U.S. Environmental Protection Agency
Region 10
Seattle, Washington

Explanation of Significant Differences Wyckoff/Eagle Harbor Superfund Site East Harbor Operable Unit

September 2007

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Signature sheet for the *Explanation of Significant Differences Wyckoff/Eagle Harbor Superfund Site East Harbor Operable Unit* at the Wyckoff/Eagle Harbor Superfund site. This ESD outlines significant changes to the *East Harbor Operable Unit Wyckoff/Eagle Harbor Superfund Site Record of Decision*, issued in September 1994.

9/28/07
Date

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Region 10

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1. Introduction

In accordance with Section 117(c) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and Section 300.435(c)(2)(i) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), if the Environmental Protection Agency (EPA) selects a remedial action and, thereafter, determines there is a significant change with respect to that action, an Explanation of Significant Differences (ESD) and the reasons for such change must be published.

This ESD has been prepared for the East Harbor Operational Unit (OU) of the Wyckoff/Eagle Harbor Superfund Site on Bainbridge Island, Washington (EPA Identification Number WAD009248295). The Wyckoff/Eagle Harbor Superfund site is located on the east side of Bainbridge Island in central Puget Sound, (Figure 1).

The Wyckoff Site includes the former Wyckoff Company wood-treatment facility, contaminated subtidal and intertidal sediments in Eagle Harbor, and other upland sources of contamination to the harbor, including a former shipyard. The East Harbor OU consists of intertidal and subtidal surface sediments in the eastern part of Eagle Harbor. The sediments are contaminated with polynuclear aromatic hydrocarbons (PAHs) and other organic compounds associated with wood treatment.

EPA is the lead agency for the Wyckoff/Eagle Harbor Superfund Site. EPA has worked closely with the Washington Department of Ecology (Ecology), the City of Bainbridge Island, the Army Corps of Engineers, the National Oceanographic and Atmospheric Agency, the Suquamish Tribe, and other parties to develop remedies for the site.

The East Harbor OU Record of Decision (ROD) was issued in September 1994. The primary remedial action objective for the East Harbor sediments was achievement of the Washington State Sediment Management Standards (SMS) (WAC 173-204) and reduction of contaminants in fish and shellfish to levels protective of human health and the environment. The major components of the remedy include sediment capping in subtidal areas with monitoring in intertidal areas to confirm the predicted recovery of intertidal sediments through natural processes. The East Harbor Subtidal Sediment Cap was completed in three phases over seven years.

In the Summer of 2005, EPA received reports from citizens about odors on the West Beach, an intertidal portion of the East Harbor OU that had previously been considered uncontaminated. Upon inspection, EPA found evidence of residual oily contamination and sheen on the beach near a set of bulkheads, as well as contaminated soils and sediments

behind the bulkheads. It appeared that some contaminated sediments associated with this portion of the site had been incompletely removed. EPA roped-off these portions of the West Beach and posted signs restricting access. . EPA conducted extensive sediment sampling along the beach during a period of extreme low tides in spring 2006. The investigation determined that the extent of visual and chemical contamination at the surface of the beach was limited to the roped-off areas. However, sediment near the surface (i.e., within 4 feet of the surface) in several additional areas was also contaminated above cleanup levels.

Consistent with the East Harbor remedy selected in the ROD, an exposure barrier system (EBS) will be constructed over these recently discovered contaminated portions of the West Beach and subtidal sediments. The EBS will be constructed from the southern edge of the existing subtidal cap (- 10 mean lower low water (MLLW)) to the intertidal area up to +10 MLLW. The construction of this EBS and accompanying extension of the subtidal cap constitute a significant difference from the ROD. In addition, the discovery of contamination in a portion of the East Harbor OU used by the public necessitates changes to the cleanup levels in the ROD.

This ESD will become part of the Administrative Record for the site which includes the ROD and other relevant documents. These documents are available for review at the following location:

EPA Region 10 Superfund Records Center
1200 Sixth Avenue, ECL-076
Seattle, WA 98101
206-553-4494 or toll-free at 1-800-424-4372
Please call for an appointment

For any questions regarding this ESD, please contact

For General Information:
Jeanne O'dell, EPA Community Involvement Coordinator
206-553-6919 or toll-free at 1-800-424-4372

Technical Information:
MaryJane Nearman, EPA Region 10 Remedial Project Manager
206-553-6642

2 Site History, Contamination, and Selected Remedy

From the early 1900s through 1988, a succession of companies treated wood at the Wyckoff wood treating plant for use as railroad ties and trestles, telephone poles, pilings, docks, piers, and treated lumber generally. The plant was one of largest in the United States. By 1910, pressure treatment began with creosote/bunker oil. Wood-preserving operations included: (1) the use and storage of creosote, pentachlorophenol, solvents, gasoline, antifreeze, fuel and waste oil, and lubricants; (2) management of process wastes; (3) wastewater treatment and discharge; and (4) storage of treated wood and wood products.

There is little historic information about the waste management practices at the facility. Until the late 1940s, treated wood was stored in surface water adjacent to the facility. Beginning in the 1940s treated logs were transported to and from varying facility treatment areas via a transfer table pit. Chemical solutions drained from retorts after a treating cycle, as well as from treated wood, went directly into the soil and groundwater. Wastewater was also discharged into Eagle Harbor for many years. Groundwater and soils at the facility are contaminated with primarily creosote-derived PAHs, PCP, aromatic carrier oils, and dioxins and furans. An on-site extraction and treatment system is used to recover and treat oily liquid and contaminated groundwater at the site. It is estimated that 1 million gallons of oily liquid still remain in the subsurface beneath the former wood-treating facility. A sheet pile wall has also been installed around the former process area to prevent migration of oily liquid and contaminated groundwater to Eagle Harbor and Puget Sound.

Sediments in areas of Eagle Harbor are contaminated with PAHs and other organic compounds, as well as with metals, primarily mercury. Eagle Harbor is divided into two areas, East Harbor and West Harbor (Figure 1). The wood treating facility is the major source of PAH to the East Harbor through both past operating practices and contaminant transport through the subsurface. An additional source of contaminants to the East Harbor was created when sludge from tanks and sumps was used as fill material between an old and new bulkhead at the Wyckoff property in the 1950s. In the West Harbor, PAH contamination in nearshore sediments appear to be from combustion products, minor spills, and pilings and piers, while subtidal PAH contamination in the West Harbor is believed to reflect a combination of these sources, disposal practices at a former shipyard and releases from the Wyckoff operations. Elevated concentrations of metals in the West Harbor, particularly near the former shipyard, are associated with past shipyard operations, including the application, use, and removal (by sandblasting) of bottom paints and antifoulants, including mercury.

2.1 Basis for Taking Action

Chemical concentrations in East Harbor sediments and marine organisms are elevated with respect to background locations. However, human health risk estimates for exposure to subtidal sediment contaminants through dermal contact and sediment ingestion are within or below EPA's range of acceptable risks (EPA's acceptable risk range is from 1 in 10,000 ($1x10^{-4}$) to 1 in 1,000,000 ($1x10^{-6}$)). For seafood ingestion, calculated cancer risks are generally between 10^{-4} and 10^{-6} at both the East Harbor and background locations. Consumption of shellfish from specific areas (such as near the Wyckoff property) results in risk levels above 10^{-4}. In addition, the bioassays for acute toxicity indicated that sediments from many sampled locations in the East Harbor are toxic to amphipods, oyster larvae, or both. The bioassay responses are most severe in areas of high PAH contamination, such as areas just north of the Wyckoff property. Additional evidence of biological effects in Eagle Harbor includes the prevalence of liver lesions and tumors in English sole, as documented by NOAA.

2.2 East Harbor Remedial Action Objective and Selected Remedy

The primary remedial action objective for the East Harbor sediments was achievement of the Washington State Sediment Management Standards (SMS) and reduction of contaminants in fish and shellfish to levels protective of human health and the environment.

In subtidal areas, active remediation is required if the top ten centimeters of sediment contain contaminant concentrations above SMS-mandated levels at the completion of upland source control. For intertidal sediments, the surface ten centimeters must at a minimum achieve SMS-mandated levels within ten years after completion of active cleanup action (WAC 173-204-570). This is supplemented by an intertidal objective of concentrations of 1,200 µg/kg (dry weight) high molecular weight PAH (HPAHs), developed by EPA to address human health risks from consumption of contaminated shellfish in intertidal areas.

The major components of the remedy specified by the ROD include sediment capping in subtidal areas with monitoring in intertidal areas to confirm the predicted recovery of intertidal sediments through natural processes.

2.2.1 Remedy Implementation

The East Harbor Subtidal Sediment Cap was completed in three phases over seven years. The major components of each phase were as follows:

- ***Phase I:*** EPA issued an Action Memorandum for a non-time-critical removal action (NTCRA) on June 15, 1993. Sediment placement NTCRA activities began in September 1993, and concluded in March 1994. Approximately 275,000 cubic yards (cy) of dredged material was placed over 54 acres of contaminated sediment approximately 900 feet from the shoreline.

