

OLYMPIC VIEW RESOURCE AREA

**YEAR 1
ANNUAL MONITORING REPORT
2003**



CITY OF TACOMA
April 20, 2004



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1.0 INTRODUCTION

This document presents the Year 1 Annual Monitoring Report for the Olympic View Resource Area (OVRA) Removal Action located in Tacoma, Washington (Figure 1). The City conducted the Year 1 physical and chemical monitoring activities in the late summer / fall of 2003.

The OVRA is located within the boundaries of the Commencement Bay Nearshore/Tideflats Superfund Site and includes approximately 12.9 acres of intertidal and subtidal area. The Removal Action involved excavation, backfilling, and capping of approximately 2.3 acres of contaminated marine sediments within the OVRA site. Chemical constituents of concern included dioxins (polychlorinated dibenzodioxins and dibenzofurans), metals (arsenic, copper, mercury, and zinc), polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs).

To evaluate alternatives for the Removal Action, the City prepared an Engineering Evaluation/Cost Analysis (EE/CA) in April 2001. The EE/CA summarized results of previous environmental investigations at the OVRA site. Following a public comment period, the EPA published an Action Memorandum in July 2001, which documented the selected alternative for the OVRA Non-Time-Critical Removal Action. Final Design Documents describing site construction activities for the Removal Action were completed in January 2002. The City completed sediment excavation and capping for the OVRA Removal Action in October 2002, and submitted a Removal Action Completion Report (RACR) to the U.S. Environmental Protection Agency (EPA) in March 2003. All design, construction, and reporting tasks for the OVRA Removal Action were completed in accordance with requirements of an Administrative Order on Consent (AOC – Docket Number CERCLA 10-2001-0069 dated July 2001) between the City and EPA. The City submitted the final Long-Term Monitoring and Reporting Plan (LMRP) to the U.S. Environmental Protection Agency (EPA) in August 2003.

2.0 PROJECT OBJECTIVES

The removal action objective for the OVRA, as described in the 2001 AOC and EPA's 2001 Action Memorandum, is to:

- Significantly reduce the potential risk to human health and/or marine ecological receptors resulting from potential exposure to contaminants present in sediments by removing and disposing of the contaminated sediment at an acceptable disposal site, or capping contaminated sediments in the project area.

The goals of the long-term monitoring program for the OVRA are to ensure that the selected cleanup action continues to be protective of human health and the environment. The specific objectives of the long-term monitoring program are to ensure that:

- The sediment cap continues to isolate toxic concentrations of previously identified chemicals of concern (COCs) in underlying sediments from marine biota and other biological receptors; and
- The sediment cap is not recontaminated with COCs from underlying sediments.

The integrity of the capped areas is fundamental to achieving these objectives. Cap integrity depends upon maintaining the designed cap thickness to avoid potential contaminant releases, and to attain the performance standards. To ensure cap integrity, monitoring activities included the following:

Physical Integrity Monitoring. Physical integrity monitoring was used to ensure that erosion is not occurring to an extent that would compromise the ability of the cap to physically isolate contaminated sediments from environmental receptors. Conventional and bathymetric transect surveys were conducted in August and November, respectively, to monitor and document any potential for erosion.

Surface Sediment Quality Monitoring. Sediment quality monitoring was conducted to confirm that contaminants are not moving upward to the top of the cap via diffusion or other transport mechanisms. Additionally, two samples (C-9 and C-10) were taken to evaluate the potential for contamination migrating from the adjacent cleanup of the Middle Waterway Problem Area.

3.0 MONITORING ACTIVITIES

3.1 Physical Integrity Monitoring

Physical integrity monitoring consists of topographic surveys (both conventional, shore based and hydrographic) and visual inspections.

Crews from the Public Works Department Survey Section, under the direction of the City's Licensed Professional Land Surveyor, conducted the conventional topographic survey transects (T1 through T4) in August 2003. The locations of these transects are shown in Appendix A, Sheet 1 of 3 and the data are listed in Table 1. These field activities were schedule around the low tide events. Shore based surveys for vertical elevation have an accuracy of +0.01 foot and, for horizontal control are accurate to +0.01 foot. Concurrently, these crews laid out the corners of the capped areas to be sampled and shot the actual locations of sample grabs.

Environmental professionals from the Science and Engineering Division conducted visual inspections concurrently with the surface sediment monitoring effort during the same period in August 2003.

Manson Construction Company conducted hydrographic survey transects (T5 and T6) over Area E under the direction of KPFF Consulting Engineers in November 2003. The locations of these transects are shown in Appendix A, Sheet 1 of 3 and the data are listed

in Table 2. Experienced crews performed this activity in accordance with the LMRP and the standards given in the following technical reference:

Engineer Manual 1110-2-1003 (1 January 2002) "Engineering and Design - Hydrographic Surveying," prepared by the Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. 20314-1000

Survey equipment included Electronic Positioning System (EPS) for horizontal control and a high resolution depth sounder with radio tide gauge for vertical control. Accuracy standards are ± 0.25 feet in the vertical and ± 3.0 feet in the horizontal.

3.2 Surface Sediment Quality Monitoring

The LMRP requires surface sediment chemistry sampling to ensure the cap continues to isolate toxic concentrations of previously identified chemicals of concern (COCs) in underlying sediments and that the cap is not recontaminated with COCs from underlying sediments. The samples and analyses called out in the LRMP for year 1 sediment chemistry monitoring are listed in Table 3.

Sampling for surface sediment chemistry was accomplished on August 11, 2003. The field effort was conducted at low tide and all sample grabs were obtained in the dry from the beach at an extreme low tide. City survey crews and environmental samplers coordinated to locate the required sampling grids, obtain the grab samples and record the locations of the grab samples. Sampling techniques were consistent with the requirements of the LRMP. Each sample was the composite of three individual grab samples from within the each sampling grid (i.e. grabs A-1A, A-1B & A-1C were composited to form sample A-1). These sample locations are shown in Appendix A, on Sheet 1 of 3 and are listed in Table 4. Qualitative sample characteristics were recorded for each sample and these forms are presented in Appendix B.

Samples were transported under chain of custody to the City's Environmental laboratory for analysis. Subsequently, analyses for Total Metals (except mercury), PCBs and Dioxins were farmed out to Washington State Department of Ecology - accredited commercial laboratories. All analyses were conducted in accordance with the LMRP.

In addition to the field samples listed in Table 3, several Quality Control samples were collected in the field as well. Sample A-D is a field duplicate of sample A-1, and sample B-D is a field duplicate of sample B-2. Duplicates were submitted as separate samples to the lab for analysis. An equipment rinseate blank was collected in the field by rinsing sampling equipment with deionized water. The rinseate water was submitted to the lab for analysis of all constituents.

4.0 MONITORING RESULTS

4.1 Physical Integrity Monitoring Results

Results of survey transects are presented in Table 1 and graphically depicted in Appendix A Sheets 2 and 3 of 3. Early warning levels are set at a loss of cap material of 0.5 feet between the as-built survey and the monitoring results in Areas A, B, and D and again at a loss of 1 foot of material in these areas. The early warning value is set at the loss of 1 foot of cap material in area E. Early warning levels are not performance standards, but are set at more stringent levels to assess whether performance standards could be exceeded in the future. The performance standards are set at minimum cap thickness in Table 1 of the LMRP. The performance standard is defined as a loss of 0.5 feet in Area C-5.

The survey monitoring results show that there has been no exceedance of the Performance Standards.

There are isolated instances of some exceedance of the early warning values in capped areas B and E. These areas will be carefully monitored in future events to ensure that they do not approach the performance standards.

At the northern edge of the Area B (near the boundary with Area C-2) along Transect 1 the surface elevation is lower by greater than 0.5 feet but less than 1.0 feet. The cap thickness in this area remains substantially greater than the 32 inch performance standard. The possible reasons for the change include:

- The as built elevation is based on contoured data that contains interpolations and is essentially an average value, while the monitoring data is a discrete survey point. Therefore, some of the difference may be ascribed to the comparison of a discrete elevation point to an average, contoured elevation. Future conventional survey monitoring events will re-establish the same discrete points for a direct comparison with Year 1 monitoring data.
- There may be some settling of the cap material or the under lying material. This is not likely given the fairly consistent elevations in other areas that received a similar loading of new material.
- There could be some erosion. If this is the case, it would appear to be an isolated occurrence and of limited extent. The visual inspections of this area did not note any evidence of rills, sloughing, or other indications of surface erosion.
- Survey accuracy is +/- 0.01 feet in the horizontal and the vertical.

In the two transects through Area E (Transects 5 & 6), the thicknesses were determined by overlay of the as-built drawing on top of the pre-existing contours and conducting a point wise comparison, as shown in Table 2. There are a couple of instances where the

mudline is lower by more than 1 foot from the as-built elevation. The cap thickness in these areas remains substantially greater than the performance standard of 33 inches. Cap thickness in these areas ranges from 48 to 60 inches (4 to 6 feet). The possible reasons for the change include:

- These areas have particularly thick caps and there could be some settling of the cap material or the underlying sediments.
- Transect 6 skirts the top of a steep subtidal slope and some of the cap material may have moved down the slope.
- Survey accuracy is +/- 3 feet in the horizontal and +/- 0.25 feet in the vertical.

Visual inspections were conducted during July and August of 2003. Photos and notes from the inspections are presented in Appendix C. Areas with erosion protection material were probed to confirm the presence of this larger rock. The erosion protection material appears to have remained stable and is covered with a sandy gravel – likely the habitat mix from the construction activities. The erosion protection material is estimated to be several inches thick, with a minimum of 3 to 4 inches. It appears from the visual inspections that the erosion protection material coverage is similar to the post construction condition. There are no apparent signs of significant erosion. It was noted that there may be accumulations of storm surge at the high water mark above Area A.

While there have been some early warning value exceedances, there have been no exceedances of the performance standards for physical integrity monitoring. Therefore the removal action has been successful in the physical isolation of contaminated sediments from environmental receptors.

4.2 Surface Sediment Quality Monitoring Results

Laboratory results from the sampling described in Section 3.2 are presented in Table 5. None of the analytes have exceeded the early warning values or the performance standards. Laboratory analysis was conducted according to the provisions of Appendix A of the LMRP. The data reports, QA/QC information and data validation reports for the Year 1 monitoring samples are presented in Appendix D of the report. Data was of an acceptable quality.

Arsenic and copper analyses in Areas A-1, A-2, C-9 and C-10 were all non-detect. All other metals concentrations were less than 15% of the OVRA Sediment Quality Criteria (SQC), provided in Table 2 of the LMRP. All PCB analyses were non-detect. Dioxin Toxic Equivalents (TEQs) ranged from 0.2 to 0.7 ng/Kg, substantially less than the SQC of 20 ng/Kg. TEQs were calculated from the individual congener concentrations using the Toxic Equivalence Factors developed by the World Health Organization [Van den Berg, et al. (1998). Toxic Equivalency Factors (TEFs) for PCBs, PCDDs, PCDFs for Humans and for Wildlife. Environmental Health Perspectives 106, 775.]

All chemical concentrations are non-detect or very low level. Therefore, sediment quality monitoring has confirmed that contaminants are not moving upward to the top of the cap via diffusion or other transport mechanisms. Additionally, the metals data for sample grids C-9 and C-10 provide baseline information and at this time do not show potential cross-contamination from Middle Waterway cleanup activities.

5.0 CONTINGENCY PLANNING AND RESPONSE

Year 1 monitoring results have confirmed the success of the removal action at the OVRA. However, as a result of the exceedance of the early warning values in Transect 1, the City will, at the request of EPA, re-survey this transect in April, 2004 and establish a new transect (Transect 0) approximately 50 feet to the west of Transect 1. This new transect will be monitored in future years, consistent with the schedule for Physical Integrity monitoring set forth in the LMRP.

At the request of EPA, the photographs taken in subsequent years will include a minimum of one close-up photograph in each of the areas with erosion protection material, and a minimum of two close-up photographs of capped areas with the intent to show grain size characteristics.

6.0 SITE ACCESS AND INSTITUTIONAL CONTROLS

6.1 DNR Environmental Reserve

The Washington State Department of Natural Resources (DNR) is re-evaluating the status of this site as an Aquatic Environmental Reserve, removed from leasing under RCW 79.68.060. If that withdrawal is rescinded by order of the Commissioner of Public Lands, then DNR will simultaneously invoke a new order that withdraws the OVRA project area from leasing under RCW 79.90.460. This withdrawal is intended to protect regionally valuable aquatic resources from further commercial use and potential development or commercial leasing.

6.2 Public Access, Signage and Buoy Markers

The City informed the Coast Guard, EPA and DNR on October 30, 2003 that one of the Private Aids to Navigation (PATON) demarcating the Restricted Navigation Area had been torn loose from its anchorage. The City contracted with Global Diving and Salvage to reinstall the Buoy, which was completed on November 26, 2003.

The public information sign identified in Appendix B and on Figure 6 of the LMRP was installed in January 2004. The four, smaller public access signs have also been installed.

6.3 Derelict Vessels

The two derelict vessels (the Cactus and the Victoria M) that were moored at this site have been removed. The City posted the vessels in accordance with the Washington State Derelict Vessel Act (RCW 79.100) on September 23, 2003, with notice of its intent to take possession of the vessels on October 27, 2003. The City followed the provisions of this act, notifying known registered owners and placing public notices in the newspapers.

On October 26, 2003, the Cactus was towed to the eastern shore of Maury Island in King County – outside of the City's jurisdiction. The DNR was notified of the move and is now tracking the vessel.

On October 28, 2003, the Victoria M was towed away from the site. On October 29, 2003, the piling that these vessels had been moored to were removed under the City's Thea Foss remedial action contract with Manson Construction and in accordance with the Interim Water Quality Certification #3 from EPA.

Table 1 Conventional Survey Transect Elevations (in feet unless otherwise noted)

Transect	Capped Area	As built Elevation	Year 1 Monitoring	Diff. ¹ (feet)	> Early Warning	Post-constr Cap thickness ²	Min Design Cap ³	>Perf Std
T1	B	6.8	7.8	1.0	No			
T1	B	4.8	5.2	0.4	No			
T1	B	3.0	2.8	-0.2	No			
T1	B	1.8	0.9	-0.9	Yes	55 inches	32 inches	No
T1	No Cap	1.0	0.7	-0.5				
T1	No Cap	0.6	0.5	-0.1				
T1	No Cap	0.3	0.4	0.1				
T1	No Cap	-0.1	0.2	0.3				
T1	No Cap	-0.2	-0.1	0.1				
T1	No Cap	-0.5	-0.7	-0.2				
T1	No Cap	-1.0	-1.0	0.0				
T1	No Cap	-0.9	-1.5	-0.7				
T2	No Cap	13.1	13.5	0.4				
T2	No Cap	11.3	10.6	-0.7				
T2	No Cap	7.3	7.6	0.3				
T2	No Cap	4.5	4.6	0.1				
T2	No Cap	3.1	3.0	-0.1				
T2	D	2.3	2.2	-0.1	No			
T2	D	2.0	1.8	-0.2	No			
T2	D	1.0	1.0	0.0	No			
T2	No Cap	0.1	-0.3	-0.4				
T2	No Cap	-1.7	-1.2	0.5				
T3	A	15.0	14.9	-0.1	No			
T3	A	12.3	12.3	0.0	No			
T3	A	9.4	9.6	0.2	No			
T3	A	8.2	8.3	0.1	No			
T3	A	6.4	6.3	-0.1	No			
T3	No Cap	4.5	4.4	-0.1				
T3	D	2.5	2.5	0.0	No			
T3	D	1.8	1.9	0.1	No			
T3	C5	1.3	0.9	-0.4	No			
T3	C5	0.5	0.1	-0.4	No			
T3	C5	0.0	-0.1	-0.1	No			
T4	A	14.5	14.6	0.1	No			
T4	A	11.6	11.5	-0.1	No			
T4	A	8.3	8.3	0.0	No			
T4	A	6.3	6.4	0.1	No			
T4	No Cap	4.2	4.0	-0.2				
T4	No Cap	2.3	2.6	0.3				
T4	No Cap	1.8	1.6	-0.2				
T4	No Cap	1.5	1.3	-0.2				
T4	No Cap	1.2	1.3	0.1				
T4	No Cap	0.7	1.1	0.4				
T4	No Cap	0.2	0.5	0.3				
T4	No Cap	0.1	-0.2	-0.3				

1 - Survey accuracy is +/- 0.01 feet in the horizontal and the vertical.

2 - Estimated post construction cap thickness in inches.

3 - Minimum design cap thickness from Table 1 of the LMRP, in inches.

Table 2 Hydrographic Survey Transect Elevations (in feet unless otherwise noted)

Transect	Capped Area	As built Elevation	Year 1 Monitoring	Diff. ¹ (feet)	> Early Warning	Post-constr Cap thickness ²	Min Design Cap ³	>Perf Std
T5	No Cap	-2.0	-3.0	-1.0				
T5	E	-1.0	-1.5	-0.5	No			
T5	E	-3.5	-3.5	0.0	No			
T5	E	-2.9	-2.5	0.4	No			
T5	E	-4.0	-5.1	-1.1	Yes	82 inches	33 inches	No
T5	E	-4.0	-4.0	0.0	No			
T5	E	-4.0	-5.1	-1.1	Yes	48 inches	33 inches	No
T5	E	-3.6	-3.5	0.1	No			
T5	No Cap	-2.8	-3.2	-0.4				
T6	No Cap	-4.1	-5.1	-1.0				
T6	E	-4.0	-3.6	0.4	No			
T6	E	-4.4	-4.0	0.4	No			
T6	E	-5.0	-5.6	-0.6	No			
T6	E	-5.0	-6.9	-1.9	Yes	102 inches	33 inches	No
T6	E	-5.0	-4.6	0.4	No			
T6	E	-3.2	-3.7	-0.5	No			
T6	E	-3.0	-3.8	-0.8	No			
T6	No Cap	-3.0	-3.4	-0.4				

1 - Survey accuracy is +/- 3 feet in the horizontal and +/- 0.25 feet in the vertical.

2 - Estimated post construction cap thickness in inches.

3 - Minimum design cap thickness from Table 1 of the LMRP, in inches.

Table 3 Samples and Analyses

Sampling Area	Analyses
A-1	Arsenic, Copper, Lead, Mercury and Zinc
A-2	Arsenic, Copper, Lead, Mercury and Zinc
B-1	PCBs and Dioxins
B-2	PCBs and Dioxins
C-5	Dioxins
C-9	Arsenic, Copper, Mercury and Zinc
C-10	Arsenic, Copper, Mercury and Zinc
D-1	Dioxins
E-1	Dioxins

Table 4 Grab Sample Locations

Grab Sample	Northing	Easting	Elevation
A-1A	709490.8	1160171.6	7.8
A-1B	709462.1	1160182.7	11.6
A-1C	709463.4	1160136.8	7.9
A-2A	709535.5	1160235.8	7.3
A-2B	709507.8	1160249.8	11.2
A-2C	709540.8	1160271.1	9.1
B-1A	709313.6	1160015.4	7.9
B-1B	709347.0	1160031.8	5.6
B-1C	709342.4	1159996.8	3.6
B-2A	709295.2	1159983.5	7.8
B-2B	709281.3	1159935.4	5.8
B-2C	709318.2	1159940.8	2.6
C-10A	709653.7	1160252.2	2.8
C-10B	709683.1	1160246.5	1.7
C-10C	709693.0	1160270.6	1.8
C-5A	709582.1	1160075.1	0.4
C-5B	709557.1	1160050.4	-0.3
C-5C	709555.0	1160094.5	1.8
C-9A	709724.5	1160188.4	-0.7
C-9B	709720.8	1160206.2	-0.4
C-9C	709699.2	1160187.2	0.1
D-1A	709528.5	1160095.5	1.8
D-1B	709496.8	1160066.9	1.8
D-1C	709479.5	1160088.1	3.2
E-1A	709618.6	1159978.4	-1.1
E-1B	709639.9	1159929.5	-1.3
E-1C	709624.9	1159998.0	-1.5

Table 5 Surface Sediment Chemistry Data

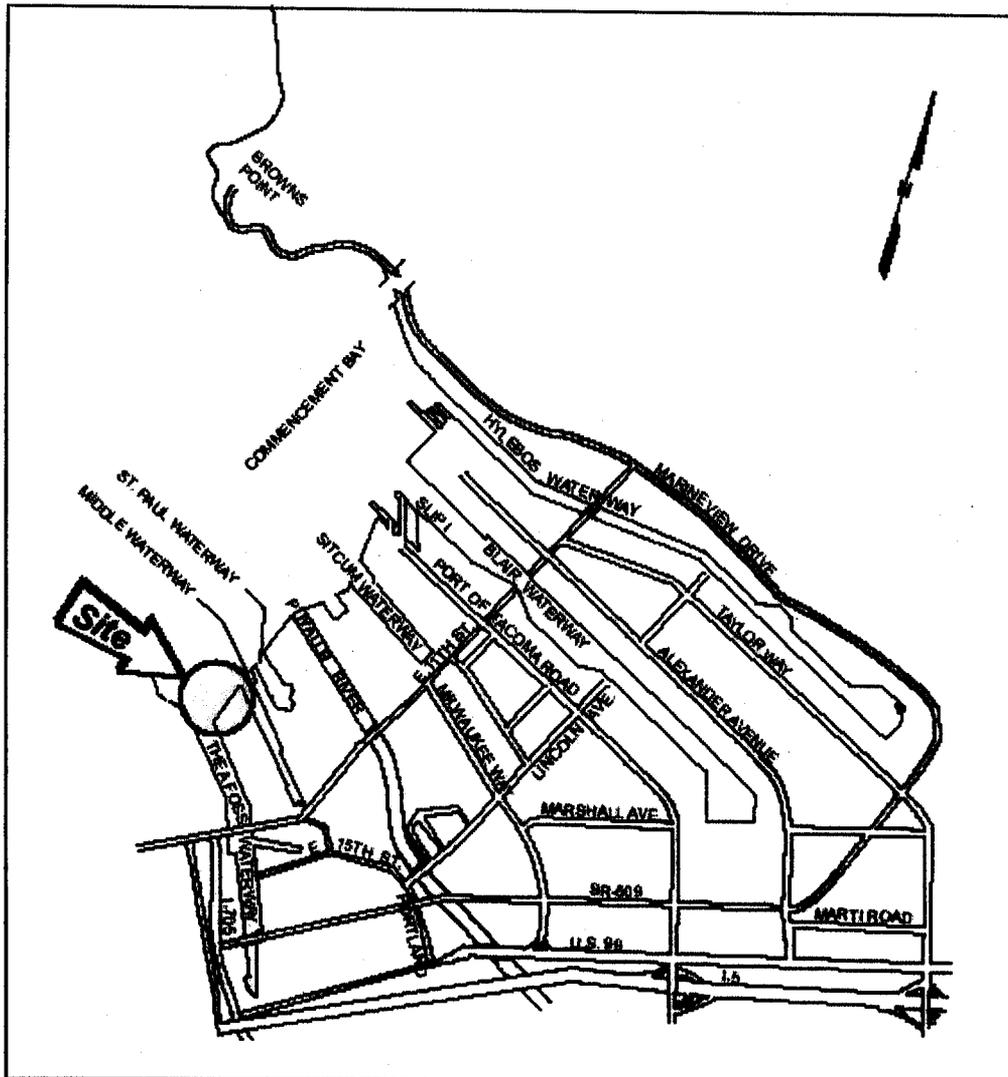
Constituents	Station Name											
	OVRA	A-1 0-10cm	A-1 Dup 0-10cm	A-2 0-10cm	B-1 0-10cm	B-2 0-10cm	B-2 Dup 0-10cm	C-5 0-10cm	C-9 0-10cm	C-10 0-10cm	D 0-10cm	E-1 0-10cm
Metals (mg/kg)												
Arsenic	57	4.4 U	4.3 U	4.8 U					4.8 U	4.6 U		
Copper	390	17.5 UJ	15.5 UJ	43.4 UJ					15.4 UJ	14.7 UJ		
Lead	450	3.5 U	3.4 U	6.7								
Mercury	0.41	0.0125	0.0326	0.0338					0.0596	0.0405		
Zinc	410	21.9	25.0	37.6					14.4	21.2		
PCBs (ng/kg)												
PCB 1016					97 U	100 U	100 U					
PCB 1221					190 U	200 U	200 U					
PCB 1232					97 U	100 U	100 U					
PCB 1242					97 U	100 U	100 U					
PCB 1248					97 U	100 U	100 U					
PCB 1254					97 U	100 U	100 U					
PCB 1260					97 U	100 U	100 U					
(see note) Total PCBs	300				190 U	200 U	200 U					
Dioxins / Furans (ng/Kg)												
2,3,7,8 - TCDD					0.083 U	0.041 U	0.047 U	0.059 U			0.042 U	0.04 U
1,2,3,7,8 - PeCDD					0.14 J	0.1 J	0.082 U	0.18 J			0.12 J	0.084 J
1,2,3,4,7,8 - HxCDD					0.084 U	0.12 J	0.1 U	0.26 J			0.12 U	0.081 J
1,2,3,6,7,8 - HxCDD					0.63 J	0.37 J	0.52 J	0.68 J			0.68 J	0.16 U
1,2,3,7,8,9 - HxCDD					0.39 J	0.22 U	0.3 U	0.4 U			0.35 J	0.11 U
1,2,3,4,6,7,8 - HpCDD					6.2 J	4.7 J	4.1 J	11			14	1.9 J
OCDD					42 B	32 B	24 B	79 B			110 B	15 B
2,3,7,8 - TCDF					0.22 J	0.13 U	0.27 J	0.19 J			0.15 U	0.069 J
1,2,3,7,8 - PeCDF					0.12 U	0.091 J	0.16 J	0.18 J			0.079 U	0.073 J
2,3,4,7,8 - PeCDF					0.19 J	0.087 J	0.15 U	0.22 J			0.14 J	0.064 J
1,2,3,4,7,8 - HxCDF					0.35 U	0.23 J	0.28 U	0.39 J			0.46 J	0.13 U
1,2,3,6,7,8 - HxCDF					0.15 J	0.046 U	0.14 U	0.23 J			0.22 J	0.04 U
1,2,3,7,8,9 - HxCDF					0.053 J	0.039 J	0.042 U	0.11 U			0.026 U	0.045 J
2,3,4,6,7,8 - HxCDF					0.15 J	0.099 J	0.17 J	0.21 U			0.14 U	0.061 U
1,2,3,4,6,7,8 - HpCDF					5.3	3.8 J	2.7 J	6.6			14	1.3 J
1,2,3,4,7,8,9 - HpCDF					0.14 U	0.1 J	0.14 J	0.29 J			0.28 U	0.083 J
1,2,3,4,7,8,9 - HpCDF					4.6 J	4.3 J	2.8 J	9.4 J			17	2.1 J
OCDF					0.6	0.3	0.4	0.7			0.7	0.2
Total TEQ	20											

Note: For "Total PCBs", pursuant to Ecology guidelines, when all Aroclors are undetected, the total PCB value is reported as the highest of the undetected values.

