Contract No. M1108 • Project No. 3306

September 2009

Results of Year 5 Operations, Maintenance, and Monitoring Plan Sampling

Head of the Thea Foss Waterway Remediation Project

prepared for:

PacifiCorp Environmental Remediation Company

and

Puget Sound Energy

Photo taken by Acqualis Photograpy

prepared by: TETRA TECH EC, INC.

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Prepared for

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ACRONYMS AND ABBREVIATIONS

ARI	Analytical Resources, Inc.
BEHP	bis(2-ethylhexyl)phthalate
City	City of Tacoma
cm	centimeter
Corps	U.S. Army Corps of Engineers
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethylene
DDT	p,p'-Dichlorodiphenyltrichloroethane
DEHP	bis(2-ethylhexyl)phthalate (BEHP)
DOF	Dalton, Olmsted and Fuglevand
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Differences
HDPE	high-density polyethylene
HPAH	high molecular weight polycyclic aromatic hydrocarbon
ICP	Institutional Control Plan
LPAH	low molecular weight polycyclic aromatic hydrocarbon
µg/kg	microgram per kilogram
m	meter
mg/kg	milligram per kilogram
MLLW	mean lower low water
MOA	Memorandum of Agreement
OMMP	Operation, Maintenance, and Monitoring Plan
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PERCo	PacifiCorp Environmental Remediation Company
PSDDA	Puget Sound Dredged Disposal Analysis
PSEP	Puget Sound Estuary Program

ACRONYMS AND ABBREVIATIONS (continued)

QAPP	quality assurance project plan
QC	quality control
RA	Remedial Action Area
ROD	Record of Decision
RSS	Research Support Services, Inc.
SPI	Sediment Profile Imagery
SQO	sediment quality objective
SR	State Route
SVOC	semivolatile organic compound
TtEC	Tetra Tech EC, Inc.
TtFW	Tetra Tech FW, Inc.
Utilities	Advance Ross Subcompany, PacifiCorp, and Puget Sound Energy
WRDA	Water Resources Development Act

1. INTRODUCTION

This report was prepared on behalf of the Advance Ross Sub Company, PacifiCorp, and Puget Sound Energy (the Utilities) and presents the results of Year 5 Operations, Maintenance, and Monitoring Plan (OMMP) observations and sampling for the southern portion of the Thea Foss Waterway. The waterway is part of the Commencement Bay Nearshore/Tideflats Superfund Site in Tacoma, Washington (Figure 1-1). The sampling and analyses were accomplished in accordance with the requirements of the OMMP prepared by Tetra Tech FW, Inc. (TtFW) et al. (2003) with amendments in March and April 2006 (PERCo 2006) and March 2007 (PERCo 2007). The Utilities are responsible for Remedial Action Areas (RAs) 23 and 24 consistent with the Consent Decree and portions of RAs 19b, 20, and 22 as described in a confidential agreement with the City of Tacoma (the City). Portions of the waterway south of a sheet pile wall installed at Station 70+10 are the responsibility of the Utilities; this area is referred to in the remainder of the document as the Utilities' Work Area.

Construction of the remedy for the Utilities' Work Area was completed in February 2004 (DOF 2004a). 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:

- 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 a high-density polyethylene (HDPE) cap over the former location of the State Route (SR) 509 seep.
- Placement of a sand cap over contaminated sediments and over the HDPE cap.
- Placement of slope cap and armor material on waterway slopes.

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

- **Deauthorization of the navigation channel south of 70+10.** This required an act of Congress to achieve deauthorization. This deauthorization request was approved as part of the Water Resources Development Act (WRDA) Bill of 2007.

- **Institutional Control Plan.** On September 29, 2006, EPA provided final approval for the Utilities' Institutional Control Plan (ICP) for the long-term maintenance of the Head of the Waterway. In January 2007, EPA approved the model restrictive covenant language and the City and the Utilities worked on finalizing and recording restrictive covenants for affected properties on the Waterway. In January 2008, the Utilities completed the implementation of the ICP by ensuring that all of the restrictive covenants for affected properties in the Head of the Waterway had been recorded.

- **Consent Decree Milestones**. The Utilities completed remedial action construction in Remedial Action Areas 23 and 24 and received a Certification of Completion of Remedial Action Construction from the EPA on September 29, 2006, in compliance with Paragraph 50 of the Utilities' May 9, 2003, Consent Decree with EPA.

  The next milestone for the project, as set forth in Paragraph 51 of the Consent Decree, is completion of remedial action for RAs 23 and 24. The Utilities submitted the Draft Remedial Action Completion Report to EPA on October 11, 2004; Tetra Tech EC, Inc. (TtEC) received EPA comments on the text on February 15, 2005, and submitted responses on March 21, 2005. EPA indicated that to receive a Certificate of Completion pursuant to Paragraph 51.B, the Utilities must demonstrate that all restrictive covenants have been recorded. With the deauthorization of the Head of the Waterway and the filing of all of the restrictive covenants for properties located in the head of the Waterway, the Utilities fulfilled these lingering requirements and documented these actions in the final Remedial Action Completion Report, submitted on March 20, 2008. EPA reviewed and approved the Utilities final Completion report and provided the Utilities "Certification of Completion of Remedial Action for Remedial Action Areas 23 and 24" on June 24, 2008. This means that, pursuant to Paragraph 83 of the Consent Decree, the Utilities' covenant with respect to future liabilities related to Remedial Action Areas 23 and 24 are now in effect.

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 consisted of dredging and capping to maintain the required navigation depth of –19 feet mean lower low water (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 (RA-20 and RA-22). Dredging by the City's contractor (Manson) in the adjacent remediation areas (RA-20 and RA-22) was completed between August 31 and September 17, 2004. Placement of a grout mat and final cap was completed in RA-19B (also adjacent to the sheet

pile wall) during the previous 2003 to 2004 construction season. Additional cap placement was conducted by the City in December of 2005 in the Utilities' Work Area north of the SR 509 Bridge in the area of the Utilities' cap that was recontaminated during the City's remedial construction activities.

The City completed remedial action construction in the rest of the Waterway (area north of the sheet pile wall) and received a Certification of Completion of Remedial Action Construction from EPA on September 29, 2006.

1.1 PURPOSE AND OBJECTIVES

As part of the remedial design work, the Utilities prepared an OMMP that was approved by EPA (TtFW et al. 2003) and amended in March and April 2006 (PERCo 2006) and March 2007 (PERCo 2007). The City of Tacoma has also been performing supplemental sampling in the head of the Waterway to monitor the impact of the stormwater discharges on sediment (City of Tacoma 2009). 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.

In September 2004, the northern portion of the Utilities' completed cap was recontaminated with construction residuals from adjacent dredging activities being conducted by the City as part of their remedial program. The City addressed the area of recontamination in December 2005 by placing additional capping material on top of the area of concern. As a contingency of its approval, EPA required the City to closely monitor the effectiveness of the cap to ensure its protectiveness. Subsequently, the scope of the Year 3, 4, and 5 OMMP sampling program in the Head of the Waterway was expanded to include additional sampling stations in the area where additional capping material was placed. All activities related to the collection of these samples were coordinated between the City and the Utilities.

Data collected during the Year 1 (2005), Year 2 (2006), Year 3 (2007), and Year 4 (2008) OMMP sampling program confirmed that stormwater discharges are recontaminating the top of the cap. As of May 2006, 7 to 19 centimeters (cm) of very fine-grained sediment had accumulated on top of the southern portion of the Utilities' cap. Constituents detected in the fine-grained sediment are typical of the suite of chemicals normally found in stormwater

and have also been detected in stormwater sediment collected from pipe-end sediment traps prior to discharge to the Thea Foss Waterway.

To further assess the stormwater recontamination issue, the City submitted a supplemental sampling proposal to EPA in November 2006 and January 2009 to monitor concentrations of phthalates and polycyclic aromatic hydrocarbon (PAHs) in the Head of the Waterway. Subsequently, the scopes of the Year 3, Year 4, and Year 5 OMMP sampling programs were expanded to include additional compliance monitoring sampling to evaluate the concentration trends for BEHP and PAHs. In addition, four compliance stations were added to the OMMP sampling program. The City was responsible for coordinating their efforts with the Utilities as part of the Year 3, 4, and 5 OMMP sampling programs.

Commencement Bay
St. Paul Waterway
Middle Waterway
Thea Foss Waterway
Wheeler Osgood Waterway
Downtown Tacoma
Project Area
LOCATION MAP
Puget Sound
Browns Point
Commencement Bay
Vicinity Map Area
Tacoma
0 0.5 1 2
Miles
N
0 0.125 0.25
Miles
Head of Thea Foss Waterway Remediation Project
TETRA TECH EC, INC
FIGURE 1-1
VICINITY MAP

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2. OMMP ACTIVITIES

To meet the OMMP objectives, monitoring of the Utilities Work Area includes physical cap integrity assessment, recolonization monitoring, and compliance and recontamination sampling. Table 2-1 is the schedule for OMMP monitoring as revised in March 2007 (PERCo 2007) and January 2009 (City of Tacoma 2009). Physical observations include periodic visual inspections of the cap and hydrographic surveys. Recolonization includes assessment using Sediment Profile Imagery (SPI) as well as collection of benthic abundance samples. Sediment sampling includes collection of samples for chemical testing. Three types of sediment samples are collected as part of the OMMP:

- **Compliance Samples.** These are surface sediment samples collected from the depth interval of 0 to 10 cm. This is the point of compliance for application of the sediment quality objectives (SQOs).
- **Early-Warning Recontamination Samples.** Early-warning samples are collected to provide warning from possible "top-down" recontamination of the cap from sources such as stormwater. The early-warning samples are collected from depths of 0 to 2 cm from the cap surface. At any given point in time, this sediment represents the newest deposited sediment for the sample location.
- **Core Samples.** Core samples are collected to provide data to evaluate possible future "bottom-up" recontamination of the waterway cap.

In March 2006, the Utilities worked with the City to develop two sampling plan proposals for EPA's consideration. The first plan was developed to monitor the effectiveness of the additional capping material placed in the Head of the Waterway by the City in December 2005 to address contamination associated with the City's dredging operations. The sampling plan modified the existing OMMP for the Utilities' Work Area and increased sampling in the area of recontamination. The second plan was developed in response to SQOs exceedances for bis(2-ethylhexyl)phthalate (BEHP) (also referred to as "DEHP" by the City) in the Head of the Waterway; it outlined a proposed approach for biological testing. The City submitted the proposed plans to EPA on March 23, 2006.

In April 2006, the Utilities and the City worked with EPA and the Corps to adequately respond to EPA and Corps comments on the sampling plans. The Utilities submitted a revised plan for sampling the area of additional cap material placement to EPA on April 28,

2006 (PERCo 2006). The revised plan was approved by EPA on May 4, 2006. EPA approved the March 23, 2006, Biological Testing Sampling Plan on May 1, 2006.

On November 28, 2006, the City submitted a technical memorandum to EPA outlining their proposal for additional sampling in the Head of the Waterway to monitor concentrations of phthalates and PAHs. The proposal was developed in response to the presence of phthalates and PAHs in early warning and compliance samples at concentrations that exceeded their SQOs as part of the Year 2 OMMP sampling event. Biological testing of a subset of the compliance stations in Year 2 confirmed that biological effects were observed in the bioassay test organisms.

On February 12, 2007, EPA and the Corps provided comments on the City's November 28, 2006, technical memorandum. On March 28, 2007, the Utilities, in cooperation with the City, provided a response to the comments provided by EPA and the Corps. The responses were discussed with the agencies in advance and the Utilities and the City received EPA approval of the plan for supplemental sampling April 12, 2007.

On January 27, 2009, the City submitted a technical memorandum to EPA outlining plans to collect and analyze compliance samples (0 to 10 cm) during the Year 5 OMMP sampling for phthalates and PAHs from the head of the Thea Foss monitoring locations as well as four locations from the area of additional cap material placement for a total of 18 samples (City of Tacoma 2009). The proposal was in response to the sampling results from the Year 4 OMMP sampling program indicating that phthalates and PAHs were continuing to recontaminate the Utilities' cap.

The EPA-approved revision to the OMMP monitoring schedule outlines the schedule for physical cap integrity monitoring and recontamination sampling. This revised table replaces Table 2-2 of the OMMP. Monitoring is to be completed on an annual basis for the first 5 years and in years 7 and 10. The specific monitoring tasks vary between years. Monitoring locations are shown in Figure 2-1.

2.1 YEAR 0 OMMP ACTIVITIES

The results of physical observations and sediment sampling completed in the period from February to July 2004 are documented in the Year 0 OMMP report (DOF 2004b). Physical observations were made in May and July 2004 and sediment sampling (surface and core sampling) was completed in April 2004. The April 2004 sampling provides baseline data on the condition of the Utilities' cap soon after the cap was completed in February 2004. Analysis of the April 2004 data indicated that stormwater constituents were accumulating on the Utilities' cap and that concentrations of high molecular weight polycyclic aromatic

hydrocarbons (HPAHs) and BEHP were highly correlated (R=0.99) indicating a common source.

2.2 YEAR 1 ACTIVITIES

In March 2004, EPA requested that the Utilities' make more frequent physical observation of the Utilities' Work Area than anticipated by the EPA-approved OMMP (EPA 2004). Physical observations that were made in May, July, September, and December 2004 and April 2005 are discussed in the Assessment of Utilities' Cap Recontamination and Data Summary (DOF and TtEC 2005). Because of the severe recontamination of the sediment surface on top of the Utilities' cap discovered in September 2004, supplemental sampling was completed that was not part of the Year 1 OMMP monitoring schedule. The physical observations that were made in September and December 2004 and April 2005 as part of EPA's OMMP requirements were also used to assess the sources of sediment recontamination on the cap. Sediment and cap sampling (including both surface and core sampling) was completed in August, September, November, and December 2004. The results of the physical observations and sampling completed between August 2004 and April 2005 are documented in DOF and TtEC (2005) and indicated that the cause of recontamination (primarily north of the SR 509 Bridge) was City remedial construction work largely completed between September and December 2004. Recontamination constituents included PAHs, phthalates, pesticides, and polychlorinated biphenyls (PCBs).

The results of physical observations and sediment sampling completed in May 2005 are documented in the Year 1 OMMP report (DOF 2005). The OMMP monitoring schedule for Year 1 called for visual monitoring of the former SR 509 seep area and collection of top-down, early-warning sediment samples (0 to 2 cm) from the 14 established OMMP sampling locations (RC-01 to RC-14). Physical observation of the former SR 509 seep area was completed on June 22, 2005 and collection of the early-warning sediment samples was completed on May 11 and 12, 2005.

In addition to the samples specified in the Utilities' OMMP, supplemental "compliance" samples (0 to 10 cm) were obtained in the area of recontamination north of the bridge and analyzed by the Utilities and the City. The City also collected sediment samples from their work area in RA-19B, RA-20, and RA-22.

The sampling results indicated that SQOs were exceeded in one or more compliance (0 to 10 cm) samples. They include individual PAHs, total low molecular weight polycyclic aromatic hydrocarbons (LPAHs), total HPAHs, BEHP, 4,4'-dichlorodiphenyldichloroethylene (DDE), 4,4'-dichlorodiphenyldichloroethane (DDD), and

total PCBs. The highest exceedance factors were detected in samples from stations S-15 and WC-11 located near the sheet pile wall. SQO exceedance factors ranged between 1.4 (naphthalene and 4,4'-DDD) and 8.4 (acenaphthene).

Sediment concentrations were higher than the SQOs in one or more early-warning (0 to 2 cm) samples. They include mercury, individual PAHs, total LPAHs, total HPAHs, dimethylphthalate, BEHP, 4,4'-DDD, and total PCBs. The highest exceedance factors were detected in samples from stations RC-01, RC-09, RC-11, and RC-12. SQO exceedance factors ranged between 1.3 (total PCBs) and 6.3 (BEHP).

2.3 POST-CITY REMEDIAL ACTION

Due to recontamination of the Utilities' cap by the City's construction activities, the City placed additional cap material in the northern section of the Head of the Thea Foss in December 2005 (shown in Figure 2-1). Details of the observations made and the confirmation sampling were included in the Year 2 OMMP report (TtEC 2006). In summary, the capping operation went smoothly. The Telebelt was particularly well-suited to deliver discrete volumes of sediment in a controlled manner. Observations made with a leadline and underwater camera during the operation seemed to confirm the desired thicknesses was obtained throughout the entire capping area. Removal of a high spot under the Foss Landing boat lift was necessary and completed on May 26, 2006.

2.4 YEAR 2 ACTIVITIES

The Year 2 monitoring results conducted in May and June of 2006 are documented in the Year 2 OMMP report (TtEC 2006). Year 2 monitoring included making physical observations, conducting recolonization monitoring, and collecting sediment samples in the Head of the Thea Foss Waterway.

The physical cap integrity was assessed with visual observation of the former SR 509 seep area, scour protection apron, and slope cap performed on June 14, 2006. There were no obvious signs of significant erosion besides what was noted in the Year 0 and Year 1 observations.

The assessment of the waterway cap was conducted with a hydrographic survey performed on May 10, 2006. Changes in elevation were noted as compared to the baseline survey conducted in February 2004 at the completion of the remedy. There was an increase in elevation where capping material was placed by the City in December 2005, after the single-beam survey was conducted at the north end of the project area. This high spot was removed in May 2006. There was a decrease in elevation in an area that had capping

material placed a short time prior to the single-beam survey in February 2004. The reduction in elevations in this area is most likely due to consolidation of the deposited sand and gravel capping material and/or the underlying sediment over the last 1.5 years, and is consistent with the consolidation calculations made during design. EPA requested further monitoring in two areas with differences greater than 1 foot as part of the Year 3 OMMP field activities.

The effectiveness of the City's cap and the chemical quality of in-place capping materials with respect to the SQOs performance standards were assessed with collection and analysis of sediment samples collected May 11 through May 18, 2006 as follows:

- Fourteen compliance (0 to 10 cm) samples (WC01 to WC14) with collection of extra material for bioassay testing at 11 stations south of the bridge,
- Four supplemental samples from the area where additional capping material was placed by the City on the north side of the Utilities' work area following recontamination by dredging (S-15, S-17, S-19, and S-24),
- Fourteen early-warning samples (0 to 2 cm) (RC-01 to RC-14),
- Six cores (WC-01, WC-04, WC-05, WC-06, WC-10, and WC-12), and
- Thirteen discrete slope cap locations (0 to 10 cm from fine-grained areas between -1 and +6 MLLW) composited into samples SC-01 to SC-04.

Ecological performance of mitigation/restoration activities were assessed with the collection of:

- Eighteen SPI stations (WC-01 to WC-14 and S-15, S-17, S-19, and S-24), and
- Four benthic infauna stations (R-1 to R-4).

Waterway Cap Samples

A silt layer of light olive color overlying a dark olive, gray to black silt layer was observed at most waterway cap locations. Benthic fauna and flora (i.e., worms, shell fragments and/or kelp) were observed at all waterway cap locations. Oily sheens and sheen spots were noted in the top silt layer at two locations RC/WC-04 and RC/WC-14. The thickness of fine-grained material ranged from 0.5 to 17 cm throughout the waterway cap area. The deposition of fine-grained material was greatest in the central areas south of the SR 509 Bridge and north of the scour protection apron with up to 17 cm of deposition. The compliance sample locations within the City recontamination capping area (RC/WC-11 and

RC/WC-12) had accumulated 1 cm of fine-grained material on top of the cap material placed in December 2005.

All of the waterway cap compliance samples (0 to 10 cm) south of the SR 509 Bridge (11 samples) and the two slope cap composites on the east side of the waterway contained samples with one or more sediment chemistry result exceeding an SQO. SQOs were exceeded in one or more compliance samples south of the bridge for individual PAHs, total HPAH, BEHP, and phenol. BEHP concentrations were higher than the SQO of 1,300 micrograms per kilogram (µg/kg) in all the compliance samples collected south of the bridge in May 2006.

Most of the maximum exceedance factors were detected in the sample from station WC-02 located in the southeast corner of the Head of the Waterway. This is a depositional area from the Twin 96ers and is adjacent to the scour protection apron. SQO exceedance factors ranged between 1.0 (benzo[a]pyrene, total HPAH, and phenanthrene) and 5.9 (BEHP).

All 15 of the early-warning samples (0 to 2 cm) contained BEHP above the SQO of 1,300 µg/kg. Samples collected at RC-01, RC-02, RC-04, and RC-13 contained concentrations of individual PAHs and/or total HPAH that exceeded the SQOs. Consistently, the concentrations of contaminants were higher in the 0 to 2 cm sample than in the 0 to 10 cm sample.

Slope Cap Samples

Slope cap samples have a different depositional pattern and do not accumulate as much silt as the waterway cap sample locations. With the exception of SC-03 and SC-04 for BEHP, contaminants were detected at concentrations well below their respective SQOs in each of the slope cap samples.

Core Samples

Cores consisted of dark olive gray silt overlying coarse sand cap material. The core collected at WC-01B contained 19 cm of silt on top of the sand cap. The bottom increments of each core contained sand cap material with very little fine-grained material. Samples from the top increments of each core were analyzed at the laboratory for chemistry. All six of the core samples contained concentrations of contaminants well below the SQOs.

Toxicity Samples

Based on criteria outlined in the March 23, 2006, Biological Testing Plan, four sampling locations were selected for bioassay testing including locations WC-02, WC-04, WC-05,

and WC-06. Selected samples were subjected to two acute biological effects tests and one chronic biological effects test in accordance with the Utilities' QAPP (TtFW et al. 2003). These tests are used to more directly evaluate the toxicity of contaminated sediments to creatures that live in sediment by exposing sand fleas, mussel larvae and juvenile worms to contamination. Bioassay testing indicated that the sediment contamination had an impact on the mussel larvae in three of the four sampling locations, on the sand fleas in one of the four sampling locations, and no impact on the juvenile worms.

Recolonization

Recolonization is primarily assessed by SPI. While recolonization has definitely taken place, there were several notable findings from this initial SPI monitoring survey. Extensive burrow formations were not seen, and only one image showed evidence of infaunal reworking in the top 5 cm of the cap material at the four northernmost stations located within the City recontamination capping area. It appears that sediment quality in the southern end of the area surveyed is definitely compromised by the nature of material being discharged by the twin outfalls at the southern end of the waterway. While the cap appears to be an effective isolation barrier from upward migration of contaminants, the more recent deposition of organically enriched, fine-grained material has limited the utility of the area as suitable habitat for mature benthic communities and also eliminated the original benefit of placing the "habitat mix" as an attractive surface for fish foraging.

2.5 SUPPLEMENTAL YEAR 2 ACTIVITIES

In addition to the annual visual observation at low tide, two site visits occurred; one on January 2, 2007, and the second on February 23, 2007. Inspections were performed in conjunction with the City of Tacoma's periodic observation of City stormwater outfalls 254, 249, 248, 245, 243, 237a and b, 235, and 230 in the Thea Foss Waterway after the rainfall event on November 6, 2006 that exceeded the 100-year 24-hour design storm. The first visit was conducted on January 2, 2007, during low tide. The purpose of this site visit was to inspect the scour protection apron at the head of the waterway in front of the twin 96-inch outfalls and the outfall scour aprons in front of outfalls 235 and 243 on a negative low tide. Displacement or settlement of armoring materials or adjacent slope capping materials was assessed and documented as required by Section 3.1.2.2 of the Operation, Maintenance, and Monitoring Plan for the Head of the Thea Foss Waterway Project (TtFW et al. 2003). Details of the January 2 observations are included in the memorandum in Appendix A.1 of the Year 2 OMMP report (TtEC 2006).

The scour protection adjacent to outfall 243 (at Station 73+40 on the east side of the waterway under the SR 509 Bridge) showed no signs of erosion. The condition of the scour protection apron at the south end of the waterway (at the base of outfalls 237a and 237b) was similar to what was previously noted in the Year 0, Year 1, and Year 2 low tide site observations: a small, shallow channel is present in the apron near the southeast corner of the waterway. The configuration and shallow depth of this channel appear unchanged from previous observations and the overall integrity of the cap has not been adversely impacted by the presence of this localized feature.

There were signs of displacement or subsidence in the scour protection apron in front of outfall 235 (at Station 73+20 on the west side of the waterway under the SR-509 Bridge). Water from heavy rain in the hours preceding the January 2 site visit was flowing out of this outfall into a relatively deep pool directly in front of the outfall.

A follow-up site visit was conducted on February 23, 2007, during low tide to inspect the outfall scour apron in front of outfall 235 as a follow-up to the January 2, 2007 site visit and quantify the post-construction changes in the scour apron. The small outfall scour protection in front of Outfall 235 has been displaced outward approximately 4 to 5 feet. There is a pool in front of the outfall ranging in depth from 12 inches to 24 inches deep. The pooling and small outfall scour protection material displacement appears to be the result of high velocity discharge or high flows from the outfall. There was no evidence suggesting that the underlying cap is being affected or that the concrete apron has been undermined. It appears that slope protection rock is still in place beneath the pool, covered by a coarse sand and gravel layer. Given the stable appearance of the conditions at the time, it was determined that no corrective action was required. The conditions will continue to be monitored over time. Photos and details of the February 23 site observations are included in the memoranda in Appendix A.2 of the Year 2 OMMP report (TtEC 2006).

2.6 YEAR 3 ACTIVITIES

The Year 3 monitoring results conducted in May of 2007 were documented in the Year 3 OMMP report (TtEC 2007). Year 3 monitoring included making physical observations and collecting sediment samples in the Head of the Thea Foss Waterway.

The visual observation of the scour protection apron and slope cap was conducted on May 16, 2007 and the former SR 509 seep area on May 16 and 17, 2007. An additional follow-up site visit for evaluating the condition of scour protection aprons was made January 22, 2008 with representatives from the City of Tacoma. The physical and visual observations indicated that the scour protection apron was functioning as intended. There were no

obvious signs of significant erosion occurring. Visual observations during low tides of the former SR 509 seep area indicated the impermeable cap is preventing the upward migration of tar that would cause visual sheens.

The Utilities also collected qualitative core samples at two locations to verify the thickness of the sand cap. This work was conducted at the request of EPA and the Corps because a comparison of the bathymetry between Year 0 and Year 2 had indicated that there had been a greater than one foot change in cap elevation. One core was located on the west bank near Outfall 235; the other core was located in the central basin. It was determined that the difference in elevation was likely due to consolidation or uncertainty during bathymetry techniques rather than erosion, and the minimum 3 foot cap thickness was maintained.

The effectiveness of the City's cap and the chemical quality of in-place capping material with respect to the SQOs performance standards were assessed with collection and analysis of two types of sediment samples, early warning recontamination samples (0-2 cm) collected on behalf of the Utilities, and compliance samples (0 to 10 cm) collected on behalf of the City. The Utilities and the City coordinated the Year 3 OMMP sampling requirements and a single sampling event was conducted from May 16, 2007, through May 17, 2007. All laboratory analysis was performed by Analytical Resources, Incorporated (ARI). The Utilities received the early warning sampling results from ARI on June 8, 2007, and the data was independently validated. The Utilities transmitted the validated early warning results to the City on July 5, 2007. The City conducted a quality assurance review of the compliance samples and transmitted the data to the Utilities on July 10, 2007. The Utilities did not conduct an independent quality assurance review of the compliance data received from the City. The City submitted a separate report of the compliance data to EPA (City of Tacoma 2008).

Waterway Cap Compliance Samples

Compliance samples were collected during the Year 3 OMMP for two reasons: to monitor the area of additional capping material (area north of the SR 509 Bridge), and to evaluate BEHP and PAH trends in the area beneath and south of the SR 509 Bridge.

These compliance samples generally consisted of olive black silt over either sand or gravel. The portion of silt versus sand or gravel in the samples varied depending on the thickness of the accumulated fine-grained deposits. A silt layer of light olive color overlying a dark olive, gray to black silt layer was observed at most locations.

Area North of the Bridge

The City was responsible for collecting seven samples from the area where additional capping material was placed by the City in December 2005 (OMMP locations /WC-10, WC-11, WC-12, and supplemental locations S-15, S-17, S-19, and S-24). Oily sheens and sheen spots were noted in the top silt layer at RC/WC-11 only. The thickness of fine-grained material ranged from 1 cm to 4 cm overlying coarse sand cap material.

The samples were analyzed for TOC, metals, SVOCs, DDT compounds, and PCB Aroclors. None of the samples contained contaminants at concentrations that exceeded their SQOs.

Area South of the Bridge

Eleven samples consisting of the top 0 to 10 cm were collected at OMMP locations in the waterway cap beneath and south of the SR 509 Bridge (WC-01 to WC-09 and WC-13 and WC-14). Oily sheens and sheen spots were noted in the top silt layer at two locations RC/WC-01 and RC/WC-08. The thickness of fine-grained material ranged from 7 cm to greater than 13 cm throughout the waterway cap area. The deposition of fine-grained material was greatest in the central areas south of the SR 509 Bridge and north of the scour protection apron with 13 cm or more of deposition.

The waterway cap compliance sample locations beneath and south of the SR 509 Bridge were analyzed for TOC and selected semivolatile organic compounds (SVOCs) (PAHs, phthalates, and phenols). BEHP concentrations were higher than the SQO of 1,300 g/kg in all the compliance samples collected south of the bridge in May 2007, ranging between approximately 2,000 µg/kg to 4,900 µg/kg. The highest BEHP concentration (4,900 µg/kg) and highest HPAH concentration (20,000 µg/kg) were co-located at station WC-02. This is a depositional area adjacent to the scour protection apron from the Twin 96ers.

Compliance sample concentrations of BEHP and HPAH south of the SR 509 Bridge appear to have generally declined between 2006 and 2007. The average concentration of BEHP declined from approximately 3,600 µg/kg to 2,700 µg/kg, whereas the average concentration of HPAH declined from approximately 9,700 µg/kg to 7,800 µg/kg. The highest exceedance factors were detected in the sample from station WC-02 with SQO exceedance factors ranging between 1.0 (benzo[a]anthracene) and 3.8 (BEHP).

Early-Warning Samples

Early-warning samples (0 to 2 cm) physical description were the same as for the waterway cap compliance samples. The fine grained sediment continues to accumulate on the top of the cap from the stormwater outfalls.

The early-warning samples were analyzed for TOC, TPH, metals, PCBs, PAHs, and BEHP. Consistently, the concentrations of contaminants were higher in the 0 to 2 cm sample than in the 0 to 10 cm sample. All 14 of the early-warning samples (0 to 2 cm), including the samples collected from the area north of the bridge where the additional capping material was placed, contained BEHP concentrations above the SQO of 1,300 g/kg. Samples collected at RC-01, RC-02, RC-08, RC-13, and RC-14 contained concentrations of individual PAHs and/or total HPAH that exceeded the SQOs.

2.7 YEAR 4 ACTIVITIES

The Year 4 monitoring results conducted in May of 2008 are documented in the Year 4 OMMP report (TtEC 2008). Year 4 monitoring included making physical observations, conducting recolonization monitoring, and collecting sediment samples in the Head of the Thea Foss Waterway.

Physical observations for Year 4 OMMP monitoring included a visual inspection of the cap and shorelines at low tide and a hydrographic survey. The visual inspection of the physical cap integrity was performed on May 7, 2008 during a predicted low tide of -3.7 feet MLLW. In general, no obvious signs of significant erosion were observed. The scour protection was functioning as intended and the scour protection adjacent to Outfall 235 had shown no further signs of erosion or displacement beyond what was noted during the Year 3 OMMP site visit. The wing walls of Outfall 235 were observed to be separating from the head wall, which has continued to be monitored.

The hydrographic survey performed on August 7, 2008 revealed the sediment cap was relatively stable when compared with the Year 2 OMMP May 2006 survey. At the south end of the waterway, some erosion on the scour protection apron sill was occurring likely due to the flow from the Twin 96ers outfalls. The material appeared to be depositing in a mound just below the sill. Additional areas of lower elevation and possible erosion were observed in the vicinity of the marina north of the SR 509 Bridge and in the area below the sheet pile wall at the north end of the waterway. Other slight variations in the bottom of the topography were observed, which was likely due to varying water flows and/or vessel prop wash. The results of the hydrographic survey indicated that the minimum cap thickness performance criterion provided for in the OMMP was in compliance.

The effectiveness of the City's cap and the chemical quality of in-place capping materials with respect to the SQOs performance standards were assessed on May 5 through May 8, 2008 with the collection and analysis of four types of sediment samples: waterway cap compliance and supplemental (0 to 10 cm) samples, early-warning (0 to 2 cm) samples,

cores samples, and slope cap composite (0 to 10 cm) samples. Ecological performance of mitigation/restoration activities were also assessed by SPI and benthic infauna samples.

Compliance Samples

Compliance samples included waterway cap compliance samples, supplemental samples, and slope cap composite samples that were collected during the Year 4 OMMP to monitor the area of additional capping material (area north of the SR 509 Bridge) and to evaluate BEHP and PAH trends in the area beneath and south of the SR 509 Bridge.

Area North of the Bridge

Compliance samples collected from the area north of the SR 509 Bridge generally consisted of 1 to 7 cm dark gray to black silt overlying sand cap material. Deposition of fine-grained material had increased at locations S-15, S-17, and S-19 from Year 2. Oily fuel-like sheen spots were noted on the water at locations S-15, S-17, S-19, and RC/WC-11 in the vicinity of the Foss Landing Marina docks. Benthic fauna and flora were not observed at locations RC/WC-11, RC/WC-12, and S-24. The resulting low average of percent fines indicated the samples consisted primarily of cap material.

The percentage of fines ranged from 4.6% to 35.4%, averaging 18% fines, which was an increase in fines content from both the Year 2 and Year 3 averages of 6.7% and 5.9% for the same suite of samples. The increase in deposition at stations RC/WC-10 and S-19 was perhaps due to the moored vessels from Foss Landing Marina and associated prop wash.

Five of the seven compliance samples collected contained BEHP at concentrations exceeding the SQO of 1,300 µg/kg with exceedance factors (EFs) ranging from 1.2 to 2.7. The SQO for mercury was exceeded at one location, WC-11, with a concentration of 1.65 mg/kg and a 2.8 EF.

The slope cap composite samples collected from the area north of the SR 509 Bridge consisted of less than 1 to 5 cm light to dark brown silt overlying gray to black silt intermixed with cobbles, pebbles, and sand cap material. The percent fines ranged from 2 to 24.8 % indicating the samples consisted primarily of capping material. The samples from location SC-04 exceeded the BEHP SQO resulting in a concentration of 2,400 µg/kg and 1.8 EF.

Area South of the Bridge

Compliance samples collected at OMMP locations in the waterway cap beneath and south of the SR 509 Bridge consisted of a range between 8 to 18 cm of dark brown/gray to black silt over silty sand or sand. Oily fuel-like sheen spots were noted on the overlying water of

two waterway cap compliance locations (RC/WC-02 and RC/WC-05) and on the homogenized sample of WC-05. Benthic fauna and flora were observed at most locations.

The deposition of material over the cap material was greatest in the central areas just south of the SR 509 Bridge and north of the scour protection apron; the greatest measured deposition was at location WC-14. The percent fines ranged from 17.4% to 54.9%, averaging 39.8%. The high percentage of fines indicated sedimentation occurring south of the bridge.

BEHP concentrations were higher than the SQO (1,300 µg/kg) in all compliance samples except for location WC-03 (1,200 µg/kg). Individual PAHs and total HPAH SQOs were exceeded at locations WC-01, WC-02, and WC-07.

Slope cap composite samples collected south of the SR 509 Bridge measured from 1 to 11 cm of material deposited over the cap. The deposited material generally consisted of light to dark brown silt overlying gray to black silt intermixed with cobbles, pebbles, and sand cap material. Benthic fauna and flora were observed throughout their locations. The percent fines ranged from 16.2 %, which indicates the sample was primarily capping material, to 36.1 % at location SC-03, which indicated greater deposition had occurred. Sample location SC-03 exceeded the BEHP SQO with a concentration of 14,000 µg/kg and a 10.8 EF, the maximum EF for May 2008 sampling.

An additional slope cap sample, Y4-SS-01, was collected from the area in the vicinity of SC-01A. The sample was collected in response to orange discoloration observed on the habitat mix of the northwest slope cap beneath the SR 509 Bridge. The thickness of fine-grained material amounted to 1 cm black silt over dark gray to black silt mixed with cobbles. Mussels, barnacles, and shells were observed at the location. There were 17 % fines content at the location. The sample exceeded the SQO for BEHP with a concentration of 7,900 µg/kg and 6.1 EF.

Recontamination Samples

Recontamination samples included early warning (0 to 2 cm) samples as well as the bottom-up core samples.

Early-Warning Samples South of the Bridge

Early-warning (0 to 2 cm) samples beneath and south of the SR 509 Bridge consisted of 2 to 18 cm of dark brown to gray, to black silt. An oil spot was observed on the homogenized sample of RC-13 south of the bridge. All early-warning samples south of the SR 509 Bridge exceeded the SQO for BEHP. BEHP concentrations ranged from 2,100 µg/kg (1.6

EF) at to 8,000 µg/kg (6.2 EF). The SQO for zinc (410 mg/kg) was exceeded at RC-02 with a concentration of 452 mg/kg (1.1 EF). Individual PAHs and/or total HPAH exceeded their SQOs at six locations.

Early-Warning Samples North of the Bridge

Early-warning (0 to 2 cm) samples north of the SR 509 Bridge consisted of 1 to 7 cm of dark brown to gray, to black silt. The greatest percentage of fines content was reported north of the bridge along the eastern shoreline by Foss Landing Marina at location RC-11 with 77.1 % fines.

All early-warning samples north of the bridge contained BEHP concentrations above the SQO. BEHP concentrations ranged from 2,500 µg/kg (1.9 EF) to 10,000 µg/kg (7.7 EF). North of the bridge samples included individual PAHs and/or total HPAH SQOs exceedances.

In general, the concentrations of contaminants in the early-warning samples were higher than in the compliance samples for Year 4 sampling. BEHP and HPAH concentrations for early warning samples were 4.5 times higher than in compliance samples, which was likely due to the early warning samples consisting of 3.5 times higher percent of fines content than compliance samples.

Core Samples

The cores consisted of brown silt to silty sand overlying olive gray medium to coarse poorly graded sand cap material. At core locations RC/WC-04 and RC/WC-10 a distinct color change from dark gray to black was observed in the bottom increments of the sand cap. The minimum cap thickness of three feet was present within the Utilities Work area, and at most core locations, the actual cap thickness appeared to be thicker than three feet. The percentage of fines content ranged from 0.3% to 4%, indicating very little fine-grained material present.

All analyzed core intervals contained concentrations well below the SQOs. At location WC-06, low concentrations of PAHs (HPAHs at 786 ug/kg) were detected in the bottom interval of core. The likely source of PAHs was due to the core's overpenetration into the underlying contaminated sediment that lies beneath the sand cap. PAHs and BEHP were not detected in the next higher interval sample collected from the WC-06 core location.

Recolonization

Recolonization was primarily assessed by SPI. The Year 4 SPI survey results were evaluated and compared with the initial SPI survey from Year 2 OMMP in May 2006. Overall, the benthic community showed mostly positive changes between 2006 and 2008; however, the stormwater outfall inputs continued to deposit organically enriched, fine-grained material into the waterway, which is a source of stress to the benthic community because the deposited material maintains a high sediment oxygen demand, specifically at areas where fine-grained material is accumulating.

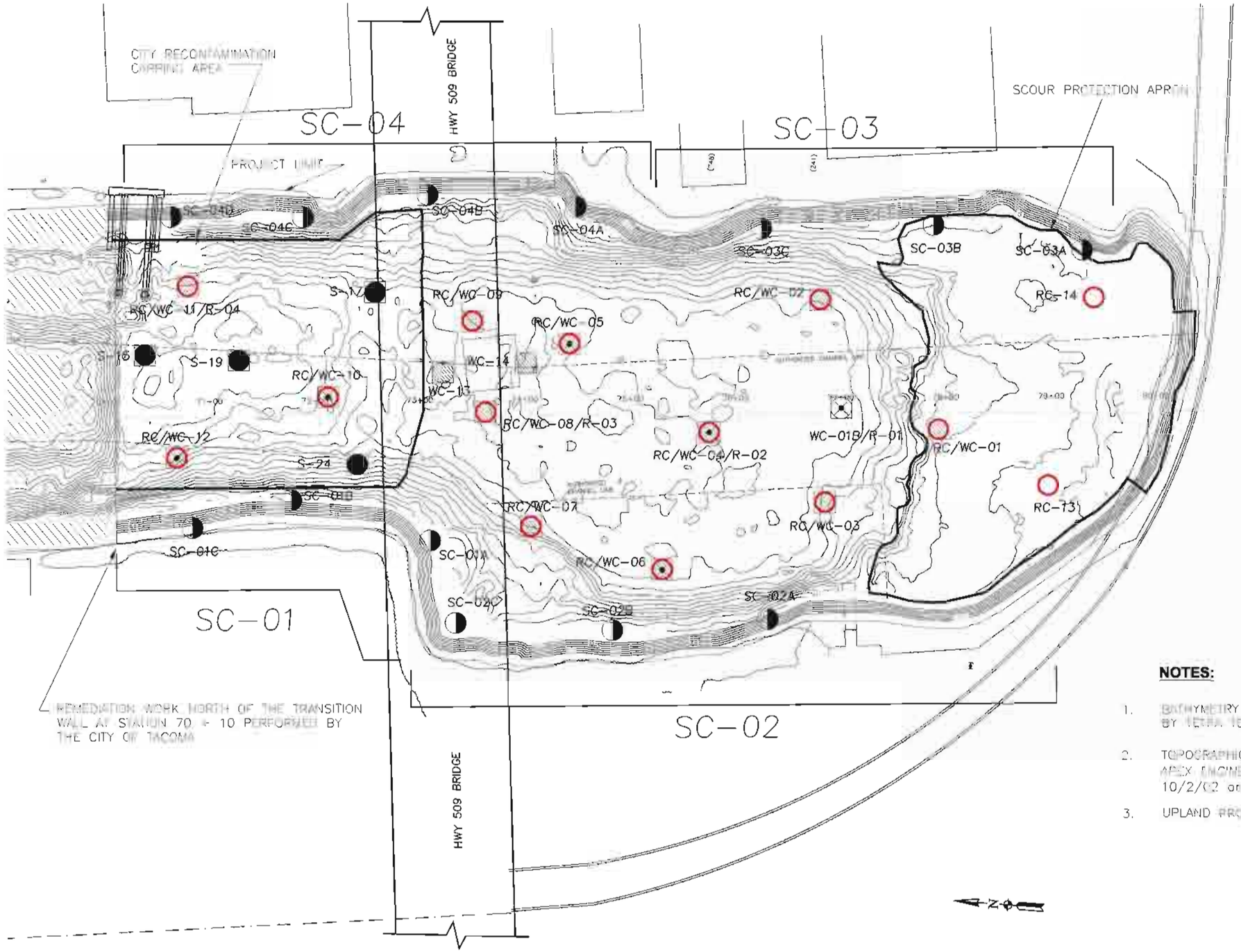
Benthos

Benthic infauna community samples were collected at four locations and were archived for potential future analysis.

Table 2-1. OMMP Schedule (Revised March 2007 and January 2009)

	Year 0[2,6]	Year 1[6]	Year 2[3,6]	Year 3[6]	Year 4[6]	Year 5[6]	Year 6[6]	Year 7[4,6]	Year 8[6]	Year 9[6]	Year 10[6]
Assumed Sediment Deposition											
Amount (cm)[1]	0	1.5	3	4.5	6	7.5	9	10.5	12	13.5	15
MONITORING TASK											
Physical Cap Integrity	x		x		x			x			x
Recontamination Sampling											
Compliance Sampling (0-10 cm)	x		X[7]	X[8]	X[7,9]	X[10]		x			x
"Top Down" (0-2 cm)	x	x	x	x	x	X		x			x
"Bottom Up" Migration (0-3 ft)	x		x		x			x			x
"Visual" SR509 Seep Monitoring [5]		x	x	x	x	X		x			x
Recolonization Monitoring			x		x			x			x

[1] Work completed by Hart Crowser suggest a sediment deposition rate of 1 to 2 cm/year.
[2] Completed soon after cap placement as part of CQAP and OMMP.
[3] First 5-year review (Based on EPS's review cycle). Adjust monitoring schedule based on first 5 years of data.
[4] Second 5-year review
[5] To be completed during daylight low tides (June/July)
[6] Significant natural events may trigger additional monitoring activity. These events include a 50-year 24-hour storm event, one percent flood discharge (commonly called the 100-year flood event) or greater, or the occurrence of a design level seismic event (i.e., 4.5 magnitude or greater)
[7] Samples will be collected and analyzed from four additional locations (i.e., S-15, S-17, S-19, and S-24) within the area of additional cap material placement during Year 2 and Year 4 monitoring. The additional samples from Stations S-15, S-17, S-19, and S-24 are in addition to the three samples that are to be collected from the existing sample stations (i.e. WC-10, WC-11, and WC-12) within the area of additional cap material placement. Results from the four additional sample locations together with three existing sample locations will be used to monitor the effectiveness of the additional cap material placement.
[8] EPA directed the City to collect compliance monitoring samples from the 14 existing sample locations (WC01-WC14) as well as four additional locations (i.e., S-15, S-17, S-19, and S-24) during Year 3 monitoring.
[9] The results from compliance sampling and analysis within the area of additional cap material placement during Year 2, 3, and 4 will be used to evaluate whether sample collection and analysis from the additional locations (i.e., footnote g) or additional monitoring events (i.e., footnote h) are warranted during subsequent monitoring years.
[10] As outlined in the letter dated January 27, 2009, the City proposed to collect compliance monitoring samples from the 14 existing sample locations (WC01-WC14) and in the area of the additional cap placement material (S-15, S-17, S-19, and S-24) during the Year 5 monitoring.



LEGEND:

- MAJOR CONTOUR LINES
- CITY OF TACOMA WORK AREA
- RC "EARLY WARNING – TOP DOWN SAMPLE" (0–2cm)
- SC SLOPE COMPLIANCE COMPOSITE (0–10cm)
- WC WATERWAY CAP COMPLIANCE SAMPLE (0–10 cm)
- WC EARLY WARNING SUBSURFACE CORE
- SPI SAMPLE
- SUPPLEMENTAL SAMPLE LOCATION

RC	RECONTAMINATION
WC	WATER CAP
SC	SLOPE CAP
R	RECOLONIZATION (BENTHIC INFAUNA)
SPI	SEDIMENT PROFILE IMAGERY

NOTES:

1. BATHYMETRY SURVEY UP TO ELEVATION +5 MLLW COMPLETED BY TETRA TECH EC ON MAY 10, 2006
2. TOPOGRAPHIC DATA SHOWN ABOVE +5 MLLW WAS PROVIDED BY APEX ENGINEERING LLC, DATED 2/7/02, 3/8/02, 5/16/02, 10/2/02 and 10/12/02.
3. UPLAND PROJECT LIMIT IS +12 FEET MLLW.

GRAPHIC SCALE
50' 0 25' 50' 100'
(IN FEET)

Thea Foss Waterway

Head of The Thea Foss Waterway
Post-Construction Monitoring

TETRA TECH EC, INC.

Figure 2-1
OMMP Monitoring Location Plan
May 2009

P:\2562_Thea Foss\OMMP\Year 5\CAD\DWGs\FOSSFIGURE2-1.DWG
PLOT: JUN 01 2009 12:32:25

3. PHYSICAL OBSERVATIONS

Physical observations for Year 5 OMMP monitoring included a visual inspection of the cap and shorelines at low tide. The purpose of the physical observations was to assess the cap integrity. The visual inspection assessed the slope cap and outfall scour cap protection.

3.1 VISUAL INSPECTION

During Year 5 of the OMMP, a visual inspection of the cap was made on April 13, 2009 and July 9, 2009 during low tide events. This visual cap inspection discussion refers to the most recent, July 2009, site visit. The July 9, 2009 visual cap inspection was made during a predicted low tide of -1.2 feet MLLW. A supplemental site visit was made on July 21, 2009 to verify that the newly installed kayak floats were not resting on the slope cap during an extreme low tide event; during the visit, the tide varied between -3.1 feet MLLW to -2.5 feet MLLW. The physical observations from April and July 2009 site visits are documented in Appendix A. Overall, the Year 5 cap observations were similar to previous site visits that indicated the following:

- The scour protection apron is functioning as intended. No obvious signs of significant erosion were observed. As previously noted in the Year 0, 1, 2, 3, and 4 physical observations, there is a small, shallow channel present in the apron near the southeast corner of the waterway. The configuration and shallow depth of this channel appear unchanged from previous observations and the overall integrity of the cap has not been adversely impacted by the presence of this localized feature.
- Side slopes show no visible evidence of slope erosion, sloughing, etc.
- Gas bubbles were observed throughout the head of the waterway and in the vicinity of the former SR-509 seep area during the site visit; however, no rising non-aqueous phase liquid sheens were observed in the former SR 509 seep area or elsewhere in the Utilities' Work Area during the Year 5 field investigation and cap inspection activities on April 13, May 26, and July 9, 2009.
- The scour protection adjacent to Outfall 243 (at Station 73+40 on the east side of the waterway under the SR-509 Bridge) shows no further signs of erosion or displacement. The Tideflex™ valve at the end of Outfall 243, which was extensively covered with barnacles and mussels at the time of the Year 4 observations, did not appear to have been cleaned. There is a very small pool about 6" deep and 18-24" in diameter in front of Outfall 243.

- The scour protection adjacent to Outfall 235 (at Station 73+20 on the west side of the waterway under the SR-509 bridge) shows no further signs of erosion or displacement beyond what was noted during Year 3 and Year 4 OMMP site visit. However, there appears to be some intentional displacement of outfall scour material directly in front of the outfall to make a pool with a sandy bottom, possibly for bathing as there is evidence of displaced persons living in the immediate area. Previously, TtEC recommended monitoring the area around Outfall 235 during annual OMMP for further changes in pool depth or small outfall scour protection material displacement. Based on current site conditions, repairs to this area are now recommended to restore the outfall scour protection to ensure the integrity of the underlying slope cap. Displaced scour protection material could be restored to its original configuration by manual movement of scour protection materials.
- At Outfall 235, both wing walls are separating from the Outfall 235 head wall. The City of Tacoma installed PK nails on the north and south ends of the top of the headwall and on the west ends of the north and south wing walls to enable monitoring of any movement between the headwall and the wing walls. The PK nail on the south end of the head wall, which was missing, has been replaced. The separation between the head wall and the south wing wall is greater than the separation between the head wall and the north wing wall and the distances between the sets of PK nails are approximately 9 3/8 inches and 7 ½ inches respectively, the same distances measured during Year 4 observations. Some loss of habitat mix material from slopes adjacent to the wing walls through the cracks in the wing walls was observed. The slope cap adjacent to the south wing wall is beginning to slough. The intentional displacement of outfall scour material directly in front of the Outfall 235 is believed to be contributing to this sloughing. The separation distances between the Outfall 235 head wall and wing walls should continue to be monitored during annual OMMP for further changes in separation distances. In addition, TtEC recommends that the slope areas adjacent to Outfall 235 be restored using materials similar to those originally specified for slope cap armor.

- The new kayak float and the associated anchor pad for the ramp to connect to the float were installed on the east side of the Waterway just south of the SR-509 Bridge. The eastern most end of the float was out of the water and not resting on the slope cap during the low tide event. The ramp connecting the anchor pad to the float was scheduled to be installed during the high tide event on July 21, 2009, which was not observed by TtEC. TtEC revisited the site on August 18, 2009 to inspect the slopes adjacent to the new ramp at a minus low tide event to ensure that the slope cap adjacent to the ramp was not disturbed during the placement of the ramp. No

evidence of slope disturbance was observed during the visit and no issues related to the ramp were noted. The gate at the top of the ramp was locked and it did not appear that the ramp and associated kayak dock was open for use.

- The new park on the west side of the waterway (Former Standard Chemical site) was being landscaped during the site visit. The associated parking lot and restroom facilities have been completed. In the parking area, there is a new curb stormwater inlet with an integrated treatment system which discharges through Outfall 235.

3.2 WATERWAY CAP INSPECTION

The Year 5 OMMP schedule did not include a hydrographic survey or core sampling activities. The results from the Year 4 hydrographic survey and collected core samples indicated that the minimum cap thickness performance criterion was being met as provided for in the OMMP; therefore, no further evaluation or remediation was warranted for Year 5 activities.

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4. SEDIMENT SAMPLES

TtEC collected 14 early warning (RC; 0 to 2 cm deep) surface sediment samples from OMMP locations (RC-01 through RC -12, RC-13, and RC-14) on behalf of the Utilities plus one field duplicate sample at location WC-02. Floyd Snider collected 14 waterway compliance (WC; 0 to 10 cm deep) surface sediment samples from OMMP locations (WC-01 through WC-12, WC-13, and WC-14), and four supplemental locations (S-15, S-17, S-19, and S-24) on behalf of the City plus one field duplicate sample at location WC-06. OMMP monitoring locations are shown in Figure 2-1.

Summary of Year 5 OMMP Samples

Sample Type	Samples Collected and Analyzed for Partial SQO list on Behalf of the Utilities[1/]	Samples Collected and Analyzed for Partial SQO list on Behalf of the City of Tacoma [2/]
Early Warning or "Top-Down" (RC; 0 to 2 cm grab)	14	--
Waterway Cap Compliance (WC; 0-10 cm grab)	--	14
Supplemental City Cap Area (0 to 10 cm grabs)	--	4

[1/] Partial SVOCs (PAHs and BEHP), metals (mercury, zinc, lead), PCBs, TPH Diesel and motor oil, total organic carbon, total solids, and grain size.
[2/] Partial SVOCs (PAHs, BEHP, and phthalates), total organic carbon, and total solids.

4.1 SAMPLING AND ANALYSIS

In all, 34 surface sediment samples were collected as part of the Year 5 OMMP sampling, including quality control (QC) samples. TtEC collected 15 (0 to 2 cm) surface sediment samples, which were hand delivered to ARI for analysis by Katrina Conlon of TtEC on behalf of the Utilities. Jessi Massingale and Amanda McKay of Floyd Snider collected 19 (0 to 10 cm) surface sediment samples on behalf of the City, which were analyzed by ARI.

4.1.1 Field Methods

Surface sediment sampling was conducted from a vessel using a stainless-steel Pneumatic Power grab sampler for the early-warning and compliance samples. The Pneumatic Power grab sampler retrieved relatively undisturbed sediment samples representative of in situ sediment conditions. The sampler and vessel were provided and operated by Research Support Services, Inc. (RSS).

Surface sediment was collected following Puget Sound Estuary Program (PSEP)/Puget Sound Dredged Disposal Analysis (PSDDA) procedures, including collecting sediment from the center of the sampler, avoiding material that touched the sampler sides, and

homogenizing each sample in a stainless-steel bowl using a stainless-steel spoon. Samples at RC/WC-01, RC-13, and RC-14 were collected by hand at low tide using stainless-steel bowls and spoons following PSEP procedures. Sampling equipment was provided by TtEC and was decontaminated in the field. A separate set of decontaminated sampling equipment (i.e., stainless-steel bowls and spoons) was used at each location. The grab sampler was decontaminated before and after each sample location with Alconox®, site water, and distilled water rinse. Samples were collected from the homogenized sediment in the stainless-steel bowl.

Sample information was recorded for each sample on log sheets, included in Appendix B. Sample collection data and sediment descriptions are summarized in Appendix C.

Early-warning (0 to 2 cm) samples were collected at 14 OMMP locations (RC-01 through RC-12, RC-13 and RC-14). Waterway cap compliance samples (0 to 10 cm) were collected at 14 OMMP locations (WC-01 through WC-12, WC-13 and WC-14) and at four supplemental locations in the area where additional capping material was placed by the City (S-15, S-17, S-19, and S-24) (shown in Figure 2-1).

Digital pictures were taken during field efforts of sampling and collection procedures. Pictures and the photo log are included on a CD contained in Appendix B.1.

To verify the performance of field sampling activities, QC samples were collected for laboratory analysis. Field QC sampling (field duplicates) and rinsate blanks were collected to check sampling and analytical accuracy and precision. A total of two field duplicate samples were collected at location RC-02 for the early-warning samples and location WC-06 for the compliance and supplemental samples. Field duplicates were sampled from the same stainless-steel bowl as the original sample. Field duplicates were collected at the required frequency of 1 per 20 samples. Two rinsate blank samples were collected to represent collection of the early warning samples and the compliance/supplemental samples.

4.1.2 Chemistry Analysis

All chemical analyses were conducted at ARI. Analyses for early warning samples collected on behalf of the Utilities included a partial list of semivolatile organic compounds, (i.e., partial list included PAHs and BEHP only), metals (lead, zinc, and mercury), PCBs, total organic carbon, total petroleum hydrocarbons, total solids, and grain size. Analyses for compliance and supplemental samples collected on behalf of the City included a partial list of semivolatile organic compounds (i.e., partial list included PAHs, BEHP, and

phthalates), total solids, and total organic carbon. The City's validated chemistry data for these samples were received on July 21, 2009 and incorporated into the Utilities' database.

4.1.3 Data Validation of Chemistry Results

Raleigh Farlow of DMD, Inc. validated the Utilities' chemistry data results from ARI. The validation report is included in Appendix D. This analytical/validation team has been responsible for the sediment analyses since implementation of the Utilities' OMMP in April 2004. Consistent analytical protocols and the same instruments have been used from April 2004 to the present. For the May 2009 OMMP analyses, DMD completed the equivalent of a QA-1 review.

Sample results reported in Appendices D and E are determined to be in general compliance with method and quality assurance project plan (QAPP) requirements. Some deviations from specified performance goals are associated with matrix effects from contaminated samples. Sample extracts/digestates were rerun and reanalyzed when QC performance goals were not initially met. Continuing deviations in subsequent analyses were identified and flagged, generally resulting in identifying associated values as estimates with the "J" qualifier code. All reported data for Year 5 OMMP results listed in Appendices D and E are considered usable for the intended purposes of the project. The laboratory data reports are provided in Appendix F.

Data validation of the compliance and supplemental samples collected on behalf of the City were performed by City of Tacoma personnel. The results of the City's validation process are included in the report prepared by the City and are not repeated here. The City's data are included in this report for completeness.

BEHP concentrations from compliance sample results provided by the City were flagged with a "B" qualifier indicating the analyte was detected in the method blank.

4.2 SEDIMENT SAMPLE DESCRIPTIONS

Visual inspection of surface samples indicates that fine-grained material has been deposited on top of the Utilities' cap since completion of remedial construction. Note, the Utilities report the measured thickness of fine-grained material (consisting of silt to sandy silt) deposited over the cap at each sample location. Alternatively, the City's measurement reports only the "silt thickness" deposited over the cap. Appendix C summarizes the locations and descriptions for each grab sample collected.

Representative photos are included in Appendix B.2 (on CD). A representative photo is not available for the sample location RC/WC-14.

4.2.1 Compliance Samples

Compliance samples include the top 0 to 10 cm surface sediment from all waterway cap compliance (WC) locations and supplemental (S) locations from the area of additional capping.

Compliance samples were collected to monitor the area of additional capping material north of SR 509 Bridge and to evaluate contaminant concentration trends in the areas beneath and south of the SR 509 Bridge. Year 5 compliance samples were not analyzed for grain size by the City; as a result, a comparison of the percent fines in the compliance samples is not available.

Area South of the Bridge

Eleven samples consisting of the top 0 to 10 cm of sediment were collected at OMMP locations beneath and south of the SR 509 Bridge (RC/WC-01 to RC/WC-09, WC-13, and WC-14). The compliance samples generally consisted of dark brown/gray to black silt over silty sand or sand (see Appendix B.2 Sample Photos and Appendix C Sediment Descriptions). The portion of silt versus silty sand or sand in the samples varied depending on the thickness of the accumulated deposits. A RPD silt layer of dark olive gray to dark brown color overlying a dark gray to black silt layer was observed at most locations. Benthic fauna and flora (i.e., crabs, clams, shrimp, worms, shell fragments and/or kelp) were observed at most locations.

Descriptions and thickness of material deposited over the cap were documented on each of the log sheets included in Appendix B.1 and summarized in Appendix C. One oily fuel-like sheen spot was noted on the overlying water at location WC-14; two iridescent sheen spots were observed on the sediment surface of grabs RC/WC-05 and RC/WC-08. The thickness of material deposited over the cap ranged from 3 cm to 23 cm throughout the waterway cap area beneath and south of the bridge (Figure 4-1). Generally, the deposited material consisted of silt, and then transitioned to a zone of silty sand above the cap material. The deposition of material over the cap was greatest within the eastern portion of the turning basin area north of the scour protection apron where, at location RC/WC-02, deposition material measured the full penetration of the grab at 23 cm; cap material was not observed.

Based on the stratigraphy of the grab samples, it is evident that the material has accumulated on top of the sand cap and has increased in depth each year at three locations south of the SR 509 Bridge (RC/WC-06, RC/WC-07, and RC/WC-08). The most likely source of the material deposited over the cap is from the stormwater outfalls.

Area North of the Bridge

Seven compliance samples were collected in the area north of the SR 509 Bridge including waterway cap compliance (WC) samples from the area where, in December 2005, additional capping material was placed by the City (OMMP locations RC/WC-10, RC/WC-11, RC/WC-12, and supplemental locations (S-15, S-17, S-19, and S-24) [see Appendix B.2 Sample Photos and Appendix C Sediment Descriptions]. These compliance samples generally consisted of dark brown to olive gray over dark gray to black silt overlying sand cap material (Figure 4-1). No sheen spots were observed with sample locations north of the bridge. The thickness of fined-grained material ranged from 3 to 14 cm of material deposited over the cap. The accumulation of material deposited over the sand cap has been increasing in depth each year at two locations north of the bridge (RC/WC-11 and RC/WC-12). Benthic fauna and flora (i.e., a snail, kelp, worm tubes, or shell fragments) were observed at all locations north of the bridge.

Locations RC/WC-10, S-15, and S-19 are situated north of the SR 509 Bridge in the channel along one of the Foss Landing Marina's docks. The dock is generally in heavy use due to the traffic of vessels to and from the dry dock storage, and/or the mooring of vessels. These vessels are typically moored over the vicinity of the locations RC/WC-10, S-15, and S-19, and may have an impact on the sedimentation of the locations considering the lower contaminant concentrations detected with their associated samples compared to concentrations of other surrounding location.

4.2.2 Recontamination/Early-Warning Samples

Early-warning samples were obtained from 14 locations within the Utilities' Work Area. Sampling occurred at OMMP locations RC-01 through RC-14 (Figure 2-1). The samples generally consisted of dark gray to black silt to sandy silt (see Appendix B.2 Sample Photos and Appendix C Sediment Descriptions). The thickness of fine-grained material deposited over the cap at these locations ranged from 3 cm to more than to 23 cm throughout the waterway cap area (see Figure 4-1).

The minimum and maximum reported percent fine values were similar to Year 4 results. Location RC/WC-10, north of the SR 509 Bridge, consisted of 1 cm of dark gray to black sandy silt over the sand cap material, containing the lowest percent fines, 24.3%, for early-warning samples. The greatest percentage of fines, 76.8%, was reported at RC-11, located north of the bridge along the eastern shoreline adjacent Foss Landing Marina.

As reported in the previous section, two iridescent sheen spots were observed on the sediment surface of grabs RC/WC-05 and RC/WC-08. A small sheen spot was also

observed on the homogenized sample of RC-03. All sheen spots were associated with locations south of the bridge. Sediment descriptions were the same as reported for the compliance samples RC/WC-01 through RC/WC-12, in addition to intertidal locations RC-13 and RC-14, which consisted of 7 to 10 cm of dark brown to black silt with benthic fauna and flora present.

4.3 CHEMICAL QUALITY

The following discussion summarizes the analytical results of sediment samples collected on behalf of the City and the Utilities on May 26, 2009 and compares those results to the SQOs. Table 4-1 includes results for parameters that exceed the SQOs in one or more Year 5 samples. Table 4-1 also includes the exceedance factor (the ratio of the result to the SQO) for results that exceed the SQO (EF of 1 or greater, as results that are equal to the SQO are considered exceedances). Parameters not included in Table 4-1 did not exceed the SQOs in any Year 5 sample at any location. Figure 4-2 through Figure 4-4 present concentrations of selected contaminants for compliance samples and Figure 4-5 through Figure 4-10 present concentrations of selected contaminants for the early warning samples.

Appendix E includes all sediment sample results from all monitoring years with detected results that exceed the SQOs in bold font. Exceedances include concentrations rounded to two significant figures that are equal to the SQO.

4.3.1 Compliance Samples

South of the Bridge

The waterway cap compliance samples (0 to 10 cm) from the locations beneath and south of the SR 509 Bridge were analyzed for partial SVOCs (PAHs, BEHP, and phthalates), TOC, and total solids. BEHP concentrations were higher than the SQO (1,300 µg/kg) in all compliance samples south of the SR 509 Bridge in May 2009. BEHP concentrations ranged from 2,400 B µg/kg (1.8 EF) at WC-03 to 10,000 B µg/kg (7.7 EF) at WC-02. In addition, SQOs were exceeded for individual PAHs and total HPAH at locations WC-01, WC-02, WC-05, WC-06 (duplicate only), WC-07, WC-09, and WC-13 (see Table 4-1).

The greatest frequency of maximum exceedance factors (EF) were detected in the sample from location WC-02 located in the southeast corner of the Head of the Waterway. This is a depositional area adjacent to the scour protection apron from the Twin 96ers. SQO EFs ranged between 1.3 (chrysene, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, benzo(g,h,i)anthracene) and 7.7 (BEHP). The EF for each SQO exceedance is included in Table 4-1.

North of the Bridge

The waterway cap compliance and supplemental samples (0 to 10 cm) from the locations north of the SR 509 Bridge were analyzed for partial SVOCs (PAHs, BEHP, and phthalates), TOC, and total solids.

In December 2004, the City remediated the area north of the bridge by placing additional capping material to address recontamination from dredging activities. Year 2 and Year 3 samples collected north of the bridge contained mostly capping material and did not contaminants at concentrations exceeding SQOs. However, in Year 4 and Year 5, five of the seven samples collected from the compliance sampling interval in this area contained BEHP concentrations exceeding the SQO of 1,300 µg/kg as a result of the increasing thickness of sediment above the cap. The exceedance factors for BEHP ranged from 0.5 at S-15 to 5.4 at S-17. Fluoranthene was also detected at its SQO (2,500 µg/kg) at S-17 (see Table 4-1).

4.3.2 Recontamination/Early-Warning Samples

South of the Bridge

The early-warning "top down" (0 to 2 cm) sediment samples south of the SR 509 bridge were analyzed for partial SVOCs (PAHs and BEHP), metals (lead, mercury, and zinc), TPH-Dx, PCB Aroclors, TOC, total solids, and grain size. All early-warning samples south of the SR 509 Bridge (RC-01 through RC-09, RC-13, and RC-14) contained BEHP concentrations above the SQO of 1,300 µg/kg. BEHP concentrations ranged from 2,700 µg/kg (2.1 EF) at RC-03 to 6,600 µg/kg (5.1 EF) at RC-01. Locations RC-01 and RC-02 exceeded the SQO for zinc (410 mg/kg). The early-warning samples collected at locations RC-01, RC-02, RC-04, RC-07, RC-13, and RC-14 contained concentrations of individual PAHs and/or total HPAH that exceeded their SQOs. The exceedance factor for each SQO exceedance is included in Table 4-1.

North of the Bridge

The early-warning "top down" (0 to 2 cm) sediment samples north of the SR 509 Bridge were analyzed for partial SVOCs (PAHs and BEHP), metals (lead, mercury, and zinc), TPH-Dx, PCB Aroclors, TOC, total solids, and grain size. BEHP was the only parameter that exceeded its SQO for early-warning samples north of the bridge. All early-warning samples north of the bridge (RC-10, RC-11, and RC-12) contained BEHP concentrations above the SQO of 1,300 µg/kg. BEHP concentrations ranged from 1,400 µg/kg (1.1 EF) at RC-10 to 5,400 µg/kg (4.2 EF) at RC-11. The exceedance factor for each SQO exceedance is included in Table 4-1.

4.3.3 Contaminant Distribution and Trends

Since the Utilities' cap was installed, sediment has accumulated on the top of cap. Table 4-2 includes the thicknesses of material deposited on top of the cap from the baseline sampling completed in April 2004 (Year 0) through Year 5 OMMP monitoring in May 2009. By May 2009, approximately 16 cm to more than 23 cm of fine-grained sediment had accumulated within the small boat turning basin south of the bridge as illustrated on Figure 4-1. Lesser thicknesses (3 to 14 cm) were present within the area capped by the City in December 2005. At most locations sediment thicknesses increased between approximately 3 cm to 5 cm from May 2008 to May 2009. The greatest increase was at station RC/WC-02 where the change in thickness was approximately 11 cm.

4.3.3.1 Compliance Samples

Compliance sample concentrations are summarized for BEHP, HPAH, and LPAH in Tables 4-3 through 4-5. Tables include data from the baseline OMMP monitoring in Year 0 (April 2004) through Year 5 (May 2009). The concentrations and extent of SQO exceedances for Year 5 data are depicted in Figures 4-2 through 4-4.

Compliance sample concentrations of BEHP and HPAH within the turning basin below and south of the SR 509 Bridge (WC-01 through WC-07, WC-13, and WC-14) have consistently increased between 2007 and 2009. In addition, the number of individual PAH SQO exceedances has increased at locations WC-01, WC-05, WC-07, WC-13, and WC-14 between 2008 and 2009. The average concentration of BEHP increased from approximately 3,100 µg/kg in 2007 to 5,500 µg/kg in 2009, while HPAH concentrations increased from approximately 6,171 µg/kg in 2007 to 14,000 µg/kg in 2009,

Turning Basin Below and South of the Bridge Compliance Sample Averages		
OMMP	BEHP	HPAH
Year 2 (2006)	3, 700 µg/kg	6,171 µg/kg
Year 3 (2007)	3,100 µg/kg	8,714 µg/kg
Year 4 (2008)	4,471 µg/kg	10,771 µg/kg
Year 5 (2009)	5,500 µg/kg	14,000 µg/kg

Compliance sample concentrations of BEHP and HPAH north of the SR509 Bridge (WC-10 through 12, S-15, S-17, S-19, and S-24) have increased between 2007 and 2009. The average concentration of BEHP increased from 529 µg/kg to 3,200 µg/kg, while the average concentration of HPAH increased from 1,133 µg/kg to 7,200 µg/kg from 2007 to 2009; resulting in a six-fold increase since 2007. It is important to note that the compliance

sampling results demonstrate that it took less than 2.5 years for the area of additional cap placement to become recontaminated to a level exceeding the SQOs.

North of the Bridge Compliance Sample Averages		
OMMP	BEHP	HPAH
Year 2 (2006)	711 µg/kg	1,180 µg/kg
Year 3 (2007)	529 µg/kg	1,133 µg/kg
Year 4 (2008)	1,806 µg/kg	4,129 µg/kg
Year 5 (2009)	3,200 µg/kg	7,200 µg/kg

4.3.3.2 Recontamination/Early-Warning Samples

Higher concentrations of contaminants are associated with the fine-grained material. The early warning samples tend to have higher concentrations than the compliance samples. Zinc, phenanthrene, individual HPAHs, sum of HPAHs and BEHP were detected at concentrations above the SQOs in one or more samples. Similar to previous sampling rounds, BEHP was above it's SQO in every early warning sampling location in the Utilities' Work Area. Exceedance factors ranged from 1.1 to 5.1 EF. The highest exceedance factor in early warning samples was for BEHP at sample location RC-01, located on the scour protection apron in the south end of the Utilities Work area. The concentrations for selected contaminants in early warning samples are depicted in Figures 4-5 through 4-10.

Figure 4-11 illustrates average concentrations in early warning samples collected within the Utilities Work Area (RC-01 to RC-14) from 2004 to 2009. Over the past six years, the highest average concentrations of lead, mercury, LPAH, HPAH, and PCBs in the Utilities' Work Area were found in 2005 after the dredging recontamination. Concentrations of zinc and lube-oil range hydrocarbons were higher in 2005 as compared 2006. BEHP was detected at similar concentrations in 2005 and 2006; as a result, sediment BEHP concentrations do not appear to have been significantly impacted by the 2005 dredging.

Between May 2006 and May 2009, annual average concentrations of lead, zinc, and lube-oil range hydrocarbons in early warning samples have steadily increased. However, average lead and zinc concentrations remain below their respective SQOs, and there is no SQO for lube-oil range hydrocarbons. Annual average concentrations of mercury, LPAHs, HPAHs, BEHP, and PCBs have fluctuated within a relatively limited range within the Utilities work area as a whole.

Additional discussions of contaminant trends are included in Appendix G.

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Table 4-1. SQO Exceedances Year 5 OMMP May 2009

Parameter		Zinc		Phenanthrene		Fluoranthene		Pyrene		Benzo(a) anthracene		Chrysene		Benzo(b+k) fluoranthenes		Benzo(a) pyrene		Indeno(1,2,3-cd)pyrene		Dibenz(a,h) anthracene		Benzo(g,h,i) perylene		HPAH		bis(2-Ethylhexyl) phthalate	
SQO		410		1500		2500		3300		1600		2800		3600		1600		690		230		720		17000		1300	
Compliance (0-10 cm)	**Units**	**mg/kg**	**EF**	**mg/kg**	**EF**	**µg/kg**	**EF**	**µg/kg**	**EF**	**µg/kg**	**EF**	**µg/kg**	**EF**	**µg/kg**	**EF**	**µg/kg**	**EF**	**µg/kg**	**EF**	**µg/kg**	**EF**	**µg/kg**	**EF**	**µg/kg**	**EF**	**µg/kg**	**EF**
RC/WC-01		N/A		1100		**3200**	**1.3**	2000		1000		1600		3000		1200		500		110 J		400		13000 J		**3600 B**	**2.8**
RC/WC-02		N/A		**2400**	**1.6**	**7000**	**2.8**	**4800**	**1.5**	**2300**	**1.4**	**3600**	**1.3**	**6800**	**1.9**	**2700**	**1.7**	**900**	**1.3**	**300**	**1.3**	**970**	**1.3**	**29000**	**1.7**	**10000 B**	**7.7**
RC/WC-03		N/A		480		1300		980		490		750		1300		630		400		150 J		410		6400 J		**2400 B**	**1.8**
RC/WC-04/R-02		N/A		900		2400		1800		870		1400		2600		1100		420		130 J		410		11000 J		**4000 B**	**3.1**
RC/WC-05		N/A		1300		**3600**	**1.4**	2600		1200		1900		**3800**	**1.1**	**1600**	**1.0**	570		200		550		16000		**7900 B**	**6.1**
RC/WC-06		N/A		580		1700		1200		600		960		1900		800		310		190 U		300		7800		**3600 B**	**2.8**
RC/WC-06 (Duplicate)		N/A		910		**2600**	**1.0**	2100		920		1400		3200		1200		430		100 J		430		12000 J		**5500 B**	**4.2**
RC/WC-07		N/A		1200		**3400**	**1.4**	2500		1200		1900		**3600**	**1.0**	**1600**	**1.0**	600		**270**	**1.2**	590		16000		**7100 B**	**5.5**
RC/WC-08/R-03		N/A		780		2100		1600		740		1200		2600		980		360		140		320		10000		**4200 B**	**3.2**
RC/WC-09		N/A		1400		**3600**	**1.4**	2900		1400		2100		**4200**	**1.2**	**1800**	**1.1**	640		**250**	**1.1**	630		**18000**	**1.1**	**7300 B**	**5.6**
RC/WC-11/R-04		N/A		320		860		750		320		540		1200		440		210		110 U		230		4600		**3500 B**	**2.7**
RC/WC-12		N/A		870		1800		1500		690		1000		2000		950		300		200 U		300		8500		**2800 B**	**2.2**
WC-13		N/A		1000		**2900**	**1.2**	2400		1000		1600		**3600**	**1.0**	1300		460		**230**	**1.0**	480		14000		**5700 B**	**4.4**
WC-14		N/A		720		1900		1600		750		1100		2400		990		350		140		350		9600		**4400 B**	**3.4**
S-17		N/A		880		**2500**	**1.0**	2100		890		1500		3200		1200		450		100		460		12000		**7000 B**	**5.4**
S-19		N/A		1000		2000		2000		800		1200		2600		1200		440		110 J		440		11000 J		**3600 B**	**2.8**
S-24		N/A		830		2200		1600		770		1300		2400		1000		380		130 J		380		10000 J		**4100 B**	**3.2**
Early Warning (0-2 cm)																											
RC/WC-01		**448**	**1.1**	**2400**	**1.6**	**3300**	**1.3**	3100		**1800**	**1.1**	**3100**	**1.1**	**3600 (J)**	**1.0**	**1900 (J)**	**1.2**	**940 (J)**	**1.4**	**290 (J)**	**1.3**	**970 (J)**	**1.3**	**19000 (J)**	**1.1**	**6600**	**5.1**
RC/WC-02		**473**	**1.2**	1200		1900		1800		1000		1800		2600		1200		530		**230**	**1.0**	550		12000		**5600**	**4.3**
RC/WC-02 (Duplicate)		**438**	**1.1**	**1500**	**1.0**	2200		2000		1200		2100		3000 (J)		1400 (J)		640 (J)		**260 (J)**	**1.1**	640 (J)		13000 (J)		**6200**	**4.8**
RC/WC-03		190		780		1100		1100		580		1000		1300 (J)		670 (J)		460 (J)		190 (J)		460 (J)		6800 (J)		**2700**	**2.1**
RC/WC-04/R-02		257		1300		1900		2000		980		1800		2600		1200		610		**230**	**1.0**	600		12000		**4900**	**3.8**
RC/WC-05		268		1200		1600		1600		850		1400		2200		1000		460		170		460		9700		**5500**	**4.2**
RC/WC-06		266		870		1600		1600		790		1400		2000		950		580		220		620		9800		**5400**	**4.2**
RC/WC-07		371		1100		2100		2000		920		1600		2200		1100		640		**250**	**1.1**	700		12000		**4900**	**3.8**
RC/WC-08/R-03		266		1000		1500		1600		850		1500		2000 (J)		990 (J)		510 (J)		110 (J)		560 (J)		9600 (J)		**3800**	**2.9**
RC/WC-09		286		830		1400		1500		750		1300		2400		960		420		140		440		9300		**5100**	**3.9**
RC/WC-10		124		420		810		770		330		570		930		400		220		83 J		260		4400 J		**1400**	**1.1**
RC/WC-11/R-04		353		850		1200		1400		760		1500		2200		990		420		170		470		9100		**5400**	**4.2**
RC/WC-12		181		710		1100		1300		490		820		680		700		270		120		300		5800		**2600**	**2.0**
RC-13		342		**2100**	**1.4**	**3600**	**1.4**	**3200**	**1.0**	**1600**	**1.0**	**2800**	**1.0**	**7600**	**2.1**	**1800**	**1.1**	**1200**	**1.7**	**520 (J)**	**2.3**	**1400**	**1.9**	**24000 (J)**	**1.4**	**6500**	**5.0**
RC-14		325		1200		1900		1800		1000		1800		2800		1300		600		**230**	**1.0**	590		12000		**5300**	**4.1**

Notes:
Bold font indicates exceedance of SQO
EF= exceedance factor
mg/kg= milligram per kilogram
µg/kg= microgram per kilogram
J= result is estimated
B=(organics) detected in Method Blank
OMMP= Operation, Maintenance, and Monitoring Plan

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Table 4-2. Thickness of Material over Cap (cm)

Early Warning (0 - 2 cm unless otherwise noted)

Date	RC-01	RC-02	RC-03	RC-04	RC-05	RC-06	RC-07	RC-08	RC-09	RC-10	RC-11	RC-12	RC-13	RC-14	RC-14B
Apr-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Aug-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1 to 3 (City)/ 1 to 3 (UTL)	N/A	N/A	N/A	N/A
Sep-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3 (City) / 3 (UTL)	N/A	N/A	N/A	N/A
Dec-04	1	8 (0-8 cm)	12 (0-12 cm)	9 (0-9 cm)	11 (0-11 cm)	5 (0-5 cm)	4 (0-4 cm)	5 (0-5 cm)	6 (0-6 cm)	3 (0-3 cm)	N/A	3 (0-3 cm)	1	1	N/A
May-05	1.5	9	10	13	10	4.5	3	4	5.5	5	10.5	5	1	1.5	1.5
May-06	N/A	16	11	9 to 17	12	1 to 10	6	7	7	0.5	1	1	2	2	1
May-07	N/A	13+	15+	17+	14-16	12	12+	7	9	1	3	3	N/A	N/A	N/A
May-08	N/A	12*	13*	12*	13	16	18*	8	13	1	7	4	2	8	N/A
May -09	3	23+	16	21	21+	20+	20	18	10	3	10	9	10	7 (avg)	N/A

Waterway Cap (0 - 10 cm unless otherwise noted)

Date	WC-01	WC-02	WC-03	WC-04	WC-05	WC-06	WC-07	WC-08	WC-09	WC-10	WC-11	WC-12	WC-13	WC-14
Apr-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Aug-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5 (City)	5 (City)	N/A	N/A
Sep-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3 (City)	3	N/A	N/A
Nov-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	7 (UTL) / 7 (City)	N/A	N/A	N/A
Dec-04	1	8 (City)	12 (City)	9	11	N/A	4	N/A	6	3	N/A	3 / 3 (City)	N/A	N/A
May-05	N/A	9	N/A	13	10	N/A	2	4	5.5	3 (City)	10.5	5	N/A	N/A
May-06	N/A	16	11	9 to 17	12	1 to 10	6	7	7	0.5	1	1	7	14
May-07	N/A	13+	15+	17+	14-16	12	12+	7	9	1	3	3	8	13+
May-08	N/A	12*	13*	12*	13	16	18*	8	13	1	7	4	3	18
May-09	3	23+	16	21	21+	20+	20	18	10	3	10	9	7	11

Core Samples

Date	Depth Below Mudline	WC-01B	Depth Below Mudline	WC-04	Depth Below Mudline	WC-05	Depth Below Mudline	WC-06	Depth Below Mudline	WC-10	Depth Below Mudline	WC-12
Apr-04	N/A	N/A	0-1 ft	N/A	0-1.3 ft	N/A	0-1 ft	N/A	0-1 ft	N/A	0-1.7 ft	N/A
Apr-04	N/A	N/A	1-2 ft	N/A	N/A	N/A	1-2 ft	N/A	1-2 ft	N/A	N/A	N/A
Apr-04	N/A	N/A	2-3 ft	N/A	N/A	N/A	N/A	N/A	2-3.3 ft	N/A	N/A	N/A
May-06	2-3 ft	19	1.5-3 ft	N/A	1-2.5 ft	N/A	2-3 ft	N/A	1-3 ft	N/A	1-2 ft	N/A
May-08	2.5-3.5 ft	N/A	5.5-6.5 ft	N/A	3.7-4.3 ft	N/A	2.9-3.7 ft	N/A	4.1-5.0 ft	N/A	0.6-1.4 ft	N/A

Slope Cap

Date	Depth Below Mudline	SC-01	SC-02	SC-03	SC-04
Apr-04	0-10 cm	N/A	N/A	N/A	N/A
May-06	0-10 cm	N/A	N/A	N/A	N/A
May-08	0-10 cm	1	2-4	1-11	<1-5

Supplemental Locations

Date	Depth	S-15	S-16	S-17	S-18	S-19	S-20	S-21	S-22	S-23	S-24	S-29	S-30
Aug-04	0-2 cm	1 to 2 (City)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sep-04	0-2 cm	3 to 5 (UTL)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nov-04	N/A	N/A	N/A	2	N/A	N/A	2	N/A	N/A	N/A	N/A	N/A	N/A
Dec-04	0-3 cm	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3	2	N/A	N/A
Aug-04	0-10 cm	1 to 2 (UTL)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sep-04	0-10 cm	3 to 5 (City)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nov-04	0-10 cm	12 (UTL) / 12 (City)	5	2 (City)	N/A	4	2 (City)	N/A	N/A	N/A	N/A	N/A	N/A
Dec-04	0-7 cm	N/A	N/A	N/A	7	N/A	N/A	7	8 (0-8 cm)	N/A	N/A	N/A	N/A
Dec-04	0-10 cm	N/A	N/A	N/A	7 (City)	N/A	N/A	7	8 (City)	N/A	2 (City)	4 (City)	N/A
May-05	0-10 cm	N/A	5	6	N/A	8	3.5	N/A	N/A	N/A	6	5	3
May-06	0-10 cm	2	N/A	0.5	N/A	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
May-07	0-10 cm	3	N/A	2	N/A	4	N/A	N/A	N/A	N/A	1	N/A	N/A
May-08	0-10 cm	4	N/A	4	N/A	3	N/A	N/A	N/A	N/A	2	N/A	N/A
May-09	0-10 cm	4	N/A	14	N/A	8	N/A	N/A	N/A	N/A	7 (avg)	N/A	N/A

*Based on piston core results.