- ***Phase II:*** In 2000-2001, EPA extended the Phase I sediment cap by an additional 15 acres to the Wyckoff facility's northern shoreline over a former Wyckoff facility log-rafting area. This area was not remediated during Phase I due to a lack of upland source control at the time. ***Phase III:*** In early 2002, EPA placed an additional 50,000 cubic yards of clean material in a shallow subtidal area to create intertidal habitat and form a continuous intertidal beach along the Eagle Harbor shoreline.

- ***West Beach/Mitigation Beach:*** This project occurred as mitigation for the taking of habitat during sheet pile wall installation in the Groundwater and Soils OU. Creation of this beach increased the area of available forage fish-spawning habitat; providing feeding, resting, and habitat for migrating salmonids; and providing a connecting corridor between existing habitats within Eagle Harbor and Puget Sound. When conducting the investigation on the recently discovered contamination on the West Beach, this area was administratively moved from that OU and added to the East Harbor OU based on its intertidal and subtidal nature and the nature of the remedy (i.e., extension of the East Harbor subtidal cap). The East Harbor OU now includes all contaminated subtidal and intertidal areas adjacent to the Wyckoff site.

2.2.2 System Operations/Operation and Maintenance

EPA is conducting long-term monitoring of the subtidal and intertidal areas of the East Harbor according to the Operation, Maintenance, and Monitoring Plan (OMMP) approved by EPA in July 1994, and amended in May 1999. The most recent Year 8 monitoring results were used to determine remedy success. The primary activities associated with the OMMP include the following:

- Subtidal and Intertidal monitoring to determine cap physical stability and containment effectiveness .
- East Beach monitoring for natural attenuation.
- West Beach/Mitigation Beach monitoring for habitat utilization.

3 Basis for the ESD

Following the Summer of 2005 citizen reports and subsequent EPA investigation and public access restrictions described in the Introduction above, EPA conducted extensive sediment sampling along the beach during a period of extreme low tides in spring 2006. The objectives of the sampling were to: 1) assess the nature and extent of the contamination in the areas of concern; 2) determine if other portions of the West Beach were contaminated; and 3) collect data to support remedial action in the contaminated areas.

The investigation determined that the extent of contamination on the surface of the beach was limited to the initial areas of concern. However, intertidal sediment near the surface (i.e., within 4 feet) in several additional areas was also contaminated above cleanup levels. Although subtidal sampling was not conducted in this effort, residual contamination from the bulkhead removals likely contaminated subtidal sediments directly adjacent to the contaminated intertidal sediments. The current subtidal cap does not extend to these additional subtidal and intertidal areas between -10 MLLW and +10 MLLW.

3.1 Selected Remedy

Consistent with the East Harbor ROD, an exposure barrier system (EBS) will be constructed over the more recently discovered contaminated portions of the West Beach and nearby subtidal sediments that were not capped during previous phases of remedial action in the East Harbor OU. The EBS will effectively isolate the contaminated West Beach sediments from human and ecological exposure. The EBS includes two primary elements:

1. **Beach Cover System.** A beach cover system will be placed on top of the existing beach sediments and previously placed habitat fill in the intertidal zone. The area to be covered includes locations where contaminant concentrations have recently been found to exceed cleanup levels and locations where visual evidence of contamination has been observed in the upper 4 feet of sediment. The cover system will consist of a porous geotextile placed on the original beach, a 1-foot-thick layer of 3-inch cobbles placed on top of the geotextile, and a 2-foot-thick layer of habitat fill placed on top of the cobble layer.
2. **Subtidal Cap Extension.** The existing Eagle Harbor sediment cap will be extended from its current southern edge to the new beach cover system. The materials, placement methods, and placement tolerances for this cap extension will be consistent with those used for the existing Eagle Harbor cap, and the cap extension will have the same overall thickness as the beach cover system. The result will be a 3-foot-thick layer of sand and gravel covering the subtidal area immediately north of the West Beach and extending up to the southern edge of the existing harbor cap.

Figure 3 shows the areas where the EBS will be constructed. Cross-sectional views through the EBS are illustrated in Figure 4.

3.2 Other Remedial Options and Modifications Considered

As a result of stakeholder suggestions, EPA also considered the following modifications to the West Beach remedial action:

- **Excavation of "Hot Spots."** EPA considered excavating the most-contaminated portions of the beach to a depth of 2 feet, backfilling the resulting holes with 3 feet of clean habitat fill, and spreading a one-foot-thick layer of habitat fill over the remainder of the contaminated beach area. The option was not pursued because it would not result in greater protectiveness because it does not account for potential exposure at small undiscovered hot spots, and because contaminated sediment would be left in place at depths greater than 2 feet below grade. In addition, it would pose difficulties in implementation due to tidal flooding, and would not provide the armoring and enhanced beach drainage provided by the selected beach cover system.

- **Reduce the Beach Cover Area.** This was evaluated to potentially reduce the cost of the beach cover system by covering only the most contaminated areas and doing limited excavation in adjoining areas with contaminant concentrations just slightly above cleanup levels. It was not pursued because it would not result in greater protectiveness (for same reasons described above) and because dynamic beach processes would tend to scavenge sediment from the covered areas to fill in the non-covered areas.

- **Incorporation of Adsorbent Materials into the Beach Cover.** EPA considered incorporating adsorbent material into the intertidal beach cover system. Both organoclay and activated carbon as granular material and manufactured mats were evaluated. Neither enhanced the protectiveness of the remedy for the following reasons:

  - Organoclay is an effective adsorbent for mobile non-aqueous phase liquid (NAPL). It was not incorporated into the final EBS for the West Beach because the residual NAPL present in a few locations, does not appear to be mobile.

  - Activated carbon is typically used to adsorb dissolved organic contaminants. However, the solubilities of PAHs and other NAPL constituents are relatively low and limited modeling shows that the concentrations of PAHs in sediment left under the cover system are unlikely to result in adverse effects to surface water.

- **Eliminating Sub-tidal Cap Extension.** Despite significant potential cost savings, after careful evaluation, EPA decided to proceed with the extension of the cap for the following reasons:

  - The harbor cap material will also support the toe of the beach cover system.

  - Extension of the harbor cap is consistent with previous remedial action in Eagle Harbor which has proven to be effective through ongoing monitoring.

  - The harbor cap would cover any remaining contamination or debris on the harbor bottom in this area.

– The design and implement of a conclusive sampling program to justify eliminating the harbor cap extension would significantly delay the implementation of the EBS.

3.3 Sources of Information

The following information in the Administrative Record supports the need for the significant differences described herein and the basis for the EBS design:

- *West Beach Investigation Data Evaluation Report Wyckoff/Eagle Harbor Superfund Site Bainbridge Island, Washington* (CH2M HILL, 2006)
- *Wyckoff West Beach Exposure Barrier System (EBS) Design Concept* (CH2M HILL, 2007)
- *Wyckoff West Beach Exposure Barrier System (EBS) Design Basis* (CH2M HILL, 2007)

4 Description of Significant Differences

As described in Section 2.2.1, the remedy components of the East Harbor ROD have been completed. However, new information about visual and chemical contamination in an additional portion of the East Harbor OU has come to light and there is a need to expand and modify the remedy to address this contamination.

The construction of the EBS at the West Beach constitutes a significant difference from the East Harbor ROD for the following reasons:

a. The Beach Cover System enhances the former Mitigation Beach portion of the remedy. While the surface of the Beach Cover System is made up of the same materials as the former Mitigation Beach and will serve the same function (i.e., increase the area of available forage fish-spawning habitat; providing feeding, resting, and habitat for migrating salmonids; and provide a connecting corridor between existing habitats within Eagle Harbor and Puget Sound), the cover system includes additional subsurface components intended to isolate contaminated sediment from human and ecological contact.

b. The Beach Cover System and Subtidal Cap Extension are estimated to cost approximately $2.3 million , constituting a significant increase in the cost of the selected remedy.

In addition, the discovery of contamination in a portion of the East Harbor accessed by the public necessitates modifications to the cleanup levels selected in the ROD. The exposure scenarios considered for development of cleanup levels in the ROD were limited to ecological exposure and human consumption of exposed marine organisms. Direct human contact with contaminated sediments may exist on the West Beach during periods of low tide. Therefore, the cleanup levels for intermittently exposed intertidal sediment along the West Beach, which were based solely on the Sediment Quality Standards (SQS) of the SMS, must be updated to also include the Washington Model Toxics Control Act (MTCA) soil cleanup levels under WAC 173-340-740. Table 1 lists the MTCA Method B cleanup levels for direct human exposure.

Table 1
Additional Cleanup Levels for West Beach Portion of East Harbor OU

Chemical Group	Chemical of Concern	MTCA Method B Soil CUL[a] (mg/kg)
PAH	2-Methylnaphthalene	320
PAH	Acenaphthene	4,800
PAH	Acenaphthylene	--
PAH	Anthracene	24,000
PAH	Benzo (a) anthracene	0.14
PAH	Benzo (a) pyrene	0.14
PAH	Benzo (b) fluoranthene	0.14
PAH	Benzo (g,h,i) perylene	--
PAH	Benzo (k) fluoranthene	0.14
PAH	Chrysene	0.14
PAH	Dibenzo (a,h) anthracene	0.14
PAH	Fluoranthene	3,200
PAH	Fluorene	3,200
PAH	Indeno (1,2,3-cd) pyrene	0.14
PAH	Naphthalene	3,200
PAH	Phenanthrene	--
PAH	Pyrene	2,400
PCP	Pentachlorophenol	8.3

Notes:
[a] Model Toxics Control Act Cleanup Levels and Risk Calculations (CLARC) database, soil, Method B direct contact
-- Cleanup level is not available
mg/kg - milligrams per kilogram (parts per million)
PAH - polynuclear aromatic hydrocarbon
PCP – pentachlorophenol

No changes in expected outcomes are anticipated from this ESD. The EBS will provide a protective and durable exposure barrier that will allow typical recreational activities on the beach and in the harbor with a low likelihood of contact with underlying contaminated sediments. The EBS will also enhance the former Mitigation Beach and serve as suitable fish habitat.