Table 5
Surface Sediment Chemistry Data

Constituents	Rinse Blank
Metals (ug/L)	
Arsenic	1.9 U
Copper	4.5 U
Lead	1.3 U
Mercury	0.05 U
Zinc	2.3 U
PCBs (ug/L)	
PCB 1016	0.1 U
PCB 1221	0.1 U
PCB 1232	0.1 U
PCB 1242	0.1 U
PCB 1248	0.1 U
PCB 1254	0.1 U
PCB 1260	0.1 U
Total PCBs	0.1 U
Dioxins / Furans (pg/L)	
2,3,7,8 - TCDD	0.24 U
1,2,3,7,8 - PeCDD	0.58 U
1,2,3,4,7,8 - HxCDD	0.42 U
1,2,3,6,7,8 - HxCDD	0.32 J
1,2,3,7,8,9 - HxCDD	0.4 U
1,2,3,4,6,7,8 - HpCDD	1.2 J
OCDD	3.8 J
2,3,7,8 - TCDF	0.29 U
1,2,3,7,8 - PeCDF	0.42 U
2,3,4,7,8 - PeCDF	0.44 U
1,2,3,4,7,8 - HxCDF	0.63 U
1,2,3,6,7,8 - HxCDF	0.2 U
1,2,3,7,8,9 - HxCDF	0.15 J
2,3,4,6,7,8 - HxCDF	0.19 U
1,2,3,4,6,7,8 - HpCDF	0.73 U
1,2,3,4,7,8,9 - HpCDF	0.32 U
OCDF	1 J
Total TEQ	0.7

Note: For "Total PCBs", pursuant to Ecology guidelines, when all Aroclors are undetected, the total PCB value is reported as the highest of the undetected values.



NOT TO SCALE

Figure 1

OLYMPIC VIEW RESOURCE AREA
YEAR 1
ANNUAL MONITORING REPORT
2003

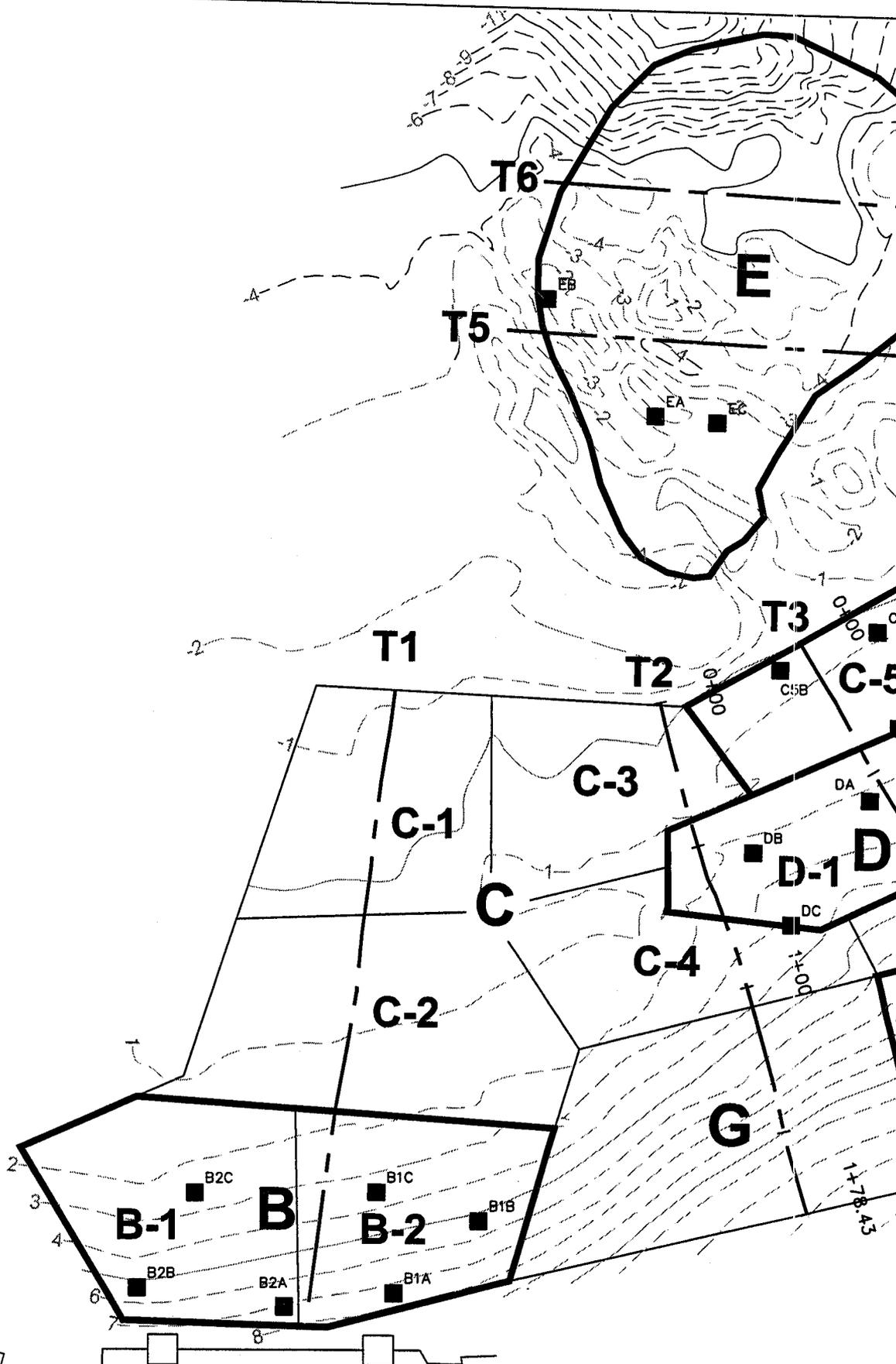
APPENDIX A

DRAWINGS

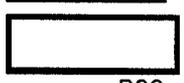
CITY OF TACOMA
April 20, 2004



I:\MSD\EnvServices\Projects\Special Projects\Olympic view\DCI\098\dwg\12-1-03-base.dwg, 04/20/2004 07:34:52 AM



LEGEND:



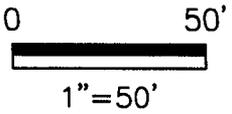
CAPPED AREAS ARE A, B, C-5, D, AND E



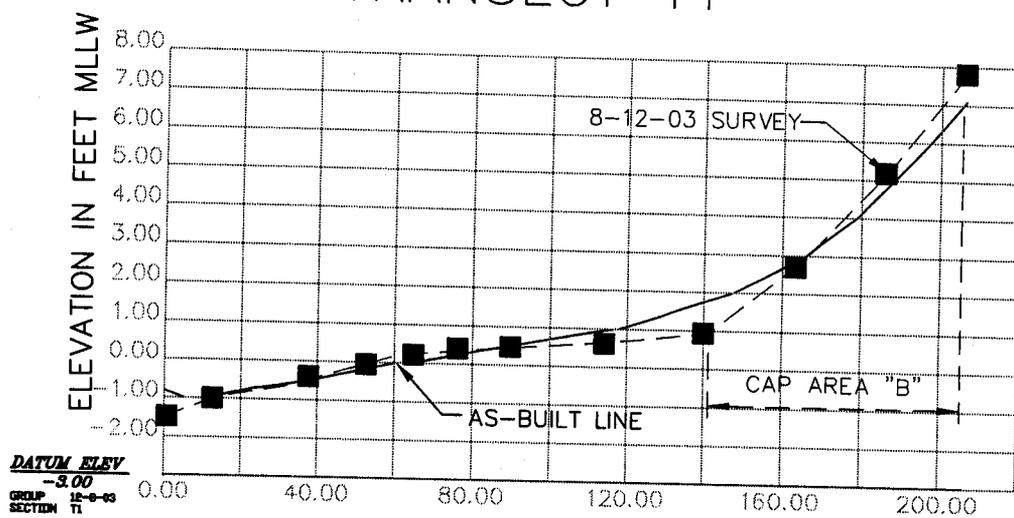
GRAB SAMPLE LOCATION



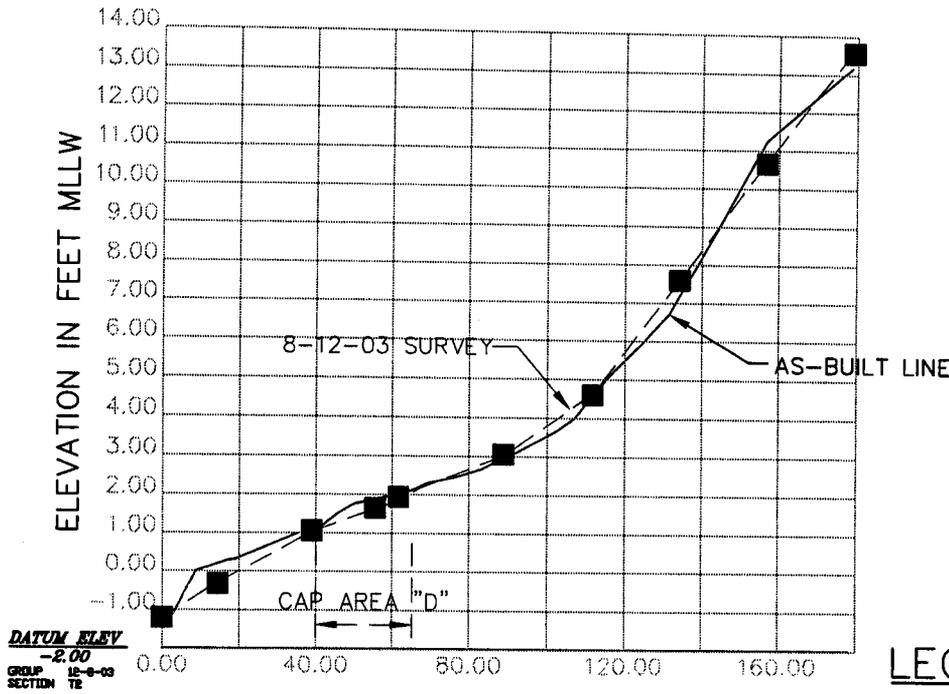
TRANSECTS



TRANSECT T1

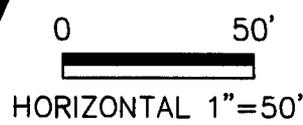


TRANSECT T2

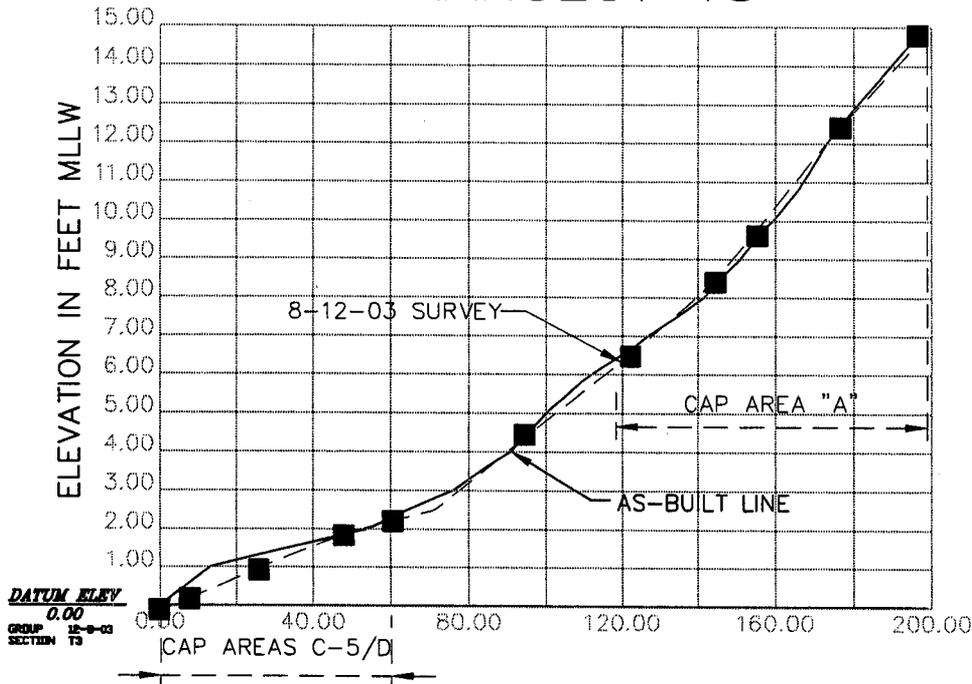


- LEGEND:**
- MONITORING POINT
 - MONITORING POINT
 - AS-BUILT

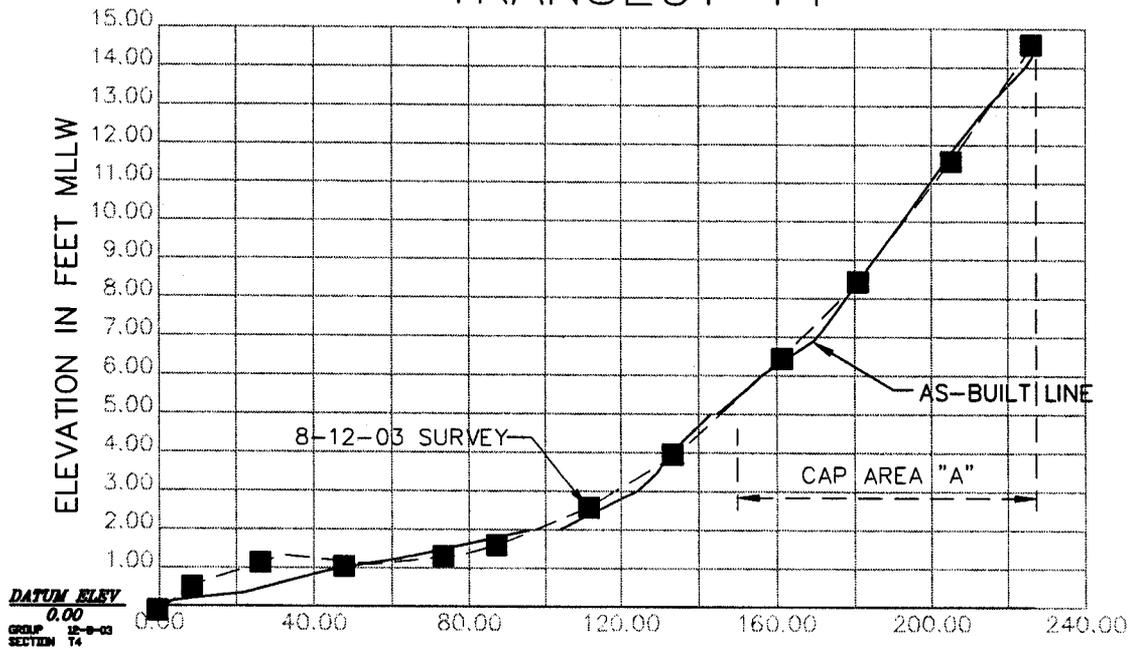
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TRANSECT T3



TRANSECT T4



GENERAL NOTES FOR SHEETS 2 & 3

1. SEE SHEET 1 FOR PLAN VIEW OF TRANSECT LOCATIONS
2. ELEVATIONS ALONG THE MONITORING TRANSECT LINES ARE INTERPOLATED BETWEEN THE DISCREET MONITORING POINTS WHICH ARE INDICATED BY BOXES ALONG THE LINES.

	DATE	4-20-04	SCALE	1"=50'
	DESIGNED	JO	CHECKED	JO
	DRAWN	REG	PROJECT NAME	AK80F6
	DRAWING NAME	12-1-03-BASE		

CITY OF TACOMA
DEPARTMENT OF PUBLIC WORKS

OLYMPIC VIEW
RESOURCE AREA
YEAR 1 MONITORING REPORT

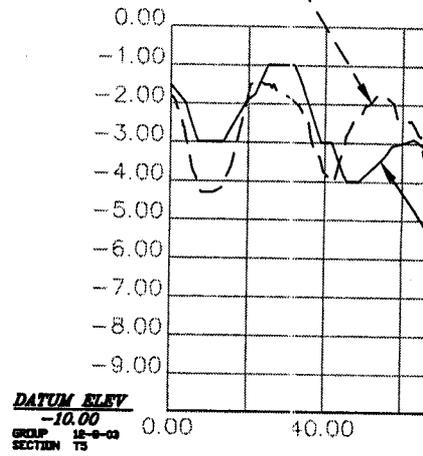
AK80F6

SHEET 1

SHEET 2 of 3

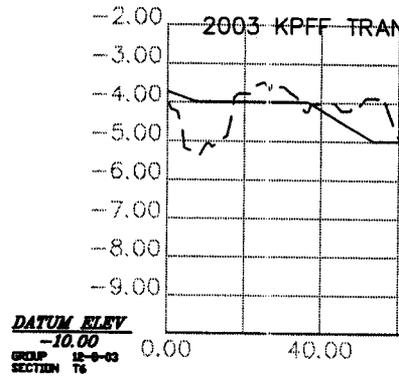
TRANS

2003 KPFF TRANSECTS



TRAN

2003 KPFF TRAN



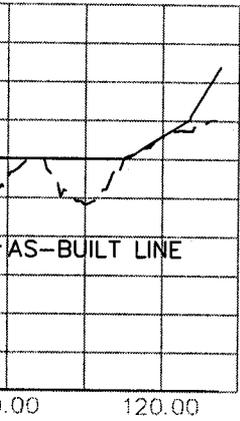
I:\V\10\EnvServices\Projects\Special Projects\Olympic View\DC1098\dwg\12-1-03-base.dwg, 04/20/2004 07:13:35 AM



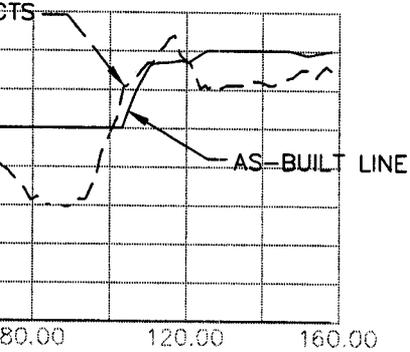
0 50'
HORIZONTAL 1"=50'

0 5'
VERTICAL 1"=5'

CT T5



ECT T6



	DATE 4-20-04	SCALE 1"=50'	CITY OF TACOMA DEPARTMENT OF PUBLIC WORKS	AK80F6
	DESIGNED JO	CHECKED JO		
	DRAWN REG	PROJECT NAME AK80F6	OLYMPIC VIEW RESOURCE AREA YEAR 1 MONITORING REPORT	SHEET NO. SHEET 3 of 3
DRAWING NAME 12-1-03-BASE				

OLYMPIC VIEW RESOURCE AREA

**YEAR 1
ANNUAL MONITORING REPORT
2003**

APPENDIX B

QUALITATIVE SAMPLE CHARACTERISTICS FORMS

**CITY OF TACOMA
April 20, 2004**



Qualitative Sample Characteristics

Date (mm/dd/yy)	Location	Station
08/11/03	1A21	AVIRA

Coordinates		Water Depth			Elevation	Time	Weather
North	East	Depth	Unit	+/-	Elev.		
						101451	sun

Coordinates	
North DDDHHMM.MMM	West DDDHHMM.MMM

Rep	Gear	Sample Type	Penetration		Recovery		Photograph		Grain Vol	Initials	Su	V O A
			Depth	Unit	Length	Unit	Roll#	Exp.				

Surficial sediment characteristics: (circle most descriptive)

Texture Smooth Fine Coarse Clay Silt Sand Gravel Cobble

Color Light Dark Gray Brown Black Other _____

Odor Normal Sewage Petroleum Chemical H2S None Other _____

Presence of:

	Yes/No	Percent	Describe Type
Biological structures	Y	1%	seaweed.
Debris	N		
Oily sheen	N		

Vertical profile characteristics:

Describe

Changes in sediment characteristics

Presence and depth of redox potential discontinuity layer (rpd)

n/a
n/a

Sample quality comments:

Describe

Leakage	
Winnowing	
Disturbance	

Comment _____

Qualitative Sample Characteristics

Date (mm/dd/yy)	Location	Station
01/31/10	B	A11

Coordinates				Water Depth			Elevation	Time	Weather
North	*	East	*	Depth	Unit	+/-	Elev.		
								101515	Sun

Coordinates											
North DDDHHMM.MMM						West DDDHHMM.MMM					

Rep	Gear	Sample Type	Penetration		Recovery		Photograph		Grain Vol	Initials	Su	V O A
			Depth	Unit	Length	Unit	Roll#	Exp.				

Surficial sediment characteristics: (circle most descriptive)

Texture Smooth Fine Coarse Clay Silt Sand Gravel Cobble

Color Light Dark Gray Brown Black Other _____

Odor Normal Sewage Petroleum Chemical H2S None Other _____

Presence of:

	Yes/No	Percent	Describe Type
Biological structures	Y	1%	seaweed/shells
Debris	N		
Oily sheen	N		

Vertical profile characteristics:

Describe
Changes in sediment characteristics
n/a
Presence and depth of redox potential discontinuity layer (rpd)
n/a

Sample quality comments:

Describe
Leakage
Winnowing
Disturbance

Comment Duplicate taken (AD) Homogenized field duplicate

Date (mm/dd/yy)	Location	Station
010111013	IEI	DIVIRIAI

Coordinates				Water Depth			Elevation	Time	Weather
North	*	East	*	Depth	Unit	+/-	Elev.		
								11/11/21	SIUN

Coordinates											
North DDDHHMM.MMM						West DDDHHMM.MMM					

Rep	Gear	Sample Type	Penetration		Recovery		Photograph		Grain Vol	Initials	Su	V O A
			Depth	Unit	Length	Unit	Roll#	Exp.				

Surficial sediment characteristics: (circle most descriptive)

Texture Smooth Fine Coarse / Clay Silt Sand Gravel Cobble
 Color Light Dark Gray Brown Black Other _____
 Odor Normal Sewage Petroleum Chemical H2S None Other _____

Presence of:

	Yes/No	Percent	Describe Type
Biological structures	N		
Debris	N		
Oily sheen	N		

Vertical profile characteristics: Describe

Changes in sediment characteristics	n/a
Presence and depth of redox potential discontinuity layer (rpd)	n/a

Sample quality comments: Describe

Leakage	
Winnowing	
Disturbance	

Comment Grab Sample @ low tide

Qualitative Sample Characteristics

Date (mm/dd/yy)	Location	Station
0181111DB	CPI	DIV 12A

Coordinates				Water Depth			Elevation	Time	Weather
North	*	East	*	Depth	Unit	+/-	Elev.		
								1112121	SWW

Coordinates											
North DDDHHMM.MMM						West DDDHHMM.MMM					

Rep	Gear	Sample Type	Penetration		Recovery		Photograph		Grain Vol	Initials	Su	V O A
			Depth	Unit	Length	Unit	Roll#	Exp.				

Surficial sediment characteristics: (circle most descriptive)

Texture Smooth Fine Coarse / Clay Silt Sand Gravel Cobble

Color Light Dark / Gray Brown Black Other _____

Odor Normal Sewage Petroleum Chemical H2S None Other _____

Presence of:

	Yes/No	Percent	Describe Type
Biological structures	Y	1%	Seaweed / Roots
Debris	N		
Oily sheen	N		

Vertical profile characteristics:

Describe

Changes in sediment characteristics

n/a
n/a

Presence and depth of redox potential discontinuity layer (rpd)

Sample quality comments:

Describe

Leakage

Winnowing

Disturbance

Comment _____

Date (mm/dd/yy)	Location	Station
01/11/10	IC1101	101VIRIA

Coordinates				Water Depth			Elevation	Time	Weather
North	*	East	*	Depth	Unit	+/-	Elev.		
								1113101	Stun

Coordinates											
North DDDHHMM.MMM						West DDDHHMM.MMM					

Rep	Gear	Sample Type	Penetration		Recovery		Photograph		Grain Vol	Initials	Su	V O A
			Depth	Unit	Length	Unit	Roll#	Exp.				

