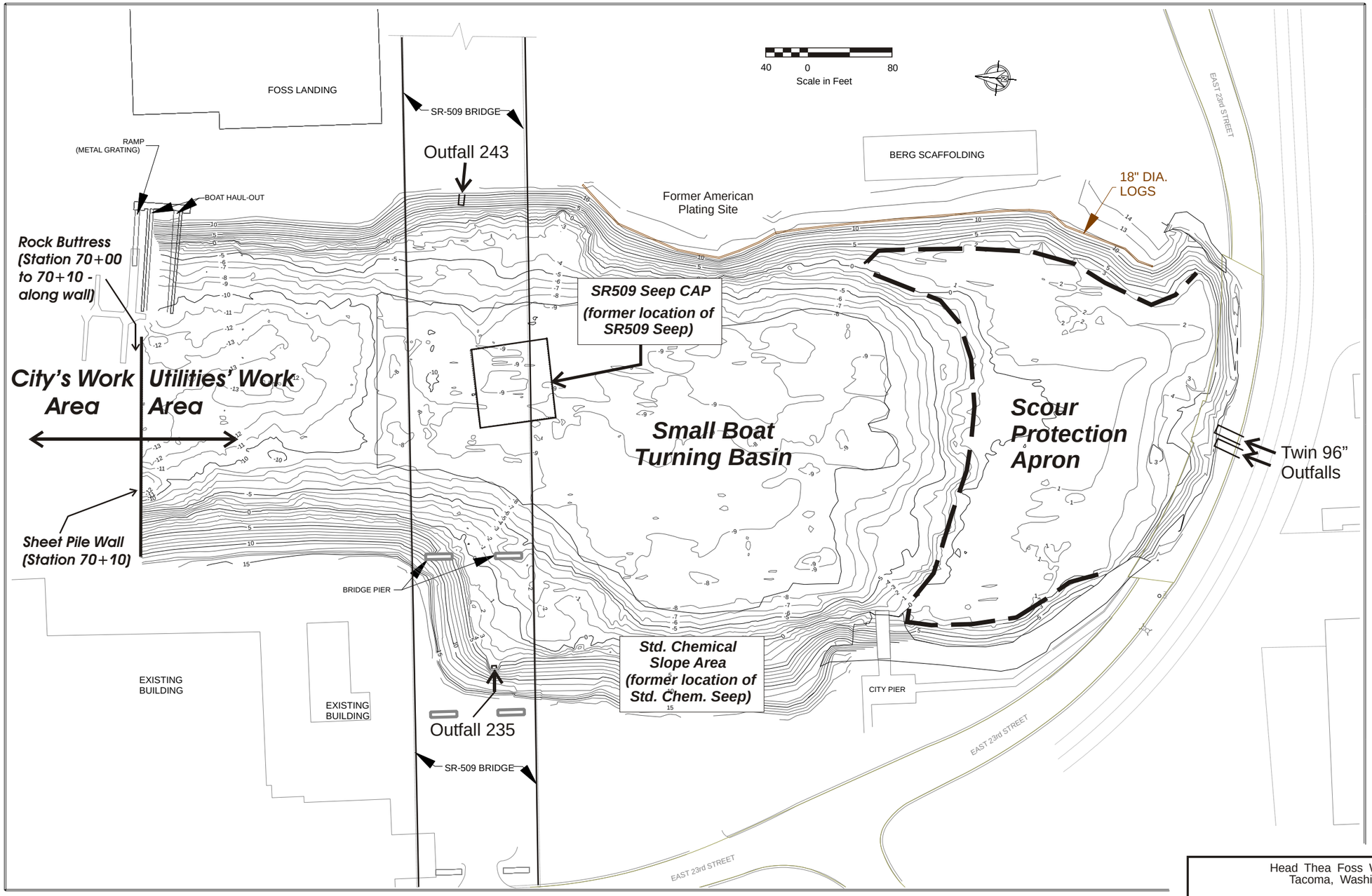
Head of Thea Foss Waterway Project
Tacoma, Washington

Vicinity Map

PAP-001-04 **FIGURE 1** May 2005

Dalton, Olmsted & Fuglevand, Inc.

Ref: vicinitymap.cdr

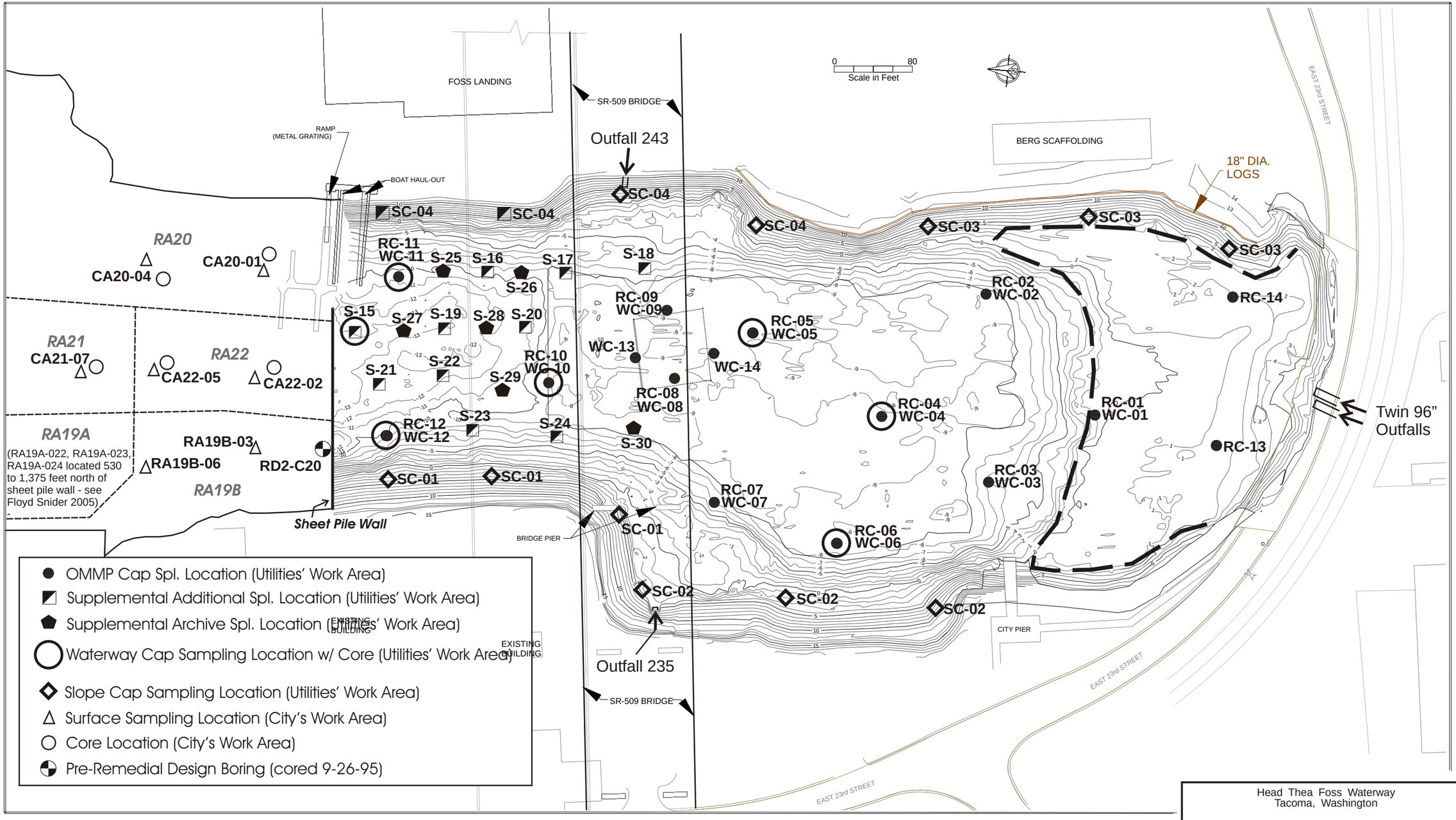


Head Thea Foss Waterway
Tacoma, Washington

Remedial Features
Utilities' Work Area

PAP-001-04 **FIGURE 2** May 2005
Dalton, Olmsted & Fuglevand, Inc.

Ref: Head of waterway a.cdr



Head Thea Foss Waterway
Tacoma, Washington

Sediment Sampling Locations

PAP-001-04 **FIGURE 3** May 2005
Dalton, Olmsted & Fuglevand, Inc.

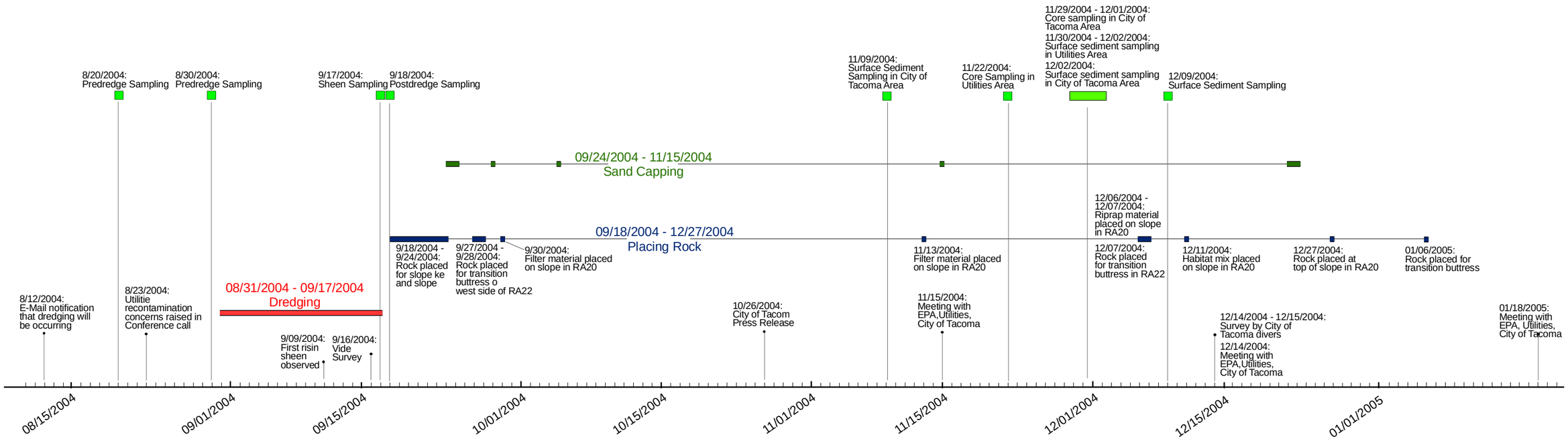
Ref: Supplemental Spl Loc Map2.cdr

Timeline of Activities Adjacent to the Utilities Work Area (RA19A, RA19B, RA20, and RA22)

August 12, 2004 - January 18, 2005

Thea Foss Waterway

Tacoma, WA



Key to Events

- Sampling
- Meeting or Significant Event
- Dredging
- Rock Placement
- Capping

FIGURE 4 - Time Line

P:\projects_2004\Thea_Foss\timeline_b.mxd

5a. Dredging RA20/22
9-9-04 - incoming
tide - view to west

5b. Dredging RA20/22
9-16-04 -incoming
tide - view to west
#1 in sequence of 3)

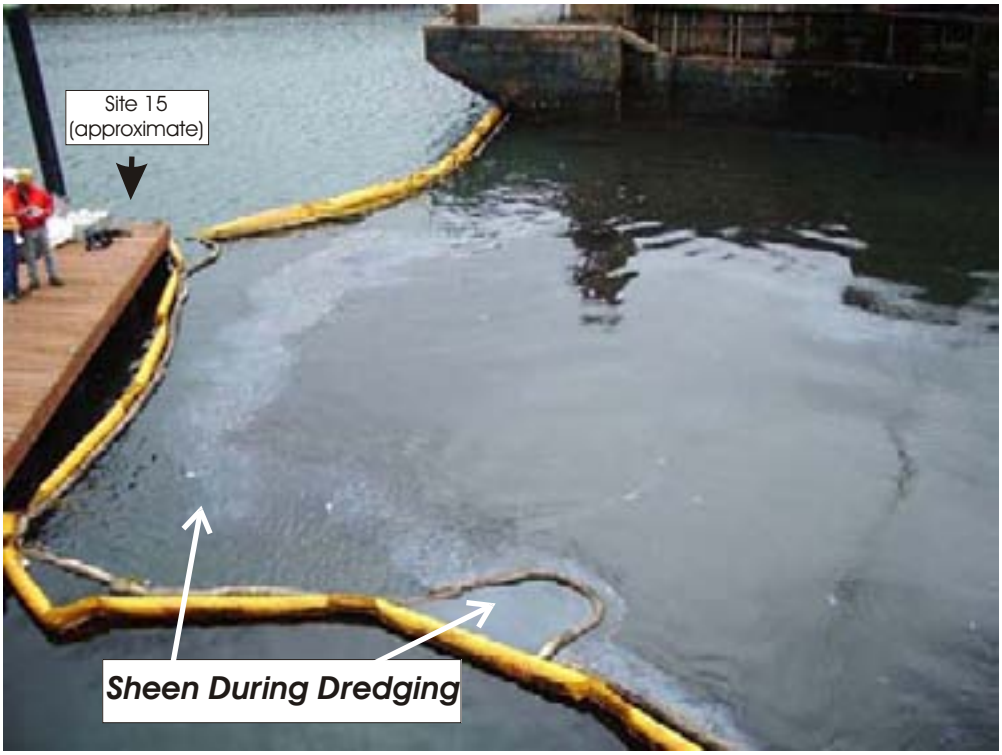
Photos by TetraTech-FW
Ref: Thea Foss Photo 1a.cdr

Thea Foss Waterway
Tacoma, Washington

Dredging Near Station
70+10 - Sept. 9 and 16, 2004
Page 1 of 2

PAP-001-01 **FIGURE 5** May 2005
Dalton, Olmsted & Fuglevand, Inc.

5c. Dredging RA20/22
9-16-04 - incoming
tide - view to west
(#2 in sequence of 3)



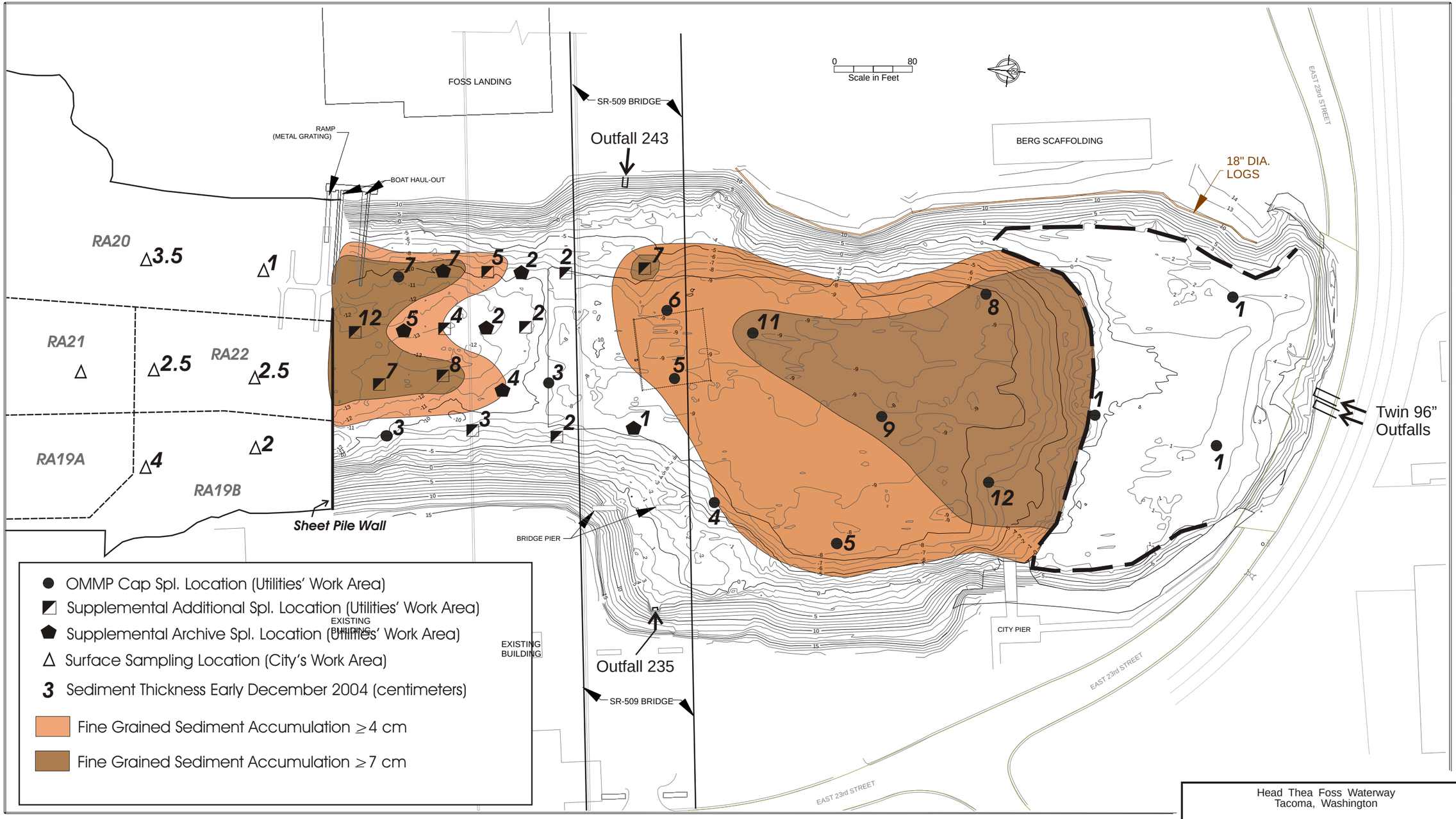
5d. Dredging RA20
9-16-04 - incoming
tide - view to west
(#3 in sequence of 3)

Photos by TetraTech-FW
Ref: Thea Foss Photo 2a.cdr

Thea Foss Waterway
Tacoma, Washington

Dredging Near Station
70+10 on September 16, 2004
Page 2 of 2

PAP-001-04 **FIGURE 5** May 2005
Dalton, Olmsted & Fuglevand, Inc.



Head Thea Foss Waterway
Tacoma, Washington

Thickness of Fine Grained Sediment Early December 2004

PAP-001-04 **FIGURE 6** May 2005
Dalton, Olmsted & Fuglevand, Inc.

Ref: Fine Grained Thickness 12-04.cdr

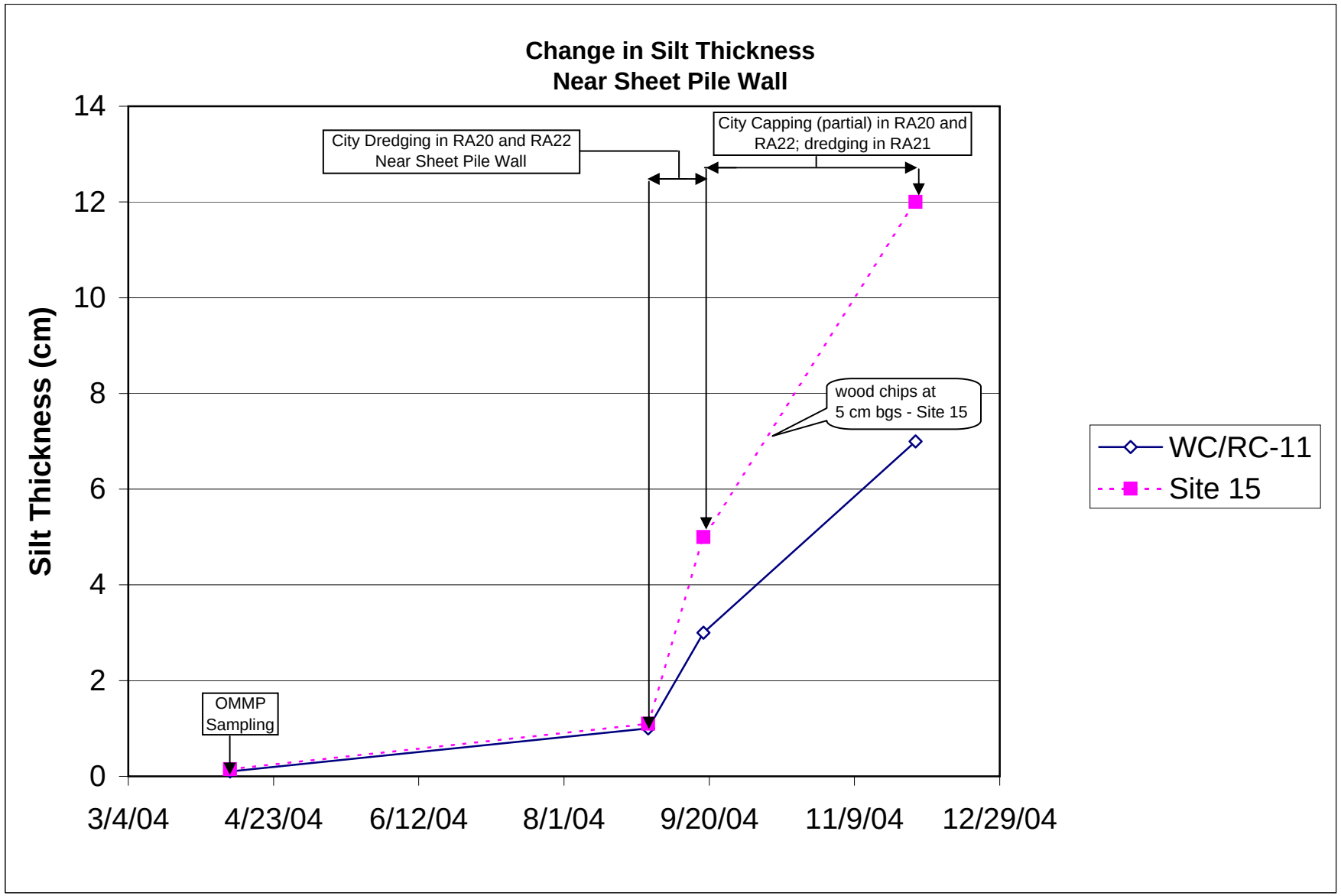


FIGURE 7
Change in Silt Thicknesses
Near Sheet Pile Wall

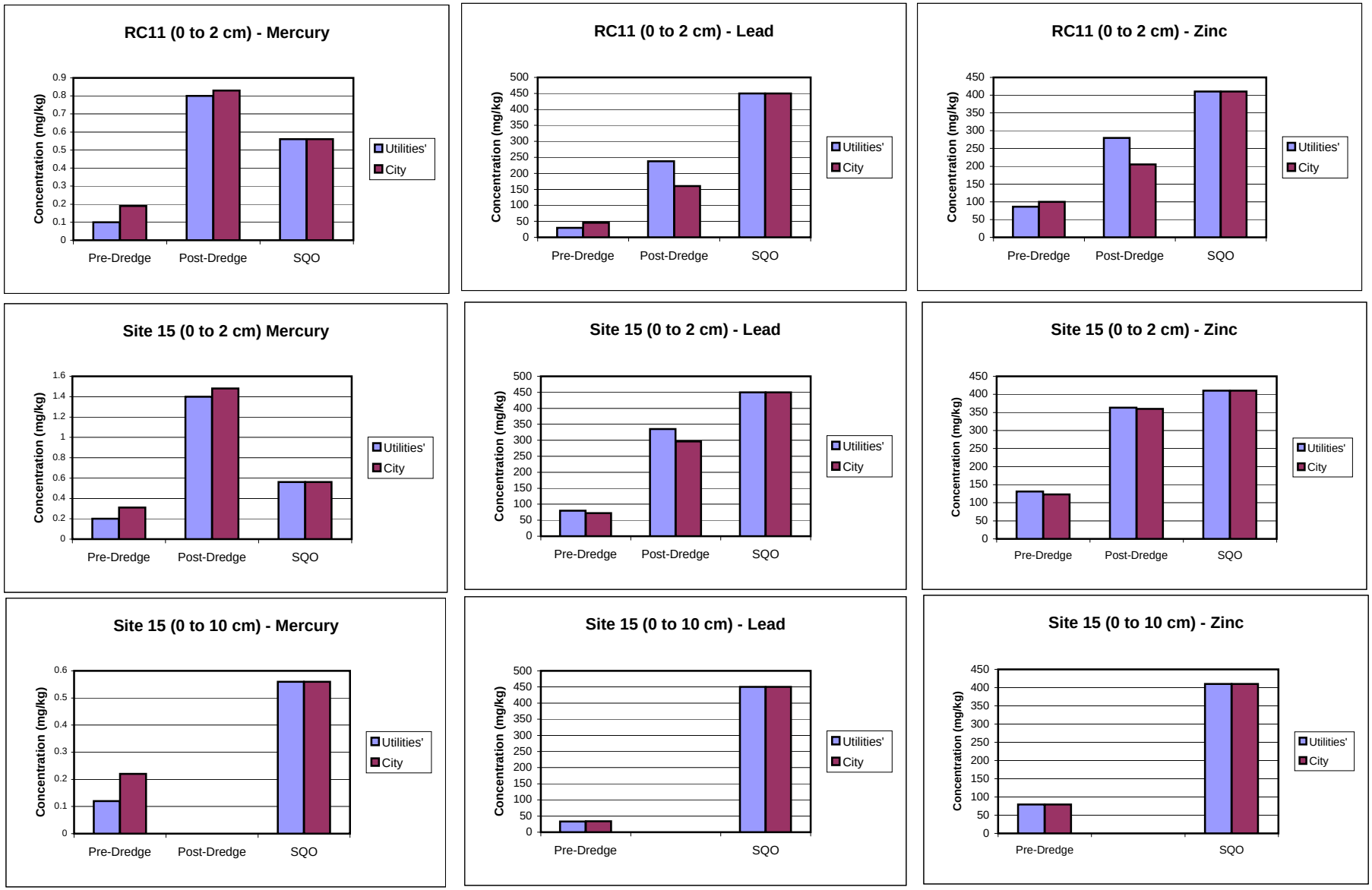
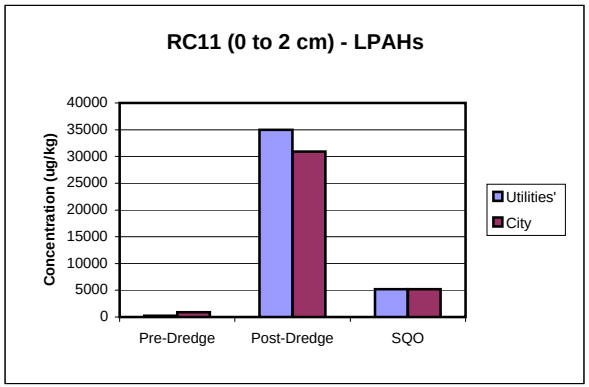
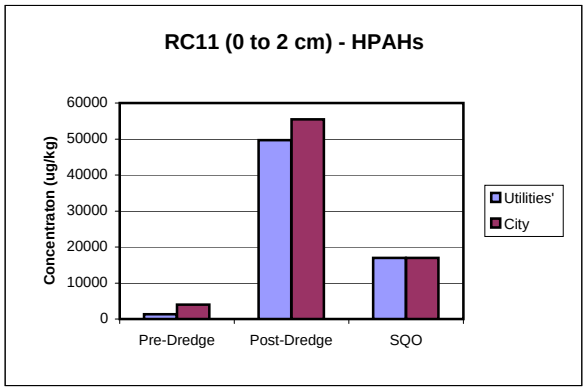
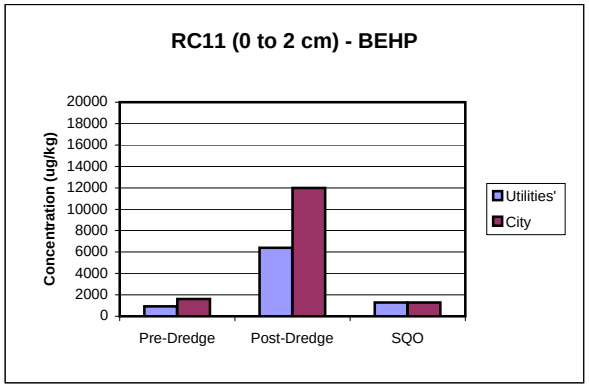
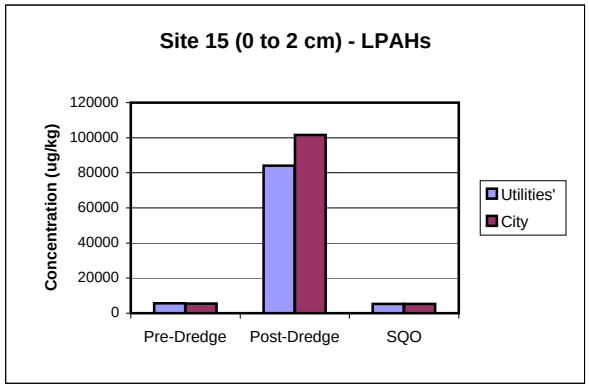


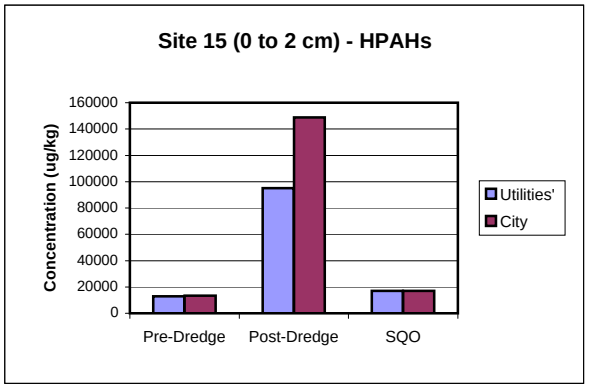
FIGURE 8
Comparison of Aug./Sept. 04 Utilities and
City's Splint Sample Results

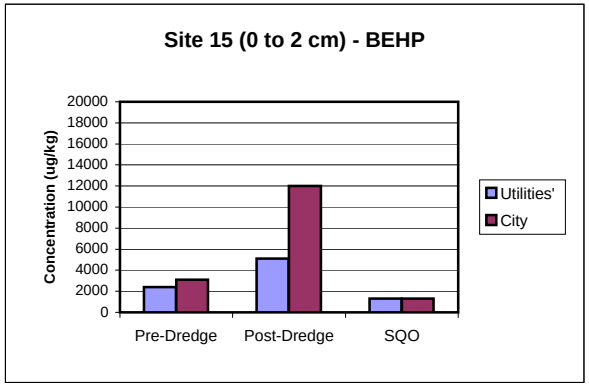


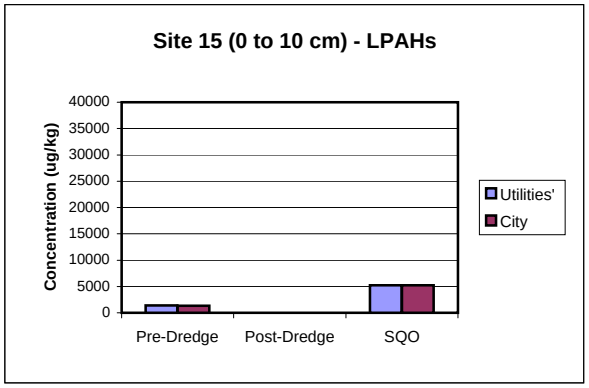


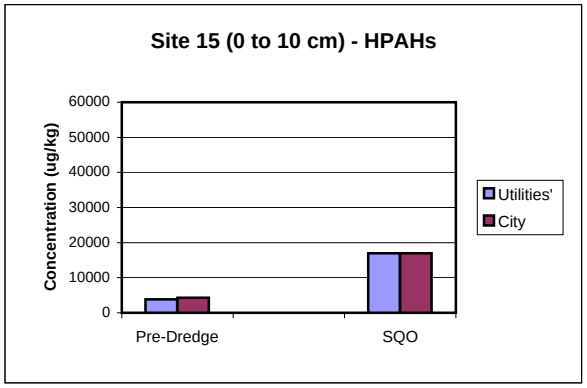












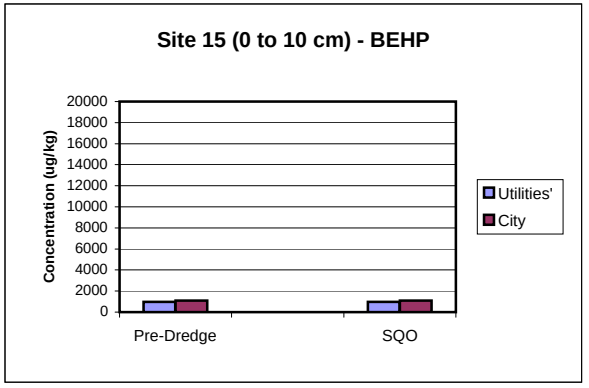
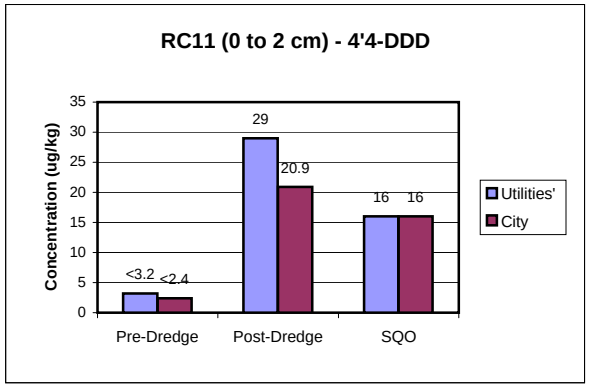
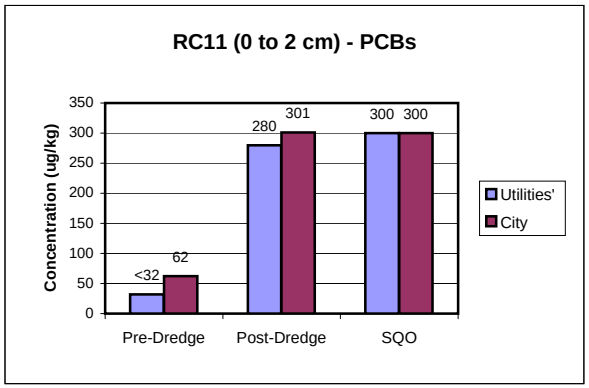
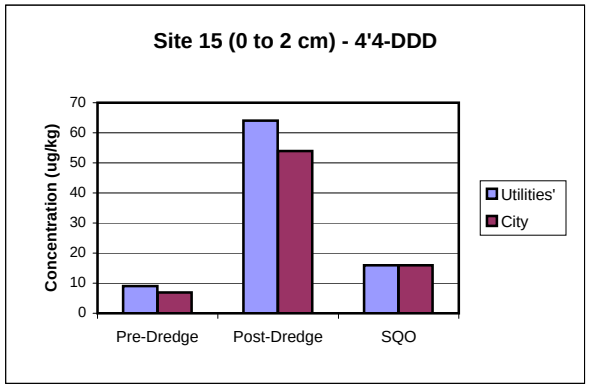
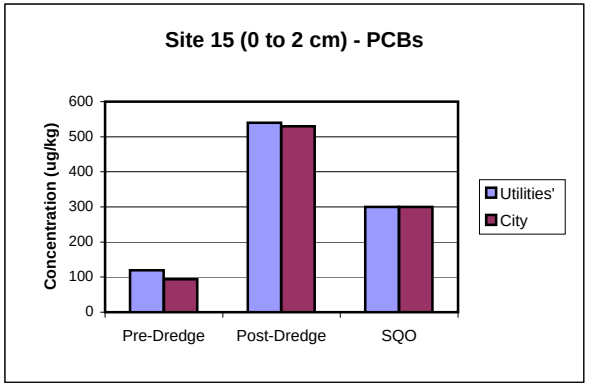


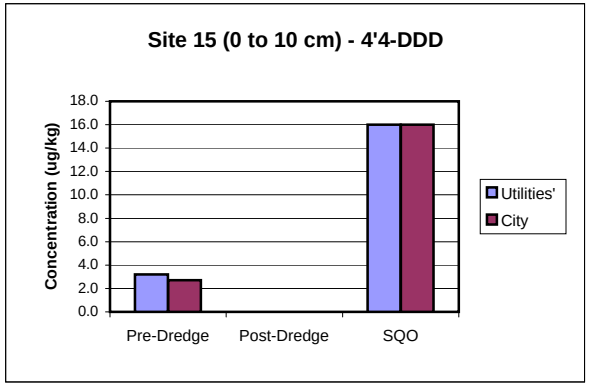
FIGURE 8
Comparison of Aug./Sept. 04 Utilities and
City's Splint Sample Results











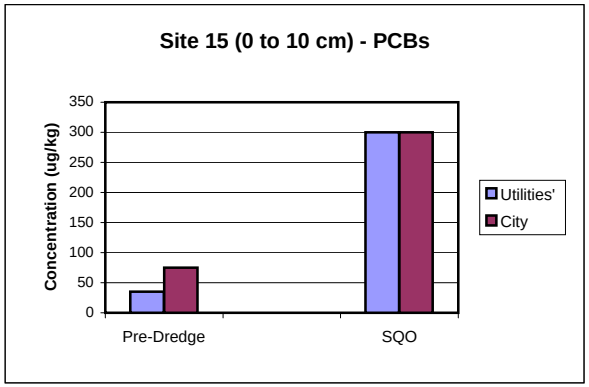


FIGURE 8
Comparison of Aug./Sept. 04 Utilities and
City's Splint Sample Results

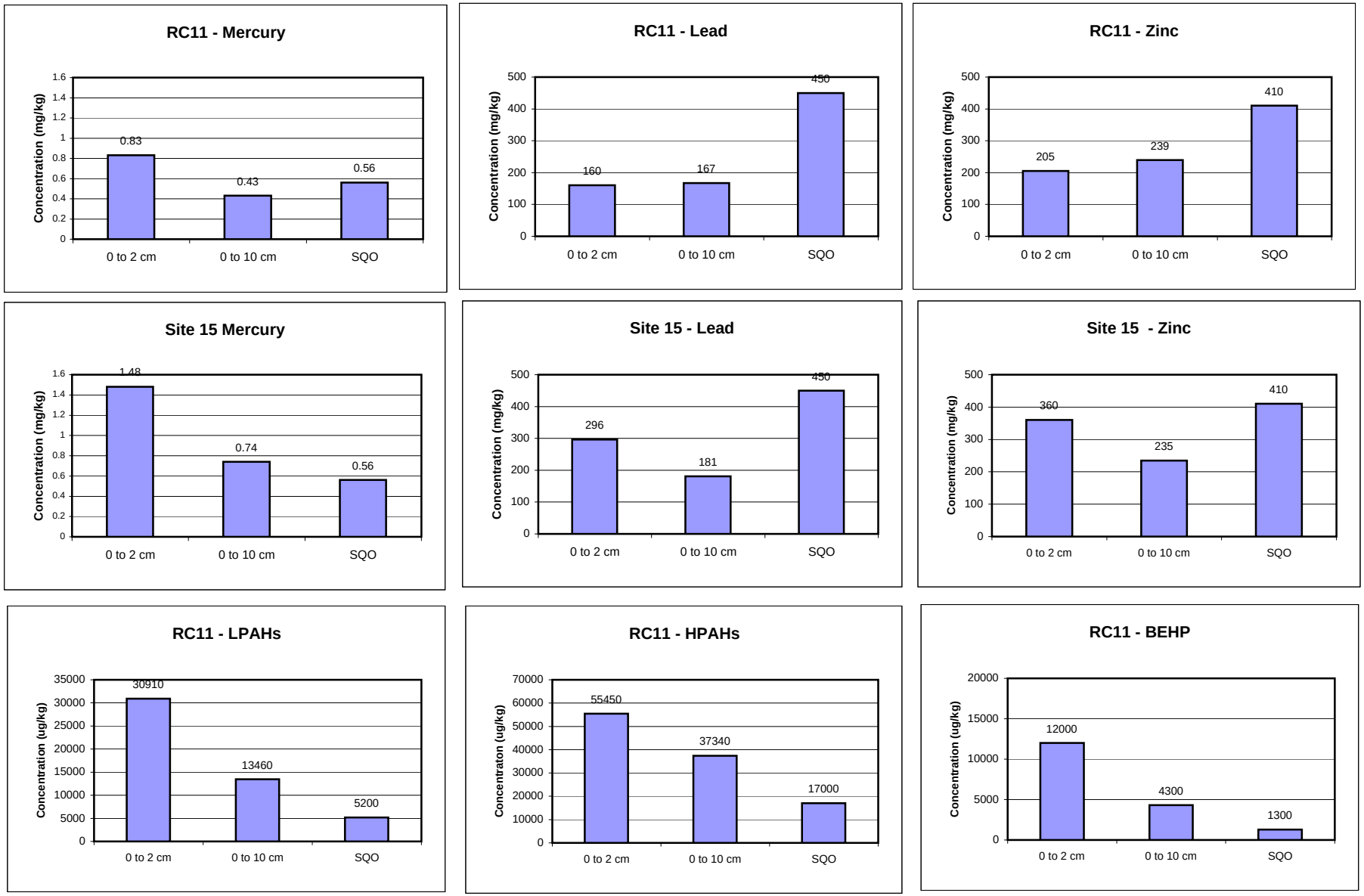
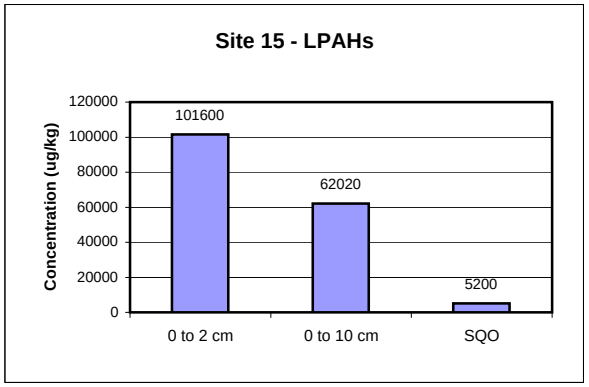
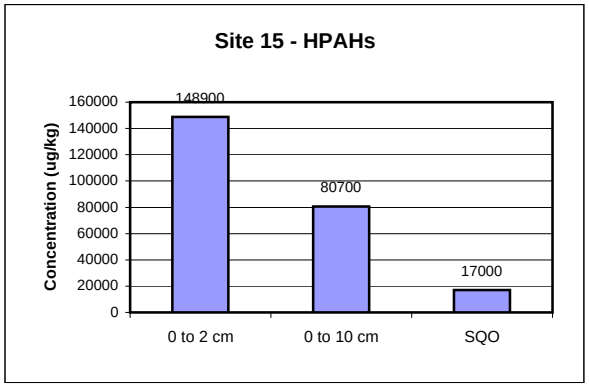
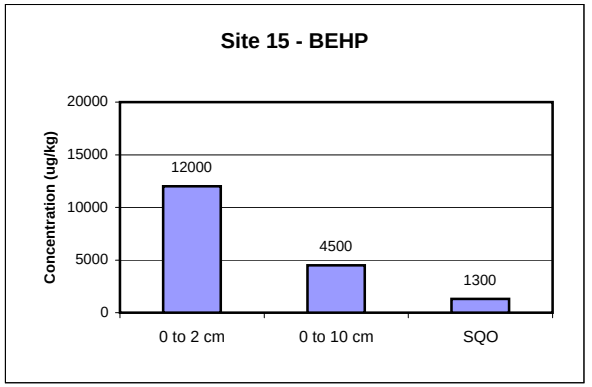
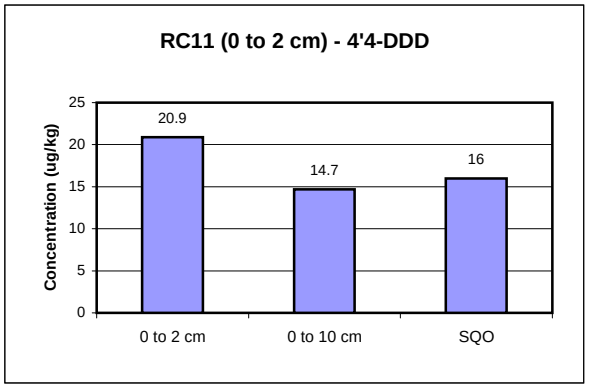


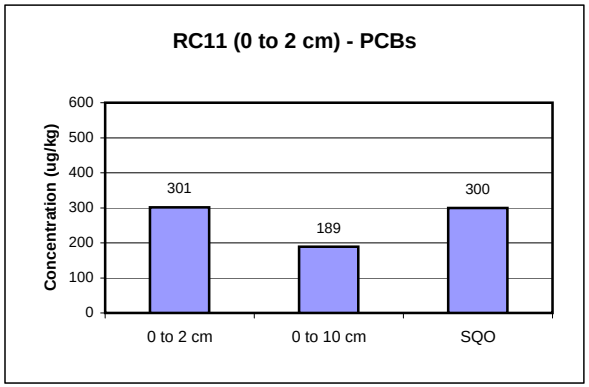
FIGURE 9
Comparison of 0 to 2cm and 0 to 10 cm (City)
Aug./Sept. 04 Sample Results

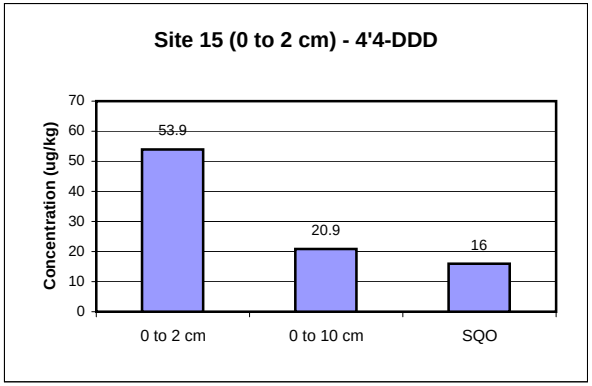












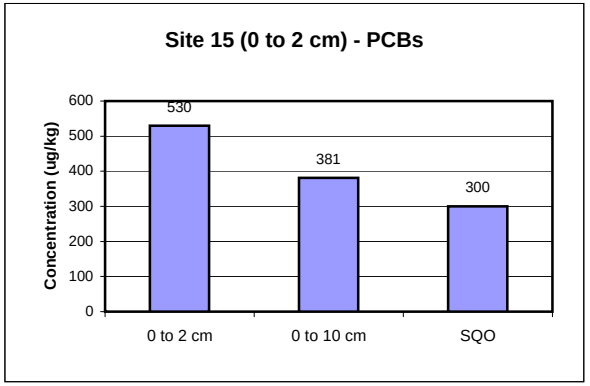
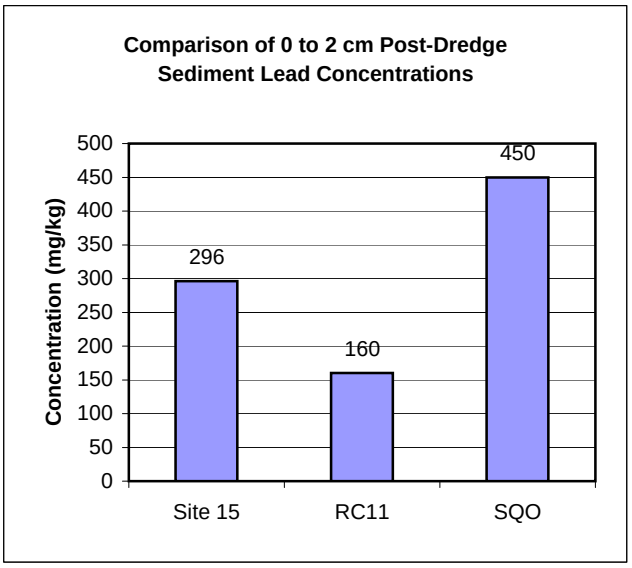
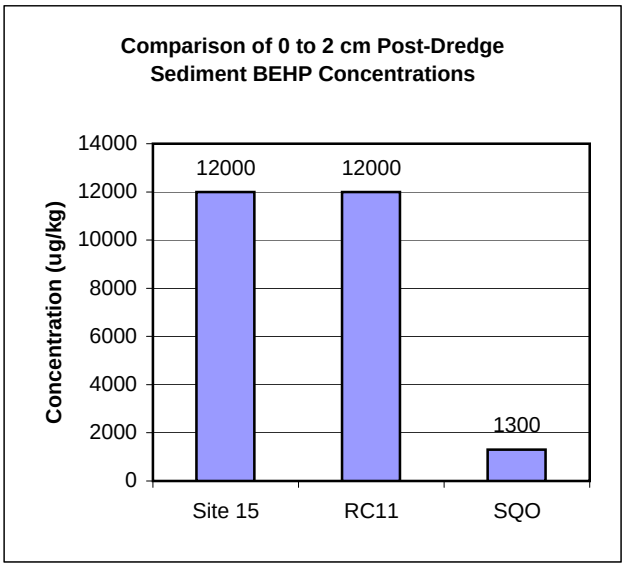
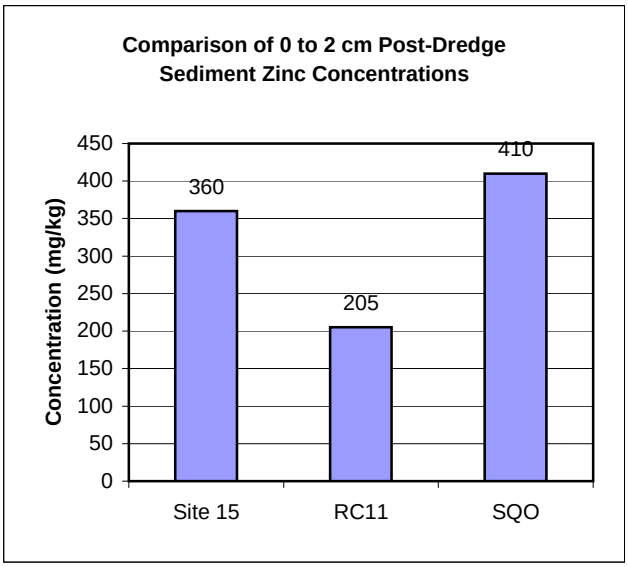
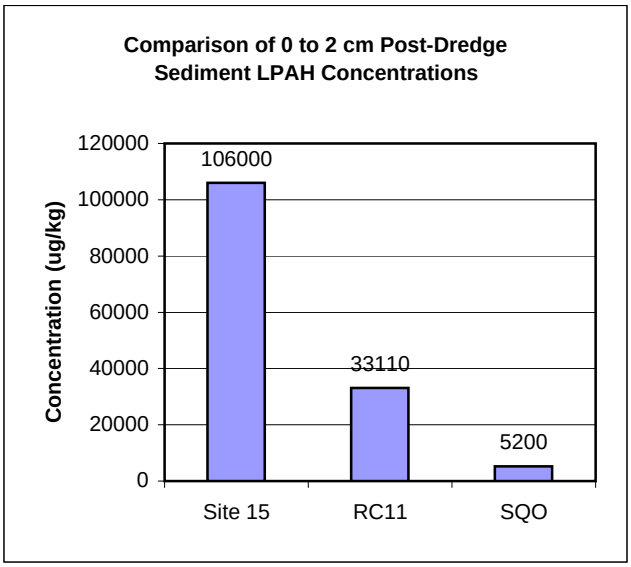