5 Support Agency Comments

Regulatory and governmental stakeholders including the State of Washington Department of Ecology (Ecology), the Suquamish Tribe, and the National Oceanic and Atmospheric Administration (NOAA) participated in the investigation and the evaluation of cleanup options for the West Beach and support the remedial action outlined in this ESD.

6 Affirmation of Statutory Determinations

The Selected Remedy attains the mandates of Section 121 of CERCLA, and the NCP. Specifically, the remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial action, is cost effective, and utilizes permanent solutions and resource recovery technologies to the maximum extent practicable.

Because this remedy will result in hazardous substances, pollutants or contaminants remaining on site above levels that allow for unrestricted exposure, a statutory review will be conducted within five years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

7 Public Participation Activities

In accordance with the NCP, a formal public comment period is not required for an ESD. However, EPA is announcing the availability of this ESD and a summary of the cleanup action in two local newspapers once the ESD is issued. EPA also discussed this action in a public meeting on the five-year review held at the Bainbridge Island Commons on August 16, 2007. The final ESD will be available on the EPA Wyckoff/Eagle Harbor website. Public notification of beach closure during construction activities will be coordinated with the City of Bainbridge Island and the Bainbridge Island Parks Department.

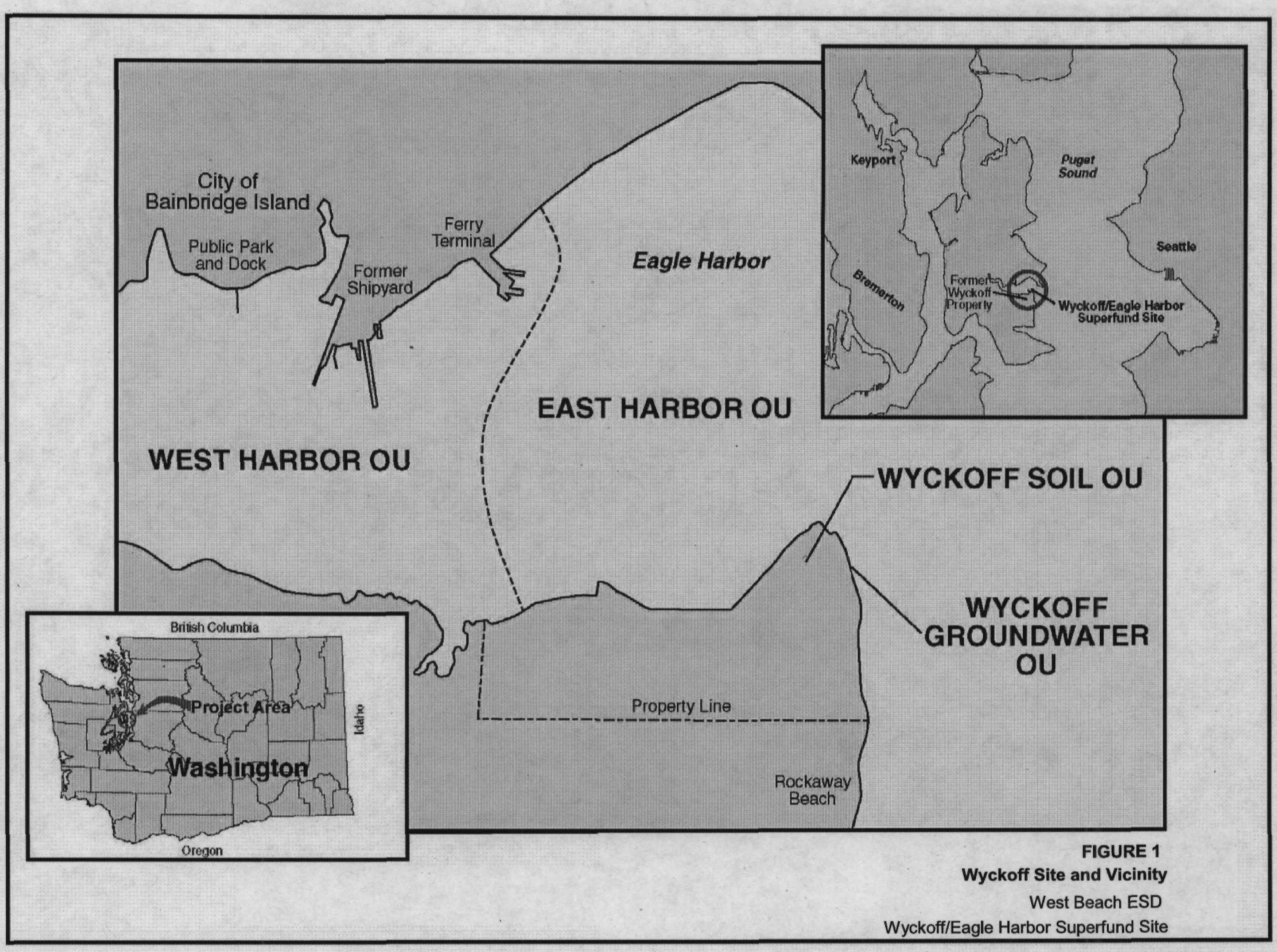
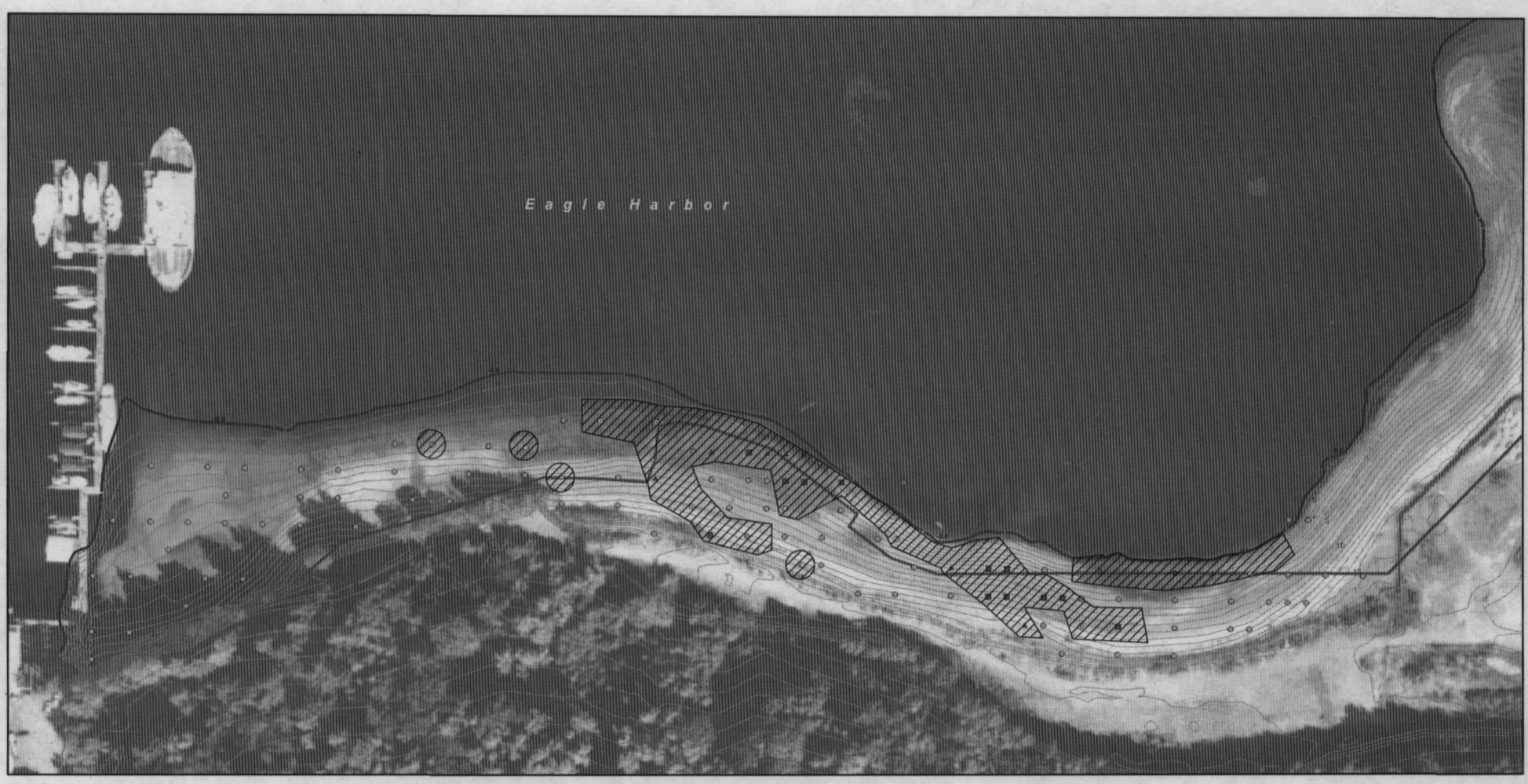


FIGURE 1
Wyckoff Site and Vicinity
West Beach ESD
Wyckoff/Eagle Harbor Superfund Site



Exceedance Magnitude

- ★ >100X cleanup level
- ▲ 10 - 100X cleanup level
- ■ Visual contamination, no samples
- ⊕ 5 - 10X cleanup level
- ⊙ 2 - 5X cleanup level
- ○ < 2X cleanup level (MTCA only)
- ⊙ No exceedances, no visual contamination

Contaminated Sediment

N

0 50 100 200 Feet

Figure 2
Distribution of Visible and Chemical Contamination - Upper 4 Feet

WEST BEACH EBS DESIGN CONCEPT
WYCKOFF/EAGLE HARBOR SUPERFUND SITE

File Path: P:\URS Greiner\180778\GIS\Layouts\Beach\Visual_Chemical_Results_ESD.mxd.