Surficial sediment characteristics: (circle most descriptive)

Texture: Smooth, Fine, **Coarse**, Clay, Silt, **Sand**, **Gravel**, Cobble
 Color: **Light**, Dark, **Gray**, Brown, Black, Other _____
 Odor: Normal, Sewage, Petroleum, Chemical, H2S, **None**, Other _____

Presence of:

	Yes/No	Percent	Describe Type
Biological structures	N		
Debris	N		
Oily sheen	N		

Vertical profile characteristics:

Describe

Changes in sediment characteristics

n/a

Presence and depth of redox potential discontinuity layer (rpd)

n/a

Sample quality comments:

Describe

Leakage

Winnowing

Disturbance

Comment

Qualitative Sample Characteristics

Date (mm/dd/yy)	Location	Station
01011103	B12	OIVRIA

Coordinates				Water Depth			Elevation	Time	Weather
North	*	East	*	Depth	Unit	+/-	Elev.		
								111421	sun

Coordinates	
North DDDHHMM.MMM	West DDDHHMM.MMM

Rep	Gear	Sample Type	Penetration		Recovery		Photograph		Grain Vol	Initials	Su	V O A
			Depth	Unit	Length	Unit	Roll#	Exp.				

Surficial sediment characteristics: (circle most descriptive)

Texture Smooth Fine Coarse / Clay Silt Sand Gravel Cobble

Color Light Dark / Gray Brown Black Other _____

Odor Normal Sewage Petroleum Chemical H2S None Other _____

Presence of:

	Yes/No	Percent	Describe Type
Biological structures	Y	1%	seaweed
Debris	N		
Oily sheen	N		

Vertical profile characteristics:

Describe

Changes in sediment characteristics

n/a
n/a

Presence and depth of redox potential discontinuity layer (rpd)

Sample quality comments:

Describe

Leakage

Winnowing

Disturbance

Comment

Duplicate taken (BD) Homogenized field duplicate.

Qualitative Sample Characteristics

Date (mm/dd/yy)	Location	Station
018 11103	BLZ	DIVIRIA

Coordinates				Water Depth			Elevation	Time	Weather
North	East	Depth	Unit	+/-	Elev.				
								111518	Sun

Coordinates											
North DDDHHMM.MMM						West DDDHHMM.MMM					

Rep	Gear	Sample Type	Penetration		Recovery		Photograph		Grain Vol	Initials	Su	V
			Depth	Unit	Length	Unit	Roll#	Exp.				

Surficial sediment characteristics: (circle most descriptive)

Texture Smooth Fine **Coarse** Clay Silt Sand Gravel Cobble

Color **Light** Dark / Gray Brown Black Other _____

Odor Normal Sewage Petroleum Chemical H2S **None** Other _____

Presence of:

	Yes/No	Percent	Describe Type
Biological structures	Y	1%	Seaweed
Debris	N		
Oily sheen	N		

Vertical profile characteristics:

Describe

Changes in sediment characteristics

n/a

Presence and depth of redox potential discontinuity layer (rpd)

n/a

Sample quality comments:

Describe

Leakage

Winnowing

Disturbance

Comment _____

Qualitative Sample Characteristics

Date (mm/dd/yy)	Location	Station
08/11/03	C5	OVI RIA

Coordinates				Water Depth			Elevation	Time	Weather
North	*	East	*	Depth	Unit	+/-	Elev.		
								1206	8W

Coordinates											
North DDDHHMM.MMM						West DDDHHMM.MMM					

Rep	Gear	Sample Type	Penetration		Recovery		Photograph		Grain Vol	Initials	Su	V O A
			Depth	Unit	Length	Unit	Roll#	Exp.				

Surficial sediment characteristics: (circle most descriptive)

Texture Smooth Fine Coarse / Clay Silt Sand Gravel Cobble

Color Light Dark Gray Brown Black Other _____

Odor Normal Sewage Petroleum Chemical H₂S None Other _____

Presence of:

	Yes/No	Percent	Describe Type
Biological structures	Y	1%	seaweed
Debris	N		
Oily sheen	N		

Vertical profile characteristics:

Describe

Changes in sediment characteristics

Presence and depth of redox potential discontinuity layer (rpd)

n/a
n/a

Sample quality comments:

Describe

Leakage

Winnowing

Disturbance

Comment

Qualitative Sample Characteristics

Date (mm/dd/yy)	Location	Station
08/11/03	D	OURA

Coordinates				Water Depth			Elevation	Time	Weather
North	East	Depth	Unit	+/-	Elev.				
								11215	PSun

Coordinates	
North DDDHHMM.MMM	West DDDHHMM.MMM

Rep	Gear	Sample Type	Penetration		Recovery		Photograph		Grain Vol	Initials	Su	VOA
			Depth	Unit	Length	Unit	Roll#	Exp.				

Surficial sediment characteristics: (circle most descriptive)

Texture: Smooth, Fine, Coarse, Clay, Silt, Sand, Gravel, Cobble

Color: Light, Dark, Gray, Brown, Black, Other

Odor: Normal, Sewage, Petroleum, Chemical, H2S, None, Other

Presence of:

	Yes/No	Percent	Describe Type
Biological structures	Y	1%	seaweed
Debris	N		
Oily sheen	N		

Vertical profile characteristics:

Describe

Changes in sediment characteristics

n/a
n/a

Presence and depth of redox potential discontinuity layer (rpd)

Sample quality comments:

Describe

Leakage

Winnowing

Disturbance

Comment

OLYMPIC VIEW RESOURCE AREA
YEAR 1
ANNUAL MONITORING REPORT
2003

APPENDIX C

VISUAL INSPECTIONS: FIELD NOTES AND PHOTOS

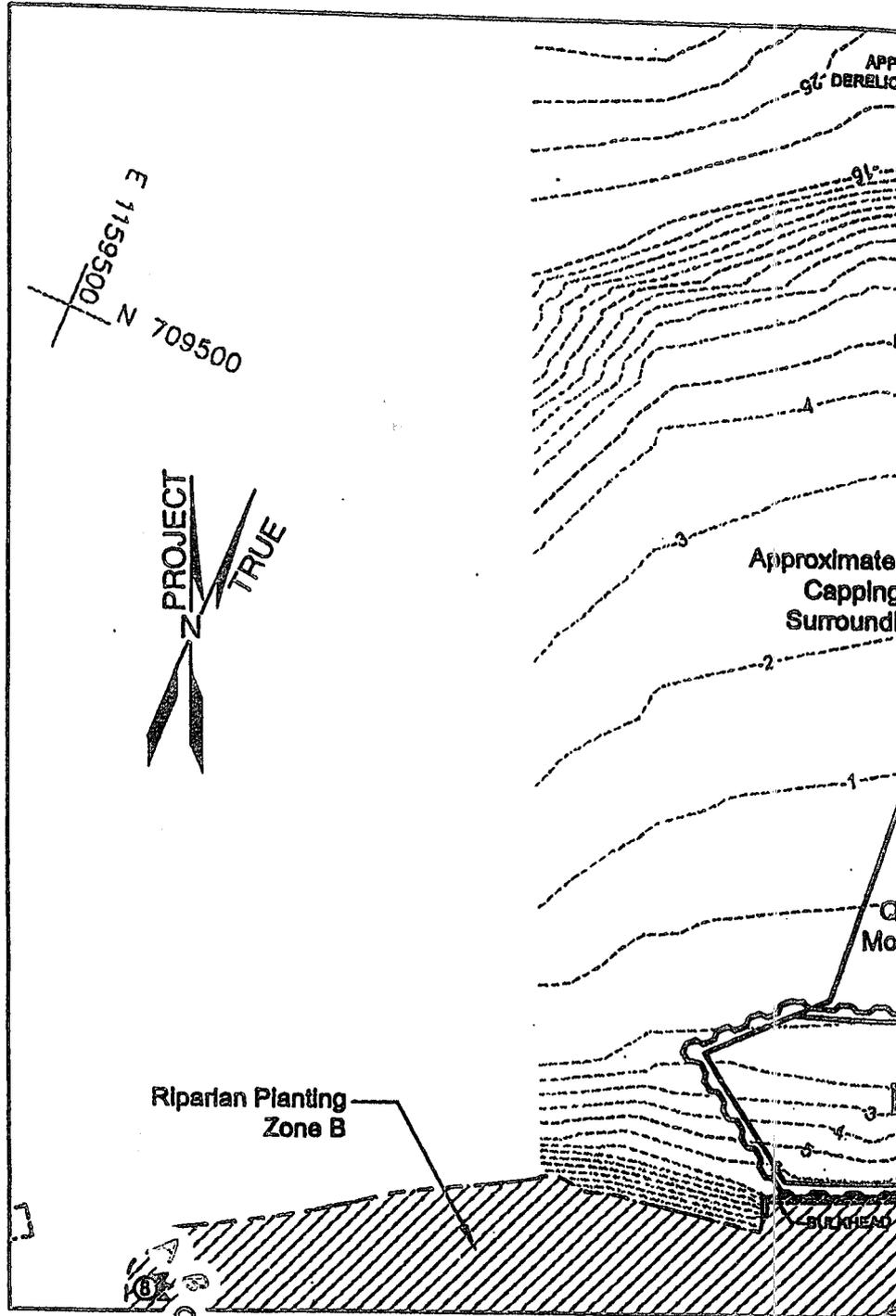
CITY OF TACOMA
April 20, 2004



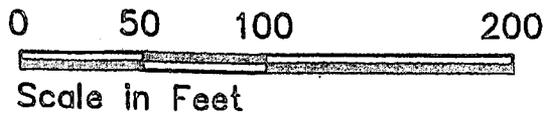
Notes on Photo Point Monitoring

Photos were taken from locations noted in attached Figure 1 from the Maintenance, Monitoring and Adaptive Management Plan (MAMP). Title indicates in which direction the photo is looking.

Post-Construction Habitat Restoration Map

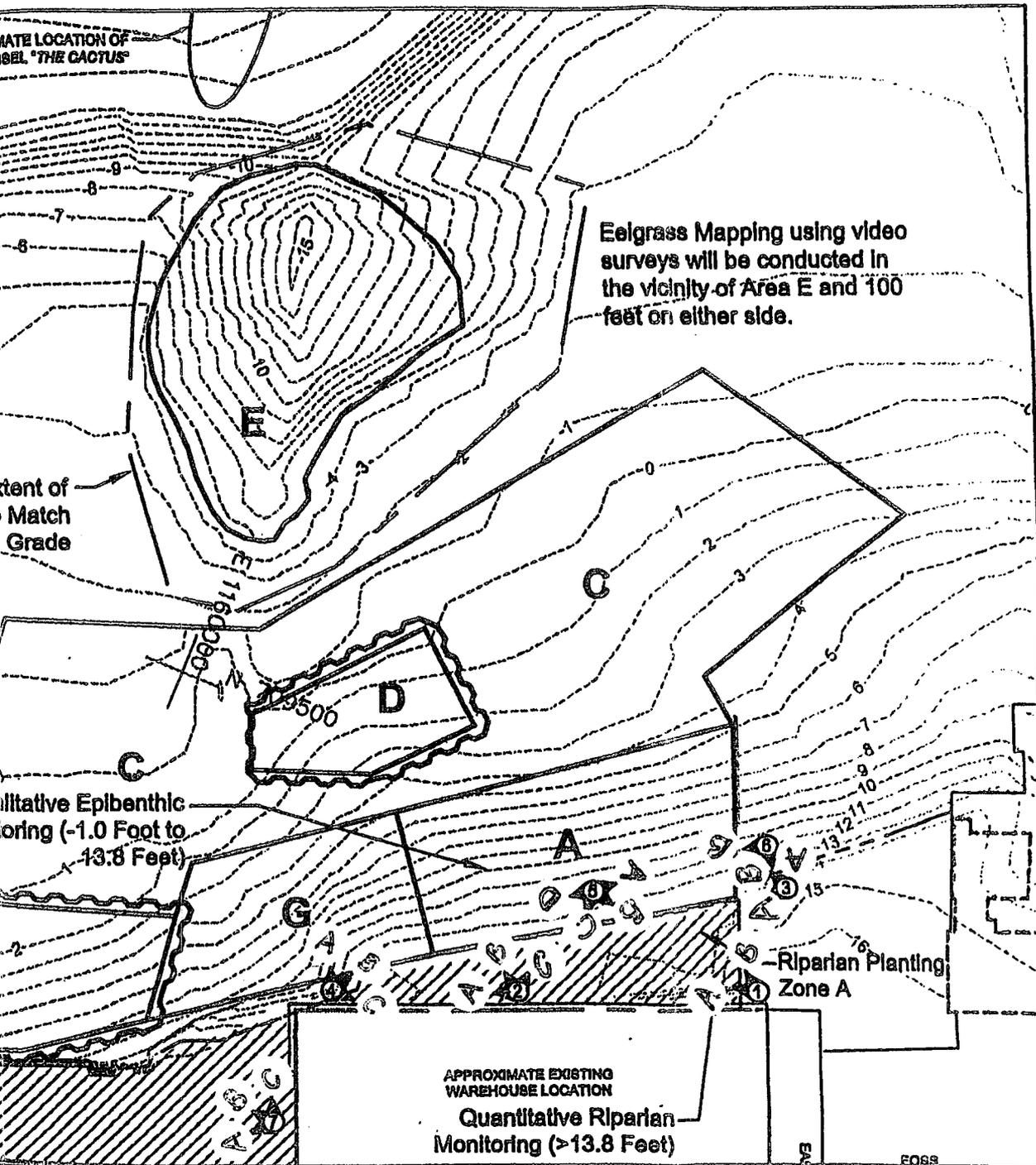


Note: See Plan Sheet 9 for location of Intertidal erosion protection areas.



HARTCROWSER
7614
12/01
MAMP
Figure 1

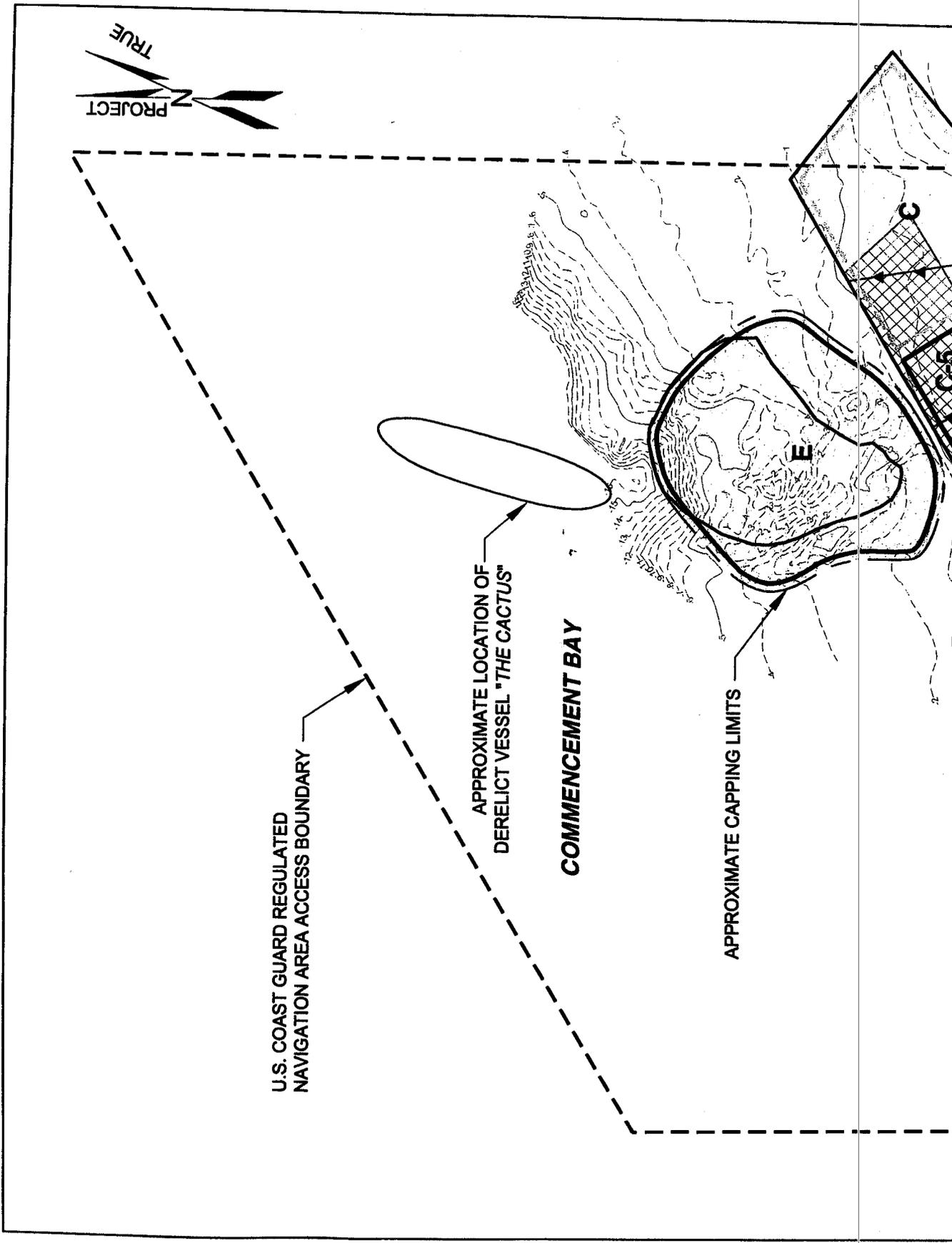
Monitoring Location Plan

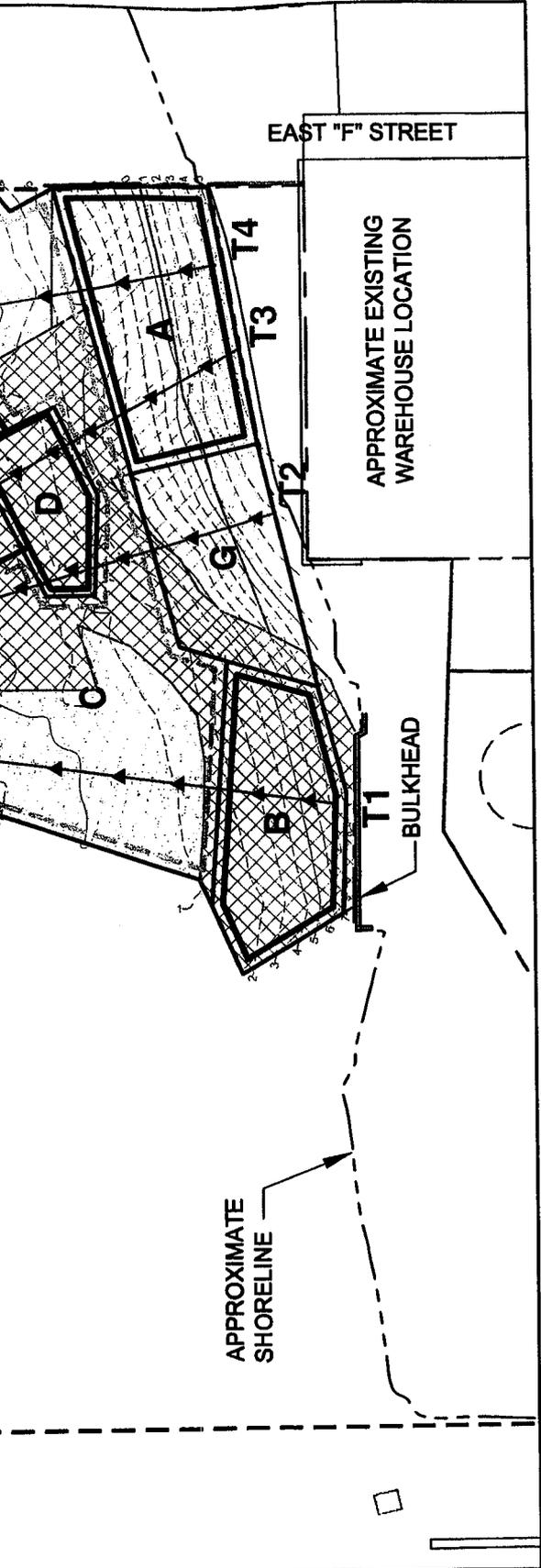


Legend:

- ① Approximate Photo Point Location and Number
- A Site Area Boundary and Designation
- ▨ Riparian Planting Zones (See Plan Sheet 9)

OVRA Site Areas and Survey Monitoring Transects





- UPPER BEACH EROSION PROTECTION-
EROSION PROTECTION MATERIAL B
PLACED OVER SAND MATERIAL
- LOWER BEACH EROSION PROTECTION-
EROSION PROTECTION MATERIAL A
PLACED OVER SAND MATERIAL
- SAND MATERIAL
- POST-CONSTRUCTION ELEVATION
CONTOUR IN FEET (CORPUS DATUM)
- C** OVRA SITE AREA DESIGNATION
- BACKFILLED AREA
- CAPPED AREA
- T1** ——— INTERTIDAL TRANSECT LOCATION AND NUMBER
- ▲ INTERTIDAL SURVEY POINT

Olympic View Resource Area Restoration
Monitoring Report Form

arrived = 2pm
left 3pm

Date 7/14/03 Year 0A 0B 1A 1B 2A 2B 3 4 5

Staff Present: Lindsay Guzzo Desiree Pooler

Weather Conditions: Sunny hot

Overall health and vigor of plants: Excellent Fair Poor

Tide: approx -1

other plants. Grasses

Qualitative Observations:

	Riparian Area (A/B)	Salt Marsh Area	Comments
Erosion	no	no	
Sedimentation		X	Possible - on HW mark
Wildlife			Geese in water
Vegetation			
Invasive	Yes A/B		A Butterfly Bush - st. john's wort
Volunteer	Yes		
Survival (%)	90%	10%	Grasses doing poorly B- Blkberry
Animal Damage			N/A
Disease			N/A
Trash	Yes-A	no	Floating debris
Vandalism			N/A
Large Organic Debris	Yes-A		Logs - wood debris

Wildlife Observed:

Geese, gulls, other birds

Soil/Sediment Quality -

Odor: n/a
 Sheen: n/a
 Color: gray
 Texture: very rocky (A) Dirt packed in rip B.

General Comments:

Survival - grass & maple - bad - dead.
Alder / cottonwood good
rose - good.
firs - ok
Pine, shore - good.
very dry - needs water
cut Blkberries
GED needs Maint.

Photo Points:

Disk Count: 1 2 3

1A 1-1	1B 1-2	2A 1-20	2B 1-21	2C 1-22	3A 1-3

3B 1-4	4A 1-17	4B 1-18	4C 1-19	5A 1-7	5B 1-8

5C 1-9	5D 1-10	6A 1-5	6B 1-6	7A 1-11	7B 1-12

7C 1-13	8A 1-14	8B 1-15	8C 1-16		

Quantitative Measurements:

Year 0

Year 1 2 5

Sediment Stake #	Current Measurement (cm)	Starting Measurement (cm)
T1-1 1	90.8 T1-1 OK 81.7 (T2)	91.5
T1-3 2	81.7 T2 79.6 cm	79.9
T2-2 3	66	65.5
T3-2 4	90.8	89.9
T4-2 5	73 73	73.2
T4-3 6	88.2	91.5

Bottom Sediment

Notes:

#5 - stake leanings @ bottom of stake are rocks (smaller 1-3.5 inches)

#4 rocks @ bottom 2-3 inches

~~T1-1 - sm. gravel~~ Stake #2 7/16/03 2.61' => cm.