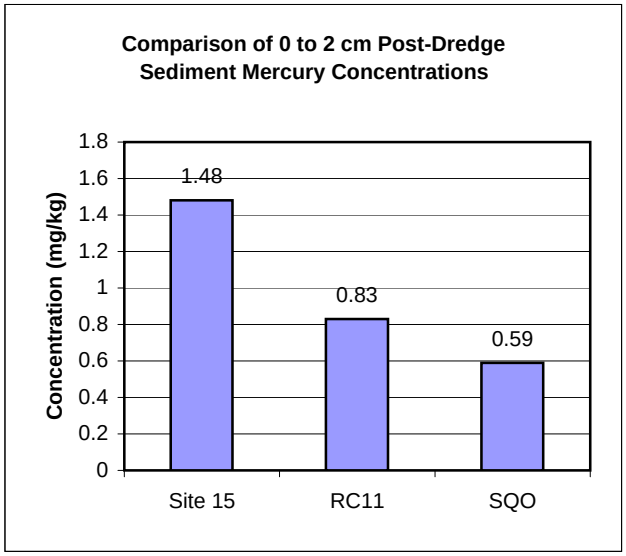
FIGURE 9
Comparison of 0 to 2cm and 0 to 10 cm (City)
Aug./Sept. 04 Sample Results











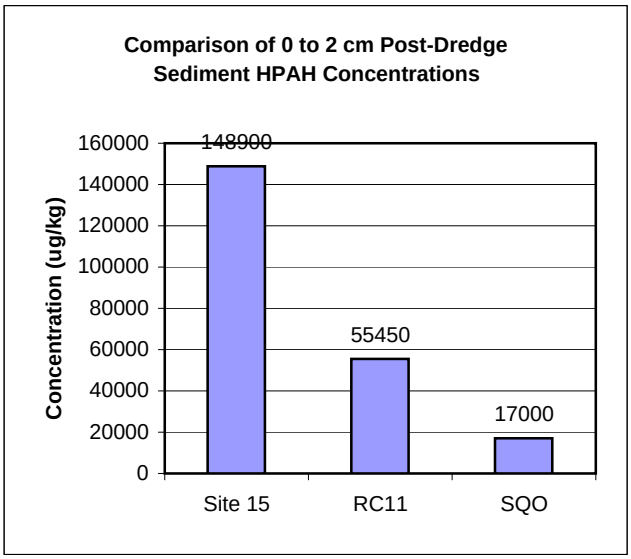
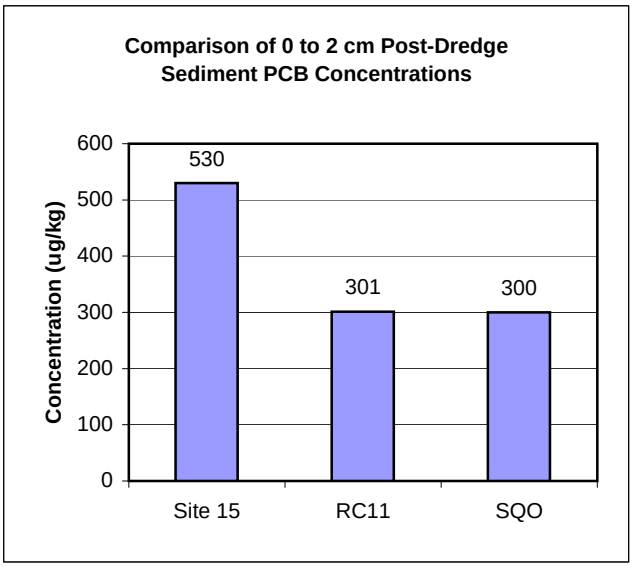
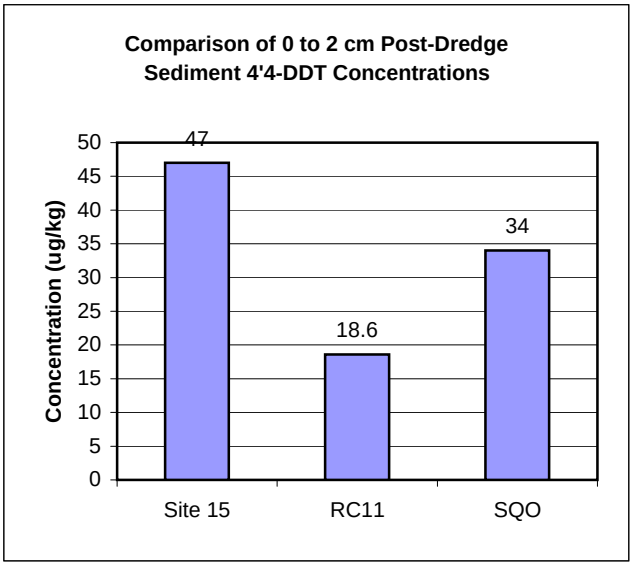
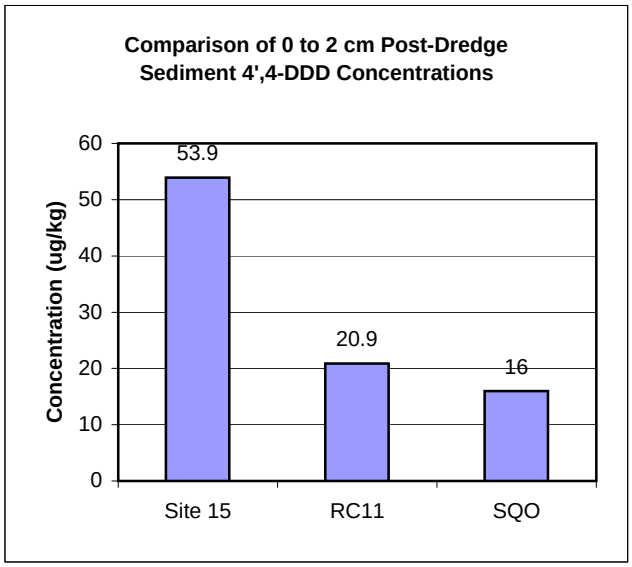


FIGURE 10
Comparison RC11 and Site 15
Post-Dredge Conditions - Setp. 04







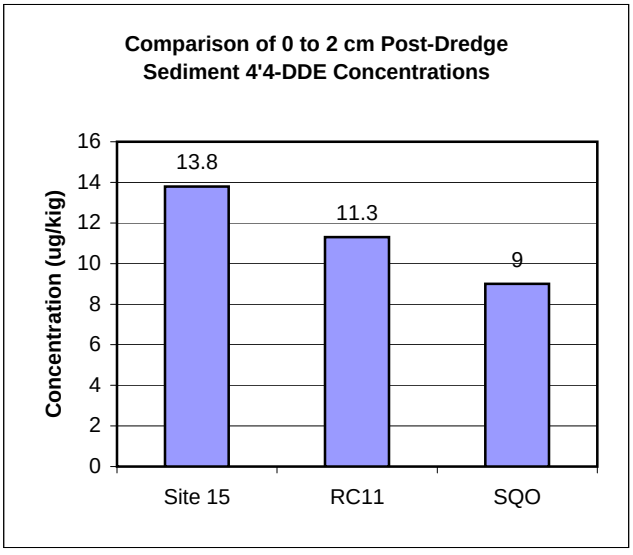
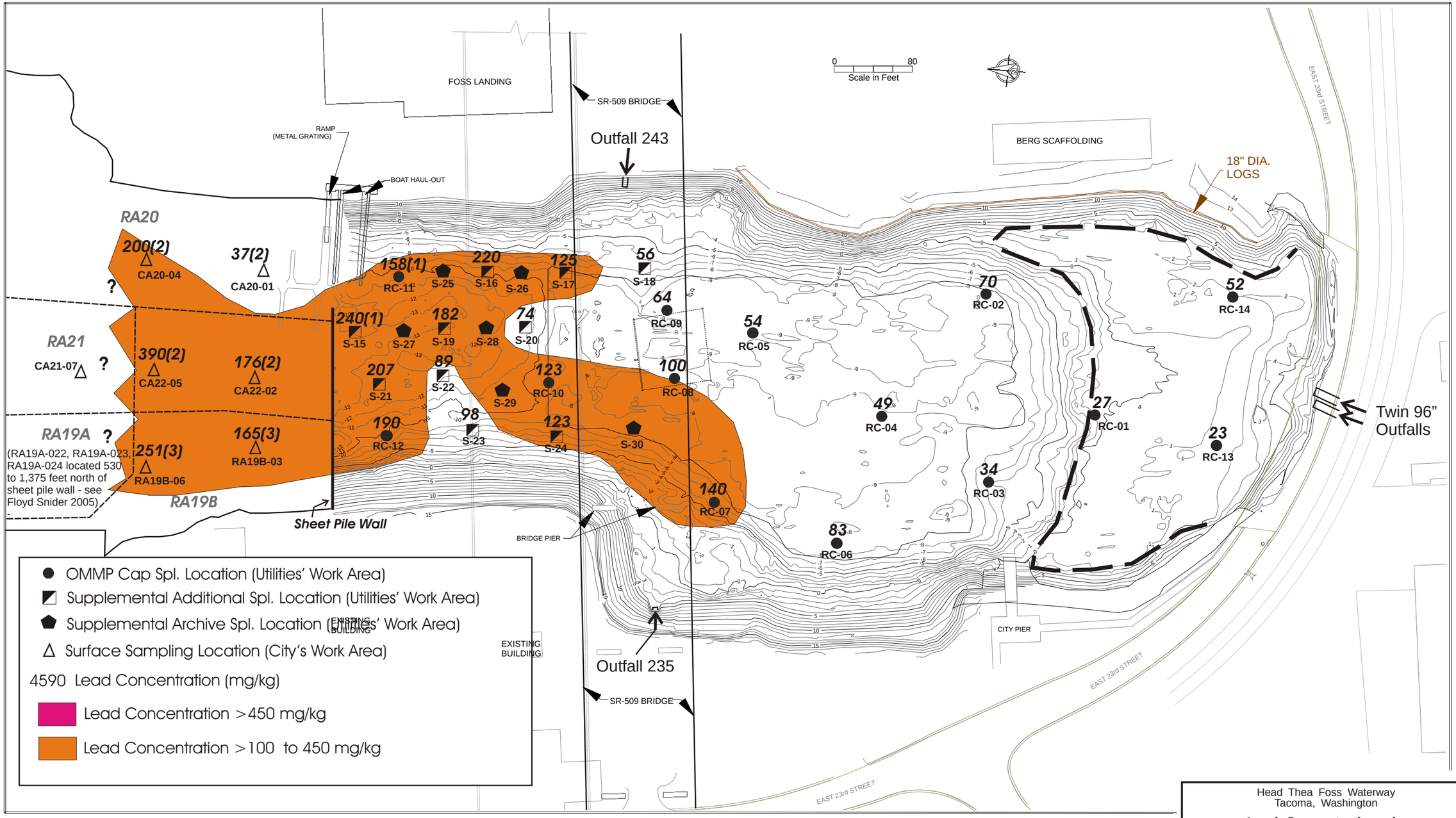


FIGURE 10
Comparison RC11 and Site 15
Post-Dredge Conditions - Setp. 04



Notes: Lead SQO = 450 mg/kg
(1) 0 to 10 cm sample
(2) 0 to 2 cm sample - first lift of cap
(3) 0 to 2 cm sample - top final cap

Ref: Fine Grained Lead 12-04.cdr

Head Thea Foss Waterway
Tacoma, Washington

Lead Concentrations in Fine Grained Sediment December 2004

PAP-001-04 **FIGURE 11** May 2005
Dalton, Olmsted & Fuglevand, Inc.

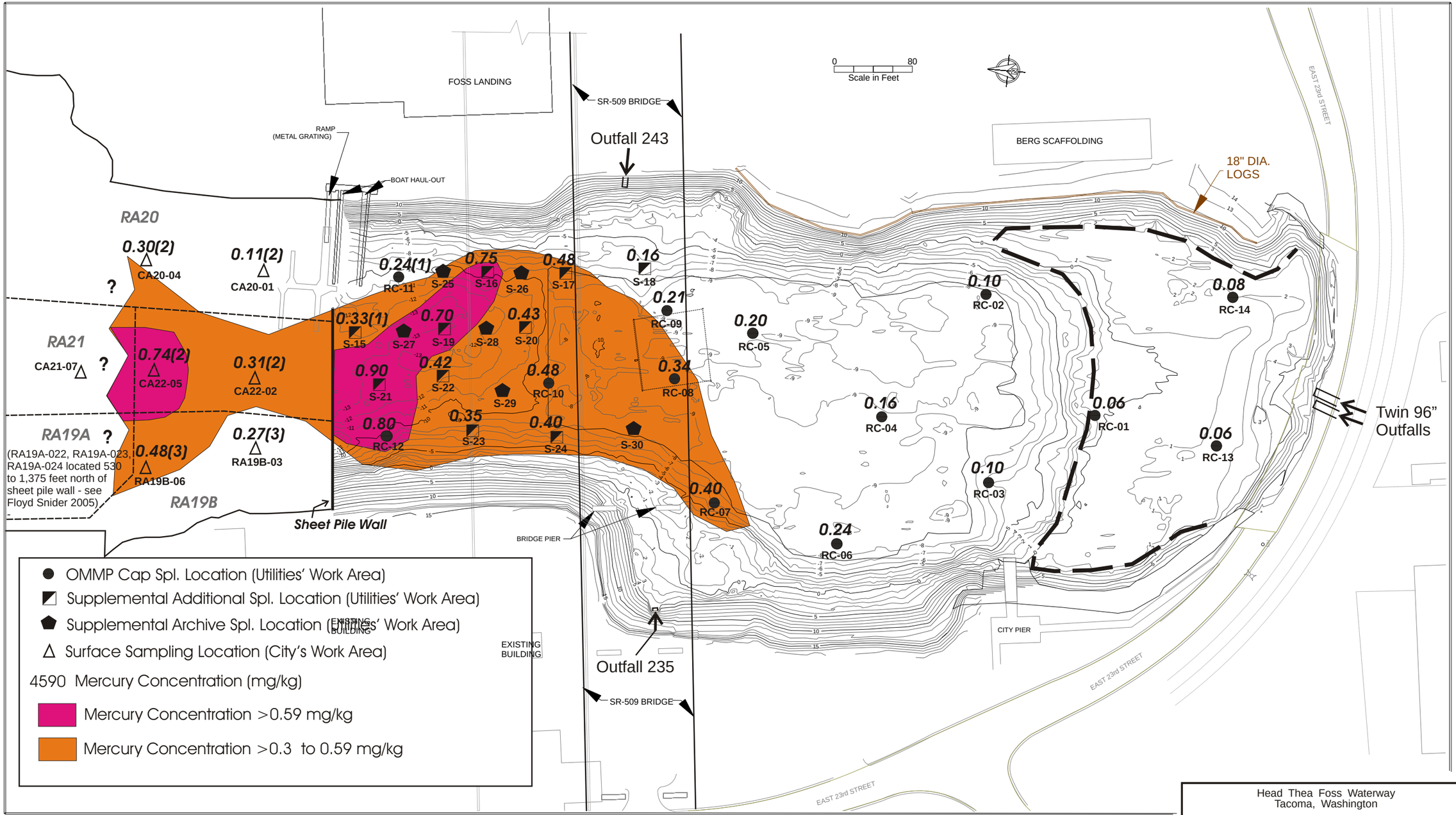
Notes: Zinc SQO = 410 mg/kg
(1) 0 to 10 cm sample
(2) 0 to 2 cm sample - first lift of cap
(3) 0 to 2 cm sample - top final cap

Ref: Fine Grained Zinc 12-04.cdr

Head Thea Foss Waterway
Tacoma, Washington

Zinc Concentrations in Fine Grained Sediment December 2004

PAP-001-04 **FIGURE 12** May 2005
Dalton, Olmsted & Fuglevand, Inc.



Notes: Hg SQO = 0.59 mg/kg
(1) 0 to 10 cm sample
(2) 0 to 2 cm sample - first lift of cap
(3) 0 to 2 cm sample - top final cap

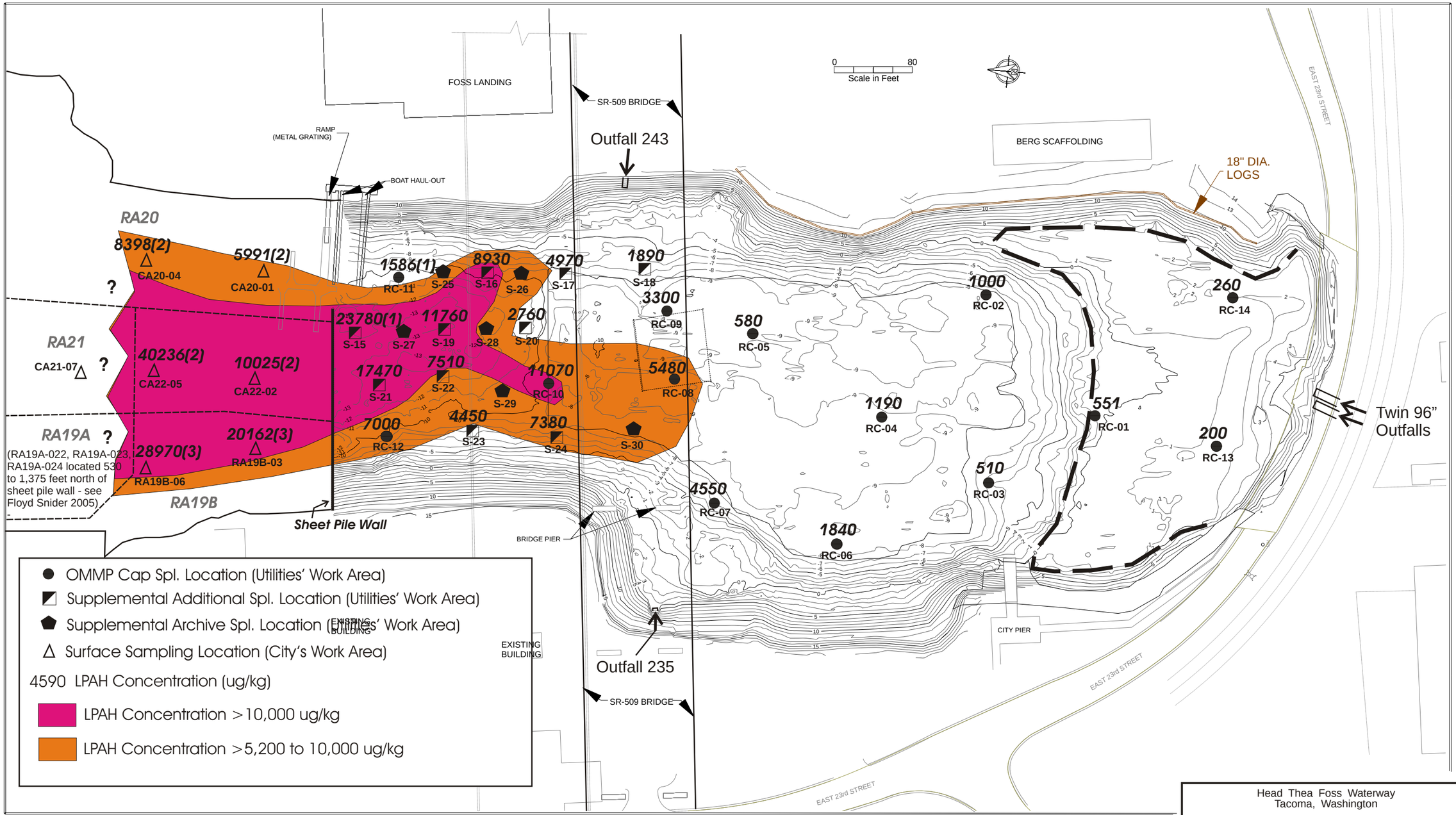
Ref: Fine Grained Mercury 12-04.cdr

Head Thea Foss Waterway
Tacoma, Washington

Mercury Concentrations in Fine Grained Sediment December 2004

PAP-001-04 **FIGURE 13** May 2005

Dalton, Olmsted & Fuglevand, Inc.



Notes: LPAH SQO = 5,200 ug/kg
(1) 0 to 10 cm sample
(2) 0 to 2 cm sample - first lift of cap
(3) 0 to 2 cm sample - top final cap

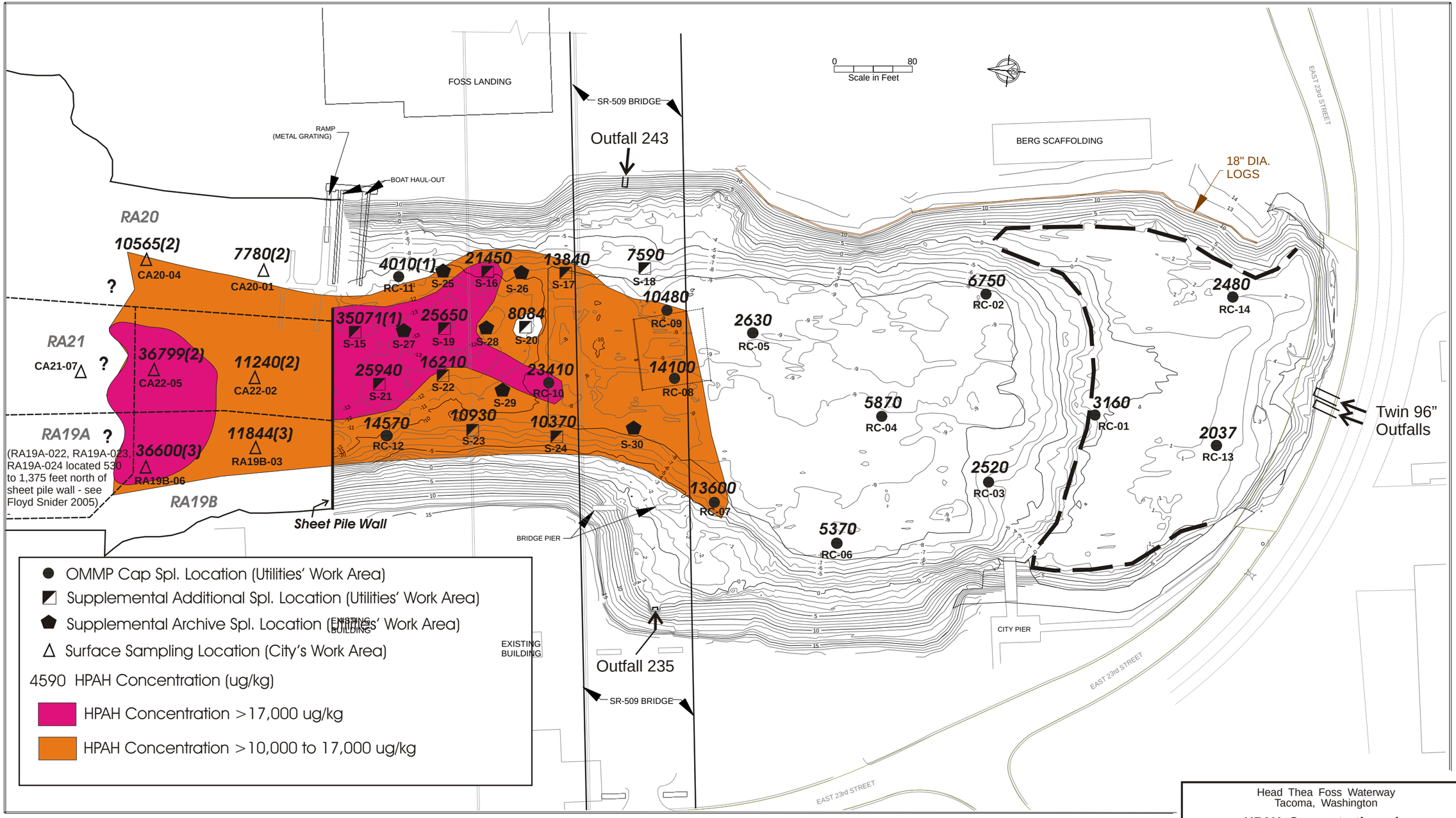
Ref: Fine Grained LPAH 12-04.cdr

Head Thea Foss Waterway
Tacoma, Washington

LPAH Concentrations in Fine Grained Sediment December 2004

PAP-001-04 **FIGURE 14** May 2005

Dalton, Olmsted & Fuglevand, Inc.



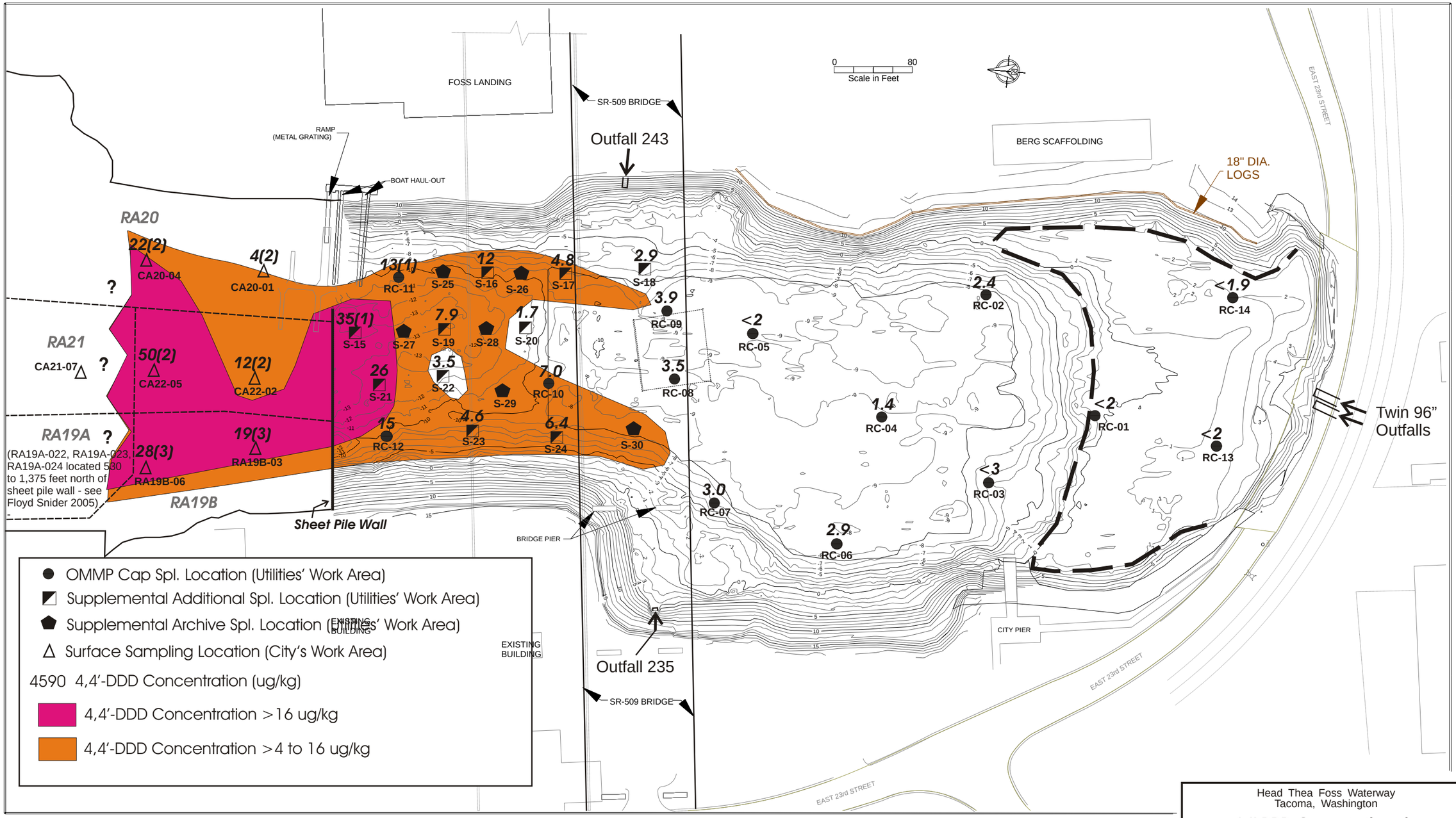
Notes: HPAH SQO = 17,000 ug/kg
(1) 0 to 10 cm sample
(2) 0 to 2 cm sample - first lift of cap
(3) 0 to 2 cm sample - top final cap

Ref: Fine Grained HPAH 12-04.cdr

Head Thea Foss Waterway
Tacoma, Washington

HPAH Concentrations in Fine Grained Sediment December 2004

PAP-001-04 **FIGURE 15** May 2005
Dalton, Olmsted & Fuglevand, Inc.



Notes: 4,4'DDD SQO = 16 ug/kg
(1) 0 to 10 cm sample
(2) 0 to 2 cm sample - first lift of cap
(3) 0 to 2 cm sample - top final cap

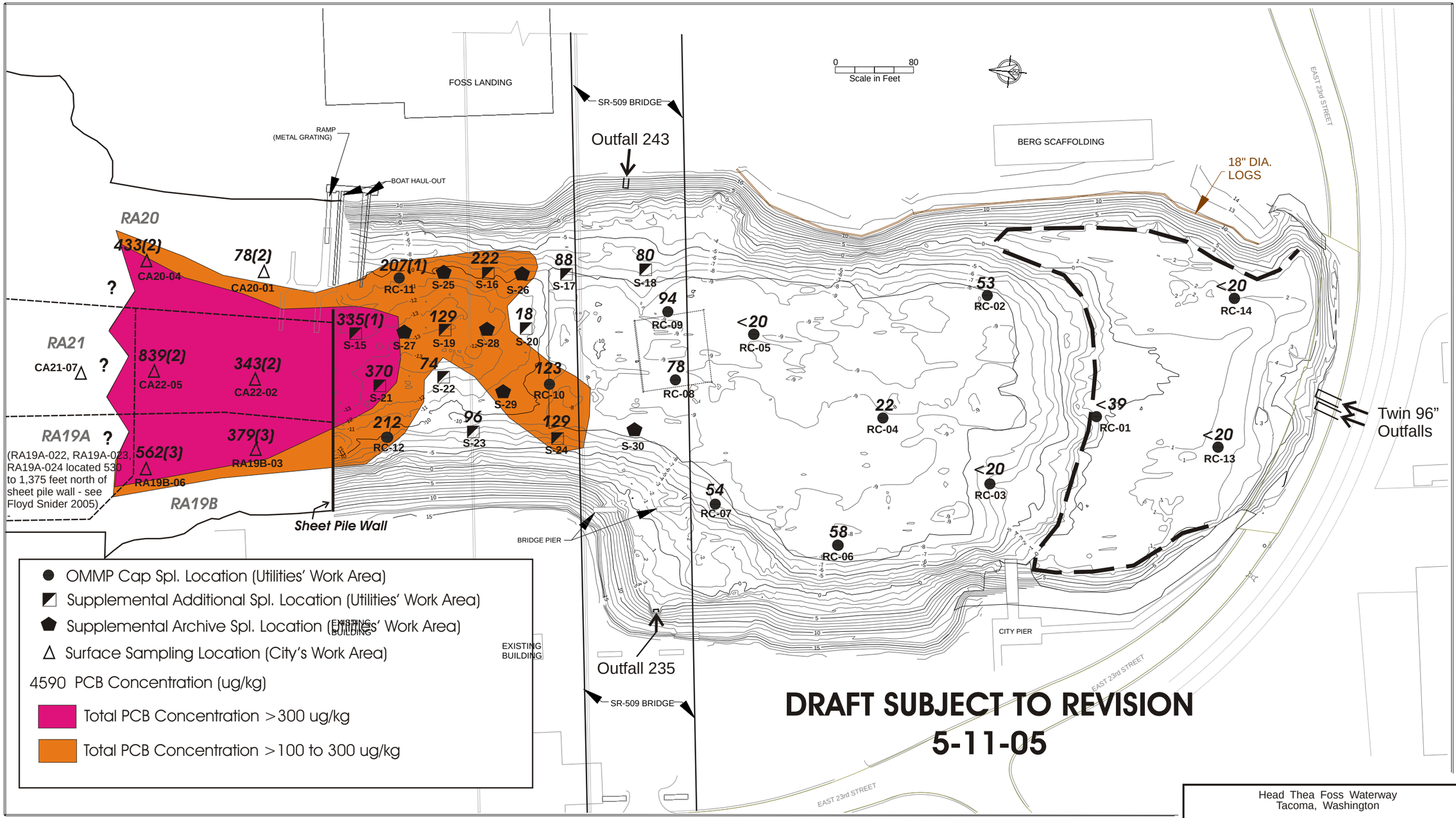
Ref: Fine Grained DDD 12-04.cdr

Head Thea Foss Waterway
Tacoma, Washington

4,4'-DDD Concentrations in Fine Grained Sediment December 2004

PAP-001-04 **FIGURE 16** May 2005

Dalton, Olmsted & Fuglevand, Inc.



Notes: T. PCB SQO = 300 ug/kg
(1) 0 to 10 cm sample
(2) 0 to 2 cm sample - first lift of cap
(3) 0 to 2 cm sample - top final cap

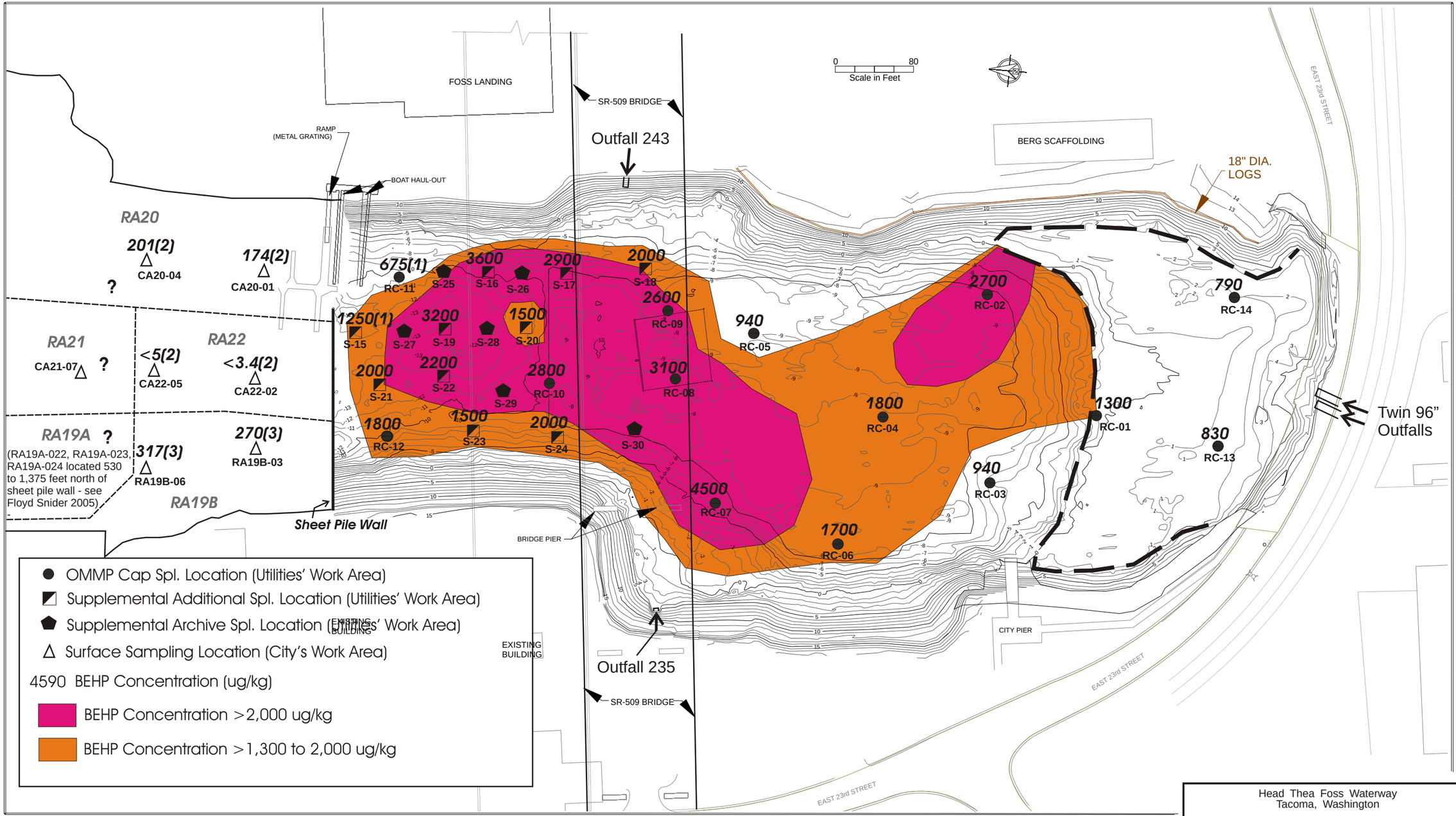
Ref: Fine Grained PCBs 12-04.cdr

Head Thea Foss Waterway
Tacoma, Washington

Total PCB Concentrations in Fine Grained Sediment December 2004

PAP-001-04 **FIGURE 17** May 2005

Dalton, Olmsted & Fuglevand, Inc.



Notes: BEHP SQO = 1,300 ug/kg
(1) 0 to 10 cm sample
(2) 0 to 2 cm sample - first lift of cap
(3) 0 to 2 cm sample - top final cap

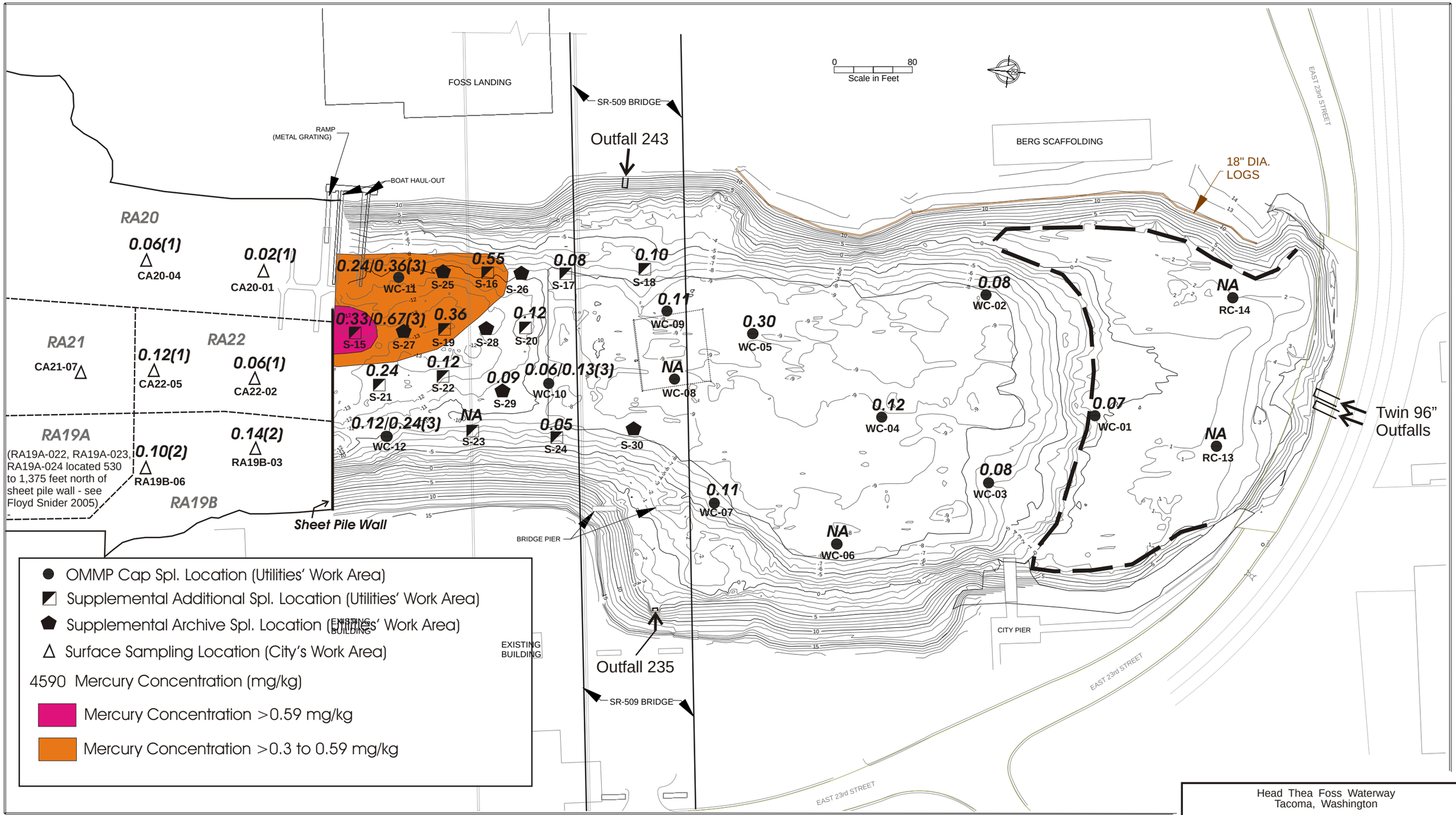
Ref: Fine Grained BEHP 12-04.cdr

Head Thea Foss Waterway
Tacoma, Washington

BEHP Concentrations in Fine Grained Sediment December 2004

PAP-001-04 **FIGURE 18** May 2005

Dalton, Olmsted & Fuglevand, Inc.



Notes: Mercury SQO = 0.59 mg/kg
NA - Not available

(1) First Cap Lift
(2) Top of final cap

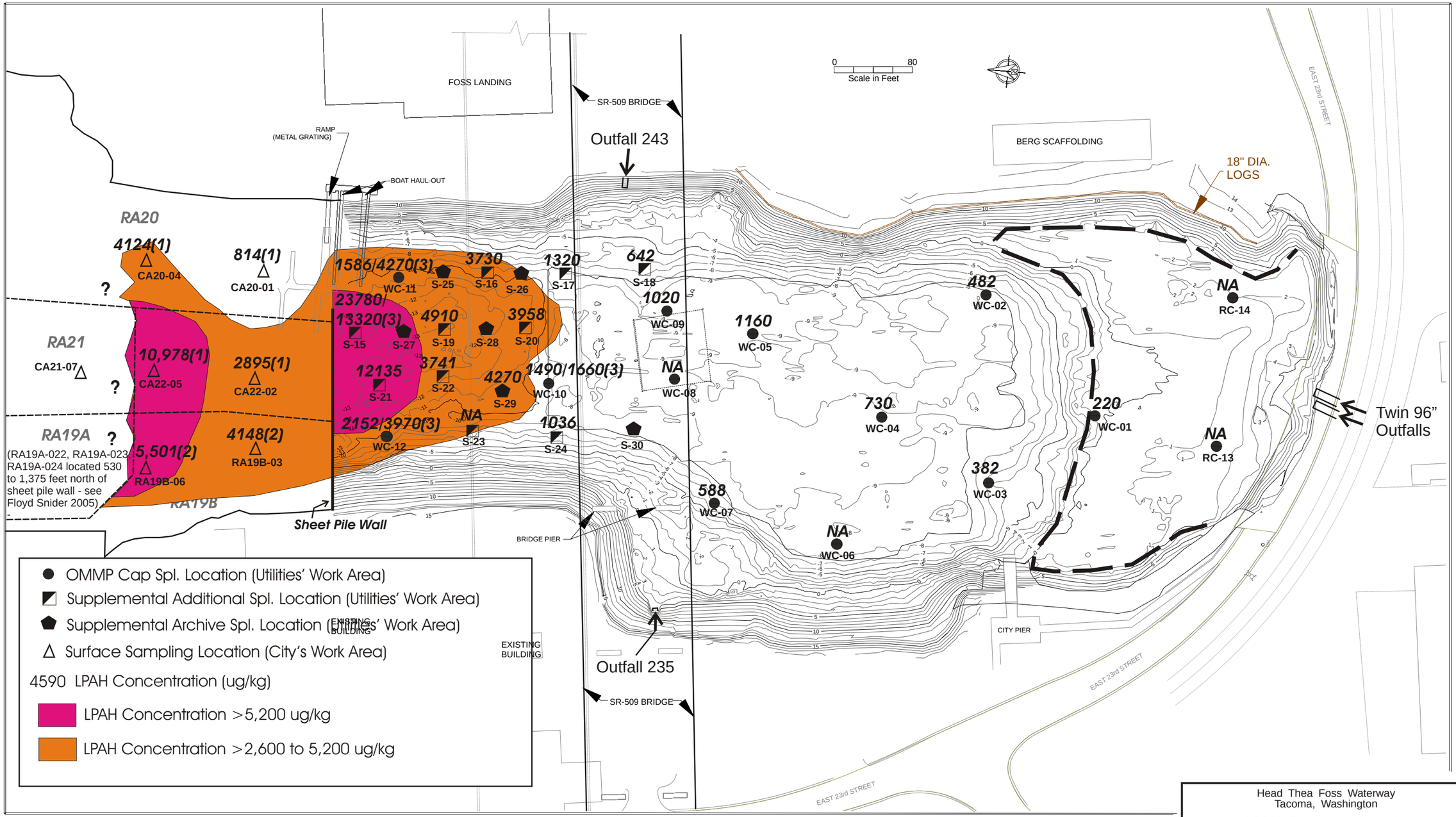
(3) City/Utilities Analyses

Head Thea Foss Waterway
Tacoma, Washington

Mercury Concentrations in 0 to 10 cm Sediment December 2004

PAP-001-04 **FIGURE 19** May 2005
Dalton, Olmsted & Fuglevand, Inc.

Ref: 0 to 10 cm Hg 12-04.cdr



Notes: LPAH SQO = 5,200 ug/kg
NA - Not available

(1) First Cap Lift
(2) Top of final cap

(3) City/Utilities Analyses

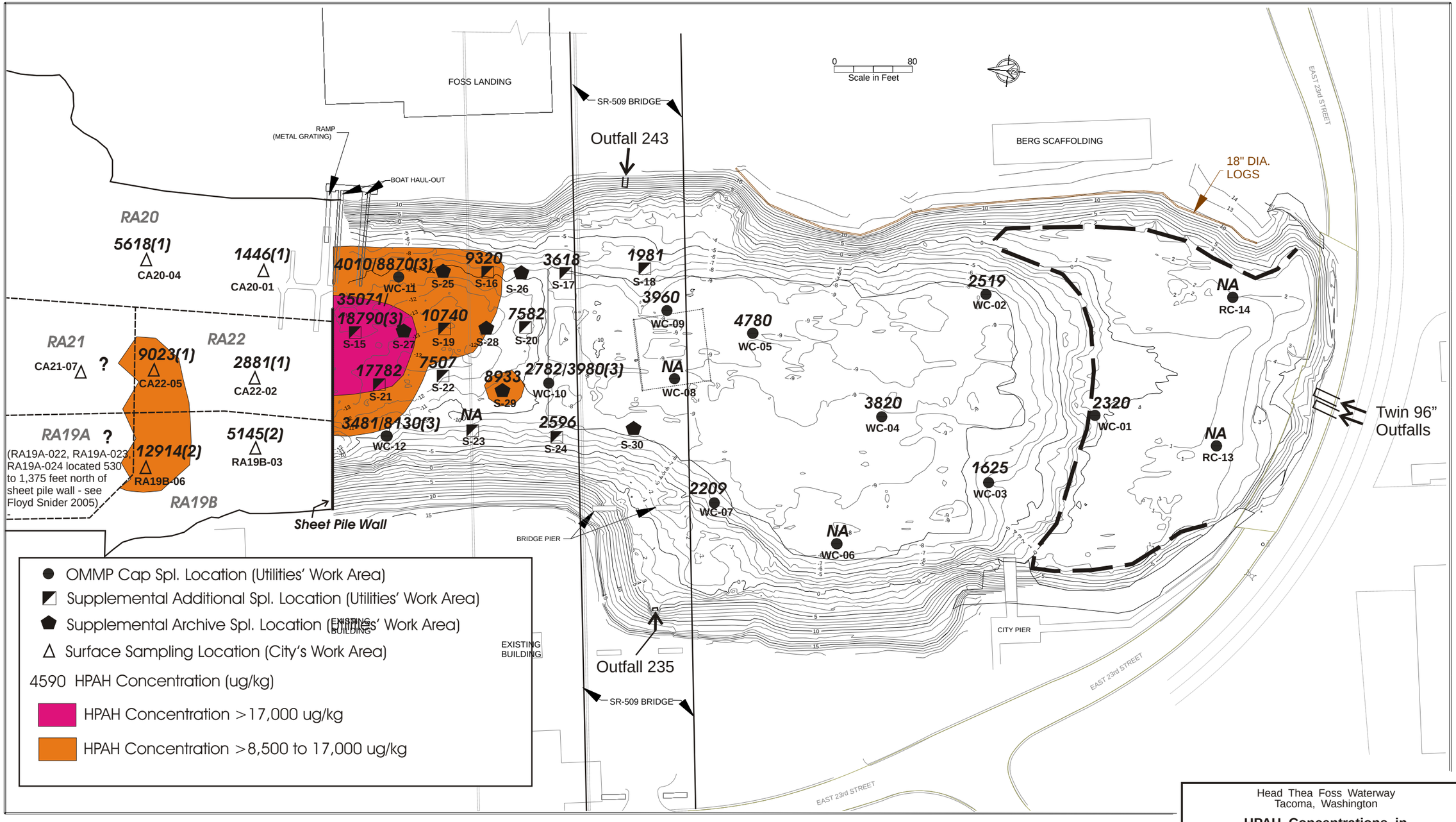
Ref: 0 to 10 cm LPAH 12-04.cdr

Head Thea Foss Waterway
Tacoma, Washington

LPAH Concentrations in 0 to 10 cm Sediment December 2004

PAP-001-04 **FIGURE 20** May 2005

Dalton, Olmsted & Fuglevand, Inc.