Subtidal Cap Extension

Beach Cover System

Exceedance Magnitude

- >100X cleanup level
- 10 - 100X cleanup level
- Visual contamination, no samples
- 5 - 10X cleanup level
- 2 - 5X cleanup level
- < 2X cleanup level (MTCA only)
- No exceedances, no visual contamination

N

0 50 100 200 Feet

Figure 3
Beach Cover System and Subtidal Cap Extension Areas

WEST BEACH EBS DESIGN CONCEPT
WYCKOFF/EAGLE HARBOR SUPERFUND SITE

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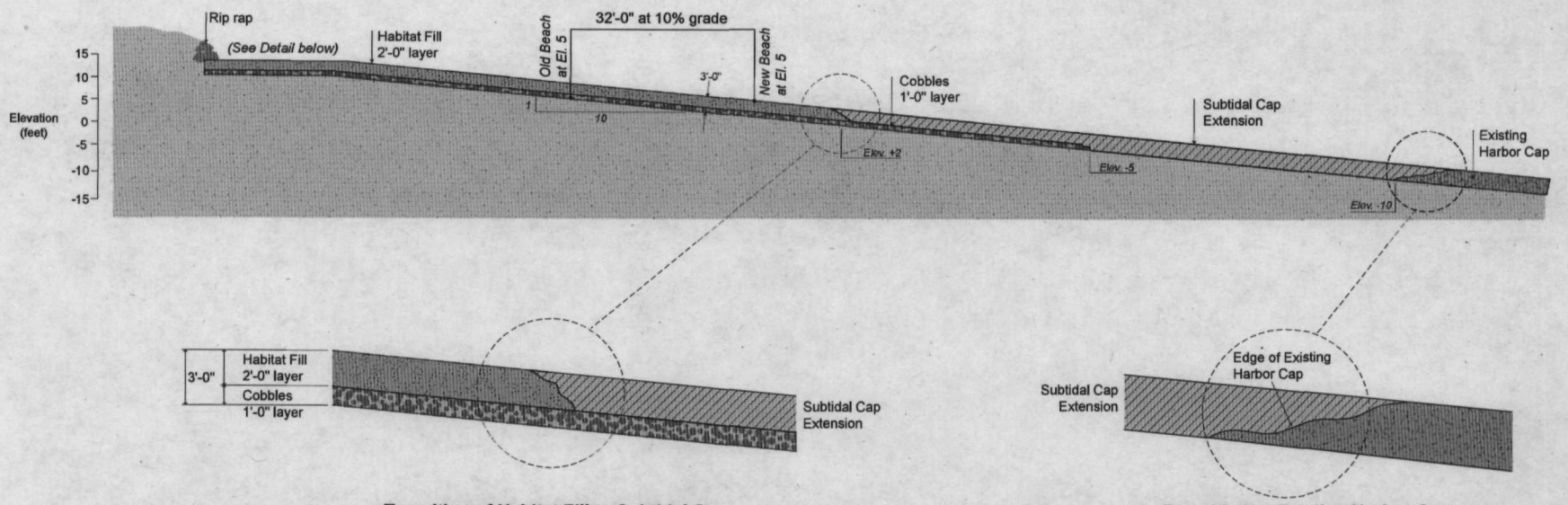
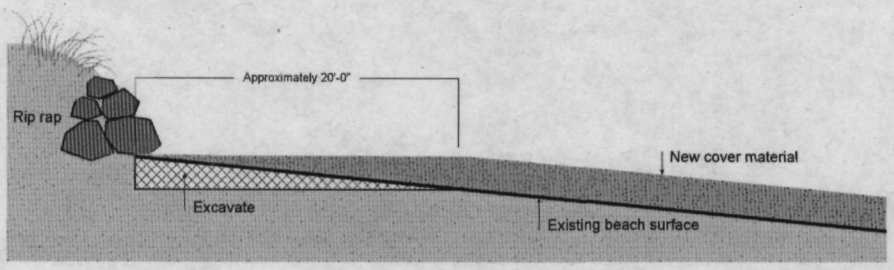


Transition of Habitat Fill to Subtidal Cap Extension Material

Transition to Existing Harbor Cap



Detail of at Top of Beach

Figure 4
Conceptual Schematic Cross Section of Overall Exposure Barrier System Looking West

WEST BEACH EBS DESIGN CONCEPT
WYCKOFF/EAGLE HARBOR SUPERFUND SITE

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APPENDIX A

Analytical Results - West Beach Sediment Samples

Explanation of Sediment Comparison Criteria Used in West Beach Data Evaluation

The Record of Decision (ROD) for OU 3 (USEPA 1992) identifies the state sediment management standards (SMS) (WAC 173-240) as the primary applicable or relevant and appropriate requirements (ARARs) to be used in defining site cleanup objectives for the East Harbor. The SMS are based on protection of marine organisms and are intended to mitigate adverse biological effects, contaminant resuspension, and bioaccumulation.

The chemical criteria in the SMS were derived from the 1988 Puget Sound lowest apparent effects threshold (LAET) testing conducted in the late 1980s (Barrick et al., 1988). Apparent effects thresholds (AETs) are concentrations of a specific chemical above which adverse biological effects always occur (Ecology, 1996). The AETs are based on paired chemical and biological results from benthic infaunal abundance date, amphipod bioassays, Microtox® assay luminosity, and oyster larvae bioassays.

At the time the West Beach Investigation Work Plan and QAPP were prepared, USEPA planned to use carbon-normalized SQS values as the screening levels for potential biological exposure. However, following receipt of analytical data from the West Beach Investigation, it was recognized that TOC concentrations in West Beach sediment samples are very low (typically less than 0.5 percent). In such cases, SMS recommend use of the LAET values to evaluate sediment contamination. The LAETs were also derived from the AET[1] study, but are based on dry weight rather than carbon-normalized values.

Depending on TOC content, sample results were either compared to the LAET values (samples with less than 0.5 percent TOC), or were carbon normalized and compared to the SQS values (samples with greater than 0.5 percent TOC).

[1] Carbon-normalized SMS criteria were developed independently of the dry-weight AETs.

Table 4-3
Area 1A and 1B Source Sample Exceedances of Criteria
West Beach Investigation Data Evaluation Report