T-2 - sm gravel

#6 - algae

#3 algae/dirt/sand mix

$1 \text{ in} = 2.54 \text{ cm}$

$1 \text{ cm} = 0.0328 \text{ ft}$

$\frac{2.61 \text{ ft}}{1} \frac{1 \text{ cm}}{0.0328} = 79.51 \text{ cm}$

$\frac{2.69 \text{ in}}{1 \text{ in}}$

Photo Point 1A to west.JPG

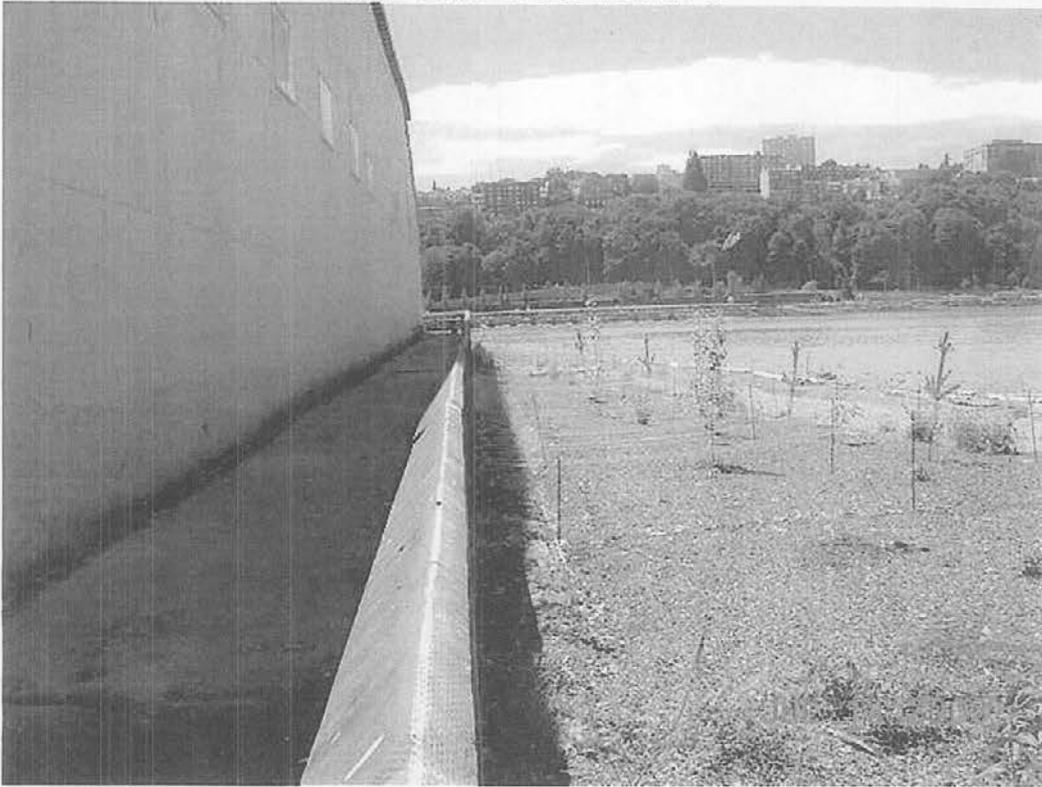


Photo Point 1B to northwest.JPG



Photo Point 2A to west.JPG

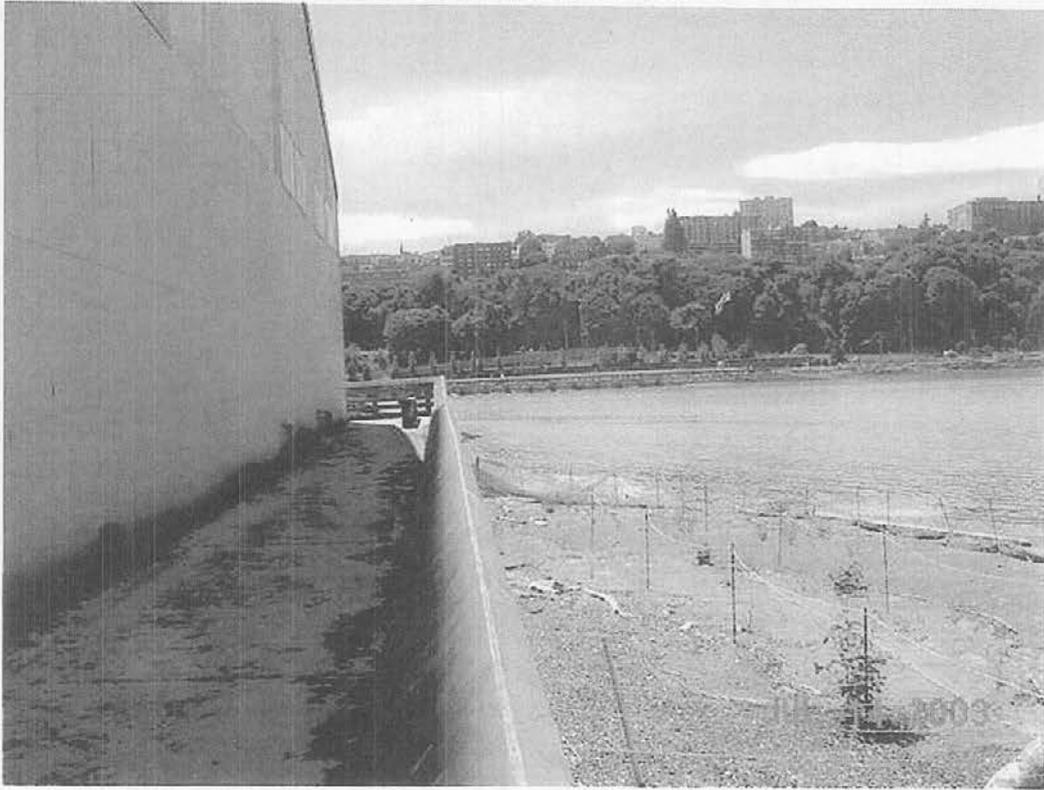


Photo Point 2B to northwest.JPG

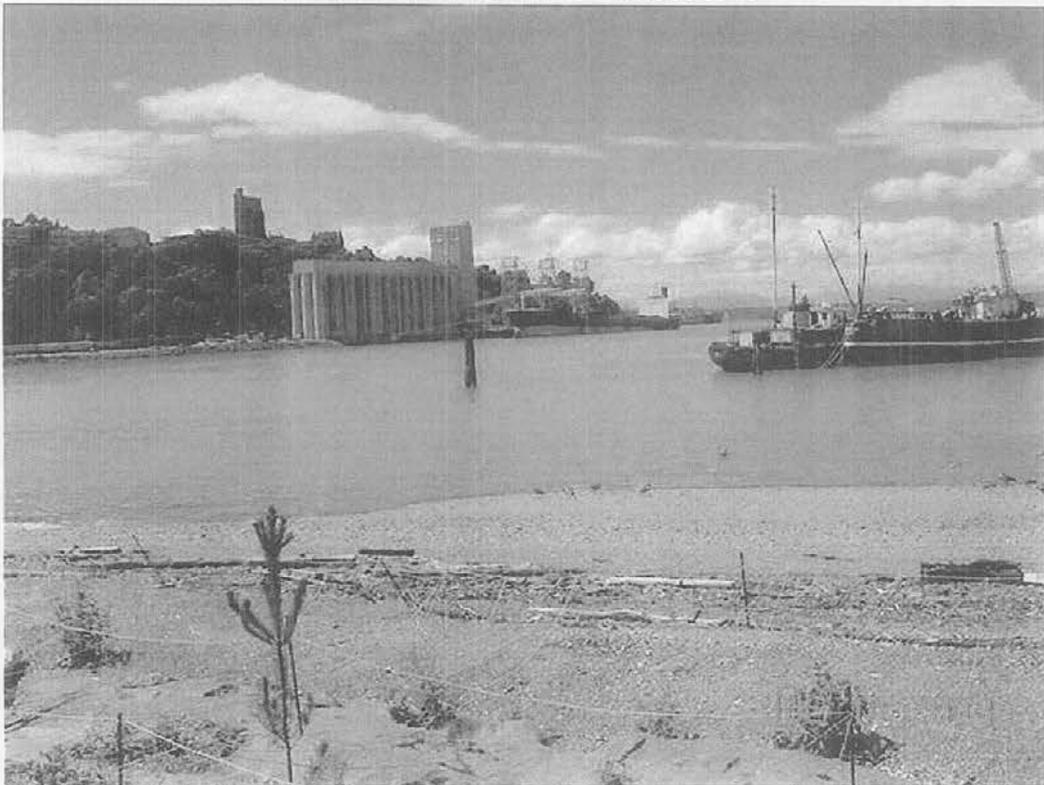


Photo Point 2C to northeast.JPG

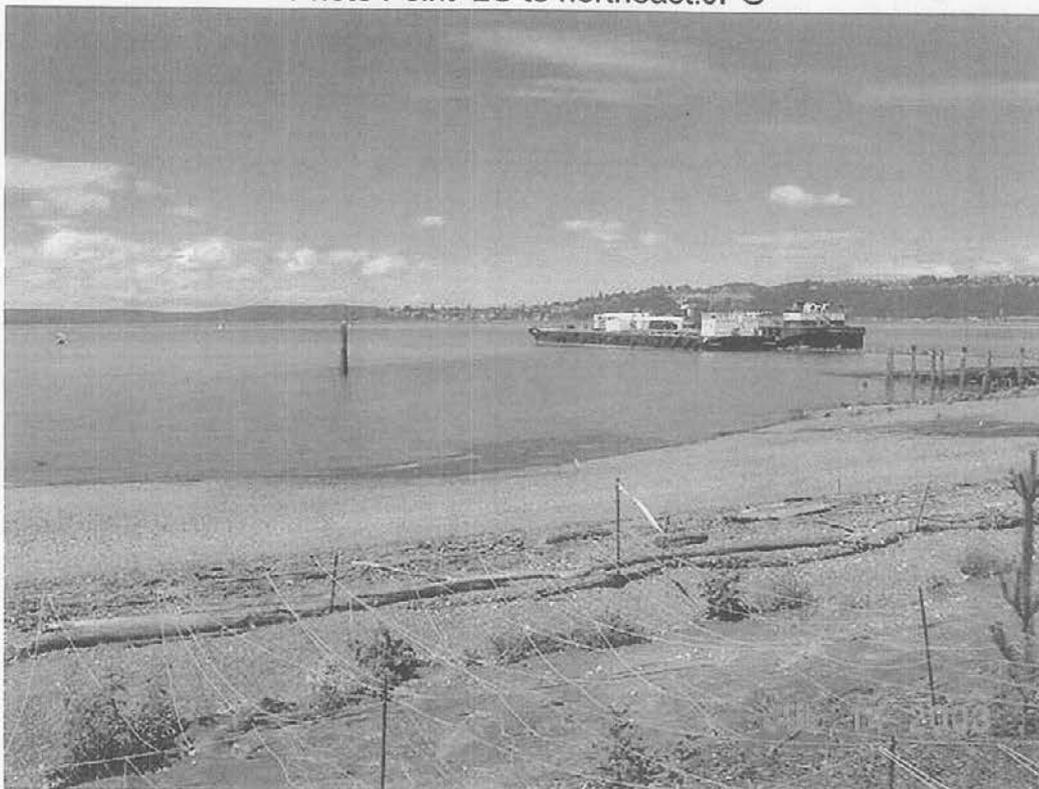


Photo Point 3A to southwest.JPG

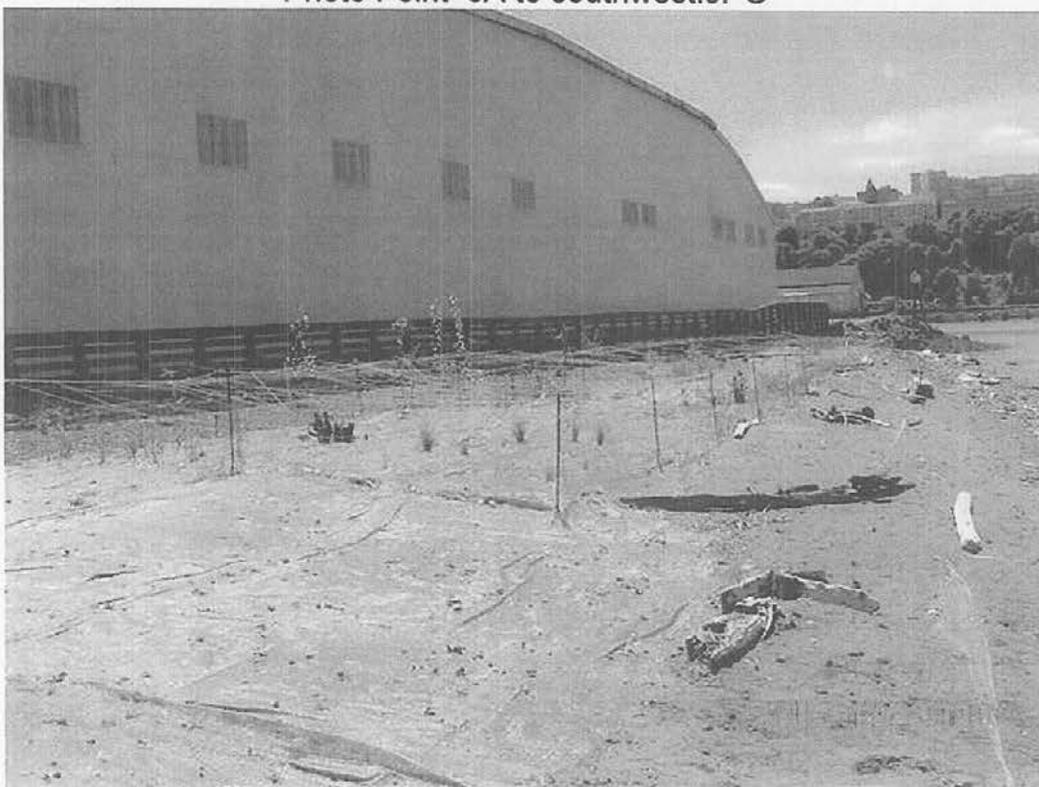


Photo Point 3B to northwest.JPG

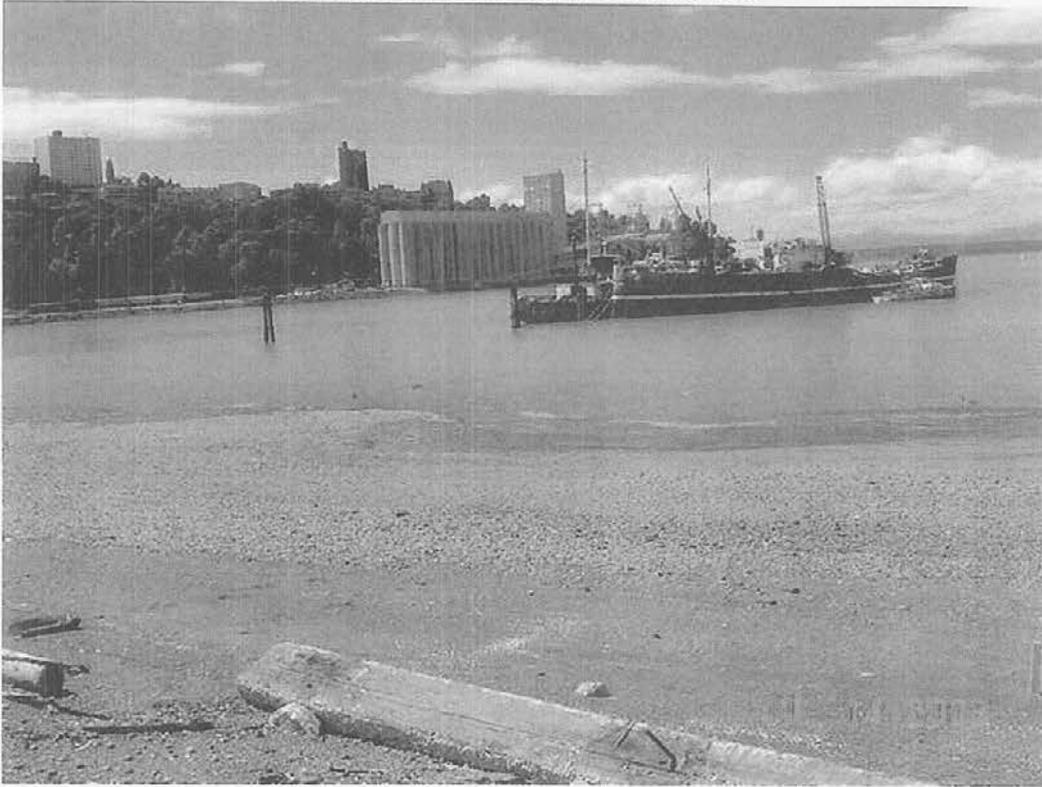


Photo Point 4A to north.JPG



Photo Point 4B to northeast.JPG

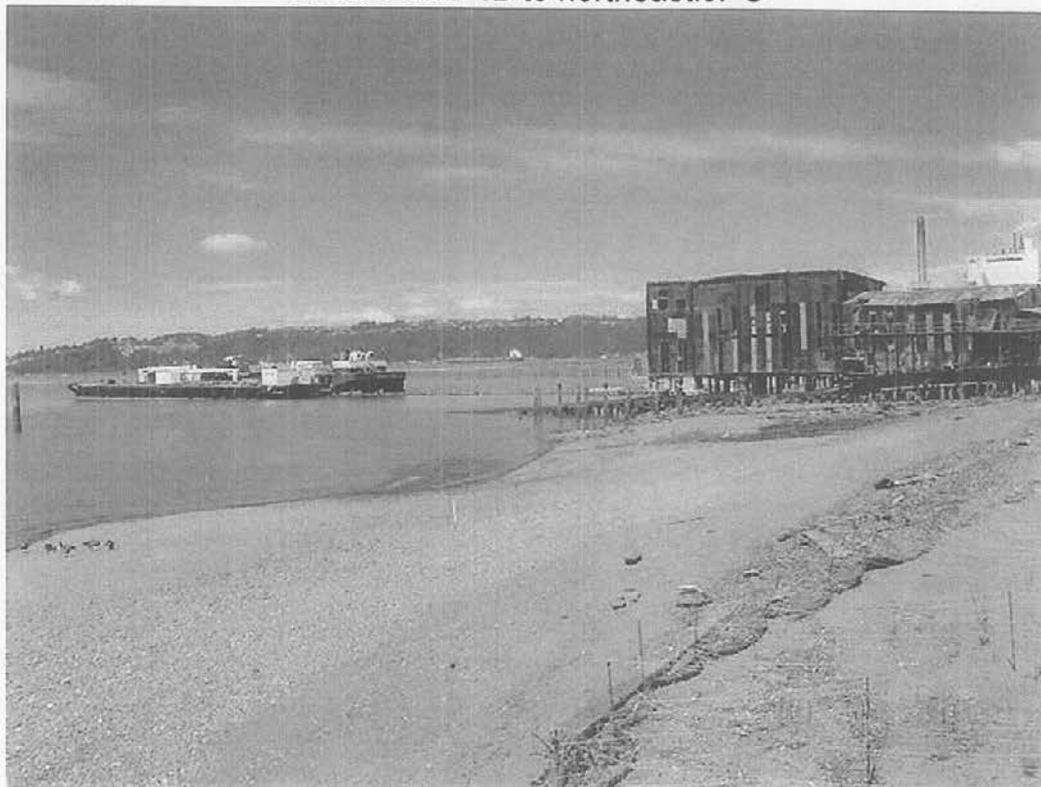


Photo Point 4C to east.JPG



Photo Point 5A to east.JPG



Photo Point 5B to southeast.JPG



Photo Point 5C to southwest.JPG



Photo Point 5D to west.JPG



Photo Point 6A to south.JPG

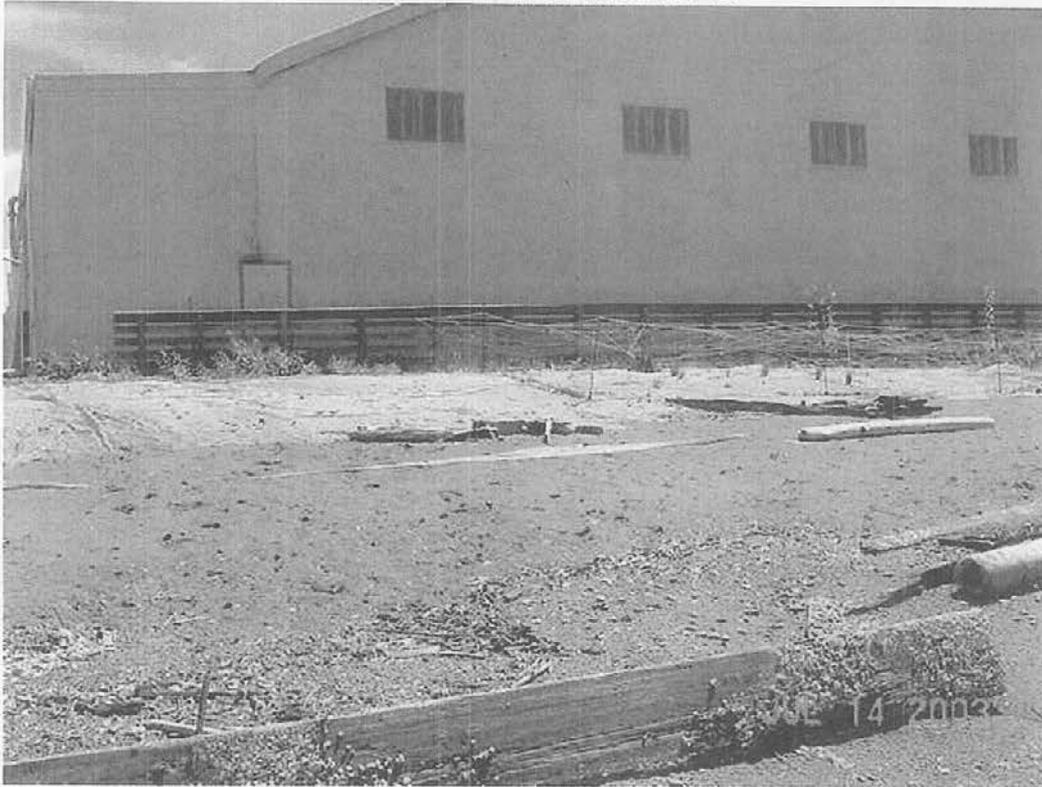


Photo Point 6B to southeast.JPG

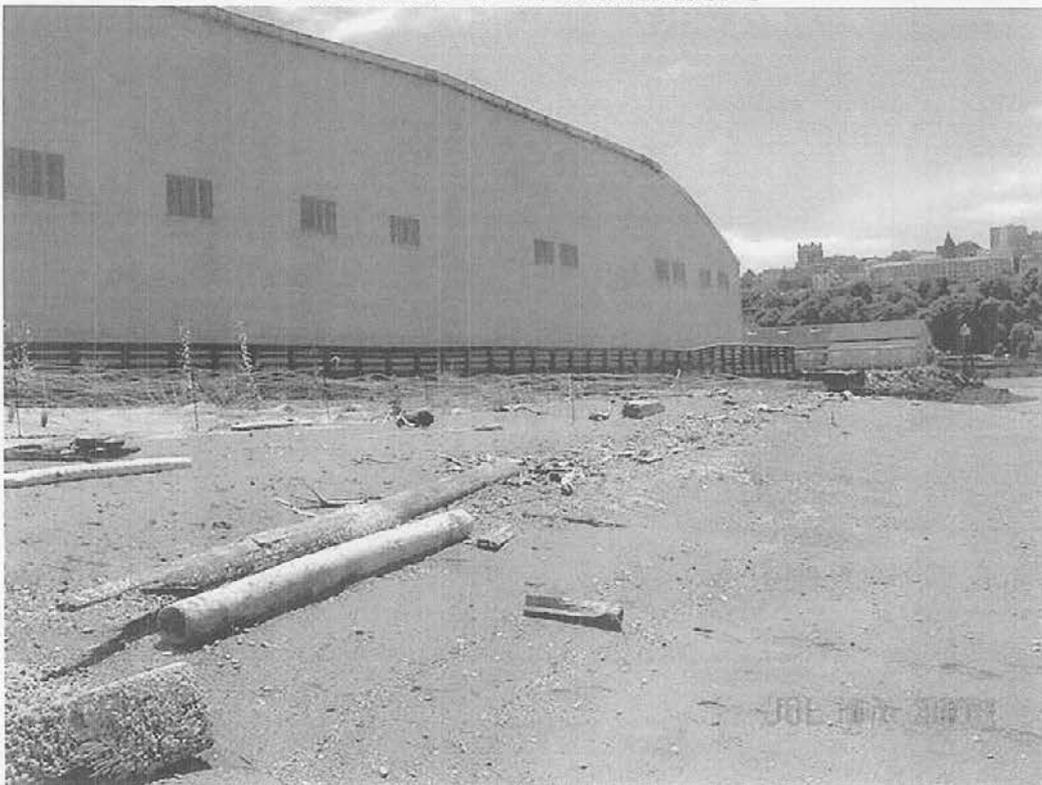


Photo Point 7A to west.JPG



Photo Point 7B to northwest.JPG

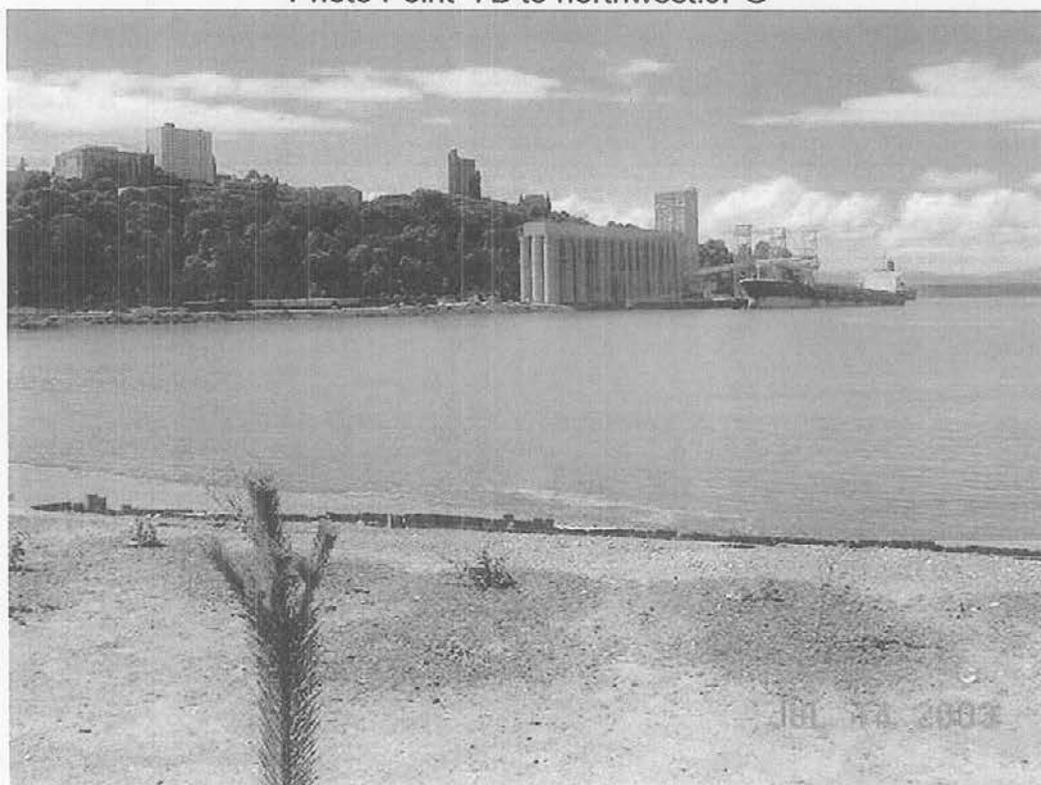


Photo Point 7C to north.JPG



Photo Point 8A to northeast.JPG

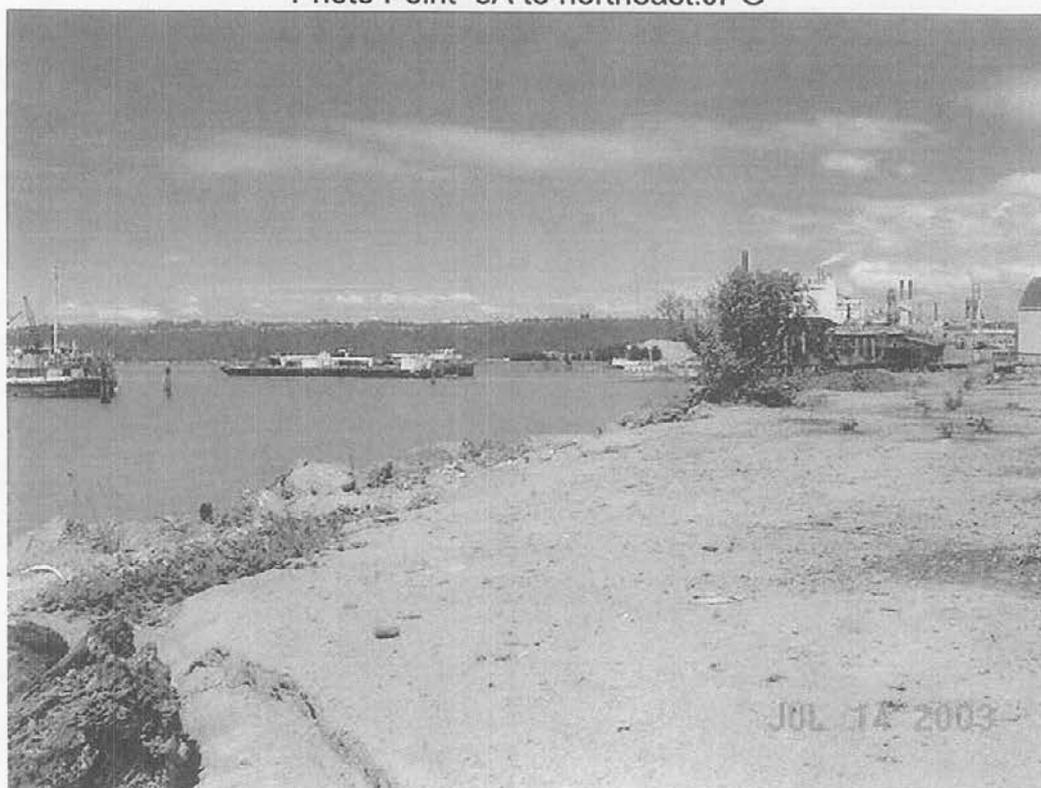


Photo Point 8B to east.JPG

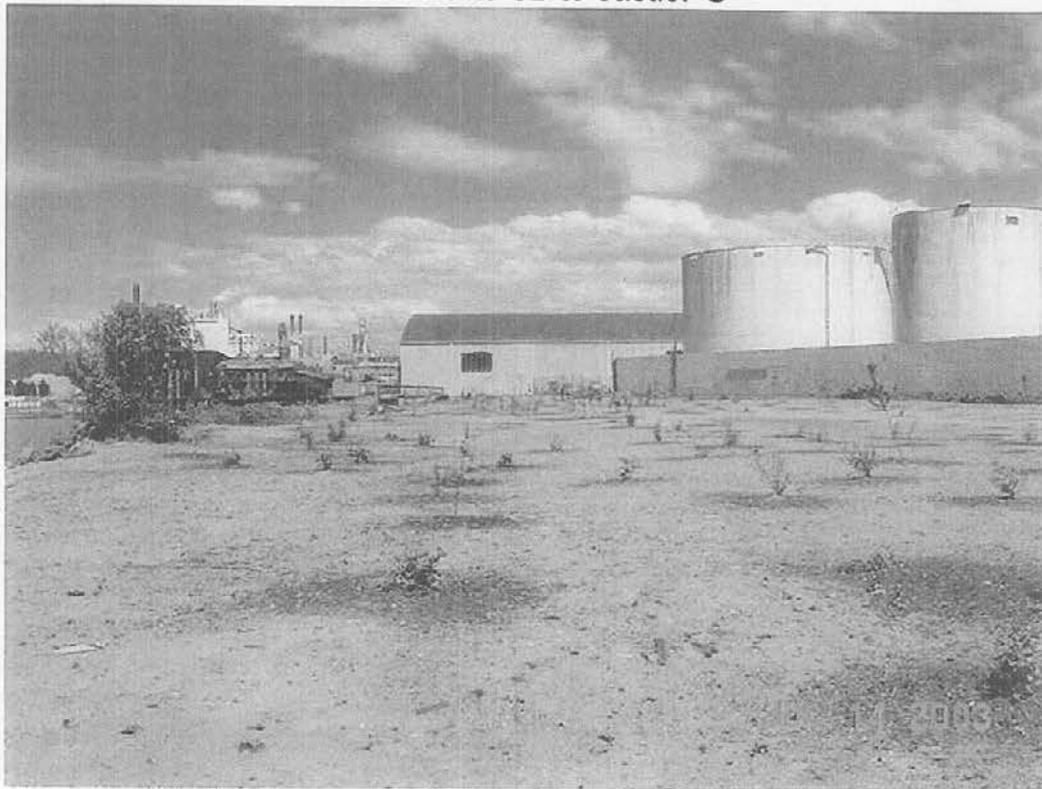
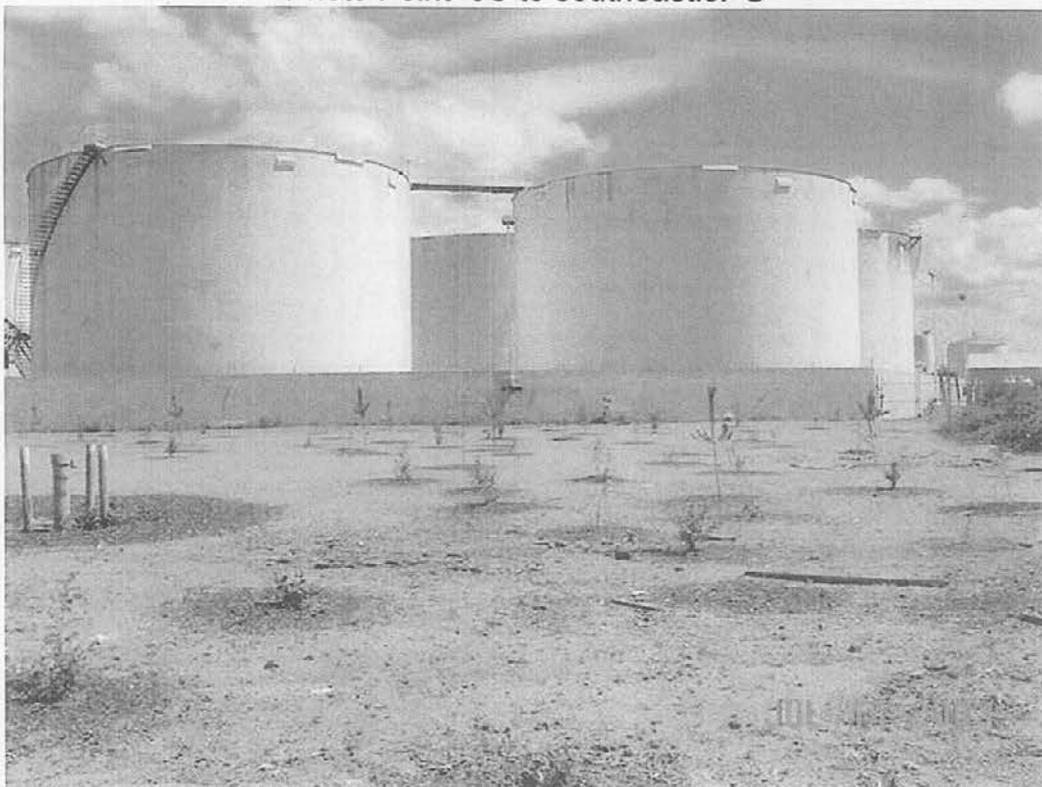


Photo Point 8C to southeast.JPG



OLYMPIC VIEW RESOURCE AREA

**YEAR 1
ANNUAL MONITORING REPORT
2003**

APPENDIX D

LABORATORY REPORT & QA/QC INFORMATION

CITY OF TACOMA
April 20, 2004





City of Tacoma

Science and Engineering Division

2201 Portland Avenue Tacoma WA 98421

Phone: 253.591.5588 Fax: 253.502.2170

Project: Olympic View Resources Area

AK80F6MJD

Date: October 29, 2003

Lab#: 20030811086

Sample ID: A-1

Sample Type: Sediment

Sample Date: 8/11/2003

Test	Result	Units
CONVENTIONAL		
Solids	96.7	per cent
CV		
Mercury	0.0125	mg/Kg
ICP		
Arsenic	4.4 U	mg/Kg
Copper	17.5 UJ	mg/Kg
Lead	3.5 U	mg/Kg
Zinc	21.9	mg/Kg

Lori A. Zboralski

October 29, 2003

Reviewed By:

Date

- Flags:
- U: The value is less than detection limit
 - UJ: The value is less than detection limit and considered estimated
 - J: The value is considered estimated
 - B: The value is less than the reporting limit but greater than detection limit



City of Tacoma

Science and Engineering Division

2201 Portland Avenue Tacoma WA 98421

Phone: 253.591.5588 Fax: 253.502.2170

Project: Olympic View Resources Area

AK80F6MJD

Date: October 29, 2003

Lab#: 20030811087

Sample ID: A-2

Sample Type: Sediment

Sample Date: 8/11/2003

	Test	Result	Units
CONVENTIONAL			
	Solids	96.0	per cent
CV			
	Mercury	0.0338	mg/Kg
ICP			
	Arsenic	4.8 U	mg/Kg
	Copper	43.4 UJ	mg/Kg
	Lead	6.7	mg/Kg
	Zinc	37.6	mg/Kg

Lori A. Zboralski October 29, 2003
Reviewed By: Date

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City of Tacoma

Science and Engineering Division

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Phone: 253.591.5588 Fax: 253.502.2170

Project: Olympic View Resources Area
AK80F6MJD
Date: October 29, 2003

Lab#: 20030811088
Sample ID: A-D
Sample Type: Sediment
Sample Date: 8/11/2003

	Test	Result	Units
	CONVENTIONAL		
	Solids	96.7	per cent
	CV		
	Mercury	0.0326	mg/Kg
	ICP		
	Arsenic	4.3 U	mg/Kg
	Copper	15.5 UJ	mg/Kg
	Lead	3.4 U	mg/Kg
	Zinc	25.0	mg/Kg

Lori A. Zboralski October 29, 2003
Reviewed By: **Date**

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B: The value is less than the reporting limit but greater than detection limit



City of Tacoma

Science and Engineering Division

2201 Portland Avenue Tacoma WA 98421

Phone: 253.591.5588 Fax: 253.502.2170

Project: Olympic View Resources Area

AK80F6MJD

Date: October 29, 2003

Lab#: 20030811089

Sample ID: B-1

Sample Type: Sediment

Sample Date: 8/11/2003

Test	Result	Units
GC/ECD-PCB		
Aroclor-1016	97 U	ug/Kg
Aroclor-1221	190 U	ug/Kg
Aroclor-1232	97 U	ug/Kg
Aroclor-1242	97 U	ug/Kg
Aroclor-1248	97 U	ug/Kg
Aroclor-1254	97 U	ug/Kg
Aroclor-1260	97 U	ug/Kg
SUBCONTRACT		
Dioxin	See Attached	ug/Kg

Lori A. Zboralski October 29, 2003
Reviewed By: **Date**

- Flags: U: The value is less than detection limit
UJ: The value is less than detection limit and considered estimated
J: The value is considered estimated
B: The value is less than the reporting limit but greater than detection limit

STL SEATTLE

Client Sample ID: 115406-4

Trace Level Organic Compounds

Lot-Sample #....: G3H130297-004 Work Order #....: FV71V1AC Matrix.....: SOLID
 Date Sampled....: 08/11/03 Date Received...: 08/13/03
 Prep Date.....: 08/20/03 Analysis Date...: 08/26/03
 Prep Batch #....: 3232371
 Dilution Factor: 1

PARAMETER	RESULT	DETECTION LIMIT	UNITS	METHOD
2,3,7,8-TCDD	ND	0.083	pg/g	EPA-5 1613B
1,2,3,7,8-PeCDD	0.14 J		pg/g	EPA-5 1613B
1,2,3,4,7,8-HxCDD	ND	0.084	pg/g	EPA-5 1613B
1,2,3,6,7,8-HxCDD	0.63 J		pg/g	EPA-5 1613B
1,2,3,7,8,9-HxCDD	0.39 J		pg/g	EPA-5 1613B
1,2,3,4,6,7,8-HpCDD	6.2		pg/g	EPA-5 1613B
OCDD	42 B		pg/g	EPA-5 1613B
2,3,7,8-TCDF	0.22 J		pg/g	EPA-5 1613B
1,2,3,7,8-PeCDF	ND	0.12	pg/g	EPA-5 1613B
2,3,4,7,8-PeCDF	0.19 J		pg/g	EPA-5 1613B
1,2,3,4,7,8-HxCDF	ND	0.35	pg/g	EPA-5 1613B
1,2,3,6,7,8-HxCDF	0.15 J		pg/g	EPA-5 1613B
2,3,4,6,7,8-HxCDF	0.15 J		pg/g	EPA-5 1613B
1,2,3,7,8,9-HxCDF	0.053 J		pg/g	EPA-5 1613B
1,2,3,4,6,7,8-HpCDF	5.3		pg/g	EPA-5 1613B
1,2,3,4,7,8,9-HpCDF	ND	0.14	pg/g	EPA-5 1613B
OCDF	4.6 J		pg/g	EPA-5 1613B

J-14

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	87	(25 - 164)
13C-1,2,3,7,8-PeCDD	86	(25 - 181)
13C-1,2,3,4,7,8-HxCDD	90	(32 - 141)
13C-1,2,3,6,7,8-HxCDD	85	(28 - 130)
13C-1,2,3,4,6,7,8-HpCDD	104	(23 - 140)
13C-OCDD	113	(17 - 157)
13C-2,3,7,8-TCDF	93	(24 - 169)
13C-1,2,3,7,8-PeCDF	96	(24 - 185)
13C-2,3,4,7,8-PeCDF	94	(21 - 178)
13C-1,2,3,6,7,8-HxCDF	96	(26 - 123)
13C-2,3,4,6,7,8-HxCDF	112	(28 - 136)
13C-1,2,3,7,8,9-HxCDF	112	(29 - 147)
13C-1,2,3,4,6,7,8-HpCDF	125	(28 - 143)
13C-1,2,3,4,7,8,9-HpCDF	130	(26 - 138)
13C-1,2,3,4,7,8-HxCDF	95	(26 - 152)

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
37C14-2,3,7,8-TCDD	94	(35 - 197)

(Continued on next page)

MB 10-20-03

001335
1535947

STL SEATTLE

Client Sample ID: 115406-4

Trace Level Organic Compounds

Lot-Sample #....: G3H130297-004 Work Order #....: FV71VLAC Matrix.....: SOLID

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

J Estimated result. Result is less than the reporting limit.

B Method blank contamination. The associated method blank contains the target analyte at a reportable level.

MTB 10-20-03

Dioxin Sampling Results

Area B-1 Total TEQ = 0.6				
	Concentration (ng/kg)	Detection Limit	Toxicity Eq. Factor	Toxicity Equivalents
2,3,7,8 - TCDD		0.083	1	0.04
1,2,3,7,8 - PeCDD	0.14		1	0.14