Notes: HPAH SQO = 17,000 ug/kg
NA - Not available

(1) First Cap Lift
(2) Top of final cap

(3) City/Utilities Analyses

Ref: 0 to 10 cm HPAH 12-04.cdr

Head Thea Foss Waterway
Tacoma, Washington

HPAH Concentrations in 0 to 10 cm Sediment December 2004

PAP-001-04 **FIGURE 21** May 2005

Dalton, Olmsted & Fuglevand, Inc.

Notes: 4,4’-DDD SQO = 16 ug/kg
NA - Not available

(1) First Cap Lift
(2) Top of final cap

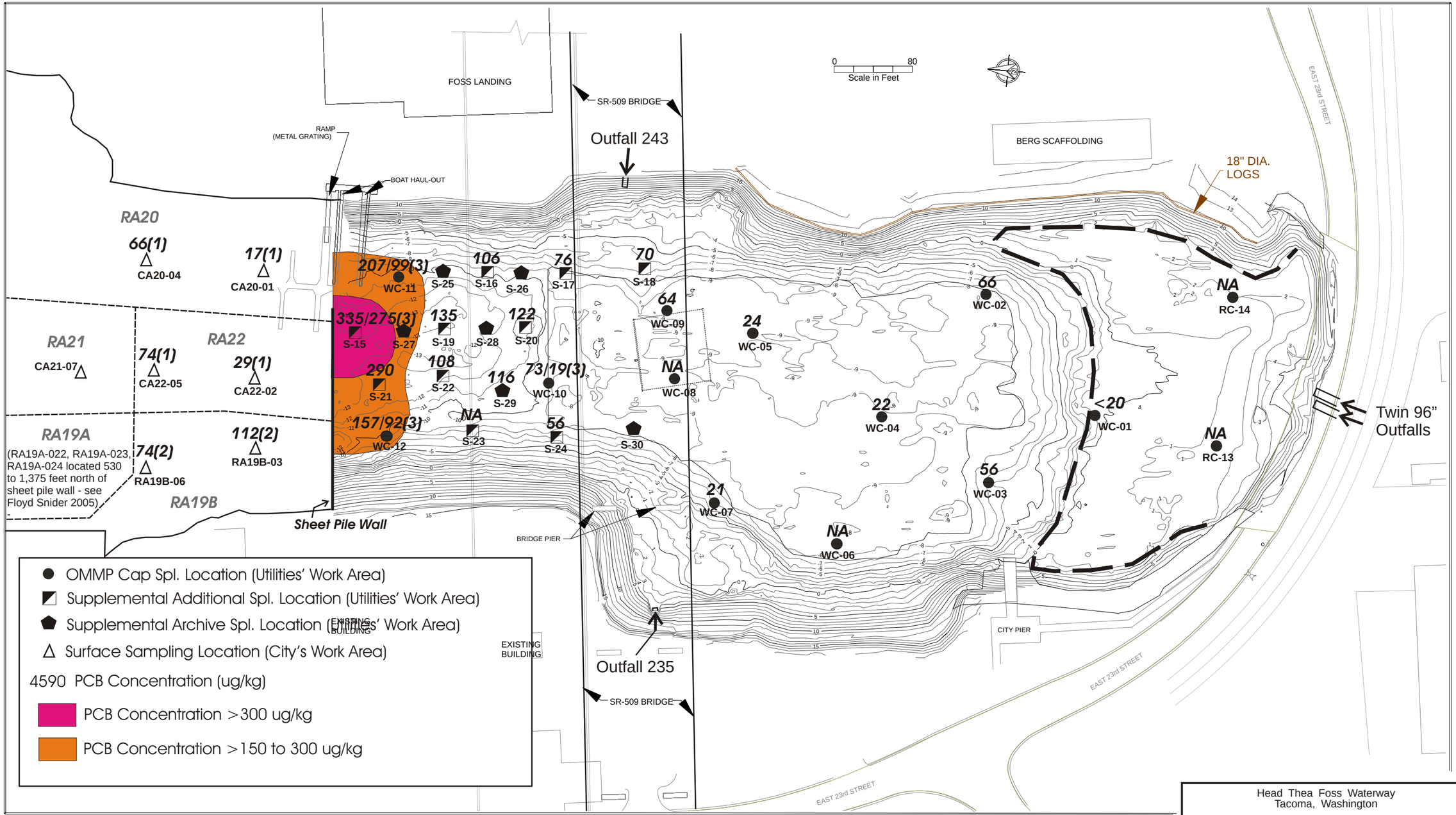
(3) City/Utilities Analyses

Head Thea Foss Waterway
Tacoma, Washington

4,4-DDD Concentrations in 0 to 10 cm Sediment December 2004

PAP-001-04 **FIGURE 22** May 2005
Dalton, Olmsted & Fuglevand, Inc.

Ref: 0 to 10 cm DDD 12-04.cdr



Notes: PCB SQO = 300 ug/kg
NA - Not available

(1) First Cap Lift
(2) Top of final cap

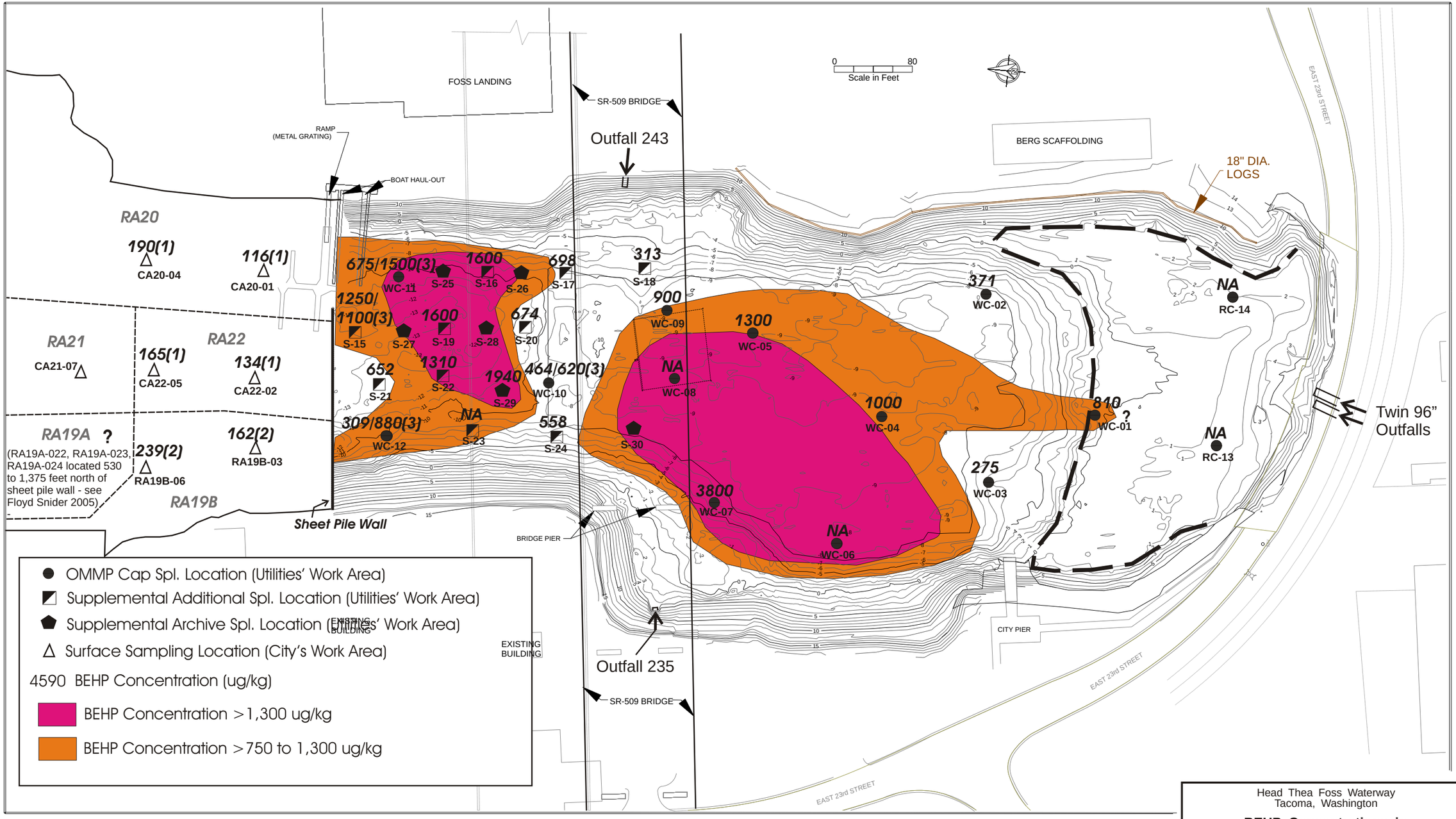
(3) City/Utilities Analyses

Head Thea Foss Waterway
Tacoma, Washington

PCB Concentrations in 0 to 10 cm Sediment December 2004

PAP-001-04 **FIGURE 23** May 2005
Dalton, Olmsted & Fuglevand, Inc.

Ref: 0 to 10 cm PCB 12-04.cdr



Notes: BEHP SQO = 1,300 ug/kg
NA - Not available

(1) First Cap Lift
(2) Top of final cap

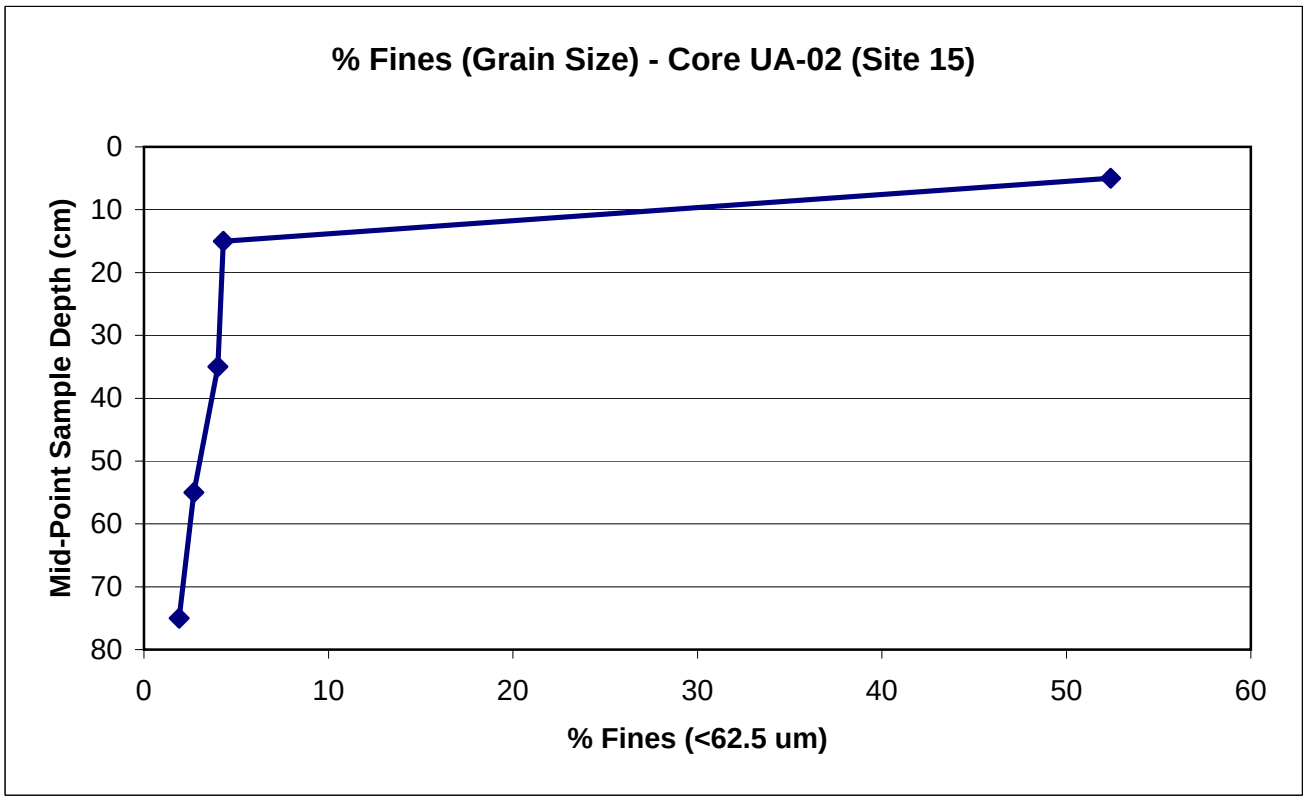
(3) City/Utilities Analyses

Head Thea Foss Waterway
Tacoma, Washington

BEHP Concentrations in 0 to 10 cm Sediment December 2004

PAP-001-04 **FIGURE 24** May 2005
Dalton, Olmsted & Fuglevand, Inc.

Ref: 0 to 10 cm BEHP 12-04.cdr



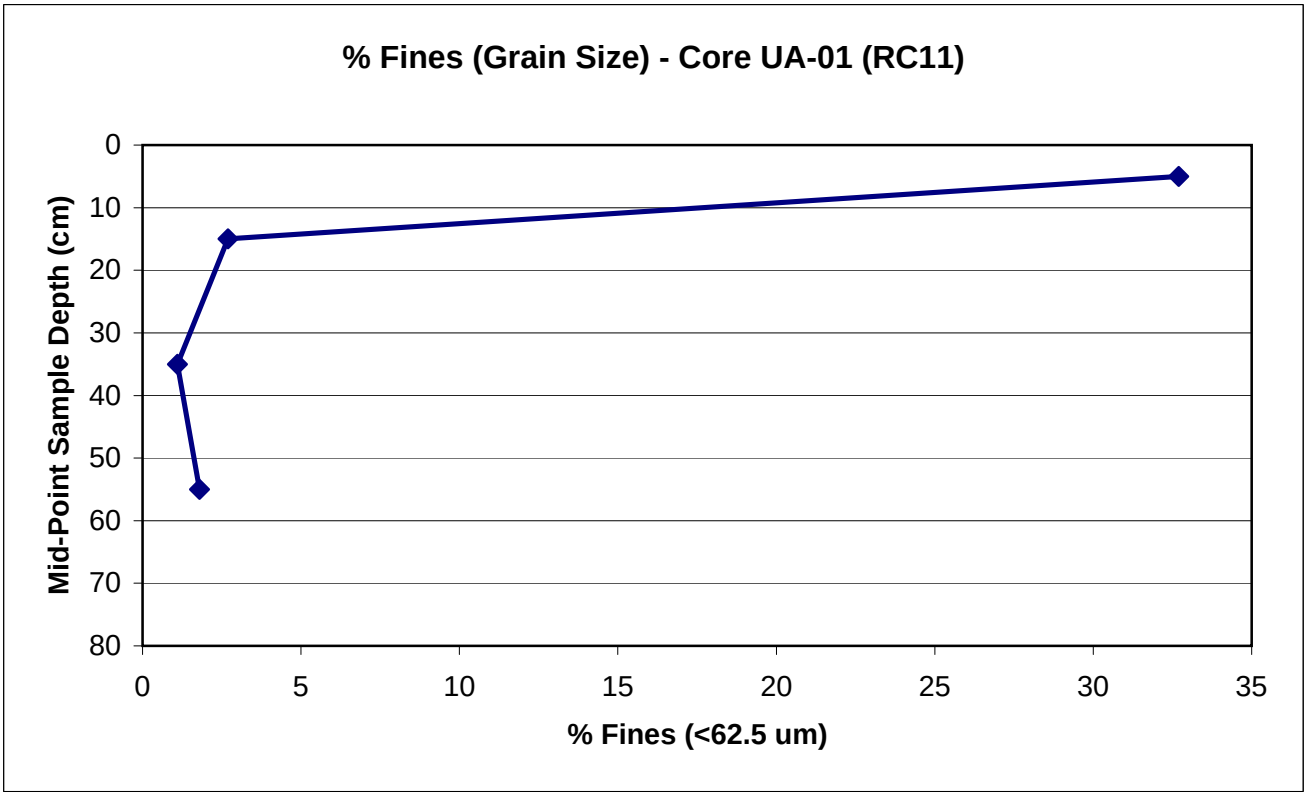


FIGURE 25
Percent Fines (Grain Size)
Cores RC11 and Site 15 - Nov. 04

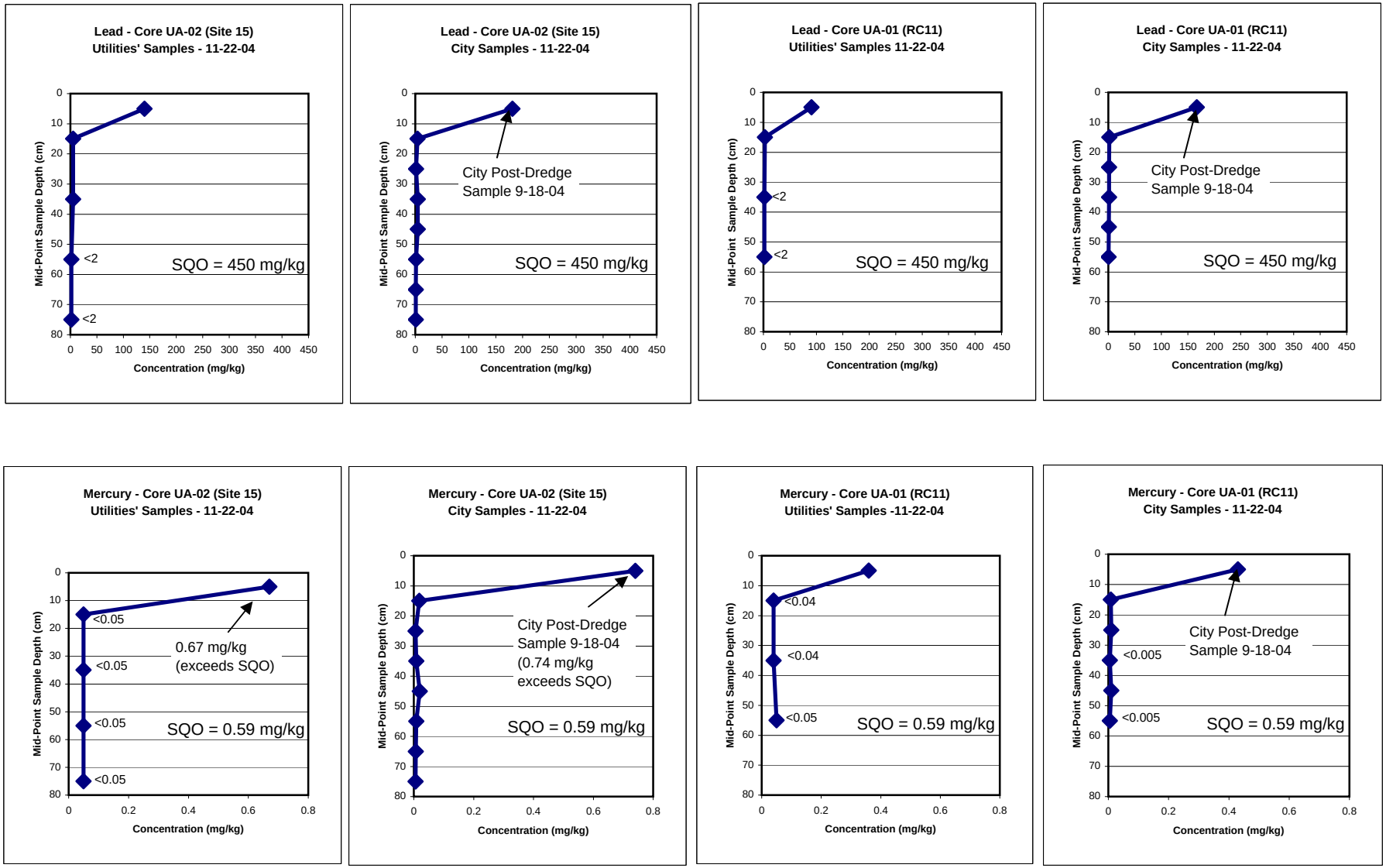
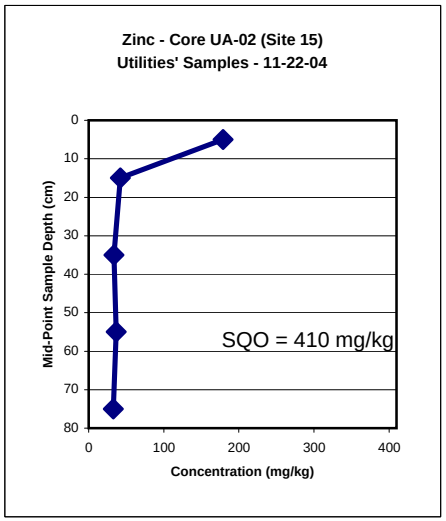
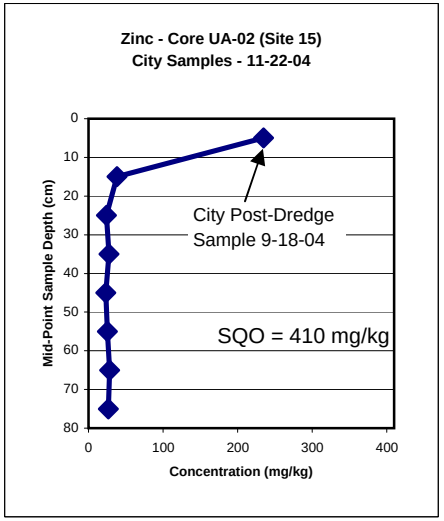
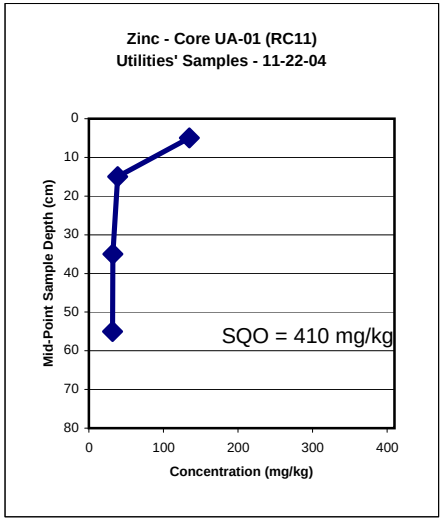


FIGURE 26
Metal Concentrations
Cores RC11 and Site 15-Nov. 04







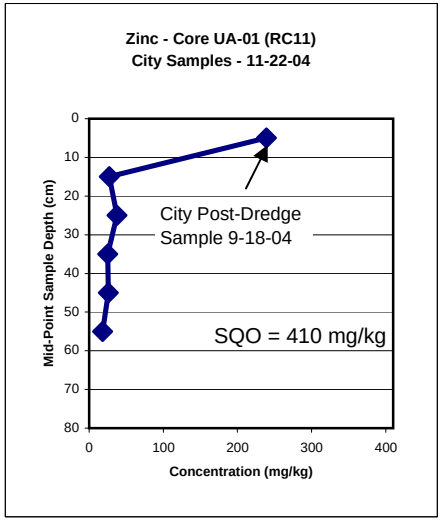
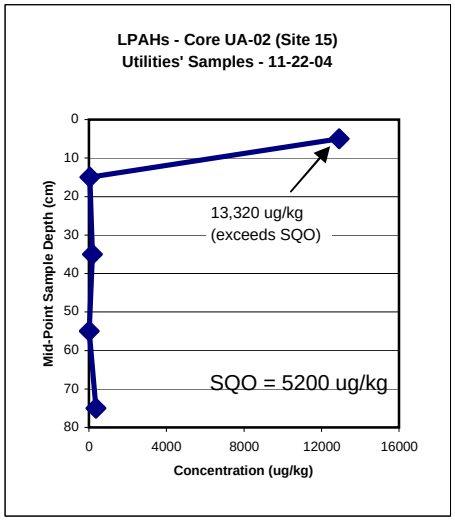
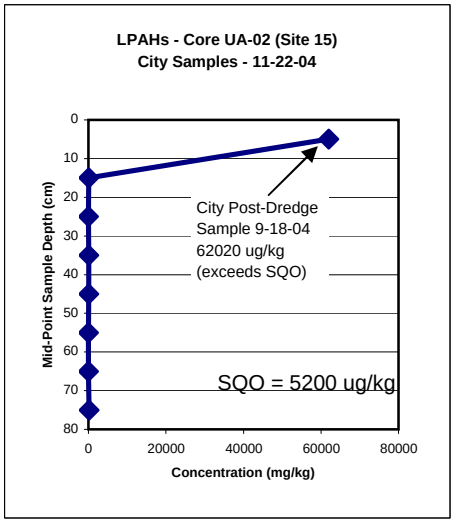
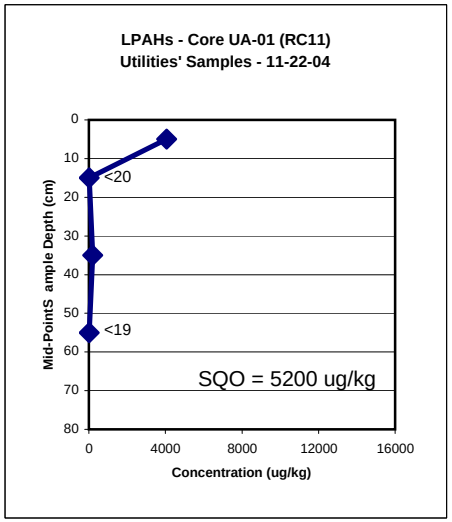
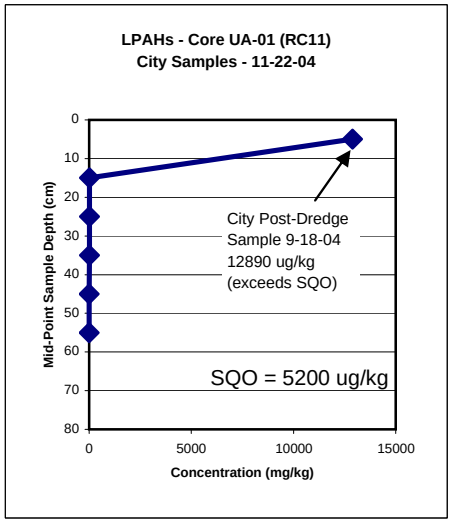


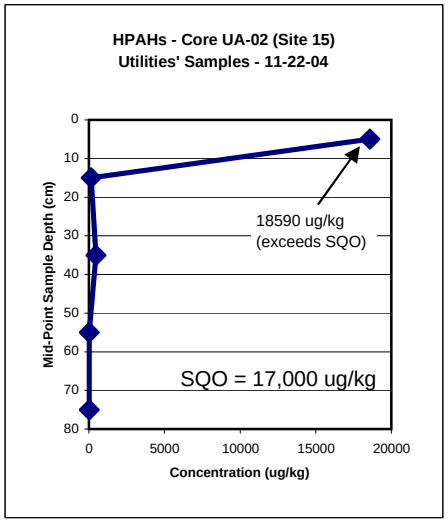
FIGURE 26
Metal Concentrations
Cores RC11 and Site 15-Nov. 04

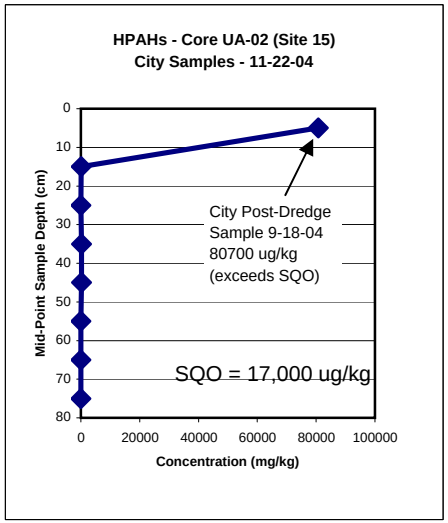


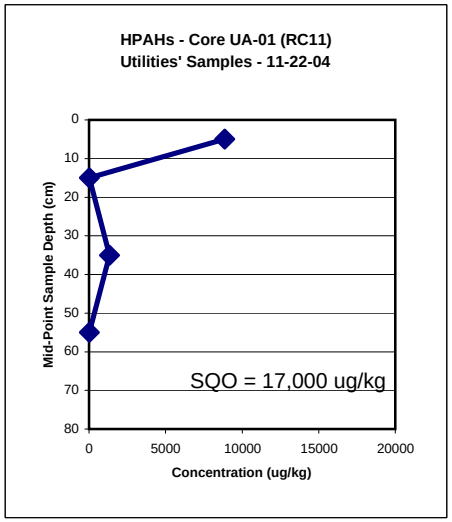












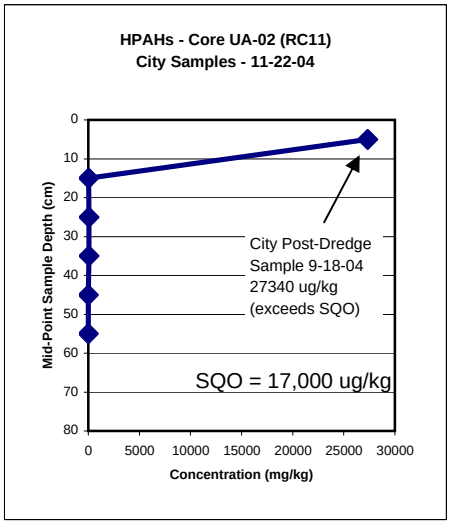
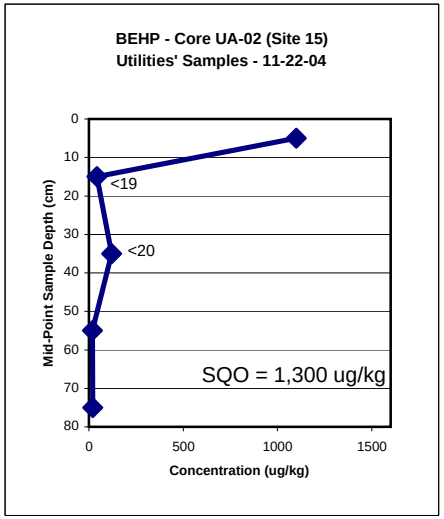
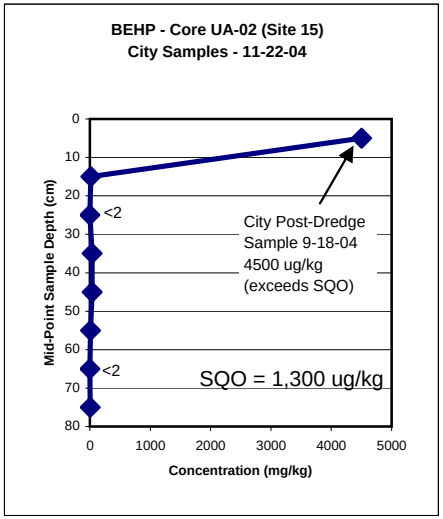
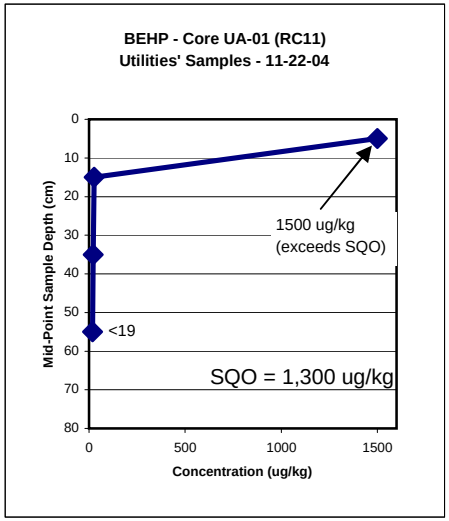


FIGURE 27
PAH and BEHP Concentrations
Cores RC11 and Site 15-Nov. 04







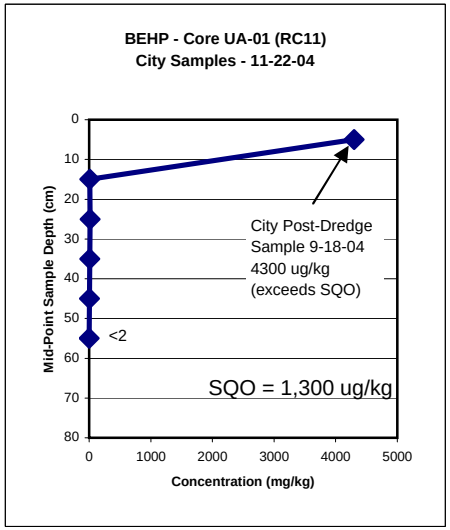
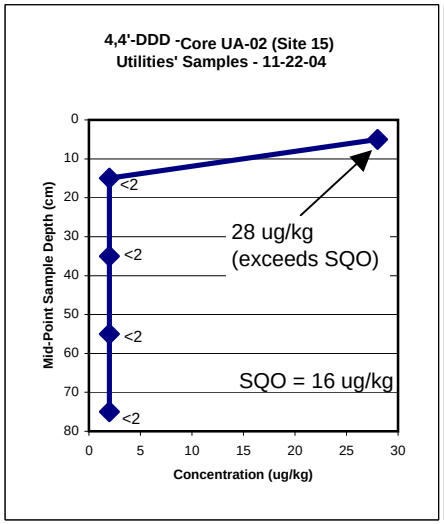
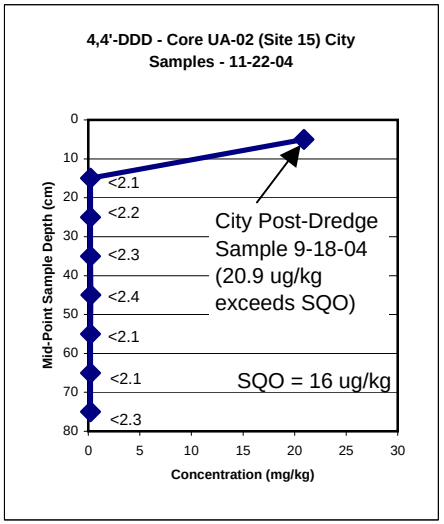
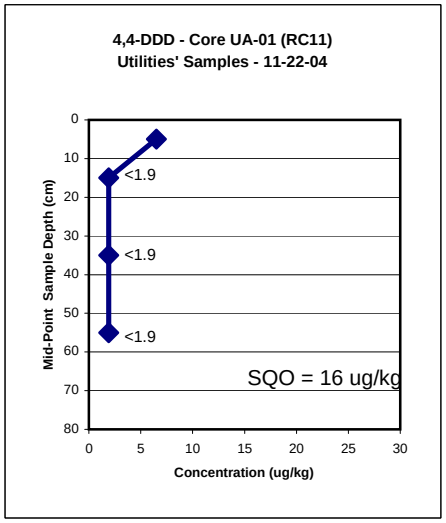
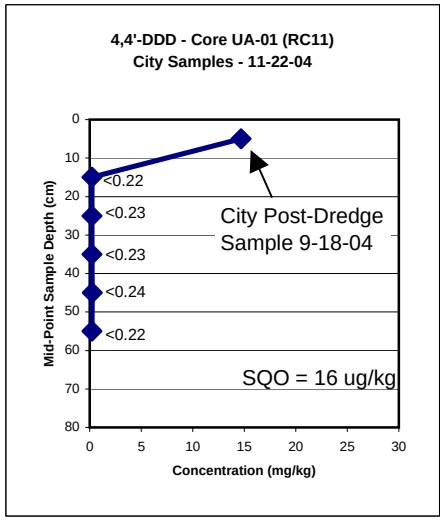


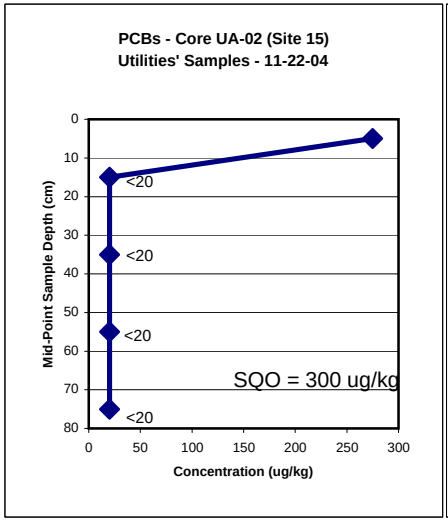
FIGURE 27
PAH and BEHP Concentrations
Cores RC11 and Site 15-Nov. 04

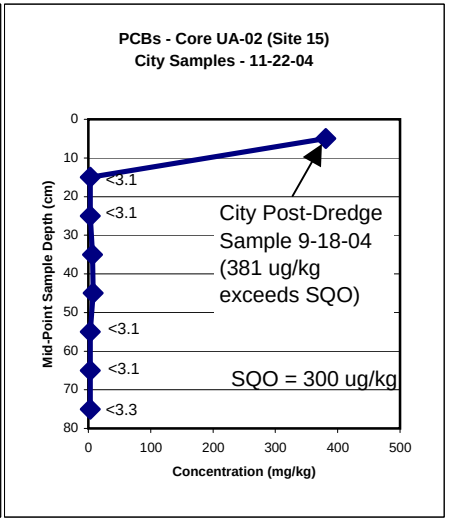


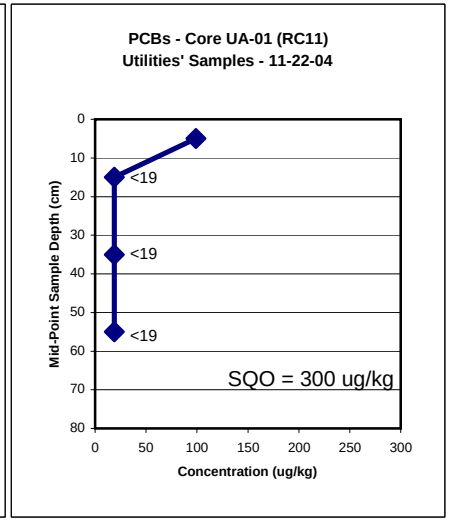












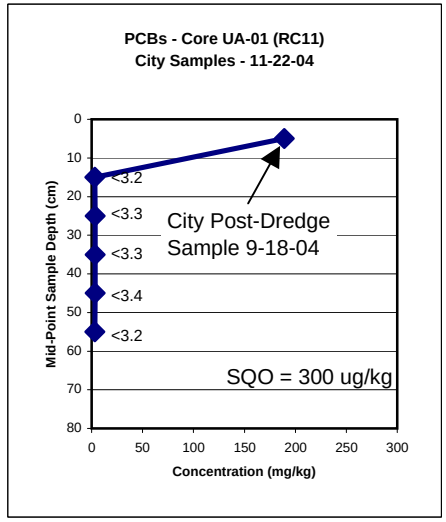
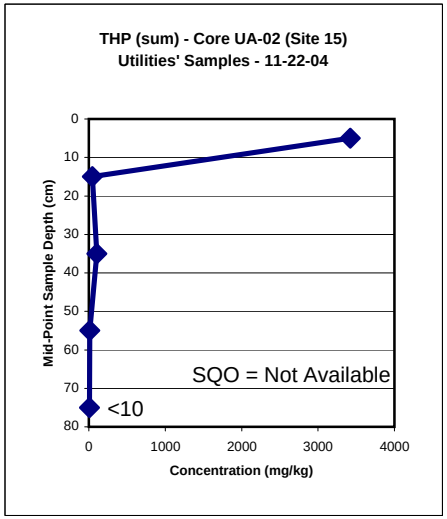


FIGURE 28
4,4'-DDD, PCB and TPH Concentrations
Cores RC11 and Site 15-Nov. 04



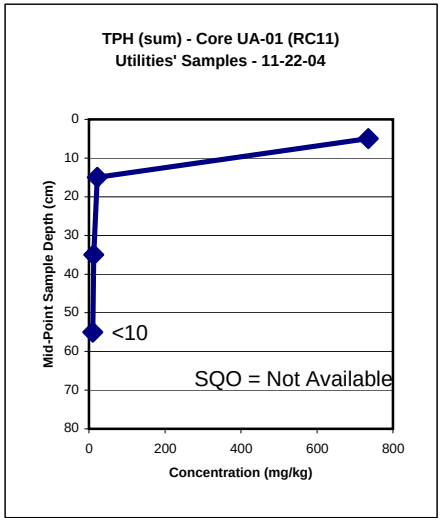
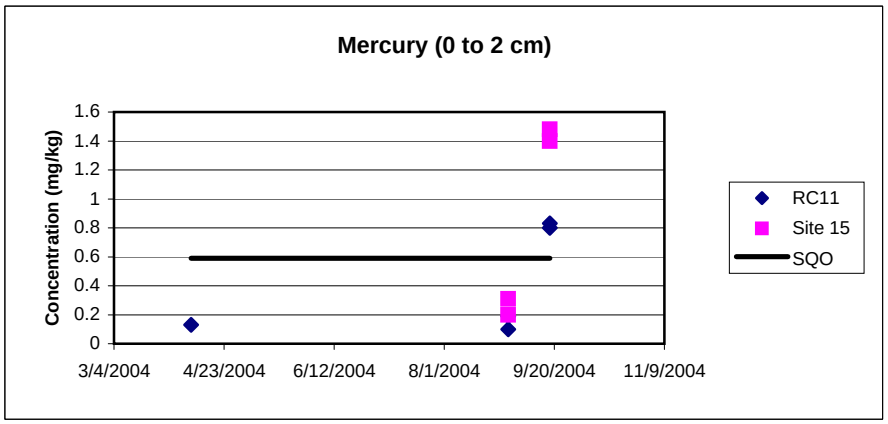
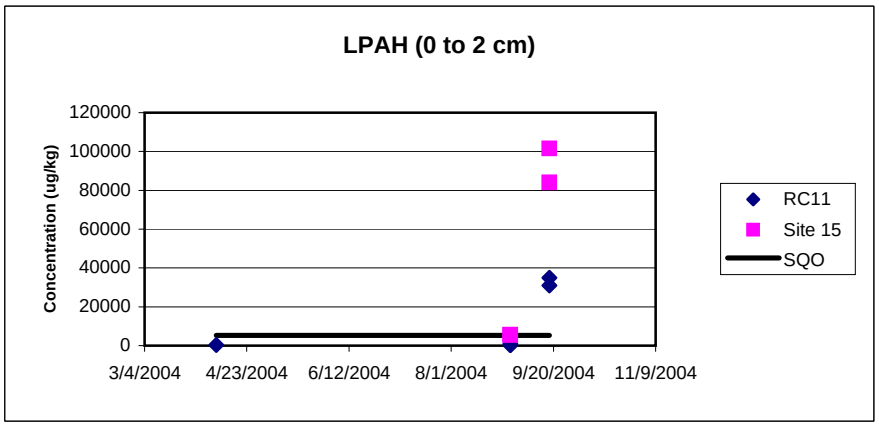
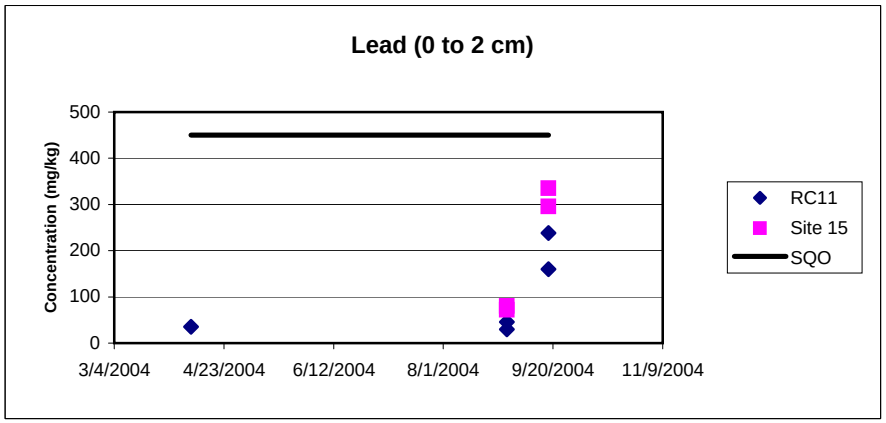
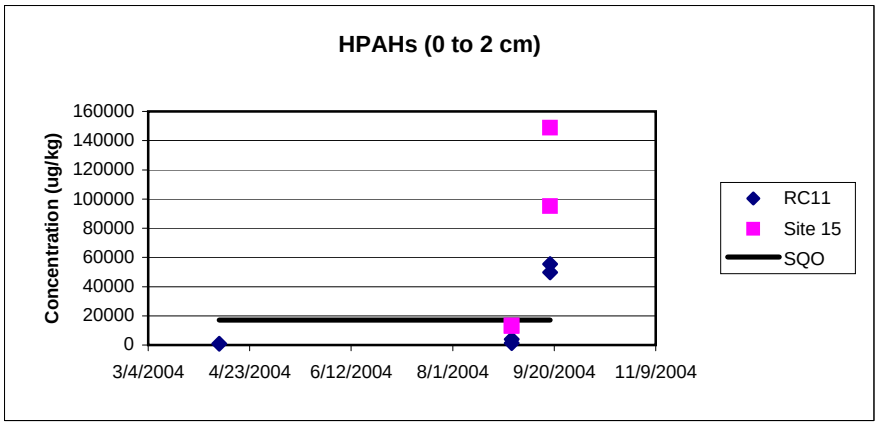


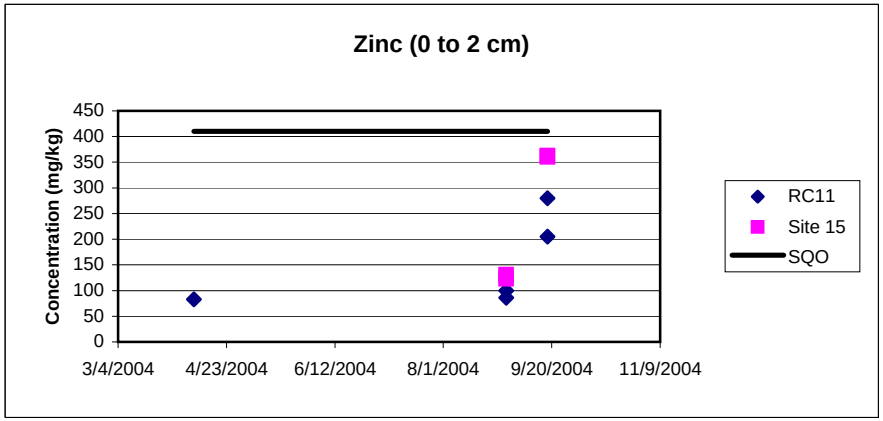
FIGURE 28
4,4'-DDD, PCB and TPH Concentrations
Cores RC11 and Site 15-Nov. 04











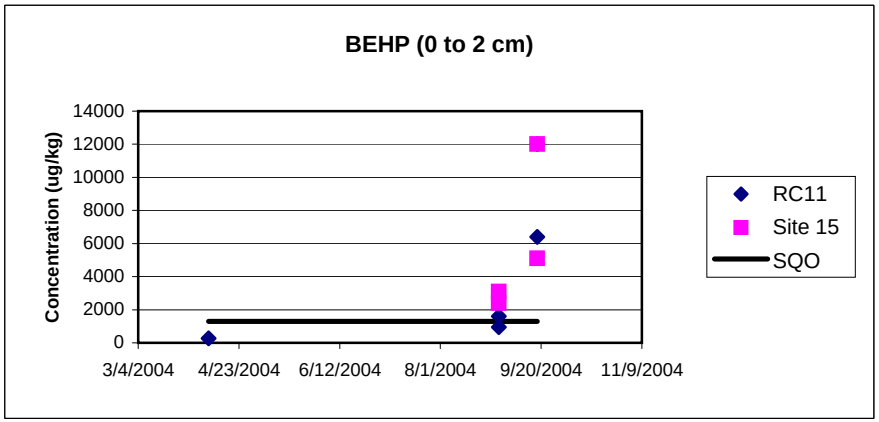
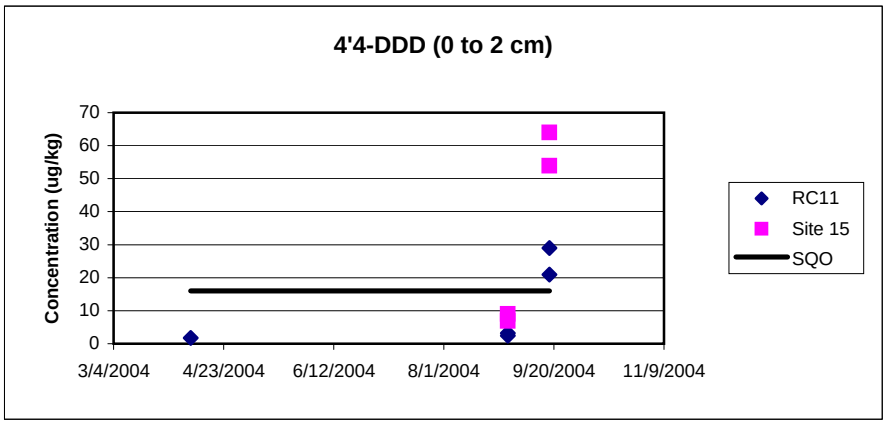