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Table 4-3. Total bis(2-Ethylhexyl) phthalate Concentration in µg/kg

Early Warning (0 - 2 cm unless otherwise noted)

Date	RC-01	RC-02	RC-03	RC-04	RC-05	RC-06	RC-07	RC-08	RC-09	RC-10	RC-11	RC-12	RC-13	RC-14	RC-14B
Apr-04	**1300**	470	1100	360	110	500	180	110	230	80	280	60	**1400**	**3000**	N/A
Aug-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**1600 (City) / 940 (UTL)**	N/A	N/A	N/A	N/A
Sep-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**12000 (City) / 6400 (UTL)**	N/A	N/A	N/A	N/A
Dec-04	**1300 B**	**2700 B (0-8 cm)**	940 B (0-12cm)	**1800 B (0-9 cm)**	940 B (0-11 cm)	**1700 B (0-5 cm)**	**4500 B (0-4 cm)**	**3100 B (0-5 cm)**	**2600 B (0-6 cm)**	**2800 B (0-3 cm)**	N/A	**1800 B (0-3 cm)**	830 B	790 B	N/A
May-05	**8200**	**7300**	**3200**	**6700**	**5600**	**4400**	**4400**	**3500**	**3500**	**3600**	**3500**	**3800**	**2100**	**3600**	**1900**
May-06	**8300**	**8700**	**5100**	**5900**	**5400**	**3900**	**5400**	**5400**	**4700**	420	1100	**1300**	**3700**	**3600**	**3800**
May-07	**14000**	**9500**	**2600**	**5100**	**4000**	**5600**	**3700**	**4300 (5100)**	**6200**	**1600**	**6100**	**2200**	**7300**	**4200**	N/A
May-08	**6000**	**8200**	**2100**	**2800**	**6900**	**6000**	**5200**	**4500**	**5100**	**2500 (1600)**	**10000**	**3600**	**6600**	**8000**	N/A
May-09	**6600**	**5600 (6200)**	**2700**	**4900**	**5500**	**5400**	**4900**	**3800**	**5100**	**1400**	**5400**	**2600**	**6500**	**5300**	N/A

Waterway Cap (0 - 10 cm unless otherwise noted)

Date	WC-01	WC-02	WC-03	WC-04	WC-05	WC-06	WC-07	WC-08	WC-09	WC-10	WC-11	WC-12	WC-13	WC-14
Apr-04	550	330	240	260	76	160	19 U	49	120	63	220	19 U	100	76
Aug-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	447 B (City)	171 B (City)	N/A	N/A
Sep-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**4300 (City)**	N/A	N/A	N/A
Nov-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**1500 (UTL)/ 675 (City)**	N/A	N/A	N/A
Dec-04	810 B	371 J (City)	275 B (City)	1000 B	**1300 B**	N/A	**3800 B**	N/A	900 B	620 B	N/A	880 B / 309 (City)	N/A	N/A
May-05	N/A	**2700**	N/A	**1700**	**2200**	N/A	730	220	289	464 (City)	**3500**	823	N/A	N/A
May-06	**4300**	**7700**	**2300**	**4600**	**3600**	**1600**	**1800**	**3400**	**4700**	460	960	590	**2000**	**3700**
May-07	**2300**	**4900**	**1800**	**2300**	**4000**	**2800**	**3600**	**2000**	**2200**	410	640	640	**2700**	**2100**
May-08	**6400**	**8000**	1200	**2400**	**5400**	**3200**	**4700**	**2500**	**3100**	540 (490)	**3500**	**1600**	**2100**	**3500**
May -09	**3600 B**	**10000 B**	**2400 B**	**4000 B**	**7900 B**	**3600 B (5500 B)**	**7100 B**	**4200 B**	**7300 B**	1000 B	**3500 B**	**2800 B**	**5700 B**	**4400 B**

Core Samples

Date	Depth Below Mudline	WC-01B	Depth Below Mudline	WC-04	Depth Below Mudline	WC-05	Depth Below Mudline	WC-06	Depth Below Mudline	WC-10	Depth Below Mudline	WC-12
Apr-04	N/A	N/A	0-1 ft	73	0-1.3 ft	46	0-1 ft	92	0-1 ft	69	0-1.7 ft	49
Apr-04	N/A	N/A	1-2 ft	19 U	N/A	N/A	1-2 ft	63	1-2 ft	20 U	N/A	N/A
Apr-04	N/A	N/A	2-3 ft	19 U	N/A	N/A	N/A	N/A	2-3.3 ft	37	N/A	N/A
May-06	2-3 ft	20	1.5-3 ft	120	1-2.5 ft	63	2-3 ft	29	1-3 ft	38	1-2 ft	20 J
May-08	2.5-3.5 ft	18 J	5.5-6.5 ft	19 U	3.7-4.3 ft	20 U	2.2-2.9 ft 2.9-3.7 ft	19 UJ 21	4.1-5.0 ft	13 J	0.6-1.4 ft	14 J

Slope Cap

Date	Depth Below Mudline	SC-01	SC-02	SC-03	SC-04
Apr-04	0-10 cm	26	31	91	94
May-06	0-10 cm	85	1000	**3400**	**1500**
May-08	0-10 cm	76	140	**14000**	**2400**

Supplemental Locations

Date	Depth	S-15	S-16	S-17	S-18	S-19	S-20	S-21	S-22	S-23	S-24	S-29	S-30
Aug-04	0-2 cm	**3100 (City)**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sep-04	0-2 cm	**5100 (UTL)**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nov-04	0-2 cm	N/A	N/A	**2900**	N/A	N/A	**1500**	N/A	N/A	N/A	N/A	N/A	N/A
Dec-04	0-3 cm	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**1500 B**	**2000 B**	N/A	N/A
Aug-04	0-10 cm	980 (UTL)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sep-04	0-10 cm	**4500 (City)**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nov-04	0-10 cm	1100 (UTL) / 1250 (City)	**3600**	698 J (City)	N/A	**3200**	674 (City)	N/A	N/A	N/A	N/A	N/A	N/A
Dec-04	0-7 cm	N/A	N/A	N/A	**2000 B**	N/A	N/A	**2000 B**	**2200 B (0-8 cm)**	N/A	N/A	N/A	N/A
Dec-04	0-10 cm	N/A	N/A	N/A	313 B (City)	N/A	N/A	652	**1310 (City)**	N/A	558 (City)	**1940 (City)**	N/A
May-05	0-10 cm	**3000**	629	**2000**	N/A	601	965	N/A	N/A	N/A	**2000**	687	224
May-06	0-10 cm	930	N/A	570	N/A	880	N/A	N/A	N/A	N/A	550	N/A	N/A
May-07	0-10 cm	500 (590)	N/A	620	N/A	300	N/A	N/A	N/A	N/A	790	N/A	N/A
May-08	0-10 cm	**1600**	N/A	**2400**	N/A	1200	N/A	N/A	N/A	N/A	**1800**	N/A	N/A
May-09	0-10 cm	700 B	N/A	**7000 B**	N/A	**3600 B**	N/A	N/A	N/A	N/A	**4100 B**	N/A	N/A

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Table 4-4. Total HPAH Concentration in µg/kg

Early Warning (0 - 2 cm unless otherwise noted. Values rounded to two significant figures.)

Date	RC-01	RC-02	RC-03	RC-04	RC-05	RC-06	RC-07	RC-08	RC-09	RC-10	RC-11	RC-12	RC-13	RC-14	RC-14B
Apr-04	2700	1000	2300	870	260	1100	270	210	580	390	880	22	4200	7400	N/A
Aug-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4000 (City) /1300 (UTL)	N/A	N/A	N/A	N/A
Sep-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**55000 (City)/ 50000 (UTL)**	N/A	N/A	N/A	N/A
Dec-04	3200	6600 (0-8 cm)	2500 (0-12 cm)	5900 (0-9 cm)	2600 (0-11 cm)	5400 (0-5 cm)	14000 (0-4 cm)	14000 (0-5 cm)	10000 (0-6 cm)	**23000 (0-3 cm)**	N/A	15000 (0-3 cm)	2000	2500	N/A
May-05	**19000**	**17000**	8600	**20000**	**20000**	14000	9800	**17000**	**20000**	**25000**	**25000**	**40000**	5800	8700	4800
May-06	15000	**22000 J**	10000	13000	8400	6800	9400	11000	11000	760	1200	2400 J	10000	7200	7200
May-07	12000 J	**26000**	7100 J	11000 J	8500 J	12000 J	8300 J	11000 (12000 J)	11000 J	3800 J	8300	5400 J	**30000**	16000	N/A
May-08	**17000**	**18000**	6400	6700	12000	14000	12000	11000	11000	6900 (4400)	**19000**	11000	**19000**	**19000**	N/A
May-09	**19000 J**	**12000 (13000 J)**	6800 J	12000	9700	9800	12000	9600 J	9300	4400 J	9100	5800	**24000 J**	12000	N/A

Waterway Cap (0 - 10 cm unless otherwise noted. Values rounded to two significant figures.)

Date	WC-01	WC-02	WC-03	WC-04	WC-05	WC-06	WC-07	WC-08	WC-09	WC-10	WC-11	WC-12	WC-13	WC-14
Apr-04	1200	720	540	690	220	350	19 U	26	260	190	410	19 U	160	66
Aug-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2000 (City)	730 (City)	N/A	N/A
Sep-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**27000 (City)**	N/A	N/A	N/A
Nov-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8900 (UTL)/ 4000 (City)	N/A	N/A	N/A
Dec-04	2300	2500 (City)	1600 (City)	3800	4800	N/A	2200	N/A	4000	4000	N/A	8100 / 3500(City)	N/A	N/A
May-05	N/A	7300	N/A	5300	6900	N/A	2600	2500	3700	2800 (City)	**27000**	8600	N/A	N/A
May-06	8400	**17000 J**	5200	9800 J	11000	3300	3800	8000	7100	1600	1000 J	980	5500	8000
May-07	6500 J	**20000**	4400 J	5300 J	9600 J	6500	8700 J	6000	5300	1100	950 J	1700 J	8000 J	5200
May-08	12000	**22000**	3100	6600	11000	7700	13000	6900	6700	1500 (1400)	6000	5200	4600	6000
May-09	13000 J	**29000**	6400 J	11000 J	16000	7800 (12000 J)	16000	10000	**18000**	2900 J	4600	8500	14000	9600

Core Samples (Values rounded to two significant figures.)

Date	Depth Below Mudline	WC-01B	Depth Below Mudline	WC-04	Depth Below Mudline	WC-05	Depth Below Mudline	WC-06	Depth Below Mudline	WC-10	Depth Below Mudline	WC-12
Apr-04	N/A	N/A	0-1 ft	190	0-1.3 ft	19 U	0-1 ft	71	0-1 ft	20 U	0-1.7 ft	20 U
Apr-04	N/A	N/A	1-2 ft	19 U	N/A	N/A	1-2 ft	20 U	1-2 ft	20 U	1-2 ft	15 J
Apr-04	N/A	N/A	2-3 ft	19 U	N/A	N/A	N/A	N/A	2-3.3 ft	19 U	N/A	N/A
May-06	2-3 ft	20 U	1.5-3 ft	310 J	1-2.5 ft	130 J	2-3 ft	54 J	1-3 ft	20 U	N/A	15 J
May-08	2.5-3.5 ft	19 U	5.5-6.5 ft	21 J	3.7-4.3 ft	20 U	2.2-2.9 ft 2.9-3.7 ft	19 U 790	4.1-5.0 ft	20 U	0.6-1.4 ft	28 J

Slope Cap (Values rounded to two significant figures.)

Date	Depth Below Mudline	SC-01	SC-02	SC-03	SC-04
Apr-04	0-10 cm	19 U	19 U	170	19 U
May-06	0-10 cm	320	2100 J	7300	3600
May-08	0-10 cm	630	1400 J	10000	5600

Supplemental Locations (Values rounded to two significant figures.)

Date	Depth	S-15	S-16	S-17	S-18	S-19	S-20	S-21	S-22	S-23	S-24	S-29	S-30
Aug-04	0-2 cm	4300 (City)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sep-04	0-2 cm	**95000 (UTL)**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nov-04	0-2 cm	N/A	N/A	14000	N/A	N/A	8100	N/A	N/A	N/A	N/A	N/A	N/A
Dec-04	0-3 cm	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	11000	10000	N/A	N/A
Aug-04	0-10 cm	3800 (UTL)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sep-04	0-10 cm	**81000 (City)**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nov-04	0-10 cm	**19000 (UTL) / 35000 (City)**	9300	3600 (City)	N/A	**26000**	7600 (City)	N/A	N/A	N/A	N/A	N/A	N/A
Dec-04	0-7 cm	N/A	N/A	N/A	7600	N/A	N/A	**26000**	16000 (0-8 cm)	N/A	N/A	N/A	N/A
Dec-04	0-10 cm	N/A	N/A	N/A	2000 (City)	N/A	N/A	**18000 (City)**	7500 (City)	N/A	2600 (City)	8900 (City)	N/A
May-05	0-10 cm	**46000**	4200	10000	N/A	5700	7100	N/A	N/A	N/A	6700	4900	2300
May-06	0-10 cm	1200 J	N/A	820 J	N/A	1600	N/A	N/A	N/A	N/A	1100 J	N/A	N/A
May-07	0-10 cm	1000 J (1100 J)	N/A	1300 J	N/A	780	N/A	N/A	N/A	N/A	1800 J	N/A	N/A
May-08	0-10 cm	2800	N/A	5300	N/A	3400	N/A	N/A	N/A	N/A	4700	N/A	N/A
May-09	0-10 cm	1200 J	N/A	12000	N/A	11000 J	N/A	N/A	N/A	N/A	10000 J	N/A	N/A

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Table 4-5. Total LPAH Concentration in µg/kg

Early Warning (0 - 2 cm unless otherwise noted. Values rounded to two significant figures.)

Date	RC-01	RC-02	RC-03	RC-04	RC-05	RC-06	RC-07	RC-08	RC-09	RC-10	RC-11	RC-12	RC-13	RC-14	RC-14B
Apr-04	160	200	590	190	74	160	26	28	130	160	340	20 U	300	660	N/A
Aug-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	920(City) / 240(UTL)	N/A	N/A	N/A	N/A
Sep-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**31000(City)/ 35000(UTL)**	N/A	N/A	N/A	N/A
Dec-04	550	1000 (0-8 cm)	510 (0-12 cm)	1200 (0-9 cm)	580 (0-11 cm)	1800 (0-5 cm)	4600 (0-4 cm)	**5500 (0-5 cm)**	3300 (0-6 cm)	**11000 (0-3 cm)**	N/A	**7000 (0-3 cm)**	200	260	N/A
May-05	2300	2800	1700	4700	5100	3100	2400	4600	5000	**9600**	**9900**	**19000**	690	1000	380
May-06	1900 J	2600 J	1200	2100 J	910	740	1400 J	2100 J	1900	79 J	110	400 J	1100	830	730
May-07	2000 J	3400 J	830 J	1400 J	930 J	1400 J	1100 J	1500 J (1700 J)	1200	410 J	1000 J	900 J	3700	2100 J	N/A
May-08	2000 J	1800	750	760	1400	1400	1400	1200	1300	460 (380)	2400	2000	2200 J	2000	N/A
May-09	3000	1400 (1700)	910	1500	1600	1000	1400	1300	1000	500 J	1100	1100	2400	1400	N/A

Waterway Cap (0 -10 cm unless otherwise noted. Values rounded to two significant figures.)

Date	WC-01	WC-02	WC-03	WC-04	WC-05	WC-06	WC-07	WC-08	WC-09	WC-10	WC-11	WC-12	WC-13	WC-14
Apr-04	85	70	200	340	64	33	19 U	19 U	57	88	94	19 U	21	20
Aug-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	800 (City)	280 (City)	N/A	N/A
Sep-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**13000 (City)**	N/A	N/A	N/A
Nov-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4300 (UTL) / 1600 (City)	N/A	N/A	N/A
Dec-04	220	480 (City)	380(City)	730	1200	N/A	590	N/A	1000	1700 / 1500(City)	N/A	4000 / 2200 (City)	N/A	N/A
May-05	N/A	1200	1700	950	1500	N/A	500	760	1300	N/A	**9200**	4100	N/A	N/A
May-06	970 J	2300 J	1200	1500	2300	440	560 J	1700 J	1700	970 J	91	120 J	1300	1400
May-07	910 J	2700 J	470 J	750 J	1200 J	760 J	1200 J	1500 J (1700 J)	930 J	120 J	92 J	320 J	1500 J	820 J
May-08	1400 J	2100	230	740	1200	690	2000	1000	780	140 (110)	600	890	500	670
May-09	1300 J	3200J	480	1200J	2000 J	700 J (1300 J)	1600 J	1300 J	2400 J	230	400 J	1500 J	1900 J	1200 J

Core Samples (Values rounded to two significant figures.)

Date	Depth Below Mudline	WC-01B	Depth Below Mudline	WC-04	Depth Below Mudline	WC-05	Depth Below Mudline	WC-06	Depth Below Mudline	WC-10	Depth Below Mudline	WC-12
Apr-04	N/A	N/A	0-1 ft	33	0-1.3 ft	19 U	0-1 ft	30	0-1 ft	20 U	0-1.7 ft	20 U
Apr-04	N/A	N/A	1-2 ft	19 U	N/A	N/A	1-2 ft	20 U	1-2 ft	20 U	N/A	N/A
Apr-04	N/A	N/A	2-3 ft	19 U	N/A	N/A	N/A	N/A	2-3.3 ft	19 U	N/A	N/A
May-06	2-3 ft	20 U	1.5-3 ft	36	1-2.5 ft	11 J	2-3 ft	20 U	1-3 ft	20 U	1-2 ft	20 U
May-08	2.5-3.5 ft	19 U	5.5-6.5 ft	19 U	3.7-4.3 ft	20 U	2.2-2.9 ft 2.9-3.7 ft	19 U 380 J	4.1-5.0 ft	14 J	0.6-1.4 ft	20 U

Slope Cap (Values rounded to two significant figures.)

Date	Depth Below Mudline	SC-01	SC-02	SC-03	SC-04
Apr-04	0-10 cm	19 U	19 U	20 U	19 U
May-06	0-10 cm	30	390 J	850	600 J
May-08	0-10 cm	64	150 J	1000 J	500 J

Supplemental Locations (Values rounded to two significant figures.)

Date	Depth	S-15	S-16	S-17	S-18	S-19	S-20	S-21	S-22	S-23	S-24	S-29	S-30
Aug-04	0-2 cm	**5400 (City)**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sep-04	0-2 cm	**84000 (UTL)**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nov-04	0-2 cm	N/A	N/A	5000	N/A	N/A	2800	N/A	N/A	N/A	N/A	N/A	N/A
Dec-04	0-3 cm	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4500	**7400**	N/A	N/A
Aug-04	0-10 cm	**5600 (UTL)**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sep-04	0-10 cm	**62000 (City)**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nov-04	0-10 cm	**13000 (UTL) / 24000 (City)**	**8900**	1300 (City)	N/A	4900	4000 (City)	N/A	N/A	N/A	N/A	N/A	N/A
Dec-04	0-7 cm	N/A	N/A	N/A	1900	N/A	N/A	**17000**	**7500 (0-8 cm)**	N/A	N/A	N/A	N/A
Dec-04	0-10 cm	N/A	N/A	N/A	640 (City)	2400	N/A	**12000 (City)**	3700 (City)	N/A	1000 (City)	4300 (City)	N/A
May-05	0-10 cm	**22000**	1500	2500	N/A	2400	2400	N/A	N/A	N/A	2000	1900	750
May-06	0-10 cm	120	N/A	71	N/A	N/A	N/A	N/A	N/A	N/A	120 J	N/A	N/A
May-07	0-10 cm	120 J (120 J)	N/A	160 J	N/A	N/A	N/A	N/A	N/A	N/A	220 J	N/A	N/A
May-08	0-10 cm	180	N/A	510	N/A	640	N/A	N/A	N/A	N/A	410	N/A	N/A
May-09	0-10 cm	110 J	N/A	1400 J	N/A	1800	N/A	N/A	N/A	N/A	1100 J	N/A	N/A

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Table 4-6. Total PCB Concentration in µg/kg

Early Warning (0 - 2 cm unless otherwise noted. Values rounded to two significant figures.)

Date	RC-01	RC-02	RC-03	RC-04	RC-05	RC-06	RC-07	RC-08	RC-09	RC-10	RC-11	RC-12	RC-13	RC-14	RC-14B
Apr-04	5.7	6.3	7.2	5.7	4.3	9.2	7.6 U	7.7 U	6.5	7.8 U	11	7.9 U	7.8 U	7.7 U	N/A
Aug-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	62 (City) / 32 U (UTL)	N/A	N/A	N/A	N/A
Sep-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	300 (City) / 280 (UTL)	N/A	N/A	N/A	N/A
Dec-04	39 U	53 (0-8 cm)	20 U (0-12 cm)	22 (0-9 cm)	20 U (0-11 cm)	58 (0-5 cm)	54 (0-4 cm)	78 (0-5 cm)	94 (0-6 cm)	120 (0-3 cm)	N/A	210 (0-3 cm)	20 U	19 U	N/A
May-05	200 J	**300 J**	180 J	170 J	270 J	190 J	120 J	190 J	220 J	270 J	**380 J**	280 J	80 J	110 J	19 J
May-06	95 J	170	130 J	110	140 J	110 J	97 J	110	230 J	28 J	9.8 U	43 J	98 J	62 J	81 J
May-07	170	**130**	64 JC	140	140	130	110	140 (130JC)	120	38 J	120	72	190	120	N/A
May-08	110	140	64 JC	97	110	97	120	110	140	38 J (26)	130	66	94	130	N/A
May-09	170	180 (160)	110	160 J	69	150 J	160	110	140 J	55	140	84	140 J	94	N/A

Waterway Cap (0 - 10 cm unless otherwise noted. Values rounded to two significant figures.)

Date	WC-01	WC-02	WC-03	WC-04	WC-05	WC-06	WC-07	WC-08	WC-09	WC-10	WC-11	WC-12	WC-13	WC-14
Apr-04	7.8 U	7.8 U	5.7	5.4	7.8 U	8 U	7.8 U	7.6 U	7.9 U	7.9 U	7.6 U	7.7 U	7.8 U	7.7 U
Aug-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	94 (City)	28 (City)	N/A	N/A
Sep-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	190 (City)	N/A	N/A	N/A
Nov-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	99 (UTL) / 210 (City)	N/A	N/A	N/A
Dec-04	20 U	66 (City)	56 J (City)	22	24	N/A	21	N/A	64	19	N/A	'92 / 160 (City)	N/A	N/A
May-05	N/A	130 J	N/A	89 J	84 J	N/A	20 U	67 J	110 J	73 (City)	**620**	**310**	N/A	N/A
May-06	72 J	160	110	86	140 J	44	88 J	110	140 J	18 J	9.7 U	12 J	130	190 J
May-07	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	9.9 U	9.7 U	9.9 U	N/A	N/A
May-08	120	140 J	51 J	87	110	79 J	110	120	120	12 J (11 J)	68	40 J	43 J	120

Core Samples (Values rounded to two significant figures.)

Date	Depth Below Mudline	WC-01B	Depth Below Mudline	WC-04	Depth Below Mudline	WC-05	Depth Below Mudline	WC-06	Depth Below Mudline	WC-10	Depth Below Mudline	WC-12
Apr-04	N/A	N/A	0-1 ft	7.6 U	0-1.3 ft	7.8 U	0-1 ft	8 U	0-1 ft	7.8 U	0-1.7 ft	7.9 U
Apr-04	N/A	N/A	1-2 ft	7.8 U	N/A	N/A	1-2 ft	8 U	1-2 ft	7.9 U	N/A	N/A
Apr-04	N/A	N/A	2-3 ft	7.8 U	N/A	N/A	N/A	N/A	2-3.3 ft	7.7 U	N/A	N/A
May-06	2-3 ft	9.7 U	1.5-3 ft	9.8 U	1-2.5 ft	9.6 U	2-3 ft	9.7 U	1-3 ft	9.8 U	1-2 ft	9.7 U
May-08	2.5-3.5 ft	9.7 U	5.5-6.5 ft	9.7 U	3.7-4.3 ft	10 U	2.2-2.9 ft 2.9-3.7 ft	N/A 9.7 U	4.1-5.0 ft	10 U	0.6-1.4 ft	9.8 U

Slope Cap (Values rounded to two significant figures.)

Date	Depth Below Mudline	SC-01	SC-02	SC-03	SC-04
Apr-04	0-10 cm	7.7 U	7.9 U	8 U	7.7 U
May-06	0-10 cm	9.7 U	60 J	71 J	75 J
May-08	0-10 cm	9.7 U	64	66	46 J

Supplemental Locations (Values rounded to two significant figures.)

Date	Depth	S-15	S-16	S-17	S-18	S-19	S-20	S-21	S-22	S-23	S-24	S-29	S-30
Aug-04	0-2 cm	94 (City)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sep-04	0-2 cm	**540 (UTL)**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nov-04	0-2 cm	88	N/A	N/A	N/A	N/A	18	N/A	N/A	N/A	N/A	N/A	N/A
Dec-04	0-3 cm	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	96	130	N/A	N/A
Aug-04	0-10 cm	35 (UTL)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sep-04	0-10 cm	**530 (City)**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nov-04	0-10 cm	280 (UTL)	N/A	88	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nov-04	0-10 cm	**280 (UTL) / 340 (City)**	220	76(City)	N/A	140	120 (City)	N/A	N/A	N/A	N/A	N/A	N/A
Dec-04	0-7 cm	N/A	N/A	N/A	80	N/A	N/A	**370**	74 (0-8 cm)	N/A	N/A	N/A	N/A
Dec-04	0-10 cm	N/A	N/A	N/A	70 (City)	N/A	N/A	290 (City)	110 (City)	N/A	56 (City)	120 (City)	N/A
May-05	0-10 cm	**460 J**	200	59 J	N/A	**400**	180	N/A	N/A	N/A	130 J	270	33 J
May-06	0-10 cm	23	N/A	15 U	N/A	23 J	N/A	N/A	N/A	N/A	9.9 U	N/A	N/A
May-07	0-10 cm	9.7 U (9.8 U)	N/A	10 U	N/A	**9.8 u**	N/A	N/A	N/A	N/A	18	N/A	N/A
May-08	0-10 cm	18 J	N/A	37 J	N/A	35 J	N/A	N/A	N/A	N/A	25	N/A	N/A

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Table 4-7. Lead Concentrations in mg/kg

Early Warning (0 - 2 cm unless otherwise noted)

Date	RC-01	RC-02	RC-03	RC-04	RC-05	RC-06	RC-07	RC-08	RC-09	RC-10	RC-11	RC-12	RC-13	RC-14	RC-14B
Apr-04	25	20	44	19	19	18	6	5	15	11	35	4	42	54	N/A
Aug-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	45.7 (City) / 30 (UTL)	N/A	N/A	N/A	N/A
Sep-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	160 (City) / 238 (UTL)	N/A	N/A	N/A	N/A
Dec-04	27	70 (0-8 cm)	34 (0-12 cm)	49 (0-9 cm)	54 (0-11 cm)	83 (0-5 cm)	140 (0-4 cm)	100 (0-5 cm)	64 (0-6 cm)	123 (0-3 cm)	N/A	190 (0-3 cm)	23	52	N/A
May-05	104	122	55	140	108	114	70	145	144	159	178	186	38	58	37
May-06	90	97	62	44	76	47	70	73	76	15	13	19	73	67	60
May-07	111	114	36	77	78	86	64	70 (76)	86	33	73	39	113	70	N/A
May-08	94	134	33	54	78	93	91	73	99	33 (36)	106	62	82	111	N/A
May-09	206	125 (112)	58	85	79	90	139	88	92	39	118	61	112	92	N/A

Waterway Cap (0 - 10 cm unless otherwise noted)

Date	WC-01	WC-02	WC-03	WC-04	WC-05	WC-06	WC-07	WC-08	WC-09	WC-10	WC-11	WC-12	WC-13	WC-14
Apr-04	6	15	20	13	10	7	2	4	7	4	14	3	4	4
Aug-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	43.7 (City)	14.5 (City)	N/A	N/A
Sep-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	167 (City)	N/A	N/A	N/A
Nov-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	91 (UTL) / 158 (City)	N/A	N/A	N/A
Dec-04	22	49.4 (City)	42 (City)	35	70	N/A	42	N/A	32	27	N/A	68 / 71.9 (City)	N/A	N/A
May-05	N/A	54	N/A	50	54	N/A	23	N/A	N/A	30.8 (City)	212	N/A	N/A	N/A
May-06	86	92	37	54	29	28	45	64	66	12	11	10	51	70
May-07	N/A	N/A	N/A	N/A	N/A	N/A	N/A	70 (76)	N/A	10	73	18	N/A	N/A
May-08	89	112	28	48	86	50	82	71	71	11 (9)	106	36	32	74

Core Samples

Date	Depth Below Mudline	WC-01B	Depth Below Mudline	WC-04	Depth Below Mudline	WC-05	Depth Below Mudline	WC-06	Depth Below Mudline	WC-10	Depth Below Mudline	WC-12
Apr-04	N/A	N/A	0-1 ft	3	0-1.3 ft	2 U	0-1 ft	3	0-1 ft	3	0-1.7 ft	2
Apr-04	N/A	N/A	1-2 ft	5 U	N/A	N/A	1-2 ft	3	1-2 ft	2	N/A	N/A
Apr-04	N/A	N/A	2-3 ft	2 U	N/A	N/A	N/A	N/A	2-3.3 ft	2 U	N/A	N/A
May-06	2-3 ft	3	1.5-3 ft	5	1-2.5 ft	3	2-3 ft	3	1-3 ft	2	1-2 ft	3
May-08	2.5-3.5 ft	2 U	5.5-6.5 ft	2 U	3.7-4.3 ft	2 U	2.2-2.9 ft / 2.9-3.7 ft	N/A / 2 U	4.1-5.0 ft	2 U	0.6-1.4 ft	2 U

Slope Cap

Date	Depth Below Mudline	SC-01	SC-02	SC-03	SC-04
Apr-04	0-10 cm	3	2 U	4	4
May-06	0-10 cm	5	36	58	44
May-08	0-10 cm	4	58	64	53

Supplemental Locations

Date	Depth	S-15	S-16	S-17	S-18	S-19	S-20	S-21	S-22	S-23	S-24	S-29	S-30
Aug-04	0-2 cm	72.1 (City)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sep-04	0-2 cm	335 (UTL)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nov-04	0-2 cm	N/A	N/A	125	N/A	N/A	74	N/A	N/A	N/A	N/A	N/A	N/A
Dec-04	0-3 cm	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	98	113	N/A	N/A
Aug-04	0-10 cm	80 (UTL)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sep-04	0-10 cm	296(City)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nov-04	0-10 cm	140 (UTL) / 240 (City)	220	38.6 (City)	N/A	182	55.7 (City)	N/A	N/A	N/A	N/A	N/A	N/A
Dec-04	0-7 cm	N/A	N/A	N/A	56	N/A	N/A	207	89 (0-8 cm)	N/A	N/A	N/A	N/A
Dec-04	0-10 cm	N/A	N/A	N/A	26.4 (City)	N/A	N/A	147(City)	44.8 (City)	N/A	25.8 (City)	48.6(City)	N/A
May-05	0-10 cm	162	N/A	87	N/A	N/A	N/A	N/A	N/A	N/A	59	N/A	N/A
May-06	0-10 cm	15	N/A	9	N/A	16	N/A	N/A	N/A	N/A	11	N/A	N/A
May-07	0-10 cm	10 (12)	N/A	15	N/A	11	N/A	N/A	N/A	N/A	23	N/A	N/A
May-08	0-10 cm	23	N/A	42	N/A	31	N/A	N/A	N/A	N/A	40	N/A	N/A

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Table 4-8. Zinc Concentration in mg/kg

Early Warning (0 - 2 cm unless otherwise noted)

Date	RC-01	RC-02	RC-03	RC-04	RC-05	RC-06	RC-07	RC-08	RC-09	RC-10	RC-11	RC-12	RC-13	RC-14	RC-14B
Apr-04	74.3	71	115	70	70	56	40.6	33	53.3	43.7	82.8	43.9	99.3	167	N/A
Aug-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	99.6 (City) / 86.3 (UTL)	N/A	N/A	N/A	N/A
Sep-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	205 (City) / 280 (UTL)	N/A	N/A	N/A	N/A
Dec-04	71.9	164 (0-8 cm)	90 (0-12 cm)	128 (0-9 cm)	117 (0-11 cm)	153 (0-5 cm)	238 (0-4 cm)	180 (0-5 cm)	126 (0-6 cm)	182 (0-3 cm)	N/A	241 (0-3 cm)	71.2	135	N/A
May-05	289	261	123	254	187	216	141	215	211	203	231	217	118	203	117
May-06	287	254	166	108	189	121	169	150	158	52	56.9	59.9	208	219	194
May-07	380	**539**	113	227	220	227	173	184 (194)	221	102	195	109	256	209	N/A
May-08	308	**452**	108	161	242	265	256	208	275	99 (106)	273	157	224	375	N/A
May-09	448	**473 (438)**	190	257	268	266	371	266	286	124	353	181	342	325	N/A

Waterway Cap (0 - 10 cm unless otherwise noted)

Date	WC-01	WC-02	WC-03	WC-04	WC-05	WC-06	WC-07	WC-08	WC-09	WC-10	WC-11	WC-12	WC-13	WC-14
Apr-04	41	58	63	52.2	48	38.8	30.7	31.8	37.4	34.5	60.5	35.9	38.5	34.4
Aug-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	90.3 (City)	44.8 (City)	N/A	N/A
Sep-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	239 (City)	N/A	N/A	N/A
Nov-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	135 (UTL) / 168 B (City)	89.7 B (City)	N/A	N/A
Dec-04	68.5	107 B (City)	93 B (City)	95	138	N/A	93	N/A	81	66	N/A	111	N/A	N/A
May-05	N/A	127	N/A	113	111	N/A	62.2	N/A	N/A	54.9 B (City)	257	N/A	N/A	N/A
May-06	269	252	99	133	63	80.7	112	134	130	44	44.2	39.4	116	160
May-07	N/A	N/A	N/A	N/A	N/A	N/A	N/A	184 (194)	221	49	195	62	N/A	N/A
May-08	324	348	96	152	255	145	222	176	202	51 (51)	165	100	106	209

Core Samples

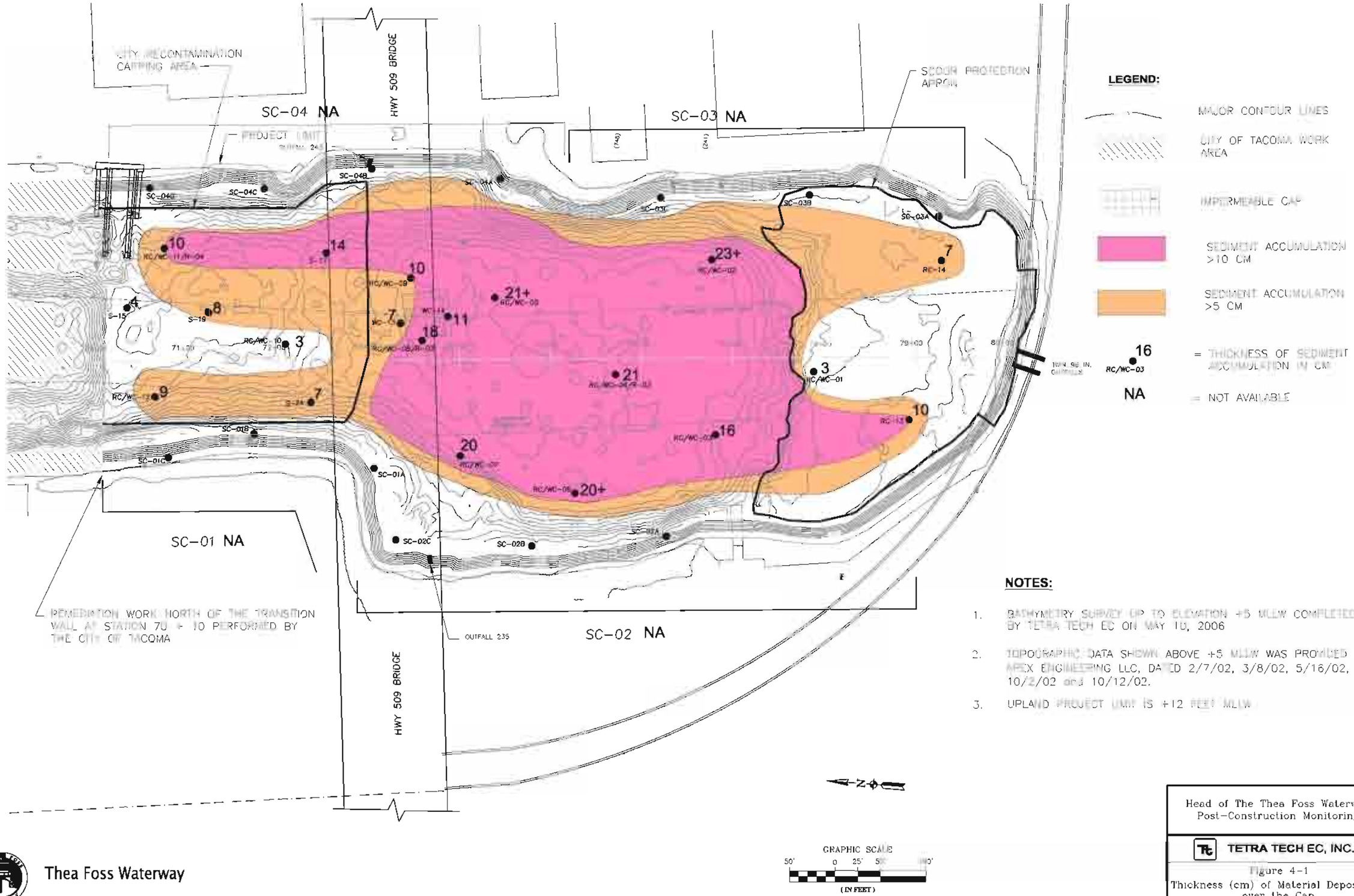
Date	Depth Below Mudline	WC-01B	Depth Below Mudline	WC-04	Depth Below Mudline	WC-05	Depth Below Mudline	WC-06	Depth Below Mudline	WC-10	Depth Below Mudline	WC-12
Apr-04	N/A	N/A	0-1 ft	35.3	0-1.3 ft	28.9	0-1 ft	39.4	0-1 ft	33.7	0-1.7 ft	34.3
Apr-04	N/A	N/A	1-2 ft	38	N/A	N/A	1-2 ft	40	1-2 ft	35.6	N/A	N/A
Apr-04	N/A	N/A	2-3 ft	36.9	N/A	N/A	N/A	N/A	2-3.3 ft	19.9	N/A	N/A
May-06	2-3 ft	29.5	1.5-3 ft	40.8	1-2.5 ft	34.7	2-3 ft	31.5	1-3 ft	33.7	1-2 ft	38.1
May-08	2.5-3.5 ft	36	5.5-6.5 ft	36	3.7-4.3 ft	31	2.2-2.9 ft / 2.9-3.7 ft	N/A / 39	4.1-5.0 ft	32	0.6-1.4 ft	37

Slope Cap

Date	Depth Below Mudline	SC-01	SC-02	SC-03	SC-04
Apr-04	0-10 cm	33	31.1	36.3	35.7
May-06	0-10 cm	36.6	87.3	169	119
May-08	0-10 cm	37	175	200	147

Supplemental Locations

Date	Depth	S-15	S-16	S-17	S-18	S-19	S-20	S-21	S-22	S-23	S-24	S-29	S-30
Aug-04	0-2 cm	79.6 (City)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sep-04	0-2 cm	363 (UTL)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nov-04	0-2 cm	N/A	N/A	173	N/A	N/A	111	N/A	N/A	N/A	N/A	N/A	N/A
Dec-04	0-3 cm	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	145	175	N/A	N/A
Aug-04	0-10 cm	79.6 (UTL)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sep-04	0-10 cm	360 (City)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nov-04	0-10 cm	179 (UTL) / 232 B (City)	279	64.3 B (City)	N/A	220	83.9 B (City)	N/A	N/A	N/A	N/A	N/A	N/A
Dec-04	0-7 cm	N/A	N/A	N/A	122	N/A	N/A	257	133 (0-8 cm)	N/A	N/A	N/A	N/A
Dec-04	0-10 cm	N/A	N/A	N/A	54.6 B (City)	N/A	N/A	159 B (City)	71.6 B (City)	N/A	48.6 B (City)	N/A	N/A
May-05	0-10 cm	200	N/A	134	N/A	N/A	N/A	N/A	N/A	N/A	105	71.7 B (City)	N/A
May-06	0-10 cm	58.8	N/A	43.4	N/A	50	N/A	N/A	N/A	N/A	40.3	N/A	N/A
May-08	0-10 cm	55 (52)	N/A	58	N/A	55	N/A	N/A	N/A	N/A	69	N/A	N/A
May-08	0-10 cm	77	N/A	122	N/A	83	N/A	N/A	N/A	N/A	115	N/A	N/A



NOTES:

1. BATHYMETRY SURVEY UP TO ELEVATION +5 MLLW COMPLETED BY TETRA TECH EC ON MAY 10, 2006
2. TOPOGRAPHIC DATA SHOWN ABOVE +5 MLLW WAS PROVIDED BY APEX ENGINEERING LLC, DATED 2/7/02, 3/8/02, 5/16/02, 10/2/02 and 10/12/02.
3. UPLAND PROJECT LIMIT IS +12 FEET MLLW

Thea Foss Waterway

Head of The Thea Foss Waterway
Post-Construction Monitoring

TETRA TECH EC, INC.

Figure 4-1
Thickness (cm) of Material Deposited over the Cap
May 2009

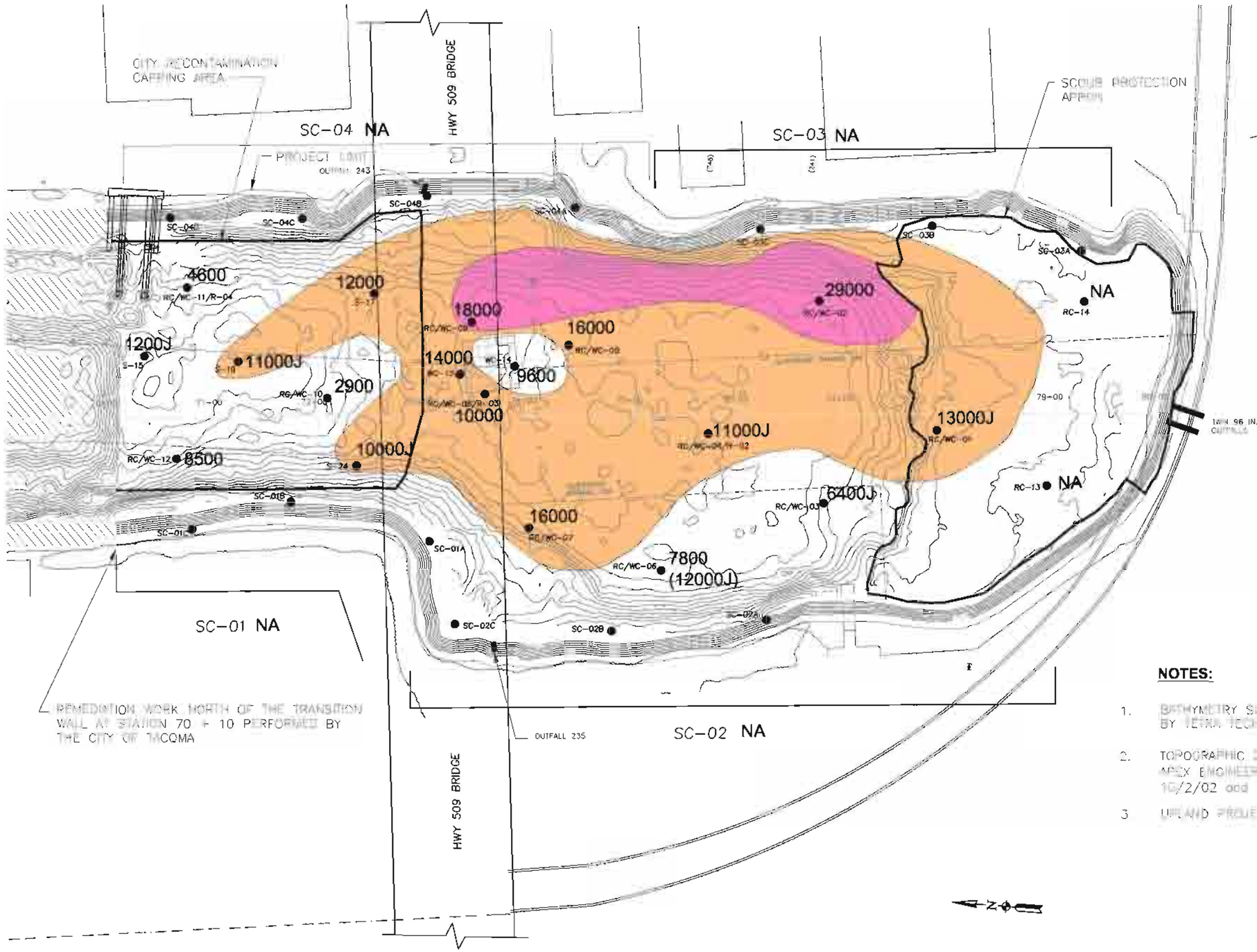
P:\2562_THEA FOSS\THEA FOSS\OMMP\YEAR 5\CAD\DWCS-NEW\FOSSFIGURE 4-1.DWG
PLOT/UPDATE: JUL 29 2009

Head of The Thea Foss Waterway
Post-Construction Monitoring

TETRA TECH EC, INC.

Figure 4-2
BEHP Concentration
0-10 cm Sediment
May 2009

P:\2562_THEA FOSS\THEA FOSS\OMMP\YEAR 5\CAD\DWGS-NEW\FOSSFIGURE 4-2.DWG
PLOT/UPDATE: JUL 27 2009



LEGEND:

- MAJOR CONTOUR LINES
- CITY OF TACOMA WORK AREA
- IMPERMEABLE CAP
- [HPAH] > 17,000 µg/kg
- HPAH SQS = 17,000 µg/kg
- [HPAH] > 10,000 to 17,000 µg/kg
- HPAH = High molecular weight Polycyclic Aromatic Hydrocarbons
- 6400J (RC/WC-03) = HPAH CONCENTRATION IN µg/kg
- NA = NOT AVAILABLE
- J = ESTIMATED VALUE

NOTES:

1. BATHYMETRY SURVEY UP TO ELEVATION +5 MLLW COMPLETED BY TETRA TECH EC ON MAY 10, 2006
2. TOPOGRAPHIC DATA SHOWN ABOVE +5 MLLW WAS PROVIDED BY APEX ENGINEERING LLC, DATED 2/7/02, 3/8/02, 5/16/02, 10/2/02 and 10/12/02.
3. UPLAND PROJECT DATUM IS +12 FEET MLLW.

GRAPHIC SCALE
50' 0 25' 50' 100'
(IN FEET)

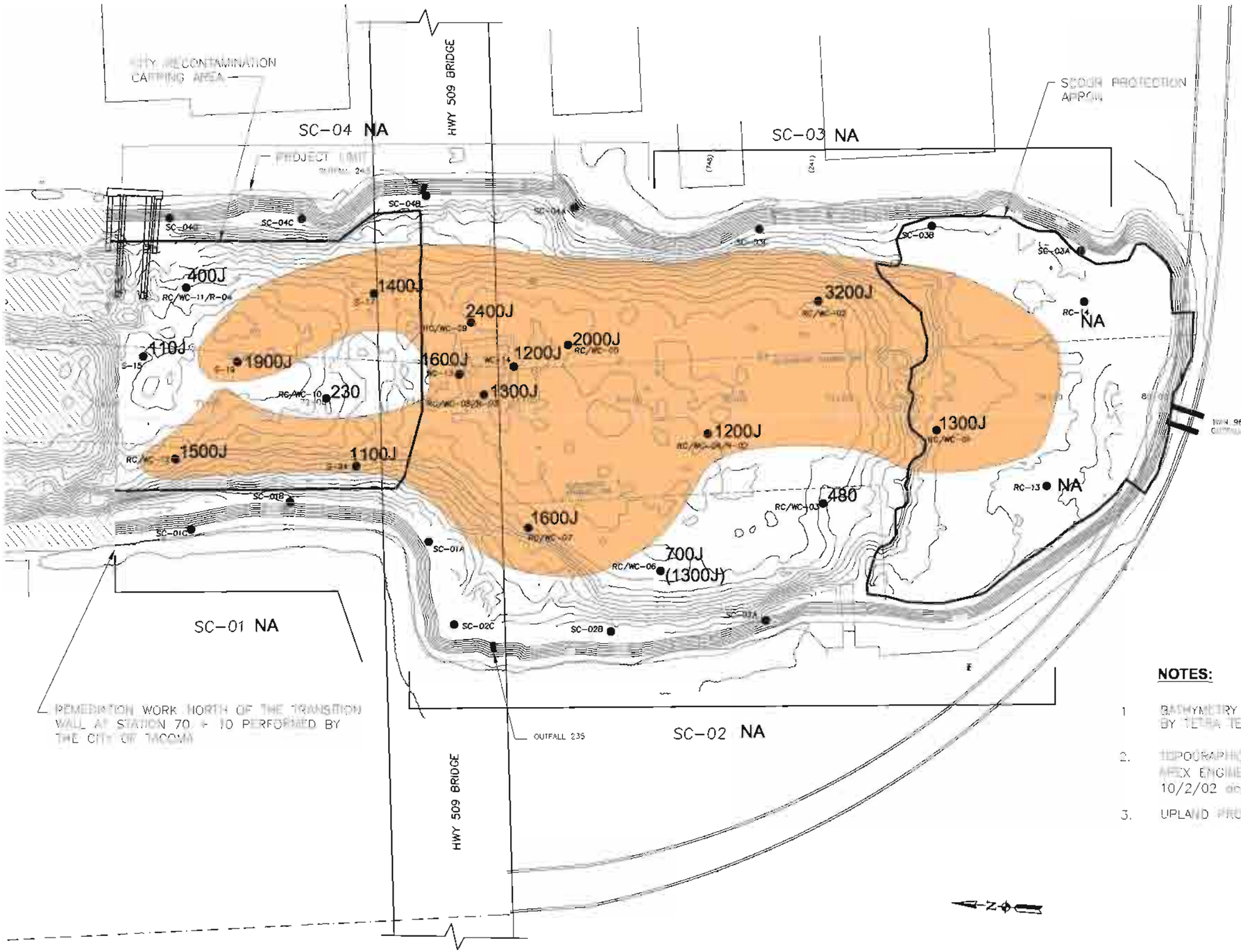
Thea Foss Waterway

Head of The Thea Foss Waterway
Post-Construction Monitoring

TETRA TECH EC, INC.

Figure 4-3
HPAH Concentration
0-10 cm Sediment
May 2009

P:\2562_THEA FOSS\THEA FOSS\OMMP\YEAR 5\CAD\DWGS\FOSSFIGURE 4-3.DWG
PLOT/UPDATE: JUL 23 2009



LEGEND:

MAJOR CONTOUR LINES

CITY OF TACOMA WORK AREA

IMPERMEABLE CAP

[LPAH] > 5,200 µg/kg

LPAH SQO = 5,200 µg/kg

[LPAH] > 1,000 to 5,200 µg/kg

LPAH = Low molecular weight Polycyclic Aromatic Hydrocarbons

480 (RC/WC-03) = LPAH CONCENTRATION IN µg/kg

NA = NOT AVAILABLE

J = ESTIMATED VALUE

NOTES:

1. BATHYMETRY SURVEY UP TO ELEVATION +5 MLLW COMPLETED BY TETRA TECH EC ON MAY 10, 2006
2. TOPOGRAPHIC DATA SHOWN ABOVE +5 MLLW WAS PROVIDED BY APEX ENGINEERING LLC, DATED 2/7/02, 3/8/02, 5/16/02, 10/2/02 and 10/12/02.
3. UPLAND PROJECT LIMIT IS +12 FEET MLLW

GRAPHIC SCALE
50' 0 25' 50' 100'
(IN FEET)

Thea Foss Waterway

Head of The Thea Foss Waterway
Post-Construction Monitoring

TETRA TECH EC, INC.

Figure 4-4
LPAH Concentration
0-10 cm Sediment
May 2009

P:\2562_THEA FOSS\THEA FOSS\OMMP\YEAR 5\CAD\DWGS\FOSSFIGURE 4-4.DWG
PLOT/UPDATE: JUL 27 2008

NOTES:

1. BATHYMETRY SURVEY UP TO ELEVATION +5 MLLW COMPLETED BY TETRA TECH EC ON MAY 10, 2006
2. TOPOGRAPHIC DATA SHOWN ABOVE +5 MLLW WAS PROVIDED BY APEX ENGINEERING LLC, DATED 2/7/02, 3/8/02, 5/16/02, 10/2/02 and 10/12/02.
3. UPLAND PROJECT LIMIT IS +12 FEET MLLW

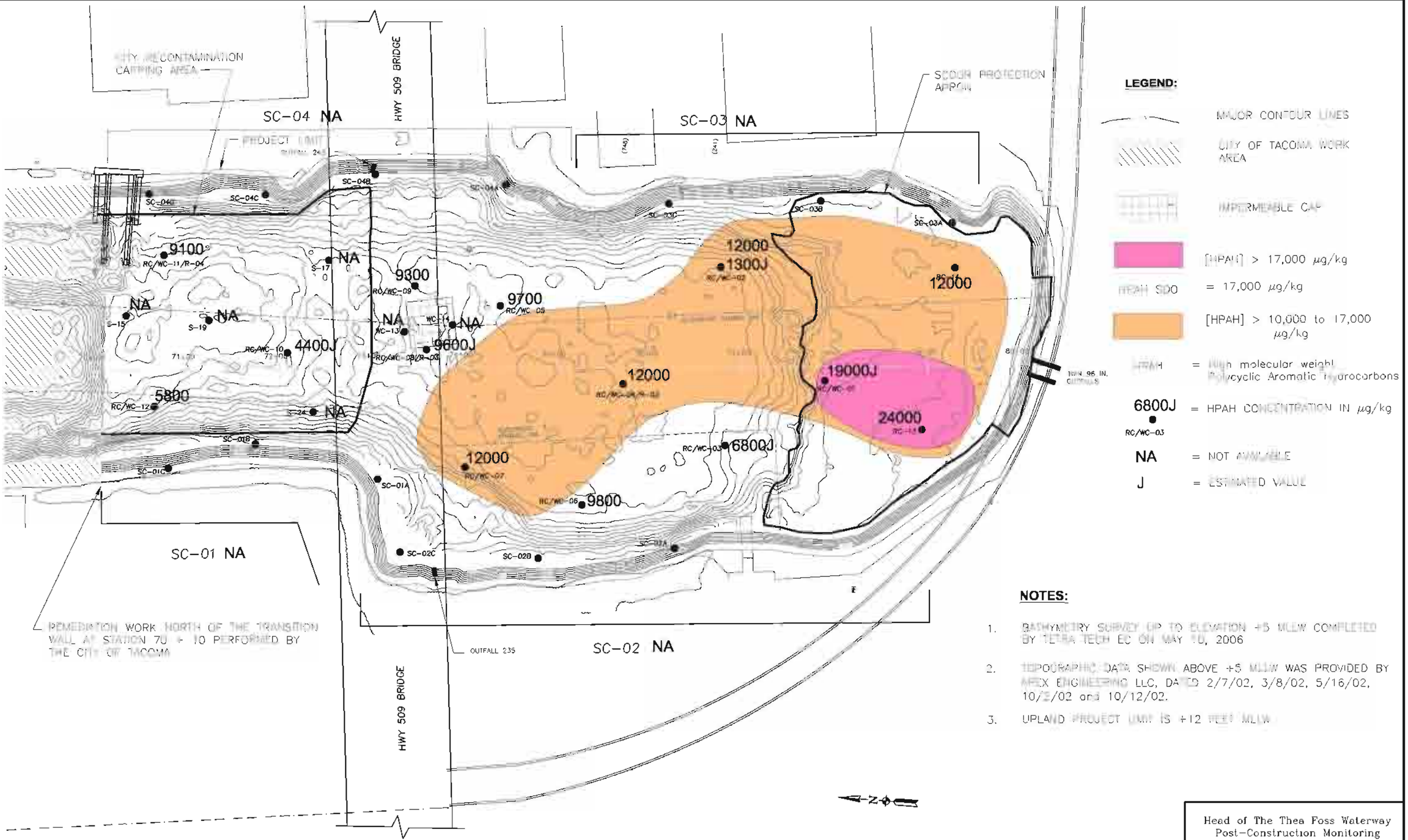
Thea Foss Waterway

Head of The Thea Foss Waterway
Post-Construction Monitoring

TETRA TECH EC, INC.

Figure 4-5
BEHP Concentration
0-2 cm Sediment
May 2009

P:\2562_THEA FOSS\THEA FOSS\OMMP\YEAR 5\CAD\DWGS\FOSSFIGURE 4-5.DWG
PLOT/UPDATE: JUL 27 2009



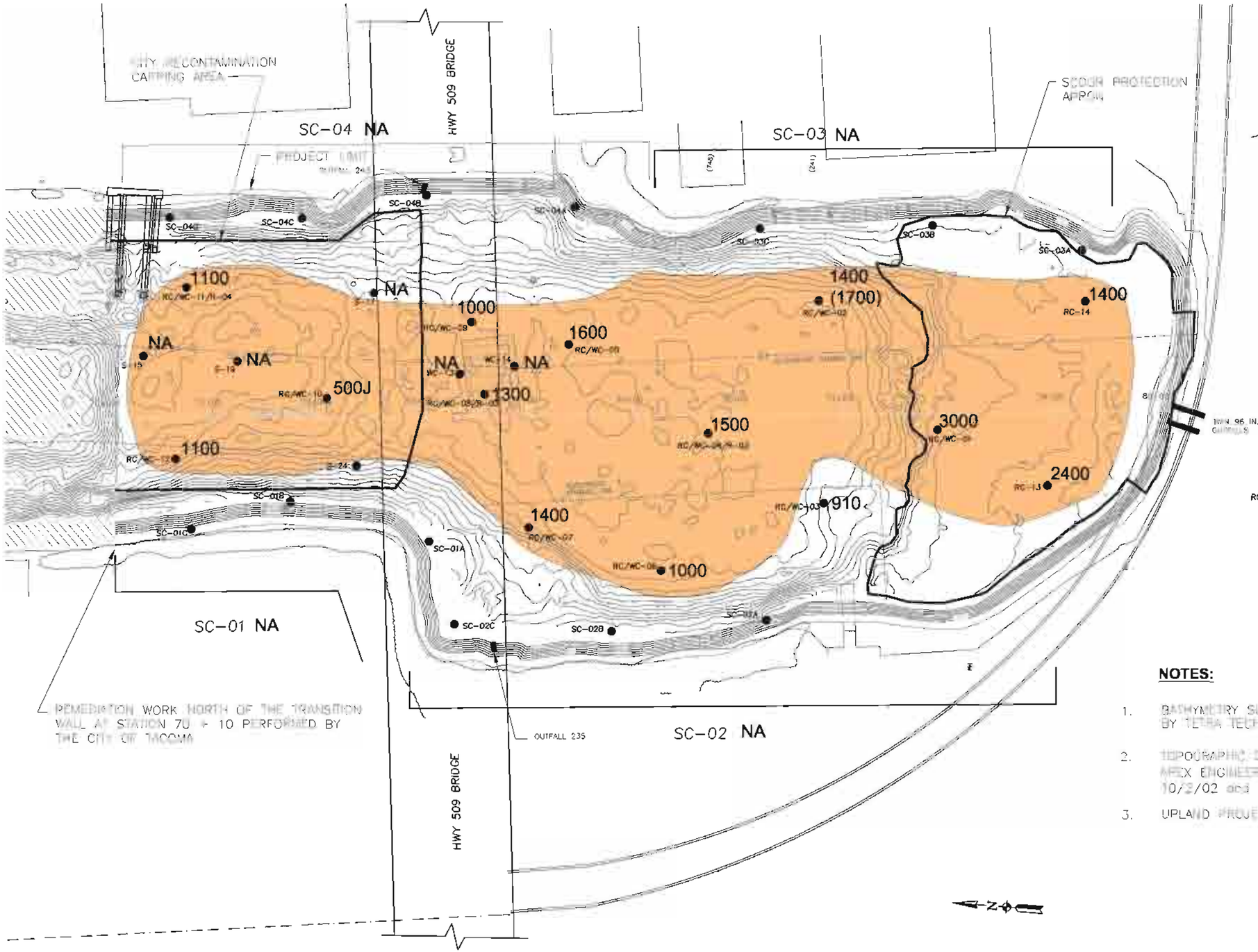
Thea Foss Waterway

Head of The Thea Foss Waterway
Post-Construction Monitoring

TETRA TECH EC, INC.

Figure 4-6
HPAH Concentration
0-2 cm Sediment
May 2009

P:\2562_THEA FOSS\THEA FOSS\OMMP\YEAR 5\CAD\DWGS\FOSSFIGURE 4-6.DWG
PLOT/UPDATE: JUL 27 2009



LEGEND:

MAJOR CONTOUR LINES

CITY OF TACOMA WORK AREA

IMPERMEABLE CAP

[LPAH] > 5,200 µg/kg

LPAH SQO = 5,200 µg/kg

[LPAH] > 1,000 to 5,200 µg/kg

LPAH = Low molecular weight Polycyclic Aromatic Hydrocarbons

910 = LPAH CONCENTRATION IN µg/kg
RC/WC-03

NA = NOT AVAILABLE

J = ESTIMATED VALUE

NOTES:

1. BATHYMETRY SURVEY UP TO ELEVATION +5 MLLW COMPLETED BY TETRA TECH EC ON MAY 10, 2006
2. TOPOGRAPHIC DATA SHOWN ABOVE +5 MLLW WAS PROVIDED BY APEX ENGINEERING LLC, DATED 2/7/02, 3/8/02, 5/16/02, 10/3/02 and 10/12/02.
3. UPLAND PROJECT LIMIT IS +12 FEET MLLW

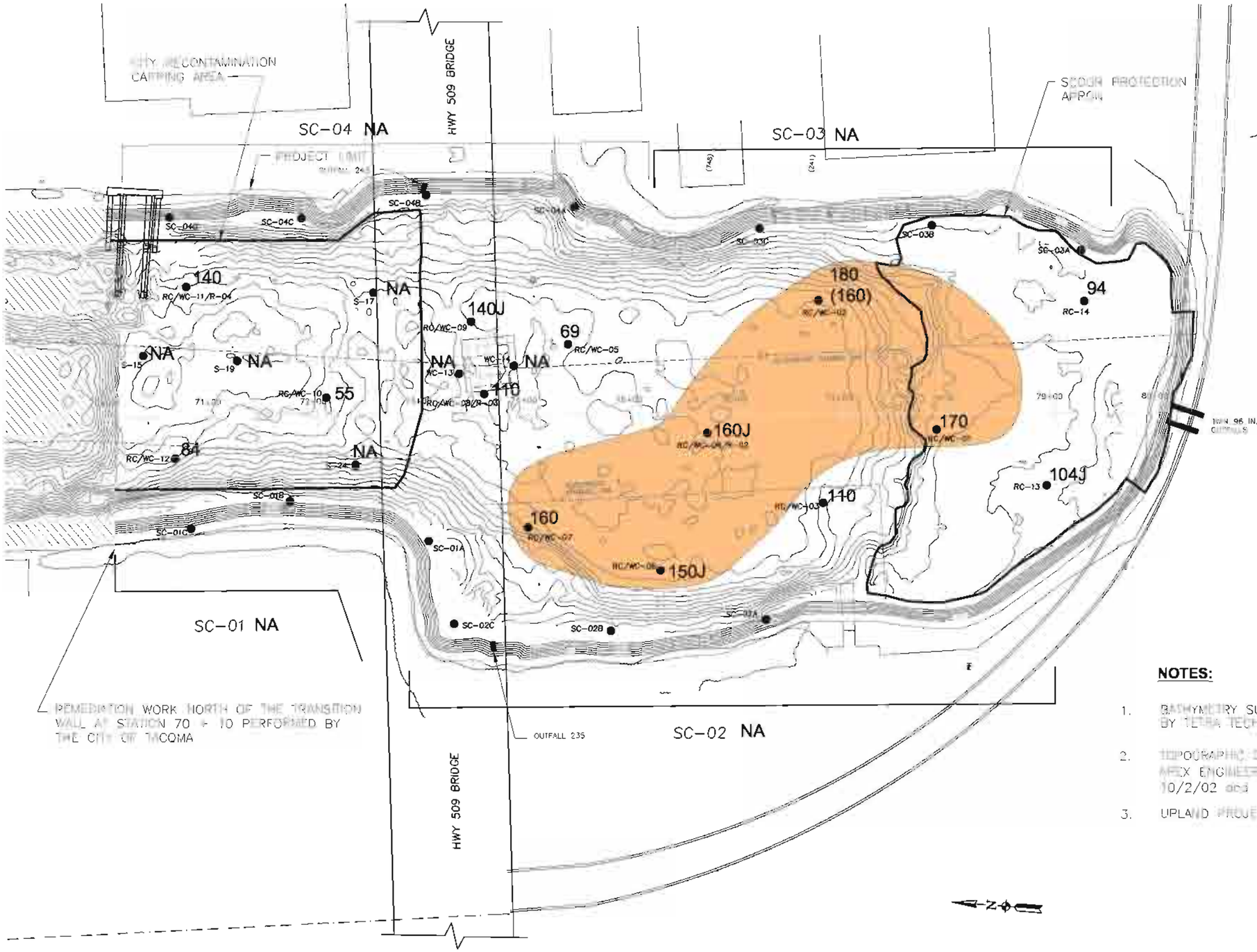
Thea Foss Waterway

Head of The Thea Foss Waterway
Post-Construction Monitoring

TETRA TECH EC, INC.

Figure 4-7
LPAH Concentration
0-2 cm Sediment
May 2009

P:\2562_THEA FOSS\THEA FOSS\OMMP\YEAR 5\CAD\DWGS\FOSSFIGURE 4-7.DWG
PLOT/UPDATE: JUL 27 2009



LEGEND:

- MAJOR CONTOUR LINES
- CITY OF TACOMA WORK AREA
- IMPERMEABLE CAP
- [PCB] > 300 µg/kg
- PCB SQO = 300 µg/kg
- [PCB] > 150 to 300 µg/kg
- TOTAL PCBs = Total Polychlorinated Biphenyls
- 110 (RC/WC-03) = TOTAL PCB CONCENTRATION IN µg/kg
- NA = NOT AVAILABLE
- J = ESTIMATED VALUE

NOTES:

1. BATHYMETRY SURVEY UP TO ELEVATION +5 MLLW COMPLETED BY TETRA TECH EC ON MAY 10, 2006
2. TOPOGRAPHIC DATA SHOWN ABOVE +5 MLLW WAS PROVIDED BY APEX ENGINEERING LLC, DATED 2/7/02, 3/8/02, 5/16/02, 10/2/02 and 10/12/02.
3. UPLAND PROJECT LIMIT IS +12 FEET MLLW

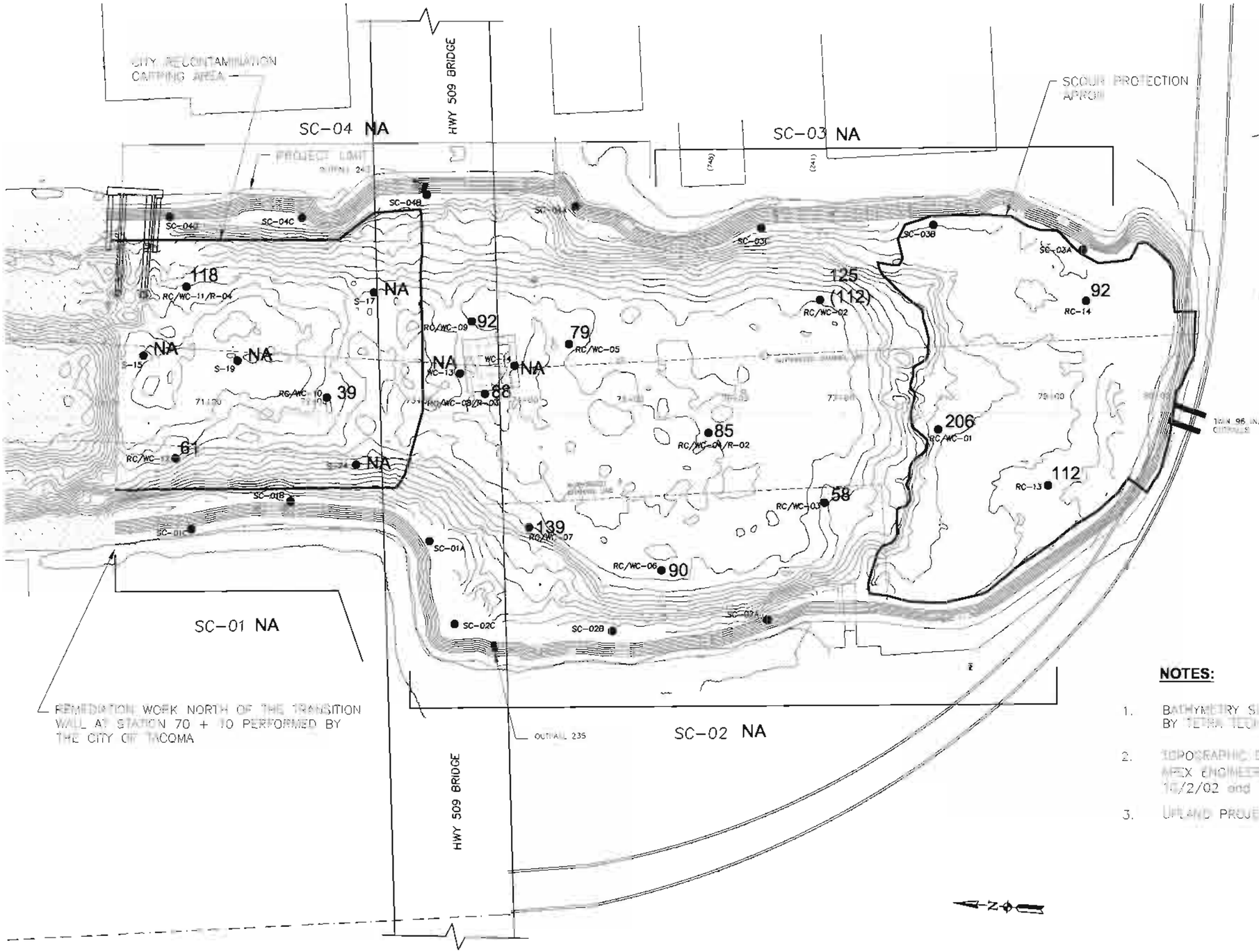
Thea Foss Waterway

Head of The Thea Foss Waterway
Post-Construction Monitoring

TETRA TECH EC, INC.

Figure 4-8
Total PCB Concentration
0-2 cm Sediment
May 2009

P:\2562_THEA FOSS\THEA FOSS\OMMP\YEAR 5\CAD\DWGS\FOSSFIGURE 4-8.DWG
PLOT/UPDATE: JUL 27 2009



LEGEND:

MAJOR CONTOUR LINES

CITY OF TACOMA WORK AREA

IMPERMEABLE CAP

LEAD SQO = 450 mg/kg

58 = LEAD CONCENTRATION IN mg/kg
RC/WC-03

NA = NOT AVAILABLE

NOTES:

1. BATHYMETRY SURVEY UP TO ELEVATION +5 MLLW COMPLETED BY TETRA TECH EC ON MAY 10, 2006
2. TOPOGRAPHIC DATA SHOWN ABOVE +5 MLLW WAS PROVIDED BY APEX ENGINEERING LLC, DATED 2/7/02, 3/8/02, 5/16/02, 10/2/02 and 10/12/02.
3. UPLAND PROJECT DMP IS +12 FEET MLLW

GRAPHIC SCALE
50' 0 25' 50' 100'
(IN FEET)

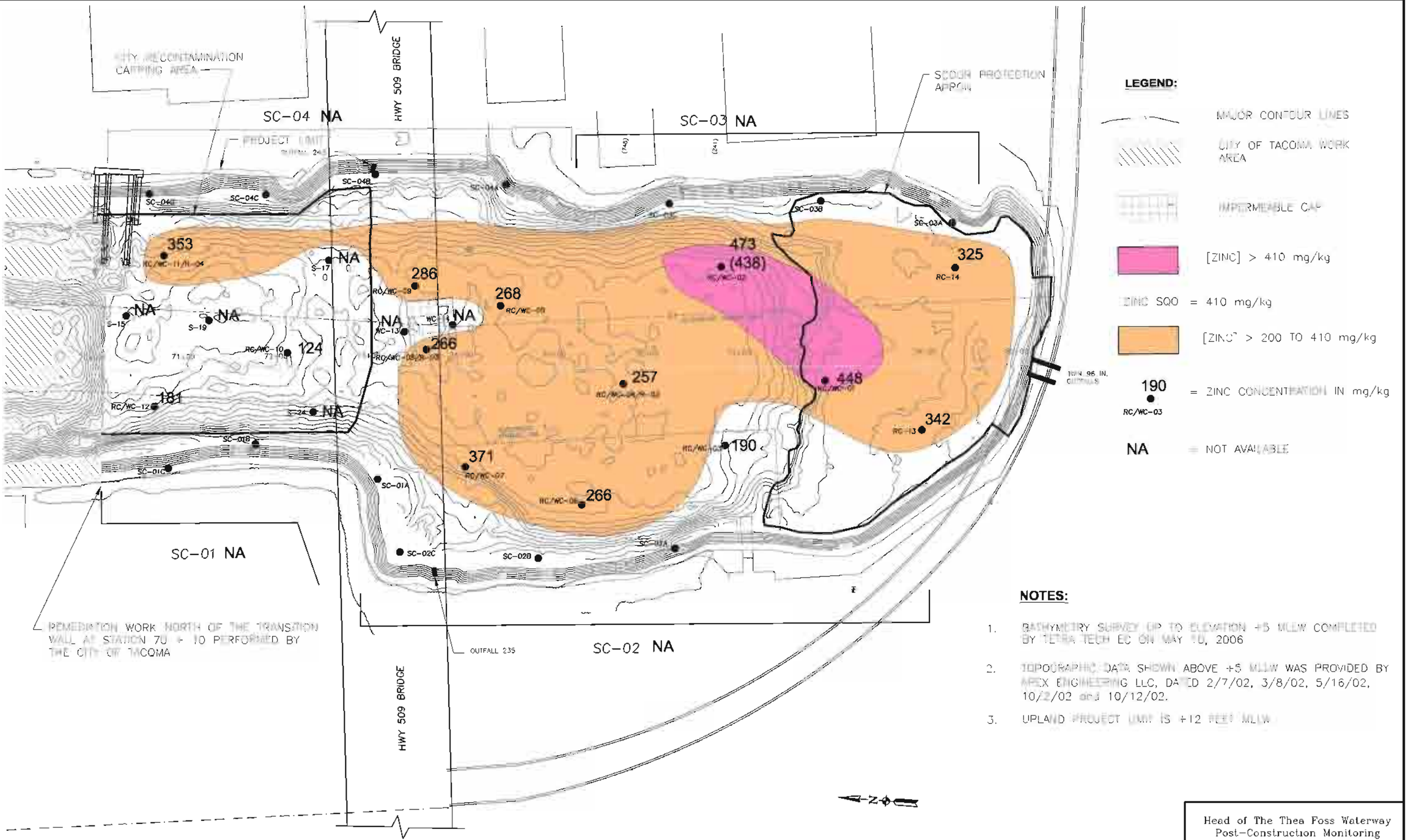
Thea Foss Waterway

Head of The Thea Foss Waterway
Post-Construction Monitoring

TETRA TECH EC, INC.

Figure 4-9
Lead Concentration
0-2 cm Sediment
May 2009

P:\2562_THEA FOSS\THEA FOSS\OMMP\YEAR 5\CAD\DWGS\FOSSFIGURE 4-9.DWG
PLOT/UPDATE: JUL 27 2009



NOTES:

1. BATHYMETRY SURVEY UP TO ELEVATION +5 MLLW COMPLETED BY TETRA TECH EC ON MAY 10, 2006
2. TOPOGRAPHIC DATA SHOWN ABOVE +5 MLLW WAS PROVIDED BY APEX ENGINEERING LLC, DATED 2/7/02, 3/8/02, 5/16/02, 10/2/02 and 10/12/02.
3. UPLAND PROJECT LIMIT IS +12 FEET MLLW

Thea Foss Waterway

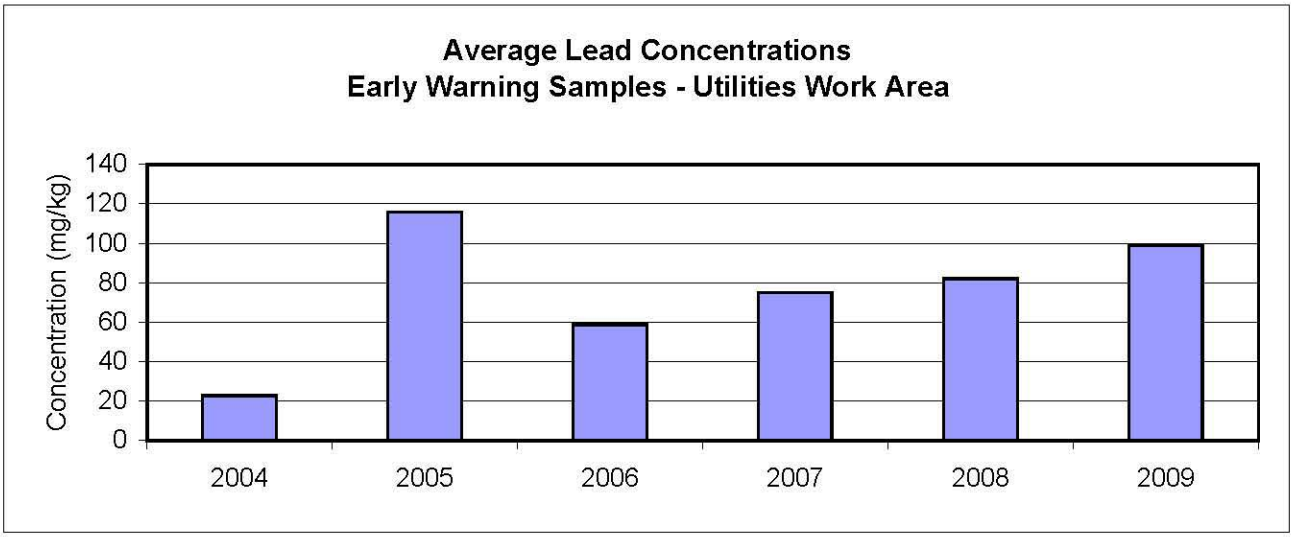
Head of The Thea Foss Waterway
Post-Construction Monitoring

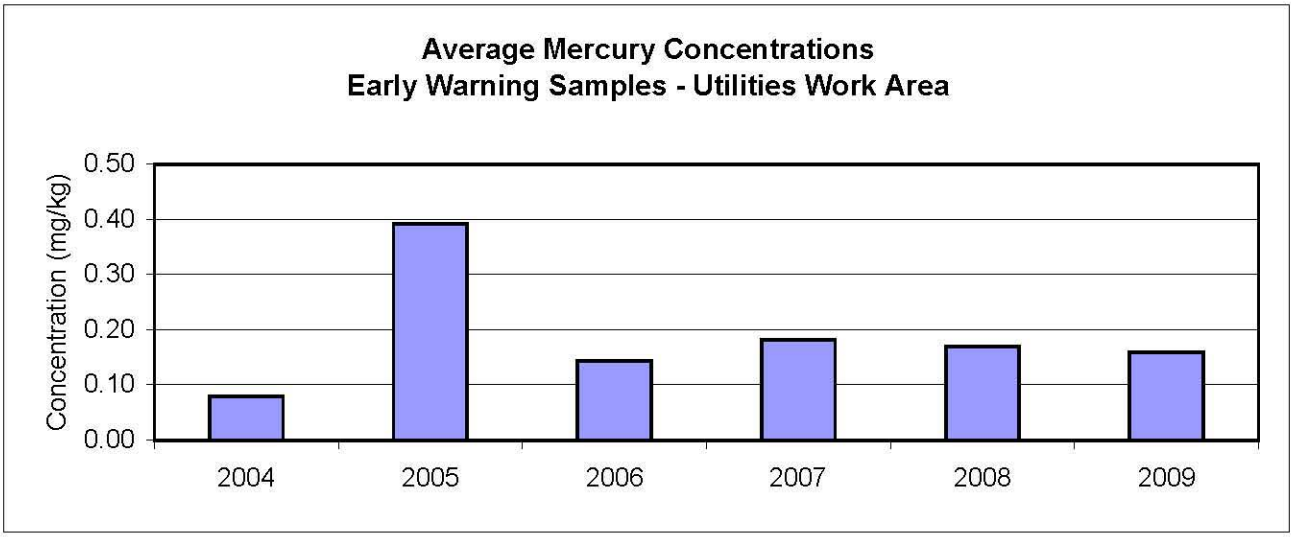
TETRA TECH EC, INC.