Sample ID					WEH-SED-1A-31-1-2	WEH-SED-1A-31-5-8	WEH-SED-1A-32-6-8	WEH-SED-1A-32-SURFACE	WEH-SED-1A-33-SURFACE	WEH-SED-1A-34-1-4	WEH-SED-1A-35-4-8	WEH-SED-1A-35-SURFACE	WEH-SED-1B-09-033-4	WEH-SED-1B-10-033-2	WEH-SED-1B-10-SURFACE
Sample Date					4/26/2006	4/26/2006	4/28/2006	4/28/2006	4/26/2006	4/26/2006	4/27/2006	4/27/2006	5/2/2006	5/2/2006	5/2/2006
Depth (ft)					1 - 2	5 - 8	6 - 8	0 - 0.33	0 - 0.33	1 - 4	4 - 8	0 - 0.33	0.33 - 4	0.33 - 2	0 - 0.33
Chemical Group	Analyte	Units	LAET	MTCA Soil CUL			Also see carbon-normalized results	Also see carbon-normalized results	Also see carbon-normalized results		Also see carbon-normalized results		Also see carbon-normalized results	Also see carbon-normalized results	Also see carbon-normalized results
PAH	2-Methylnaphthalene	mg/kg	0.67	320	0.83 J	0.30	1.9	0.038 J	2.9 J	5.8	0.0026 J	0.14 J	0.73	0.14 J	0.011 J
PAH	Acenaphthene	mg/kg	0.5	4,800	4.5	0.74	3.4 D	1.5	61 J	8.3	0.14 J	0.23	15	0.81	0.013 J
PAH	Acenaphthylene	mg/kg	1.3	--	0.0038 U	0.0063 J	0.015	0.17 U	100 U	1.8 U	0.018	0.0033 U	0.027 J	0.21 U	0.010 J
PAH	Anthracene	mg/kg	0.96	24,000	3.0	0.21	1.7	1.5	220	2.3	0.12 J	0.56	28	1.8	0.062 J
PAH	Benzo (a) anthracene	mg/kg	1.3	0.14	1.5	0.16 J	0.97	1.6	52 J	2.0	0.34	0.0057	6.2	2.5	0.17 J
PAH	Benzo (a) pyrene	mg/kg	1.6	0.14	0.50	0.059 J	0.22	0.77	24 J	0.62	0.21 J	0.015	2.6	0.91	0.13 J
PAH	Benzo (b) fluoranthene	mg/kg	--	0.14	0.90	0.098 J	0.38	1.2	56 J	1.2	0.47	0.011	3.6	1.5	0.21
PAH	Benzo (g,h,i) perylene	mg/kg	0.67	--	0.18 J	0.017 J	0.046 J	0.32	4.9 J	1.8 U	0.11 J	0.002 J	0.95	0.26	0.053 J
PAH	Benzo (k) fluoranthene	mg/kg	--	0.14	0.28	0.042 J	0.17 J	0.43	100 UJ	0.32	0.16 J	0.0037	1.2	0.54	0.060 J
PAH	Chrysene	mg/kg	1.4	0.14	1.6	0.18 J	1.0	1.7	68 J	1.9 J	0.64	0.21	6.5	2.7	0.22
PAH	Dibenzo (a,h) anthracene	mg/kg	0.23	0.14	0.038 J	0.19 U	0.011 J	0.073 J	100 U	0.057 J	0.027 J	0.0033 U	0.24	0.075 J	0.0084 UJ
PAH	Fluoranthene	mg/kg	1.7	3,200	11	1.0	6.8 D	7.7 D	280	14	0.64	0.52	35	8.1	0.52
PAH	Fluorene	mg/kg	0.54	3,200	5.1	0.83	3.9 D	0.84	83 J	5.6	0.10 J	0.33	16	1.7	0.014 J
PAH	Indeno (1,2,3-cd) pyrene	mg/kg	0.6	0.14	0.24	0.022 J	0.055 J	0.34	2.9 J	0.24	0.16 J	0.0027 J	1.0 J	0.30 J	0.053 J
PAH	Naphthalene	mg/kg	2.1	3,200	3.8	0.38	3.7	0.063 J	2.9 J	14	0.030	0.21	0.72	0.12 J	0.028 J
PAH	Phenanthrene	mg/kg	1.5	--	15	1.2	12 D	3.1 D	230	13	0.21	0.8	44	3.9	0.065 J
PAH	Pyrene	mg/kg	2.6	2,400	8.3	0.61	3.4 D	4.2 D	200	8.0	0.64	0.39	20	4.3	0.26
PAH	Total Benzofluoranthenes	mg/kg	3.2	--	1.2	0.14	0.55	1.6	56 J	1.5	0.62	0.0147	4.8	2.0	0.27
PAH	Total HPAH	mg/kg	12	--	23	2.2	13	18	688	28	3.4	1.1634	77	21	1.7
PAH	Total LPAH	mg/kg	5.2	--	36	3.2	25	7.9	577	43	0.62	2.13	104	8.3	0.19
PCP	Pentachlorophenol	mg/kg	0.4	8.3	0.38 U	0.37 U	0.0082 UJ	0.0065 UJ	190 U	0.35 U	0.0074 UJ	0.0017 J	0.0078 UJ	0.0083 UJ	0.0078 UJ
TPH-Dx	TPH-GC/Diesel Range Organics	mg/kg	--	2,000	280	150	240	150	280	2,900	64	8.4 U	2,200	340	25
TPH-Dx	TPH-GC/Motor Oil Range Organics	mg/kg	--	2,000	46 U	54 U	58 U	48 U	56 U	530 U	58 U	21 U	480 U	100 U	47 U

Dry weight result exceeds LAET
Dry weight result exceeds MTCA Soil CUL
Dry weight result exceeds both LAET and MTCA Soil CUL

Carbon-Normalized Results

Sample ID				WEH-SED-1A-32-6-8	WEH-SED-1A-32-SURFACE	WEH-SED-1A-33-SURFACE	WEH-SED-1A-35-4-8	WEH-SED-1B-09-0.33-4	WEH-SED-1B-10-0.33-2	WEH-SED-1B-10-SURFACE
Sample Date				4/28/2006	4/28/2006	4/26/2006	4/27/2006	5/2/2006	5/2/2006	5/2/2006
Depth (ft)				6 - 8	0 - 0.33	0 - 0.33	4 - 8	0.33 - 4	0.33 - 2	0 - 0.33
Chemical Group	Analyte	Units	SQS							
PAH	2-Methylnaphthalene	mg/kg	--	262	7.4 J	473 J	0.28 J	72	17 J	1.3 J
PAH	Acenaphthene	mg/kg	16	470 D	293	9,951 J	13 J	1,485	101	1.5 J
PAH	Acenaphthylene	mg/kg	66	2.1	33 U	16,313 U	1.7	2.7 J	26 U	1.2 J
PAH	Anthracene	mg/kg	220	235	293	35,889	11 J	2,772	224	7.4 J
PAH	Benzo (a) anthracene	mg/kg	110	134	313	8,483 J	32	614	311	20 J
PAH	Benzo (a) pyrene	mg/kg	99	30	159	3,915 J	20 J	287	101	15 J
PAH	Benzo (b) fluoranthene	mg/kg	--	52	234	9,135 J	45	356	186	25
PAH	Benzo (g,h,i) perylene	mg/kg	31	6.4 J	63	799 J	10 J	94	32	6.3 J
PAH	Benzo (k) fluoranthene	mg/kg	--	23 J	84	16,313 U	14 J	119	67	7.1 J
PAH	Chrysene	mg/kg	110	138	332	11,093 J	61	644	335	26
PAH	Dibenzo (a,h) anthracene	mg/kg	12	1.5 J	14 J	16,313 U	2.6 J	24	9.3 J	1.00 UJ
PAH	Fluoranthene	mg/kg	160	938 D	1,504 D	46,677	61	3,465	1,006	62
PAH	Fluorene	mg/kg	23	539 D	164	16,277 J	9.5 J	1,584	211	1.7 J
PAH	Indeno (1,2,3-cd) pyrene	mg/kg	34	7.6 J	56	473 J	15 J	99 J	37 J	6.3 J
PAH	Naphthalene	mg/kg	99	511	12 J	473 J	2.9	71	15 J	3.3 J
PAH	Phenanthrene	mg/kg	100	1,567 D	606 D	37,520	20	4,366	484	7.7 J
PAH	Pyrene	mg/kg	1,000	470 D	820 D	32,626	61	1,980	534	31
PAH	Total Benzofluoranthenes	mg/kg	230	76	318	9,135 J	59	475	253	32
PAH	Total HPAH	mg/kg	960	1,893	3,581	112,202	323	7,652	2,619	199
PAH	Total LPAH	mg/kg	370	3,414	1,368	94,111	59	10,373	1,961	23
PCP	Pentachlorophenol	mg/kg	360	1.1 UJ	1.3 UJ	30,995 U	0.70 UJ	0.77 UJ	1.0 UJ	0.90 UJ

Carbon-normalized result exceeds SQS

CUL = Cleanup Level
ft = feet
HPAH = high molecular weight polycyclic aromatic hydrocarbon
LAET = lowest apparent effects threshold
LPAH = low molecular weight polycyclic aromatic hydrocarbon
mg/kg = milligrams per kilogram
MTCA = Model Toxics Control Act
PAH = polycyclic aromatic hydrocarbon
PCP = pentachlorophenol
SQS = Sediment Quality Standards
TOC = total organic carbon
TPH = total petroleum hydrocarbons

D Dilution.
J The analyte was positively identified.
U The analyte was not detected at or above the reported value.
UJ The analyte was not detected at or above the reported value; the quantitation is an estimation.