FIGURE 29
Changes in Sediment Quality
Between April and September 04



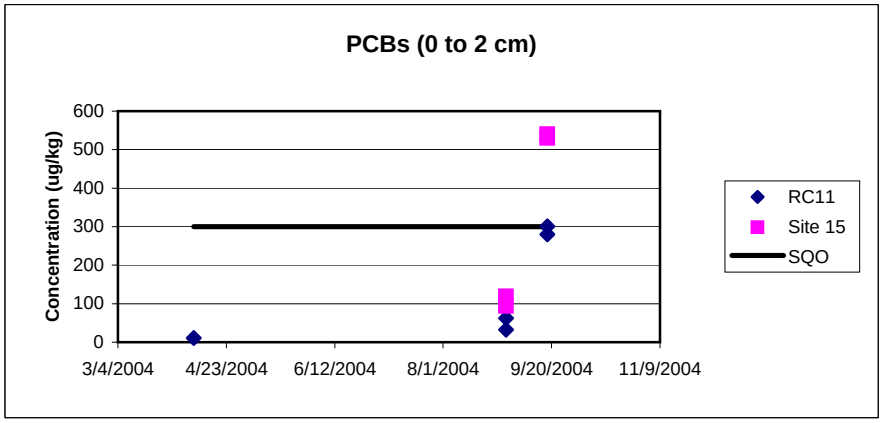
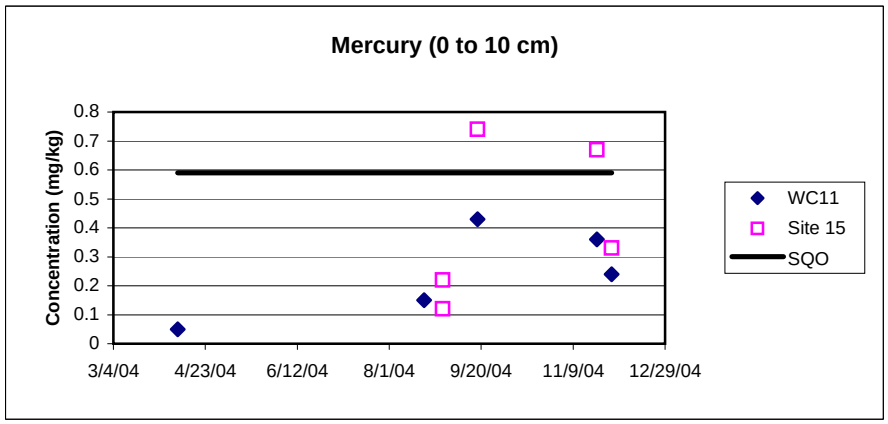
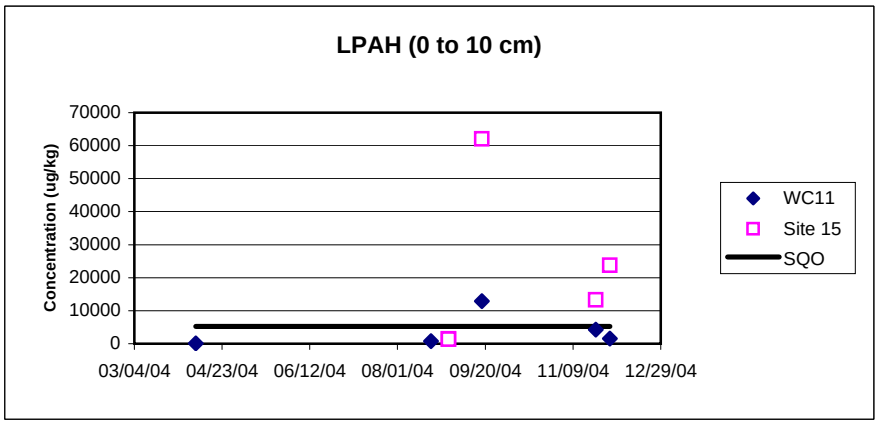
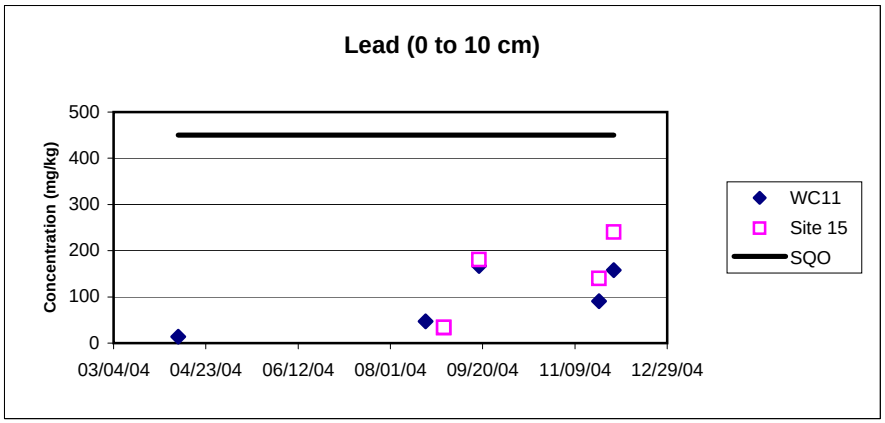
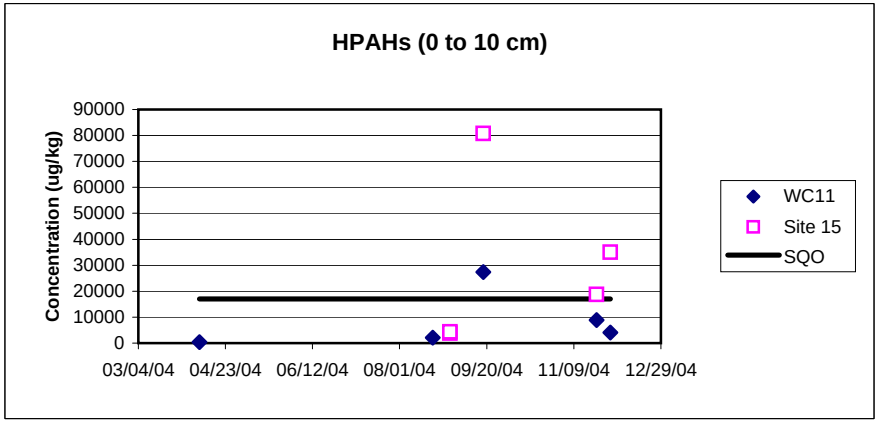


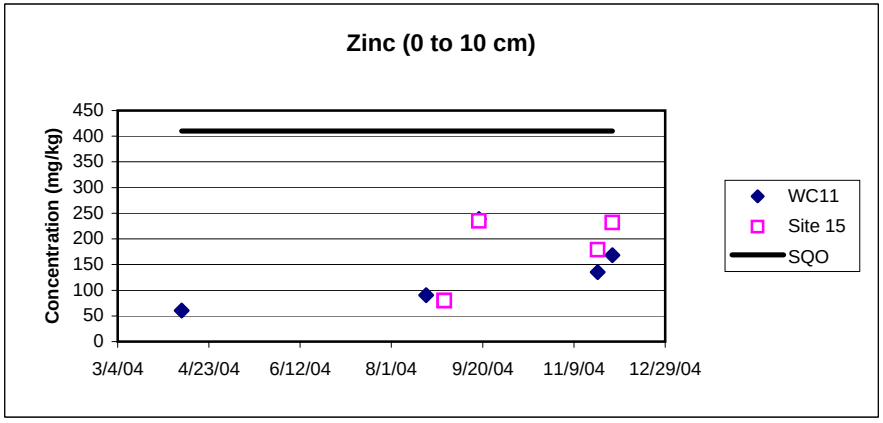
FIGURE 29
Changes in Sediment Quality
Between April and September 04











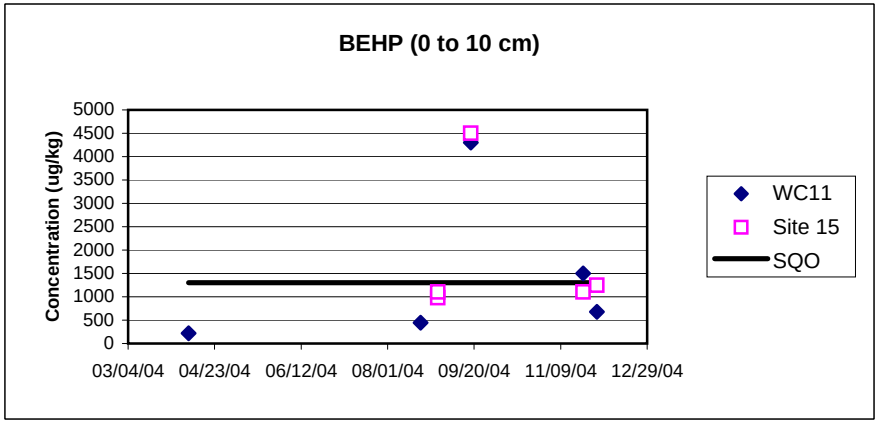
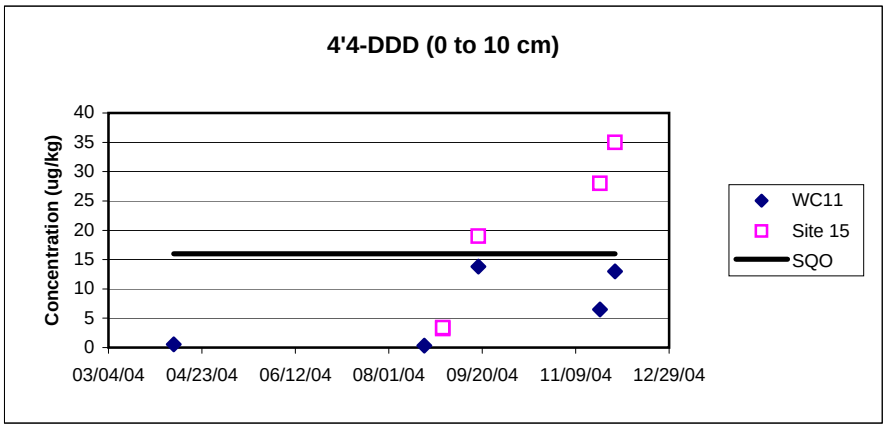


FIGURE 30
Changes in Sediment Quality
Between April and December 04



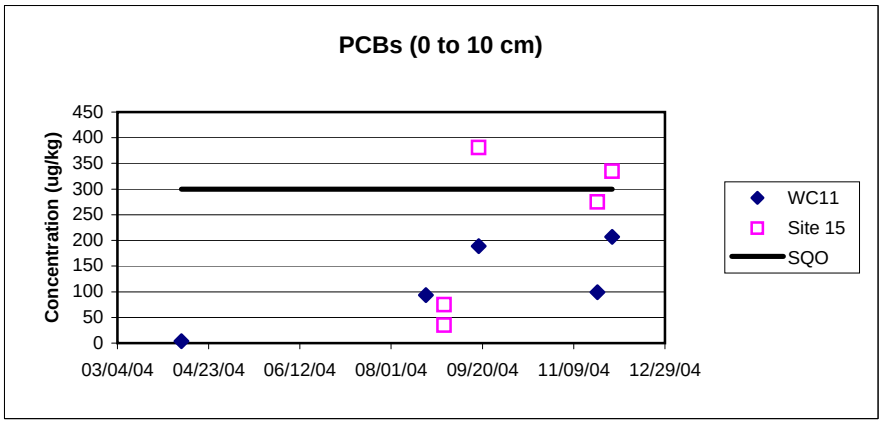


FIGURE 30
Changes in Sediment Quality
Between April and December 04

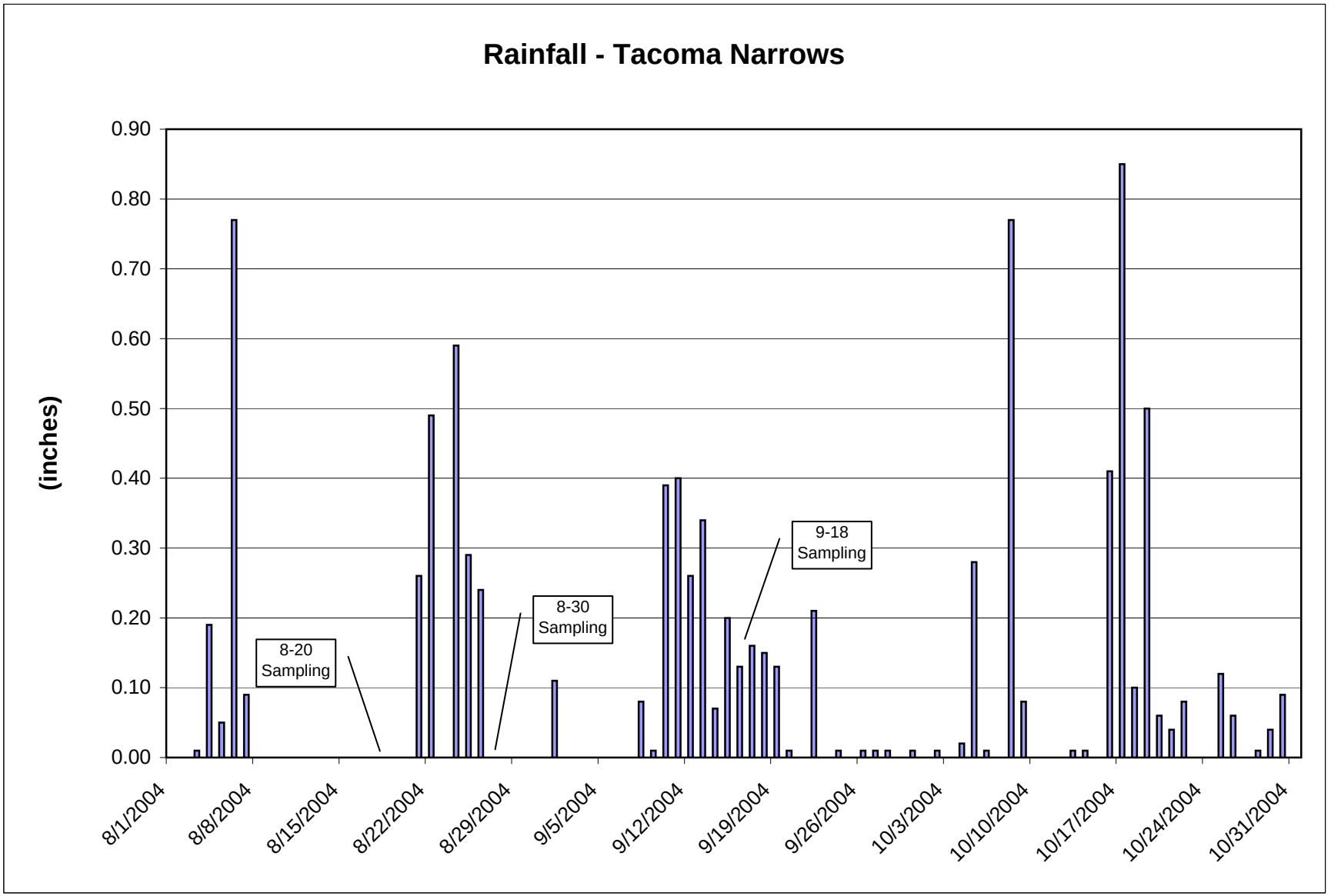
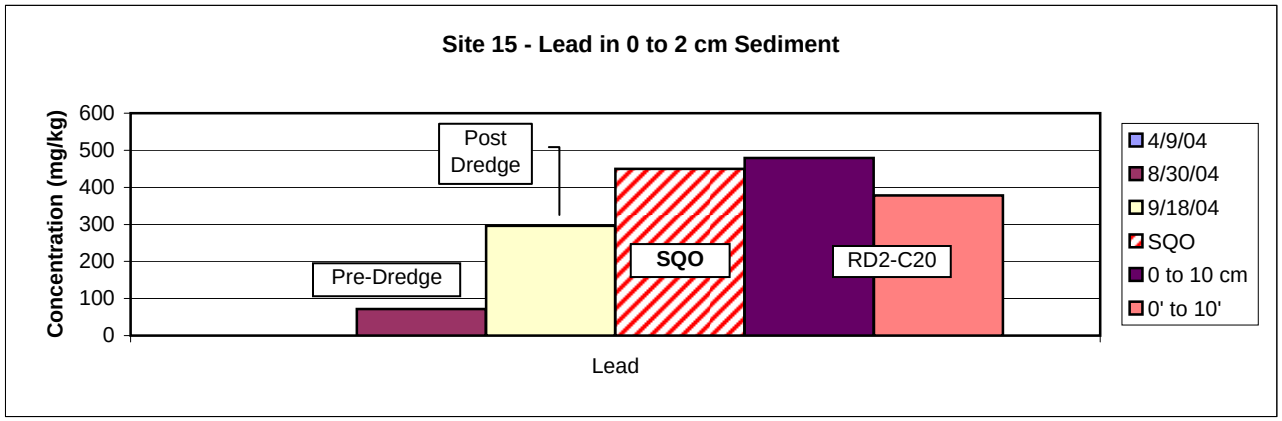
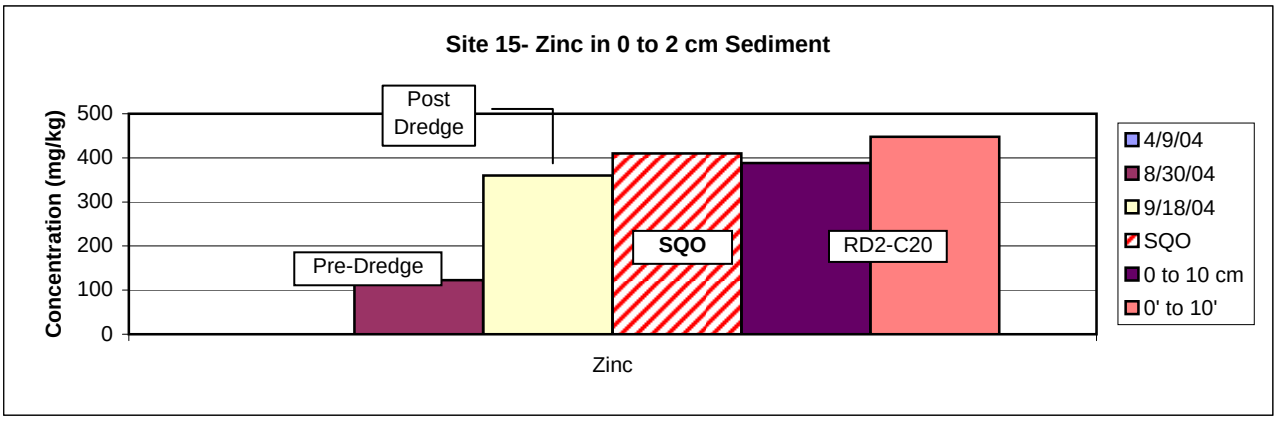
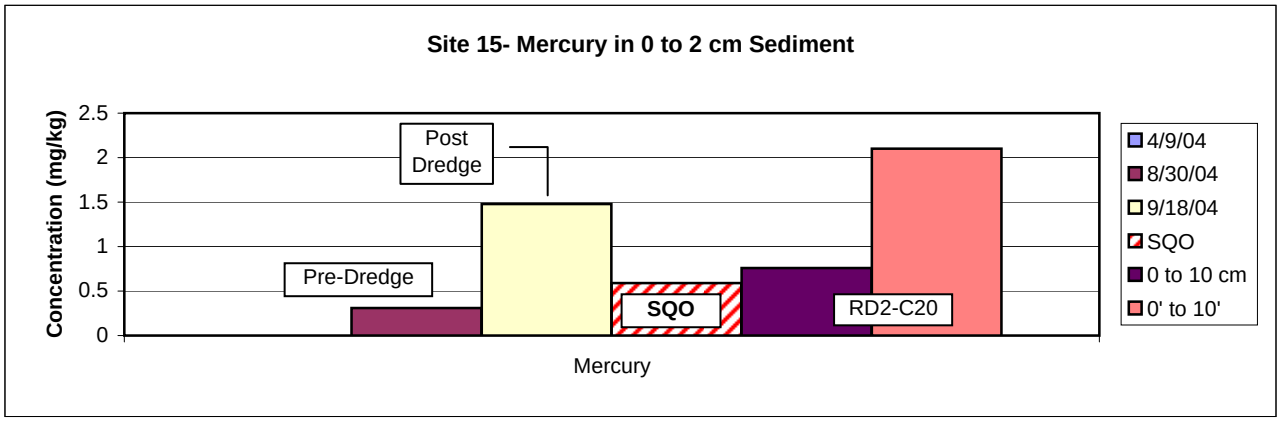


FIGURE 31
Tacoma Narrows Rainfall
Aug. to Oct.2004







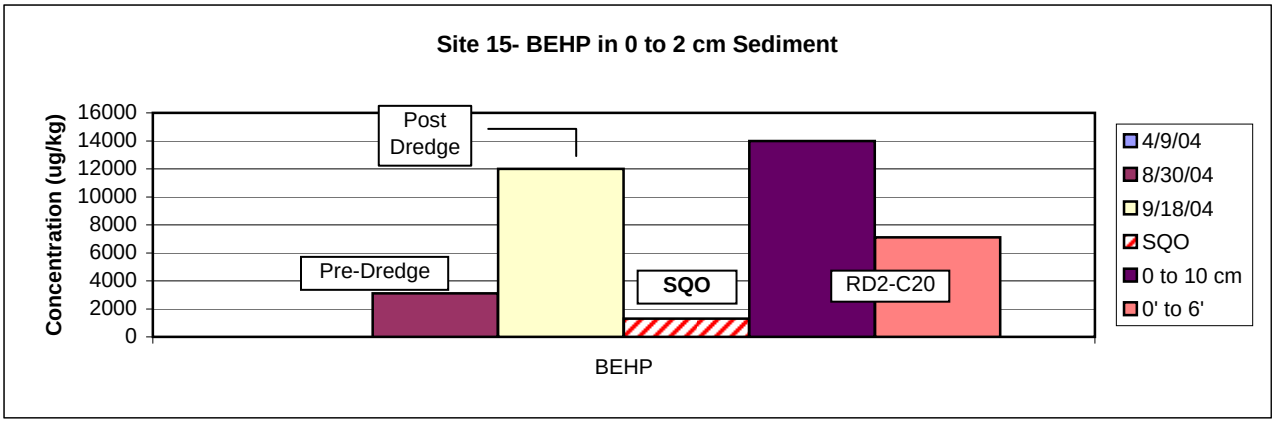
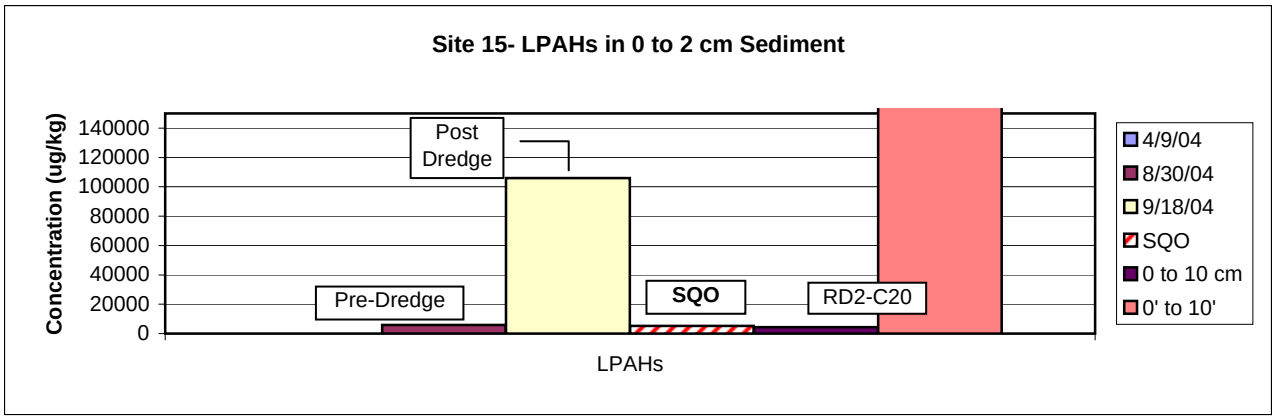
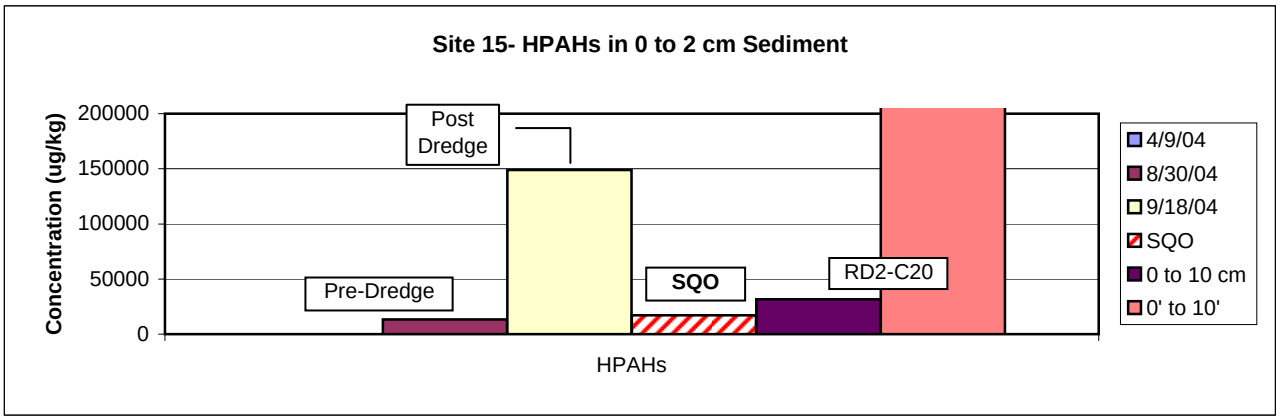
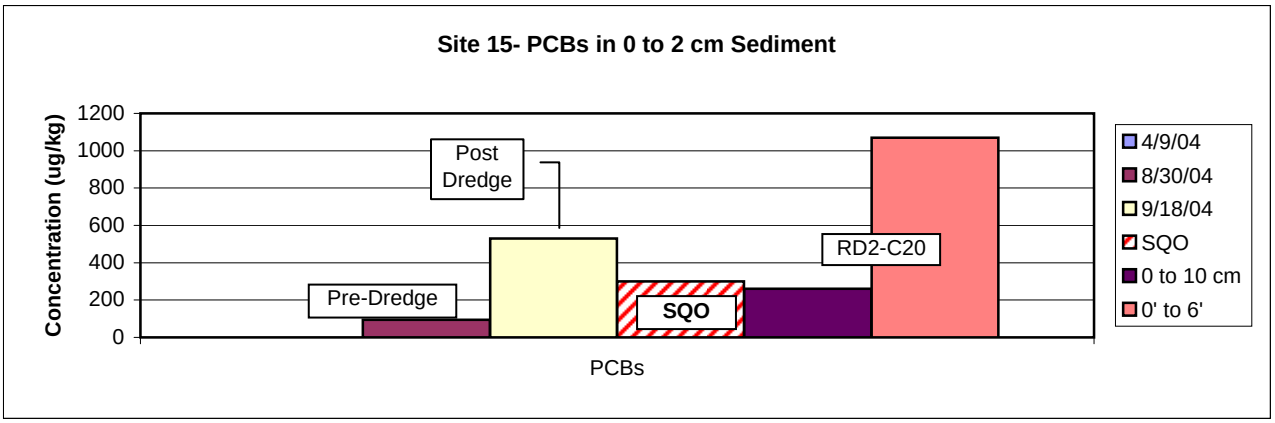


FIGURE 32
Comparison Site 15 (0 to 2 cm)
Samples- Aug./Sept. 04 Data







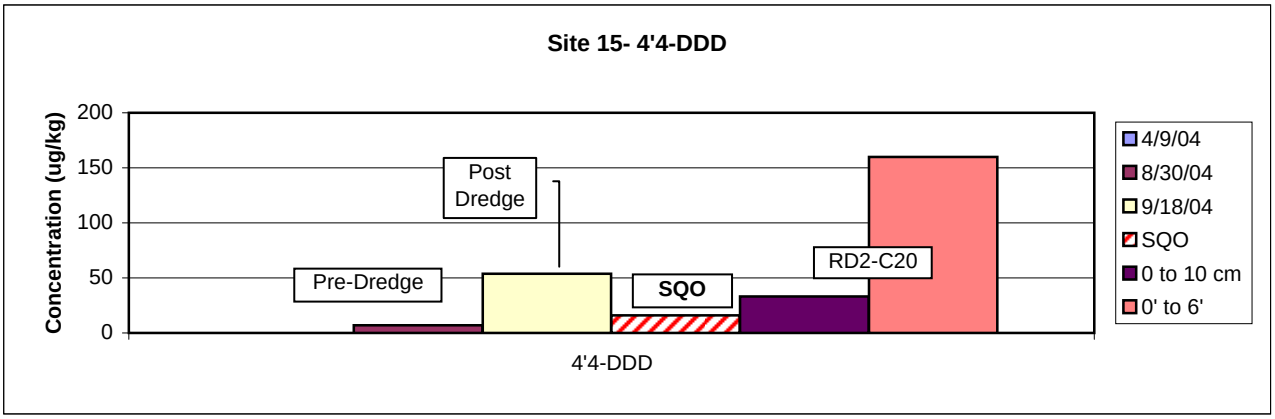
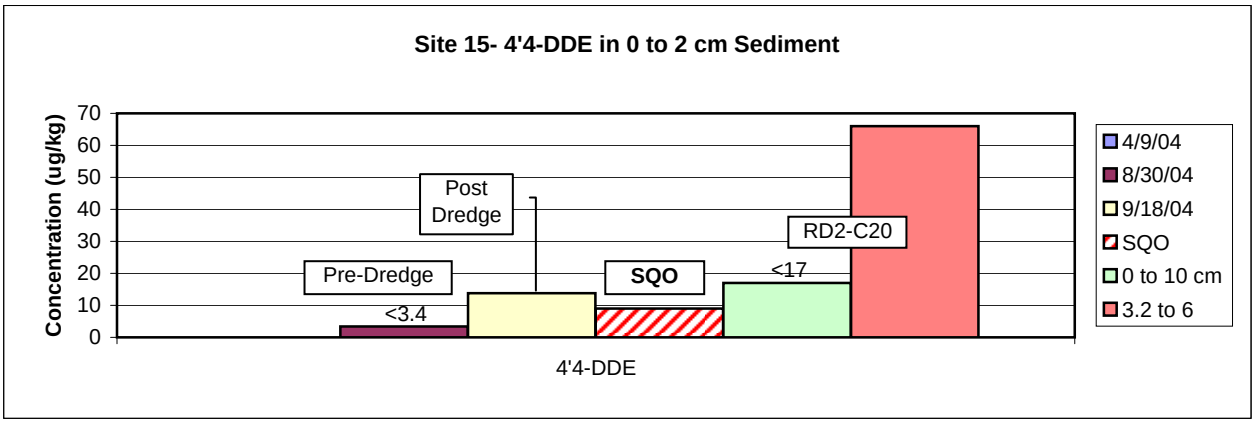


FIGURE 32
Comparison Site 15 (0 to 2 cm) Samples- Aug./Sept. 04 Data



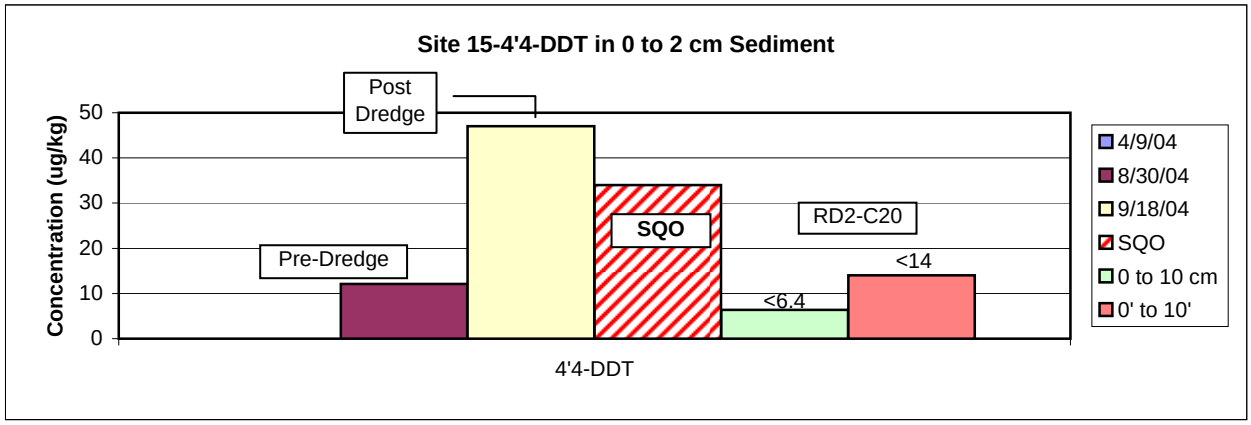
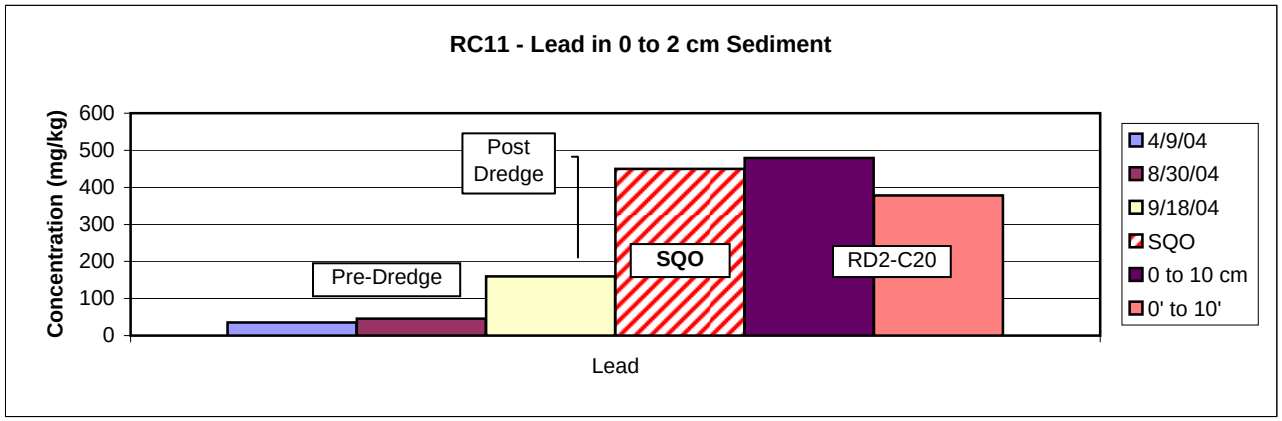
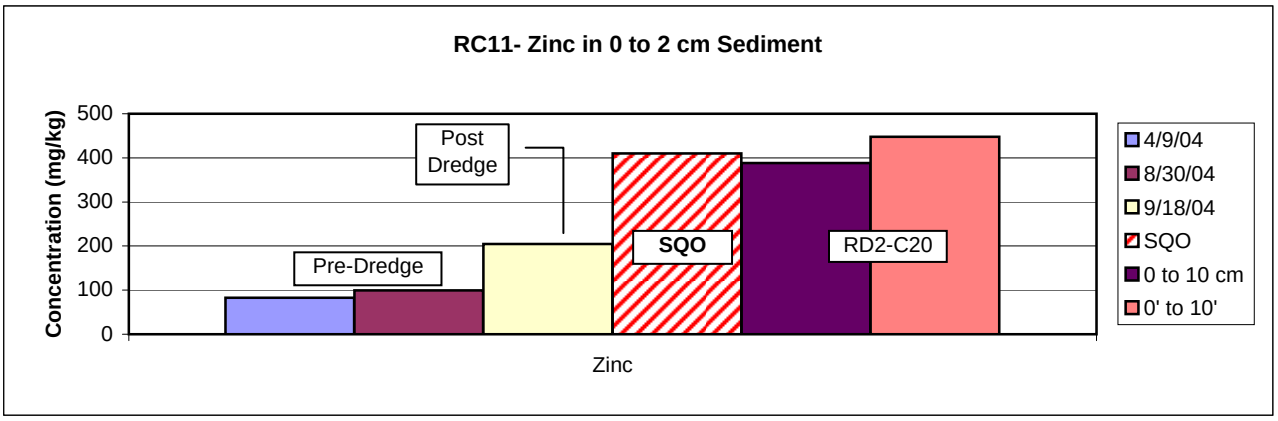
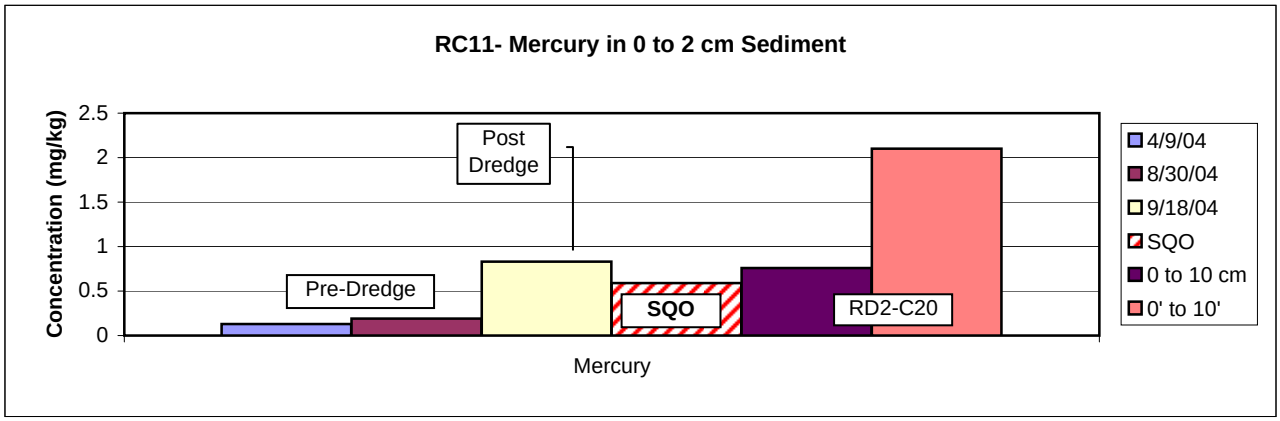


FIGURE 32
Comparison Site 15 (0 to 2 cm)
Samples- Aug./Sept. 04 Data







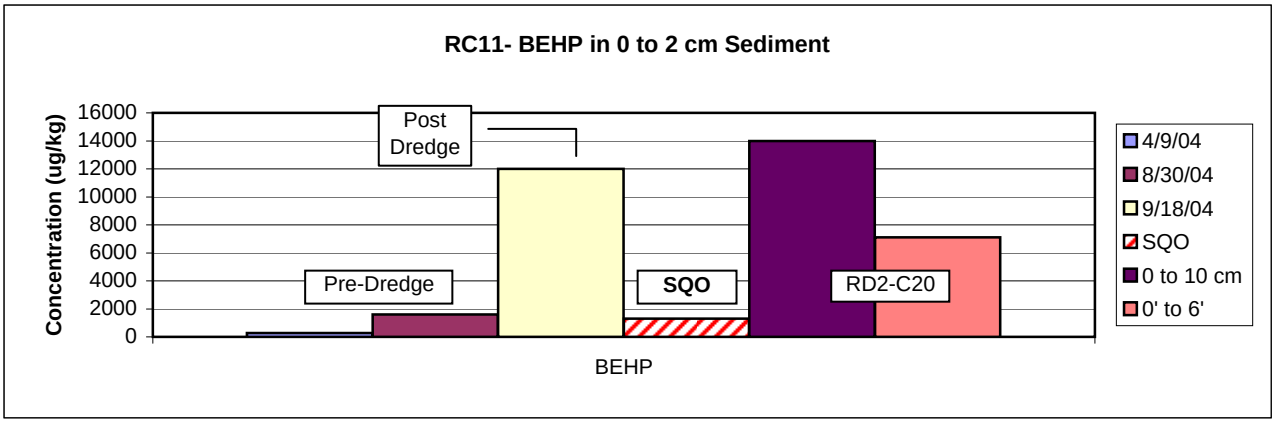
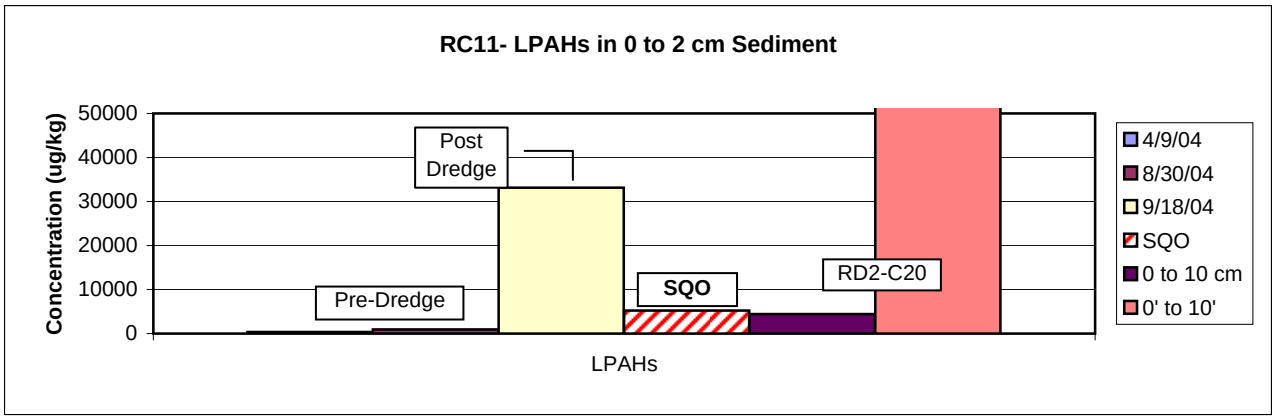
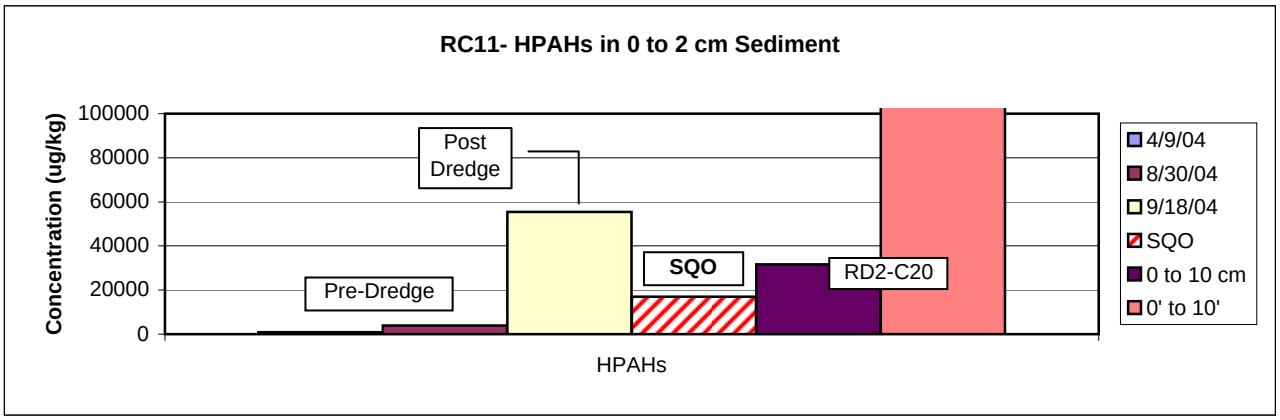
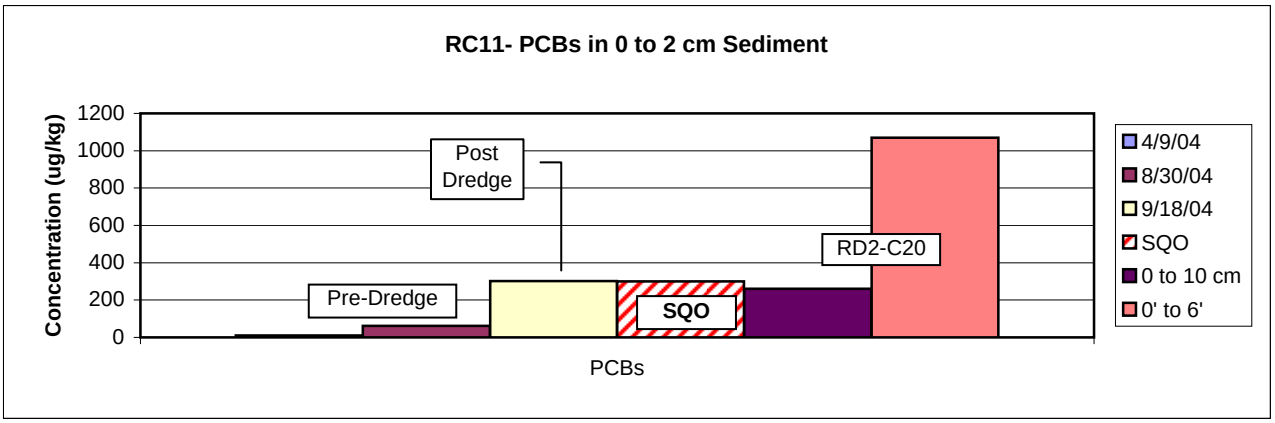


FIGURE 33
Comparison RC-11 (0 to 2 cm)
Samples - Aug./Sept. 04 Data







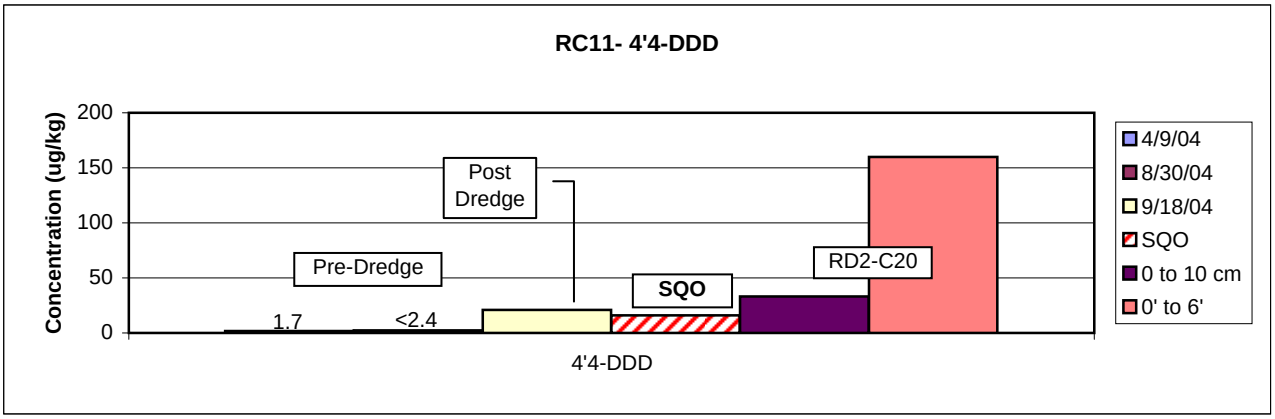
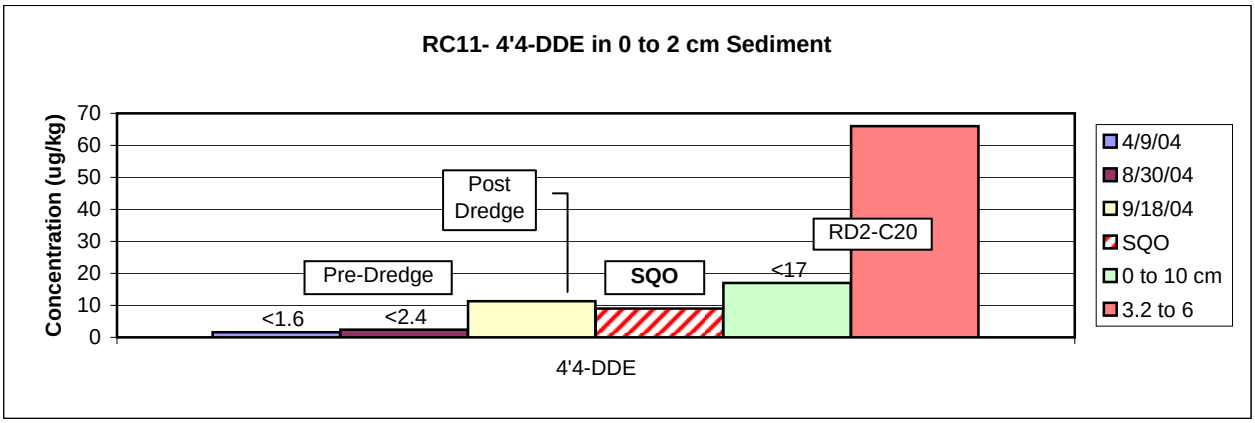


FIGURE 33
Comparison RC-11 (0 to 2 cm) Samples - Aug./Sept. 04 Data



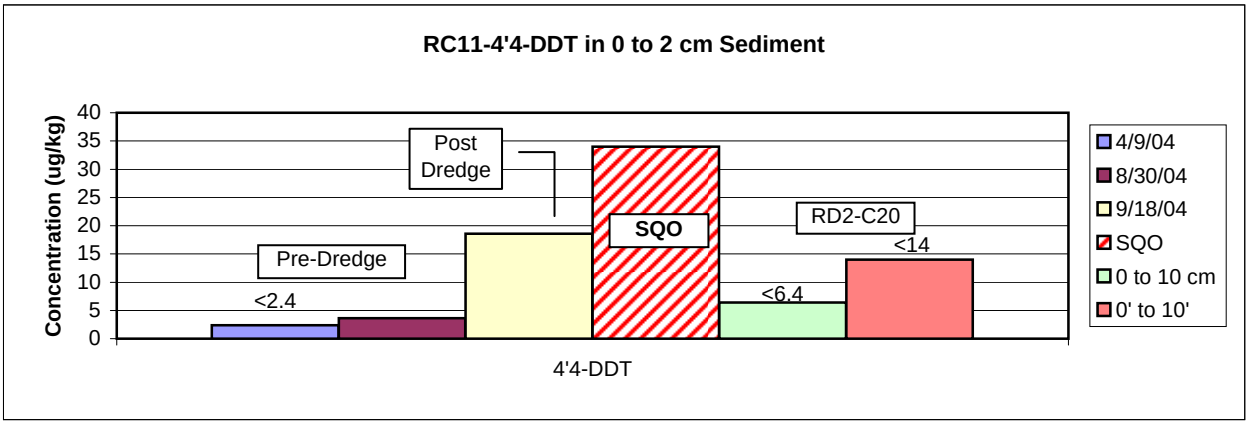


FIGURE 33
Comparison RC-11 (0 to 2 cm)
Samples - Aug./Sept. 04 Data

APPENDIX A
Year 0 OMMP Report
Dalton Olmsted & Fuglevand, Inc.
August 27, 2004

RESULTS OF YEAR 0 OPERATION, MAINTENANCE AND MONITORING PLAN SAMPLING
HEAD OF THE THEA FOSS WATERWAY REMEDIATION
TACOMA, WASHINGTON

Prepared for:
Puget Sound Energy
PacifiCorp Environmental Remediation Company

Dalton, Olmsted & Fuglevand, Inc. *Environmental Consultants*

August 27, 2004

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RESULTS OF YEAR 0 OPERATION, MAINTENANCE AND MONITORING PLAN SAMPLING
HEAD OF THE THEA FOSS WATERWAY REMEDIATION
TACOMA, WASHINGTON

1.0 INTRODUCTION

This report was prepared on behalf of the "*Utilities*" consisting of the Advance Ross Sub Company, PacifiCorp, and Puget Sound Energy and presents the results of "Year 0" Operation, Maintenance and Monitoring Plan (OMMP) sampling. The sampling and analyses were accomplished in accordance with the requirements of the OMMP prepared by TetraTech-FW et al (2003). The Utilities are responsible for Remedial Action Areas 23 and 24 (RA23/24) consistent with the CD and portions of RAs 19b, 20 and 22 as described in a confidential agreement with the City of Tacoma. Portions of the waterway south of a sheet pile wall installed at station 70+10 (Figure 1) are the responsibility of the Utilities (herein termed the *"Utilities' Work Area"*).