Figure 4-10
Zinc Concentration
0-2 cm Sediment
May 2009

P:\2562_THEA FOSS\THEA FOSS\OMMP\YEAR 5\CAD\DWGS\FOSSFIGURE 4-10.DWG
PLOT/UPDATE: JUL 27 2009

Figure 4-11. Average Concentrations of Early Warning Samples RC-01 to RC-14





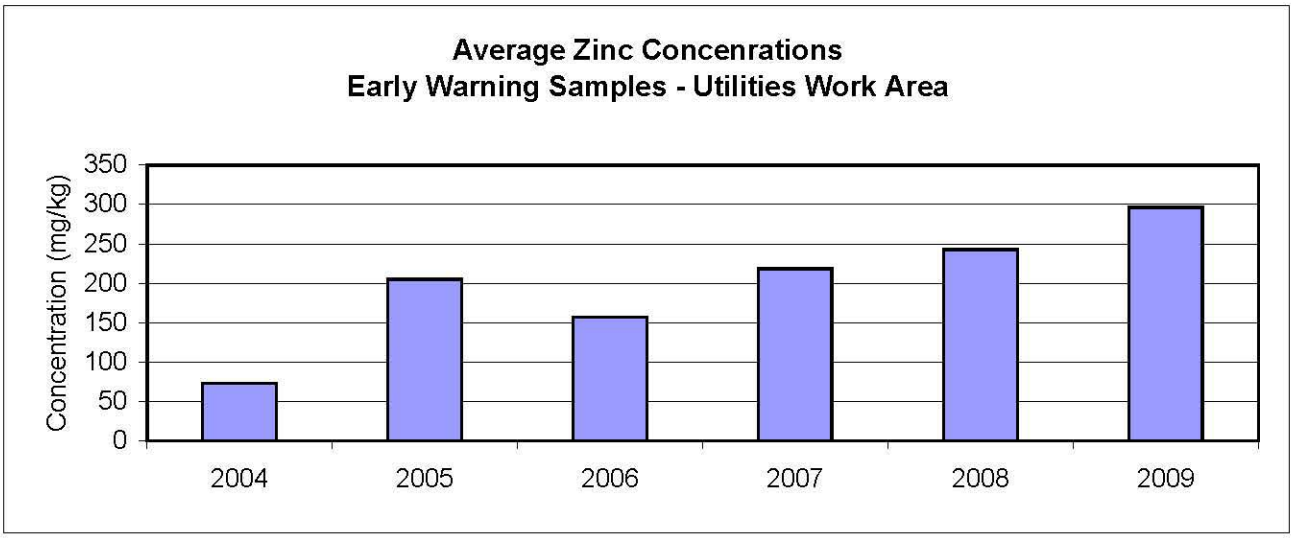
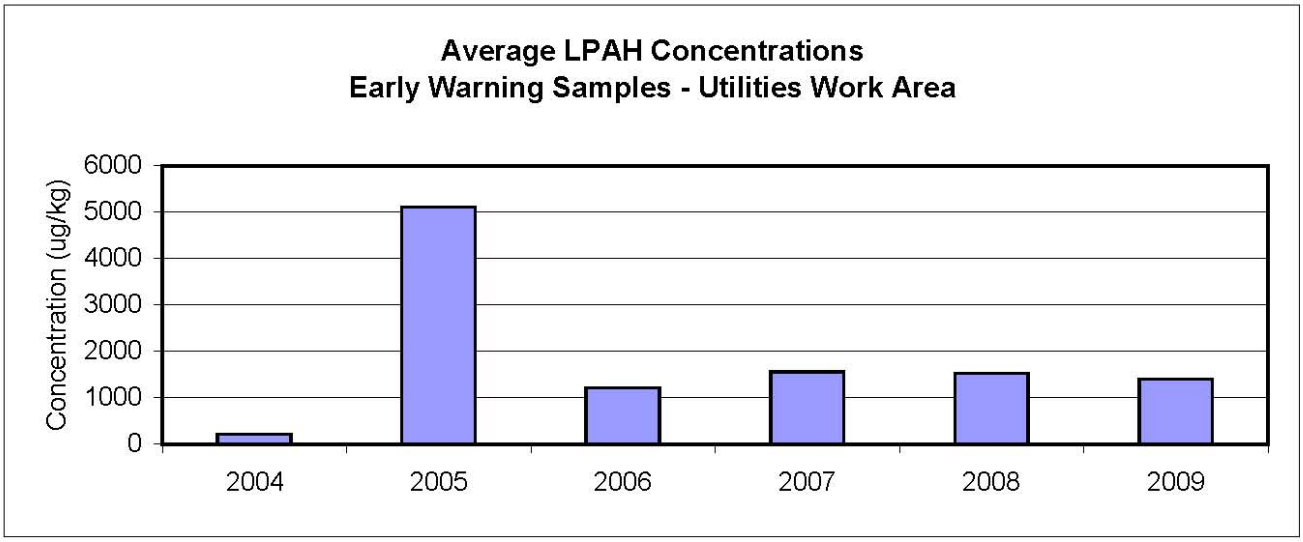
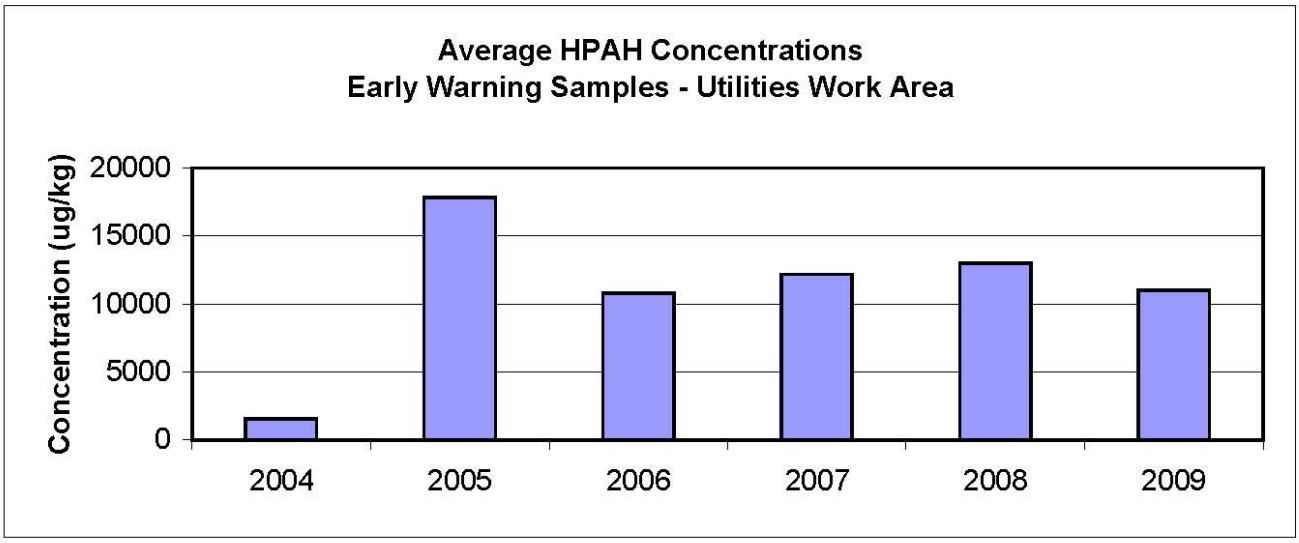


Figure 4-11. Average Concentrations of Early Warning Samples RC-01 to RC-14 (continued)





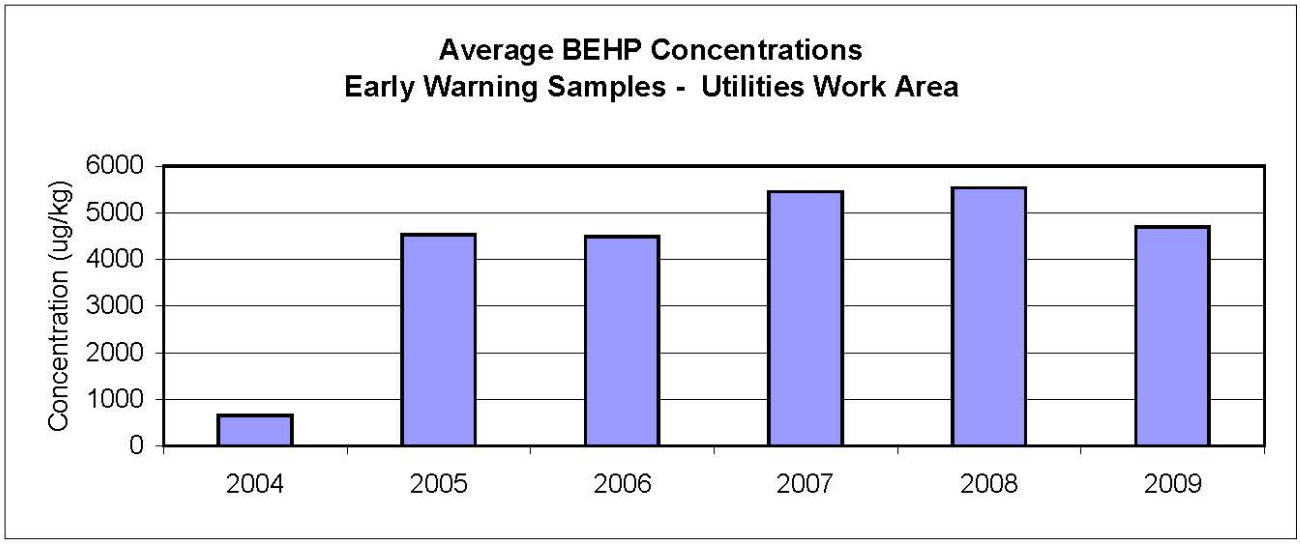
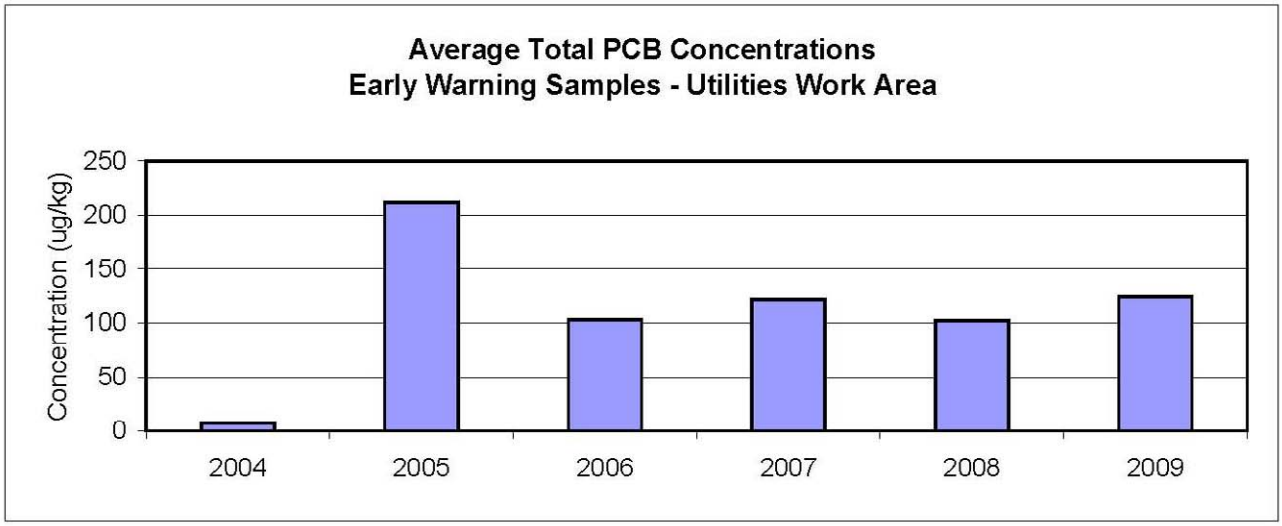
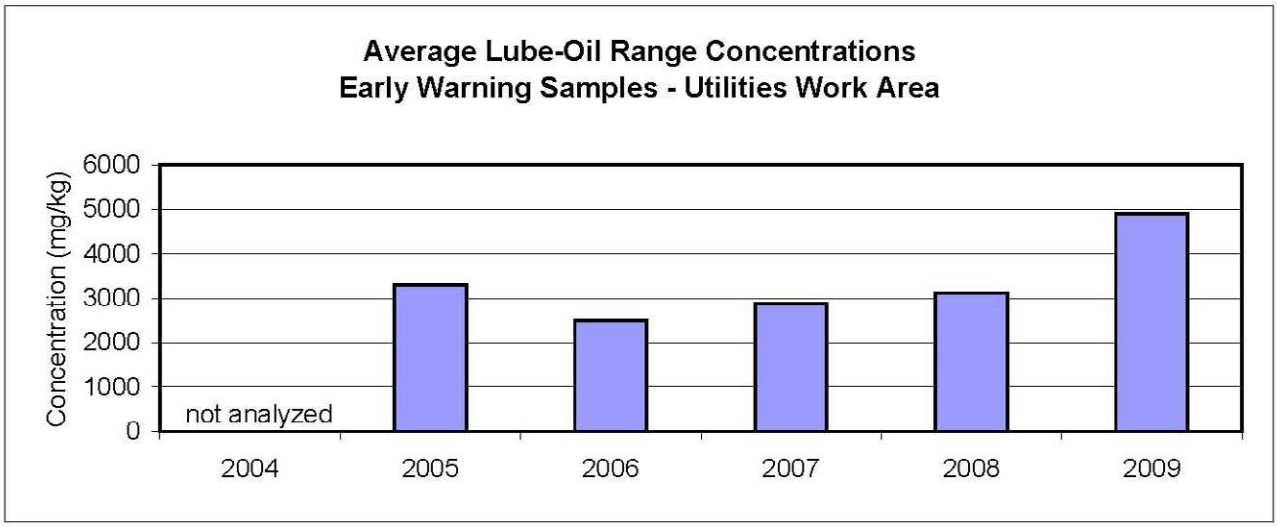


Figure 4-11. Average Concentrations of Early Warning Samples RC-01 to RC-14 (continued)





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5. RECONTAMINATION EVALUATION AND INTERPRETATION

Available data continue to indicate that the top of the Utilities' cap has been recontaminated at levels above the Commencement Bay-Nearshore/Tideflats SQOs. BEHP exceeds the SQOs by the greatest degree and over the widest area. Several individual PAHs and total HPAHs also exceed their respective SQOs at one or more locations. The greatest exceedance of the SQOs occurs at compliance sample location WC-02; BEHP was measured at 10,000 µg/kg with an exceedance factor of 7.7.

A temporary dredging recontamination source was identified in late 2004 (DOF 2005). The area impacted by the dredging recontamination was capped in December 2005 and the Utilities' OMMP was revised to account for the presence of this recontamination.

An additional source of recontamination is on-going stormwater outfalls. The results of an evaluation of a variety of data documenting the conclusion that the recontamination sources are stormwater outfalls that discharge to the head of the waterway were documented in Appendix J of the Year 2 OMMP report (DOF 2006) and in Appendix G.

Figure 5-1 illustrates how the average thicknesses of accumulated sediment in the small boat turning basin south of the SR 509 Bridge generally increased between April 2004 and May 2009. By May 2009, the average thickness was greater than 18 cm in the turning basin. Sediment thicknesses north of the bridge in the City capping area generally increased as well. Accumulation of sediment appears to be occurring beneath the SR 509 Bridge and along the eastern bank. For example, at location S-17, the sediment accumulation increased from 4 cm in May 2008 to 14 cm in May 2009.

Figure 5-1 also shows the average fines content and total organic carbon content (TOC) of early warning sediment samples collected in the turning basin May 2005 and May 2009. The percent fines content ranged between approximately 40 and 60% while TOC ranged between approximately 5 and 7%. The highest average fines and TOC contents were observed in May 2009.

As noted in previous reports, the accumulated fine-grained sediment is distinctly different from the more granular underlying capping material. The capping material contains generally less than 4 percent fines and a substantially lower TOC content when compared to results observed from accumulated sediment. The waterway capping material is composed of clean, silty sand mixed with an organic carbon source to increase the TOC content of the cap. Testing of core samples soon after the cap was installed indicated a TOC content of approximately 0.4% (DOF 2004). Comparatively, the average TOC content of early

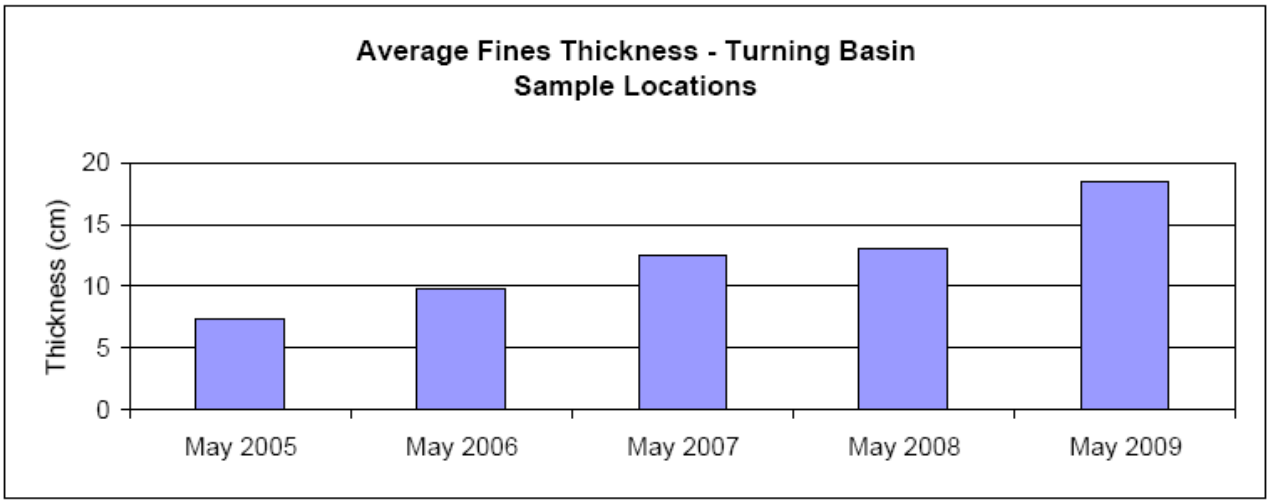
warning sediment samples collect between May 2005 and 2009 is approximately between 5 and 7% (Figure 5-1).

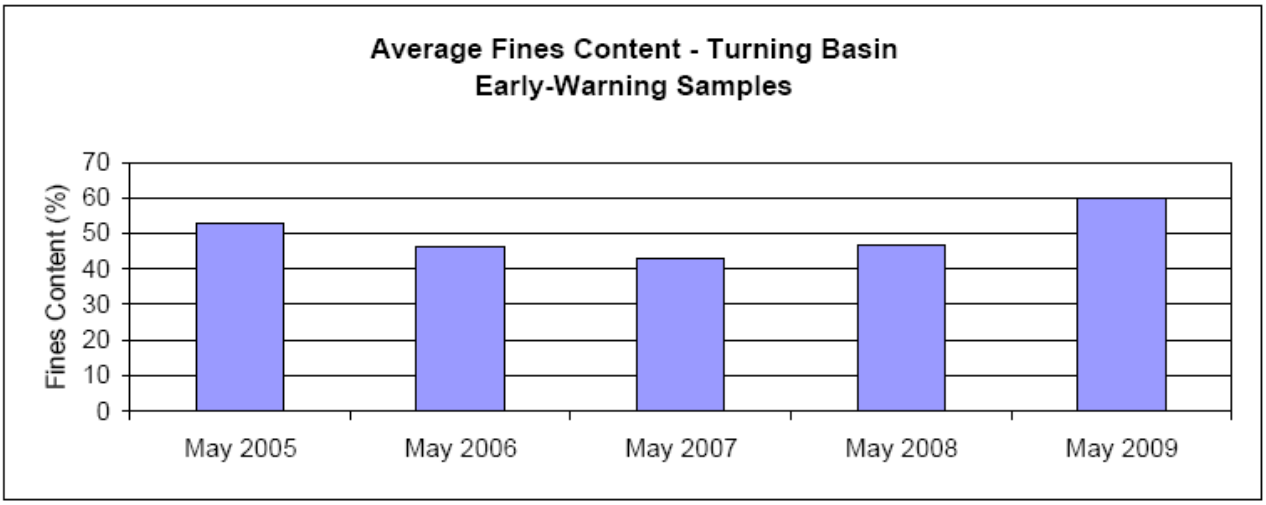
The source of accumulated fine-grained sediment above the capping material is predominantly stormwater that discharges to the head of the waterway. This finding is based on comparison of the chemical quality of the accumulated fine-grained sediment with stormwater sediment (collected by in-line sediment traps) that discharges to the waterway. Stormwater sediment contains a typical suite of chemicals. These chemicals include petroleum hydrocarbons, metals, and organic chemicals such as PAHs and phthalates. Pesticides and PCBs are also commonly detected in stormwater sediments.

Previous analyses (DOF 2006, 2007, and 2008) documented a high correlation between HPAHs and BEHP in surface sediment samples collected within the Utilities' Work Area and a similarity in trends between the surface sediment and stormwater sediment discharged to the head of the waterway. The high correlation (R=0.79 to R=0.92) continued in the 2009 sediment samples as illustrated on Figure 5-2. Figure 5-3 also shows how the 2009 early warning sample results compare with the results of samples analyzed between 2004 and 2008. Theses data continue to support that BEHP and HPAH are derived from a similar source (i.e., stormwater). The HPAH and BEHP trend relationship in early-warning sediment samples is similar to the trend relationship of stormwater sediment samples collected near the end of the Twin 96 outfalls. These data indicate that the Twin 96 outfalls are the primary source of PAHs and BEHP to the Head of the Thea Foss Waterway.

Additional details of this evaluation are included in Appendix G.

Figure 5-1. Characteristics of Early Warning Sample Sediment





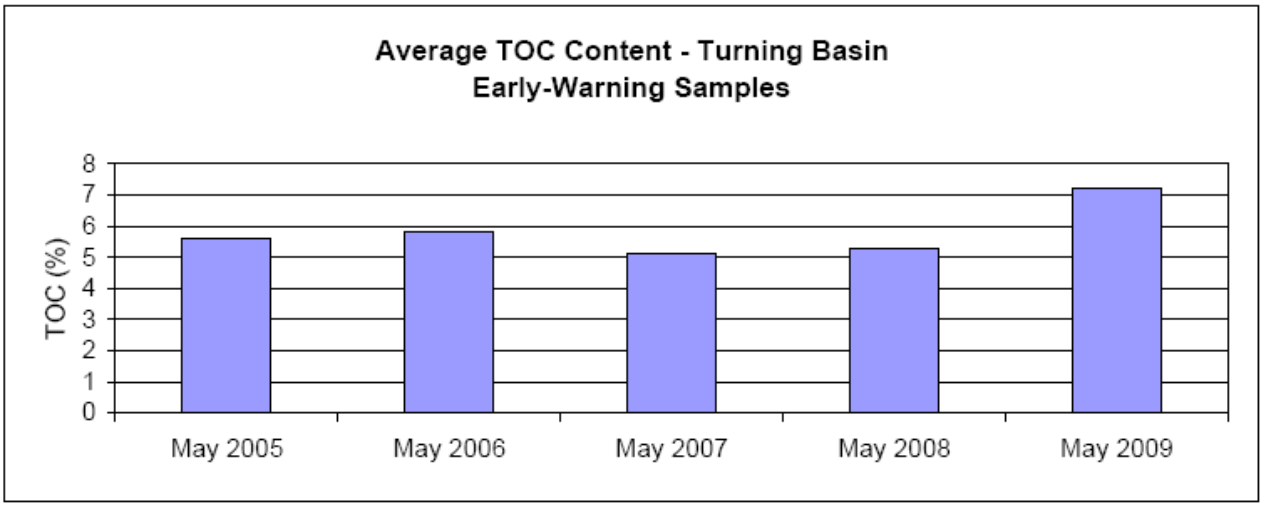
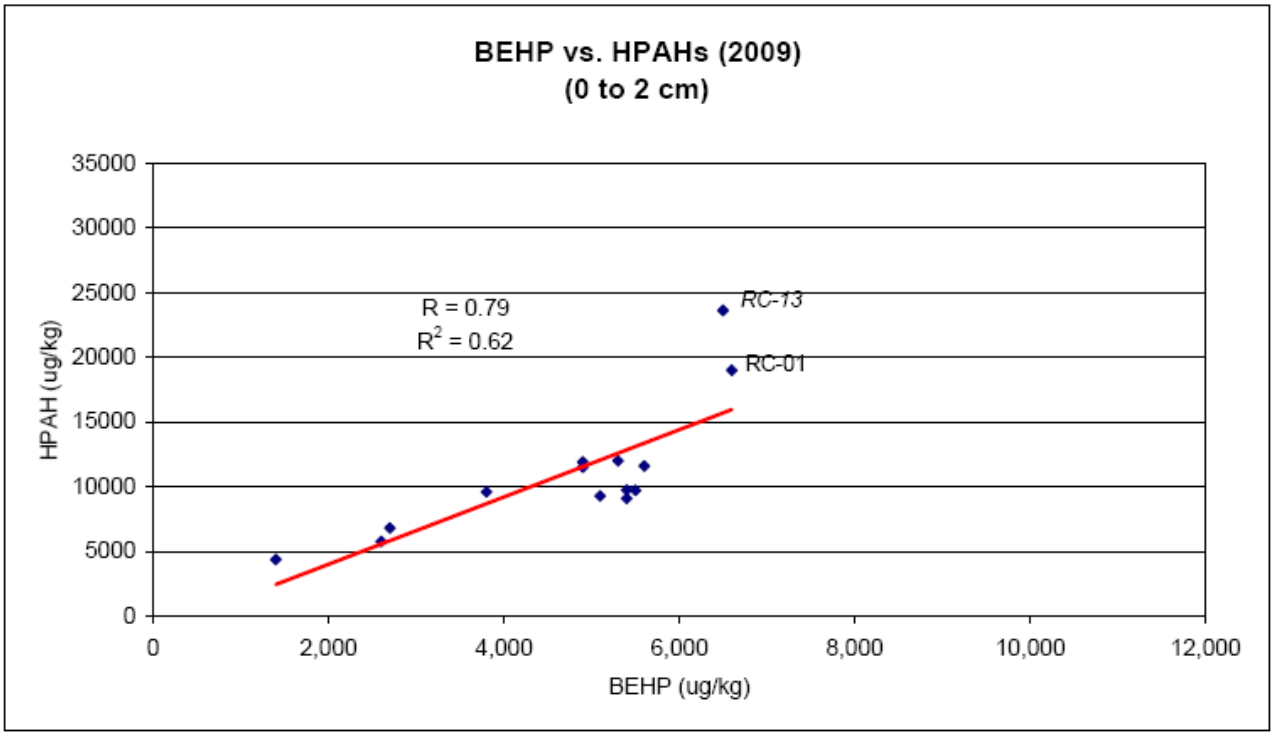


Figure 5-2. HPAH vs. BEHP Concentrations for Early Warning (0 to 2 cm) Samples and Compliance (0 to 10 cm) Samples



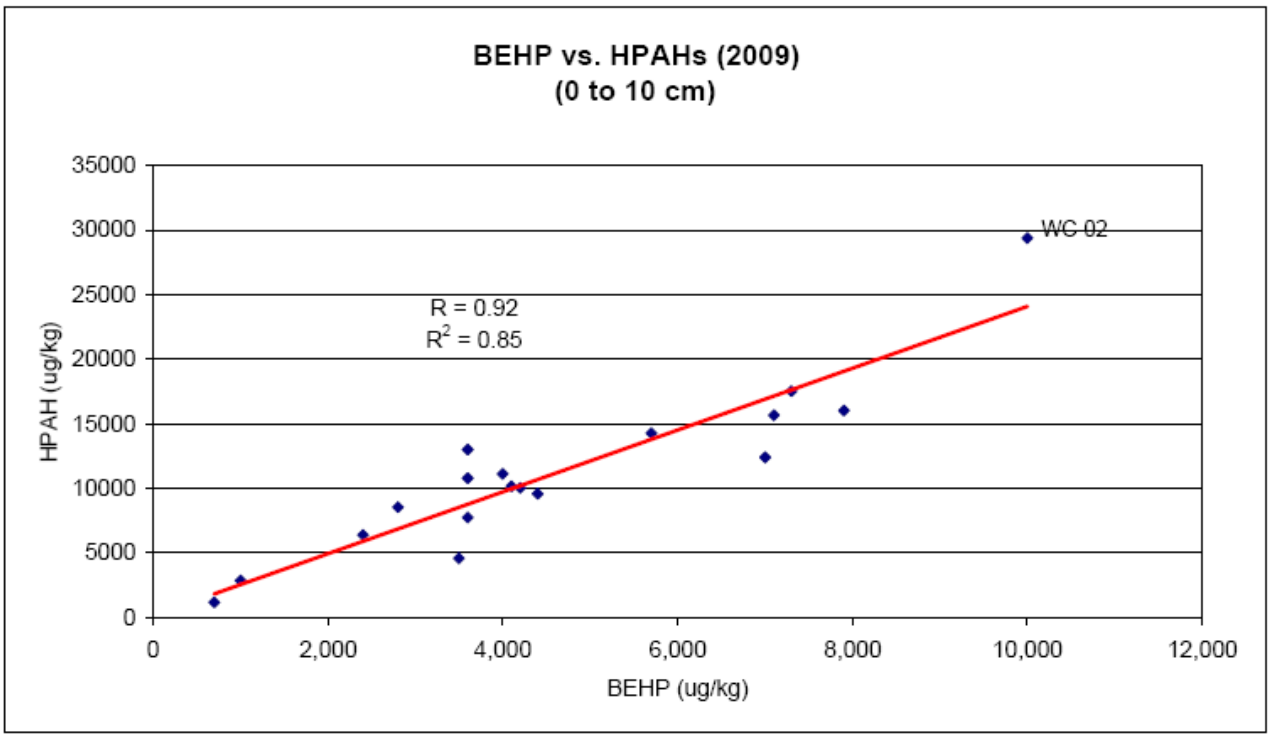
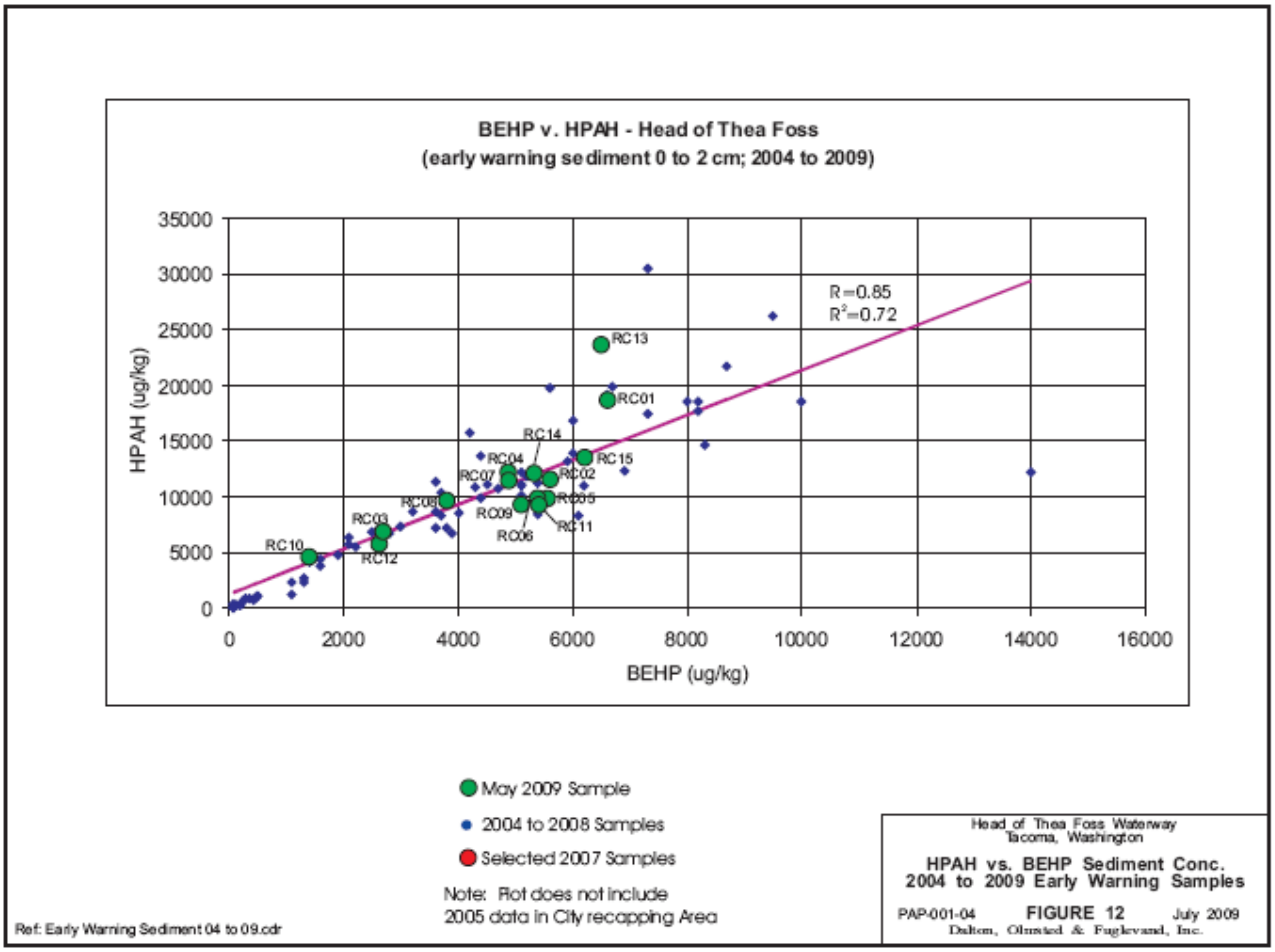


Figure 5-3. HPAH vs. BEHP Sediment Concentrations 2004-2009 Early Warning Samples



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6. SUMMARY

Remediation of the Utilities' Work Area was completed with final placement of capping material in February 2004. OMMP sampling was completed in April 2004 (Year 0 – baseline), May 2005 (Year 1), May 2006 (Year 2), May 2007 (Year 3), May 2008 (Year 4), and May 2009 (Year 5). The Utilities' sampling in 2009 consisted of collecting early-warning (0 to 2 cm) recontamination samples in addition to the City's sampling, which included compliance (waterway cap and supplemental, 0 to 10 cm) samples .

Physical observations for Year 5 OMMP monitoring included a visual inspection of the cap, slopes, and outfall scour protection at low tide. Based on the physical observations made during the Year 5 monitoring, it is recommended that the slope armor and outfall scour protection adjacent to Outfall 235 be restored.

The top of the Utilities cap has been recontaminated from top-down sources. Available data indicate that discharges from stormwater outfalls in the head of the waterway are the source of the recontamination. This finding is based on the following evidence:

- Fine grained sediment, distinctly different from the Utilities' capping material, has accumulated on top of the capping material. This finer grained sediment contains contaminants typical of stormwater discharges. The stormwater outfalls are the only identified significant source of this fine grained deposited material.
- Early-warning samples contain SQO exceedances of BEHP throughout the Utilities' Work Area. All 14 of the Year 5 early-warning samples (0 to 2 cm) consisting of the accumulated sediment contained BEHP concentrations above the SQO of 1,300 µg/kg. PAHs exceed SQOs at locations in the Utilities' Work Area (i.e., RC-01, RC-02, RC-04, RC-07, RC-13, and RC-14).
- The compliance samples collected in Year 5 exceeded the BEHP SQO (1,300 µg/kg) at all stations, except WC-10 and S-15. BEHP concentrations ranged between approximately 700 µg/kg to 10,000 µg/kg. PAHs also exceeded SQOs in a number of compliance samples.
- High correlations and similar concentration trends between HPAHs and BEHP in early warning sediment samples between April 2004 and May 2009 continue to indicate a similar source.
- Similarity of the HPAH and BEHP trend relationship in early warning sediment samples with the trend relationship of stormwater in-pipe sediment-trap samples collected near the end of the Twin 96" outfalls. These data indicate that the Twin

96" outfalls are the primary source of PAHs and BEHP to the Head of the Thea Foss Waterway.

- In general, the average concentrations of individual PAHs, total HPAH, and BEHP in the compliance samples have continued to rise and have not stabilized.
- Concentrations of lead, zinc, and lube-oil range hydrocarbons appear to be increasing in the early warning samples. Concentrations of lead (in 2009) are well below the SQO and there is no SQO for lube-oil hydrocarbons. However, the 2009 average concentration of zinc in the Utilities' Work Area is approximately 72% of the SQO and approximately 79% of the SQO in the turning basin samples south of the SR 509 Bridge. These data suggest that evaluation of zinc concentrations should be emphasized along with BEHP and HPAHs.

7. RECOMMENDATIONS FOR REVISING THE OMMP

As described in the July 2003 Operations, Maintenance, and Monitoring Plan for the Head of the Waterway, the cap monitoring objectives are as follows:

1. Ensure that the cap is providing an effective physical and chemical containment of underlying sediments as well as a clean substrate for colonization by aquatic organisms; and

2. Ensure the clean cap material has not been recontaminated by continuing sources.

The sediment sampling results from Years 1 through 5 demonstrate that the cap continues to provide an effective physical and chemical containment of underlying sediments. The sampling results also demonstrate that the discharge of municipal storm water into the Head of the Waterway has contaminated the top of the cap and one of the primary objectives of our OMMP (i.e., that the cap has not been recontaminated) can no longer be met. Therefore, as part of the Year 4 monitoring report and in subsequent meetings with EPA, the Utilities requested that the cap monitoring objectives for early warning sampling and benthic recolonization monitoring be modified.

EPA required the Utilities to implement the Year 5 sampling program without any changes but never officially responded to the request to remove early warning sampling and benthic recolonization from the Year 7 and Year 10 OMMP monitoring events.

Based on the Year 5 monitoring results, the Utilities request that the OMMP sampling for Year 7 and Year 10 be revised to remove the early warning sampling and benthic recolonization monitoring, as these elements no longer provide useful data to meet the OMMP objectives.

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APPENDIX A

YEAR 5 SITE OBSERVATIONS

TETRA TECH EC, INC.

Memorandum

Date: April 13, 2009

To: Jacqueline Thiell Wetzsteon, PacifiCorp

From: Pamela Sargent and Katrina Conlon

RE: Low Tide Site Observations
April 1, 2009
Head of the Thea Foss Waterway Project

This technical memorandum presents a summary of the observed site conditions within the Head of the Thea Foss Waterway, Tacoma, Washington (Figure 1). The observations were made by Pamela Sargent, Principal Environmental Engineer, and Katrina Conlon, Environmental Scientist for Tetra Tech EC, Inc. (TtEC). They visited the site between approximately 2:55 pm and 4:00 pm PDT on April 1, 2009. During this period, a low tide of -1.0 feet Mean Lower Low Water (MLLW) was predicted for 3:17 pm PDT (Figure 2).

The purposes of this site visit were to:

- Observe the general condition of the scour protection apron placed at the head of the waterway;
- Observe the general condition of the waterway slopes exposed at low tides;
- Monitor the former SR-509 seep area for evidence of sheens; and
- Document the observed site conditions during the lowest daytime tides of the year as part of the Year 5 Operation, Maintenance and Monitoring activities for the Head of the Thea Foss Waterway Project.

Field Observations – April 1, 2009

Condition of the Scour Protection Apron Placed at the Head of the Waterway:

The condition of the scour protection apron at the south end of the waterway is shown in Figures 3 to 8. Water was flowing out of outfalls 237a and 237b during the site visit (Figure 9). The discharge from these outfalls was spreading out over the apron and flowing northward towards the turning basin. As previously noted in the Years 0, 1, 2, 3 and 4 low tide site observations, a small, shallow channel is present in the apron near the southeast corner of the waterway; however, discharge flow from the outfalls 237a and 237b is more centralized in the waterway (Figures 5 and 10). The configuration and shallow depth of this channel appear unchanged from previous observations and the overall integrity of the cap has not been adversely impacted by the presence of this localized feature. No corrective action is proposed at this time. However, this

feature should continue to be monitored during future low tide events for changes. Silt continues to build up on and adjacent to this scour apron with the greatest accumulation on the east side of the scour apron (Figure 11).

General Condition of the Waterway Slopes Exposed at Low Tide:

Photographs of the east and west bank slopes exposed during April 1, 2009 daytime low tide are shown in Figures 12 to 17. No slope erosion or sloughing was observed. As previously noted in the Years 0, 1, 2, 3 and 4 site observation memoranda, the coarser slope cap materials are covered with algae, seaweed, and barnacles. Mussels are also present on these materials. A layer of olive and gray silt is present over capping material on the lower portions of the east and west bank slopes.

Observations in the Vicinity of the Former SR-509 Seep Area:

Gas bubbles were observed in the vicinity of the former SR-509 seep area during the site visit but no sheens were observed in the former SR-509 seep area. The shadow of the SR-509 Bridge did not allow for quality photos of this area from the east bank slope during the site visit.

General Observations:

- The weather was overcast with light sprinkles, light winds from the south and temperature in the mid- 40s during this field visit.
- Extensive gas bubbling was observed throughout the head of the waterway but no sheens were observed (Figures 18 and 19).
- Crabs, mussels, barnacles, a living oyster, geese, ducks (e.g., Hooded Mergansers and Mallards), seaweed and algae observed at site during the site visit (Figure 20).
- The scour protection adjacent to Outfall 243 (at Station 73+40 on the east side of the waterway under the SR-509 Bridge) shows no further signs of erosion or displacement (Figures 21 and 22). Water was flowing out of Outfall 243 during the site visit. The Tideflex™ valve at the end of Outfall 243, which was extensively covered with barnacles and mussels at the time of the year 4 observations, does not appear to have been cleaned. There is a very small pool about 6 - 8” deep and 18-24” in diameter in front of Outfall 243, similar to Year 4 observations.
- The scour protection adjacent to Outfall 235 (at Station 73+20 on the west side of the waterway under the SR-509 bridge) shows no further signs of erosion or displacement beyond what was noted during the Year 3 and Year 4 OMMP (Figure 23). Water was flowing out of Outfall 235 during the Year 5 OMMP daytime low tide site visit (Figure 24). As previously recommended, the area around Outfall 235 should continue to be monitored during annual OMMP for further changes in pool depth or small outfall scour protection material displacement. Repairs to this area may be warranted if further changes occur to ensure the integrity of the underlying slope cap.
- At Outfall 235, both wing walls are separating from the Outfall 235 head wall (Figures 25 - 27). The City of Tacoma installed PK nails on the north and south ends of the top of the

headwall and on the west ends of the north and south wing walls to enable monitoring of any movement between the headwall and the wing walls. The PK nail on the south end of the head wall is no longer present. The separation between the head wall and the wing walls are similar to Year 4 observations. The separation between the head wall and the south wing wall is larger than the separation between the head wall and the north wing wall and the distances between the sets of PK nails are approximately 9 3/8 inches and 7 ½ inches respectively, same distances measured during Year 4 observations (Figures 28 and 29). Some loss of habitat mix material from slopes adjacent to the wing walls through the cracks in the wing walls was observed (Figures 26 and 30). The slope cap adjacent to the south wing wall is beginning to slough. The separation distances between the Outfall 235 head wall and wing walls should continue to be monitored during annual OMMP for further changes in separation distances or habitat mix material displacement. Repairs may be warranted if further changes occur to ensure the integrity of the underlying slope cap.

Figures

Figure 1 – Head of the Thea Foss Waterway Utilities' Work Area

Figure 2 – Commencement Bay Tides Aril 1, 2009

Figure 3 – Looking South/Southwest at Scour Apron at the Head of the Waterway.

Figure 4 – Looking North/Northeast along East side of Scour Apron just North of the East 23rd Street Bridge.

Figure 5 – Looking West across the Scour Apron at the Head of the Waterway

Figure 6 – Looking Southwest across the North edge of the Scour Apron at the Head of the Waterway

Figure 7 – Looking East across the North Edge of the Scour Apron at the Head of the Waterway.

Figure 8 – Looking Southeast across the Scour Apron at the Head of the Waterway.

Figure 9 – Looking South at Twin 96-inch Outfalls – Outfalls 237A and 237B

Figure 10 – Looking North across the Scour Apron at the Head of the Waterway

Figure 11 – Looking Northwest along the East Slope from just North of the East 23rd Street Bridge towards the SR-509 Bridge.

Figure 12 – Looking North along the East slope from beneath the SR-509 Bridge towards Foss Landing

Figure 13 – Looking West at East Slope of Waterway beneath of the SR-509 Bridge

Figure 14 – Looking Northwest at the East Slope of the Waterway

Figure 15 – Looking West at the Central Portion of West Slope of the Waterway.

Figure 16 – Looking North along the West Slope of the Waterway.

Figure 17 – Looking Southeast towards Outfalls 237A and 237B from West Slope of Waterway.

Figure 18 – Gas Bubbles at the Base of the West Slope of the Waterway.

Figure 19 – Gas Bubbles at the Base of the West Slope (Former Standard Chemical Site)

Figure 20 – Live Oyster on West Slope of Waterway (near Old City Pier).

Figure 21 – Looking North at Outfall 243.

Figure 22 – Looking East at Outfall 243

Figure 23 – Looking Northeast at the Base of the West Slope under the SR-509 Bridge.

Figure 24 – Pool in Front of Outfall 235.

Figure 25 - Looking North at Outfall 235's North Wing Wall.

Figure 26 – Close up of Outfall 235, Looking West.

Figure 27 –Looking Southwest at Outfall 235's South Wing Wall.

Figure 28 - Separation between the Head Wall and the South Wing Wall - approximately 9 3/8 inches between PK Nails.

Figure 29 - Separation between the Head Wall and the North Wing Wall - approximately 7 1/2 inches between PK Nails.

Figure 30 - Sloughing Adjacent to the South Wing Wall of Outfall 235.

FIGURES

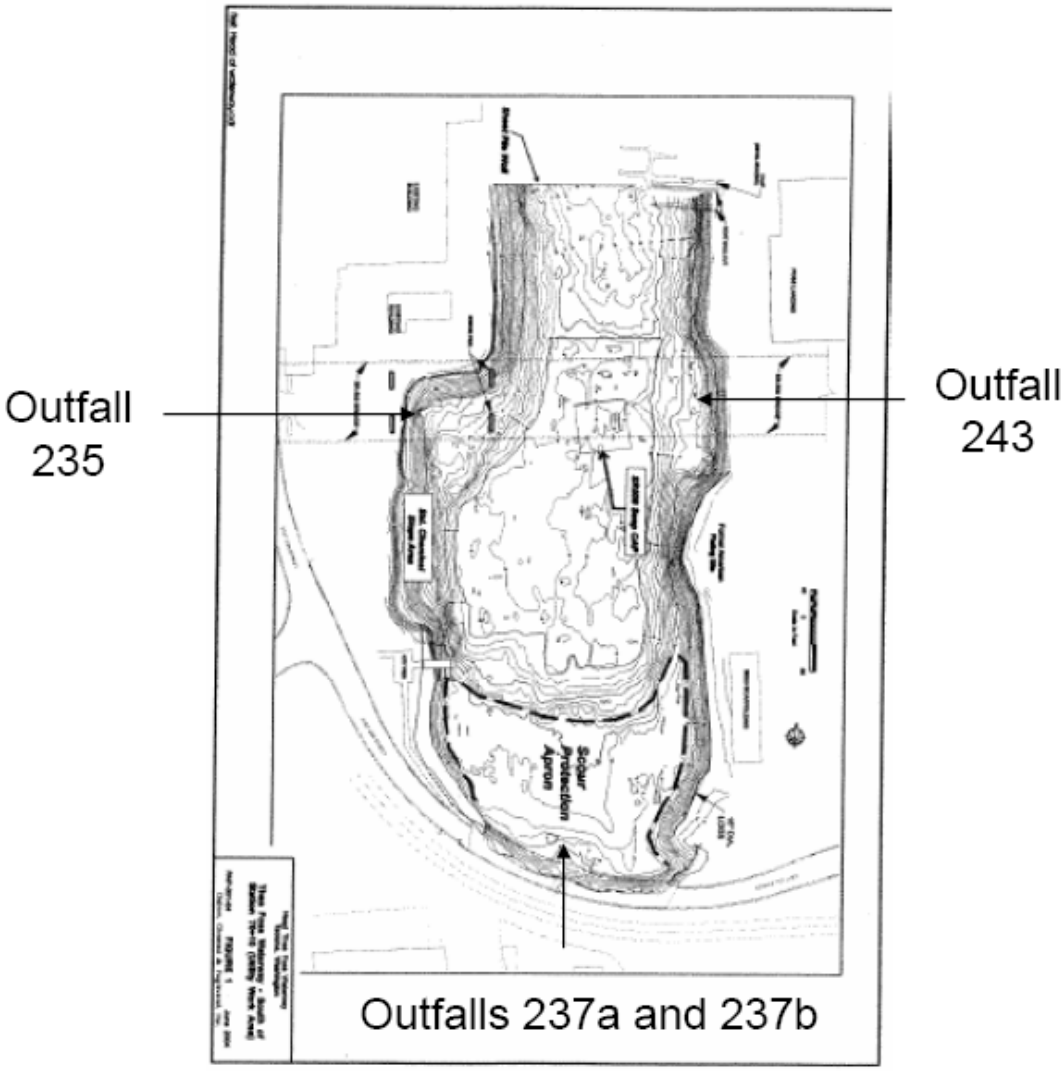

Figure 1 – Head of the Thea Foss Waterway Utilities' Work Area

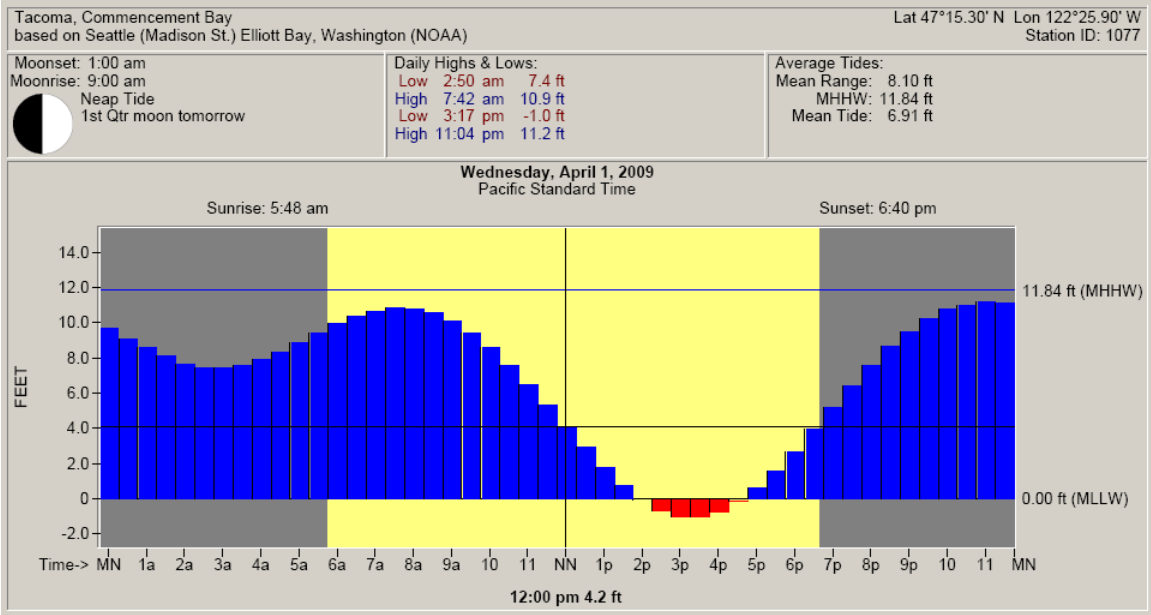

Figure 2 – Commencement Bay Tides
April 1, 2009

Figure 3 – Looking South / Southwest at Scour Apron at the Head of the Waterway

Figure 4 –Looking North/ Northeast along East side of Scour Apron just North of the East 23rd Street Bridge

Figure 5 – Looking West across the Scour Apron at the Head of the Waterway

Figure 6 –Looking Southwest across the North Edge of the Scour Apron at the Head of the Waterway

Figure 7 – Looking East across the North Edge of the Scour Apron at the Head of the Waterway.

Figure 8 – Looking Southeast across the Scour Apron at the Head of the Waterway

Figure 9 – Looking South at Twin 96-inch Outfalls – Outfalls 237A and 237B

Figure 10 – Looking North across the Scour Apron at the Head of the Waterway

Figure 11 – Looking Northwest along the East Slope from just North of the East 23rd Street Bridge towards the SR-509 Bridge.

Figure 12 – Looking North along the East Slope from beneath the SR-509 Bridge towards Foss Landing

Figure 13 – Looking West at East Slope of Waterway beneath of the SR-509 Bridge

Figure 14 – Looking Northwest at the East Slope of the Waterway

Figure 15 – Looking West at the Central Portion of the West Slope of the Waterway

Figure 16 – Looking North along the West Slope of the Waterway

Figure 17 – Looking Southeast towards Outfalls 237A and 237B from West Slope of Waterway

Figure 18 – Gas Bubbles at the Base of the West Slope of the Waterway

Figure 19 – Gas Bubbles at the Base of the West Slope (Former Standard Chemical Site)

Figure 20 – Live Oyster on West Slope of the Waterway (near Old City Pier)

Figure 21 – Looking North at Outfall 243

Figure 22 – Looking East at Outfall 243

Figure 23 – Looking Northeast at the base of the West Slope under the SR-509 Bridge

Figure 24 –Pool in Front of Outfall 235

Figure 25 - Looking North at Outfall 235's North wing wall

Figure 26 – Close up of Outfall 235 looking West

Figure 27 –Looking Southwest at Outfall 235's South Wing Wall

Figure 28 - Separation between the Head Wall and the North Wing Wall - approximately 7 1/2 inches between PK Nails

Figure 29 - Separation between the Head Wall and the South Wing Wall - approximately 9 3/8 inches between PK Nails

Figure 30 - Sloughing Adjacent to South Wing Wall of Outfall 235

TETRA TECH EC, INC.

Memorandum

Date: August 28, 2009

To: Jacqueline Thiell Wetzsteon, PacifiCorp

From: Benjamin Starr and Pamela Sargent

RE: Low Tide Site Observations
July 9 and 21 and August 18, 2009
Head of the Thea Foss Waterway Project

This technical memorandum presents a summary of the observed site conditions within the Head of the Thea Foss Waterway, Tacoma, Washington (Figure 1). The observations were made by Benjamin Starr, Civil/Environmental Engineer and Pamela Sargent, Principal Environmental Engineer for Tetra Tech EC, Inc. (TtEC). Ben Starr visited the site between approximately 12:20 pm and 2:00 pm PDT on July 9, 2009. During this period, a low tide of -1.2 feet Mean Lower Low Water (MLLW) was predicted for 1:00 pm PDT (Figure 2).

The purposes of this site visit were to:

- Observe the general condition of the scour protection apron placed at the head of the waterway;
- Observe the general condition of the waterway slopes exposed at low tides;
- Monitor the former SR-509 seep area for evidence of sheens; and
- Document the observed site conditions during the lowest daytime tides of the year as part of the Year 5 Operation, Maintenance and Monitoring activities for the Head of the Thea Foss Waterway Project.

Pam Sargent made two supplemental visits to the site, one on July 21, 2009 and one on August 18, 2009. The site visit on July 21, 2009 was to verify that the newly installed kayak float was not resting on the slope cap during an extreme low tide event. She visited the site between approximately 11:30 am and 12:30 pm PDT on July 21, 2009 and the tide varied from -3.1 feet MLLW to -2.5 feet MLLW during this visit. A low tide of -3.4 feet MLLW was predicted for 10:59 am PDT. The site visit on August 18, 2009 was to verify that the slope cap had not been disturbed when the kayak float ramp was installed during an extreme low tide event. She visited the site between approximately 9:30 am and 10:00 am PDT on August 18, 2009 and the tide varied from -2.0 feet MLLW to -2.1 feet MLLW during this visit. A low tide of -2.1 feet MLLW was predicted for 9:53 am PDT.

Field Observations – July 9, 2009

Condition of the Scour Protection Apron Placed at the Head of the Waterway:

The condition of the scour protection apron at the south end of the waterway is shown in Figures 3 to 8. Water was flowing out of outfalls 237a and 237b during the site visit (Figure 9). The discharge from these outfalls was spreading out over the apron and flowing northward towards the turning basin. As previously noted in the Years 0, 1, 2, 3 and 4 low tide site observations, a small, shallow channel is present in the apron near the southeast corner of the waterway (Figure 10). As noted in the Year 4 observations, discharge flow from the outfalls 237a and 237b is more centralized in the waterway (Figure 11). The configuration and shallow depth of this channel appear unchanged from previous observations and the overall integrity of the cap has not been adversely impacted by the presence of this localized feature. No corrective action is proposed at this time. However, this feature should continue to be monitored during future low tide events for changes. A slight sheen was observed in the water discharging from the twin 96-inch outfalls (Figure 12). Silt continues to build up on and adjacent to this scour apron with the greatest accumulation on the east side of the scour apron (Figure 13).

General Condition of the Waterway Slopes Exposed at Low Tide:

Photographs of the east and west bank slopes exposed during July 9, 2009 daytime low tide are shown in Figures 14 to 23. No slope erosion or sloughing was observed. As previously noted in the Years 0, 1, 2, 3 and 4 site observation memoranda, the coarser slope cap materials are covered with algae, seaweed, and barnacles. Mussels are also present on these materials. A layer of olive and gray silt is present over capping material on the lower portions of the east and west bank slopes.

Observations in the Vicinity of the Former SR-509 Seep Area:

Gas bubbles were observed in the vicinity of the former SR-509 seep area during the site visit but no sheens were observed in the former SR-509 seep area. The shadow of the SR-509 Bridge did not allow for quality photos of this area from the east bank slope during the site visit.

General Observations:

- The weather was partly cloudy, light winds from the north-northwest and temperature in the mid- 60s during this field visit.
- Gas bubbling was observed throughout the head of the waterway but no sheens were observed (Figure 24).
- Crabs, mussels, barnacles, geese, sandpipers, seaweed and algae observed at site during the site visit.
- The scour protection adjacent to Outfall 243 (at Station 73+40 on the east side of the waterway under the SR-509 Bridge) shows no further signs of erosion or displacement (Figures 25 and 26). Water was flowing out of Outfall 243 during the site visit. The Tideflex™ valve at the end of Outfall 243, which was extensively covered with barnacles and mussels at the time of the year 5 observations, does not appear to have been cleaned.

There is a very small pool about 6 - 8" deep and 18-24" in diameter in front of Outfall 243, similar to Year 4 observations.

- The scour protection adjacent to Outfall 235 (at Station 73+20 on the west side of the waterway under the SR-509 bridge) shows no further signs of erosion beyond what was noted during the Year 3 and Year 4 OMMP (Figure 27). However, there appears to be some intentional displacement of outfall scour material directly in front of the outfall to make a pool with a sandy bottom, possibly for bathing as there is evidence that there are displaced persons living in the immediate area (Figure 28). Water was flowing out of Outfall 235 during the Year 5 OMMP daytime low tide site visit (Figure 29). Previously, TtEC recommended monitoring the area around Outfall 235 during annual OMMP for further changes in pool depth or small outfall scour protection material displacement. Based on current site conditions, repairs to this area are now recommended to restore the outfall scour protection to ensure the integrity of the underlying slope cap. Displaced scour protection material could be restored to its original configuration by manual movement of scour protection materials.

- At Outfall 235, both wing walls are separating from the Outfall 235 head wall (Figures 30 and 31). The City of Tacoma installed PK nails on the north and south ends of the top of the headwall and on the west ends of the north and south wing walls to enable monitoring of any movement between the headwall and the wing walls. The PK nail on the south end of the head wall which was missing has been replaced. The separation between the head wall and the wing walls are similar to Year 4 observations. The separation between the head wall and the south wing wall is larger than the separation between the head wall and the north wing wall and the distances between the sets of PK nails are approximately 9 3/8 inches and 7 ½ inches respectively, same distances measured during Year 4 observations (Figures 32 and 33). Some loss of habitat mix material from slopes adjacent to the wing walls through the cracks in the wing walls was observed. The slope cap adjacent to both the south and north wing walls is beginning to slough (Figures 34 and 35). The intentional displacement of outfall scour material directly in front of the Outfall 235 is believed to be contributing to this sloughing. The separation distances between the Outfall 235 head wall and wing walls should continue to be monitored during annual OMMP for further changes in separation distances. In addition, TtEC recommends that the slope areas adjacent to Outfall 235 be restored using materials similar to those originally specified for slope cap armor.

- The new kayak float was installed on the east side of the Waterway just south of the SR-509 Bridge but the associated anchor pad for the ramp to the float and the ramp had not yet been installed. See field observations below from July 21, 2009 for additional detail.

<u>Field Observations – July 21, 2009</u>

General Observations

- The new kayak float was installed on the east side of the Waterway just south of the SR-509 Bridge as noted above and the associated anchor pad for the ramp to the float had been installed between the July 9th and July 21st site visits (Figure 36). The eastern most end of the float was out of the water and not resting on the slope cap during the site visit (Figures 37 and 38). During the site visit, a worker from American Construction informed Pam Sargent

that the ramp connecting the anchor pad to the float was to be installed at high tide that evening.

- The new park on the west side of the waterway (Former Standard Chemical Site) was being landscaped during the site visit. The associated parking lot and restroom facilities have been completed. In the parking lot, there is a new curb stormwater inlet with an integrated treatment system which discharges through Outfall 235 (Figure 39).

Field Observations – August 18, 2009

General Observations

- The kayak float ramp had been installed since the previous site visit on July 21, 2009 and there was no evidence that the slope cap adjacent to the ramp had been disturbed during the ramp installation (Figure 40).
- The eastern most end of the float was out of the water and not resting on the slope cap during the site visit (Figure 41).
- The gate at the top of the ramp to the kayak float was locked and no signage was present at the time of the site visit (Figure 42).
- The new park on the west side of the waterway (Former Standard Chemical Site) appeared to be complete and operational at the time of the site visit.

Figures:

Figure 1 – Head of the Thea Foss Waterway Utilities' Work Area

Figure 2 – Commencement Bay Tides July 9, 2009

Figure 3 – Looking Southwest at Scour Apron at the Head of the Waterway

Figure 4 – Looking Southwest at the Southwest Portion of the Scour Apron

Figure 5 – Looking Northeast across the Scour Apron at the Head of the Waterway

Figure 6 –Looking Northwest across the Scour Apron at the Head of the Waterway

Figure 7 – Looking North across the Scour Apron from the South End of the Waterway

Figure 8 – Looking Northwest across the Scour Apron at the Head of the Waterway

Figure 9 – Looking South at Twin 96-inch Outfalls – Outfalls 237A and 237B

Figure 10 – Looking South across the Narrow Channel near SE Corner of the Waterway

Figure 11 – Looking South/Southeast at Flow from Twin 96-inch Outfalls

Figure 12 – Close-up Showing Slight Sheen in Water Discharging from Twin 96-inch Outfalls

Figure 13 – Looking South at the Southeast Corner of the Scour Apron

Figure 14 – Looking North at the East Slope of the Waterway from Just South of the SR-509 Bridge

Figure 15 – Looking North/Northeast along the East Slope of the Waterway from just South of the SR-509 Bridge

Figure 16 – Looking North along the East Slope of the Waterway

Figure 17 – Looking Southwest towards Outfalls 237A and 237B along the East Slope of the Waterway

Figure 18 – Looking East/Northeast at the South End of the East Slope of the Waterway

Figure 19 – Looking South along the Southern End of the West Slope

Figure 20 – Looking North along the West Slope of the Waterway

Figure 21 – Looking North along the West Slope of the Waterway (near the Old City Pier)

Figure 22 – Looking North along the West Slope North of the Old City Pier

Figure 23 – Looking West at the Base of the West Slope under the SR-509 Bridge

Figure 24 – Gas Bubbles at the Base of the West Slope (in the Former Standard Chemical Site Area)

Figure 25 - Looking East at Outfall 243

Figure 26 – Close-Up of Pool in Front of Outfall 243 Looking East

Figure 27 – Close-Up of the Pool in Front of Outfall 235

Figure 28 - Evidence of Homeless Person Near Outfall 235 and Just South of the SR-509 Bridge on the West Side of the Waterway

Figure 29 – Close-Up of Outfall 235 Looking West

Figure 30 - Separation between the Head Wall and the South Wing Wall at Outfall 235

Figure 31 - Separation between the Head Wall and the North Wing Wall at Outfall 235

Figure 32 – Separation between the Head Wall and the North Wing Wall at Outfall 235 – approximately 9 3/8 inches between PK Nails

Figure 33 - Separation between the Head Wall and the South Wing Wall at Outfall 235 – approximately 7 ½ inches between PK Nails

Figure 34 – Sloughing Adjacent to the South Wing Wall at Outfall 235

Figure 35 – Sloughing Adjacent to the North Wing Wall at Outfall 235

Figure 36 – Anchor Pad for New Kayak Float Ramp on the East Side of Thea Foss Waterway just South of the SR-509 Bridge

Figure 37 – New Kayak Float on the East Side of the Thea Foss Waterway Just South of the SR-509 Bridge

Figure 38 – Close-Up of East End of New Kayak Float on the East Side of the Thea Foss Waterway at Approximately -3.1 Foot Tide

Figure 39 – Close-Up of New Curb Stormwater Inlet Treatment System Just Upstream of Outfall 235 in the New Park at the Former Standard Chemical Site

Figure 40 – Kayak Float Ramp and Adjacent Slope Cap Areas – Looking South

Figure 41 – Close-Up of East End of New Kayak Float on the East Side of the Thea Foss Waterway at Approximately -2.1 Foot Tide

Figure 42 – Gate at the Top of the Ramp to the Kayak Float – Looking West

FIGURES

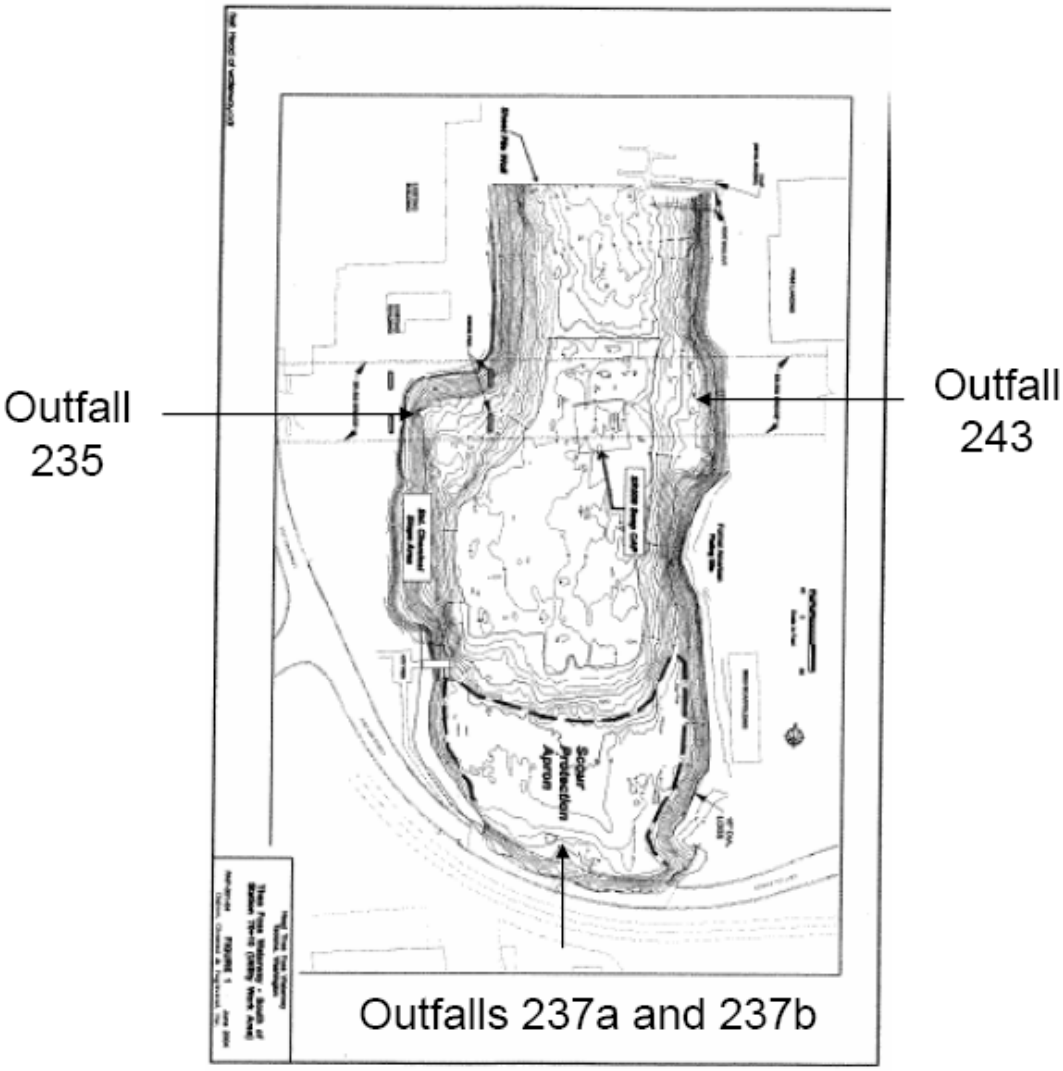

Figure 1 – Head of the Thea Foss Waterway Utilities' Work Area

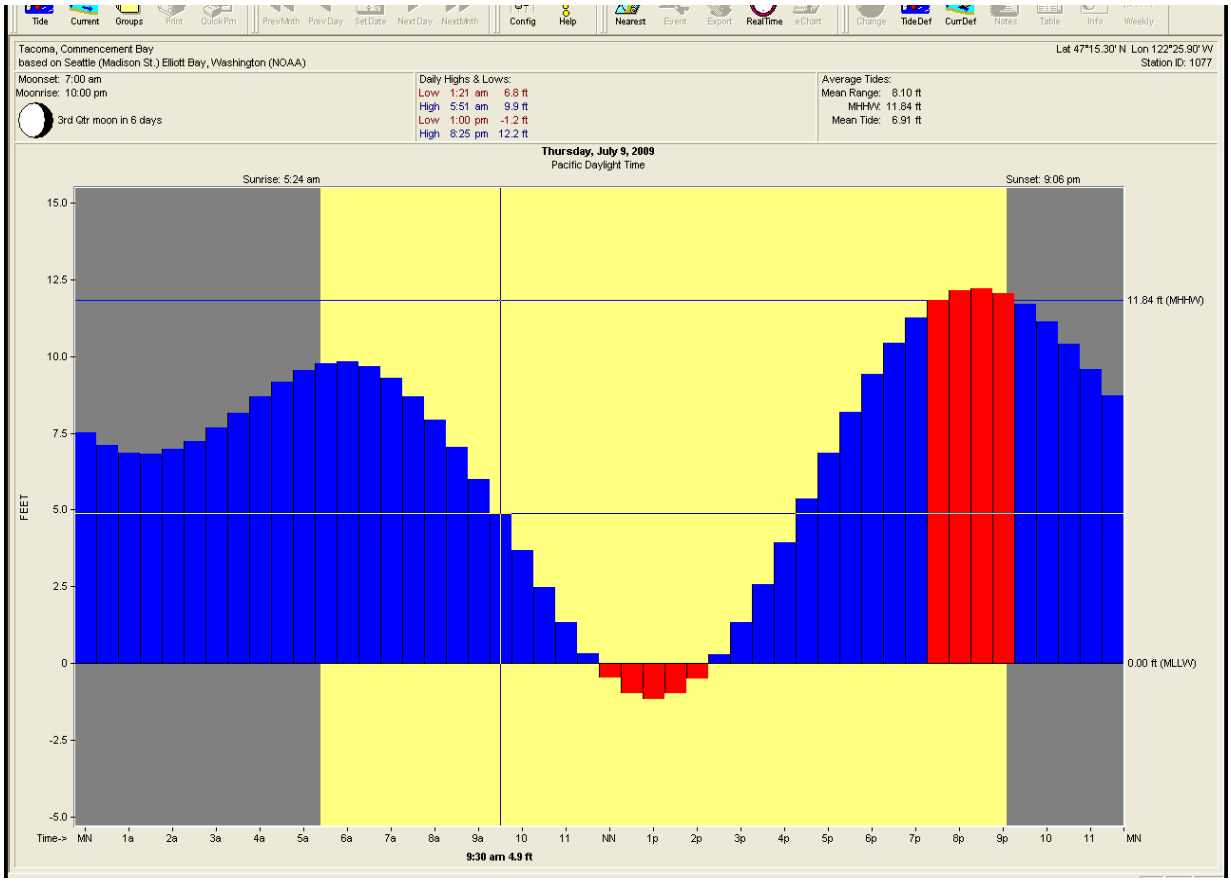

Figure 2 – Commencement Bay Tides
July 9, 2009

Figure 3 – Looking Southwest at Scour Apron at the Head of the Waterway

Figure 4 – Looking Southwest at the Southwest Portion of the Scour Apron

Figure 5 – Looking Northeast across the Scour Apron at the Head of the Waterway

Figure 6 – Looking Northwest across the Scour Apron at the Head of the Waterway

Figure 7 – Looking North across the Scour Apron from the South End of the Waterway

Figure 8 – Looking Northwest across the Scour Apron at the Head of the Waterway

Figure 9 – Looking South at Twin 96-inch Outfalls – Outfalls 237A and 237B

Figure 10 – Looking South across the Narrow Channel near SE Corner of the Waterway

Figure 11 – Looking South/Southeast at Flow from Twin 96-inch Outfalls

Figure 12 – Close-up Showing Slight Sheen in Water Discharging from Twin 96-inch Outfalls

Figure 13 – Looking South at the Southeast Corner of the Scour Apron

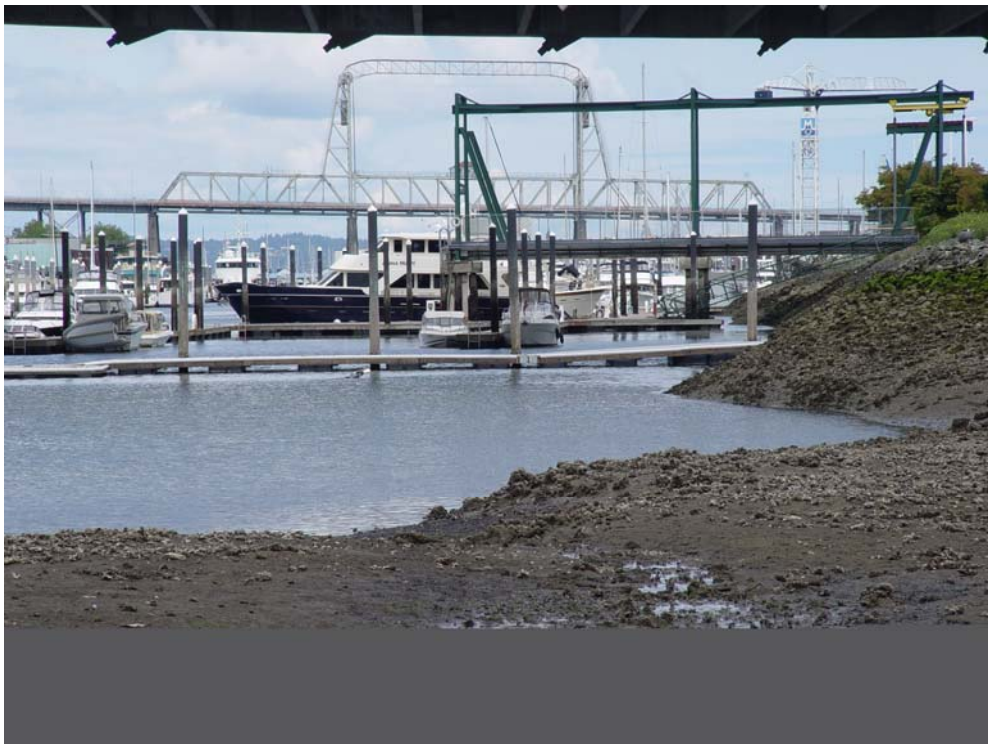

Figure 14 – Looking North at the East Slope of the Waterway from Just South of the SR-509 Bridge

Figure 15 – Looking North/Northeast along the East Slope of the Waterway from just South of the SR-509 Bridge

Figure 16 – Looking North along the East Slope of the Waterway

Figure 17 – Looking Southwest towards Outfalls 237A and 237B along the East Slope of the Waterway

Figure 18 – Looking East/Northeast at the South End of the East Slope of the Waterway

Figure 19 – Looking South along the Southern End of the West Slope

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Figure 40 - Kayak Float Ramp and Adjacent Slope Cap Areas – Looking South

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Figure 42 - Gate at the Top of the Ramp to the Kayak Float – Looking West

APPENDIX B

FIELD NOTES

APPENDIX B.1

LOG BOOK AND SAMPLE LOG FORMS

Overcast ~58°

5/26/09 YEAR 5 onnnr Thea Fess Sampling

0630 Arrive at Fess Land Parking lot under SR 509 Bridge

Meet Jessi Massingale + Amanda McKay w/ Floyd Snider

0645 Gary Braun on site

0700 Eric Parker with RSS called said he'd be late (7:30am) due to a dead battery on the boat this AM.

0740 Eric Parker & Ben w/ RSS arrive on site

0800 Conduct H&S briefing

0830 Begin Sediment Sampling
Collected RC-01 – RC14,
Y5-RC15-S = duplicate
Floyd Snider collected WC01 – WC14,
S15, S17, S19, S24

1530 End of sampling. demob boat

1600 Depart site to deliver samples to ARI (lab)

RC
5/26/09

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Sample No. 45-RC01-S
Project Name: Thea Foss 45OMMP
Project No.: 106-3306

Date: 5/26/09 Time: 1330 Sampled by: KC Checked by:
Equipment: Hand sample intertidal
Location Description: WC/RC-01

Deployment: Na Time: 1330 Northing: 702002.6 Easting: 1160586
Accepted / Rejected Bio / Chem Water Depth Na Penetration Na RPD Depth 1mm
Sediment (density, color, type: brown surface 1mm - to black silt to 3cm then mod coarse sand
Sediment Odor (type and magnitude): None
Biological (flora and fauna): shells, mussels,
Sheen None Debris organic debris
Comments: Silt thickness ≥ 3cm

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

KC 5/26/09

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Sample No. Y5-RC02-S
Project Name: Thea Foss Y5 OMMP
Project No.: 106-3306

Date: 5/26/09 Time: 0937 Sampled by: KC Checked by:
Equipment: Power Grab
Location Description: RC/WC-02

Deployment: A Time: 0937 Northing: 702124.562 Easting: 1160698.548
Accepted / Rejected Bio / Chem Water Depth 12 Penetration 23 RPD Depth
Sediment (density, color, type: dark grey to black silt w/ trace sand
Sediment Odor (type and magnitude): Faint H_2S
Biological (flora and fauna): Clam shell
Sheen None Debris Abundant Organic debris, leaf litter, pine needles
Comments: Full Analyses for both samples Silt Thickness: 23cm
Collect Duplicate: Y5-RC15-SD @ 0942

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

KC 5/26/09

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Sample No. Y5-RC03-S
Project Name: Thea Foss Y5 OMMP
Project No.: 106-3306

Date: 5/26/09 Time: 0915 Sampled by: KC Checked by:
Equipment: Power Grab
Location Description: WC/RC-03

Deployment: A Time: 0915 Northing: 702105.755 Easting: 1160508.761
Accepted / Rejected Bio / Chem Water Depth 13.0 Penetration 19 RPD Depth
Sediment (density, color, type: fine to med, silt top 1-2cm, slightly sandy silt, dark gray to black sand increases
Sediment Odor (type and magnitude): faint H_2S odor at 5cm
Biological (flora and fauna): Musselshells,
Sheen small sheen spot on homog. sample Debris organic debris, leaves
Comments: silt thickness 16cm, total: 19cm, @16cm intermixing of sand, silt w/ possible cap mat'l

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

KC 5/26/09

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Sample No. Y5-RC04-S
Project Name: Thea Foss Year 5 OMMP
Project No.: 106-3306

Date: 5/26/09 Time: 0957 Sampled by: KC Checked by:
Equipment: Power Grab
Location Description: RC/WC-04

Deployment: A Time: 0957 Northing: 702219.088 Easting: 1160565.648
Accepted / Rejected Bio / Chem Water Depth 11.2 Penetration 22 RPD Depth
Sediment (density, color, type: dark gray to black sandy silt
Sediment Odor (type and magnitude): Faint H_2S odor
Biological (flora and fauna): 4cm macoma clam (live)
Sheen None Debris organic debris (some), pine needles,
Comments: @ 21-22cm intermixed clay & med. to coarse sand

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

KC 5/26/09

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Sample No. 45-RC05-S
Project Name: Thea Foss Year 5 ambmp
Project No.: 106-3306

Date: 5/26/09 Time: 1449 Sampled by: KC Checked by:
Equipment: Power Grab
Location Description: RC-05/WC-05

Deployment: A Time: 1449 Northing: 702359.601 Easting: 1160637.718
Accepted / Rejected Bio / Chem Water Depth 9.3 Penetration 21 RPD Depth
Sediment (density, color, type: dark gray to black silt w/ some fine sand
Sediment Odor (type and magnitude): faint H_2S
Biological (flora and fauna): broken clam shells, kelp, 3 shrimp,
Sheen: ~~present~~ absent Sheen spot on sed surface Debris abundant leaf litter & organics, piece of plastic
Comments: silt thickness = 21cm

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

KC 5/26/09

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Sample No. 45-RC06-S
Project Name: Thea Foss Year 5
Project No.: 106-3306

Date: 5/26/09 Time: 0850 Sampled by: KC Checked by:
Equipment: Power Grab
Location Description: WQRC-06

Deployment: A Time: 0850 Northing: 702254.892 Easting: 1160437567
Accepted / Rejected Bio / Chem Water Depth 15.8 Penetration 20 RPD Depth
Sediment (density, color, type: dark gray to black silt w/ trace sand
Sediment Odor (type and magnitude): none, (odor below surface)
Biological (flora and fauna): 6 crab, kelp, bivalve shells, pine needles
Sheen None Debris
Comments: Grab disturbed sed (surface), did not reach sandcap
- fine sand (gray) near bottom of grab

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

KC 5/26/09

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

VS-RC07-S

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Sample No. ~~VS-RC07-S~~
Project Name: Sheafoss Years 5
Project No.: 106-3306

Date: 5/26/09 Time: 0827 Sampled by: KC Checked by:
Equipment: Power Grab
Location Description: RC-07/WC-07

Deployment: A Time: 0827 Northing: 702387.457 Easting: 1160464.89 US Survey Feet
Accepted / Rejected Bio / Chem Water Depth 13.3 Penetration 20 cm RPD Depth 1 cm
Sediment (density, color, type: dark grey-black, slight sandy silt w/organic fragments
Sediment Odor (type and magnitude): ~~Slight~~ H_2S odor
Biological (flora and fauna): larval flat fish, mussel shell, shrimp, surface kelp
Sheen ~~Slight~~ ~~H_2O odor~~ Debris
Comments: piece of fabric, did not reach cap

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

KC 5/26/09

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Sample No. Y5-RC08-S
Project Name: Thea Foss Y50MMP
Project No.: 106-3306

Date: 5/26/09 Time: 1352 Sampled by: KC Checked by:

Equipment: Power Grab

Location Description: RC-08/WC-08

Deployment : A Time: 1352 Northing: NA - Under Bridge Easting: NA - Under Bridge

Accepted / Rejected Bio / Chem Water Depth 7 Penetration 20 RPD Depth 1cm

Sediment (density, color, type: 5Y0 - dark olive gray/green to dark gray/black silt with fine sand. grades into top of sand cap

Sediment Odor (type and magnitude):

Biological (flora and fauna): kelp, worm tubes, broken clam shells

Sheen Iradescent sheen on surface sed. Debris organic debris, leaf litter, kelp

Comments: Silt thickness = 18 cm

Deployment : Time: Northing: Easting:

Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth

Sediment (density, color, type:

Sediment Odor (type and magnitude):

Biological (flora and fauna):

Sheen Debris

Comments:

Deployment : Time: Northing: Easting:

Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth

Sediment (density, color, type:

Sediment Odor (type and magnitude):

Biological (flora and fauna):

Sheen Debris

Comments:

Deployment : Time: Northing: Easting:

Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth

Sediment (density, color, type:

Sediment Odor (type and magnitude):

Biological (flora and fauna):

Sheen Debris

Comments:

KC 5/26/09

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Sample No. Y5-RC09-S
Project Name: Thea Foss Y5 OMMP
Project No.: 106-3306

Date: 5/26/09 Time: 1420 Sampled by: KC Checked by:
Equipment: Power Grab
Location Description: RC-09/WC-09

Deployment: A Time: 1420 Northing: NA Easting: NA
Accepted / Rejected Bio / Chem Water Depth 7.8 Penetration 20 RPD Depth 1 cm
Sediment (density, color, type: H_2S odor
Sediment Odor (type and magnitude): dark olive gray 1cm RPD, underlying black silt with some fine sand
Biological (flora and fauna): trace worm tubes, worms.
Sheen None Debris organic debris, pine needles
Comments: Total silt thickness = 10 cm, sandcap below

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type: do
Sediment Odor (type and magnitude):
Biological (flora and fauna): ~~trace worm tubes, kc~~
Sheen Debris
Comments:

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

KC 5/26/09

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Sample No. YS-RC10-S
Project Name: THE EOSS 450MMP
Project No.: 106-3306

Date: 5/26/09 Time: 1244 Sampled by: KC Checked by:
Equipment: Power Grab
Location Description: RC/WC-10

Deployment: A Time: 1244 Northing: 702583.631 Easting: 1160574.577
Accepted / Rejected Bio / Chem Water Depth 6.9' Penetration 20 RPD Depth 1cm
Sediment (density, color, type: dark brown surface, dark gray to black sandy silt grades into sand cap matl
Sediment Odor (type and magnitude): None
Biological (flora and fauna): Shell fragments, worm tubes
Sheen None Debris some organic, leaf litter
Comments: silt thickness: 3cm

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

KC 5/26/09

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Sample No. Y5- RC11-S
Project Name: Thea Foss Y5 OMMP
Project No.: 106-3306

Date: 5/26/09 Time: 1135 Sampled by: KC Checked by:

Equipment: Power Grab

Location Description: WC/RC-11

Deployment : A Time: 1135 Northing: 702722.874 Easting: 1160664.639

Accepted / Rejected Bio / Chem Water Depth ~~2.39~~ Penetration 22 cm RPD Depth 1 cm

Sediment (density, color, type): RPD 1cm dark olive gray, black silt w/ some sand underlayer grades into black med sand cap material

Sediment Odor (type and magnitude): faint H_2S odor

Biological (flora and fauna): Mussel shells, worm tubes

Sheen None Debris some organic debris

Comments: silt thickness = 5cm, clean cap material at 10cm

Deployment : Time: Northing: Easting:

Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth

Sediment (density, color, type:

Sediment Odor (type and magnitude):

Biological (flora and fauna):

Sheen Debris

Comments:

Deployment : Time: Northing: Easting:

Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth

Sediment (density, color, type:

Sediment Odor (type and magnitude):

Biological (flora and fauna):

Sheen Debris

Comments:

Deployment : Time: Northing: Easting:

Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth

Sediment (density, coior, type:

Sediment Odor (type and magnitude):

Biological (flora and fauna):

Sheen Debris

Comments:

KC 5/26/09

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Sample No. Y5-RC12-S
Project Name: Thea Foss Y5 OMMP
Project No.:

Date: 5/26/09 Time: 1021 Sampled by: EC Checked by:
Equipment: Power Grab
Location Description: RC/WC-12

Deployment: A Time: 1021 Northing: 7027 20.796 Easting: 1160500.875
Accepted / Rejected Bio / Chem Water Depth 9.4 Penetration 20cm RPD Depth
Sediment (density, color, type): brown sandy silt on surface 1cm thick, dark gray sandy silt fine to med sand
Sediment Odor (type and magnitude): None
Biological (flora and fauna): Snail, broken clam shell, kelp,
Sheen None Debris some organic debris,
Comments: 1" rock. grades into clayey silt w/ med-coarse sand
- reached sand cap at 9cm

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type):
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type):
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type):
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

EC 5/26/09

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Sample No. 45-RC13-S
Project Name: Thea Foss 45 DMMP
Project No.: 106-3306

Date: 5/26/09 Time: 1335 Sampled by: KC Checked by:
Equipment: Hand sample - bowl & spoon
Location Description: RC-13

Deployment: Na Time: 1335 Northing: 701876.1 Easting: 1160565.9
Accepted / Rejected Bio / Chem Water Depth Na Penetration 2cm RPD Depth
Sediment (density, color, type: brown - light brown top 1cm, black silt dark gray to black w/ depth
Sediment Odor (type and magnitude): None
Biological (flora and fauna): mussels, barnacles,
Sheen None Debris Lots of organic debris,
Comments: Silt thickness = 10 avg

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

KC 5/26/09

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Sample No. S-15
Project Name: Thea Foss 45OMMP
Project No.: 106-3306

Date: 5/26/09 Time: 1059 Sampled by: JM/AM Checked by:
Equipment: Ponar Grab
Location Description: S-15 (Floyd Snider (City) Sample Only)

Deployment: A Time: 1059 Northing: 702762.0 Easting: 1160595.9
Accepted / Rejected Bio / Chem Water Depth 11' Penetration 17cm RPD Depth 1cm
Sediment (density, color, type: RPD = dark brown dark gray to black, med to coarse sand + coarse cap mat
Sediment Odor (type and magnitude): None
Biological (flora and fauna): shrimp, Kelp on surface,
Sheen None Debris
Comments: interbedded black silt 4cm, brown, cap material below 4cm

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

KC 5/26/09

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Sample No. S-17
Project Name: Thea Foss 45 OM MP
Project No.: 106-3306

Date: 5/18/09 Time: 1301 Sampled by: JM/AM Checked by:
Equipment: Ponar Grab
Location Description: S-17 (Flood Side Sample only) "City"

Deployment: A Time: 1301 Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth 5.6' Penetration 21 RPD Depth
Sediment (density, color, type: Dark olive gray to black silt
Sediment Odor (type and magnitude): H_2S odor
Biological (flora and fauna): shell fragments
Sheen None Debris some organic debris
Comments: Silt thickness = 14cm

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

EC 5/26/09

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Sample No. S-19
Project Name: Thea Foss Y50MMP
Project No.: 106-3306

Date: 5/20/09 Time: 1231 Sampled by: JM/AM Checked by:
Equipment: Power Grab
Location Description: S-19

Deployment: A Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

Deployment: B Time: 1231 Northing: 702667.175 Easting: 1160592.223
Accepted / Rejected Bio / Chem Water Depth 9.2 Penetration 19 RPD Depth 1cm
Sediment (density, color, type: dark olive gray 1cm RPD, black silt w/ some fine sand grading into coarse cap material
Sediment Odor (type and magnitude): None → faint H_2S odor within homogenized
Biological (flora and fauna): worm tubes
Sheen None Debris Organic debris
Comments: silt thickness = 8cm

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

EC 5/26/09

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Sample No. ~~76~~ S-24
Project Name: Thea Foss y50MMP
Project No.: 106-3306

Date: 5/26/09 Time: 1045 Sampled by: JM/AM Checked by:
Equipment: Power Grab
Location Description: S-24

Deployment: A Time: 1045 Northing: 702552.4 Easting: 1160508.6
Accepted / Rejected Bio / Chem Water Depth 6.7 Penetration 15 cm RPD Depth
Sediment (density, color, type: dark gray/olive green to black, surface silt w/fine sand
Sediment Odor (type and magnitude): Faint H_2S
Biological (flora and fauna): Shell fragments, worm tubes,
Sheen None Debris Organic debris
Comments: Silt thickness = 5-8 cm then coarse sand cap material

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type:
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

KC 5/26/09

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Sample No. ~~WC-14~~ WC-13
Project Name: Thea Foss 450MMP
Project No.: 106-3306

Date: 5/26/09 Time: 1117 Sampled by: JM/AM Checked by:

Equipment: Power Grab

Location Description: ~~WC-14~~ WC-13 (Floyd Snider Sample only) (under Bridge)

Deployment: A Time: 1117 Northing: NA Easting: NA

Accepted / Rejected Bio / Chem Water Depth 7.8 Penetration 21 cm RPD Depth

Sediment (density, color, type: Dark olive gray to black, Silt w/trace fine sand

Sediment Odor (type and magnitude): None

Biological (flora and fauna): worms, worm tubes

Sheen None Debris Plastic

Comments: Sand cap material @ 7cm, 7cm = Silt thickness

Deployment: Time: Northing: Easting:

Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth

Sediment (density, color, type:

Sediment Odor (type and magnitude):

Biological (flora and fauna):

Sheen Debris

Comments:

Deployment: Time: Northing: Easting:

Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth

Sediment (density, color, type:

Sediment Odor (type and magnitude):

Biological (flora and fauna):

Sheen Debris

Comments:

Deployment: Time: Northing: Easting:

Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth

Sediment (density, color, type:

Sediment Odor (type and magnitude):

Biological (flora and fauna):

Sheen Debris

Comments:

RC 6/24/09

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Sample No. ~~45~~ WC-14
Project Name: Thea Foss 45 OMMP
Project No.: 106-3306

Date: 5/26/09 Time: 1325 Sampled by: JM/AM Checked by:
Equipment: Power Grab
Location Description: WC-14 (Flyod Snider/City of Tacoma Sample Only)

Deployment: A Time: 1325 Northing: 702408.8 Easting: 1160618.7
Accepted / Rejected Bio / Chem Water Depth 6.5' Penetration 20cm RPD Depth 1cm
Sediment (density, color, type): dark olive gray/black silt w/ some fine sand, grades to dark gray fine sandy silt.
Sediment Odor (type and magnitude):
Biological (flora and fauna): 4" crab, worm tubes, some
Sheen small sheen spot overlying water Debris leaf litter,
Comments: silt thickness = 11cm, cap @ 11cm - 12cm ~~[illegible]~~, (clean)

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type):
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type):
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

KC 5/24/09

Deployment: Time: Northing: Easting:
Accepted / Rejected Bio / Chem Water Depth Penetration RPD Depth
Sediment (density, color, type):
Sediment Odor (type and magnitude):
Biological (flora and fauna):
Sheen Debris
Comments:

APPENDIX B.2

SAMPLE PHOTOS

(Located on Enclosed CD)

Appendix B.2 Field Photos

File Name	Description	Date
100_5314	Facing Southwest at Foss Landing Marina at the Head of the Thea Foss Waterway	5/26/2009
100_5317	Facing South at Foss Landing Marina at the Head of the Thea Foss Waterway	5/26/2009
100_5318	Facing South looking at the east slope under the SR 509 bridge at Head of the Thea Foss Waterway	5/26/2009
100_5319	Facing South looking at the Head of the Thea Foss Waterway Previous dock debris removed pilings in waterway	5/26/2009
100_5320	Facing Northwest looking at boats moored at the Foss Landing Marina slips	5/26/2009
100_5321	Facing West looking at boats moored at the Foss Landing Marina slips	5/26/2009
100_5322	Sample location RC-07/WC-07	5/26/2009
100_5325	Sample location RC-06/WC-06	5/26/2009
100_5326	Sample location RC-03/WC-03	5/26/2009
100_5327	Sample location RC-02/WC-02	5/26/2009
100_5328	Sample location RC-04/WC-04	5/26/2009
100_5329	Sample location RC-12/WC-12	5/26/2009
100_5330	Sample location S-24	5/26/2009
100_5331	Sample location S-15	5/26/2009
100_5332	Sample location WC-13	5/26/2009
100_5333	Sample location RC-11	5/26/2009
100_5334	RSS Pneumatic Power Grab System	5/26/2009
100_5335	RSS Pneumatic Power Grab System	5/26/2009
100_5336	RSS Pneumatic Power Grab System	5/26/2009
100_5337	RSS Sampling Vessel	5/26/2009
100_5338	Sample location S-19	5/26/2009
100_5339	Sample location RC-10/WC-10	5/26/2009
100_5340	Sample location S-17	5/26/2009
100_5341	Sample location RC-01/WC-01	5/26/2009
100_5342	Sample location RC-13	5/26/2009
100_5343	Sample location RC-14	5/26/2009
100_5344	Sample location RC-09/WC-09	5/26/2009
100_5345	Sample location RC-05/WC-05	5/26/2009
100_5346	Sample location RC-05/WC-05 sheen spot on surface.	5/26/2009
100_5347	Sample location RC/WC-08	5/26/2009
100_5348	Sample location RC/WC-08 sheen spot	5/26/2009

APPENDIX C

SAMPLE LOCATIONS AND DESCRIPTIONS

Appendix C. Surface Sediment Sampling Locations and Descriptions

Location	Easting	Northing	Sample ID	Sample Date	Sample Time	Sample Depth (cm)	Silt Thickness (cm)	Depth of Material Over Cap (cm)	Penetration (cm)	Was Cap Reached?	Sediment Description
Surface Grab Samples											
RC/WC-01	1160556.0	702002.6	Y5-RC01-S	5/26/2009	13:30	0-2	3	3	NA	NA	1 mm brown RPD layer over black SILT to 3 cm then medium to coarse SAND, mussels, clam shells, organic debris. Hand sample collected from intertidal area.
RC/WC-02	1160698.5	702124.6	Y5-RC02-S (Y5-RC15-SD)	5/26/2009	09:37 (09:42)	0-2	23+	23+	23	No	Dark gray to black SILT with trace SAND to 23 cm, faint H_2S odor, clam shell, abundant organic debris, leaf litter, pine needles.
RC/WC-03	1160508.8	702105.8	Y5-RC03-S	5/26/2009	09:15	0-2	16	16	19	Yes, intermixed with silt	1-2 cm dark gray to black fine to medium SILT, slightly sandy SILT, sand increases with depth, at 16 cm intermixing of SAND and SILT with possible cap material, faint H2S odor at 5 cm, mussels, shells, small sheen spot on homogenized sample, organic debris, leaves.
RC/WC-04	1160565.6	702219.1	Y5-RC04-S	5/26/2009	09:57	0-2	21	21	22	Yes, intermixed with clay/silt	Dark gray to black sandy SILT, at 21 cm intermixed clay and medium to coarse SAND, faint H2S odor, 4 cm live *macoma* clam, some organic debris, pine needles.
RC/WC-05	1160637.7	702359.6	Y5-RC05-S	5/26/2009	14:49	0-2	21+	21+	21	No	Dar gray to black SILT with some fine SAND, faint H2S odor, broken clam shells, kelp, 3 live shrimp (one containing eggs), iridesent sheen spot on sediment surface of grab, abundant leaf litter and organic debris, piece of plastic.
RC/WC-06	1160431.6	702254.9	Y5-RC06-S	5/26/2009	08:50	0-2	20+	20+	20	No	Dark gray to black SILT with trace SAND to 20 cm, fine gray SAND near bottom of grab, faint odor below surface, 6 live crabs, kelp, bivalve, shells, pine needles. Crabs disturbed sediment surface.
RC/WC-07	1160464.9	702387.5	Y5-RC07-S	5/26/2009	08:27	0-2	20	20	20	Yes, observed at very bottom of grab.	1 cm RPD layer over 20 cm of dark gray to black slightly sandy SILT with organic fragments, cap material observed at very bottom of grab, H2S odor, larval flat fish, mussel shells, shrimp, surface kelp, piece of plastic debris.
RC/WC-08	1160586*	702434.5*	Y5-RC08-S	5/26/2009	13:52	0-2	18	18	20	Yes	1 cm RPD layer dark olive gray to green over dark gray to black SILT with fine SAND to 18 cm grades into top of cap material, kelp, worm tubes, brown clam shells, iradescent sheen on surface sediment of grab, organic debris, leaf litter.
RC/WC-09	1160653.5*	702452.3*	Y5-RC09-S	5/26/2009	14:20	0-2	10	10	20	Yes	1 cm RPD layer dark olive gray underlying black SILT with some fine SAND to 10 cm then cap material below, H2S odor, trace worm tubes, worms, organic debris, pine needles.
RC/WC-10	1160574.6	702583.6	Y5-RC10-S	5/26/2009	12:44	0-2	3	3	20	Yes	1 cm RPD layer dark brown over dark gray to black sandy SILT to 3 cm grade into sand cap material, shell fragments, worm tubes, some organic debris, leaf litter.
RC/WC-11	1160664.6	702722.9	Y5-RC11-S	5/26/2009	11:35	0-2	5	10	22	Yes, 5-10 cm silt mixed with cap, clean cap at 10 cm	1 cm RPD layer dark olive gray over black SILT with some SAND to 5 cm then grades into black medium sand cap material at 10 cm, faint H2S odor, mussel shells, worm tubes, some organic debris.
RC/WC-12	1160500.9	702720.8	Y5-RC12-S	5/26/2009	10:21	0-2	9	9	20	Yes	1 cm brown sandy SILT on surface, dark gray sandy SILT grades into fine to medium SAND over 1" rock grades into clayey SILT with medium to coarse SAND, cap material at 9 cm, snail, broken clam shell, kelp, some organic debris.
RC-13	1160565.9	701876.1	Y5-RC13-S	5/26/2009	13:35	0-2	10	10	NA	NA	1 cm light brown to brown SILT over black SILT grades into dark gray to black with depth, mussels, barnacles, abundant organic debris. Hand sample collected from intertidal area.
RC-14	1160718.7	701872.7	Y5-RC14-S	5/26/2009	14:00	0-2	5.5-8	7 (avg)	NA	NA	Dark brown SILT with SAND and cobbles on surface over dark gray to brown SILT with depth, mussels, barnacles, shells, dead crab, abundant organic debris, grass fibers. Hand sample collected from intertidal area.
WC-13[1]	1160603.4*	702459.5*	N/A	5/26/2009	11:17	0-10	7	7	21	Yes	Dark olive gray to black SILT with trace fine SAND to 7 cm over cap material, worms, worm tubes, piece of plastic.
WC-14[1]	1160618.7	702408.8	N/A	5/26/2009	13:25	0-10	11	11	20	Yes	1 cm RPD layer dark olive gray over black SILT with some fine SAND grades to dark gray fine sandy SILT for 11-12 cm over cap material, 4" crab, worm tubes, small sheen spot overlying water of grab sample, some leaf litter.
S-15[1]	1160595.9	702762.0	N/A	5/26/2009	10:59	0-10	2	4	17	Yes	1 cm RPD layer dark brown over dark gray to black SILT to 4 cm, over medium to coarse SAND to coarse cap material, shrimp, kelp on surface.
S-17[1]	1160673.6	702546.9	N/A	5/26/2009	13:01	0-10	14	14	21	Yes	Dark olive gray to black SILT to 14 cm, H2S odor, shell fragments, some organic debris.
S-19[1]	1160592.2	702667.2	N/A	5/26/2009	12:31	0-10	8	8	19	Yes	1 cm RPD layer dark olive gray over black SILT with some fine SAND to 8 cm grades into coarse sand cap material, faint H2S odor when homogenized, worm tubes, organic debris.
S-24[1]	1160508.6	702552.4	N/A	5/26/2009	10:45	0-10	5-8	7 (avg)	15	Yes	Dark gray, olive green to black surface SILT with fine SAND to 5-8 cm over cap material, faint H2S, shell fragments, worm tubes, organic debris.