1,2,3,4,7,8 - HxCDD		0.084	0.1	0.00
1,2,3,6,7,8 - HxCDD	0.63		0.1	0.06
1,2,3,7,8,9 - HxCDD	0.39		0.1	0.04
1,2,3,4,6,7,8 - HpCD	6.2		0.01	0.06
OCDD	42		0.0001	0.00
2,3,7,8 - TCDF	0.22		0.1	0.02
1,2,3,7,8 - PeCDF		0.12	0.05	0.00
2,3,4,7,8 - PeCDF	0.19		0.5	0.10
1,2,3,4,7,8 - HxCDF		0.35	0.1	0.02
1,2,3,6,7,8 - HxCDF	0.15		0.1	0.02
1,2,3,7,8,9 - HxCDF	0.053		0.1	0.01
2,3,4,6,7,8 - HxCDF	0.15		0.1	0.02
1,2,3,4,6,7,8 - HpCDF	5.3		0.01	0.05
1,2,3,4,7,8,9 - HpCDF		0.14	0.01	0.00
OCDF	4.6		0.0001	0.00
			Total TEQ	0.6



City of Tacoma

Science and Engineering Division

2201 Portland Avenue Tacoma WA 98421
Phone: 253.591.5588 Fax: 253.502.2170

Project: Olympic View Resources Area
AK80F6MJD
Date: October 29, 2003

Lab#: 20030811090
Sample ID: B-2
Sample Type: Sediment
Sample Date: 8/11/2003

Test	Result	Units
GC/ECD-PCB		
Aroclor-1016	100 U	ug/Kg
Aroclor-1221	200 U	ug/Kg
Aroclor-1232	100 U	ug/Kg
Aroclor-1242	100 U	ug/Kg
Aroclor-1248	100 U	ug/Kg
Aroclor-1254	100 U	ug/Kg
Aroclor-1260	100 U	ug/Kg
SUBCONTRACT		
Dioxin	See Attached	ug/Kg

Lori A. Zboralski October 29, 2003
Reviewed By: **Date**

- Flags: U: The value is less than detection limit
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STL SEATTLE

Client Sample ID: 115406-2

Trace Level Organic Compounds

Lot-Sample #....: G3H130297-002 Work Order #....: FV71Q1AC
 Date Sampled....: 08/11/03 Date Received...: 08/13/03
 Prep Date.....: 08/20/03 Analysis Date...: 08/26/03
 Prep Batch #....: 3232371
 Dilution Factor: 1

Matrix.....: SOLID

*Sample ID
B-2 J*

PARAMETER	RESULT	DETECTION LIMIT	UNITS	METHOD
2,3,7,8-TCDD	ND	0.041	pg/g	EPA-5 1613B
1,2,3,7,8-PeCDD	0.10 J		pg/g	EPA-5 1613B
1,2,3,4,7,8-HxCDD	0.12 J		pg/g	EPA-5 1613B
1,2,3,6,7,8-HxCDD	0.37 J		pg/g	EPA-5 1613B
1,2,3,7,8,9-HxCDD	ND	0.22	pg/g	EPA-5 1613B
1,2,3,4,6,7,8-HpCDD	4.7 J		pg/g	EPA-5 1613B
OCDD	32 B		pg/g	EPA-5 1613B
2,3,7,8-TCDF	ND	0.13	pg/g	EPA-5 1613B
1,2,3,7,8-PeCDF	0.091 J		pg/g	EPA-5 1613B
2,3,4,7,8-PeCDF	0.087 J		pg/g	EPA-5 1613B
1,2,3,4,7,8-HxCDF	0.23 J		pg/g	EPA-5 1613B
1,2,3,6,7,8-HxCDF	ND	0.046	pg/g	EPA-5 1613B
2,3,4,6,7,8-HxCDF	0.099 J		pg/g	EPA-5 1613B
1,2,3,7,8,9-HxCDF	0.039 J		pg/g	EPA-5 1613B
1,2,3,4,6,7,8-HpCDF	3.8 J		pg/g	EPA-5 1613B
1,2,3,4,7,8,9-HpCDF	0.10 J		pg/g	EPA-5 1613B
OCDF	4.3 J		pg/g	EPA-5 1613B

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	91	(25 - 164)
13C-1,2,3,7,8-PeCDD	91	(25 - 181)
13C-1,2,3,4,7,8-HxCDD	91	(32 - 141)
13C-1,2,3,6,7,8-HxCDD	84	(28 - 130)
13C-1,2,3,4,6,7,8-HpCDD	112	(23 - 140)
13C-OCDD	116	(17 - 157)
13C-2,3,7,8-TCDF	96	(24 - 169)
13C-1,2,3,7,8-PeCDF	95	(24 - 135)
13C-2,3,4,7,8-PeCDF	97	(21 - 178)
13C-1,2,3,6,7,8-HxCDF	101	(26 - 123)
13C-2,3,4,6,7,8-HxCDF	113	(28 - 136)
13C-1,2,3,7,8,9-HxCDF	113	(29 - 147)
13C-1,2,3,4,6,7,8-HpCDF	129	(28 - 143)
13C-1,2,3,4,7,8,9-HpCDF	132	(26 - 138)
13C-1,2,3,4,7,8-HxCDF	99	(26 - 152)

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
37Cl4-2,3,7,8-TCDD	99	(35 - 197)

(Continued on next page)

MTS 10-20-03

STL SEATTLE

Client Sample ID: 115406-2

Trace Level Organic Compounds

Lot-Sample #....: G3H130297-002 Work Order #....: FV71Q1AC Matrix.....: SOLID

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

J Estimated result. Result is less than the reporting limit.

B Method blank contamination. The associated method blank contains the target analyte at a reportable level.

MTB 10-20-03

Dioxin Sampling Results

Area B-2 Total TEQ = 0.4				
	Concentration	Detection	Toxicity Eq.	Toxicity
	(ng/kg)	Limit	Factor	Equivalents
2,3,7,8 - TCDD		0.041	1	0.02
1,2,3,7,8 - PeCDD	0.1		1	0.10
1,2,3,4,7,8 - HxCDD	0.12		0.1	0.01
1,2,3,6,7,8 - HxCDD	0.37		0.1	0.04
1,2,3,7,8,9 - HxCDD		0.22	0.1	0.01
1,2,3,4,6,7,8 - HpCDD	4.7		0.01	0.05
OCDD	32		0.0001	0.00
2,3,7,8 - TCDF		0.13	0.1	0.01
1,2,3,7,8 - PeCDF	0.091		0.05	0.00
2,3,4,7,8 - PeCDF	0.087		0.5	0.04
1,2,3,4,7,8 - HxCDF	0.23		0.1	0.02
1,2,3,6,7,8 - HxCDF		0.046	0.1	0.00
1,2,3,7,8,9 - HxCDF	0.039		0.1	0.00
2,3,4,6,7,8 - HxCDF	0.099		0.1	0.01
1,2,3,4,6,7,8 - HpCDF	3.8		0.01	0.04
1,2,3,4,7,8,9 - HpCDF	0.1		0.01	0.00
OCDF	4.3		0.0001	0.00
			Total TEQ	0.4



City of Tacoma

Science and Engineering Division

2201 Portland Avenue Tacoma WA 98421

Phone: 253.591.5588 Fax: 253.502.2170

Project: Olympic View Resources Area
AK80F6MJD
Date: October 29, 2003

Lab#: 20030811091
Sample ID: B-D
Sample Type: Sediment
Sample Date: 8/11/2003

Test	Result	Units
GC/ECD-PCB		
Aroclor-1016	100 U	ug/Kg
Aroclor-1221	200 U	ug/Kg
Aroclor-1232	100 U	ug/Kg
Aroclor-1242	100 U	ug/Kg
Aroclor-1248	100 U	ug/Kg
Aroclor-1254	100 U	ug/Kg
Aroclor-1260	100 U	ug/Kg
SUBCONTRACT		
Dioxin	See Attached	ug/Kg

Lori A. Zboralski October 29, 2003
Reviewed By: **Date**

- Flags: U: The value is less than detection limit
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STL SEATTLE

Client Sample ID: 115406-3

Trace Level Organic Compounds

Lot-Sample #....: G3H130297-003
 Date Sampled....: 08/11/03
 Prep Date.....: 08/20/03
 Prep Batch #....: 3232371
 Dilution Factor: 1

Work Order #....: FV711IAC
 Date Received...: 08/13/03
 Analysis Date...: 08/26/03

Matrix.....: SOLID

PARAMETER	RESULT	DETECTION LIMIT	UNITS	METHOD
2,3,7,8-TCDD	ND	0.047	pg/g	EPA-5 1613B
1,2,3,7,8-PeCDD	ND	0.082	pg/g	EPA-5 1613B
1,2,3,4,7,8-HxCDD	ND	0.10	pg/g	EPA-5 1613B
1,2,3,6,7,8-HxCDD	0.52 J		pg/g	EPA-5 1613B
1,2,3,7,8,9-HxCDD	ND	0.30	pg/g	EPA-5 1613B
1,2,3,4,6,7,8-HpCDD	4.1 J		pg/g	EPA-5 1613B
OCDD	24 B		pg/g	EPA-5 1613B
2,3,7,8-TCDF	0.27 J		pg/g	EPA-5 1613B
1,2,3,7,8-PeCDF	0.16 J		pg/g	EPA-5 1613B
2,3,4,7,8-PeCDF	ND	0.15	pg/g	EPA-5 1613B
1,2,3,4,7,8-HxCDF	ND	0.28	pg/g	EPA-5 1613B
1,2,3,6,7,8-HxCDF	ND	0.14	pg/g	EPA-5 1613B
2,3,4,6,7,8-HxCDF	0.17 J		pg/g	EPA-5 1613B
1,2,3,7,8,9-HxCDF	ND	0.042	pg/g	EPA-5 1613B
1,2,3,4,6,7,8-HpCDF	2.7 J		pg/g	EPA-5 1613B
1,2,3,4,7,8,9-HpCDF	ND	0.14	pg/g	EPA-5 1613B
OCDF	2.8 J		pg/g	EPA-5 1613B

J-14

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	84	(25 - 164)
13C-1,2,3,7,8-PeCDD	79	(25 - 181)
13C-1,2,3,4,7,8-HxCDD	85	(32 - 141)
13C-1,2,3,6,7,8-HxCDD	85	(28 - 130)
13C-1,2,3,4,6,7,8-HpCDD	100	(23 - 140)
13C-OCDD	88	(17 - 157)
13C-2,3,7,8-TCDF	84	(24 - 169)
13C-1,2,3,7,8-PeCDF	89	(24 - 185)
13C-2,3,4,7,8-PeCDF	84	(21 - 178)
13C-1,2,3,6,7,8-HxCDF	99	(26 - 123)
13C-2,3,4,6,7,8-HxCDF	107	(28 - 136)
13C-1,2,3,7,8,9-HxCDF	98	(29 - 147)
13C-1,2,3,4,6,7,8-HpCDF	114	(28 - 143)
13C-1,2,3,4,7,8,9-HpCDF	108	(26 - 138)
13C-1,2,3,4,7,8-HxCDF	97	(26 - 152)
SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
37Cl4-2,3,7,8-TCDD	101	(35 - 197)

(Continued on next page)

MTB 10-20-03

STL SEATTLE

Client Sample ID: 115406-3

Trace Level Organic Compounds

Lot-Sample #...: G3H130297-003 Work Order #...: FV71T1AC Matrix.....: SOLID

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

J Estimated result. Result is less than the reporting limit.