Construction of the remedy for the Utilities' Work Area was completed in February 2004 [Dalton, Olmsted & Fuglevand, Inc. (DOF 2004)]. The selected remedy for the Utilities' area of responsibility was containment of contaminated sediments south of waterway station 70+10. The primary components of the remedy are listed below and are shown on Figure 1.

- Installation of a sheet pile wall at waterway station 70+10.
- Dredging beneath the current location of the scour protection apron at the head of the waterway and placement of capping and scour protection material where stormwater discharges from outfalls known as the Twin 96" outfalls.
- Placement of an HDPE cap over the former location of the "SR509 seep".
- Placement of a sand cap over contaminated sediments and the SR509 seep HDPE cap.
- Placement of slope cap and armor material on waterway slopes.

Year 0 sampling had two general purposes:

- To provide data to assess the chemical quality of in-place capping materials with respect to the Sediment Quality Objectives (SQOs) performance standards as part of the construction cap verification sampling, and
- To provide baseline data to assess possible recontamination of capping materials from underlying contaminated materials (bottom-up recontamination) and other sources such as storm water discharge (top-down recontamination).

The analytical results of the cap verification sampling (0 to 10 cm samples) were previously submitted to EPA as Attachment 8 of the Remedial Construction Report (DOF 2004). The results of the verification analyses (herein termed *"compliance sample"*

analyses are included in this report as they also provide data to establish the Year 0 baseline sediment quality conditions.

2.0 GENERAL SITE OBSERVATIONS – MAY AND JULY, 2004

On May 7 and July 1 and 2, 2004, site visits were made to document the site conditions during the lowest daylight tides of the year. The July 2 visit was made in a boat with representatives of the City of Tacoma. Predicted low tides during the site visits were as follows:

- May 7, 2004 -3.32 feet MLLW @ 1:38pm
- July 1, 2004 -3.6 feet MLLW @ 10:44am
- July 2, 2004 -4.1 feet MLLW @ 11:32am

The observations made during the site visits along with site photographs are presented in Attachments A and B. Air-photographs were also obtained during the afternoon of May 25, 2004 with a predicted low tide of 0.18 feet MLLW (Figures 3a and 3b).

The purpose of the site visits was to observe the:

- General condition of the scour protection placed at the head of the waterway,
- General condition of the waterway slopes exposed at the low tides, and
- Former SR509 seep area for evidence of sheens.

As discussed in Attachments A and B, no significant erosion of the scour protection or erosion/sloughing of waterway slopes was observed. Furthermore, while some gas bubbles were observed (throughout the waterway), no sheens were observed, including in the areas with gas bubbles, during the extreme low tides in the former SR509 seep area or elsewhere in the Utilities' work area. Overall, the remedy appears to be functioning as intended.

3.0 SEDIMENT SAMPLE COLLECTION

Sediment samples were collected on April 7, 8 and 9, 2004. The sampling platform was a vessel provided by Sound Vessels under subcontract to Tetra Tech-FW. Sampling was completed by Terry Olmsted (DOF) and Gary Braun (Tetra Tech-FW) with assistance from Tetra Tech-FW staff. Tetra Tech-FW provided the equipment. Sample locations are shown on Figure 2. Washington State Plane coordinates for the sampling locations are presented in Table 4.1 of the OMMP.

Four types of samples were collected as outlined in the OMMP and described below:

- **Waterway Cap Compliance Samples (0 to 10 cm)**. Fourteen waterway cap samples (WC-1 to WC-14) were collected from the top of the waterway cap using a Van Veen Sampler (0.1 square meter). The samples were described and containerized for laboratory analysis. These samples were obtained at the point of compliance for waterway capping material (i.e. top 10 cm of capping material).

- **Slope Cap Compliance Samples (0 to 10 cm)**. Thirteen slope cap samples were collected from the top of the slope cap during low tide conditions. Three to four adjacent samples were used to form four composite samples as illustrated on Figure 2. An equal volume of material was collected from each location using stainless steel spoons. The samples were described and were then mixed in a stainless steel bowl to form the composite samples. The mixed samples were placed in containers provided by the receiving laboratory. The slope cap compliance samples were obtained at the point of compliance for slope capping material (i.e. top 10 cm of capping material).

- **Early Warning Recontamination Samples (0 to 2 cm)**. Fourteen early warning samples (RC-1 to RC-14) were collected to provide warning from possible *"top down"* recontamination of the cap. At most locations, early warning recontamination samples were collected from the top of the waterway cap using the Van Veen sampler at the same time the waterway cap compliance samples were obtained. Early warning and compliance samples were co-located and obtained at stations WC-01 to WC-12. At stations RC-13 and RC-14, located on the scour protection cap, only early warning samples were obtained. The samples were collected using stainless steel spoons during low tide. The samples were described and containerized for laboratory analysis.

- **Core Samples (0 to 3.3 feet)**. Core samples were collected from the waterway cap using a 4-inch diameter VibraCore operated by Tetra Tech-FW personnel. A 4-foot long aluminum tube with a stainless steel core catcher and a clear cellulose acetate butyrate (CAB) liner was lowered through the water column and vibrated into the bottom materials at five locations as shown on Figure 2. The sampling equipment was raised to the boat deck and the inner CAB liner removed. The liner was cut with a knife and the core was described and photographed. Core recovery varied from 1.3 feet up to 3.3 feet. At some locations, several attempts were required to obtain sufficient core recovery. Recovered core samples were divided into approximately 12-inch long segments. Each core segment was given a discrete sample number and each segment was mixed in a stainless steel bowl. The mixed sample was placed in containers provided by the receiving laboratory. Core samples were obtained to provide a baseline for possible future bottom-up recontamination of the waterway cap.

During the sampling event, samples were "split" with representatives of the City of Tacoma.

Sample locations that were not under the SR 509 Bridge were determined using Differential Global Positioning System (DGPS) methods (Trimble system). Samples taken under the SR 509 Bridge, where DGPS could not be used, were established by setting location buoys using a *"Total Station"* system operated by Tetra Tech-FW personnel. Each buoy was removed following sampling.

4.0 CHEMICAL ANALYSES AND DATA VALIDATION

4.1 Analytical Constituents

Section 2.3.4 of the OMMP outlines the constituents to be analyzed as part of the OMMP sampling. The chemical analytes for the waterway and slope cap (0 to 10 cm) compliance samples and core (bottom-up) samples include:

- Semivolatile Organic Compounds (including PAHs, phthalates, chlorobenzenes, and other miscellaneous compounds)
- Metals (mercury, zinc and lead)
- p,p'-Dichlorodiphenyltrichloroethane (DDT) compounds
- Polychlorinated biphenyls (PCBs).
- Conventional parameters (TOC and grain size)

The chemical analytes for monitoring *"early warning"* signs of top-down recontamination in newly deposited sediment (0 to 2 cm) include:

- Polycyclic Aromatic Hydrocarbons (PAHs)
- Metals (lead, zinc, and mercury)
- bis(2-Ethylhexyl)phthalate (BEHP)
- Polychlorinated biphenyls (PCBs)
- Conventional parameters (TOC and grain size)

In addition to the analytes listed above, several additional metals were analyzed because they are often constituents in stormwater discharges (a possible source of top-down recontamination). These additional metals included antimony, arsenic, cadmium, chromium, copper, nickel and silver.

4.2 Sample Handling

The collected sediment samples were placed in clean glass containers provided by the receiving laboratory. After being filled, the sample containers were placed in chilled coolers with frozen "blue" ice and were delivered to the laboratory using standard chain-of-custody procedures. Completed chain-of-custody forms are provided with the laboratory data sheets in Attachment C.

4.3 Sample Analysis and Data Validation

The samples were analyzed by the project laboratory Analytical Resources Inc. (ARI) located in Tukwila, Washington. Laboratory data sheets are presented in Attachment D provided in a separate volume. Attachment D was submitted to EPA and others and is also in the files of DOF.

DMD, Inc. (Raleigh Farlow) reviewed and validated the analytical data. The report is included as Attachment C. Some data was qualified as estimated concentrations. However, overall DMD concluded that *"With minor exceptions, the data quality is within the criteria and specifications outlined in the project sampling plan and QAPP"* and that *"The reported data are determined to be usable for the intended purposes of the project".*

5.0 SEDIMENT SAMPLE DESCRIPTIONS

5.1 Waterway Cap Samples (0 to 10 cm and 0 to 2 cm)

Waterway cap surface samples were taken at fourteen locations (WC-01 to WC-14, Figure 2). The 0 to 10 cm samples consisted predominately of brown-gray, fine to medium sand. At the mudline surface, a variable thickness of a fine sandy silt material was observed to have accumulated since the final capping material was placed. This fine-grained material ranged from a thin coating up to approximately 1 cm thick and comprised a larger percentage of the 0 to 2 cm samples as compared to the 0 to 10 cm samples.

5.2 Slope Cap Samples (0 to 10 cm)

Slope cap samples were taken at several locations to form four composite samples (SC-01 to 04, Figure 2). Each composite sample consisted of three or four discrete samples. As observed in the waterway cap samples, at the slope cap surface a silt coating was noted ranging from 0 cm to approximately 1 cm thick, with the thickest coatings noted at locations SC-02 and -03, nearer the head of the waterway.

5.3 Sediment Cores.

Sediment cores were collected at five locations (Figure 2). Core depths ranged from 1.3 feet to 3.3 feet as summarized below. Core logs, sample depths, and the results of selected analyses are summarized in Table 3.

Core Designation	Depth (feet)
WCBU-04	3.0
WCBU-05	1.3
WCBU-06	2.0
WCBU-10	3.3
WCBU-12	1.7

The cores encountered waterway capping material through their full thickness, except at the mud line where fine grained sediments have accumulated since the final capping materials were placed.

6.0 DISCUSSION OF YEAR 0 BASELINE SAMPLING

6.1 Comparison to Sediment Quality Objectives – Surface Samples

Table 1 presents a summary of the analytical data for the waterway cap and slope cap compliance (0 to 10 cm) samples and early warning (0 to 2 cm) samples. Table 2 presents a comparison of the maximum detected concentration for particular constituents along with the SQOs.

As summarized in Table 2 and illustrated on Figure 4, none of the constituents analyzed in the compliance samples (0 to 10 cm) were detected at concentrations greater than the SQOs. Most of the analyzed constituents were either not detected or the maximum concentration was detected at less than 10% of their respective SQO. The maximum concentrations of copper (168 mg/kg) and bis(2-Ethylhexyl)phthalate (550 mg/kg) were detected at the greatest percentage of their SQOs (approximately 42% to 43%). Based on these data, the waterway and slope capping material meet the SQOs at the point of compliance. In addition, these analytical results establish the baseline concentrations to which future analyses will be compared.

Higher analyte concentrations were generally detected in the early warning (0 to 2 cm) sediment samples as compared to the compliance (0 to 10 cm) samples. The maximum early-warning concentration of bis(2-Ethylhexyl)phthalate (BEHP – 3,000 ug/kg) exceeded the SQO of 1,300 ug/kg at location RC-14. BEHP also exceeded the SQO at location RC-13 (BEHP-1,400 ug/kg). HPAHs were also detected at higher percentages of the SQOs as compared to the 0 to 10 cm samples as illustrated on Figures 4 and 5. For example, the maximum concentration of fluoranthene was detected at 64 percent of its SQO in the 0 to 2 cm sample as compared to 10 percent of the SQO in the 0 to 10 cm sample.

6.2 Source of Higher Analyte Concentrations in Early-Warning Sediment Samples

Figures 5 and 6 show the surface sediment concentration patterns for BEHP and high molecular weight polycyclic aromatic hydrocarbons (HPAHs). As illustrated on the figures, higher sediment concentrations are generally present in the 0 to 2 cm samples as compared to the 0 to 10 cm samples. Furthermore, the highest 0 to 2 cm sample concentrations are present at the extreme head of the waterway. BEHP concentrations greater than 1,000 ug/kg were detected in early-warning samples RC-1 (1,300 ug/kg), RC-3 (1,100), RC-13 (1,400 ug/kg) and RC-14 (3,000 ug/kg). HPAH concentrations greater than 1,000 ug/kg (but well below the SQO of 17,000 ug/kg) were detected in samples RC-1 (2,667 ug/kg), RC-2 (1,033 ug/kg), RC-3 (2,270 ug/kg), RC-6 (1,050), RC-13 (4,180 ug/kg), and RC-14 (7,360 ug/kg).

The presence of finer grained material observed at the mudline and higher concentrations in the early warning (0 to 2 cm) samples as compared to the compliance (0 to 10 cm) samples indicate a top-down source of contamination. The spatial concentration patterns indicate a source located at the head of Thea Foss.

Correlation of HPAH and BEHP early warning sample concentrations (R=0.99, a very high correlation) indicate the same source for these sediment contaminants. The correlation is illustrated on Figure 7 that shows a scatter plot of HPAH and BEHP concentrations. As BEHP concentrations increase, HPAH concentrations also increase. A least-squares fit of the data is also shown on Figure 7 and accounts for most of the data variability (R^2=0.98).

6.3 Core Samples

As discussed above, five sediment cores were obtained to depths of 1.3 to 3.3 feet. Core logs and the results of selected analyses are summarized in Table 3. A summary of all the core sample analytical results are presented in Table 1.

The core sample results show no evidence of *"bottom-up"* migration from underlying contaminated sediment. However, the results are consistent with a top-down contaminant source. Higher analyte concentrations are generally present in the shallower samples as compared to the deeper samples. The sample concentrations are well below the SQOs.

6.4 Erosion, Migration and Deposition

Observation and analysis of the surface sediment samples indicates that fine grained material with relatively higher concentrations of organic carbon is being deposited on top of the containment cap. In April 2004, soon after the final capping material was placed, the greatest amount of deposition and highest analyte concentrations were generally present on the scour protection apron. In late May 2004, it appears that migration from

the scour protection apron was occurring with migration and potential deposition in deeper water along the eastern shoreline (Figure 3a).

It is expected that areas where deposition and erosion of fine grained sediment that accumulates on the cap will vary with season. Over the longer term, variations in sediment concentrations will likely reflect the erosional/depositional pathways in the waterway.

7.0 SCHEDULE FOR NEXT SEDIMENT SAMPLING ROUND

Consistent with the schedule outlined in the OMMP (Table 2-2), the next OMMP activities include collection of a round of early-warning sediment samples (0 to 2 cm) and visual observation of the former SR509 seep area. These activities will be completed in June/July of 2005 when the lowest daylight tides of the year occur. Similar site observations as described in Attachments A and B will also be made during the 2005 sampling event.

In addition to the summer 2005 sampling described above, a site visit will be made in late September 2004 when the last daylight low tides (less than 0 feet MLLW) of the year occur. Similar site observations as described in Attachments A and B will be made.

8.0 REFERENCES

- DOF (Dalton, Olmsted & Fuglevand, Inc.), 2004, Results of Cap Verification Sampling, Attachment 8 to Remedial Action Construction Report, Head of Thea Foss Waterway Remediation Project, Tacoma, Washington, Draft June 9, 2004.

- Tetra Tech-FW, Dalton, Olmsted & Fuglevand, Inc., Geoengineers, Inc., 2003, Operations, Maintenance, and Monitoring Plan, Head of the Thea Foss Waterway Remediation Project, Tacoma, Washington , July 2003.

9.0 LIMITATIONS

The services described in this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, expressed or implied, is made. These services were performed consistent with the requirements of the OMMP and our agreement with our client.

Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices or regulations subsequent to

performance of services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this report.

Dalton, Olmsted & Fuglevand, Inc.

Matthew G. Dalton
Post-Remediation Quality Assurance Officer

TABLE 1 - Summary of Year 0 Sediment Quality Data

Head of Thea Foss Waterway
Tacoma, Washington

PARAMETER					Sb	As	Cd	Cr	Cu	Pb	Hg	Ni	Ag	Zn
Units					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SQO					150	57	5.1	---	390	450	0.59	140	6.1	410
Location	Depth Below Mudline	Sample Date	% solids	% TOC	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Waterway Cap Samples														
RC-01	recon. sed. (2 cm)	4/8/2004	79.8	2.4	6 UJ	**6**	0.2 U	**33.2**	**44.1**	**25**	0.06 U	**28**	0.3 U	**74.3**
RC-02	recon. sed. (2 cm)	4/8/2004	50.7	5.3	9 UJ	9 U	0.4 U	**27.5**	**71.3**	**20**	0.1 U	**27**	0.6 U	**71**
RC-03	recon. sed. (2 cm)	4/8/2004	37.8	6.7	10 UJ	10 U	0.5 U	**40**	**112**	**44**	**0.1**	**36**	0.8 U	**115**
RC-04	recon. sed. (2 cm)	4/8/2004	55.2	6.3	9 UJ	9 U	0.4 U	**27.1**	**71.8**	**19**	**0.08**	**25**	0.5 U	**70**
RC-05	recon. sed. (2 cm)	4/8/2004	46.2	5.3	10 UJ	10 U	0.4 U	**33**	**87.3**	**19**	**0.09**	**29**	0.6 U	**70**
RC-Dup1	RC-05 dup.(2 cm)	4/8/2004	45.4	5.2	10 UJ	10 U	0.4 U	**31**	**85.1**	**19**	0.09 U	**28**	0.6 U	**69**
RC-06	recon. sed. (2 cm)	4/8/2004	57.4	4.7	9 UJ	9 U	0.4 U	**22.9**	**54.5**	**18**	0.08 U	**21**	0.5 U	**56**
RC-07	recon. sed. (2 cm)	4/8/2004	84.1	1.3	6 UJ	6 U	0.2 U	**19.9**	**49.5**	**6**	0.05 U	**19**	0.3 U	**40.6**
RC-08	recon. sed. (2 cm)	4/8/2004	79.7	0.92	6 UJ	6 U	0.3 U	**17.8**	**32.8**	**5**	0.06 U	**16**	0.4 U	**33.0**
RC-09	recon. sed. (2 cm)	4/8/2004	67.3	2.9	8 UJ	8 U	0.3 U	**25.6**	**64.0**	**15**	0.07 U	**23**	0.5 U	**53.3**
RC-10	recon. sed. (2 cm)	4/9/2004	68.1	3.2	7 UJ	7 U	0.3 U	**21.9**	**54.7**	**11**	0.06 U	**20**	**0.5**	**43.7**
RC-11	recon. sed. (2 cm)	4/8/2004	67.6	3.0	8 UJ	**20**	**0.5**	**25.2**	**132**	**35**	**0.13**	**28**	0.5 U	**82.8**
RC-12	recon. sed. (2 cm)	4/9/2004	88.4	0.37	5 UJ	5 U	0.2 U	**27.3**	**48.5**	**4**	0.05 U	**22**	0.3 U	**43.9**
RC-13	recon. sed. (2 cm)	4/8/2004	78.5	3.3	7 UJ	**8**	0.3 U	**26.4**	**58.5**	**42**	**0.07**	**31**	0.4 U	**99.3**
RC-14	recon. sed. (2 cm)	4/8/2004	65.9	7.0	8 UJ	**9**	**0.5**	**30.1**	**73.3**	**54**	**0.10**	**31**	0.5 U	**167**
WC-01	cap compl. sed. (10 cm)	4/8/2004	86.9	1.5	5 UJ	5 U	0.2 U	**19.1**	**28.9**	**6**	0.04 U	**23**	0.3 U	**41.0**
WC-02	cap compl. sed. (10 cm)	4/8/2004	61.6	3.5	8 UJ	8 U	0.3 U	**23.6**	**60.9**	**15**	0.08 U	**23**	0.5 U	**58**
WC-03	cap compl. sed. (10 cm)	4/8/2004	50.8	7.1	10 UJ	10 U	0.4 U	**26**	**65.6**	**20**	**0.07**	**24**	0.6 U	**63**
WC-04	cap compl. sed. (10 cm)	4/8/2004	70.0	4.6	7 UJ	7 U	0.3 U	**24.0**	**55.2**	**13**	0.06 U	**22**	0.4 U	**52.2**
WC-Dup1	WC-04 dup.	4/8/2004	67.7	6.2	7 UJ	7 U	0.3 U	**23.2**	**62.0**	**13**	**0.05**	**21**	0.4 U	**48.2**
WC-05	cap compl. sed. (10 cm)	4/8/2004	58.7	4.5	8 UJ	8 U	0.3 U	**24.2**	**60.4**	**10**	**0.11**	**23**	0.5 U	**48**
WC-06	cap compl. sed. (10 cm)	4/8/2004	73.0	3.5	7 UJ	7 U	0.3 U	**19.1**	**40.0**	**7**	0.06 U	**18**	0.4 U	**38.8**
WC-07	cap compl. sed. (10 cm)	4/8/2004	86.6	0.19	6 UJ	6 U	0.2 U	**18.2**	**32.2**	**2**	0.04 U	**16**	0.3 U	**30.7**
WC-08	cap compl. sed. (10 cm)	4/8/2004	82.6	0.88	6 UJ	6 U	0.2 U	**17.2**	**33.9**	**4**	0.05 U	**16**	0.3 U	**31.8**
WC-09	cap compl. sed. (10 cm)	4/8/2004	71.7	3.0	7 UJ	7 U	0.3 U	**18.4**	**39.8**	**7**	0.05 U	**18**	0.4 U	**37.4**
WC-10	cap compl. sed. (10 cm)	4/9/2004	79.4	1.4	6 UJ	6 U	0.3 U	**19.1**	**35.9**	**4**	0.06 U	**17**	0.4 U	**34.5**
WC-11	cap compl. sed. (10 cm)	4/8/2004	84.2	2.1	6 UJ	**16**	0.2 U	**21.5**	**168**	**14**	**0.05**	**24**	0.4 U	**60.5**
WC-12	cap compl. sed. (10 cm)	4/9/2004	86.9	0.19	6 UJ	6 U	0.2 U	**19.8**	**35.6**	**3**	0.05 U	**19**	0.3 U	**35.9**
WC-13	cap compl. sed. (10 cm)	4/8/2004	84.7	0.96	5 UJ	5 U	0.2 U	**24.2**	**44.0**	**4**	0.05 U	**22**	0.3 U	**38.5**
WC-14	cap compl. sed. (10 cm)	4/9/2004	74.4	2.3	7 UJ	7 U	0.3 U	**18.2**	**36.1**	**4**	0.05 U	**18**	0.4 U	**34.4**
Slope Cap Samples														
SC-01	slope cap (composite)	4/8/2004	91.5	0.22	5 UJ	5 U	0.2 U	**18.9**	**30.7**	**3**	0.05 U	**19**	0.3 U	**33.0**
SC-02	slope cap (composite)	4/8/2004	90.3	0.18	5 UJ	5 U	0.2 U	**19.7**	**41.6**	2 U	0.04 U	**18**	0.3 U	**31.1**
SC-03	slope cap (composite)	4/8/2004	89.3	0.54	5 UJ	5 U	0.2 U	**19.8**	**33.9**	**4**	0.04 U	**20**	**0.3**	**36.3**
SC-04	slope cap (composite)	4/8/2004	91.9	0.31	5 UJ	5 U	0.2 U	**20.4**	**52.3**	**4**	0.04 U	**22**	0.3 U	**35.7**

TABLE 1 - Summary of Year 0 Sediment Quality Data

Head of Thea Foss Waterway
Tacoma, Washington

PARAMETER					Sb	As	Cd	Cr	Cu	Pb	Hg	Ni	Ag	Zn
Units					(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SQO					150	57	5.1	---	390	450	0.59	140	6.1	410
Location	Depth Below Mudline	Sample Date	% solids	% TOC	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Waterway Cap Core Samples														
WCBU-4A	core - 0-1 feet	4/7/2004	84.1	0.89	6 UJ	6 U	0.2 U	**19.7**	**36.0**	**3**	0.04 U	**20**	0.3 U	**35.3**
WCBU-4B	core - 1-2 feet	4/7/2004	91.7	0.14	10 UJ	10 U	0.5 U	**26**	**37.0**	5 U	0.05 U	**22**	0.8 U	**38**
WCBU-4C	core - 2-3 feet	4/7/2004	90.8	0.04	5 UJ	5 U	0.2 U	**18.3**	**40.8**	2 U	0.05 U	**18**	0.3 U	**36.9**
WCBU-5A	core - 0-1.3 feet	4/7/2004	89.0	0.25	6 UJ	6 U	0.2 U	**16.5**	**30.4**	2 U	0.05 U	**16**	0.3 U	**28.9**
WCBU-6A	core - 0-1 feet	4/7/2004	82.8	1.6	6 UJ	6 U	0.2 U	**18.0**	**40.5**	**3**	0.04 U	**18**	0.3 U	**39.4**
WCBU-6B	core - 1-2 feet	4/7/2004	86.4	0.40	6 UJ	6 U	0.2 U	**26.0**	**42.6**	**3**	0.04 U	**21**	0.3 U	**40.0**
WCBU-10A	core - 0-1 feet	4/7/2004	88.7	0.40	5 UJ	5 U	0.2 U	**17.4**	**31.2**	**3**	0.04 U	**17**	0.3 U	**33.7**
WCBU-Dup1	core - 0-1 feet (dup. 10A)	4/7/2004	88.3	0.32	6 UJ	6 U	0.2 U	**16.1**	**31.2**	**3**	0.04 U	**17**	0.3 U	**31.0**
WCBU-10B	core - 1-2 feet	4/7/2004	94.7	0.15	5 UJ	5 U	0.2 U	**20.2**	**46.7**	**2**	0.05 U	**20**	0.3 U	**35.6**
WCBU-10C	core - 2-3.3 feet	4/7/2004	93.1	0.30	5 UJ	5 U	0.2 U	**13.1**	**21.1**	2 U	0.04 U	**12**	0.3 U	**19.9**
WCBU-12A	core - 0-1.7 feet	4/7/2004	90.9	0.02 U	5 UJ	5 U	0.2 U	**20.1**	**39.4**	**2**	0.04 U	**20**	0.3 U	**34.3**

Notes: *U = nondetected at the associated value*
UJ = nondetect may be biased low due to low spike recoveries
J = associated value is considered an estimate due to being outside the verifiable linear calibration range
nd - Not detected

TABLE 1 - Summary of Year 0 Sediment Quality Data

Head of Thea Foss Waterway
Tacoma, Washington

PARAMETER	% gravel	% cs. sand	% med. sand	% fine sand	% silt	% clay	% fines	1,3-Dichloro-benzene	1,4-Dichloro-benzene	1,2-Dichloro-benzene	1,2,4-Trichloro-benzene	Dibenzo-furan
Units								(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO	-----	-----	-----	-----	-----	-----	-----	170	110	50	51	540
Location	> 2000 µm	2000-500 µm	500-250 µm	250-62 µm	62.5-3.9 µm	< 3.9 µm	< 62.5 µm	-----	-----	-----	-----	-----
Waterway Cap Samples												
RC-01	25	40	17	6.1	7.2	4.9	12	----	----	----	----	----
RC-02	1.2	8.7	21	33	19	18	36	----	----	----	----	----
RC-03	0.1	4.9	3.7	18	40	34	73	----	----	----	----	----
RC-04	4.1	18	20	24	18	16	34	----	----	----	----	----
RC-05	0.1	5.6	8.0	32	32	22	54	----	----	----	----	----
RC-Dup1	3.4	3.6	7.9	33	31	21	53	----	----	----	----	----
RC-06	2.2	2.9	17	52	14	12	26	----	----	----	----	----
RC-07	26	27	22	18	3.0	3.2	6.2	----	----	----	----	----
RC-08	1.6	18	39	37	2.5	2.7	5.2	----	----	----	----	----
RC-09	2.2	9.3	25	39	14	10	25	----	----	----	----	----
RC-10	5.3	11	16	48	12	7.6	20	----	----	----	----	----
RC-11	48	17	0.7	10	15	9.0	24	----	----	----	----	----
RC-12	29	47	17	5.0	0.8	1.1	1.9	----	----	----	----	----
RC-13	28	34	12	7.9	10	7.9	18	----	----	----	----	----
RC-14	13	31	11	11	20	14	34	----	----	----	----	----
WC-01	28	42	16	6.1	4.8	3.0	7.8	39 U	39 U	39 U	39 U	----
WC-02	8.2	14	23	32	14	10	24	39 U	39 U	39 U	39 U	----
WC-03	0.5	8.4	16	33	26	17	43	40 U	40 U	40 U	40 U	----
WC-04	14	25	20	25	9.8	6.4	16	20 U	20 U	20 U	20 U	----
WC-Dup1	14	24	20	25	11	6.7	18	20 U	20 U	20 U	20 U	----
WC-05	3.2	13	17	36	20	11	31	20 U	20 U	20 U	20 U	----
WC-06	0.7	16	36	37	6.5	4.2	11	20 U	20 U	20 U	20 U	----
WC-07	33	37	18	9.2	2.0	0.5	2.5	19 U	19 U	19 U	19 U	----
WC-08	19	28	27	23	1.6	1.7	3.3	19 U	19 U	19 U	19 U	----
WC-09	4.4	13	26	45	7.1	4.0	11	20 U	20 U	20 U	20 U	----
WC-10	7.9	18	29	38	4.3	2.8	7.1	20 U	20 U	20 U	20 U	----
WC-11	57	18	4.5	7.7	8.6	4.4	13	39 U	39 U	39 U	39 U	----
WC-12	20	44	23	11	1.1	0.9	2.0	19 U	19 U	19 U	19 U	----
WC-13	31	30	19	14	3.4	2.3	5.7	20 U	20 U	20 U	20 U	----
WC-14	2.8	18	30	41	5.4	3.6	9.0	19 U	19 U	19 U	19 U	----
Slope Cap Samples												
SC-01	13	27	32	27	0.7	0.6	1.3	19 U	19 U	19 U	19 U	----
SC-02	30	34	21	14	0.4	0.7	1.1	19 U	19 U	19 U	19 U	----
SC-03	18	37	24	15	4.3	2.4	6.7	20 U	20 U	20 U	20 U	----
SC-04	20	43	25	11	0.9	0.2	1.1	19 U	19 U	19 U	19 U	----

TABLE 1 - Summary of Year 0 Sediment Quality Data

PARAMETER	% gravel	% cs. sand	% med. sand	% fine sand	% silt	% clay	% fines	1,3-Dichloro-benzene	1,4-Dichloro-benzene	1,2-Dichloro-benzene	1,2,4-Trichloro-benzene	Dibenzo-furan
Units								(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO	-----	-----	-----	-----	-----	-----	-----	**170**	**110**	**50**	**51**	**540**
Location	> 2000 µm	2000-500 µm	500-250 µm	250-62 µm	62.5-3.9 µm	< 3.9 µm	< 62.5 µm	-----	-----	-----	-----	-----
Waterway Cap Core San												
WCBU-4A	15	33	26	22	2.6	1.3	3.9	19 U	19 U	19 U	19 U	19 U
WCBU-4B	25	43	21	9.8	0.8	0.5	1.3	19 U	19 U	19 U	19 U	19 U
WCBU-4C	28	44	19	7.3	1.1	0.5	1.6	19 U	19 U	19 U	19 U	19 U
WCBU-5A	29	30	22	18	0.8	0.4	1.2	19 U	19 U	19 U	19 U	19 U
WCBU-6A	28	27	21	21	2.0	1.2	3.2	20 U	20 U	20 U	20 U	20 U
WCBU-6B	35	34	18	10	1.9	1.5	3.4	20 U	20 U	20 U	20 U	20 U
WCBU-10A	11	24	31	32	1.5	0.6	2.1	20 U	20 U	20 U	20 U	20 U
WCBU-Dup1	14	23	31	31	1.1	0.7	1.8	20 U	20 U	20 U	20 U	20 U
WCBU-10B	34	35	20	10	0.2	0.6	0.8	20 U	20 U	20 U	20 U	20 U
WCBU-10C	35	40	17	7.2	0.4	0.9	1.3	19 U	19 U	19 U	19 U	19 U
WCBU-12A	27	35	24	13	1.1	0.4	1.5	20 U	20 U	20 U	20 U	20 U

Notes: *U = nondetected at the associated value*
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nd - Not detected

TABLE 1 - Summary of Year 0 Sediment Quality Data

Head of Thea Foss Waterway
Tacoma, Washington

PARAMETER	Naphthalene	Acenaph-thylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	2-Methyl-naphthalene	Total LPAHs	Fluoranthene	Pyrene	Benzo(a)-anthracene	Chrysene
Units	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO	**2100**	**1300**	**500**	**540**	**1500**	**960**	**670**	**5200**	**2500**	**3300**	**1600**	**2800**
Location	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Waterway Cap Samples												
RC-01	39 U	39 U	39 U	39 U	**160**	39 U	39 U	**160**	**480**	**360**	**140**	**260**
RC-02	**47**	20 U	**22**	20 U	**99**	**29**	20 U	**197**	**230**	**160**	**70**	**100**
RC-03	**130**	20 U	**67**	**41**	**240**	**73**	**35**	**586**	**500**	**360**	**150**	**220**
RC-04	**44**	19 U	**24**	19 U	**98**	**25**	19 U	**191**	**180**	**150**	**56**	**82**
RC-05	**34**	20 U	20 U	20 U	**40**	20 U	20 U	**74**	**73**	**49**	**22**	**30**
RC-Dup1	**36**	20 U	20 U	20 U	**47**	20 U	20 U	**83**	**72**	**53**	**23**	**30**
RC-06	**54**	39 U	39 U	39 U	**110**	39 U	39 U	**164**	**230**	**160**	**75**	**110**
RC-07	19 U	19 U	19 U	19 U	**26**	19 U	19 U	**26**	**55**	**39**	**20**	**32**
RC-08	19 U	19 U	19 U	19 U	**28**	19 U	19 U	**28**	**50**	**37**	**20**	**28**
RC-09	**56**	38 U	38 U	38 U	**74**	38 U	38 U	**130**	**120**	**110**	**51**	**69**
RC-10	**44**	19 U	**22**	19 U	**67**	**26**	19 U	**159**	**91**	**74**	**36**	**44**
RC-11	**110**	39 U	**42**	39 U	**130**	**56**	39 U	**338**	**200**	**150**	**78**	**100**
RC-12	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	**22**	20 U	20 U	20 U
RC-13	38 U	38 U	38 U	38 U	**260**	**43**	38 U	**303**	**870**	**510**	**240**	**410**
RC-14	77 U	77 U	77 U	77 U	**570**	**88**	77 U	**658**	**1600**	**890**	**460**	**760**
WC-01	39 U	39 U	39 U	39 U	**85**	39 U	39 U	**85**	**250**	**140**	**75**	**130**
WC-02	39 U	39 U	39 U	39 U	**70**	39 U	39 U	**70**	**150**	**120**	**54**	**78**
WC-03	**78**	40 U	**41**	40 U	**85**	40 U	40 U	**204**	**120**	**110**	**45**	**60**
WC-04	**78**	20 U	**51**	**26**	**120**	**40**	**21**	**336**	**160**	**120**	**54**	**72**
WC-Dup1	**92**	20 U	**61**	**30**	**140**	**45**	**24**	**392**	**190**	**140**	**64**	**81**
WC-05	**25**	20 U	20 U	20 U	**39**	20 U	20 U	**64**	**63**	**50**	20 U	**24**
WC-06	20 U	20 U	20 U	20 U	**33**	20 U	20 U	**33**	**78**	**67**	**24**	**38**
WC-07	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
WC-08	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	**26**	19 U	19 U	19 U
WC-09	**21**	20 U	20 U	20 U	**36**	20 U	20 U	**57**	**67**	**53**	**22**	**30**
WC-10	**22**	20 U	20 U	20 U	**46**	**20**	20 U	**88**	**53**	**61**	**22**	**28**
WC-11	**41**	39 U	39 U	39 U	**53**	39 U	39 U	**94**	**110**	**73**	**41**	**52**
WC-12	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
WC-13	20 U	20 U	20 U	20 U	**21**	20 U	20 U	**21**	**53**	**37**	20 U	**27**
WC-14	19 U	19 U	19 U	19 U	**20**	19 U	19 U	**20**	**38**	**28**	19 U	19 U
Slope Cap Samples												
SC-01	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
SC-02	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
SC-03	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	**43**	**30**	20 U	**23**
SC-04	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U

TABLE 1 - Summary of Year 0 Sediment Quality Data

PARAMETER	Naphthalene	Acenaph-thylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	2-Methyl-naphthalene	Total LPAHs	Fluoranthene	Pyrene	Benzo(a)-anthracene	Chrysene
Units	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO	**2100**	**1300**	**500**	**540**	**1500**	**960**	**670**	**5200**	**2500**	**3300**	**1600**	**2800**
Location	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Waterway Cap Core Sam												
WCBU-4A	19 U	19 U	19 U	19 U	**33**	19 U	19 U	**33**	**54**	**50**	**20**	**27**
WCBU-4B	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
WCBU-4C	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
WCBU-5A	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
WCBU-6A	20 U	20 U	20 U	20 U	**30**	20 U	20 U	**30**	**41**	**30**	20 U	20 U
WCBU-6B	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
WCBU-10A	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
WCBU-Dup1	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
WCBU-10B	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
WCBU-10C	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
WCBU-12A	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U

Notes: *U = nondetected at the associated value*
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nd - Not detected

TABLE 1 - Summary of Year 0 Sediment Quality Data

Head of Thea Foss Waterway
Tacoma, Washington

PARAMETER	Benzo(b)-fluoranthene	Benzo(k)-fluoranthene	Benzofluoranthenes	Benzo(a)-pyrene	Indeno(1,2,3-cd)pyrene	Dibenz(a,h)-anthracene	Benzo(g,h,i)-perylene	Total HPAHs	Dimethyl-phthalate	Di-n-butyl-phthalate	Diethyl-phthalate	Butylbenzyl-phthalate
Units	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO	----	----	**3600**	**1600**	**690**	**230**	**720**	**17000**	**160**	**1400**	**200**	**900**
Location	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Waterway Cap Samples												
RC-01	**320**	**220**	**540**	**170**	**90**	39 U	**87**	**2667**	39 U	**48**	39 U	**91**
RC-02	**100**	**79**	**179**	**64**	**27**	20 U	**24**	**1033**	20 U	20 U	20 U	**29**
RC-03	**190**	**210**	**400**	**140**	**56**	20 U	**53**	**2279**	20 U	**19 J**	20 U	**62**
RC-04	**76**	**74**	**150**	**56**	**23**	19 U	**21**	**868**	19 U	19 U	19 U	**27**
RC-05	**23**	**19 J**	**42**	**20**	20 U	20 U	20 U	**259**	20 U	20 U	20 U	20 U
RC-Dup1	**20**	**18 J**	**38**	**20 J**	20 U	20 U	20 U	**236**	20 U	20 U	20 U	20 U
RC-06	**91**	**69**	**160**	**68**	**44**	39 U	**43**	**1050**	39 U	39 U	39 U	**38 J**
RC-07	**25**	**27**	**52**	**20**	19 U	19 U	19 U	**270**	19 U	19 U	19 U	19 U
RC-08	**20**	**19 J**	**39**	**19**	19 U	19 U	19 U	**213**	19 U	19 U	19 U	19 U
RC-09	**44**	**47**	**91**	**45**	38 U	38 U	38 U	**577**	38 U	38 U	38 U	38 U
RC-10	**28**	**29**	**57**	**33**	19 U	19 U	19 U	**392**	19 U	19 U	19 U	19 U
RC-11	**74**	**66**	**140**	**73**	39 U	39 U	39 U	**881**	39 U	39 U	39 U	39 U
RC-12	20 U	20 U	20 U	20 U	20 U	20 U	20 U	**22**	20 U	20 U	20 U	20 U
RC-13	**500**	**330**	**830**	**260**	**120**	38 U	**110**	**4180**	38 U	**57**	38 U	**130**
RC-14	**740**	**640**	**1380**	**480**	**210**	77 U	**200**	**7360**	77 U	77 U	77 U	**180**
WC-01	**120**	**85**	**205**	**79**	**53**	39 U	**50**	**1187**	39 U	39 U	39 U	39 U
WC-02	**74**	**62**	**136**	**50**	39 U	39 U	39 U	**724**	39 U	39 U	39 U	39 U
WC-03	**58**	**42**	**100**	40 U	40 U	40 U	40 U	**535**	40 U	40 U	40 U	40 U
WC-04	**54**	**66**	**120**	**47**	20 U	20 U	20 U	**693**	20 U	20 U	20 U	20 U
WC-Dup1	**70**	**66**	**136**	**55**	20 U	20 U	20 U	**802**	20 U	20 U	20 U	20 U
WC-05	**21**	**20**	**41**	20 U	20 U	20 U	20 U	**219**	20 U	20 U	20 U	20 U
WC-06	**28**	**32**	**60**	**27**	**18 J**	20 U	**18 J**	**354**	20 U	20 U	20 U	20 U
WC-07	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
WC-08	19 U	19 U	19 U	19 U	19 U	19 U	19 U	**26**	19 U	19 U	19 U	19 U
WC-09	**34**	20 U	34	**21**	20 U	20 U	20 U	**261**	20 U	20 U	20 U	20 U
WC-10	20 U	20 U	20 U	**22**	20 U	20 U	20 U	**186**	20 U	20 U	20 U	20 U
WC-11	39 U	**44**	**44**	**41**	39 U	39 U	39 U	**405**	39 U	39 U	39 U	39 U
WC-12	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
WC-13	20 U	**21**	**21**	20 U	20 U	20 U	20 U	**159**	20 U	20 U	20 U	20 U
WC-14	19 U	19 U	19 U	19 U	19 U	19 U	19 U	**66**	19 U	**32**	19 U	19 U
Slope Cap Samples												
SC-01	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
SC-02	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	**35**	19 U	19 U
SC-03	**25**	**22**	**22**	20 U	20 U	20 U	20 U	**165**	20 U	**24**	20 U	20 U
SC-04	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U

TABLE 1 - Summary of Year 0 Sediment Quality Data

PARAMETER	Benzo(b)-fluoranthene	Benzo(k)-fluoranthene	Benzofluoranthenes	Benzo(a)-pyrene	Indeno(1,2,3-cd)pyrene	Dibenz(a,h)-anthracene	Benzo(g,h,i)-perylene	Total HPAHs	Dimethyl-phthalate	Di-n-butyl-phthalate	Diethyl-phthalate	Butylbenzyl-phthalate
Units	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO	**----**	**----**	**3600**	**1600**	**690**	**230**	**720**	**17000**	**160**	**1400**	**200**	**900**
Location	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Waterway Cap Core Sam												
WCBU-4A	**22**	**19 J**	**41 J**	**20**	19 U	19 U	19 U	**193**	19 U	19 U	19 U	**23**
WCBU-4B	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
WCBU-4C	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
WCBU-5A	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
WCBU-6A	20 U	20 U	20 U	20 U	20 U	20 U	20 U	**71**	20 U	20 U	20 U	20 U
WCBU-6B	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
WCBU-10A	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
WCBU-Dup1	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	**21**	20 U
WCBU-10B	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
WCBU-10C	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
WCBU-12A	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U

Notes: *U = nondetected at the associated value*
UJ = nondetect may be biased low due to low spike recoveries
J = associated value is considered an estimate due to being outside the verifiable linear calibration range
nd - Not detected

TABLE 1 - Summary of Year 0 Sediment Quality Data

Head of Thea Foss Waterway
Tacoma, Washington

PARAMETER	*bis* (2-Ethylhexyl)-phthalate	Di-n-octyl-phthalate	4,4'-DDE	4,4'-DDD	4,4'-DDT	Aroclor 1016	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1221	Aroclor 1232	Total PCBs
Units	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO	**1300**	**6200**	**9**	**16**	**34**	----	----	----	----	----	----	----	**300**
Location	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Waterway Cap Samples													
RC-01	**1300**	**45**	0.38 U	**0.44**	2.3 U	3.8 U	3.8 U	3.8 U	**5.7**	3.8 U	7.6 U	3.8 U	**5.7**
RC-02	**470**	**120**	0.39 U	**0.68**	1.3 U	3.9 U	3.9 U	3.9 U	**6.3**	3.9 U	7.8 U	3.9 U	**6.3**
RC-03	**1100**	**58**	1.1 U	**0.78**	1.4 U	3.9 U	3.9 U	3.9 U	**7.2**	3.9 U	7.9 U	3.9 U	**7.2**
RC-04	**360**	19 U	0.39 U	**0.75**	1.3 U	3.9 U	3.9 U	3.9 U	**5.7**	3.9 U	7.7 U	3.9 U	**5.7**
RC-05	**110**	20 U	0.39 U	**0.66**	0.39 U	3.9 U	3.9 U	3.9 U	**4.3**	3.9 U	7.8 U	3.9 U	**4.3**
RC-Dup1	**100**	20 U	0.39 U	0.39 U	0.39 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.9 U	3.9 U	nd
RC-06	**500**	**38 J**	0.39 U	**0.65**	1.7 U	3.9 U	3.9 U	3.9 U	**9.2**	3.9 U	7.9 U	3.9 U	**9.2**
RC-07	**180**	**19**	0.38 U	0.38 U	0.38 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	7.6 U	3.8 U	nd
RC-08	**110**	19 U	0.39 U	0.39 U	0.39 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.7 U	3.9 U	nd
RC-09	**230**	38 U	0.38 U	**0.88**	1.7 U	3.8 U	3.8 U	3.8 U	**6.5**	3.8 U	7.6 U	3.8 U	**6.5**
RC-10	**80**	19 U	0.39 U	**0.55**	0.39 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U	3.9 U	nd
RC-11	**280**	39 U	1.6 U	**1.7**	2.4 U	3.9 U	3.9 U	3.9 U	**11**	3.9 U	7.9 U	3.9 U	**11**
RC-12	**60**	20 U	0.39 U	0.39 U	0.39 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.9 U	3.9 U	nd
RC-13	**1400**	**98**	3.4 U	**1.1**	3.7 U	3.9 U	3.9 U	3.9 U	13 U	3.9 U	7.8 U	3.9 U	nd
RC-14	**3000**	**150**	3.1 U	**1.7**	4.9 U	3.9 U	3.9 U	3.9 U	14 U	3.9 U	7.7 U	3.9 U	nd
WC-01	**550**	**41**	0.39 U	0.39 U	0.39 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U	3.9 U	nd
WC-02	**330**	39 U	0.39 U	**0.64**	1.1 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U	3.9 U	nd
WC-03	**240**	40 U	0.40 U	**0.68**	1.1 U	4.0 U	4.0 U	4.0 U	**5.7**	4.0 U	7.9 U	4.0 U	**5.7**
WC-04	**260**	20 U	0.39 U	**0.77**	0.93 U	3.9 U	3.9 U	3.9 U	**5.4**	3.9 U	7.8 U	3.9 U	**5.4**
WC-Dup1	**290**	**25**	0.40 U	**0.89**	1.1 U	4.0 U	4.0 U	4.0 U	**5.6**	4.0 U	8.0 U	4.0 U	**5.6**
WC-05	**76**	20 U	0.39 U	0.39 U	0.50 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U	3.9 U	nd
WC-06	**160**	20 U	0.40 U	0.40 U	0.55 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	4.0 U	nd
WC-07	19 U	19 U	0.39 U	0.39 U	0.39 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U	3.9 U	nd
WC-08	**49**	19 U	0.38 U	0.38 U	0.38 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	7.6 U	3.8 U	nd
WC-09	**120**	20 U	0.39 U	0.39 U	0.39 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.9 U	3.9 U	nd
WC-10	**63**	20 U	0.40 U	0.40 U	0.40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	7.9 U	4.0 U	nd
WC-11	**220**	39 U	0.38 U	**0.54**	0.96 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	7.6 U	3.8 U	nd
WC-12	19 U	19 U	0.38 U	0.38 U	0.38 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	7.7 U	3.8 U	nd
WC-13	**100**	20 U	0.39 U	0.39 U	0.39 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U	3.9 U	nd
WC-14	**76**	19 U	0.39 U	0.39 U	0.39 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.7 U	3.9 U	nd
Slope Cap Samples													
SC-01	**26**	19 U	0.39 U	0.39 U	0.39 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.7 U	3.9 U	nd
SC-02	**31**	19 U	0.40 U	0.40 U	0.40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	7.9 U	4.0 U	nd
SC-03	**91**	20 U	0.40 U	0.40 U	0.40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	4.0 U	nd
SC-04	**94**	19 U	0.38 U	0.38 U	0.38 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	7.7 U	3.8 U	nd

TABLE 1 - Summary of Year 0 Sediment Quality Data

PARAMETER	*bis* (2-Ethylhexyl)-phthalate	Di-n-octyl-phthalate	4,4'-DDE	4,4'-DDD	4,4'-DDT	Aroclor 1016	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1221	Aroclor 1232	Total PCBs
Units	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SQO	**1300**	**6200**	**9**	**16**	**34**	----	----	----	----	----	----	----	**300**
Location	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Waterway Cap Core Sam													
WCBU-4A	**73**	19 U	0.38 U	0.38 U	0.38 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	7.6 U	3.8 U	nd
WCBU-4B	19 U	19 U	0.39 U	0.39 U	0.39 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U	3.9 U	nd
WCBU-4C	19 U	19 U	0.39 U	0.39 U	0.39 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U	3.9 U	nd
WCBU-5A	**46**	19 U	0.39 U	0.39 U	0.39 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U	3.9 U	nd
WCBU-6A	**92**	20 U	0.40 U	0.40 U	0.40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	4.0 U	nd
WCBU-6B	**63**	20 U	0.40 U	0.40 U	0.40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	4.0 U	nd
WCBU-10A	**69**	20 U	0.39 U	0.39 U	0.39 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U	3.9 U	nd
WCBU-Dup1	**75**	20 U	0.39 U	0.39 U	0.39 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U	3.9 U	nd
WCBU-10B	20 U	20 U	0.40 U	0.40 U	0.40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	7.9 U	4.0 U	nd
WCBU-10C	**37**	19 U	0.39 U	0.39 U	0.39 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.7 U	3.9 U	nd
WCBU-12A	**49**	20 U	0.40 U	0.40 U	0.40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	7.9 U	4.0 U	nd