Notes:
[1] Location sampled by Floyd Snider representatives only.
* Proposed coordinates for Impermeable Cap Edge samples (RC/WC-08, RC/WC-09, and WC-13) due to lack of GPS signal under the SR-509 bridge during sample collection.
N/A - Not available
NAD 83 State Plane Coordinates, Washington South Zone-4602, U.S. Survey Feet.

APPENDIX D

DATA EVALUATION REPORTS

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: July 6, 2009

SUBJECT: Review of Results of Analyses for Fifteen Sediments and One Field Rinsate Blank Collected during May 2009 from the Head of Thea Foss Waterway (Year-Five Post-Construction Monitoring)

Fifteen (surficial, 2 cm depth) sediments and one field equipment rinsate sample were collected and submitted in a single sample delivery group to Analytical Resources Inc. (ARI) of Tukwila, Washington, for analyses of TOC (Plumb, 1981), TPH-Dx (NWTPHDx), metals (6010B & 7471A), SVOCs (including PAH and phthalates)(8270D), PCBs (8082) and sediment grain size (PSEP). One set (a single pair) of blind field duplicate was also submitted for analyses (RC02-S / RC15-SD [0-2 cm]). Results of analyses (all dry weight normalized for sediments, as required) are attached to this summary. Samples were relinquished by Tetra Tech EC under chain-of-custody (C-O-C) procedure and "hand" delivered to ARI on the same day of collection. Samples were received intact at 8 - 16 °C, with ice present in coolers. All analyses were completed within the technical holding time requirements identified in the project QAPP (*Quality Assurance Project Plan (QAPP), Utilities Work Area Remediation*, prepared by DOF, DMD & Tetra Tech-FW, July 24, 2003) and/or within the recommended maximum holding times recommended by the U.S. EPA. Sample holding times/conditions are determined to be within specification.

All **reporting limits** are sufficiently low for comparison to the project/task SQO's. Dilutions and reruns were frequently required for SVOC extracts due to internal standard deviations. Most SVOC parameters show a lower reporting limit of 98 - 240 µg/kg. All samples showed lower reporting limits less than individual chemical SQOs. Dilutions were required, in some cases (principally for *bis*(2-ethylhexyl)phthalate) to bring detected analyte concentrations within the instrumental linear calibration range. All lower reporting limits for organics are based on the lowest calibration point used to establish instrument linearities. Detections of organic analytes at less than the lower verifiable calibration point are qualified as estimates with the "J_l" qualifier code.

Method blanks were analyzed with each parameter group, and all blanks showed nondetected analytes. One method blank reported a low-level detection of *bis*(2-ethylhexyl)phthalate. The level was not sufficiently elevated to affect reported sediment sample results. The method blank associated with the analysis of the field rinsate blank showed no detections of target analytes.

The field equipment **rinsate blank** showed contamination for *bis*(2-ethylhexyl)phthalate only, at 3.9 µg/L. The associated method blank reported no detection of the phthalate.

All laboratory control sample (**LCS**) and matrix spike (**MS/MSD**) recoveries were within the QAPP-specified ranges for all designated analytes (Aroclors 1016 and 1260 were substituted for the QAPP-specified Aroclor 1242 with the same specified acceptance range). Slightly elevated MS/MSD recoveries were observed for Aroclor 1016 due to coelutions and overlap with components from native Aroclor 1248. All recoveries were within acceptable limits, and no qualification of results was required.

All **surrogate compound recoveries** (for organic analytes) are within the project-specified acceptance ranges. All measures of recovery performance in sediments are acceptable or within specification; no data qualification is necessary.

Internal standards (**IS**) performance was determined to be within method specifications for reported results of organic analytes. d_{12}-Perylene internal standard exhibited elevated response in multiple extracts. Associated extracts were reanalyzed as dilutions with elevated responses remaining consistent. This deviation may bias low the associated data, which are qualified with the "J_i" code in the attached table. Affected parameters are benzofluoranthenes, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene and benzo(ghi)perylene.

Initial and **continuing calibration** performances were determined to be within method specifications and less than 25 RPD for all analyses. No qualification of data is required based on calibration performance.

Examination of **TPH-Dx** profiles revealed the presence of principally lubricant-range hydrocarbons, and <u>not</u> diesel-range hydrocarbons. The values reported by the analyst/laboratory for diesel-range hydrocarbons are due principally to the chromatographic overlap associated with lubricant hydrocarbons. The lube-range profile exhibits an unresolved complex mixture (UCM) typical of contamination from urban runoff containing motor oil. All samples exhibited near identical profiles in the lubricant range characterized with centroid at slightly less than SAE 30 weight petroleum-based motor oil. Total hydrocarbons are most represented by the lube-range values, and are thus highlighted in bold in the attached results table.

All chromatograms were inspected to evaluate general chromatographic integrity. Peak shapes are reasonable and acceptable, and no abrupt baseline shifts are noted. Aroclor 1248 results in four samples are reported as an estimate ("J_p" qualifier code) due to slightly elevated variability in responses exhibited between the two gas chromatographic columns.

Monitoring variability determined by comparison of results reported for the two sets of blind field duplicates shows up to 17 RPD (relative percent difference) in the pair RC02-S / RC15-SD. Grain size (particle size distribution) analyses exhibited relatively consistent agreement with small variability for the duplicate pair.

Sample results reported here are determined to be in general compliance with method and QAPP requirements. Some deviations from specified performance goals are associated with matrix

effects from contaminated samples. Sample extracts/digestates were rerun/reanalyzed when QC performance goals were not initially met. All reported data (see attached), including qualified data, are considered usable for the intended purposes of the project.

D.M.D., Inc.

Thea Foss
OMMP Y5 - May 2009

metals as mg/kg (ppm), dry
organics as ug/kg (ppb), dry

							TPH-Dx (mg/kg)		Pb	Hg
Field Sample I.D.	**Location**	Comments	Sample Date	Lab I.D.	% solids	% TOC	Diesel-range	Lube-range	7439-92-1	7439-97-6
Y5-RC07-S	RC/WC-07	0-2 cm	5/26/2009	0912013-PA27A	37.3	7.25	980	**6700**	**139**	**0.16**
Y5-RC06-S	RC/WC-06	0-2 cm	5/26/2009	0912014-PA27B	43.4	7.32	720	**4600**	**90**	**0.18**
Y5-RC03-S	RC/WC-03	0-2 cm	5/26/2009	0912015-PA27C	50.9	5.72	460	**3100**	**58**	**0.10**
Y5-RC04-S	RC/WC-04	0-2 cm	5/26/2009	0912016-PA27D	46.6	5.28	670	**4100**	**85**	**0.12**
Y5-RC02-S	RC/WC-02	0-2 cm	5/26/2009	0912017-PA27E	34.2	10.3	1100	**7100**	**125**	**0.16**
Y5-RC15-SD	RC/WC-02	0-2 cm	5/26/2009	0912018-PA27F	34.7	15.0	960	**6000**	**112**	**0.17**
Y5-RC12-S	RC/WC-12	0-2 cm	5/26/2009	0912019-PA27G	48.5	7.10	430	**2300**	**61**	**0.14**
Y5-RC11-S	RC/WC-11	0-2 cm	5/26/2009	0912020-PA27H	39.9	8.90	1500	**7900**	**118**	**0.21**
Y5-RC10-S	RC/WC-10	0-2 cm	5/26/2009	0912021-PA27I	59.5	6.10	280	**1600**	**39**	**0.09**
Y5-RC05-S	RC/WC-05	0-2 cm	5/26/2009	0912022-PA27J	40.4	6.07	1200	**6100**	**79**	**0.14**
Y5-RC09-S	RC/WC-09	0-2 cm	5/26/2009	0912023-PA27K	38.3	8.18	870	**4600**	**92**	**0.19**
Y5-RC13-S	RC-13	0-2 cm	5/26/2009	0912024-PA27L	41.0	7.15	900	**4900**	**112**	**0.16**
Y5-RC14-S	RC-14	0-2 cm	5/26/2009	0912025-PA27M	46.0	9.75	670	**4200**	**92**	**0.20**
Y5-RC01-S	RC/WC-01	0-2 cm	5/26/2009	0912026-PA27N	39.9	8.15	1400	**7400**	**206**	**0.19**
Y5-RC08-S	RC/WC-08	0-2 cm	5/26/2009	0912027-PA27O	46.2	7.67	790	**4100**	**88**	**0.19**
Y5-RB-01	Rinsate Blk	water matrix	5/26/2009	0912028-PA27P	0.0		0.25 U	0.5 U	0.02 U	0.0001 U

U = nondetected at the associated value
TPH-Dx most resembles motor oil

Thea Foss
OMMP Y5 - May 2009

metals as mg/kg (ppm), dry
organics as ug/kg (ppb), dry

Field Sample I.D.	Zn 7440-66-6	% gravel > 2000 µm	% v. coarse sand 1000-2000 µm	% coarse sand 500-1000 µm	% med. sand 250-500 µm	% fine sand 125-250 µm	% v. fine sand 62-125 µm	% silt 3.9-62.5 µm	% clay < 3.9 µm	% fines < 62.5 µm
Y5-RC07-S	**371**	0.7	1.6	2.6	7.1	9.0	8.2	57	14	71
Y5-RC06-S	**266**	0.2	1.9	3.7	13	14	7.2	49	12	61
Y5-RC03-S	**190**	0.5	2.4	5.2	15	19	12	33	13	46
Y5-RC04-S	**257**	0.1	2.5	5.0	12	14	11	40	15	55
Y5-RC02-S	**473**	1.0	4.2	6.1	9.2	12	8.6	43	16	59
Y5-RC15-SD	**438**	3.1	5.2	6.3	10	13	9.1	34	19	53
Y5-RC12-S	**181**	11	7.6	14	18	8.4	3.5	27	11	38
Y5-RC11-S	**353**	6.2	3.2	3.3	3.2	3.6	3.6	51	26	77
Y5-RC10-S	**124**	42	8.4	7.9	8.3	5.5	3.4	19	4.9	24
Y5-RC05-S	**268**	0.4	2.7	2.3	11	13	9.0	43	20	62
Y5-RC09-S	**286**	0.2	1.8	2.5	9.4	11	7.4	52	16	67
Y5-RC13-S	**342**	8.9	3.5	3.6	4.7	7.5	8.1	40	24	64
Y5-RC14-S	**325**	3.1	3.6	5.6	7.8	12	12	37	19	56
Y5-RC01-S	**448**	4.8	8.4	9.3	7.8	9.8	12	34	14	48
Y5-RC08-S	**266**	0.9	2.7	5.2	14	12	8.1	40	17	57
Y5-RB-01	0.01 U									

U = nondetected at the associated value

Thea Foss
OMMP Y5 - May 2009

metals as mg/kg (ppm), dry
organics as ug/kg (ppb), dry

Field Sample I.D.	Naphthalene 91-20-3	1-Methyl-naphthalene 90-12-0	2-Methyl-naphthalene 91-57-6	Acenaph-thylene 208-96-8	Acenaphthene 83-32-9	Dibenzo-furan 132-64-9	Fluorene 86-73-7	Phenanthrene 85-01-8	Anthracene 120-12-7	Fluoranthene 206-44-0
Y5-RC07-S	**110**	99 U	99 U	99 U	99 U	99 U	99 U	**1100**	**190**	**2100**
Y5-RC06-S	99 U	99 U	99 U	99 U	99 U	99 U	99 U	**870**	**150**	**1600**
Y5-RC03-S	98 U	98 U	98 U	98 U	98 U	98 U	98 U	**780**	**130**	**1100**
Y5-RC04-S	98 U	98 U	98 U	98 U	98 U	98 U	98 U	**1300**	**200**	**1900**
Y5-RC02-S	98 U	98 U	98 U	98 U	98 U	98 U	98 U	**1200**	**170**	**1900**
Y5-RC15-SD	99 U	99 U	99 U	99 U	99 U	99 U	99 U	**1500**	**230**	**2200**
Y5-RC12-S	**110**	100 U	100 U	100 U	**100**	100 U	100 U	**710**	**200**	**1100**
Y5-RC11-S	**100**	98 U	98 U	98 U	98 U	98 U	98 U	**850**	**190**	**1200**
Y5-RC10-S	97 U	97 U	97 U	97 U	97 U	97 U	97 U	**420**	**77 J_l**	**810**
Y5-RC05-S	99 U	99 U	99 U	99 U	**100**	99 U	**100**	**1200**	**210**	**1600**
Y5-RC09-S	99 U	99 U	99 U	99 U	99 U	99 U	99 U	**830**	**170**	**1400**
Y5-RC13-S	240 U	240 U	240 U	240 U	240 U	240 U	240 U	**2100**	**330**	**3600**
Y5-RC14-S	98 U	98 U	98 U	98 U	98 U	98 U	98 U	**1200**	**190**	**1900**
Y5-RC01-S	98 U	98 U	98 U	98 U	**110**	98 U	**140**	**2400**	**350**	**3300**
Y5-RC08-S	**110**	99 U	99 U	99 U	99 U	99 U	99 U	**1000**	**200**	**1500**
Y5-RB-01	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

U = nondetected at the associated value
J_l = associated value is considered an estimate; less than verifiable lower calibration point

Thea Foss
OMMP Y5 - May 2009

metals as mg/kg (ppm), dry
organics as ug/kg (ppb), dry

Field Sample I.D.	Pyrene 129-00-0	Benzo(a)-anthracene 56-55-3	*bis* (2-Ethylhexyl)-phthalate 117-81-7	Chrysene 218-01-9	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	Dibenz(a,h)-anthracene 53-70-3	Benzo(ghi)-perylene 191-24-2
Y5-RC07-S	**2000**	**920**	**4900**	**1600**	**1100**	**1100**	**1100**	**640**	**250**	**700**
Y5-RC06-S	**1600**	**790**	**5400**	**1400**	**1000**	**1000**	**950**	**580**	**220**	**620**
Y5-RC03-S	**1100**	**580**	**2700**	**1000**	**630 J_i**	**630 J_i**	**670 J_i**	**460 J_i**	**190 J_i**	**460 J_i**
Y5-RC04-S	**2000**	**980**	**4900**	**1800**	**1300**	**1300**	**1200**	**610**	**230**	**600**
Y5-RC02-S	**1800**	**1000**	**5600**	**1800**	**1300**	**1300**	**1200**	**530**	**230**	**550**
Y5-RC15-SD	**2000**	**1200**	**6200**	**2100**	**1500 J_i**	**1500 J_i**	**1400 J_i**	**640 J_i**	**260 J_i**	**640 J_i**
Y5-RC12-S	**1300**	**490**	**2600**	**820**	**340**	**340**	**700**	**270**	**120**	**300**
Y5-RC11-S	**1400**	**760**	**5400**	**1500**	**1100**	**1100**	**990**	**420**	**170**	**470**
Y5-RC10-S	**770**	**330**	**1400**	**570**	**570**	**360**	**400**	**220**	**83 J_l**	**260**
Y5-RC05-S	**1600**	**850**	**5500**	**1400**	**1100**	**1100**	**1000**	**460**	**170**	**460**
Y5-RC09-S	**1500**	**750**	**5100**	**1300**	**1300**	**1100**	**960**	**420**	**140**	**440**
Y5-RC13-S	**3200**	**1600**	**6500**	**2800**	**3800**	**3800**	**1800**	**1200**	**520 J_i**	**1400**
Y5-RC14-S	**1800**	**1000**	**5300**	**1800**	**1400**	**1400**	**1300**	**600**	**230**	**590**
Y5-RC01-S	**3100**	**1800**	**6600**	**3100**	**1800 J_i**	**1800 J_i**	**1900 J_i**	**940 J_i**	**290 J_i**	**970 J_i**
Y5-RC08-S	**1600**	**850**	**3800**	**1500**	**1000 J_i**	**1000 J_i**	**990 J_i**	**510 J_i**	**110 J_i**	**560 J_i**
Y5-RB-01	1.0 U	1.0 U	**3.9**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

U = nondetected at the associated value
J_i = associated value is considered an estimate; elevated internal standard response
J_l = associated value is considered an estimate; less than verifiable lower calibration point

Thea Foss
OMMP Y5 - May 2009

metals as mg/kg (ppm), dry
organics as ug/kg (ppb), dry

	Aroclor 1016	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1221	Aroclor 1232
Field Sample I.D.	12674-11-2	53469-21-9	12672-29-6	11097-69-1	11096-82-5	11104-28-2	11141-16-5
Y5-RC07-S	12 U	12 U	**29**	**66**	**68**	12 U	12 U
Y5-RC06-S	12 U	12 U	**25 J_p**	**58**	**68**	12 U	12 U
Y5-RC03-S	12 U	12 U	**18**	**46**	**48**	12 U	12 U
Y5-RC04-S	12 U	12 U	**26 J_p**	**60**	**69**	12 U	12 U
Y5-RC02-S	12 U	12 U	**28**	**73**	**77**	12 U	12 U
Y5-RC15-SD	12 U	12 U	**20**	**63**	**74**	12 U	12 U
Y5-RC12-S	12 U	12 U	12 U	**38**	**46**	12 U	12 U
Y5-RC11-S	12 U	12 U	**21**	**54**	**60**	12 U	12 U
Y5-RC10-S	12 U	12 U	12 U	**27**	**28**	12 U	12 U
Y5-RC05-S	12 U	12 U	12 U	**36**	**33**	12 U	12 U
Y5-RC09-S	12 U	12 U	**23 J_p**	**58**	**56**	12 U	12 U
Y5-RC13-S	12 U	12 U	**24 J_p**	**52**	**64**	12 U	12 U
Y5-RC14-S	12 U	12 U	12 U	**38**	**56**	12 U	12 U
Y5-RC01-S	12 U	12 U	**23**	**63**	**81**	12 U	12 U
Y5-RC08-S	12 U	12 U	**18**	**39**	**50**	12 U	12 U
Y5-RB-01	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

U = nondetected at the associated value
J_p = associated value is considered an estimate; dual column RPD elevated

APPENDIX E

HEAD OF THE THEA FOSS CHEMISTRY DATA 2004-2009

Table E. Head of the Thea Foss Results 2004-2009

Location	Sample ID	Monitoring Type	Sample Date	Depth Below Mudline	Easting	Northing	Total Solids	TOC	TPH Diesel	TPH Motor Oil	Sb	As	Cd	Cr	Cu	Pb	Hg	Ni	Ag	Zn	Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand
		SQO Units					Percent	Percent	MG/KG	MG/KG	150 MG/KG	57 MG/KG	5.1 MG/KG	MG/KG	390 MG/KG	450 MG/KG	0.59 MG/KG	140 MG/KG	6.1 MG/KG	410 MG/KG	Percent	Percent	Percent	Percent	Percent	Percent
RC/WC-01	RC-01	Year 0 OMMP	4/8/2004	0-2 cm	1160586.1	702002.6	79.8	2.44			6 U	6	0.2 U	33.2	44.1	25	0.06 U	28	0.3 U	74.3	25		40	17		6.1
RC/WC-01	RC-01	City Sampling	12/9/2004	0-2 cm	1160586.1	702002.6	77.7		96	430		7			39.7	27	0.06	24		71.9	25.8	19.7	31.5	14		1.8
RC/WC-01	RC-01	Year 1 OMMP	5/12/2005	0-2 cm	1160586.1	702002.6	6.93	45.2	1200	4800		10			81.7	104	0.2	37		289	21.3	8.6	15	10.1	7.3	7.9
RC/WC-01	Y2-RC01-S	Year 2 OMMP	5/16/2006	0-2 cm	1160586.1	702002.6	40.4	9.92	900	4700	10 U (UJ)	10 U	0.6		76.5	90	0.1	59	0.8 U	287	22	10.1	10.1	11.2	9.9	9.6
RC/WC-01	Y3-RC01-S	Year 3 OMMP	5/16/2007	0-2 cm	1160586.1	702003.0	26.5	11.8	540	3400						111	0.3			380	31.7	16	10.1	7.3	5.5	5.1
RC/WC-01	Y4-RC01-S	Year 4 OMMP	5/7/2008	0-2 cm	1160586.1	702002.6	45.6	5.65	860	5000						94	0.1			308	12.9	6.4	8.1	15.5	13.4	8.6
RC/WC-01	Y5-RC01-S	Year 5 OMMP	5/26/2009	0 - 2 cm	1160556.0	702002.6	39.9	8.15	1400	7400						206	0.19			**448**	4.8	8.4	9.3	7.8	9.8	11.8
RC/WC-01	WC-01	Year 0 OMMP	4/8/2004	0-10 cm	1160586.1	702002.6	86.9	1.47			5 U	5 U	0.2 U	19.1	28.9	6	0.04 U	23	0.3 U	41	28		42	16		6.1
RC/WC-01	WC-01	City Sampling	12/9/2004	0-10 cm	1160586.1	702002.6	78.9		91	440		6 U			37.4	22	0.07	25		68.5	46.8	10.4	18.8	12.2		3.3
RC/WC-01	Y2-WC01-S	Year 2 OMMP	5/16/2006	0-10 cm	1160586.1	702002.6	36.4	7.11	1100	5100	10 U (UJ)	10 U	0.6		69.4	86	0.1	34	0.8 U	269	20.5	9.1	808	10.8	8.9	7.1
RC/WC-01	WC-01-070516-G	Year 3 OMMP/City Sampling	5/16/2007	0-10 cm	1160586.1	702003.0	60.8	4.55																		
RC/WC-01	Y4-WC01-Sa	Year 4 OMMP	5/7/2008	0-10 cm	1160586.1	702002.6	46.7	6.84	670	3400						89	0.16			324	9.8	5.9	6.6	15.2	13.9	7.6
RC/WC-01	Y4-WC01B-Ca3	Year 4 OMMP	5/8/2008	2.5-3.5 ft	1160586.1	702002.6	86.8	1.19								2 U	0.06 U			36	18	16.3	18.7	27	16.4	2.5
RC/WC-01	WC-01-260509-G	Year 5 OMMP/City Sampling	5/26/2009	0-10 cm	1160556.0	702002.6	52.1	5.76																		
WC-01B/R-01B	Y2-WC01B-C3	Year 2 OMMP	5/17/2006	2-3 ft	1160608.6	702092.9	85.6	0.548			6 U (UJ)	6 U	0.2 U		31.1	3	0.05 U	15	0.3 U	29.5	28.4	16.3	17.9	21.3	11.9	1.5
RC/WC-02	Y5-RC02-S	Year 5 OMMP	5/26/2009	0 - 2 cm	1160698.5	702124.6	34.2	10.3	1100	7100						125	0.16			**473**	1	4.2	6.1	9.2	12.4	8.6
RC/WC-02	RC-02	Year 0 OMMP	4/8/2004	0-2 cm	1160699.7	702124.5	50.7	5.32			9 U	9 U	0.4 U	27.5	71.3	20	0.1 U	27	0.6 U	71	1.2		8.7	21		33
RC/WC-02	RC-02	Year 1 OMMP	5/12/2005	0-2 cm	1160699.7	702124.5	7.11	41.7	1300	5900		10			107	122	0.3	34		261	0.4	1	6.4	15	17.2	9
RC/WC-02	RC-2A (Dup of RC-2)	Year 1 OMMP	5/12/2005	0-2 cm	1160699.7	702124.5	6.54	40.8	880	3700		10			106	123	0.3	34		267	0.2	0.9	6.6	14.7	16.6	9
RC/WC-02	Y2-RC02-S	Year 2 OMMP	5/12/2006	0-2 cm	1160699.7	702124.5	41.6	5.17	1000	5300	10 U (UJ)	10 U	1		88.4	97	0.2	31	0.7 U	254	0.8	3.8	16.2	15.9	11.6	0
RC/WC-02	Y3-RC02-S	Year 3 OMMP	5/16/2007	0-2 cm	1160702.6	702134.0	33.4	7.02	790	5600						114	0.2			**539**	2.4	5.4	9.3	14.5	19.7	12.5
RC/WC-02	Y4-RC02-S	Year 4 OMMP	5/6/2008	0-2 cm	1160699.7	702124.5	32.4	3.22	880	4200						134	0.2			**452**	2	2.7	6.5	10	12.8	12.4
RC/WC-02	Y5-RC15-SD	Year 5 OMMP	5/26/2009	0 - 2 cm	1160698.5	702124.6	34.7	15	960	6000						112	0.17			**438**	3.1	5.2	6.3	10.1	13.2	9.1
RC/WC-02	RC-02	City Sampling	12/2/2004	0-8 cm	1160699.7	702124.5	48.9		340	1700		10 U			91.3	70	0.1	30		164	0.7	1.7	5.1	18.4		6.8
RC/WC-02	WC-02	Year 0 OMMP	4/8/2004	0-10 cm	1160699.7	702124.5	61.6	3.45			8 U	8 U	0.3 U	23.6	60.9	15	0.08 U	23	0.5 U	58	8.2		14	23		32
RC/WC-02	WC-02 (City)	City Sampling	12/2/2004	0-10 cm	1160699.7	702124.5	52	4.2								49.4	0.075			107 B						
RC/WC-02	WC-02	Year 1 OMMP	5/12/2005	0-10 cm	1160699.7	702124.5	4.9	65.3	440	2100		10			72.5	54	0.12	26		127	1.3	0.7	5.4	22	25.8	8
RC/WC-02	Y2-WC02-S	Year 2 OMMP	5/12/2006	0-10 cm	1160699.7	702124.5	47	6.37	840	4000	10 U (UJ)	10 U	1.2		90.8	92	0.22	32	0.7 U	252	0.6	3	5	11.7	19	10.9
RC/WC-02	WC-02-070516-G	Year 3 OMMP/City Sampling	5/16/2007	0-10 cm	1160702.6	702134.0	35.6	6.86																		
RC/WC-02	Y4-WC02-Sa	Year 4 OMMP	5/6/2008	0-10 cm	1160699.7	702124.5	34.2	8.33	610	2900						112	0.5			348	0.8	3.6	6.1	10.5	16.9	12
RC/WC-02	WC-02-260509-G	Year 5 OMMP/City Sampling	5/26/2009	0-10 cm	1160698.5	702124.6	42.5	8.69																		
RC/WC-03	Y5-RC03-S	Year 5 OMMP	5/26/2009	0 - 2 cm	1160508.8	702105.8	50.9	5.72	460	3100						58	0.1			190	0.5	2.4	5.2	15.2	18.9	11.7
RC/WC-03	RC-03	Year 0 OMMP	4/8/2004	0-2 cm	1160508.2	702105.1	37.8	6.68			10 U	10 U	0.5 U	40	112	44	0.1	36	0.8 U	115	0.1		4.9	3.7		18
RC/WC-03	RC-03	Year 1 OMMP	5/12/2005	0-2 cm	1160508.2	702105.1	5.44	50.4	400	1600		10 U			69.3	55	0.21	25		123	0.1	1	6.4	18.4	23.3	12.3
RC/WC-03	Y2-RC03-S	Year 2 OMMP	5/15/2006	0-2 cm	1160508.2	702105.1	47.9	4.98	530	2300	10 U (UJ)	10 U	0.6		73.6	62	0.16	28	0.7 U	166	3.8	2.4	5	15.4	17.8	9.2
RC/WC-03	Y3-RC03-S	Year 3 OMMP	5/16/2007	0-2 cm	1160505.2	702107.0	55.1	5.13	230	1500						36	0.1			113	0.1	3.2	8.4	20.8	23.4	12.5
RC/WC-03	Y4-RC03-S	Year 4 OMMP	5/6/2008	0-2 cm	1160508.2	702105.1	50.4	4.35	280	1200						33	0.09			108	0.1	2	7.4	20.7	24.3	13.1
RC/WC-03	WC-03	Year 0 OMMP	4/8/2004	0-10 cm	1160508.2	702105.1	50.8	7.12			10 U	10 U	0.4 U	26	65.6	20	0.07	24	0.6 U	63	0.5		8.4	16		33
RC/WC-03	WC-03 (City)	City Sampling	12/2/2004	0-10 cm	1160508.2	702105.1	42	6.5								42	0.081			93 B						
RC/WC-03	Y2-WC03-S	Year 2 OMMP	5/15/2006	0-10 cm	1160508.2	702105.1	54.4	5.32	340	1400	10 U (UJ)	10 U	0.4 U		55.7	37	0.13	21	0.6 U	99	1.53	1.9	5.3	15.7	23.1	12.3
RC/WC-03	WC-03-070516-G	Year 3 OMMP/City Sampling	5/16/2007	0-10 cm	1160505.2	702107.0	60.4	2.54																		
RC/WC-03	Y4-WC03-Sa	Year 4 OMMP	5/6/2008	0-10 cm	1160508.2	702105.1	65.1	2.96	170	800						28	0.08			96	0.9	2.7	8.5	23.2	27.8	13.2
RC/WC-03	RC-03	City Sampling	12/2/2004	0-12 cm	1160508.2	702105.1	48.1		93	420		10 U			84.4	34	0.1	29		90	1.1	0.7	1.5	9.9		18.5
RC/WC-03	WC-03-260509-G	Year 5 OMMP/City Sampling	5/26/2009	0-10 cm	1160508.8	702105.8	64.3	3.34																		
RC/WC-04/R-02	Y5-RC04-S	Year 5 OMMP	5/26/2009	0 - 2 cm	1160565.6	702219.1	46.6	5.28	670	4100						85	0.12			257	0.1	2.5	5	11.7	14.4	10.8
RC/WC-04/R-02	RC-04	Year 0 OMMP	4/8/2004	0-2 cm	1160565.7	702219.9	55.2	6.34			9 U	9 U	0.4 U	27.1	71.8	19	0.08	25	0.5 U	70	4.1		18	20		24
RC/WC-04/R-02	RC-04	Year 1 OMMP	5/12/2005	0-2 cm	1160565.7	702219.9	6.26	35.4	1000	3500		20			119	140	0.5	37		254	0.2	0.6	5.7	8.7	9.5	7.5
RC/WC-04/R-02	Y2-RC04-S	Year 2 OMMP	5/12/2006	0-2 cm	1160565.7	702219.9	46.4	7.41	680	3000	10 U (UJ)	10 U	0.5 U		46.7	44	0.2	19	0.7 U	108	2.8	3.5	5.9	13.8	17.6	10.3
RC/WC-04/R-02	Y3-RC04-S	Year 3 OMMP	5/17/2007	0-2 cm	1160560.3	702206.0	45.5	7.21	500	3300						77	0.32			227	0.7	0.8	5.3	13.6	15.5	11.2
RC/WC-04/R-02	Y4-RC04-S	Year 4 OMMP	5/6/2008	0-2 cm	1160565.7	702219.9	46	4.44	470	2200						54	0.12			161	0.1	1.6	7.1	19	19.9	10.1
RC/WC-04/R-02	RC-04	City Sampling	12/1/2004	0-9 cm	1160565.7	702219.9	49.1		40	210		10			76.8	49	0.16	27		128	5.9	5.1	8.7	14.3		7.7
RC/WC-04/R-02	WC-04	Year 0 OMMP	4/8/2004	0-10 cm	1160565.7	702219.9	70	4.6			7 U	7 U	0.3 U	24	55.2	13	0.06 U	22	0.4 U	52.2	14		25	20		25
RC/WC-04/R-02	WC-04-Duplicate	Year 0 OMMP	4/8/2004	0-10 cm	1160565.7	702219.9	67.7	6.23			7 U	7 U	0.3 U	23.2	62	13	0.05	21	0.4 U	48.2	14		24	20		25
RC/WC-04/R-02	S-34 (Dup of WC-04)	City Sampling	12/1/2004	0-10 cm	1160565.7	702219.9	55.1		31	100		9 U			67.7	33	0.11	26		98	3	5.3	7.8	19.3		7.8
RC/WC-04/R-02	WC-04	City Sampling	12/1/2004	0-10 cm	1160565.7	702219.9	54.3		71	380		9 U			67.2	35	0.12	25		95	4.5	4	9.6	18.9		7.6
RC/WC-04/R-02	WC-04	Year 1 OMMP	5/12/2005	0-10 cm	1160565.7	702219.9	6.28	52.5	350	1400		10			80.9	50	0.25	26		113	9.3	5.8	10.4	17.1	12.9	7
RC/WC-04/R-02	Y2-WC04-S	Year 2 OMMP	5/12/2006	0-10 cm	1160565.7	702219.9	55.3	3.2	470	2100	9 U (UJ)	9 U	0.6		61.2	54	0.18	23	0.6 U	133	7.1	5.2	9.5	19.3	15.7	7.2
RC/WC-04/R-02	WC-04-070517-G	Year 3 OMMP/City Sampling	5/17/2007	0-10 cm	1160560.3	702206.0	56.1	3.3																		
RC/WC-04/R-02	Y4-WC04-Sa	Year 4 OMMP	5/6/2008	0-10 cm	1160565.7	702219.9	53.6	3.53	420	2000						48	0.13			152	0.33	2.7	8.87	21.1	20.4	9.83
RC/WC-04/R-02	WCBU-4A	Year 0 OMMP	4/7/2004	0-1 ft	1160565.7	702219.9	84.1	0.886			6 U	6 U	0.2 U	19.7	36	3	0.04 U	20	0.3 U	35.3	15		33	26		22
RC/WC-04/R-02	WCBU-4B	Year 0 OMMP	4/7/2004	1-2 ft	1160565.7	702219.9	91.7	0.14			10 U	10 U	0.5 U	26	37	5 U	0.05 U	22	0.8 U	38	25		43	21		9.8
RC/WC-04/R-02	WCBU-4C	Year 0 OMMP	4/7/2004	2-3 ft	1160565.7	702219.9	90.8	0.0364			5 U	5 U	0.2 U	18.3	40.8	2 U	0.05 U	18	0.3 U	36.9	28		44	19		7.3
RC/WC-04/R-02	Y2-WC04-C3	Year 2 OMMP	5/17/2006	1.5-3 ft	1160565.7	702219.9	87.5	0.866			6 U (UJ)	6 U	0.2 U		43.8	5	0.06 U	21	0.3 U	40.8	20.5	17.1	20.3	23.8	12.7	2.9
RC/WC-04/R-02	Y4-WC04-Cc3	Year 4 OMMP	5/8/2008	5.5-6.5 ft	1160565.7	702219.9	86.6	0.201								2 U	0.04 U			36	40.9	14.7	13.9	19.1	10.1	1
RC/WC-04/R-02	WC-04-260509-G	Year 5 OMMP/City Sampling	5/26/2009	0-10 cm	1160565.6	702219.1	54.9	4.24																		
RC/WC-05	Y5-RC05-S	Year 5 OMMP	5/26/2009	0 - 2 cm	1160637.7	702359.6	40.4	6.07	1200	6100						79	0.14			268	0.4	2.7	2.3	10.7	12.7	9
RC/WC-05	RC-05	Year 0 OMMP	4/8/2004	0-2 cm	1160639.3	702358.6	46.2	5.34			10 U	10 U	0.4 U	33	87.3	19	0.09	29	0.6 U	70	0.1		5.3	8		32
RC/WC-05	RC-05-Duplicate	Year 0 OMMP	4/8/2004	0-2 cm	1160639.3	702358.6	45.4	5.2			10 U	10 U	0.4 U	31	85.1	19	0.09 U	28	0.6 U	69	3.4		3.6	7.9		33
RC/WC-05	RC-05	Year 1 OMMP	5/12/2005	0-2 cm	1160639.3	702358.6	5.2	41.6	880	3000		10			100	108	0.3	31		187	0.1	0.6	3.6	9.9	16	9.9
RC/WC-05	Y2-RC05-S	Year 2 OMMP	5/15/2006	0-2 cm	1160639.3	702358.6	44.6	6.58	720	3200	10 U (UJ)	10 U	0.7		83.5	76	0.19	32	0.7 U	189	0.4	3.7	4.8	12	16.5	11.2
RC/WC-05	Y3-RC05-S	Year 3 OMMP	5/16/2007	0-2 cm	1160645.4	702363.0	44	5.89	540	3300						78	0.2			220	0.7	3.1	5.3	12.4	15.7	11.8

Table E. Head of the Thea Foss Results 2004-2009

Location	Sample ID	Monitoring Type	Sample Date	Depth Below Mudline	Easting	Northing	Total Solids	TOC	TPH Diesel	TPH Motor Oil	Sb	As	Cd	Cr	Cu	Pb	Hg	Ni	Ag	Zn	Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand
		SQO Units					Percent	Percent	MG/KG	MG/KG	150 MG/KG	57 MG/KG	5.1 MG/KG	MG/KG	390 MG/KG	450 MG/KG	0.59 MG/KG	140 MG/KG	6.1 MG/KG	410 MG/KG	Percent	Percent	Percent	Percent	Percent	Percent
RC/WC-05	Y4-RC05-S	Year 4 OMMP	5/6/2008	0-2 cm	1160639.3	702358.6	40.5	7.24	730	3200						78	0.24			242	0.1	1.9	5.1	12	14.2	10.3
RC/WC-05	WC-05	Year 0 OMMP	4/8/2004	0-10 cm	1160639.3	702358.6	58.7	4.48			8 U	8 U	0.3 U	24.2	60.4	10	0.11	23	0.5 U	48	3.2		13	17		36
RC/WC-05	WC-05	City Sampling	12/2/2004	0-10 cm	1160639.3	702358.6	44.9		190	790		10 U			100	70	0.3	31		138	0.5	0.4	1	6.2		16.2
RC/WC-05	WC-05	Year 1 OMMP	5/12/2005	0-10 cm	1160639.3	702358.6	4.89	49.4	390	1400		10			80.3	54	0.2	27		111	2.6	3.4	5.4	11.3	16.3	13.2
RC/WC-05	Y2-WC05-S	Year 2 OMMP	5/15/2006	0-10 cm	1160639.3	702358.6	49	5.16	580	2300	10 U (UJ)	10 U	0.4 U		31.6	29	0.2	11	0.6 U	63	1.4	2.2	3.6	11.6	19	11.3
RC/WC-05	WC-05-070516-G	Year 3 OMMP/City Sampling	5/16/2007	0-10 cm	1160645.4	702363.0	52.4	5.03																		
RC/WC-05	Y4-WC05-Sa	Year 4 OMMP	5/6/2008	0-10 cm	1160639.3	702358.6	43	4.16	690	3000						86	0.21			255	0.6	2.2	5.1	11.4	14.5	11.3
RC/WC-05	RC-05	City Sampling	12/2/2004	0-11 cm	1160639.3	702358.6	46.9		140	710		10 U			92.6	54	0.2	30		117	0.2	0.6	1	7.8		17.8
RC/WC-05	WCBU-5A	Year 0 OMMP	4/7/2004	0-1.3 ft	1160639.3	702358.6	89	0.251			6 U	6 U	0.2 U	16.5	30.4	2 U	0.05 U	16	0.3 U	28.9	29		30	22		18
RC/WC-05	Y2-WC05-C3	Year 2 OMMP	5/17/2006	1-2.5 ft	1160639.3	702358.6	87.9	0.527			6 U (UJ)	6 U	0.2 U		35.3	3	0.05 U	19	0.3 U	34.7	21.1	13.9	17.9	24.7	17	2.8
RC/WC-05	Y4-WC05-Ca5	Year 4 OMMP	5/8/2008	3.7-4.3 ft	1160639.3	702358.6	81.9	0.521								2 U	0.04 U			31	13.6	8	12.7	32	27.6	4.1
RC/WC-05	WC-05-260509-G	Year 5 OMMP/City Sampling	5/26/2009	0-10 cm	1160637.7	702359.6	44	7.37																		
RC/WC-06	Y5-RC06-S	Year 5 OMMP	5/26/2009	0 - 2 cm	1160431.6	702254.9	43.4	7.32	720	4600						90	0.18			266	0.2	1.9	3.7	12.7	13.6	7.2
RC/WC-06	RC-06	Year 0 OMMP	4/8/2004	0-2 cm	1160432.2	702254.1	57.4	4.65			9 U	9 U	0.4 U	22.9	54.5	18	0.08 U	21	0.5 U	56	2.2		2.6	17		52
RC/WC-06	RC-06	Year 1 OMMP	5/12/2005	0-2 cm	1160432.2	702254.1	5.63	42.2	580	1800		10 U			100	114	0.3	32		216	0.3	1.1	5.4	15	15.7	8
RC/WC-06	Y2-RC06-S	Year 2 OMMP	5/15/2006	0-2 cm	1160432.2	702254.1	58.7	5.47	380	1700	8 U (UJ)	8 U	0.3		56.8	47	0.11	24	0.5 U	121	3.6	4.4	11	24.9	19.8	6.9
RC/WC-06	Y2-RC15-S	Year 2 OMMP	5/15/2006	0-2 cm	1160432.2	702254.1	59.8	6.67	400	1700	9 U (UJ)	9 U	0.3 U		57.7	47	0.12	24	0.5 U	122	6.3	4.5	10.7	23.7	20.2	6.6
RC/WC-06	Y3-RC06-S	Year 3 OMMP	5/17/2007	0-2 cm	1160432.5	702239.0	48.2	3.73	420	2900						86	0.18			227	4.6	2.5	5.5	17.7	15.8	8.8
RC/WC-06	Y4-RC06-S	Year 4 OMMP	5/6/2008	0-2 cm	1160432.2	702254.1	41.1	5.65	570	2800						93	0.2			265	1.8	0.8	4.5	13.7	14.5	7.6
RC/WC-06	RC-06	City Sampling	12/2/2004	0-5 cm	1160432.2	702254.1	49		220	870		10			94.4	83	0.24	28		153	0.9	0.6	3.2	16.5		3.4
RC/WC-06	WC-06	Year 0 OMMP	4/8/2004	0-10 cm	1160432.2	702254.1	73	3.45			7 U	7 U	0.3 U	19.1	40	7	0.06 U	18	0.4 U	38.8	0.7		16	36		37
RC/WC-06	Y2-WC06-S	Year 2 OMMP	5/15/2006	0-10 cm	1160432.2	702254.1	66.1	5.02	190	810	8 U (UJ)	8 U	0.3 U		52.2	28	0.08	20	0.5 U	80.7	1	2.1	6.4	25.7	30.4	8.4
RC/WC-06	WC-06-070517-G	Year 3 OMMP/City Sampling	5/17/2007	0-10 cm	1160432.5	702239.0	56.9	6.58																		
RC/WC-06	Y4-WC06-Sa	Year 4 OMMP	5/6/2008	0-10 cm	1160432.2	702254.1	55.9	5.28	330	1600						50	0.12			145	0.3	1.4	6.7	22.3	22.3	8.4
RC/WC-06	WCBU-6A	Year 0 OMMP	4/7/2004	0-1 ft	1160432.2	702254.1	82.8	1.59			6 U	6 U	0.2 U	18	40.5	3	0.04 U	18	0.3 U	39.4	28		27	21		21
RC/WC-06	WCBU-6B	Year 0 OMMP	4/7/2004	1-2 ft	1160432.2	702254.1	86.4	0.397			6 U	6 U	0.2 U	26	42.6	3	0.04 U	21	0.3 U	40	35		34	18		10
RC/WC-06	Y4-WC06-Cb2	Year 4 OMMP	5/8/2008	2.3-3.0 ft	1160432.2	702254.1																				
RC/WC-06	Y2-WC06-C3	Year 2 OMMP	5/17/2006	2-3 ft	1160432.2	702254.1	85.3	1.04			6 U (UJ)	6 U	0.2 U		33.6	3	0.05 U	17	0.3 U	31.5	13.1	14.9	20.3	28	16.8	3.3
RC/WC-06	Y4-WC06-Cb3	Year 4 OMMP	5/8/2008	2.9-3.7 ft	1160432.2	702254.1	88.1	1.44								2 U	0.05 U			39	25.6	17.3	16.5	22.9	12.3	1.6
RC/WC-06	WC-06-260509-G	Year 5 OMMP/City Sampling	5/26/2009	0-10 cm	1160431.6	702254.9	53.5	6.46																		
RC/WC-06	WC-06-260509-G-B	Year 5 OMMP/City Sampling	5/26/2009	0-10 cm	1160431.6	702254.9	53.9	4.94																		
RC/WC-07	Y5-RC07-S	Year 5 OMMP	5/26/2009	0 - 2 cm	1160464.9	702387.5	37.3	7.25	980	6700						139	0.16			371	0.7	1.6	2.6	7.1	9	8.2
RC/WC-07	RC-07	Year 0 OMMP	4/8/2004	0-2 cm	1160463.1	702382.9	84.1	1.32			6 U	6 U	0.2 U	19.9	49.5	6	0.05 U	19	0.3 U	40.6	26		27	22		18
RC/WC-07	RC-07	Year 1 OMMP	5/11/2005	0-2 cm	1160463.1	702382.9	5.5	56.8	480	2100		10			73.9	70	0.22	25		141	11.5	5.3	9.6	23	16.6	7.8
RC/WC-07	Y2-RC07-S	Year 2 OMMP	5/16/2006	0-2 cm	1160463.1	702382.9	52.7	6.01	600	2700	10 U (UJ)	10 U	0.6		69.9	70	0.15	26	0.6 U	169	4	3.3	7.73	18.5	18	7.7
RC/WC-07	Y3-RC07-S	Year 3 OMMP	5/16/2007	0-2 cm	1160462.8	702377.0	52.9	5.44	310	2200						64	0.15			173	3.7	2.6	9.6	26	17.9	6.8
RC/WC-07	Y4-RC07-S	Year 4 OMMP	5/6/2008	0-2 cm	1160463.1	702382.9	45.3	7.05	600	3100						91	0.16			256	1.5	2.3	6.7	17.8	19.9	11.3
RC/WC-07	RC-07	City Sampling	12/2/2004	0-4 cm	1160463.1	702382.9	37.6		550	2100		20			118	140	0.4	32		238	47.3	1.2	2.3	6.3		6.3
RC/WC-07	WC-07	Year 0 OMMP	4/8/2004	0-10 cm	1160463.1	702382.9	86.6	0.189			6 U	6 U	0.2 U	18.2	32.2	2	0.04 U	16	0.3 U	30.7	33		37	18		9.2
RC/WC-07	WC-07	City Sampling	12/2/2004	0-10 cm	1160463.1	702382.9	63.8		140	740		9 U			56	42	0.11	20		93	21.3	2.8	6.7	24.1		3.8
RC/WC-07	WC-07	Year 1 OMMP	5/11/2005	0-10 cm	1160463.1	702382.9	2.53	80.2	140	600		7			45.3	23	0.07	20		62.2	40.4	8.5	10.5	21.3	10.4	1.7
RC/WC-07	WC-7	Year 1 OMMP	5/11/2005	0-10 cm	1160463.1	702382.9	1.1	77.3									0.04									
RC/WC-07	Y2-WC07-S	Year 2 OMMP	5/16/2006	0-10 cm	1160463.1	702382.9	68.7	4.22	220	1100	8 U (UJ)	8 U	0.4		59	45	0.11	26	0.5 U	112	9.7	4.2	10.8	27.8	21.8	4.4
RC/WC-07	WC-07-070516-G	Year 3 OMMP/City Sampling	5/16/2007	0-10 cm	1160462.8	702377.0	58	4.65																		
RC/WC-07	Y4-WC07-Sa	Year 4 OMMP	5/6/2008	0-10 cm	1160463.1	702382.9	52.7	5.02	380	2000						82	0.13			222	0.8	2.3	7.5	19.4	18.2	8.6
RC/WC-07	WC-07-260509-G	Year 5 OMMP/City Sampling	5/26/2009	0-10 cm	1160464.9	702387.5	47.4	8.21																		
RC/WC-08/R-03	Y5-RC08-S	Year 5 OMMP	5/26/2009	0 - 2 cm	1160586.0	702434.5	46.2	7.67	790	4100						88	0.19			266	0.9	2.7	5.2	13.6	12.3	8.1
RC/WC-08/R-03	RC-08	Year 0 OMMP	4/8/2004	0-2 cm	1160586.0	702434.5	79.7	0.923			6 U	6 U	0.3 U	17.8	32.8	5	0.06 U	16	0.4 U	33	1.6		18	39		37
RC/WC-08/R-03	RC-08	Year 1 OMMP	5/11/2005	0-2 cm	1160586.0	702434.5	4.65	41.3	1000	3200		20			111	145	0.5	31		215	2.7	3.6	7.6	9.9	8	5.9
RC/WC-08/R-03	Y2-RC08-S	Year 2 OMMP	5/12/2006	0-2 cm	1160586.0	702434.5	52.9	5.63	550	2200	10 U (UJ)	10	0.8		73.6	73	0.22	30	0.6 U	150	2.3	2.4	7	17.8	16	7.6
RC/WC-08/R-03	Y3-RC08-S	Year 3 OMMP	5/16/2007	0-2 cm	1160568.2	702433.0	47.8	3.36	490	3100						70	0.18			184	0.8	1.3	8.4	21.2	17.9	9
RC/WC-08/R-03	Y3-RC15-S	Year 3 OMMP	5/16/2007	0-2 cm	1160568.2	702433.0	47.2	5.45	520	3100						76	0.2			194	0.8	1.5	8	21.2	17.7	8.9
RC/WC-08/R-03	Y4-RC08-S	Year 4 OMMP	5/6/2008	0-2 cm	1160586.0	702434.5	46.5	4.95	510	2100						73	0.16			208	3.9	4	9.1	19.5	14.5	7.9
RC/WC-08/R-03	RC-08	City Sampling	12/1/2004	0-5 cm	1160586.0	702434.5	52.1		370	850		10			89	100	0.34	30		180	4.1	4.2	10.7	17.7		4.2
RC/WC-08/R-03	WC-08	Year 0 OMMP	4/8/2004	0-10 cm	1160586.0	702434.5	82.6	0.881			6 U	6 U	0.2 U	17.2	33.9	4	0.05 U	16	0.3 U	31.8	19		28	27		23
RC/WC-08/R-03	WC-8	Year 1 OMMP	5/11/2005	0-10 cm	1160586.0	702434.5	1.4	72.5									0.07									
RC/WC-08/R-03	Y2-WC08-S	Year 2 OMMP	5/12/2006	0-10 cm	1160586.0	702434.5	59.4	4.17	470	1800	9 U (UJ)	9 U	0.8		72	64	0.19	24	0.6	134	2.8	2.9	7.7	20	20	8.4
RC/WC-08/R-03	WC-08-070516-G	Year 3 OMMP/City Sampling	5/16/2007	0-10 cm	1160568.2	702433.0	55.6	2.71																		
RC/WC-08/R-03	Y4-WC08-Sa	Year 4 OMMP	5/6/2008	0-10 cm	1160586.0	702434.5	54.8	3.92	460	1700						71	0.21			176	5.5	6	11	19.5	10.9	6
RC/WC-08/R-03	WC-08-260509-G	Year 5 OMMP/City Sampling	5/26/2009	0-10 cm	1160586.0	702434.5	53.8	6.35																		
RC/WC-09	Y5-RC09-S	Year 5 OMMP	5/26/2009	0 - 2 cm	1160653.5	702452.3	38.3	8.18	870	4600						92	0.19			286	0.1	1.6	2.5	9.3	11.3	7.5
RC/WC-09	RC-09	Year 0 OMMP	4/8/2004	0-2 cm	1160653.5	702452.3	67.3	2.86			8 U	8 U	0.3 U	25.6	64	15	0.07 U	23	0.5 U	53.3	2.2		9.3	25		39
RC/WC-09	RC-09	Year 1 OMMP	5/11/2005	0-2 cm	1160653.5	702452.3	4.66	40.9	1100	3700		20			117	144	0.5	32		211	0.2	0.5	4.6	11.5	12.3	7.2
RC/WC-09	Y2-RC09-S	Year 2 OMMP	5/15/2006	0-2 cm	1160653.5	702452.3	47.9	5.12	740	2800	10 U (UJ)	10 U	0.7		73.5	76	0.28	26	0.7 U	158	0.2	3.4	5.6	13.2	13.3	6.7
RC/WC-09	Y3-RC09-S	Year 3 OMMP	5/16/2007	0-2 cm	1160653.5	702452.0	42.9	3.13	560	3600						86	0.2			221	0.6	1.3	6.6	17.6	16.4	8.3
RC/WC-09	Y4-RC09-S	Year 4 OMMP	5/6/2008	0-2 cm	1160653.5	702452.3	39.7	5.53	710	3100						99	0.2			275	0.2	6.1	10.3	14.7	10.3	7.3
RC/WC-09	RC-09	City Sampling	12/1/2004	0-6 cm	1160653.5	702452.3	56.4		130	350		10			76.8	64	0.21	26		126	0	0.5	3.5	19.3		26.3
RC/WC-09	WC-09	Year 0 OMMP	4/8/2004	0-10 cm	1160653.5	702452.3	71.7	2.99			7 U	7 U	0.3 U	18.4	39.8	7	0.05 U	18	0.4 U	37.4	4.4		13	26		45
RC/WC-09	WC-09	City Sampling	12/1/2004	0-10 cm	1160653.5	702452.3	61.4		37	110		9			57.4	32	0.11	22		81	1.1	0.6	2	17.7		34.6
RC/WC-09	WC-9	Year 1 OMMP	5/11/2005	0-10 cm	1160653.5	702452.3	1.8	65.4									0.09									
RC/WC-09	Y2-WC09-S	Year 2 OMMP	5/15/2006	0-10 cm	1160653.5	702452.3	59.3	4.43	350	1300	9 U (UJ)	9 U	0.7		70.6	66	0.18	25	0.5 U	130	0.5	3.1	7.4	21.7	20.3	6.8

Table E. Head of the Thea Foss Results 2004-2009

Location	Sample ID	Monitoring Type	Sample Date	Depth Below Mudline	Easting	Northing	Total Solids	TOC	TPH Diesel	TPH Motor Oil	Sb	As	Cd	Cr	Cu	Pb	Hg	Ni	Ag	Zn	Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand
		SQO Units					Percent	Percent	MG/KG	MG/KG	150 MG/KG	57 MG/KG	5.1 MG/KG	MG/KG	390 MG/KG	450 MG/KG	0.59 MG/KG	140 MG/KG	6.1 MG/KG	410 MG/KG	Percent	Percent	Percent	Percent	Percent	Percent
RC/WC-09	WC-09-070516-G	Year 3 OMMP/City Sampling	5/16/2007	0-10 cm	1160653.5	702452.0	55	4.3																		
RC/WC-09	Y4-WC09-Sa	Year 4 OMMP	5/6/2008	0-10 cm	1160653.5	702452.3	51	3.48	500	2000						71	0.2			202	0.2	4.1	10.4	20.6	14.7	7.1
RC/WC-09	WC-09-260509-G	Year 5 OMMP/City Sampling	5/26/2009	0-10 cm	1160653.5	702452.3	46.9	5.79																		
RC/WC-10	Y5-RC10-S	Year 5 OMMP	5/26/2009	0 - 2 cm	1160574.6	702583.6	59.5	6.1	280	1600						39	0.09			124	42.1	8.4	7.9	8.3	5.5	3.4
RC/WC-10	RC-10	Year 0 OMMP	4/9/2004	0-2 cm	1160570.7	702583.8	68.1	3.22			7 U	7 U	0.3 U	21.9	54.7	11	0.06 U	20	0.5	43.7	5.3		11	16		48
RC/WC-10	RC-10	Year 1 OMMP	5/11/2005	0-2 cm	1160570.7	702583.8	4.7	44.5	1200	3800		20			115	159	**0.6**	32		203	2.2	2.7	3	9.2	11.1	6.6
RC/WC-10	Y2-RC10-S	Year 2 OMMP	5/16/2006	0-2 cm	1160570.7	702583.8	84.3	2.96	110	510	6 U (UJ)	6 U	0.2 U		24.3	15	0.04 U	20	0.4 U	52	55.6	12.7	11.6	8	3.2	1.3
RC/WC-10	Y3-RC10-S	Year 3 OMMP	5/16/2007	0-2 cm	1160568.5	702580.0	68.4	5.27	140	1000						33	0.08			102	20.2	11.1	16.1	20.9	9.4	3.7
RC/WC-10	Y4-RC10-S	Year 4 OMMP	5/6/2008	0-2 cm	1160570.7	702583.8	58.8	4.95	270	1400						33	0.08			99	53	11.3	7.7	4.7	2.2	2.3
RC/WC-10	Y4-RC15-SD	Year 4 OMMP	5/6/2008	0-2 cm	1160570.7	702583.8	64.3	7.01	180	940						36	0.1			106	53.1	10.6	7.9	4.9	2.3	2.4
RC/WC-10	RC-10	City Sampling	12/1/2004	0-3 cm	1160570.7	702583.8	49.6		520	1700		10			95.3	123	0.48	27		182	6.9	1.8	4.7	15.1		5.6
RC/WC-10	WC-10	Year 0 OMMP	4/9/2004	0-10 cm	1160570.7	702583.8	79.4	1.4			6 U	6 U	0.3 U	19.1	35.9	4	0.06 U	17	0.4 U	34.5	7.9		18	29		38
RC/WC-10	WC-10	City Sampling	12/1/2004	0-10 cm	1160570.7	702583.8	78.3		110	250		7			48.2	27	0.13	19		66	10.5	6.6	10.7	26.3		5.6
RC/WC-10	WC-10 (City)	City Sampling	12/1/2004	0-10 cm	1160570.7	702583.8	74.4	1.4								30.8	0.06			54.9 B						
RC/WC-10	Y2-WC10-S	Year 2 OMMP	5/16/2006	0-10 cm	1160570.7	702583.8	84.1	1.99	68	290	6 U (UJ)	6 U	0.2 U		20.6	12	0.05 U	18	0.4 U	44	47.4	11.5	15.5	15.4	4.6	1
RC/WC-10	WC-10-070516-G	Year 3 OMMP/City Sampling	5/16/2007	0-10 cm	1160568.5	702580.0	86.6	0.861								10	0.04 U			49	61.1	11.9	9.6	8.8	3.6	1
RC/WC-10	Y4-WC10-Sa	Year 4 OMMP	5/6/2008	0-10 cm	1160570.7	702583.8	86.3	1.47	72	360						11	0.05 U			51	61.3	14.2	10.2	6.6	1.6	0.7
RC/WC-10	Y4-WC15-SD	Year 4 OMMP	5/6/2008	0-10 cm	1160570.7	702583.8	82.2	0.992	71	360						9	0.05 U			51	62.3	14.1	10.2	6.5	1.6	0.6
RC/WC-10	WCBU-10A	Year 0 OMMP	4/7/2004	0-1 ft	1160570.7	702583.8	88.7	0.402			5 U	5 U	0.2 U	17.4	31.2	3	0.04 U	17	0.3 U	33.7	11		24	31		32
RC/WC-10	WCBU-10A-Duplicate	Year 0 OMMP	4/7/2004	0-1 ft	1160570.7	702583.8	88.3	0.323			6 U	6 U	0.2 U	16.1	31.2	3	0.04 U	17	0.3 U	31	14		23	31		31
RC/WC-10	WCBU-10B	Year 0 OMMP	4/7/2004	1-2 ft	1160570.7	702583.8	94.7	0.145			5 U	5 U	0.2 U	20.2	46.7	2	0.05 U	20	0.3 U	35.6	34		35	20		10
RC/WC-10	Y2-WC10-C3	Year 2 OMMP	5/17/2006	1-3 ft	1160570.7	702583.8	87.4	0.225			5 U (UJ)	5 U	0.2 U		37.8	2	0.05 U	20	0.3 U	33.7	26.2	13.7	19.4	25.9	12.5	1.3
RC/WC-10	WCBU-10C	Year 0 OMMP	4/7/2004	2-3.3 ft	1160570.7	702583.8	93.1	0.299			5 U	5 U	0.2 U	13.1	21.1	2 U	0.04 U	12	0.3 U	19.9	35		40	17		7.2
RC/WC-10	Y4-WC10-Cb5	Year 4 OMMP	5/8/2008	4.1-5.0 ft	1160570.7	702583.8	88.2	0.233								2 U	0.04 U			32	28.7	18.5	17.6	21.4	10.9	1.1
RC/WC-10	WC-10-260509-G	Year 5 OMMP/City Sampling	5/26/2009	0-10 cm	1160574.6	702583.6	79.9	2.62																		
RC/WC-11/R-04	Y5-RC11-S	Year 5 OMMP	5/26/2009	0 - 2 cm	1160664.6	702722.9	39.9	8.9	1500	7900						118	0.21			353	6.2	3.2	3.3	3.2	3.6	3.6
RC/WC-11/R-04	RC-11	Year 0 OMMP	4/8/2004	0-2 cm	1160665.1	702724.8	67.6	2.95			8 U	20	0.5	25.2	132	35	0.13	28	0.5 U	82.8	48		17	0.7		10
RC/WC-11/R-04	RC-11(pre-City dredge)-CITY	City (pre-City dredge)	8/30/2004	0-2 cm	1160665.1	702724.8	58.9	1.6								45.7	0.191			99.6						
RC/WC-11/R-04	RC-11(pre-City dredge)-UTL	Utilities' (pre-City dredge)	8/30/2004	0-2 cm	1160665.1	702724.8	71.3					18			127	30	0.1	22		86.3						
RC/WC-11/R-04	RC-11(post-City dredge)-CITY	City (post-City dredge)	9/18/2004	0-2 cm	1160665.1	702724.8	39.1	3.2								160	**0.828**			205						
RC/WC-11/R-04	RC-11(post-City dredge)-UTL	Utilities' (post-City dredge)	9/18/2004	0-2 cm	1160665.1	702724.8	34.4					20			168	238	**0.8**	37		280						
RC/WC-11/R-04	RC-11	Year 1 OMMP	5/11/2005	0-2 cm	1160665.1	702724.8	4.52	41.8	2200	5700		20			132	178	**0.84**	35		231	0.2	0.8	2	3.5	6.2	8.1
RC/WC-11/R-04	Y2-RC11-S	Year 2 OMMP	5/12/2006	0-2 cm	1160665.1	702724.8	84.9	4.32	140	660	6 U (UJ)	6 U	0.2 U		25.3	13	0.06 U	18	0.4 U	56.9	59.6	10.4	10.7	7.1	2.4	1
RC/WC-11/R-04	Y3-RC11-S	Year 3 OMMP	5/16/2007	0-2 cm	1160665.6	702713.0	48	6.08	490	3000						73	0.19			195	9.7	6.5	12.6	12.2	5.2	4.2
RC/WC-11/R-04	Y4-RC11-S	Year 4 OMMP	5/6/2008	0-2 cm	1160665.1	702724.8	35.6	6.65	850	4600						106	0.29			273	1.43	1.1	4.13	5.8	5.1	5.3
RC/WC-11/R-04	WC-11	Year 0 OMMP	4/8/2004	0-10 cm	1160665.1	702724.8	84.2	2.07			6 U	16	0.2 U	21.5	168	14	0.05	24	0.4 U	60.5	57		18	4.5		7.7
RC/WC-11/R-04	WC-11(pre-City dredge)-CITY	City (pre-City dredge)	8/20/2004	0-10 cm	1160665.1	702724.8	66.3	3.6								43.7	0.147			90.3						
RC/WC-11/R-04	WC-11(post-City dredge)-CITY	City (post-City dredge)	9/18/2004	0-10 cm	1160665.1	702724.8	54	2.8								167	0.428			239						
RC/WC-11/R-04	WC-11 (Utilities' core)	City Sampling	11/22/2004	0-10 cm	1160665.1	702724.8	60.4		190	545		15			139	91	0.36	25		135	36.3	6	5.4	7.2		7.1
RC/WC-11/R-04	WC-11 (City)	City Sampling	11/30/2004	0-10 cm	1160665.1	702724.8	59.6	4.8								158	0.24			168 B						
RC/WC-11/R-04	WC-11	Year 1 OMMP	5/11/2005	0-10 cm	1160665.1	702724.8	5.84	42.9	2100	5300		20			145	212	**0.7**	35		257	1	0.8	2.2	4.4	6.8	7.8
RC/WC-11/R-04	Y2-WC11-S	Year 2 OMMP	5/12/2006	0-10 cm	1160665.1	702724.8	86.1	3.64	130	580	6 U (UJ)	6 U	0.2 U		17.9	11	0.06 U	16	0.4 U	44.2	49.4	15.4	14.4	9.4	2.6	1
RC/WC-11/R-04	Y2-WC15-S	Year 2 OMMP	5/12/2006	0-10 cm	1160665.1	702724.8	86.3	2.86	140	570	6 U (UJ)	6 U	0.2 U		20.5	11	0.05	20	0.4 U	41.6	53.7	13.3	14.1	8.3	2.3	0.9
RC/WC-11/R-04	WC-11-070516-G	Year 3 OMMP/City Sampling	5/16/2007	0-10 cm	1160665.6	702713.0	87.1	0.764								12	0.05 U			53	60.3	13.7	10.7	7.8	1.9	0.5
RC/WC-11/R-04	Y4-WC11-Sa	Year 4 OMMP	5/6/2008	0-10 cm	1160665.1	702724.8	54.1	5.36	380	1900						60	**1.65**			165	31.3	9.1	8.9	8.5	3.9	2.8
RC/WC-11/R-04	WC-11-260509-G	Year 5 OMMP/City Sampling	5/26/2009	0-10 cm	1160664.6	702722.9	68.5	6.19																		
RC/WC-12	Y5-RC12-S	Year 5 OMMP	5/26/2009	0 - 2 cm	1160500.9	702720.8	48.5	7.1	430	2300						61	0.14			181	10.5	7.6	13.7	17.9	8.4	3.5
RC/WC-12	RC-12	Year 0 OMMP	4/9/2004	0-2 cm	1160501.9	702722.3	88.4	0.365			5 U	5 U	0.2 U	27.3	48.5	4	0.05 U	22	0.3 U	43.9	29		47	17		5
RC/WC-12	RC-12	Year 1 OMMP	5/11/2005	0-2 cm	1160501.9	702722.3	4.81	43.8	1600	4400		20			121	186	**0.8**	31		217	2	2.4	4	5.4	6.6	7.6
RC/WC-12	Y2-RC12-S	Year 2 OMMP	5/16/2006	0-2 cm	1160501.9	702722.3	76.2	3.74	160	720	6 U (UJ)	6 U	0.3 U		24.7	19	0.05 U	19	0.4 U	59.9	42.2	8.5	12.2	17.5	6.4	2
RC/WC-12	Y3-RC12-S	Year 3 OMMP	5/17/2007	0-2 cm	1160496.5	702715.0	61.4	4.91	220	1300						39	0.14			109	29.6	11.2	13.3	13.4	5	3
RC/WC-12	Y4-RC12-S	Year 4 OMMP	5/6/2008	0-2 cm	1160501.9	702722.3	47.2	4.48	450	2200						62	0.17			157	1.3	3.6	11.7	18.5	9.9	5
RC/WC-12	RC-12	City Sampling	12/1/2004	0-3 cm	1160501.9	702722.3	46.1		380	720		20			123	190	**0.8**	33		241	5.9	2.6	4.3	7		6.9
RC/WC-12	WC-12	Year 0 OMMP	4/9/2004	0-10 cm	1160501.9	702722.3	86.9	0.192			6 U	6 U	0.2 U	19.8	35.6	3	0.05 U	19	0.3 U	35.9	20		44	23		11
RC/WC-12	WC-12(pre-City dredge)-CITY	City (pre-City dredge)	8/20/2004	0-10 cm	1160501.9	702722.3		0.898								14.5	0.0692			44.8						
RC/WC-12	WC-12	City Sampling	12/1/2004	0-10 cm	1160501.9	702722.3	68.6		120	270		9			65.6	68	0.24	23		111	33.6	13	10.7	10.3		5.2
RC/WC-12	WC-12 (City)	City Sampling	12/1/2004	0-10 cm	1160501.9	702722.3	65.7	3								71.9	0.122			89.7 B						
RC/WC-12	WC-12	Year 1 OMMP	5/11/2005	0-10 cm	1160501.9	702722.3	3	60.02									0.21									
RC/WC-12	Y2-WC12-S	Year 2 OMMP	5/16/2006	0-10 cm	1160501.9	702722.3	85.4	1.01	69	310	6 U (UJ)	6 U	0.2 U		16.9	10	0.05 U	18	0.3 U	39.4	72.2	8.8	5.7	5.3	2.2	0.8
RC/WC-12	WC-12-070517-G	Year 3 OMMP/City Sampling	5/17/2007	0-10 cm	1160496.5	702715.0	77.1	1.24								18	0.05 U			62	58.9	11.8	10.5	8.1	2.7	1
RC/WC-12	Y4-WC12-Sa	Year 4 OMMP	5/6/2008	0-10 cm	1160501.9	702722.3	67.1	3.37	230	1100						36	0.11			100	29.7	9.9	14.2	14.7	5.7	2.5
RC/WC-12	Y2-WC12-C3	Year 2 OMMP	5/17/2006	1-2 ft	1160501.9	702722.3	89.7	0.139			6 U (UJ)	6 U	0.2 U		44.3	3	0.05 U	25	0.3 U	38.1	28.7	15.4	20.4	23.9	9.5	0.9
RC/WC-12	Y4-WC12-Cb2	Year 4 OMMP	5/8/2008	0.6-1.4 ft	1160501.9	702722.3	88.3	0.333								2 U	0.05 U			37	22.4	16.4	19.7	26.3	12.2	1.5
RC/WC-12	WCBU-12A	Year 0 OMMP	4/7/2004	0-1.7 ft	1160501.9	702722.3	90.9	0.02 U			5 U	5 U	0.2 U	20.1	39.4	2	0.04 U	20	0.3 U	34.3	27		35	24		13
RC/WC-12	WC-12-260509-G	Year 5 OMMP/City Sampling	5/26/2009	0-10 cm	1160500.9	702720.8	59.4	3.7																		
RC-13	Y5-RC13-S	Year 5 OMMP	5/26/2009	0 - 2 cm	1160565.9	701876.1	41	7.15	900	4900						112	0.16			342	8.9	3.5	3.6	4.7	7.5	8.1
RC-13	RC-13	Year 0 OMMP	4/8/2004	0-2 cm	1160541.6	701894.6	78.5	3.33			7 U	8	0.3 U	26.4	58.5	42	0.07	31	0.4 U	99.3	28		34	12		7.9
RC-13	RC-13	City Sampling	12/9/2004	0-2 cm	1160541.6	701894.6	75.2		96	450		6			38.6	23	0.06	25		71.2	46.3	12.2	18.9	11.2		3.5
RC-13	RC-13	Year 1 OMMP	5/12/2005	0-2 cm	1160541.6	701894.6	11.7	70.7	210	910		8 U			53.3	38	0.08	26		118	32.3	12.6	19.7	12.3	5	2.8
RC-13	Y2-RC13-S	Year 2 OMMP	5/16/2006	0-2 cm	1160541.6	701894.6	49.1	6.66	450	2800	10 U (UJ)	10 U	0.4 U		62.3	73	0.12	34	0.6 U	208	7.6	8.1	12.2	9.4	12.5	14.4
RC-13	Y3-RC13-S	Year 3 OMMP	5/16/2007	0-2 cm	1160565.9	701876.0	39.8	5.47	560	3800						113	0.2			256	4.6	6.3	7.7	10.2	17.1	13.6