Table 4-4
Area 1A and 1B Step-Out Sample Exceedances of Criteria
West Beach Investigation Data Evaluation Report

Sample ID				WEH-SED-1A-07-SURFACE	WEH-SED-1A-09-0.33-4	WEH-SED-1A-26-4-9	WEH-SED-1A-28-0.33-4	WEH-SED-1B-05-0.33-4
Sample Date				4/27/2006	4/27/2006	4 - 9	4/27/2006	5/03/2006
Depth (ft)				0 - 0.33	0.33 - 4	4/28/2006	0.33 - 4	0.33 - 4
Chemical Group	Analyte	LAET	MTCA Soil CUL			Also see carbon normalized results		
PAH	2-Methylnaphthalene	0.67	320	0.079 J	0.014	2.5	0.0035 U	0.017
PAH	Acenaphthene	0.5	4,800	0.51	0.64 J	7.9 D	0.0035 U	0.11 J
PAH	Acenaphthylene	1.3	–	0.018	0.18 U	0.0037 U	0.0035 U	0.0050
PAH	Anthracene	0.96	24,000	0.58	0.86	5.5 D	0.0045	0.0038 J
PAH	Benzo (a) anthracene	1.3	0.14	1.2	0.52	2.3	0.30	0.13 J
PAH	Benzo (a) pyrene	1.6	0.14	0.76	0.26	0.63	0.012	0.032 J
PAH	Benzo (b) fluoranthene	–	0.14	1.5 J	0.48	1.1	0.021	0.073 J
PAH	Benzo (g,h,i) perylene	0.67	–	0.35	0.13 J	0.14 J	0.0021 J	0.036 J
PAH	Benzo (k) fluoranthene	–	0.14	0.41	0.15 J	0.39	0.0066	0.032 J
PAH	Chrysene	1.4	0.14	1.9 J	0.62	2.3	0.18 J	0.18 J
PAH	Dibenzo (a,h) anthracene	0.23	0.14	0.080 J	0.023 J	0.033 J	0.0035 U	0.0069 J
PAH	Fluoranthene	1.7	3,200	2.4 J	2.1 J	15 D	0.0045	0.80
PAH	Fluorene	0.54	3,200	0.47	0.26	11 D	0.0035 U	0.071 J
PAH	Indeno (1,2,3-cd) pyrene	0.6	0.14	0.50	0.17 J	0.18 J	0.0028 J	0.057 J
PAH	Naphthalene	2.1	3,200	0.086 J	0.027 J	3.5	0.0035	0.074 J
PAH	Phenanthrene	1.5	–	0.98	1.4 J	29 D	0.0031 J	0.057 J
PAH	Pyrene	2.6	2,400	2.4 J	1.5 J	7.7 D	0.0059	0.48
PAH	Total Benzofluoranthenes	3.2	–	1.9	0.63	1.5	0.028	0.11
PAH	Total HPAH	12	–	12	6.0	30	0.53	1.8
PAH	Total LPAH	5.2	–	2.6	3.2	57	0.011	0.32
PCP	Pentachlorophenol	0.4	8.3	0.0069 UJ	0.0070 UJ	0.0073 UJ	0.0035 J	0.0077 U
TPH-Dx	TPH-GC/Diesel Range Organics	–	2,000	9.5 U	33	480	9.4 U	29
TPH-Dx	TPH-GC/Motor Oil Range Organics	–	2,000	24 U	48 U	100 U	23 U	52 U

Dry weight result exceeds LAET
Dry weight result exceeds MTCA Soil CUL
Dry weight result exceeds both LAET and MTCA Soil CUL

Carbon-Normalized Results

Sample ID				WEH-SED-1A-26-4-9
Sample Date				4/28/2006
Depth (ft)				4 - 9
Chemical Group	Analyte	Units	SQS	
PAH	2-Methylnaphthalene	mg/kg	–	287
PAH	Acenaphthene	mg/kg	16	908 D
PAH	Acenaphthylene	mg/kg	66	0.43 U
PAH	Anthracene	mg/kg	220	632 D
PAH	Benzo (a) anthracene	mg/kg	110	264
PAH	Benzo (a) pyrene	mg/kg	99	72
PAH	Benzo (b) fluoranthene	mg/kg	–	126
PAH	Benzo (g,h,i) perylene	mg/kg	31	16 J
PAH	Benzo (k) fluoranthene	mg/kg	–	45
PAH	Chrysene	mg/kg	110	264
PAH	Dibenzo (a,h) anthracene	mg/kg	12	3.8 J
PAH	Fluoranthene	mg/kg	160	1,724 D
PAH	Fluorene	mg/kg	23	1,264 D
PAH	Indeno (1,2,3-cd) pyrene	mg/kg	34	21 J
PAH	Naphthalene	mg/kg	99	402
PAH	Phenanthrene	mg/kg	100	3,333 D
PAH	Pyrene	mg/kg	1,000	885 D
PAH	Total Benzofluoranthenes	mg/kg	230	171
PAH	Total HPAH	mg/kg	960	3,422
PAH	Total LPAH	mg/kg	370	6,540
PCP	Pentachlorophenol	mg/kg	360	0.84 UJ

Carbon-normalized result exceeds SQS

CUL = Cleanup Level
ft = feet
HPAH = high molecular weight polycyclic aromatic hydrocarbon
LAET = lowest apparent effects threshold
LPAH = low molecular weight polycyclic aromatic hydrocarbon
mg/kg = milligrams per kilogram
MTCA = Model Toxics Control Act
PAH = polycyclic aromatic hydrocarbon
PCP = pentachlorophenol
SQS = Sediment Quality Standards
TOC = total organic carbon
TPH = total petroleum hydrocarbons

D Dilution.
J The analyte was positively identified
U The analyte was not detected at or above the reported value.
UJ The analyte was not detected at or above the reported value; the quantitation is an estimation

Table 4-5
Area 1A and 1B Vertical Extent Sample Exceedances of Criteria
West Beach Investigation Data Evaluation Report

Sample ID				WEH-SED-1A-33-8-11		WEH-SED-1A-34-6-10	
Sample Date				4/26/2006		4/26/2006	
Depth (ft)				8 - 11		6 - 10	
Chemical Group	Analyte	LAET	MTCA Soil CUL				
PAH	2-Methylnaphthalene	0.67	320	0.072	J	1.7	J
PAH	Acenaphthene	0.5	4,800	0.69		2.4	
PAH	Acenaphthylene	1.3	–	0.010	J	0.0039	UJ
PAH	Anthracene	0.96	24,000	0.63		3.6	
PAH	Benzo (a) anthracene	1.3	0.14	0.57		0.69	
PAH	Benzo (a) pyrene	1.6	0.14	0.21		0.16	J
PAH	Benzo (b) fluoranthene	–	0.14	0.41		0.30	
PAH	Benzo (g,h,i) perylene	0.67	–	0.074	J	0.035	J
PAH	Benzo (k) fluoranthene	–	0.14	0.089	J	0.075	J
PAH	Chrysene	1.4	0.14	0.46		1.1	J
PAH	Dibenzo (a,h) anthracene	0.23	0.14	0.025	J	0.017	J
PAH	Fluoranthene	1.7	3,200	1.9	J	3.0	
PAH	Fluorene	0.54	3,200	0.89	J	2.3	
PAH	Indeno (1,2,3-cd) pyrene	0.6	0.14	0.11	J	0.050	J
PAH	Naphthalene	2.1	3,200	0.099	J	4.4	
PAH	Phenanthrene	1.5	–	2.7	J	5.8	
PAH	Pyrene	2.6	2,400	1.6	J	2.4	J
PAH	Total Benzofluoranthenes	3.2	–	0.50		0.38	
PAH	Total HPAH	12	–	5.4		7.8	
PAH	Total LPAH	5.2	–	5.0		19	
PCP	Pentachlorophenol	0.4	8.3	0.38	U	0.39	U
TPH-Dx	TPH-GC/Diesel Range Organics	–	2,000	77		150	
TPH-Dx	TPH-GC/Motor Oil Range Organics	–	2,000	48	U	56	U

Dry weight result exceeds LAET
Dry weight result exceeds MTCA Soil CUL
Dry weight result exceeds both LAET and MTCA Soil CUL

Note: Carbon-normalized results not applicable, all TOC concentrations < 0.5%.

CUL = Cleanup Level
ft = feet
HPAH = high molecular weight polycyclic aromatic hydrocarbon
LAET = lowest apparent effects threshold
LPAH = low molecular weight polycyclic aromatic hydrocarbon
mg/kg = milligrams per kilogram
MTCA = Model Toxics Control Act
PAH = polycyclic aromatic hydrocarbon
PCP = pentachlorophenol
SQS = Sediment Quality Standards
TOC = total organic carbon
TPH = total petroleum hydrocarbons

D Dilution.
J The analyte was positively identified.
U The analyte was not detected at or above the reported value.
UJ The analyte was not detected at or above the reported value; the quantitation is an estimation.

Table 4-6
Subarea 2-1 Sample Exceedances of Criteria
West Beach Investigation Data Evaluation Report

Sample ID				WEH-SED-215-SURFACE		WEH-SED-216-8-12		WEH-SED-219-2-5	
Sample Date				5/02/2006		4/24/2006		4/28/2006	
Depth (ft)				0 - 0.33		8 - 12		2 - 5	
Chemical Group	Analyte	LAET	MTCA Soil CUL						
PAH	2-Methylnaphthalene	0.67	320	0.19	J	47		3.9	
PAH	Acenaphthene	0.5	4,800	0.047	J	1.6		12	D
PAH	Acenaphthylene	1.3	–	0.024	J	0.054		0.0050	U
PAH	Anthracene	0.96	24,000	0.83		37		11	D
PAH	Benzo (a) anthracene	1.3	0.14	0.46		17		6.9	D
PAH	Benzo (a) pyrene	1.6	0.14	0.36		1.0		3.6	
PAH	Benzo (b) fluoranthene	–	0.14	0.54		1.9		5.5	D
PAH	Benzo (g,h,i) perylene	0.67	–	0.15	J	0.26		1.4	
PAH	Benzo (k) fluoranthene	–	0.14	0.16	J	0.57		1.5	
PAH	Chrysene	1.4	0.14	0.60		23		8.3	D
PAH	Dibenzo (a,h) anthracene	0.23	0.14	0.036	J	0.24		0.34	
PAH	Fluoranthene	1.7	3,200	1.4		12		34	D
PAH	Fluorene	0.54	3,200	0.11	J	1.7	J	14	D
PAH	Indeno (1,2,3-cd) pyrene	0.6	0.14	0.16	J	0.35		1.6	
PAH	Naphthalene	2.1	3,200	0.20	J	37		2.8	
PAH	Phenanthrene	1.5	–	0.20		14		40	D
PAH	Pyrene	2.6	2,400	1.1		6.6	J	20	D
PAH	Total Benzofluoranthenes	3.2	–	0.70		2.5		7.0	
PAH	Total HPAH	12	–	5.0		63		83	
PAH	Total LPAH	5.2	–	1.4		91		80	
PCP	Pentachlorophenol	0.4	8.3	0.0068	UJ	0.37	U	0.010	UJ
TPH-Dx	TPH-GC/Diesel Range Organics	–	2,000	8.8	U	320		7,700	
TPH-Dx	TPH-GC/Motor Oil Range Organics	–	2,000	22	U	52	U	1,900	U