Notes: *U = nondetected at the associated value*
UJ = nondetect may be biased low due to low spike recoveries
J = associated value is considered an estimate due to being outside the verifiable linear calibration range
nd - Not detected

TABLE 2 - Summary of Maximum Sediment Concentrations

Head of Thea Foss Waterway
Tacoma, Washington

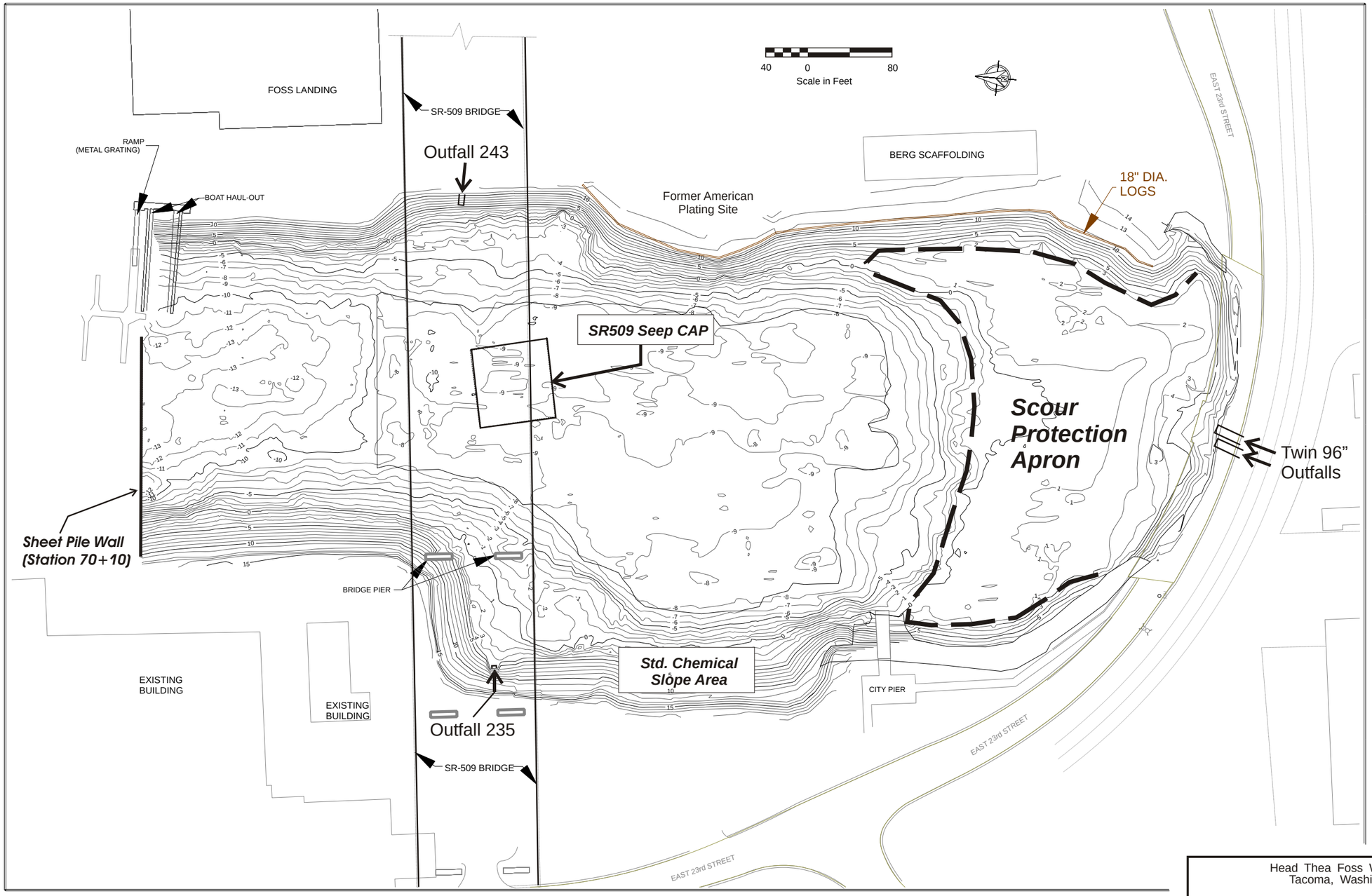
PARAMETER	Units	SQO	0 to 2 cm		0 to 10 cm		Core Spls.	
			Max. Conc.	% SQO	Max. Conc.	% SQO	Max. Conc.	% SQO
***bis* (2-Ethylhexyl)phthalate**	(ug/kg)	**1300**	**3000**	**231**	**550**	**42.3**	**92**	**7.1**
Fluoranthene	(ug/kg)	**2500**	**1600**	**64.0**	**250**	**10.0**	**54**	**2.2**
Total HPAHs	(ug/kg)	**17000**	**7360**	**43.3**	**1187**	**7.0**	**193**	**1.1**
Zn	(mg/kg)	**410**	**167**	**40.7**	**63**	**15.4**	**40**	**9.8**
Benzofluoranthenes	(ug/kg)	**3600**	**1380**	**38.3**	**205**	**5.7**	**41**	**1.1**
Phenanthrene	(ug/kg)	**1500**	**570**	**38.0**	**140**	**9.3**	**33**	**2.2**
As	(mg/kg)	**57**	**20**	**35.1**	**16**	**28.1**	<10	<17.5
Cu	(mg/kg)	**390**	**132**	**33.8**	**168**	**43.1**	**46.7**	**12.0**
Indeno(1,2,3-cd)pyrene	(ug/kg)	**690**	**210**	**30.4**	**53**	**7.7**	<20	<2.9
Benzo(a)pyrene	(ug/kg)	**1600**	**480**	**30.0**	**79**	**4.9**	**20**	**1.3**
Benzo(a)anthracene	(ug/kg)	**1600**	**460**	**28.8**	**75**	**4.7**	**20**	**1.3**
Benzo(g,h,i)-perylene	(ug/kg)	**720**	**200**	**27.8**	**50**	**6.9**	<20	<2.8
Chrysene	(ug/kg)	**2800**	**760**	**27.1**	**130**	**4.6**	**27**	**1.0**
Pyrene	(ug/kg)	**3300**	**890**	**27.0**	**140**	**4.2**	**50**	**1.5**
Ni	(mg/kg)	**140**	**36**	**25.7**	**24**	**17.1**	**22**	**15.7**
Hg	(mg/kg)	**0.59**	**0.13**	**22.0**	**0.11**	**18.6**	<0.05	<8.5
Butylbenzylphthalate	(ug/kg)	**900**	**180**	**20.0**	<40	<4.4	**23**	**2.6**
Acenaphthene	(ug/kg)	**500**	**67**	**13.4**	**61**	**12.2**	<20	<4.0
Total LPAHs	(ug/kg)	**5200**	**658**	**12.7**	**392**	**7.5**	**33**	**0.6**
Pb	(mg/kg)	**450**	**54**	**12.0**	**20**	**4.4**	**3**	**0.7**
4,4'-DDD	(ug/kg)	**16**	**1.7**	**10.6**	**0.89**	**5.6**	<0.4	<2.5
Cd	(mg/kg)	**5.1**	**0.5**	**9.8**	<0.4	<7.8	<0.5	<9.8
Anthracene	(ug/kg)	**960**	**88**	**9.2**	**45**	**4.7**	<20	<2.1
Ag	(mg/kg)	**6.1**	**0.5**	**8.2**	<0.6	<9.8	<0.8	<13.1
Fluorene	(ug/kg)	**540**	**41**	**7.6**	**30**	**5.6**	<20	<3.7
Naphthalene	(ug/kg)	**2100**	**130**	**6.2**	**92**	**4.4**	<20	<1.0
2-Methylnaphthalene	(ug/kg)	**670**	**35**	**5.2**	**24**	**3.6**	<20	<3.0
Di-n-butyl-phthalate	(ug/kg)	**1400**	**57**	**4.1**	**32**	**2.3**	<20	<1.4
Total PCBs	(ug/kg)	**300**	**11**	**3.7**	**5.7**	**1.9**	nd	nd
Di-n-octyl-phthalate	(ug/kg)	**6200**	**150**	**2.4**	**41**	**0.7**	<20	<0.3
Dimethyl-phthalate	(ug/kg)	**160**	<77	<48.1	<40	<25.0	<20	<12.5
Diethyl-phthalate	(ug/kg)	**200**	<77	<38.5	<40	<20.0	**21**	**10.5**
4,4'-DDE	(ug/kg)	**9**	<3.4	<37.8	<0.4	<4.4	<0.4	<4.4
Dibenz(a,h)-anthracene	(ug/kg)	**230**	<77	<33.5	<40	<17.4	<20	<8.7
4,4'-DDT	(ug/kg)	**34**	<4.9	<14.4	<1.1	<3.2	<0.4	<1.2
Sb	(mg/kg)	**150**	<10	<6.7	<10	<6.7	<10	<6.7
Acenaphthylene	(ug/kg)	**1300**	<77	<5.9	<40	<3.1	<20	<1.5
TOC	(percent)	---	**7.0**	---	**7.1**	---	**1.6**	---
Cr	(mg/kg)	---	**40**	---	**26**	---	**26**	---
1,3-Dichlorobenzene	(ug/kg)	**170**	na	---	<40	<23.5	<20	<11.8
1,4-Dichlorobenzene	(ug/kg)	**110**	na	---	<40	<36.4	<20	<18.2
1,2-Dichlorobenzene	(ug/kg)	**50**	na	---	<40	<80.0	<20	<40.0
1,2,4-Trichlorobenzene	(ug/kg)	**51**	na	---	<40	<78.4	<20	<39.2
Dibenzo-furan	(ug/kg)	**540**	na	---	na	---	<20	<3.7
Benzo(b)fluoranthene	(ug/kg)	----	**740**	---	**120**	---	22	---
Benzo(k)fluoranthene	(ug/kg)	----	**640**	---	**85**	---	19	---
Aroclor 1016	(ug/kg)	----	<3.9	---	<4.0	---	<4.0	---
Aroclor 1242	(ug/kg)	----	<3.9	---	<4.0	---	<4.0	---
Aroclor 1248	(ug/kg)	----	<3.9	---	<4.0	---	<4.0	---
Aroclor 1254	(ug/kg)	----	**11**	---	**5.7**	---	<4.0	---
Aroclor 1260	(ug/kg)	----	<3.9	---	<4.0	---	<4.0	---
Aroclor 1221	(ug/kg)	----	<7.9	---	<8.0	---	<8.0	---
Aroclor 1232	(ug/kg)	----	<3.9	---	<4.0	---	<4.0	---

Notes: < - Not detected at indicated concentration
na - Not analyzed
nd - not detected

TABLE 3 - Summary of Sediment Core Data

Head of Thea Foss Waterway
Tacoma, Washington

Units SQO Core No.	Depth (feet) (feet)	Description	TOC (percent) ----	Lead (mg/kg) 450	Mercury (mg/kg) 0.59	Zinc (mg/kg) 410	LPAHs (ug/kg) 5200	HPAHs (ug/kg) 17000	BEP (ug/kg) 1300
WCBU-04	0 to 0.2	Brown, fine sandy, slightly clayey SILT							
	0.2 to 1.2	Brown-gray, fine to medium SAND							
	1.2 to 3.0	grades to Brown-gray, fine to coarse SAND							
Samples									
WC-04	0 to 0.3		**4.6**	**13**	<0.06	**52.2**	**336**	**573**	**260**
WCBU-04A	0 to 1.0		**0.89**	**3**	<0.04	**35.3**	**33**	**193**	**73**
WCBU-04B	1.0 to 2.0		**0.14**	<5	<0.05	**38**	<19	<19	<19
WCBU-04C	2.0 to 3.0		**0.04**	<2	<0.05	**36.9**	<19	<19	<19
WCBU-05	0 to 0.06	Brown, fine sandy SILT							
	0.06 to 1.3	Brown-gray, fine to coarse SAND							
Samples									
WC-05	0 to 0.3		**4.5**	**10**	**0.11**	**48**	**64**	**178**	**76**
WCBU-05A	0 to 1.3		**0.25**	<2	<0.05	**28.9**	<19	<19	**46**
WCBU-06	0 to 0.5	Gray-brown, silty, fine SAND							
	0.5 to 2.0	Brown-gray, fine to coarse SAND w/ trace fine gravel							
Samples									
WC-6	0 to 0.3		**3.5**	**7**	<0.06	**38.8**	**33**	**294**	**160**
WCBU-06A	0 to 1.0		**1.6**	**3**	<0.04	**39.4**	**30**	**71**	**92**
WCBU-06B	1.0 to 2.0		**0.4**	**3**	<0.04	**40**	<20	<20	**63**
WCBU-10	0 to 0.5	Brown, clayey, fine sandy SILT w/ organics							
	0.5 to 1.8	Brown-gray, fine SAND							
	1.8 to 3.3	grades to Brown-gray, fine to coarse SAND							
Samples									
WC-10	0 to 0.3		**1.4**	**4**	<0.06	**34.5**	**88**	**186**	**63**
WCBU-10A	0 to 1.0		**0.4**	**3**	<0.04	**33.7**	<20	<20	**69**
WCBU-10B	1.0 to 2.0		**0.15**	**2**	<0.05	**35.6**	<20	<20	<20
WCBU-10C	2.0 to 3.3		**0.3**	<2	<0.04	**19.9**	<19	<19	**37**
WCBU-12	0 to 1.7	Gray, fine to coarse SAND							
Samples									
WC-12	0 to 0.3		**0.19**	**3**	<0.05	**35.9**	<19	<19	<19
WCBU-12A	0 to 1.7		<0.02	**2**	<0.04	**34.3**	<20	<20	**49**

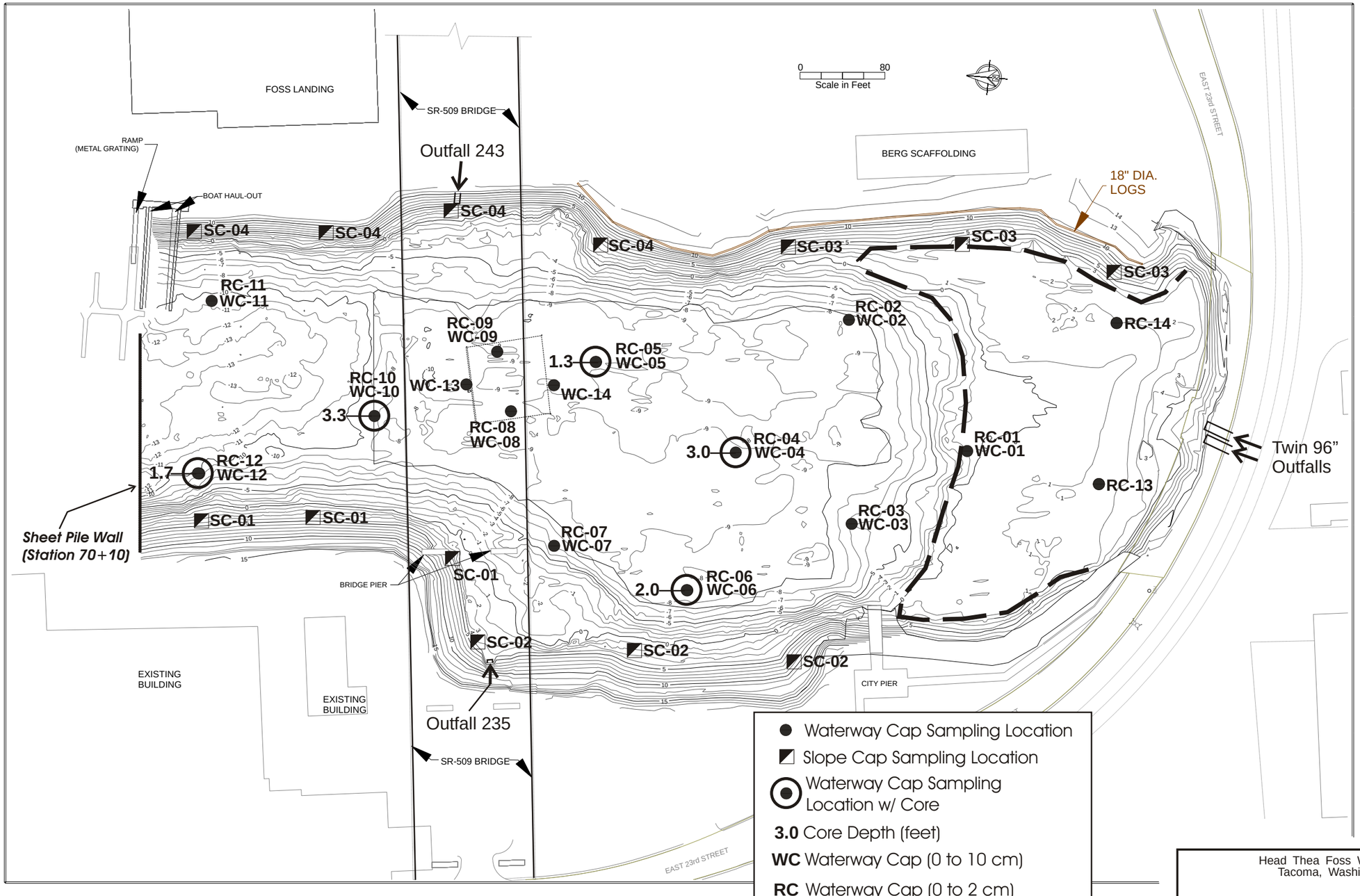


Head Thea Foss Waterway
Tacoma, Washington

Remedial Features
Utilities' Work Area

PAP-001-04 **FIGURE 1** June 2004
Dalton, Olmsted & Fuglevand, Inc.

Ref: Head of waterway.cdr



Head Thea Foss Waterway
Tacoma, Washington

OMMP SAMPLING LOCATIONS

PAP-001-04 **FIGURE 2** July 2004
Dalton, Olmsted & Fuglevand, Inc.

Ref: OMMP Spl Loc Map.cdr

Low Tide 0.18 feet

By: Aequalis Photography
(view to north)

Ref: Air Photo 5-24-04a.cdr

Head of Thea Foss Waterway Project

Air Photo - May 25, 2004

PAP-001-04 **FIGURE 3a** July 2004

Dalton, Olmsted & Fuglevand, Inc.

Low Tide 0.18 feet
By: Aequalis Photography
(view to south)

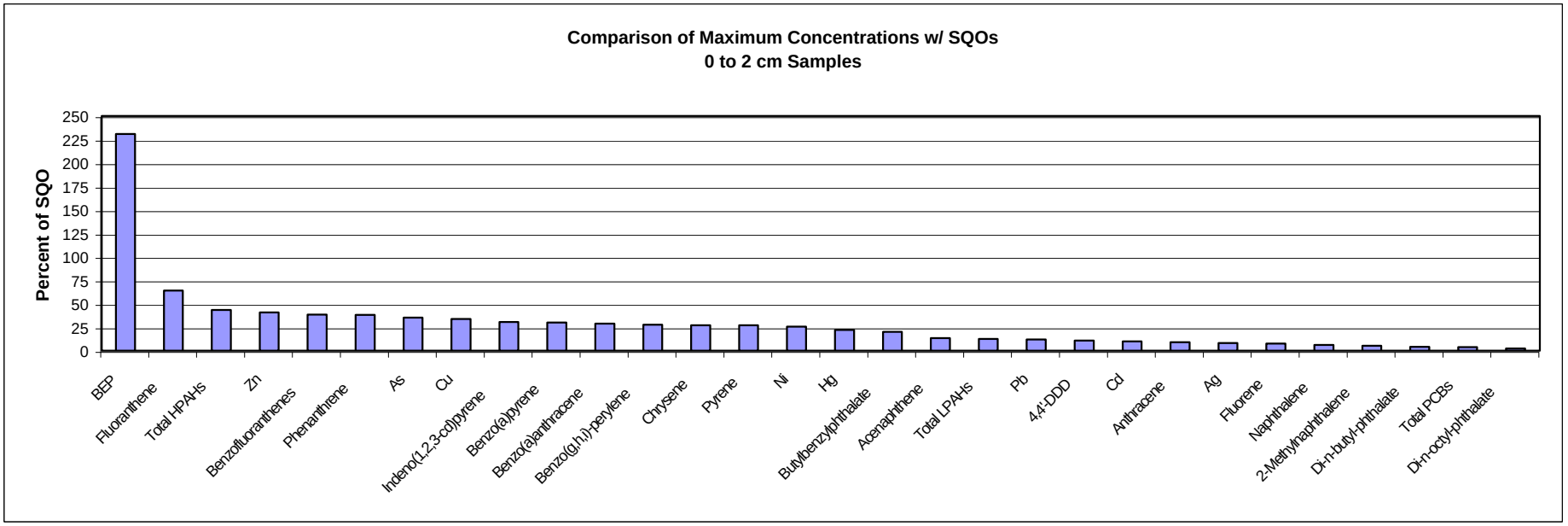
Ref: Air Photo 5-24-04B.cdr

Head of Thea Foss Waterway Project

Air Photo - May 25, 2004

PAP-001-04 **FIGURE 3b** July 2004

Dalton, Olmsted & Fuglevand, Inc.


Comparison of Maximum Concentrations w/ SQOs
0 to 2 cm Samples
Percent of SQO
250
225
200
175
150
125
100
75
50
25
0
BEP
Fluoranthene
Total HPAHs
Zn
Benzofluoranthenes
Phenanthrene
As
Cu
Indeno(1,2,3-cd)pyrene
Benzo(a)pyrene
Benzo(a)anthracene
Benzo(g,h,i)-perylene
Chrysene
Pyrene
Ni
Hg
Butylbenzylphthalate
Acenaphthene
Total LPAHs
Pb
4,4'-DDD
Cd
Anthracene
Ag
Fluorene
Naphthalene
2-Methylnaphthalene
Di-n-butyl-phthalate
Total PCBs
Di-n-octyl-phthalate

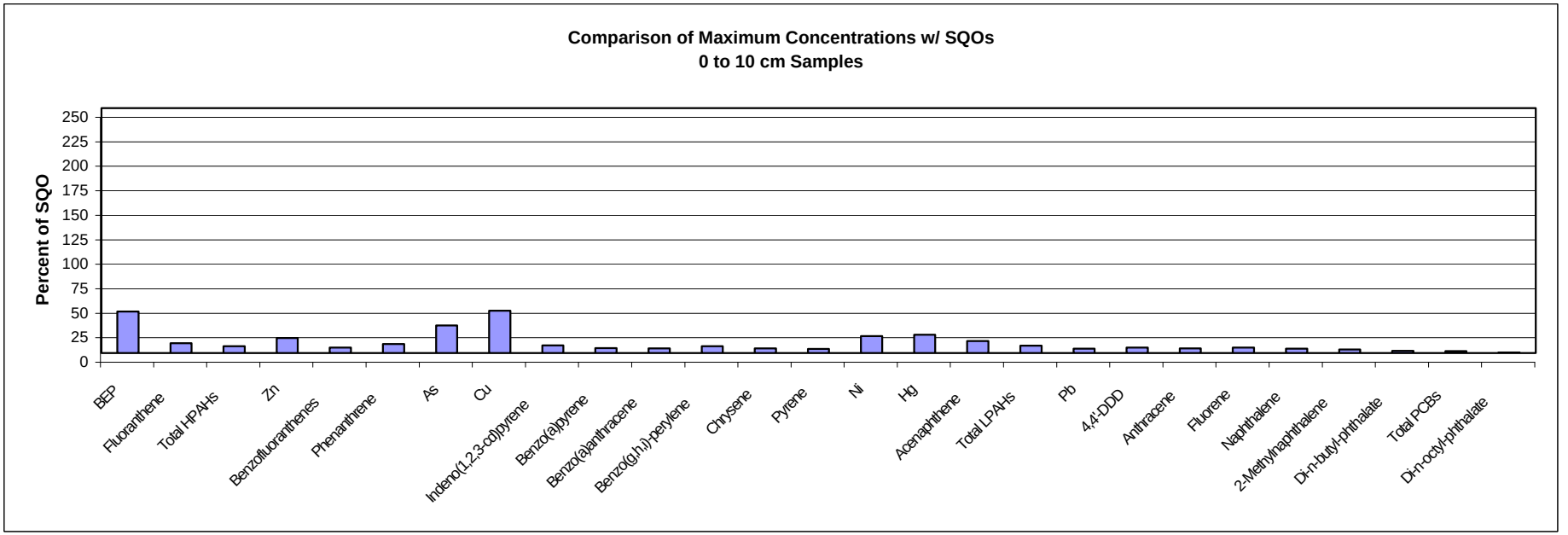
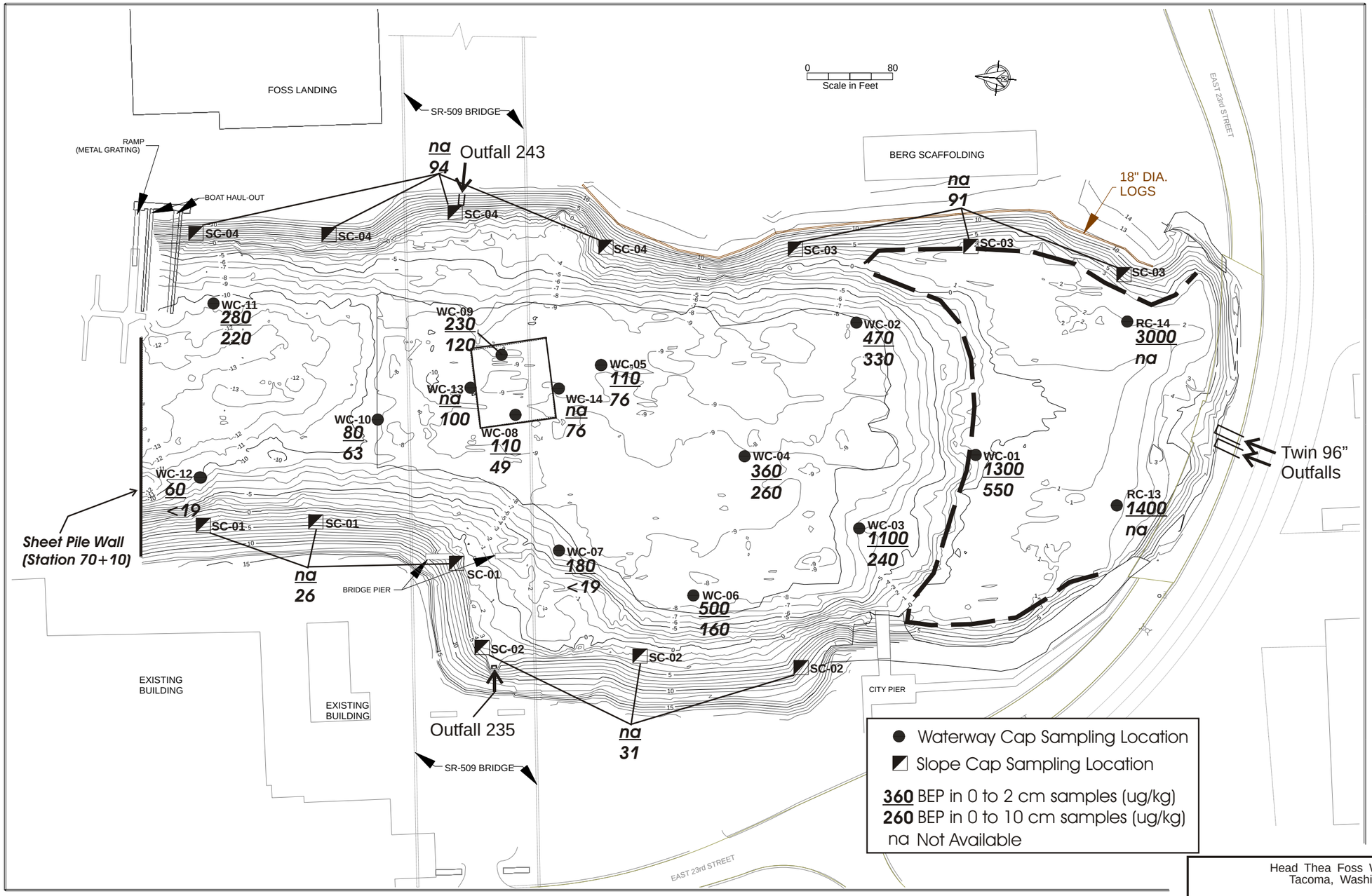

Comparison of Maximum Concentrations w/ SQOs
0 to 10 cm Samples
Percent of SQO
250
225
200
175
150
125
100
75
50
25
0
BEP
Fluoranthene
Total HPAHs
Zn
Benzofluoranthenes
Phenanthrene
As
Cu
Indeno(1,2,3-cd)pyrene
Benzo(a)pyrene
Benzo(a)anthracene
Benzo(g,h,i)-perylene
Chrysene
Pyrene
Ni
Hg
Acenaphthene
Total LPAHs
Pb
4,4'-DDD
Anthracene
Fluorene
Naphthalene
2-Methylnaphthalene
Di-n-butyl-phthalate
Total PCBs
Di-n-octyl-phthalate

FIGURE 4

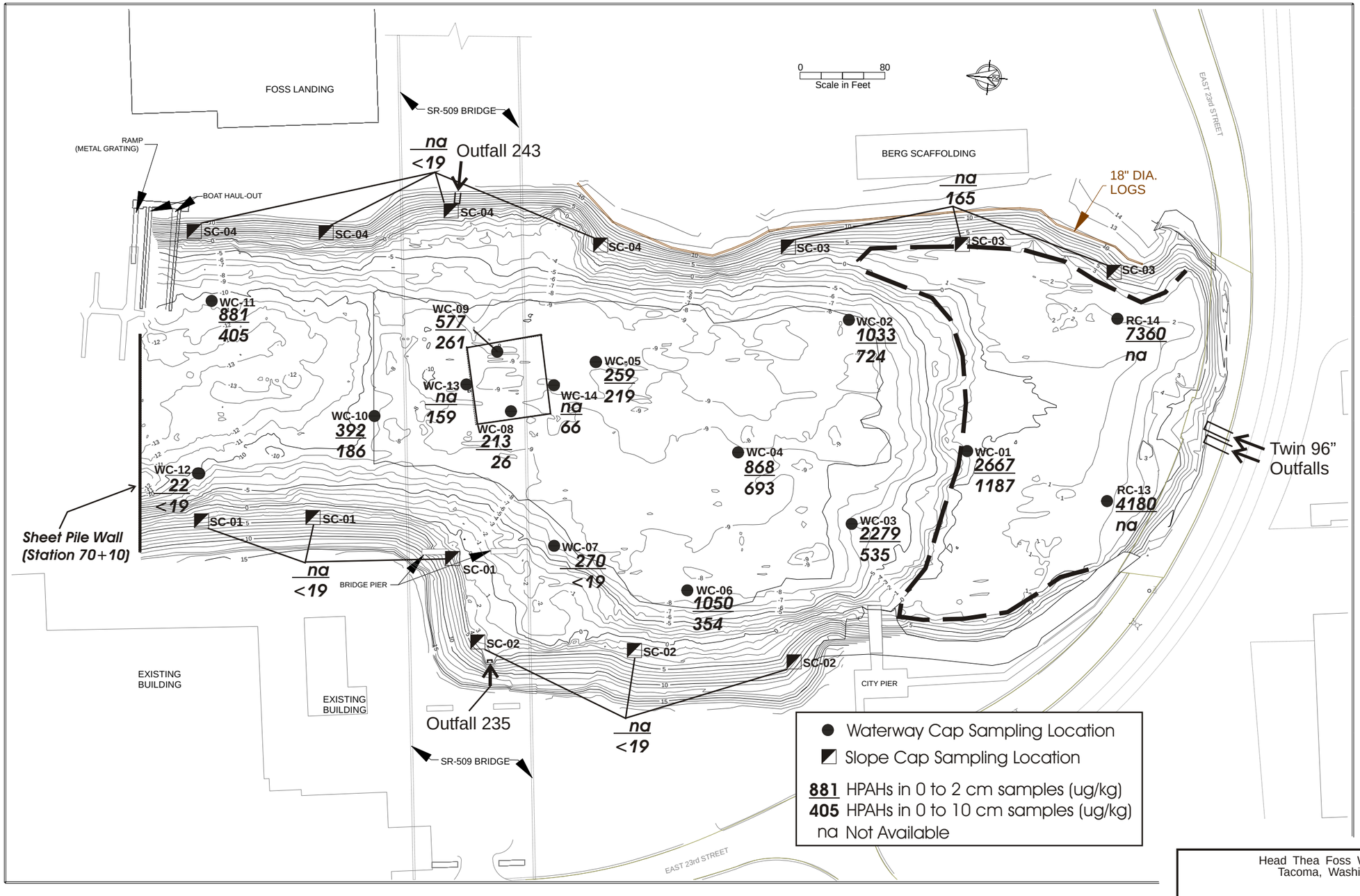


Head Thea Foss Waterway
Tacoma, Washington

BEP in Surface Sediments

PAP-001-04 **FIGURE 5** Aug. 2004
Dalton, Olmsted & Fuglevand, Inc.

Ref: OMMP 4-04 BEP.cdr



Head Thea Foss Waterway
Tacoma, Washington

HPAHs in Surface Sediments

PAP-001-04 **FIGURE 6** Aug. 2004
Dalton, Olmsted & Fuglevand, Inc.

Ref: OMMP 4-04 HPAHs.cdr

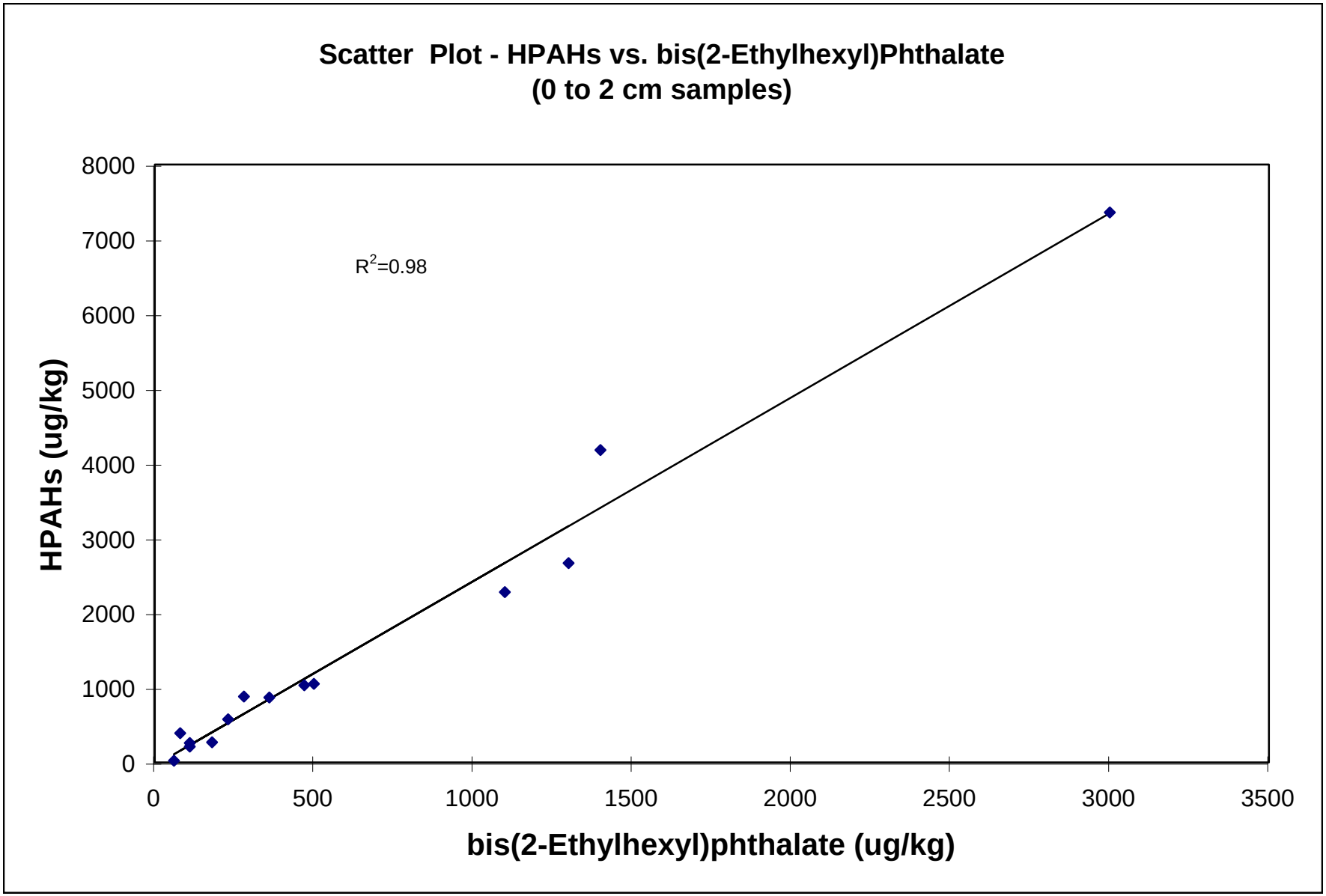

Scatter Plot - HPAHs vs. bis(2-Ethylhexyl)Phthalate
(0 to 2 cm samples)
HPAHs (ug/kg)
bis(2-Ethylhexyl)phthalate (ug/kg)
R2=0.98
0
1000
2000
3000
4000
5000
6000
7000
8000
0
500
1000
1500
2000
2500
3000
3500

FIGURE 7

ATTACHMENT A
Site Observations – May 7, 2004

Dalton, Olmsted & Fuglevand, Inc. *Environmental Consultants*

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Telephone (360) 380-0862 (FAX 360-380-0862)
Cell (206) 498-6616 e-mail: mdalton@dofnw.com
(Kirkland, WA Office – 425-827-4588)

MEMORANDUM

TO: Lotte Hass - PacifiCorp

FROM: Matt Dalton

DATE: July 9, 2004

SUBJECT: Site Observations
May 7, 2004
Thea Foss Waterway Project

REF. NO: PAP-001-01b

This technical memorandum presents a summary of observations of site conditions within the Head of the Thea Foss Waterway, Tacoma, Washington (Figure 1). The observations were made by Matthew Dalton, Sr. Consulting Hydrogeologist for Dalton, Olmsted & Fuglevand, Inc. (DOF) who visited the site between approximately 1:00 pm and 2:00 pm on May 7, 2004. During this period, a low tide of –3.32 feet Mean Lower Low Water (MLLW) was predicted for 1:38 pm (Figure 2).

The primary objectives of the visit were to observe the following.

- **Condition of the scour protection apron installed at extreme head of the waterway, particularly related to discharges from the Twin 96" stormwater outfalls.**

  Digital photographs of the scour protection apron are shown on Figures 3 to 7. Water discharge from the Twin 96" outfalls was spreading out over the apron (as intended) and migrating in a northward direction to the waterway channel. No erosional channels were observed on the apron and most of the water infiltrated into coarser materials near the north end of the apron (Figure 7b).

  A small, shallow erosional channel was observed on the north side of apron near the southeast corner of the waterway (Figure 5). This portion of the waterway bottom would only be exposed during the lowest tides (estimated to be less than minus 2 feet MLLW). The channel was several inches deep and approximately fifteen to twenty feet long. The bottom of the channel appeared to be "*self*

armoring" in that coarser materials were observed in the bottom of the channel. The minor erosion is very local in nature and does not appear to have adversely impacted the overall integrity of the cap. No corrective action is warranted at this time other than to monitor this feature during other low tide events.

- **General condition of the waterway slopes exposed at low tide.**

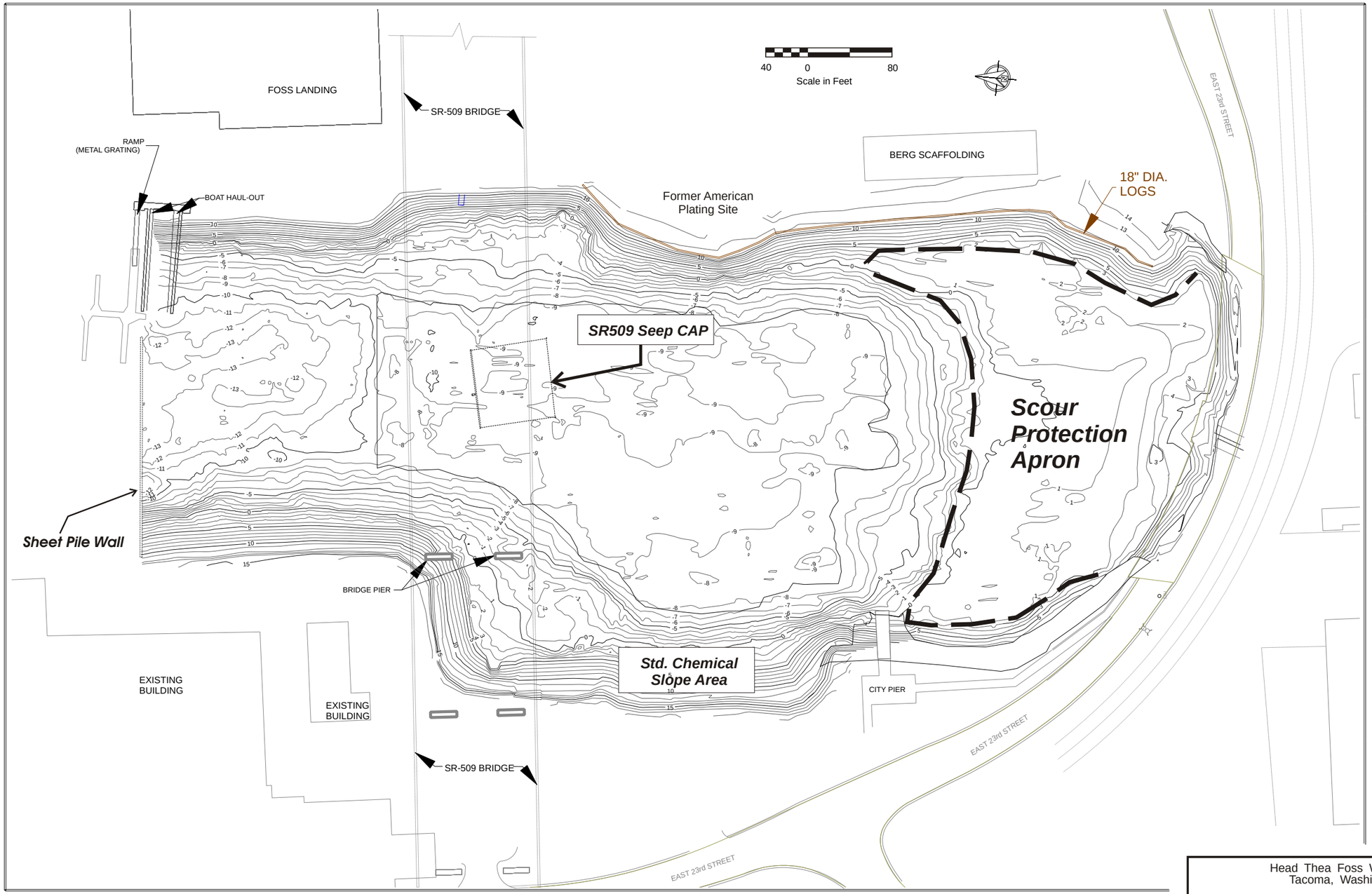
  Exposed waterway slopes are shown on many of the photographs presented in Figures 3 to 9. During the site visit in May, the coarser cover materials were beginning to be covered with algae and barnacles. No visibly observable evidence of slope erosion, sloughing etc. was observed.

- **Former SR509 seep area for evidence of sheens.**

  Although gas bubbles were observed in the area of the former SR509 seep and elsewhere in the waterway, no sheens were observed anywhere in the waterway during our site visit when the tide was observed at -3.2 feet MLLW. Some bubbles were observed roughly along a portions of the southern and northern edges of the HDPE cap (Figure 9).

Attachments

Figure 1 – Thea Foss Waterway – South of Station 70+10 (Utility Work Area)
Figure 2 – Commencement Bay Tides – May 7, 2004
Figure 3 – Scour Protection Apron – East View
Figure 4 – Scour Protection Apron – North View
Figure 5 – Scour Protection Apron – Southwest View
Figure 6 – South End of Waterway
Figure 7 – North End of Scour Protection Apron
Figure 8 – Standard Chemical Slope and SR509 Seep Areas
Figure 9 – SR509 Seep Area

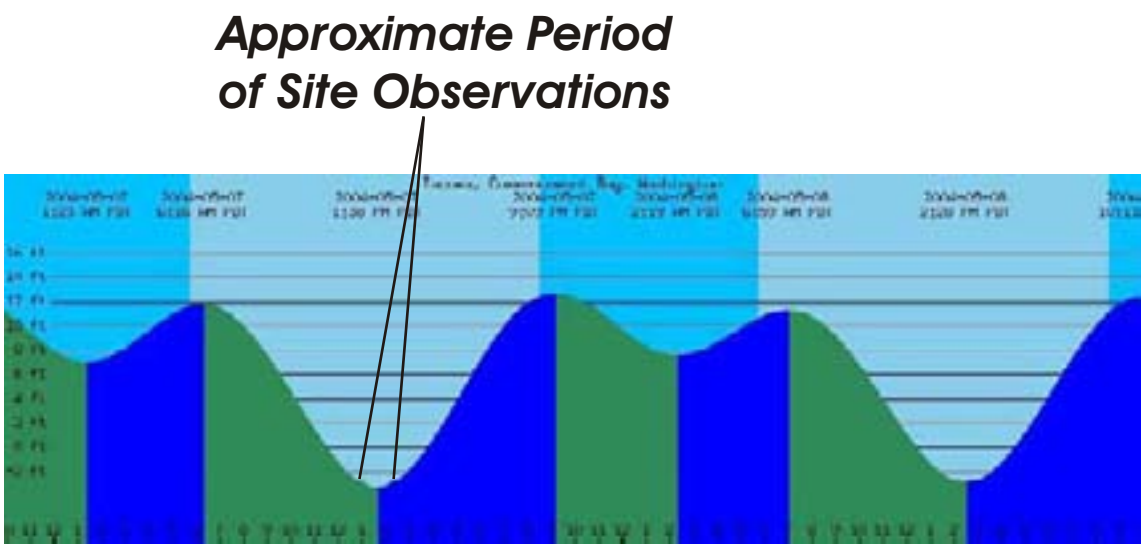


Head Thea Foss Waterway
Tacoma, Washington

Thea Foss Waterway - South o
Station 70+10 (Utility Work Area)

PAP-001-04 **FIGURE 1** June 2004
Dalton, Olmsted & Fuglevand, Inc.

Ref: Head of waterway.cdr



Low Tide @1:38pm on May 7, 2004
-3.32 feet MLLW

Source: XTide Prediction Server
(http://www.mobilegeographics.com:81/)

Ref: Tides May 7 04.cdr

Thea Foss Waterway
Tacoma, Washington

Commencement Bay Tides
May 7, 2004

PAP-001-01b **FIGURE 2** June 2004
Dalton, Olmsted & Fuglevand, Inc.

Figure 3a - Scour Protection Apron - View to East (towards Berg Scaffolding)

Figure 3b - Scour Protection Apron - View to Northeast (towards Berg Scaffolding)

Thea Foss Waterway, Tacoma, Washington

Scour Protection Apron - East View

PAP-001-01b **FIGURE 3** June 2004

Dalton, Olmsted & Fuglevand, Inc.

Ref: Apron E, NE.cdr

Figure 4a - Scour Protection Apron - View to North (towards Commencement Bay)

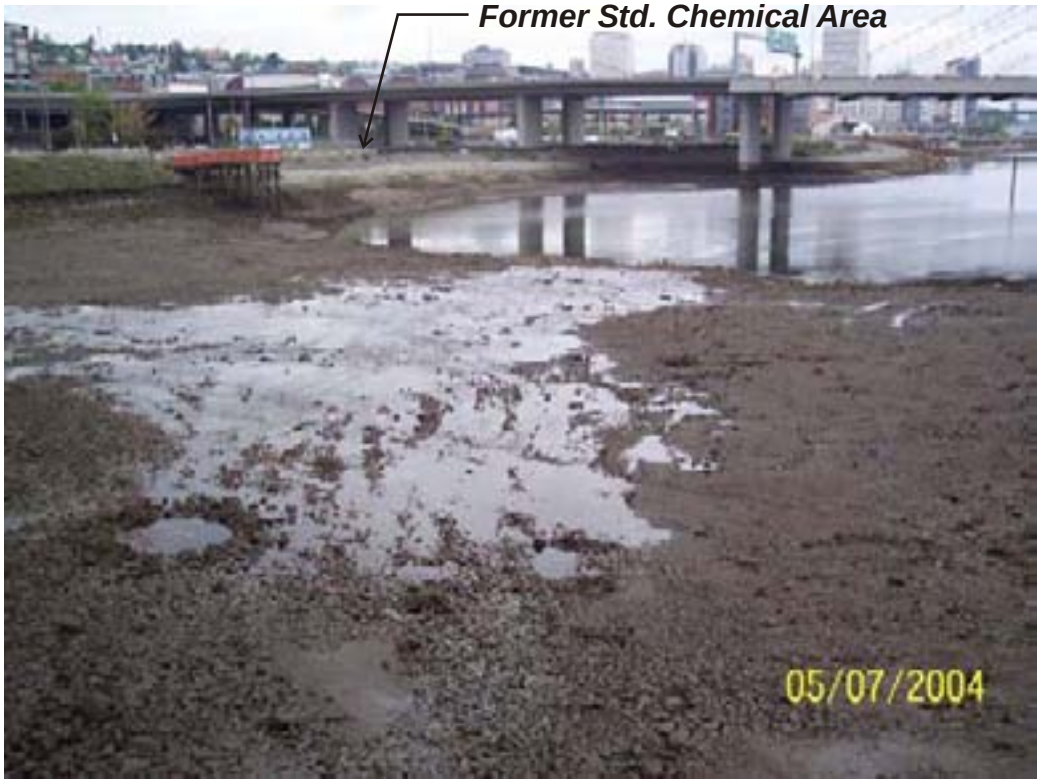


Figure 4b - Scour Protection Apron - View to Northwest (towards City Pier and former Std. Chemical Area)

Thea Foss Waterway, Tacoma, Washington

Scour Protection Apron - North View

PAP-001-01b **FIGURE 4** June 2004

Dalton, Olmsted & Fuglevand, Inc.