Table E. Head of the Thea Foss Results 2004-2009

Location	Sample ID	Monitoring Type	Sample Date	Depth Below Mudline	Easting	Northing	Total Solids	TOC	TPH Diesel	TPH Motor Oil	Sb	As	Cd	Cr	Cu	Pb	Hg	Ni	Ag	Zn	Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand
		SQO Units					Percent	Percent	MG/KG	MG/KG	150 MG/KG	57 MG/KG	5.1 MG/KG	MG/KG	390 MG/KG	450 MG/KG	0.59 MG/KG	140 MG/KG	6.1 MG/KG	410 MG/KG	Percent	Percent	Percent	Percent	Percent	Percent
RC-13	Y4-RC13-S	Year 4 OMMP	5/7/2008	0-2 cm	1160541.6	701894.6	46.1	6.07	530	3100						82	0.11			224	3.83	5	10.8	22.8	22.1	10
RC-14	Y5-RC14-S	Year 5 OMMP	5/26/2009	0 - 2 cm	1160718.7	701872.7	46	9.75	670	4200						92	0.2			325	3.1	3.6	5.6	7.8	12	12.4
RC-14	RC-14	Year 0 OMMP	4/8/2004	0-2 cm	1160718.7	701872.7	65.9	6.96			8 U	9	0.5	30.1	73.3	54	0.1	31	0.5 U	167	13		31	11		11
RC-14	RC-14	City Sampling	12/9/2004	0-2 cm	1160718.7	701872.7	66.7		230	1400		7			50.9	52	0.08	30		135	31.6	11.9	24.1	12.4		6.4
RC-14	RC-14	Year 1 OMMP	5/12/2005	0-2 cm	1160718.7	701872.7	7.43	61.3	390	1800		9			56.2	58	0.13	30		203	18.1	9.8	19.5	15	9.6	7.8
RC-14	Y2-RC14-S	Year 2 OMMP	5/16/2006	0-2 cm	1160718.7	701872.7	57	7.09	470	2300	8 U (UJ)	9	0.4		63.9	67	0.13	31	0.5 U	219	31.5	7.5	12.4	9.9	8	7.7
RC-14	Y3-RC14-S	Year 3 OMMP	5/16/2007	0-2 cm	1160718.7	701873.0	52.4	7.33	300	2200						70	0.1			209	13.6	7	11.2	13.5	16.4	14.9
RC-14	Y4-RC14-S	Year 4 OMMP	5/7/2008	0-2 cm	1160718.7	701872.7	36	15.9	1000	5500						111	0.2			375	1.4	3.5	5.6	9.2	16.1	18.3
RC-14B	RC-14B	Year 1 OMMP	5/12/2005	0-2 cm	1160727.9	701824.2	4.37	66.9	250	1200		7			44.6	37	0.08	26		117	25.5	13.2	21.8	13.3	4.6	3.3
RC-14B	Y2-RC14B-S	Year 2 OMMP	5/16/2006	0-2 cm	1160727.9	701824.2	58.7	6.25	360	2400	8 U (UJ)	10	0.3 U		67.2	60	0.11	33	0.5 U	194	34.5	8.7	14.8	8.9	4.1	4.4
WC-13	WC-13	Year 0 OMMP	4/8/2004	0-10 cm	1160603.4	702459.5	84.7	0.955			5 U	5 U	0.2 U	24.2	44	4	0.05 U	22	0.3 U	38.5	31		30	19		14
WC-13	Y2-WC13-S	Year 2 OMMP	5/15/2006	0-10 cm	1160603.4	702459.5	62.2	3.92	330	1500	9 U (UJ)	9 U	0.5		61.3	51	0.2	23	0.5 U	116	3.6	3.8	9	20.5	19.7	8.4
WC-13	WC-13-070516-G	Year 3 OMMP/City Sampling	5/16/2007	0-10 cm	1160602.7	702477.0	55.4	3.33																		
WC-13	Y4-WC13-Sa	Year 4 OMMP	5/6/2008	0-10 cm	1160603.4	702459.5	58.6	4.71	250	1100						32	0.08			106	60.8	7.4	6.1	4.3	2.2	1.8
WC-13	WC-13-260509-G	Year 5 OMMP/City Sampling	5/26/2009	0-10 cm	1160603.4	702459.5	51.4	7.74																		
WC-14	WC-14	Year 0 OMMP	4/9/2004	0-10 cm	1160614.7	702408.5	74.4	2.3			7 U	7 U	0.3 U	18.2	36.1	4	0.05 U	18	0.4 U	34.4	2.8		18	30		41
WC-14	Y2-WC14-S	Year 2 OMMP	5/15/2006	0-10 cm	1160614.7	702408.5	46.8	4.51	650	3200	10 U (UJ)	10 U	0.7		78.3	70	0.2	28	0.7 U	160	0.6	2.5	4.5	12.7	18	9.6
WC-14	WC-14-070516-G	Year 3 OMMP/City Sampling	5/16/2007	0-10 cm	1160617.9	702398.0	57.1	2.84																		
WC-14	Y4-WC14-Sa	Year 4 OMMP	5/6/2008	0-10 cm	1160614.7	702408.5	50.6	3.45	590	2500						74	0.18			209	0.2	1.5	5.2	18.7	18.9	8.1
WC-14	WC-14-260509-G	Year 5 OMMP/City Sampling	5/26/2009	0-10 cm	1160618.7	702408.8	51.9	7.26																		
SC-01	SC-01	Year 0 OMMP	4/8/2004	0-10 cm	1160436.4	702702.2	91.5	0.223			5 U	5 U	0.2 U	18.9	30.7	3	0.05 U	19	0.3 U	33	13		27	32		27
SC-01	Y2-SC01-S	Year 2 OMMP	5/16/2006	0-10 cm	1160436.4	702702.2	94.3	0.462	14	75	5 U (UJ)	5 U	0.2 U		24.1	5	0.04 U	19	0.3 U	36.6	56.2	10.6	10.6	11.9	7.3	1.8
SC-01	Y4-SC01-S	Year 4 OMMP	5/7/2008	0-10 cm	1160436.4	702702.2	91.2	0.215	12	67						4	0.05 U			37	41	12.7	14.3	17.5	10.2	2.3
SC-02	SC-02	Year 0 OMMP	4/8/2004	0-10 cm	1160366.1	702445.9	90.3	0.177			5 U	5 U	0.2 U	19.7	41.6	2 U	0.04 U	18	0.3 U	31.1	30		34	21		14
SC-02	Y2-SC02-S	Year 2 OMMP	5/16/2006	0-10 cm	1160366.1	702445.9	81	2.75	160	770	6 U (UJ)	6 U	0.2 U		44.6	36	0.05 U	21	0.3 U	87.3	29.5	13.7	20.5	17	7.9	2.1
SC-02	Y4-SC02-S	Year 4 OMMP	5/7/2008	0-10 cm	1160366.1	702445.9	64.6	6.03	370	1900						58	0.1			175	47	7.9	10.5	10.8	5.2	2.4
SC-03	SC-03	Year 0 OMMP	4/8/2004	0-10 cm	1160762.9	702185.7	89.3	0.536			5 U	5 U	0.2 U	19.8	33.9	4	0.04 U	20	0.3	36.3	18		37	24		15
SC-03	Y2-SC03-S	Year 2 OMMP	5/16/2006	0-10 cm	1160762.9	702185.7	60	5.52	380	2000	8 U (UJ)	8 U	0.3		78.8	58	0.1	29	0.5 U	169	45.9	4.9	8.5	8.6	6.5	4.3
SC-03	Y4-SC03-S	Year 4 OMMP	5/7/2008	0-10 cm	1160762.9	702185.7	56.7	6.57	530	2900						64	0.1			200	5.2	7.9	12	15.5	12.8	10.4
SC-04	SC-04	Year 0 OMMP	4/8/2004	0-10 cm	1160729.6	702745.9	91.9	0.31			5 U	5 U	0.2 U	20.4	52.3	4	0.04 U	22	0.3 U	35.7	20		43	25		11
SC-04	Y2-SC04-S	Year 2 OMMP	5/16/2006	0-10 cm	1160729.6	702745.9	72.1	5.33	210	1100	7 U (UJ)	7 U	0.3 U		51.1	44	0.08	28	0.4 U	119	61.3	6	8.4	7.1	4.5	2.2
SC-04	Y4-SC04-S	Year 4 OMMP	5/7/2008	0-10 cm	1160729.6	702745.9	69.3	4.13	310	1600						53	0.11			147	27.6	13.3	15.9	10.6	4.6	3.2
NW shoreline under 509 bridge	Y4-SS-01	Year 4 OMMP	5/8/2008	0-10 cm			50.8	9.86	640	4200						196	0.14			408	60.2	4.9	5.6	4.3	4	4.4
City Area Locations																										
S-15	Site 15(pre-City dredge)-CITY	City (pre-City dredge)	8/30/2004	0-2 cm	1160596.5	702760.4	62.6	1.6								72.1	0.307			79.6						
S-15	Site 15(post-City dredge)-UTL	Utilities' (post-City dredge)	9/18/2004	0-2 cm	1160596.5	702760.4	34.3					20			167	335	**1.4**	43		363						
S-15	Site 15(pre-City dredge)-UTL	Utilities' (pre-City dredge)	8/30/2004	0-10 cm	1160596.5	702760.4	64.8					20			81.5	80	0.2	27		79.6						
S-15	Site 15(post-City dredge)-CITY	City (post-City dredge)	9/18/2004	0-10 cm	1160596.5	702760.4	48.1	3.5								296	**1.48**			360						
S-15	S-15 (Utilities' core)	City Sampling	11/22/2004	0-10 cm	1160596.5	702760.4	53.1		1100	2300		11			104	140	**0.67**	27		179	5.4	3.9	5	10.5		8.8
S-15	S-15 (City)	City Sampling	11/30/2004	0-10 cm	1160596.5	702760.4	43.7	7.7								240	0.328			232 B						
S-15	S-15	Year 1 OMMP	5/10/2005	0-10 cm	1160596.5	702760.4	4.24	49	1600	4300		10			106	162	**0.7**	37		200	2.9	3.9	9.3	10.8	9.1	6.3
S-15	S-15A	City Sampling	5/10/2005	0-10 cm	1160596.5	702760.4	4.7	51.9									0.22									
S-15	Y2-S15-S	Year 2 OMMP	5/15/2006	0-10 cm	1160596.5	702760.4	82.8	3.77	130	670	6 U (UJ)	6 U	0.2 U		23.6	15	0.05 U	23	0.4 U	58.8	52.9	11.1	10.7	10.9	4.7	1.3
S-15	S-15-070516-G	Year 3 OMMP/City Sampling	5/16/2007	0-10 cm	1160587.6	702759.0	86	1.57								10	0.04 U			55	57	13	10.5	10.5	3.1	0.6
S-15	S-15-070516-G-D	Year 3 OMMP/City Sampling	5/16/2007	0-10 cm	1160587.6	702759.0	85.8	0.977								12	0.05 U			52	53.6	11.5	10.8	12.7	4.5	0.9
S-15	Y4-S15-Sa	Year 4/City Sampling	5/6/2008	0-10 cm	1160596.5	702760.4	72.2	4.73	160	870						23	0.06			77	50.9	10	10.2	9.3	3.1	1.1
S-15	S-15-260509-G	Year 5 OMMP/City Sampling	5/26/2009	0-10 cm	1160595.9	702762.0	83.6	2.83																		
S-15A	S-15	City Sampling	5/10/2005	0-10 cm	1160596.5	702760.4	3.1	51.2									0.25									
S-16	S-16	City Sampling	11/30/2004	0-10 cm	1160669.5	702640.5	49.9		760	4200		20			162	220	**0.75**	38		279	58.6	2.6	2.4	2.4		5.5
S-16	S-32 (Dup of S-16)	City Sampling	11/30/2004	0-10 cm	1160669.5	702640.5	51.1		580	1700		20			157	153	0.51	32		207	47.2	3.3	2.7	2.8		4.1
S-16	S-16	City Sampling	5/10/2005	0-10 cm	1160669.5	702640.5	3.7	59.9									0.12									
S-17	S-17	City Sampling	11/30/2004	0-2 cm	1160673.6	702546.9	49.8		800	2200		13			119	125	0.48	26		173	23.2	8.8	5.7	4.8		5.1
S-17	S-17 (City)	City Sampling	11/30/2004	0-10 cm	1160673.6	702546.9	74.4	1.9								38.6	0.075			64.3 B						
S-17	S-17	Year 1 OMMP	5/11/2005	0-10 cm	1160673.6	702546.9	4.09	55.1	680	2700		13			92.2	87	0.29	26		134	7	2.7	5.4	14.7	18.8	8.6
S-17	Y2-S17-S	Year 2 OMMP	5/12/2006	0-10 cm	1160673.6	702546.9	86.8	3.91	95	400	6 U (UJ)	6 U	0.2 U		19.9	9	0.04 U	14	0.3 U	43.4	59.1	14.1	12.1	6.9	0.8	1.3
S-17	S-17-070516-G	Year 3 OMMP/City Sampling	5/16/2007	0-10 cm	1160673.6	702547.0	81.6	1.62								15	0.06 U			58	48.2	13.5	12.6	11.2	4.8	1.4
S-17	Y4-S17-Sa	Year 4/City Sampling	5/6/2008	0-10 cm	1160673.6	702546.9	65.6	4.82	240	1200						42	0.08			122	52.5	9	7.2	6.4	3.7	2.3
S-17	S-17-260509-G	Year 5 OMMP/City Sampling	5/26/2009	0-10 cm	1160673.6	702546.9	38.6	7.62																		
S-18	S-18	City Sampling	12/1/2004	0-7 cm	1160699.9	702481.5	53.7		39	110		10			77	56	0.16	26		122	2	1.4	3.6	16.9		25.4
S-18	S-18 (City)	City Sampling	12/1/2004	0-10 cm	1160699.9	702481.5	65.1	2.5								26.4	0.097			54.6 B						
S-19	S-19	City Sampling	11/30/2004	0-10 cm	1160598.8	702671.0	57.5		610	4500		20			127	182	**0.7**	29		220	52.4	7.1	7.1	3.2		6.6
S-19	S-19	City Sampling	5/10/2005	0-10 cm	1160598.8	702671.0	5.7	51.1									0.23									
S-19	Y2-S19-S	Year 2 OMMP	5/15/2006	0-10 cm	1160598.8	702671.0	84.1	1.28	120	590	6 U (UJ)	6 U	0.2 U		22	16	0.05 U	18	0.4 U	50	52.3	12	12.2	9.1	2.8	1.4
S-19	S-19-070516-G	Year 3 OMMP/City Sampling	5/16/2007	0-10 cm	1160587.0	702660.0	88.4	0.848								11	0.04 U			55	61.2	14.7	10.8	6.3	1.8	0.6
S-19	Y4-S19-Sa	Year 4/City Sampling	5/6/2008	0-10 cm	1160598.8	702671.0	65.9	4.37	200	930						31	0.12			83	51.2	10.5	8.7	7.5	4.1	2.2
S-19	S-19-260509-G	Year 5 OMMP/City Sampling	5/26/2009	0-10 cm	1160592.2	702667.2	52.3	5.68																		
S-20	S-20	City Sampling	11/30/2004	0-2 cm	1160602.5	702537.4	62.7		620	2000		11			126	74	0.43	21		111	37.8	3.4	5.8	14		4.5
S-20	S-20 (City)	City Sampling	11/30/2004	0-10 cm	1160602.5	702537.4	61.5	2.2								55.7	0.118			83.9 B						
S-20	S-20	City Sampling	5/10/2005	0-10 cm	1160602.5	702537.4	3.7	46.7									0.16									
S-21	S-21	City Sampling	12/1/2004	0-7 cm			42.3		660	1200		20			127	207	**0.9**	34		257	0.7	1	3.2	7.9		8.4

Table E. Head of the Thea Foss Results 2004-2009

Location	Sample ID	Monitoring Type	Sample Date	Depth Below Mudline	Easting	Northing	Total Solids	TOC	TPH Diesel	TPH Motor Oil	Sb	As	Cd	Cr	Cu	Pb	Hg	Ni	Ag	Zn	Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand
		SQO Units					Percent	Percent	MG/KG	MG/KG	150 MG/KG	57 MG/KG	5.1 MG/KG	MG/KG	390 MG/KG	450 MG/KG	0.59 MG/KG	140 MG/KG	6.1 MG/KG	410 MG/KG	Percent	Percent	Percent	Percent	Percent	Percent
S-21	S-33 (Dup of S-21)	City Sampling	12/1/2004	0-7 cm			41.9		490	960		20			145	202	**0.81**	32		251	0.4	0.8	3	7.6		8
S-21	S-21 (City)	City Sampling	12/1/2004	0-10 cm			48.7	4.1								147	0.239			159 B						
S-22	S-22	City Sampling	12/1/2004	0-8 cm	1160543.0	702648.0	49.4		860	1800		10			73.1	89	0.42	22		133	1.8	0.9	4.5	18.6		6.8
S-22	S-22 (City)	City Sampling	12/1/2004	0-10 cm	1160543.0	702648.0	66.5	1.9								44.8	0.123 J			71.6 B						
S-23	S-23	City Sampling	12/1/2004	0-3 cm			56.1		230	500		12			75.8	98	0.35	24		145	1.6	1.5	6.2	26.3		4.6
S-24	S-24	City Sampling	12/1/2004	0-3 cm	1160509.0	702551.0	52.9		180	420		10			89.8	113	0.4	28		175	5.6	2.9	7	18.1		6.1
S-24	S-24 (City)	City Sampling	12/1/2004	0-10 cm	1160509.0	702551.0	78.2	1								25.8	0.052			48.6 B						
S-24	S-24	Year 1 OMMP	5/11/2005	0-10 cm	1160509.0	702551.0	4.39	60.1	430	1700		9 U			66	59	0.2	22		105	4.4	4.5	7.8	25.4	26.3	6.5
S-24	Y2-S24-S	Year 2 OMMP	5/12/2006	0-10 cm	1160509.0	702551.0	86.8	2.48	97	410	5 U (UJ)	5 U	0.2 U		18.7	11	0.17	14	0.3 U	40.3	67.5	11.4	7.3	5.8	3	0.9
S-24	S-24-070516-G	Year 3 OMMP/City Sampling	5/16/2007	0-10 cm	1160507.8	702549.0	85.3	2.4								23	0.05			69	65.9	9.2	6.9	6.4	3.3	1.4
S-24	Y4-S24-Sa	Year 4/City Sampling	5/6/2008	0-10 cm	1160509.0	702551.0	69	4.33	200	1000						40	0.1			115	55.3	7.6	6.8	7.7	4.6	2.4
S-24	S-24-260509-G	Year 5 OMMP/City Sampling	5/26/2009	0-10 cm	1160508.6	702552.4	53.6	6.24																		
S-29	S-29 (City)	City Sampling	12/1/2004	0-10 cm	1160549.0	702609.4	70.3	1.7								48.6	0.0932			71.7 B						
S-29	S-29	City Sampling	5/10/2005	0-10 cm	1160549.0	702609.4	3.4	56.3									0.19									
S-30	S-30	City Sampling	5/11/2005	0-10 cm	1160510.9	702470.9	2.1	83.2									0.02									
CA-19B	CA-19B-03	City Sampling	5/10/2005	0-10 cm	1160456.0	702958.0	3.4	62.4									0.13									
CA-19B	CA-19B-06	City Sampling	5/10/2005	0-10 cm	1160456.0	702958.0	3	47.5									0.28									
CA-20	CA-20-01	City Sampling	5/10/2005	0-10 cm	1160658.5	702858.4	0.71	88.8									0.013 J									
CA-20	CA-20-04	City Sampling	5/10/2005	0-10 cm	1160658.5	702858.4	1.8	88.3									0.04									
CA-22	CA-22-02	City Sampling	5/10/2005	0-10 cm	1160556.0	702849.0	4.1	57.5									0.23									
CA-22	CA-22-05	City Sampling	5/10/2005	0-10 cm	1160556.0	702849.0	1.3	84.7									0.05									
Reference Locations																										
CI-1	Y2-CI-01	Year 2 OMMP	5/18/2006	0-10 cm	1103837.9	737635.8	63.7	0.796													0	0.2	0.5	5.8	22.8	22.8
CI-2	Y2-CI-02	Year 2 OMMP	5/18/2006	0-10 cm	1103837.9	737635.8	73.5	0.692													0.1	0.2	1.5	12.7	37.2	21
Rinsate Blanks																										
FIELDQC	Y2-RB-01	Year 2 OMMP	5/15/2006	NA					0.25 U	0.5 U	0.05 U	0.05 U	0.002 U		0.002	0.04	0.0001 U	0.01 U	0.003 U	0.016						
FIELDQC	Y2-RB-02	Year 2 OMMP	5/16/2006	NA					0.25 U	0.5 U	0.05 U	0.05 U	0.002 U		0.002 U	0.02 U	0.0001 U	0.01 U	0.003 U	0.014						
FIELDQC	Y2-RB-03	Year 2 OMMP	5/17/2006	NA							0.05 U	0.05 U	0.002 U		0.004	0.02 U	0.0001 U	0.01 U	0.003 U	0.017						
FIELDQC	Y3-RB-01	Year 3 OMMP	5/17/2007	NA					0.25 U	0.5 U						0.02 U	0.0001 U			0.01 U						
FIELDQC	Y4-RB-01	Year 4 OMMP	5/6/2008	NA					0.25 U	0.5 U						0.02 U	0.0001 U			0.01 U						
FIELDQC	Y4-RB02	Year 4 OMMP	5/7/2008	NA					0.25 U	0.5 U						0.02 U	0.0001 U			0.01 U						
FIELDQC	Y4-RB-03	Year 4 OMMP	5/9/2008	NA												0.02 U	0.0001 U			0.01 U						
FIELDQC	Y5-RB-01	Year 5 OMMP	5/26/2009	NA					0.25 U	0.5 U						20 U	0.1 U			10 U						
FIELDQC	WC-05-RB	Year 3 OMMP/City Sampling	5/17/2007	NA												0.02 U	0.0001 U			0.01 U						
FIELDQC	RINSATE BLANK-260509	Year 5 OMMP/City Sampling	5/26/2009	0-10 cm				1.5 U																		

Footnotes:

Laboratory Data Qualifiers

U= result was not detected at or above the method detection limit

J (for Organics)= result is an estimated concentration that is less than the reporting limit, but greater than or equal to the detection limit

B (for metals)= result is an estimated concentration that is less than the reporting limit, but greater than or equal to the detection limit

B (for organics)= analyte detected in an associated Method Blank at a concentration greater than one-half of ARI's reporting limit or 5% of the regulatory limit or 5% of the analyte concentration in the sample.

Y=analyte is not detected at or above the reported concentrations. The reporting limit is raised due to the chromatographic interference. The Y flag is equivalent to the U flag with a raised reporting limit.

Data Validation Qualifiers

U= nondetected at the associated value

J= associated value is considered an estimate; less than verifiable lower calibration point

Acronyms

mg/kg= milligrams per kilogram

ug/kg= micrograms per kilogram

mg/L= milligrams per liter

ug/L= micrograms per liter

SQO= Sediment Quality Objectives for Thea Foss Waterway

Concentrations in bold font indicate an SQO exceedance

Table E. Head of the Thea Foss Results 2004-2009

Location	Sample ID	Percent Silt Percent	Percent Clay Percent	Percent Fines Percent	Phenol 420 UG/KG	1,3-Dichlorobenzene 170 UG/KG	1,4-Dichlorobenzene 110 UG/KG	1,2-Dichlorobenzene 50 UG/KG	Dibenzofuran 540 UG/KG	Benzyl Alcohol 73 UG/KG	2-Methylphenol 63 UG/KG	4-Methylphenol 670 UG/KG	Hexachloroethane UG/KG	2,4-Dimethylphenol 29 UG/KG	Benzoic Acid 650 UG/KG	1,2,4-Trichlorobenzene 51 UG/KG	Hexachlorobutadiene 11 UG/KG	N-Nitrosodiphenylamine 28 UG/KG	Hexachlorobenzene 22 UG/KG	Pentachlorophenol 360 UG/KG	Naphthalene 2100 UG/KG	Acenaphthylene 1300 UG/KG	Acenaphthene 500 UG/KG	Fluorene 540 UG/KG
RC/WC-01	RC-01	7.2	4.9	12																	39 U	39 U	39 U	39 U
RC/WC-01	RC-01	3.8	2.5	6.3					57 U												120	57 U	57 U	57 U
RC/WC-01	RC-01	18.1	11.7	29.8					220 U												260	220 U	220 U	220 U
RC/WC-01	Y2-RC01-S	15.4	11.7	27.1					160 U												160 U	160 U	160 U	100 J
RC/WC-01	Y3-RC01-S	14.2	10	24.2					150 U												110 J	150 U	150 U	100 J
RC/WC-01	Y4-RC01-S	20.6	14.6	35.2					160 U												160 U	160 U	160 U	100 J
RC/WC-01	Y5-RC01-S	33.6	14.4	48					98 U												98 U	98 U	110	140
RC/WC-01	WC-01	4.8	3	7.8		39 U	39 U	39 U								39 U					39 U	39 U	39 U	39 U
RC/WC-01	WC-01	4.7	2.5	7.2					59 U												59 U	59 U	59 U	59 U
RC/WC-01	Y2-WC01-S	20.1	14.7	34.8	**650**	190 U	190 U	190 U	190 U	190 U	190 U	650	190 U	190 U	1900 U	190 U	3.5 U	190 U	3.5 U	960 U	190 U	190 U	190 U	190 U
RC/WC-01	WC-01-070516-G				77 U				77 U												64 J	77 U	77 U	47 J
RC/WC-01	Y4-WC01-Sa	25.1	16.1	41.2	75 J	99 U	99 U	99 U	99 U	99 U	99 U	99 U	99 U	99 U	990 U	99 U	0.98 U	99 U	2.4	500 U	52 J	99 U	99 U	66 J
RC/WC-01	Y4-WC01B-Ca3			1.2	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	190 U	19 U	0.97 U	19 U	0.97 U	97 U	19 U	19 U	19 U	19 U
RC/WC-01	WC-01-260509-G								120 U												120 U	120 U	120 U	61 J
WC-01B/R-01B	Y2-WC01B-C3	1.7	0.9	2.6	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	200 U	20 U	1 U	20 U	1 U	98 U	20 U	20 U	20 U	20 U
RC/WC-02	Y5-RC02-S	42.5	16.1	58.6					98 U												98 U	98 U	98 U	98 U
RC/WC-02	RC-02	19	18	36																	47	20 U	22	20 U
RC/WC-02	RC-02	34.7	16.2	50.9					78												420	74	220	190
RC/WC-02	RC-2A (Dup of RC-2)	37.2	14.8	52					230 U												530	230 U	250	230 U
RC/WC-02	Y2-RC02-S	34.7	17	51.7					160 U												190	160 U	140 J	150 J
RC/WC-02	Y3-RC02-S	25.8	10.6	36.4					110 J												150 J	170 U	110 J	160 J
RC/WC-02	Y4-RC02-S	38.1	15.5	53.6					200 U												200 U	200 U	200 U	200 U
RC/WC-02	Y5-RC15-SD	33.6	19.3	52.9					99 U												99 U	99 U	99 U	99 U
RC/WC-02	RC-02	30.6	13.7	44.3					120 U												140	120 U	120 U	120 U
RC/WC-02	WC-02	14	10	24		39 U	39 U	39 U								39 U					39 U	39 U	39 U	39 U
RC/WC-02	WC-02 (City)								11.8												52.7	18 J	34.5	31.7
RC/WC-02	WC-02	26.1	10.7	36.8					39												140	29 U	82	70
RC/WC-02	Y2-WC02-S	33.6	23.7	57.3	120 U	120 U	120 U	120 U	120 U	120 U	120 U	120 U	120 U	120 U	1200 U	120 U	3.5 U	120 U	3.5 U	580 U	210	60 J	130	110 J
RC/WC-02	WC-02-070516-G				140 J				160 U												93 J	160 U	94 J	120 J
RC/WC-02	Y4-WC02-Sa	35.7	14.5	50.2	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U	2000 U	200 U	0.98 U	200 U	5.6	990 U	200 U	200 U	200 U	200 U
RC/WC-02	WC-02-260509-G								86 J												120 J	120 U	100 J	170
RC/WC-03	Y5-RC03-S	33.2	12.8	46					98 U												98 U	98 U	98 U	98 U
RC/WC-03	RC-03	40	34	73																	130	20 U	67	41
RC/WC-03	RC-03	26.2	12.3	38.5					51												320	50	160	120
RC/WC-03	Y2-RC03-S	32.7	13.6	46.3					120 U												150	120 U	120 U	120 U
RC/WC-03	Y3-RC03-S	22	9.7	31.7					76 U												100	76 U	40 J	76 U
RC/WC-03	Y4-RC03-S	22.9	9.6	32.5					99 U												99 U	99 U	99 U	99 U
RC/WC-03	WC-03	26	17	43		40 U	40 U	40 U								40 U					78	40 U	41	40 U
RC/WC-03	WC-03 (City)								9.1 J												65.4	20.9 J	33.4	28
RC/WC-03	Y2-WC03-S	26.2	14	40.2	73 U	73 U	73 U	73 U	73 U	73 U	73 U	73 U	73 U	73 U	730 U	73 U	3.5 U	73 U	3.5 U	370 U	99	73 U	73 U	73 U
RC/WC-03	WC-03-070516-G				69 U				69 U												50 J	69 U	69 U	69 U
RC/WC-03	Y4-WC03-Sa	16.1	7.6	23.7	58 U	58 U	58 U	58 U	58 U	58 U	58 U	58 U	58 U	58 U	580 U	58 U	0.96 U	58 U	1.8	290 U	58 U	58 U	58 U	58 U
RC/WC-03	RC-03	33.7	20.5	54.2					99 U												120	99 U	99 U	99 U
RC/WC-03	WC-03-260509-G								200 U												200 U	200 U	200 U	200 U
RC/WC-04/R-02	Y5-RC04-S	40.1	15.3	55.4					98 U												98 U	98 U	98 U	98 U
RC/WC-04/R-02	RC-04	18	16	34																	44	19 U	24	19 U
RC/WC-04/R-02	RC-04	49.7	18.1	67.8					120												980	140	480	350
RC/WC-04/R-02	Y2-RC04-S	33.2	12.9	46.1					320 U												320 U	320 U	190 J	190 J
RC/WC-04/R-02	Y3-RC04-S	35.8	17.1	52.9					110 U												130	110 U	61 J	63 J
RC/WC-04/R-02	Y4-RC04-S	29.9	12.4	42.3					59 U												99	59 U	59 U	59 U
RC/WC-04/R-02	RC-04	29.7	15.8	45.5					120 U												220	120 U	130	120 U
RC/WC-04/R-02	WC-04	9.8	6.4	16		20 U	20 U	20 U								20 U					78	20 U	51	26
RC/WC-04/R-02	WC-04-Duplicate	11	6.7	18		20 U	20 U	20 U								20 U					92	20 U	61	30
RC/WC-04/R-02	S-34 (Dup of WC-04)	23.6	14.8	38.4					98 U												170	98 U	110	98 U
RC/WC-04/R-02	WC-04	22.6	14.8	37.4					140 U												160	140 U	140 U	140 U
RC/WC-04/R-02	WC-04	24.6	12.8	37.4					36 U												170	36 U	86	61
RC/WC-04/R-02	Y2-WC04-S	24	12.1	36.1	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	1000 U	100 U	3.5 U	100 U	3.5 U	520 U	190	100 U	120	120
RC/WC-04/R-02	WC-04-070517-G				66 U				66 U												91	66 U	47 J	34 J
RC/WC-04/R-02	Y4-WC04-Sa	24.7	12.1	36.8	59 U	59 U	59 U	59 U	59 U	59 U	59 U	59 U	59 U	59 U	590 U	59 U	1.9 U	59 U	2.6	300 U	80	59 U	59 U	59 U
RC/WC-04/R-02	WCBU-4A	2.6	1.3	3.9		19 U	19 U	19 U	19 U							19 U					19 U	19 U	19 U	19 U
RC/WC-04/R-02	WCBU-4B	0.8	0.5	1.3		19 U	19 U	19 U	19 U							19 U					19 U	19 U	19 U	19 U
RC/WC-04/R-02	WCBU-4C	1.1	0.5	1.6		19 U	19 U	19 U	19 U							19 U					19 U	19 U	19 U	19 U
RC/WC-04/R-02	Y2-WC04-C3	2.7	0	2.7	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	200 U	20 U	1 U	20 U	1 U	98 U	20 U	20 U	20 U	20 U
RC/WC-04/R-02	Y4-WC04-Cc3			0.3	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	190 U	19 U	0.97 U	19 U	0.97 U	97 U	19 U	19 U	19 U	19 U
RC/WC-04/R-02	WC-04-260509-G								200 U												110 J	200 U	200 U	200 U
RC/WC-05	Y5-RC05-S	42.6	19.6	62.2					99 U												99 U	99 U	100	100
RC/WC-05	RC-05	32	22	54																	34	20 U	20 U	20 U
RC/WC-05	RC-05-Duplicate	31	21	53																	36	20 U	20 U	20 U
RC/WC-05	RC-05	45.4	14.6	60					130												1000	170	**530**	360
RC/WC-05	Y2-RC05-S	34.4	16.9	51.3					150 U												150 U	150 U	150 U	150 U
RC/WC-05	Y3-RC05-S	34.3	16.7	51					150 U												110 J	150 U	150 U	150 U

Table E. Head of the Thea Foss Results 2004-2009

Location	Sample ID	Percent Silt Percent	Percent Clay Percent	Percent Fines Percent	Phenol 420 UG/KG	1,3-Dichlorobenzene 170 UG/KG	1,4-Dichlorobenzene 110 UG/KG	1,2-Dichlorobenzene 50 UG/KG	Dibenzofuran 540 UG/KG	Benzyl Alcohol 73 UG/KG	2-Methylphenol 63 UG/KG	4-Methylphenol 670 UG/KG	Hexachloroethane UG/KG	2,4-Dimethylphenol 29 UG/KG	Benzoic Acid 650 UG/KG	1,2,4-Trichlorobenzene 51 UG/KG	Hexachlorobutadiene 11 UG/KG	N-Nitrosodiphenylamine 28 UG/KG	Hexachlorobenzene 22 UG/KG	Pentachlorophenol 360 UG/KG	Naphthalene 2100 UG/KG	Acenaphthylene 1300 UG/KG	Acenaphthene 500 UG/KG	Fluorene 540 UG/KG
RC/WC-05	Y4-RC05-S	43.9	12.5	56.4					59 U												150	59 U	73	67
RC/WC-05	WC-05	20	11	31		20 U	20 U	20 U								20 U					25	20 U	20 U	20 U
RC/WC-05	WC-05	41.7	19.5	61.2					120 U												180	120 U	140	120 U
RC/WC-05	WC-05	32.6	15.2	47.8					41 U												280	49	140	100
RC/WC-05	Y2-WC05-S	35.5	15.3	50.8	99 U	99 U	99 U	99 U	99 U	99 U	99 U	99 U	99 U	99 U	990 U	99 U	3.5 U	99 U	3.5 U	500 U	200	99 U	140	130
RC/WC-05	WC-05-070516-G				92 U				92 U												130	92 U	81 J	51 J
RC/WC-05	Y4-WC05-Sa	38.3	16.6	54.9	60 U	60 U	60 U	60 U	60 U	60 U	60 U	60 U	60 U	60 U	600 U	60 U	2 U	60 U	3.6	300 U	160	60 U	69	60 U
RC/WC-05	RC-05	39.4	18.7	58.1					110 U												110	110 U	110 U	110 U
RC/WC-05	WCBU-5A	0.8	0.4	1.2		19 U	19 U	19 U	19 U							19 U					19 U	19 U	19 U	19 U
RC/WC-05	Y2-WC05-C3	2.6	0	2.6	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	200 U	20 U	1 U	20 U	1 U	100 U	20 U	20 U	20 U	20 U
RC/WC-05	Y4-WC05-Ca5			2	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	200 U	20 U	1 U	20 U	1 U	100 U	20 U	20 U	20 U	20 U
RC/WC-05	WC-05-260509-G								57 J												130	40 J	92	98
RC/WC-06	Y5-RC06-S	48.5	12.3	60.8					99 U												99 U	99 U	99 U	99 U
RC/WC-06	RC-06	14	12	26																	54	39 U	39 U	39 U
RC/WC-06	RC-06	39.2	15.3	54.5					76												650	100	260	200
RC/WC-06	Y2-RC06-S	20.7	8.9	29.6					87 U												87 U	87 U	87 U	87 U
RC/WC-06	Y2-RC15-S	19.9	8	27.9					86 U												86 U	86 U	86 U	86 U
RC/WC-06	Y3-RC06-S	35.8	9.3	45.1					120 U												160	120 U	59 J	62 J
RC/WC-06	Y4-RC06-S	39.1	17.9	57					60 U												130	60 U	64	77
RC/WC-06	RC-06	37	15.6	52.6					130 U												430	130 U	220	130
RC/WC-06	WC-06	6.5	4.2	11		20 U	20 U	20 U								20 U					20 U	20 U	20 U	20 U
RC/WC-06	Y2-WC06-S	16.8	9.3	26.1	60 U	60 U	60 U	60 U	60 U	60 U	60 U	60 U	60 U	60 U	600 U	60 U	3.4 U	60 U	3.4 U	300 U	62	60 U	60 U	60 U
RC/WC-06	WC-06-070517-G				85 U				85 U												84 J	85 U	44 J	85 U
RC/WC-06	Y4-WC06-Sa	25.7	12.9	38.6	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	1000 U	100 U	0.97 U	100 U	2.6	500 U	100 U	100 U	100 U	100 U
RC/WC-06	WCBU-6A	2	1.2	3.2		20 U	20 U	20 U	20 U							20 U					20 U	20 U	20 U	20 U
RC/WC-06	WCBU-6B	1.9	1.5	3.4		20 U	20 U	20 U	20 U							20 U					20 U	20 U	20 U	20 U
RC/WC-06	Y4-WC06-Cb2				19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	190 U	19 U	19 U	19 U	19 U	97 U	19 U	19 U	19 U	19 U
RC/WC-06	Y2-WC06-C3	2	1.7	3.7	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	200 U	20 U	1 U	20 U	1 U	98 U	20 U	20 U	20 U	20 U
RC/WC-06	Y4-WC06-Cb3	2.8	1.2	4	20 U	20 U	20 U	20 U	12 J	20 U	20 U	20 U	20 U	20 U	200 U	20 U	0.97 U	20 U	0.97 U	97 U	20 U	13 J	16 J	28
RC/WC-06	WC-06-260509-G								190 U												190 U	190 U	190 U	190 U
RC/WC-06	WC-06-260509-G-B								120 U												120	120 U	120 U	70 J
RC/WC-07	Y5-RC07-S	56.7	14.1	70.8					99 U												110	99 U	99 U	99 U
RC/WC-07	RC-07	3	3.2	6.2																	19 U	19 U	19 U	19 U
RC/WC-07	RC-07	17.3	8.9	26.2					69												490	72	220	160
RC/WC-07	Y2-RC07-S	32.7	8.07	40.8					120 U												120 J	120 U	110 J	100 J
RC/WC-07	Y3-RC07-S	22.8	10.8	33.6					96 U												130	96 U	61 J	52 J
RC/WC-07	Y4-RC07-S	29.7	10.8	40.5					59 U												130	59 U	78	84
RC/WC-07	RC-07	23.9	9.3	33.2					180 U												860	180 U	**530**	320
RC/WC-07	WC-07	2	0.5	2.5		19 U	19 U	19 U								19 U					19 U	19 U	19 U	19 U
RC/WC-07	WC-07	11.3	6	17.3					62 U												120	62 U	78	62 U
RC/WC-07	WC-07	4.3	2.9	7.2					25 U												120	25 U	46	29
RC/WC-07	WC-7																				97.4	9.5 J	34.4	26.7
RC/WC-07	Y2-WC07-S	14.7	6.6	21.3	83 U	83 U	83 U	83 U	83 U	83 U	83 U	83 U	83 U	83 U	830 U	83 U	3.5 U	83 U	3.5 U	410 U	90	83 U	54 J	83 U
RC/WC-07	WC-07-070516-G				84 U				84 U												120	84 U	74 J	50 J
RC/WC-07	Y4-WC07-Sa	30.5	12.6	43.1	60 U	60 U	60 U	60 U	60 U	60 U	60 U	60 U	60 U	60 U	600 U	60 U	0.99 U	60 U	0.76 J	300 U	130	60 U	120	100
RC/WC-07	WC-07-260509-G								200 U												180 J	200 U	200 U	200 U
RC/WC-08/R-03	Y5-RC08-S	39.9	17.3	57.2					99 U												110	99 U	99 U	99 U
RC/WC-08/R-03	RC-08	2.5	2.7	5.2																	19 U	19 U	19 U	19 U
RC/WC-08/R-03	RC-08	42.5	19.6	62.1					120 U												960	150	430	300
RC/WC-08/R-03	Y2-RC08-S	31.8	15	46.8					92 U												330	84 J	170	130
RC/WC-08/R-03	Y3-RC08-S	29.4	12	41.4					120 U												200	120 U	87 J	74 J
RC/WC-08/R-03	Y3-RC15-S	29.6	12.4	42					110 U												220	110 U	100 J	90 J
RC/WC-08/R-03	Y4-RC08-S	28.5	12.5	41					59 U												120	59 U	59	59 U
RC/WC-08/R-03	RC-08	31.1	16	47.1					150 U												990	200	**710**	420
RC/WC-08/R-03	WC-08	1.6	1.7	3.3		19 U	19 U	19 U								19 U					19 U	19 U	19 U	19 U
RC/WC-08/R-03	WC-8																				171	36.2	64.1	43.9
RC/WC-08/R-03	Y2-WC08-S	24.5	13.7	38.2	94 U	94 U	94 U	94 U	94 U	94 U	94 U	94 U	94 U	94 U	940 U	94 U	3.5 U	94 U	3.5 U	470 U	290	64 J	150	110
RC/WC-08/R-03	WC-08-070516-G				46				24 J												160	31	94	57 J
RC/WC-08/R-03	Y4-WC08-Sa	26.6	14.5	41.1	59 U	59 U	59 U	59 U	59 U	59 U	59 U	59 U	59 U	59 U	590 U	59 U	0.98 U	59 U	2.2	300 U	200	59 U	86	59 U
RC/WC-08/R-03	WC-08-260509-G								32 J												110	37 J	67	67
RC/WC-09	Y5-RC09-S	51.6	16	67.6					99 U												99 U	99 U	99 U	99 U
RC/WC-09	RC-09	14	10	25																	56	38 U	38 U	38 U
RC/WC-09	RC-09	43.6	20.2	63.8					120 U												1200	130	460	320
RC/WC-09	Y2-RC09-S	38.9	18.6	57.5					110 U												340	110 U	180	110 U
RC/WC-09	Y3-RC09-S	34.6	14.5	49.1					130 U												150	130 U	130 U	130 U
RC/WC-09	Y4-RC09-S	34.1	16.9	51					60 U												160	60 U	65	60
RC/WC-09	RC-09	25.8	14.4	40.2					120 U												580	140	380	240
RC/WC-09	WC-09	7.1	4	11		20 U	20 U	20 U								20 U					21	20 U	20 U	20 U
RC/WC-09	WC-09	19.5	11.8	31.3					89 U												190	89 U	140	89 U
RC/WC-09	WC-9																				277	65.3	114	83.4
RC/WC-09	Y2-WC09-S	25.9	14.4	40.3	90 U	90 U	90 U	90 U	90 U	90 U	90 U	90 U	90 U	90 U	900 U	90 U	3.5 U	90 U	3.5	450 U	300	90 U	170	120

Table E. Head of the Thea Foss Results 2004-2009

Location	Sample ID	Percent Silt Percent	Percent Clay Percent	Percent Fines Percent	Phenol 420 UG/KG	1,3-Dichlorobenzene 170 UG/KG	1,4-Dichlorobenzene 110 UG/KG	1,2-Dichlorobenzene 50 UG/KG	Dibenzofuran 540 UG/KG	Benzyl Alcohol 73 UG/KG	2-Methylphenol 63 UG/KG	4-Methylphenol 670 UG/KG	Hexachloroethane UG/KG	2,4-Dimethylphenol 29 UG/KG	Benzoic Acid 650 UG/KG	1,2,4-Trichlorobenzene 51 UG/KG	Hexachlorobutadiene 11 UG/KG	N-Nitrosodiphenylamine 28 UG/KG	Hexachlorobenzene 22 UG/KG	Pentachlorophenol 360 UG/KG	Naphthalene 2100 UG/KG	Acenaphthylene 1300 UG/KG	Acenaphthene 500 UG/KG	Fluorene 540 UG/KG
RC/WC-09	WC-09-070516-G				23 J				24 J												130	36	73 J	47 J
RC/WC-09	Y4-WC09-Sa	27.9	15.1	43	60 U	60 U	60 U	60 U	60 U	60 U	60 U	60 U	60 U	60 U	600 U	60 U	2 U	60 U	3.6	300 U	120	60 U	60 U	60 U
RC/WC-09	WC-09-260509-G								54 J												200	87 J	130	120
RC/WC-10	Y5-RC10-S	19.4	4.9	24.3					97 U												97 U	97 U	97 U	97 U
RC/WC-10	RC-10	12	7.6	20																	44	19 U	22	19 U
RC/WC-10	RC-10	44.9	20.1	65					180												2000	310	**1000**	**640**
RC/WC-10	Y2-RC10-S	4.9	2.6	7.5					26 U												26 U	26 U	26 U	26 U
RC/WC-10	Y3-RC10-S	12.6	5.9	18.5					67 U												44 J	67 U	67 U	67 U
RC/WC-10	Y4-RC10-S	12.6	6.1	18.7					160 U												160 U	160 U	160 U	160 U
RC/WC-10	Y4-RC15-SD	12.8	6	18.8	59 U	59 U	59 U	59 U	59 U	59 U	59 U	59 U	59 U	59 U	590 U	59 U	0.98 U	59 U	1.5	300 U	59 U	59 U	59 U	59 U
RC/WC-10	RC-10	35.6	16.3	51.9					190												1800	410	**1600**	**870**
RC/WC-10	WC-10	4.3	2.8	7.1		20 U	20 U	20 U								20 U					22	20 U	20 U	20 U
RC/WC-10	WC-10	9.7	5.3	15					67 U												270	67 U	240	130
RC/WC-10	WC-10 (City)								30.4 J												274	90 U	201	115
RC/WC-10	Y2-WC10-S	2.9	1.8	4.7	20 U	20 U	20 U	20 U	64	20 U	20 U	20 U	20 U	20 U	200 U	20 U	3.5 U	20 U	3.5 U	98 U	13 J	20 U	78	120
RC/WC-10	WC-10-070516-G	2.4	1.4	3.9	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	200 U	20 U	20 U	20 U	20 U	99 U	12 J	20 U	20 U	20 U
RC/WC-10	Y4-WC10-Sa	3.5	1.8	5.3	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	200 U	20 U	0.95 U	20 U	0.95 U	98 U	20 U	20 U	20 U	20 U
RC/WC-10	Y4-WC15-SD	2.8	1.8	4.6	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	200 U	20 U	0.96 U	20 U	0.7 J	98 U	20 U	20 U	20 U	20 U
RC/WC-10	WCBU-10A	1.5	0.6	2.1		20 U	20 U	20 U	20 U							20 U					20 U	20 U	20 U	20 U
RC/WC-10	WCBU-10A-Duplicate	1.1	0.7	1.8		20 U	20 U	20 U	20 U							20 U					20 U	20 U	20 U	20 U
RC/WC-10	WCBU-10B	0.2	0.6	0.8		20 U	20 U	20 U	20 U							20 U					20 U	20 U	20 U	20 U
RC/WC-10	Y2-WC10-C3	1	0	1	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	200 U	20 U	1 U	20 U	1 U	97 U	20 U	20 U	20 U	20 U
RC/WC-10	WCBU-10C	0.4	0.9	1.3		19 U	19 U	19 U	19 U							19 U					19 U	19 U	19 U	19 U
RC/WC-10	Y4-WC10-Cb5			1.8	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	200 U	20 U	1 U	20 U	1 U	100 U	14 J	20 U	20 U	20 U
RC/WC-10	WC-10-260509-G								200 U												200 U	200 U	200 U	200 U
RC/WC-11/R-04	Y5-RC11-S	50.5	26.3	76.8					98 U												100	98 U	98 U	98 U
RC/WC-11/R-04	RC-11	15	9	24																	110	39 U	42	39 U
RC/WC-11/R-04	RC-11(pre-City dredge)-CITY								99 U												210	99 U	99	99 U
RC/WC-11/R-04	RC-11(pre-City dredge)-UTL								200 U												200 U	200 U	200 U	200 U
RC/WC-11/R-04	RC-11(post-City dredge)-CITY					79	79	**85**	**740**							**85**					**3700**	410	**3100**	**2300**
RC/WC-11/R-04	RC-11(post-City dredge)-UTL								**800**												**4500**	980	**5500**	**3200**
RC/WC-11/R-04	RC-11	54.6	24.6	79.2					190												1800	360	**1400**	**800**
RC/WC-11/R-04	Y2-RC11-S	5.7	3	8.7					48 U												48 U	48 U	48 U	48 U
RC/WC-11/R-04	Y3-RC11-S	35.7	13.9	49.6					60 U												120	60 U	60	52 J
RC/WC-11/R-04	Y4-RC11-S	58.3	18.9	77.1					120 U												260	120 U	200	120
RC/WC-11/R-04	WC-11	8.6	4.4	13		39 U	39 U	39 U								39 U					41	39 U	39 U	39 U
RC/WC-11/R-04	WC-11(pre-City dredge)-CITY					5.87	5.8	4.68	18							5.85					115	45.3	106	58.2
RC/WC-11/R-04	WC-11(post-City dredge)-CITY					78	78	**78**	340							**78**					2000	220	**1500**	**970**
RC/WC-11/R-04	WC-11 (Utilities' core)	20.3	12.4	32.7					83												500	160	**670**	360
RC/WC-11/R-04	WC-11 (City)								34 UJ												303	125	205	141
RC/WC-11/R-04	WC-11	52.5	24.4	76.9					180												689	400	**608**	**710**
RC/WC-11/R-04	Y2-WC11-S	5.5	2.6	8.1	44 U	44 U	44 U	44 U	44 U	44 U	44 U	44 U	44 U	44 U	440 U	44 U	3.4 U	44 U	3.4 U	220 U	44 U	44 U	44 U	44 U
RC/WC-11/R-04	Y2-WC15-S	5	2.3	7.3	44 U	44 U	44 U	44 U	44 U	44 U	44 U	44 U	44 U	44 U	440 U	44 U	3.4 U	44 U	3.4 U	220 U	44 U	44 U	44 U	44 U
RC/WC-11/R-04	WC-11-070516-G	3.1	1.9	5.1	22	20 U	20 U	20 U	20 U	20 U	20 U	14 J	20 U	20 U	200 U	20 U	20 U	20 U	20 U	99 U	11 J	20 U	20 U	20 U
RC/WC-11/R-04	Y4-WC11-Sa	24.4	11	35.4	60 U	60 U	60 U	60 U	60 U	60 U	60 U	60 U	60 U	60 U	600 U	60 U	0.98 U	60 U	3.7 P (J)	300 U	84	60 U	60 U	60 U
RC/WC-11/R-04	WC-11-260509-G								110 U												110 U	110 U	110 U	110 U
RC/WC-12	Y5-RC12-S	27.3	11.1	38.4					100 U												110	100 U	100	100 U
RC/WC-12	RC-12	0.8	1.1	1.9																	20 U	20 U	20 U	20 U
RC/WC-12	RC-12	45.9	26.1	72					340												**3000**	510	**2700**	**1400**
RC/WC-12	Y2-RC12-S	8.1	3.3	11.4					20 U												39	12 J	30	24
RC/WC-12	Y3-RC12-S	17.2	7.5	24.7					72 U												130	72 U	76	48 J
RC/WC-12	Y4-RC12-S	34.8	15.2	50					59 U												240	89	170	130
RC/WC-12	RC-12	47.3	19.5	66.8					250 U												760	250 U	**1200**	**620**
RC/WC-12	WC-12	1.1	0.9	2		19 U	19 U	19 U								19 U					19 U	19 U	19 U	19 U
RC/WC-12	WC-12(pre-City dredge)-CITY					5	4.9	3.98	5.4							4.98					59.2	17.6	34.4	18.4
RC/WC-12	WC-12	16.7	8.4	25.1					100 U												380	130	**630**	340
RC/WC-12	WC-12 (City)								39.3 J												297	100	306	199
RC/WC-12	WC-12																				638	128	**525**	308
RC/WC-12	Y2-WC12-S	3.3	1.7	5	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	200 U	20 U	3.4 U	20 U	3.4 U	98 U	12 J	20 U	20 U	20 U
RC/WC-12	WC-12-070517-G	4.6	2.4	7.1	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	200 U	20 U	20 U	20 U	20 U	99 U	26	20 U	30	16 J
RC/WC-12	Y4-WC12-Sa	15.8	7.4	23.2	59 U	59 U	59 U	59 U	59 U	59 U	59 U	59 U	59 U	59 U	590 U	59 U	0.96 U	59 U	0.84 J	300 U	110	59 U	84	64
RC/WC-12	Y2-WC12-C3	1.2	0	1.2	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	200 U	20 U	1 U	20 U	1 U	99 U	20 U	20 U	20 U	20 U
RC/WC-12	Y4-WC12-Cb2			1.4	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	200 U	20 U	0.98 U	20 U	0.98 U	98 U	20 U	20 U	20 U	20 U
RC/WC-12	WCBU-12A	1.1	0.4	1.5		20 U	20 U	20 U	20 U							20 U					20 U	20 U	20 U	20 U
RC/WC-12	WC-12-260509-G								200 U												200	200 U	140 J	200 U
RC-13	Y5-RC13-S	40.1	23.5	63.6					240 U												240 U	240 U	240 U	240 U
RC-13	RC-13	10	7.9	18																	38 U	38 U	38 U	38 U
RC-13	RC-13	3.9	2.4	6.3					58 U												58 U	58 U	58 U	58 U
RC-13	RC-13	9.6	5.7	15.3					28 U												73	28 U	32	33
RC-13	Y2-RC13-S	25.3	10.5	35.8					120 U												120 U	120 U	120 U	120 U
RC-13	Y3-RC13-S	27.2	13.2	40.4					120 J												130	120 U	130	180

Table E. Head of the Thea Foss Results 2004-2009

Location	Sample ID	Percent Silt Percent	Percent Clay Percent	Percent Fines Percent	Phenol 420 UG/KG	1,3-Dichlorobenzene 170 UG/KG	1,4-Dichlorobenzene 110 UG/KG	1,2-Dichlorobenzene 50 UG/KG	Dibenzofuran 540 UG/KG	Benzyl Alcohol 73 UG/KG	2-Methylphenol 63 UG/KG	4-Methylphenol 670 UG/KG	Hexachloroethane UG/KG	2,4-Dimethylphenol 29 UG/KG	Benzoic Acid 650 UG/KG	1,2,4-Trichlorobenzene 51 UG/KG	Hexachlorobutadiene 11 UG/KG	N-Nitrosodiphenylamine 28 UG/KG	Hexachlorobenzene 22 UG/KG	Pentachlorophenol 360 UG/KG	Naphthalene 2100 UG/KG	Acenaphthylene 1300 UG/KG	Acenaphthene 500 UG/KG	Fluorene 540 UG/KG
RC-13	Y4-RC13-S	15.7	9.73	25.5					140 U												73 J	140 U	140 U	89 J
RC-14	Y5-RC14-S	36.5	19.1	55.6					98 U												98 U	98 U	98 U	98 U
RC-14	RC-14	20	14	34																	77 U	77 U	77 U	77 U
RC-14	RC-14	8.4	4.3	12.7					69 U												69 U	69 U	69 U	69 U
RC-14	RC-14	12.8	7.4	20.2					40 U												70	40 U	48	48
RC-14	Y2-RC14-S	15	8.2	23.2					110 U												110 U	110 U	110 U	110 U
RC-14	Y3-RC14-S	15.7	7.8	23.5					72 J												74 J	120 U	86 J	110 J
RC-14	Y4-RC14-S	33.9	12	45.9					200 U												200 U	200 U	200 U	200 U
RC-14B	RC-14B	11.4	6.8	18.2					86 U												86 U	86 U	86 U	86 U
RC-14B	Y2-RC14B-S	16.1	8.6	24.7					94 U												94 U	94 U	94 U	94 U
WC-13	WC-13	3.4	2.3	5.7		20 U	20 U	20 U								20 U					20 U	20 U	20 U	20 U
WC-13	Y2-WC13-S	21.6	13.4	35	69 U	69 U	69 U	69 U	69 U	69 U	69 U	69 U	69 U	69 U	690 U	69 U	3.5 U	69 U	3.5 U	350 U	210	69 U	150	110
WC-13	WC-13-070516-G				33 J				34 J												220	69 J	140	82
WC-13	Y4-WC13-Sa	11.3	6.1	17.4	22	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	200 U	20 U	1 U	20 U	4	100 U	53	20 U	24	26
WC-13	WC-13-260509-G								120 U												140	120 U	76 J	87 J
WC-14	WC-14	5.4	3.6	9		19 U	19 U	19 U								19 U					19 U	19 U	19 U	19 U
WC-14	Y2-WC14-S	32.8	19.5	52.3	96 U	96 U	96 U	96 U	96 U	96 U	96 U	96 U	96 U	96 U	960 U	96 U	3.6 U	96 U	3.6 U	480 U	240	96 U	130	98
WC-14	WC-14-070516-G				32 J				21 J												110	30 J	63 J	52 J
WC-14	Y4-WC14-Sa	32.4	14.9	47.3	59 U	59 U	59 U	59 U	59 U	59 U	59 U	59 U	59 U	59 U	590 U	59 U	1.9 U	59 U	3.4	300 U	100	59 U	59 U	59 U
WC-14	WC-14-260509-G								59 U												120	37 J	69	64
SC-01	SC-01	0.7	0.6	1.3		19 U	19 U	19 U								19 U					19 U	19 U	19 U	19 U
SC-01	Y2-SC01-S	0.7	1	1.7	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	200 U	20 U	1 U	20 U	1 U	98 U	20 U	20 U	20 U	20 U
SC-01	Y4-SC01-S			2	26	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	190 U	19 U	0.95 U	19 U	0.95 U	97 U	19 U	19 U	19 U	19 U
SC-02	SC-02	0.4	0.7	1.1		19 U	19 U	19 U								19 U					19 U	19 U	19 U	19 U
SC-02	Y2-SC02-S	6.4	2.9	9.3	21 U	21 U	21 U	21 U	21 U	21 U	21 U	21 U	21 U	21 U	480	21 U	1 U	21 U	1 U	73 J	20 J	21 U	17 J	22
SC-02	Y4-SC02-S	12.3	3.9	16.2	16 J	20 U	20 U	20 U	13 J	20 U	20 U	20 U	20 U	20 U	200 U	20 U	0.98 U	20 U	1.8	85 J	11 J	20 U	20 U	14 J
SC-03	SC-03	4.3	2.4	6.7		20 U	20 U	20 U								20 U					20 U	20 U	20 U	20 U
SC-03	Y2-SC03-S	13.9	7.3	21.2	88 U	88 U	88 U	88 U	88 U	88 U	88 U	88 U	88 U	88 U	880 U	88 U	3.5 U	88 U	3.5 U	440 U	88 U	88 U	88 U	88 U
SC-03	Y4-SC03-S	22	14.1	36.1	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	1000 U	100 U	0.99 U	100 U	2.5	500 U	100 U	100 U	100 U	52 J
SC-04	SC-04	0.9	0.2	1.1		19 U	19 U	19 U								19 U					19 U	19 U	19 U	19 U
SC-04	Y2-SC04-S	6.1	4.4	10.5	79 U	79 U	79 U	79 U	79 U	79 U	79 U	40 J	79 U	79 U	790 U	79 U	3.5 U	79 U	3.5 U	400 U	65 J	79 U	53 J	79 U
SC-04	Y4-SC04-S	14.6	10.2	24.8	98 U	98 U	98 U	98 U	98 U	98 U	98 U	98 U	98 U	98 U	980 U	98 U	0.97 U	98 U	1.4	490 U	98 U	98 U	98 U	98 U
NW shoreline under 509 bridge	Y4-SS-01	10.6	5.87	16.5	95 J	120 U	120 U	120 U	120 U	120 U	120 U	120 U	120 U	120 U	1200 U	120 U	0.98 U	120 U	3.6	590 U	100 J	120 U	59 J	61 J
City Area Locations																								
S-15	Site 15(pre-City dredge)-CITY								99 U												950	99 U	**700**	460
S-15	Site 15(post-City dredge)-UTL								**1800**												**11000**	**2000**	**14000**	**8000**
S-15	Site 15(pre-City dredge)-UTL								200 U												780	210	**780**	460
S-15	Site 15(post-City dredge)-CITY					78	78	**78**	**2400**							**78**					**8200**	820	**7700**	**9300**
S-15	S-15 (Utilities' core)	34.6	17.8	52.4					250												890	320	**2300**	**1300**
S-15	S-15 (City)								404												2010	**1390**	**3690**	**2410**
S-15	S-15	39.7	18	57.7					380												**3000**	560	**4200**	**1700**
S-15	S-15A																				1020	363	**1200**	**649**
S-15	Y2-S15-S	5.7	3.6	9.3	51 U	51 U	51 U	51 U	51 U	51 U	51 U	51 U	51 U	51 U	510 U	51 U	3.5 U	51 U	3.5 U	260 U	51 U	51 U	51 U	51 U
S-15	S-15-070516-G	3.5	2	5.3	14 J	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	200 U	20 U	20 U	20 U	20 U	98 U	15 J	20 U	20 U	20 U
S-15	S-15-070516-G-D	3.8	2.4	6.1	18 J	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	200 U	20 U	20 U	20 U	20 U	98 U	13 J	20 U	20 U	20 U
S-15	Y4-S15-Sa	9	6.1	15.1	59 U	59 U	59 U	59 U	59 U	59 U	59 U	59 U	59 U	59 U	590 U	59 U	0.97 U	59 U	1 J	300 U	59 U	59 U	59 U	59 U
S-15	S-15-260509-G								190 U												190 U	190 U	190 U	190 U
S-15A	S-15																				1340	444	**1430**	**773**
S-16	S-16	42.1	9.8	61.6					75												550	330	**560**	**700**
S-16	S-32 (Dup of S-16)	23.6	12.6	36.2					92												680	170	**770**	400
S-16	S-16																				236	86.2	164	101
S-17	S-17	32.8	14.9	47.7					91												850	190	**650**	370
S-17	S-17 (City)								30.1 J												270	83	178	130
S-17	S-17	29	13.7	42.7					86 U												590	86 U	240	140
S-17	Y2-S17-S	3.4	2.1	5.5	40 U	40 U	40 U	40 U	40 U	40 U	40 U	40 U	40 U	40 U	400 U	40 U	3.4 U	40 U	3.4 U	200 U	40 U	40 U	40 U	40 U
S-17	S-17-070516-G	5.2	3.2	8.3	22	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	200 U	20 U	20 U	20 U	20 U	100 U	22	20 U	11 J	20 U
S-17	Y4-S17-Sa	12.1	6.8	18.9	59 U	59 U	59 U	59 U	59 U	59 U	59 U	59 U	59 U	59 U	590 U	59 U	0.97 U	59 U	1 J	300 U	59	59 U	59 U	59 U
S-17	S-17-260509-G								34 J												120	41 J	64	62
S-18	S-18	25	14.8	39.8					120 U												300	120 U	240	150
S-18	S-18 (City)								11												122	34.8 J	62.1	52.6
S-19	S-19	40.4	8.9	59.5					95												660	340	**760**	**980**
S-19	S-19																				405	112	296	162
S-19	Y2-S19-S	6.2	4.2	10.4	48 U	48 U	48 U	48 U	48 U	48 U	48 U	48 U	48 U	48 U	480 U	48 U	3.5 U	48 U	3.5 U	240 U	54	48 U	48 U	48 U
S-19	S-19-070516-G	2.7	1.7	4.5	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	200 U	20 U	20 U	20 U	20 U	100 U	19 J	20 U	15 J	12 J
S-19	Y4-S19-Sa	10.2	5.6	15.8	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	200 U	20 U	0.97 U	20 U	0.75 J	98 U	94	31	60	36
S-19	S-19-260509-G								120 U												230	91 U	170	120
S-20	S-20	13.1	7.6	20.7					50												420	110	320	210
S-20	S-20 (City)								80.6												521	235	**572**	344
S-20	S-20																				306	132	297	159
S-21	S-21	47.5	21.2	68.7					300												1400	530	**3100**	**1600**

Table E. Head of the Thea Foss Results 2004-2009

Location	Sample ID	Percent Silt Percent	Percent Clay Percent	Percent Fines Percent	Phenol 420 UG/KG	1,3-Dichlorobenzene 170 UG/KG	1,4-Dichlorobenzene 110 UG/KG	1,2-Dichlorobenzene 50 UG/KG	Dibenzofuran 540 UG/KG	Benzyl Alcohol 73 UG/KG	2-Methylphenol 63 UG/KG	4-Methylphenol 670 UG/KG	Hexachloroethane UG/KG	2,4-Dimethylphenol 29 UG/KG	Benzoic Acid 650 UG/KG	1,2,4-Trichlorobenzene 51 UG/KG	Hexachlorobutadiene 11 UG/KG	N-Nitrosodiphenylamine 28 UG/KG	Hexachlorobenzene 22 UG/KG	Pentachlorophenol 360 UG/KG	Naphthalene 2100 UG/KG	Acenaphthylene 1300 UG/KG	Acenaphthene 500 UG/KG	Fluorene 540 UG/KG
S-21	S-33 (Dup of S-21)	49.3	20.7	70					410												1900	660	**4000**	**2100**
S-21	S-21 (City)								206												1070	816	**1840**	**1330**
S-22	S-22	32.3	15.5	47.9					160 U												1000	280	**1200**	**620**
S-22	S-22 (City)								76.9												610	150	469	362
S-23	S-23	25.3	13.4	38.7					140 U												500	190	**650**	350
S-24	S-24	29.2	13.8	43					150 U												**2600**	170	**1000**	420
S-24	S-24 (City)								16.6 J												199	48.2	127	82.5
S-24	S-24	16.5	8.6	25.1					42												390	72	190	130
S-24	Y2-S24-S	2.7	1.5	4.2	39 U	39 U	39 U	39 U	39 U	39 U	39 U	39 U	39 U	39 U	390 U	39 U	3.4 U	39 U	3.4 U	200 U	39 U	39 U	39 U	39 U
S-24	S-24-070516-G	4.8	2.1	6.9	22	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	200 U	20 U	20 U	20 U	20 U	100 U	22	20 U	11 J	11 J
S-24	Y4-S24-Sa	10.8	4.8	15.6	60 U	60 U	60 U	60 U	60 U	60 U	60 U	60 U	60 U	60 U	600 U	60 U	0.97 U	60 U	1 J	300 U	60 U	60 U	60 U	60 U
S-24	S-24-260509-G								190 U												110 J	190 U	190 U	190 U
S-29	S-29 (City)								93.8												844	182	**515 J**	384
S-29	S-29																				324	100	237	131
S-30	S-30																				157	37.9	63.9	48.6
CA-19B	CA-19B-03																				365	97.7	406	207
CA-19B	CA-19B-06																				486	180	**759**	436
CA-20	CA-20-01																				78.9	21.2 J	58.8	32
CA-20	CA-20-04																				87.4	15.9 J	56.9	38.6
CA-22	CA-22-02																				**2560**	469	**2960**	**1680**
CA-22	CA-22-05																				99.9	25.5	77.9	38.5
Reference Locations																								
CI-1	Y2-CI-01	39.3	8.5	47.8																				
CI-2	Y2-CI-02	22.3	5.2	27.5																				
Rinsate Blanks																								
FIELDQC	Y2-RB-01				1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	10 U	1 U	0.05 U	1 U	0.05 U	5 U	1 U	1 U	1 U	1 U
FIELDQC	Y2-RB-02				1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	10 U	1 U	0.05 U	1 U	0.05 U	5 U	1 U	1 U	1 U	1 U
FIELDQC	Y2-RB-03				1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	10 U	1 U	0.05 U	1 U	0.05 U	5 U	1 U	1 U	1 U	1 U
FIELDQC	Y3-RB-01								1 U												1 U	1 U	1 U	1 U
FIELDQC	Y4-RB-01				1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	10 U	1 U	0.05 U	1 U	0.05 U	5 U	1 U	1 U	1 U	1 U
FIELDQC	Y4-RB02				1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	10 U	1 U	0.05 U	1 U	0.05 U	5 U	1 U	1 U	1 U	1 U
FIELDQC	Y4-RB-03				1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	10 U	1 U	0.05 U	1 U	0.05 U	5 U	1 U	1 U	1 U	1 U
FIELDQC	Y5-RB-01								1 U												1 U	1 U	1 U	1 U
FIELDQC	WC-05-RB				1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	10 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U
FIELDQC	RINSATE BLANK-260509								1 U												1 U	1 U	1 U	1 U

Footnotes:

Laboratory Data Qualifiers

U= result was not detected at or above the method detection l

J (for Organics)= result is an estimated concentration that is l

B (for metals)= result is an estimated concentration that is les

B (for organics)= analyte detected in an associated Method B

Y=analyte is not detected at or above the reported concentrat

Data Validation Qualifiers

U= nondetected at the associated value

J= associated value is considered an estimate; less than verifi

Acronyms

mg/kg= milligrams per kilogram

ug/kg= micrograms per kilogram

mg/L= milligrams per liter

ug/L= micrograms per liter

SQO= Sediment Quality Objectives for Thea Foss Waterway

Concentrations in bold font indicate an SQO exceedance

Table E. Head of the Thea Foss Results 2004-2009

Location	Sample ID	Phenanthrene	Anthracene	2-Methyl naphthalene	LPAH	Fluor anthene	Pyrene	Benzo(a) anthracene	Chrysene	Benzo(b) fluoranthene	Benzo(k) fluoranthene	Benzo(b+k) fluoranthenes	Benzo(a) pyrene	Indeno(1,2,3-cd) pyrene	Dibenz(a,h) anthracene	Benzo(g,h,i) perylene	HPAH	Dimethylph thalate	Diethyl phthalate	Di-n-Butyl phthalate	Butylbenzyl phthalate
		1500	**960**	**670**	**5200**	**2500**	**3300**	**1600**	**2800**			**3600**	**1600**	**690**	**230**	**720**	**17000**	**160**	**200**	**1400**	**900**
		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**	**UG/KG**	**UG/KG**	**UG/KG**	**UG/KG**	**UG/KG**	**UG/KG**
RC/WC-01	RC-01	160	39 U	39 U	160	480	360	140	260	320	220	540	170	90	39 U	87	2700	39 U	39 U	48	91
RC/WC-01	RC-01	340	91	57 U	550	680	560	250	380	280	280	560	320	230	57 U	180	3200	57 U	57 U	57 U	120
RC/WC-01	RC-01	**1700**	380	220 U	2300	**4300**	**4000**	1200	2000	2400	2000	**4400**	**1600**	540	220 U	530	**19000**	220 U	220 U	410	520
RC/WC-01	Y2-RC01-S	**1600**	230	160 U	1900 J	**3900**	2200	1100	1800	1600	1700	3300	1400	410	160 U	480	15000				
RC/WC-01	Y3-RC01-S	**1500**	300	150 U	2000 J	**2800**	2000	900	1600	1500	1500	3000	960	380	93 J	410	12000 J				
RC/WC-01	Y4-RC01-S	**1600**	270	160 U	2000 J	**3900**	3000	1300	2000	1600	1500	3100	1400	**890**	**350**	**910**	**17000**				
RC/WC-01	Y5-RC01-S	**2400**	350	98 U	3000	**3300**	3100	**1800**	**3100**	1800 (J)	1800 (J)	**3600 (J)**	**1900 (J)**	**940 (J)**	**290 (J)**	**970 (J)**	**19000 (J)**				
RC/WC-01	WC-01	85	39 U	39 U	85	250	140	75	130	120	85	210	79	53	39 U	50	1200	39 U	39 U	39 U	39 U
RC/WC-01	WC-01	220	59 U	59 U	220	490	390	180	290	220	220	440	240	160	59 U	130	2300	59 U	59 U	59 U	70
RC/WC-01	Y2-WC01-S	810	160 J	190 U	970 J	2100	1400	670	1100	1200	660	1900	690	260	190 U	330	8400	190 U	190 U	160 J	180 J
RC/WC-01	WC-01-070516-G	680	120	77 U	910 J	1500	1100	540	750	710	850	1600	580	220	53 J	210	6500 J	77 U	77 U	77 U	180
RC/WC-01	Y4-WC01-Sa	1100	190	99 U	1400 J	**2700**	2000	940	1400	1200	1200	2400	1000	490	210	480	12000	99 U	99 U	100	380
RC/WC-01	Y4-WC01B-Ca3	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	19 U	19 U	19 U	19 U	19 U	31	19 U
RC/WC-01	WC-01-260509-G	1100	180	120 U	1300 J	**3200**	2000	1000	1600	1500	1500	3000	1200	500	110 J	400	13000 J	120 U	120 U	120 U	260
WC-01B/R-01B	Y2-WC01B-C3	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	20 U	20 U	20 U	20 U	20 U	20 U	20 U
RC/WC-02	Y5-RC02-S	1200	170	98 U	1400	1900	1800	1000	1800	1300	1300	2600	1200	530	**230**	550	12000				
RC/WC-02	RC-02	99	29	20 U	200	230	160	70	100	100	79	180	64	27	20 U	24	1000	20 U	20 U	20 U	29
RC/WC-02	RC-02	1300	490	150	2800	**3900**	**3800**	1300	2000	1700	1700	3400	**1600**	600	190	600	**17000**	67 U	67 U	320	540
RC/WC-02	RC-2A (Dup of RC-2)	**1600**	570	230 U	3000	**4600**	**4600**	**1600**	2300	2300	1900	**4200**	**1900**	660	230 U	640	**21000**	230 U	230 U	470	580
RC/WC-02	Y2-RC02-S	**1700**	370	160 U	2600 J	**5300**	**3500**	**1600**	2700	2700	2300	**5000**	**2100**	620	100 J	**790**	**22000 J**				
RC/WC-02	Y3-RC02-S	**2500**	430	170 U	3400 J	**5000**	**4700**	**2000**	**3100**	3300	3600	**6900**	**2300**	**870**	**390**	**900**	**26000**				
RC/WC-02	Y4-RC02-S	**1500**	250	200 U	1800	**3800**	3000	1300	2200	1800	2100	**3900**	**1600**	**760**	**310**	**760**	**18000**				
RC/WC-02	Y5-RC15-SD	**1500**	230	99 U	1700	2200	2000	1200	2100	1500 (J)	1500 (J)	3000 (J)	1400 (J)	640 (J)	**260 (J)**	640 (J)	13000 (J)				
RC/WC-02	RC-02	650	210	120 U	1000	1500	1100	540	790	670	670	1300	680	340	120 U	280	6600	120 U	120 U	120 U	270
RC/WC-02	WC-02	70	39 U	39 U	70	150	120	54	78	74	62	140	50	39 U	39 U	39 U	720	39 U	39 U	39 U	39 U
RC/WC-02	WC-02 (City)	230 J	92.9	22.3	480	820	441	183	265 B			340	194	106	39.3	130	2500	3.7 J	6.7 J	58.5 J	4
RC/WC-02	WC-02	650	190	51	1200	1700	1600	540	780	710	710	1400	670	250	89	240	7300	29 U	29 U	130	200
RC/WC-02	Y2-WC02-S	1400	360	120 U	2300 J	**4200**	3100	1200	2200	2200	1800	**4000**	**1600**	480	81 J	620	**17000 J**	120 U	120 U	170 J (JB)	380
RC/WC-02	WC-02-070516-G	**2100**	320	160 U	2700 J	**4800**	**3300**	**1600**	2200	2900	2000	**4900**	**1700**	600	**230**	570	**20000**	160 U	160 U	160 U	350
RC/WC-02	Y4-WC02-Sa	**1800**	310	200 U	2100	**4800**	**3700**	**1600**	2700	2800	2100	**4900**	**2000**	**860**	**370**	**860**	**22000**	200 U	200 U	200 U	360
RC/WC-02	WC-02-260509-G	**2400**	410	62 J	3200 J	**7000**	**4800**	**2300**	**3600**	3400	3400	**6800**	**2700**	**900**	**300**	**970**	**29000**	120 U	120 U	340	620
RC/WC-03	Y5-RC03-S	780	130	98 U	910	1100	1100	580	1000	630 (J)	630 (J)	1300 (J)	670 (J)	460 (J)	190 (J)	460 (J)	6800 (J)				
RC/WC-03	RC-03	240	73	35	590	500	360	150	220	190	210	400	140	56	20 U	53	2300	20 U	20 U	19 J	62
RC/WC-03	RC-03	700	290	100	1700	2000	2000	650	920	830	830	1700	810	240	83	240	8600	44 U	44 U	150	240
RC/WC-03	Y2-RC03-S	820	210	120 U	1200	2400	1700	790	1200	1100	1000	2100	970	410	120 U	520	10000				
RC/WC-03	Y3-RC03-S	570	120	39 J	870 J	1400	1300	540	790	920	960	1900	620	260	61 J	270	7100 J				
RC/WC-03	Y4-RC03-S	650	100	99 U	750	1300	1200	460	750	570	720	1300	580	320	130	320	6400				
RC/WC-03	WC-03	85	40 U	40 U	200	120	110	45	60	58	42	100	40 U	40 U	40 U	40 U	540	40 U	40 U	40 U	40 U
RC/WC-03	WC-03 (City)	152 J	62.5	19.9	380	356	393	121	170			240	125	89.4	34.9	92.9	1600	4.5 UJ	8.2 UJ	35.7 B	4.9 U
RC/WC-03	Y2-WC03-S	440	140	73 U	680	1200	920	400	570	530	480	1000	480	250	73 U	320	5200	73 U	73 U	200 J (JB)	130
RC/WC-03	WC-03-070516-G	340	76	69 U	470 J	900	770	330	480	540	600	1100	410	160	39 J	150	4400 J	69 U	69 U	50 J	94
RC/WC-03	Y4-WC03-Sa	230	58 U	58 U	230	580	610	220	370	290	360	650	290	150	61	160	3100	58 U	58 U	58 U	76
RC/WC-03	RC-03	270	120	99 U	510	590	520	230	300	250	250	500	260	120	99 U	99 U	2500	99 U	99 U	99 U	99 U
RC/WC-03	WC-03-260509-G	480	200 U	200 U	480	1300	980	490	750	640	640	1300	630	400	150 J	410	6400 J	200 U	200 U	200 U	130 J
RC/WC-04/R-02	Y5-RC04-S	1300	200	98 U	1500	1900	2000	980	1800	1300	1300	2600	1200	610	**230**	600	12000				
RC/WC-04/R-02	RC-04	98	25	19 U	190	180	150	56	82	76	74	150	56	23	19 U	21	870	19 U	19 U	19 U	27
RC/WC-04/R-02	RC-04	**1600**	860	320	4700	**4500**	**4600**	**1600**	2100	1900	1900	**3800**	**1900**	550	200	580	**20000**	72 U	72 U	250	520
RC/WC-04/R-02	Y2-RC04-S	1400	270 J	320 U	2100 J	**2900**	2600	960	1500	1600	920	2500	1100	670	320 U	**910**	13000				
RC/WC-04/R-02	Y3-RC04-S	930	190	110 U	1400 J	2300	2000	840	1300	1300	1500	2800	1000	410	82 J	420	11000 J				
RC/WC-04/R-02	Y4-RC04-S	540	120	59 U	760	1400	1200	500	800	820	710	1500	630	270	64	280	6700				
RC/WC-04/R-02	RC-04	600	240	120 U	1200	1500	940	480	660	600	600	1200	610	260	120 U	220	5900	120 U	120 U	120 U	180
RC/WC-04/R-02	WC-04	120	40	21	340	160	120	54	72	54	66	120	47	20 U	20 U	20 U	690	20 U	20 U	20 U	20 U
RC/WC-04/R-02	WC-04-Duplicate	140	45	24	390	190	140	64	81	70	66	140	55	20 U	20 U	20 U	800	20 U	20 U	20 U	20 U
RC/WC-04/R-02	S-34 (Dup of WC-04)	440	190	98 U	910	1100	730	360	490	450	450	900	440	200	98 U	160	4400	98 U	98 U	98 U	140
RC/WC-04/R-02	WC-04	400	170	140 U	730	950	600	320	440	400	400	800	400	170	140 U	140	3800	140 U	140 U	140 U	140 U
RC/WC-04/R-02	WC-04	400	180	57	950	1200	1200	390	540	580	510	1100	490	150	50	140	5300	36 U	36 U	92	160
RC/WC-04/R-02	Y2-WC04-S	840	220	100 U	1500	2400	1900	780	1100	1400	640	2000	860	300	63 J	350	9800 J	100 U	100 U	290	200
RC/WC-04/R-02	WC-04-070517-G	440	99	34 J	750 J	940	1000	420	600	730	690	1400	510	190	40 J	200	5300 J	66 U	66 U	66 U	200
RC/WC-04/R-02	Y4-WC04-Sa	540	120	59 U	740	1400	1100	510	790	890	730	1600	640	250	61	260	6600	59 U	59 U	59 U	120
RC/WC-04/R-02	WCBU-4A	33	19 U	19 U	33	54	50	20	27	22	19 J	41 J	20	19 U	19 U	19 U	190	19 U	19 U	19 U	23
RC/WC-04/R-02	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	19 U	19 U	19 U	19 U	19 U	19 U	19 U
RC/WC-04/R-02	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	19 U	19 U	19 U	19 U	19 U	19 U	19 U
RC/WC-04/R-02	Y2-WC04-C3	36	20 U	20 U	36	66	68	25	34	38	19 J	57 J	26	16 J	20 U	22	310 J	20 U	20 U	14 J	20 U
RC/WC-04/R-02	Y4-WC04-Cc3	19 U	19 U	19 U	19 U	9.7 J	11 J	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	21 J	19 U	19 U	19 U	19 U
RC/WC-04/R-02	WC-04-260509-G	900	170 J	200 U	1200 J	2400	1800	870	1400	1300	1300	2600	1100	420	130 J	410	11000 J	200 U	200 U	200 U	290
RC/WC-05	Y5-RC05-S	1200	210	99 U	1600	1600	1600	850	1400	1100	1100	2200	1000	460	170	460	9700				
RC/WC-05	RC-05	40	20 U	20 U	74	73	49	22	30	23	19 J	42	20	20 U	20 U	20 U	260	20 U	20 U	20 U	20 U
RC/WC-05	RC-05-Duplicate	47	20 U	20 U	83	72	53	23	30	20	18 J	38	20 J	20 U	20 U	20 U	240	20 U	20 U	20 U	20 U
RC/WC-05	RC-05	**1700**	**1000**	350	5100	**4500**	**4900**	**1700**	2000	1800	1800	**3600**	**1900**	490	180	510	**20000**	75 U	75 U	220	480
RC/WC-05	Y2-RC05-S	690	220	150 U	910	1700	1600	690	1100	820	1100	1900	840	240	150 U	280	8400				
RC/WC-05	Y3-RC05-S	680	140 J	150 U	930 J	1800	1500	640	960	1100	870	2000	740	400	83 J	390	8500 J				