B Method blank contamination. The associated method blank contains the target analyte at a reportable level.

MTB 10-20-03

Dioxin Sampling Results

Area B-2 (Dup) Total TEQ = 0.3				
	Concentration (ng/kg)	Detection Limit	Toxicity Eq. Factor	Toxicity Equivalents
2,3,7,8 - TCDD		0.047	1	0.02
1,2,3,7,8 - PeCDD		0.082	1	0.04
1,2,3,4,7,8 - HxCDD		0.1	0.1	0.01
1,2,3,6,7,8 - HxCDD	0.52		0.1	0.05
1,2,3,7,8,9 - HxCDD		0.3	0.1	0.02
1,2,3,4,6,7,8 - HpCD	4.1		0.01	0.04
OCDD	24		0.0001	0.00
2,3,7,8 - TCDF	0.27		0.1	0.03
1,2,3,7,8 - PeCDF	0.16		0.05	0.01
2,3,4,7,8 - PeCDF		0.15	0.5	0.04
1,2,3,4,7,8 - HxCDF		0.28	0.1	0.01
1,2,3,6,7,8 - HxCDF		0.14	0.1	0.01
1,2,3,7,8,9 - HxCDF		0.042	0.1	0.00
2,3,4,6,7,8 - HxCDF	0.17		0.1	0.02
1,2,3,4,6,7,8 - HpCDF	2.7		0.01	0.03
1,2,3,4,7,8,9 - HpCDF	0.14		0.01	0.00
OCDF	2.8		0.0001	0.00
			Total TEQ	0.3

STL SEATTLE

Client Sample ID: 115406-5

Trace Level Organic Compounds

Lot-Sample #....: G3H130297-005 Work Order #....: FV71WLAC Matrix.....: SOLID
 Date Sampled....: 08/11/03 Date Received...: 08/13/03
 Prep Date.....: 08/20/03 Analysis Date...: 08/26/03
 Prep Batch #....: 3232371
 Dilution Factor: 1

*Sample ID
 115406-5*

PARAMETER	RESULT	DETECTION LIMIT	UNITS	METHOD
2,3,7,8-TCDD	ND	0.059	pg/g	EPA-5 1613B
1,2,3,7,8-PeCDD	0.18 J		pg/g	EPA-5 1613B
1,2,3,4,7,8-HxCDD	0.26 J		pg/g	EPA-5 1613B
1,2,3,6,7,8-HxCDD	0.68 J		pg/g	EPA-5 1613B
1,2,3,7,8,9-HxCDD	ND	0.40	pg/g	EPA-5 1613B
1,2,3,4,6,7,8-HpCDD	11		pg/g	EPA-5 1613B
OCDD	79 B		pg/g	EPA-5 1613B
2,3,7,8-TCDF	<u>0.19 J</u>		pg/g	EPA-5 1613B J-14
1,2,3,7,8-PeCDF	0.18 J		pg/g	EPA-5 1613B
2,3,4,7,8-PeCDF	0.22 J		pg/g	EPA-5 1613B
1,2,3,4,7,8-HxCDF	0.39 J		pg/g	EPA-5 1613B
1,2,3,6,7,8-HxCDF	0.23 J		pg/g	EPA-5 1613B
2,3,4,6,7,8-HxCDF	ND	0.21	pg/g	EPA-5 1613B
1,2,3,7,8,9-HxCDF	ND	0.11	pg/g	EPA-5 1613B
1,2,3,4,6,7,8-HpCDF	6.6		pg/g	EPA-5 1613B
1,2,3,4,7,8,9-HpCDF	0.29 J		pg/g	EPA-5 1613B
OCDF	9.4 J		pg/g	EPA-5 1613B

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	79	(25 - 164)
13C-1,2,3,7,8-PeCDD	78	(25 - 181)
13C-1,2,3,4,7,8-HxCDD	75	(32 - 141)
13C-1,2,3,6,7,8-HxCDD	77	(28 - 130)
13C-1,2,3,4,6,7,8-HpCDD	95	(23 - 140)
13C-OCDD	81	(17 - 157)
13C-2,3,7,8-TCDF	84	(24 - 169)
13C-1,2,3,7,8-PeCDF	86	(24 - 185)
13C-2,3,4,7,8-PeCDF	85	(21 - 178)
13C-1,2,3,6,7,8-HxCDF	86	(26 - 123)
13C-2,3,4,6,7,8-HxCDF	98	(28 - 136)
13C-1,2,3,7,8,9-HxCDF	95	(29 - 147)
13C-1,2,3,4,6,7,8-HpCDF	106	(28 - 143)
13C-1,2,3,4,7,8,9-HpCDF	111	(26 - 138)
13C-1,2,3,4,7,8-HxCDF	85	(26 - 152)

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
37C14-2,3,7,8-TCDD	96	(35 - 197)

(Continued on next page)

MTB 10-26-03

STL SEATTLE

Client Sample ID: 115406-5

Trace Level Organic Compounds

Lot-Sample #....: G3H130297-005 Work Order #....: FV71WLAC Matrix.....: SOLID

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

J - Estimated result. Result is less than the reporting limit.

B - Method blank contamination. The associated method blank contains the target analyte at a reportable level.

MTB 10-20-03

Dioxin Sampling Results

Area C-5 Total TEQ = 0.7				
	Concentration (ng/kg)	Detection Limit	Toxicity Eq. Factor	Toxicity Equivalents
2,3,7,8 - TCDD		0.059	1	0.03
1,2,3,7,8 - PeCDD	0.18		1	0.18
1,2,3,4,7,8 - HxCDD	0.26		0.1	0.03
1,2,3,6,7,8 - HxCDD	0.68		0.1	0.07
1,2,3,7,8,9 - HxCDD		0.4	0.1	0.02
1,2,3,4,6,7,8 - HpCD	11		0.01	0.11
OCDD	79		0.0001	0.01
2,3,7,8 - TCDF	0.19		0.1	0.02
1,2,3,7,8 - PeCDF	0.18		0.05	0.01
2,3,4,7,8 - PeCDF	0.22		0.5	0.11
1,2,3,4,7,8 - HxCDF	0.39		0.1	0.04
1,2,3,6,7,8 - HxCDF	0.23		0.1	0.02
1,2,3,7,8,9 - HxCDF		0.11	0.1	0.01
2,3,4,6,7,8 - HxCDF		0.21	0.1	0.01
1,2,3,4,6,7,8 - HpCDF	6.6		0.01	0.07
1,2,3,4,7,8,9 - HpCDF	0.29		0.01	0.00
OCDF	9.4		0.0001	0.00
			Total TEQ	0.7

STL SEATTLE

Client Sample ID: 115406-6

Trace Level Organic Compounds

Lot-Sample #....: G3H130297-006 Work Order #....: FV71KLAC Matrix.....: SOLID
 Date Sampled....: 08/11/03 Date Received...: 08/13/03
 Prep Date.....: 08/20/03 Analysis Date...: 08/26/03
 Prep Batch #....: 3232371
 Dilution Factor: 1

PARAMETER	RESULT	DETECTION LIMIT	UNITS	METHOD
2,3,7,8-TCDD	ND	0.042	pg/g	EPA-5 1613B
1,2,3,7,8-PeCDD	0.12 J		pg/g	EPA-5 1613B
1,2,3,4,7,8-HxCDD	ND	0.12	pg/g	EPA-5 1613B
1,2,3,6,7,8-HxCDD	0.68 J		pg/g	EPA-5 1613B
1,2,3,7,8,9-HxCDD	0.35 J		pg/g	EPA-5 1613B
1,2,3,4,6,7,8-HpCDD	14		pg/g	EPA-5 1613B
OCDD	110 B		pg/g	EPA-5 1613B
2,3,7,8-TCDF	ND	0.15	pg/g	EPA-5 1613B
1,2,3,7,8-PeCDF	ND	0.079	pg/g	EPA-5 1613B
2,3,4,7,8-PeCDF	0.14 J		pg/g	EPA-5 1613B
1,2,3,4,7,8-HxCDF	0.46 J		pg/g	EPA-5 1613B
1,2,3,6,7,8-HxCDF	0.22 J		pg/g	EPA-5 1613B
2,3,4,6,7,8-HxCDF	ND	0.14	pg/g	EPA-5 1613B
1,2,3,7,8,9-HxCDF	ND	0.026	pg/g	EPA-5 1613B
1,2,3,4,6,7,8-HpCDF	14		pg/g	EPA-5 1613B
1,2,3,4,7,8,9-HpCDF	ND	0.28	pg/g	EPA-5 1613B
OCDF	17		pg/g	EPA-5 1613B

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	87	(25 - 164)
13C-1,2,3,7,8-PeCDD	83	(25 - 181)
13C-1,2,3,4,7,8-HxCDD	83	(32 - 141)
13C-1,2,3,6,7,8-HxCDD	80	(28 - 130)
13C-1,2,3,4,6,7,8-HpCDD	97	(23 - 140)
13C-OCDD	110	(17 - 157)
13C-2,3,7,8-TCDF	89	(24 - 169)
13C-1,2,3,7,8-PeCDF	97	(24 - 185)
13C-2,3,4,7,8-PeCDF	94	(21 - 178)
13C-1,2,3,6,7,8-HxCDF	90	(26 - 123)
13C-2,3,4,6,7,8-HxCDF	104	(28 - 136)
13C-1,2,3,7,8,9-HxCDF	108	(29 - 147)
13C-1,2,3,4,6,7,8-HpCDF	119	(28 - 143)
13C-1,2,3,4,7,8,9-HpCDF	107	(26 - 138)
13C-1,2,3,4,7,8-HxCDF	90	(26 - 152)

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
37C14-2,3,7,8-TCDD	97	(35 - 197)

(Continued on next page)

Sample 115406-6

MTB 10-20-03

STL SEATTLE

Client Sample ID: 115406-6

Trace Level Organic Compounds

Lot-Sample #....: G3H130297-006 Work Order #....: FV71X1AC Matrix.....: SOLID

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

A Estimated result. Result is less than the reporting limit.

B Method blank contamination. The associated method blank contains the target analyte at a reportable level.

MTS 10-20-03

Dioxin Sampling Results

Area D Total TEQ = 0.7				
	Concentration (ng/kg)	Detection Limit	Toxicity Eq. Factor	Toxicity Equivalents
2,3,7,8 - TCDD		0.042	1	0.02
1,2,3,7,8 - PeCDD	0.12		1	0.12
1,2,3,4,7,8 - HxCDD		0.12	0.1	0.01
1,2,3,6,7,8 - HxCDD	0.68		0.1	0.07
1,2,3,7,8,9 - HxCDD	0.35		0.1	0.04
1,2,3,4,6,7,8 - HpCDD	14		0.01	0.14
OCDD	110		0.0001	0.01
2,3,7,8 - TCDF		0.15	0.1	0.01
1,2,3,7,8 - PeCDF		0.079	0.05	0.00
2,3,4,7,8 - PeCDF	0.14		0.5	0.07
1,2,3,4,7,8 - HxCDF	0.46		0.1	0.05
1,2,3,6,7,8 - HxCDF	0.22		0.1	0.02
1,2,3,7,8,9 - HxCDF		0.026	0.1	0.00
2,3,4,6,7,8 - HxCDF		0.14	0.1	0.01
1,2,3,4,6,7,8 - HpCDF	14		0.01	0.14
1,2,3,4,7,8,9 - HpCDF		0.28	0.01	0.00
OCDF	17		0.0001	0.00
			Total TEQ	0.7

STL SEATTLE

Sample ID E 8

Client Sample ID: 115406-1

Trace Level Organic Compounds

Lot-Sample #...: G3H130297-001 Work Order #...: FV7111AC
 Date Sampled...: 08/11/03 Date Received...: 08/13/03
 Prep Date...: 08/20/03 Analysis Date...: 08/26/03
 Prep Batch #...: 3232371
 Dilution Factor: 1

Matrix.....: SOLID

PARAMETER	RESULT	DETECTION LIMIT	UNITS	METHOD
2,3,7,8-TCDD	ND	0.040	pg/g	EPA-5 1613B
1,2,3,7,8-PeCDD	0.084 J		pg/g	EPA-5 1613B
1,2,3,4,7,8-HxCDD	0.081 J		pg/g	EPA-5 1613B
1,2,3,6,7,8-HxCDD	ND	0.16	pg/g	EPA-5 1613B
1,2,3,7,8,9-HxCDD	ND	0.11	pg/g	EPA-5 1613B
1,2,3,4,6,7,8-HpCDD	1.9 J		pg/g	EPA-5 1613B
OCDD	15 B		pg/g	EPA-5 1613B
2,3,7,8-TCDF	0.069 J		pg/g	EPA-5 1613B
1,2,3,7,8-PeCDF	0.073 J		pg/g	EPA-5 1613B
2,3,4,7,8-PeCDF	0.064 J		pg/g	EPA-5 1613B
1,2,3,4,7,8-HxCDF	ND	0.13	pg/g	EPA-5 1613B
1,2,3,6,7,8-HxCDF	ND	0.040	pg/g	EPA-5 1613B
2,3,4,6,7,8-HxCDF	ND	0.061	pg/g	EPA-5 1613B
1,2,3,7,8,9-HxCDF	0.045 J		pg/g	EPA-5 1613B
1,2,3,4,6,7,8-HpCDF	1.3 J		pg/g	EPA-5 1613B
1,2,3,4,7,8,9-HpCDF	0.083 J		pg/g	EPA-5 1613B
OCDF	2.1 J		pg/g	EPA-5 1613B

J-14

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	88	(25 - 164)
13C-1,2,3,7,8-PeCDD	88	(25 - 181)
13C-1,2,3,4,7,8-HxCDD	84	(32 - 141)
13C-1,2,3,6,7,8-HxCDD	80	(28 - 130)
13C-1,2,3,4,6,7,8-HpCDD	110	(23 - 140)
13C-OCDD	106	(17 - 157)
13C-2,3,7,8-TCDF	92	(24 - 169)
13C-1,2,3,7,8-PeCDF	97	(24 - 185)
13C-2,3,4,7,8-PeCDF	95	(21 - 178)
13C-1,2,3,6,7,8-HxCDF	93	(26 - 123)
13C-2,3,4,6,7,8-HxCDF	108	(28 - 136)
13C-1,2,3,7,8,9-HxCDF	105	(29 - 147)
13C-1,2,3,4,6,7,8-HpCDF	119	(28 - 143)
13C-1,2,3,4,7,8,9-HpCDF	125	(26 - 138)
13C-1,2,3,4,7,8-HxCDF	92	(26 - 152)

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
37C14-2,3,7,8-TCDD	103	(35 - 197)

(Continued on next page)

MTB 10-20-03

001297
70347

STL SEATTLE

Client Sample ID: 115406-1

Trace Level Organic Compounds

Lot-Sample #....: G3H130297-001 Work Order #....: FV71L1AC Matrix.....: SOLID

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

J Estimated result. Result is less than the reporting limit.

B Method blank contamination. The associated method blank contains the target analyte at a reportable level.

MTB 10-20-03

Dioxin Sampling Results

Area E Total TEQ = 0.2				
	Concentration (ng/kg)	Detection Limit	Toxicity Eq. Factor	Toxicity Equivalents
2,3,7,8 - TCDD		0.04	1	0.02
1,2,3,7,8 - PeCDD	0.084		1	0.08
1,2,3,4,7,8 - HxCDD	0.081		0.1	0.01
1,2,3,6,7,8 - HxCDD		0.16	0.1	0.01
1,2,3,7,8,9 - HxCDD		0.11	0.1	0.01
1,2,3,4,6,7,8 - HpCD	1.9		0.01	0.02
OCDD	15		0.0001	0.00
2,3,7,8 - TCDF	0.069		0.1	0.01
1,2,3,7,8 - PeCDF	0.073		0.05	0.00
2,3,4,7,8 - PeCDF	0.064		0.5	0.03
1,2,3,4,7,8 - HxCDF		0.13	0.1	0.01
1,2,3,6,7,8 - HxCDF		0.04	0.1	0.00
1,2,3,7,8,9 - HxCDF	0.045		0.1	0.00
2,3,4,6,7,8 - HxCDF		0.061	0.1	0.00
1,2,3,4,6,7,8 - HpCDF	1.3		0.01	0.01
1,2,3,4,7,8,9 - HpCDF	0.083		0.01	0.00
OCDF	2.1		0.0001	0.00
			Total TEQ	0.2

Dioxin Sampling Results

	Rinse Blank Concentration (pg/L)	Rinse Blank Detection Limit	Toxicity Eq. Factor	Toxicity Equivalents
2,3,7,8 - TCDD		0.24	1	0.12
1,2,3,7,8 - PeCDD		0.58	1	0.29
1,2,3,4,7,8 - HxCDD		0.42	0.1	0.02
1,2,3,6,7,8 - HxCDD	0.32		0.1	0.03
1,2,3,7,8,9 - HxCDD		0.4	0.1	0.02
1,2,3,4,6,7,8 - HpCDD	1.2		0.01	0.01
OCDD	3.8		0.0001	0.00
2,3,7,8 - TCDF		0.29	0.1	0.01
1,2,3,7,8 - PeCDF		0.42	0.05	0.01
2,3,4,7,8 - PeCDF		0.44	0.5	0.11
1,2,3,4,7,8 - HxCDF		0.63	0.1	0.03
1,2,3,6,7,8 - HxCDF		0.2	0.1	0.01
2,3,4,6,7,8 - HxCDF		0.19	0.1	0.01
1,2,3,7,8,9 - HxCDF	0.15		0.1	0.02
1,2,3,4,6,7,8 - HpCDF		0.73	0.01	0.00
1,2,3,4,7,8,9 - HpCDF		0.32	0.01	0.00
OCDF	1		0.0001	0.00
			Total TEQ	0.7



City of Tacoma

Science and Engineering Division

2201 Portland Avenue Tacoma WA 98421
Phone: 253.591.5588 Fax: 253.502.2170

Project: Olympic View Resources Area
AK80F6MJD
Date: October 29, 2003

Lab#: 20030811097
Sample ID: RB-1
Sample Type: Water
Sample Date: 8/11/2003

	Test	Result	Units
CV			
	Mercury	0.050 U	µg/L
GC/ECD-PCB			
	Aroclor-1016	0.1 U	ug/L
	Aroclor-1221	0.1 U	ug/L
	Aroclor-1232	0.1 U	ug/L
	Aroclor-1242	0.1 U	ug/L
	Aroclor-1248	0.1 U	ug/L
	Aroclor-1254	0.2 U	ug/L
	Aroclor-1260	0.1 U	ug/L
ICP			
	Arsenic	1.9 U	ug/L
	Copper	4.5 U	ug/L
	Lead	1.3 U	ug/L
	Zinc	2.3 U	ug/L
SUBCONTRACT			
	Dioxin	See Attached	ug/Kg

Lori A. Zboralski October 29, 2003
Reviewed By: **Date**

- Flags: U: The value is less than detection limit
UJ: The value is less than detection limit and considered estimated
J: The value is considered estimated
B: The value is less than the reporting limit but greater than detection limit

STL SEATTLE

Client Sample ID: 115406-7

Trace Level Organic Compounds

Lot-Sample #...: G3H130297-007 Work Order #...: FV7101AA Matrix.....: WATER
 Date Sampled...: 08/11/03 Date Received...: 08/13/03
 Prep Date.....: 08/20/03 Analysis Date...: 08/26/03
 Prep Batch #...: 3232525
 Dilution Factor: 1

PARAMETER	RESULT	DETECTION LIMIT	UNITS	METHOD
2,3,7,8-TCDD	ND	0.24	pg/L	EPA-5 1613B
1,2,3,7,8-PeCDD	ND	0.58	pg/L	EPA-5 1613B
1,2,3,4,7,8-HxCDD	ND	0.42	pg/L	EPA-5 1613B
1,2,3,6,7,8-HxCDD	0.32 J		pg/L	EPA-5 1613B
1,2,3,7,8,9-HxCDD	ND	0.40	pg/L	EPA-5 1613B
1,2,3,4,6,7,8-HpCDD	1.2 J		pg/L	EPA-5 1613B
OCDD	3.8 J		pg/L	EPA-5 1613B
2,3,7,8-TCDF	ND	0.29	pg/L	EPA-5 1613B
1,2,3,7,8-PeCDF	ND	0.42	pg/L	EPA-5 1613B
2,3,4,7,8-PeCDF	ND	0.44	pg/L	EPA-5 1613B
1,2,3,4,7,8-HxCDF	ND	0.63	pg/L	EPA-5 1613B
1,2,3,6,7,8-HxCDF	ND	0.20	pg/L	EPA-5 1613B
2,3,4,6,7,8-HxCDF	ND	0.19	pg/L	EPA-5 1613B
1,2,3,7,8,9-HxCDF	0.15 J		pg/L	EPA-5 1613B
1,2,3,4,6,7,8-HpCDF	ND	0.73	pg/L	EPA-5 1613B
1,2,3,4,7,8,9-HpCDF	ND	0.32	pg/L	EPA-5 1613B
OCDF	1.0 J		pg/L	EPA-5 1613B

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	60	(25 - 164)
13C-1,2,3,7,8-PeCDD	65	(25 - 181)
13C-1,2,3,4,7,8-HxCDD	68	(32 - 141)
13C-1,2,3,6,7,8-HxCDD	67	(28 - 130)
13C-1,2,3,4,6,7,8-HpCDD	95	(23 - 140)
13C-OCDD	94	(17 - 157)
13C-2,3,7,8-TCDF	60	(24 - 169)
13C-1,2,3,7,8-PeCDF	67	(24 - 185)
13C-2,3,4,7,8-PeCDF	65	(21 - 178)
13C-1,2,3,6,7,8-HxCDF	66	(26 - 123)
13C-2,3,4,6,7,8-HxCDF	83	(28 - 136)
13C-1,2,3,7,8,9-HxCDF	88	(29 - 147)
13C-1,2,3,4,6,7,8-HpCDF	96	(28 - 143)
13C-1,2,3,4,7,8,9-HpCDF	106	(26 - 138)
13C-1,2,3,4,7,8-HxCDF	64	(26 - 152)

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
37Cl4-2,3,7,8-TCDD	86	(35 - 197)

NOTE(S):

J Estimated result. Result is less than the reporting limit.

SAMPLE ID
R B-1

MTB 10-20-03



City of Tacoma
Environmental Services
Science and Engineering Division

Memorandum

TO: Desiree Pooley, Environmental Specialist, Sr.
FROM: Christopher L. Getchell, Source Control Supervisor
SUBJECT: Olympic View WBS Element ENV-00022-01-06
DATE: October 29, 2003

Attached are the analytical results for the OVRA samples collected on August 11, 2003. The samples were analyzed for Total Metals, Polychlorinated Biphenyls (PCBs), and PCDD/PCDF compounds.

The Science and Engineering Division analyzed the samples for Total Mercury. SPECTRA Laboratories, Inc. analyzed the samples for Total Metals. Severn Trent Laboratories analyzed the samples for PCBs and PCDD/PCDF compounds. A detailed Data Quality Review report was prepared. The original data is immediately available for review upon request.

If you have any questions concerning this data, call me at (253) 502-2130. Please note that the remaining portion of the samples associated with this report will be discarded six months from the date of this report, unless notified otherwise.

A handwritten signature in black ink that reads "Christopher L. Getchell".

Christopher L. Getchell
Source Control Supervisor,
Science and Engineering Division

CLG:LAZ



Chain of Custody Record

Page 1 of 1

#	EPA ID	Date	Time	Matrix	Composite	Sample ID	Analysis/# of Containers			PO#	Samples Sent to:	Remarks
							Total Containers	AS, Cu, Pb, Hg	Dioxins			
1	AZ	8/11/03	145A	Soil	X		1	1				
2	A1		1055A	Soil			1	1				
3	AD		1055A	Soil			1	1				
4	E		1112A	Soil			1	1				
5	C9		1122A	Soil			1	1				No Pb
6	C10		1130A	Soil			1	1				No Pb
7	B2		1142A	Soil			2	1				
8	BD		1192A	Soil			2	1				
9	B1		1150A	Soil			2	1				
10	C5		1206A	Soil			1	1				
11	D		1215A	Soil			1	1				
12	RBI		1235A	Water	X		4	2				
13												
14												
15												
16												
Relinquished By (Signature):							Received By (Signature):			Relinquished by (Signature):		
Date/Time: 8/11/03 12:45							Date/Time: 8/11/03 12:45			Date/Time: 8/11/03 12:45		
Relinquished By (Signature):							Received for Analysis By (Signature):			Received for Laboratory by (Signature):		
Date/Time:							Date/Time:			Date/Time:		
Remarks:							Remarks:			Remarks:		

Data Review Report

TO: Christopher L. Getchell, Source Control Supervisor
FROM: Lori A. Zboralski, Senior Laboratory Analyst *LAZ*
DATE: October 29, 2003

SAMPLES

This report concerns the following samples associated with **OVRA WBS Element ENV-00022-01-06**:

<u>Sample Description</u>	<u>Lab ID#</u>	<u>Date Sampled</u>
A-1	20030811086	08/11/2003
A-2	20030811087	08/11/2003
A-D	20030811088	08/11/2003
B-1	20030811089	08/11/2003
B-2	20030811090	08/11/2003
B-D	20030811091	08/11/2003
C-9	20030811093	08/11/2003
C-10	20030811094	08/11/2003
RB-1	20030811097	08/11/2003

The following samples' PCDD/PCDF data are reviewed in the attached document from EcoChem:

<u>Sample Description</u>	<u>Lab ID#</u>	<u>Date Sampled</u>
B-1	20030811089	08/11/2003
B-2	20030811090	08/11/2003
B-D	20030811091	08/11/2003
C-5 (PCDD/PCDF only)	20030811092	08/11/2003
D-1 (PCDD/PCDF only)	20030811095	08/11/2003
E-1 (PCDD/PCDF only)	20030811096	08/11/2003
RB-1	20030811097	08/11/2003

HOLDING TIMES

The samples were extracted within 14 days for Polychlorinated Biphenyls (PCBs) and analyzed within 7 days for Total Solids, 28 days for Mercury, 40 days for PCBs, and 180 days for Total Metals.