Ref: Apron N, NW.cdr

Figure 5a - Scour Protection Apron - View to Southwest

Figure 5b - Southeast Corner Scour Protection Apron - View to Southwest

Thea Foss Waterway, Tacoma, Washington

Scour Protection Apron - Southwest View

PAP-001-01b **FIGURE 5** June 2004

Dalton, Olmsted & Fuglevand, Inc.

Ref: Apron SW.cdr

Figure 6a - South End of Waterway - View to Southwest

Figure 6b - South End of Waterway - View to Southwest (Former Am. Plating Site Slope in Foreground)

Thea Foss Waterway, Tacoma, Washington

South End of Waterway

PAP-001-01b **FIGURE 6** June 2004

Dalton, Olmsted & Fuglevand, Inc.

Ref: S end TF.cdr

Figure 7a - North End of Scour Protection Apron - View to East (towards Berg Scaffolding)

Figure 7b - North End of Scour Protection Apron - View to East (towards Berg Scaffolding)

Thea Foss Waterway, Tacoma, Washington

North End of Scour Protection Area

PAP-001-01b **FIGURE 7** June 2003

Dalton, Olmsted & Fuglevand, Inc.

Ref: Apron E.cdr

Figure 8a - West Bank Slope in Former Std. Chemical Co. Area - View to North

Figure 8b - Former SR509 Seep Area - View to West Under SR509 Bridge

Thea Foss Waterway, Tacoma, Washington

Standard Chemical Slope and SR509 Seep Areas

PAP-001-01b **FIGURE 8** June 2004

Dalton, Olmsted & Fuglevand, Inc.

Ref: Misc 1.cdr

Figure 9a - Bubbles in Former SR509 Seep Area- View to Southwest

Figure 9b - Bubbles in Former SR509 Seep Area- View to Northwest

Thea Foss Waterway, Tacoma, Washington

SR509 Seep Area

PAP-001-01b **FIGURE 9** June 2004

Dalton, Olmsted & Fuglevand, Inc.

Ref: SR509 Seep Area.cdr

ATTACHMENT B
Site Observations – July 1 and 2, 2004

ATTACHMENT B
Site Observations – July 1 and 2, 2004

Dalton, Olmsted & Fuglevand, Inc. *Environmental Consultants*

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(Kirkland, WA Office – 425-827-4588)

MEMORANDUM

TO: Lotte Hass - PacifiCorp

FROM: Matt Dalton

DATE: July 13, 2004

SUBJECT: Site Observations
July 1 and 2, 2004
Head of Thea Foss Waterway Project

REF. NO: PAP-001-01

This technical memorandum presents a summary of observed site conditions within the Head of the Thea Foss Waterway, Tacoma, Washington (Figure 1). The observations were made by Matthew Dalton, Sr. Consulting Hydrogeologist for Dalton, Olmsted & Fuglevand, Inc. (DOF) and Terry Olmsted, Sr. Consulting Engineering Geologist of DOF who was the Utilities' remedial construction oversight manager. They visited the site between approximately 9:30 am and 11:30 am on July 1, 2004. During this period, a low tide of -3.6 feet Mean Lower Low Water (MLLW) was predicted for 10:44 am (Figure 2).

This memorandum also reports the observations of Lotte Hass, Utility Project Coordinator who visited the site on July 2, 2004 with representatives of the City of Tacoma. They viewed the Head of Thea Foss area between approximately 11:30 am and 12:45 pm. During this period, a low tide of -4.1 feet MLLW was predicted for 11:32 am (Figure 2).

OBSERVATIONS – JULY 1, 2004

The primary objectives of the visit by DOF staff were to observe the following.

- **Condition of the scour protection apron installed at extreme head of the waterway, particularly related to discharges from the Twin 96" stormwater outfalls.**

  The condition of the apron was similar to that observed during the visit by DOF staff on May 7, 2004. Digital photographs of the scour protection apron are

shown on Figures 3 to 6. Water discharge from the Twin 96" outfalls was spreading out over the apron (as intended) and migrating in a northward direction to the waterway channel. No erosional channels were observed on the apron and most of the water infiltrated into coarser materials near the north end of the apron.

In May 2004, a small, shallow erosional channel was observed on the north side of the apron near the southeast corner of the waterway. This portion of the waterway bottom would only be exposed during the lowest tides (estimated to be less than -2 feet MLLW). The small channel was visually less pronounced as compared to the May observations (Figure 5). The bottom of the channel appeared to be "*self armoring*" in that coarser materials were observed in the bottom of the channel. The minor erosion is very local in nature and does not appear to have adversely impacted the overall integrity of the cap. No corrective action is warranted at this time other than to monitor this feature during other low tide events.

- **General condition of the waterway slopes exposed at low tide.**

  Exposed waterway slopes are shown on the photographs presented in Figures 3 to 11. During the site visit in July, barnacles and algae covered the coarser capping materials. No visibly observable evidence of slope erosion, sloughing etc. was observed.

  Several small channels were observed at the toe of outfall scour protection material associated with Outfall 235 near the west side of the SR509 bridge (Figure 7). The bottom of the channel appeared to be "*self armoring*" in that coarser materials were observed in the bottom of the channel. The minor erosion is local in nature and does not appear to have adversely impacted the overall integrity of the cap. No corrective action is warranted at this time other than to monitor this feature during other low tide events.

- **SR509 seep area for evidence of sheens.**

  Although gas bubbles were observed in the area of the former SR509 seep (Figures 8 and 9) and elsewhere in the waterway, no sheens were observed anywhere in the waterway during our site visit when the tide was observed at approximately -3.6 feet MLLW. Some bubbles were observed near a portion of the northern edge of the HDPE cap.

OBSERVATIONS – JULY 2, 2004

Lotte Hass (PacifiCorp) and representatives of the City of Tacoma (City) observed the SR509 seep area from a boat during the -4.1 feet MLLW low tide on July 2, 2004. Ms. Hass reported a water depth of about four feet over the SR509 seep cap area and water

visibility was good (they could see the bottom). Water surface observations were supplemented with a small underwater camera provided by the City. Ms. Hass reported the following observations:

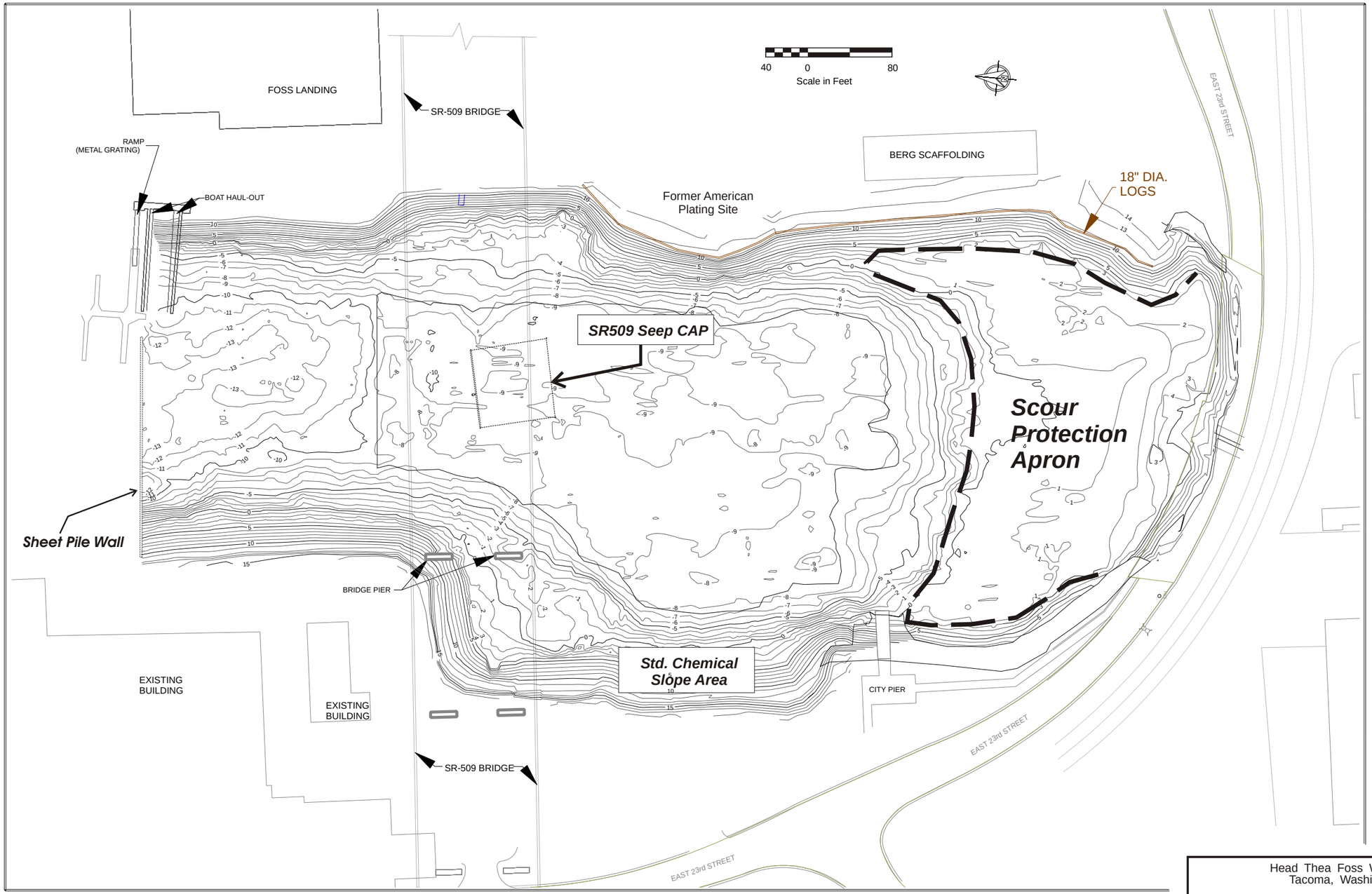
- Bubbling was mild under the bridge--no big bubblers. There was a rough "*line*" of bubbles nearly parallel to the kayak dock that roughly corresponded with a part of the southern edge of the HDPE cap. There was no distinctive bubbling along the east, west, or north edges. Some bubbling over the center of the HDPE cap was observed.

- With the City's camera, the locations on the bottom where the bubbles were coming from could be viewed. In all locations, there was no sign of tar accumulation at the hole, or entrainment in rising bubbles. There were no sheens.

- Bigger bubbles near the City Pier were also viewed. There was a “divot” in the sediment at the bubble source, presumably from fine sediment being moved by the bubbles. Divots were not observed around the impermeable cap. There were no sheens observed near the City Pier.

Attachments

Figure 1 – Thea Foss Waterway – South of Station 70+10 (Utility Work Area)
Figure 2 – Commencement Bay Tides – July 1 and 2, 2004
Figure 3 – Scour Protection Apron – East View
Figure 4 – Scour Protection Apron – North View
Figure 5 – Scour Protection Apron – Southwest View
Figure 6 – South End of Waterway
Figure 7 – Discharge Area – Outfall 235
Figure 8 – Standard Chemical Slope and SR509 Seep Areas
Figure 9 – SR509 Seep Area
Figure 10 – East Bank Slope and Foss Landing Marina
Figure 11 – Outfall 243



Head Thea Foss Waterway
Tacoma, Washington

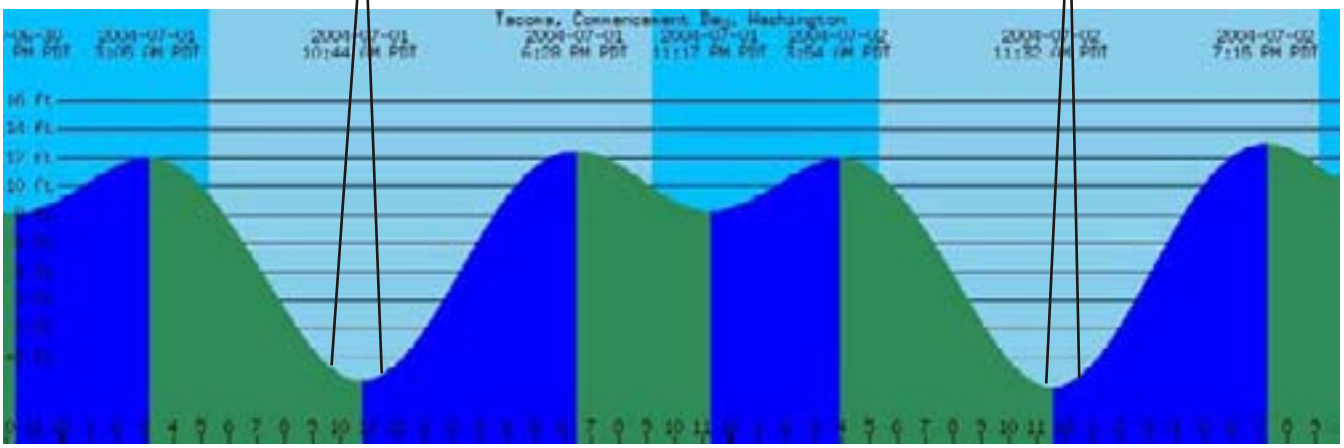
Thea Foss Waterway - South o
Station 70+10 (Utility Work Area)

PAP-001-04 **FIGURE 1** June 2004
Dalton, Olmsted & Fuglevand, Inc.

Ref: Head of waterway.cdr

Approximate Period of Site Observations by DOF

Approximate Period of Site Observations by PacifiCorp and Tacoma



Low Tide @10:44am on July 1, 2004
-3.66 feet MLLW

Low Tide @11:32am on July 2, 2004
-4.11 feet MLLW

Source: XTide Prediction Server
(http://www.mobilegeographics.com:81/)

Ref: Tides July 1 04.cdr

Thea Foss Waterway
Tacoma, Washington

Commencement Bay Tides
July 1 and 2, 2004

PAP-001-01 **FIGURE 2** July 2004
Dalton, Olmsted & Fuglevand, Inc.

Figure 3a - Scour Protection Apron - View to East (towards Berg Scaffolding)

Figure 3b - Scour Protection Apron - View to Northeast (towards Berg Scaffolding)

Thea Foss Waterway, Tacoma, Washington

Scour Protection Apron - East View

PAP-001-01b **FIGURE 3** July 2004

Dalton, Olmsted & Fuglevand, Inc.

Ref: Apron E, NE 7-04.cdr

Figure 4a - Scour Protection Apron - View to North (towards Commencement Bay)

Figure 4b - Scour Protection Apron - View to Northwest (towards City Pier and former Std. Chemical Area)

Thea Foss Waterway, Tacoma, Washington

Scour Protection Apron - North View

PAP-001-01b **FIGURE 4** July 2004

Dalton, Olmsted & Fuglevand, Inc.

Ref: Apron N, NW 7-04.cdr

Figure 5a - Scour Protection Apron - View to Southwest (May 04)

Figure 5b - Southeast Corner Scour Protection Apron - View to Southwest (July 04)

Thea Foss Waterway, Tacoma, Washington

Scour Protection Apron - Southwest View

PAP-001-01 **FIGURE 5** July 2004

Dalton, Olmsted & Fuglevand, Inc.

Ref: Apron SW 7-04.cdr

Figure 6a - South End of Waterway - View to Southwest

Figure 6b - South End of Waterway - View to Southwest (Former Am. Plating Site Slope in Foreground)

Thea Foss Waterway, Tacoma, Washington

South End of Waterway

PAP-001-01 **FIGURE 6** July 2004

Dalton, Olmsted & Fuglevand, Inc.

Ref: S end TF 7-04.cdr

Figure 7a - Discharge From Outfall 235 - View to South

Figure 7b - Discharge from Outfall 235 - View to Northeast

Thea Foss Waterway, Tacoma, Washington

Discharge Area - Outfall 235

PAP-001-01 **FIGURE 7** July 2004

Dalton, Olmsted & Fuglevand, Inc.

Ref: Dis Outfall 235.cdr

Figure 8a - West Bank Slope in Former Std. Chemical Co. Area - View to North

Figure 8b - Former SR509 Seep Area - View to West Under SR509 Bridge

Thea Foss Waterway, Tacoma, Washington

Standard Chemical Slope and SR509 Seep Areas

PAP-001-01 **FIGURE 8** July 2004

Dalton, Olmsted & Fuglevand, Inc.

Ref: Misc 1 7-04.cdr

Figure 9a - Bubbles in Former SR509 Seep Area- View to Southwest

Figure 9b - Bubbles in Former SR509 Seep Area- View to Northwest

Thea Foss Waterway, Tacoma, Washington

SR509 Seep Area

PAP-001-01 **FIGURE 9** July 2004

Dalton, Olmsted & Fuglevand, Inc.

Ref: SR509 Seep Area 7-04.cdr

Figure 10a - East Bank Slope - View to North

Figure 10b - Foss Landing Marina - View to South

Thea Foss Waterway, Tacoma, Washington

East Bank Slope and Foss Landing Marina

PAP-001-01 **FIGURE 10** July 2004

Dalton, Olmsted & Fuglevand, Inc.

Ref: Misc 2 7-04.cdr

Figure 11a - Outfall 243 Under SR509 Bridge - View to East

Figure 11b - Outfall 243 - View to East

Thea Foss Waterway, Tacoma, Washington

Outfall 243

PAP-001-01b **FIGURE 11** July 2004

Dalton, Olmsted & Fuglevand, Inc.

Ref: Outfall 243 7-04.cdr

ATTACHMENT C
DMD, Inc. Data Quality Review

Data Evaluation for the Head of Thea Foss Waterway, Utilities Work Area Remediation, Post-Construction / Remediation Monitoring, April 2004

Forty-five sediment samples were collected during April 7-9, 2004, for the analyses of selected SVOCs [chlorinated benzenes, polycyclic aromatic hydrocarbons (PAHs), and phthalate esters], total organic carbon (TOC), metals, DDT analogs, PCBs as Aroclors, and grain size distribution. Samples were collected by DOF (Dalton, Olmsted & Fuglevand) of Kirkland, Washington, and analyzed by Analytical Resources, Inc. (ARI) of Tukwila, Washington. Sampling and analyses were conducted in accordance with the specifications of the *Quality Assurance Project Plan (QAPP), Utilities Work Area Remediation*, prepared by DOF, DMD & Tetra Tech-FW, July 24, 2003. All sample results are presented in the attached Table, entitled, "Head of Thea Foss Waterway, Post-Construction Monitoring, April 2004".

Samples were received at the laboratory with complete documentation, including completed analytical request and chain-of-custody forms.

Analytical methods employed are summarized here:

Analyte(s)	Matrix	Method
Metals	sediments	SW-846 M.6010B, M.7471A
Total Organic Carbon (TOC)	sediments	Plumb, 1981
Grain size	sediments	PSEP, apparent grain size
Chlor. pesticides / PCBs	sediments	SW-846 M.8081; PSDDA
Selected SVOCs	sediments	SW-846 M.8270; PSDDA

No significant anomalies or problems were encountered with these analyses. Metals were prepped/digested by EPA method 3050B and "CLP", in the case of mercury (Hg). Extracts for analysis of chlorinated pesticides and PCBs were subjected to S_x removal procedures and silica gel cleanups. Some samples were sufficiently sandy and gravelly to yield less than 5 grams for the measurement of fines during the pipetting procedure. This may yield some inaccuracies in the %fines when they are especially small. The 12 samples with the lowest %fines may be affected. As specified by PSEP, no peroxide oxidation was employed. Sampling dates recorded on a couple of laboratory data reports were in error. The sample collection dates in the attached results table are verified against the dates reported on the C-O-C / analytical request forms.

All **holding times and conditions** were within the requirements of the sampling plan and QAPP. Samples were shipped on ice and held under refrigeration upon receipt at the laboratory. All samples were received by the project laboratory within 48 hours of collection and at 2-6 °C upon arrival. Extractable organic analytes were extracted within 14 days of collection, and extracts analyzed within 14 days of extraction. Exceptions are noted for WC-06, which required retrieval from frozen archival storage for re-extraction and analysis due to low surrogate recoveries in the initial analysis of SVOCs, and RC-07 which required extraction of the [frozen] archived sample for chlorinated pesticides/PCBs after 19 days. (Archival storage at -20 °C is recommended by PSEP at $\leq$ 1 year.) Metals were digested within 7 days of collection and digestates analyzed

within 7 days. TOC was analyzed within 14 days of collection, and grain size determinations were completed within 30 days of sample collection. All holding times are within specification of the project QAPP. No data required qualification based on holding times and conditions.

Method/procedural **blanks** for all analytical procedures were analyzed and reported for each delivery group of less than 20 samples. Blanks exhibited no detectable analytes above the lower reporting limits (quantitation limits), with the exception of copper at 0.4 mg/kg in analytical batch GN46. Sample results are sufficiently greater to not be affected by the low method blank value. No data required qualification based on blank analyses.

Analyte recoveries were evaluated with the use of **matrix spikes** (MS and matrix spike duplicates [MSDs]) and laboratory control samples (LCS or blank spikes). A summary of MS performance is as follows:

	MS / MSD %recovery (RPD)			
	GN18I	*GN45J*	*GN46K*	Accept. Criteria
1,4-dichlorobenzene	57 / 67 (17)	60 / 58 (3)		28 - 104 (27)
1,2,4-trichlorobenzene	66 / 79 (18)	75 / 73 (2)		38 - 107 (23)
acenaphthene	61 / 74 (19)	71 / 66 (6)	62 / 65 (2)	31 - 137 (19)
pyrene	67 / 80 (19)	78 / 63 (19)	36 / 45 (7)	35 - 142 (31)
4,4'-DDT	70 / 61 (15)	70 / 68 (3)	68 / 71 (2)	23 - 134 (50)
	GN18A	*GN45A*	*GN46A*	
TOC	105	103	125	75 - 125
Sb	25	17	16	75 - 125
As	97	101	103	75 - 125
Cd	97	104	103	75 - 125
Cr	92	92	96	75 - 125
Cu	100	104	104	75 - 125
Pb	95	95	97	75 - 125
Hg	107	109	110	75 - 125
Ni	91	91	96	75 - 125
Ag	102	109	109	75 - 125
Zn	91	89	97	75 - 125

SVOC spike levels were 480-490 µg/kg, DDT spike concentration was 4 µg/kg, TOC spike levels ranged from 1.2 to 6%, and metals spike concentrations ranged from 58 to 370 mg/kg (Hg spike levels = 0.4 - 1.0 mg/kg).

All MS/MSD performance measurements were within criteria with the exception of antimony (Sb), which exhibited low recoveries. This performance is typical of Sb in silicate-containing matrices. However, all Sb results are nondetected and qualified with the "UJ" code to alert the data user that the nondetects are biased with the actual quantitation limit greater than the reporting limit presented in the lab results and the attached results table. (A 10% recovery threshold normally triggers nondetects as unusable or rejected).

Lab control samples (LCS, spiked blank) performance is summarized as follows:

	LCS Recov. (%)				
	GN18	*GN45a*	*GN45b*	*GN45c*	*GN46*
1,4-dichlorobenzene	73	66	75	65	
1,2,4-trichlorobenzene	76	78	75	70	
acenaphthene	76	67	81	73	64

pyrene	88	71	86	84	70
4,4'-DDE	55	86			88 / 81
4,4'-DDD	55	86			90 / 89
4,4'-DDT	70	91			87 / 86
TOC	107	100			106
Sb	104	109			116
As	101	102			110
Cd	101	105			111
Cr	97	96			102
Cu	97	101			107
Pb	103	102			110
Hg	102	104			108
Ni	98	98			104
Ag	103	107			112
Zn	98	96			104

LCS recoveries are within acceptable ranges. No results required qualification based on LCS performance. TOC analytical performance was also assessed with use of NIST #8704. Analytical accuracy for TOC (@ 3.16%) was reported as 108%, 106% and 97%.

Duplicate analyses for TOC generally showed a variability of < 30 relative percent difference (RPD), with the exception of low levels, in the case of WC-07 @ 0.19%, which show greater variability (up to 48 RPD). This is expected for samples exhibiting low TOC levels and [low] %fines content. Three duplicate pairs were analyzed for evaluation of metals variability. RPDs varied from 0% to 10% for detected metals. Three sets of triplicates were analyzed and reported for grain size distributions. Variability was reported as < 15% RSD (relative standard deviation) for all class size fractions, with the exception of those fractions showing low relative content, such as 1.3% content for gravel in RC-02 (53% RSD).

Blind field duplicates were submitted with each sample delivery group; three duplicate pairs were submitted and results are presented in the attached table. Variability for all parameters, with the exception of discrete grain size fractions, was ≤ 25 RPD.

All **surrogate compound recoveries** for chlorinated pesticides / PCBs and SVOCs were in compliance with project specifications. Sample WC-06 required reanalysis in order to bring surrogate recoveries into compliance with project specifications. Reanalysis was performed on an aliquot taken from frozen archives, which did not adversely affect acceptable holding times and conditions. Surrogate recoveries are determined to be within project specifications.

Lower reporting limits for all parameters in all samples were significantly less than the project SQOs in order to allow a comparison to applicable criteria. Samples RC-13 and RC-14 show slightly elevated reporting limits for Aroclor 1254 compared to other project samples due to some chemical interference. Reevaluation by the reviewer indicates that Aroclor 1254 is probably present at approximately 13 µg/kg for both samples. The results table remains with the elevated nondetected values. (While the project lab met the minimum reporting requirements to determine if PCBs exceeded the SQO of 300 µg/kg, need for confirmation of presence of Aroclor 1254 in samples RC-13 and RC-14 would require additional analytical effort, which is outside the scope of this task.)

With minor exceptions, as noted above, the **data quality** is within the criteria and specifications outlined in the project sampling plan and QAPP. The reported data as presented in the attached results table are determined to be usable for the intended purposes of the project.

D.M.D., Inc.

Head of Thea Foss Waterway
Post-Construction Monitoring
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metals - mg/kg, dry
organics - µg/kg, dry

Field I.D.	Comments	Sample Date	Lab I.D.	% solids	% TOC	Sb 7440-36-0	As 7440-38-2	Cd 7440-43-9	Cr 7440-47-3	Cu 7440-50-8
WCBU-4A	sediment core	4/7/2004	045524-GN18A	84.1	0.89	6 UJ	6 U	0.2 U	**19.7**	**36.0**
WCBU-4B	sediment core	4/7/2004	045525-GN18B	91.7	0.14	10 UJ	10 U	0.5 U	**26**	**37.0**
WCBU-4C	sediment core	4/7/2004	045526-GN18C	90.8	0.04	5 UJ	5 U	0.2 U	**18.3**	**40.8**
WCBU-5A	sediment core	4/7/2004	045527-GN18D	89.0	0.25	6 UJ	6 U	0.2 U	**16.5**	**30.4**
WCBU-12A	sediment core	4/7/2004	045528-GN18E	90.9	0.02 U	5 UJ	5 U	0.2 U	**20.1**	**39.4**
WCBU-6A	sediment core	4/7/2004	045529-GN18F	82.8	1.6	6 UJ	6 U	0.2 U	**18.0**	**40.5**
WCBU-6B	sediment core	4/7/2004	045530-GN18G	86.4	0.40	6 UJ	6 U	0.2 U	**26.0**	**42.6**
WCBU-10A	sediment core	4/7/2004	045531-GN18H	88.7	0.40	5 UJ	5 U	0.2 U	**17.4**	**31.2**
WCBU-Dup1	WCBU-10A dup.	4/7/2004	045534-GN18K	88.3	0.32	6 UJ	6 U	0.2 U	**16.1**	**31.2**
WCBU-10B	sediment core	4/7/2004	045532-GN18I	94.7	0.15	5 UJ	5 U	0.2 U	**20.2**	**46.7**
WCBU-10C	sediment core	4/7/2004	045533-GN18J	93.1	0.30	5 UJ	5 U	0.2 U	**13.1**	**21.1**
RC-01	recon. sed. (2 cm)	4/8/2004	045707-GN46K	79.8	2.4	6 UJ	**6**	0.2 U	**33.2**	**44.1**
RC-02	recon. sed. (2 cm)	4/8/2004	045697-GN46A	50.7	5.3	9 UJ	9 U	0.4 U	**27.5**	**71.3**
RC-03	recon. sed. (2 cm)	4/8/2004	045698-GN46B	37.8	6.7	10 UJ	10 U	0.5 U	**40**	**112**
RC-04	recon. sed. (2 cm)	4/8/2004	045699-GN46C	55.2	6.3	9 UJ	9 U	0.4 U	**27.1**	**71.8**
RC-05	recon. sed. (2 cm)	4/8/2004	045700-GN46D	46.2	5.3	10 UJ	10 U	0.4 U	**33**	**87.3**
RC-Dup1	RC-05 dup.	4/8/2004	045705-GN46I	45.4	5.2	10 UJ	10 U	0.4 U	**31**	**85.1**
RC-06	recon. sed. (2 cm)	4/8/2004	045701-GN46E	57.4	4.7	9 UJ	9 U	0.4 U	**22.9**	**54.5**
RC-07	recon. sed. (2 cm)	4/8/2004	045702-GN46F	84.1	1.3	6 UJ	6 U	0.2 U	**19.9**	**49.5**
RC-08	recon. sed. (2 cm)	4/8/2004	045709-GN46M	79.7	0.92	6 UJ	6 U	0.3 U	**17.8**	**32.8**
RC-09	recon. sed. (2 cm)	4/8/2004	045703-GN46G	67.3	2.9	8 UJ	8 U	0.3 U	**25.6**	**64.0**
RC-10	recon. sed. (2 cm)	4/9/2004	045710-GN46N	68.1	3.2	7 UJ	7 U	0.3 U	**21.9**	**54.7**
RC-11	recon. sed. (2 cm)	4/8/2004	045708-GN46L	67.6	3.0	8 UJ	**20**	**0.5**	**25.2**	**132**
RC-12	recon. sed. (2 cm)	4/9/2004	045711-GN46O	88.4	0.37	5 UJ	5 U	0.2 U	**27.3**	**48.5**
RC-13	recon. sed. (2 cm)	4/8/2004	045706-GN46J	78.5	3.3	7 UJ	**8**	0.3 U	**26.4**	**58.5**
RC-14	recon. sed. (2 cm)	4/8/2004	045704-GN46H	65.9	7.0	8 UJ	**9**	**0.5**	**30.1**	**73.3**
WC-01	cap compl. sed. (10 cm)	4/8/2004	045690-GN45M	86.9	1.5	5 UJ	5 U	0.2 U	**19.1**	**28.9**
WC-02	cap compl. sed. (10 cm)	4/8/2004	045678-GN45A	61.6	3.5	8 UJ	8 U	0.3 U	**23.6**	**60.9**
WC-03	cap compl. sed. (10 cm)	4/8/2004	045679-GN45B	50.8	7.1	10 UJ	10 U	0.4 U	**26**	**65.6**
WC-04	cap compl. sed. (10 cm)	4/8/2004	045680-GN45C	70.0	4.6	7 UJ	7 U	0.3 U	**24.0**	**55.2**
WC-Dup1	WC-04 dup.	4/8/2004	045681-GN45D	67.7	6.2	7 UJ	7 U	0.3 U	**23.2**	**62.0**
WC-05	cap compl. sed. (10 cm)	4/8/2004	045682-GN45E	58.7	4.5	8 UJ	8 U	0.3 U	**24.2**	**60.4**
WC-06	cap compl. sed. (10 cm)	4/8/2004	045683-GN45F	73.0	3.5	7 UJ	7 U	0.3 U	**19.1**	**40.0**
WC-07	cap compl. sed. (10 cm)	4/8/2004	045684-GN45G	86.6	0.19	6 UJ	6 U	0.2 U	**18.2**	**32.2**

Head of Thea Foss Waterway
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metals - mg/kg, dry
organics - µg/kg, dry

Field I.D.	Comments	Sample Date	Lab I.D.	% solids	% TOC	Sb 7440-36-0	As 7440-38-2	Cd 7440-43-9	Cr 7440-47-3	Cu 7440-50-8
WC-08	cap compl. sed. (10 cm)	4/8/2004	045693-GN45P	82.6	0.88	6 UJ	6 U	0.2 U	**17.2**	**33.9**
WC-09	cap compl. sed. (10 cm)	4/8/2004	045685-GN45H	71.7	3.0	7 UJ	7 U	0.3 U	**18.4**	**39.8**
WC-10	cap compl. sed. (10 cm)	4/9/2004	045695-GN45R	79.4	1.4	6 UJ	6 U	0.3 U	**19.1**	**35.9**
WC-11	cap compl. sed. (10 cm)	4/8/2004	045691-GN45N	84.2	2.1	6 UJ	**16**	0.2 U	**21.5**	**168**
WC-12	cap compl. sed. (10 cm)	4/9/2004	045696-GN45S	86.9	0.19	6 UJ	6 U	0.2 U	**19.8**	**35.6**
WC-13	cap compl. sed. (10 cm)	4/8/2004	045692-GN45O	84.7	0.96	5 UJ	5 U	0.2 U	**24.2**	**44.0**
WC-14	cap compl. sed. (10 cm)	4/9/2004	045694-GN45Q	74.4	2.3	7 UJ	7 U	0.3 U	**18.2**	**36.1**
SC-01	slope cap (composite)	4/8/2004	045689-GN45L	91.5	0.22	5 UJ	5 U	0.2 U	**18.9**	**30.7**
SC-02	slope cap (composite)	4/8/2004	045688-GN45K	90.3	0.18	5 UJ	5 U	0.2 U	**19.7**	**41.6**
SC-03	slope cap (composite)	4/8/2004	045687-GN45J	89.3	0.54	5 UJ	5 U	0.2 U	**19.8**	**33.9**
SC-04	slope cap (composite)	4/8/2004	045686-GN45I	91.9	0.31	5 UJ	5 U	0.2 U	**20.4**	**52.3**

U = nondetected at the associated value
UJ = nondetect may be biased low due to low spike recoveries
J = associated value is considered an estimate due to being outside the verifiable linear calibration range

Head of Thea Foss Waterway
Post-Construction Monitoring
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metals - mg/kg, dry
organics - µg/kg, dry

Field I.D.	Pb 7439-92-1	Hg 7439-97-6	Ni 7440-02-0	Ag 7440-22-4	Zn 7440-66-6	% gravel > 2000 µm	% cs. sand 2000-500 µm	% med. sand 500-250 µm	% fine sand 250-62 µm	% silt 62.5-3.9 µm	% clay < 3.9 µm	% fines < 62.5 µm
WCBU-4A	**3**	0.04 U	**20**	0.3 U	**35.3**	15	33	26	22	2.6	1.3	3.9
WCBU-4B	5 U	0.05 U	**22**	0.8 U	**38**	25	43	21	9.8	0.8	0.5	1.3
WCBU-4C	2 U	0.05 U	**18**	0.3 U	**36.9**	28	44	19	7.3	1.1	0.5	1.6
WCBU-5A	2 U	0.05 U	**16**	0.3 U	**28.9**	29	30	22	18	0.8	0.4	1.2
WCBU-12A	**2**	0.04 U	**20**	0.3 U	**34.3**	27	35	24	13	1.1	0.4	1.5
WCBU-6A	**3**	0.04 U	**18**	0.3 U	**39.4**	28	27	21	21	2.0	1.2	3.2
WCBU-6B	**3**	0.04 U	**21**	0.3 U	**40.0**	35	34	18	10	1.9	1.5	3.4
WCBU-10A	**3**	0.04 U	**17**	0.3 U	**33.7**	11	24	31	32	1.5	0.6	2.1
WCBU-Dup1	**3**	0.04 U	**17**	0.3 U	**31.0**	14	23	31	31	1.1	0.7	1.8
WCBU-10B	**2**	0.05 U	**20**	0.3 U	**35.6**	34	35	20	10	0.2	0.6	0.8
WCBU-10C	2 U	0.04 U	**12**	0.3 U	**19.9**	35	40	17	7.2	0.4	0.9	1.3
RC-01	**25**	0.06 U	**28**	0.3 U	**74.3**	25	40	17	6.1	7.2	4.9	12
RC-02	**20**	0.1 U	**27**	0.6 U	**71**	1.2	8.7	21	33	19	18	36
RC-03	**44**	**0.1**	**36**	0.8 U	**115**	0.1	4.9	3.7	18	40	34	73
RC-04	**19**	**0.08**	**25**	0.5 U	**70**	4.1	18	20	24	18	16	34
RC-05	**19**	**0.09**	**29**	0.6 U	**70**	0.1	5.6	8.0	32	32	22	54
RC-Dup1	**19**	0.09 U	**28**	0.6 U	**69**	3.4	3.6	7.9	33	31	21	53
RC-06	**18**	0.08 U	**21**	0.5 U	**56**	2.2	2.9	17	52	14	12	26
RC-07	**6**	0.05 U	**19**	0.3 U	**40.6**	26	27	22	18	3.0	3.2	6.2
RC-08	**5**	0.06 U	**16**	0.4 U	**33.0**	1.6	18	39	37	2.5	2.7	5.2
RC-09	**15**	0.07 U	**23**	0.5 U	**53.3**	2.2	9.3	25	39	14	10	25
RC-10	**11**	0.06 U	**20**	**0.5**	**43.7**	5.3	11	16	48	12	7.6	20
RC-11	**35**	**0.13**	**28**	0.5 U	**82.8**	48	17	0.7	10	15	9.0	24
RC-12	**4**	0.05 U	**22**	0.3 U	**43.9**	29	47	17	5.0	0.8	1.1	1.9
RC-13	**42**	**0.07**	**31**	0.4 U	**99.3**	28	34	12	7.9	10	7.9	18
RC-14	**54**	**0.10**	**31**	0.5 U	**167**	13	31	11	11	20	14	34
WC-01	**6**	0.04 U	**23**	0.3 U	**41.0**	28	42	16	6.1	4.8	3.0	7.8
WC-02	**15**	0.08 U	**23**	0.5 U	**58**	8.2	14	23	32	14	10	24
WC-03	**20**	**0.07**	**24**	0.6 U	**63**	0.5	8.4	16	33	26	17	43
WC-04	**13**	0.06 U	**22**	0.4 U	**52.2**	14	25	20	25	9.8	6.4	16
WC-Dup1	**13**	**0.05**	**21**	0.4 U	**48.2**	14	24	20	25	11	6.7	18
WC-05	**10**	**0.11**	**23**	0.5 U	**48**	3.2	13	17	36	20	11	31
WC-06	**7**	0.06 U	**18**	0.4 U	**38.8**	0.7	16	36	37	6.5	4.2	11
WC-07	**2**	0.04 U	**16**	0.3 U	**30.7**	33	37	18	9.2	2.0	0.5	2.5

Head of Thea Foss Waterway
Post-Construction Monitoring
April 2004

metals - mg/kg, dry
organics - µg/kg, dry

Field I.D.	Pb 7439-92-1	Hg 7439-97-6	Ni 7440-02-0	Ag 7440-22-4	Zn 7440-66-6	% gravel > 2000 µm	% cs. sand 2000-500 µm	% med. sand 500-250 µm	% fine sand 250-62 µm	% silt 62.5-3.9 µm	% clay < 3.9 µm	% fines < 62.5 µm
WC-08	**4**	0.05 U	**16**	0.3 U	**31.8**	19	28	27	23	1.6	1.7	3.3
WC-09	**7**	0.05 U	**18**	0.4 U	**37.4**	4.4	13	26	45	7.1	4.0	11
WC-10	**4**	0.06 U	**17**	0.4 U	**34.5**	7.9	18	29	38	4.3	2.8	7.1
WC-11	**14**	**0.05**	**24**	0.4 U	**60.5**	57	18	4.5	7.7	8.6	4.4	13
WC-12	**3**	0.05 U	**19**	0.3 U	**35.9**	20	44	23	11	1.1	0.9	2.0
WC-13	**4**	0.05 U	**22**	0.3 U	**38.5**	31	30	19	14	3.4	2.3	5.7
WC-14	**4**	0.05 U	**18**	0.4 U	**34.4**	2.8	18	30	41	5.4	3.6	9.0
SC-01	**3**	0.05 U	**19**	0.3 U	**33.0**	13	27	32	27	0.7	0.6	1.3
SC-02	2 U	0.04 U	**18**	0.3 U	**31.1**	30	34	21	14	0.4	0.7	1.1
SC-03	**4**	0.04 U	**20**	**0.3**	**36.3**	18	37	24	15	4.3	2.4	6.7
SC-04	**4**	0.04 U	**22**	0.3 U	**35.7**	20	43	25	11	0.9	0.2	1.1

U = nondetected at the associated value
UJ = nondetect may be biased low due to low spike recoveries
J = associated value is considered an estimate due to being outside the verifiable linear calibration range

Head of Thea Foss Waterway
Post-Construction Monitoring
April 2004

metals - mg/kg, dry
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Field I.D.	1,3-Dichloro-benzene 541-73-1	1,4-Dichloro-benzene 106-46-7	1,2-Dichloro-benzene 95-50-1	1,2,4-Trichloro-benzene 120-82-1	Naphthalene 91-20-3	2-Methyl-naphthalene 91-57-6	Dimethyl-phthalate 131-11-3	Acenaph-thylene 208-96-8	Acenaphthene 83-32-9	Dibenzo-furan 132-64-9	Diethyl-phthalate 84-66-2	Fluorene 86-73-7	Phenanthrene 85-01-8
WCBU-4A	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	**33**
WCBU-4B	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
WCBU-4C	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
WCBU-5A	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
WCBU-12A	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
WCBU-6A	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	**30**
WCBU-6B	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
WCBU-10A	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
WCBU-Dup1	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	**21**	20 U	20 U
WCBU-10B	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
WCBU-10C	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
RC-01					39 U	39 U	39 U	39 U	39 U		39 U	39 U	**160**
RC-02					**47**	20 U	20 U	20 U	**22**		20 U	20 U	**99**
RC-03					**130**	**35**	20 U	20 U	**67**		20 U	**41**	**240**
RC-04					**44**	19 U	19 U	19 U	**24**		19 U	19 U	**98**
RC-05					**34**	20 U	20 U	20 U	20 U		20 U	20 U	**40**
RC-Dup1					**36**	20 U	20 U	20 U	20 U		20 U	20 U	**47**
RC-06					**54**	39 U	39 U	39 U	39 U		39 U	39 U	**110**
RC-07					19 U	19 U	19 U	19 U	19 U		19 U	19 U	**26**
RC-08					19 U	19 U	19 U	19 U	19 U		19 U	19 U	**28**
RC-09					**56**	38 U	38 U	38 U	38 U		38 U	38 U	**74**
RC-10					**44**	19 U	19 U	19 U	**22**		19 U	19 U	**67**
RC-11					**110**	39 U	39 U	39 U	**42**		39 U	39 U	**130**
RC-12					20 U	20 U	20 U	20 U	20 U		20 U	20 U	20 U
RC-13					38 U	38 U	38 U	38 U	38 U		38 U	38 U	**260**
RC-14					77 U	77 U	77 U	77 U	77 U		77 U	77 U	**570**
WC-01	39 U	39 U	39 U	39 U	39 U	39 U	39 U	39 U	39 U		39 U	39 U	**85**
WC-02	39 U	39 U	39 U	39 U	39 U	39 U	39 U	39 U	39 U		39 U	39 U	**70**
WC-03	40 U	40 U	40 U	40 U	**78**	40 U	40 U	40 U	**41**		40 U	40 U	**85**
WC-04	20 U	20 U	20 U	20 U	**78**	**21**	20 U	20 U	**51**		20 U	**26**	**120**
WC-Dup1	20 U	20 U	20 U	20 U	**92**	**24**	20 U	20 U	**61**		20 U	**30**	**140**
WC-05	20 U	20 U	20 U	20 U	**25**	20 U	20 U	20 U	20 U		20 U	20 U	**39**
WC-06	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U		20 U	20 U	**33**
WC-07	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U		19 U	19 U	19 U

Head of Thea Foss Waterway
Post-Construction Monitoring
April 2004

metals - mg/kg, dry
organics - µg/kg, dry

Field I.D.	1,3-Dichloro-benzene 541-73-1	1,4-Dichloro-benzene 106-46-7	1,2-Dichloro-benzene 95-50-1	1,2,4-Trichloro-benzene 120-82-1	Naphthalene 91-20-3	2-Methyl-naphthalene 91-57-6	Dimethyl-phthalate 131-11-3	Acenaph-thylene 208-96-8	Acenaphthene 83-32-9	Dibenzo-furan 132-64-9	Diethyl-phthalate 84-66-2	Fluorene 86-73-7	Phenanthrene 85-01-8
WC-08	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U		19 U	19 U	19 U
WC-09	20 U	20 U	20 U	20 U	**21**	20 U	20 U	20 U	20 U		20 U	20 U	**36**
WC-10	20 U	20 U	20 U	20 U	**22**	20 U	20 U	20 U	20 U		20 U	20 U	**46**
WC-11	39 U	39 U	39 U	39 U	**41**	39 U	39 U	39 U	39 U		39 U	39 U	**53**
WC-12	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U		19 U	19 U	19 U
WC-13	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U		20 U	20 U	**21**
WC-14	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U		19 U	19 U	**20**
SC-01	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U		19 U	19 U	19 U
SC-02	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U		19 U	19 U	19 U
SC-03	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U		20 U	20 U	20 U
SC-04	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U		19 U	19 U	19 U

U = nondetected at the associated value
UJ = nondetect may be biased low due to low spike recoveries
J = associated value is considered an estimate due to being outside the verifiable linear calibration range

Head of Thea Foss Waterway
Post-Construction Monitoring
April 2004

metals - mg/kg, dry
organics - µg/kg, dry

Field I.D.	Anthracene 120-12-7	Di-n-butyl-phthalate 84-74-2	Fluoranthene 206-44-0	Pyrene 129-00-0	Butylbenzyl-phthalate 85-68-7	Benzo(a)-anthracene 56-55-3	*bis* (2-Ethylhexyl)-phthalate 117-81-7	Chrysene 218-01-9	Di-n-octyl-phthalate 117-84-0	Benzo(b)-fluoranthene 205-99-2	Benzo(k)-fluoranthene 207-08-9	Benzo(a)-pyrene 50-32-8	Indeno(1,2,3-cd)pyrene 193-39-5
WCBU-4A	19 U	19 U	**54**	**50**	**23**	**20**	**73**	**27**	19 U	**22**	**19 J**	**20**	19 U
WCBU-4B	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
WCBU-4C	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
WCBU-5A	19 U	19 U	19 U	19 U	19 U	19 U	**46**	19 U	19 U	19 U	19 U	19 U	19 U
WCBU-12A	20 U	20 U	20 U	20 U	20 U	20 U	**49**	20 U	20 U	20 U	20 U	20 U	20 U
WCBU-6A	20 U	20 U	**41**	**30**	20 U	20 U	**92**	20 U	20 U	20 U	20 U	20 U	20 U
WCBU-6B	20 U	20 U	20 U	20 U	20 U	20 U	**63**	20 U	20 U	20 U	20 U	20 U	20 U
WCBU-10A	20 U	20 U	20 U	20 U	20 U	20 U	**69**	20 U	20 U	20 U	20 U	20 U	20 U
WCBU-Dup1	20 U	20 U	20 U	20 U	20 U	20 U	**75**	20 U	20 U	20 U	20 U	20 U	20 U
WCBU-10B	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
WCBU-10C	19 U	19 U	19 U	19 U	19 U	19 U	**37**	19 U	19 U	19 U	19 U	19 U	19 U
RC-01	39 U	**48**	**480**	**360**	**91**	**140**	**1300**	**260**	**45**	**320**	**220**	**170**	**90**
RC-02	**29**	20 U	**230**	**160**	**29**	**70**	**470**	**100**	**120**	**100**	**79**	**64**	**27**
RC-03	**73**	**19 J**	**500**	**360**	**62**	**150**	**1100**	**220**	**58**	**190**	**210**	**140**	**56**
RC-04	**25**	19 U	**180**	**150**	**27**	**56**	**360**	**82**	19 U	**76**	**74**	**56**	**23**
RC-05	20 U	20 U	**73**	**49**	20 U	**22**	**110**	**30**	20 U	**23**	**19 J**	**20**	20 U
RC-Dup1	20 U	20 U	**72**	**53**	20 U	**23**	**100**	**30**	20 U	**20**	**18 J**	**20 J**	20 U
RC-06	39 U	39 U	**230**	**160**	**38 J**	**75**	**500**	**110**	**38 J**	**91**	**69**	**68**	**44**
RC-07	19 U	19 U	**55**	**39**	19 U	**20**	**180**	**32**	**19**	**25**	**27**	**20**	19 U
RC-08	19 U	19 U	**50**	**37**	19 U	**20**	**110**	**28**	19 U	**20**	**19 J**	**19**	19 U
RC-09	38 U	38 U	**120**	**110**	38 U	**51**	**230**	**69**	38 U	**44**	**47**	**45**	38 U
RC-10	**26**	19 U	**91**	**74**	19 U	**36**	**80**	**44**	19 U	**28**	**29**	**33**	19 U
RC-11	**56**	39 U	**200**	**150**	39 U	**78**	**280**	**100**	39 U	**74**	**66**	**73**	39 U
RC-12	20 U	20 U	**22**	20 U	20 U	20 U	**60**	20 U	20 U	20 U	20 U	20 U	20 U
RC-13	**43**	**57**	**870**	**510**	**130**	**240**	**1400**	**410**	**98**	**500**	**330**	**260**	**120**
RC-14	**88**	77 U	**1600**	**890**	**180**	**460**	**3000**	**760**	**150**	**740**	**640**	**480**	**210**
WC-01	39 U	39 U	**250**	**140**	39 U	**75**	**550**	**130**	**41**	**120**	**85**	**79**	**53**
WC-02	39 U	39 U	**150**	**120**	39 U	**54**	**330**	**78**	39 U	**74**	**62**	**50**	39 U
WC-03	40 U	40 U	**120**	**110**	40 U	**45**	**240**	**60**	40 U	**58**	**42**	40 U	40 U
WC-04	**40**	20 U	**160**	**120**	20 U	**54**	**260**	**72**	20 U	**54**	**66**	**47**	20 U
WC-Dup1	**45**	20 U	**190**	**140**	20 U	**64**	**290**	**81**	**25**	**70**	**66**	**55**	20 U
WC-05	20 U	20 U	**63**	**50**	20 U	20 U	**76**	**24**	20 U	**21**	**20**	20 U	20 U
WC-06	20 U	20 U	**78**	**67**	20 U	**24**	**160**	**38**	20 U	**28**	**32**	**27**	**18 J**
WC-07	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U

D.M.D., Inc.