Table E. Head of the Thea Foss Results 2004-2009

Location	Sample ID	Phenanthrene 1500 UG/KG	Anthracene 960 UG/KG	2-Methyl naphthalene 670 UG/KG	LPAH 5200 UG/KG	Fluor anthene 2500 UG/KG	Pyrene 3300 UG/KG	Benzo(a) anthracene 1600 UG/KG	Chrysene 2800 UG/KG	Benzo(b) fluoranthene UG/KG	Benzo(k) fluoranthene UG/KG	Benzo(b+k) fluoranthenes 3600 UG/KG	Benzo(a) pyrene 1600 UG/KG	Indeno(1,2,3-cd) pyrene 690 UG/KG	Dibenz(a,h) anthracene 230 UG/KG	Benzo(g,h,i) perylene 720 UG/KG	HPAH 17000 UG/KG	Dimethylph thalate 160 UG/KG	Diethyl phthalate 200 UG/KG	Di-n-Butyl phthalate 1400 UG/KG	Butylbenzyl phthalate 900 UG/KG
RC/WC-05	Y4-RC05-S	940	210	64	1500	**2500**	2300	820	1400	1500	1500	3000	1300	450	83	480	12000				
RC/WC-05	WC-05	39	20 U	20 U	64	63	50	20 U	24	21	20	41	20 U	20 U	20 U	20 U	220	20 U	20 U	20 U	20 U
RC/WC-05	WC-05	580	260	120 U	1200	1100	890	420	550	350	350	700	490	340	120 U	290	4800	120 U	120 U	120 U	230
RC/WC-05	WC-05	550	300	95	1500	1600	1700	550	690	640	640	1300	650	180	56	170	6900	41 U	41 U	92	170
RC/WC-05	Y2-WC05-S	**1500**	310	99 U	2300	**2700**	2400	760	1800	1200	760	2000	810	230	99 U	280	11000	99 U	99 U	240 J (JB)	160 J (JIS)
RC/WC-05	WC-05-070516-G	740	180	55 J	1200 J	1900	1600	720	1000	1200	1100	2300	850	530	110 J	600	9600 J	92 U	92 U	66 J	210
RC/WC-05	Y4-WC05-Sa	810	200	64	1300	2400	2000	750	1300	1200	1500	2700	1000	350	68	350	11000	60 U	60 U	60 U	180
RC/WC-05	RC-05	320	150	110 U	580	580	500	230	300	200	200	400	280	190	110 U	150	2600	110 U	110 U	110 U	120
RC/WC-05	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	19 U	19 U	19 U	19 U	19 U	19 U	19 U
RC/WC-05	Y2-WC05-C3	11 J	20 U	20 U	11 J	27	32	12 J	15 J	19 J	20 U	19 J	11 J	20 U	20 U	10 J	130 J	20 U	20 U	11 J	20 U
RC/WC-05	Y4-WC05-Ca5	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	20 U	20 U	20 U	20 U	20 U	45	20 U
RC/WC-05	WC-05-260509-G	1300	250	63	2000 J	**3600**	2600	1200	1900	1900	1900	**3800**	**1600**	570	200	550	16000	59 U	59 U	90	370
RC/WC-06	Y5-RC06-S	870	150	99 U	1000	1600	1600	790	1400	1000	1000	2000	950	580	220	620	9800				
RC/WC-06	RC-06	110	39 U	39 U	160	230	160	75	110	91	69	160	68	44	39 U	43	1100	39 U	39 U	39 U	38 J
RC/WC-06	RC-06	1100	540	220	3100	**3100**	**3300**	1100	1400	1300	1300	2600	1300	340	120	350	14000	67 U	67 U	210	350
RC/WC-06	Y2-RC06-S	610	130	87 U	740	1400	1300	540	820	750	780	1500	660	220	87 U	280	6800				
RC/WC-06	Y2-RC15-S	600	140	86 U	740	1300	1300	510	800	900	590	1500	640	210	86 U	240	6500				
RC/WC-06	Y3-RC06-S	910	180	60 J	1400 J	2400	2100	860	1300	1400	1700	3100	990	440	84 J	460	12000 J				
RC/WC-06	Y4-RC06-S	940	200	60	1500	**2600**	3100	840	1600	1000	1200	2200	1200	**950**	**270**	**1100**	14000				
RC/WC-06	RC-06	740	320	130 U	1800	1200	930	500	630	510	510	1000	610	260	130 U	220	5400	130 U	130 U	130 U	190
RC/WC-06	WC-06	33	20 U	20 U	33	78	67	24	38	28	32	60	27	18 J	20 U	18 J	350	20 U	20 U	20 U	20 U
RC/WC-06	Y2-WC06-S	290	85	60 U	440	760	580	270	390	400	280	680	310	150	60 U	200	3300	60 U	60 U	210 J (JB)	110
RC/WC-06	WC-06-070517-G	520	110	85 U	760 J	1400	1200	470	720	920	800	1700	590	210	85 U	220	6500	85 U	85 U	85 U	160
RC/WC-06	Y4-WC06-Sa	560	130	100 U	690	1600	1400	560	900	730	870	1600	700	400	160	420	7700	100 U	100 U	100 U	170
RC/WC-06	WCBU-6A	30	20 U	20 U	30	41	30	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	71	20 U	20 U	20 U	20 U
RC/WC-06	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	20 U	20 U	20 U	20 U	20 U	20 U	20 U
RC/WC-06	Y4-WC06-Cb2	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	19 U	19 U	19 U	19 U	19 U	19 U	19 U
RC/WC-06	Y2-WC06-C3	20 U	20 U	20 U	20 U	21	23	20 U	10 J	20 U	20 U	20 U	20 U	20 U	20 U	20 U	54 J	20 U	20 U	10 J	20 U
RC/WC-06	Y4-WC06-Cb3	270	54	20 U	380 J	200	210	81	84	60	47	110	60	24	20 U	20	790	20 U	20 U	20 U	20 U
RC/WC-06	WC-06-260509-G	580	120 J	190 U	700 J	1700	1200	600	960	940	940	1900	800	310	190 U	300	7800	190 U	190 U	190 U	240
RC/WC-06	WC-06-260509-G-B	910	190	120 U	1300 J	**2600**	2100	920	1400	1600	1600	3200	1200	430	100 J	430	12000 J	120 U	120 U	95 J	480
RC/WC-07	Y5-RC07-S	1100	190	99 U	1400	2100	2000	920	1600	1100	1100	2200	1100	640	**250**	700	12000				
RC/WC-07	RC-07	26	19 U	19 U	26	55	39	20	32	25	27	52	20	19 U	19 U	19 U	270	19 U	19 U	19 U	19 U
RC/WC-07	RC-07	880	400	160	2400	2400	2400	810	1000	840	810	1700	880	290	88 J	300	9800	42 U	42 U	200	270
RC/WC-07	Y2-RC07-S	800	220	120 U	1400 J	2200	1600	760	1200	890	890	1800	780	450	120 U	610	9400				
RC/WC-07	Y3-RC07-S	690	150	52 J	1100 J	1600	1500	640	960	980	990	2000	770	380	77 J	400	8300 J				
RC/WC-07	Y4-RC07-S	910	210	59 U	1400	2400	2300	780	1400	1200	1200	2400	1100	620	200	680	12000				
RC/WC-07	RC-07	**1800**	760	280	4600	**3100**	2200	1300	1600	1300	1300	2600	**1600**	650	180 U	550	14000	180 U	180 U	180 U	420
RC/WC-07	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	19 U	19 U	19 U	19 U	19 U	19 U	19 U
RC/WC-07	WC-07	270	120	62 U	590	490	380	200	280	200	200	400	240	120	62 U	99	2200	62 U	62 U	62 U	100
RC/WC-07	WC-07	180	87	36	500	700	660	200	250	220	280	500	210	52	25 U	51	2600	25 U	25 U	62	150
RC/WC-07	WC-7	125	51.9	30	370	272	264	113	140			250	139	90.7	19.2 J	97.2	1400				
RC/WC-07	Y2-WC07-S	310	110	83 U	560 J	880	700	320	450	500	320	820	370	110	83 U	130	3800	83 U	83 U	45 J	120
RC/WC-07	WC-07-070516-G	700	170	47 J	1200 J	1800	1400	660	940	1000	1200	2100	760	460	90 J	490	8700 J	84 U	84 U	72 J	240
RC/WC-07	Y4-WC07-Sa	1300	300	67	2000	**2500**	2400	980	1400	1400	1100	2500	1200	**720**	**230**	**840**	13000	60 U	60 U	74	200
RC/WC-07	WC-07-260509-G	1200	250	200 U	1600 J	**3400**	2500	1200	1900	1800	1800	**3600**	**1600**	600	**270**	590	16000	200 U	200 U	200 U	440
RC/WC-08/R-03	Y5-RC08-S	1000	200	99 U	1300	1500	1600	850	1500	1000 (J)	1000 (J)	2000 (J)	990 (J)	510 (J)	110 (J)	560 (J)	9600 (J)				
RC/WC-08/R-03	RC-08	28	19 U	19 U	28	50	37	20	28	20	19 J	39	19	19 U	19 U	19 U	210	19 U	19 U	19 U	19 U
RC/WC-08/R-03	RC-08	**1600**	890	310	4600	**3800**	**4600**	**1600**	1700	1700	1000	2700	**1700**	530	170	510	**17000**	120 U	120 U	160	370
RC/WC-08/R-03	Y2-RC08-S	950	310	120	2100 J	2400	2000	930	1300	1600	1000	2600	1100	330	130	410	11000				
RC/WC-08/R-03	Y3-RC08-S	890	200	76 J	1500 J	1900	1900	800	1200	1400	1100	2500	1000	600	**270**	650	11000				
RC/WC-08/R-03	Y3-RC15-S	1000	240	93 J	1700 J	2400	2300	920	1400	1700	1400	3100	1100	420	93 J	440	12000 J				
RC/WC-08/R-03	Y4-RC08-S	800	180	59 U	1200	2400	2000	750	1200	1500	1500	3000	980	330	68	330	11000				
RC/WC-08/R-03	RC-08	**1800**	**1000**	360	**5500**	**3300**	2800	1300	1500	1300	1300	2600	1500	600	150 U	500	14000	150 U	150 U	150 U	400
RC/WC-08/R-03	WC-08	19 U	19 U	19 U	19 U	26	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	26	19 U	19 U	19 U	19 U
RC/WC-08/R-03	WC-8	226	165	51.9	760	570	645	217	208			300	237	115	34.1	129	2500				
RC/WC-08/R-03	Y2-WC08-S	710	270	99	1700 J	1600	1700	700	890	1000	790	1800	850	230	94 U	280	8000	94 U	94 U	94 U	170
RC/WC-08/R-03	WC-08-070516-G	530	160	60	1100 J	1100	1000	440	630	770	790	1600	600	260	86	280	6000	27 U	27 U	41	150
RC/WC-08/R-03	Y4-WC08-Sa	570	170	76	1100	1300	1300	480	730	940	1100	2000	700	170	59 U	180	6900	59 U	59 U	59 U	150
RC/WC-08/R-03	WC-08-260509-G	780	170	49 J	1300 J	2100	1600	740	1200	1300	1300	2600	980	360	140	320	10000	59 U	59 U	70	230
RC/WC-09	Y5-RC09-S	830	170	99 U	1000	1400	1500	750	1300	1300	1100	2400	960	420	140	440	9300				
RC/WC-09	RC-09	74	38 U	38 U	130	120	110	51	69	44	47	91	45	38 U	38 U	38 U	580	38 U	38 U	38 U	38 U
RC/WC-09	RC-09	**1600**	940	380	5000	**3900**	**4700**	**1700**	1800	2600	2600	**5200**	**1800**	600	190	600	**20000**	**350**	120 U	180	360
RC/WC-09	Y2-RC09-S	940	330	120	1900	2000	2100	950	1300	1600	940	2500	1200	270	110 U	320	11000				
RC/WC-09	Y3-RC09-S	860	190	130 U	1200	2300	1900	800	1300	1200	1600	2800	950	410	100 J	410	11000 J				
RC/WC-09	Y4-RC09-S	800	180	65	1300	2400	1900	720	1300	1500	1400	2900	1000	360	94	360	11000				
RC/WC-09	RC-09	1100	660	200	3300	**2500**	2000	950	1100	980	980	2000	1100	480	120 U	390	10000	120 U	120 U	120 U	290
RC/WC-09	WC-09	36	20 U	20 U	57	67	53	22	30	34	20 U	34	21	20 U	20 U	20 U	260	20 U	20 U	20 U	20 U
RC/WC-09	WC-09	440	250	89 U	1000	1000	690	360	420	380	380	760	410	180	89 U	140	4000	89 U	89 U	89 U	130
RC/WC-09	WC-9	382	319	89.8	1300	717	1050	323	276			520	386	198	51.8 J	206	3700				
RC/WC-09	Y2-WC09-S	700	280	100	1700	1200	1600	660	800	840	760	1600	800	200	90 U	250	7100	90 U	90 U	340 J (JB)	210 J (JIS)

Table E. Head of the Thea Foss Results 2004-2009

Location	Sample ID	Phenanthrene 1500 UG/KG	Anthracene 960 UG/KG	2-Methyl naphthalene 670 UG/KG	LPAH 5200 UG/KG	Fluor anthene 2500 UG/KG	Pyrene 3300 UG/KG	Benzo(a) anthracene 1600 UG/KG	Chrysene 2800 UG/KG	Benzo(b) fluoranthene UG/KG	Benzo(k) fluoranthene UG/KG	Benzo(b+k) fluoranthenes 3600 UG/KG	Benzo(a) pyrene 1600 UG/KG	Indeno(1,2,3-cd) pyrene 690 UG/KG	Dibenz(a,h) anthracene 230 UG/KG	Benzo(g,h,i) perylene 720 UG/KG	HPAH 17000 UG/KG	Dimethylph thalate 160 UG/KG	Diethyl phthalate 200 UG/KG	Di-n-Butyl phthalate 1400 UG/KG	Butylbenzyl phthalate 900 UG/KG
RC/WC-09	WC-09-070516-G	450	150	45	930 J	1100	950	380	560	550	800	1400	500	230	48	240	5300	16 J	26 U	78	120
RC/WC-09	Y4-WC09-Sa	530	130	60 U	780	1400	1100	460	800	910	980	1900	660	190	60 U	190	6700	60 U	60 U	60 U	150
RC/WC-09	WC-09-260509-G	1400	350	85 J	2400 J	**3600**	2900	1400	2100	2100	2100	**4200**	**1800**	640	**250**	630	**18000**	95 U	95 U	110	390
RC/WC-10	Y5-RC10-S	420	77 J	97 U	500 J	810	770	330	570	570	360	930	400	220	83 J	260	4400 J				
RC/WC-10	RC-10	67	26	19 U	160	91	74	36	44	28	29	57	33	19 U	19 U	19 U	390	19 U	19 U	19 U	19 U
RC/WC-10	RC-10	**3000**	**1900**	**720**	**9600**	**5300**	**6500**	**2500**	2600	2300	1800	**4100**	**2800**	670	**240**	620	**25000**	150 U	150 U	250	390
RC/WC-10	Y2-RC10-S	65	14 J	26 U	79 J	160	130	62	94	97	56	150	59	45	26 U	61	760				
RC/WC-10	Y3-RC10-S	310	60 J	67 U	410 J	720	660	280	450	550	460	1000	340	160	35 J	170	3800 J				
RC/WC-10	Y4-RC10-S	460	160 U	160 U	460	1200	1200	450	780	600	740	1300	590	510	**230**	580	6900				
RC/WC-10	Y4-RC15-SD	310	71	59 U	380	810	740	300	500	420	440	860	380	320	120	390	4400	59 U	59 U	59 U	74
RC/WC-10	RC-10	**3500**	**2200**	**690**	**11000**	**5500**	**4500**	**2400**	2500	2000	2000	**4000**	**2700**	**930**	220	660	**23000**	180 U	180 U	470 B	360
RC/WC-10	WC-10	46	20	20 U	88	53	61	22	28	20 U	20 U	20 U	22	20 U	20 U	20 U	190	20 U	20 U	20 U	20 U
RC/WC-10	WC-10	570	340	110	1700	960	740	400	460	350	350	700	450	150	67 U	120	4000	67 U	67 U	67 U	67 U
RC/WC-10	WC-10 (City)	507	268	125	1500	634	823	286	328			440 U	312	144	86.7	168	2800	25.5 U	47 UJ	50.5 UJ	27.9 U
RC/WC-10	Y2-WC10-S	680	80	20 U	970 J	580	300	120	160	110	130	240	88	29	20 U	36	1600	20 U	20 U	18 J	26
RC/WC-10	WC-10-070516-G	94	18 J	20 U	120 J	210	180	82	130	100	160	260	98	72	24	80	1100	20 U	20 U	20 U	24
RC/WC-10	Y4-WC10-Sa	110	28	20 U	140	280	250	98	170	140	160	300	130	110	43	130	1500	20 U	20 U	20 U	27
RC/WC-10	Y4-WC15-SD	93	21	20 U	110	250	230	89	150	150	130	280	120	98	40	120	1400	20 U	20 U	20 U	32
RC/WC-10	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	20 U	20 U	20 U	20 U	20 U	20 U	20 U
RC/WC-10	WCBU-10A-Duplicate	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	20 U	20 U	20 U	20 U	21	20 U	20 U
RC/WC-10	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	20 U	20 U	20 U	20 U	20 U	20 U	20 U
RC/WC-10	Y2-WC10-C3	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	20 U	20 U	20 U	20 U	20 U	20 U	20 U
RC/WC-10	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	19 U	19 U	19 U	19 U	19 U	19 U	19 U
RC/WC-10	Y4-WC10-Cb5	20 U	20 U	20 U	14 J	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	20 U	35	20 U
RC/WC-10	WC-10-260509-G	230	200 U	200 U	230	630	460	220	340	350	350	700	280	120 J	200 U	120 J	2900 J	200 U	200 U	200 U	200 U
RC/WC-11/R-04	Y5-RC11-S	850	190	98 U	1100	1200	1400	760	1500	1100	1100	2200	990	420	170	470	9100				
RC/WC-11/R-04	RC-11	130	56	39 U	340	200	150	78	100	74	66	140	73	39 U	39 U	39 U	880	39 U	39 U	39 U	39 U
RC/WC-11/R-04	RC-11(pre-City dredge)-CITY	430	180	99 U	920	680	1000	330	420			700	350	220	99 U	280	4000	19	99 U	99 U	220
RC/WC-11/R-04	RC-11(pre-City dredge)-UTL	240	200 U		240	520	360	200 U	230	200 U	200 U	200 U	220	200 U	200 U	200 U	1300	200 U	200 U	200 U	200 U
RC/WC-11/R-04	RC-11(post-City dredge)-CITY	**17000**	**4400**	**2200**	**31000**	**4400**	**19000**	**5800**	**6300**			**8100**	**5500**	**2500**	**950**	**2900**	**55000**	79 U	79 U	190	**1200**
RC/WC-11/R-04	RC-11(post-City dredge)-UTL	**15000**	**5800**		**35000**	**12000**	**11000**	**5200**	**5300**	3600	3600	**7200**	**5100**	**1800**	**550**	**1500**	**50000**	470 U	470 U	470 U	820
RC/WC-11/R-04	RC-11	**2900**	**1900**	**700**	**9900**	**5400**	**6700**	**2400**	2600	1900	1900	**3800**	**2600**	**700**	**240**	650	**25000**	37 U	37 U	110	480
RC/WC-11/R-04	Y2-RC11-S	110	48 U	48 U	110	290	200	82	170	140	120	260	99	49	48 U	61	1200				
RC/WC-11/R-04	Y3-RC11-S	630	150	48 J	1000 J	1500	1400	610	1000	1300	980	2300	750	350	79	380	8300				
RC/WC-11/R-04	Y4-RC11-S	1400	430	130	2500	**3400**	**3300**	1200	2100	1900	1700	**3600**	**1700**	**1200**	**400**	**1600**	**19000**				
RC/WC-11/R-04	WC-11	53	39 U	39 U	94	110	73	41	52	39 U	44	44	41	39 U	39 U	39 U	410	39 U	39 U	39 U	39 U
RC/WC-11/R-04	WC-11(pre-City dredge)-CITY	330	146	55.3	800	452	490	163	195			280	170	115	54.6	130	2000	13.5 U	24.9 U	12.5 U	14.8 U
RC/WC-11/R-04	WC-11(post-City dredge)-CITY	**6000**	**2200**	570	**13000**	**3800**	**9400**	**2100**	2400			**3900**	**2600**	**1300**	**340**	**1500**	**27000**	78 U	78 U	120	**940**
RC/WC-11/R-04	WC-11 (Utilities' core)	**1500**	880	200	4300	1900	2000	860	910	720	720	1400	990	390	90	290	8900	26 U	26 U	27	210
RC/WC-11/R-04	WC-11 (City)	435	259	118	1600	876	947	357	471			520	379	179	69	211	4000	32 U	59.1 UJ	56.3 UJ	186 J
RC/WC-11/R-04	WC-11	**2800**	**999**	**690**	**9200**	**5500**	**7500**	**2600**	**2800**	2000	2000	**4000**	**2800**	**760**	79.8	**803**	**27000**	38 U	38 U	160	520
RC/WC-11/R-04	Y2-WC11-S	91	44 U	44 U	91	240	180	71	140	120	120	240	86	42 J	44 U	48	1000 J	44 U	44 U	44 U	51
RC/WC-11/R-04	Y2-WC15-S	89	44 U	44 U	89	240	180	74	140	160	86	250	90	41 J	44 U	51	1100 J	44 U	44 U	63 J (JB)	41 J
RC/WC-11/R-04	WC-11-070516-G	67	14 J	20 U	92 J	170	160	70	110	78	150	230	82	54	12 J	64	950 J	20 U	20 U	20 U	29
RC/WC-11/R-04	Y4-WC11-Sa	400	120	60 U	600	1000	1000	410	670	650	550	1200	540	430	160	540	6000	60 U	60 U	60 U	140
RC/WC-11/R-04	WC-11-260509-G	320	79 J	110 U	400 J	860	750	320	540	620	620	1200	440	210	110 U	230	4600	110 U	110 U	110 U	180
RC/WC-12	Y5-RC12-S	710	200	100 U	1100	1100	1300	490	820	340	340	680	700	270	120	300	5800				
RC/WC-12	RC-12	20 U	20 U	20 U	20 U	22	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	22	20 U	20 U	20 U	20 U
RC/WC-12	RC-12	**6200**	**3600**	**1100**	**19000**	**8900**	**11000**	**3800**	**3500**	2400	3500	**5900**	**4200**	**1000**	**360**	**990**	**40000**	49 U	49 U	180	500
RC/WC-12	Y2-RC12-S	230	61	20 U	400 J	580	360	190	310	300	230	530	210	82	14 J	100	2400 J				
RC/WC-12	Y3-RC12-S	500	150	54 J	960 J	1100	980	420	620	820	560	1400	510	190	48 J	190	5400 J				
RC/WC-12	Y4-RC12-S	990	340	110	2100	2000	2000	760	1300	1300	950	2300	1100	**780**	**260**	**870**	11000				
RC/WC-12	RC-12	**2600**	**1500**	320	**7000**	**3100**	3100	1500	1600	1200	830	2000	**1600**	**890**	250 U	**750**	15000	250 U	250 U	250 U	300
RC/WC-12	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	19 U	19 U	19 U	19 U	19 U	19 U	19 U
RC/WC-12	WC-12(pre-City dredge)-CITY	93.8	41.2	18.2	280	145	174	60	70			110	59.6	41.5	24.2	48.6	730	11.5 U	21.2 U	18.3	12.6 U
RC/WC-12	WC-12	**1500**	820	170	4000	1700	1700	830	880	490	490	980	880	590	110	460	8100	100 U	100 U	100 U	180
RC/WC-12	WC-12 (City)	712	401	137	2200	709	945	324	355			430	316	146	73.6	179	3500	150 U	150 UJ	150 B	299 U
RC/WC-12	WC-12	1460	765	244	4100	1730	2060	919	845			1100	1000	405	56.9	520	8600				
RC/WC-12	Y2-WC12-S	90	19 J	20 U	120 J	230	160	75	120	120	88	210	84	45	20 U	60	980	20 U	20 U	23	28
RC/WC-12	WC-12-070517-G	190	43	12 J	320 J	320	280	130	200	170	230	400	160	88	18 J	90	1700 J	20 U	20 U	13 J	33
RC/WC-12	Y4-WC12-Sa	470	160	59 U	890	850	970	390	550	600	420	1000	510	350	140	420	5200	59 U	59 U	59 U	93
RC/WC-12	Y2-WC12-C3	20 U	20 U	20 U	20 U	20 U	15 J	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	15 J	20 U	20 U	20 U	20 U
RC/WC-12	Y4-WC12-Cb2	20 U	20 U	20 U	20 U	11 J	17 J	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	28 J	20 U	43	46	20 U
RC/WC-12	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	20 U	20 U	20 U	20 U	20 U	20 U	20 U
RC/WC-12	WC-12-260509-G	870	250	200 U	1500 J	1800	1500	690	1000	1000	1000	2000	950	300	200 U	300	8500	200 U	200 U	200 U	220
RC-13	Y5-RC13-S	**2100**	330	240 U	2400	**3600**	3200	**1600**	**2800**	3800	3800	**7600**	**1800**	**1200**	**520 (J)**	**1400**	**24000 (J)**				
RC-13	RC-13	260	43	38 U	300	870	510	240	410	500	330	830	260	120	38 U	110	4200	38 U	38 U	57	130
RC-13	RC-13	200	58 U	58 U	200	440	340	160	250	210	210	420	210	120	58 U	97	2000	58 U	58 U	58 U	85
RC-13	RC-13	460	88	28 U	690	1300	1200	380	590	800	570	1400	510	180	60	170	5800	28 U	28 U	120	170
RC-13	Y2-RC13-S	970	160	120 U	1100	**2600**	1600	820	1300	1700	820	2500	960	280	120 U	340	10000				
RC-13	Y3-RC13-S	**2800**	460	64 J	3800	**6200**	**5300**	**2400**	**3500**	3400	4400	**7800**	**2700**	**1200**	**240**	**1100**	**30000**				

Table E. Head of the Thea Foss Results 2004-2009

Location	Sample ID	Phenanthrene 1500 UG/KG	Anthracene 960 UG/KG	2-Methyl naphthalene 670 UG/KG	LPAH 5200 UG/KG	Fluor anthene 2500 UG/KG	Pyrene 3300 UG/KG	Benzo(a) anthracene 1600 UG/KG	Chrysene 2800 UG/KG	Benzo(b) fluoranthene UG/KG	Benzo(k) fluoranthene UG/KG	Benzo(b+k) fluoranthenes 3600 UG/KG	Benzo(a) pyrene 1600 UG/KG	Indeno(1,2,3-cd) pyrene 690 UG/KG	Dibenz(a,h) anthracene 230 UG/KG	Benzo(g,h,i) perylene 720 UG/KG	HPAH 17000 UG/KG	Dimethylph thalate 160 UG/KG	Diethyl phthalate 200 UG/KG	Di-n-Butyl phthalate 1400 UG/KG	Butylbenzyl phthalate 900 UG/KG
RC-13	Y4-RC13-S	**1800**	280	140 U	2200 J	**4400**	**3400**	1500	2300	1700	2000	**3700**	**1600**	**960**	**390**	**950**	**19000**				
RC-14	Y5-RC14-S	1200	190	98 U	1400	1900	1800	1000	1800	1400	1400	2800	1300	600	**230**	590	12000				
RC-14	RC-14	570	88	77 U	660	1600	890	460	760	740	640	1400	480	210	77 U	200	7400	77 U	77 U	77 U	180
RC-14	RC-14	260	69 U	69 U	260	580	430	200	300	250	250	500	240	130	69 U	100	2500	69 U	69 U	69 U	85
RC-14	RC-14	710	120	40 U	1000	2100	1900	580	880	930	930	1900	760	260	86	260	8700	40 U	40 U	320	190
RC-14	Y2-RC14-S	710	120	110 U	830	1800	1100	590	920	860	820	1700	650	210	110 U	260	7200				
RC-14	Y3-RC14-S	**1600**	270	120 U	2100 J	**3400**	2600	1200	1800	2000	2100	**4100**	1400	560	130	540	16000				
RC-14	Y4-RC14-S	**1700**	260	200 U	2000	**4100**	3200	1400	2300	2000	1800	**3800**	**1600**	**860**	**340**	**920**	**19000**				
RC-14B	RC-14B	380	86 U	86 U	380	1100	1000	320	520	580	550	1100	430	150	86 U	140	4800	86 U	86 U	100	140
RC-14B	Y2-RC14B-S	620	110	94 U	730	1800	1100	530	920	1100	620	1700	680	210	94 U	250	7200				
WC-13	WC-13	21	20 U	20 U	21	53	37	20 U	27	20 U	21	21	20 U	20 U	20 U	20 U	160	20 U	20 U	20 U	20 U
WC-13	Y2-WC13-S	590	210	69 U	1300	960	1200	510	630	570	670	1200	610	140	69 U	180	5500	69 U	69 U	160 J (JB)	140 J (JIS)
WC-13	WC-13-070516-G	710	250	88 J	1500 J	1400	1400	590	960	1000	1100	2100	840	320	69 J	340	8000 J	34 U	34 U	42	150
WC-13	Y4-WC13-Sa	320	78	22	520	990	820	230	570	630	580	1200	410	150	32	160	4600	20 U	20 U	23	95
WC-13	WC-13-260509-G	1000	220	65 J	1600 J	**2900**	2400	1000	1600	1800	1800	**3600**	1300	460	**230**	480	14000	120 U	120 U	120 U	440
WC-14	WC-14	20	19 U	19 U	20	38	28	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	66	19 U	19 U	32	19 U
WC-14	Y2-WC14-S	680	260	96 U	1400	1600	1700	690	880	1300	560	1900	790	200	96 U	240	8000	96 U	96 U	150 J (JB)	180 J (JIS)
WC-14	WC-14-070516-G	400	120	44	820 J	980	910	380	520	670	720	1400	490	220	45	230	5200	32 U	32 U	27 J	120
WC-14	Y4-WC14-Sa	460	110	59 U	670	1300	1000	430	720	810	810	1600	560	180	59 U	190	6000	59 U	59 U	59 U	130
WC-14	WC-14-260509-G	720	170	48 J	1200 J	1900	1600	750	1100	1200	1200	2400	990	350	140	350	9600	59 U	59 U	76	240
SC-01	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	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
SC-01	Y2-SC01-S	30	20 U	20 U	30	63	59	26	38	31	31	62	28	24	20 U	24	320	20 U	20 U	20 U	20 U
SC-01	Y4-SC01-S	39	25	10 J	74	130	120	50	91	70	78	150	51	21	19 U	21	630	19 U	19 U	19 U	19 U
SC-02	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	19 U	19 U	19 U	19 U	19 U	19 U	35	19 U
SC-02	Y2-SC02-S	250	77	21 U	390 J	580	270	150	260	200 J	200 J	400 J	180 J	130 J	36 J	120 J	2100 J	21 U	21 U	38	62
SC-02	Y4-SC02-S	78	47	14 J	160 J	330	290	100	250	110	170	280	92	36	18 J	32	1400 J	19 J	20 U	20 U	20 U
SC-03	SC-03	20 U	20 U	20 U	20 U	43	30	20 U	23	25	22	22	20 U	20 U	20 U	20 U	170	20 U	20 U	24	20 U
SC-03	Y2-SC03-S	700	150	88 U	850	1800	1100	570	940	900	700	1600	670	260	88 U	340	7300	88 U	88 U	110	190
SC-03	Y4-SC03-S	830	140	100 U	1000 J	2300	1800	800	1200	1200	1100	2300	920	450	190	430	10000	100 U	100 U	100 U	150
SC-04	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	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
SC-04	Y2-SC04-S	380	100	79 U	600 J	750	610	290	450	490	250	740	340	170	79 U	220	3600	79 U	79 U	50 J	130
SC-04	Y4-SC04-S	420	82 J	98 U	500 J	1200	960	390	680	730	550	1300	500	260	100	260	5600	98 U	98 U	98 U	130
NW shoreline under 509 bridge	Y4-SS-01	1000	180	120 U	1400 J	2400	2000	750	1400	1500	1200	2700	1100	430	130	460	11000	120 U	120 U	90 J	440
City Area Locations																					
S-15	Site 15(pre-City dredge)-CITY	560	230	99	**5400**	710	960	380	440			750	450	**740**	99 U	**890**	4300	24	99 U	99 U	450
S-15	Site 15(post-City dredge)-UTL	**35000**	**14000**		**84000**	**24000**	**22000**	**10000**	**10000**	6200	6200	**12000**	**9900**	**3100**	**1100**	**2600**	**95000**	510 U	510 U	510 U	630
S-15	Site 15(pre-City dredge)-UTL	580	360		**5600**	**3200**	690	400	480	420	360	780	460	560	200 U	470	3800	200 U	200 U	200 U	480
S-15	Site 15(post-City dredge)-CITY	**48000**	**9200**	**4400**	**62000**	**26000**	**45000**	**7500**	**8100**			**19000**	**7800**	**5500**	**2000**	**6400**	**81000**	78 U	78 U	250	**940**
S-15	S-15 (Utilities' core)	**5800**	**2300**	410	**13000**	**3700**	**4800**	**1900**	2100	1200	1200	2400	**2100**	**860**	**310**	620	**19000**	48 U	48 U	48 U	120
S-15	S-15 (City)	**8980**	**4260**	**1040**	**24000**	**7390**	**10200**	**3200**	**3350**			**3900**	**3600**	**1330**	**651**	**1450**	**35000**	43.6 U	80.3 UJ	193 UJ	47.6 U
S-15	S-15	**7300**	**4100**	**1300**	**22000**	**10000**	**13000**	**4600**	**4700**	2900	2900	**5800**	**4700**	**1500**	**510**	**1500**	**46000**	140 U	140 U	210	260
S-15	S-15A	**2510**	**1450**	470	**7700**	**2750**	**3400**	1510	1480			2200	**1670**	**828**	188	**832**	15000				
S-15	Y2-S15-S	120	51 U	51 U	120	230	250	98 J (JIS)	160 J (JIS)	200	110	310	120	51 U	51 U	51 U	1200 J	51 U	51 U	65 J (JB)	51 U
S-15	S-15-070516-G	87	20	20 U	120 J	200	160	73	120	120	130	250	94	55	14 J	57	1000 J	20 U	20 U	20 U	25
S-15	S-15-070516-G-D	91	20 J	20 U	120 J	230	180	81	140	180	110	290	100	56	13 J	59	1100 J	20 U	20 U	20 U	26
S-15	Y4-S15-Sa	180	59 U	59 U	180	490	470	190	320	310	270	580	240	210	80	260	2800	59 U	59 U	59 U	63
S-15	S-15-260509-G	110 J	190 U	190 U	110 J	220	210	110 J	150 J	130 J	130 J	260 J	120 J	190 U	190 U	120 J	1200 J	190 U	190 U	190 U	190 U
S-15A	S-15	**2990**	**1770**	599	**9300**	**3230**	**4140**	**1810**	1810			2700	**2100**	**1060**	**234**	**1050**	**18000**				
S-16	S-16	**2800**	800	500	**8900**	**4600**	**4500**	930	990	800	800	**3600**	**2500**	**850**	60	680	9300	60 U	60 U	47 U	460
S-16	S-32 (Dup of S-16)	**1700**	**1100**	280	5100	**2700**	2600	1300	1400	1000	1000	2000	1400	520	140	420	12000	44 U	44 U	64	240
S-16	S-16	518	298	97.6	1500	744	939	410	413			650	451	264	56	255	4200				
S-17	S-17	**1500**	**1100**	310	5000	**2900**	2600	1400	1500	1400	1200	2600	**1600**	560	200	480	14000	47 U	47 U	84	320
S-17	S-17 (City)	376	194	89.1	1300	790	988	269	293			510	333	170	93.2	175	3600	25.4 U	46.8 UJ	62.8 UJ	27.7 U
S-17	S-17	870	510	190	2500	2100	2700	900	980	760	750	1500	960	380	120	400	10000	86 U	86 U	98	190
S-17	Y2-S17-S	71	40 U	40 U	71	170	150	59	100	120	74	190	76	30 J	40 U	38 J	820 J	40 U	40 U	40 U	28 J
S-17	S-17-070516-G	100	26	20 U	160 J	220	210	95	150	130	190	320	120	59	16 J	60	1300 J	20 U	20 U	20 U	32
S-17	Y4-S17-Sa	360	93	59 U	510	930	900	350	590	480	580	1100	470	390	150	480	5300	59 U	59 U	59 U	100
S-17	S-17-260509-G	880	190	52 J	1400 J	**2500**	2100	890	1500	1600	1600	3200	1200	450	100	460	12000	59 U	59 U	75	340
S-18	S-18	760	440	120 U	1900	1800	1400	680	820	740	740	1500	800	340	120 U	270	7600	120 U	120 U	120 U	270
S-18	S-18 (City)	202 J	123	45.3	640	659	323	176	199			260	170	78	27.7	88.1	2000	2.9 UJ	5.4 UJ	43.3 B	92.4
S-19	S-19	**3900**	**2400**	640	4900	**5800**	**5700**	**2600**	2600	860	860	**4000**	**2800**	450	**260**	**790**	**26000**	70 U	70 U	72	410
S-19	S-19	812	474	141	2400	1030	1280	553	553			890	639	346	70.8	329	5700				
S-19	Y2-S19-S	160	59	48 U	270	350	290	140	200	240	140	380	170	48 U	48 U	53	1600	48 U	48 U	62 J (JB)	48 U
S-19	S-19-070516-G	82	23	20 U	150 J	130	150	64	88	120	72	190	81	39	20 U	38	780	20 U	20 U	20	18 J
S-19	Y4-S19-Sa	310	110	40	680	550	650	230	370	360	280	640	350	240	89	290	3400	20 U	20 U	20 U	56
S-19	S-19-260509-G	1000	310	97 J	1900	2000	2000	800	1200	1300	1300	2600	1200	440	110 J	440	11000 J	120 U	120 U	120 U	320
S-20	S-20	940	600	160	2800	1700	1600	800	870	730	730	1500	950	340	94	270	8100	31 U	31 U	55	460
S-20	S-20 (City)	1380	620	286	4000	1530	2070	687	730			960	741	348	171	347	7600	30.5 U	56.2 UJ	84 UJ	274 J
S-20	S-20	903	490	120	2400	1330	1500	665	702			1200	777	440	92.4	423	7100				
S-21	S-21	**6700**	**3400**	**740**	**17000**	**5900**	**5400**	**2800**	**3100**	1700	1700	3400	**3100**	**1100**	**320**	**820**	**26000**	230 U	230 U	230 U	280

Table E. Head of the Thea Foss Results 2004-2009

Location	Sample ID	Phenanthrene	Anthracene	2-Methyl naphthalene	LPAH	Fluor anthene	Pyrene	Benzo(a) anthracene	Chrysene	Benzo(b) fluoranthene	Benzo(k) fluoranthene	Benzo(b+k) fluoranthenes	Benzo(a) pyrene	Indeno(1,2,3-cd) pyrene	Dibenz(a,h) anthracene	Benzo(g,h,i) perylene	HPAH	Dimethylph thalate	Diethyl phthalate	Di-n-Butyl phthalate	Butylbenzyl phthalate
		1500	**960**	**670**	**5200**	**2500**	**3300**	**1600**	**2800**			**3600**	**1600**	**690**	**230**	**720**	**17000**	**160**	**200**	**1400**	**900**
		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**	**UG/KG**	**UG/KG**	**UG/KG**	**UG/KG**	**UG/KG**	**UG/KG**
S-21	S-33 (Dup of S-21)	**8600**	**4300**	**900**	**22000**	**8000**	**7200**	**3700**	**3900**	2400	2400	**4800**	**4000**	**1300**	**390**	**960**	**34000**	230 U	230 U	230 U	340
S-21	S-21 (City)	**4400**	**1960**	**719**	**12000**	**3530**	**4760**	**1760**	1860			2200	**1740**	**770**	**277**	**875**	**18000**	39.4 U	72.6 UJ	36.6 UJ	43 U
S-22	S-22	**2400**	**1600**	410	**7500**	**3800**	3200	**1700**	1800	1300	1300	2600	**1800**	660	160	490	16000	160 U	160 U	160 U	320
S-22	S-22 (City)	1190	717	243	3700	1390	1760	762	872			1000	763	385	114	421	7500	28.5 U	52.5 U	121 J	220 J
S-23	S-23	**1600**	940	220	4500	2400	2100	1100	1300	740	740	1500	1300	600	190	460	11000	140 U	140 U	140 U	190
S-24	S-24	**1600**	860	**730**	**7400**	2400	1900	1100	1200	830	830	1700	1200	520	150 U	390	10000	150 U	150 U	150 U	260
S-24	S-24 (City)	326	181	72.2	1000	522	645	212	314			340	231	129	73.1	128	2600	24.6 U	45.3 UJ	22.9 UJ	26.9 U
S-24	S-24	680	390	140	2000	1400	1600	600	730	640	640	1300	690	160	58	160	6700	28 U	28 U	110	200
S-24	Y2-S24-S	100	24 J	39 U	120 J	230	200	80	120	150	98	250	96	39 J	39 U	45	1100 J	39 U	39 U	39 U	26 J
S-24	S-24-070516-G	150	30	20 U	220 J	350	300	140	210	210	250	460	160	72	18 J	73	1800 J	20 U	20 U	14 J	54
S-24	Y4-S24-Sa	330	76	60 U	410	880	800	320	530	470	460	930	410	330	130	400	4700	60 U	60 U	60 U	69
S-24	S-24-260509-G	830	180 J	190 U	1100 J	2200	1600	770	1300	1200	1200	2400	1000	380	130 J	380	10000 J	190 U	190 U	190 U	310
S-29	S-29 (City)	1260	757	328	4300	1620	2070 J	908	1070			1300	931	448	100	516	8900	28.5 U	51.9 UJ	130 J	307
S-29	S-29	662	359	120	1900	931	1070	460	484			760	531	295	62.4	290	4900				
S-30	S-30	233	167	47.1	750	490	565	289	216			260	189	114	20.3	131	2300				
CA-19B	CA-19B-03	934	540	132	2700	900	1090	449	434			660	505	238	49.3	229	4600				
CA-19B	CA-19B-06	**1760**	912	227	4800	1550	1850	838	809			1200	956	452	102	426	8200				
CA-20	CA-20-01	130	73.3	22.1 J	420	190	212	108	117			190	135	85.9	16.1 J	74.5	1100				
CA-20	CA-20-04	146	70.5	23.7	440	191	198	89	93.6			150	98.9	65.9	11.4 J	55.2	960				
CA-22	CA-22-02	**6720**	**2560**	**839**	**18000**	**4090**	**5680**	**2290**	2170			3200	**2590**	**1210**	**267**	**1150**	**23000**				
CA-22	CA-22-05	174	107	35.9	560	257	255	125	127			210	134	86.1	15.7 J	76.7	1300				
Reference Locations																					
CI-1	Y2-CI-01																				
CI-2	Y2-CI-02																				
Rinsate Blanks																					
FIELDQC	Y2-RB-01	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
FIELDQC	Y2-RB-02	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
FIELDQC	Y2-RB-03	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
FIELDQC	Y3-RB-01	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U				
FIELDQC	Y4-RB-01	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
FIELDQC	Y4-RB02	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
FIELDQC	Y4-RB-03	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
FIELDQC	Y5-RB-01	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U				
FIELDQC	WC-05-RB	1 U	1 U	1 U		1 U	1 U	1 U	1 U	1 U	1 U		1 U	1 U	1 U	1 U		1 U	1 U	1 U	1 U
FIELDQC	RINSATE BLANK-260509	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

Footnotes:

Laboratory Data Qualifiers

U= result was not detected at or above the method detection l

J (for Organics)= result is an estimated concentration that is l

B (for metals)= result is an estimated concentration that is les

B (for organics)= analyte detected in an associated Method B

Y=analyte is not detected at or above the reported concentrat

Data Validation Qualifiers

U= nondetected at the associated value

J= associated value is considered an estimate; less than verifi

Acronyms

mg/kg= milligrams per kilogram

ug/kg= micrograms per kilogram

mg/L= milligrams per liter

ug/L= micrograms per liter

SQO= Sediment Quality Objectives for Thea Foss Waterway

Concentrations in bold font indicate an SQO exceedance

Table E. Head of the Thea Foss Results 2004-2009

Location	Sample ID	bis(2-Ethylhexyl)phthalate 1300 UG/KG	Di-n-Octyl phthalate 6200 UG/KG	4,4'-DDD 16 UG/KG	4,4'-DDE 9 UG/KG	4,4'-DDT 34 UG/KG	Aroclor 1016 UG/KG	Aroclor 1221 UG/KG	Aroclor 1232 UG/KG	Aroclor 1242 UG/KG	Aroclor 1248 UG/KG	Aroclor 1254 UG/KG	Aroclor 1260 UG/KG	Total PCBs 300 UG/KG
RC/WC-01	RC-01	**1300**	45	0.44	0.38 U	2.3 U	3.8 U	7.6 U	3.8 U	3.8 U	3.8 U	5.7	3.8 U	5.7
RC/WC-01	RC-01	**1300 B**	57 U	2 U	2 U	2 U	20 U	20 U	20 U	20 U	20 U	20 U	39 U	39 U
RC/WC-01	RC-01	**8200**	330	4.4 J	9.4 U	15 J	20 U	20 U	20 U	20 U	36 J	92 J	72	200 J
RC/WC-01	Y2-RC01-S	**8300**					9.9 U	9.9 U	20 U	9.9 U	20 U	40	55 J (JC)	95 J
RC/WC-01	Y3-RC01-S	**14000**					9.9 U	9.9 U	9.9 U	9.9 U	30 U	100	72	170
RC/WC-01	Y4-RC01-S	**6000**					9.8 U	9.8 U	9.8 U	9.8 U	31	43	32	110
RC/WC-01	Y5-RC01-S	**6600**					12 U	12 U	12 U	12 U	23	63	81	170
RC/WC-01	WC-01	550	41	0.39 U	0.39 U	0.39 U	3.9 U	7.8 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U
RC/WC-01	WC-01	810 B	59 U	2 U	2 U	2 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
RC/WC-01	Y2-WC01-S	**4300**	420	7 U	7 U	7 U	9.9 U	9.9 U	15 U	9.9 U	9.9 U	28	44 J (JC)	72 J
RC/WC-01	WC-01-070516-G	**2300**	72 J											
RC/WC-01	Y4-WC01-Sa	**6400**	210	2 U	2 U	2 U	10 U	10 U	10 U	10 U	27	48	45	120
RC/WC-01	Y4-WC01B-Ca3	18 J	19 U	2 U	2 U	2 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U
RC/WC-01	WC-01-260509-G	**3600 B**	210											
WC-01B/R-01B	Y2-WC01B-C3	20	20 U	2 U	2 U	2 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U
RC/WC-02	Y5-RC02-S	**5600**					12 U	12 U	12 U	12 U	28	73	77	180
RC/WC-02	RC-02	470	120	0.68	0.39 U	1.3 U	3.9 U	7.8 U	3.9 U	3.9 U	3.9 U	6.3	3.9 U	6.3
RC/WC-02	RC-02	**7300**	230	9.1 U	4.5 J	18 U	20 U	20 U	20 U	20 U	50 J	130 J	120	**300 J**
RC/WC-02	RC-2A (Dup of RC-2)	**13000**	320	10 J	15 U	27 J	59 U	59 U	59 U	59 U	61	180 J	110	**350 J**
RC/WC-02	Y2-RC02-S	**8700**					9.8 U	9.8 U	9.8 U	9.8 U	23	77	69	170
RC/WC-02	Y3-RC02-S	**9500**					9.8 U	9.8 U	9.8 U	9.8 U	39 Y (U)	78	55	130
RC/WC-02	Y4-RC02-S	**8200**					9.8 U	9.8 U	9.8 U	9.8 U	18	54	63	140
RC/WC-02	Y5-RC15-SD	**6200**					12 U	12 U	12 U	12 U	20	63	74	160
RC/WC-02	RC-02	**2700 B**	120 U	2.4	1.9 U	3.7 U	19 U	19 U	19 U	19 U	19 U	30	23	53
RC/WC-02	WC-02	330	39 U	0.64	0.39 U	1.1 U	3.9 U	7.8 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U
RC/WC-02	WC-02 (City)	371 J	54	5.5	3.47 J	12.5	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	34.5	31.9	66
RC/WC-02	WC-02	**2700**	70	5.1 J	2 U	5 U	20 U	20 U	20 U	20 U	25 J	57 J	43	130 J
RC/WC-02	Y2-WC02-S	**7700**	190	7 U	7 U	12 U	9.8 U	9.8 U	9.8 U	9.8 U	27	69	64	160
RC/WC-02	WC-02-070516-G	**4900**	260											
RC/WC-02	Y4-WC02-Sa	**8000**	440	2 U	4 Y (U)	2 U	20 U	20 U	20 U	20 U	18 J	52	68	140 J
RC/WC-02	WC-02-260509-G	**10000 B**	560											
RC/WC-03	Y5-RC03-S	**2700**					12 U	12 U	12 U	12 U	18	46	48	110
RC/WC-03	RC-03	1100	58	0.78	1.1 U	1.4 U	3.9 U	7.9 U	3.9 U	3.9 U	3.9 U	7.2	3.9 U	7.2
RC/WC-03	RC-03	**3200**	130	7.3 J	8.4 U	18 U	20 U	20 U	20 U	20 U	34 J	71 J	73 J	180 J
RC/WC-03	Y2-RC03-S	**5100**					9.8 U	9.8 U	9.8 U	9.8 U	32 J (JP)	58	44	130 J
RC/WC-03	Y3-RC03-S	**2600**					9.7 U	9.7 U	9.7 U	9.7 U	15 Y (U)	26 (JC)	38	64 (JC)
RC/WC-03	Y4-RC03-S	**2100**					9.8 U	9.8 U	9.8 U	9.8 U	9.8 J	24	30	64 J
RC/WC-03	WC-03	240	40 U	0.68	0.4 U	1.1 U	4 U	7.9 U	4 U	4 U	4 U	5.7	4 U	5.7
RC/WC-03	WC-03 (City)	275 B	4.2 U	3.74 J	3.72 J	12.2	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	30.3	25.5	56 J
RC/WC-03	Y2-WC03-S	**2300**	100	7 U	7 U	7 U	10 U	10 U	10 U	10 U	24	47	36	110
RC/WC-03	WC-03-070516-G	**1800**	67 J											
RC/WC-03	Y4-WC03-Sa	1200	58 U	1.9 U	1.9 U	1.9 U	9.6 U	9.6 U	9.6 U	9.6 U	8.2 JP (J)	18	25	51 J
RC/WC-03	RC-03	940 B	99 U	2 U	2 U	2 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
RC/WC-03	WC-03-260509-G	**2400 B**	120 J											
RC/WC-04/R-02	Y5-RC04-S	**4900**					12 U	12 U	12 U	12 U	26 J	60	69	160 J
RC/WC-04/R-02	RC-04	360	19 U	0.75	0.39 U	1.3 U	3.9 U	7.7 U	3.9 U	3.9 U	3.9 U	5.7	3.9 U	5.7
RC/WC-04/R-02	RC-04	**6700**	250	5.8	8.1 U	11	20 U	20 U	20 U	20 U	37	71 J	64	170 J
RC/WC-04/R-02	Y2-RC04-S	**5900**					10 U	10 U	10 U	10 U	20	46	42	110
RC/WC-04/R-02	Y3-RC04-S	**5100**					9.9 U	9.9 U	9.9 U	9.9 U	25 Y (U)	67	73	140
RC/WC-04/R-02	Y4-RC04-S	**2800**					9.9 U	9.9 U	9.9 U	9.9 U	16	39	42	97
RC/WC-04/R-02	RC-04	**1800 B**	120 U	1.4 J	2 U	2 U	20 U	20 U	20 U	20 U	20 U	22 J	20 U	22
RC/WC-04/R-02	WC-04	260	20 U	0.77	0.39 U	0.93 U	3.9 U	7.8 U	3.9 U	3.9 U	3.9 U	5.4	3.9 U	5.4
RC/WC-04/R-02	WC-04-Duplicate	290	25	0.89	0.4 U	1.1 U	4 U	8 U	4 U	4 U	4 U	5.6	4 U	5.6
RC/WC-04/R-02	S-34 (Dup of WC-04)	**1300 B**	98 U	1.5 J	2 U	2 U	20 U	20 U	20 U	20 U	20 U	21 J	20 U	21
RC/WC-04/R-02	WC-04	1000 B	140 U	2.1	2 U	20	20 U	20 U	20 U	20 U	20 U	22 J	20 U	22
RC/WC-04/R-02	WC-04	**1700**	70	5.7 U	2 U	11 J	20 U	20 U	20 U	20 U	21 J	39 J	29	89 J
RC/WC-04/R-02	Y2-WC04-S	**4600**	180	7 U	7 U	7 U	9.8 U	9.8 U	9.8 U	9.8 U	17	36	33	86
RC/WC-04/R-02	WC-04-070517-G	**2300**	53 J											
RC/WC-04/R-02	Y4-WC04-Sa	**2400**	120	3.8 U	3.8 U	3.8 U	9.8 U	9.8 U	9.8 U	9.8 U	15	33	39	87
RC/WC-04/R-02	WCBU-4A	73	19 U	0.38 U	0.38 U	0.38 U	3.8 U	7.6 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	7.6 U
RC/WC-04/R-02	WCBU-4B	19 U	19 U	0.39 U	0.39 U	0.39 U	3.9 U	7.8 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U
RC/WC-04/R-02	WCBU-4C	19 U	19 U	0.39 U	0.39 U	0.39 U	3.9 U	7.8 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U
RC/WC-04/R-02	Y2-WC04-C3	120	20 U	2 U	2 U	2 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U
RC/WC-04/R-02	Y4-WC04-Cc3	19 U	19 U	1.9 U	1.9 U	1.9 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U
RC/WC-04/R-02	WC-04-260509-G	**4000 B**	180 J											
RC/WC-05	Y5-RC05-S	**5500**					12 U	12 U	12 U	12 U	12 U	36	33	69
RC/WC-05	RC-05	110	20 U	0.66	0.39 U	0.39 U	3.9 U	7.8 U	3.9 U	3.9 U	3.9 U	4.3	3.9 U	4.3
RC/WC-05	RC-05-Duplicate	100	20 U	0.39 U	0.39 U	0.39 U	3.9 U	7.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.9 U
RC/WC-05	RC-05	**5600**	240	12 J	10 U	19 J	20 U	20 U	20 U	20 U	53 J	120 J	100 J	270 J
RC/WC-05	Y2-RC05-S	**5400**					9.8 U	9.8 U	9.8 U	9.8 U	29 J (JP)	60	53	140 J
RC/WC-05	Y3-RC05-S	**4000**					9.7 U	9.7 U	9.7 U	9.7 U	29 U	61	82	140

Table E. Head of the Thea Foss Results 2004-2009

Location	Sample ID	bis(2-Ethylhexyl)phthalate 1300 UG/KG	Di-n-Octyl phthalate 6200 UG/KG	4,4'-DDD 16 UG/KG	4,4'-DDE 9 UG/KG	4,4'-DDT 34 UG/KG	Aroclor 1016 UG/KG	Aroclor 1221 UG/KG	Aroclor 1232 UG/KG	Aroclor 1242 UG/KG	Aroclor 1248 UG/KG	Aroclor 1254 UG/KG	Aroclor 1260 UG/KG	Total PCBs 300 UG/KG
RC/WC-05	Y4-RC05-S	**6900**					9.8 U	9.8 U	9.8 U	9.8 U	19	44	49	110
RC/WC-05	WC-05	76	20 U	0.39 U	0.39 U	0.5 U	3.9 U	7.8 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U
RC/WC-05	WC-05	**1300 B**	120 U	2.4	2 U	2 U	20 U	20 U	20 U	20 U	20 U	24	20 U	24
RC/WC-05	WC-05	**2200**	92	6.7 U	8.8 U	12	20 U	20 U	20 U	20 U	20 U	47 J	37	84 J
RC/WC-05	Y2-WC05-S	**3600**	150 J (JIS)	7 U	7 U	7 U	9.8 U	9.8 U	9.8 U	9.8 U	31 J (JP)	56	48	140 J
RC/WC-05	WC-05-070516-G	**4000**	130											
RC/WC-05	Y4-WC05-Sa	**5400**	220	3.9 U	3.9 U	3.9 U	10 U	10 U	10 U	10 U	20	44	42	110
RC/WC-05	RC-05	940 B	110 U	2 U	2 U	2 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
RC/WC-05	WCBU-5A	46	19 U	0.39 U	0.39 U	0.39 U	3.9 U	7.8 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U
RC/WC-05	Y2-WC05-C3	63	20 U	2 U	2 U	2 U	9.6 U	9.6 U	9.6 U	9.6 U	9.6 U	9.6 U	9.6 U	9.6 U
RC/WC-05	Y4-WC05-Ca5	20 U	20 U	2 U	2 U	2 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
RC/WC-05	WC-05-260509-G	**7900 B**	490											
RC/WC-06	Y5-RC06-S	**5400**					12 U	12 U	12 U	12 U	25 J	58	68	150 J
RC/WC-06	RC-06	500	38 J	0.65	0.39 U	1.7 U	3.9 U	7.9 U	3.9 U	3.9 U	3.9 U	9.2	3.9 U	9.2
RC/WC-06	RC-06	**4400**	150	8 J	7.3 U	12 J	20 U	20 U	20 U	20 U	40 J	92 J	60	190 J
RC/WC-06	Y2-RC06-S	**3900**					9.8 U	9.8 U	9.8 U	9.8 U	26 J (JP)	49	38	110 J
RC/WC-06	Y2-RC15-S	**3800**					9.9 U	9.9 U	9.9 U	9.9 U	26 J (JP)	42	37	110 J
RC/WC-06	Y3-RC06-S	**5600**					9.8 U	9.8 U	9.8 U	9.8 U	29 U	54	72	130
RC/WC-06	Y4-RC06-S	**6000**					9.9 U	9.9 U	9.9 U	9.9 U	14	42	41	97
RC/WC-06	RC-06	**1700 B**	130 U	2.9	1.9 U	1.9 U	19 U	19 U	19 U	19 U	19 U	34	24	58
RC/WC-06	WC-06	160	20 U	0.4 U	0.4 U	0.55 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U	8 U
RC/WC-06	Y2-WC06-S	**1600**	60 U	7 U	7 U	7 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	25	19	44
RC/WC-06	WC-06-070517-G	**2800**	93											
RC/WC-06	Y4-WC06-Sa	**3200**	100 U	2 U	2 U	2 U	9.9 U	9.9 U	9.9 U	9.9 U	12 JP (J)	33	34	79 J
RC/WC-06	WCBU-6A	92	20 U	0.4 U	0.4 U	0.4 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U	8 U
RC/WC-06	WCBU-6B	63	20 U	0.4 U	0.4 U	0.4 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U	8 U
RC/WC-06	Y4-WC06-Cb2	19 U (J)	19 U											
RC/WC-06	Y2-WC06-C3	29	20 U	2 U	2 U	2 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U
RC/WC-06	Y4-WC06-Cb3	21	20 U	2 U	2 U	2 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U
RC/WC-06	WC-06-260509-G	**3600 B**	160 J											
RC/WC-06	WC-06-260509-G-B	**5500 B**	250											
RC/WC-07	Y5-RC07-S	**4900**					12 U	12 U	12 U	12 U	29	66	68	160
RC/WC-07	RC-07	180	19	0.38 U	0.38 U	0.38 U	3.8 U	7.6 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	7.6 U
RC/WC-07	RC-07	**4400**	120	4.8 J	5.8 U	7.4 U	19 U	19 U	19 U	19 U	25	46 J	49	120 J
RC/WC-07	Y2-RC07-S	**5400**					9.9 U	9.9 U	20 U	9.9 U	20 U	43	54 J (JC)	97 J
RC/WC-07	Y3-RC07-S	**3700**					9.9 U	9.9 U	9.9 U	9.9 U	25 Y (U)	52	53	110
RC/WC-07	Y4-RC07-S	**5200**					9.8 U	9.8 U	9.8 U	9.8 U	18	54	43	120
RC/WC-07	RC-07	**4500 B**	180 U	3	2 U	2 U	20 U	20 U	20 U	20 U	20 U	31	23	54
RC/WC-07	WC-07	19 U	19 U	0.39 U	0.39 U	0.39 U	3.9 U	7.8 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U
RC/WC-07	WC-07	**3800 B**	62 U	1.7 J	1.9 U	1.9 U	19 U	19 U	19 U	19 U	19 U	21 J	19 U	21
RC/WC-07	WC-07	730	30	2 U	2 U	5 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
RC/WC-07	WC-7	557		0.56 J	1.87 J		6.5 U	6.5 U	6.5 U	6.5 U	6.5 U	26.2	28.9	55
RC/WC-07	Y2-WC07-S	**1800**	53 J	7 U	7 U	7 U	9.8 U	9.8 U	20 U	9.8 U	20 U	38	50 J (JC)	88 J
RC/WC-07	WC-07-070516-G	**3600**	130											
RC/WC-07	Y4-WC07-Sa	**4700**	110	2 U	2 U	2 U	9.8 U	9.8 U	9.8 U	9.8 U	20	48	44	110
RC/WC-07	WC-07-260509-G	**7100 B**	300											
RC/WC-08/R-03	Y5-RC08-S	**3800**					12 U	12 U	12 U	12 U	18	39	50	110
RC/WC-08/R-03	RC-08	110	19 U	0.39 U	0.39 U	0.39 U	3.9 U	7.7 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.7 U
RC/WC-08/R-03	RC-08	**3500**	130	11 J	9 U	14 U	20 U	20 U	20 U	20 U	45	75 J	68	190 J
RC/WC-08/R-03	Y2-RC08-S	**5400**					9.8 U	9.8 U	9.8 U	9.8 U	22	50	40	110
RC/WC-08/R-03	Y3-RC08-S	**4300**					9.9 U	9.9 U	9.9 U	9.9 U	35 Y (U)	56	80	140
RC/WC-08/R-03	Y3-RC15-S	**5100**					9.8 U	9.8 U	9.8 U	9.8 U	19 (JC)	49	66	130 (JC)
RC/WC-08/R-03	Y4-RC08-S	**4500**					9.9 U	9.9 U	9.9 U	9.9 U	17	44	44	110
RC/WC-08/R-03	RC-08	**3100 B**	150 U	3.5	2 U	2 U	19 U	19 U	19 U	19 U	25	32	21 J	78
RC/WC-08/R-03	WC-08	49	19 U	0.38 U	0.38 U	0.38 U	3.8 U	7.6 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	7.6 U
RC/WC-08/R-03	WC-8	220		5.68	4.28		39.4 U	39.4 U	39.4 U	39.4 U	39.4 U	21.6 U	67.4 J	67 J
RC/WC-08/R-03	Y2-WC08-S	**3400**	130	7 U	7 U	7 U	9.8 U	9.8 U	9.8 U	9.8 U	18	47	46	110
RC/WC-08/R-03	WC-08-070516-G	**2000**	54 J											
RC/WC-08/R-03	Y4-WC08-Sa	**2500**	84	5.8 Y (U)	2 U	2 U	9.8 U	9.8 U	9.8 U	9.8 U	20	46	52	120
RC/WC-08/R-03	WC-08-260509-G	**4200 B**	200											
RC/WC-09	Y5-RC09-S	**5100**					12 U	12 U	12 U	12 U	23 J	58	56	140 J
RC/WC-09	RC-09	230	38 U	0.88	0.38 U	1.7 U	3.8 U	7.6 U	3.8 U	3.8 U	3.8 U	6.5	3.8 U	6.5
RC/WC-09	RC-09	**3500**	170	14 J	11 U	18 U	20 U	20 U	20 U	20 U	46	90 J	83	220 J
RC/WC-09	Y2-RC09-S	**4700**					9.8 U	9.8 U	9.8 U	9.8 U	46 J (JP)	94	86	230 J
RC/WC-09	Y3-RC09-S	**6200**					9.8 U	9.8 U	9.8 U	9.8 U	29 Y (U)	60	62	120
RC/WC-09	Y4-RC09-S	**5100**					9.9 U	9.9 U	9.9 U	9.9 U	24	56	60	140
RC/WC-09	RC-09	**2600 B**	120 U	3.9	1.9 U	1.9 U	19 U	19 U	19 U	19 U	25	42	27	94
RC/WC-09	WC-09	120	20 U	0.39 U	0.39 U	0.39 U	3.9 U	7.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.9 U
RC/WC-09	WC-09	900 B	89 U	2 U	2 U	2 U	20 U	20 U	20 U	20 U	18 J	28	18 J	64
RC/WC-09	WC-9	289		1.12 J	1.7 J		37.9 U	37.9 U	37.9 U	37.9 U	37.9 U	20.8 U	107 J	110 J
RC/WC-09	Y2-WC09-S	**4700**	120 J (JIS)	7 U	7 U	7 U	9.7 U	9.7 U	9.7 U	9.7 U	32 J (JP)	56	48	140 J

Table E. Head of the Thea Foss Results 2004-2009

Location	Sample ID	bis(2-Ethylhexyl)phthalate 1300 UG/KG	Di-n-Octyl phthalate 6200 UG/KG	4,4'-DDD 16 UG/KG	4,4'-DDE 9 UG/KG	4,4'-DDT 34 UG/KG	Aroclor 1016 UG/KG	Aroclor 1221 UG/KG	Aroclor 1232 UG/KG	Aroclor 1242 UG/KG	Aroclor 1248 UG/KG	Aroclor 1254 UG/KG	Aroclor 1260 UG/KG	Total PCBs 300 UG/KG
RC/WC-09	WC-09-070516-G	**2200**	74 J											
RC/WC-09	Y4-WC09-Sa	**3100**	110	4 U	4 U	4 U	9.9 U	9.9 U	9.9 U	9.9 U	17	43	56	120
RC/WC-09	WC-09-260509-G	**7300 B**	320											
RC/WC-10	Y5-RC10-S	**1400**					12 U	12 U	12 U	12 U	12 U	27	28	55
RC/WC-10	RC-10	80	19 U	0.55	0.39 U	0.39 U	3.9 U	7.8 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U
RC/WC-10	RC-10	**3600**	150 U	**17 J**	12 U	20 U	20 U	20 U	20 U	20 U	52	110 J	110	270 J
RC/WC-10	Y2-RC10-S	420					9.9 U	9.9 U	9.9 U	9.9 U	9.9 U	11 J	17 J	28 J
RC/WC-10	Y3-RC10-S	**1600**					9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	20 (JC)	20	40 (JC)
RC/WC-10	Y4-RC10-S	**2500**					9.9 U	9.9 U	9.9 U	9.9 U	6.3 J	16	16	38 J
RC/WC-10	Y4-RC15-SD	**1600**	59 U	2 U	2 U	2 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	12	14	26
RC/WC-10	RC-10	**2800 B**	180 U	7	2 U	2 U	20 U	20 U	20 U	20 U	38	52	33	120
RC/WC-10	WC-10	63	20 U	0.4 U	0.4 U	0.4 U	4 U	7.9 U	4 U	4 U	4 U	4 U	4 U	7.9 U
RC/WC-10	WC-10	620 B	67 U	1.3 J	2 U	2 U	20 U	20 U	20 U	20 U	20 U	19 J	20 U	19
RC/WC-10	WC-10 (City)	464	24 U	1.98 J	1.66 J	5.91	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	36.6	36.1	73
RC/WC-10	Y2-WC10-S	460	30	7 U	7 U	7 U	9.9 U	9.9 U	9.9 U	9.9 U	9.9 U	8 J	10 J	18 J
RC/WC-10	WC-10-070516-G	410	12 J	2 U	2 U	2 U	9.9 U	9.9 U	9.9 U	9.9 U	9.9 U	9.9 U	9.9 U	9.9 U
RC/WC-10	Y4-WC10-Sa	540	20 U	7.68 P	4.67	1.9 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	6.3 J	5.9 J	12 J
RC/WC-10	Y4-WC15-SD	490	20 U	1.9 U	1.9 U	1.9 U	9.6 U	9.6 U	9.6 U	9.6 U	9.6 U	5 J	5.6 J	11 J
RC/WC-10	WCBU-10A	69	20 U	0.39 U	0.39 U	0.39 U	3.9 U	7.8 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U
RC/WC-10	WCBU-10A-Duplicate	75	20 U	0.39 U	0.39 U	0.39 U	3.9 U	7.8 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U
RC/WC-10	WCBU-10B	20 U	20 U	0.4 U	0.4 U	0.4 U	4 U	7.9 U	4 U	4 U	4 U	4 U	4 U	7.9 U
RC/WC-10	Y2-WC10-C3	38	20 U	2 U	2 U	2 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U
RC/WC-10	WCBU-10C	37	19 U	0.39 U	0.39 U	0.39 U	3.9 U	7.7 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.7 U
RC/WC-10	Y4-WC10-Cb5	13 J	20 U	2 U	2 U	2 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
RC/WC-10	WC-10-260509-G	1000 B	200 U											
RC/WC-11/R-04	Y5-RC11-S	**5400**					12 U	12 U	12 U	12 U	21	54	60	140
RC/WC-11/R-04	RC-11	280	39 U	1.7	1.6 U	2.4 U	3.9 U	7.9 U	3.9 U	3.9 U	3.9 U	11	3.9 U	11
RC/WC-11/R-04	RC-11(pre-City dredge)-CITY	**1600**	140	2.4 U	2.4 U	3.6	13 U	13 U	13 U	13 U	13 U	27	35	62
RC/WC-11/R-04	RC-11(pre-City dredge)-UTL	940	200 U	3.2 U	3.2 U	3.2 U	32 U	32 U	32 U	32 U	32 U	32 U	32 U	32 U
RC/WC-11/R-04	RC-11(post-City dredge)-CITY	**12000**	1800	**20.9**	**11.3**	18.6	19 U	19 U	19 U	19 U	19 U	162	139	**300**
RC/WC-11/R-04	RC-11(post-City dredge)-UTL	**6400**	470 U	**29**	10 U	21 U	33 U	33 U	33 U	33 U	66	130	84	280
RC/WC-11/R-04	RC-11	**3500**	99	**27 J**	18 U	33 U	20 U	20 U	20 U	20 U	81 J	150 J	150	**380 J**
RC/WC-11/R-04	Y2-RC11-S	1100					9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U
RC/WC-11/R-04	Y3-RC11-S	**6100**					9.9 U	9.9 U	9.9 U	9.9 U	25 Y (U)	57	65	120
RC/WC-11/R-04	Y4-RC11-S	**10000**					9.9 U	9.9 U	9.9 U	9.9 U	24	56	50	130
RC/WC-11/R-04	WC-11	220	39 U	0.54	0.38 U	0.96 U	3.8 U	7.6 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	7.6 U
RC/WC-11/R-04	WC-11(pre-City dredge)-CITY	447 B	12.7 U	0.859	0.286 U	0.336 U	4.18 U	4.18 U	4.18 U	4.18 U	4.18 U	54.1	39.5	94
RC/WC-11/R-04	WC-11(post-City dredge)-CITY	**4300**	1500	14.7	8.4	13.8	17 U	17 U	17 U	17 U	17 U	103	86	190
RC/WC-11/R-04	WC-11 (Utilities' core)	**1500**	26 U	6.5	1.9 U	1.9 U	19 U	19 U	19 U	19 U	23	48	28	99
RC/WC-11/R-04	WC-11 (City)	675	88.6 J	13.3	**11**	16	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	111	96	210
RC/WC-11/R-04	WC-11	**3500**	80	**19 J**	**19.3**	23 U	20 U	20 U	20 U	20 U	61 J	312	96	**620**
RC/WC-11/R-04	Y2-WC11-S	960	84	7 U	7 U	7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U
RC/WC-11/R-04	Y2-WC15-S	990	86	7 U	7 U	7 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
RC/WC-11/R-04	WC-11-070516-G	640	30	1.9 U	1.9 U	1.9 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U
RC/WC-11/R-04	Y4-WC11-Sa	**3500**	130	2 U	2 U	2 U	9.8 U	9.8 U	9.8 U	9.8 U	10	26	32	68
RC/WC-11/R-04	WC-11-260509-G	**3500 B**	220											
RC/WC-12	Y5-RC12-S	**2600**					12 U	12 U	12 U	12 U	12 U	38	46	84
RC/WC-12	RC-12	60	20 U	0.39 U	0.39 U	0.39 U	3.9 U	7.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.9 U
RC/WC-12	RC-12	**3800**	63	**21 J**	14 U	21 J	20 U	20 U	20 U	20 U	65 J	110 J	100	280 J
RC/WC-12	Y2-RC12-S	**1300**					9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	16 J	27 J (JC)	43 J
RC/WC-12	Y3-RC12-S	**2200**					9.8 U	9.8 U	9.8 U	9.8 U	24 Y (U)	32	40	72
RC/WC-12	Y4-RC12-S	**3600**					9.7 U	9.7 U	9.7 U	9.7 U	11	29	26	66
RC/WC-12	RC-12	**1800 B**	250 U	15	1.9 U	13 U	19 U	19 U	19 U	19 U	64	89	59	210
RC/WC-12	WC-12	19 U	19 U	0.38 U	0.38 U	0.38 U	3.8 U	7.7 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	7.7 U
RC/WC-12	WC-12(pre-City dredge)-CITY	171 B	10.8 U	0.237 U	0.232 U	0.273 U	3.41 U	3.41 U	3.41 U	3.41 U	3.41 U	13.7	14.7	28
RC/WC-12	WC-12	880 B	100 U	5.7	2 U	2 U	20 U	20 U	20 U	20 U	24	41	27	92
RC/WC-12	WC-12 (City)	309	299 U	2.86	6.1	8.1	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	81.7	75.5	160
RC/WC-12	WC-12	823		3.2	8.5		11 U	11 U	11 U	11 U	11 U	144	163	**310**
RC/WC-12	Y2-WC12-S	590	32	7 U	7 U	7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	5 J	7 J	12 J
RC/WC-12	WC-12-070517-G	640	21	2 U	2 U	2 U	9.9 U	9.9 U	9.9 U	9.9 U	9.9 U	9.9 U	9.9 U	9.9 U
RC/WC-12	Y4-WC12-Sa	**1600**	59 U	1.9 U	1.9 U	1.9 U	9.7 U	9.7 U	9.7 U	9.7 U	7.2 J	18	15	40 J
RC/WC-12	Y2-WC12-C3	20 J	20 U	2 U	2 U	2 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U
RC/WC-12	Y4-WC12-Cb2	14 J	20 U	9.55 P	6.03	2 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U
RC/WC-12	WCBU-12A	49	20 U	0.4 U	0.4 U	0.4 U	4 U	7.9 U	4 U	4 U	4 U	4 U	4 U	7.9 U
RC/WC-12	WC-12-260509-G	**2800 B**	110 J											
RC-13	Y5-RC13-S	**6500**					12 U	12 U	12 U	12 U	24 J	52	64	140 J
RC-13	RC-13	**1400**	98	1.1	3.4 U	3.7 U	3.9 U	7.8 U	3.9 U	3.9 U	3.9 U	13 U	3.9 U	7.8 U
RC-13	RC-13	830 B	58 U	2 U	2 U	2 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
RC-13	RC-13	**2100**	81	2 U	2 U	12 U	20 U	20 U	20 U	20 U	20 U	42 J	38	80 J
RC-13	Y2-RC13-S	**3700**					9.9 U	9.9 U	20 U	9.9 U	20 U	40	58 J (JC)	98 J
RC-13	Y3-RC13-S	**7300**					9.8 U	9.8 U	9.8 U	9.8 U	30 Y (U)	82	110	190

Table E. Head of the Thea Foss Results 2004-2009

Location	Sample ID	bis(2-Ethylhexyl)phthalate 1300 UG/KG	Di-n-Octyl phthalate 6200 UG/KG	4,4'-DDD 16 UG/KG	4,4'-DDE 9 UG/KG	4,4'-DDT 34 UG/KG	Aroclor 1016 UG/KG	Aroclor 1221 UG/KG	Aroclor 1232 UG/KG	Aroclor 1242 UG/KG	Aroclor 1248 UG/KG	Aroclor 1254 UG/KG	Aroclor 1260 UG/KG	Total PCBs 300 UG/KG
RC-13	Y4-RC13-S	**6600**					10 U	10 U	10 U	10 U	22	37	35	94
RC-14	Y5-RC14-S	**5300**					12 U	12 U	12 U	12 U	12 U	38	56	94
RC-14	RC-14	**3000**	150	1.7	3.1 U	4.9 U	3.9 U	7.7 U	3.9 U	3.9 U	3.9 U	14 U	3.9 U	7.7 U
RC-14	RC-14	790 B	69 U	1.9 U	1.9 U	3.2	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
RC-14	RC-14	**3600**	93	5.2 J	7.2 U	11 J	20 U	20 U	20 U	20 U	20 U	57 J	53 J	110 J
RC-14	Y2-RC14-S	**3600**					9.9 U	9.9 U	15 U	9.9 U	15 U	24	38 J (JC)	62 J
RC-14	Y3-RC14-S	**4200**					10 U	10 U	10 U	10 U	20 Y (U)	60	62	120
RC-14	Y4-RC14-S	**8000**					20 U	20 U	20 U	20 U	26	54	47	130
RC-14B	RC-14B	**1900**	86 U	2 U	2 U	5 U	20 U	20 U	20 U	20 U	20 U	20 U	19 J	19 J
RC-14B	Y2-RC14B-S	**3800**					9.8 U	9.8 U	15 U	9.8 U	15 U	28	53 J (JC)	81 J
WC-13	WC-13	100	20 U	0.39 U	0.39 U	0.39 U	3.9 U	7.8 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U
WC-13	Y2-WC13-S	**2000**	87 J (JIS)	7 U	7 U	7 U	9.7 U	9.7 U	9.7 U	9.7 U	26	54	51	130
WC-13	WC-13-070516-G	**2700**	74 J											
WC-13	Y4-WC13-Sa	**2100**	96	2 U	**9.91**	2 U	10 U	10 U	10 U	10 U	6.4 J	16	21	43 J
WC-13	WC-13-260509-G	**5700 B**	270											
WC-14	WC-14	76	19 U	0.39 U	0.39 U	0.39 U	3.9 U	7.7 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.7 U
WC-14	Y2-WC14-S	**3700**	170 J (JIS)	7 U	7 U	7 U	9.8 U	9.8 U	9.8 U	9.8 U	38 J (JP)	77	72	190 J
WC-14	WC-14-070516-G	**2100**	61											
WC-14	Y4-WC14-Sa	**3500**	190	3.9 U	3.9 U	3.9 U	9.9 U	9.9 U	9.9 U	9.9 U	19	48	57	120
WC-14	WC-14-260509-G	**4400 B**	190											
SC-01	SC-01	26	19 U	0.39 U	0.39 U	0.39 U	3.9 U	7.7 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.7 U
SC-01	Y2-SC01-S	85	20 U	2 U	2 U	2 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U
SC-01	Y4-SC01-S	76	19 U	1.9 U	1.9 U	1.9 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U
SC-02	SC-02	31	19 U	0.4 U	0.4 U	0.4 U	4 U	7.9 U	4 U	4 U	4 U	4 U	4 U	7.9 U
SC-02	Y2-SC02-S	1000	57	2 U	2 U	2 U	9.9 U	9.9 U	9.9 U	9.9 U	9.9 U	28	32 J (JC)	60 J
SC-02	Y4-SC02-S	140	20 U	2 U	2 U	2 U	9.9 U	9.9 U	9.9 U	9.9 U	13	25	26	64
SC-03	SC-03	91	20 U	0.4 U	0.4 U	0.4 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U	8 U
SC-03	Y2-SC03-S	**3400**	140	7 U	7 U	7 U	9.9 U	9.9 U	20 U	9.9 U	20 U	36	35 J (JC)	71 J
SC-03	Y4-SC03-S	**14000**	140	2 U	2 U	2 U	10 U	10 U	10 U	10 U	15	31	20	66
SC-04	SC-04	94	19 U	0.38 U	0.38 U	0.38 U	3.8 U	7.7 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	7.7 U
SC-04	Y2-SC04-S	**1500**	62 J	7 U	7 U	7 U	9.8 U	9.8 U	20 U	9.8 U	20 U	44	31 J (JC)	75 J
SC-04	Y4-SC04-S	**2400**	100	1.9 U	1.9 U	1.9 U	9.8 U	9.8 U	9.8 U	9.8 U	9.6 J	18	18	46 J
NW shoreline under 509 bridge	Y4-SS-01	**7900**	360	9.22 P	**9.39 P**	4.1 Y (U)	9.8 U	9.8 U	9.8 U	9.8 U	22 Y (U)	43	30	73
City Area Locations														
S-15	Site 15(pre-City dredge)-CITY	**3100**	99 U	6.9	3.4 U	3.4	19 U	19 U	19 U	19 U	19 U	48	46	94
S-15	Site 15(post-City dredge)-UTL	**5100**	510 U	**64**	16 U	16 U	33 U	33 U	33 U	33 U	130	230	180	**540**
S-15	Site 15(pre-City dredge)-UTL	980	200 U	9	3.2 U	3.2 U	32 U	32 U	32 U	32 U	32 U	72	47	35
S-15	Site 15(post-City dredge)-CITY	**4500**	1600	**53.9**	**13.8**	**47**	20 U	20 U	20 U	20 U	20 U	287	243	**530**
S-15	S-15 (Utilities' core)	1100	48 U	**28**	10 U	23 U	19 U	19 U	19 U	19 U	62	120	93	280
S-15	S-15 (City)	1250	40.9 U	**35.3**	**23.3**	30.2	6.2 U	6.2 U	6.2 U	6.2 U	6.2 U	165	170	**340**
S-15	S-15	**3000**	140 U	**22 J**	9.8 U	**34 J**	20 U	20 U	20 U	20 U	98	180 J	180	**460 J**
S-15	S-15A	775		5.9	**18**		9.5 U	9.5 U	9.5 U	9.5 U	9.5 U	295	243	**540**
S-15	Y2-S15-S	930	76 J (JIS)	7 U	7 U	7 U	9.6 U	9.6 U	9.6 U	9.6 U	9.6 U	12	11	23
S-15	S-15-070516-G	500	24	1.9 U	1.9 U	1.9 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U
S-15	S-15-070516-G-D	590	28	1.9 U	1.9 U	1.9 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U
S-15	Y4-S15-Sa	**1600**	67	1.9 U	1.9 U	1.9 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	8.2 J	9.9	18 J
S-15	S-15-260509-G	700 B	190 U											
S-15A	S-15	937		7.9	**17.4**		13.3 U	13.3 U	13.3 U	13.3 U	13.3 U	300	284	**580**
S-16	S-16	**3600**	60 U	6.2	5.6 U	2 U	20 U	20 U	20 U	20 U	43	50	79	220
S-16	S-32 (Dup of S-16)	**2400**	44 U	3	2 U	2 U	20 U	20 U	20 U	20 U	20 U	31	20 U	31
S-16	S-16	629		2.67 J	1.67 J		7.5 U	7.5 U	7.5 U	7.5 U	7.5 U	104	99.7	200
S-17	S-17	**2900**	47 U	4.8	1.9 U	1.9 U	19 U	19 U	19 U	19 U	20 J	42	26	88
S-17	S-17 (City)	698 J	124	2.5	2.27 U	6.42	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	41.4	34.7	76
S-17	S-17	**2000**	86 U	4.5 J	4.3 U	5 U	20 U	20 U	20 U	20 U	20 U	30 J	29 J	59 J
S-17	Y2-S17-S	570	45	7 U	7 U	7 U	9.9 U	15 U	9.9 U	9.9 U	9.9 U	9.9 U	9.9 U	15 U
S-17	S-17-070516-G	620	26	2 U	2 U	2 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
S-17	Y4-S17-Sa	**2400**	68	2 U	2 U	2 U	9.8 U	9.8 U	9.8 U	9.8 U	6.6 J	15	15	37 J
S-17	S-17-260509-G	**7000 B**	400											
S-18	S-18	**2000 B**	120 U	2.9	2 U	2 U	20 U	20 U	20 U	20 U	22 J	35	23 J	80
S-18	S-18 (City)	313 B	2.8 U	2.55	1.42	8.63	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	38.1	31.8	70
S-19	S-19	**3200**	70 U	7.9	3.4 U	2 U	20 U	20 U	20 U	20 U	30	61	44	140
S-19	S-19	601		15.4	**12.3**		11.6 U	11.6 U	11.6 U	11.6 U	11.6 U	219	178	**400**
S-19	Y2-S19-S	880	66	7 U	7 U	7 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	11 J	12	23 J
S-19	S-19-070516-G	300	12 J	1.9 U	1.9 U	1.9 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U
S-19	Y4-S19-Sa	1200	30	1.9 U	1.9 U	1.9 U	9.7 U	9.7 U	9.7 U	9.7 U	6.8 J	14	14	35 J
S-19	S-19-260509-G	**3600 B**	140											
S-20	S-20	**1500**	31 U	1.7	2 U	2 U	20 U	20 U	20 U	20 U	20 U	18	20 U	18
S-20	S-20 (City)	674	28.6 U	4.43	2.87 UJ	10.7	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	61.9	59.9	120
S-20	S-20	965		11	**12.4**		7.9 U	7.9 U	7.9 U	7.9 U	7.9 U	96.2	85.7	180
S-21	S-21	**2000 B**	230 U	**26**	8.8 U	26 U	20 U	20 U	20 U	20 U	90	160	120	**370**

Table E. Head of the Thea Foss Results 2004-2009

Location	Sample ID	bis(2-Ethylhexyl)phthalate 1300 UG/KG	Di-n-Octyl phthalate 6200 UG/KG	4,4'-DDD 16 UG/KG	4,4'-DDE 9 UG/KG	4,4'-DDT 34 UG/KG	Aroclor 1016 UG/KG	Aroclor 1221 UG/KG	Aroclor 1232 UG/KG	Aroclor 1242 UG/KG	Aroclor 1248 UG/KG	Aroclor 1254 UG/KG	Aroclor 1260 UG/KG	Total PCBs 300 UG/KG
S-21	S-33 (Dup of S-21)	**2600 B**	230 U	5.2	2 U	2 U	20 U	20 U	20 U	20 U	25	35	22 J	82
S-21	S-21 (City)	652	187 J	**17.5**	**13.6**	18.5	5.8 U	5.8 U	5.8 U	5.8 U	5.8 U	145	145	290
S-22	S-22	**2200 B**	160 U	3.5	2 U	2 U	20 U	20 U	20 U	20 U	23	32	19 J	74
S-22	S-22 (City)	**1310**	63 J	5.18	2.44 J	7.75	3.86 U	3.86 U	3.86 U	3.86 U	3.86 U	60.3	47.5	110
S-23	S-23	**1500 B**	140 U	4.6	2 U	2 U	20 U	20 U	20 U	20 U	30	40	26	96
S-24	S-24	**2000 B**	150 U	6.5	1.9 U	1.9 U	19 U	19 U	19 U	19 U	36	56	37	130
S-24	S-24 (City)	558	23.1 U	1.84 J	0.963 J	5.66	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	27.4	29	56
S-24	S-24	**2000**	43	6.6 J	5.5 U	8.9 J	20 U	20 U	20 U	20 U	24	52 J	56	130 J
S-24	Y2-S24-S	550	34 J	7 U	7 U	7 U	9.9 U	9.9 U	9.9 U	9.9 U	9.9 U	9.9 U	9.9 U	9.9 U
S-24	S-24-070516-G	790	29	1.9 U	1.9 U	1.9 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	18	18
S-24	Y4-S24-Sa	**1800**	60 U	1.9 U	1.9 U	1.9 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	12	13	25
S-24	S-24-260509-G	**4100 B**	190 J											
S-29	S-29 (City)	**1940**	95.6 J	4.94	2.07 J	7.67	3.86 U	3.86 U	3.86 U	3.86 U	3.86 U	66	49.7	120
S-29	S-29	687		7.4	**9.8**		7.6 U	7.6 U	7.6 U	7.6 U	7.6 U	140	129	270
S-30	S-30	224		0.571 J	1.82 J		33.5 U	33.5 U	33.5 U	33.5 U	33.5 U	18.4 U	33.1 J	33 J
CA-19B	CA-19B-03	209		6.7	**9.9**		5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	118	113	230
CA-19B	CA-19B-06	363		5.6	**18.1**		7 U	7 U	7 U	7 U	7 U	210	216	**430**
CA-20	CA-20-01	169 J		0.215 U	0.75 J		3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	11.1 J	9.4 J	21 J
CA-20	CA-20-04	159 J		0.71 J	1.15 J		3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	21.3	19	40
CA-22	CA-22-02	580		2.27 J	**14.4**		8.6 U	8.6 U	8.6 U	8.6 U	8.6 U	240	239	**480**
CA-22	CA-22-05	206 J		1.45 J	1.25 J		4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	24.1	25.6	50
Reference Locations														
CI-1	Y2-CI-01													
CI-2	Y2-CI-02													
Rinsate Blanks														
FIELDQC	Y2-RB-01	1 U	1 U	0.1 U	0.1 U	0.1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
FIELDQC	Y2-RB-02	1 U	1 U	0.1 U	0.1 U	0.1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
FIELDQC	Y2-RB-03	1 U	1 U	0.1 U	0.1 U	0.1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
FIELDQC	Y3-RB-01	1 U					1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
FIELDQC	Y4-RB-01	1 U	1 U	0.1 U	0.1 U	0.1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
FIELDQC	Y4-RB02	2.6	1 U	0.1 U	0.1 U	0.1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
FIELDQC	Y4-RB-03	1 U	1 U	0.1 U	0.1 U	0.1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
FIELDQC	Y5-RB-01	3.9					1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
FIELDQC	WC-05-RB	1 U	1 U	0.1 U	0.1 U	0.1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
FIELDQC	RINSATE BLANK-260509	28	1 U											

Footnotes:

Laboratory Data Qualifiers

U= result was not detected at or above the method detection l

J (for Organics)= result is an estimated concentration that is l

B (for metals)= result is an estimated concentration that is les

B (for organics)= analyte detected in an associated Method B

Y=analyte is not detected at or above the reported concentrat

Data Validation Qualifiers

U= nondetected at the associated value

J= associated value is considered an estimate; less than verifi

Acronyms

mg/kg= milligrams per kilogram

ug/kg= micrograms per kilogram

mg/L= milligrams per liter

ug/L= micrograms per liter

SQO= Sediment Quality Objectives for Thea Foss Waterway

Concentrations in bold font indicate an SQO exceedance

APPENDIX F

LABORATORY DATA REPORTS

(Located on Enclosed CD)

APPENDIX G

YEAR 5 ASSESSMENT OF UTILITIES' CAP RECONTAMINATION

YEAR 5 ASSESSMENT OF UTILITIES' CAP RECONTAMINATION
HEAD OF THEA FOSS WATERWAY PROJECT
TACOMA, WASHINGTON

Prepared for:

PacifiCorp Environmental Remediation Company

And

Puget Sound Energy

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

August 2009

YEAR 5 ASSESSMENT OF UTILITIES' CAP RECONTAMINATION
HEAD OF THEA FOSS WATERWAY PROJECT
TACOMA, WASHINGTON

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YEAR 5 ASSESSMENT OF UTILITIES' CAP RECONTAMINATION
HEAD OF THEA FOSS WATERWAY PROJECT
TACOMA, WASHINGTON

1.0 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 updated assessment of the cause of recontamination of the Utilities' cap in the Thea Foss Waterway since the cap was installed in February 2004. Previous recontamination assessments are presented in a number of reports (DOF 2005, 2006, 2007, 2008; DOF and Tetra Tech EC, Inc., 2005).

This updated assessment incorporates the results of Year 5 monitoring completed as part of the Utilities' Operation, Maintenance and Monitoring Plan or OMMP (Tetra Tech FW and DOF 2003). The update also incorporates supplemental sampling conducted by the City of Tacoma (herein referred to as the City) to assess conditions related to recontamination of the top of the Utilities' cap. Year 5 sampling occurred in May 2009 and was coordinated between the City and the Utilities.