Dry weight result exceeds LAET
Dry weight result exceeds MTCA Soil CUL
Dry weight result exceeds both LAET and MTCA Soil CUL

Note: Carbon-normalized results not applicable; no carbon-normalized exceedances

CUL = Cleanup Level
ft = feet
HPAH = high molecular weight polycyclic aromatic hydrocarbon
LAET = lowest apparent effects threshold
LPAH = low molecular weight polycyclic aromatic hydrocarbon
mg/kg = milligrams per kilogram
MTCA = Model Toxics Control Act
PAH = polycyclic aromatic hydrocarbon
PCP = pentachlorophenol
SQS = Sediment Quality Standards
TOC = total organic carbon
TPH = total petroleum hydrocarbons

D Dilution.
J The analyte was positively identified.
U The analyte was not detected at or above the reported value.
UJ The analyte was not detected at or above the reported value; the quantitation is an estimation.

Table 4-7
Subarea 2-2 Sample Exceedances of Criteria
West Beach Investigation Data Evaluation Report

Sample ID				WEH-SED-224-1-3		WEH-SED-227-0.33-1	
Sample Date				5/03/2006		4/24/2006	
Depth (ft)				1 - 3		0.33 - 1	
Chemical Group	**Analyte**	**LAET**	**MTCA Soil CUL**				
PAH	2-Methylnaphthalene	0.67	320	0.27		0.0062	
PAH	Acenaphthene	0.5	4,800	2.8	D	0.24	J
PAH	Acenaphthylene	1.3	–	0.0035	U	0.0044	
PAH	Anthracene	0.96	24,000	1.3		0.25	
PAH	Benzo (a) anthracene	1.3	0.14	0.81		0.18	
PAH	Benzo (a) pyrene	1.6	0.14	0.21		0.11	J
PAH	Benzo (b) fluoranthene	–	0.14	0.32		0.18	J
PAH	Benzo (g,h,i) perylene	0.67	–	0.092	J	0.042	J
PAH	Benzo (k) fluoranthene	–	0.14	0.25		0.091	J
PAH	Chrysene	1.4	0.14	0.76		0.25	
PAH	Dibenzo (a,h) anthracene	0.23	0.14	0.020	J	0.0095	J
PAH	Fluoranthene	1.7	3,200	4.8	D	0.66	J
PAH	Fluorene	0.54	3,200	3.6	D	0.040	J
PAH	Indeno (1,2,3-cd) pyrene	0.6	0.14	0.18	J	0.044	J
PAH	Naphthalene	2.1	3,200	0.97		0.021	
PAH	Phenanthrene	1.5	–	9.0	D	0.15	J
PAH	Pyrene	2.6	2,400	2.5	D	0.39	J
PAH	Total Benzofluoranthenes	3.2	–	0.57		0.27	
PAH	Total HPAH	12	–	9.9		2.0	
PAH	Total LPAH	5.2	–	18		0.71	
PCP	Pentachlorophenol	0.4	8.3	0.0070	U	0.36	U
TPH-Dx	TPH-GC/Diesel Range Organics	–	2,000	99		38	
TPH-Dx	TPH-GC/Motor Oil Range Organics	–	2,000	46	U	50	U

Dry weight result exceeds LAET

Dry weight result exceeds MTCA Soil CUL

Dry weight result exceeds both LAET and MTCA Soil CUL

Note: Carbon-normalized results not applicable; all TOC concentrations < 0.5%.

CUL = Cleanup Level
ft = feet
HPAH = high molecular weight polycyclic aromatic hydrocarbon
LAET = lowest apparent effects threshold
LPAH = low molecular weight polycyclic aromatic hydrocarbon
mg/kg = milligrams per kilogram
MTCA = Model Toxics Control Act
PAH = polycyclic aromatic hydrocarbon
PCP = pentachlorophenol
SQS = Sediment Quality Standards
TOC = total organic carbon
TPH = total petroleum hydrocarbons

D Dilution.
J The analyte was positively identified.
U The analyte was not detected at or above the reported value.
UJ The analyte was not detected at or above the reported value; the quantitation is an estimation.

Table 4-8
Subarea 2-3 Sample Exceedances of Criteria
West Beach Investigation Data Evaluation Report

Sample ID				WEH-SED-233-SURFACE	WEH-SED-234-0.33-4	WEH-SED-235-0.33-4	WEH-SED-237-1-3	WEH-SED-238-0.33-4	WEH-SED-239-0.33-4
Sample Date				5/02/2006	5/01/2006	4/28/2006	5/03/2006	4/28/2006	5/01/2006
Depth (ft)				0 - 0.33	0.33 - 4	0.33 - 4	1 - 3	0.33 - 4	0.33 - 4
Chemical Group	Analyte	LAET	MTCA Soil CUL	Also see carbon normalized results	Also see carbon normalized results	Also see carbon normalized results	Also see carbon normalized results	Also see carbon normalized results	Also see carbon normalized results
PAH	2-Methylnaphthalene	0.67	320	0.023 J	0.018	0.032	0.024 J	0.0082	0.14 J
PAH	Acenaphthene	0.5	4,800	0.030 J	0.22	1.4	1.2	1.7	4.4 J
PAH	Acenaphthylene	1.3	–	0.0096 J	0.010	0.20 U	0.011 J	0.0041 U	0.23 U
PAH	Anthracene	0.96	24,000	0.090 J	0.33	1.5	0.46	0.0041 U	3.4 J
PAH	Benzo (a) anthracene	1.3	0.14	0.19 J	0.28	2.9 D	0.57	0.80	2.3
PAH	Benzo (a) pyrene	1.6	0.14	0.14 J	0.13 J	0.85	0.19 J	0.14 J	0.55
PAH	Benzo (b) fluoranthene	–	0.14	0.37	0.25	1.6	0.29	0.30	1.0
PAH	Benzo (g,h,i) perylene	0.67	–	0.068 J	0.048 J	0.18 J	0.073 J	0.016 J	0.13 J
PAH	Benzo (k) fluoranthene	–	0.14	0.086 J	0.092 J	0.51	0.20	0.079 J	0.35
PAH	Chrysene	1.4	0.14	0.37	0.29	2.6	0.57	0.65	2.2
PAH	Dibenzo (a,h) anthracene	0.23	0.14	0.015 J	0.0096 J	0.060 J	0.021 J	0.0057	0.034 J
PAH	Fluoranthene	1.7	3,200	0.54	1.2	14 D	3.2 J	5.5 J	8.8 J
PAH	Fluorene	0.54	3,200	0.044 J	0.33	0.46	0.50	0.19 J	2.4
PAH	Indeno (1,2,3-cd) pyrene	0.6	0.14	0.072 J	0.051 J	0.23	0.14 J	0.049 J	0.16 J
PAH	Naphthalene	2.1	3,200	0.15 J	0.027	0.043 U	0.078 J	0.021	0.32
PAH	Phenanthrene	1.5	–	0.17 J	0.88	1.4	1.0	0.19 J	3.1 J
PAH	Pyrene	2.6	2,400	0.76	1.1	9.9 D	1.9	3.2 J	6.0 J
PAH	Total Benzofluoranthenes	3.2	–	0.46	0.34	2.1	0.49	0.38	1.4
PAH	Total HPAH	12	–	2.6	3.5	33	7.2	11	22
PAH	Total LPAH	5.2	–	0.49	1.8	4.8	3.2	2.1	14
PCP	Pentachlorophenol	0.4	8.3	0.0024 J	0.0079 UJ	0.0079 UJ	0.0066 U	0.0081 UJ	0.0089 UJ
TPH-Dx	TPH-GC/Diesel Range Organics	–	2,000	55	63	100	140	160	550
TPH-Dx	TPH-GC/Motor Oil Range Organics	–	2,000	90	54 U	56 U	48 U	58 U	112 U

Dry weight result exceeds LAET
Dry weight result exceeds MTCA Soil CUL
Dry weight result exceeds both LAET and MTCA Soil CUL