Head of Thea Foss Waterway
Post-Construction Monitoring
April 2004

metals - mg/kg, dry
organics - µg/kg, dry

Field I.D.	Anthracene 120-12-7	Di-n-butyl-phthalate 84-74-2	Fluoranthene 206-44-0	Pyrene 129-00-0	Butylbenzyl-phthalate 85-68-7	Benzo(a)-anthracene 56-55-3	*bis* (2-Ethylhexyl)-phthalate 117-81-7	Chrysene 218-01-9	Di-n-octyl-phthalate 117-84-0	Benzo(b)-fluoranthene 205-99-2	Benzo(k)-fluoranthene 207-08-9	Benzo(a)-pyrene 50-32-8	Indeno(1,2,3-cd)pyrene 193-39-5
WC-08	19 U	19 U	**26**	19 U	19 U	19 U	**49**	19 U	19 U	19 U	19 U	19 U	19 U
WC-09	20 U	20 U	**67**	**53**	20 U	**22**	**120**	**30**	20 U	**34**	20 U	**21**	20 U
WC-10	**20**	20 U	**53**	**61**	20 U	**22**	**63**	**28**	20 U	20 U	20 U	**22**	20 U
WC-11	39 U	39 U	**110**	**73**	39 U	**41**	**220**	**52**	39 U	39 U	**44**	**41**	39 U
WC-12	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
WC-13	20 U	20 U	**53**	**37**	20 U	20 U	**100**	**27**	20 U	20 U	**21**	20 U	20 U
WC-14	19 U	**32**	**38**	**28**	19 U	19 U	**76**	19 U	19 U	19 U	19 U	19 U	19 U
SC-01	19 U	19 U	19 U	19 U	19 U	19 U	**26**	19 U	19 U	19 U	19 U	19 U	19 U
SC-02	19 U	**35**	19 U	19 U	19 U	19 U	**31**	19 U	19 U	19 U	19 U	19 U	19 U
SC-03	20 U	**24**	**43**	**30**	20 U	20 U	**91**	**23**	20 U	**25**	**22**	20 U	20 U
SC-04	19 U	19 U	19 U	19 U	19 U	19 U	**94**	19 U	19 U	19 U	19 U	19 U	19 U

U = nondetected at the associated value
UJ = nondetect may be biased low due to low spike recoveries
J = associated value is considered an estimate due to being outside the verifiable linear calibration range

Head of Thea Foss Waterway
Post-Construction Monitoring
April 2004

metals - mg/kg, dry
organics - µg/kg, dry

Field I.D.	Dibenz(a,h)-anthracene 53-70-3	Benzo(g,h,i)-perylene 191-24-2	4,4'-DDE 72-55-9	4,4'-DDD 72-54-8	4,4'-DDT 50-29-3	Aroclor 1016 12674-11-2	Aroclor 1242 53469-21-9	Aroclor 1248 12672-29-6	Aroclor 1254 11097-69-1	Aroclor 1260 11096-82-5	Aroclor 1221 11104-28-2	Aroclor 1232 11141-16-5
WCBU-4A	19 U	19 U	0.38 U	0.38 U	0.38 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	7.6 U	3.8 U
WCBU-4B	19 U	19 U	0.39 U	0.39 U	0.39 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U	3.9 U
WCBU-4C	19 U	19 U	0.39 U	0.39 U	0.39 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U	3.9 U
WCBU-5A	19 U	19 U	0.39 U	0.39 U	0.39 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U	3.9 U
WCBU-12A	20 U	20 U	0.40 U	0.40 U	0.40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	7.9 U	4.0 U
WCBU-6A	20 U	20 U	0.40 U	0.40 U	0.40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	4.0 U
WCBU-6B	20 U	20 U	0.40 U	0.40 U	0.40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	4.0 U
WCBU-10A	20 U	20 U	0.39 U	0.39 U	0.39 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U	3.9 U
WCBU-Dup1	20 U	20 U	0.39 U	0.39 U	0.39 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U	3.9 U
WCBU-10B	20 U	20 U	0.40 U	0.40 U	0.40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	7.9 U	4.0 U
WCBU-10C	19 U	19 U	0.39 U	0.39 U	0.39 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.7 U	3.9 U
RC-01	39 U	**87**	0.38 U	**0.44**	2.3 U	3.8 U	3.8 U	3.8 U	**5.7**	3.8 U	7.6 U	3.8 U
RC-02	20 U	**24**	0.39 U	**0.68**	1.3 U	3.9 U	3.9 U	3.9 U	**6.3**	3.9 U	7.8 U	3.9 U
RC-03	20 U	**53**	1.1 U	**0.78**	1.4 U	3.9 U	3.9 U	3.9 U	**7.2**	3.9 U	7.9 U	3.9 U
RC-04	19 U	**21**	0.39 U	**0.75**	1.3 U	3.9 U	3.9 U	3.9 U	**5.7**	3.9 U	7.7 U	3.9 U
RC-05	20 U	20 U	0.39 U	**0.66**	0.39 U	3.9 U	3.9 U	3.9 U	**4.3**	3.9 U	7.8 U	3.9 U
RC-Dup1	20 U	20 U	0.39 U	0.39 U	0.39 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.9 U	3.9 U
RC-06	39 U	**43**	0.39 U	**0.65**	1.7 U	3.9 U	3.9 U	3.9 U	**9.2**	3.9 U	7.9 U	3.9 U
RC-07	19 U	19 U	0.38 U	0.38 U	0.38 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	7.6 U	3.8 U
RC-08	19 U	19 U	0.39 U	0.39 U	0.39 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.7 U	3.9 U
RC-09	38 U	38 U	0.38 U	**0.88**	1.7 U	3.8 U	3.8 U	3.8 U	**6.5**	3.8 U	7.6 U	3.8 U
RC-10	19 U	19 U	0.39 U	**0.55**	0.39 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U	3.9 U
RC-11	39 U	39 U	1.6 U	**1.7**	2.4 U	3.9 U	3.9 U	3.9 U	**11**	3.9 U	7.9 U	3.9 U
RC-12	20 U	20 U	0.39 U	0.39 U	0.39 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.9 U	3.9 U
RC-13	38 U	**110**	3.4 U	**1.1**	3.7 U	3.9 U	3.9 U	3.9 U	13 U	3.9 U	7.8 U	3.9 U
RC-14	77 U	**200**	3.1 U	**1.7**	4.9 U	3.9 U	3.9 U	3.9 U	14 U	3.9 U	7.7 U	3.9 U
WC-01	39 U	**50**	0.39 U	0.39 U	0.39 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U	3.9 U
WC-02	39 U	39 U	0.39 U	**0.64**	1.1 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U	3.9 U
WC-03	40 U	40 U	0.40 U	**0.68**	1.1 U	4.0 U	4.0 U	4.0 U	**5.7**	4.0 U	7.9 U	4.0 U
WC-04	20 U	20 U	0.39 U	**0.77**	0.93 U	3.9 U	3.9 U	3.9 U	**5.4**	3.9 U	7.8 U	3.9 U
WC-Dup1	20 U	20 U	0.40 U	**0.89**	1.1 U	4.0 U	4.0 U	4.0 U	**5.6**	4.0 U	8.0 U	4.0 U
WC-05	20 U	20 U	0.39 U	0.39 U	0.50 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U	3.9 U
WC-06	20 U	**18 J**	0.40 U	0.40 U	0.55 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	4.0 U
WC-07	19 U	19 U	0.39 U	0.39 U	0.39 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U	3.9 U

Head of Thea Foss Waterway
Post-Construction Monitoring
April 2004

metals - mg/kg, dry
organics - µg/kg, dry

Field I.D.	Dibenz(a,h)-anthracene 53-70-3	Benzo(g,h,i)-perylene 191-24-2	4,4'-DDE 72-55-9	4,4'-DDD 72-54-8	4,4'-DDT 50-29-3	Aroclor 1016 12674-11-2	Aroclor 1242 53469-21-9	Aroclor 1248 12672-29-6	Aroclor 1254 11097-69-1	Aroclor 1260 11096-82-5	Aroclor 1221 11104-28-2	Aroclor 1232 11141-16-5
WC-08	19 U	19 U	0.38 U	0.38 U	0.38 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	7.6 U	3.8 U
WC-09	20 U	20 U	0.39 U	0.39 U	0.39 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.9 U	3.9 U
WC-10	20 U	20 U	0.40 U	0.40 U	0.40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	7.9 U	4.0 U
WC-11	39 U	39 U	0.38 U	**0.54**	0.96 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	7.6 U	3.8 U
WC-12	19 U	19 U	0.38 U	0.38 U	0.38 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	7.7 U	3.8 U
WC-13	20 U	20 U	0.39 U	0.39 U	0.39 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U	3.9 U
WC-14	19 U	19 U	0.39 U	0.39 U	0.39 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.7 U	3.9 U
SC-01	19 U	19 U	0.39 U	0.39 U	0.39 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.7 U	3.9 U
SC-02	19 U	19 U	0.40 U	0.40 U	0.40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	7.9 U	4.0 U
SC-03	20 U	20 U	0.40 U	0.40 U	0.40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	4.0 U
SC-04	19 U	19 U	0.38 U	0.38 U	0.38 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	7.7 U	3.8 U

U = nondetected at the associated value
UJ = nondetect may be biased low due to low spike recoveries
J = associated value is considered an estimate due to being outside the verifiable linear calibration range

APPENDIX B
Site Observation Reports
Dalton Olmsted & Fuglevand, Inc.
For:
September 24 and December 9, 2004
April 27, 2005

Note: Site observation reports for May 7, 2004 and July 1 and 2, 2004 are presented in Appendix A Year 0 OMMP Report, August 27, 2004 by Dalton Olmsted & Fuglevand, Inc.

Dalton, Olmsted & Fuglevand, Inc. *Environmental Consultants*

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Cell (206) 498-6616 e-mail: mdalton@dofnw.com
(Kirkland, WA Office – 425-827-4588)

MEMORANDUM

TO: Lotte Hass - PacifiCorp

FROM: Matt Dalton

DATE: April 28, 2005

SUBJECT: Site Observations
September 24 and December 9, 2004
Head of Thea Foss Waterway Project

REF. NO: PAP-001-01 (Tech memo Sept_Dec 04 ob.doc)

This technical memorandum presents a summary of observed site conditions within the Head of the Thea Foss Waterway Project Area (also known as the Utilities' Work Area), Tacoma, Washington (Figure 1). The observations were made by Matthew Dalton, Sr. Consulting Hydrogeologist for Dalton, Olmsted & Fuglevand, Inc. (DOF). He visited the site between approximately 7:15 am and 9:00 am on September 24, 2004. During this period, a low tide of –0.52 feet Mean Lower Low Water (MLLW) was predicted for 8:05am (Figure 2). He also visited the site on December 9, 2004 from 6:45am to 8:30am when a daylight low tide of 6.80 feet was predicted for 8:17am (Figure 3).

OBSERVATIONS – September 24, 2004

The primary objectives of the visit by DOF staff were to observe the following.

- **Condition of the scour protection apron installed at extreme head of the waterway, particularly related to discharges from the Twin 96" stormwater outfalls.**

  The condition of the apron was similar to that observed during previous visits by DOF staff that occurred in May and July, 2004 (DOF 2004). Digital photographs of the scour protection apron are shown on Figures 4 to 6a. Water discharge from the Twin 96" outfalls was spreading out over the apron (as intended) and migrating in a northward direction to the waterway channel. No erosional channels were observed on the apron and most of the water infiltrated into coarser materials near the north end of the apron.

- **General condition of the waterway slopes exposed at low tide.**

  Exposed waterway slopes are shown on the photographs presented in Figures 6, 7, 8a, and 10. No visible evidence of slope erosion, sloughing etc. was observed.

  Several small channels were observed at the toe of outfall scour protection material associated with Outfall 235 near the west side of the SR509 bridge in July 2004 (DOF 2004) (Figure 7). At the time of the July observations, the bottom of the channel appeared to be "*self armoring*" in that coarser materials were observed in the bottom of the channel. The erosion was considered minor and local in nature and did not appear to have adversely impacted the overall integrity of the cap. No corrective action was recommended in July other than to monitor this feature during other low tide events. However, the daylight low tide on September 24, 2004 was not low enough to expose the bottom area where erosion was observed.

- **SR509 seep area for evidence of sheens.**

  Although gas bubbles were observed in the area of the former SR509 seep (Figures 8b, 9 and 10b) and elsewhere in the waterway, no sheens were observed anywhere in the waterway during our site visit when the tide was observed at approximately –0.52 feet MLLW.

OBSERVATIONS – December 9, 2004

A site visit was made during a daylight low tide on December 9, 2004. The predicted low tide was 6.80 feet MLLW. Flat-calm water conditions were present during the visit.

- Exposed side slopes above the low tide elevation showed no evidence of sloughing or erosion.

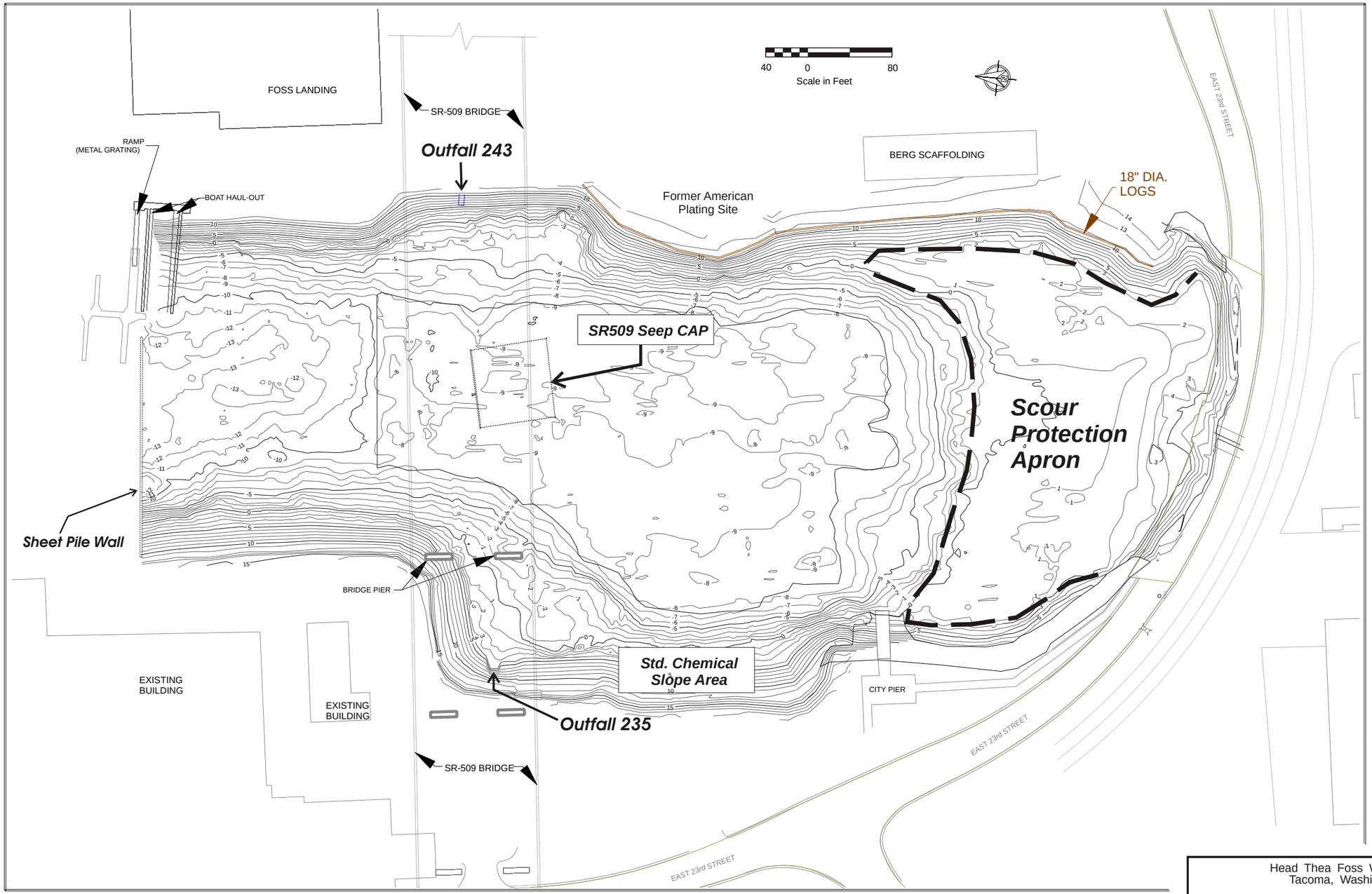
- No sheens (either coal tar- or petroleum-like sheens) were observed adjacent to the Foss Landing dock or south of the boat-lift, including in the general area of the former SR509 seep. Some petroleum-like sheens were observed immediately beneath the boat lift that were similar to what are typically present in other marinas. During the site visit Manson, the City's contractor, was placing sand cap material north of the boat-lift.

Reference

DOF (Dalton Olmsted & Fuglevand, Inc.), 2004, Results of Year 0 Operation, Maintenance and Monitoring Plan Sampling, Head of Thea Foss Waterway Remediation, Tacoma, Washington, prepared for PacifiCorp Environmental Remediation Company and Puget Sound Energy, August 27, 2004.

Attachments

Figure 1 – Thea Foss Waterway – South of Station 70+10 (Utility Work Area)
Figure 2 – Commencement Bay Tides – September 24, 2004
Figure 3 – Commencement Bay Tides – December 9, 2004
Figure 4 – Scour Protection Apron – East View
Figure 5 – Scour Protection Apron – North View
Figure 6 – South End of Waterway
Figure 7 – Discharge Area – Outfall 235
Figure 8 – Standard Chemical Slope and SR509 Seep Areas
Figure 9 – SR509 Seep Area
Figure 10 – East Bank Slope and Foss Landing Marina



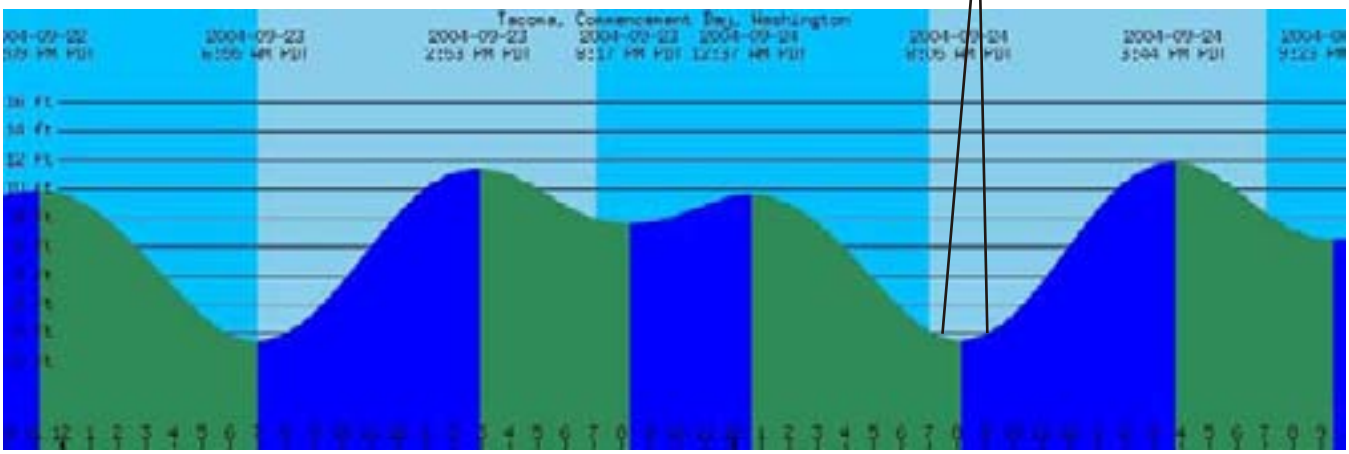
Head Thea Foss Waterway
Tacoma, Washington

Thea Foss Waterway - South o
Station 70+10 (Utility Work Area)

PAP-001-04 **FIGURE 1** June 2004
Dalton, Olmsted & Fuglevand, Inc.

Ref: Head of waterway.cdr

Approximate Period of Site Observations by DOF



Low Tide @8:05am on September 24, 2004
-0.52 feet MLLW

Source: XTide Prediction Server
(http://www.mobilegeographics.com:81/)

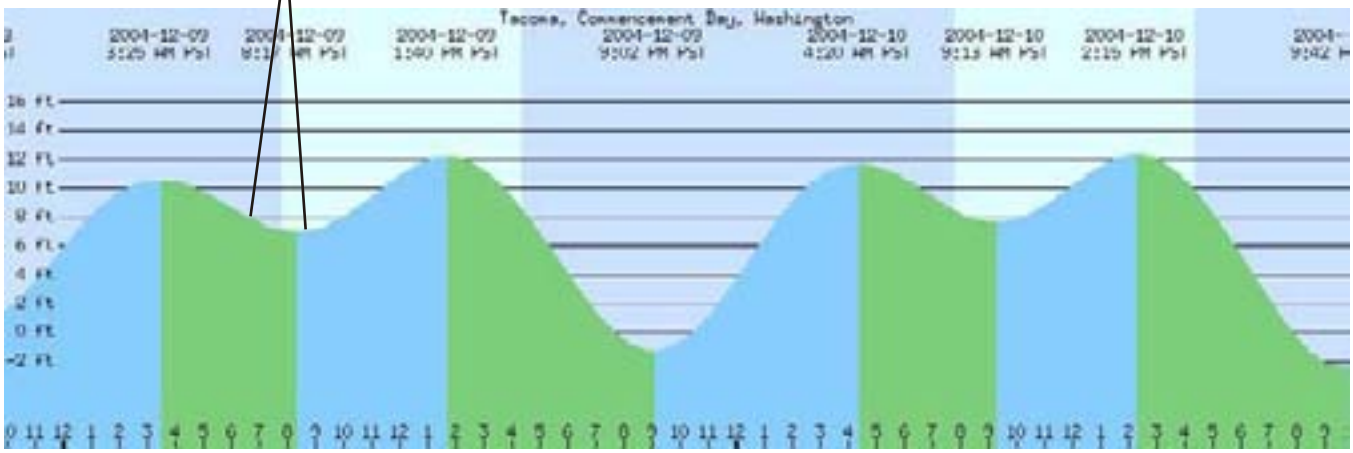
Ref: Tides Sept, 04.cdr

Thea Foss Waterway
Tacoma, Washington

Commencement Bay Tides
September 24, 2004

PAP-001-01 **FIGURE 2** Oct. 2004
Dalton, Olmsted & Fuglevand, Inc.

Approximate Period of Site Observations by DOF



Low Tide @8:17 am on December 9, 2004
6.80 feet MLLW (Daylight)

Source: XTide Prediction Server
(http://www.mobilegeographics.com:81/)

Ref: Tides Dec 9, 04.cdr

Thea Foss Waterway
Tacoma, Washington

Commencement Bay Tides
December 9, 2004

PAP-001-01 **FIGURE 3** Apr. 2005
Dalton, Olmsted & Fuglevand, Inc.

Figure 4a - Scour Protection Apron - View to East (towards Berg Scaffolding)

Figure 4b - Scour Protection Apron - View to Northeast (towards Berg Scaffolding)

Thea Foss Waterway, Tacoma, Washington

Scour Protection Apron - East View

PAP-001-01b **FIGURE 4** Oct. 2004

Dalton, Olmsted & Fuglevand, Inc.

Ref: Apron E, NE 9-04.cdr

Figure 5a - Scour Protection Apron - View to North (towards Commencement Bay)

Figure 5b - Scour Protection Apron - View to Northwest (towards City Pier and former Std. Chemical Area)

Thea Foss Waterway, Tacoma, Washington

Scour Protection Apron - North View

PAP-001-01b **FIGURE 5** Oct. 2004

Dalton, Olmsted & Fuglevand, Inc.

Ref: Apron N, NW 9-04.cdr

Figure 6a - South End of Waterway - View to Southwest

Figure 6b - South End of Waterway - View to Southwest (Former Am. Plating Site Slope in Foreground)

Thea Foss Waterway, Tacoma, Washington

South End of Waterway

PAP-001-01 **FIGURE 6** Oct. 2004

Dalton, Olmsted & Fuglevand, Inc.

Ref: S end TF 9-04.cdr

Figure 7a - Discharge From Outfall 235 - View to South

Figure 7b - Discharge from Outfall 235 - View to Southeast

Thea Foss Waterway, Tacoma, Washington

Discharge Area - Outfall 235

PAP-001-01 **FIGURE 7** Oct. 2004

Dalton, Olmsted & Fuglevand, Inc.

Ref: Dis Outfall 235 9-04.cdr

Figure 8a - West Bank Slope in Former Std. Chemical Co. Area - View to North

Figure 8b - Former SR509 Seep Area - View to West Under SR509 Bridge

Thea Foss Waterway, Tacoma, Washington

Standard Chemical Slope and SR509 Seep Areas

PAP-001-01 **FIGURE 8** Oct. 2004

Dalton, Olmsted & Fuglevand, Inc.

Ref: Misc 1 9-04.cdr

Figure 9a - Bubbles in Former SR509 Seep Area- View to Southwest

Figure 9b - Bubbles Near Former SR509 Seep Area- View to Northwest

Thea Foss Waterway, Tacoma, Washington

SR509 Seep Area

PAP-001-01 **FIGURE 9** Oct. 2004

Dalton, Olmsted & Fuglevand, Inc.

Ref: SR509 Seep Area 9-04.cdr

Figure 10a - East Bank Slope - View to North

Figure 10b - Foss Landing Marina - View to North

Thea Foss Waterway, Tacoma, Washington

East Bank Slope and Foss Landing Marina

PAP-001-01 **FIGURE 10** Oct. 2004

Dalton, Olmsted & Fuglevand, Inc.

Ref: Misc 2 9-04.cdr

Dalton, Olmsted & Fuglevand, Inc. *Environmental Consultants*

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Cell (206) 498-6616 e-mail: mdalton@dofnw.com
(Kirkland, WA Office – 425-827-4588)

MEMORANDUM

TO: Lotte Hass - PacifiCorp

FROM: Matt Dalton

DATE: April 28, 2005

SUBJECT: Site Observations
April 27, 2005
Head of Thea Foss Waterway Project

REF. NO: PAP-001-01 (Tech memo April 05 ob.doc)

This technical memorandum presents a summary of observed site conditions within the Head of the Thea Foss Waterway Project Area (also known as the Utilities' Work Area), Tacoma, Washington (Figure 1). The observations were made by Matthew Dalton, Sr. Consulting Hydrogeologist for Dalton, Olmsted & Fuglevand, Inc. (DOF). He visited the site between approximately 1:00 pm and 2:30 pm on April 27, 2005. During this period, a low tide of –2.4 feet Mean Lower Low Water (MLLW) was predicted for 1:53pm (Figure 2).

OBSERVATIONS – April 27, 2005

The primary objectives of the visit by DOF staff were to observe the following.

- **Condition of the scour protection apron installed at extreme head of the waterway, particularly related to discharges from the Twin 96" stormwater outfalls.**

  The condition of the apron was similar to that observed during previous visits by DOF staff that occurred in May, July, September and December 2004 (DOF 2004, 2005). Digital photographs of the scour protection apron are shown on Figures 3, 4 and 5a. Water discharge from the Twin 96" outfalls was spreading out over the apron (as intended) and migrating in a northward direction to the waterway channel. No erosional channels were observed on the apron and most of the water infiltrated into coarser materials near the north end of the apron.

In the bottom of the flow swale, coarse grained materials were observed. Most of the hard surfaces were encrusted with barnacles. On the west and east flanks of the channel, fine grained sediment, up to several centimeters thick, covered the apron. Patches of organic materials consisting of leaves, twigs etc. were present on the apron.

- **General condition of the waterway slopes exposed at low tide.**

Exposed waterway slopes are shown on the photographs presented in Figures 4b, 5b, 6a, 7, 8a, 9 and 10. No visible evidence of slope erosion, sloughing etc. was observed.

Several small channels were observed at the toe of outfall scour protection material associated with Outfall 235 near the west side of the SR509 bridge in July 2004 (DOF 2004). At the time of the July observations, the bottom of the channel appeared to be "*self armoring*" in that coarser materials were observed in the bottom of the channel. The erosion was considered minor and local in nature and did not appear to have adversely impacted the overall integrity of the cap. No corrective action was recommended in July other than to monitor this feature during other low tide events.

Figure 6 shows photographs of the area where stormwater from Outfall 235 discharges. The conditions appear similar to those observed in July 2004.

Figure 9b shows the top of the east slope near Berg Scaffolding. Eighteen-inch diameter logs were placed at the top of the slope for habitat enhancement. A log is missing near the south end of the slope (as shown on Figure 9b).

- **SR509 seep area for evidence of sheens.**

Although gas bubbles were observed in the area of the former SR509 seep and elsewhere in the waterway, no sheens were observed anywhere in the vicinity of the former SR509 seep area when the tide was observed at approximately –2.4 feet MLLW.

- **Observations in area of Foss Landing Docks**

During the daylight low tide on April 27, 2005, observations were made of the Foss Landing dock area. Sheens were previously observed in the general dock area during the dredging and capping activities completed during the fall of 2004. In April 2005, gas bubbles were present, however no sheens of any kind were observed in the vicinity of the docks. Conversations with Foss Landing staff indicated they have not noticed any recent unusual sheens in the vicinity of the docks.

Reference

DOF (Dalton Olmsted & Fuglevand, Inc.), 2004, Results of Year 0 Operation, Maintenance and Monitoring Plan Sampling, Head of Thea Foss Waterway Remediation, Tacoma, Washington, prepared for PacifiCorp Environmental Remediation Company and Puget Sound Energy, August 27, 2004.

DOF, 2005, Site Observations, September 24 and December 9, 2004, Head of Thea Foss Waterway Project, April 28, 2005.

Attachments

Figure 1 – Thea Foss Waterway – South of Station 70+10 (Utility Work Area)
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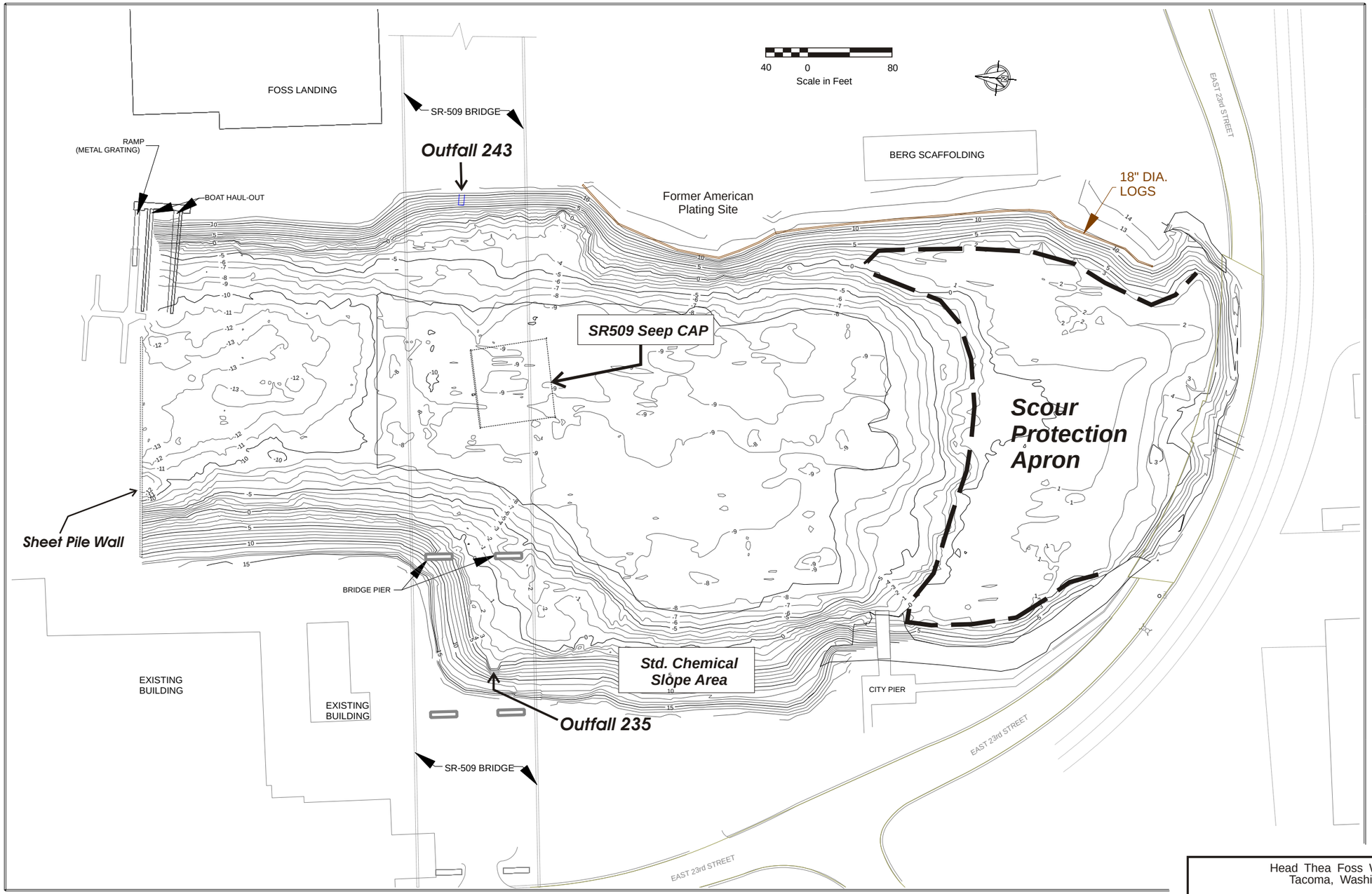
Figure 3 – Scour Protection Apron – East View
Figure 4 – Scour Protection Apron – North View
Figure 5 – South End of Waterway
Figure 6 – Discharge Area – Outfall 235
Figure 7 – West Bank Slopes
Figure 8 – SR509 Seep Area
Figure 9 – East Bank Slope
Figure 10 – Outfall 243



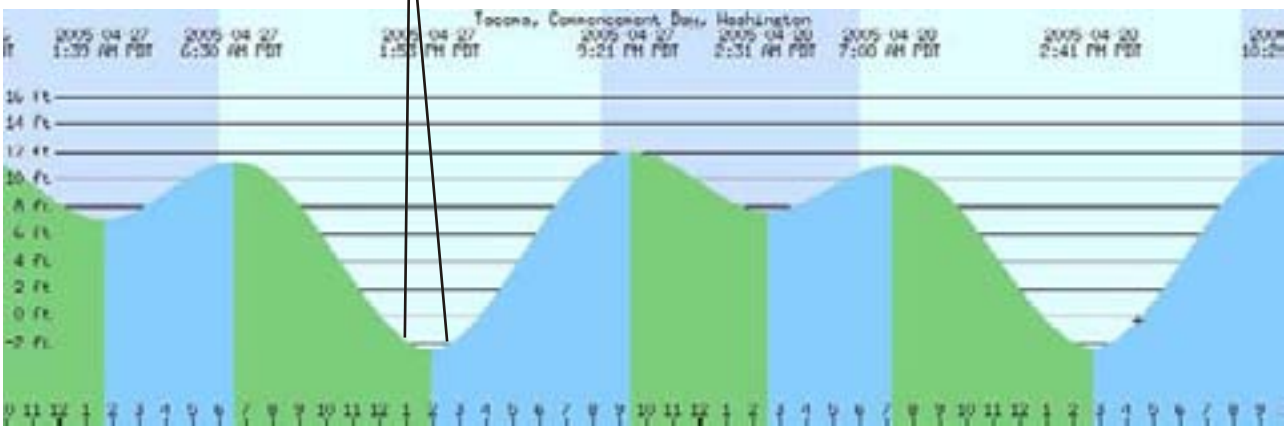
Head Thea Foss Waterway
Tacoma, Washington

Thea Foss Waterway - South o
Station 70+10 (Utility Work Area)

PAP-001-04 **FIGURE 1** June 2004
Dalton, Olmsted & Fuglevand, Inc.

Ref: Head of waterway.cdr

Approximate Period of Site Observations by DOF



Low Tide @1:53 pm on April 27, 2005
-2.4 feet MLLW (Daylight)

Source: XTide Prediction Server
(http://www.mobilegeographics.com:81/)

Ref: Tides April 27, 05.cdr

Thea Foss Waterway
Tacoma, Washington

Commencement Bay Tides
April 27, 2005

PAP-001-04 **FIGURE 2** Apr. 2005
Dalton, Olmsted & Fuglevand, Inc.

Figure 3a - Scour Protection Apron - View to East (towards Berg Scaffolding)

Figure 3b - Scour Protection Apron - View to Northeast (towards Berg Scaffolding)

Thea Foss Waterway, Tacoma, Washington

Scour Protection Apron - East View

PAP-001-01b **FIGURE 3** Apr. 2005

Dalton, Olmsted & Fuglevand, Inc.

Ref: Apron E, NE 4-05.cdr

Figure 4a - Scour Protection Apron - View to North (towards Commencement Bay)

Figure 4b - Scour Protection Apron - View to Northwest (towards City Pier and former Std. Chemical Area)

Thea Foss Waterway, Tacoma, Washington

Scour Protection Apron - North View

PAP-001-01b **FIGURE 4** Apr. 2005

Dalton, Olmsted & Fuglevand, Inc.

Ref: Apron N, NW 4-05.cdr

Figure 5a - South End of Waterway - View to Southwest

Figure 5b - South End of Waterway - View to Southwest (Former Am. Plating Site Slope in Foreground)

Thea Foss Waterway, Tacoma, Washington

South End of Waterway

PAP-001-04 **FIGURE 5** Apr. 2005

Dalton, Olmsted & Fuglevand, Inc.

Ref: S end TF 4-05.cdr

Figure 6a - Discharge From Outfall 235 - View to South

Figure 6b - Discharge from Outfall 235 - View to Southeast

Thea Foss Waterway, Tacoma, Washington

Discharge Area - Outfall 235

PAP-001-04 **FIGURE 6** Apr. 2005

Dalton, Olmsted & Fuglevand, Inc.

Ref: Dis Outfall 235 4-05.cdr

Figure 7a - West Bank Slope in Former Std. Chemical Co. Area - View to North

Figure 7b - West Bank Slope - North of SR509 Bridge -View to North

Thea Foss Waterway, Tacoma, Washington

West Bank Slopes

PAP-001-04 **FIGURE 7** Apr. 2005

Dalton, Olmsted & Fuglevand, Inc.

Ref: Misc 1 4-05.cdr

Figure 8a - Former SR509 Seep Area and Foss Landing Marina - View to North

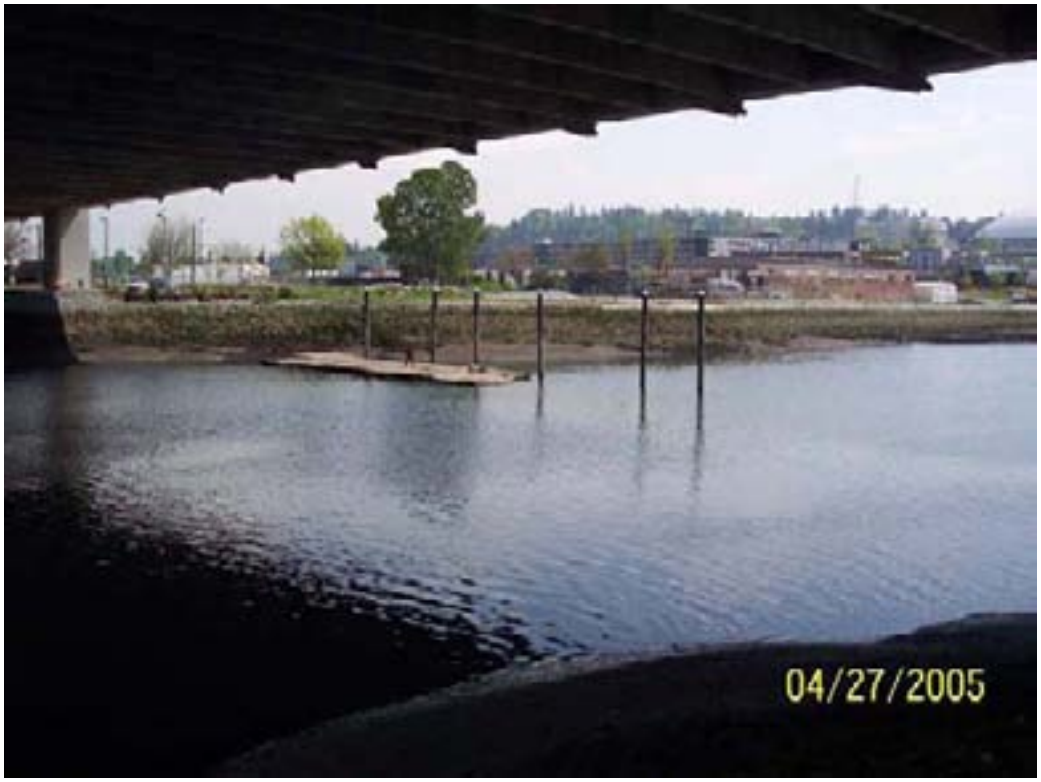


Figure 8b - Former SR509 Seep Area- View to Southeast

Thea Foss Waterway, Tacoma, Washington

SR509 Seep Area

PAP-001-04 **FIGURE 8** Apr. 2005

Dalton, Olmsted & Fuglevand, Inc.

Ref: SR509 Seep Area 4-05.cdr

Figure 9a - East Bank Slope - View to North

Figure 9b - East Bank Slope - View to North

Thea Foss Waterway, Tacoma, Washington

East Bank Slope

PAP-001-04 **FIGURE 9** Apr. 2005

Dalton, Olmsted & Fuglevand, Inc.

Ref: Misc 2 4-05.cdr

Figure 10a - Outfall 243 Under SR509 Bridge - View to East

Figure 10b - Outfall 243 - View to East

Thea Foss Waterway, Tacoma, Washington

Outfall 243

PAP-001-04 **FIGURE 10** Apr. 2005

Dalton, Olmsted & Fuglevand, Inc.

Ref: Outfall 243 4-05.cdr

[Provided to EPA on CD w/ July 2005 Recontamination Report]

APPENDIX C
Field Sampling/Observation Memoranda

1. **KPFF, October 29, 2004, Data From Utilities Cap Area**

2. **Floyd-Snider, November 2, 2004, Supplemental Sampling and Analysis Plan, Thea Foss and Osgood-Wheeler Waterways Remediation Project**

3. **Tetra Tech FW, Inc., December 9, 2004, City of Tacoma Pre and Post Dredge Sampling**

4. **KPFF, November 29, 2004, Supplemental Surface Sediment Sample Results**

5. **Tetra Tech FW, Inc., December 10, 2004, Post City Dredge Sampling on Utilities' Property**

6. **Tetra Tech FW, Inc., December 17, 2004, City of Tacoma Core Logging and Sampling (11-24-04, 11-29-04, 12-01-04, and 12-02-04) for the City of Tacoma**

7. **Tetra Tech FW, Inc., December 17, 2004, City of Tacoma Diving Operations on 12-14-04 and 12-15-04**

8. **KPFF, December 17, 2004, Core Sediment Sampling, Utilities Cap Area, South of 70+10**

9. **KPFF, January 7, 2005, Supplemental Surface Samples Collected in Utilities Cap Area**

10. **KPFF, January 10, 2005, Sediment Core Sampling Results for November 22, 2004 (RA20, 21, 22)**

11. **KPFF, January 11, 2005, Supplemental Sediment Surface Sampling – RA19A**

12. **Tetra Tech EC, Inc., June 8, 2005, Observation and Water Quality Report of the City of Tacoma's Remedial Activities Adjacent to the Utilities' Work Area, Head of Thea Foss Remediation, Tacoma, Washington**

[Provided to EPA on CD w/ July 2005 Recontamination Report]

APPENDIX D
LABORATORY DATA SHEETS
UTILITIES' SAMPLE ANALYSES

AUGUST TO DECEMBER 2004

APPENDIX E

Characteristics of Floating Sheen Collected From Thea Foss Waterway on September 17, 2004

By: DMD, Inc. (November 9, 2004)

D.M.D., Inc.
Environmental & Toxicological Services
13706 SW Caster Road, Vashon, WA 98070-7428 (206) 463-6223 fax: (206) 463-4013

MEMORANDUM

TO: Matt Dalton (DOF)

FROM: Raleigh Farlow

DATE: November 9, 2004

RE: Characteristics of Floating Sheen Collected from Thea Foss Waterway on September 17, 2004

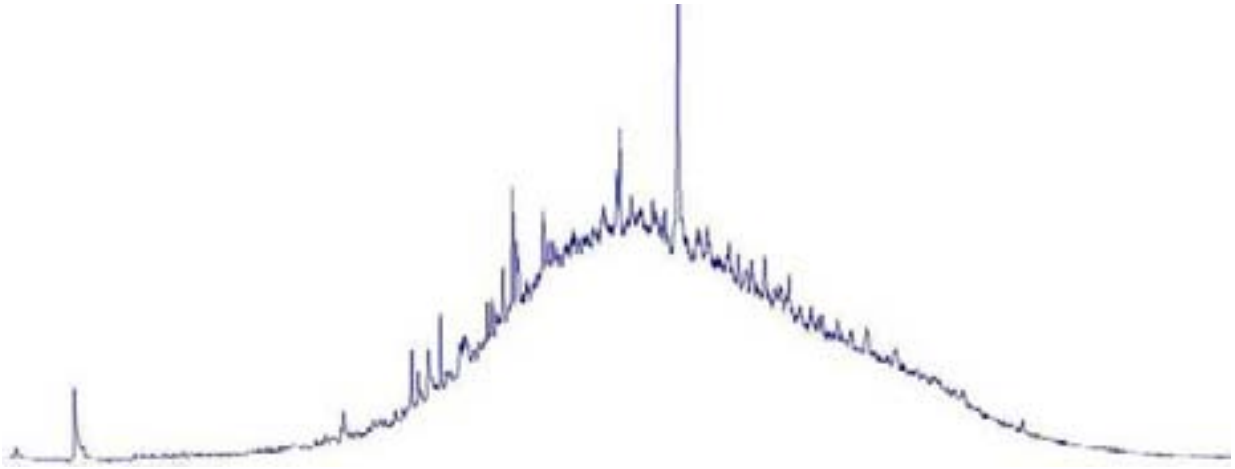
A floating petroleum-like sheen was collected from the surface of the Thea Foss Waterway on September 17, 2004, by TT-Foster Wheeler. The sample was collected with the use of a PTFE (polytetrafluoroethylene or Teflon®) mat or wipe (4-5 wipes) and submitted to Analytical Resources, Inc. (ARI) for the analysis of total petroleum hydrocarbons (WTPH-Dx) and selected SVOCs (PAH, phthalate esters and chlorobenzenes by SW-846 M.8270). Blank PTFE wipes were also submitted for analysis as a field blank. The sample and blank were extracted in methylene chloride/acetone, dried with anhydrous Na_2SO_4, concentrated, and analyzed by GC/MS and GC/FID on 9/30/04 and 10/11/04, respectively.

No target analytes were detected on the field blank, with the exception of a small amount of phenanthrene (22 µg/kg) and low TPH (47 mg diesel-range & 140 mg lube-range) response. The field blank responses were significantly less than the response exhibited by the sheen sample. Concentrations of target analytes were determined and presented normalized to the amount of lube-range hydrocarbons reported on the PTFE wipe samples. Lube-range hydrocarbons were the predominant material found by WTPH-Dx analysis; the diesel-range reported is a consequence of overlap from the lubricant range.

Analytical results for the **sheen** composite are as follows (µg/kg, unless otherwise noted):

Diesel-range TPH	11,000 mg/sample	Di-n-butylphthalate	**26**
Lube-range TPH	26,000 mg/sample	Fluoranthene	**845**
1,3-Dichlorobenzene	19 U	Pyrene	**957**
1,4-Dichlorobenzene	19 U	Butylbenzylphthalate	19 U
1,2-Dichlorobenzene	19 U	Benzo(a)anthracene	**358**
1,2,4-Trichlorobenzene	19 U	*bis*(2-Ethylhexyl)phthalate	**780**
Naphthalene	**44**	Chrysene	**359**
2-Methylnaphthalene	**124**	Di-n-octylphthalate	19 U
Dimethylphthalate	19 U	Benzo(b)fluoranthene	**372**
Acenaphthene	**513**	Benzo(k)fluoranthene	**340**
Dibenzofuran	**60**	Benzo(a)pyrene	**279**
Diethylphthalate	**21**	Indeno(1,2,3-cd)pyrene	**136**
Fluorene	**280**	Dibenz(a,h)anthracene	**48**
Phenanthrene	**986**	Benzo(g,h,i)perylene	**119**
Anthracene	**282**		

The WTPH-Dx GC/FID chromatographic profile is typical of lubricant petroleum hydrocarbons with minimal to no distinguishable diesel profile evident. The GC/FID profile is characteristic of urban-derived organic contamination; exhibiting the C_{24}-C_{38} UCM (unresolved complex mixture or hump in the mid-portion of the chromatogram). GC/MS analysis identifies the composition of the UCM as branched and cyclic alkanes, which is the composition of petroleum hydrocarbon lubricants. The discrete (chromatographically resolved) constituents in the sheen are determined to be phthalate esters, PAH, alkyl-substituted PAH, and branched and cyclic alkanes. The presence of the three phthalate esters (diethyl-, di-n-butyl- and *bis*(2-ethylhexyl)-) also suggests an urban (mixed use) derivation.



Thea Foss Sheen Composite
GC/FID chromatographic profile
collected on PTFE membrane 9/17/04

Comparison of the above GC/FID profile to that for the NAPL associated with the former "SR509 seep" shows little to no similarities. The NAPL profile exhibited discrete (well-resolved peaks) constituents across the entire chromatographic range with individual PAH concentrations in the percent range (normalized to total hydrocarbon mass), and no phthalate esters or UCM present.