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 (Figure 1). For remediation purposes, the waterway was divided into the "*City Work Area*" and the "*Utilities' Work Area*".

In the Remedial Design/Remedial Action (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 a result, the Utilities' Work Area (also known as the "*Head of Thea Foss Waterway Project*") 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 remedy for the Utilities' Work Area was completed in February 2004 (DOF 2004). The Utilities' received Certification of Completion of Remedial Action Construction from the Environmental Protection Agency (EPA) on September 29, 2006 (EPA 2006).

As part of the remedy, deauthorization of the navigation channel beneath the Utilities' Work Area needed to be approved by the U.S. Congress and an Institutional Control Plan (ICP) needed to be approved by EPA and implemented by the Utilities and the City. The Head of the Waterway was deauthorized by Congress on November 8, 2007 as part of the Water Resources Development Act (DOF 2008). On September 29, 2006, EPA provided final approval of the Utilities' ICP for the long term maintenance of the Head of the Waterway. As of January 10, 2008, all of the restrictive covenants for properties located in the Head of the Waterway were signed and filed with Pierce County. With completion of these remedial tasks, a revised Remedial Action Completion Report (DOF 2008) was submitted to EPA in March 2008. Certification of Completion of Remedial Action for Remedial Action Areas 23 and 24 was received from EPA in June 2008 (EPA 2008).

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 2.

- 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 a high density polyethylene (HDPE) cap over the former location of the "SR509 seep".
- Placement of a sand cap over contaminated sediments and over the HDPE cap.
- Placement of slope cap and armor material on waterway slopes.

The City was 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 consisted of dredging and capping to maintain the required navigation depth of –19 feet mean lower low water (MLLW). During the 2003 to 2005 construction seasons, the City completed dredging and capping in part of the area next to the Utilities' sheet pile wall (RA19B, RA20 and RA22 – shown on Figure 3). In September 2004, it was discovered that City dredging had caused suspension and migration of contaminated sediments in the water column. Some of the suspended sediment accumulated on and recontaminated the northern portion of the Utilities' cap (DOF and Tetra Tech EC 2005; DOF 2005). To respond to the dredging recontamination, in December 2005, the City recapped the contaminated portion of the Utilities' cap (generally north of the SR509 bridge) with 6 to 18 inches of fine to medium sand (City of Tacoma et al. 2006). The recapped area is shown on Figure 2.

2.0 YEAR 5 OMMP SAMPLING

Year 5 OMMP sediment sampling occurred on May 26, 2009. Sample locations are shown on Figure 3. Sampling was completed by Tetra Tech, EC and the City in accordance with the Utilities' OMMP and several sampling amendments as outlined

below. The first set of OMMP revisions called for the addition of a number of sampling locations to monitor the effectiveness of the capping material placed by the City in December 2005 within the northern portion of the Utilities Work Area. The samples were added to address dredging recontamination that occurred during the last quarter of 2004 and included locations S-15, S-17, S-19 and S-24. The Utilities worked with the City and EPA to develop a scope of work that was acceptable to all parties. The final plan for sampling the area of additional cap material placement was submitted to EPA on April 28, 2006 and approved on May 4, 2006.

The second set of OMMP revisions was developed to respond to SQO exceedances for bis(2-ethylhexyl)phthalate (BEHP also abbreviated as DEHP) related to stormwater discharges to the head of the waterway. On November 28, 2006, the City submitted a technical memorandum to EPA outlining their proposal for additional sampling to monitor concentrations of phthalates and polycyclic aromatic hydrocarbons (PAHs) within the Utilities' Work Area. After further discussions between the parties, a revised supplemental sampling plan was submitted to EPA on March 28, 2007 and approved on April 12, 2007.

The City developed a third set of OMMP revisions for the Head of the Waterway to respond to the sampling results from the Year 4 OMMP sampling program indicating that phthalates and PAHs were continuing to recontaminate the Utilities' cap. As presented in the City's letter to EPA dated January 27, 2009, the City outlined a plan for the collection and analysis of compliance samples (0-10 cm) for phthalates and PAHs from the head of the Thea Foss monitoring locations as well as 4 locations from the area of additional cap material placement for a total of 18 samples.

The Utilities and the City coordinated the Year 5 OMMP sampling requirements; a single sampling event was conducted within the Utilities Work Area in May 2009. The Utilities were responsible for the collection and analysis of early warning (0 to 2 cm) samples as outlined in the Utilities OMMP while the City was responsible for the collection and analysis of compliance and supplemental (0 to 10 cm) samples. All laboratory analyses were completed by Analytical Resources Inc. (ARI). Field sampling procedures and observations, data summaries, and comparison of sediment quality data to the SQOs are presented in the Year 5 OMMP report prepared by Tetra Tech EC (2009). DMD, Inc. (Raleigh Farlow) completed the data quality review (DMD 2009) of the early warning sediment samples collected and analyzed by the Utilities. The analytical results for the compliance samples were validated by the City and were received in an excel spread sheet.

The results of the Year 5 analyses are summarized in Table 1. Early warning samples (0 to 2 cm depth interval) were collected to provide warning from possible *"top-down"* recontamination in surface sediments from sources such as stormwater. Early warning samples were collected from the sediment surface at fourteen locations (RC-1 to RC-14). At any given point in time, this sediment represents the newest deposited sediment for

the sample location. Early warning samples were analyzed for the following constituents:

- Total organic carbon (TOC)
- Grain size
- Petroleum hydrocarbons (diesel and heavy-oil range hydrocarbons)
- Metals (lead, mercury, and zinc)
- Polycyclic aromatic hydrocarbons (PAHs)
- Bis(2-ethylhexyl)phthalate (BEHP)
- Polychlorinated biphenyls (PCBs)

Compliance samples (0 to 10 cm depth interval) were collected from eighteen locations including WC-1 to WC-14 and supplemental sample locations S-15, S-17, S-19 and S-24. These samples were analyzed for the following constituents:

- Polycyclic aromatic hydrocarbons (PAHs)
- Phthalates including Bis(2-ethylhexyl)phthalate or BEHP

In addition to the Utilities OMMP sample locations collected in May 2009, Figure 3 shows other locations that were previously sampled in 2004 to 2008 to assess the impacts of dredging recontamination and the performance of the Utilities' Cap (i.e. core samples).

3.0 COMPLIANCE SAMPLE QUALITY COMPARISON TO SQOS

The point of compliance (POC) is the 0 to 10 cm interval below the sediment surface (or mudline). Compliance samples were obtained and analyzed for the constituents required by the OMMP and amendments (Table 1). Comparison of the analytical results of the compliance samples to the SQOs indicates that in Year 5 the following analytical constituents exceeded their respective SQO in one or more compliance samples.

Constituents Above SQOs in Compliance Samples

- BEHP (16 of 18 samples)
- Sum of High Molecular Weight PAHs (HPAHs) (WC02 and WC09)
- Phenanthrene (WC02)
- Fluoranthene (WC01, WC02, WC05, WC07, WC09, WC13, S17)
- Benzo(a)anthracene (WC02)
- Pyrene (WC02)
- Chrysene (WC02)
- Benzofluoranthene (WC02, WC05, WC09, WC13)
- Benzo(a)pyrene (WC02 and WC09)
- Indeno(1,2,3-cd)pyrene (WC02)
- Dibenzo(a,h)anthracene (WC02, WC07, WC09)

- Benzo(ghi)perylene (WC02)

BEHP exceeded its SQO (1,300 ug/kg) most frequently and by the greatest amount in compliance samples located throughout the Utilities' Work Area (Figure 4). Exceedance factors (EF = SQO divided by the sample concentration) ranged between 0.5 and 7.7. The highest EFs (greater than approximately 5.0) were detected in samples collected along the eastern portion of the waterway head. The highest EF (7.7) was detected at sample location WC02. In May 2008, sample locations with BEHP EFs greater than 5.0 were located south of the SR509 bridge. By May 2009, the higher BEHP EFs in compliance samples appear to have extended in a northward direction beneath the bridge.

Phenanthrene was the only LPAH that exceeded an SOQ in a compliance sample in May 2008 or 2009. The phenanthrene SQO was exceeded at location WC02 in both years.

In May 2008, one or more HPAH constituents were exceeded in compliance samples from two locations (WC02 and WC07). In May 2009, the number of locations that exceeded SQOs for HPAH constituents increased to eight locations as summarized above and illustrated on Figure 5. PAHs that exceeded the SQOs were generally in the vicinity of samples where BEHP exceeded the SQOs by a factor greater than 5.0.

The average concentrations of HPAHs and BEHP for turning basin compliance samples collected since 2004 are presented in Table 2 and are graphically shown on Figure 6. Turning basin samples include locations WC-01 to WC-07. These samples are most representative of the top-down source concentration trends for the head of the waterway because they have been least impacted by dredging recontamination and re-capping that occurred north of the bridge. As illustrated on Figure 6, since 2006 average HPAH concentrations ranged between approximately 8,700 ug/kg and 14,200 ug/kg and average BEHP concentrations ranged between approximately 3,100 ug/kg and 5,500 ug/kg. The highest average concentrations were detected in the May 2009 samples. Average concentrations have consistently increased over the past three years.

4.0 POSSIBLE SEDIMENT CONTAMINATION SOURCES

Sources of contamination to surface sediment include:

- **Bottom-up contamination.** This potential source consists of contaminated sediment and coal tar derived material that underlie and are contained by the Utilities' cap (including the former SR-509 seep). Year 2 (2006) and Year 4 (2008) OMMP core data indicated the cap was functioning as intended. Core samples were not part of the work scope for Year 1 (2005), Year 3 (2007), or Year 5 (2009) OMMP sampling.

  In May 2009 visual observations of the former SR509 seep were made during seasonal low tides (Tetra Tech 2009). Consistent with observations made in

previous years, no visual sheens were observed. The lack of visual sheens indicates that the hybrid cap (HDPE covered by sand) placed over the former SR509 seep is functioning as intended.

- **Top-down contamination.** Previous work identified two primary sources of top-down recontamination. These include City dredging contamination that occurred during the fall of 2004 and stormwater discharges to the head of the Thea Foss Waterway. Four stormwater outfalls discharge to the head of the waterway including 237A and 237B (together termed the *"Twin 96" Outfalls"*), 235 and 243 (Figures 2 and 3). The drainage areas and general land uses upstream of these outfalls are summarized below (City of Tacoma 2005):

Outfall	Drainage Area (acres)	Landuse
o 237A	2,794	residential, commercial, industrial
o 237B	1,821	residential
o 235	181	residential, commercial, industrial
o 243	45	industrial

5.0 DATA EVALUATION AND INTERPRETATION

Available data continue to indicate that recontamination of waterway sediments, after the Utilities' cap was installed in the southern portion of the Thea Foss Waterway, occurred from top-down sources. This finding is based on the following lines of evidence.

5.1 Accumulation of Sediment Above CAP

Since the Utilities' cap was installed, relatively fine-grained sediment has accumulated on top of the cap. Table 3 summarizes the thicknesses and percent fines for sampling rounds completed in April 2004 (Year 0 OMMP), November/December 2004, May 2005 (Year 1 OMMP), May 2006 (Year 2 OMMP), May 2007 (Year 3 OMMP), May 2008 (Year 4 OMMP) and May 2009 (Year 5 OMMP). In May 2009, approximately 16 to 23+ cm of sediment had accumulated within the small boat turning basin south of the bridge as illustrated on Figure 7. Lesser thicknesses (1 to 8 cm) were generally present within the area capped by the City in December 2005, although 10 to 14 cm of sediment appears to have accumulated beneath the eastern portion of the SR509 bridge.

Figure 8 illustrates how the average thicknesses of accumulated sediment in the small boat turning basin located south of the SR 509 bridge generally increased between April 2004 and May 2009. By May 2009, the average accumulated thickness was greater than 18 cm in the turning basin. North of the bridge in the City capping area, sediment thicknesses were generally thinner, however, accumulation (thickening) of sediment appears to be occurring beneath the SR509 bridge and along the eastern bank. For example, at location S17 the sediment thickness was observed to be approximately 4 cm in May 2008 increasing to 14 cm by May 2009.

Figure 8 also shows the average fines content and total organic carbon content (TOC) of early warning sediment samples collected in the turning basin between May 2005 and May 2009. The fines content (herein defined as particle sizes less than 62.5 microns) ranged between approximately 40 and 60% while TOC ranged between approximately 5 and 7%. The highest average fines and TOC contents were observed in May 2009.

As noted in previous reports, the accumulated sediment is distinctly different from the more granular underlying capping material. The capping material has a fines content generally less than 4 percent.

The accumulated sediment also has a TOC content substantially higher than the capping material. The waterway capping material is composed of clean, silty sand mixed with an organic carbon source to increase the TOC content of the cap. Testing of core samples soon after the cap was installed indicated a TOC content of approximately 0.4% (DOF 2004 – Attachment 8). This compares with average TOC contents of between approximately 5 and 7 percent of early warning sediment samples collected between May 2005 and May 2009 (Figure 8).

The source of accumulated sediment above the capping material is predominately stormwater that discharges to the head of the waterway. This finding is based on the physical characteristics of the sediment discussed above and comparison of the chemical quality of the accumulated sediment with stormwater sediment (collected by in-line sediment traps) that discharges to the waterway as discussed further below.

5.2 Early Warning Sample Quality Comparison to SQOs

Early warning samples collected from the 0 to 2 cm interval provide an indication of the quality of the most recent sediment deposited at any given location and provide an indication of possible SQO exceedances at the POC in the future. The following constituents were detected at or above SQO concentrations in early warning samples collected in May 2008 and May 2009.

Constituent	Exceedance Factor (EF) – May 08	Exceedance Factor (EF) – May 09	Locations May 2009
Zinc	1.1	1.1 to 1.2	RC-01,RC-02
Phenanthrene	1.1 to 1.2	1.4 to 1.6	RC-01, RC-13
Fluoranthene	1.0 to 1.8	1.3 to 1.4	RC-01, RC-13
Pyrene	1.0	None Exceed	-----
Benzo(a)anthracene	None Exceed	1.0 to 1.1	RC-01, RC-13
Chrysene	None Exceed	1.0 to 1.1	RC-01, RC-13

Constituent	Exceedance Factor (EF) – May 08	Exceedance Factor (EF) – May 09	Locations May 2009
Benzofluoranthenes	1.0 to 1.1	1.0 to 2.1	RC-01, RC-13
Benzo(a)Pyrene	1.1	1.1 to 1.2	RC-01, RC-13
Indeno(1,2,3-cd)pyrene	1.1 to 1.7	1.4 to 1.7	RC-1, RC-13
Dibenzo(a,h)anthracene	1.1 to 1.7	1.0 to 2.3	RC-1, RC-2, RC-4, RC-7, RC-13, RC-14
Benzo(g,h,i)perylene	1.1 to 2.2	1.3 to 1.9	RC-1, RC-13
HPAH	1.0 to 1.1	1.1 to 1.4	RC-01, RC-13
BEHP	1.2 to 7.7	1.1 to 5.1	RC-01 to RC-14

In general, similar constituents were above SQOs in the 2009 samples as in 2008 and included zinc, PAHs and BEHP. The exceedance factors were also of a similar magnitude for the past two years. Similar to previous sampling rounds, BEHP was above it's SQO in every early warning sampling location in the Utilities' Work Area (Figure 9). Exceedance factors ranged between 1.1 to 5.1 The highest exceedance factor in early warning samples was for BEHP at sample location RC-1, located near the north end of the scour protection apron.

5.3 Concentration Trends in Early Warning Samples

Figures 10 illustrates average concentrations in early warning samples collected within the Utilities Work Area (RC-01 to RC-14) between 2004 to 2009. Data used to prepare the histograms is presented in Table 4. Interpretation of the data needs to consider the impacts of the dredging recontamination that occurred in 2004.

Over the past six years, the highest annual average concentration of lead, mercury, LPAH, HPAH and PCBs in the Utilities Work Area (as a whole) were in 2005 after the dredging recontamination. Concentrations of zinc and lube-oil range hydrocarbons were higher in 2005 as compared to 2006. BEHP was detected at similar concentrations in 2005 and 2006 and sediment BEHP concentrations do not appear to have been significantly impacted by the 2005 dredging.

Between May 2006 and May 2009, annual average concentrations of lead, zinc and lube-oil range hydrocarbons in early warning samples have steadily increased. Average lead and zinc concentrations remain below their respective SQO. There is no SQO for lube-oil range hydrocarbons. Annual average concentrations of mercury, LPAHs, HPAHs, BEHP and PCBs have fluctuated within a relatively limited range within the Utilities Work Area as a whole.

5.4 Comparison of Accumulated Sediment Quality with Stormwater Sediment Quality

As noted in previous Utilities' OMMP reports (DOF 2006), stormwater sediment contains a typical suite of chemicals. These chemicals include petroleum hydrocarbons, metals and organic chemicals such as polycyclic aromatic hydrocarbons (PAHs) and phthalates. Pesticides and polychlorinated biphenyls (PCBs) are also commonly detected in stormwater sediments.

Since the mid- to late-1990's, Tacoma has implemented, with oversight by Ecology and EPA, a program to assess stormwater quality using in-line sediment-traps placed within portions of their stormwater conveyance system. Sediments collected by these traps are recovered and analyzed on an annual basis. Typically the traps are deployed in the fall (beginning of the wet season) and are recovered in the spring (near the end of the wet season). Several of the traps are placed immediately upstream of where stormwater discharges into the head of Thea Foss. Stormwater sediment quality data for outfalls that discharge to the head of Thea Foss are summarized for the period 2002 to 2008 in Table 5. Data for 2009 is not yet available. Metals, petroleum hydrocarbons, PAHs, phthalates, and PCBs were detected in stormwater sediment collected by the sediment traps. These are the same constituents also detected in Thea Foss accumulated sediment present on top of the Utilities' cap.

5.5 Sediment Quality Correlations and Source Evaluation

Previous analyses (DOF 2006, 2007, 2008) documented a high correlation between HPAHs and BEHP in surface sediment samples collected within the Utilities' Work Area and a similarity in trends between the surface sediment and stormwater sediment discharged to the head of the waterway. The high correlation (R=0.79 to 0.92) continued in the 2009 sediment samples as illustrated on Figure 11. Figure 12 shows how the 2009 early warning sample results compare with the results of samples analyzed between 2004 and 2008.

A higher degree of variability is evident in the early warning samples as compared to the compliance samples. If annual average early warning sample concentrations are used to reduce variability, the correlation increases (R=0.997) and variability decreases (R^2=0.995) as shown in the bottom graph on Figure 13. These data continue to support that BEHP and HPAH are derived from a similar source (i.e. stormwater).

The primary source of contamination for the early warning OMMP sediment samples is interpreted to be stormwater discharges to the Head of the Thea Foss Waterway. Figure 14 shows a plot of stormwater sediment-trap sediment concentrations installed near the outlets of outfalls that discharge to the head of Thea Foss. Sediment trap data used to prepare the plots (2002 to 2008) are summarized in Table 5. Two concentration patterns

are evident in the data. Sediment from the larger outfalls (237A and 237B) is enriched with HPAHs relative to BEHP as compared to the smaller outfalls (235 and 243).

Figure 14 also includes plots of the early warning sediment data collected between 2004 and 2009 to compare the relationship between HPAH and BEHP in early warning sediment samples (not significantly impacted by the dredging recontamination) and stormwater sediment collected by the sediment traps. As shown on Figure 14, the comparison indicates a similar relationship exists between HPAH and BEHP in most of the early warning sediment in the waterway and sediment being discharged from outfalls 237A and 237B. This relationship indicates the primary sources of BEHP and HPAHs to surface sediment are likely the Twin 96" Outfalls.

As discussed earlier, early warning sediment lead, zinc and lube-oil range hydrocarbons appear to be increasing in concentration (Figure 10). Figure 15 shows the relationship between these sediment constituents. Correlations range between 0.91 and 0.99 and regression analyses indicated similar trends (R^2=0.82 to 0.99). These analyses indicate a similar stormwater source.

BEHP and HPAHs do not show a similar increasing trend in the early warning samples as do lead, zinc and lube-oil range hydrocarbons (Figure 10). Average annual early warning sediment sample concentrations of zinc, HPAH and BEHP are compared in Figure 13. Concentrations are moderately correlated (R=0.82) and the trends show more variability (R^2=0.67) as compared lead, zinc and lube-oil hydrocarbon concentrations. While the data clearly show that stormwater is the source of the sediment contaminants, specific sources to stormwater appear to be more complicated in nature.

6.0 SUMMARY AND FINDINGS

- Remediation of the Utilities' Work Area was completed in February 2004 with final placement of capping material. OMMP sampling was completed in April 2004 (Year 0 – baseline), May 2005 (Year 1), May 2006 (Year 2), May 2007 (Year 3), May 2008 (Year 4) and May 2009 (Year 5). The Utilities' sampling in 2009 consisted of collecting and analyzing early warning "*top-down*" recontamination samples (0 to 2 cm). The City obtained and analyzed supplemental compliance samples (0 to 10 cm) from the Utilities' Work Area. Visual observations during low tides of the former SR509 Seep area were also made.

- BEHP exceeded its SQO (1,300 ug/kg) in 16 of 18 compliance samples obtained in most of the Utilities Work Area. PAHs also exceeded SQOs in a number of compliance samples, but at lower exceedance factors and fewer locations as compared to BEHP. Average concentrations of BEHP and HPAH in compliance

samples collected in the turning basin south of the bridge appear to have increased over the past three years (2007 to 2009).

- Potential sediment recontamination sources identified near the Head of Thea Foss Waterway between February 2004 and May 2009 include stormwater (on-going) and dredging (2004) top-down sources and upward migration of contaminants contained by the Utilities' cap (bottom up source). Visual observations during low tides of the former SR509 Seep area indicate the impermeable cap is preventing the upward migration of tar that would cause visual sheens (Tetra Tech 2009). Cores obtained in May 2008 indicated the Utilities' cap is functioning as intended.

- Contamination of the Utilities' Work Area (top of cap) began soon after the cap was installed. Finer grained sediment (as compared to the capping material) began to accumulate and concentrations of BEHP, PAHs and other contaminants began to increase. The source of this contamination appears to be stormwater discharges based on the following lines of evidence:

    - Core samples obtained in 2006 and 2008 indicate little evidence of upward migration through the sand cap.

    - More than 23 cm of finer grained sediment has accumulated on top of the Utilities' cap. The finer grained sediment contains contaminants typical of stormwater discharges.

    - High correlation and similar concentration trends between HPAHs and BEHP in early warning sediment samples between April 2004 and May 2009 indicate a similar source.

    - Similarity of the HPAH and BEHP trend relationship in early warning sediment samples with the trend relationship of stormwater sediment samples collected near the end of the Twin 96" outfalls. These data indicate that the Twin 96" outfalls are the primary source of PAHs and BEHP to the Head of the Thea Foss Waterway. While sediment trap concentrations of BEHP may be higher in the smaller outfalls (235 and 243), these outfalls do not contribute a large percentage of the solids and contaminants on a "loading" basis.

- Concentrations of lead, zinc and lube-oil range hydrocarbons appear to be increasing in the early warning samples. Concentrations of lead (in 2009) are well below the SQO (99 mg/kg or 22% of the SQO of 450 mg/kg) and there is no SQO for lube-oil range hydrocarbons. However, the 2009 average concentration of zinc in the Utilities' Work Area is approximately 72% of the SQO and approximately 79% in the turning basin samples north of the SR509 bridge.

These data suggest that evaluation of zinc concentrations should be emphasized along with BEHP and HPAHs.

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7.0 CLOSING

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 our agreement with our client. This report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

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
Sr. Consulting Hydrogeologist.

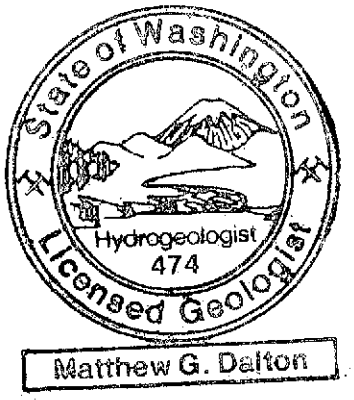

TABLE 1 - Summary of Utilities' Sediment Quality Data - May 2009 (Year 5)

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

							TPH-Dx (mg/kg)		Pb	Hg	Zn
Field Sample I.D.	**Location**	Comments	Sample Date	Lab I.D.	% solids	% TOC	Diesel-range	Lube-range	7439-92-1	7439-97-6	7440-66-6
SQOs							na	na	450	0.59	410
Early Warning Samples											
Y5-RC01-S	RC/WC-01	0-2 cm	5/26/2009	09-12026	40	8.2	**1400**	**7400**	**206**	**0.19**	**448**
Y5-RC02-S	RC/WC-02	0-2 cm	5/26/2009	09-12017	34	10.3	**1100**	**7100**	**125**	**0.16**	**473**
Y5-RC03-S	RC/WC-03	0-2 cm	5/26/2009	09-12015	51	5.7	**460**	**3100**	**58**	**0.1**	**190**
Y5-RC04-S	RC/WC-04	0-2 cm	5/26/2009	09-12016	47	5.3	**670**	**4100**	**85**	**0.12**	**257**
Y5-RC05-S	RC/WC-05	0-2 cm	5/26/2009	09-12022	40	6.1	**1200**	**6100**	**79**	**0.14**	**268**
Y5-RC06-S	RC/WC-06	0-2 cm	5/26/2009	09-12014	43	7.3	**720**	**4600**	**90**	**0.18**	**266**
Y5-RC07-S	RC/WC-07	0-2 cm	5/26/2009	09-12013	37	7.3	**980**	**6700**	**139**	**0.16**	**371**
Y5-RC08-S	RC/WC-08	0-2 cm	5/26/2009	09-12027	46	7.7	**790**	**4100**	**88**	**0.19**	**266**
Y5-RC09-S	RC/WC-09	0-2 cm	5/26/2009	09-12023	38	8.2	**870**	**4600**	**92**	**0.19**	**286**
Y5-RC10-S	RC/WC-10	0-2 cm	5/26/2009	09-12021	60	6.1	**280**	**1600**	**39**	**0.09**	**124**
Y5-RC11-S	RC/WC-11	0-2 cm	5/26/2009	09-12020	40	8.9	**1500**	**7900**	**118**	**0.21**	**353**
Y5-RC12-S	RC/WC-12	0-2 cm	5/26/2009	09-12019	49	7.1	**430**	**2300**	**61**	**0.14**	**181**
Y5-RC13-S	RC-13	0-2 cm	5/26/2009	09-12024	41	7.2	**900**	**4900**	**112**	**0.16**	**342**
Y5-RC14-S	RC-14	0-2 cm	5/26/2009	09-12025	46	9.8	**670**	**4200**	**92**	**0.2**	**325**
Y5-RC15-SD	RC/WC-02	0-2 cm	5/26/2009	09-12018	35	15.0	**960**	**6000**	**112**	**0.17**	**438**
Y5-RB-01	field QC	Rinsate Blank	5/26/2009	09-12028	-----	-----	0.25 U	0.50 U	0.02 U	0.0001 U	0.01 U
Compliance Samples											
Y5-WC01-S	RC/WC-01	0-10 cm	5/26/2009	WC-01-260509-G	52	5.76	-----	-----	-----	-----	-----
Y5-WC02-S	RC/WC-02	0-10 cm	5/26/2009	WC-02-260509-G	43	8.69	-----	-----	-----	-----	-----
Y5-WC03-S	RC/WC-03	0-10 cm	5/26/2009	WC-03-260509-G	64	3.34	-----	-----	-----	-----	-----
Y5-WC04-S	RC/WC-04	0-10 cm	5/26/2009	WC-04-260509-G	55	4.24	-----	-----	-----	-----	-----
Y5-WC05-S	RC/WC-05	0-10 cm	5/26/2009	WC-05-080506-G	44	7.37	-----	-----	-----	-----	-----
Y5-WC06-S	RC/WC-06	0-10 cm	5/26/2009	WC-06-260509-G	54	6.46	-----	-----	-----	-----	-----
Y5-WC07-S	RC/WC-07	0-10 cm	5/26/2009	WC-07-260509-G	47	8.21	-----	-----	-----	-----	-----
Y5-WC08-S	RC/WC-08	0-10 cm	5/26/2009	WC-08-260509-G	54	6.35	-----	-----	-----	-----	-----
Y5-WC09-S	RC/WC-09	0-10 cm	5/26/2009	WC-09-260509-G	47	5.79	-----	-----	-----	-----	-----
Y5-WC10-S	RC/WC-10	0-10 cm	5/26/2009	WC-10-260509-G	80	2.62	-----	-----	-----	-----	-----
Y5-WC11-S	RC/WC-11	0-10 cm	5/26/2009	WC-11-260509-G	69	6.19	-----	-----	-----	-----	-----
Y5-WC12-S	RC/WC-12	0-10 cm	5/26/2009	WC-12-260509-G	59	3.7	-----	-----	-----	-----	-----
Y5-WC13-S	WC-13	0-10 cm	5/26/2009	WC-13-260509-G	51	7.74	-----	-----	-----	-----	-----
Y5-WC14-S	WC-14	0-10 cm	5/26/2009	WC-14-260509-G	52	7.26	-----	-----	-----	-----	-----
Y5-S-15	S-15	0-10 cm	5/26/2009	S-15-260509-G	84	2.83	-----	-----	-----	-----	-----
Y5-S-17	S-17	0-10 cm	5/26/2009	S-17-260509-G	39	7.62	-----	-----	-----	-----	-----
Y5-S-19	S-19	0-10 cm	5/26/2009	S-19-260509-G	52	5.68	-----	-----	-----	-----	-----
Y5-S-24	S-24	0-10 cm	5/26/2009	S-24-260509-G	54	6.24	-----	-----	-----	-----	-----

Notes: U = No detected at indicated value
J = Estimated Concentration
TPH-Dx most resembles motor oil
Ji - Indicated value is considered an estimate; elevated internal standard response
JI - Indicated value is considered an estimate; less than verifiable lower calibration point
Jp - Indicated value is considered an estimate; dual column RPD elevated

TABLE 1 - Summary of Utilities' Sediment Quality Data - May 2009 (Year 5)

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

Field Sample I.D.	% gravel > 2000 µm	% v. coarse sand 1000-2000 µm	% coarse sand 500-1000 µm	% med. sand 250-500 µm	% fine sand 125-250 µm	% v. fine sand 63-125 µm	% silt 3.9-62.5 µm	% clay < 3.9 µm	% fines < 62.5 µm
SQOs									
Early Warning Samples									
Y5-RC01-S	4.8	8.4	9.3	7.8	9.8	12	34	14	48
Y5-RC02-S	1.0	4.2	6.1	9.2	12	8.6	43	16	59
Y5-RC03-S	0.5	2.4	5.2	15	19	12	33	13	46
Y5-RC04-S	0.1	2.5	5.0	12	14	11	40	15	55
Y5-RC05-S	0.4	2.7	2.3	11	13	9.0	43	20	62
Y5-RC06-S	0.2	1.9	3.7	13	14	7.2	49	12	61
Y5-RC07-S	0.7	1.6	2.6	7.1	9.0	8.2	57	14	71
Y5-RC08-S	0.9	2.7	5.2	14	12	8.1	40	17	57
Y5-RC09-S	0.2	1.8	2.5	9.4	11	7.4	52	16	67
Y5-RC10-S	42	8.4	7.9	8.3	5.5	3.4	19	4.9	24
Y5-RC11-S	6.2	3.2	3.3	3.2	3.6	3.6	51	26	77
Y5-RC12-S	11	7.6	14	18	8.4	3.5	27	11	38
Y5-RC13-S	8.9	3.5	3.6	4.7	7.5	8.1	40	24	64
Y5-RC14-S	3.1	3.6	5.6	7.8	12	12	37	19	56
Y5-RC15-SD	3.1	5.2	6.3	10	13	9.1	34	19	53
Y5-RB-01	-----	-----	-----	-----	-----	-----	-----	-----	-----
Compliance Samples									
Y5-WC01-S	-----	-----	-----	-----	-----	-----	-----	-----	-----
Y5-WC02-S	-----	-----	-----	-----	-----	-----	-----	-----	-----
Y5-WC03-S	-----	-----	-----	-----	-----	-----	-----	-----	-----
Y5-WC04-S	-----	-----	-----	-----	-----	-----	-----	-----	-----
Y5-WC05-S	-----	-----	-----	-----	-----	-----	-----	-----	-----
Y5-WC06-S	-----	-----	-----	-----	-----	-----	-----	-----	-----
Y5-WC07-S	-----	-----	-----	-----	-----	-----	-----	-----	-----
Y5-WC08-S	-----	-----	-----	-----	-----	-----	-----	-----	-----
Y5-WC09-S	-----	-----	-----	-----	-----	-----	-----	-----	-----
Y5-WC10-S	-----	-----	-----	-----	-----	-----	-----	-----	-----
Y5-WC11-S	-----	-----	-----	-----	-----	-----	-----	-----	-----
Y5-WC12-S	-----	-----	-----	-----	-----	-----	-----	-----	-----
Y5-WC13-S	-----	-----	-----	-----	-----	-----	-----	-----	-----
Y5-WC14-S	-----	-----	-----	-----	-----	-----	-----	-----	-----
Y5-S-15	-----	-----	-----	-----	-----	-----	-----	-----	-----
Y5-S-17	-----	-----	-----	-----	-----	-----	-----	-----	-----
Y5-S-19	-----	-----	-----	-----	-----	-----	-----	-----	-----
Y5-S-24	-----	-----	-----	-----	-----	-----	-----	-----	-----

Notes: U = No detected at indicated value J = Estimated Concentration
TPH-Dx most resembles motor oil
Ji - Indicated value is considered an estimate; elevated internal standard response
JI - Indicated value is considered an estimate; less than verifiable lower calibration point
Jp - Indicated value is considered an estimate; dual column RPD elevated

TABLE 1 - Summary of Utilities' Sediment Quality Data - May 2009 (Year 5)

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

Field Sample I.D.	1-Methyl-naphthalene	2-Methyl-naphthalene	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	LPAHs
	90-12-0	91-57-6	91-20-3	208-96-8	83-32-9	86-73-7	85-01-8	120-12-7	
SQOs	na	670	2100	1300	500	540	1500	960	5200
Early Warning Samples									
Y5-RC01-S	98 U	98 U	98 U	98 U	**110**	**140**	**2400**	**350**	**3000**
Y5-RC02-S	98 U	98 U	98 U	98 U	98 U	98 U	**1200**	**170**	**1370**
Y5-RC03-S	98 U	98 U	98 U	98 U	98 U	98 U	**780**	**130**	**910**
Y5-RC04-S	98 U	98 U	98 U	98 U	98 U	98 U	**1300**	**200**	**1500**
Y5-RC05-S	99 U	99 U	99 U	99 U	**100**	**100**	**1200**	**210**	**1610**
Y5-RC06-S	99 U	99 U	99 U	99 U	99 U	99 U	**870**	**150**	**1020**
Y5-RC07-S	99 U	99 U	**110**	99 U	99 U	99 U	**1100**	**190**	**1400**
Y5-RC08-S	99 U	99 U	**110**	99 U	99 U	99 U	**1000**	**200**	**1310**
Y5-RC09-S	99 U	99 U	99 U	99 U	99 U	99 U	**830**	**170**	**1000**
Y5-RC10-S	97 U	97 U	97 U	97 U	97 U	97 U	**420**	**77 J1**	**497**
Y5-RC11-S	98 U	98 U	**100**	98 U	98 U	98 U	**850**	**190**	**1140**
Y5-RC12-S	100 U	100 U	**110**	100 U	**100**	100 U	**710**	**200**	**1120**
Y5-RC13-S	240 U	240 U	240 U	240 U	240 U	240 U	**2100**	**330**	**2430**
Y5-RC14-S	98 U	98 U	98 U	98 U	98 U	98 U	**1200**	**190**	**1390**
Y5-RC15-SD	99 U	99 U	99 U	99 U	99 U	99 U	**1500**	**230**	**1730**
Y5-RB-01	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Compliance Samples									
Y5-WC01-S	120 U	120 U	120 U	120 U	120 U	61 J	1,100	180	1,341
Y5-WC02-S	120 U	62 J	120 J	120 U	100 J	170	2,400	410	3,262
Y5-WC03-S	200 U	200 U	200 U	200 U	200 U	200 U	480	200 U	480
Y5-WC04-S	200 U	200 U	110 J	200 U	200 U	200 U	900	170 J	1,180
Y5-WC05-S	40 J	63	130	40 J	92	98	1,300	250	2,013
Y5-WC06-S	190 U	190 U	190 U	190 U	190 U	190 U	580	120 J	700
Y5-WC07-S	200 U	200 U	180 J	200 U	200 U	200 U	1,200	250	1,630
Y5-WC08-S	34 J	49 J	110	37 J	67	67	780	170	1,314
Y5-WC09-S	67 J	85 J	200	87 J	130	120	1,400	350	2,439
Y5-WC10-S	200 U	200 U	200 U	200 U	200 U	200 U	230	200 U	230
Y5-WC11-S	110 U	110 U	110 U	110 U	110 U	110 U	320	79 J	399
Y5-WC12-S	200 U	200 U	200	200 U	140 J	200 U	870	250	1,460
Y5-WC13-S	120 U	65 J	140	120 U	76 J	87 J	1,000	220	1,588
Y5-WC14-S	37 J	48 J	120	37 J	69	64	720	170	1,265
Y5-S-15	190 U	190 U	190 U	190 U	190 U	190 U	110 J	190 U	110
Y5-S-17	39 J	52 J	120	41 J	64	62	880	190	1,448
Y5-S-19	72 J	97 J	230	91 U	170	120	1,000	310	1,999
Y5-S-24	190 U	190 U	110 J	190 U	190 U	190 U	830	180 J	1,120

Notes: U = No detected at indicated value J = Estimated Concentration
TPH-Dx most resembles motor oil
Ji - Indicated value is considered an estimate; elevated internal standard response
JI - Indicated value is considered an estimate; less than verifiable lower calibration point
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TABLE 1 - Summary of Utilities' Sediment Quality Data - May 2009 (Year 5)

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

	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	Benzo(ghi)-perylene	HPAHs
Field Sample I.D.	206-44-0	129-00-0	56-55-3	218-01-9	205-99-2	207-08-9		50-32-8	193-39-5	53-70-3	191-24-2	
SQOs	2500	3300	1600	2800	na	na	3600	1600	690	230	720	17000
Early Warning Samples												
Y5-RC01-S	**3300**	**3100**	**1800**	**3100**	1800 Ji	1800 Ji	**3600 Ji**	**1900 Ji**	**940 Ji**	**290 Ji**	**970 Ji**	**19000**
Y5-RC02-S	**1900**	**1800**	**1000**	**1800**	1300	1300	**2600**	**1200**	**530**	**230**	**550**	**11610**
Y5-RC03-S	**1100**	**1100**	**580**	**1000**	630 Ji	630 Ji	**1260 Ji**	**670 Ji**	**460 Ji**	**190 Ji**	**460 Ji**	**6820**
Y5-RC04-S	**1900**	**2000**	**980**	**1800**	1300	1300	**2600**	**1200**	**610**	**230**	**600**	**11920**
Y5-RC05-S	**1600**	**1600**	**850**	**1400**	1100	1100	**2200**	**1000**	**460**	**170**	**460**	**9740**
Y5-RC06-S	**1600**	**1600**	**790**	**1400**	1000	1000	**2000**	**950**	**580**	**220**	**620**	**9760**
Y5-RC07-S	**2100**	**2000**	**920**	**1600**	1100	1100	**2200**	**1100**	**640**	**250**	**700**	**11510**
Y5-RC08-S	**1500**	**1600**	**850**	**1500**	1000 Ji	1000 Ji	**2000 Ji**	**990 Ji**	**510 Ji**	**110 Ji**	**560 Ji**	**9620**
Y5-RC09-S	**1400**	**1500**	**750**	**1300**	1300	1100	**2400**	**960**	**420**	**140**	**440**	**9310**
Y5-RC10-S	**810**	**770**	**330**	**570**	570	360	**930**	**400**	**220**	**83 Ji**	**260**	**4373**
Y5-RC11-S	**1200**	**1400**	**760**	**1500**	1100	1100	**2200**	**990**	**420**	**170**	**470**	**9110**
Y5-RC12-S	**1100**	**1300**	**490**	**820**	340	340	**680**	**700**	**270**	**120**	**300**	**5780**
Y5-RC13-S	**3600**	**3200**	**1600**	**2800**	3800	3800	**7600**	**1800**	**1200**	**520 Ji**	**1400**	**23720**
Y5-RC14-S	**1900**	**1800**	**1000**	**1800**	1400	1400	**2800**	**1300**	**600**	**230**	**590**	**12020**
Y5-RC15-SD	**2200**	**2000**	**1200**	**2100**	1500 Ji	1500 Ji	**3000 Ji**	**1400 Ji**	**640 Ji**	**260 Ji**	**640 Ji**	**13440**
Y5-RB-01	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Compliance Samples												
Y5-WC01-S	3,200	2,000	1,000	1,600	-----	-----	3,000	1,200	500	110 J	400	13010
Y5-WC02-S	7,000	4,800	2,300	3,600	-----	-----	6,800	2,700	900	300	970	29,370
Y5-WC03-S	1,300	980	490	750	-----	-----	1,280	630	400	150 J	410	6,390
Y5-WC04-S	2,400	1,800	870	1,400	-----	-----	2,600	1,100	420	130 J	410	11,130
Y5-WC05-S	3,600	2,600	1,200	1,900	-----	-----	3,800	1,600	570	200	550	16,020
Y5-WC06-S	1,700	1,200	600	960	-----	-----	1,880	800	310	190 U	300	7,750
Y5-WC07-S	3,400	2,500	1,200	1,900	-----	-----	3,600	1,600	600	270	590	15,660
Y5-WC08-S	2,100	1,600	740	1,200	-----	-----	2,600	980	360	140	320	10,040
Y5-WC09-S	3,600	2,900	1,400	2,100	-----	-----	4,200	1,800	640	250	630	17,520
Y5-WC10-S	630	460	220	340	-----	-----	700	280	120 J	200 U	120 J	2,870
Y5-WC11-S	860	750	320	540	-----	-----	1,240	440	210	110 U	230	4,590
Y5-WC12-S	1,800	1,500	690	1,000	-----	-----	2,000	950	300	200 U	300	8,540
Y5-WC13-S	2,900	2,400	1,000	1,600	-----	-----	3,900	1,300	460	230	480	14,270
Y5-WC14-S	1,900	1,600	750	1,100	-----	-----	2,400	990	350	140	350	9,580
Y5-S-15	220	210	110 J	150 J	-----	-----	260 J	120 J	190 U	190 U	120 J	1,190
Y5-S-17	2,500	2,100	890	1,500	-----	-----	3,200	1,200	450	100	460	12,400
Y5-S-19	2,000	2,000	800	1,200	-----	-----	2,600	1,200	440	110 J	440	10,790
Y5-S-24	2,200	1,600	770	1,300	-----	-----	2,400	1,000	380	130 J	380	10,160

Notes: U = No detected at indicated value
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TPH-Dx most resembles motor oil
Ji - Indicated value is considered an estimate; elevated internal standard response
JI - Indicated value is considered an estimate; less than verifiable lower calibration point
Jp - Indicated value is considered an estimate; dual column RPD elevated

TABLE 1 - Summary of Utilities' Sediment Quality Data - May 2009 (Year 5)

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

	Dibenzo-furan	*bis* (2-Ethylhexyl)-phthalate	Aroclor 1016	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1221	Aroclor 1232	Sum PCBs
Field Sample I.D.	132-64-9	117-81-7	12674-11-2	53469-21-9	12672-29-6	11097-69-1	11096-82-5	11104-28-2	11141-16-5	
SQOs	540	1300	na	na	na	na	na	na	na	300
Early Warning Samples										
Y5-RC01-S	98 U	**6,600**	12 U	12 U	**23**	**63**	**81**	12 U	12 U	**167**
Y5-RC02-S	98 U	**5600**	12 U	12 U	**28**	**73**	**77**	12 U	12 U	**178**
Y5-RC03-S	98 U	**2700**	12 U	12 U	**18**	**46**	**48**	12 U	12 U	**112**
Y5-RC04-S	98 U	**4900**	12 U	12 U	**26 Jp**	**60**	**69**	12 U	12 U	**155**
Y5-RC05-S	99 U	**5500**	12 U	12 U	12 U	**36**	**33**	12 U	12 U	**69**
Y5-RC06-S	99 U	**5400**	12 U	12 U	**25 Jp**	**58**	**68**	12 U	12 U	**151**
Y5-RC07-S	99 U	**4900**	12 U	12 U	**29**	**66**	**68**	12 U	12 U	**163**
Y5-RC08-S	99 U	**3800**	12 U	12 U	**18**	**39**	**50**	12 U	12 U	**107**
Y5-RC09-S	99 U	**5100**	12 U	12 U	**23 Jp**	**58**	**56**	12 U	12 U	**137**
Y5-RC10-S	97 U	**1400**	12 U	12 U	12 U	**27**	**28**	12 U	12 U	**55**
Y5-RC11-S	98 U	**5400**	12 U	12 U	**21**	**54**	**60**	12 U	12 U	**135**
Y5-RC12-S	100 U	**2600**	12 U	12 U	12 U	**38**	**46**	12 U	12 U	**84**
Y5-RC13-S	240 U	**6500**	12 U	12 U	**24 Jp**	**52**	**64**	12 U	12 U	**140**
Y5-RC14-S	98 U	**5300**	12 U	12 U	12 U	**38**	**56**	12 U	12 U	**94**
Y5-RC15-SD	99 U	**6200**	12 U	12 U	**20**	**63**	**74**	12 U	12 U	**157**
Y5-RB-01	1.0 U	3.9	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	nd
Compliance Samples										
Y5-WC01-S	120 U	3,600	-----	-----	-----	-----	-----	-----	-----	-----
Y5-WC02-S	86 J	10,000	-----	-----	-----	-----	-----	-----	-----	-----
Y5-WC03-S	200 U	2,400	-----	-----	-----	-----	-----	-----	-----	-----
Y5-WC04-S	200 U	4,000	-----	-----	-----	-----	-----	-----	-----	-----
Y5-WC05-S	57 J	7,900	-----	-----	-----	-----	-----	-----	-----	-----
Y5-WC06-S	190 U	3,600	-----	-----	-----	-----	-----	-----	-----	-----
Y5-WC07-S	200 U	7,100	-----	-----	-----	-----	-----	-----	-----	-----
Y5-WC08-S	32 J	4,200	-----	-----	-----	-----	-----	-----	-----	-----
Y5-WC09-S	54 J	7,300	-----	-----	-----	-----	-----	-----	-----	-----
Y5-WC10-S	200 U	1,000	-----	-----	-----	-----	-----	-----	-----	-----
Y5-WC11-S	110 U	3,500	-----	-----	-----	-----	-----	-----	-----	-----
Y5-WC12-S	200 U	2,800	-----	-----	-----	-----	-----	-----	-----	-----
Y5-WC13-S	120 U	5,700	-----	-----	-----	-----	-----	-----	-----	-----
Y5-WC14-S	59 U	4,400	-----	-----	-----	-----	-----	-----	-----	-----
Y5-S-15	190 U	700	-----	-----	-----	-----	-----	-----	-----	-----
Y5-S-17	34 J	7,000	-----	-----	-----	-----	-----	-----	-----	-----
Y5-S-19	120 U	3,600	-----	-----	-----	-----	-----	-----	-----	-----
Y5-S-24	190 U	4,100	-----	-----	-----	-----	-----	-----	-----	-----

Notes: U = No detected at indicated value J = Estimated Concentration
TPH-Dx most resembles motor oil
Ji - Indicated value is considered an estimate; elevated internal standard response
JI - Indicated value is considered an estimate; less than verifiable lower calibration point
Jp - Indicated value is considered an estimate; dual column RPD elevated

TABLE 2 - Summary of Average Compliance Sediment Concentrations

Head Thea Foss Waterway
Tacoma, Washington

Location	Lead					Mercury					Zinc					LPAH					
	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2009
Util. Work Area																					
WC-1	6	-----	86	86	89	0.04 U	-----	0.1	0.1	0.16	41.0	-----	269	-----	324	85	-----	970	910	1408	1280
WC-2	15	54	92	92	112	0.08 U	0.12	0.22	0.22	0.5	58	127	252	-----	348	70	1183	2270	2700	2110	3262
WC-3	20	-----	37	37	28	0.07	-----	0.13	0.13	0.08	63	-----	99	-----	96	204	-----	679	470	230	480
WC-4	13	50	54	54	48	0.06 U	0.25	0.18	0.18	0.13	52.2	113	133	-----	152	336	954	1490	750	740	1180
WC-5	10	54	29	29	86	0.11	0.2	0.2	0.2	0.21	48	111	63	-----	255	64	1514	2280	1200	1303	2013
WC-6	7	-----	28	28	50	0.06 U	-----	0.08	0.08	0.12	38.8	-----	80.7	-----	145	33	-----	437	760	690	700
WC-7	2	23	45	45	82	0.04 U	0.07	0.11	0.11	0.13	30.7	62.2	112	-----	222	19 U	498	564	1200	2017	1630
WC-8	4	-----	64	64	71	0.05 U	-----	0.19	0.19	0.21	31.8	-----	134	-----	176	19 U	-----	1594	1100	1102	1314
WC-9	7	-----	66	66	71	0.05 U	-----	0.18	0.18	0.20	37.4	-----	130	-----	202	57	-----	1570	930	780	2439
WC-10	4	-----	12	10	11	0.06 U	-----	0.05 U	0.04 U	0.05 U	34.5	-----	44.0	49	51	88	-----	971	120	138	230
WC-11	14	212	11	12	60	0.05	0.7	0.06 U	0.05 U	1.65	60.5	257	44.2	53	165	94	9200	91	92	604	399
WC-12	3	-----	10	18	36	0.05 U	-----	0.05 U	0.05 U	0.11	35.9	-----	39.4	62	100	19 U	-----	121	320	888	1460
WC-13	4	-----	51	51	32	0.05 U	-----	0.20	0.2	0.08	38.5	-----	116	-----	106	21	-----	1270	1500	523	1501
WC-14	4	-----	70	70	74	0.05 U	-----	0.2	0.2	0.18	34.4	-----	160	-----	209	20	-----	1408	820	670	1265
S-15	-----	162	15	10	23	-----	0.7	0.05 U	0.04 U	0.06	-----	200	58.8	55	77	-----	22160	120	120	180	110
S-17	-----	87	9	9	42	-----	0.29	0.04 U	0.04 U	0.08	-----	134	43.4	58	122	-----	2540	71	160	512	1448
S-19	-----	-----	16	11	31	-----	-----	0.05 U	0.04 U	0.12	-----	-----	50.0	55	83	-----	-----	273	150	681	1999
S-24	-----	59	11	11	40	-----	0.2	0.17	0.17	0.10	-----	105	40.3	69	115	-----	1992	124	220	406	1120
Average	**8**	**88**	**39**	**39**	**55**	**0.06**	**0.32**	**0.13**	**0.12**	**0.23**	**43**	**139**	**104**	**57**	**164**	**81**	**5005**	**906**	**751**	**832**	**1324**

Location	Lead					Mercury					Zinc					LPAH					
	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2009
Turning Basin																					
WC-1	6	-----	86	86	89	0.04 U	-----	0.1	0.1	0.16	41.0	-----	269	-----	324	85	-----	970	910	1408	1280
WC-2	15	54	92	92	112	0.08 U	0.12	0.22	0.22	0.5	58	127	252	-----	348	70	1183	2270	2700	2110	3262
WC-3	20	-----	37	37	28	0.07	-----	0.13	0.13	0.08	63	-----	99	-----	96	204	-----	679	470	230	480
WC-4	13	50	54	54	48	0.06 U	0.25	0.18	0.18	0.13	52.2	113	133	-----	152	336	954	1490	750	740	1180
WC-5	10	54	29	29	86	0.11	0.2	0.2	0.2	0.21	48	111	63	-----	255	64	1514	2280	1200	1303	2013
WC-6	7	-----	28	28	50	0.06 U	-----	0.08	0.08	0.12	38.8	-----	80.7	-----	145	33	-----	437	760	690	700
WC-7	2	23	45	45	82	0.04 U	0.07	0.11	0.11	0.13	30.7	62.2	112	-----	222	19 U	498	564	1200	2017	1630
Average	**10**	**45**	**53**	**53**	**71**	**0.07**	**0.16**	**0.15**	**0.15**	**0.19**	**47**	**103**	**144**	**-----**	**220**	**116**	**1037**	**1241**	**1141**	**1214**	**1506**

TABLE 2 - Summary of Average Compliance Sediment Concentrations

Head Thea Foss Waterway
Tacoma, Washington

Location	HPAH						BEHP						PCBs				
	2004	2005	2006	2007	2008	2009	2004	2005	2006	2007	2008	2009	2004	2005	2006	2007	2008
Util. Work Area																	
WC-1	1187	-----	10270	6500	11620	13010	550	-----	4300	2300	6400	3600	nd	-----	72	-----	120
WC-2	724	7289	21481	20000	21790	29370	330	2700	7700	4900	8000	10000	nd	125	160	-----	138
WC-3	535	-----	6160	4400	3091	6390	240	-----	2300	1800	1200	2400	5.7	-----	107	-----	51.2
WC-4	693	5250	11833	5300	6631	11130	260	1700	4600	2300	2400	4000	5.4	89	86	-----	87
WC-5	219	6876	12900	9600	10918	16020	76	2200	3600	4000	5400	7900	nd	84	135	-----	106
WC-6	354	-----	4020	6500	7740	7750	160	-----	1600	2800	3200	3600	nd	-----	44	-----	79
WC-7	19 U	2623	4600	8700	12770	15660	19 U	730	1800	3600	4700	7100	nd	20	88	-----	112
WC-8	26	-----	9830	6000	6900	10040	49	-----	3400	2000	2500	4200	nd	-----	111	-----	118
WC-9	261	-----	8710	5300	6690	17520	120	-----	4700	2200	3100	7300	nd	-----	136	-----	116
WC-10	186	-----	1793	1100	1511	2870	63	-----	460	410	540	1000	nd	-----	18	9.9 U	12.2
WC-11	405	26920	1287	950	5950	4590	220	3500	960	640	3500	3500	nd	267	9.7 U	9.7 U	68
WC-12	19 U	-----	1190	1700	5200	8540	19 U	-----	590	640	1600	2800	nd	-----	12	9.9 U	40.2
WC-13	159	-----	6710	8000	4572	14270	100	-----	2000	2700	2100	5700	nd	-----	131	-----	43.4
WC-14	66	-----	9820	5200	6000	9580	76	-----	3700	2100	3500	4400	nd	-----	187	-----	124
S-15	-----	46310	1478	1000	2840	1190	-----	3000	930	500	1600	700	-----	458	23	9.7 U	18.1
S-17	-----	10050	1011	1300	5320	12400	-----	2000	570	620	2400	7000	-----	59	9.9 U	10 U	36.6
S-19	-----	-----	1963	780	3409	10790	-----	-----	880	300	1200	3600	-----	-----	23	9.8 U	34.8
S-24	-----	6678	1306	1800	4730	10160	-----	2000	550	790	1800	4100	-----	132	9.9 U	18	25
Average	401	14000	6465	5229	7093	11182	187	2229	2480	1922	3063	4606	6	154	89	11	74

Location	HPAH						BEHP						PCBs				
	2004	2005	2006	2007	2008	2009	2004	2005	2006	2007	2008	2009	2004	2005	2006	2007	2008
Turning Basin																	
WC-1	1187	-----	10270	6500	11620	13010	550	-----	4300	2300	6400	3600	nd	-----	72	-----	120
WC-2	724	7289	21481	20000	21790	29370	330	2700	7700	4900	8000	10000	nd	125	160	-----	138
WC-3	535	-----	6160	4400	3091	6390	240	-----	2300	1800	1200	2400	5.7	-----	107	-----	51.2
WC-4	693	5250	11833	5300	6631	11130	260	1700	4600	2300	2400	4000	5.4	89	86	-----	87
WC-5	219	6876	12900	9600	10918	16020	76	2200	3600	4000	5400	7900	nd	84	135	-----	106
WC-6	354	-----	4020	6500	7740	7750	160	-----	1600	2800	3200	3600	nd	-----	44	-----	79
WC-7	19 U	2623	4600	8700	12770	15660	19 U	730	1800	3600	4700	7100	nd	20	88	-----	112
Average	619	5510	10181	8714	10651	14190	269	1833	3700	3100	4471	5514	6	80	99	-----	99

TABLE 3 - Accumulated Layer Thicknesses and "Fines" Contents of Samples

Head Thea Foss Waterway
Tacoma, Washington

Location	Apr-04			Nov./Dec-04			May -05		
	Thickness (cm)	Sample Thickness (cm)(a)	% Fines (GS)(b)	Thickness (cm)	Sample Thickness (cm)(a)	% Fines (GS)(b)	Thickness (cm)	Sample Thickness (cm)	% Fines (GS)(b)
Early Warning Samples									
RC-1	(c)	2	12	1	2	6.3	1.5	2	30
RC-1B	-----	-----	-----	-----	-----	----	-----	-----	----
RC-2	(c)	2	36	8	8	44	9	2	51
RC-3	(c)	2	73	12	12	54	10	2	39
RC-4	(c)	2	34	9	9	46	13	2	68
RC-5	(c)	2	54	11	11	58	10	2	60
RC-6	(c)	2	26	5	5	53	4.5	2	55
RC-7	(c)	2	6.2	4	4	33	3	2	26
RC-8	(c)	2	5.2	5	5	47	4	2	62
RC-9	(c)	2	25	6	6	40	5.5	2	64
RC-10	(c)	2	20	3	3	52	5	2	65
RC-11	(c)	2	24	7	-----	-----	10.5	2	79
RC-12	(c)	2	1.9	3	3	67	5	2	72
RC-13	(c)	2	18	1	2	6.3	1	2	15
RC-14	(c)	2	34	1	2	13	1.5	2	20
RC-14B	-----	-----	-----	-----	-----	-----	1.5	2	18
S-16	-----	-----	-----	5	5	62	5	-----	-----
S-17	-----	-----	-----	2	2	48	6	-----	-----
S-18	-----	-----	-----	7	7	40	3	-----	-----
S-19	-----	-----	-----	4	4	60	8	-----	-----
S-20	-----	-----	-----	2	2	21	3.5	-----	-----
S-21	-----	-----	-----	7	7	69	-----	-----	-----
S-22	-----	-----	-----	8	8	48	6.5	-----	-----
S-23	-----	-----	-----	3	3	39	-----	-----	-----
S-24	-----	-----	-----	2	3	43	6	-----	-----
Compliance Samples									
WC-1	(c)	10	7.8	1	10	7.2	1.5	10	-----
WC-1B	-----	-----	-----	-----	-----	-----	-----	-----	-----
WC-2	(c)	10	24	8	10	-----	9	10	37
WC-3	(c)	10	43	12	10	-----	10	10	-----
WC-4	(c)	10	16	9	10	37	13	10	37
WC-5	(c)	10	31	11	10	61	10	10	48
WC-6	(c)	10	11	5	-----	-----	4.5	10	-----

TABLE 3 - Accumulated Layer Thicknesses and "Fines" Contents of Samples

Location	Apr-04			Nov./Dec-04			May -05		
	Thickness (cm)	Sample Thickness (cm)(a)	% Fines (GS)(b)	Thickness (cm)	Sample Thickness (cm)(a)	% Fines (GS)(b)	Thickness (cm)	Sample Thickness (cm)	% Fines (GS)(b)
WC-7	(c)	10	2.5	4	10	17	3	10	7.2
WC-8	(c)	10	3.3	5	-----	-----	4	10	-----
WC-9	(c)	10	11	6	10	31	5.5	10	-----
WC-10	(c)	10	7.1	3	10	15	5	10	-----
WC-11	(c)	10	13	7	10	33	10.5	10	77
WC-12	(c)	10	2	3	10	25	5	10	-----
WC-13	(c)	10	5.7	-----	-----	-----	-----	-----	-----
WC-14	(c)	10	9.0	-----	-----	-----	-----	-----	-----
S-15	-----	-----	-----	12	10	52	11.5	10	58
S-16	-----	-----	-----	5	10	28	5	10	-----
S-17	-----	-----	-----	2	10	-----	6	10	43
S-18	-----	-----	-----	7	10	-----	3	10	-----
S-19	-----	-----	-----	4	10	25	8	10	-----
S-20	-----	-----	-----	2	10	-----	3.5	10	-----
S-21	-----	-----	-----	7	10	-----	-----	-----	-----
S-22	-----	-----	-----	8	10	-----	6.5	10	-----
S-23	-----	-----	-----	3	-----	-----	-----	-----	-----
S-24	-----	-----	-----	2	10	-----	6	10	25
S-25	-----	-----	-----	7	-----	-----	-----	-----	-----
S-26	-----	-----	-----	2	-----	-----	-----	-----	-----
S-27	-----	-----	-----	5	-----	-----	-----	-----	-----
S-28	-----	-----	-----	2	-----	-----	-----	-----	-----
S-29	-----	-----	-----	4	10	-----	5	10	-----
S-30	-----	-----	-----	1	-----	-----	3	10	-----

Notes: (a) - In Nov./Dec. 2004, "RC" designated samples consisted of the full thickness of the fine grained sediment that had accumulated on the Utilities' Cap, except where accumulations were less than 2 cm. Where less than 2 cm of fine grained sediment was present, a 0 to 2 cm thick sample was obtained that also included some of the underlying capping material.

(b) - Based on grain size analysis (GS), less than 62.5 micron (um) in size

(c) - 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.

TABLE 3 - Accumulated Layer Thicknesses and "Fines" Contents of Samples

Location	May -06			May -07			May -08		
	Thickness (cm)	Sample Thickness (cm)	% Fines (GS)(b)	Thickness (cm)	Sample Thickness (cm)	% Fines (GS)(b)	Thickness (cm)	Sample Thickness (cm)	% Fines (GS)(b)
Early Warning Samples									
RC-1	-----	2	27	-----	2	24	na	2	35
RC-1B	19	-----	-----	-----	-----	-----	-----	-----	-----
RC-2	16	2	52	13+	2	36	12	2	54
RC-3	11	2	46	15+	2	32	13	2	33
RC-4	9 to 17	2	46	17+	2	53	12	2	42
RC-5	12	2	51	15	2	51	13	2	56
RC-6	1 to 10	2	30	12	2	45	16	2	57
RC-7	6	2	41	12+	2	34	18	2	41
RC-8	7	2	47	7	2	42	8	2	41
RC-9	7	2	58	9	2	49	13	2	51
RC-10	0.5	2	7.5	1	2	19	1	2	19
RC-11	1	2	8.7	3	2	50	7	2	77
RC-12	1	2	11	3	2	25	4	2	50
RC-13	2	2	36	-----	2	40	2	2	25
RC-14	2	2	23	-----	2	24	8	2	46
RC-14B	1	2	25	-----	-----	-----	-----	-----	-----
S-16	-----	-----	-----	-----	-----	-----	-----	-----	-----
S-17	0.5	-----	-----	2	-----	-----	4	-----	-----
S-18	-----	-----	-----	-----	-----	-----	-----	-----	-----
S-19	2	-----	-----	4	-----	-----	3	-----	-----
S-20	-----	-----	-----	-----	-----	-----	-----	-----	-----
S-21	-----	-----	-----	-----	-----	-----	-----	-----	-----
S-22	-----	-----	-----	-----	-----	-----	-----	-----	-----
S-23	-----	-----	-----	-----	-----	-----	-----	-----	-----
S-24	0.5	-----	-----	1	-----	-----	2	-----	-----
Compliance Samples									
WC-1	-----	10	35	-----	-----	-----	-----	10	41
WC-1B	19	-----	-----	-----	-----	-----	-----	-----	-----
WC-2	16	10	57	13+	-----	-----	12	10	50
WC-3	11	10	40	15+	-----	-----	13	10	24
WC-4	9 to 17	10	36	17+	-----	-----	12	10	37
WC-5	12	10	51	15	-----	-----	13	10	55
WC-6	1 to 10	10	26	12	-----	-----	16	10	39

TABLE 3 - Accumulated Layer Thicknesses and "Fines" Contents of Samples

Location	May -06			May -07			May -08		
	Thickness (cm)	Sample Thickness (cm)	% Fines (GS)(b)	Thickness (cm)	Sample Thickness (cm)	% Fines (GS)(b)	Thickness (cm)	Sample Thickness (cm)	% Fines (GS)(b)
WC-7	6	10	21	11+	-----	-----	18	10	43
WC-8	7	10	38	7	-----	-----	8	10	41
WC-9	7	10	40	9	-----	-----	13	10	43
WC-10	0.5	10	4.7	1	-----	-----	1	10	5.3
WC-11	1	10	8.1	3	-----	-----	7	10	35
WC-12	1	10	5	3	-----	-----	4	10	23
WC-13	7	10	35	8	-----	-----	3	10	17
WC-14	7	10	52	13+	-----	-----	18	10	47
S-15	2	10	9.3	3	10	-----	4	10	15
S-16	-----	-----	-----	-----	-----	-----	-----	-----	-----
S-17	0.5	10	5.5	2	10	-----	4	10	19
S-18	-----	-----	-----	-----	-----	-----	-----	-----	-----
S-19	2	10	10	4	10	-----	3	10	16
S-20	-----	-----	-----	-----	-----	-----	-----	-----	-----
S-21	-----	-----	-----	-----	-----	-----	-----	-----	-----
S-22	-----	-----	-----	-----	-----	-----	-----	-----	-----
S-23	-----	-----	-----	-----	-----	-----	-----	-----	-----
S-24	0.5	10	4.2	1	10		2	10	16
S-25	-----	-----	-----	-----	-----	-----	-----	-----	-----
S-26	-----	-----	-----	-----	-----	-----	-----	-----	-----
S-27	-----	-----	-----	-----	-----	-----	-----	-----	-----
S-28	-----	-----	-----	-----	-----	-----	-----	-----	-----
S-29	-----	-----	-----	-----	-----	-----	-----	-----	-----
S-30	-----	-----	-----	-----	-----	-----	-----	-----	-----

Notes: (a) - In Nov./Dec. 2004, "RC" designated samples consisted of the full thickness of the fine grained sediment that had accumulated on the Utilities' Cap, except where accumulations were less than 2 cm. Where less than 2 cm of fine grained sediment was present, a 0 to 2 cm thick sample was obtained that also included some of the underlying capping material.

(b) - Based on grain size analysis (GS), less than 62.5 micron (um) in size

(c) - 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.

TABLE 3 - Accumulated Layer Thicknesses and "Fines" Contents of Samples

Location	May -09		
	Thickness (cm)	Sample Thickness (cm)	% Fines (GS)(b)
Early Warning Samples			
RC-1	3	2	48
RC-1B	-----	-----	
RC-2	23+	2	59
RC-3	16	2	46
RC-4	21	2	55
RC-5	21+	2	62
RC-6	20+	2	61
RC-7	20	2	71
RC-8	18	2	57
RC-9	10	2	67
RC-10	3	2	24
RC-11	10	2	77
RC-12	9	2	38
RC-13	10	2	64
RC-14	7	2	56
RC-14B	-----	-----	-----
S-16	-----	-----	-----
S-17	-----	-----	-----
S-18	-----	-----	-----
S-19	-----	-----	-----
S-20	-----	-----	-----
S-21	-----	-----	-----
S-22	-----	-----	-----
S-23	-----	-----	-----
S-24	-----	-----	-----
Compliance Samples			
WC-1	3	10	-----
WC-1B	-----	-----	-----
WC-2	23+	10	-----
WC-3	16	10	-----
WC-4	21	10	-----
WC-5	21+	10	-----
WC-6	20+	10	-----

TABLE 3 - Accumulated Layer Thicknesses and "Fines" Contents of Samples

Location	May -09		
	Thickness (cm)	Sample Thickness (cm)	% Fines (GS)(b)
WC-7	20	10	-----
WC-8	18	10	-----
WC-9	10	10	-----
WC-10	3	10	-----
WC-11	10	10	-----
WC-12	9	10	-----
WC-13	7	10	-----
WC-14	11	10	-----
S-15	4	10	-----
S-16	-----	-----	-----
S-17	14	10	-----
S-18	-----	-----	-----
S-19	8	10	-----
S-20	-----	-----	-----
S-21	-----	-----	-----
S-22	-----	-----	-----
S-23	-----	-----	-----
S-24	7	10	-----
S-25	-----	-----	-----
S-26	-----	-----	-----
S-27	-----	-----	-----
S-28	-----	-----	-----
S-29	-----	-----	-----
S-30	-----	-----	-----

Notes: (a) - In Nov./Dec. 2004, "RC" designated samples consisted of the full thickness of the fine grained sediment that had accumulated on the Utilities' Cap, except where accumulations were less than 2 cm. Where less than 2 cm of fine grained sediment was present, a 0 to 2 cm thick sample was obtained that also included some of the underlying capping material.

(b) - Based on grain size analysis (GS), less than 62.5 micron (um) in size

(c) - 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.

TABLE 4 - Summary of Average Early Warning Sediment Concentrations

Head Thea Foss Waterway
Tacoma, Washington

Location	Lead						Mercury						Zinc					
	2004	2005	2006	2007	2008	2009	2004	2005	2006	2007	2008	2009	2004	2005	2006	2007	2008	2009
Util. Work Area																		
RC-1	25	104	90	111	94	206	<0.06	0.2	0.1	0.3	0.1	0.19	74	289	287	380	308	448
RC-2	20	122	97	114	134	125	<0.10	0.3	0.2	0.2	0.2	0.16	71	261	254	539	452	473
RC-3	44	55	62	36	33	58	0.1	0.21	0.16	0.1	0.09	0.1	115	123	166	113	108	190
RC-4	19	140	44	77	54	85	0.08	0.5	0.2	0.32	0.12	0.12	70	254	108	227	161	257
RC-5	19	108	76	78	78	79	0.09	0.3	0.19	0.2	0.24	0.14	70	187	189	220	242	268
RC-6	18	114	47	86	93	90	<0.08	0.3	0.11	0.18	0.2	0.18	56	216	121	227	265	266
RC-7	6	70	70	64	91	139	<0.05	0.22	0.15	0.15	0.16	0.16	41	141	169	173	256	371
RC-8	5	145	73	70	73	88	<0.06	0.5	0.22	0.18	0.16	0.19	33	215	150	184	208	266
RC-9	15	144	76	86	99	92	<0.07	0.5	0.28	0.2	0.2	0.19	53.3	211	158	221	275	286
RC-10	11	159	15	33	33	39	<0.06	0.6	<0.04	0.08	0.08	0.09	44	203	52	102	99	124
RC-11	35	178	13	73	106	118	0.13	0.84	<0.06	0.19	0.29	0.21	83	231	56.9	195	273	353
RC-12	4	186	19	39	62	61	<0.05	0.8	<0.05	0.14	0.17	0.14	44	217	59.9	109	157	181
RC-13	42	38	73	113	82	112	0.07	0.08	0.12	0.2	0.11	0.16	99	118	208	109	224	342
RC-14	54	58	67	70	111	92	0.1	0.13	0.13	0.1	0.2	0.2	167	203	219	256	375	325
Average	**23**	**116**	**59**	**75**	**82**	**99**	**0.08**	**0.39**	**0.14**	**0.18**	**0.17**	**0.16**	**73**	**205**	**157**	**218**	**243**	**296**

Location	Lead						Mercury						Zinc					
	2004	2005	2006	2007	2008	2009	2004	2005	2006	2007	2008	2009	2004	2005	2006	2007	2008	2009
Turning Basin																		
RC-1	25	104	90	111	94	206	<0.06	0.2	0.1	0.3	0.1	0.19	74	289	287	380	308	448
RC-2	20	122	97	114	134	125	<0.10	0.3	0.2	0.2	0.2	0.16	71	261	254	539	452	473
RC-3	44	55	62	36	33	58	0.1	0.21	0.16	0.1	0.09	0.1	115	123	166	113	108	190
RC-4	19	140	44	77	54	85	0.08	0.5	0.2	0.32	0.12	0.12	70	254	108	227	161	257
RC-5	19	108	76	78	78	79	0.09	0.3	0.19	0.2	0.24	0.14	70	187	189	220	242	268
RC-6	18	114	47	86	93	90	<0.08	0.3	0.11	0.18	0.2	0.18	56	216	121	227	265	266
RC-7	6	70	70	64	91	139	<0.05	0.22	0.15	0.15	0.16	0.16	41	141	169	173	256	371
Average	**22**	**102**	**69**	**81**	**82**	**112**	**<0.08**	**0.29**	**0.16**	**0.21**	**0.16**	**0.15**	**71**	**210**	**185**	**268**	**256**	**325**

TABLE 4 - Summary of Average Early Warning Sediment Concentrations

Head Thea Foss Waterway
Tacoma, Washington

Location	LPAH						HPAH						BEHP					
	2004	2005	2006	2007	2008	2009	2004	2005	2006	2007	2008	2009	2004	2005	2006	2007	2008	2009
Util. Work Area																		
RC-1	160	2340	1930	2010	1970	3000	2667	18570	17890	12143	16850	19000	1300	8200	8300	14000	6000	6,600
RC-2	197	2844	2550	3350	1750	1370	1033	17390	21710	26160	17630	11610	470	7300	8700	9500	8200	5600
RC-3	586	1740	1180	830	750	910	2279	8603	12190	7121	6350	6820	1100	3200	5100	2600	2100	2700
RC-4	191	4730	2050	1374	759	1500	868	19830	15680	11152	6674	11920	360	6700	5900	5100	2800	4900
RC-5	74	5110	910	930	1504	1610	259	19780	10290	8483	12333	9740	110	5600	5400	4000	6900	5500
RC-6	164	3070	740	1371	1471	1020	1050	13610	8280	11734	13860	9760	500	4400	3900	5600	6000	5400
RC-7	26	2382	1350	1083	1412	1400	270	9818	11160	8297	11880	11510	180	4400	5400	3700	5200	4900
RC-8	28	4640	1974	1451	1159	1310	213	17310	13800	10820	11058	9620	110	3500	5400	4300	4500	3800
RC-9	130	5030	1790	1200	1330	1000	577	20490	13220	10970	11034	9310	230	3500	4700	6200	5100	5100
RC-10	159	9570	79	414	460	497	392	25330	917	3825	6880	4373	80	3600	420	1600	2500	1400
RC-11	338	9860	110	1012	2540	1140	881	25090	1471	8349	18500	9110	280	3500	1100	6100	10000	5400
RC-12	<20	18510	396	904	2069	1120	22	39650	2906	5438	11320	5780	60	3800	1300	2200	3600	2600
RC-13	303	686	1130	3700	2242	2430	4180	5760	12940	30440	19200	23620	1400	2100	3700	7300	6600	6500
RC-14	658	996	830	2140	1960	1390	7360	8686	8890	15730	18520	12020	3000	3600	3600	4200	8000	5300
Average	**217**	**5108**	**1216**	**1555**	**1527**	**1407**	**1575**	**17851**	**10810**	**12190**	**13006**	**11014**	**656**	**4529**	**4494**	**5457**	**5536**	**4693**

Location	LPAH						HPAH						BEHP					
	2004	2005	2006	2007	2008	2009	2004	2005	2006	2007	2008	2009	2004	2005	2006	2007	2008	2009
Turning Basin																		
RC-1	160	2340	1930	2010	1970	3000	2667	18570	17890	12143	16850	19000	1300	8200	8300	14000	6000	6,600
RC-2	197	2844	2550	3350	1750	1370	1033	17390	21710	26160	17630	11610	470	7300	8700	9500	8200	5600
RC-3	586	1740	1180	830	750	910	2279	8603	12190	7121	6350	6820	1100	3200	5100	2600	2100	2700
RC-4	191	4730	2050	1374	759	1500	868	19830	15680	11152	6674	11920	360	6700	5900	5100	2800	4900
RC-5	74	5110	910	930	1504	1610	259	19780	10290	8483	12333	9740	110	5600	5400	4000	6900	5500
RC-6	164	3070	740	1371	1471	1020	1050	13610	8280	11734	13860	9760	500	4400	3900	5600	6000	5400
RC-7	26	2382	1350	1083	1412	1400	270	9818	11160	8297	11880	11510	180	4400	5400	3700	5200	4900
Average	**200**	**3174**	**1530**	**1564**	**1374**	**1544**	**1204**	**15372**	**13886**	**12156**	**12225**	**11480**	**574**	**5686**	**6100**	**6357**	**5314**	**5086**

TABLE 4 - Summary of Average Early Warning Sediment Concentrations

Location	PCBs						Lube					
	2004	2005	2006	2007	2008	2009	2004	2005	2006	2007	2008	2009
Util. Work Area												
RC-1	5.7	200	95	172	106	167	-----	4800	**4700**	**3400**	**5000**	**7400**
RC-2	6.3	300	169	133	135	178	-----	5900	**5300**	**5600**	**4200**	**7100**
RC-3	7.2	178	134	64	63.8	112	-----	1600	**2300**	**1500**	**1200**	**3100**
RC-4	5.7	172	108	140	97	155	-----	3500	**3000**	**3300**	**2200**	**4100**
RC-5	4.3	273	142	143	112	69	-----	3000	**3200**	**3300**	**3200**	**6100**
RC-6	9.2	192	113	126	97	151	-----	1800	**1700**	**2900**	**2800**	**4600**
RC-7	nd	120	97	105	115	163	-----	2100	**2700**	**2200**	**3100**	**6700**
RC-8	nd	188	112	136	105	107	-----	3200	**2200**	**3100**	**2100**	**4100**
RC-9	6.5	219	226	122	140	137	-----	3700	**2800**	**3600**	**3100**	**4600**
RC-10	nd	272	28	40	38.3	55	-----	3800	**510**	**1000**	**1400**	**1600**
RC-11	11	381	9.8	138	130	135	-----	5700	**660**	**3000**	**4600**	**7900**
RC-12	nd	275	43	72	66	84	-----	4400	**720**	**1300**	**2200**	**2300**
RC-13	nd	80	98	192	94	140	-----	910	**2800**	**3800**	**3100**	**4900**
RC-14	nd	110	62	122	127	94	-----	1800	**2300**	**2200**	**5500**	**4200**
Average	**7**	**211**	**103**	**122**	**102**	**125**	**-----**	**3301**	**2492**	**2871**	**3121**	**4907**

Location	PCBs						Lube					
	2004	2005	2006	2007	2008	2009	2004	2005	2006	2007	2008	2009
Turning Basin												
RC-1	5.7	200	95	172	106	167	-----	4800	**4700**	**3400**	**5000**	**7400**
RC-2	6.3	300	169	133	135	178	-----	5900	**5300**	**5600**	**4200**	**7100**
RC-3	7.2	178	134	64	63.8	112	-----	1600	**2300**	**1500**	**1200**	**3100**
RC-4	5.7	172	108	140	97	155	-----	3500	**3000**	**3300**	**2200**	**4100**
RC-5	4.3	273	142	143	112	69	-----	3000	**3200**	**3300**	**3200**	**6100**
RC-6	9.2	192	113	126	97	151	-----	1800	**1700**	**2900**	**2800**	**4600**
RC-7	nd	120	97	105	115	163	-----	2100	**2700**	**2200**	**3100**	**6700**
Average	**6**	**205**	**123**	**126**	**104**	**142**	**-----**	**3243**	**3271**	**3171**	**3100**	**5586**

TABLE 5 - Sediment Trap Concentrations - 2002 to 2008

Head of Thea Foss Waterway
Tacoma, WA

	Lead	Mercury	Zinc	Diesel	Heavy Oil	LPAH	HPAH	BEHP	4,4'-DDD	4,4'-DDE	4,4'-DDT	T-PCBs
Units	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(ug/kg)**	**(ug/kg)**	**(ug/kg)**	**(ug/kg)**	**(ug/kg)**	**(ug/kg)**	**(ug/kg)**
SQO	450	0.59	410	None	None	5200	17000	1300	16	9	34	300
237A-FD2												
3/26/2002	78.9	0.04	220 J	160	2100	2263	17850	4600	6.3 U	6.3 U	8.5	84
4/28/2003	114 J	0.11 J	365 J	130	3700	5920	40020	22000	4 UJ	4 U	28.6 J	62
4/8/2004	114	0.07 J	307	97	2000	5840	35220	11000	8 UJ	8 UJ	11 J	110
4/19/2005	74.5	0.06 J	290	72	2400	5750	36000	14000	9.5 U	9.5 U	9.5 U	101
4/6/2006	81.5	0.05	267	69	2600	4080	28530	8800	3.3 U	3.3 U	3.3 U	197
4/20/2007	50.9 J	0.029 J	278 J	110	1400	3999	35200	3800	10 U	10 U	10 U	20 U
4/3/2008	93.7 J	0.089 J	344 J	780	3300	4020	25190	16000	8 U	8 U	8 U	80 U
237B-FD1												
3/26/2002	56.7	0.05	185 J	37 J	1400	823	4193	3000	1.4 B	1.3 B	4.2 B	30
4/28/2003	129 J	0.16 J	277 J	72	3000	4509	28310	17000	4 UJ	4 U	12.9 J	8 U
4/8/2004	72.3	0.10 J	233	60	1800	3349	20100	8500	8 UJ	8 UJ	9.3 J	75 U
4/19/2005	35.7	0.04 UJ	123	25 U	750	1960	6090	3600	8.2 U	8.2 U	8.2 U	35
4/6/2006	50.8	0.04 J	211	25 U	1400	860	8160	5100	3.2 UJ	3.2 UJ	3.2 UJ	88 B
4/20/2007	66.1 J	0.034 J	198 J	52	1700	2109	17280	3900	9.8 U	9.8 U	9.8 U	20 U
4/3/2008	78.1	0.06	218	780	2600	3290	16460	5900	8 U	8 U	8 U	80 U
235-FD6												
3/26/2002	144	0.08	348	110	3100	1158	6550	9700	5.8 U	5.8 U	14	79
4/28/2003	202	0.08	332	130 UJ	2300	2200	11030	22000	6.3 UJ	6.3 U	6.3 U	40.6
4/8/2004	96.4	0.06 J	296	92	1700	1322	5588	10000	7.9 UJ	7.9 UJ	7.9 UJ	65 U
4/19/2005	94.9	0.05 J	219	86	1600	1400	4680	15000	10 U	10 U	10 U	23
5/5/2006	183	0.05 J	323	99	3300	3650	14070	1600	3.2 UJ	3.2 UJ	3.2 UJ	79 B
4/20/2007	99.2	0.06	288	270	2300	1120	4930	7700	10 U	10 U	10 U	20 U
4/3/2008	134	1.35	396	1000	4500	1070	6690	18000	8 U	8 U	8 U	80 U
243-FD23												
3/26/2002	388	0.60	742	670	3800	1529	7440	16000	-----	-----	-----	-----
4/28/2003	-----	-----	-----	190	7200	4830	15720	41000	34 U	34 U	34 U	220
4/8/2004	430	0.97 J	649	220	4700	2037	10020	18000	8 UJ	8 UJ	9.6 J	206
4/19/2005	-----	-----	-----	240	6600	3140	8500	37000	-----	-----	-----	-----
4/6/2006	620	0.96	790	210	6100	2390	11900	29000	12 UJ	12 UJ	12 UJ	160 U
4/20/2007	-----	0.27	-----	110	1700	1230	7950	3600	25	84	10 U	150
4/3/2008	450	0.309	440	-----	-----	-----	-----	-----	-----	-----	-----	-----

TABLE 5 - Sediment Trap Concentrations - 2002 to 2008

Head of Thea Foss Waterway
Tacoma, WA

	Lead	Mercury	Zinc	Diesel	Heavy Oil	LPAH	HPAH	BEHP	4,4'-DDD	4,4'-DDE	4,4'-DDT	T-PCBs
Units	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(ug/kg)**	**(ug/kg)**	**(ug/kg)**	**(ug/kg)**	**(ug/kg)**	**(ug/kg)**	**(ug/kg)**
SQO	450	0.59	410	None	None	5200	17000	1300	16	9	34	300
Range (detections)												
High	620	1.35	790	1000	7200	5920	40020	41000	25	84	28.6	220
Low	35.7	0.029	123	37	750	823	4193	1600	25	84	8.5	23
Average	158	0.21	334	238	2928	2809	16062	13178	-----	-----	-----	-----
Geomean	116	0.09	303	151	2547	2364	12703	9743	-----	-----	-----	-----

Notes:

Source - Table E-15 in Stormwater Monitoring, August 2001-2008 Report, Thea Foss and Wheeler-Osgood Waterways, Prepared by City of Tacoma, March 2009.