CHAIN OF CUSTODY

There were no deviations from Chain of Custody procedures.

METHODS

The samples were analyzed according to EPA SW-846 Methods 7470 for Mercury, 8082 for PCBs, and 6010B for Total Metals.

CALIBRATION AND VERIFICATION

The Initial Calibration for the PCBs met method recommendations of %RSD for the standard response factors of less than 20% for all compounds analyzed. The Continuing Calibration for the PCBs met method recommendations with %D for the standard response factors of less than 10% when compared with the initial calibration average response factors.

The ICP and Mercury calibrations met method requirements for accuracy. Independent mid-range standards were analyzed to monitor calibration accuracy (ICV and CCV). Acceptable recoveries for ICP and Mercury must be within 90 to 110%. All ICVs and CCVs had recoveries within acceptable limits and ranged from 95 to 104%.

METHOD AND CALIBRATION BLANKS

Method Preparation and Calibration blanks were analyzed at the required frequency. The concentrations of these blanks were less than 1/5th the amount found in the sample or less than the detection limit at all times, **except for Copper in the Method Blank. The Method Blank had a concentration of copper at 136 ug/L. The copper values for samples A-1, A-2, A-D, C-9, and C-10 are qualified as not detected and estimated based on the method blank analysis.**

FIELD BLANKS

Sample RB-1 is a field blank. There were no target analytes found in the sample.

SURROGATE COMPOUNDS

Two Surrogate compounds are added to each sample in PCB method 8082. Recoveries of surrogate compounds are compared with laboratory established control limits.

The surrogate recoveries for this sample ranged from 81 to 94% and were within the laboratory's control limits.

LABORATORY CONTROL SAMPLES

Laboratory Control Samples (LCS) monitor the performance of each step of the analysis, including sample preparation. The Arsenic true value was below the instrument detection limit and the Copper true value was less than the blank contamination. The LCS recoveries for all other parameters were within the laboratory established control limits.

DUPLICATE SAMPLE ANALYSIS

The duplicate samples had relative percent differences (RPD) within laboratory-established limits of less than 35%, for analytes with concentrations greater than 5 times the reporting limits.

MATRIX SPIKE SAMPLE ANALYSIS

A known amount of analyte was added to an aliquot of sample A-1 to be analyzed as a Matrix Spike for Total Metals analysis. The recoveries of these spikes were within the acceptance limits of 75-125%. Actual recoveries ranged from 75 to 90%.

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE ANALYSIS

Five compounds were added to two aliquots of sample B-2 for PCBs for Matrix Spike (MS) and Matrix Spike Duplicate (MSD) analysis. The recoveries ranged from 86 to 93%. All recoveries were within the method defined limits. No data is qualified.

FIELD DUPLICATE ANALYSIS

Samples A-1 and A-D are field duplicate samples. The results are summarized in the following table.

Analyte	A-1	A-D	RPD
Solids (percent)	96.7	96.7	0
Mercury (mg/Kg)	0.0125	0.0326	89
Arsenic (mg/Kg)	4.4 U	4.3 U	not calculated
Copper (mg/Kg)	17.5 UJ	15.5 UJ	not calculated
Lead (mg/Kg)	3.5 U	3.4 U	not calculated
Zinc (mg/Kg)	21.9	25.0	13



EcoChem, Inc.

Environmental Science and Chemistry

TRANSMITTAL

DATE: October 29, 2003

PROJECT NO.: 5403-2

TO: Lori Zboralski
Environmental Services
City of Tacoma Public Works
2201 Portland Avenue
Tacoma, Washington 98421

FROM: Craig Hutchings
EcoChem, Inc.
405 Westland Building
100 South King Street
Seattle, Washington 98104-2885

VIA: Mail

WE ARE SENDING THE FOLLOWING MATERIALS:

Data Validation Report for the OVRA Site Project

REMARKS:

Please feel free to call if you have any questions.

Copies: Chron
Project



EcoChem, Inc.

Environmental Science and Chemistry

DATA VALIDATION REPORT

CITY OF TACOMA

OVRA Site

Prepared for:

City of Tacoma
Public Works Department
2201 Portland Avenue
Tacoma, Washington 98421

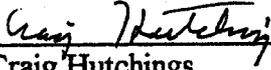
Prepared by:

EcoChem, Inc.
405 Westland Building
100 South King Street
Seattle, Washington 98104-2885

EcoChem Project: C5403-2

October 29, 2003

Approved for Release:



Craig Hutchings
Project Manager
EcoChem, Inc.

PROJECT NARRATIVE

Basis for the Data Validation

This report summarizes the results for data validation performed on soil and water sample data submitted for the OVRA Site project. A full data review was performed on Sample 115406-3, while Samples 115406-1, 115406-2, 115406-4, 115406-5, 115406-6, and 115406-7 received a limited review.

Samples were analyzed for dioxins/furans by Severn Trent Laboratories, Inc., Sacramento, California. The analytical methods and EcoChem project chemists are listed in the table below.

ANALYSIS METHODS AND ECOCHEM CHEMISTS

Analysis	Method	Primary Review	Secondary Review
Dioxins and Furans	EPA 1613B	Mark T. Brindle	Craig E. Hutchings

Data validation was based on the quality control (QC) criteria documented in the method listed above, and in the document *National Functional Guidelines for Organic Data Review* (USEPA 1999).

Data qualifier definitions with reason codes are included as **APPENDIX A**. **APPENDIX B** contains the Qualified Data Forms I. Worksheets and other project documentation are in **APPENDIX C**.

DATA VALIDATION REPORT
Dioxins and Furans
Method: 1613B
SDG: G3H130297

Analytical data for six soil samples and one water sample were reviewed using quality control (QC) criteria documented in the analytical method and *National Functional Guidelines for Organic Data Review* (USEPA, 1999). The samples were collected August 11, 2003. Severn Trent Laboratories, Inc. of Sacramento, California performed the analyses. Refer to the table below for a complete listing of samples.

Client Sample ID	Lab Sample ID	Matrix
115406-1	G3H130297-001	Soil
115406-2	G3H130297-002	Soil
115406-3	G3H130297-003	Soil
115406-4	G3H130297-004	Soil
115406-5	G3H130297-005	Soil
115406-6	G3H130297-006	Soil
115406-7	G3H130297-007	Water

I. DATA PACKAGE COMPLETENESS

The laboratory narrative and chain-of-custody (COC) forms indicated no problems with sample receipt. The laboratory submitted all of the necessary deliverables. Adequate corrective action processes were followed and anomalies were discussed in the case narrative.

II. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

Technical Holding Times and Sample Receipt	1	Matrix Spike/Matrix Spike Duplicate (MS/MSD)
GC/MS Tuning	1	Laboratory Duplicate
Initial Calibration (ICAL)		Ongoing Precision Recovery (OPR)
Calibration Verification (CVER)	1	Field Duplicate
Isomer Specificity	2	Compound Identification
1 Blanks		Compound Quantitation and Reporting Limits
Labeled Compound Recovery		

¹ Quality control results are discussed below, but no data were qualified.

² Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.

Blanks

The analyte OCDD was detected in the soil method blank prepared September 20, 2003. An action level of five times the blank concentration was established. The reported results for OCDD were greater than the action levels in all soil samples. No qualifiers were necessary.

Matrix Spike/Matrix Spike Duplicates

Matrix spike/matrix spike (MS/MSD) duplicate samples were not reported with this SDG. Accuracy was evaluated using the surrogate and ongoing precision and recovery (OPR) percent recovery values. No further action was required.

Laboratory Duplicate Analyses

Laboratory duplicate analyses were not performed. No evaluation of laboratory precision was possible.

Field Duplicates

Samples 115406-2 and 115406-3 were identified as field duplicates. All relative percent difference (RPD) values were acceptable.

Reporting Limits and Compound Identification

Positive values for 2,3,7,8-TCDF were reported in Samples 115406-1, 115406-3, 115406-4, and 115406-5. These results were not confirmed on a dissimilar column. The values were qualified as estimated (J-14).

Overall Assessment

As determined by this evaluation, the laboratory followed the specified method. Laboratory accuracy was acceptable as demonstrated by the recovery values for the OPR and labeled compounds. Laboratory precision acceptable as demonstrated by the field duplicate.

Data were estimated because confirmation was not performed for 2,3,7,8-TCDF.

All data, as qualified, are acceptable for use.



EcoChem, Inc.

Environmental Science and Chemistry

APPENDIX A
DATA QUALIFIER DEFINITIONS
REASON CODES

DATA VALIDATION QUALIFIER CODES

National Functional Guidelines

The following definitions provide brief explanations of the qualifiers assigned to results in the data review process.

U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification".
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

The following is an EcoChem qualifier that may also be assigned in the data review process:

DNR	Do-not-report. Duplicate results exist due to reanalyses. This result should not be reported.
-----	---

DATA QUALIFIER REASON CODES

1	Holding Times
2	Sample Preservation
3	Sample Custody
4	Missing Deliverables
5A	Calibration (initial)
5B	Calibration (continuing)
6	Field Blanks
7	Laboratory Blanks
8	Matrix Spike
9	Precision (Duplicate, or Matrix Spike Duplicate)
10	Laboratory Control Sample
11	Detection Limit
12	Standards
13	Surrogates
14	Other
15	Furnace QC
16	ICP Serial Dilution
17	Chemical Recoveries
18	Trip Blanks
19	Internal Standards
20	Linear Range Exceeded
21	Potential False Positives



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APPENDIX B
SAMPLE RESULT SUMMARIES (FORM I)



APPENDIX C
DATA VALIDATION WORKSHEETS

5403-2

10/23/07 Lori Zburalski 253-502-2137

Left message regarding Field Duplicates in
Dioxin package.

10/29 called again & left message

She called back & is waiting to hear about
field dup's from the lab. The dioxins were subbed out
& have STC IDs on the CoC, not CoT IDs.
She will call back w/ IDs.

10/29 Lori called back & confirmed field duplicate IDs

V-2
K-9

Project No.: <u>5403-2</u>	Screener: <u> </u> Date: <u> </u>
Project Name: <u>OVRA</u>	Reviewer: <u>MTB</u> Date: <u>10-16-03</u>
SDG/Package: <u>G3H130297</u>	

MODULE A: COMPLETENESS AND HOLDING TIME CHECKLIST

1.0 Chain-of-Custody

Y N N/A

1.1 Are all Chain-of-Custody (COC) forms included in data package?	✓		
1.2 Were COC forms properly signed and dated?	✓		
1.3 Was sample container temperature recorded on COC form (or other appropriate form) by laboratory?	✓		
1.4 Is the recorded temperature within control limits (4°C ±2°C) Temperature(s): <u>3.0°C</u>	✓		

Comments:

2.0 Completeness Check

2.1 Is a case narrative present and does it describe analytical problems, discrepancies and corrective actions?	✓		
2.2 Are all required summary forms present (see attached list)?	✓		
2.3 Are all required raw data sections present (see attached list)? (PRELIMINARY CHECK ONLY; detailed review of raw data will be documented on Module B Checklist).	✓		

Comments:

3.0 Holding Times/Preservation (Technical Criteria: CFR40; QAPP; Other _____)

3.1 Were all samples properly preserved?	✓		
3.2 Complete the Holding Time Tables. (Documented in Comments or in worksheets attached to Module B; qualifiers assigned during Module B review)	✓		

Comments:

Completeness and Holding Time Check Complete?

Table	Parameters (✓)	Completed	Location (attached or filename)
Sample Index		Y	
Holding Time Tables (list):			
Volatiles		Y / NA	
Semivolatiles		Y / NA	
P/PCBs		Y / NA	
Metals		Y / NA	
Dioxins <u>1613B</u>	✓	Y / NA	<i>see attached</i>
Conventionals		Y / NA	
		Y / NA	
		Y / NA	
Other: (list)		Y / NA	
		Y / NA	
		Y / NA	

See attached.

HOLDING TIME CHECKLIST

Dioxins/Furans by 1613B

Project Name:
Project No.
Client:

OVRA
5403-2
City of Tacoma

Date: 10/16/2003
Reviewer: MTB
SDG: G3H130297

Sample ID	Laboratory ID	Matrix	Date Collected	Date Extracted	Date Analyzed	Holding Time (days)		Qualifier	
						Extracted	Analyzed	Positive	ND
115406-1	G3H 130297-001	Soil	8/11/2003	8/20/2003	8/26/2003	9	6		
115406-2	G3H 130297-002	Soil	8/11/2003	8/20/2003	8/26/2003	9	6		
115406-3	G3H 130297-003	Soil	8/11/2003	8/20/2003	8/26/2003	9	6		
115406-4	G3H 130297-004	Soil	8/11/2003	8/20/2003	8/26/2003	9	6		
115406-5	G3H 130297-005	Soil	8/11/2003	8/20/2003	8/26/2003	9	6		
115406-6	G3H 130297-006	Soil	8/11/2003	8/20/2003	8/26/2003	9	6		
115406-7	G3H 130297-007	Water	8/11/2003	8/20/2003	8/26/2003	9	6		

Holding Time Criteria

Matrix	Extraction	Analysis
Soil	30 days	45 days
Soil, frozen	one year	45 days
Water	30 days	45 days



EcoChem, Inc.

Environmental Science and Chemistry

PROJECT NO.: 5403-2

SDG: G3H130297

SCREENED BY: _____

DATE: _____

REVIEWED BY: MTB

DATE: 10-16-03

**DATA PACKAGE COMPLETENESS
HIGH RESOLUTION MASS SPECTROMETER
DIOXIN/FURAN OR PCB CONGENER**

- 1 = MODULE A + B-1 (No calibration; summary forms only) (screening or data verification)
- 2 = MODULE A + B1 & B-2 (Sample, QC and calibration results; no raw data) (Level III, Level C)
- ③ = MODULE A + B1 & B-2 + C (Sample and QC results; raw data; trans/calc. Checks) (Level IV or V, Level D or E)

Deliverable Requirement	Equivalent EPA Form	Required	Present	Comments
Copies of Shipping Documents (Fed-Ex Airbills)		1, 2, 3	NO	
Case Narrative		1, 2, 3	✓	
Table of Contents		3	✓	
Cross reference of Field Sample No., Lab Sample No., and Analytical Batch		1, 2, 3	✓	
Chain-of-Custody Form (including Sample Receipt Checklist)		1, 2, 3	✓	
Sample Calculation (usually just a page copied from SOW)		3	NO	
Results Summary for Each Sample and Blank (includes ion abundance ratios)		1, 2, 3	✓	
TEF/TEQ Summary (if requested by client)		1, 2, 3	NO	
Blank Spike Results (OPR)		1, 2, 3	✓	
Labeled Compound Recovery Summary		1, 2, 3	✓	
Matrix Spike/Duplicate Matrix Spike Recovery Summaries		1, 2, 3	NO	
Instrument Performance Check (Resolution)		2, 3	✓	
Initial Calibration Data		2, 3	✓	
Continuing Calibration Data		2, 3	✓	
Windows Defining Mixture/Column Resolution Check		3	✓	
Selected Ion Chromatograms for Each Sample, Blank, and Standard		3	✓	
Quantitation List		3	✓	
Copies of Sample Preparation Work Sheets		3	✓	
Copies of Run Logs		3	✓	

Project No.: <u>5403-2</u>	Reviewer: <u>MTB</u> Date: <u>10-16-03</u>
Project Name: <u>OVRA</u>	Secondary: <u>CL</u> Date: <u>10/27/03</u>
SDG/Package: <u>G3H/30297</u>	
Laboratory: <u>STL - Sacramento</u>	

Parameter/Method: Dioxins / 1613 B Data Validation Criteria Table: NFG'99 & EPA Reg. X SOP
Furans for Validation of PCDD/PCDF data
 Jan. 96

MODULE B: TECHNICAL EVALUATION CHECKLIST- ORGANICS

- MODULE B-1 (Summaries of sample results; accuracy; precision; blanks)
- MODULE B-2 (Summaries of calibration, instrument performance & compound ID)
 - B-2 Org B-2 HRMS B-2 Other _____ (name)

NO Qualifiers Issued. See Sample Summary forms or other: _____

1.0 Technical Holding Times and Sample Handling (B-1)

	Y	N	N/A
1.1 Is Module A Checklist (COC, package completeness, Holding Time Table) complete?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.2 Are all holding times within the technical criteria from CFR40; QAPP; Other _____)? <input checked="" type="checkbox"/> no outliers _____ see attached Holding Time worksheet or data package page _____ see below	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.3 Are all cooler temperatures within the control limits? (temperature outliers listed on HT table) <input checked="" type="checkbox"/> no outliers _____ see attached Holding Time worksheet or data package page _____ see below	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: _____ Data judged as not significantly affected by outliers; no qualifiers assigned

2.0 Surrogates/Labeled Compounds (B-1)

2.1 Are all recovery values within the control limits? <input checked="" type="checkbox"/> no outliers _____ see attached Surrogate Summary Form or data package page _____ see below	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--	-------------------------------------	--------------------------	--------------------------

Comments: _____ No positive results; no qualifiers as all outliers were > UCL (high bias)

_____ No qualifiers assigned; one outlier per fraction/column acceptable (if > 10%)

¹³C - 2,3,7,8-TCDD used as surrogate control limits 35-197%

internal stds (labeled compounds) control limits ~ 25-150%

3.0 Method/Field Blank (B-1)

Y N N/A

3.1 Are Method Blanks free from contamination? no outliers see attached Blank Summary Form or data package page <input checked="" type="checkbox"/> see below		<input checked="" type="checkbox"/>	
3.2 Are there any trip/equipment/field blanks included in the data package (list below)?		<input checked="" type="checkbox"/>	
3.3 Are trip/equipment/field blanks free from contamination? no outliers see attached Blank Summary Form or data package page see below			<input checked="" type="checkbox"/>

Comments: No positive results in associated samples; no action required for method / trip / equip. / other
10X action level established for common lab cont.; 5X action level for others

soil method blank OCDD @ 1.5 pg/g action level = 7.5 pg/g (X)
(FWLQCIAA) analyzed on 5D5

Water method blank free of contaminants
(FWMV81AA) analyzed 8-23-03 @ 03:59 on inst. 1D5

(X) all OCDD results in soil samples were significantly greater than the action level
• No results were qualified based on blank contamination.

4.0 Laboratory Control Sample (Blank Spike/OPR Sample) (B-1)

4.1 Are all %R-values within the control limits? <input checked="" type="checkbox"/> no outliers see attached Summary Form or data package page see below	<input checked="" type="checkbox"/>		
4.2 Are all RPD values within control limits (if duplicate analyzed)? no outliers see attached Summary Form or data package page see below			<input checked="" type="checkbox"/>

Comments for LCS: No positive results in associated samples; no qualifiers as all outliers were > UCL (high bias)

OPR - soil matrix all %R values within control limits
MTB 101773 (FWLQCIAA) (FWLQCIAC) analyzed on 5D5
OPR - water matrix all %R values within control limits
(FWMV81AC) analyzed 8-23-03 @ 04:41 on inst. 1D5

5.0 Performance Evaluation (PE)/Standard Reference Material (SRM) (B-1)

PE/SRM Sample ID(s):

5.1 Was PE/SRM sample(s) analyzed?		<input checked="" type="checkbox"/>	
5.2 Are all values within control limits? no outliers see below			<input checked="" type="checkbox"/>

Comments: No qualifiers assigned based on PE/SRM outliers

aqueous sample
T15406-7 analyzed 8-26-03 @ 05:49 on inst. 8D5
(G3H130297-7)
(FY7107AA)

6.0 Matrix Spike/Matrix Spike Duplicate or Sample and Lab Duplicate(B-1)

Parent Sample ID: _____ Y N N/A

6.1 Are all %R-values within the control limits? no outliers see attached MS/MSD Summary Form or data package page see below			✓
6.2 Are all RPD values within control limits? no outliers see attached MS/MSD Summary Form or data package page see below			✓

Comments: No positive results in parent sample; no qualifiers as all outliers were > UCL (high bias)

MS/MSD not analyzed

7.0 Field Duplicate (B-1) Field Duplicate Sample ID(s):

7.1 Were field duplicates collected and analyzed?		✓	
7.2 Are all RPD values within control limits? no outliers see attached Field Dup. Summary Form or data package page see below			✓

Comments: No qualifiers assigned based on field duplicate outliers

*no field duplicates identified - Field Dup 1154d02 & 3
See Summary Form CH
4/2/02*

8.0 Sample Results (B-1)

8.1 Are there results for all analytes on the client required target compound list(s) see QAPP for lists?	✓		
8.2a Were TIC requested for this project?		✓	
8.2b If "yes", were TIC reported as required?			✓
8.3 Are reporting limits and sample results adjusted for sample size, % moisture (solid samples), etc.?	✓		
8.4 Do detection limits meet project-specific or method-specific limits?	✓		

Comments: Qualify TIC "NJ" unless already qualified "U" due to blank contamination

General Notes and Information:

*Precision
Since duplicate analyses were not performed, laboratory precision could not be evaluated.*

MODULE: B-2-HRMS (calibration, instrument performance & compound identification)

9.0 HRMS/GC Compound Identification (B-2)

Y N N/A

9.1 Were all retention time criteria met? <input checked="" type="checkbox"/> no outliers <input type="checkbox"/> see below	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.2 Were the retention times of all the native compound ions within ± 2 seconds of the labeled compound ions? <input checked="" type="checkbox"/> no outliers <input type="checkbox"/> see below	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.3 Were the ion abundance ratios within the method QC limits? <input checked="" type="checkbox"/> no outliers <input type="checkbox"/> see below	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.4 Were all S/N ratio criteria met? <input checked="" type="checkbox"/> no outliers <input type="checkbox"/> see below	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.5 Was a DB-225 (or equivalent column) confirmation performed for 2378-TCDF hits? (Dioxins only)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9.6 Were there any false positives or negatives?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Comments:

No confirmation of 2,3,7,8-TCDF hits on DB-225 column
for: 115406-1, 115406-3, 115406-4, & 115406-5

J-14

(see attached)

10.0 HRMS Instrument Performance (B-2)

10.1 Are PFK static resolving power checks performed at the required frequency?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.2 Was PFK resolving power at least 10,000 (10% valley definition) for an appropriate mass?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.3 Was the resolving power zeroed correctly (i.e. were the bases of peak displays within the lower grid intersections)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.4 Was the exact mass within 5 ppm of the theoretical mass? (see method for specific mass and criteria) <input checked="" type="checkbox"/> no outliers <input type="checkbox"/> see below	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.5 Was the GC windows-defining mixture analyzed at the required frequency?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.6 Are any/all chromatographic separation (valley/peak) criteria met? <input checked="" type="checkbox"/> no outliers <input type="checkbox"/> see below	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.7 Are retention time windows established for all homologue groups?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

11.0 Initial Calibration (B-2)

	Y	N	N/A
11.1 Are ICALs analyzed on all instruments on which samples are analyzed?	<input checked="" type="checkbox"/>		
11.2 Are the correct number and concentration of standards used?	<input checked="" type="checkbox"/>		
11.3 Are all ion abundance ratios for unlabeled and labeled compounds within method QC limits? <input checked="" type="checkbox"/> no outliers _____ see attached ICAL Summary Form or data package page _____ see below	<input checked="" type="checkbox"/>		
11.4 Is the method-specified signal to noise (S/N) criteria met? <u>> 2.5</u> <input checked="" type="checkbox"/> no outliers _____ see attached ICAL Summary Form or data package page _____ see below	<input checked="" type="checkbox"/>		
11.5 Are the %RSD values for the native compounds within QC limits? (<u>≤ 20%</u> RSD) <input checked="" type="checkbox"/> no outliers _____ see attached ICAL Summary Form or data package page _____ see below	<input checked="" type="checkbox"/>		
11.6 Are the %RSD values for the labeled compounds within QC limits? (<u>≤ 30%</u> RSD) <input checked="" type="checkbox"/> no outliers _____ see attached ICAL Summary Form or data package page _____ see below	<input checked="" type="checkbox"/>		
11.7 Are any/all absolute retention time criteria met? <input checked="" type="checkbox"/> no outliers _____ see attached ICAL Summary Form or data package page _____ see below	<input checked="" type="checkbox"/>		

Comments: _____ No positive results assoc. w/ outliers; RL judged as not affected – no qualifiers assigned

- 8-6-03 ICAL on 5D5 using DB-5 column
- * 8-25-03 ICAL on 8D5 using DB-5 column
(two copies in data pkg for 8-25 8D5 ICAL)
- 8-23-03 ICAL on 1D5 using DB-5 column

12.0 Continuing Calibration / Calibration Verification (B-2)

12.1 Are continuing calibration/calibration verification standards analyzed at the proper frequency?	<input checked="" type="checkbox"/>		
12.2 Are all ion abundance ratios for unlabeled and labeled compounds within method QC limits? <input checked="" type="checkbox"/> no outliers _____ see attached CCAL Summary Form or data package page _____ see below	<input checked="" type="checkbox"/>		
12.3 Is the method-specified signal to noise (S/N) criteria met? <u>> 2.5</u> <input checked="" type="checkbox"/> no outliers _____ see attached CCAL Summary Form or data package page _____ see below	<input checked="" type="checkbox"/>		
12.4 Are any/all absolute retention time criteria met? <input checked="" type="checkbox"/> no outliers _____ see attached CCAL Summary Form or data package page _____ see below	<input checked="" type="checkbox"/>		
12.5 Are CCALs acceptable (____ %D ____ Concentration Values ____ other)? <input checked="" type="checkbox"/> no outliers _____ see attached CCAL Summary Form or data package page _____ see below	<input checked="" type="checkbox"/>		

Comments: _____ No positive results assoc. w/ outliers; RL judged as not affected – no qualifiers assigned

20% D (native) 30% D (labeled)

- Daily std. : 8-23-03 @ 23:58 on 5D5
- Daily Std. : 8-26-03 @ 07:54 on 8D5

DB-255 Confirmation for 2,3,7,8-TCDF

Dioxins and Furans by EPA Method 1613B

Project Name: OVRA SDG: G3H130297
 Project Number: 5403-2 Date: 10/17/2003
 Client: City of Tacoma Reviewer: MTB

SDG	Client Sample Number	2,3,7,8-TCDF conc. (pg/g)	Was confirmation performed?	Qualifier
G3H130297	115406-1 ✓	0.06900	No	J-14
G3H130297	115406-3 ✓	0.27000	No	J-14
G3H130297	115406-4 ✓	0.22000	No	J-14
G3H130297	115406-5 ✓	0.19000	No	J-14

Field Duplicate Precision

Dioxins/Furans

Project No. 5403-2 SDGs: A3C260146
 Project Name: City of Tacoma RPD
 Reviewer/Date: CEH 10/27/03 Control Limit = 35

Compound	Sample Result ug/L	Duplicate Result ug/L	Calculated RPD	Suggested Qualifier
	115406-2 G3H130297-002	115406-3 G3H130297-003		
1,2,3,7,8-PeCDD	0.10 J	0.082 U	19.8	
1,2,3,4,7,8-HxCDD	0.12 J	0.10 U	18.2	
1,2,3,6,7,8-HxCDD	0.37 J	0.52 J	33.7	
1,2,3,4,6,7,8-HpCDD	4.7 J	4.1 J	13.6	
OCDD	32	24	28.6	
1,2,3,7,8-PeCDF	0.091 J	0.16 J	55.0	*
2,3,4,7,8-PeCDF	0.087 J	0.15 U	53.2	*
1,2,3,4,7,8-HxCDF	0.23 J	0.28 U	19.6	
2,3,4,6,7,8-HxCDF	0.099 J	0.17 J	52.8	*
1,2,3,7,8,9-HxCDF	0.031 J	0.042 U	30.5	
1,2,3,4,6,7,8-HpCDF	3.8 J	2.7 J	33.8	
1,2,3,4,7,8,9-HpCDF	0.10 J	0.14 U	33.3	
OCDF	4.30 J	2.80 J	42.3	*

J = Estimated concentration less than the reporting limit.
 U = Not detected at the stated concentration.