Carbon-Normalized Results

Sample ID				WEH-SED-233-SURFACE	WEH-SED-234-0.33-4	WEH-SED-235-0.33-4	WEH-SED-237-1-3	WEH-SED-238-0.33-4	WEH-SED-239-0.33-4
Sample Date				5/02/2006	5/01/2006	4/28/2006	5/03/2006	4/28/2006	5/01/2006
Depth (ft)				0 - 0.33	0.33 - 4	0.33 - 4	1 - 3	0.33 - 4	0.33 - 4
Chemical Group	Analyte	Units	SQS						
PAH	2-Methylnaphthalene	mg/kg	–	1.1 J	2.1	2.3	1.3 J	0.84	11 J
PAH	Acenaphthene	mg/kg	16	1.4 J	25	101	67	173	361 J
PAH	Acenaphthylene	mg/kg	66	0.45 J	1.2	14 U	0.61 J	0.42 U	19 U
PAH	Anthracene	mg/kg	220	4.3 J	38	108	26	0.42 U	279 J
PAH	Benzo (a) anthracene	mg/kg	110	9.0 J	32	208 D	32	82	189
PAH	Benzo (a) pyrene	mg/kg	99	6.6 J	15 J	61	11 J	14 J	45
PAH	Benzo (b) fluoranthene	mg/kg	–	18	29	115	16	31	82
PAH	Benzo (g,h,i) perylene	mg/kg	31	3.2 J	5.5 J	13 J	4.1 J	1.6 J	11 J
PAH	Benzo (k) fluoranthene	mg/kg	–	4.1 J	11 J	37	11	8.1 J	29
PAH	Chrysene	mg/kg	110	18	33	187	32	66	180
PAH	Dibenzo (a,h) anthracene	mg/kg	12	0.71 J	1.1 J	4.3 J	1.2 J	0.58	2.8 J
PAH	Fluoranthene	mg/kg	160	26	139	1,006 D	178 J	561 J	721 J
PAH	Fluorene	mg/kg	23	2.1 J	38	33	28	19 J	197
PAH	Indeno (1,2,3-cd) pyrene	mg/kg	34	3.4 J	5.9 J	17	7.8 J	5.0 J	13 J
PAH	Naphthalene	mg/kg	99	7.1 J	3.1	3.1 U	4.3 J	2.1	26
PAH	Phenanthrene	mg/kg	100	8.1 J	102	101	56	19 J	254 J
PAH	Pyrene	mg/kg	1000	36	127	711 D	106	327 J	492 J
PAH	Total Benzofluoranthenes	mg/kg	230	22	39	152	27	39	111
PAH	Total HPAH	mg/kg	960	124	398	2,358	397	1,098	1,764
PAH	Total LPAH	mg/kg	370	23	208	342	181	214	1,116
PCP	Pentachlorophenol	mg/kg	360	0.11 J	0.91 UJ	0.57 UJ	0.37 U	0.83 UJ	0.73 UJ

Carbon-normalized result exceeds SQS

CUL = Cleanup Level
ft = feet
HPAH = high molecular weight polycyclic aromatic hydrocarbon
LAET = lowest apparent effects threshold
LPAH = low molecular weight polycyclic aromatic hydrocarbon
mg/kg = milligrams per kilogram
MTCA = Model Toxics Control Act
PAH = polycyclic aromatic hydrocarbon
PCP = pentachlorophenol
SQS = Sediment Quality Standards
TOC = total organic carbon
TPH = total petroleum hydrocarbons

D Dilution.
J The analyte was positively identified
U The analyte was not detected at or above the reported value.
UJ The analyte was not detected at or above the reported value; the quantitation is an estimation

Table 4-9
Subarea 2-4 Sample Exceedances of Criteria
West Beach Investigation Data Evaluation Report

Sample ID				WEH-SED-241-0.33-4		WEH-SED-246-SURFACE		WEH-SED-248-0.33-4	
Sample Date				5/01/2006		5/02/2006		4/28/2006	
Depth (ft)				0.33 - 4		0 - 0.33		0.33 - 4	
Chemical Group	Analyte	LAET	MTCA Soil CUL	Also see carbon normalized results		Also see carbon normalized results		Also see carbon normalized results	
PAH	2-Methylnaphthalene	0.67	320	0.0042		0.0029	J	0.010	
PAH	Acenaphthene	0.5	4,800	0.0058		0.0033	J	0.010	J
PAH	Acenaphthylene	1.3	–	0.0042		0.0059		0.0025	J
PAH	Anthracene	0.96	24,000	0.015	J	0.038	J	0.27	
PAH	Benzo (a) anthracene	1.3	0.14	0.12	J	0.15	J	0.25	
PAH	Benzo (a) pyrene	1.6	0.14	0.078	J	0.091	J	0.10	J
PAH	Benzo (b) fluoranthene	–	0.14	0.15	J	0.18	J	0.31	
PAH	Benzo (g,h,i) perylene	0.67	–	0.041	J	0.034	J	0.038	J
PAH	Benzo (k) fluoranthene	–	0.14	0.053	J	0.067	J	0.094	J
PAH	Chrysene	1.4	0.14	0.18	J	0.24		0.42	
PAH	Dibenzo (a,h) anthracene	0.23	0.14	0.20	U	0.0021	J	0.0050	J
PAH	Fluoranthene	1.7	3,200	0.46		0.16	J	1.1	
PAH	Fluorene	0.54	3,200	0.0092		0.0088		0.064	J
PAH	Indeno (1,2,3-cd) pyrene	0.6	0.14	0.047	J	0.042	J	0.058	J
PAH	Naphthalene	2.1	3,200	0.015		0.011		0.0083	
PAH	Phenanthrene	1.5	–	0.068	J	0.070	J	0.12	J
PAH	Pyrene	2.6	2,400	0.32		0.17	J	1.4	
PAH	Total Benzofluoranthenes	3.2	–	0.20		0.25		0.40	
PAH	Total HPAH	12	–	1.4		1.1		3.8	
PAH	Total LPAH	5.2	–	0.12		0.14		0.47	
PCP	Pentachlorophenol	0.4	8.3	0.0076	UJ	0.0083	UJ	0.0083	UJ
TPH-Dx	TPH-GC/Diesel Range Organics	–	2,000	23	U	22	U	43	
TPH-Dx	TPH-GC/Motor Oil Range Organics	–	2,000	58	U	54	U	58	U

Dry weight result exceeds LAET
Dry weight result exceeds MTCA Soil CUL
Dry weight result exceeds both LAET and MTCA Soil CUL

Carbon-Normalized Results

Sample ID				WEH-SED-241-0.33-4		WEH-SED-246-SURFACE		WEH-SED-248-0.33-4	
Sample Date				5/01/2006		5/02/2006		4/28/2006	
Depth (ft)				0.33 - 4		0 - 0.33		0.33 - 4	
Chemical Group	Analyte	Units	SQS						
PAH	2-Methylnaphthalene	mg/kg	–	0.20		0.37	J	0.53	
PAH	Acenaphthene	mg/kg	16	0.27		0.42	J	0.53	J
PAH	Acenaphthylene	mg/kg	66	0.20		0.75		0.13	J
PAH	Anthracene	mg/kg	220	0.70	J	4.8	J	14	
PAH	Benzo (a) anthracene	mg/kg	110	5.6	J	19	J	13	
PAH	Benzo (a) pyrene	mg/kg	99	3.7	J	12	J	5.3	J
PAH	Benzo (b) fluoranthene	mg/kg	–	7.0	J	23	J	16	
PAH	Benzo (g,h,i) perylene	mg/kg	31	1.9	J	4.3	J	2.0	J
PAH	Benzo (k) fluoranthene	mg/kg	–	2.5	J	8.5	J	5.0	J
PAH	Chrysene	mg/kg	110	8.5	J	30		22	
PAH	Dibenzo (a,h) anthracene	mg/kg	12	9.4	U	0.27	J	0.27	J
PAH	Fluoranthene	mg/kg	160	22		20	J	59	
PAH	Fluorene	mg/kg	23	0.43		1.1		3.4	J
PAH	Indeno (1,2,3-cd) pyrene	mg/kg	34	2.2	J	5.3	J	3.1	J
PAH	Naphthalene	mg/kg	99	0.70		1.4		0.44	
PAH	Phenanthrene	mg/kg	100	3.2	J	8.9	J	6.4	J
PAH	Pyrene	mg/kg	1000	15		22	J	74	
PAH	Total Benzofluoranthenes	mg/kg	230	9.5		31		21	
PAH	Total HPAH	mg/kg	960	68		144		201	
PAH	Total LPAH	mg/kg	370	5.5		17		25	
PCP	Pentachlorophenol	mg/kg	360	0.36	UJ	1.1	UJ	0.44	UJ

Carbon-normalized result exceeds SQS

CUL = Cleanup Level
ft = feet
HPAH = high molecular weight polycyclic aromatic hydrocarbon
LAET = lowest apparent effects threshold
LPAH = low molecular weight polycyclic aromatic hydrocarbon
mg/kg = milligrams per kilogram
MTCA = Model Toxics Control Act
PAH = polycyclic aromatic hydrocarbon
PCP = pentachlorophenol
SQS = Sediment Quality Standards
TOC = total organic carbon
TPH = total petroleum hydrocarbons

D Dilution.
J The analyte was positively identified
U The analyte was not detected at or above the reported value.
UJ The analyte was not detected at or above the reported value; the quantitation is an estimation