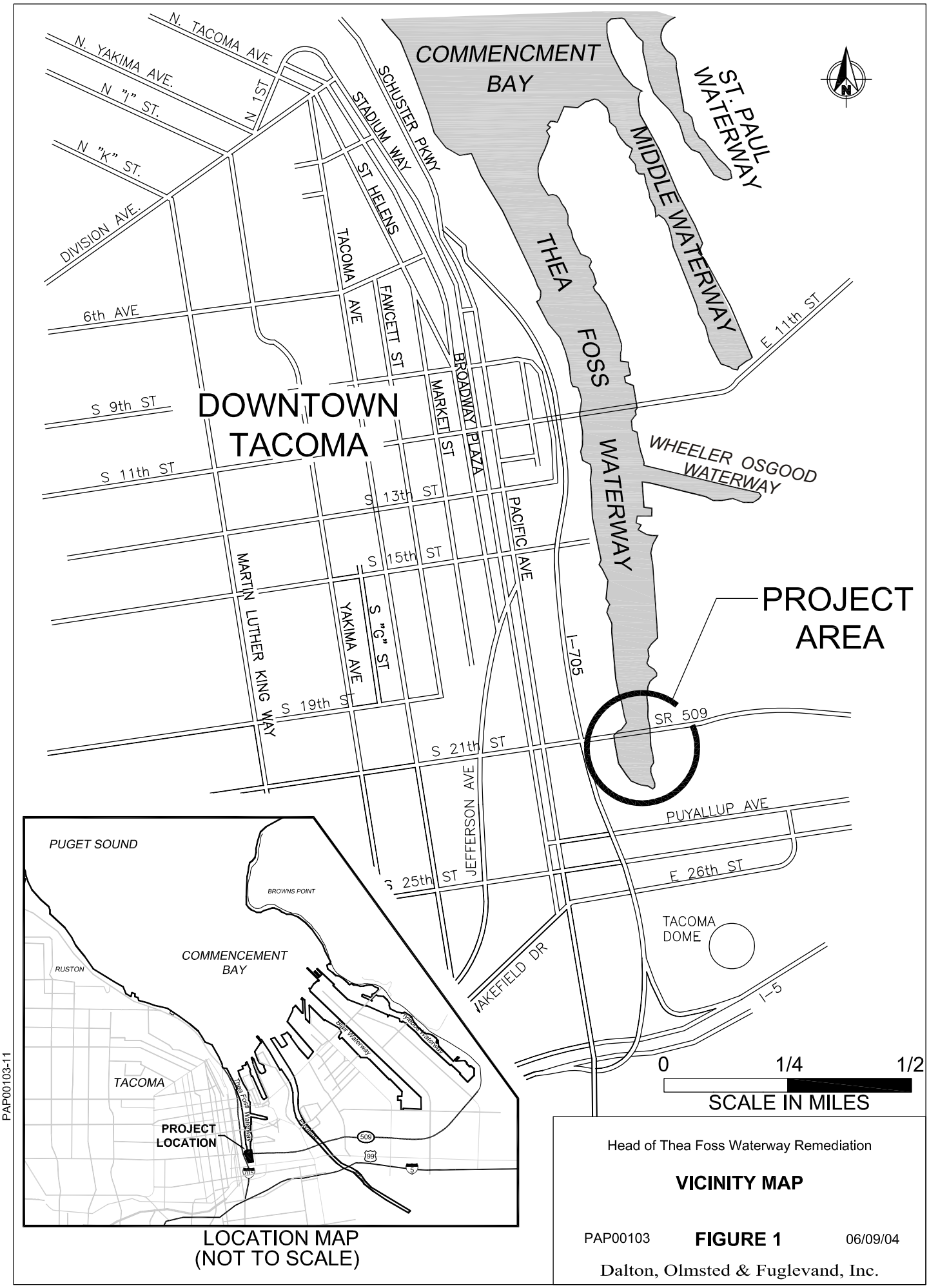
U - Not detected at indicated value

J - Estimated concentration

B - Analyte detected in laboratory blank

----- - Not reported

SQO - Commencement Bay Sediment Quality Objective



LOCATION MAP
(NOT TO SCALE)

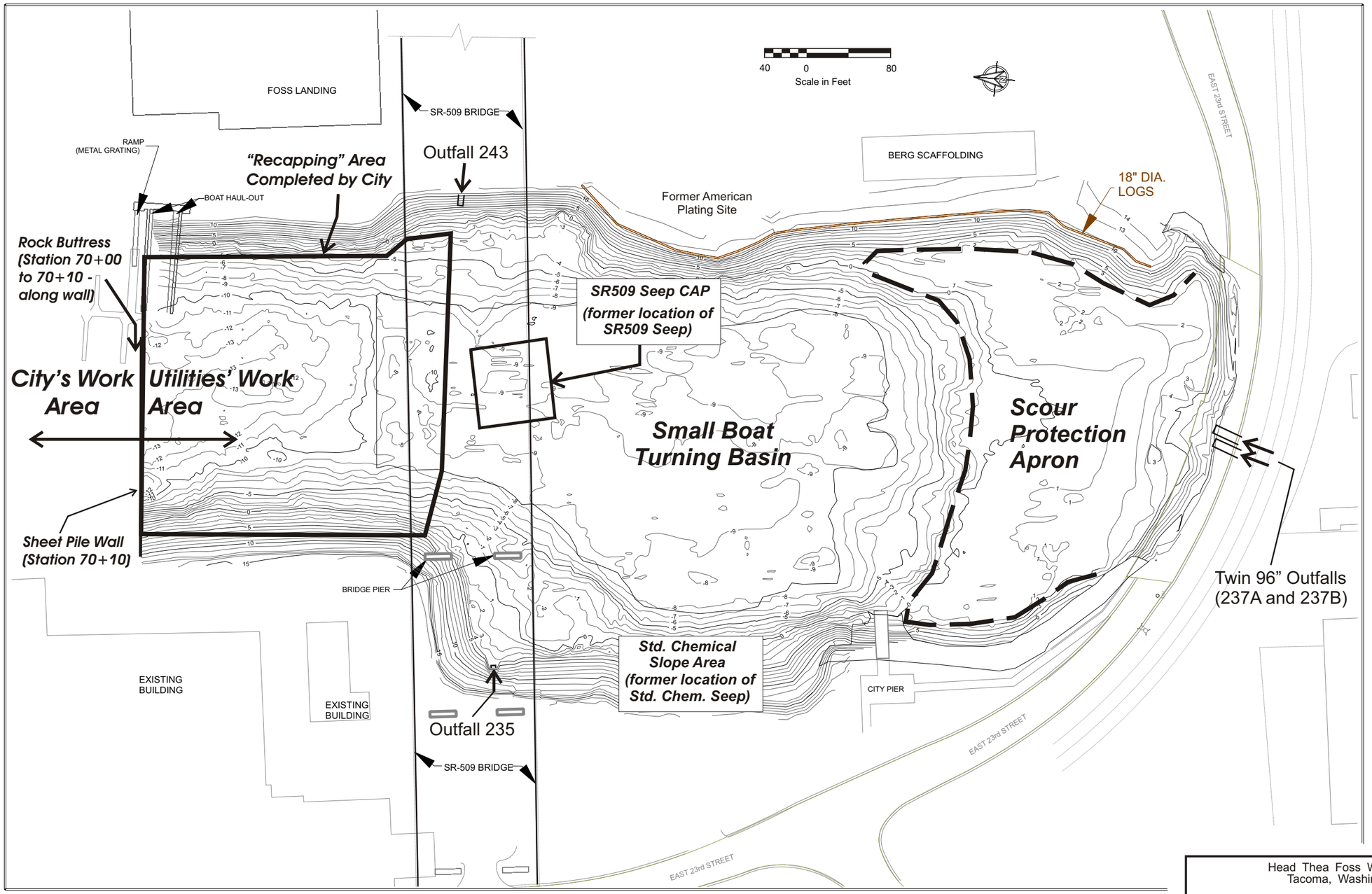
PAP00103-11

Head of Thea Foss Waterway Remediation

VICINITY MAP

PAP00103 **FIGURE 1** 06/09/04

Dalton, Olmsted & Fuglevand, Inc.



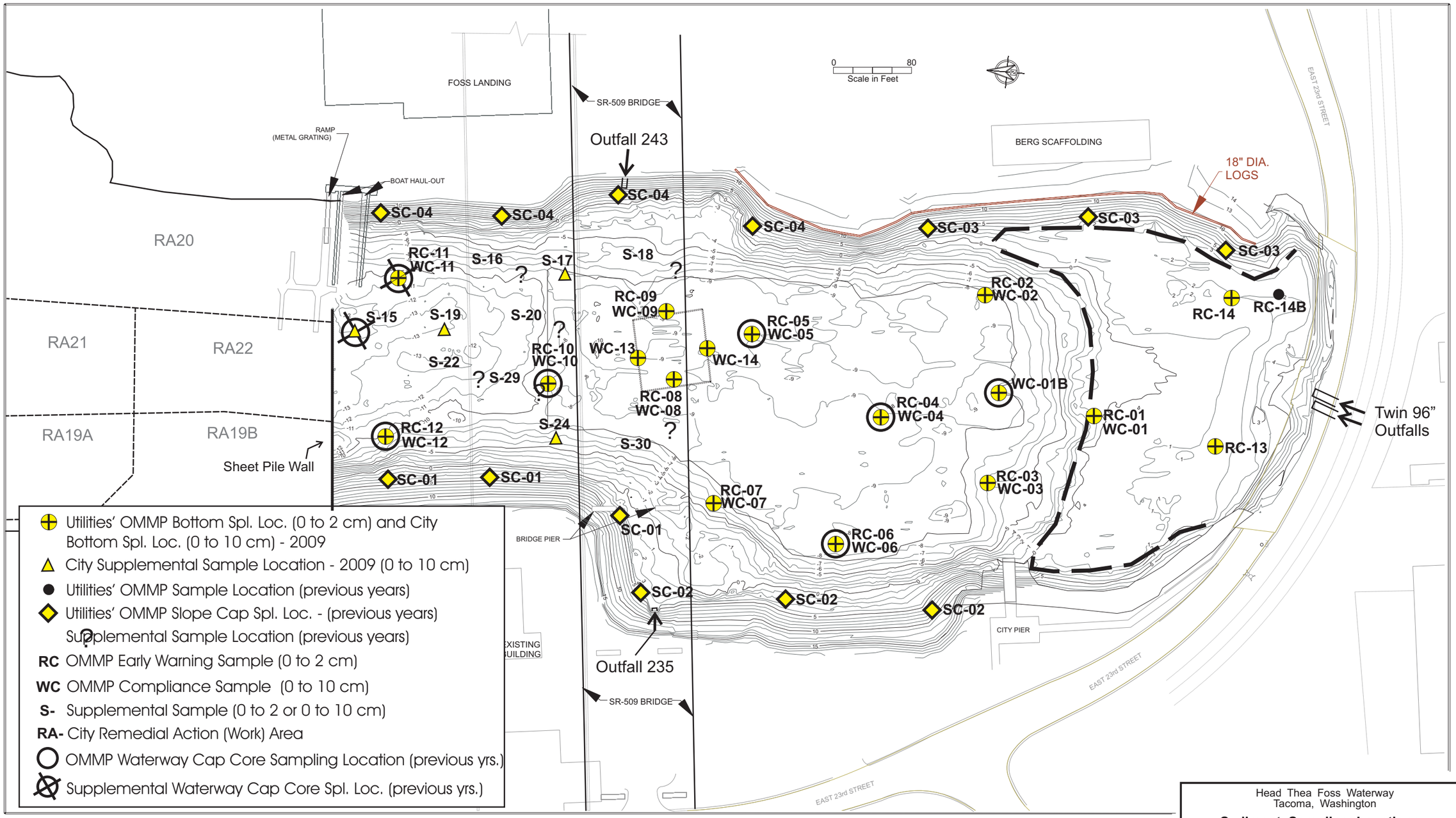
Ref: Head of waterway b 2006.cdr

Head Thea Foss Waterway
Tacoma, Washington

Remedial Features
Utilities' Work Area

PAP-001-04 **FIGURE 2** Sept. 2006

Dalton, Olmsted & Fuglevand, Inc.



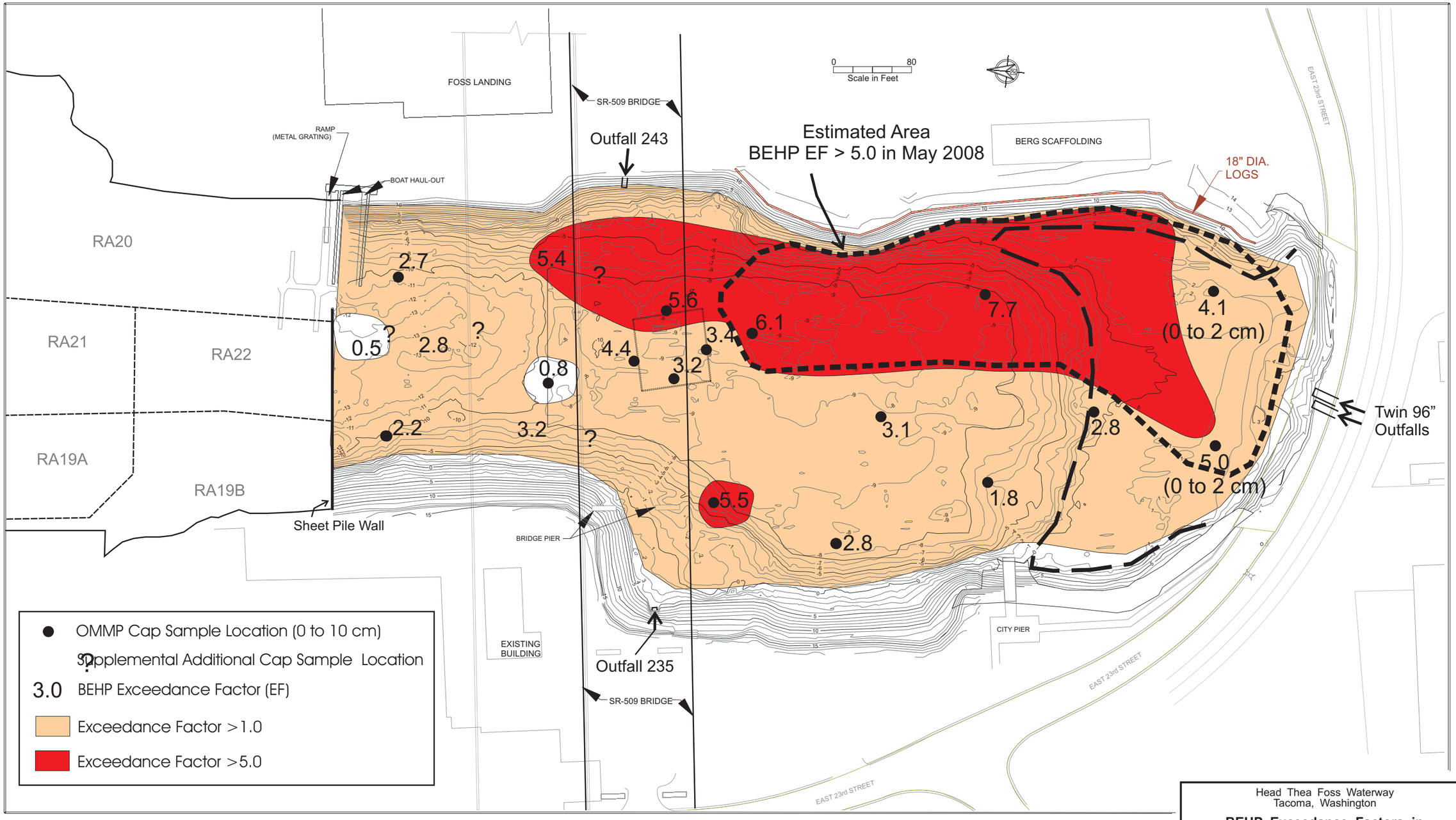
Head Thea Foss Waterway
Tacoma, Washington

Sediment Sampling Locations
Utilities Work Area
April 2004 to May 2009

PAP-001-04 **FIGURE 3** July 2009

Dalton, Olmsted & Fuglevand, Inc.

Ref: Sur Spl Loc Map 2009.cdr



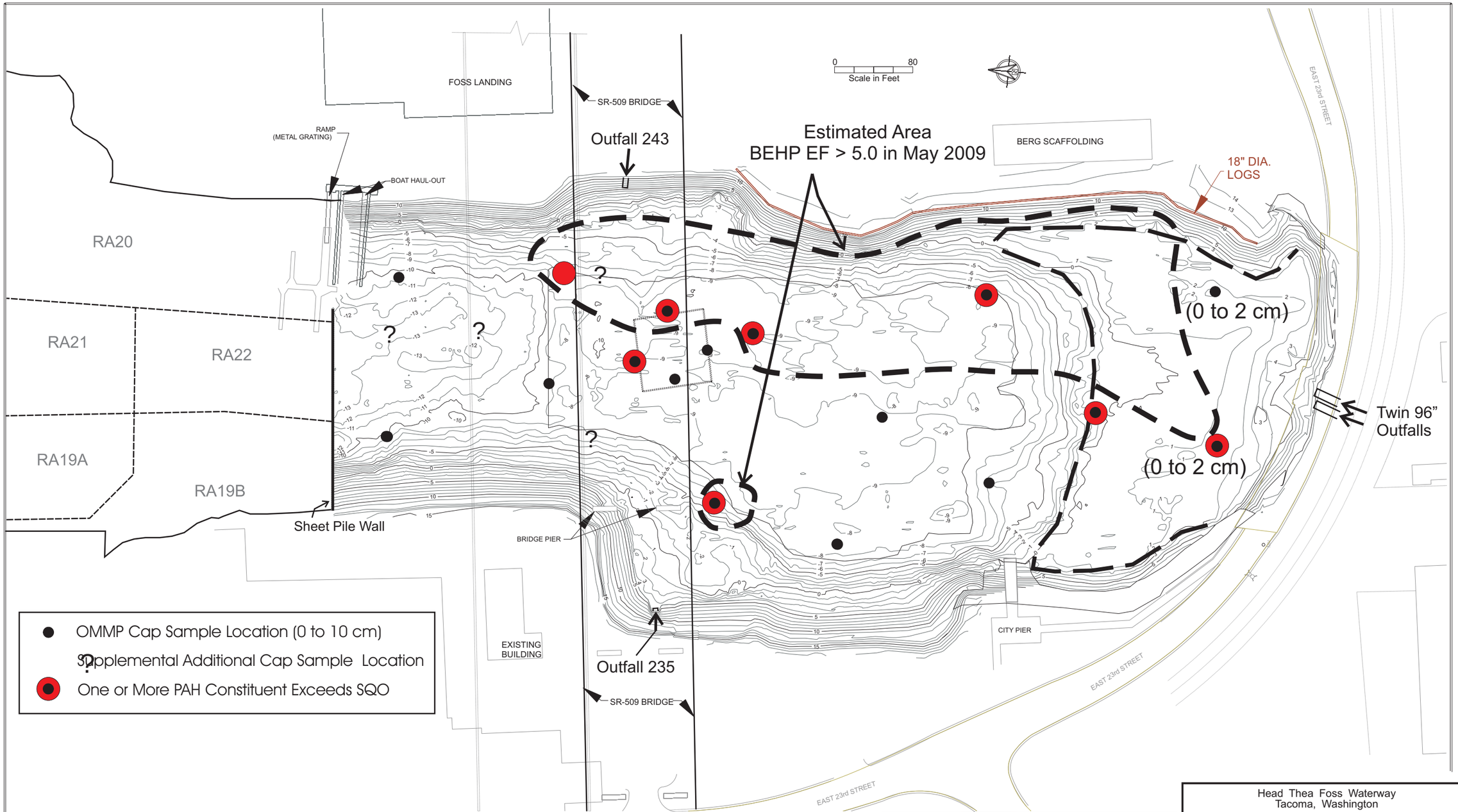
Head Thea Foss Waterway
Tacoma, Washington

BEHP Exceedance Factors in Compliance Sediment Samples May 2009

PAP-001-04 **FIGURE 4** July 2009

Dalton, Olmsted & Fuglevand, Inc.

Ref: Compliance BEHP EF 5-09.cdr



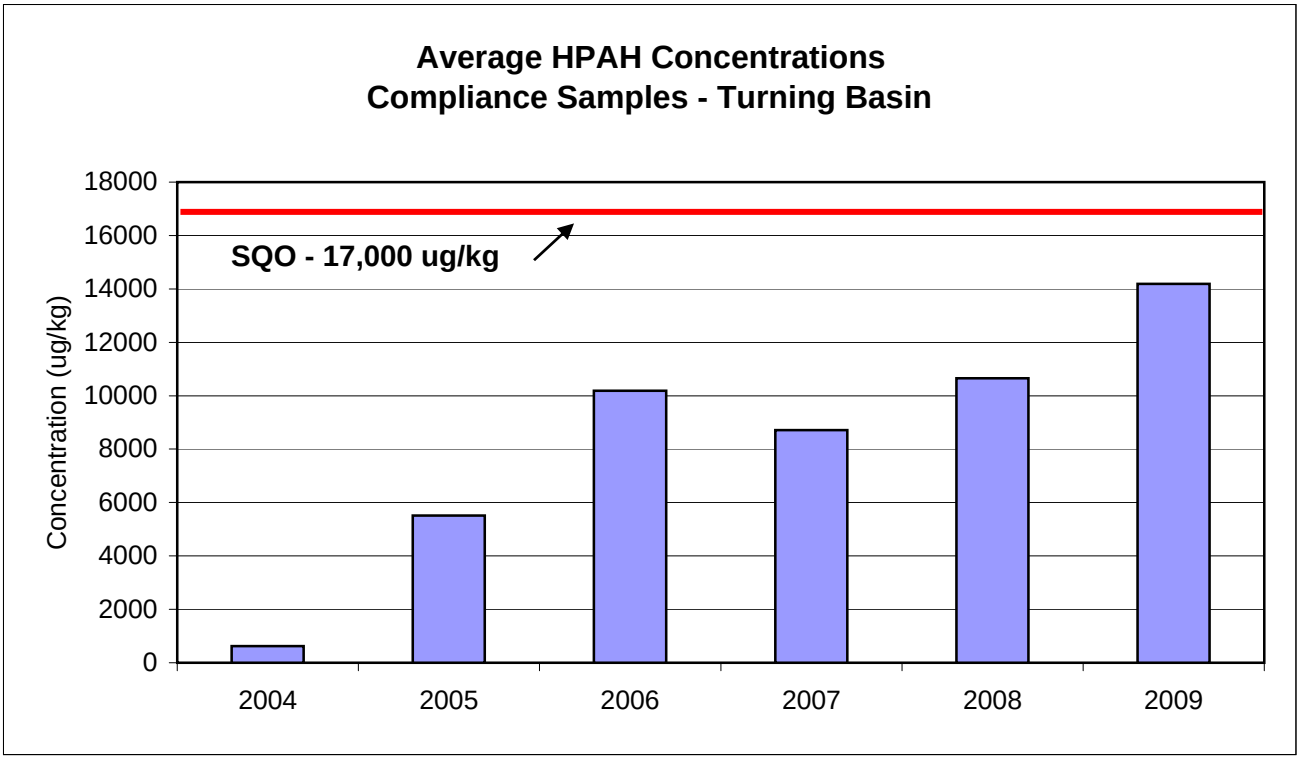
Head Thea Foss Waterway
Tacoma, Washington

PAH Locations That Exceed SQOs in Compliance Sediment Samples May 2009

PAP-001-04 **FIGURE 5** July 2009

Dalton, Olmsted & Fuglevand, Inc.

Ref: Compliance PAH EF 5-09.cdr



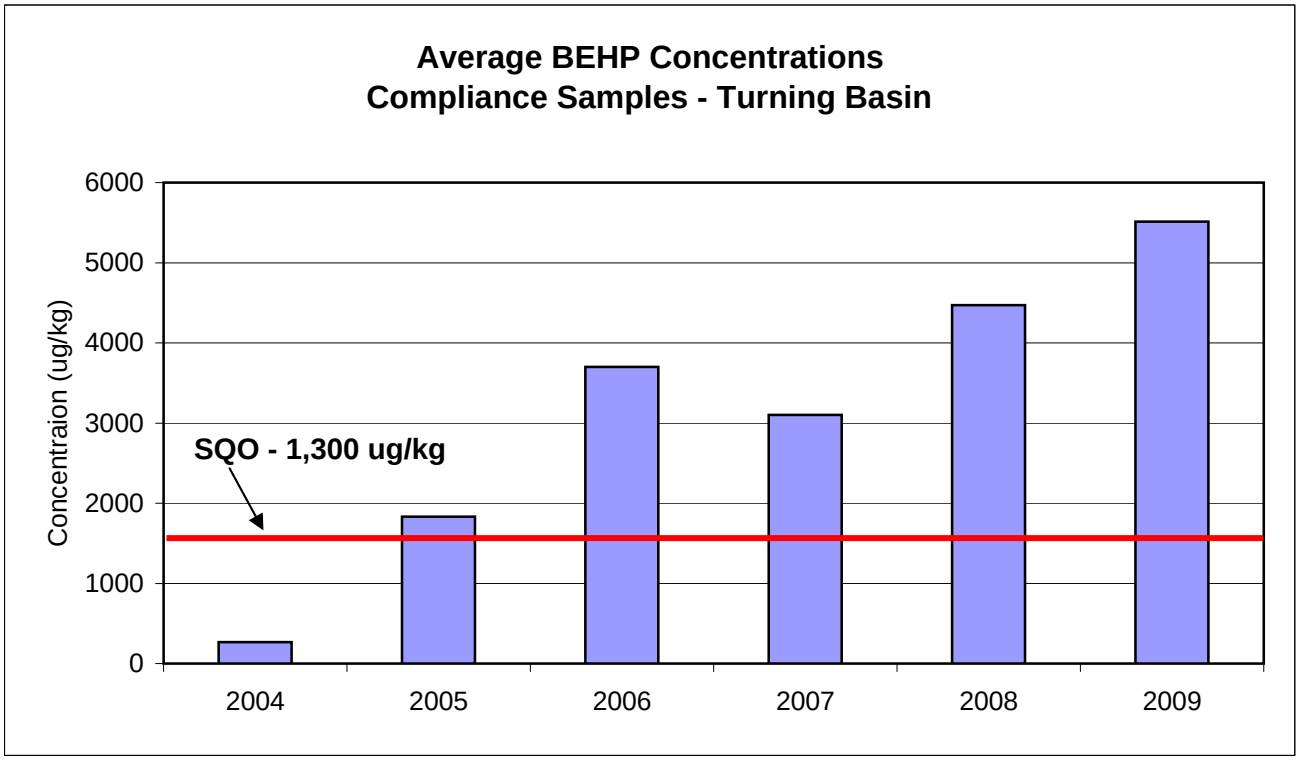
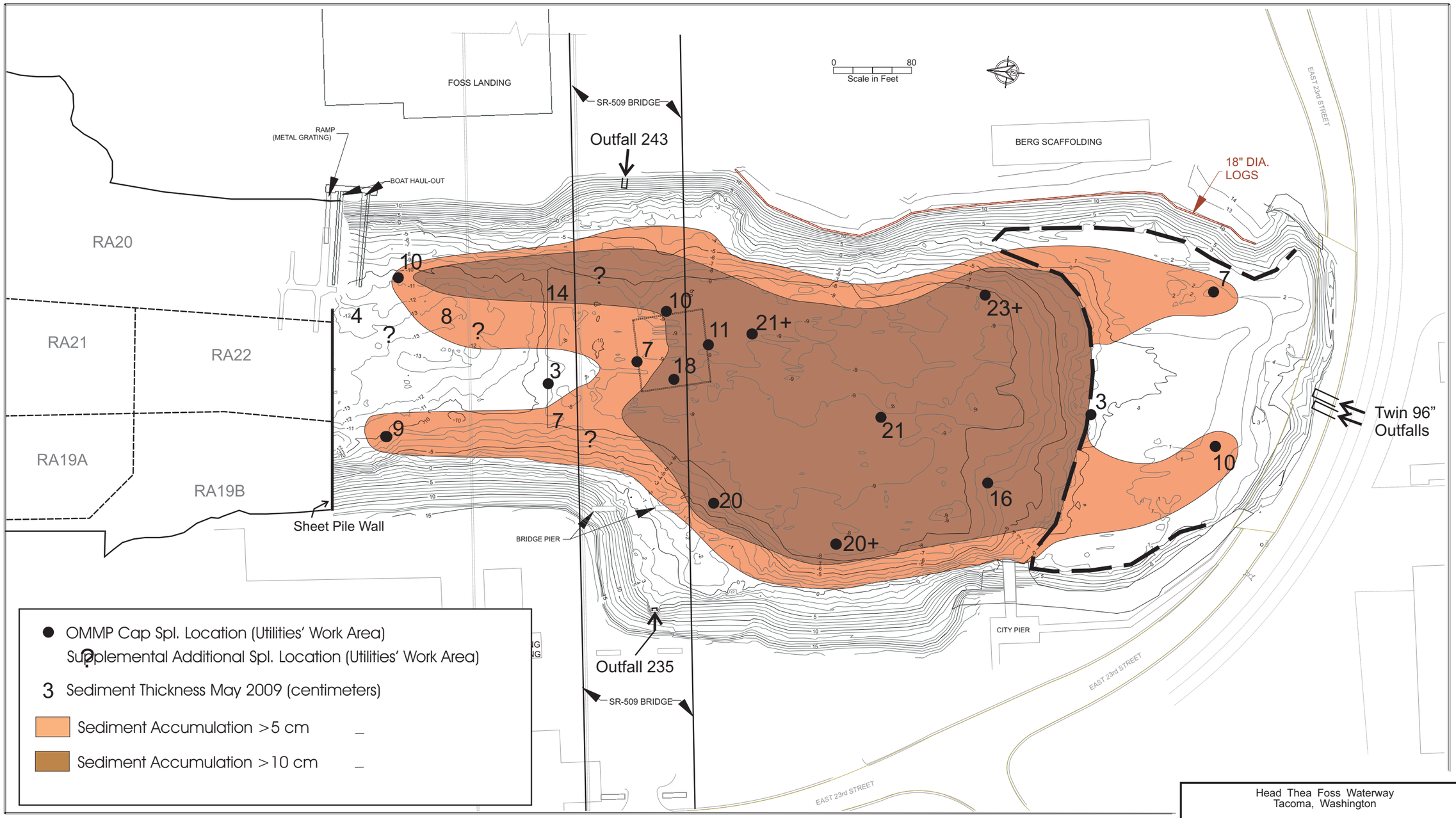


FIGURE 6
Average Concentrations
Compliance Spls. - Turning Basin



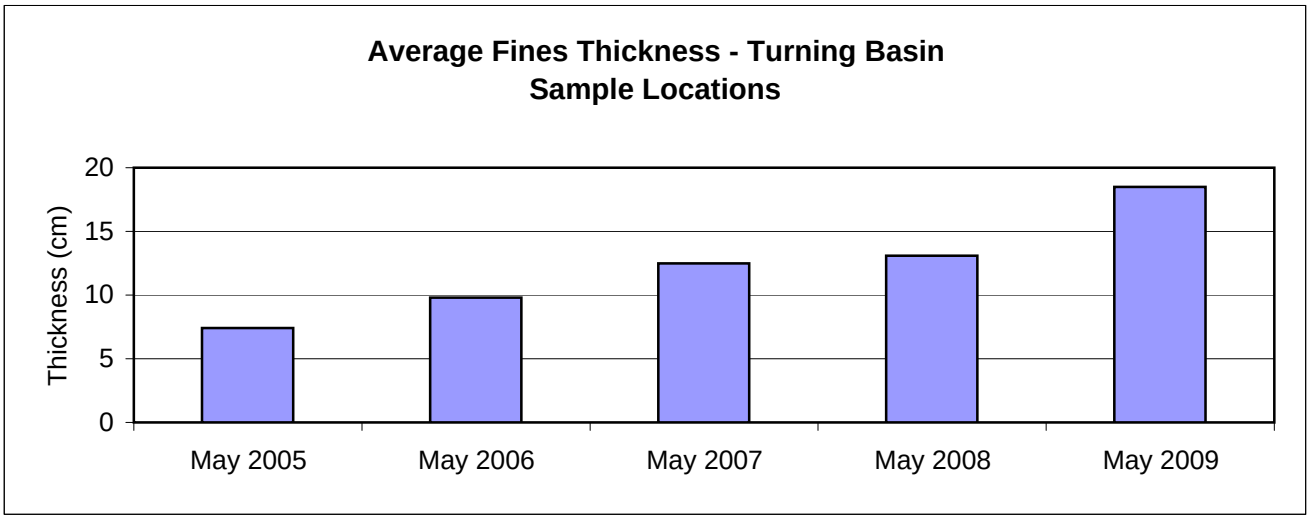
Head Thea Foss Waterway
Tacoma, Washington

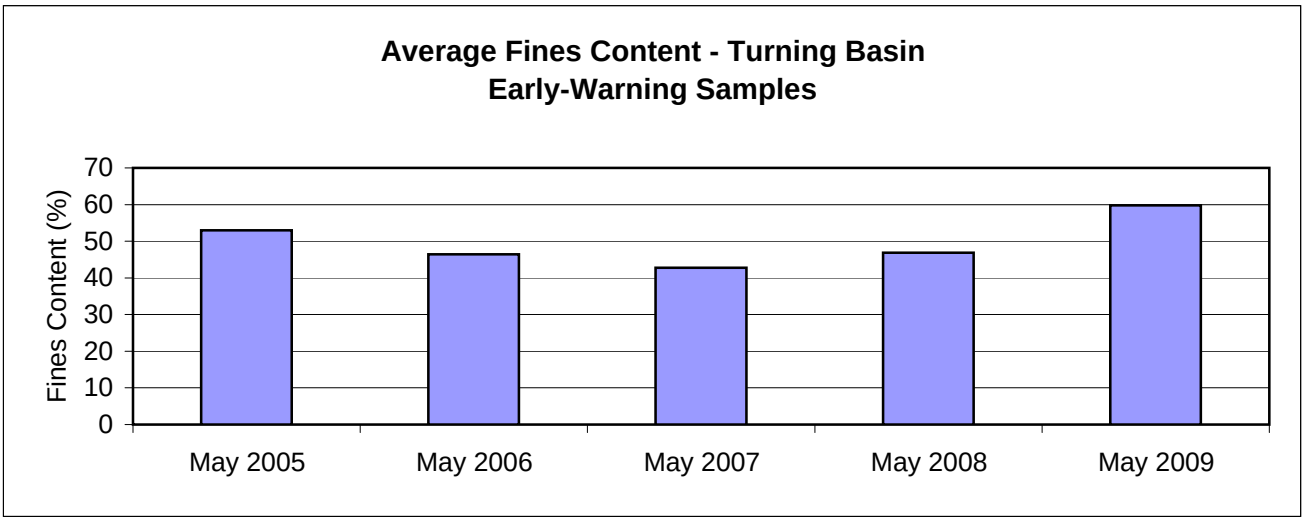
Thickness of Accumulated Sediment Above CAP - May 2009

PAP-001-04 **FIGURE 7** July 2009

Dalton, Olmsted & Fuglevand, Inc.

Ref: Fine Grained Thickness 5-09.cdr





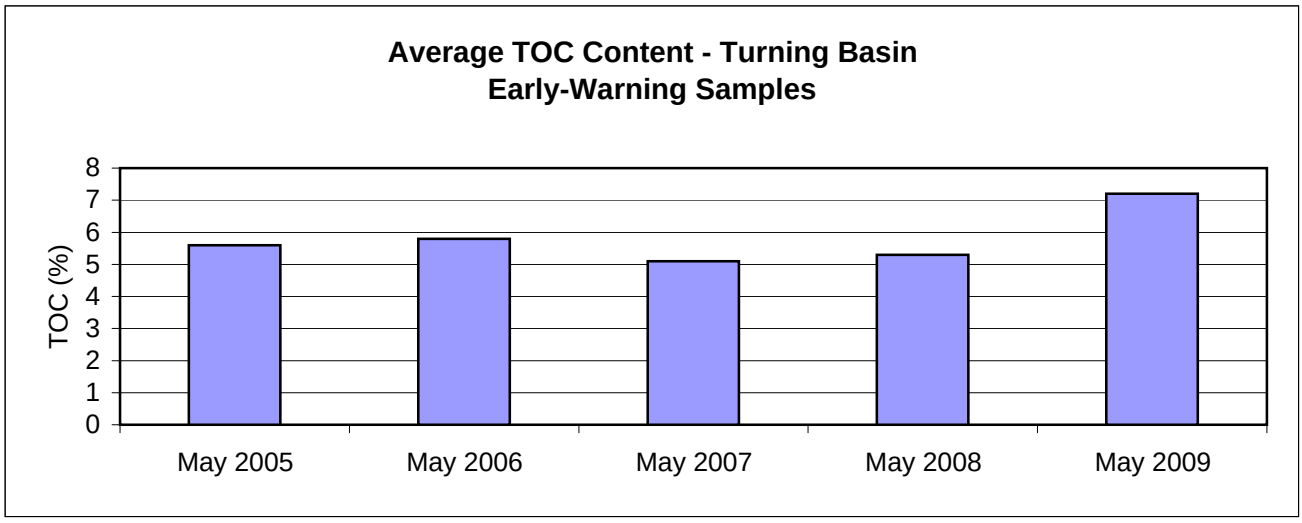
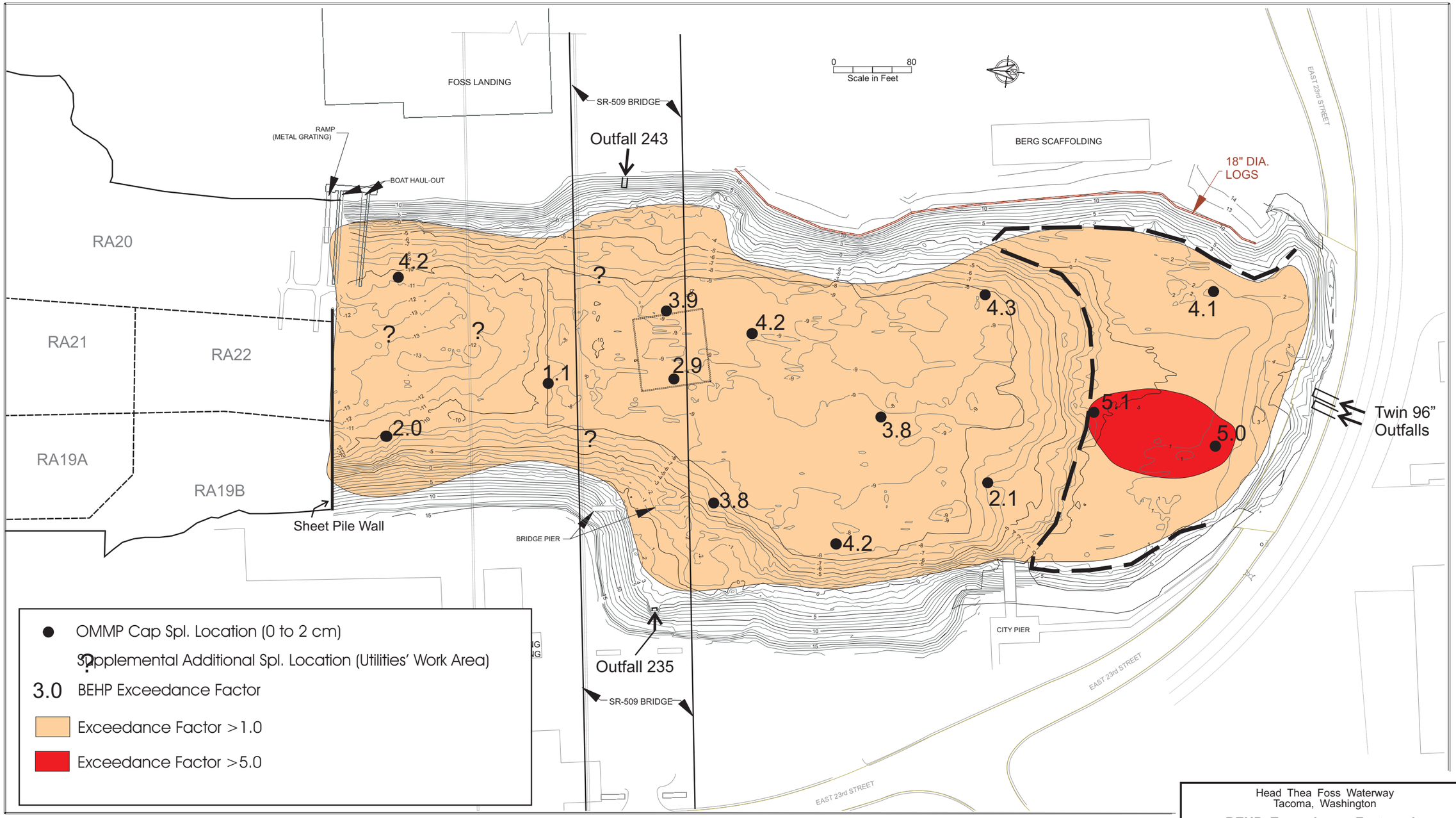


FIGURE 8
Characteristics Early Warning Sample Sediment



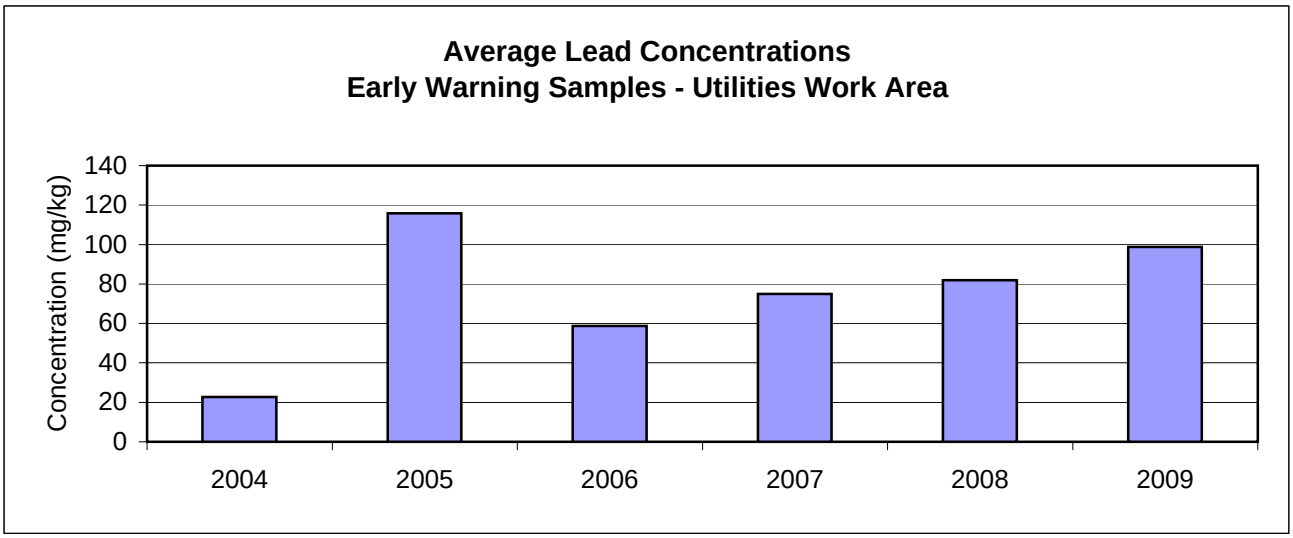
Head Thea Foss Waterway
Tacoma, Washington

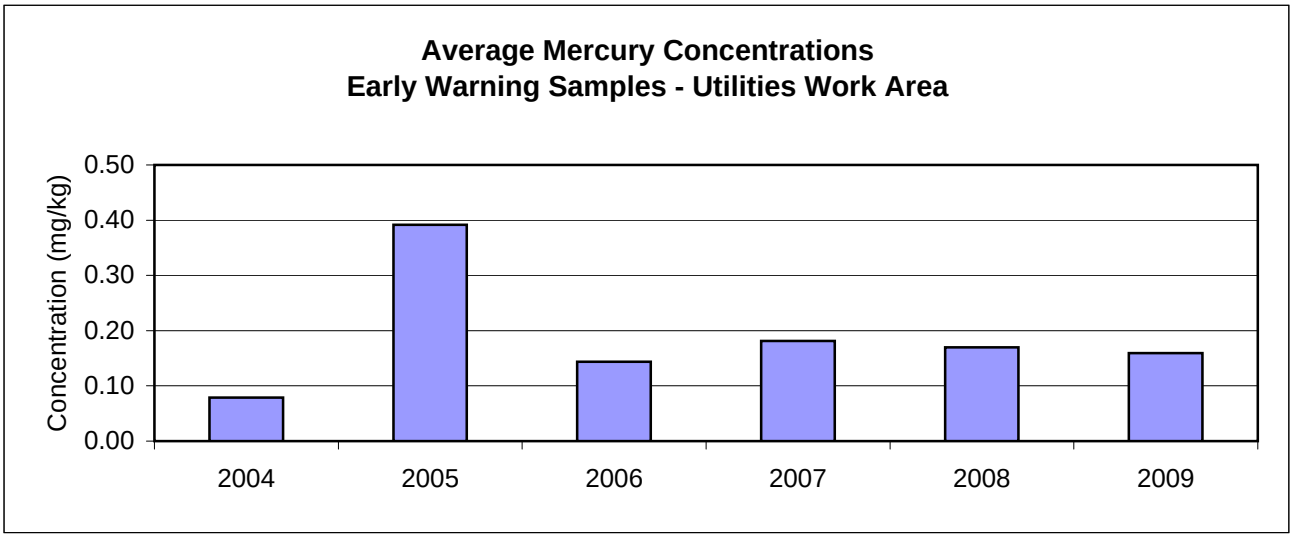
BEHP Exceedance Factors in Early Warning Sediment Samples May 2009

PAP-001-04 **FIGURE 9** July 2009

Dalton, Olmsted & Fuglevand, Inc.

Ref: Early Warning BEHP EF 5-09.cdr





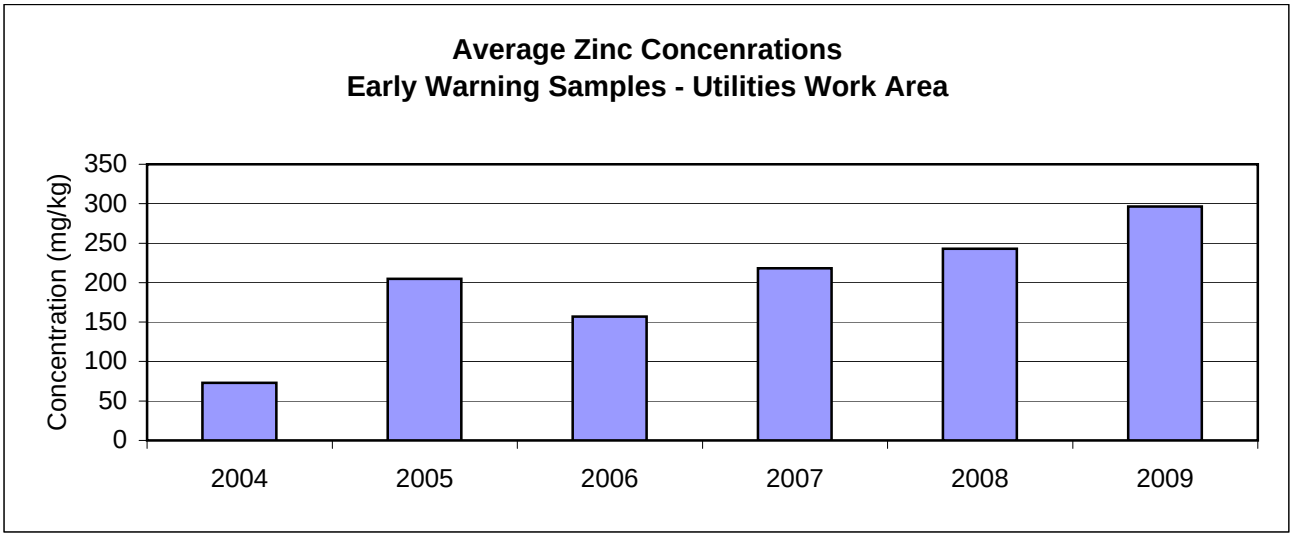
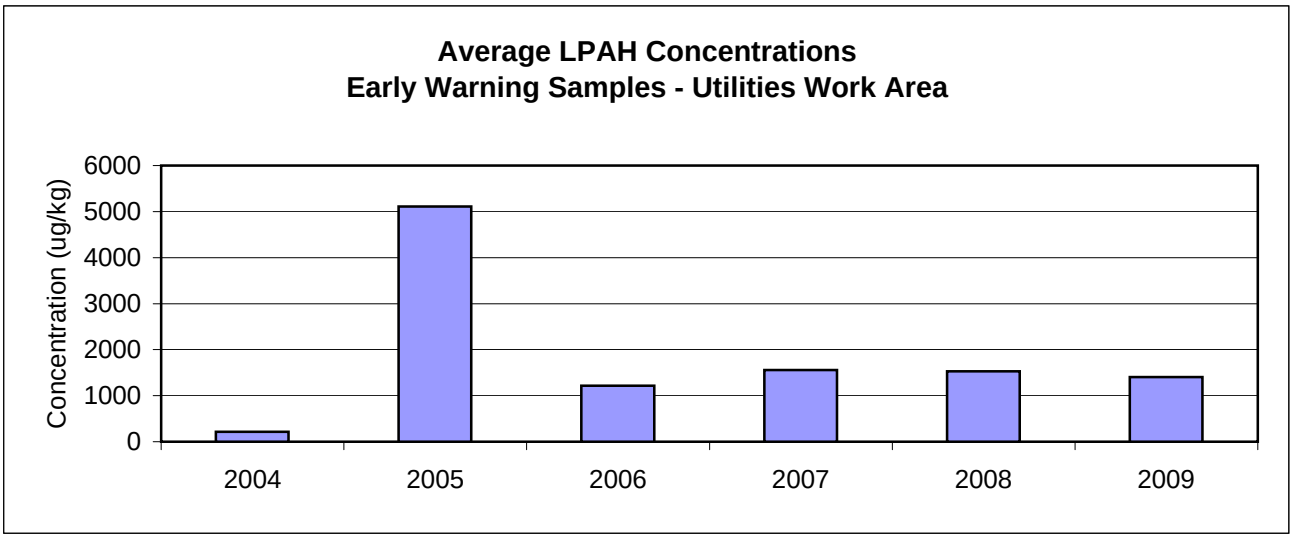
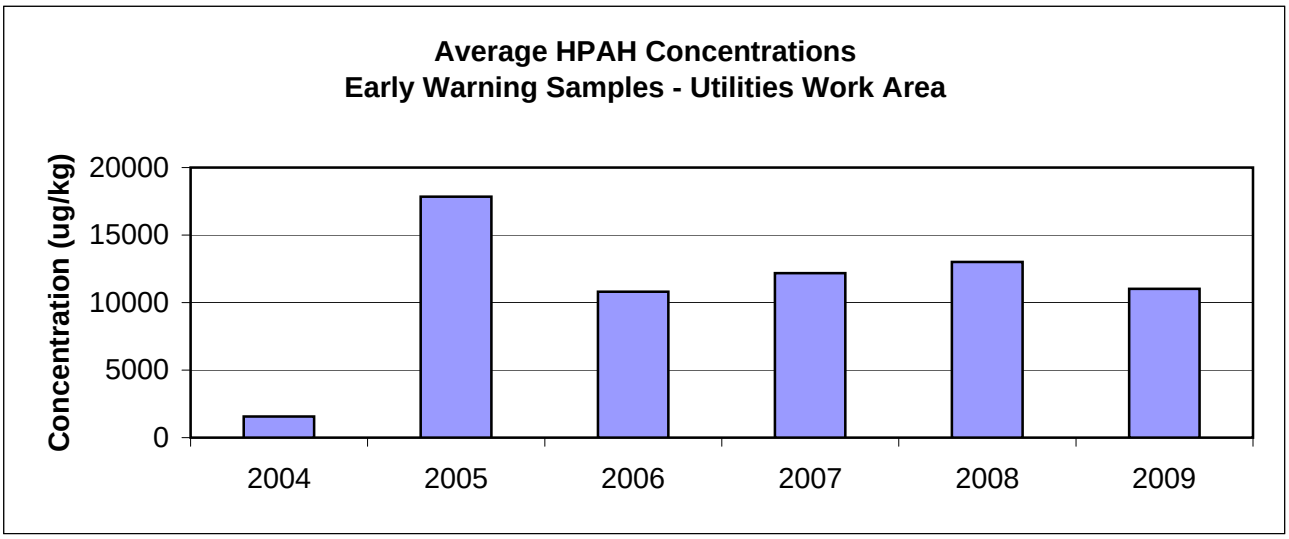


FIGURE 10
Average Concentrations
Utilities' Work Area





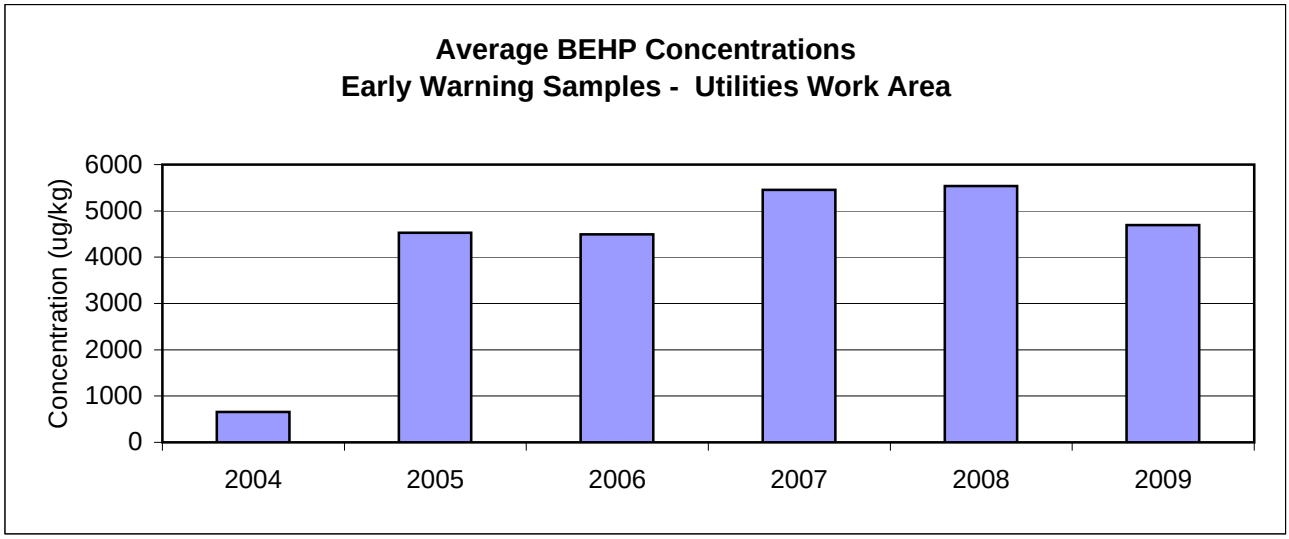
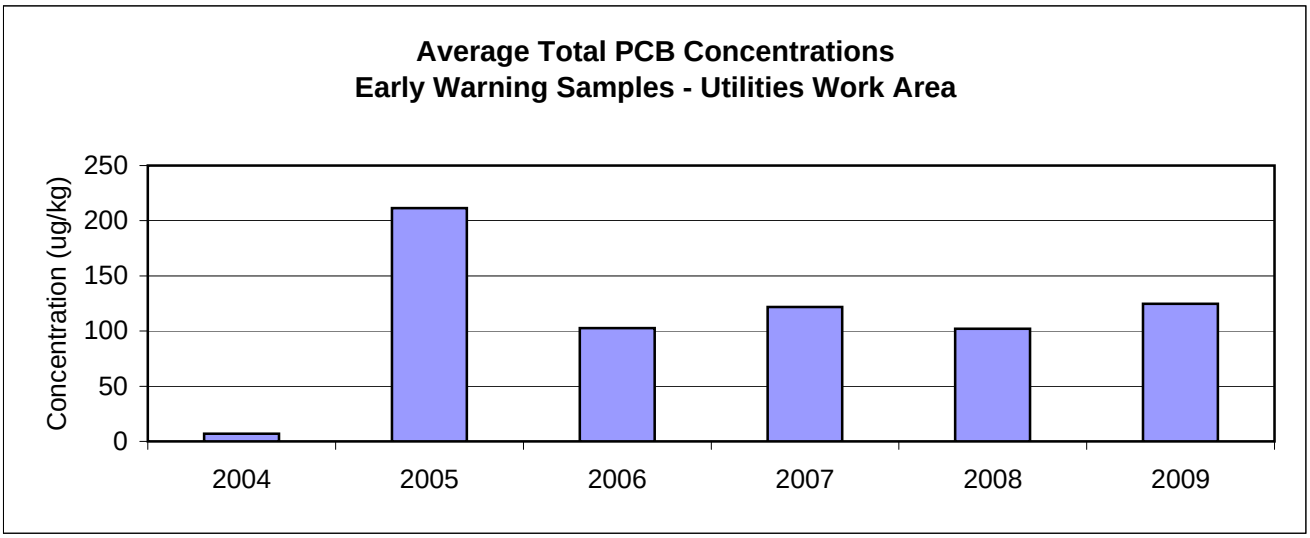


FIGURE 10
Average Concentrations
Utilities' Work Area



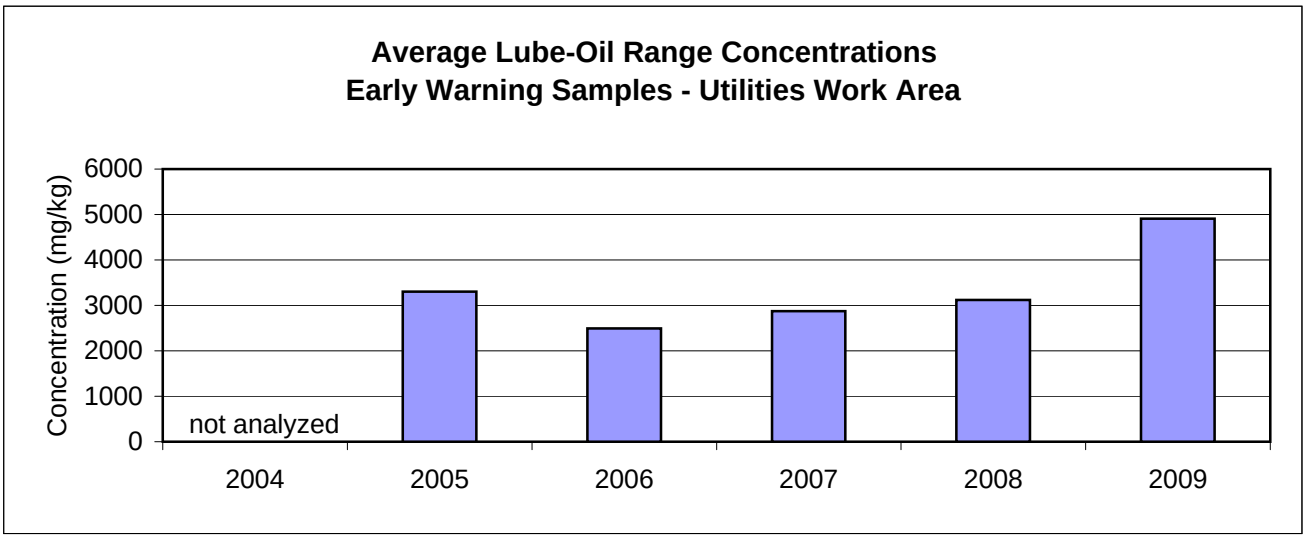
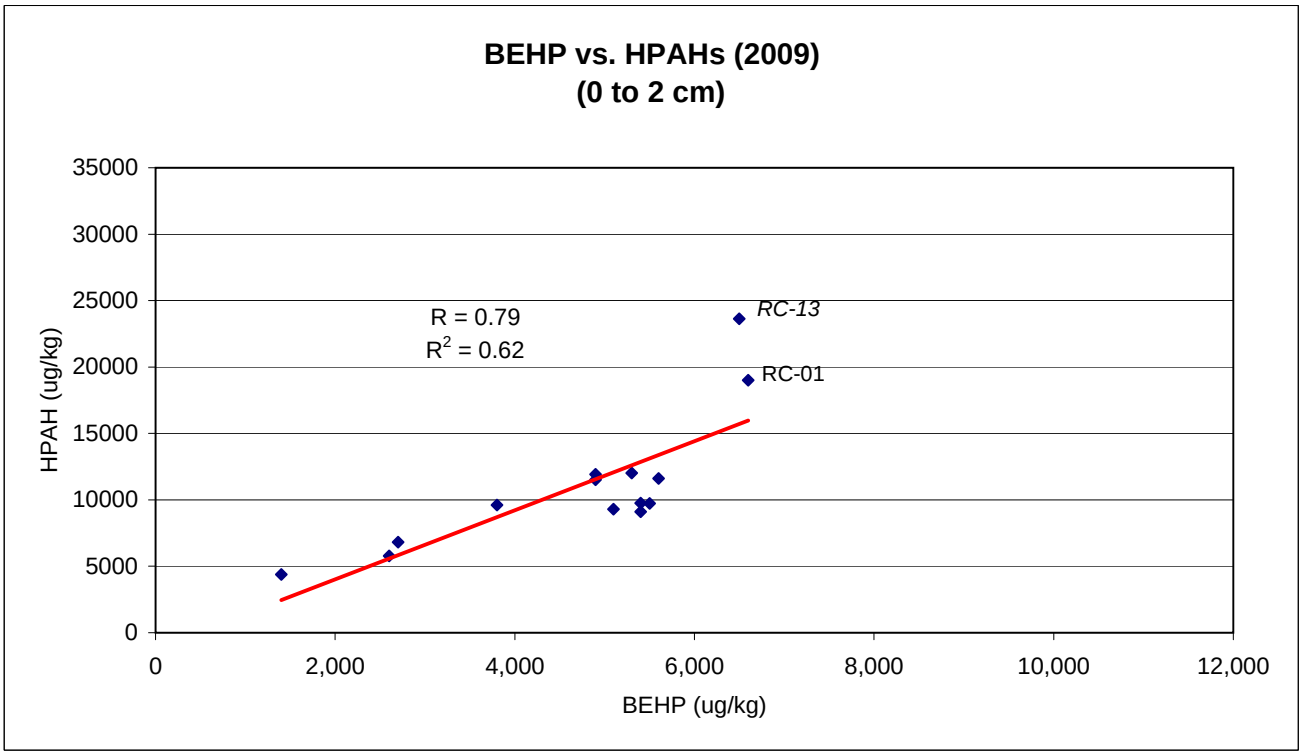


FIGURE 10
Average Concentrations
Utilities' Work Area



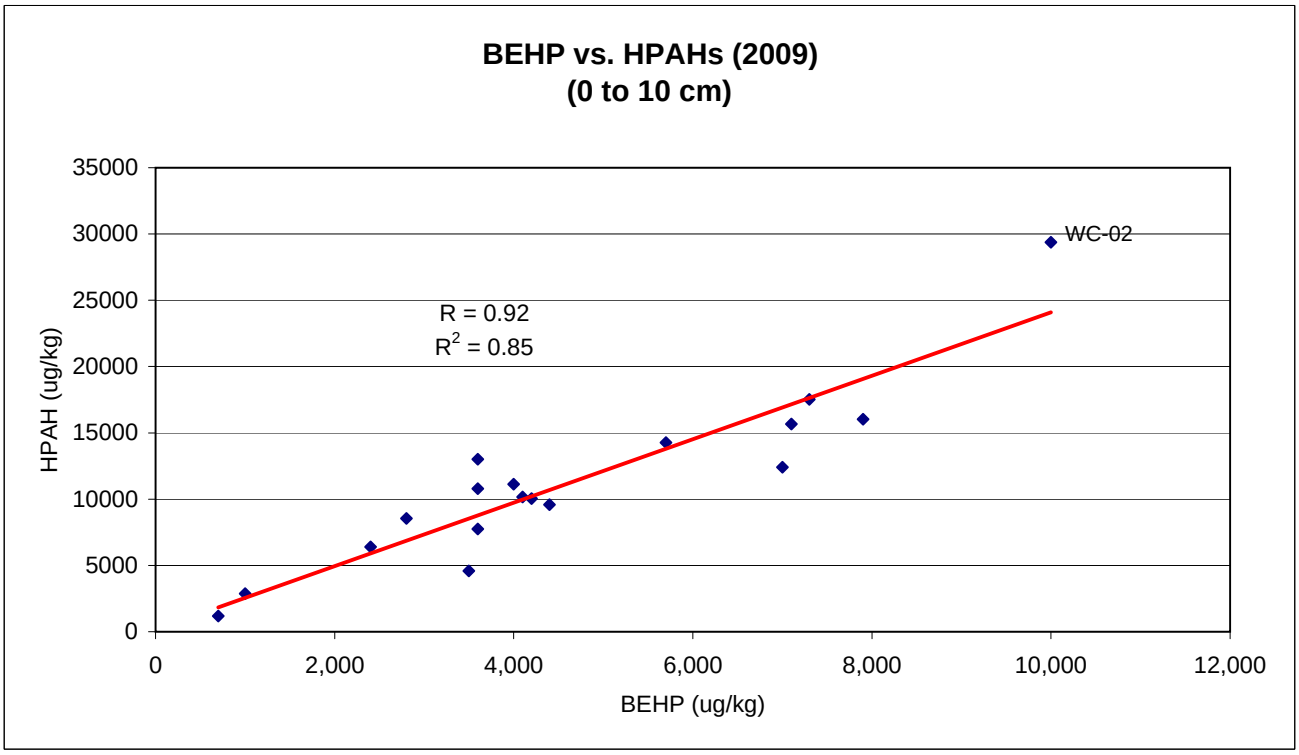
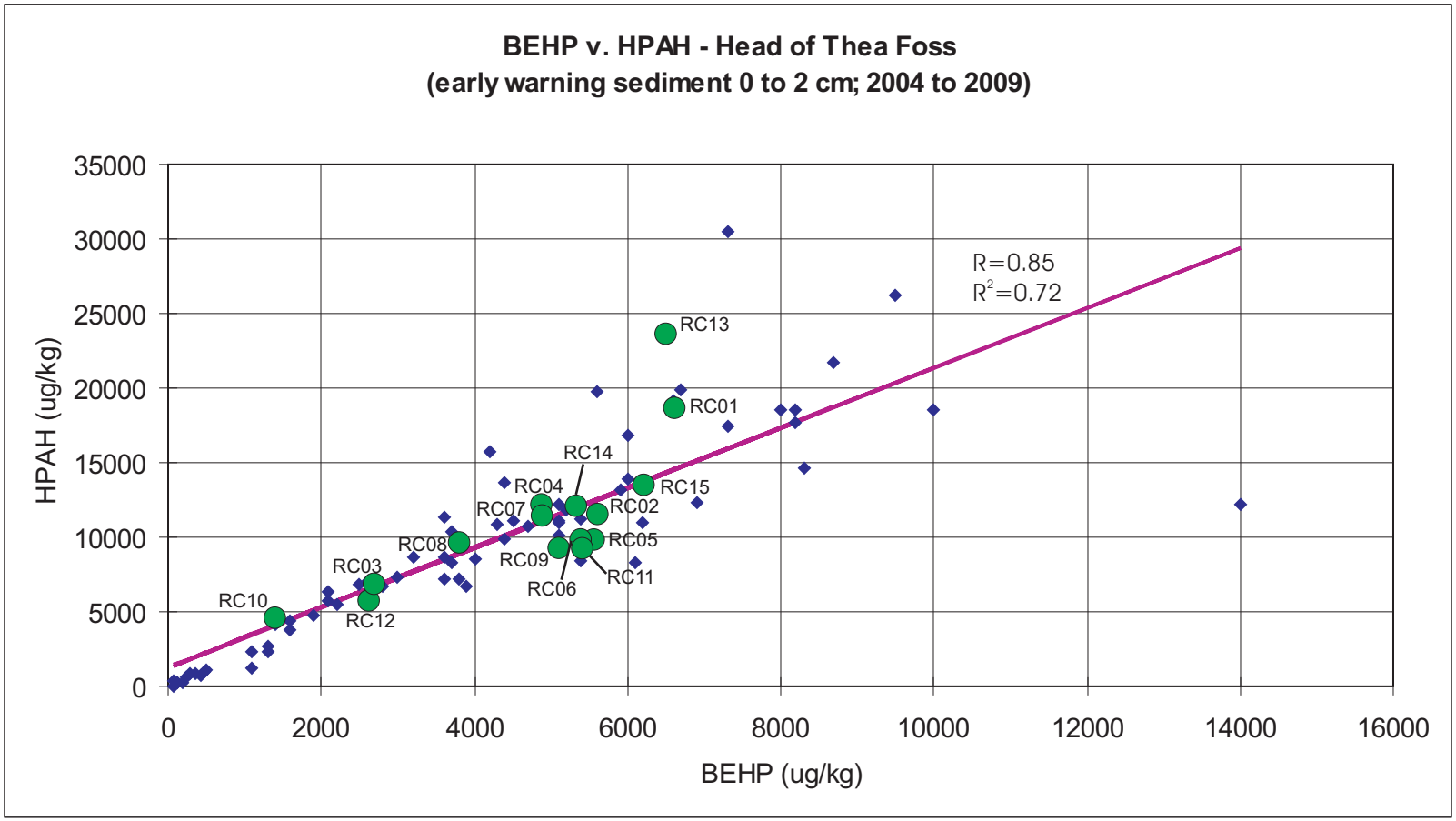


FIGURE 11
HPAH vs. BEHP - 2009



May 2009 Sample

2004 to 2008 Samples

Selected 2007 Samples

Note: Plot does not include 2005 data in City recapping Area

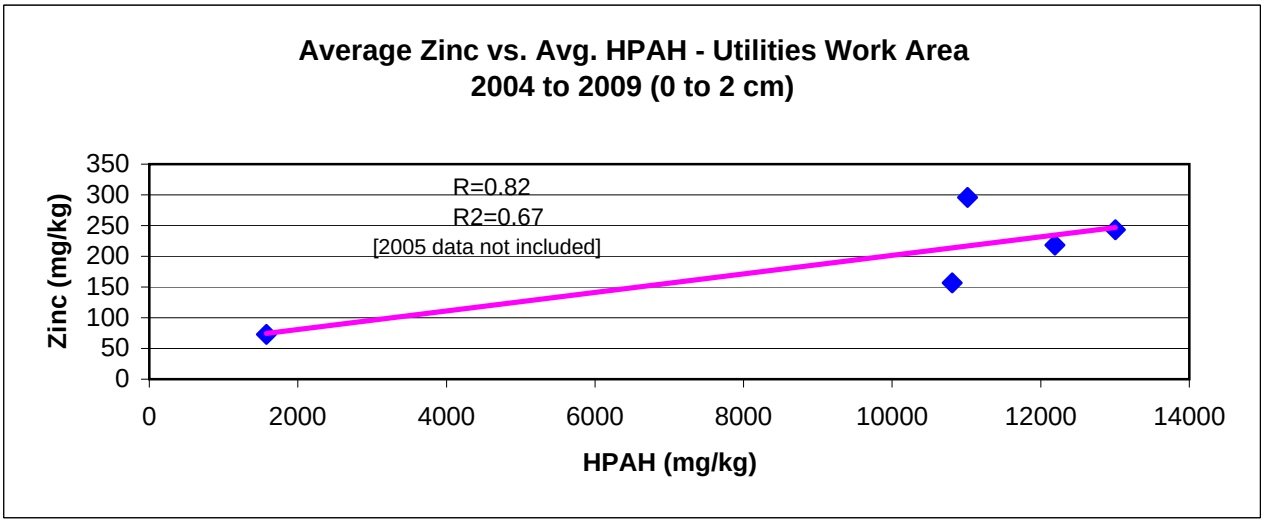
Ref: Early Warning Sediment 04 to 09.cdr

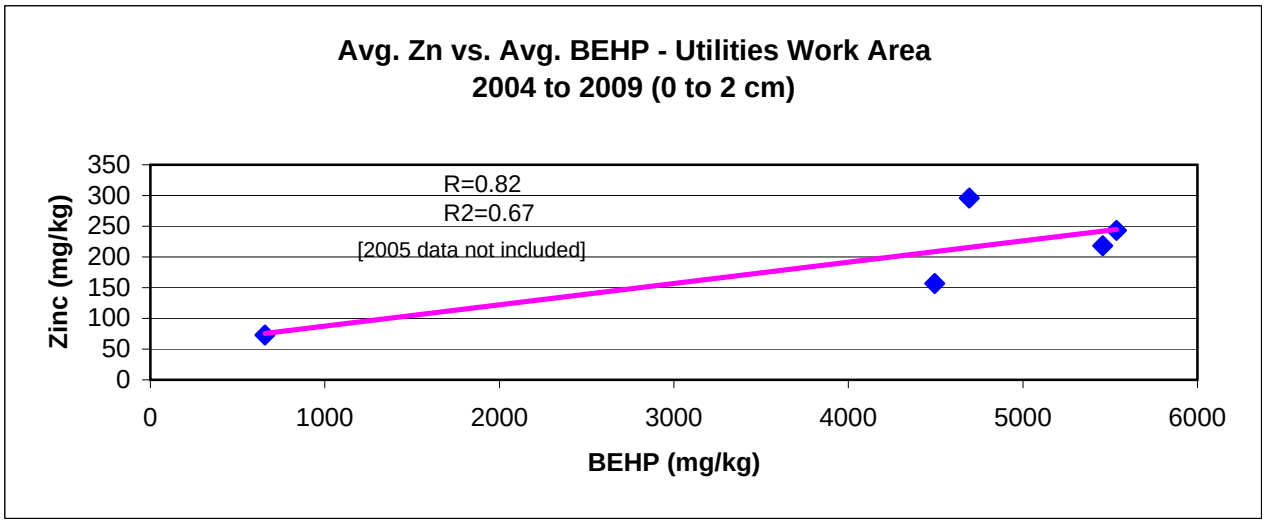
Head of Thea Foss Waterway
Tacoma, Washington

HPAH vs. BEHP Sediment Conc.
2004 to 2009 Early Warning Samples

PAP-001-04 **FIGURE 12** July 2009

Dalton, Olmsted & Fuglevand, Inc.





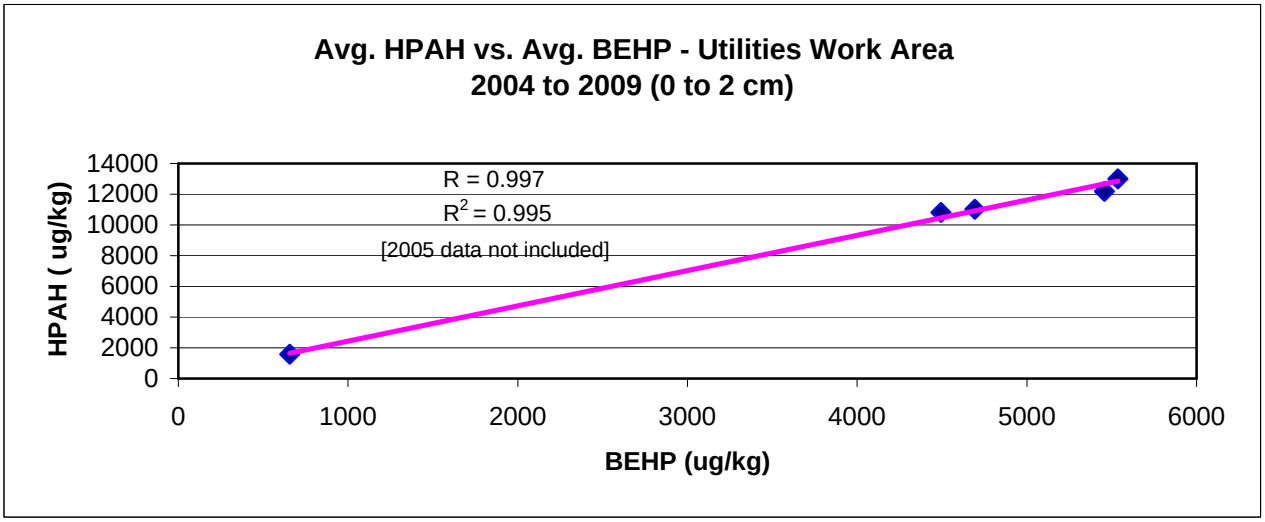
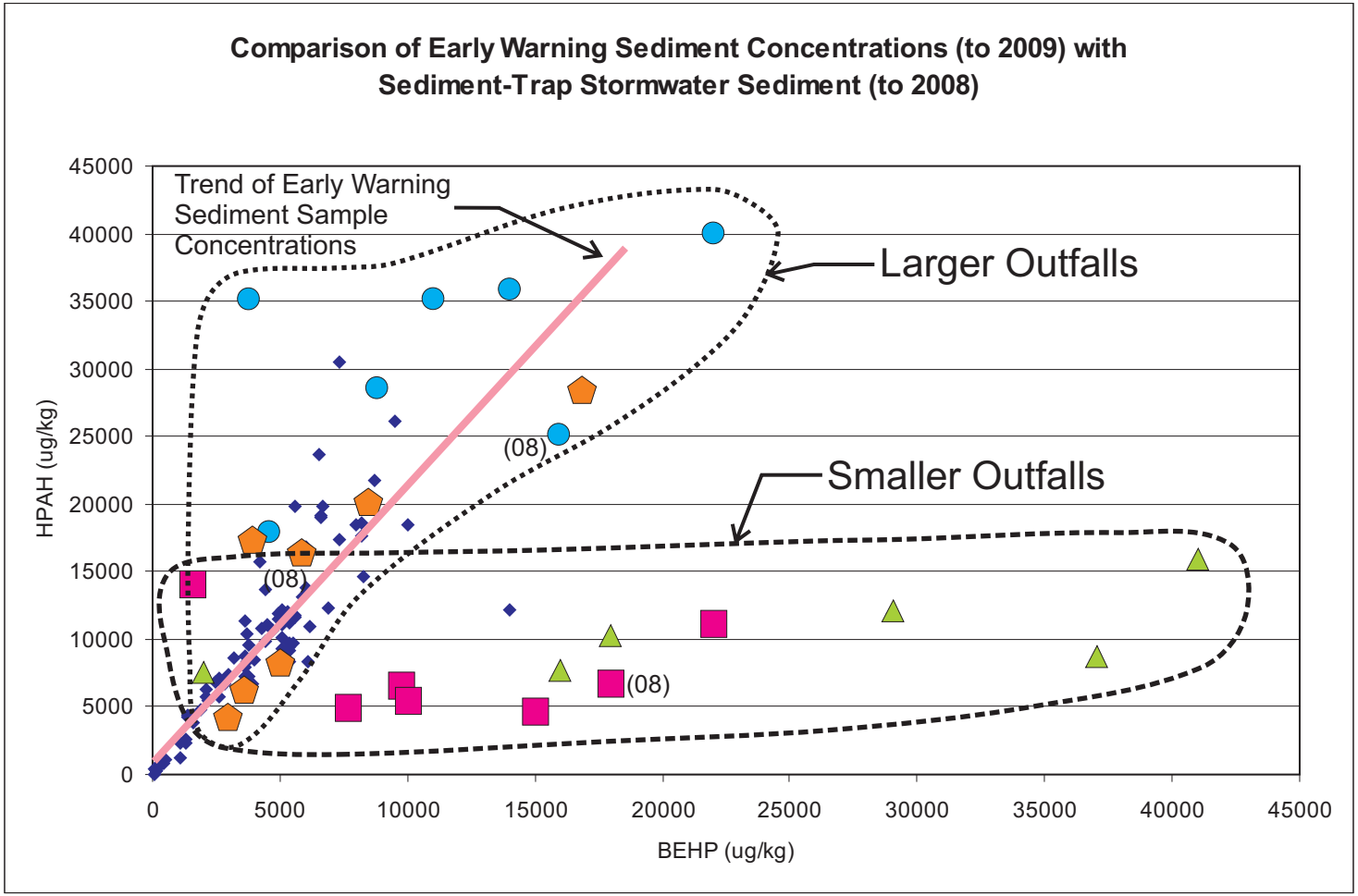


FIGURE 13
Zinc and HPAH/BEHP Comparisons



Outfalls

237A (FD2) 235 (FD6)

237B (FD1) 243 (FD23)

Early Warning Sediment Sample

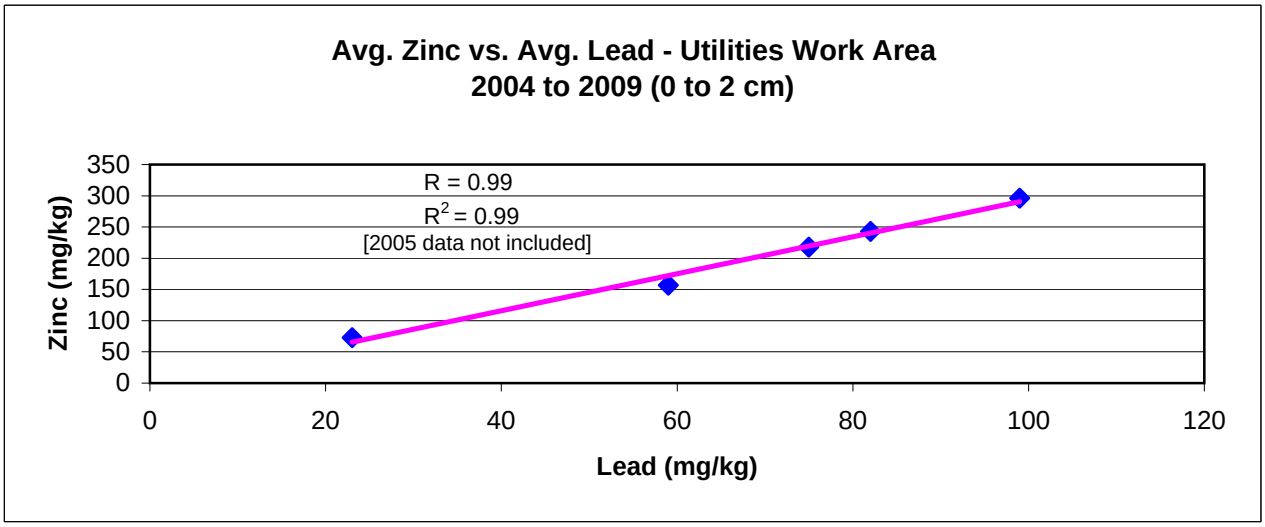
Ref: Comparison Sed w Sed Trap Thea Foss 09.cdr
(Early Warning Sediments09.xls)

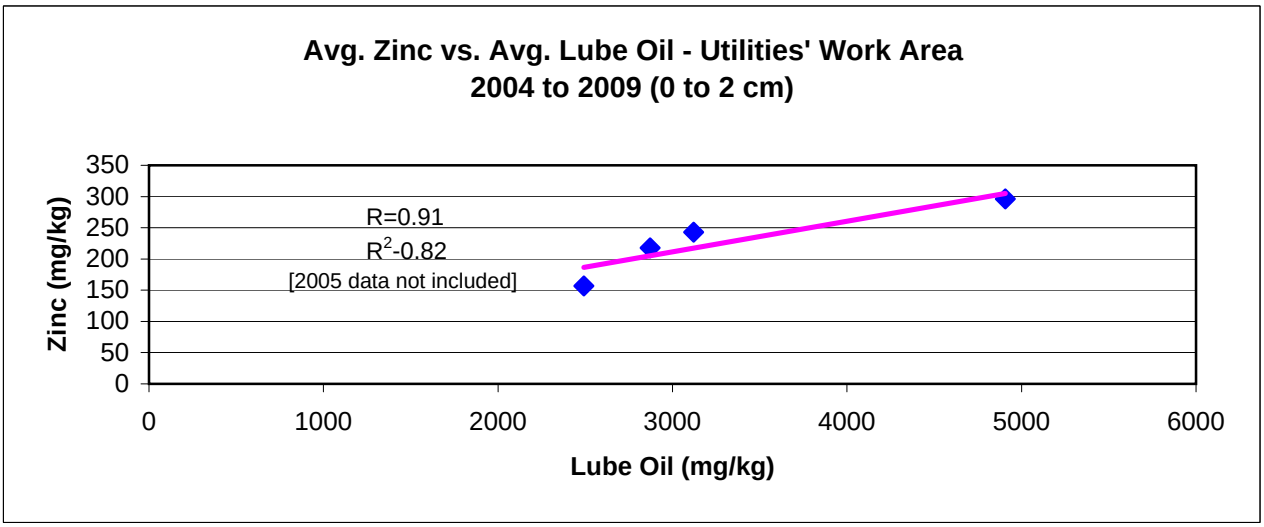
Head of Thea Foss Waterway
Tacoma, Washington

Comparison of HPAH and BEHP Sediment Conc. With Stormwater Sediment-Trap Conc.

PAP-001-04 **FIGURE 14** July 2009

Dalton, Olmsted & Fuglevand, Inc.





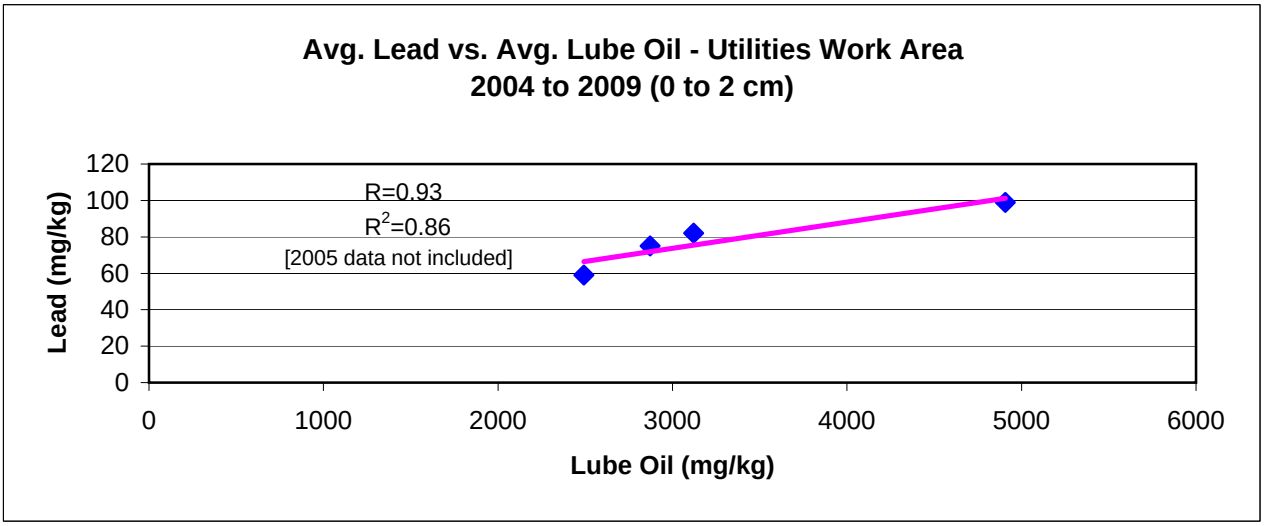


FIGURE 15
Metal and Lube Oil Comparisons