* No qualifier assigned as reported value is less than the reporting limit.

Project No.: <u>5403-2</u>	Reviewer: <u>MTB</u>	Date: <u>10-16-03</u>
SDG/Package: <u>G3H130297</u>	Secondary: <u>C12</u>	Date: <u>10/23/03</u>
Parameter/Method: <u>Dioxins / 1613B</u>	Equation List (attached): <u>NA</u>	
Laboratory: <u>STI</u> <u>Sacramento</u>	<u>CH 10/1/03</u>	

MODULE C: CALCULATION AND TRANSCRIPTION CHECKLIST

(As per project specific requirements and/or Table 1: Summary of Recalculation Requirements)

Calculation Check Worksheet	Chromatograms Checked (✓/ NA / *) * see comments	Calculations Attached (✓/ NA)	Transcriptions
Initial calibration	✓	✓	OK ✓ See below _____
Continuing Calibration	✓	✓	OK ✓ See below _____
Tunes	✓	N/A	OK ✓ See below _____
Blanks	✓	N/A	OK ✓ See below _____
Samples	✓	✓	OK ✓ See below _____
Surrogates <u>labeled cpd</u>	✓	✓	OK ✓ See below _____
Laboratory Control Sample <u>OPR</u>	✓	✓	OK ✓ See below _____
MS/MSD or Matrix Spike	N/A	N/A	OK <u>N/A</u> See below _____
Laboratory Duplicate	N/A	N/A	OK <u>N/A</u> See below _____
Internal Standards	✓	✓	OK ✓ See below _____
Serial Dilutions	N/A	N/A	OK <u>N/A</u> See below _____
Other:			OK _____ See below _____
			OK _____ See below _____

Comments: (attach additional page if needed) ✓ NO PROBLEMS

Method 1613

Initial Calibration for native compounds on DB-5 Column

$$RR = \frac{(An1 + An2) (Ci)}{(AI1 + AI2) (Cn)}$$

where:

An1 + An2 = Areas of 1 + 2 ions for non-labeled compounds

AI1 + AI2 = Areas of 1 + 2 ions for labeled compounds

Ci = concentration of labeled compound (ng/mL)

Cn = concentration of unlabeled compound in standard (ng/mL)

For OCDD and 13C - OCDD

OCDD ions = 457/459

13C- OCDD ions = 469/471

CS 1 Std		Date = 8/25/2003				Instrument ID 8D5					
Ion	Area	ion ratio	RT min	sec	calc's RT	RRT	A1 + A2	Cn / Ci conc.	calc'd RR	reported RR	
457.7377	2.40E+05	0.94	36	56	36.93		4.96E+05	5.0	2.33	2.33	
459.7348	2.56E+05		x	x		1.000					
469.7779	4.15E+06	0.95	36	55	36.92		8.52E+06	200			
471.7750	4.37E+06		x	x							
CS 2 Std		Date = 8/25/2003									
Ion	Area	ion ratio	RT min	sec	calc'd RT	RRT	A1 + A2	Cn / Ci conc.	calc'd RR	reported RR	
457.7377	1.06E+06	0.89	36	56	36.93		2.26E+06	20	2.22	2.22	
459.7348	1.20E+06		x	x		1.000					
469.7779	4.86E+06	0.91	36	55	36.92		1.02E+07	200			
471.7750	5.33E+06		x	x							
CS 3 Std		Date = 8/25/2003									
Ion	Area	ion ratio	RT min	sec	calc'd RT	RRT	A1 + A2	Cn / Ci conc.	calc'd RR	reported RR	
457.7377	9.23E+06	0.88	36	55	36.92		1.97E+07	100	2.46	2.46	
459.7348	1.05E+07		x	x		1.000					
469.7779	7.61E+06	0.90	36	54	36.90		1.61E+07	200			
471.7750	8.44E+06		x	x							
CS 4 Std		Date = 8/25/2003									
Ion	Area	ion ratio	RT min	sec	calc's RT	RRT	A1 + A2	Cn / Ci conc.	calc'd RR	reported RR	
457.7377	3.62E+07	0.89	36	55	36.92		7.66E+07	400	2.41	2.41	
459.7348	4.04E+07		x	x		1.000					
469.7779	7.55E+06	0.90	36	54	36.90		1.59E+07	200			
471.7750	8.36E+06		x	x							
CS 5 Std		Date = 8/25/2003									
Ion	Area	ion ratio	RT min	sec	calc's RT	RRT	A1 + A2	Cn / Ci conc.	calc'd RR	reported RR	
457.7377	2.12E+08	0.89	36	55	36.92		4.50E+08	2000	2.54	2.53	
459.7348	2.38E+08		x	x		1.000					
469.7779	8.51E+06	0.92	36	54	36.90		1.77E+07	200			
471.7750	9.22E+06		x	x							

Mean RR calculated =
% RSD calculated =

2.39
5.138%

Mean RR reported = 2.39
% RSD reported = 5.10%

Method 1613

Initial Calibration for native compounds on DB-5 Column

$$RR = \frac{(An1 + An2) (Cl)}{(Al1 + Al2) (Cn)}$$

where:

An1 + An2 = Areas of 1 + 2 ions for non-labeled compounds

Al1 + Al2 = Areas of 1 + 2 ions for labeled compounds

Cl = concentration of labeled compound (ng/mL)

Cn = concentration of unlabeled compound in standard (ng/mL)

For 2,3,7,8-TCDD and 13C-2,3,7,8-TCDD

2,3,7,8-TCDD ions = 319/321

13C-2,3,7,8 TCDD ions = 331/333

CS 1 Std Date = 8/25/2003 Instrument ID 8D5

Ion	Area	ion ratio	RT		calc's		A1 + A2	Cn / Cl conc.	calc'd RR	reported RR
			min	sec	RT	RRT				
319.8965	7.38E+06	0.83	17	10	17.17		1.45E+07	40.0	1.12	1.12
321.8936	7.38E+06		x	x		1.001				
331.9368	nr	0.81	17	9	17.15		3.24E+07	100		
333.9339	nr		x	x						

CS 2 Std Date = 8/25/2003

Ion	Area	ion ratio	RT		calc'd		A1 + A2	Cn / Cl conc.	calc'd RR	reported RR
			min	sec	RT	RRT				
319.8965	2.51E+05	0.81	17	10	17.17		5.62E+05	2	0.89	0.97
321.8936	3.11E+05		x	x		1.001				
331.9368	1.42E+07	0.80	17	9	17.15		3.14E+07	100		
333.9339	1.72E+07		x	x						

CS 3 Std Date = 8/25/2003

Ion	Area	ion ratio	RT		calc'd		A1 + A2	Cn / Cl conc.	calc'd RR	reported RR
			min	sec	RT	RRT				
319.8965	1.57E+06	0.79	17	9	17.15		3.55E+06	10	1.02	1.02
321.8936	1.98E+06		x	x		1.002				
331.9368	1.54E+07	0.80	17	7	17.12		3.47E+07	100		
333.9339	1.93E+07		x	x						

CS 4 Std Date = 8/25/2003

Ion	Area	ion ratio	RT		calc's		A1 + A2	Cn / Cl conc.	calc'd RR	reported RR
			min	sec	RT	RRT				
319.8965	5.63E+04	0.78	17	10	17.17		1.24E+05	0.5	0.89	0.89
321.8936	6.77E+04		x	x		1.001				
331.9368	nr	0.79	17	9	17.15		2.78E+07	100		
333.9339	nr		x	x						

CS 5 Std Date = 8/25/2003

Ion	Area	ion ratio	RT		calc's		A1 + A2	Cn / Cl conc.	calc'd RR	reported RR
			min	sec	RT	RRT				
319.8965	3.10E+07	0.79	17	10	17.17		7.04E+07	200	1.08	1.11
321.8936	3.94E+07		x	x		1.002				
331.9368	1.46E+07	0.81	17	8	17.13		3.26E+07	100		
333.9339	1.80E+07		x	x						

Mean RR calculated = 1.00
 % RSD calculated = 10.487%

Mean RR reported = 1.02
 % RSD reported = 9.51%

Calibration Verification Worksheet

isotope Dilution Concentration

$$C_{ex} \text{ (ng/ml)} = \frac{(A_{n1} + A_{n2}) \text{ (Cl)}}{(A_{I1} + A_{I2}) \text{ RR}}$$

where:

A_{n1} + A_{n2} = Areas of 1 + 2 ions of unlabeled compoundsA_{I1} + A_{I2} = Areas of 1 + 2 ions of labeled compounds

Cl = concentration of labeled compound in standard (100 and 200)

2,3,7,8-TCDD ions = 319.8965 and 321.8936

13C12 - 2,3,7,8-TCDD ions = 331.9368 and 333.9339

Date:	8/26/2003	ion	RT	calc'd		ICAL	ng/mL	ng/mL	ng/mL		
ion	Area	ratio	min	sec	RT	RRT	A1 + A2	RRF	Cl	calc'd Conc	reported Conc
319.8965	4.03E+06	0.78	17	12	17.20		9.19E+06	1.02		10.65	10.52
321.8936	5.18E+06					1.001					
331.9368	3.79E+07	0.80	17	11	17.18		8.54E+07		100		
333.9339	4.75E+00										

2,3,7,8-TCDF ions = 303.9016 and 305.8987

13C12 - 2,3,7,8-TCDF ions = 315.9419 and 317.9389

Date:	8/26/2003	ion	RT	calc'd		ICAL	ng/mL	ng/mL	ng/mL		
ion	Area	ratio	min	sec	RT	RRT	A1 + A2	RRF	Cl	calc'd Conc	reported Conc
303.9016	4.67E+06	0.76	16	31	16.52		1.08E+07	0.77		11.67	11.70
305.8987	6.11E+06					1.001					
315.9419	nr	0.80	16	30	16.50		1.20E+08		100		
317.9389	nr										

Ion abundance limits=0.65 - 0.89

$$\text{Calc Conc} = (\text{Area cmp1} \times \text{IS}) / (\text{Area cmp2} \times \text{ICAL RRF})$$

Sample Check

2,3,7,8-TCDF ions = 303.9016 and 305.8987

13C12 - 2,3,7,8-TCDF ions = 315.9419 and 317.9389

115406-3	ion	RT	calc'd		ICAL	pg/g	pg/g				
ion	Area	ratio	min	sec	RT	RRT	A1 + A2	RRF	pg	calc'd conc.	reported conc.
303.9016	3.40E+04	0.83	16	34	16.57		7.48E+04	0.77		0.255	0.27
305.8987	4.08E+04					1.002					
315.9419	3.39E+07	0.80	16	32	16.53		7.63E+07		200		
317.9389	4.24E+07										

$$\text{Calc Conc} = (\text{Area cmp} \times \text{IS} \times \text{Fin Vol}) / (\text{Area IS} \times \text{RRF} \times \text{Vol.})$$

1,2,3,6,7,8-HxCDD ions = 389/391

13C12 - 1,2,3,6,7,8-HxCDD ions = 401/403

115406-3	ion	RT	calc'd		ICAL	pg/g	pg/g				
ion	Area	ratio	min	sec	RT	RRT	A1 + A2	RRF	pg	calc'd conc.	reported conc.
389.8157	5.14E+04	1.39	31	8	31.13		8.85E+04	0.89		0.505	0.52
391.8127	3.71E+04					1.001					
401.8559	2.22E+07	1.29	31	6	31.10		3.94E+07		200		
403.8529	1.72E+07										

$$\text{Calc Conc} = (\text{Area cmp} \times \text{IS} \times \text{Fin Vol}) / (\text{Area IS} \times \text{RRF} \times \text{Vol.})$$

OCDD ions = 457/459

13C12 - OCDD ions = 401/403

115406-3	ion	RT	calc'd		ICAL	pg/g	pg/g				
ion	Area	ratio	min	sec	RT	RRT	A1 + A2	RRF	pg	calc'd conc.	reported conc.
457.7377	1.58E+06	0.89	36	55	36.92		3.31E+06	2.39		23.276	24.00
459.7348	1.75E+06					1.000					
401.8559	1.12E+07	0.89	36	55	36.92		2.38E+07		400		
403.8529	1.26E+07										

$$\text{Calc Conc} = (\text{Area cmp} \times \text{IS} \times \text{Fin Vol}) / (\text{Area IS} \times \text{RRF} \times \text{Vol.})$$

Ongoing Precision Recovery (OPR)

OPR_check_1613B.xls

Dioxins and Furans by EPA Method 1613B

Project Name: OVRA
 Project No: 5403-2
 Client: City of Tacoma

SDG: G3H130297
 Reviewer/Date: MTB 10/20/03

G3H200000-371

Compound	Reported Amount (pg/g)	Spike Added (pg/g)	Reported Percent Recovery	Calculated Percent Recovery	Control Limits % Recovery
2,3,7,8-TCDD	20.30	20.00	101%	101.50%	67-158
1,2,3,7,8-PeCDD	83.30	100.00	83%	83.30%	70-142
1,2,3,4,7,8-HxCDD	86.70	100.00	87%	86.70%	70-164
1,2,3,6,7,8-HxCDD	88.00	100.00	88%	88.00%	76-134
1,2,3,7,8,9-HxCDD	90.40	100.00	90%	90.40%	64-162
1,2,3,4,6,7,8-HpCDD	96.70	100.00	97%	96.70%	70-140
OCDD	197.00	200.00	99%	98.50%	78-144
2,3,7,8-TCDF	17.50	20.00	87%	87.50%	75-158
1,2,3,7,8-PeCDF	111.00	100.00	111%	111.00%	80-134
2,3,4,7,8-PeCDF	113.00	100.00	113%	113.00%	68-160
1,2,3,4,7,8-HxCDF	105.00	100.00	105%	105.00%	72-134
1,2,3,6,7,8-HxCDF	103.00	100.00	103%	103.00%	84-130
2,3,4,6,7,8-HxCDF	101.00	100.00	101%	101.00%	70-156
1,2,3,7,8,9-HxCDF	101.00	100.00	101%	101.00%	78-130
1,2,3,4,6,7,8-HpCDF	98.60	100.00	99%	98.60%	82-132
1,2,3,4,7,8,9-HpCDF	99.60	100.00	100%	99.60%	78-138
OCDF	208.00	200.00	104%	104.00%	63-170



City of Tacoma
Public Works Department

April 20, 2004

Karen Keeley
US EPA, Region 10
1200 Sixth Avenue, MS ECL-111
Seattle, WA 98101

Subject: Final Olympic View Resource Area Year 1 Annual Monitoring Report

Dear Ms. Keeley:

Please find enclosed the City's responses to EPA comments on the Year 1 Annual Monitoring Report, as well as the Final version of the report.

If you have any questions about this, please contact me at 253-502-2108.

Sincerely,

John O'Loughlin, P.E.
Project Manager
Science & Engineering Division

JO:sh (Final Y1AR Tran)

Enclosure

cc: Beth Coffey, ACOE (2 copies)
Joyce Mercuri, Ecology
Robert Taylor, NOAA
David Templeton, Anchor Environmental
Ed Woodfield, Foss Maritime Co.
Tom Gibbons, WADNR
John Carlton, WDFW
Robert Clark, NOAA Restoration Center
Jay Davis, USFWS
Bill Sullivan, Puyallup Tribe of Indians
Glen St. Amant, Muckleshoot Indian Tribe
Rick Moore, Hart Crowser
Leslie Ann Rose, CHB

File: NRDA - OVRA

**City Responses to EPA Comments on Year 1 Annual Monitoring Report 2003
Olympic View Resource Area, Tacoma, WA**

City responses are in *italics* and immediately follow the EPA comment.

1. Editorial comments are marked on the attached hard copy.

City Response: Corrections were made.

2. Global. Consistent with the Long-term Monitoring and Reporting Plan (LMRP), references to sampling area grids in D and E should be labelled "D-1" and "E-1". In future years, different grids (e.g., E-2 and E-3) will be sampled.

City Response: Corrections were made globally.

3. Page 1, 2nd P. According to the Removal Action Completion Report (RACR; p. 1) the Removal Action involved work at approximately 2.3 acres, not 2.9 acres.

City Response: Correction was made.

4. Section 3.2.

- Add information clarifying that samples from grids C-9 and C-10 are being analyzed to evaluate potential off-site migratory contamination related to remediation in an adjacent part of the Middle Waterway Problem Area (as described in Section 5.1.2 of the LMRP).

City Response: Text was added to last paragraph of Section 2.

- Text indicates that all samples were collected from the beach in the dry. Given elevations, it appears that Area E samples were collected from a boat.

City Response: The elevations are actually -2 and above. Samples were taken at an extreme low tide in the dry.

- Based on the Data Validation Memorandum, it appears that the total metals analyses were also performed by an outside laboratory (i.e., SPECTRA).

City Response: Text of report was corrected.

5. Section 4.1.

- Incorporate the following sentence from the LMRP: Early warning levels are not performance standards, but are set at more stringent levels to assess whether performance standards could be exceeded in the future.

City Response: Change was made.

- On Page 4, please clarify how the as-built cap thicknesses were determined for the two transects in Area E. Also, for Area E, incorporate additional bullets that describe how the accuracy standards of the survey equipment and the accuracy of relocating the exact points on a subtidal transect may also affect the observed changes in elevation.

City Response: Additional text was added for clarification.

- On Page 5, please describe the depth of the erosion protection material that was probed – does it appear that six inches is remaining in place? Per the LMRP (p. 7), specifically state whether the coverage and distribution of the erosion protection material conditions present immediately after construction remain similar at the site.

City Response: Additional text was added to this section.

- For the photographs next year, please take a minimum of one close-up photograph in each of the areas with erosion protection material, and a minimum of two close-up photographs of capped areas with the intent to show grain size characteristics.

City Response: City notes this requirement and additional text was added to section 5 to document it for future monitoring events.

6. Section 4.2.

- Modify text “...the OVRA Sediment Quality Criteria (SQC), provided in Table 2 of the LMRP. All other metals (i.e., lead, mercury, and zinc) concentrations...”.

City Response: Change was made.

- Clarify the TEQ values (e.g., WHO) that were used for calculating the dioxin TEQs. Provide an appropriate citation for those values.

City Response: Change was made.

- In the final sentence, clarify that the 2003 metals data for sample grids C-9 and C-10 provide baseline information and at this time do not show potential cross-contamination from Middle Waterway cleanup activities.

City Response: Additional text was added for clarification.

7. Section 5.0. Based on the exceedance of the early warning level at one of the four stations in Transect 1, EPA requests that the portion of Transect 1 that crosses Area B be surveyed in April 2004. In addition, survey elevations should be collected from a new transect located in the area west of the existing Transect 1. This new transect should be positioned parallel to the existing Transect 1, and should cover the area from approximately elevation 8 to 1 ft MLLW.

City Response: City notes this requirement and additional text was added to section 5 to document it for future monitoring events.

8. Section 6.2. Update this section to clarify that the public information sign has been installed.

City Response: Update was made.

9. Tables 1 and 2.

- Clarify that the units are “feet” for the elevations and differences.

City Response: Change was made.

- Add a footnote to the “Difference” column clarifying the vertical and horizontal accuracy standards are 0.01 ft and 0.01 ft, respectively (Table 1) and +/- 3 ft, respectively (Table 2).

City Response: Change was made.

- After the “Early Warning” column, add two additional columns to summarize information for those transect locations that exceed the early warning level. The two columns would include the “Estimated Post-Construction Cap Thickness” and the “Minimum Design Cap Thickness” (from Table 1 of the LMRP, in inches). For example, for the fourth entry for Transect T1, the “Yes” would be followed by an estimated post-construction cap thickness of 55 inches; the reader could subtract the elevation difference of 0.9 ft (11 inches); then, the resultant value of 44 inches could be compared to the minimum design cap thickness of 32 inches. It may not be possible to do this for Table 2, where the post-construction thickness of the cap varies so much. Are there alternative approaches that would yield the same type of information for Area E? Is it worthwhile, given future monitoring events, to estimate the cap thickness in the as-built for each of the two transects and add this information to Table 2?

City Response: Tables were revised per EPA request.

10. Table 5. Total PCBs should be summed using the approach recommended by Ecology and PSDDA (i.e., total PCBs are summed using a value of zero for undetected individual Aroclor values). The use of this approach should be described

in a footnote.

City Response: A footnote was added to document use of Ecology standard procedure to use the largest non-detect value for the total when all Aroclors are non-detect.

11. Sheets 2 and 3. Please provide a title for each plotted transect (e.g., Transect 1) and include a footnote referencing Sheet 1 for showing the locations of transects at the site. Notes should also be added clarifying that the plotted lines are interpolated from individual elevations that were determined at discrete points. Is it possible to show the specific discrete points that were shot for each of the transects, as these same points will be shot in future years (e.g., 12 marks would be shown for the 12 locations that were shot for Transect 1)? For Sheet 3, the KPFF transects should be marked 2003.

City Response: Changes were made. Boxes were modified to line up with discrete monitoring points.

12. Sheet 2.

- For Transect 2, the as-built and 2003 survey lines do not appear to be plotted correctly. For example, the as-built elevation of 11.3 ft does not appear to be plotted any differently than the 2003 survey elevation of 10.6 ft. A similar discrepancy is noted for other elevations in Transect 2.

City Response: Corrections were made to the Figure and the corresponding table. Original boxes did not line up with monitoring points (but were simply evenly spaced along the monitoring line), which led to some confusion.

- For Transect 3, the as-built elevation of 9.8 ft and the 2003 elevation of 9.6 ft do not appear to be plotted correctly.

City Response: See immediately previous response.

- For Transect 4, the as-built elevation of 12 ft and the 2003 elevation of 11.5 ft do not appear to be plotted correctly.

City Response: See immediately previous response.

13. Appendix C.

- Please provide clean, clear copies of the first two pages and the Chain of Custody Record from Appendix C. The existing copies are too light, and are difficult to read.

City Response: Better copies are being provided.

- The third page of Appendix C is a draft figure (May 2003) from the LMRP. Please incorporate the final figure (Figure 3; August 2003) from the LMRP.

City Response: Correction was made.

- Please provide a numerical list of the photo points shown in the reproduced Figure 1 from the MAMP, and clarify whether these "approximate" photo point locations were indeed selected. With this numerical list (1 through 7), show the photo numbers (e.g., PPTA3A 81203.jpg) that correspond to each point location, and identify the general direction of the photograph (e.g., east, west).

City Response: Changes were made.